User's Manual

DLM5034, DLM5038, DLM5054, DLM5058 Mixed Signal Oscilloscope Getting Started Guide

YOKOGAWA
Yokogawa Test & Measurement Corporation

IM DLM5058-03EN
7th Edition

User Registration

YOKOGAWA provides registered users with useful information and services. Please allow us to serve you best by completing the user registration form accessible from our website.

https://tmi.yokogawa.com/support/

Contact Us

If you want to resolve a technical support issue or need to contact YOKOGAWA, please fill out the inquiry form on our website.

https://tmi.yokogawa.com/contact/

Thank you for purchasing the DLM5034, DLM5038, DLM5054, or DLM5058 Series Mixed Signal Oscilloscope.
This getting started guide primarily explains the handling precautions and basic operations of this instrument. To ensure correct use, please read this manual thoroughly before operation.
Keep this manual in a safe place for quick reference in the event that a question arises. The manuals for this instrument are listed on the next page. Please read all manuals.

Contact information of Yokogawa offices worldwide is provided on the following sheet.

Document No.	Description
PIM 113-01Z2	List of worldwide contacts

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functionality. Refer to our website to view our latest manuals.
- The figures given in this manual may differ from those that actually appear on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
- Copying or reproducing all or any part of the contents of this manual without the permission of YOKOGAWA is strictly prohibited.
- The TCP/IP software of this product and the documents concerning it have been developed/created by YOKOGAWA based on the BSD Networking Software, Release 1 that has been licensed from the Regents of the University of California.

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- In this manual, the ® and TM symbols do not accompany their respective registered trademark or trademark names.
- Other company and product names are registered trademarks or trademarks of their respective holders.

Updating the Firmware

It is recommended to update the firmware to the latest version to improve the features and usability of this instrument.
Download the latest firmware from the YOKOGAWA website, or contact your nearest YOKOGAWA dealer for details.

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Revisions

- September 2020 1st Edition
- March 2021 2nd Edition
- April 2021 3rd Edition
- January 2022 4th Edition
- April 2023 5th Edition
- June 2025 6th Edition
- October 2025 7th Edition

Manuals

The following manuals, including this one, are provided as manuals for this instrument. Please read all manuals.

Manuals Included with the Product

Manual Title	Manual No.	Description
DLM5034, DLM5038, DLM5054, DLM5058 Mixed Signal Oscilloscope Getting Started Guide	IM DLM5058-03EN	This document. This guide explains the handling precautions, common operations, troubleshooting measures, and specifications of this instrument.
DLM5034, DLM5038, DLM5054, DLM5058 Mixed Signal Oscilloscope Operation Guide	IM DLM5058-04EN	Explains the basic operations of this instrument. Operations are described in steps from “Preparation” to “Displaying Waveforms,” “Measuring Waveforms,” and “Saving Screen Captures.”
DLM5034, DLM5038, DLM5054, DLM5058 Mixed Signal Oscilloscope Request to Download Manuals	IM DLM5058-73Z2	Describes the manuals provided on the website.
DLM5034, DLM5038, DLM5054, DLM5058 Mixed Signal Oscilloscope	IM DLM5058-92Z1	Document for China
Safety Instruction Manual	IM 00C01C01-01Z1	Safety manual (European languages)

Manuals Provided on the Website

Download the following manuals from the YOKOGAWA website.

Manual Title	Manual No.	Description
DLM5034, DLM5038, DLM5054, DLM5058 Mixed Signal Oscilloscope Features Guide	IM DLM5058-01EN	This manual explains all the instrument’s features other than the communication interface features.
DLM5034, DLM5038, DLM5054, DLM5058 Mixed Signal Oscilloscope User’s Manual	IM DLM5058-02EN	The manual explains how to operate this instrument.
DLM5034, DLM5038, DLM5054, DLM5058 Mixed Signal Oscilloscope Communication Interface User’s Manual	IM DLM5058-17EN	The manual explains the functions of this instrument’s communication interface, how to configure it, and the commands used to control this instrument from a PC through the interface.

For details on downloading manuals, see Request to Download Manuals (IM DLM5058-73Z2). To view the PDF data, you need Adobe Acrobat Reader or a software application that can open PDF data.

The “EN”, “Z1”, and “Z2” in the manual numbers are the language codes.
Refer to the “Optional Accessories (Sold Separately)” about the accessory’s manual number.

Online Help

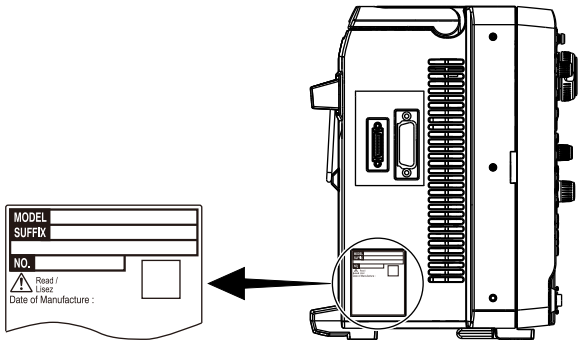
The content similar to the *Features Guide*, IM DLM5058-01EN, is included in this instrument as a help file (some the content may be omitted). For instructions on how to use the help file, see section 3.10.

Checking the Contents of the Package

Unpack the box, and check the following before operating the instrument. If the wrong items have been delivered, if items are missing, or if there is a problem with the appearance of the items, contact your nearest YOKOGAWA dealer.

DLM5034, DLM5038, DLM5054, or DLM5058

Check that the product that you received is what you ordered by referring to the model name and suffix code given on the name plate on the left side panel.



Model	Suffix Code[1]		Specifications
DLM5034			DLM5034 Mixed Signal Oscilloscope 4 ch analog + 16-bit logic, 350 MHz, 12.5 M/50 M/125 Mpoints
DLM5038			DLM5038 Mixed Signal Oscilloscope 8 ch analog + 16-bit logic, 350 MHz, 12.5 M/50 M/125 Mpoints
DLM5054			DLM5054 Mixed Signal Oscilloscope 4 ch analog + 16-bit logic, 500 MHz, 12.5 M/50 M/125 Mpoints
DLM5058			DLM5058 Mixed Signal Oscilloscope 8 ch analog + 16-bit logic, 500 MHz, 12.5 M/50 M/125 Mpoints
Power cord[2]	-D		UL/CSA standard, rated voltage: 125 V
	-F		VDE standard, Korean standard, rated voltage: 250 V
	-R		Australian standard, rated voltage: 250 V
	-Q		BS standard, rated voltage: 250 V
	-H		Chinese standard, rated voltage: 250 V
	-N		Brazilian standard, rated voltage: 250 V
	-T		Taiwanese standard, rated voltage: 125 V
	-B		Indian standard, rated voltage: 250 V
	-U		IEC plug Type B, rated voltage: 250 V
	-Y		No power cord[3]
Language (One option can be selected for the factory default message language and panel sheet language.)		-HJ	Japanese
		-HE	English
		-HC	Chinese
		-HG	German
		-HF	French
		-HK	Korean
		-HL	Italian
		-HS	Spanish

1 For products whose suffix code contains “Z,” an exclusive manual may be included. Please read it along with the standard manual.

2 Make sure that the attached power cord meets the designated standards of the country and area that you are using it in.

3 Prepare a power cord that complies with the standard specified by the country or region that the instrument will be used in.

Model	Suffix Code[1]	Specifications
Options	/L32	Logic 16-bit expansion (32 bits total)
	/B5	Built-in printer
	/M1S	Memory expansion 25 M^2/125 M^3/250 M^4 points (4ch model only)
	/M2S	Memory expansion 50 M^2/250 M^3/500 M^4 points (4ch model only)
	/M1	Memory expansion 25 M^2/125 M^3/250 M^4 points (8ch model only)
	/M2	Memory expansion 50 M^2/250 M^3/500 M^4 points (8ch model only)
	/P4	Probe power terminal (4 terminals) (4ch model only)[5]
	/P8	Probe power terminal (8 terminals) (8ch model only)[5]
	/C1	GP-IB interface
	/C8	Internal storage
	/SYN	Synchronous operation
	/G02	User-defined computation
	/G03	Power supply analysis feature
	/F01	UART + I^2C + SPI trigger and analysis
	/F02	CAN + CAN FD + LIN trigger and analysis
	/F03	FlexRay trigger and analysis
	/F04	SENT trigger and analysis
	/F05	CXPI trigger and analysis
	/F06	PSI5 trigger and analysis
	/E1	Four extra 701937 passive probes in addition to the four standard 701937 passive probes (8ch model only)
	/E2	Four 701949 miniature passive probes instead of the four standard 701937 passive probes
	/E3	Eight 701949 miniature passive probes instead of the four standard 701937 passive probes (8ch model only)

1 For products whose suffix code contains “Z,” an exclusive manual may be included. Please read it along with the standard manual.
2 Maximum record length for which repetitive acquisitions are possible.
3 Maximum record length for which a single acquisition is possible when all channels are used.
4 Maximum record length for which a single acquisition is possible when only odd channels are used.
5 Option /P8 or /P4 is necessary to use a probe that is not compatible with the probe interface and that requires a power supply. For detailed specifications, see sections 2.4 and 6.9.

Note

The SUFFIX (suffix code) inscribed in the name plate on the instrument’s case indicates the installed options at the time of factory shipment. After you add options through additional option licenses,* check the options on the instrument overview screen.

* For details on additional option licenses, see “Overview (Overview)” in chapter 23, “Other Features” of the *Features Guide*, IM DLM5058-01EN.

NO. (Instrument Number)

When contacting the dealer from which you purchased the instrument, please give them the instrument number.

Standard Accessories

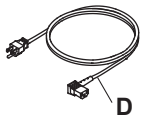
The standard accessories below are supplied with the instrument. Check that all contents are present and undamaged.

Item	Model or Part No.	Quantity	Specifications and Notes
Power cord[1]	See the figure below.	(1)	Included or not included depending on the suffix code
Rubber stoppers	B8080FR	4	—
Printer roll paper[2]	B9988AE	1	—
500 MHz passive probe[3]	701937	4	—
Panel sheet	See the figure below.	1	Japanese, Chinese, German, French, Korean, Italian, or Spanish
Soft case	B8059GG	1	—
Front panel protection cover	B8229CH	1	—
Manuals	IM DLM5058-03EN	1	Getting Started Guide (this guide)
	IM DLM5058-04EN	1	Operation Guide
	IM DLM5058-73Z2	1	Request to Download Manuals
	IM DLM5058-92Z1	1	Document for China
	IM 00C01C01-01Z1	1	Safety manual (European languages)
	PIM 113-01Z2	1	List of worldwide contacts

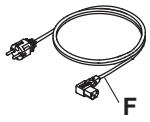
Standard accessories are not covered by warranty.

Power cord (one cord that matches the suffix code is included)[1]

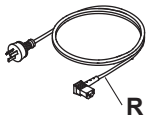
UL/CSA standard A1006WD



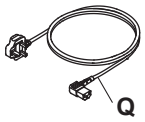
VDE standard, Korean standard A1009WD



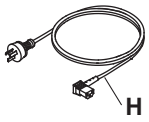
Australian standard A1024WD



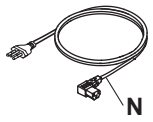
BS standard A1054WD



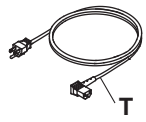
Chinese standard A1064WD



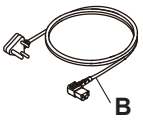
Brazilian standard A1103WD



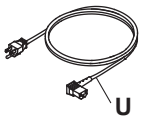
Taiwanese standard A1100WD



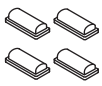
Indian standard A1101WD



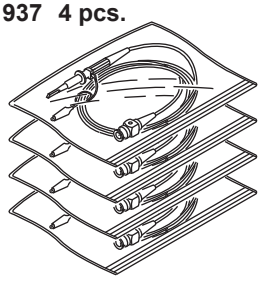
IEC plug Type B A1102WD



Rubber stoppers B8080FR 4 feet

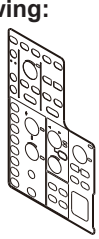


500 MHz passive probe[3] 701937 4 pcs.

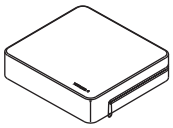


Panel sheet
One of the following:

Japanese (HJ)
Chinese (HC)
German (HG)
French (HF)
Korean (HK)
Italian (HL)
Spanish (HS)



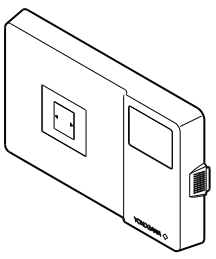
Soft case[4] B8059GG



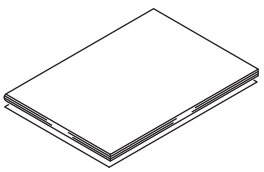
Printer roll paper[2] B9988AE 1 roll



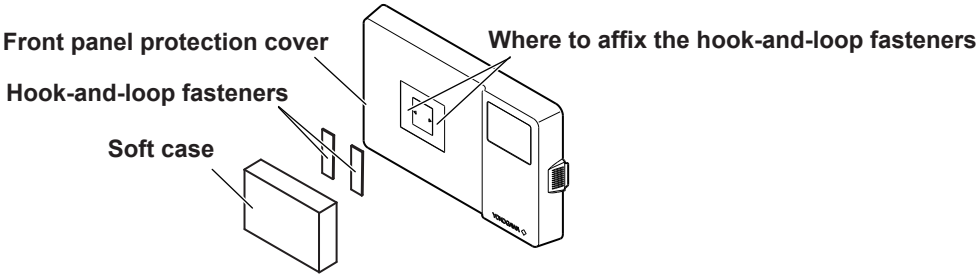
Front panel protection cover B8229CH



Manuals



1 Make sure that the attached power cord meets the designated standards of the country and area that you are using it in. If the suffix code is -Y, a power cord is not included.
2 Included only on models with the optional built-in printer (/B5)
3 On models with the /E1 option, four 701937 passive probes are provided in addition to the four standard 701937 passive probes. On models with the /E2 option, four 701949 miniature passive probes are provided instead of the four standard 701937 passive probes. On models with the /E3 option, eight 701949 miniature passive probes are provided instead of the four standard 701937 passive probes.
4 The soft case can be affixed to the front panel protection cover. Hook-and-loop fasteners are attached to the back side of the soft case.



Optional Accessories (Sold separately)

The optional accessories below are available for purchase separately. For information about ordering accessories, contact your nearest YOKOGAWA dealer.

- Use the following accessories within the ranges indicated in the specifications of each accessory. When using several accessories together, use them within the specification range of the accessory with the lowest rating.
- If you use accessories other than those below, YOKOGAWA assumes no responsibility or liability for the specifications of this instrument or any damage caused by the use of this instrument.
- Accessories (sold separately) are not covered by warranty.

Group 1

Compliance with EN standards is achieved by using the following in combination with the instrument.

Item	Model or Part No.	Min. Q'ty	General Specifications	Manual No.
500 MHz passive probe[1]	701937	1	DC to 500 MHz bandwidth, maximum input voltage ±600 V (DC+AC peak)	IM 701937-01EN
Miniature passive probe[1]	701949	1	DC to 500 MHz bandwidth, maximum input voltage 400 Vrms	IM 701949-01EN
Passive probe[1] (wide temperature range)	702907	1	DC to 200 MHz bandwidth, maximum input voltage ±1000 V (DC+AC peak) operating temperature range: –40°C to +85°C (excluding the phase adjustment side)	IM 702907-01EN
PBL100 logic probe[1]	701988	1	Maximum toggle frequency: 100 MHz, input voltage: ±40 V	IM 701988-01E
PBL250 logic probe[1]	701989	1	Maximum toggle frequency: 250 MHz, threshold level: ±6 V, input voltage: threshold level setting ± 6 V	IM 701989-01E
PBL500 5 GHz resistance probe	701974	1	DC to 5 GHz bandwidth, maximum input voltage: 20 Vrms	IM 701974-01E
Mini clip adapter	700971	1 set	—	—
BNC adapter	700972	1	—	—
50 Ω terminator[2]	700976	1	DC to 500 MHz bandwidth	IM 700976-01JE
BNC cable	366924	1	1 m	—
BNC cable	366925	1	2 m	—
PCB adapter	366945	1 set	—	—
Solder-in adapter	366946	1 set	—	—
Probe stand	701919	1	—	IM 701919-01E
GO/NO-GO cable	366973	1	—	—
Connection cable	701982-01	1	For DLMsync, 1.0 m	—
	701982-02	1	For DLMsync, 2.8 m	—
Soft carrying case	701968	1	Shoulder type, three pockets	—
Rack mount kit	701969-E	1	EIA standard	IM 701969-02EN
	701969-J	1	JIS standard	IM 701969-01EN
Printer roll paper	B9988AE	10	Heat-sensitive paper, 111 mm × 10 m	—

1 The accessory by itself also complies with EN standards.
2 Used to terminate the external trigger at 50 Ω.

Group 2

The following accessories by themselves comply with EN standards.

Item	Model or Part No.	Min. Q'ty	General Specifications	Manual No.
PBDH1000 differential probe with YOKOGAWA probe interface	701924	1	DC to 1 GHz bandwidth, maximum differential input voltage ±25 V (DC+AC peak)	IM 701924-01E
PBDH0500 differential probe with YOKOGAWA probe interface	701925	1	DC to 500 MHz bandwidth, maximum differential input voltage: ±25 V (DC+AC peak)	IM 701925-01EN
PBDH0400 differential probe with YOKOGAWA probe interface	702921	1	DC to 400 MHz bandwidth, maximum differential input voltage: ±1000 V (DC+AC peak)	IM 702921-01EN
	702922	1	DC to 400 MHz bandwidth, maximum differential input voltage: ±2000 V (DC+AC peak)	
PBDH0150 differential probe with YOKOGAWA probe interface	701927	1	DC to 150 MHz bandwidth, maximum differential input voltage ±1400 V (DC+AC peak)	IM 701927-01EN
PBC100 current probe with YOKOGAWA probe interface	701928	1	DC to 100 MHz bandwidth, maximum input current 30 Arms	IM 701928-01E
PBC050 current probe with YOKOGAWA probe interface	701929	1	DC to 50 MHz bandwidth, maximum input current 30 Arms	
100:1 high-voltage passive probe	701944	1	DC to 400 MHz bandwidth, maximum input voltage: 1000 Vrms	IM 701944-01E
	701945	1	DC to 250 MHz bandwidth, maximum input voltage: 1000 Vrms	
FET probe*	700939	1	DC to 900 MHz bandwidth, maximum input voltage: 10 V (DC+AC peak)	IM 700939-01E
Differential probe*	701977	1	DC to 50 MHz bandwidth, maximum differential input voltage: 7000 V peak or less	IM 701977-01EN
	701978	1	DC to 150 MHz bandwidth, maximum differential input voltage: ±1500 V (DC+AC peak)	IM 701978-01EN
	702923	1	DC to 400 MHz bandwidth, maximum differential input voltage: ±1000 V (DC+AC peak)	IM 702921-01EN
	702924	1	DC to 400 MHz bandwidth, maximum differential input voltage: ±2000 V (DC+AC peak)	

* Used by connecting to a probe power terminal (/P8 or /P4 option) or a probe power supply (701934; sold separately).

Item	Model or Part No.	Min. Q'ty	General Specifications	Manual No.
Current probe*	701917	1	DC to 50 MHz bandwidth, maximum input current: 5 Arms	IM 701917-01EN
	701918	1	DC to 120 MHz bandwidth, maximum input current: 5 Arms	
	701930	1	DC to 10 MHz bandwidth, maximum input current: 150 Arms	IM 701930-01E
	701931	1	DC to 2 MHz bandwidth, maximum input current: 500 Arms	IM 701931-01E
	701932	1	DC to 100 MHz bandwidth, maximum input current: 30 Arms	IM 701932-01E
	701933	1	DC to 50 MHz bandwidth, maximum input current: 30 Arms	IM 701933-01E
	702915	1	DC to 50 MHz bandwidth, input range: 3 ranges maximum input current 30 Arms (30 A range) maximum input current 5 Arms (5 A range) maximum input current 0.5 Arms (0.5 A range)	IM 702915-01EN
	702916	1	DC to 120 MHz bandwidth, Input range: 3 ranges maximum input current 30 Arms (30 A range) maximum input current 5 Arms (5 A range) maximum input current 0.5 Arms (0.5 A range)	
Probe power supply	701934	1	Number of outputs: 4, output voltage: ±(12 ± 0.5) V	IM 701934-01E
Deskew signal source	701936	1	Output voltage (square wave): approx. 0 to 5 V, output current (square wave): approx. 0 to 100 mA (small current), approx. 0 to 1 A (large current)	IM 701936-01EN

* Used by connecting to a probe power terminal (/P8 or /P4 option) or a probe power supply (701934; sold separately).

Conventions Used in This Manual

Prefixes k and K

Prefixes k and K used before units are distinguished as follows:

k:	Denotes 1000.	Example: 100 kS/s (sample rate)
K:	Denotes 1024.	Example: 720 KB (file size)

Displayed Characters

Bold characters in procedural explanations are used to indicate panel keys and soft keys that are used in the procedure and menu items that appear on the screen.

Notes and Cautions

The notes and cautions in this manual are categorized using the following symbols.



Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

WARNING Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

French

AVERTISSEMENT Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures graves (voire mortelles), et sur les précautions de sécurité pouvant prévenir de tels accidents.

ATTENTION Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures légères ou d'endommager l'instrument ou les données de l'utilisateur, et sur les précautions de sécurité susceptibles de prévenir de tels accidents.

Note Calls attention to information that is important for the proper operation of the instrument.

Safety Precautions

This product is designed to be used by a person with specialized knowledge.
This instrument is an IEC safety class I instrument (provided with a terminal for protective earth grounding).
The general safety precautions described herein must be observed during all phases of operation. If the instrument is used in a manner not specified in this manual, the protection provided by the instrument may be impaired. YOKOGAWA assumes no liability for the customer's failure to comply with these requirements.

This manual is part of the product and contains important information. Store this manual in a safe place close to the instrument so that you can refer to it immediately. Keep this manual until you dispose of the instrument.

The following symbols are used on this instrument.


Handle with care. Refer to the user's manual or service manual. This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.


Ground or the functional ground terminal (do not use as the protective earth ground terminal)


Alternating current

Direct current

ON (power)


OFF (power)

French


À manipuler délicatement. Toujours se reporter aux manuels d'utilisation et d'entretien. Ce symbole a été apposé aux endroits dangereux de l'instrument pour lesquels des consignes spéciales d'utilisation ou de manipulation ont été émises. Le même symbole apparaît à l'endroit correspondant du manuel pour identifier les consignes qui s'y rapportent.


Borne de terre ou borne de terre fonctionnelle (ne pas utiliser cette borne comme prise de terre.)


Courant alternatif

Courant direct

Marche (alimentation)


Arrêt (alimentation)

Failure to comply with the precautions below could lead to injury or death or damage to the instrument.

WARNING

Use the Instrument Only for Its Intended Purpose
This instrument is a waveform measuring device that monitors and measures electrical signals. Do not use this instrument for anything other than as a waveform measuring device.

Check the Physical Appearance
Do not use the instrument if there is a problem with its physical appearance.

Use the Correct Power supply
First, ensure that the source voltage matches the rated supply voltage of the instrument and that it is within the maximum rated voltage of the power cord you will use. Then connect the power cord.

Use the Correct Power Cord and Plug
To prevent the possibility of electric shock or fire, be sure to use the power cord for the instrument. The main power plug must be plugged into an outlet with a protective earth terminal. Do not invalidate this protection by using an extension cord without protective earth grounding. Further, do not use this power cord with other instruments.

Connect the Protective Ground Terminal
Be sure to connect the protective earth to prevent electric shock before turning ON the power. The power cord that you can use for the instrument is a three-prong cord. Connect the power cord to a properly grounded three-prong outlet.

Do Not Impair the Protective Grounding
Never cut off the internal or external protective earth wire or disconnect the wiring of the protective earth terminal. Doing so may result in electric shock or damage to the instrument.

Do Not Use When the Protection Functions Are Defective
Before using this instrument, check that the protection functions, such as the protective grounding and fuse, are working properly. If you suspect a defect, do not use the instrument.

Do Not Operate in an Explosive Atmosphere
Do not operate the instrument in the presence of flammable gases or vapors. Doing so is extremely dangerous.

Do Not Remove the Covers or Disassemble or Alter the Instrument
Only qualified YOKOGAWA personnel may remove the covers and disassemble or alter the instrument. The inside of the instrument is dangerous because parts of it have high voltages.

Ground the Instrument before Making External Connections

Securely connect the protective grounding before connecting to the item under measurement or to an external control unit. Before touching a circuit, turn off its power and check that it has no voltage. To prevent electric shock and accidents, connect the ground of the probes or input connectors to the ground potential of the device under measurement. The ground of each signal input terminal (input connector) of this instrument is common with the instrument's protective ground (see the block diagram in appendix 3). Do not apply floating potential signals to the input connector ground. This is extremely dangerous as doing so will cause a short to the ground potential.

Measurement Category

The measurement category of this instrument's signal input terminals is Other (O). Do not use it to measure the main power supply or for Measurement Categories II, III, and IV.

Install or Use the Instrument in Appropriate Locations

- Do not install or use the instrument outdoors or in locations subject to rain or water.
- Install the instrument so that you can immediately remove the power cord if an abnormal or dangerous condition occurs.

Accessories

Use the accessories specified in this manual. Moreover, use the accessories of this product only with Yokogawa products that specify them as accessories.
Do not use faulty accessories.

CAUTION

Operating Environment Limitations

This product is classified as Class A (for use in industrial environments). Operation of this product in a residential area may cause radio interference, in which case the user will be required to correct the interference.

French

AVERTISSEMENT

Utiliser l’instrument aux seules fins pour lesquelles il est prévu
Cet instrument est un appareil de mesure de forme d’onde pour le contrôle et la mesure des signaux électriques. Ne pas utiliser cet instrument à d’autres fins que celles de mesure de forme d’onde.

Inspecter l’apparence physique
Ne pas utiliser l’instrument si son intégrité physique semble être compromise.

Vérifier l’alimentation
Assurez-vous que la tension d’alimentation correspond à la tension d’alimentation nominale de l’appareil et qu’elle ne dépasse pas la plage de tension maximale du cordon d’alimentation à utiliser.

Utiliser le cordon d’alimentation et la fiche adaptés
Pour éviter tout risque de choc électrique, utiliser exclusivement le cordon d’alimentation prévu pour cet instrument. La fiche doit être branchée sur une prise secteur raccordée à la terre. En cas d’utilisation d’une rallonge, celleci doit être impérativement reliée à la terre. Par ailleurs, ne pas utiliser ce cordon d’alimentation avec d’autres instruments.

Brancher la prise de terre
Avant de mettre sous tension, veiller à brancher la mise à la terre de protection afin d’éviter les chocs électriques. Le cordon d’alimentation que vous utilisez pour l’instrument est un cordon à trois broches.
Brancher le cordon d’alimentation sur une prise de courant à trois plots et mise à la terre.

Ne pas entraver la mise à la terre de protection
Ne jamais neutraliser le fil de terre interne ou externe, ni débrancher la borne de mise à la terre. Cela pourrait entraîner un choc électrique ou endommager l’instrument.

Ne pas utiliser lorsque les fonctions de protection sont défectueuses
Avant d’utiliser l’instrument, vérifier que les fonctions de protection, telles que le raccordement à la terre et le fusible, fonctionnent correctement. En cas de dysfonctionnement possible, ne pas utiliser l’instrument.

Ne pas utiliser dans un environnement explosif
Ne pas utiliser l’instrument en présence de gaz et de vapeur inflammables. Cela pourrait être extrêmement dangereux.

Ne pas retirer le capot, ni démonter ou modifier l’instrument
Seul le personnel YOKOGAWA qualifié est habilité à retirer le capot et à démonter ou modifier l’instrument. Certains composants à l’intérieur de l’instrument sont à haute tension et par conséquent, représentent un danger.

Relier l’instrument à la terre avant de le brancher sur des connexions externes
Toujours relier l’instrument à la terre avant de le brancher aux appareils à mesurer ou à une commande externe. Avant de toucher un circuit, mettre l’instrument hors tension et vérifier l’absence de tension. Pour éviter un choc électrique et un accident, connecter la terre des sondes ou les connecteurs d’entrée au potentiel de terre de l’appareil faisant l’objet de la mesure. La terre de chaque borne d’entrée du signal (connecteur d’entrée) de cet instrument est commune à la terre de protection de l’instrument (voir le schéma fonctionnel à l’annexe 3). Ne pas appliquer de signaux de potentiel flottant à la terre du connecteur d’entrée. Ceci est extrêmement dangereux car le potentiel de terre risque d’être court-circuité.

Catégorie de mesure
La catégorie de mesure des bornes d’entrée du signal de cet instrument est Autre (O). Ne pas l’utiliser pour mesurer l’alimentation électrique, ni pour les catégories de mesure II, III et IV.

Installer et utiliser l’instrument aux emplacements appropriés
- Ne pas installer, ni utiliser l’instrument à l’extérieur ou dans des lieux exposés à la pluie ou à l’eau.
- Installer l’instrument de manière à pourvoir immédiatement le débrancher du secteur en cas de fonctionnement anormal ou dangereux.

Accessoires
Utiliser les accessoires spécifiés dans ce manuel. En outre, utiliser les accessoires de ce produit uniquement avec des produits Yokogawa pour lesquels ils sont spécifiés comme accessoires.
Ne pas utiliser d’accessoires défectueux.

ATTENTION

Limitations relatives à l’environnement opérationnel
Ce produit est un produit de classe A (pour environnements industriels). L’utilisation de ce produit dans un zone résidentielle peut entraîner une interférence radio que l’utilisateur sera tenu de rectifier.

Regulations and Sales in Each Country or Region

Waste Electrical and Electronic Equipment (WEEE)



(EU WEEE Directive valid only in the EEA* and UK WEEE Regulation in the UK)
This product complies with the WEEE marking requirement. This marking indicates that you must not discard this electrical/electronic product in domestic household waste. When disposing of products in the EEA or UK, contact your local Yokogawa office in the EEA or UK respectively.

* EEA: European Economic Area

Batteries and Waste Batteries



(EU Battery Directive/Regulation valid only in the EEA and UK Battery Regulation in the UK)
Batteries are included in this product. This marking indicates they shall be sorted out and collected as ordained in the EU battery Directive/Regulation and UK battery Regulation.

Battery type: Lithium battery
When you need to replace batteries, contact your local Yokogawa office in the EEA or UK respectively.

Authorized Representative in the EEA

Yokogawa Europe B.V. is the authorized representative of Yokogawa Test & Measurement Corporation for this product in the EEA. To contact Yokogawa Europe B. V., see the separate list of worldwide contacts, PIM 113-01Z2.

關於在台灣銷售

This section is valid only in Taiwan.
關於在台灣所販賣的符合其相關規定的電源線 A1100WD 的限用物質含量信息，請至下麵的網址進行查詢

https://tmi.yokogawa.com/support/service-warranty-quality/product-compliance/

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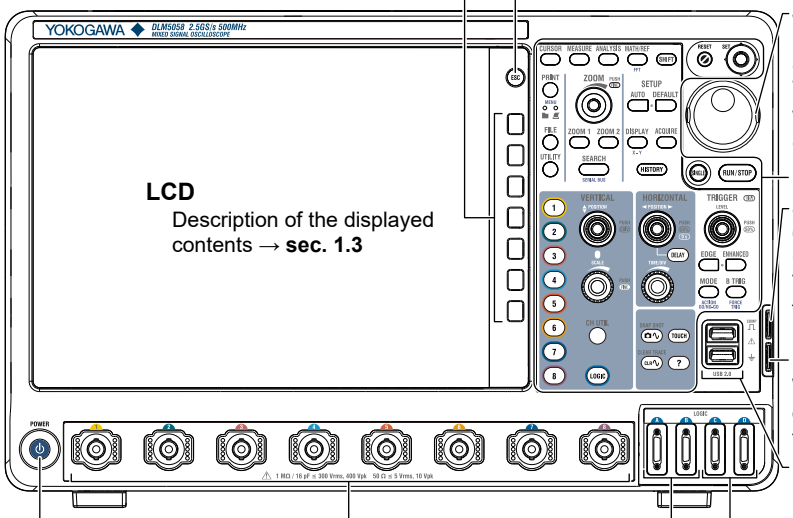
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1.1 Front, Right, Left, Top, and Rear Panels

Front Panel

DLM5038 and DLM5058



Soft keys
Use these keys to select items on the setup menus that appear during configuration.

ESC Key
Use this key to clear soft key menus and pop-up menus.

LCD
Description of the displayed contents → **sec. 1.3**

Jog shuttle
Use the jog shuttle to change values and move cursors.
Turn the shuttle ring to vary the rate at which values change. The rate is set according to the shuttle ring angle.

Keys and knobs → sec. 1.2

Signal output terminal for probe compensation adjustment (1 kHz/1 Vp-p) ⚠
Transmits phase compensation signals for probes.
Phase correction procedure → sec. 2.5

Functional ground terminal
When correcting a probe phase, connect the probe's ground wire to this terminal.

USB ports for peripherals
Use to connect a USB keyboard, USB mouse, USB storage device, or USB printer.
USB keyboard or mouse → **sec. 3.4**
USB storage device or printer → see the user's manual

Signal input terminals - probe interface terminals (CH1 to CH8) ⚠
Connect probes to these terminals to observe analog signals. → **sec. 2.4**

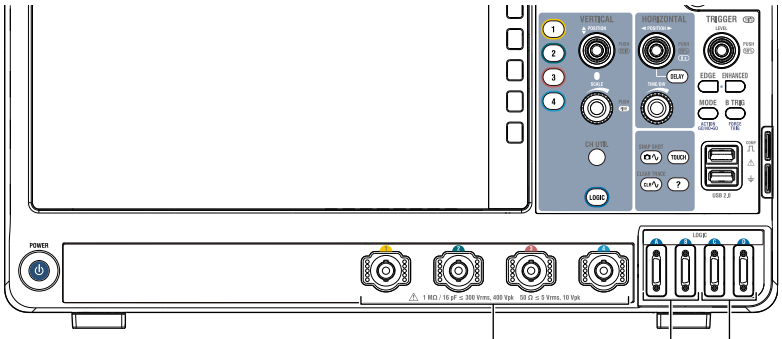
LOGIC A and B (logic signal input ports)
Connect logic probe to these ports to observe up to 16-bit logic signals. → **sec. 2.6**

LOGIC C and D (logic signal input ports)*
Connect logic probe to these ports to observe up to 32-bit logic signals. → **sec. 2.6**

Power switch → sec. 2.3

* LOGIC C and D (logic signal input ports) are equipped on models with the /L32 option.

DLM5034 and DLM5054



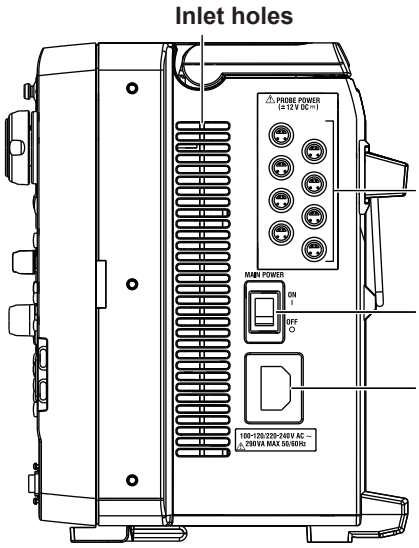
Signal input terminals - probe interface terminals (CH1 to CH4) ⚠
Connect probes to these terminals to observe analog signals. → **sec. 2.4**

LOGIC A and B (logic signal input ports)
Connect logic probe to these ports to observe up to 16-bit logic signals. → **sec. 2.6**

LOGIC C and D (logic signal input ports)*
Connect logic probe to these ports to observe up to 32-bit logic signals. → **sec. 2.6**

* LOGIC C and D (logic signal input ports) are equipped on models with the /L32 option.

Right Side Panel

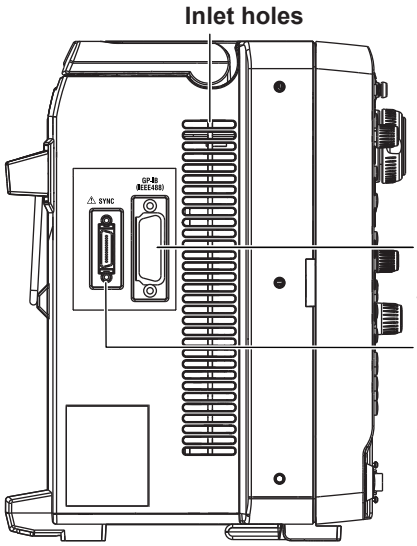


Probe power terminal (optional) ⚠
Use these terminals to supply power to a YOKOGAWA FET probe or current probe. → **sec. 2.4**

Main power switch → sec. 2.3

Power connector⚠→ sec. 2.3

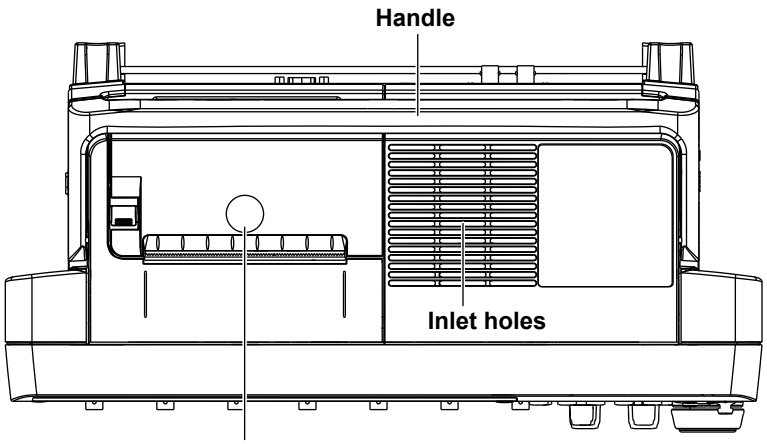
Left Side Panel



GP-IB port (optional)
Use this connector to communicate with the instrument through the GP-IB interface.
→ Communication Interface User's Manual

Synchronous operation I/O connector ⚠
Use this connector to connect to another DLM5034, DLM5038, DLM5054, or DLM5058.
→ sec. 4.5

Top Panel



Built-in printer (option)
Prints the display.

Rear Panel

GO/NO-GO output port
This connector transmits GO/NO-GO result signals. → **sec. 4.4**

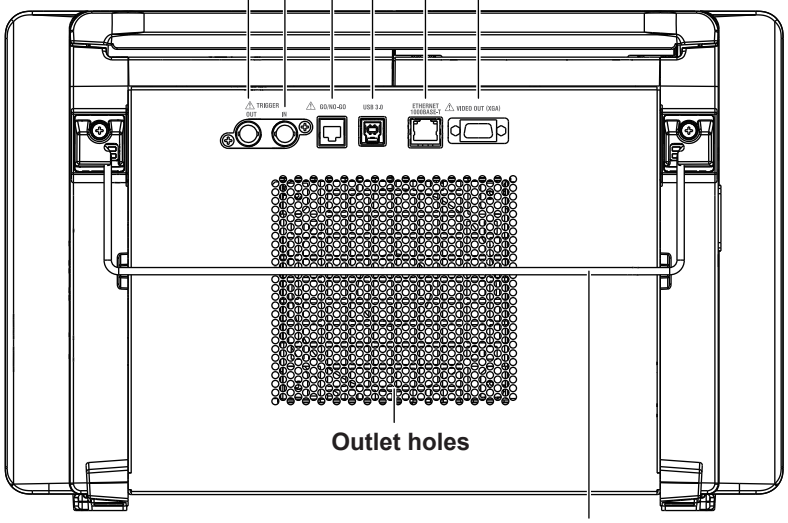
External trigger input terminal ⚠
Use to apply external trigger signals.
→ **sec. 4.1**

USB port for PCs
Use to connect to a PC that has a USB port.
→ Communication Interface User's Manual

Ethernet port
Used to connect the instrument to a network
→ User's Manual and Communication Interface User's Manual

Trigger output terminal ⚠
Use to transmit trigger signals. → **sec. 4.2**

Video Signal Output Connector
Use this connector to view the instrument's display on an external display. → **sec. 4.3**



Outlet holes

Stand → sec. 2.2

1.2 Keys and Knobs

Vertical Axis/Channel

CH1 to CH8 keys and LOGIC key

When you press any of these keys, a menu appears for turning analog signal input channels on and off and for setting the coupling, probe type, offset voltage, bandwidth limit, linear scaling, and waveform labels. Also, press any of these keys before pressing the SCALE or ⬍ POSITION knob to select which channel the SCALE knob will control. The LED between the SCALE and ⬍ POSITION knobs illuminates in the color assigned to the selected channel (the color around the CH key). Each CH key illuminates when its corresponding channel is being displayed. The CH key being controlled by the SCALE or ⬍ POSITION knob illuminates. Use the LOGIC key to configure the logic channel.

⬍ POSITION Knob (Vertical position knob)

Use the POSITION knob to move the display position (vertical position) of the input waveform along the vertical axis. Before turning this knob, press any of the CH1 to CH8 keys to specify the waveform that you want to adjust the position of. This knob has a push switch. You can press the knob to reset the trigger position to 0.00 div. You can also press the LOGIC key to produce the same effect.

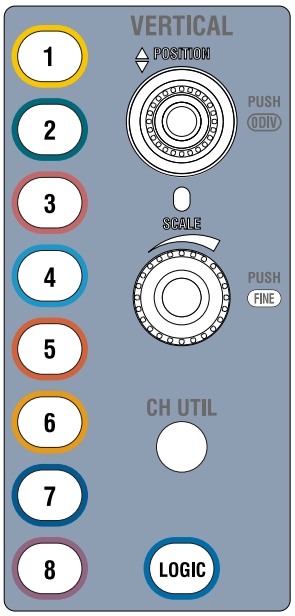
SCALE Knob

Use this knob to set the vertical scale. Before turning this knob, press any of the CH1 to CH8 keys to specify the waveform that you want to adjust the position of. If you change the scale while signal acquisition is stopped, the waveform is expanded or reduced vertically. If you restart signal acquisition, the instrument acquires signals using the new vertical scale. This knob has a push switch. If you press the knob so that Fine illuminates, the resolution is set to fine mode.
When you press the LOGIC key, you can use this knob to change the vertical display size between three levels.

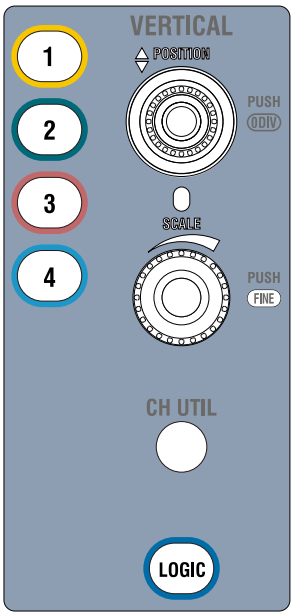
CH UTIL Key

Use this key to display or hide all the waveforms of analog signal input channels and logic signal input ports or to copy settings between analog signal input channels.
You can display all the waveforms of logic signal input ports by connecting a logic probe.

8ch model



4ch model



Horizontal Axis

◄POSITION► Knob

Use this knob to move the center position (trigger position) when you change the time range. When you move the trigger position, the ratio of the displayed data before the trigger point (the pre-trigger section) to the data after the trigger point (the post-trigger point) changes. This knob has a push switch. You can press the knob to reset the trigger position to 50%.

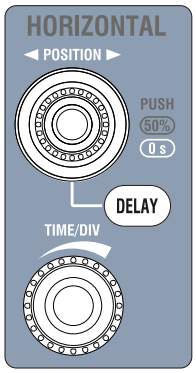
DELAY Key

When you press the DELAY key, the key illuminates. Then you can set the trigger delay using the ◄POSITION► knob.

You can reset the trigger delay to its default value (0 s) by pressing the ◄POSITION► knob when the DELAY key is illuminated.

TIME/DIV Knob

Use this knob to set the time-axis scale. If you change the scale while signal acquisition is stopped, the waveform is expanded or reduced horizontally. If you restart signal acquisition, the instrument acquires signals using the new time-axis scale.



Trigger

EDGE Key

Press this key to display a menu for setting the edge trigger. When you press this key, the edge trigger is selected, and the key illuminates.

ENHANCED Key

Press this key to display a menu for setting the enhanced trigger. When you press this key, the enhanced trigger is selected, and the key illuminates.

MODE Key

Press this key to display a menu for selecting the trigger mode.

SHIFT+MODE (ACTION GO/NO-GO) Key

Press SHIFT and then press MODE to display an action-on-trigger menu or a GO/NO-GO menu.

B TRIG Key

Use this key to set trigger combinations with the Edge or Enhanced trigger and to set the trigger B type.

SHIFT+B TRIG (FORCE TRIG) Key

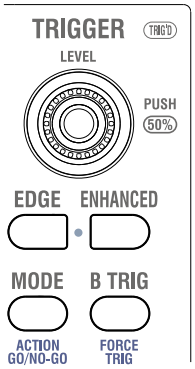
Press SHIFT and then press B TRIG to force the instrument to trigger even when trigger conditions are not met.

LEVEL Knob

Use this knob to set the trigger level. This knob has a push switch. You can press the knob to automatically set the trigger level to the center of the waveform's amplitude (50% of the amplitude).

TRIG'D Indicator

This indicator illuminates when the instrument triggers.



Waveform Acquisition and Display

SETUP Key

- **AUTO Key**
  Press this key to automatically set values that correspond to the input signal. Undo appears in the menu, and you can undo the settings made with this key.
- **DEFAULT Key**
  Press this key to restore settings to their factory default values. Undo appears in the menu, and you can undo the settings made with this key.

ACQUIRE Key

Press this key to display a menu for setting the signal acquisition mode.

RUN/STOP Key

Starts and stops signal acquisition according to the trigger mode. The key illuminates while the instrument is acquiring signals.

SINGLE Key

Press this key to acquire a single waveform. In Average mode, the instrument acquires one waveform that has been obtained by linearly averaging waveforms for the specified number of times.

DISPLAY Key

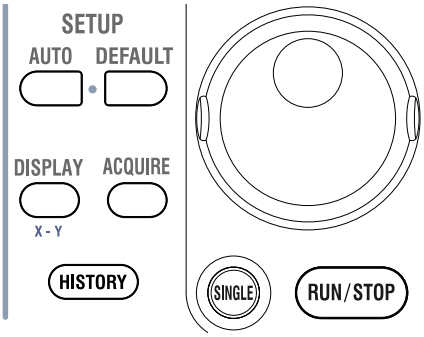
Press this key to display a menu for configuring the display.

SHIFT + DISPLAY (X-Y) key

Press SHIFT and then press DISPLAY to display an X-Y display menu.

HISTORY Key

Press this key to display a menu for displaying and searching the history memory waveforms.



Zoom, Search, and Serial Bus

ZOOM1 and ZOOM2 Keys

Press either key to display a waveform zoom display menu. When a waveform zoom display is on, the corresponding key illuminates. If ZOOM1 and ZOOM2 are both on, the ZOOM knob controls the magnification of the zoom waveform whose corresponding key is illuminated brightly.

ZOOM Knob

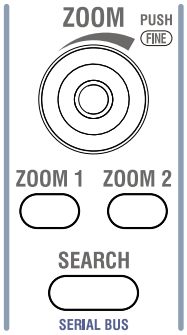
When a zoom display is on, you can turn this knob to set the magnification of the horizontal axis of the selected zoom display. Before turning this knob, press ZOOM1 or ZOOM2 to select the zoom waveform whose magnification you want to control. This knob has a push switch. If you press the knob so that Fine illuminates, the resolution is set to fine mode.

SEARCH Key

Displays a waveform search menu.

SHIFT+SEARCH (SERIAL BUS) key

Press SHIFT and then press SEARCH to display a serial bus menu.



Analysis

CURSOR Key

Press this key to display a menu for making cursor measurements.

MEASURE Key

Press this key to display a menu for automatic measurement of waveform parameters and for statistical processing.

ANALYSIS Key

Press this key to display a waveform histogram display and an optional power supply analysis menu.

MATH/REF Key

Press this key to configure waveform computation and reference waveforms.

SHIFT+MATH/REF (FFT) Key

Press SHIFT and then press MATH/REF to display an FFT menu.



Screen Image Printing and Data Storage

PRINT Key

Press this key to print or save screen image.

SHIFT+PRINT (MENU) Key

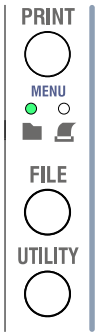
Press these keys to display a menu for printing screen images with the built-in printer, a USB printer, or a network printer or a menu for saving screen images to a storage device. There is an indicator next to the PRINT key that shows whether printing or storage is enabled. If you are printing or saving to multiple output destinations simultaneously, both indicators turn on or off.

FILE Key

Press this key to display a menu for saving various data to the internal storage or USB storage, loading data that you have saved, and performing other file-related tasks.

UTILITY Key

Press this key to display a menu for calibrating the instrument, connecting to a network or PC, running a self-test, and setting the date and time, menu language, message language, click sound, LCD backlight, offset cancel, and delay cancel.
You can also use this key to display system information (installed options and firmware version).



Other Features

SNAP SHOT (📷∿) Key

Retains the currently displayed waveforms on the screen in white (by default).

CLEAR TRACE (CLR∿) Key

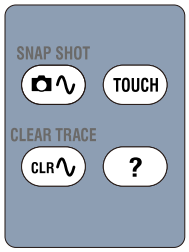
Press this key to clear the displayed waveforms. If you execute a clear trace operation during waveform acquisition, the instrument clears all the history waveforms that it has acquired and restarts waveform acquisition from the first acquisition.

TOUCH Key

Press this key to turn the touch panel feature on and off. When the touch panel feature is on, the key illuminates.

? Key

Press this key to display and hide the help window, which explains various features.



SHIFT key

Press this key once to illuminate it and access the features that are written in purple below each key. Press the key again to clear that state.

Jog Shuttle

When configuring various settings, use the jog shuttle to set values, move cursors, and select items. Turn the shuttle ring to vary the rate at which values change. The rate is set according to the shuttle ring angle.

SET (●) Key

Press this key to enter the menu item that you selected using the jog shuttle.

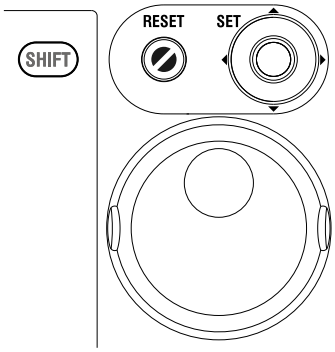
If there are two items on the jog shuttle setting menu, you can press the key to change the item that the jog shuttle controls.

Move the SET key left and right to move the cursor between numeric digits.

Move the SET key up and down to increase and decrease a value. You can change the setting on a dialog menu by moving the key up, down, left, and right.

RESET (⊘) Key

Press this key to reset an entered value to its default value.



Soft Keys

Use these keys to select items on setup menus.

ESC Key

Press this key to close setup menus and dialog boxes and to return to the menu level above the current one.

Notes about the Operation of Knobs with Push Switches

The following knobs have push switches: POSITION (vertical and horizontal), SCALE, LEVEL, and ZOOM. Push the knobs straight. If you push a knob at an angle, it may not operate properly. If this happens, push the knob straight one more time.

CAUTION

Do not push a knob sideways with strong force. If you do, the knob may break.

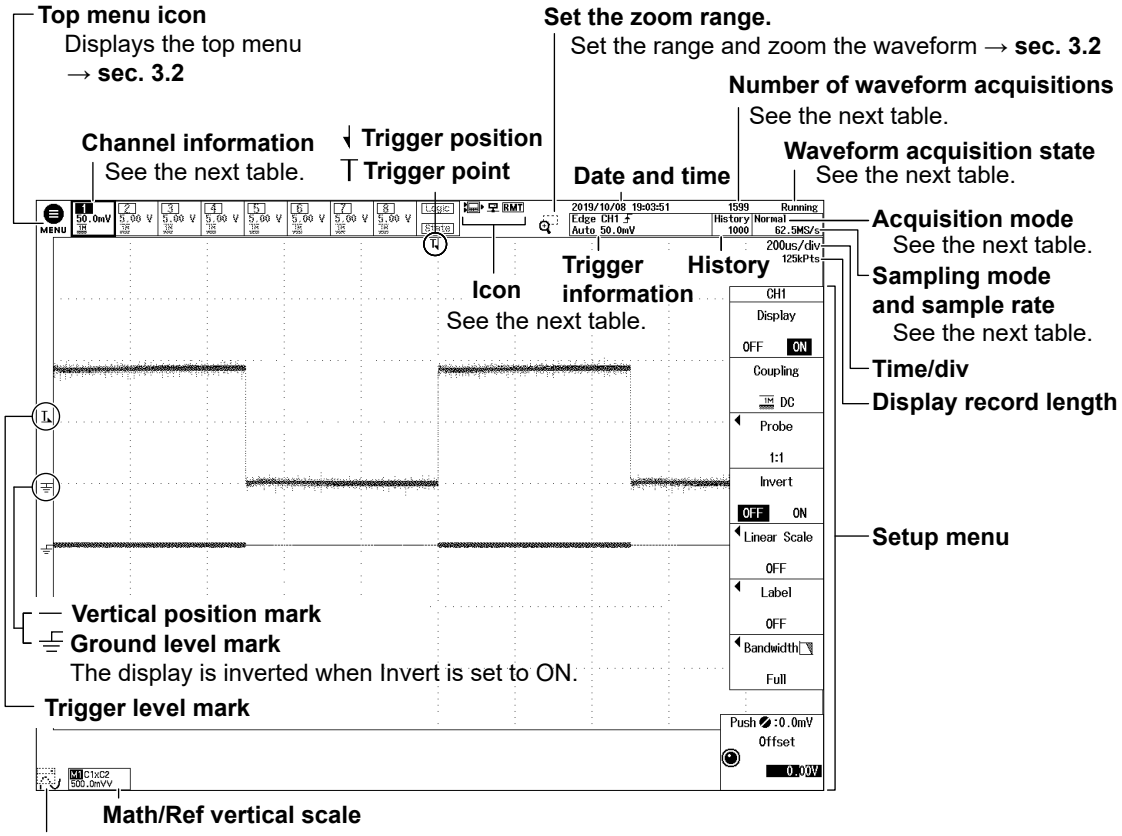
French

ATTENTION

Ne pas pousser violemment un bouton sur le côté. Cela pourrait les endommager, voire les casser.

1.3 Screens

Normal Analog Signal Waveform Screen



Channel Information	
	Appears when over-range is occurring
	Appears when the input coupling is set to AC
	Appears when the input coupling is set to DC
	Appears when the input coupling is set to DC50
	Appears when the bandwidth limit is not set to Full
	Appears when the probe's deskew value is not set to 0.00 ns

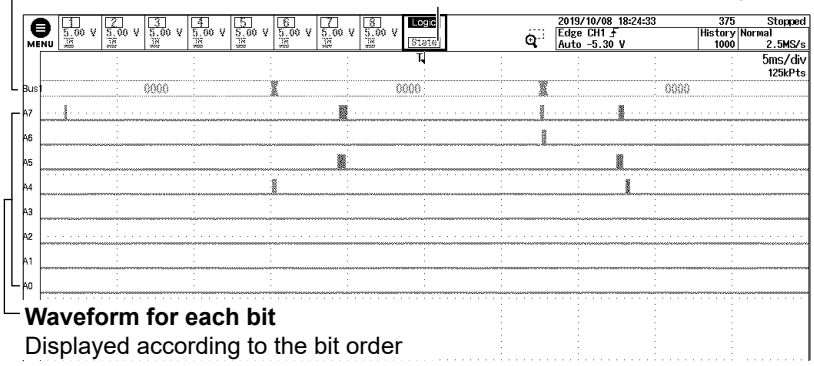
Icon	
	Analysis, such as automated measurement of waveform parameters, serial bus analysis, or user-defined computation, in progress
	Connected to an FTP server
RMT	In remote mode. Key operations are locked. For details, see the Communication Interface User's Manual, IM DLM5058-17EN.
M	Running as the main unit of synchronous operation
S	Running as the sub unit of synchronous operation
	Not communicating with the master. The sampling clock is running based on the internal oscillator.
	Starting to synchronize with the master and adjusting the time and sampling clock.
	Established synchronization with the master and the time and sampling clock are stable. To measure using the IEEE 1588 time synchronization feature, start measuring after this icon is displayed.

Waveform Acquisition States	
Stopped	Waveform acquisition is stopped.
Running	Waveform acquisition is taking place.
Preview	This state indication appears when waveform acquisition is stopped and a waveform acquisition condition such as the vertical scale (SCALE), time-axis scale (TIME/DIV), or trigger has been changed.
Number of Waveform Acquisitions	
Value	Indicates the number of waveform acquisitions. While the waveform acquisition state is "Running," the number increases up to the specified waveform acquisition count (ACQ Count).
Waiting for Trig.	The instrument is waiting for a trigger. This indication blinks.
Pre Trig.	Data before the trigger point (the pre-trigger section) is being acquired.
Post Trig.	Data after the trigger point (the post-trigger section) is being acquired.
Acquisition Mode	
Normal	Normal mode
Norm:Hi-Res	Normal mode with high resolution mode enabled
Envelope	Envelope mode
Env:Hi-Res	Envelope mode with high resolution mode enabled
Average	Averaging mode
Avg:Hi-Res	Averaging mode with high resolution mode enabled
Sampling Mode and Sample Rate	
Number	Real-time sampling mode. Only the sample rate is displayed.
“IntP” and a number	Interpolation mode. The sample rate is displayed after “IntP.”
“Rep” and a number	Repetitive sampling mode. The sample rate is displayed after "Rep."

Logic Signal Waveform Screen

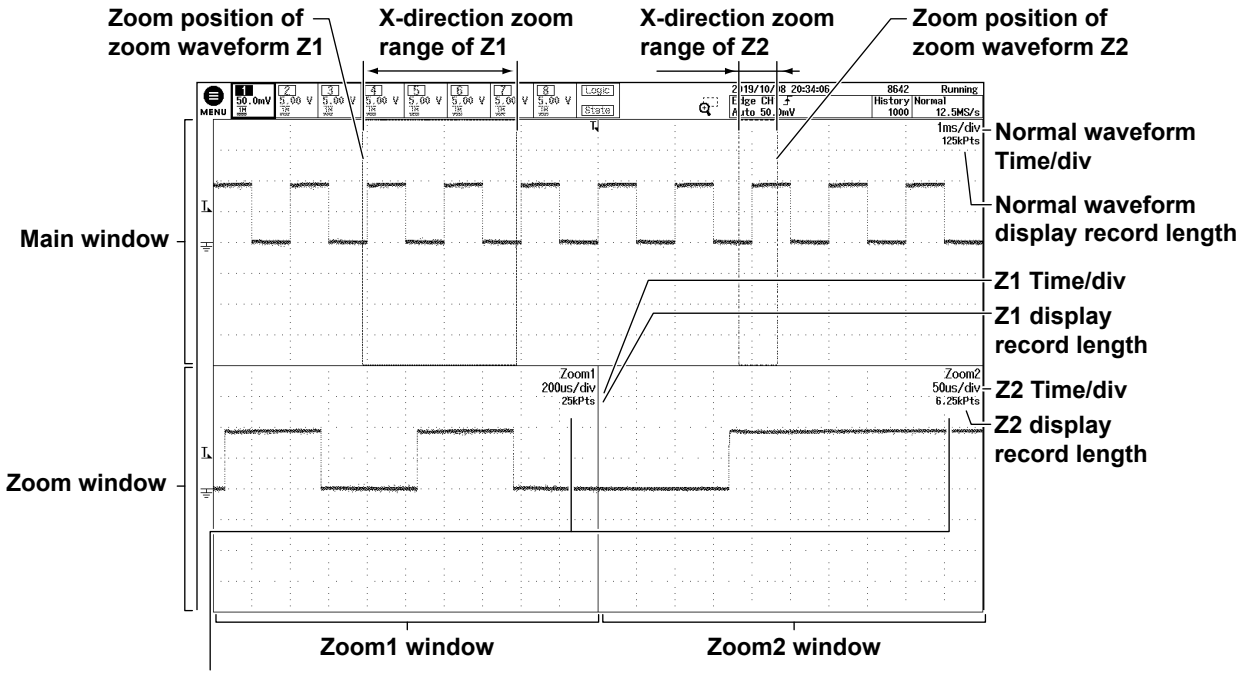
Bus display (Bus)
Displays data in binary or hexadecimal notation according to the bus bit assignments

State display (State)
Illuminates when the state display is on



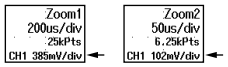
Waveform for each bit
Displayed according to the bit order

Screen Displaying Zoom Waveforms

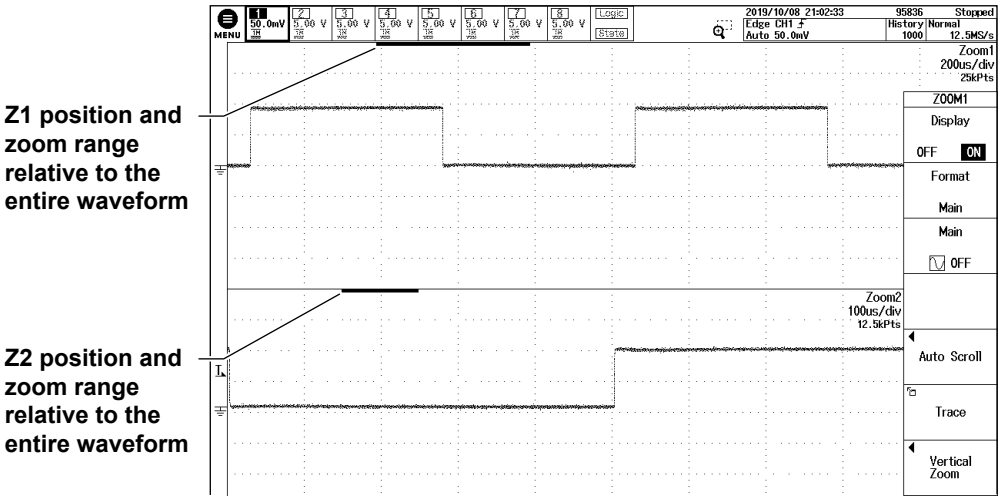


Zoom vertically

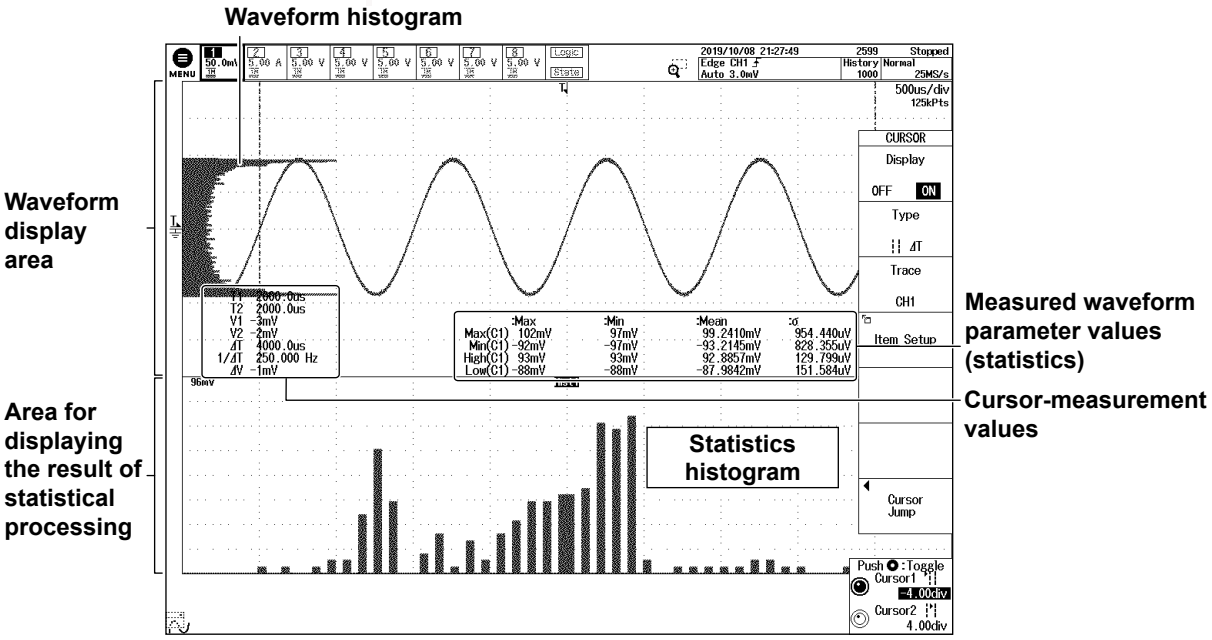
When the vertical zoom factor of the selected waveform is not x1.00, the vertical zoom amount is displayed in terms of the voltage per division as shown in the following figure.



Screen When the Main Window Is Not Displayed



Screen Displaying Analysis Results



If the setup menu is not displayed, measured waveform parameter values or cursor measurement values can be displayed in the area at the bottom of the screen (the area outside of the waveform and measured value display areas).

2.1 Handling Precautions

Safety Precautions

If you are using this instrument for the first time, make sure to thoroughly read the safety precautions given on pages xii to xvi.

Do Not Remove the Case

Do not remove the case from the instrument. Some parts of the instrument use high voltages and are extremely dangerous. For internal inspection and adjustment, contact your nearest YOKOGAWA dealer.

Unplug If Abnormal Behavior Occurs

If you notice smoke or unusual odors coming from the instrument, immediately turn off the power and unplug the power cord. Then, contact your nearest YOKOGAWA dealer.

Do Not Damage the Power Cord

Nothing should be placed on top of the power cord, and it should be kept away from any heat sources. When removing the plug from the power outlet, do not pull on the cord. Pull from the plug. If the power cord is damaged or if you are using the instrument in a location where the power supply specifications are different, purchase a power cord that matches the specifications of the region that the instrument will be used in.

Operating Environment and Conditions

This instrument complies with the EMC standard under specific operating environment and operating conditions. If the installation, wiring, and so on are not appropriate, the compliance conditions of the EMC standard may not be met. In such cases, the user will be required to take appropriate measures.

General Handling Precautions

Do Not Place Objects on Top of the Instrument

Never place other instruments or objects containing water on top of the instrument, otherwise a breakdown may occur.

Do Not Subject the Inputs to Mechanical Shock

Applying shock to the input connectors, probes, and the like, can cause electrical noise to enter the instrument through the signal lines.

Do Not Damage the LCD

Because the LCD is very vulnerable and can be easily scratched, do not allow any sharp objects near it. Also it should not be exposed to vibrations and shocks.

Unplug during Extended Non-Use

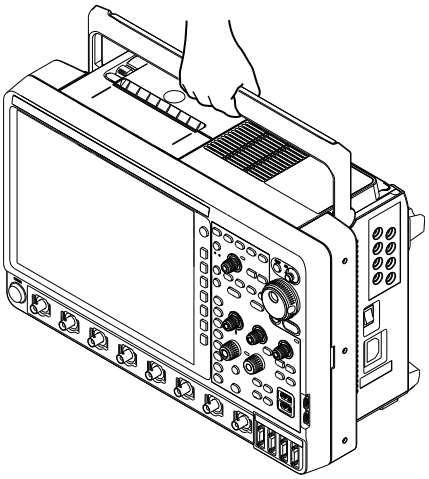
Unplug the power cord from the outlet.

Connecting a PC to the Instrument

Before connecting a PC to the USB port for PCs, ground the PC to the same electrical potential as the instrument.

When Carrying the Instrument

Remove the power cord and connecting cables. When carrying the instrument, either hold the handle or hold the instrument with both hands as shown in the figure below.



WARNING

- When you hold or put away the handle, be careful not to get your hand caught between the handle and the case.
- When you carry the instrument, be careful not to get your hand caught between the wall, installation surface, or other objects and the instrument.

French

AVERTISSEMENT

- Lorsque vous attrapez ou rabattez la poignée, veillez à ne pas vous coincer la main entre la poignée et l'instrument.
- Lorsque vous déplacez l'instrument, veillez à ne pas vous coincer la main entre l'instrument et le mur, la surface d'installation ou tout autre objet.

When Cleaning the Instrument

When cleaning the case or the operation panel, first remove the power cord from the outlet, and then wipe with a dry, soft, clean cloth. Do not use chemicals such as benzene or thinner. These can cause discoloring and deformation.

2.2 Appropriate Locations for Using the Instrument

WARNING

- Do not install the instrument outdoors or in locations subject to rain or water.
- Install the instrument so that you can immediately remove the power cord if an abnormal or dangerous condition occurs.

CAUTION

If you block the inlet or outlet holes on the instrument, it will become hot and may break down.

French

AVERTISSEMENT

- Ne pas installer l'instrument à l'extérieur ou dans des endroits exposés à la pluie ou à l'eau.
- Installer l'instrument de manière à pourvoir immédiatement le débrancher du secteur en cas de fonctionnement anormal ou dangereux.

ATTENTION

Ne pas boucher les orifices d'entrée ou de sortie de l'instrument pour éviter toute surchauffe et panne éventuelle.

Installation Conditions

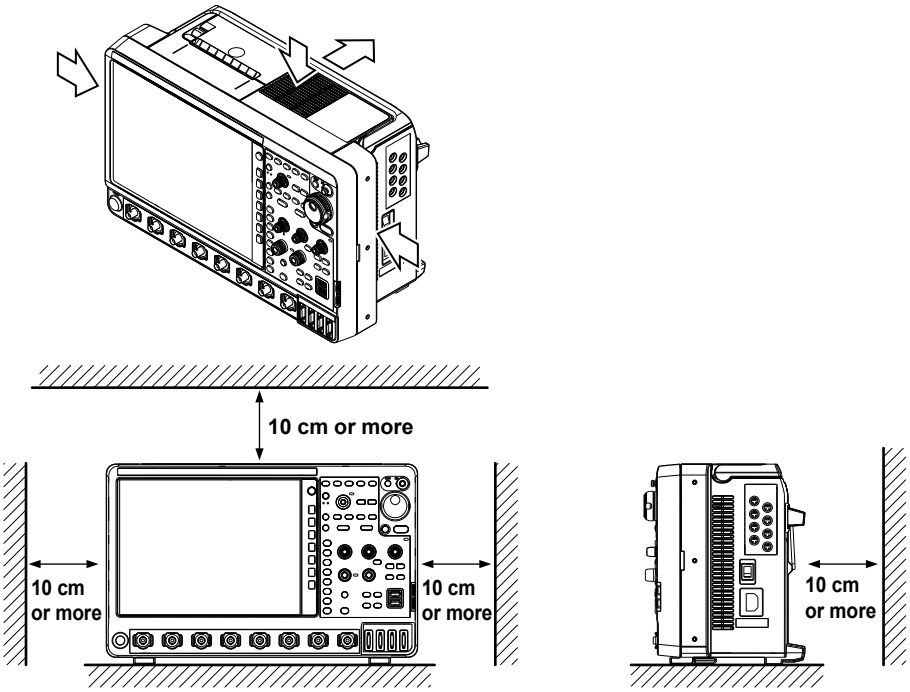
Install the instrument in a place that meets the following conditions.

Flat, Even Surface

Install the instrument in the correct orientation (see page 2-5) in a safe place, with no tilting from front to back or left to right. The printing quality may be hindered when the instrument is placed in an unstable or inclined place.

Well-Ventilated Location

Inlet holes are located on the top panel and the left and right side panels of the instrument. In addition, there are outlet holes for the cooling fan on the rear panel. To prevent internal overheating, allow for enough space around the instrument (see the figure below) and do not block the inlet and outlet holes.



When connecting cables, allow for enough space, above and beyond the space shown in the figure above, to carry out the procedure.

Ambient Temperature and Humidity

Use the instrument in the following environment.

Ambient temperature	5°C to 40°C
Ambient humidity	20% to 80%RH when the printer is not used. (No condensation) 35% to 80%RH when the printer is used. (No condensation)

Note

- To ensure high measurement accuracy, operate the instrument in the 23°C ± 5°C temperature range and 55% ± 10%RH.
- Condensation may occur if the instrument is moved to another place where the ambient temperature or humidity is higher, or if the temperature changes rapidly. In such cases, allow the instrument adjust to the new environment for at least an hour before using the instrument.

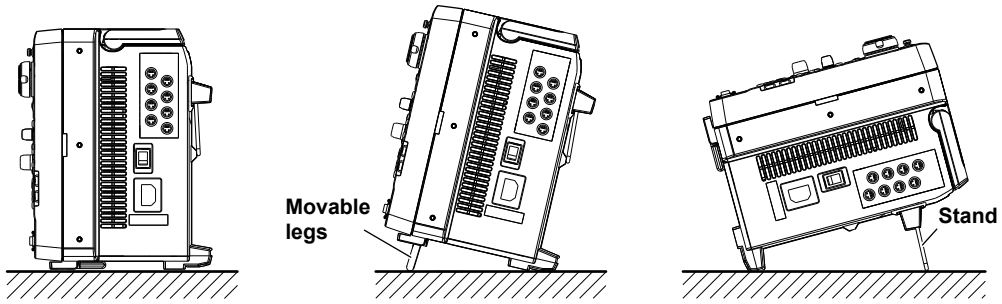
Do not install the instrument in the following places.

- Outdoors
- In direct sunlight or near heat sources
- Where the instrument is exposed to water or other liquids
- Where an excessive amount of soot, steam, dust, or corrosive gas is present
- Near strong magnetic field sources
- Near high voltage equipment or power lines
- Where the level of mechanical vibration is high
- On an unstable surface

Installation Orientation

Place the instrument in a horizontal position or tilt it on its movable legs or stand. When using the movable legs or stand, push it out until it locks into place. To put away the stand, push it inward while returning it to its original position.

Horizontal installation **Tilted installation**



WARNING

- When you handle the movable legs, be careful not to injure your hand with the leg edges.
- When you put away the movable legs or stand, be careful not to get your hand caught between the movable legs or stand and the instrument.
- Handling the movable legs or stand without firmly supporting the instrument can be dangerous. Please take the following precautions.
  - Only handle the movable legs or stand when the instrument is on a stable surface.
  - Do not handle the movable legs or stand when the instrument is tilted.
- Do not place the instrument in any position other than those shown in the above figures. Also, do not stack the instrument.

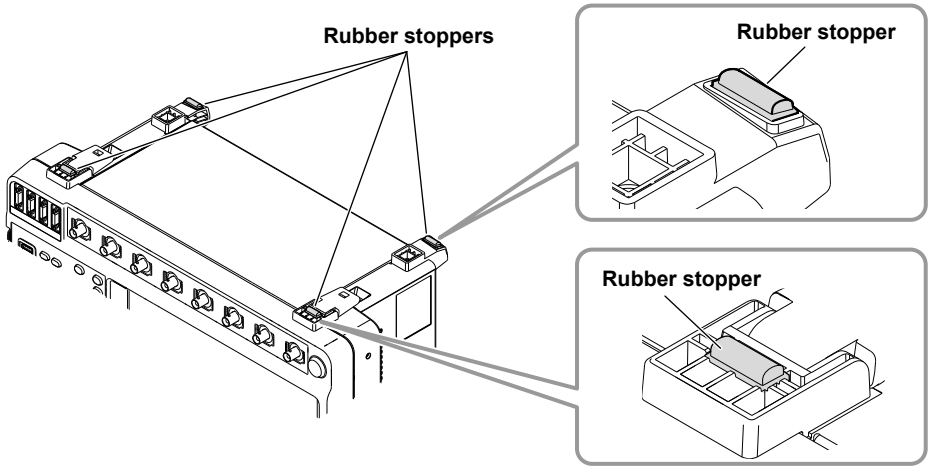
French

AVERTISSEMENT

- Lorsque vous manipulez les pieds escamotables, veillez à ne pas vous blesser la main.
- Lorsque vous rangez les pieds ou le support escamotable, veillez à ne pas vous coincer la main entre l'instrument et les pieds ou le support.
- Lorsque vous manipulez les pieds ou le support escamotable, soutenez toujours l'instrument fermement. Prendre les précautions suivantes.
  - Ne manipuler les pieds ou le support escamotable que lorsque l'instrument est placé sur une surface stable.
  - Ne pas manipuler les pieds ou le support escamotable lorsque l'instrument est incliné.
- Ne pas placer l'instrument dans des positions autres celles indiquées ci-dessus. Ne pas empiler l'instrument.

Rubber Stoppers

You can attach rubber feet to the feet at the bottom of the instrument for when you use the instrument in the first and second positions from the left in the installation orientation figure. One set of feet (four feet) comes with the instrument as a standard accessory.



2.3 Connecting the Power Supply and Turning the Power Switch On and Off

Before Connecting the Power Supply

Make sure to follow the warnings below when connecting the power supply. Failure to do so may cause electric shock or damage to the instrument.

WARNING

- First, ensure that the source voltage matches the rated supply voltage of the instrument and that it is within the maximum rated voltage of the power cord you will use. Then connect the power cord.
- Connect the power cord after checking that the main power switch of the instrument is turned off.
- To prevent electric shock or fire, use the power cord for the instrument.
- To prevent electric shock, make sure to ground the instrument. Connect the power cord to a three-prong power outlet with a protective earth terminal.
- Do not use an ungrounded extension cord. If you do, the instrument will not be grounded.
- If there is no AC outlet that is compatible with the power cord that you will be using and you cannot ground the instrument, do not use the instrument.

French

AVERTISSEMENT

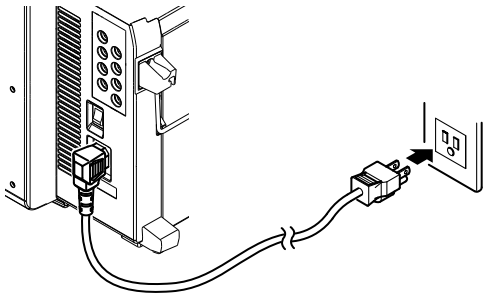
- Assurez-vous que la tension d’alimentation correspond à la tension d’alimentation nominale de l’appareil et qu’elle ne dépasse pas la plage de tension maximale du cordon d’alimentation à utiliser.
- Brancher le cordon d’alimentation après avoir vérifié que l’interrupteur d’alimentation principal de l’instrument est sur OFF.
- Pour éviter tout risque de choc électrique, utiliser exclusivement le cordon d’alimentation prévu pour cet instrument.
- Pour éviter tout risque de choc électrique, l’instrument doit impérativement être relié à la terre. Brancher le cordon d’alimentation sur une prise de courant à trois plots reliée à la terre.
- Toujours utiliser une rallonge avec broche de mise à la terre, à défaut de quoi l’instrument ne serait pas relié à la terre.
- Si une sortie CA conforme au câble d’alimentation fourni n’est pas disponible et que vous ne pouvez pas relier l’instrument à la terre, ne l’utilisez pas.

Connecting the Power Cord

1. Check that the main power switch on the right side panel of the instrument is turned off.
2. Connect the power cord plug to the power connector on the right side panel.
3. Connect the other end of the cord to an outlet that meets the following conditions. Use a grounded three-prong outlet.

Item	
Rated supply voltage*	100 VAC to 120 VAC, 220 VAC to 240 VAC
Permitted supply voltage range	90 VAC to 132 VAC, 198 VAC to 264 VAC
Rated supply frequency	50/60 Hz
Permitted supply frequency range	48 Hz to 63 Hz
Maximum power consumption	290 VA

* This instrument can use a 100 V or a 200 V power supply. The maximum rated voltage differs according to the type of power cord. Check that the voltage supplied to the instrument is less than or equal to the maximum rated voltage of the power cord that you will be using before use.



Turning On the Power Switch

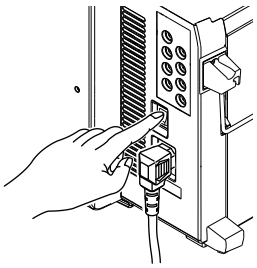
Before Turning On the Power, Check That:

- The instrument is installed properly. See section 2.2, “Appropriate Locations for Using the Instrument.”
- The power cord is connected properly. See “Connecting the Power Cord,” described earlier.

Turning On the Main Power Switch

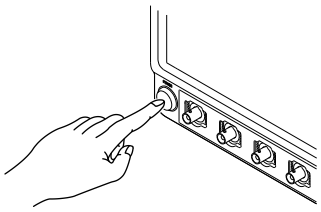
1. Switch the power switch on the right side panel to the ON (|) position.

   The front-panel power switch illuminates in orange.



Turning On the Power Switch

2. Press the power switch on the front panel.
The power switch color will change from orange to green.



Note

If you turn off the main power switch while the front-panel power switch is turned on (while the power switch is illuminated in green), you simply turn on the main power switch to start the instrument the next time. However, if you turn off the main power switch while the front-panel power switch is turned on, the setup data immediately before the power switch is turned off will not be stored properly.

Power-on Operation

When the power switch is turned on, calibration starts automatically. When the instrument starts normally, the waveform display screen appears. Check that the instrument has started normally before you use it.

If the Instrument Does Not Start Normally When the Power Is Turned On

Turn off the power switch, and check the following items.

- Check that the power cord is securely connected.
- Check that the correct voltage is coming to the power outlet. See section 2.3, “Connecting the Power Supply and Turning the Power Switch On and Off.”

If the instrument does not operate properly after checking the above, turn on the power switch while holding down the RESET key. The settings will be returned to their factory default values.

Note

- After turning the power switch off, wait at least 10 seconds before you turn it on again.
- It may take a few seconds for the startup screen to appear.
- If the instrument still does not start properly even when you turn on the power switch while holding down the RESET key, contact your nearest YOKOGAWA dealer for repairs.

Turning Off the Power Switch

CAUTION

Abruptly turning off the main power switch or unplugging the power cord while data is being saved or the internal printer is printing may corrupt the media on which data is being saved or damage the built-in printer. Also, the data being saved is not guaranteed. Always turn the main power switch off after data has been saved.

French

ATTENTION

Mettre brutalement l'instrument hors tension ou débrancher le cordon d'alimentation pendant l'enregistrement de données ou le fonctionnement de l'imprimante interne peut corrompre le support d'enregistrement des données ou endommager l'imprimante intégrée. Les données en cours d'enregistrement pourront également être perdues. Toujours mettre l'instrument hors tension après que les données ont été enregistrées.

Turning Off the Power Switch

1. Press the power switch on the front panel.

Turning Off the Main Power Switch

2. Check that the front-panel power switch changes from green to orange, and then switch the power switch on the right side panel to the OFF (○) position.

Operations Performed When the Power Is Turned Off

The settings immediately before the power switch is turned off are stored. This means that if you turn the power switch on and begin measurement, the instrument will perform measurements using the settings from immediately before the instrument was last turned off.

Note

If you turn off the main power switch on the right side panel while the power switch on the front panel is turned on, the setup data immediately before the power switch is turned off will not be stored properly. The next time you turn on the main power switch, the front-panel power switch automatically turns on, and the instrument starts using the previous settings that were stored properly. When this occurs, a message appears on the screen, but it does not mean that the instrument is broken. When turning the power off, turn off the power switch on the front panel, and then turn off the main power switch on the right side panel.

To Make Accurate Measurements

- After turning on the power switch, wait at least 30 minutes to allow the instrument to warm up.
- Perform calibration after the instrument has warmed up. If auto calibration is set to ON, the instrument will automatically perform calibration. For details on the auto calibration operation, see section 3.8.

Note

If calibration is executed while signals are being applied to the instrument, we recommend that you stop signal application and recalibrate the instrument.

- Adjust the vertical scale using the SCALE knob so that the input waveform fits within the effective data range. The effective data range is ±5 div from the center of the main window. If this range is exceeded, proper measurements may not be possible.

2.4 Connecting Probes

WARNING

- When connecting a device under measurement to the instrument, be sure to turn off the device. It is extremely dangerous to connect or disconnect a measuring lead while the device under measurement is on.
- Do not apply input voltage exceeding the maximum input voltage, withstand voltage, or allowable surge voltage.
- To avoid electric shock, be sure to ground the instrument. Furthermore, connect the ground of the probes or input connectors to the ground potential of the device under measurement. The ground of each signal input terminal (input connector) of this instrument is common with the instrument's protective ground (see the block diagram in appendix 3). Do not apply floating potential signals to the input connector ground. This is extremely dangerous as doing so will cause a short to the ground potential. Use a differential probe when measuring floating potential.
- Avoid continuous connection in an environment where a surge voltage may occur.
- If over-range is indicated, the instrument may be receiving a voltage higher than the observed waveform or measured waveform values. To prevent electric shock, change the vertical scale with the SCALE knob so that the entire amplitude of the waveform is displayed within the waveform display area, and check the input voltage level.



Over-range indication

- If the input coupling is AC, in accordance with the frequency response, the input signal is attenuated more in lower frequencies.* As such, even when a high voltage signal is received, the over-range indicator may not be displayed on the instrument's screen. As necessary, switch the input coupling to DC to check the input signal voltage.

  * For details, see section 1.1, "Input Coupling," in the User's Manual, IM DLM5058-02EN.

CAUTION

- The probe interface terminals are located near the input terminals on this instrument. Do not short the probe interface terminals. When you connect a probe, make sure to prevent an excessive voltage caused by static electricity, etc., from being applied to the probe interface terminal, as this may damage the terminal.
- The maximum input voltage for 1 MΩ input is 300 Vrms or 400 Vpeak when the frequency is 100 kHz or less. Applying a voltage greater than either of these limits may damage the input section. If the frequency is above 100 kHz, damage may occur even when the voltage is below this value.
- The maximum input voltage for 50 Ω input is 5 Vrms or 10 Vpeak. Applying a voltage greater than either of these limits may damage the input section.
- If you change the input coupling setting* while waveform acquisition is stopped, the input coupling on the instrument is actually changed when waveform acquisition is executed the next time. Be careful of the maximum input voltage.
- For information about how to handle a probe, refer to the user's manual that came with the probe.

French

AVERTISSEMENT

- Lors de la connexion à l'instrument d'un appareil faisant l'objet de la mesure, éteindre impérativement l'appareil. Il est extrêmement dangereux de brancher un câble de mesure lorsque l'appareil à mesurer est sous tension.
- Ne pas dépasser les valeurs maximales de tension d'entrée, de tension de maintien ou de surtension admissible.
- Pour éviter tout risque de choc électrique, l'instrument doit impérativement être relié à la terre. Par ailleurs, connecter la terre des sondes ou les connecteurs d'entrée au potentiel de terre de l'appareil faisant l'objet de la mesure.
  La terre de chaque borne d'entrée du signal (connecteur d'entrée) de cet instrument est commune à la terre de protection de l'instrument (voir le schéma fonctionnel à l'annexe 3). Ne pas appliquer de signaux de potentiel flottant à la terre du connecteur d'entrée. Ceci est extrêmement dangereux car le potentiel de terre risque d'être court-circuité. Utiliser une sonde différentielle lors de la mesure du potentiel flottant.
- Évitez un branchement continu dans un environnement pouvant être soumis à une surtension.
- En cas de dépassement de plage, l'instrument risque de recevoir une tension supérieure à la forme d'onde observée ou aux valeurs de forme d'onde mesurées. Pour éviter tout risque de choc électrique, modifier l'échelle de gain vertical à l'aide du bouton SCALE, de sorte que l'amplitude entière de la forme d'onde s'affiche sur l'afficheur, et vérifier le niveau de tension d'entrée.



← **Dépassement de plage**

- Si le courant du couplage d'entrée est alternatif (CA), conforme à la réponse en fréquence, le signal d'entrée est plus atténué aux fréquences plus basses.* Ainsi, même si un signal haute tension est reçu, le voyant de dépassement de plage risque de ne pas s'afficher à l'écran de l'instrument. Le cas échéant, basculez le couplage d'entrée sur CC (courant continu) afin de vérifier la tension du signal d'entrée.
  * Pour les détails, voir la section 1.1, «Couplage d'entrée» dans le Manuel de l'utilisateur, IM DLM5058-02EN.

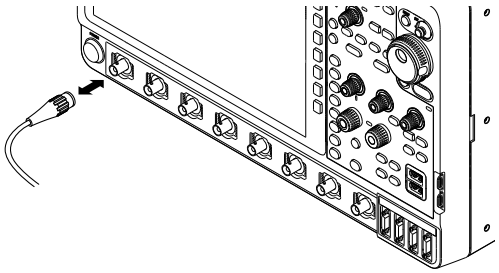
ATTENTION

- Sur cet instrument, les bornes d'interface de sonde se situent à proximité des bornes d'entrée. Ne pas court-circuiter les bornes d'interface de sonde. Lors du branchement d'une sonde, éviter qu'une tension excessive, causée entre autre par l'électricité statique, ne soit appliquée sur la borne d'interface de sonde, car cela pourrait l'endommager.
- La tension d'entrée maximum pour une entrée de 1 MΩ est de 300 Vrms ou 400 V crête lorsque la fréquence est inférieure ou égale à 100 kHz. Le fait d'appliquer une tension dépassant l'une de ces limites risque d'endommager la section d'entrée. Si la fréquence est supérieure à 100 kHz, des dommages risquent de survenir même lorsque la tension est inférieure à cette valeur.
- La tension d'entrée maximale pour une entrée de 50 Ω est de 5 Vrms ou 10 Vcrête. L'application d'une tension supérieure à l'une de ces limites pourrait endommager la section d'entrée.

- Si vous modifiez le paramètre de couplage d'entrée alors que l'acquisition de forme d'onde est arrêtée, le couplage d'entrée sur l'instrument est en réalité modifié lorsque la prochaine acquisition de forme d'onde est exécutée. Faites attention à la tension d'entrée maximale.
- Pour toute information sur la manipulation de la sonde, se reporter au manuel d'utilisation fourni avec la sonde.

Connecting Probes

Connect probes (or input cables such as BNC cables) to the input terminals on the bottom of the front panel. The input impedance is 1 MΩ ± 1.0% and approximately 16 pF parallel or 50 Ω ± 1.0%.



Notes about Connections

- When connecting a probe to the instrument for the first time, perform phase correction of the probe as described in section 2.5, "Correcting a Probe Phase." If you don't correct the probe phase, the frequency characteristics will not be flat, and measurements will not be correct. Perform phase correction on each channel to which a probe is to be connected.
- Please note that if the circuit being measured is directly connected to the instrument without the use of a probe, correct measurements may not be possible because of the effect of the input impedance of the instrument.

Note

Only use the standard accessory probes for this instrument. If you use other probes, the specifications of this instrument may no longer be met.

About Probes

Specifications, after probe phase compensation, of the probe (model 701937) that is supplied as a standard accessory

For details, see the manual that came with the probe.

Item	Specifications
Probe length	Approx. 1.3 m
Input resistance	10 MΩ ± 2%
Input capacitance	Approx. 10.5 pF
Attenuation ratio	10:1 ± 2%
Bandwidth	DC to 500 MHz (within –3 dB)
Rise time	700 ps or less (typical*)
Maximum input voltage	600 V (DC+ACpeak)

* Typical value represents a typical or average value. It is not strictly warranted.

Specifications, after probe phase compensation, of the probe (model 701949) that is supplied as an option

For details, see the manual that came with the probe.

Item	Specifications
Probe length	1.3 m
Input resistance	10 MΩ±1%
Input capacitance	Approx. 9.5 pF
Attenuation ratio	10: 1±2%
Bandwidth	DC to 500 MHz (within –3 dB)
Rise time	700 ps or less (typical*)
Maximum input voltage	400 Vrms

* Typical value represents a typical or average value. It is not strictly warranted.

Precautions to Be Taken When Using Voltage Probes Other Than Those Provided with the Instrument

- When measuring a signal that includes a frequency close to 500 MHz, use a probe with a frequency band above 500 MHz.
- Measurement will only be correct if the attenuation ratio is set properly. Check the attenuation ratio of the probe that you are using and set it properly.

Setting the Probe Attenuation Ratio or the Voltage-Current Conversion Factor

When using a probe not supported by the probe interface connectors, set the instrument's attenuation ratio or voltage-current conversion factor to match the probe attenuation ratio or voltage-current conversion factor. If the instrument's settings do not match the probe specifications, correct measurement values will not be displayed.

Connecting a Probe Supported by the Probe Interface Connectors

- If you connect a probe supported by the probe interface connector to the instrument, the probe type is automatically recognized, and the attenuation ratio set.* Also because power is supplied to the probe through the probe interface, it is not necessary to connect the probe power cable to the probe power terminals.
  * For a list of compatible probes, see “Optional Accessories” on page viii.
- You can execute automatic zero adjustment on a current probe that is compatible with the probe interface connector.

Connecting an FET Probe, Current Probe, or Differential Probe

If you are using a YOKOGAWA FET probe, current probe, or differential probe, use one of the probe power terminals (option) on the instrument’s right side panel for the power supply.* For details on the connection procedure, see the manual that came with the product that you want to use.

* For a list of probe, see “Optional Accessories” on page viii.

CAUTION

Do not use the probe power terminals (option) on the instrument’s right side panel for purposes other than supplying power to an FET probe, current probe, or differential probe. Be sure that the total current of the eight probe power terminals and the eight probe interface terminals (±12 V each) on 8 channel models or that of the four probe power terminals and the four probe interface terminals on 4 channel models (±12 V each) does not exceed 2.0 A. Otherwise, the instrument or a device connected to the probe power terminals may break.

French

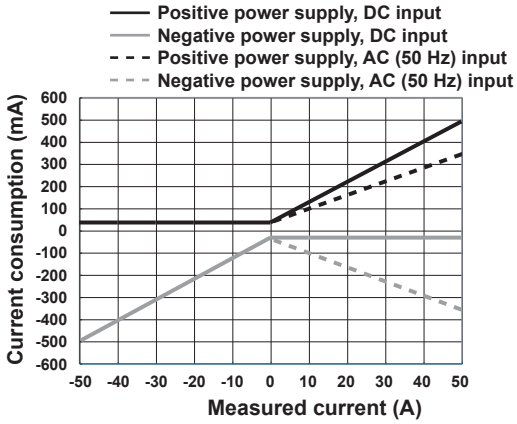
ATTENTION

Ne pas utiliser les bornes d'alimentation de la sonde (en option) sur le panneau latéral droit de l'instrument à des fins autres que l'alimentation d'une sonde FET, d'une sonde de courant ou d'une sonde différentielle. S'assurer que le courant total des huit bornes d'alimentation de la sonde et les huit bornes d'interface de la sonde (± 12 V chacune) sur les modèles à 8 canaux ou celui des quatre bornes d'alimentation de la sonde et les quatre bornes d'interface de la sonde sur les modèles à 4 canaux (± 12 V chacun) ne dépasse pas 2,0 A. Sinon, l’instrument ou un appareil connecté aux bornes d’alimentation de la sonde pourraient casser.

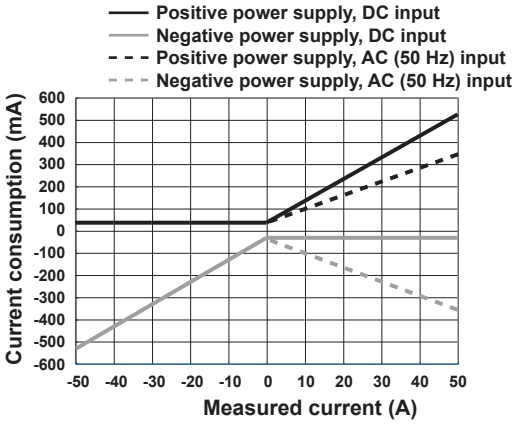
Handling Precautions for the Probe Interface Terminals and Probe Power Terminals

If you are connecting an FET probe, current probe, or differential probe to one of the probe power terminals (option) on the right side panel, be sure that the total current of the eight probe power terminals and the eight probe interface terminals (±12 V each) on 8 channel models or that of the four probe power terminals and the four probe interface terminals (±12 V each) on 4 channel models does not exceed 2.0 A. Otherwise, the instrument's operation may become unstable as a result of the activation of the overcurrent protection circuit of the power supply.

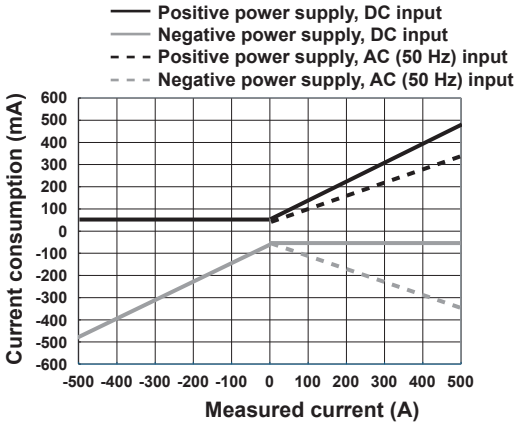
- The number of current probes that can be used is limited by the measured current (the current measured by the current probes). The characteristics of measured current versus current consumption for the active probes that can be connected to the instrument are as follows.



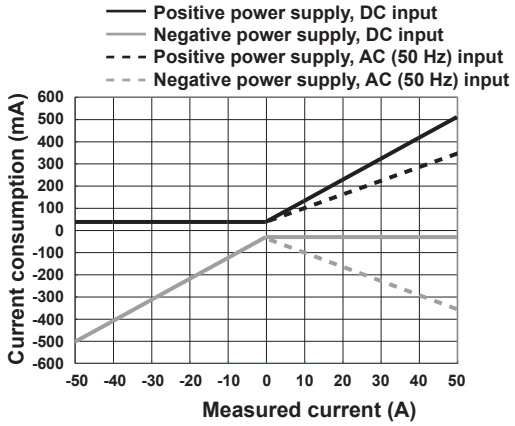
Measured current and current consumption of the 701928 current probe (example of characteristics)



Measured current and current consumption of the 701929 current probe (example of characteristics)



Measured current and current consumption of the 701931 current probe (example of characteristics)



Measured current and current consumption of the 701932/701933 current probe (example of characteristics)

- In calculations, take the maximum current consumption of an FET probe (700939) or differential probe (701925, 701977, or 701978) to be 125 mA for both negative and positive voltages. Take the maximum current consumption of a differential probe (701927) to be 50 mA for both negative and positive voltages. Take the maximum current consumption of a differential probe (702921, 702922, 702923 or 702924) to be 250 mA for both negative and positive voltages.

2.5 Correcting a Probe Phase

Before using a probe to make measurements, be sure to correct the probe phase.

CAUTION

Do not apply external voltage to the signal output terminal for probe compensation adjustment. This may cause damage to the internal circuitry.

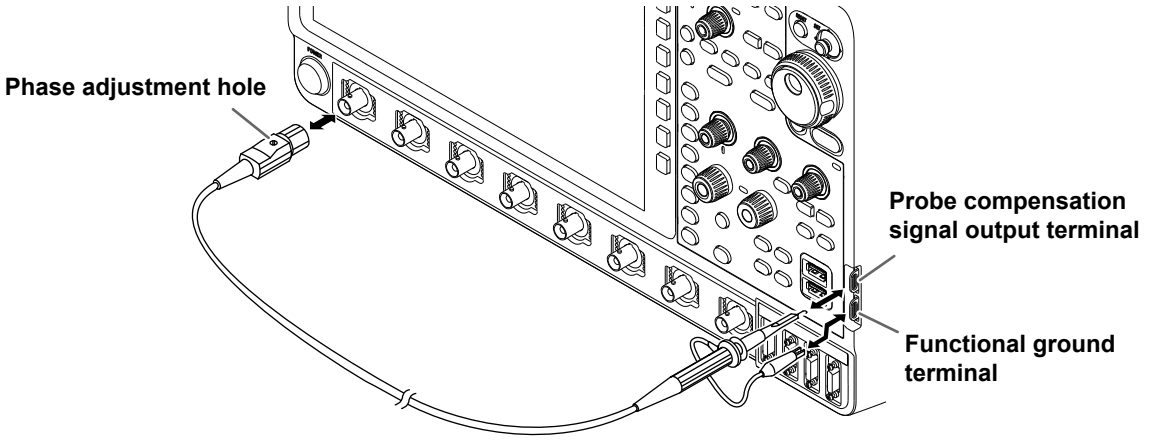
French

ATTENTION

Ne pas appliquer de tension externe sur la borne de sortie de signal afin d'ajuster la compensation de sonde. Cela pourrait endommager le circuit interne.

Procedure

1. Turn on the power switch.
2. Connect the probe to the input terminal to which the signal is to be applied.
3. Connect the tip of the probe to the signal output terminal for probe compensation adjustment on the front panel of the instrument and connect the ground wire to the functional ground terminal.
4. Perform auto setup according to the procedures given in section 3.6, “Performing Auto Setup.”
5. Insert a flat-head screwdriver into the phase adjustment hole and turn the variable capacitor to make the displayed waveform a correct rectangular wave.



Explanation

Necessity of Probe Phase Correction

The phase of each probe is already corrected so as to approximately match the input capacitance of the oscilloscope that the probe is intended to be used with. However, the input resistance and input capacitance each of the input channels of each individual oscilloscope vary. This results in a mismatch in the voltage divider ratio between low and high frequency signals and causes uneven frequency characteristics.

There is a variable capacitor for adjusting the division ratio (trimmer) for high frequency signals on the probe. To correct the phase, you must adjust this trimmer so that flat frequency characteristics are obtained.

Be sure to correct the phase of a probe that you are using for the first time.

Because the input capacitance varies on each channel, probe compensation is always required when the probe is switched from one channel to another.

Phase Compensation Signal

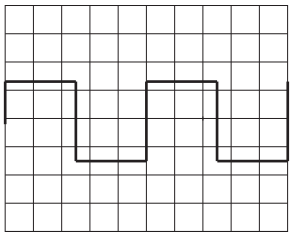
The following square wave signal is output from the signal output terminal for probe compensation adjustment.

Frequency: Approx. 1 kHz

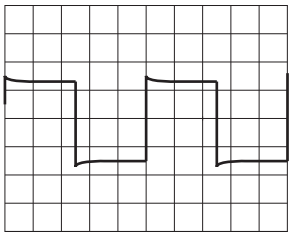
Amplitude: Approx. 1 V

Differences in the Waveform due to the Phase Correction of the Probe

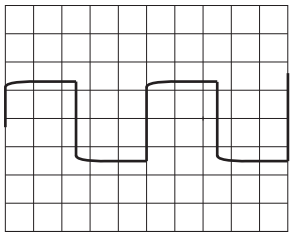
Correct waveform



Overcompensated (The gain in the high frequency region is too high.)



Undercompensated (The gain in the high frequency region is too low.)



2.6 Connecting Logic Probes

WARNING

- When connecting a device under measurement to the instrument, be sure to turn off the device.
- Do not apply voltage exceeding the maximum input voltage.
- To avoid electric shock, be sure to ground the instrument. Furthermore, connect the ground of the probes or input connectors to the ground potential of the device under measurement. The ground of each signal input terminal (input connector) of this instrument is common with the instrument's protective ground (see the block diagram in appendix 3). Do not apply floating potential signals to the input connector ground. This is extremely dangerous as doing so will cause a short to the ground potential.

CAUTION

- The maximum logic probe input voltage is ±40 V (DC + ACpeak) or 28 Vrms for the 701989 and ±42 V (DC + ACpeak) or 29 Vrms for the 701988. Applying a voltage greater than either of these limits may damage the logic probe or the instrument. If the frequency is high, damage may occur even if the voltage is below the values specified above. For information about derating based on frequency, see the user's manual of the logic probe that you are using.
- The eight input lines on the logic port have a common ground. In addition, the ground for the instrument and the ground for the logic port is also a common ground. Do not apply signals with different common voltages. Doing so may damage the instrument, connected logic probes, and connected devices.
- For information about how to handle a logic probe, refer to the user's manual that came with the logic probe.

French

AVERTISSEMENT

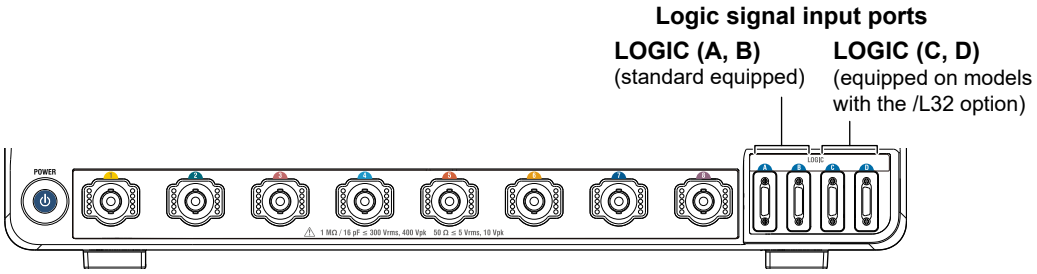
- Lors de la connexion à l'instrument d'un appareil faisant l'objet de la mesure, éteindre impérativement l'appareil.
- Ne pas appliquer de tension supérieure à la tension d'entrée maximum.
- Pour éviter tout risque de choc électrique, l'instrument doit impérativement être relié à la terre. Par ailleurs, connecter la terre des sondes ou les connecteurs d'entrée au potentiel de terre de l'appareil faisant l'objet de la mesure.
  La terre de chaque borne d'entrée du signal (connecteur d'entrée) de cet instrument est commune à la terre de protection de l'instrument (voir le schéma fonctionnel à l'annexe 3).
  Ne pas appliquer de signaux de potentiel flottant à la terre du connecteur d'entrée. Ceci est extrêmement dangereux car le potentiel de terre risque d'être court-circuité.

ATTENTION

- La tension d'entrée maximum pour la sonde logique 701989 est ± 40 V (CC + CA crête) ou 28 Vrms, et la tension d'entrée maximum pour la sonde logique 701988 est ± 42 V (CC + CA crête) ou 29 Vrms. L'application d'une tension supérieure à l'une de ces limites pourrait endommager la sonde logique ou l'instrument. Si la fréquence est élevée, une tension inférieure aux valeurs indiquées ci-dessus pourra tout de même causer des dégâts.
  Pour toute information sur le déclassement basé sur la fréquence, se reporter au manuel d'utilisation de la sonde logique utilisée.
- Les huit lignes d'entrée du port logique partagent la même terre. De plus, la terre de l'instrument et la terre du port logique sont également partagées. Ne pas appliquer de signaux ayant des tensions communes différentes. Cela pourrait endommager l'instrument, les sondes logiques connectées et les appareils connectés.
- Pour toute information sur la manipulation de la sonde logique, se reporter au manuel d'utilisation fourni avec la sonde logique.

Logic Signal Input Ports

Connect a logic probe (701988 or 701989) to the logic signal input port on the front panel.



About the Logic Probes

The 701988 and 701989 logic probes are designed to be connected to the instrument's logic signal input port. You can connect or remove the logic probe regardless of whether the instrument is on or off.

Use an appropriate connection lead for the probe to connect to the point of measurement. Do not alter the connection lead. Doing so may degrade their specifications.

The logic port has eight lines of logic input terminals. You can set the threshold level in the instrument's menu.

Logic Input Specifications When Used with the Instrument

The specifications of the 701988 and 701989 are as follows. For details, see page 6-3.

Item	When using the 701988	When using the 701989
Maximum toggle frequency[1]	100 MHz	250 MHz
Number of input bits	8	
Maximum input voltage[2]	±42 V (DC + ACpeak) or 29 Vrms	±40 V (DC + ACpeak) or 28 Vrms
Input range	±40 V	±6 V (around the threshold level)
Maximum sample rate	Real-time sampling mode: 1.25 GS/s[3] (1.25 GS/s). Values inside parentheses are for high resolution mode.[4] Repetitive sampling mode: 250 GS/s[5] Interpolation sampling mode: 250 GS/s (pulse interpolation for logic waveforms)	
Threshold level	±40 V (resolution: 0.05 V)	±6 V (resolution: 0.05 V)
Threshold accuracy[1]	±(0.1 V + 3% of setting)	
Minimum input voltage	500 mVp-p	300 mVp-p
Input impedance	Approx. 1 MΩ, approx. 10 pF (Typical)[6]	Approx. 100 kΩ, approx. 3 pF (Typical)[6]
Preset threshold levels	CMOS (5 V) = 2.50 V, CMOS (3.3 V) = 1.65 V, CMOS (2.5 V) = 1.25 V, CMOS (1.8 V) = 0.90 V, ECL = –1.30 V	

1 Under standard operating conditions (see section 6.12) after warm-up
2 For frequencies up to 1 kHz.
3 If high resolution mode is off and the sample rate of analog channels is 2.5 GS/s, interpolation (sampling) mode is used.
4 Resolution only improves for analog waveforms.
5 Repetitive sampling is not possible when the trigger source is set to logic input.
6 Typical values represent typical or average values. They are not guaranteed.

2.7 Affixing the Panel Sheet

Affix the supplied panel sheet to the instrument as necessary. The panel sheet that comes with the instrument is determined by language suffix code.

Procedure

Affixing the Panel Sheet

You can affix the panel sheet over the panel sheet that is affixed to the instrument when it is shipped from the factory.

- If the operation panel is stained, wipe gently with a soft, dry, clean cloth.
- Make sure that the panel sheet does not make contact with the keys or knobs. If it does, reaffix the panel sheet.

Note

If you peel off and affix the panel sheet numerous times, the sheet will lose its adhesive strength and will come off more easily.

2.8 Loading Roll Paper Into the Built-In Printer (Optional)

This section explains how to load roll paper into the optional built-in printer.

Printer Roll Paper

Use a YOKOGAWA roll paper. Do not use any other paper. When using the printer for the first time, use the roll paper supplied with the instrument. When you need extra roll paper, please contact your nearest YOKOGAWA dealer.

Part Number:	B9988AE
Specification:	Heat-sensitive paper, 10 m
Minimum Quantity:	10 rolls

Roll Paper Handling

The roll paper is made of heat-sensitive paper that changes color thermochemically. Please read the following information carefully.

Storage Precautions

The heat-sensitive paper starts changing color at about 70°C. The paper can be affected by heat, humidity, or chemicals, whether something has been recorded on it or not. As such, please follow the guidelines listed below.

- Store the paper in a cool, dry, and dark place.
- Use the paper as quickly as possible after you break its protective seal.
- If you attach a plastic film that contains plasticizing material such as vinyl chloride film or cellophane tape to the paper for a long time, the recorded sections will fade due to the effect of the plasticizing material. Use a holder made of polypropylene to store the roll paper.
- When starching the record paper, do not use starches containing organic solvents such as alcohol or ether. Doing so will change the paper's color.
- We recommend that you make copies of the recordings if you intend to store them for a long period of time. Because of the nature of heat-sensitive paper, the recorded sections may fade.

Handling Precautions

- Only use genuine YOKOGAWA roll paper.
- If you touch the roll paper with sweaty hands, there is a chance that you will leave fingerprints on the paper or smudge the recorded sections.
- If you rub the surface of the roll paper against something hard, there is a chance that the paper will change color due to frictional heat.
- If the roll paper comes into contact with products such as chemicals or oil, there is a chance that the paper will change color or that the recorded sections will disappear.

Loading the Roll Paper

CAUTION

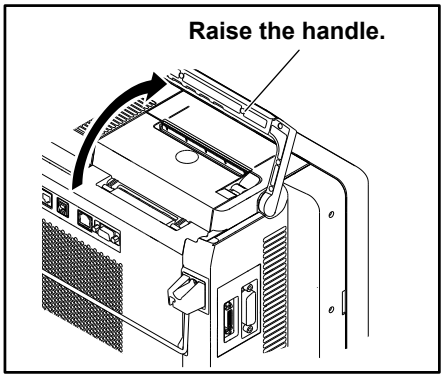
- Do not touch the print head. If you do, you may burn yourself.
- Do not touch the roll paper cutter section at the end of the printer cover. Doing so may cause injury.

French

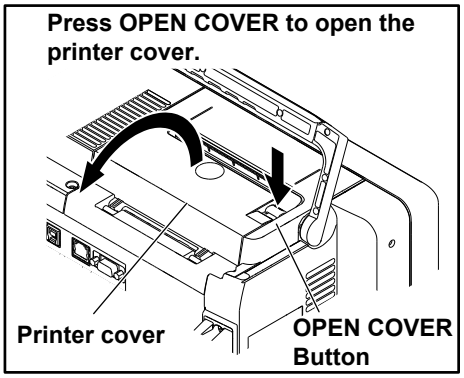
ATTENTION

- Ne pas toucher la tête d'impression. Vous pourriez vous brûler.
- Ne pas toucher la section du coupe-papier à l'extrémité du cache de l'imprimante. Vous pourriez vous blesser

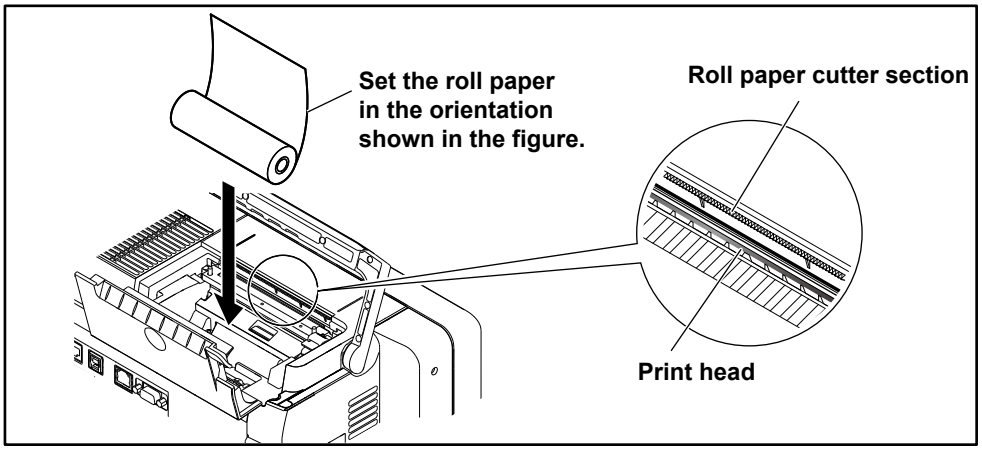
1. Raise the handle.



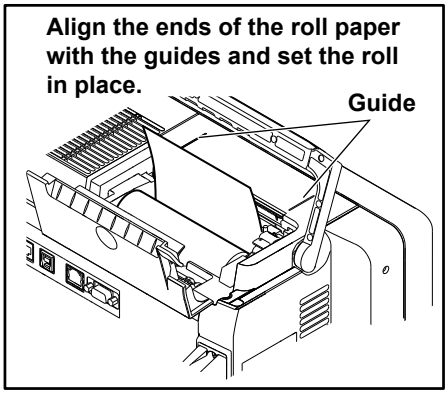
2. Press OPEN COVER to open the printer cover.



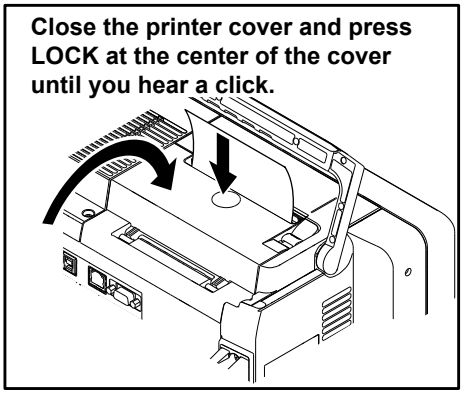
3.



4. Align the ends of the roll paper with the guides and set the roll in place.



5. Close the printer cover and press LOCK at the center of the cover until you hear a click.

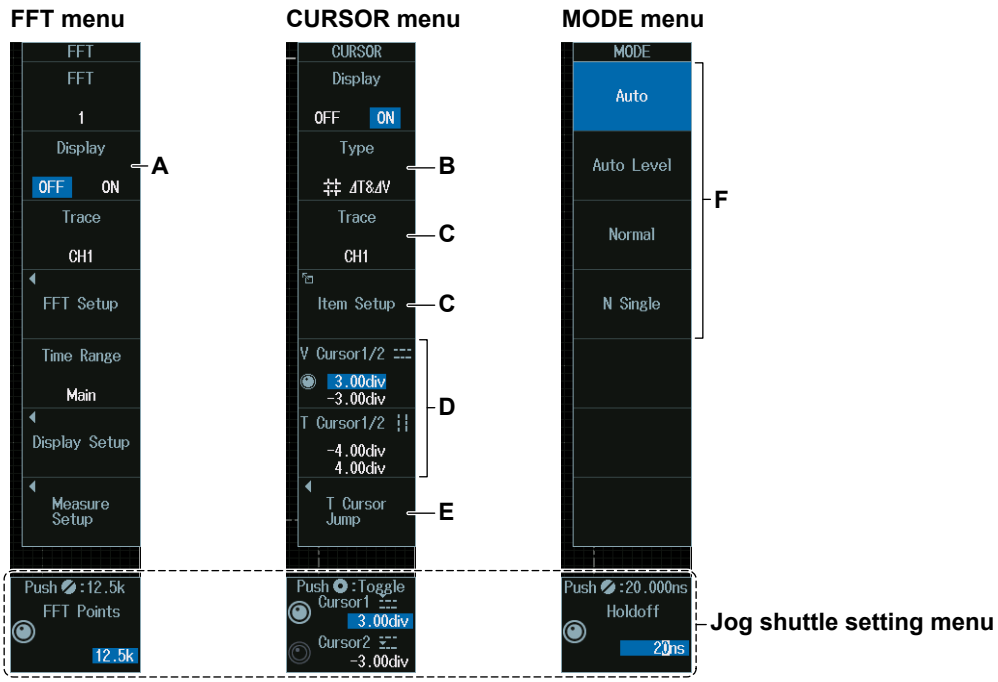


3.1 Key and Jog Shuttle Operations

key Operations

How to Use Setup Menus That Appear When Keys Are Pressed

The operation after you press a key varies depending on the setup menu type.



A: The selected value switches each time you press the soft key.

B: A selection menu appears when you press the soft key.
Press the soft key that corresponds to the appropriate setting.

C: A dialog box, a keyboard, or a selection menu appears when you press the soft key.
Use the jog shuttle and the SET key (●) to configure the settings.

D: Pressing the soft key selects the item that you can control using the jog shuttle. The jog shuttle setting menu shows the selected soft key setting. Depending on the setting, you can set the value by moving between digits using the SET key.

E: A related setup menu appears when you press the soft key.

F: Pressing a soft key selects the corresponding option.

How to Display the Setup Menus That Are Written in Purple below the Keys

In the explanations in this manual, "**SHIFT+key name** or **soft key name** (written in purple)" is used to indicate the following operation.

1. Press **SHIFT**. The SHIFT key illuminates to indicate that the keys are shifted.
   Now you can select the setup menus written in purple below the keys or soft keys.
2. Press the key or soft key that you want to display the setup menu of.

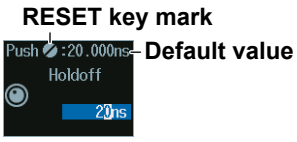
ESC Key Operation

- If you press ESC when a setup menu or available options are displayed, the screen returns to the menu level above the current one.
- If you press ESC when the highest level menu is shown, the display changes as follows.

Operation of pressing ESC	When measured values are displayed	When measured values are not displayed
1st time	The setup menu disappears.	
2nd time	Measured values move outside the waveform area.	The jog shuttle setting menu disappears.
3rd time	The jog shuttle setting menu disappears.	Nothing changes from this point.
—	From this point, the display position of measured values switches between outside the waveform area and inside the area each time you press ESC.	

RESET Key (⊘) Operation

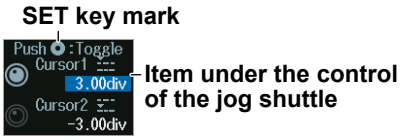
If you press RESET when you are using the jog shuttle to set a value or select an item, the setting is reset to its default value (depending on the operating state of the instrument, the setting may not be reset).



SET Key (●) Operations

The operation varies as indicated below depending on what you are setting.

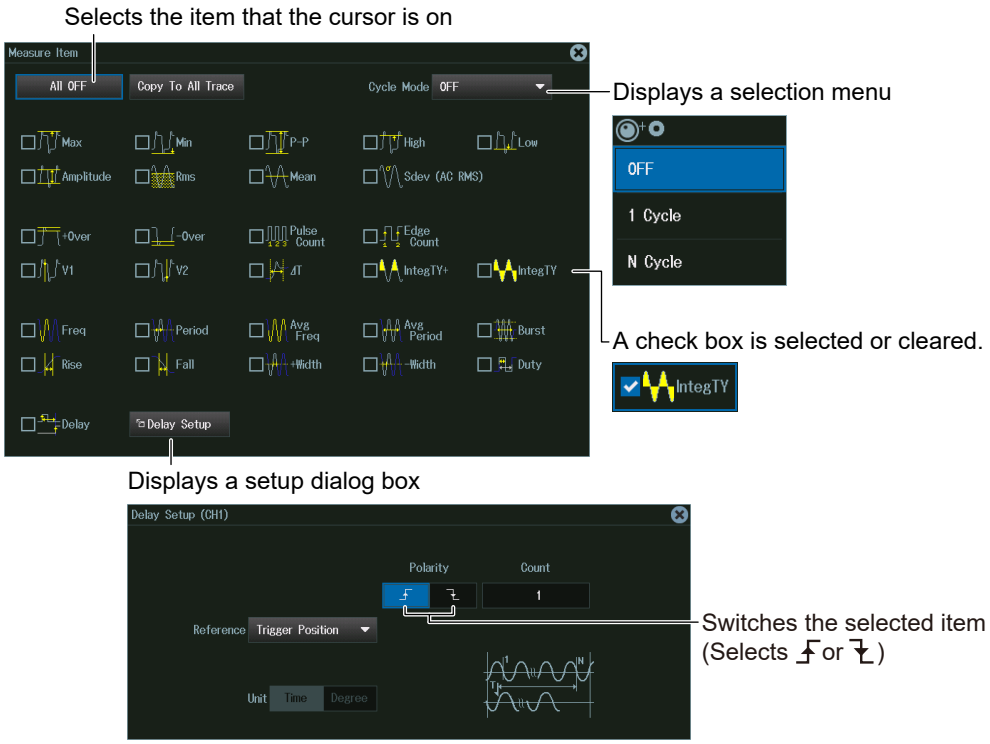
- When there are two values to set in the jog shuttle setting menu
  The setting that the jog shuttle controls switches each time you press the SET key. The jog shuttle mark of the setting being controlled appears bright.



- When the jog shuttle and SET key marks (⊙+●) are displayed in the setup menu
  Press SET to confirm the selected item.
- When setting a value
  Tilting the SET key up or down moves the value up or down.
  Tilting the SET key to the left and right changes which digit your are setting.
- When selecting the item to set
  Tilting the SET key up, down, left, and right moves the cursor.

How to Enter Values in Setup Dialog Boxes

1. Display the appropriate setup dialog box.
2. Turn the **jog shuttle**, or tilt the **SET** key (●) up, down, left, or right to move the cursor to the appropriate item.
3. Press **SET** (●). The operation varies depending on the selected item.



How to Clear Setup Dialog Boxes

Press **ESC**. The setup dialog box closes.

Scroll Operation

If a vertical or horizontal scroll bar is shown on the screen, you can move the **SET** key up and down or left and right to scroll.

3.2 Touch Panel Operations

Touch Panel Operations

The basic touch panel operations are described below.

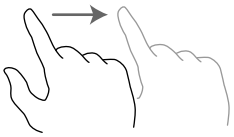
Tap

Tap refers to the act of touching the screen lightly and letting go quickly.
Tapping is used on the instrument screen to select areas with a mark as well as items on setup menus and dialog boxes.



Drag

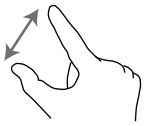
Drag refers to the act of pressing your finger against the screen and moving your finger.
Dragging is used to select a waveform, cursor, zoom box, or the like and move it.



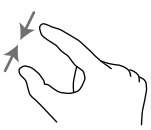
Pinch Out and Pinch In

Pinch out refers to the act of pressing two fingers against the screen and spreading them apart. Pinch in refers to the act of pressing two fingers against the screen and drawing them together.
On a screen displaying waveforms, you can pinch out to zoom in and pinch in to zoom out.

Pinch out



Pinch in

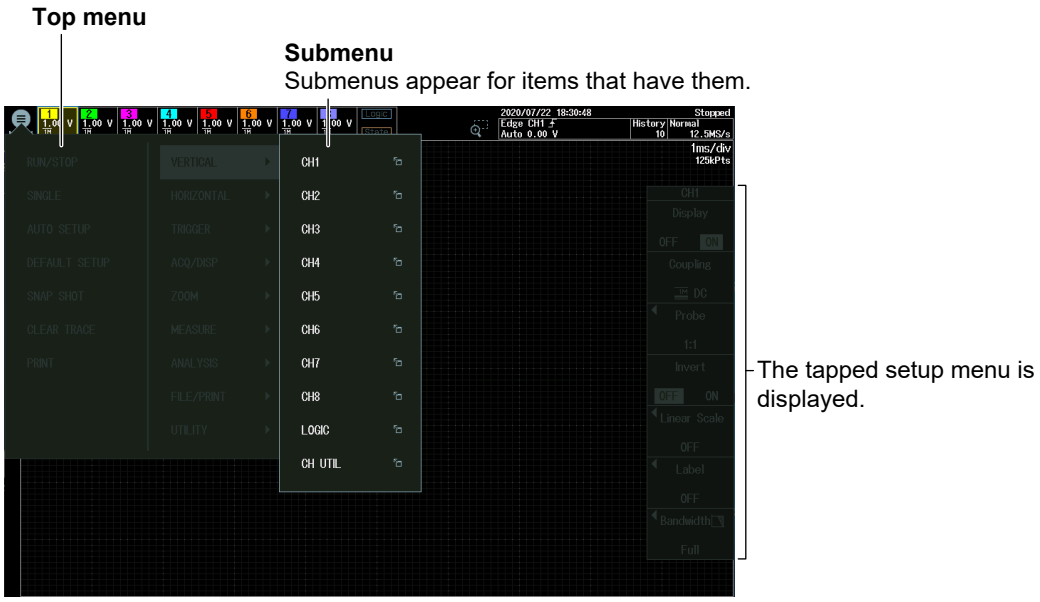


Top Menu Operation (same operation as the front panel keys)

From the top menu, select the item you want to set to display the setup menu. Tapping an item without a setup menu executes the operation of that item.

Displaying the Top Menu and Selecting an Item

1. Tap the top menu icon MENU.
   A menu of the instrument's front panel keys (the top menu) appears.
2. Tap the item you want to select.
   The item that you tapped is executed, or a setup menu for the tapped item appears at the right side of the screen. The top menu disappears.
   If the item has a submenu, the submenu is displayed. To select an item on a submenu, tap it, just as you would on the top menu.



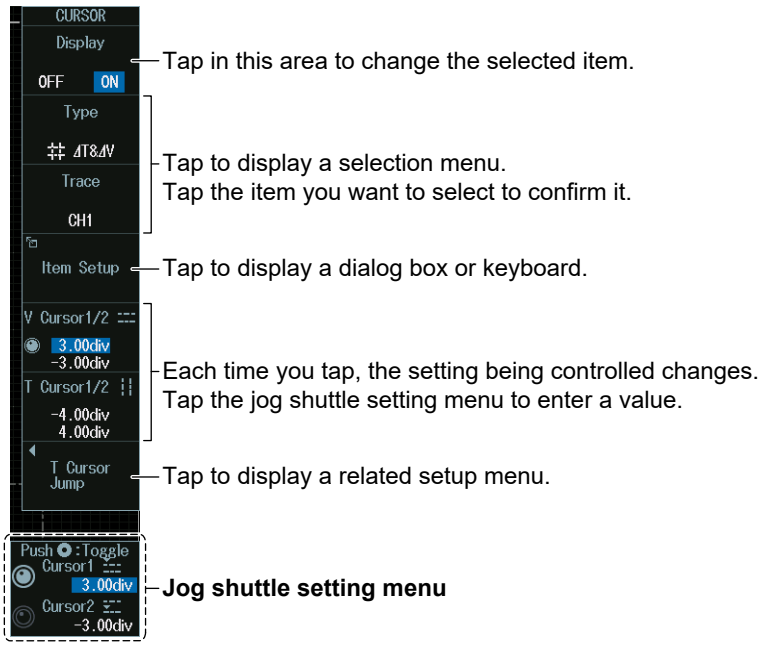
Clearing the Top Menu

To close the top menu or submenu, tap outside the top menu or submenu, or press ESC.

Setup Menu Operations (Same as soft key operations)

Selecting a Setup Menu Item

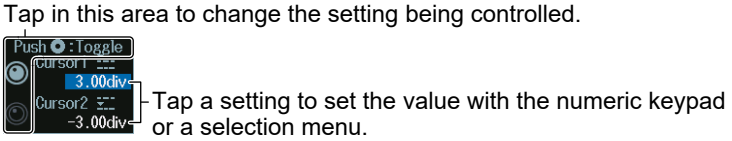
Tap the item you want to select on the setup menu. The operation after you tap varies depending on the setup menu type.



Jog Shuttle Setting Menu

In the jog shuttle setting menu, you can set the value as follows:

- When there is a single ◎ icon, tapping inside the frame displays a numeric keypad or selection menu. When a numeric keypad appears, tap the numeric keypad to input a value. Tap **Enter** to confirm the value. When a selection menu appears, tap the item you want to select.
- When there are two ◎ icons, tapping the ◎ icon switches the setting being controlled. Tapping the setting displays a numeric keypad or a selection menu.



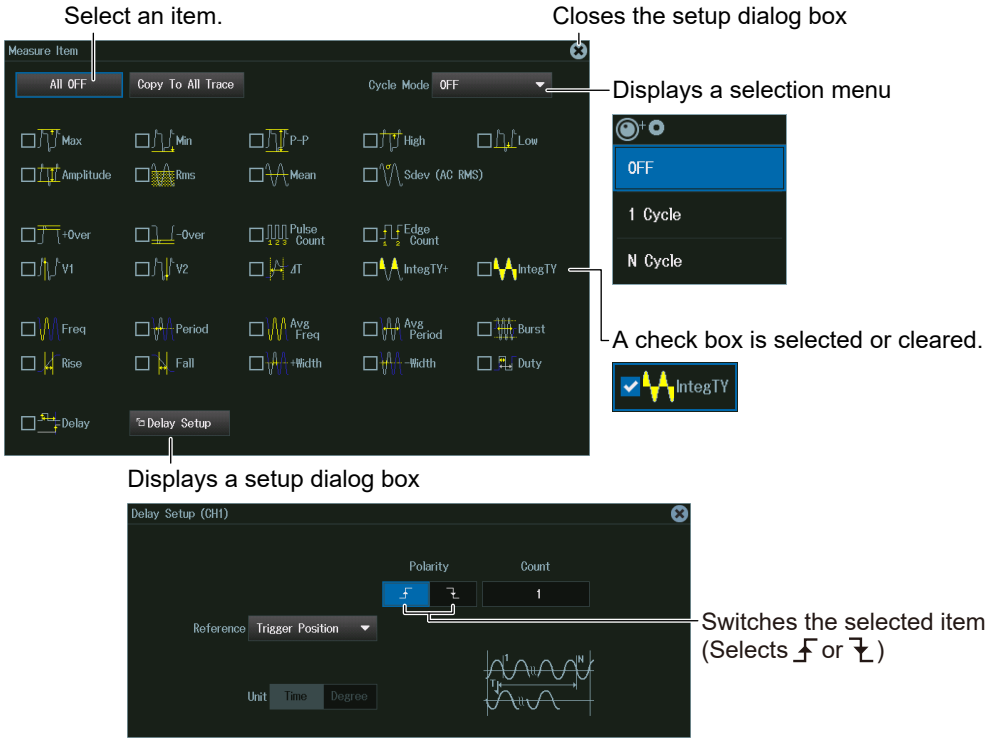
- To reset a value you set to its default value, tap the setting, and tap **Default** in the setup menu that appears. When the setup menu does not appear, press **RESET**.

Clearing a Setup Menu or Setup Screen

Tap outside the setup menu or setup screen, or press ESC.

How to Enter Values in Setup Dialog Boxes

Tap the item you want to select. The operation varies depending on the selected item.

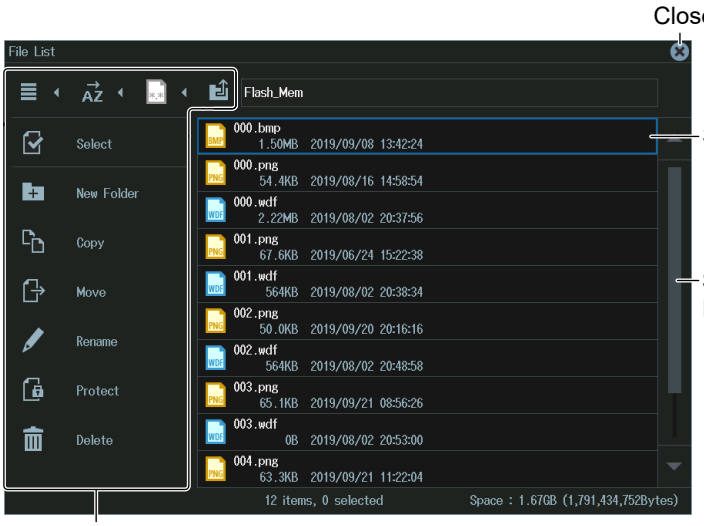


Scroll Operation

If a vertical or horizontal scroll bar is shown on the screen, you can scroll by dragging the scroll bar.

Controlling the File List

Tap the item you want to select. The operation varies depending on the selected item.

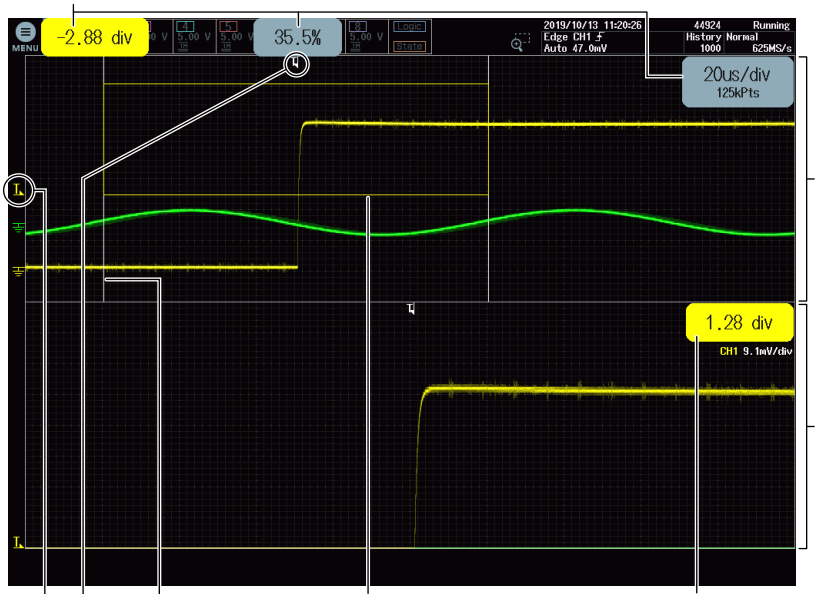


To cancel the selection, tap in the upper right of the screen. The file list will close when you cancel your selection.

Waveform Operation

You can directly zoom and move waveforms from the touch panel.

Display of settings (main window)
When you control a waveform in the main window, the settings are displayed accordingly. The display disappears after a few seconds when you stop controlling the waveform. When you control a waveform in the vertical direction, the settings are displayed in the same color as the target waveform in the upper left of the screen.



Display of settings (zoom window)
When you control a waveform in the zoom window, the settings are displayed accordingly. The display disappears after a few seconds when you stop controlling the waveform. When you control a waveform in the vertical direction, the settings are displayed in the same color as the target waveform.

The operation varies depending on the window you controlling as follows.

Control	Main window	Zoom window
Tap[1]	Selects the waveform	Selects the waveform
Drag horizontally[2]	—	Changes the timescale zoom position[4]
Pinch horizontally	Changes the time scale	Changes the timescale zoom factor[4]
Drag vertically[3]	Moves the selected waveform vertically	Changes the vertical zoom position of the selected waveform[5]
Pinch vertically[3]	Changes the vertical scale of the selected waveform	Changes the vertical zoom factor of the selected waveform[5]

1 The tapped waveform is selected and becomes controllable. If multiple waveforms are displayed overlapped, you can tap repeatedly to select the target waveform.
You can change the trigger level by dragging the trigger level mark vertically. You can also change the trigger level by dragging vertically the horizontal line that appears when you control the trigger level mark.
2 You can move the trigger position by dragging the trigger position mark horizontally.
3 When you control an area that is not displaying a control target (waveform, cursor, etc.), the currently selected waveform becomes a target.
4 The position and range of the time scale zoom box (displayed in white) changes in sync. You can also drag the zoom box to change the zoom position.

5 The position and range of the vertical zoom box (displayed in the zoom source waveform color) changes in sync. You can also drag the zoom box to change the zoom position.

Note

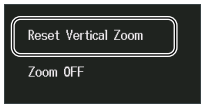
Cursors and zoom boxes can be dragged to change their positions. In addition, the following cursors can be moved between the main window and zoom windows.

ΔT cursor, ΔV cursor, ΔT&ΔV cursor, marker cursor, angle cursor, cursors (T Range1 and T Range2) indicating the range for performing automated measurement of waveform parameters, cursors (Start Point and End Point) indicating the waveform search range, etc.

Resetting the Vertical Zoom Position and Zoom Factor

1. Hold down the zoom window.

The following screen appears. To cancel the operation, tap an area outside the displayed screen.



2. Tap **Reset Vertical Zoom**.

The vertical zoom position and zoom factor of all waveforms are reset to default values.

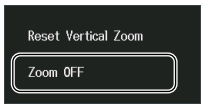
Note

This is the same function as Vertical Zoom Reset on the ZOOM menu.

Turning off the Zoom Window Display

1. Hold down the zoom window.

The following screen appears. To cancel the operation, tap an area outside the displayed screen.



2. Tap the **Zoom OFF** tab.

The zoom window display is turned off.

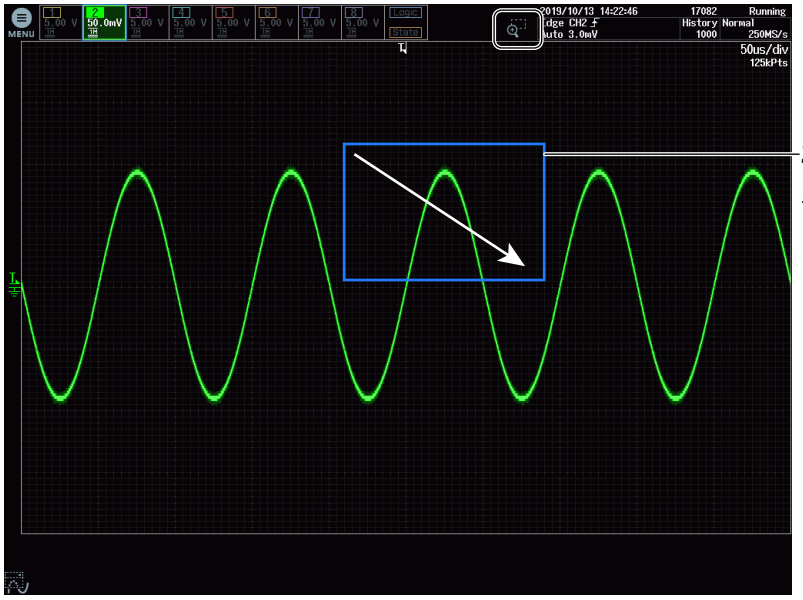
Setting a Range and Zooming the Waveform

By dragging the area to zoom, you can set the zoom position and zoom factor in the time and vertical directions simultaneously.

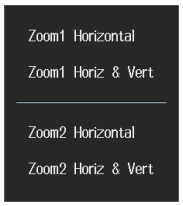
1. Tap  at the top of the screen.

-  is highlighted, and you will be able to set the area.
- To cancel controlling, tap  again.
  You can also cancel controlling by tapping any area on the screen or pressing any key on the front panel.

2. In the main window or zoom window, drag diagonally the area to zoom.
A rectangular frame is displayed, and the zoom area is set.



3. The following screen appears. Select the target item.



- To cancel the operation, tap an area outside the displayed screen or press any key on the front panel.
- A zoom waveform is displayed according to the selected item.

Item	Time axis direction	Vertical direction	Displayed zoom window
Zoom1 Horizontal	○	—	ZOOM1
Zoom1 Horiz & Vert	○	○	ZOOM1
Zoom2 Horizontal	○	—	ZOOM2
Zoom2 Horiz & Vert	○	○	ZOOM2

○: The zoom area set in step 2 is displayed in the zoom window.
-: The vertical zoom position and zoom factor of all waveforms are reset to their default values.

4. To cancel zooming, tap the **Undo** soft key.
The screen returns to the state that was in before setting the zoom area.



Note

Vertical zoom

- If you set the zoom area in the main window, the vertical zoom position and zoom factor will be the same for all waveforms.
- If you set the zoom area in the zoom window, the content of the zoom window is zoomed further.

3.3 Entering Values and Strings

Entering Values

Using the Dedicated Knobs

You can use the following dedicated knobs to enter values directly.

- POSITION knob (VERTICAL, HORIZONTAL)
- SCALE knob (VERTICAL)
- TIME/DIV knob
- LEVEL knob (TRIGGER)
- ZOOM magnification knob

Using the Jog Shuttle

Select the appropriate item using the soft keys, and change the value using the jog shuttle and the SET key. This manual sometimes describes this operation simply as “using the jog shuttle.”

Note

For items that you can set using the jog shuttle, you can reset them to their default values by pressing the RESET key.

Using the Touch Panel

Use the numeric keypad that appears on the screen to enter values. After you enter the value, tap a unit or **Enter** to confirm it.

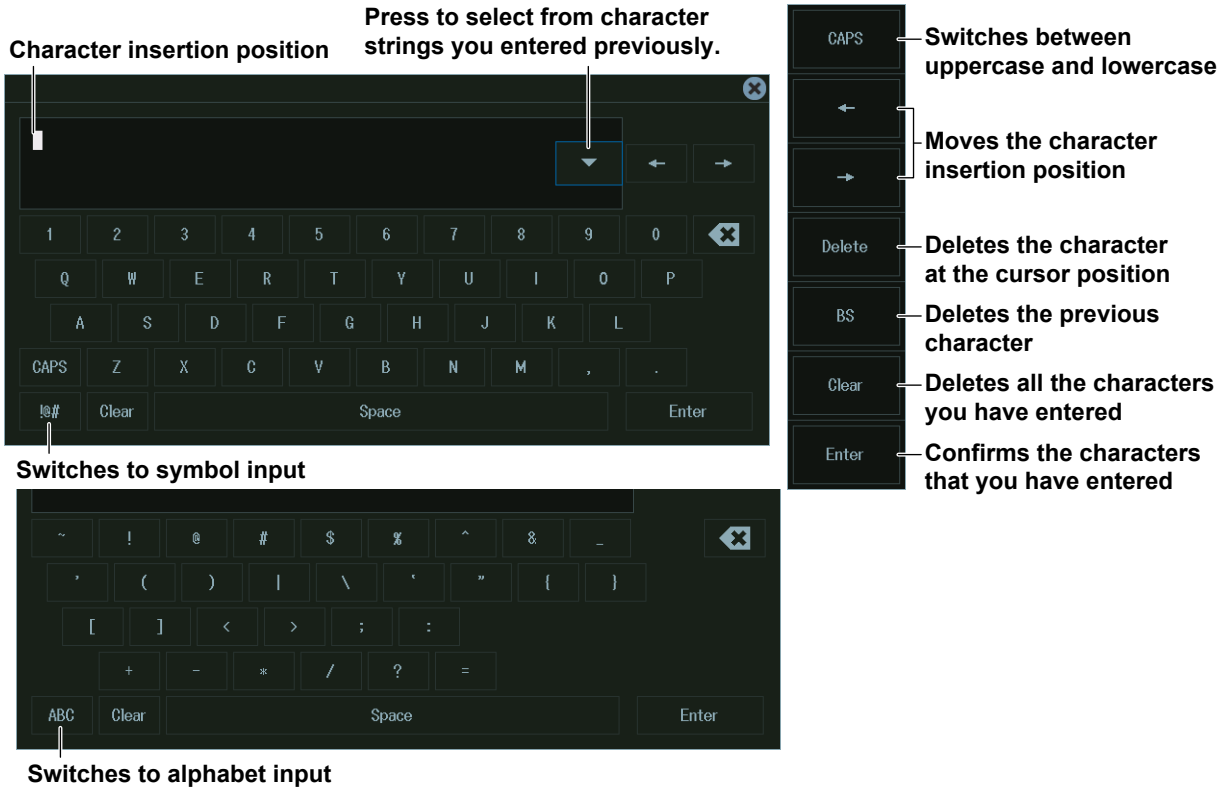


Enter a unit.

Enter an exponent.

Entering Character Strings

Use the keyboard that appears on the screen to enter character strings such as file names and comments.



How to Operate the Keyboard

Use the jog shuttle and the SET key to operate the keyboard and enter a character string. If you turn on the touch panel, you can tap the keyboard to enter character strings.

1. After bringing up the keyboard, use the **jog shuttle** to move the cursor to the character that you want to enter. You can also tilt the **SET** key up, down, left, and right to move the cursor.
2. Press **SET** to enter the character.
   - If a character string has already been entered, use the arrow soft keys to move the cursor to the position you want to insert characters into.
   - Use the **CAPS** soft key to switch between uppercase and lowercase.
   - To enter a symbol, select !@# on the keyboard, and press **SET**.
   - Use the **Delete** soft key to delete the character at the cursor.
   - Use the **BS** soft key or ⌫ on the keyboard to delete the previous character.
   - Use the **Clear** soft key to clear all the entered characters.
3. Repeat steps 1 and 2 to enter all of the characters in the string.
   Select ▼ on the keyboard to display a list of character strings that you have entered previously. Use the **jog shuttle** to select a character string, and press **SET** to enter the selected character string.
4. Press the **Enter** soft key, or move the cursor to Enter on the keyboard, and press **SET** to confirm the character string and clear the keyboard.

Note

- @ cannot be entered consecutively.
- File names are not case-sensitive. Comments are case-sensitive. The following file names cannot be used due to MS-DOS limitations:
  AUX, CON, PRN, NUL, CLOCK, COM1 to COM9, and LPT1 to LPT9

3.4 Using USB Keyboards and Mouse Devices

Connecting a USB Keyboard

You can connect a USB keyboard and use it to enter file names, comments, and other items.

Compatible Keyboards

You can use the following keyboards that conform to USB Human Interface Devices (HID) Class Ver. 1.1.

- When the USB keyboard language is English: 104-key keyboard
- When the USB keyboard language is Japanese: 109-key keyboard

Note

- Do not connect incompatible keyboards.
- The operation of USB keyboards that have USB hubs or mouse connectors is not guaranteed.
- For USB keyboards that have been tested for compatibility, contact your nearest YOKOGAWA dealer.

USB Ports for Peripherals

Connect a USB keyboard to one of the USB ports for peripherals on the front panel.

Connection Procedure

Connect the type A connector of the USB keyboard to the instrument. You can connect or remove the USB cable regardless of whether the instrument's power switch is on or off (hot-plugging is supported). When the power switch is turned on, the keyboard is detected and enabled approximately 6 seconds after it is connected.

Note

- Only connect a compatible USB keyboard, mouse, printer, or storage device to the USB port for peripherals.
- Do not connect multiple keyboards. You can connect one keyboard, one mouse, and one printer.
- Do not connect and disconnect multiple USB devices repetitively. Wait for at least 10 seconds after you connect or remove one USB device before you connect or remove another USB device.
- Do not remove USB cables during the time from when this instrument is turned on until key operation becomes available (approximately 20 seconds).

Entering File Names, Comments, and Other Items

When a keyboard is displayed on the screen, you can enter file names, comments, and other items using the USB keyboard.

Using a USB Mouse

You can connect a USB mouse and use it to perform the same operations that you can perform with the keys of this instrument. Also, by clicking a menu item, you can perform the same operation that you can perform by pressing the menu item's soft key or selecting the menu item and pressing the SET key.

USB Ports for Peripherals

Connect a USB mouse to one of the USB ports for peripherals on the front panel of the instrument.

Compatible USB Mouse Devices

You can use mouse devices that are compliant with USB HID Class Version 1.1.

Note

For USB mouse devices that have been tested for compatibility, contact your nearest YOKOGAWA dealer.

Connection Procedure

To connect a USB mouse to the instrument, use one of the USB ports for peripherals. You can connect or disconnect the USB mouse at any time regardless of whether the instrument is on or off (hot-plugging is supported). When the power switch is on, the mouse is detected approximately 6 seconds after it is connected, and the mouse pointer (↖) appears.

Note

Only connect a compatible USB keyboard, mouse, printer, or storage device to the USB port for peripherals.

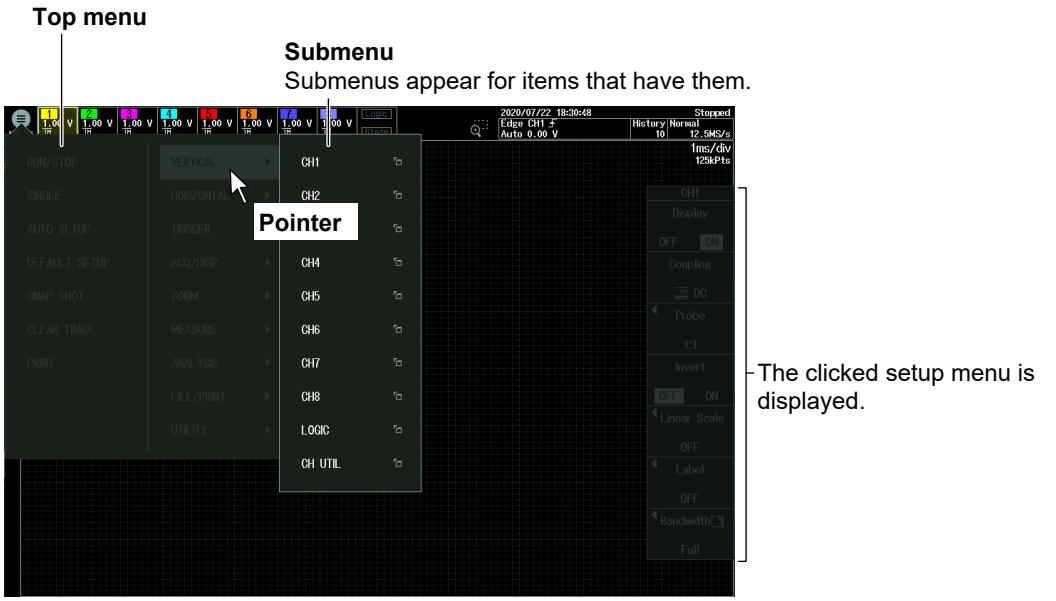
Controlling the Instrument Using a USB Mouse

Top Menu Operation (same operation as the front panel keys)

From the top menu, select the item you want to set to display the setup menu. Tapping an item without a setup menu executes the operation of that item.

Displaying the Top Menu and Selecting an Item

1. Click the MENU icon on the top menu.
   A menu of the instrument's front panel keys (the top menu) appears.
2. Click the item that you want to select.
   The item that you clicked is executed, or a setup menu for the clicked item appears at the right side of the screen. The top menu disappears.
   If the item has a submenu, the submenu is displayed. To select an item on a submenu, click it, just as you would to select an item on the top menu.



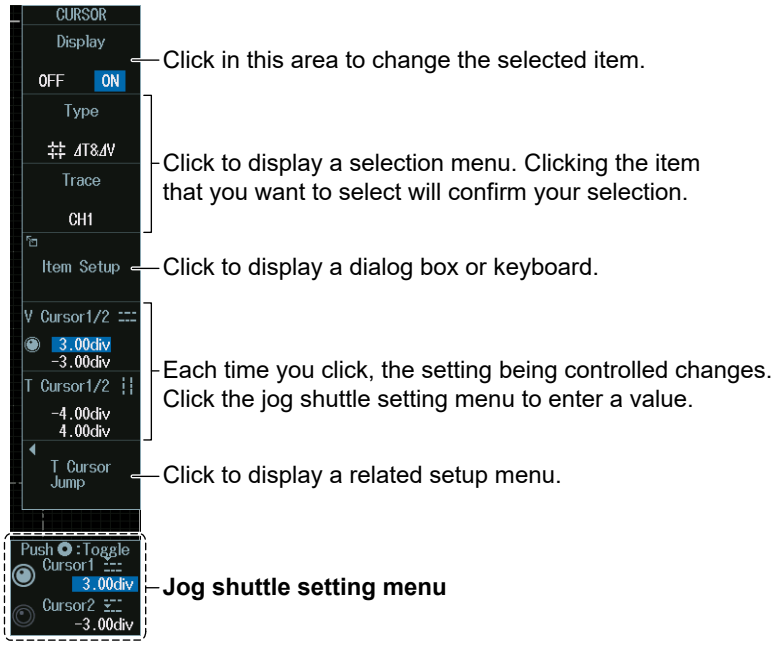
Clearing the Top Menu

To close the top menu or submenu, tap outside the top menu or submenu, or press ESC.

Setup Menu Operations (Same as soft key operations)

Selecting a Setup Menu Item

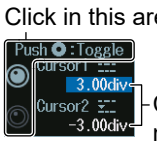
Click the setup menu item that you want to select. The operation after you click varies depending on the setup menu type.



Jog Shuttle Setting Menu

In the jog shuttle setting menu, you can set the value as follows:

- When there is a single ◎ icon, clicking inside the frame displays a numeric keypad or selection menu. When a numeric keypad appears, click the numeric keypad to input a value. Click **Enter** to confirm the value. When a selection menu appears, click the item you want to select.
- When there are two ◎ icons, clicking the ◎ icon switches the setting being controlled. Clicking the setting displays a numeric keypad or a selection menu.



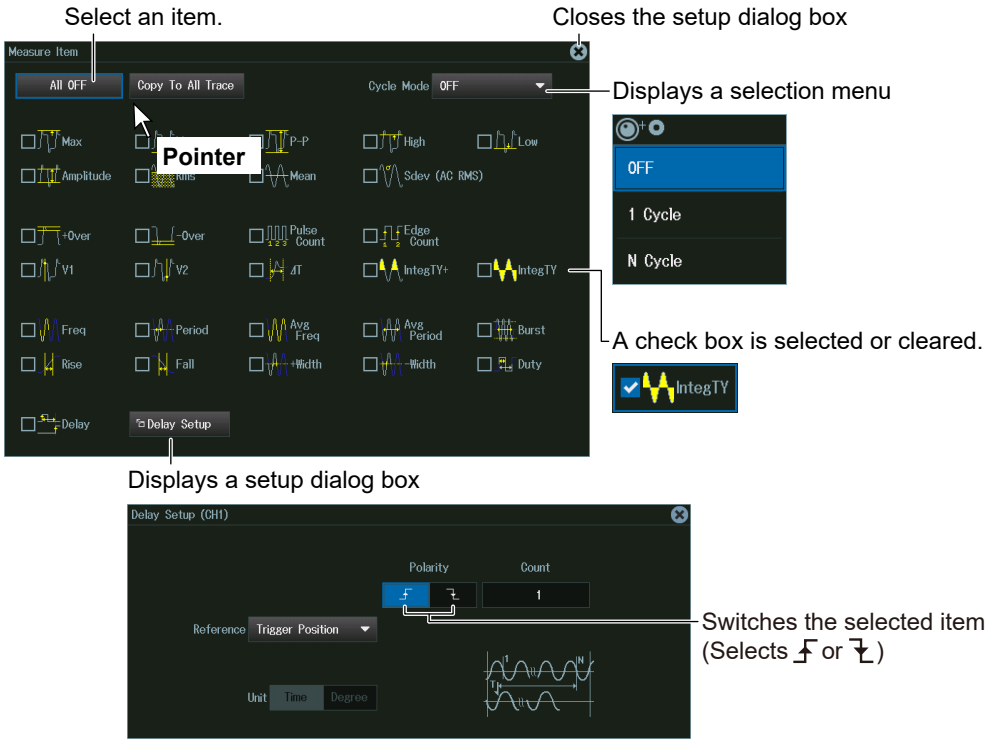
- To reset a value you set to its default value, click the setting, and click **Default** in the setup menu that appears. When the setup menu does not appear, press **RESET**.

Clearing a Setup Menu or Setup Screen

Move the pointer and click outside the setup menu or setup screen, or press ESC.

How to Enter Values in Setup Dialog Boxes

To select an item, click it. The operation varies depending on the selected item.

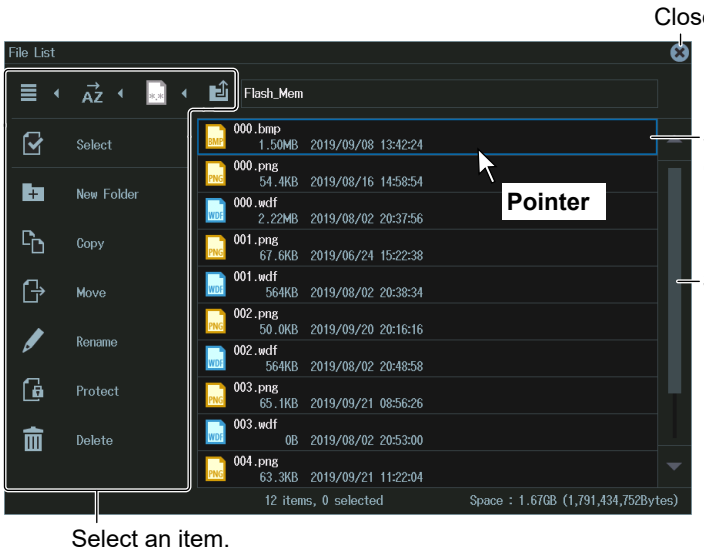


Scroll Operation

If a vertical or horizontal scroll bar is shown on the screen, you can scroll by dragging the scroll bar.

Controlling the File List

To select an item, click it. The operation varies depending on the selected item.



To cancel the selection, click in the upper right of the screen. The file list will close when you cancel your selection.

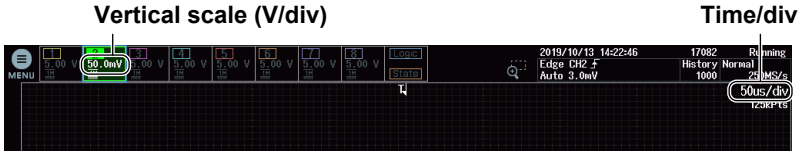
Controlling the Vertical Scale (V/div) and Time/div

Controlling the Vertical Scale (V/div)

When the waveform of a channel whose voltage is being measured appears on the display, move the pointer close to the V/div value. Rotate the mouse wheel forward to decrease the V/div value, and rotate it back to increase the value. If you click the mouse wheel so that Fine illuminates, the resolution is set to fine mode.

Controlling Time/div

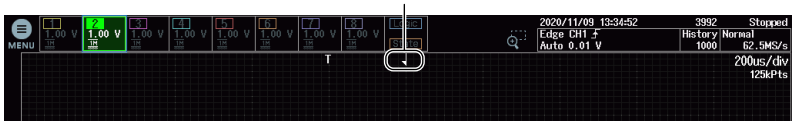
Move the pointer close to the time/div value that is displayed in the upper right of the screen. Rotate the mouse wheel forward to decrease the Time/div value, and rotate it back to increase the value.



Controlling the Trigger Position

Move the pointer close to ↓ displayed on the screen. Drag the mouse horizontally to move the trigger position.

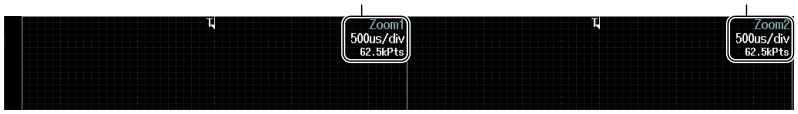
Trigger position mark (↓)



Controlling Time/div during Zooming

During zoom display, move the pointer close to the Time/div value displayed in the zoom window. Rotate the mouse wheel forward to increase the zoom factor, and rotate it back to decrease the value. If click the mouse wheel so that Fine illuminates, the resolution is set to fine mode.

Zoom1 Time/div **Zoom2 Time/div**

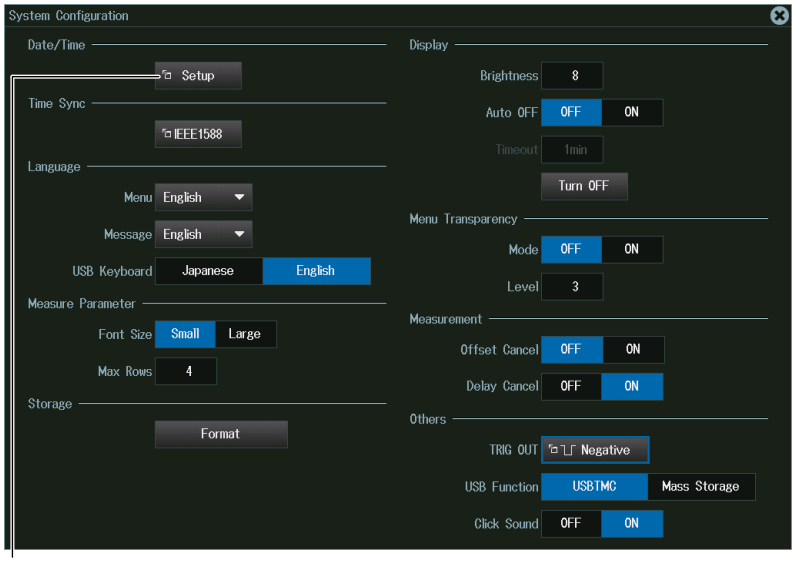


3.5 Synchronizing the Clock

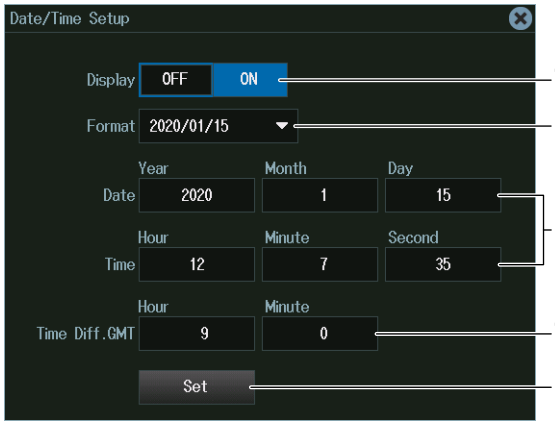
This section explains how to set the instrument's clock, which is used to generate timestamps for measured data and files. The instrument is factory shipped with a given date and time. You must set the clock before you start measurements.

Procedure

Press **UTILITY** and then the **System Configuration** soft key. The following menu appears.



Clock settings



Turns the date and time display on or off

Display format

Date and time

Time difference from Greenwich Mean Time

Confirms the settings

Explanation

Turning the Date and Time Display On and Off (Display)

Specify whether to display the date and time on the instrument screen.

Display Format (Format)

Select the display format from one of the following options.

- Year/month (number)/day
- Day/month (number)/year
- Date-month (abbreviations)-year (lower two digits)
- Date month (abbreviations)-year

Time Difference from Greenwich Mean Time (Time Diff. GMT)

Set the time difference between the region where you are using the instrument and Greenwich Mean Time.

Selectable range: -12 hours 00 minutes to 13 hours 00 minutes

For example, Japan standard time is ahead of GMT by 9 hours. In this case, set Hour to 9 and Minute to 0.

Checking the Standard Time

Using one of the methods below, check the standard time of the region where you are using the instrument.

- Check the Date, Time, Language, and Regional Options on your PC.
- Check the website at the following URL: https://www.worldtimeserver.com/

Note

- This instrument does not support Daylight Saving Time. To set the time to Daylight Saving Time, reset the time difference from Greenwich Mean Time.
- Date and time settings are backed up using an internal lithium battery. They are retained even if the power is turned off.
- This instrument has leap-year information.
- The setting of the time difference from Greenwich Mean Time is shared with the IEEE 1588 time synchronization feature.
  For details on the IEEE 1588 time synchronization feature, see the *User's Manual*, IM DLM5058-02EN.

3.6 Performing Auto Setup

Procedure

Executing Auto Setup

1. Press **AUTO**.
   Auto setup is executed, and an Undo menu item appears.

Undoing Auto Setup

2. Press the **Undo** soft key.
   The settings from immediately before the auto setup was executed will be restored.



Executes undo

Explanation

The auto setup feature automatically sets the vertical scale (V/div), time scale (Time/div), trigger level, and other settings to the most suitable values for the input signals.

Center Position after the Execution of Auto Setup

The center position after you execute auto setup will be 0 V.

Source Channels

CH1 to CH8 (CH1 to CH4 on 4ch models)
Logic waveforms are displayed with the same settings that were used before you executed auto setup.

Waveforms Displayed before the Execution of Auto Setup

When you perform auto setup, the data in the acquisition memory is overwritten, and the waveforms that were displayed before you executed auto setup are cleared.

Undoing Auto Setup

You can press the Undo soft key to restore the settings from immediately before the auto setup was executed. You cannot undo auto setup if you switch to a different setup menu or clear the Undo menu using the ESC key.

Signals That Auto Setup Can Be Applied To

Frequency: Approx. 50 Hz or higher
Absolute input voltage: Signals whose maximum value is at least approx. 20 mV (at 1:1 setting)
Type: Simple, repeating signals

Note

- The auto setup feature may not work properly for signals that include a DC component or high-frequency components.
- To measure serial bus signals, execute auto setup from the appropriate serial bus signal setup menu.

Settings after the Execution of Auto Setup

CH1 to CH8 Settings	
Position	0 div
Coupling	The same as the value used before you executed auto setup. However, if the setting before executing the auto setup was AC, this is set to DC.
Bandwidth	Full
Offset	0 V
Invert	OFF
Acquisition Settings	
Record Length	The same as the value used before you executed auto setup. However, if the record length is such that the instrument can only acquire waveforms in Single mode, the record length is set to the maximum record length at which the instrument can acquire waveforms repeatedly.
Mode	Normal
Hi Resolution	OFF
Sampling Mode	Interpolation
Trigger Settings	
Trigger Type	Edge
Trigger Mode	Auto
Holdoff	20 ns
Delay	0 s
Position	50%
Slope	Rising ()
HF Rejection	OFF
Noise Rejection	Low ()
Settings That Depend on the Input Signal	
Display	On if the instrument detects a voltage of ±20 mV (1:1) or higher and off otherwise
V/div	The instrument selects the range with the highest sensitivity that does not exceed ±3.5 div.
Trigger Level	Center
Trigger Source	The channel with the lowest frequency among the signals whose amplitude (Max – Min) is at least 1 div
Time/div	The fastest sweep range that allows at least two periods of the fastest signal among the signals whose amplitude is at least 1 div to be observed. The sweep range must be at least 5 ms/div.

The values of settings not listed here do not change.

3.7 Resetting the Instrument to Its Factory Default Settings

Procedure

Resetting to Factory Default Settings

1. Press **DEFAULT**.
   The instrument is reset to its factory default settings. An Undo menu item appears.

Undoing the Reset Operation

2. Press the **Undo** soft key.
   The previous settings are restored.



Executes undo

Explanation

You can reset the instrument settings to their factory default values. This feature is useful when you want to cancel all the settings that you have entered or when you want to redo measurement from scratch.

Settings That Cannot Be Reset to Their Factory Default Values

- Date and time settings
- Communication settings
- Language setting (English or Japanese)
- Measured value font size setting
- Transparent display on and off, transparency level
- Touch panel feature on and off

Undoing the Reset Operation

If you reset the settings by mistake, you can press the Undo soft key to restore the previous settings. However, you cannot undo the reset operation if you clear the Undo menu item by switching to a different setup menu or pressing the ESC key.

To Reset All Settings to Their Factory Default Values

While holding down the RESET key (⊘), turn the power switch on. All settings are reset to their factory default values except the date and time settings (the display on/off setting will be reset) and the setup data stored in internal memory.

3.8 Calibrating the Instrument

Procedure

Press **UTILITY** and then the **Calibration** soft key. The following menu appears.



Executes calibration

Turns auto calibration on and off

Explanation

Calibration

You can calibrate the vertical axis ground level and gain. Execute calibration when you want to make accurate measurements.

Note

Calibration is automatically performed when the power switch is turned on.

Notes about Calibration

- Allow the instrument to warm up for at least 30 minutes before you execute calibration. If you execute calibration immediately after power-on, the calibrated values may drift due to temperature changes or other environmental changes.
- Execute calibration in a stable temperature environment ranging from 5 to 40°C (23 ± 5°C recommended).
- Do not apply signals when calibrating. Calibration may not be executed properly when input signals are being applied to the instrument.

Auto Calibration (Auto Cal)

Auto calibration is executed when you perform one of the following operations and any of the time periods listed below has elapsed since the power was turned on.

90 seconds, 3 minutes, 10 minutes, 30 minutes, 1 hour, and each following hour

- Change the time scale (time/div) during waveform acquisition (when the RUN/STOP key is illuminated)
- Start waveform acquisition after stopping waveform acquisition (so that the RUN/STOP key is not illuminated)

Note

If calibration is executed while signals are being applied to the instrument, we recommend that you stop signal application and recalibrate the instrument.

3.9 Starting and Stopping Waveform Acquisition

Procedure

Starting and Stopping Waveform Acquisition

1. Press **RUN/STOP**.
   - The RUN/STOP key illuminates, and waveform acquisition starts. The acquired waveform is displayed.
   - If you set the record length to a value that allows only one waveform to be acquired, pressing the RUN/STOP key will produce the same result as pressing the SINGLE key.
2. Press **RUN/STOP** again.
   The RUN/STOP key light turns off, and waveform acquisition stops.

Acquiring a Single Waveform

Press **SINGLE**.

- The SINGLE key illuminates, and waveform acquisition starts. The acquired waveform is displayed.
- The trigger mode is set to Single mode, and the instrument acquires a waveform.
- When the instrument triggers, it acquires and displays only one waveform and then stops waveform acquisition. The SINGLE key light turns off.
- To stop waveform acquisition, press RUN/STOP.

Explanation

Waveform Acquisition and Indicators

- When the RUN/STOP key or SINGLE key is illuminated, the instrument is acquiring waveforms. “Running” appears in the upper right of the screen.
- When the RUN/STOP key or SINGLE key is not illuminated, waveform acquisition is stopped. “Stopped” appears in the upper right of the screen.

Instrument Operation When the Acquisition Mode Is Set to Averaging

- Averaging stops when you stop waveform acquisition.
- If you restart waveform acquisition again, averaging starts from the beginning.

Running and Stopping Operations during Accumulation

- Accumulation stops when you stop waveform acquisition.
- If you restart waveform acquisition, past waveforms are cleared, and accumulation starts over.

Note

- If you start waveform acquisition using RUN/STOP, past data stored in the acquisition memory is cleared.
- You can use the snapshot feature to retain the displayed waveform on the screen. This feature allows you to retain the waveform that you have taken a snapshot of on the screen while the instrument continues signal acquisition.
- If you change the settings related to waveform acquisition conditions, such as the vertical axis, horizontal axis, and trigger, while waveform acquisition is stopped, the changes take effect the next time waveform acquisition is executed.
  However, if you change the vertical scale, vertical position, time scale, trigger position, or the like, the waveform is expanded, reduced, or moved, and a preview is displayed with the waveform acquisition stopped.

3.10 Displaying and Using the Help File

The content similar to the Features Guide, IM DLM5058-01EN, is included in this instrument as a help file (some the content may be omitted).

Procedure

Displaying the Help File

Press **?**. A help document appears.
The table of contents and index appear in the left frame, and text appears in the right frame.

Switching between Frames

To switch to the frame that you want to scroll through or otherwise control, tilt the **SET** key (◉) left and right.

Moving Cursors and Scrolling

To scroll through the screen or move the cursor in the table of contents or index, turn the jog shuttle.

Moving to the Link Destination

To move to a description that relates to blue text or to move from the table of contents or index to the corresponding description, move the cursor to the appropriate blue text or item, and press the **SET** key.

Displaying Panel Key Descriptions

With the help file displayed, press a panel key to display an explanation of it.

Returning to the Previous Screen

To return to the previous screen, press **RESET** (⊘).

Hiding the Help File

When the help file is displayed, press **?**. The help file closes.

4.1 External Trigger Input (TRIGGER IN)

CAUTION

Only apply signals that meet the specifications below. Excessive voltage or the like may damage the instrument.

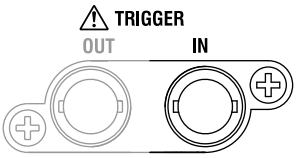
French

ATTENTION

Les signaux ne correspondant pas aux spécifications risquent d'endommager cet instrument, à cause de facteurs tels qu'une tension excessive.

External Trigger Input Terminal (TRIGGER IN)

This terminal is used when an external signal is used as the trigger source.



Item	Specifications
Connector type	BNC
Maximum input voltage	±40 V (DC + ACpeak) or 28 Vrms (At 1 MHz and higher, the voltage decreases at 20 dB/decade down to ±5 V (DC+ACpeak) or 2 Vrms.)
Input frequency bandwidth	DC to 100 MHz
Input impedance	Approx. 1 MΩ, approx. 16 pF
Input range	±2 V ±20 V
Trigger sensitivity	0.1 Vp-p (for the ±2 V range) 1 Vp-p (for the ±20 V range)
Trigger level	±2 V. The resolution is 5 mV (for the ±2 V range). ±20 V. The resolution is 50 mV (for the ±20 V range).

4.2 Trigger Output (TRIGGER OUT)

CAUTION

Do not short the TRIGGER OUT terminal or apply external voltage to it. If you do, the instrument may malfunction.

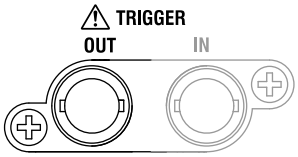
French

ATTENTION

Ne pas mettre la borne TRIGGER OUT en court-circuit et ne pas y appliquer une tension externe. Si vous le faites, l'instrument risque de ne pas fonctionner correctement.

Trigger Output Terminal (TRIGGER OUT)

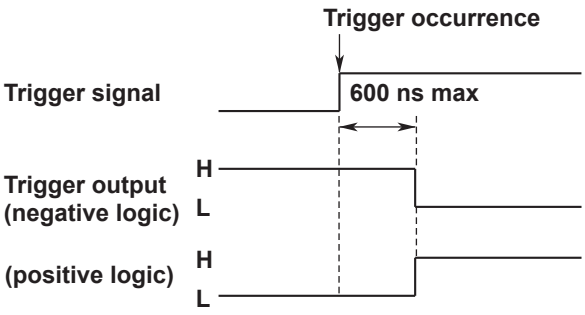
A 3.3 V CMOS level signal is output when the instrument triggers. The signal level is normally high but goes low when a trigger occurs.



Item	Specifications
Connector type	BNC
Output level	3.3 V CMOS
Output impedance	Approx. 50 Ω
Output logic	Negative logic (⊓) and positive logic (⊔) switchable
Output delay time	600 ns or less*
Output hold time	For negative logic, the low level is 500 ns min. and the high level is 50 ns min. For positive logic, the high level is 500 ns min. and the low level is 50 ns min.

* When deskewing is not used

Output Timing

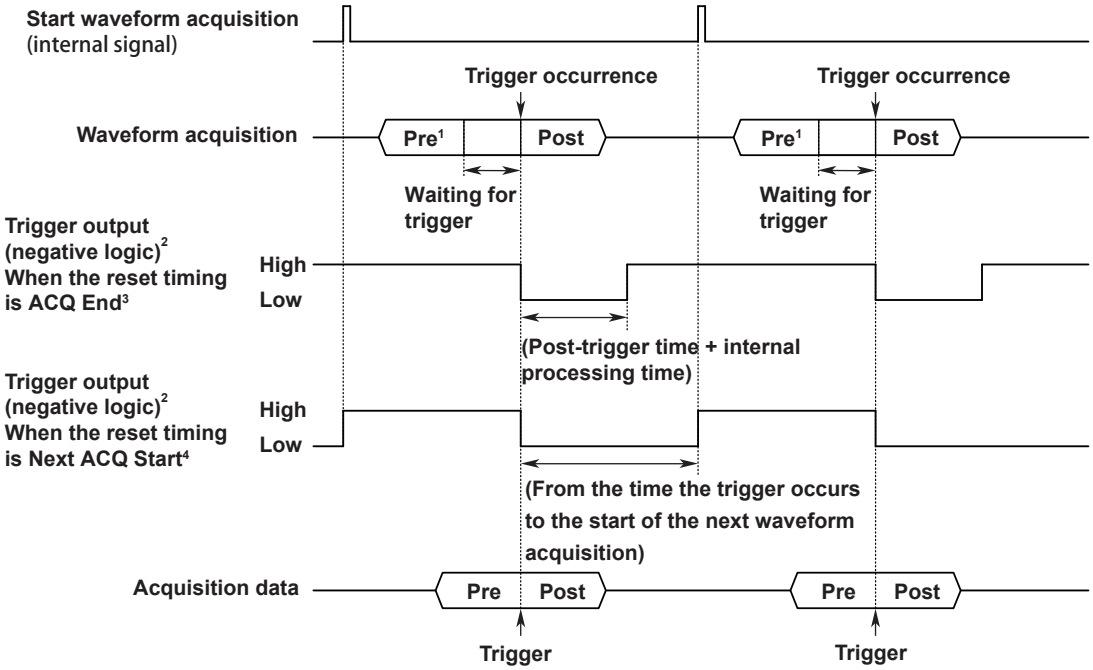


Note

During synchronous operation, triggers are generated only from the trigger output terminal of the main unit. They are not generated from the sub unit.

Low Level and High Level Hold Times

The hold time of the set output logic level varies depending on the timing of resetting the trigger output.



*1 After waveform acquisition starts, the instrument waits for a trigger when the pre-trigger data has been acquired.

*2 When you select positive logic, the definitions of high and low given here are reversed.

*3 When the output is set to negative logic and the reset timing is ACQ End
Low (low level) period:Post-trigger time and internal processing time. The minimum period is 500 ns.
High (high level) period:Time other than the above. The minimum period is 50 ns.

*4 When the output is set to negative logic and the reset timing is Next ACQ Start
Low (low level) period: Time from trigger occurrence to the start of the next waveform acquisition. The minimum period is 500 ns.
High (high level) period: Time from the start of waveform acquisition to trigger occurrence. The minimum period is 50 ns.

Trigger Output Settings

You can set the output logic for the signal transmitted from the trigger output terminal and the output reset timing.

UTILITY System Configuration Menu

Press **UTILITY** and then the **System Configuration** soft key. The following menu appears.



4.3 Video Signal Output (VIDEO OUT)

CAUTION

- Connect the cable after turning OFF this instrument and the monitor.
- Do not short the VIDEO OUT connector or apply an external voltage to it. If you do, the instrument may malfunction.

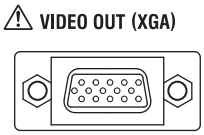
French

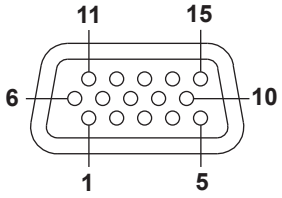
ATTENTION

- Connecter le câble après avoir mis cet instrument et le moniteur hors tension.
- Ne pas mettre le connecteur VIDEO OUT en court-circuit et ne pas y appliquer une tension externe. Si vous le faites, l'instrument risque de ne pas fonctionner correctement.

Video Signal Output Connector (VIDEO OUT)

You can use video signal output to display the instrument's screen on a monitor. Any multisync monitor that supports XGA can be connected.





D-Sub 15-pin receptacle

Pin No.	Signal Name	Specifications
1	Red	0.7 Vp-p
2	Green	0.7 Vp-p
3	Blue	0.7 Vp-p
4	–	
5	GND	
6	GND	
7	GND	
8	GND	
9	–	
10	GND	
11	–	
12	–	
13	Horizontal sync signal	Approx. 48.3 kHz, TTL negative logic ⎍
14	Vertical sync signal	Approx. 60 Hz, TTL negative logic ⎍
15	–	

Connecting to a Monitor

1. Turn off this instrument and the monitor.
2. Connect this instrument and the monitor using an analog RGB cable.
3. Turn on the instrument and the monitor.

Note

- An RGB video signal is always running through the VIDEO OUT connector.
- The monitor display may flicker if you place the instrument or some other device close to it.
- Depending on the type of monitor, parts of the instrument's display may be cut off.

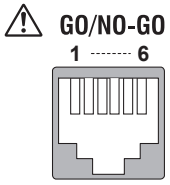
4.4 GO/NO-GO Signal Output (GO/NO-GO)

Signal Output Port

The connector uses an RJ-12 modular jack. Use a cable designed for GO/NO-GO determination, such as optional accessory 366973.

Pinout

The pin arrangement is as follows.



Connector on the instrument

Pin No.	Signal Name	Logic
1	NC (no connection)	
2	NC (no connection)	
3	GO OUT	Negative logic
4	NO-GO OUT	Negative logic
5	GND	
6	NC (no connection)	

Output Signal

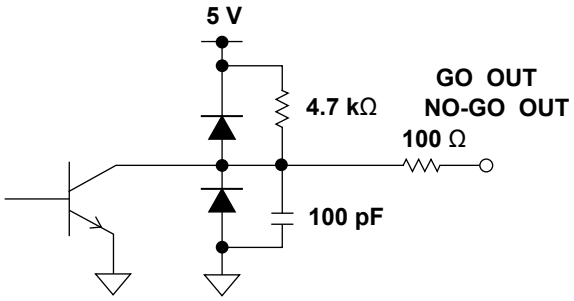
NO-GO OUT Signal

When the determination result is NO-GO, the output signal level (the TTL level) temporarily changes from high level (H) to low level (L).

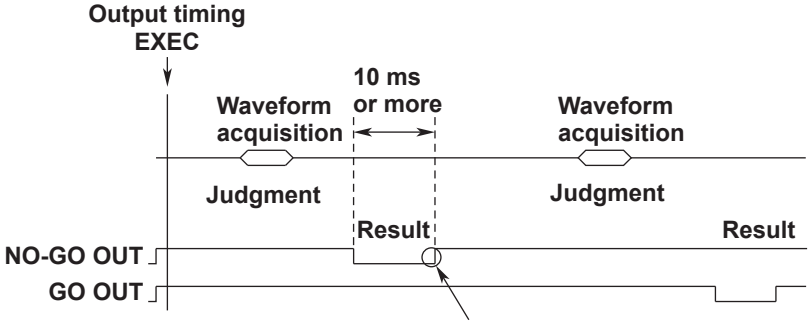
GO OUT Signal

When the determination result is GO, the output signal level (the TTL level) temporarily changes from high level (H) to low level (L).

Signal Output Circuit Diagram



Output Timing



The signal remains low until the instrument is ready to accept the next measurement. If you have specified an action to perform when conditions are true, this time is extended until that action is complete.

Connecting to Other Instruments

CAUTION

- Do not apply external voltage to the NO-GO OUT and GO OUT output pins. If you do, the instrument may malfunction.
- When connecting the GO/NO-GO determination signal output to another device, do not connect the wrong signal pin. Doing so may damage this instrument or the connected instrument.
- Do not connect a USB cable to the GO/NO-GO output port. If you do, the instrument may malfunction.

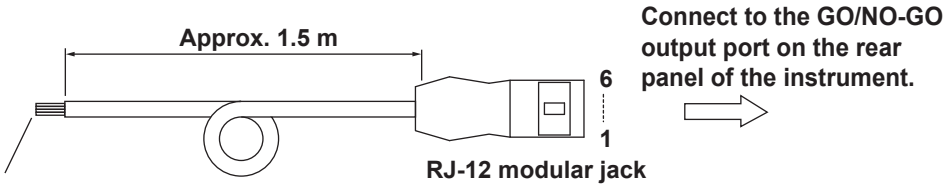
French

ATTENTION

- Ne pas appliquer de tension externe aux broches de sortie NO-GO OUT et GO OUT.
  Si vous le faites, l'instrument risque de ne pas fonctionner correctement.
- Lors de la connexion de la sortie de signal de détermination GO/NO-GO à un autre appareil, veiller à ne pas connecter la mauvaise broche de signal.
  Cela pourrait endommager cet instrument ou l'instrument connecté.
- Ne pas brancher de câble USB sur le port de sortie GO/NO-GO.
  Si vous le faites, l'instrument risque de ne pas fonctionner correctement.

When connecting to an external instrument, use a cable designed for GO/NO-GO determination, such as optional accessory 366973.
Do not use a cable designed for GO/NO-GO determination (optional accessory 366973) for any purpose other than performing GO/NO-GO determination with the instrument.

Specifications of the GO/NO-GO Cable (Optional accessory 366973)



Process the wires at the end of the stripped cable as necessary.

Color	Pin No.	Signal	Logic
Yellow	2	NC	
White	3	GO OUT	Negative logic
Green	4	NO-GO OUT	Negative logic
Blue	5	GND	

4.5 Synchronous Operation I/O (SYNC)

CAUTION

- Do not short the synchronous operation I/O connector or apply an external voltage to it. If you do, the instrument may malfunction.
- Use a connection cable (701982-01, 701982-02). Do not use any other cables. If you do, the instrument may malfunction.
- Do not connect this instrument to an instrument other than a DLM5034, DLM5038, DLM5054, or DLM5058. Doing so may damage the instrument, the connection cable, or the connected device.

French

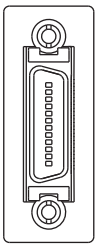
ATTENTION

- Ne pas court-circuiter le connecteur d'E/S à fonctionnement synchrone et ne pas lui appliquer de tension externe. Si vous le faites, l'instrument pourrait mal fonctionner.
- Utiliser un câble de connexion (701982-01, 701982-02). Ne utiliser aucun autre câble. Si vous le faites, l'instrument pourrait mal fonctionner.
- Ne pas connecter cet instrument à un instrument autre qu'un DLM5034, DLM5038, DLM5054 ou DLM5058. Cela pourrait endommager l'instrument, le câble de connexion ou l'appareil connecté.

Synchronous Operation I/O Connector (SYNC)

You can connect this instrument to another DLM5034, DLM5038, DLM5054, or DLM5058 through the synchronous operation I/O.

⚠ SYNC



To connect to another DLM5034, DLM5038, DLM5054, or DLM5058, use an optional accessory connection cable (701982-01, 701982-02). Note that to use synchronous operation (DLMsync), a separate option is required.

Connecting the Cable

Connect a connection cable between the SYNC connector of this instrument and that of the target instrument.

Connect the cable securely to the synchronous operation I/O connector, and check that it is locked in place.

Note

- For details on the synchronous operation (DLMsync) feature, see the Features Guide, IM DLM5058-01EN.
- For instructions on how to use synchronous operation (DLMsync), see the User's Manual, IM DLM5058-02EN.

5.1 If a Problem Occurs

Faults and Corrective Actions

- If a message appears on the screen, see the following pages for reference.
- If servicing is necessary, or if the instrument does not operate properly even after you have attempted to deal with the problem according to the instructions in this section, contact your nearest YOKOGAWA dealer.

Problems and Solutions	Refer To
The instrument does not turn on.	
Securely connect the power cord to the instrument and to the power outlet.	2.3
Make sure that the power switch is on.	2.3
Set the supply voltage and frequency to within the permitted range.	2.3
Nothing is displayed.	
Press any key to turn on the backlight.	4.4[1]
Press the DEFAULT key to initialize the screen's display colors.	3.7
The display is odd.	
Confirm that the ambient temperature and humidity are within their specified ranges.	2.2
Confirm that the display is not being affected by noise.	2.1
Make sure that the probes are properly connected.	2.4
Restart the instrument.	2.3
Keys do not work.	
When the instrument is being controlled remotely through communication commands, press SHIFT + CLEAR TRACE to switch it to local mode.	—[2]
Perform a key test. If the test fails, servicing is required.	5.3
Triggering does not work.	
Check the trigger conditions.	Chapter 2[1]
Confirm that the trigger source is being applied.	2.4, 2.6, 4.1
The measured values are not correct.	
Confirm that the ambient temperature and humidity are within their specified ranges.	2.2
After turning on the power, wait at least 30 minutes to allow the instrument to warm up.	2.3
Calibrate the instrument.	3.8
Correct the probe phase.	2.5
Set the correct probe attenuation ratio.	1.1[1]
Set the offset voltage to 0 V.	1.1[1]
The built-in printer isn't printing.	
The printer head may be damaged or worn out. Servicing is required.	—
It takes time to save to or load from the internal storage.	
The data may be fragmented, or registered data from deleted files may have remained in the memory. Format the internal memory. When the internal storage is formatted, all of its data is lost. Back up the data as necessary.	5.6
Unable to save data to the specified storage device.	
Check the free space on the storage device. Remove files or use a different storage device as necessary.	—
USB devices or the instrument does not operate properly.	
If you turned the instrument on with USB devices connected to the USB ports for peripherals, turn the instrument off, remove the USB devices, turn the instrument back on, and then connect the USB devices. After turning off the power, wait at least 10 seconds before you turn it back on.	3.4
Unable to configure or control the instrument through the communication interface.	
Check the address settings.	—[2]
Match the address used in the program to the instrument's address.	
Confirm that the interface meets the electrical and mechanical specifications.	

1 See the User's Manual, IM DLM5058-02EN.
2 See the Communication Interface User's Manual, IM DLM5058-17EN.

5.2 Messages and Corrective Actions

Messages

Messages may appear on the screen during operation. This section describes the error messages and how to respond to them. You can display the messages in the language that you specify through the operations explained in section 20.1 in the User's Manual. If servicing is necessary to solve the problem indicated by a message, contact your nearest YOKOGAWA dealer.

In addition to the following error messages, there are also communications error messages. These messages are explained in the communication interface user's manual, IM DLM5058-17EN.

Information

Code	Message and Corrective Action	Section
2	Turned on pressing the RESET key. All the settings will be initialized.	3.7
3	Firmware is updated. All the settings are initialized.	—
4	Hardcopy is aborted.	—
5	File access is aborted.	—
6	Action-on-trigger is aborted.	2.27*
7	Search aborted.	—
8	Search execution is completed, but no record was found that matched the conditions.	—
9	Search execution is completed, but no record was found that matched the pattern.	—
10	Statistical measurement is aborted.	Chapter 9*
11	Analysis is aborted.	—
12	Data not detected. Execute again after changing settings or reacquiring waveforms.	—
13	The corresponding field was not found.	—
14	Action-on-trigger is completed.	2.27*
15	The instrument is set to remote mode by the communication control. Press the SHIFT + CLEAR TRACE key to change to local mode.	—
16	Local lockout is set by the communication control. To operate using the keys, release the lockout using the communication control.	—
20	Any serial bus signal can not be detected.	Chapter 12*
21	Serial bus automatic setting was aborted.	Chapter 12*
22	The symbol/physical value file(.sbl) has not been loaded.	17.7*
23	A contradiction in bit numbers of logic setting and symbol definition was detected. Check the symbol/physical value file(.sbl).	—
24	Check the input voltage level and attenuation ratio.	Chapter 12*
26	Firmware is updated.	—
27	The format was completed.	—
28	It was not turned off by the power switch of the front.	2.3
29	The option was set up.	—
30	Calculating the value of Lambda. Try to execute later.	Chapter 14*
31	USB Function is set to Mass Storage mode. In this mode you can only read and write files.	Chapter 19*
33	Auto deskew was executed even though input signals were outside the specifications. Check whether current and differential probe offset adjustments have been executed properly.	—
35	Backed up with auxiliary backup data.	—
36	Enable the zoom link feature.	Chapter 12*

* User's Manual, IM DLM5058-02EN

Code	Message and Corrective Action	Section
38	A DLMsync connection was established. This instrument is the main unit. The M icon appears at the top of the screen. The instrument connected to this instrument is the sub unit. The S icon appears at the top of the screen.	19.1*1
41	The following option was installed. To activate the option, restart this instrument.	—
42	The following option was uninstalled. To deactivate the option, restart this instrument.	—
45	Your free trial has started. To activate the option, restart this instrument.	—
60	Updating Firmware. Note: Please DO NOT turn off the power until processing is completed. And, DO NOT touch a keyboard.	—
65	A time synchronization procedure was started. Start a measurement after time synchronization is complete. You can check the synchronization status with the following icons displayed at the top of the screen. : Finding the master (blinking): Time synchronization being established : Time synchronization established It takes about 2 minutes for time synchronization to be established.	1.3, 20.5[1], Chapter 23[2]
66	The waveform time information may not be accurate because time synchronization is not established. Start a measurement after time synchronization is complete. You can check the synchronization status with the following icons displayed at the top of the screen. : Finding the master (blinking): Time synchronization being established : Time synchronization established	1.3, 20.5[1], Chapter 23[2]

1 User's Manual, IM DLM5058-02EN
2 Features Guide, IM DLM5058-01EN

File Errors

Code	Message and Corrective Action	Section
500	Data size larger than remaining capacity in media. Delete unnecessary files or use other media.	Chapter 17*
501	File does not exist. Check the file name.	Chapter 17*
502	Assigned path does not exist or no media. Check the path name and media.	Chapter 17*
503	Writing prohibited in the media. Unlock write protection of the media.	Chapter 17*
504	Insufficient remaining capacity in media. Delete unnecessary files or use other media.	Chapter 17*
505	File not compatible. Check the file, firmware version of the unit or model name of the unit.	—
506	Save data do not exist. Check the content to be saved.	—
507	Save data do not exist. Check the content to be saved.	—
508	Unable to open file. The may be opened by other process. Try to open file later. If the problem still exist, service may be necessary.	Chapter 18*
509	Access denied. Check whether the target file or folder is in use or its attributes.	Chapter 17*
510	File system error. Service is required.	—
511	Media error. Service is required.	—
512	Directory can not be deleted.	Chapter 17*
513	File or Directory can not be moved to other media. If the problem occurs on other media, service may be required.	Chapter 17*

* User's Manual, IM DLM5058-02EN

Code	Message and Corrective Action	Section
514	Directory entry does not exist.	—
515	Media error. Service is required.	—
516	Media error. Service is required.	—
517	End of the file.	—
518	The same file or directory name exist. Remove the file/directory or change the current path.	Chapter 17*
519	Target file of Move or Copy has a read only property.	Chapter 17*
520	Assigned path does not exist or no media. Check the path name and media.	Chapter 17*
521	Destination folder assigned to Copy / Move is the same as the origin or sub folder. Change the destination folder.	Chapter 17*
522	No file name. Type in file name.	Chapter 17*
523	Auto file name failure. Change the type of auto file name or change the header of the auto name.	Chapter 17*
524	Improper file or path name. Check file / path name.	Chapter 17*
525	Improper file or path name. Check file / path name.	Chapter 17*
526	File is disintegrated. Check the file.	—
527	File system error. Service is required.	—
528	Illegal file name. The name contains prohibited characters. Change it to a different name.	Chapter 17*
529	Illegal file name. The name is reserved by the system. Change it to a different name.	Chapter 17*
530	Load failure. Number of vortex exceeded the maximum. Redefine the mask data.	—
531	Unable to open file. The may be opened by other process. Try to open file later. If the problem still exist, service may be necessary.	—
532	Unable to save. Compressed record size exceeded current record size. Change the compressed record size and execute again.	—
533	Assigned path does not exist. Check the network setting and configuration.	Chapter 18*
534	Assigned path does not exist. Check the network setting and configuration.	Chapter 18*
535	Network access is denied. Check the network setting and configuration.	Chapter 18*
536	File operation not supported in root directory. Please verify the path name.	Chapter 17*
537	A file which contains multiple saved traces can not be loaded into Ref. Please load it into ACQ.	Chapter 17*
538	A file which contains compressed waveform can not be loaded into the ACQ. Please load it into Ref.	Chapter 17*
539	Unable to load a logic waveform to Ref.	Chapter 17*
540	Unable to load a file containing logic waveforms.	Chapter 17*
541	Unable to load that file. Its extension is invalid.	Chapter 17*
542	Cannot save file more than 2GB. Please either partially save the Zoom section, save in compressed format, or turn off unnecessary wave display.	Chapter 17*
543	There is already a file. Do you overwrite?	Chapter 17*
544	A file which contains multiple saved traces can not be loaded into Ref. Please load it into Channels.	Chapter 17*
545	Cannot save all the data with record length exceeding 1.25M in ASCII (CSV format). Please either save in compressed format, partially save the Zoom section, or turn off unnecessary wave display.	Chapter 17*
546	The number of files of a root directory is maximum. Delete unnecessary files or save at a subdirectory.	Chapter 17*
547	The file save is unsupported in this setting.	Chapter 17*

* User's Manual, IM DLM5058-02EN

Code	Message and Corrective Action	Section
560	Cannot save because there is no data to be saved in the main unit. There needs to be at least one set of waveform data in the main unit and in the sub unit. Display any of the waveforms in the main unit, and then save.	Chapter 22*
561	Cannot save because there is no data to be saved in the sub unit. There needs to be at least one set of waveform data in the main unit and in the sub unit. Display any of the waveforms in the sub unit, and then save.	Chapter 22*
562	This file cannot be loaded. This is a file created during DLMsync. It can be loaded only during DLMsync. Load the file after establishing a DLMsync connection.	Chapter 22*
563	This file cannot be loaded. This is a not file created during DLMsync. It cannot be loaded during DLMsync. Load the file after closing the DLMsync connection.	Chapter 22*

* Features Guide, IM DLM5058-01EN

Printer Errors

Code	Message and Corrective Action	Section
550	Printer error. Confirm the printer status.	—
551	Cannot detect printer. Turn ON the printer. Check connectors.	—
552	Communication error. Check all connections and make sure all devices are on.	—
553	Paper not loaded correctly. Set the paper correctly.	16.1*
554	Temperature error. Power off immediately.	—
555	Close the printer cover.	16.1*
556	No built-in printer on this model. Check the specifications to see whether or not the optional printer is provided.	5.4
557	Image creation failure. Working memory space may be insufficient. Maintenance service is required.	—
558	Unable to print or save image with file property dialog.	Chapter 17*

* User's Manual, IM DLM5058-02EN

Network Errors

Code	Message and Corrective Action	Section
600	Invalid network parameter settings. Check the network parameters.	Chapter 18*
601	Unable to connect to the server. Check the network settings and configuration.	Chapter 18*
602	Invalid file server settings. Check the file server settings.	Chapter 18*

* User's Manual, IM DLM5058-02EN

Execution Errors

Code	Message and Corrective Action	Section
650	Running. Stop and execute again.	3.9
651	Accessing file. Abort or wait until it is completed, and execute again.	—
652	Printing. Abort or wait until it is completed, and execute again.	—
653	Processing action-on-trigger. Abort or wait until it is completed, and execute again.	2.27*
654	Processing zoom search. Abort or wait until it is completed, and execute again.	Chapter 11*
655	Processing auto scroll. Abort or wait until it is completed, and execute again.	—
656	Processing history search. Abort or wait until it is completed, and execute again.	Chapter 15*
657	Processing history replay. Abort or wait until it is completed, and execute again.	Chapter 15*
658	Processing statistical measurement. Abort or wait until it is completed, and execute again.	Chapter 9*
659	Analyzing serial bus data. Abort or wait until it is completed, and execute again.	Chapter 12*
660	Zone edit in process. Terminate editing.	Chapter 2*
661	Processing self test. Wait until it is completed.	—
662	Acquisition in process in N Single trigger mode. Press Start/Stop key or wait until the process is completed.	Chapter 2*
663	Retrievable settings does not exist.	—
664	Failed to execute statistical measurement. Waveform data may not exist. In Cycle statistic mode, improper setting may result in failure to recognize the cycle.	Chapter 9*
665	Search target data does not exist. Execute search after analysis is completed.	—
666	Improper action setting. The saved data type is either Waveform group or Analysis group. This can be assigned from File menu.	Chapter 17*
667	Retrievable data not found.	—
668	Failed to update firmware. Either the data file could be inappropriate or damaged.	—
669	Sending E-Mail. Wait until it is completed.	—
670	The corresponding field was not found.	—
671	Cannot be executed when the current probe setting is 100A:1V. Change the probe setting on the channel menu or the Power Analysis Setup menu.	Chapter 1*
672	Auto Deskew was canceled because input signals were not detected. Check whether current or differential probe offset adjustments have been executed properly.	Chapter 1*
673	Processing math on history. Abort or wait until it is completed, and execute again.	Chapter 15*
674	Cannot store because the data is locked. Release the lock through Store Detail.	Chapter 17*
675	Serial bus automatic setting is in progress. Please wait.	Chapter 12*
677	Cannot execute the user-defined math function during roll mode. After acquisition stop, it will be executed.	3.9
678	Cannot execute the search function during roll mode.	—
679	The data length that is necessary for FFT is short. Please make Time/div late.	Chapter 1*
680	The data length that is necessary for the user-defined math function is short. Please lower the order of the MEAN operator or change setting of Filter1(Filter2).	Chapter 6*

* User's Manual, IM DLM5058-02EN

Code	Message and Corrective Action	Section
681	The data length that is necessary for the harmonics analysis function is short.	—
682	The decode cannot be displayed, because the threshold level is not appropriate.	—
683	Cannot execute the math function, because the display of source is OFF.	Chapter 6[1]
684	Logic waveforms cannot be loaded into Ref.	Chapter 17[1]
685	Cannot load into Ref with maximum record length.	—
686	Cannot execute during roll mode. Stop and execute again.	3.9
687	It connects with PC Application.	—
688	Cannot execute on current record length.	—
689	Cannot execute during Preview mode.	—
691	Cannot execute after history search. Reset history search and execute again.	15.2[1]
692	Cannot execute, because history is not exist.	—
693	Cannot execute, when the output of the print is “Multi”.	16.6[1]
695	Failed to establish a DLMsync connection. Check that the DLMsync cable is connected properly, and execute again.	19.1[1]
696	DLMsync cannot be used because the firmware versions are not matched. Update the firmware to the latest version.	—
697	DLMsync cannot be used because the /SYN option is not installed in the connected instrument. Connect an instrument with the /SYN option, or purchase the option and install it.	—
698	Failed to execute DLMsync auto deskew. The proper signal may not be applied to CH1 of both instruments, or the probe may not be connected properly. See the help or the Features Guide for the execution conditions of auto deskew.	Chapter 22[2]

1 User’s Manual, IM DLM5058-02EN
2 Features Guide, IM DLM5058-01EN

Setting Errors

Code	Message and Corrective Action	Section
800	Improper Date / Time setting.	3.5
801	Not allowed unless waveforms are shown. Display waveforms.	Chapter 1[1]
802	Source waveforms do not exist. Display source waveforms.	Chapter 3[1]
803	Zone waveforms do not exist.	Chapter 2[1]
804	Illegal expression.	Chapter 6[1]
806	Invalid bit assignment in the logic bus.	Chapter 1[1]
807	Unable to enable the trigger conditions. Set the clock source to another group or assign bits to the group.	2.6[1]
808	Cannot set this parameter with maximum record length.	—
809	Cannot change the setting of the math operation, because power analysis is set.	—
810	Cannot set this parameter when A-trigger is not serial bus.	Chapter 2[1]
811	This setting is necessary only in the case of ON display of Zoom1 and Zoom2.	Chapter 10[1]
812	Cannot set this parameter during interleave mode.	—
813	This option is not available.	—
814	The user-defined math option is not available.	—
815	The logic input option is not available.	—
816	This function is not supported.	—
817	The ID value cannot be set to 0.	2.17,[1] 12.5[1]
825	This operation cannot be executed during DLMsync.	Chapter 22[2]
826	This operation cannot be executed on the sub unit during DLMsync.	Chapter 22[2]
827	This operation cannot be executed on the sub unit during DLMsync. Execute it on the main unit.	Chapter 22[2]
828	This operation cannot be executed during DLMsync. Stop the acquisition or wait for it to finish, and then execute.	Chapter 22[2]

1 User’s Manual, IM DLM5058-02EN
2 Features Guide, IM DLM5058-01EN

System Errors

Code	Message and Corrective Action	Section
900	Setup data saving error. Setting information has not saved because the main power switch on the side panel is turned to OFF before the power switch on the front panel.	2.3
901	Fan stopped. Power off immediately. Maintenance service is required.	2.3
902	Backup battery is low. Maintenance service is required to replace the back-up battery.	5.7
903	Calibration failure. Disconnect the input and execute again. If it fails again, servicing is necessary.	—
906	Failed to update firmware. The internal media may be damaged. Maintenance service is required.	—
907	Calibration failure. Set V/div to the highest sensitivity and turn the coarse adjustment trimmer of the current probe so that the signal is within ±2 division from the center of the screen. If the calibration still fails, servicing is required.	Chapter 1[1]
911	There is a problem to a probe power supply. Maintenance service is required.	—
912	Failed to initialize the probe. Check the probe connection. If the probe still fails to be initialized, servicing is required.	—
915	Internal temperature is too high. Maintenance service is required. It will shutdown automatically.	—
916	An error occurred during DLMsync. Check that the DLMsync cable is connected properly, and reconnect.	Chapter 22[2]

1 User's Manual, IM DLM5058-02EN
2 Features Guide, IM DLM5058-01EN

5.3 Carrying Out Self-Tests

This section explains how to test whether the instrument's memory, keyboard, and printer are working properly.

Procedure

1. Press **UTILITY** and then the **Self Test** soft key. The following menu appears.



Test type

2. Press the **Type** soft key. The following menu appears.

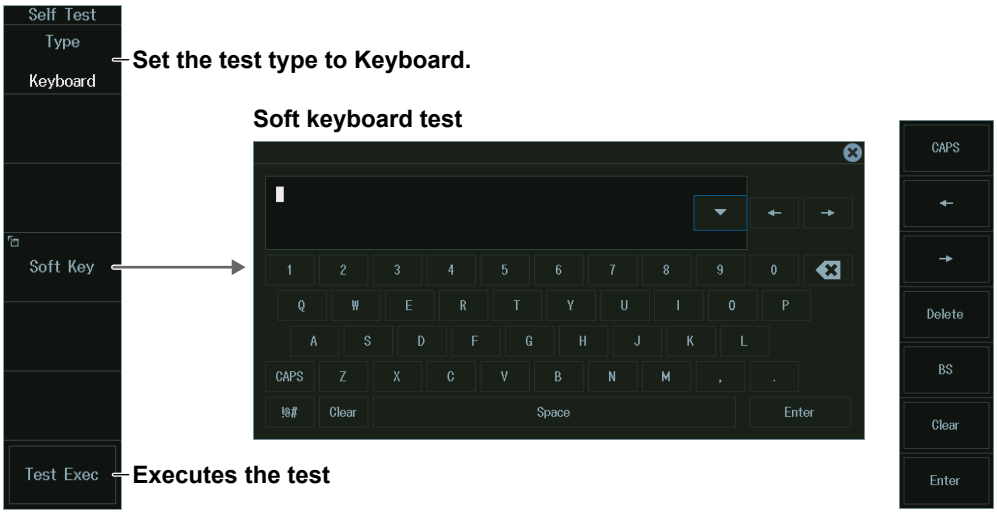
Memory Test



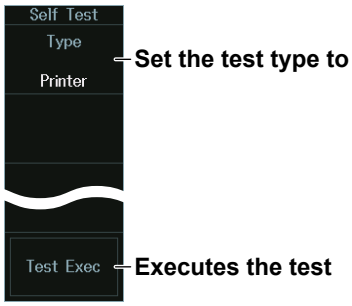
Set the test type to Memory.

Executes the test

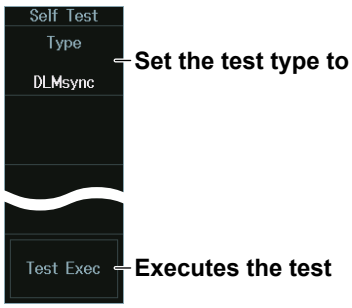
Executing the Soft Keyboard Test



Printer Test



Synchronous Operation Feature Test



Explanation

Test Type (Type)

Memory

Tests whether or not the internal CPU board RAM and ROM are operating properly. If they are operating properly, "Success" appears. If an error occurs, “Fail” appears.

Keyboard

Tests whether the front panel keys and knobs are operating correctly and whether the soft keyboard accepts input properly.

- The front panel keys are operating properly if the background color of the names of the keys that you press turns white or green.
- Knobs are operating properly if you turn them slowly, press them, or move them up, down, left, and right depending on the type of knob and the background color of the names or arrows changes to white or green.
- The soft keyboard is operating properly if you can enter the specified characters.

Printer

Tests whether or not the optional built-in printer is operating properly. The built-in printer is operating properly if the print density is correct. If an error occurs, the print density will not be correct.

DLMsync

Tests whether or not the option’s synchronous operation feature is operating properly. Connect the two DLM5000s with a connection cable, and start (Connect) the synchronous operation. Stop acquiring waveforms, and then execute the test on the main unit. If they are operating properly, “Success” appears. If an error occurs, “Fail” appears.

Note

- Accuracy is a service test item. Under normal circumstances, you do not need to perform these tests.
- The DLMsync soft key menu is displayed only when the /SYN option is installed.

If an Error Occurs during a Self-Test

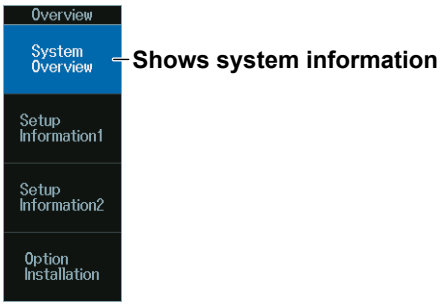
If an error occurs even after you carry out the following procedure, contact your nearest YOKOGAWA dealer.

- Execute the self-test again several times.
- Check that the paper is set properly in the built-in printer and that the paper is not jammed.
- Connect the connection cable securely to the synchronous operation I/O connector, and check that it is locked in place.
- In the case of a synchronous operation feature test, check that M is displayed at the top of the screen on the main unit.

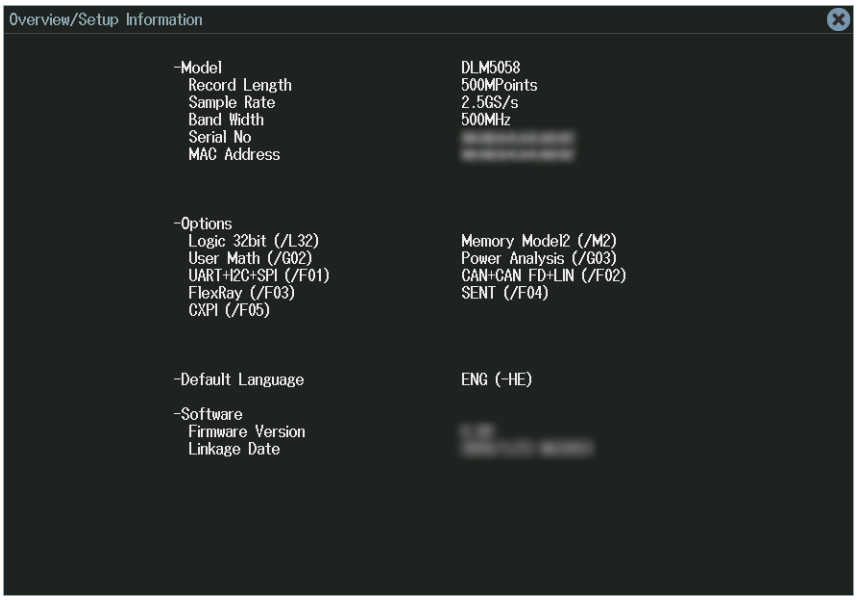
5.4 Viewing System Information (Overview)

Procedure

1. Press **UTILITY** and then the **Overview** soft key. The following menu appears.



2. Press the **System Overview** soft key. The following screen appears.



Explanation

Displayed Information

Model	The model number
Record Length	The record length
Sample Rate	The maximum sample rate
Band Width	The frequency bandwidth
Serial No	The serial number (instrument number)
MAC Address	The MAC address
Options	The installed options
Default Language	The default language
Firmware Version	The firmware version number
Linkage Date	The firmware version date

5.5 Adding Options to the Instrument

License Key

Have a license key ready.

Purchase a license key by contacting your nearest YOKOGAWA dealer. When making a purchase, please indicate the instrument's instrument number and the suffix code of the option you want to add.

Procedure

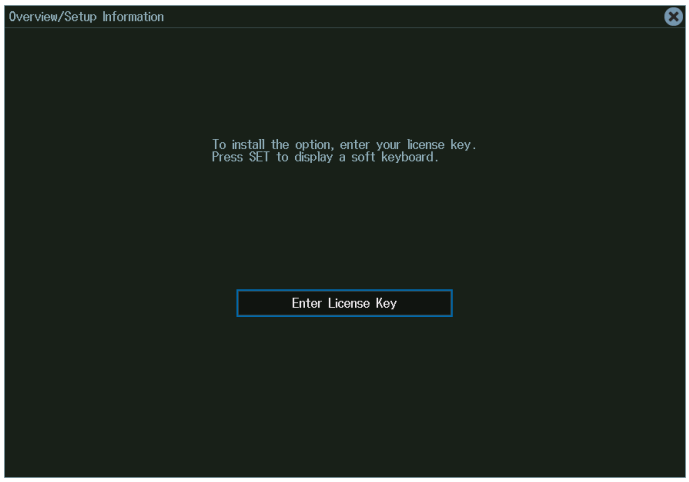
1. Press **UTILITY** and then the **Overview** soft key. The following menu appears.



Add an option.

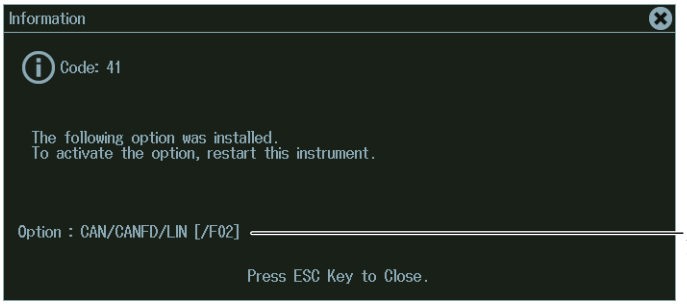
Adding Options

2. Press the **Option Installation** soft key. The following screen appears.



3. Press **SET** (●) to display a keyboard. Use it to enter the license key.

4. Press the **Enter** soft key. The additional option will be installed. When the option is installed successfully, the following screen appears.



Additional option indication
The installed additional option is displayed.

Restarting

5. Restart the instrument. The additional option will be activated.

Viewing the System Information

6. To verify that the option has been installed, view the system information on the instrument overview screen. For instructions on how to display the overview screen, see section 5.4.

Note

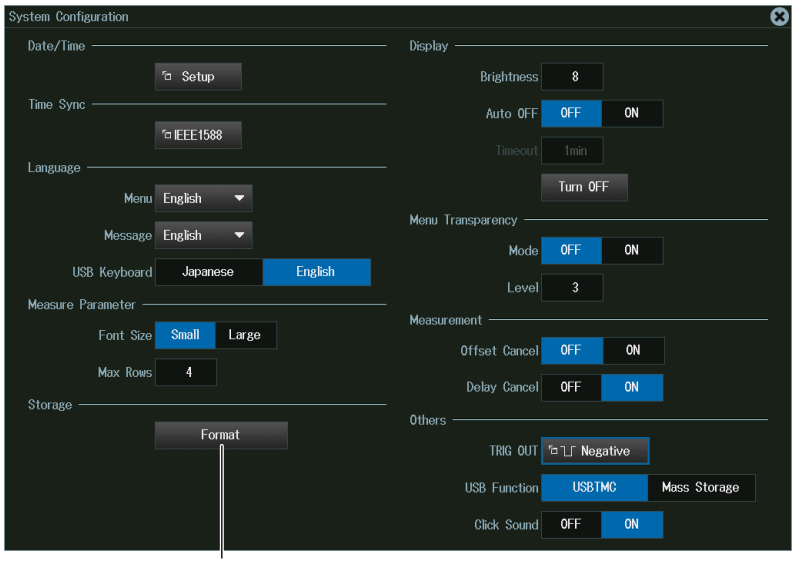
The SUFFIX (suffix code) inscribed in the name plate on the instrument's case indicates the installed options at the time of factory shipment. After you add options through additional option licenses, check the options on the instrument overview screen.

5.6 Formatting the Internal Storage

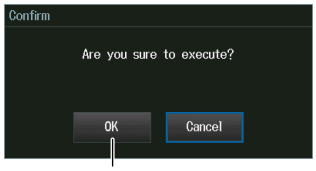
Procedure

UTILITY System Configuration menu

Press **UTILITY** and then the **System Configuration** soft key. The following menu appears.



Formats the internal storage



Confirm that you want to format internal memory.

CAUTION

If you format the internal storage, all saved data is erased.

French

ATTENTION

Si vous formatez la mémoire interne, toutes les données enregistrées sont effacées.

5.7 Recommended Part Replacement

The life and replacement period for expendable items varies depending on the conditions of use. Refer to the table below as a general guideline.
For part replacement and purchase, contact your nearest YOKOGAWA dealer.

Parts with Limited Service Life

Part Name	Service Life
Built-in printer	Under normal conditions of use, the period it takes to use 360 rolls of printer paper (part number: B9988AE)
LCD backlight	Under normal conditions of use, approximately 50000 hours

Consumable Parts

We recommend replacing them at the following intervals.

Part Name	Recommended Replacement Interval
Cooling fan	3 years
Backup battery (lithium battery)	5 years

5.8 Disposal

When disposing of this instrument, follow the laws and ordinances of the country or region where the product will be disposed of.

6.1 Signal Input Section

Analog Signal Input

Item	Specifications		
Number of input channels	DLM5034, DLM5054: 4 (CH1 to CH4) DLM5038, DLM5058: 8 (CH1 to CH8)		
Input coupling settings	AC1MΩ, DC1MΩ, DC50Ω		
Input connector	BNC connector		
Input impedance	1 MΩ ± 1.0%, approx. 16 pF 50 Ω ±1.0% (VSWR1.4 or less at DC to 500 MHz)		
Voltage scale setting	1 MΩ input:	500 µV/div to 10 V/div (1-2-5 steps)	
	50 Ω input:	500 µV/div to 1 V/div (1-2-5 steps)	
Maximum input voltage	1 MΩ input:	300 Vrms and 400 Vpeak; neither values may be exceeded. (At 100 kHz and higher, the voltage decreases at 20 dB/decade down to 2 Vrms.)	
	50 Ω input:	5 Vrms and 10 Vpeak; neither values may be exceeded.	
Selectable maximum DC offset range (when the probe attenuation is set to 1:1)	1 MΩ input		
	500 µV/div to 50 mV/div:	±1 V	
	100 mV/div to 500 mV/div:	±10 V	
	1 V/div to 10 V/div:	±100 V	
	50 Ω input		
	500 µV/div to 50 mV/div:	±1 V	
	100 mV/div to 1 V/div:	±5 V	
Vertical (voltage) axis accuracy			
DC accuracy[1]	500 µV/div:	±(3.0% of 8 div + offset voltage accuracy)	
	1 mV/div to 10 V/div:	±(1.5% of 8 div + offset voltage accuracy)	
Offset voltage accuracy[1]	500 µV/div to 50 mV/div:	±(1% of setting +0.2 mV)	
	100 mV/div to 500 mV/div:	±(1% of setting +2 mV)	
	1 V/div to 10 V/div:	±(1% of setting +20 mV)	
Frequency bandwidth (≥–3 dB)[1, 2] (± 3 divp-p sine wave input)	1 MΩ input (measured from the probe tip when using the supplied 10:1 passive probe (10:1 conversion))		
		DLM5034, DLM5038	DLM5054, DLM5058
	20 mV/div to 100 V/div:	DC to 350 MHz	DC to 500 MHz
	10 mV/div:	DC to 350 MHz	DC to 350 MHz
	5 mV/div:	DC to 200 MHz	DC to 200 MHz
	50 Ω input		
		DLM5034, DLM5038	DLM5054, DLM5058
	2 mV/div to 1 V/div:	DC to 350 MHz	DC to 500 MHz
	1 mV/div:	DC to 350 MHz	DC to 350 MHz
	500 µV/div:	DC to 200 MHz	DC to 200 MHz
–3 dB point for AC coupling	Approx. 1 Hz (for direct input) 1 Hz or less (when using the supplied 10:1 probe)		
Skew between channels (when channels are set to the same conditions)	100 ps or less (typical value[4])		
Residual noise level[3]	0.2 mVrms or 0.05 div rms, whichever is greater (typical value[4])		
Isolation between channels (when set to the same voltage scale)	Maximum bandwidth: –34 dB (typical value[4])		

1 Values measured under standard operating conditions as indicated in section 6.12 after a 30-minute warm-up and calibration.
2 Values for repeating phenomena. The single-shot frequency bandwidth is from DC to the sampling frequency/2.5 or is the frequency bandwidth of the repeating phenomena, whichever is less.
3 Values when the input section is shorted, the acquisition mode is set to Normal, accumulation is set to off, and the probe attenuation is set to 1:1.
4 Typical values represent typical or average values. They are not strictly warranted.

6.1 Signal Input Section

Item	Specifications	
A/D converter resolution	8 bit (25LSB/div)	
	12 bits maximum (during high-resolution mode)	
Probe attenuation settings	Voltage probe:	0.001:1 to 2000:1 (1-2-5 steps)
	Current probe:	0.001A:1V to 2000A:1V (1-2-5 steps)
Bandwidth Limit	For each channel, you can select FULL, 200MHz, 150MHz, 100MHz, 20MHz, 10MHz, 5MHz, 2MHz, 1MHz, 500kHz, 250kHz, 125kHz, 62.5kHz, 32kHz, 16kHz, or 8kHz. Uses IIR and FIR digital filters	
Maximum sample rate	Real-time sampling mode:	2.5 GS/s (1.25 GS/s). Values inside parentheses are for high resolution mode.
	Repetitive sampling mode:	250 GS/s*
	Interpolation sampling mode:	250 GS/s
Maximum record length	Maximum record length for which repetitive acquisitions are possible	
	No options:	12.5 MPoints
	On models with the /M1S or /M1 option:	25 MPoints
	On models with the /M2S or /M2 option:	50 MPoints
	Maximum record length for which a single acquisition is possible (Values inside parentheses can be used only for odd channels.)	
	No options:	50 MPoints (125 MPoints)
	On models with the /M1S or /M1 option:	125 MPoints (250 MPoints)
	On models with the /M2S or /M2 option:	250 MPoints (500 MPoints)

* Repetitive sampling mode is not possible when the trigger source is set to logic input.

Logic Signal Input

Item	Specifications	
Usable probes	701988, 701989 (8-bit input)	
Number of input bits	8-bit per port No options:16-bit total on ports A and B On models with the /L32 option:32-bit total on ports A, B, C, and D	
Nondestructive maximum input voltage	701989: 701988: For information about derating based on frequency, see the respective logic probe user's manual.	±40 V (DC + ACpeak) or 28 Vrms ±42 V (DC + ACpeak) or 29 Vrms
	When using the 701988	When using the 701989
Input range	±40 V	Threshold level ± 6 V
Minimum input voltage	500 mV_{p-p}	300 mV_{p-p}
Maximum toggle frequency[1]	100 MHz	250 MHz
Input impedance (typical value[2])	1 MΩ, approx. 10 pF	100 kΩ, approx. 3 pF
Threshold level setting	Same value for all 8 bits	Different values for each of the 8 bits
Variable threshold level range	±40 V	±6 V
Threshold level resolution	0.05 V	0.05 V
Threshold level accuracy[1]	±(0.1 V + 3% of setting)	±(0.1 V + 3% of setting)
Hysteresis voltage (typical value[2])	100 mV	When noise rejection is off: 100 mV When noise rejection is on: 250 mV
Minimum pulse width	5 ns	2 ns
Maximum sample rate	Real-time sampling mode:	1.25 GS/s[4] (1.25 GS/s). Values inside parentheses are for high resolution mode.[3]
	Repetitive sampling mode:	250 GS/s[5]
	Interpolation sampling mode:	250 GS/s (pulse interpolation for logic waveforms)
Maximum record length	Maximum record length for which repetitive acquisitions are possible	
	No options:	12.5 MPoints
	On models with the /M1S or /M1 option:	25 MPoints
	On models with the /M2S or /M2 option:	50 MPoints
	Maximum record length for which a single acquisition is possible (Values inside parentheses can be used only for bits A0 to A7 and B0 to B7.)	
	No options:	50 MPoints (125 MPoints)
	On models with the /M1S or /M1 option:	125 MPoints (250 MPoints)
	On models with the /M2S or /M2 option:	250 MPoints (500 MPoints)

1 Under standard operating conditions (see section 6.12) after warm-up
2 Typical values represent typical or average values. They are not strictly warranted.
3 Resolution only improves for analog waveforms.
4 If high resolution mode is off and the sample rate of analog channels is 2.5 GS/s, interpolation (sampling) mode is used.
5 Repetitive sampling mode is not possible when the trigger source is set to logic input.

6.2 Triggering Section

Item	Specifications		
Trigger mode	Auto, Auto Level, Normal, Single, N Single The instrument measures in Single mode when you start acquisition by pressing the SINGLE key or when you start acquisition by pressing the RUN/STOP key when the record length setting only allows for single acquisition.		
Trigger source	CH1 to CH8[1]:	Signals received through the input terminals	
	LINE:	The connected commercial power supply signal (only Edge trigger can be used)	
	EXT:	Signals received through the TRIGGER IN terminal	
	Logic (A0 to A7, B0 to B7, C0 to C7[2], D0 to D7[2])	Signals received through the logic signal input port terminals	
Trigger coupling	CH1 to CH8[1]:	DC	
	EXT:	DC	
HF rejection	Trigger source bandwidth limit can be specified separately for CH1 to CH8.[1]		
	OFF:	No bandwidth limit	
	15kHz:	DC to approx. 15 MHz	
	20MHz:	DC to approx. 20 MHz	
Noise rejection	Noise rejection can be used (trigger level hysteresis can be selected) for CH1 to CH8[1] separately. Noise rejection cannot be specified on channels set to TV trigger.		
	Low ():	Approx. 0.3 div of hysteresis	
	Mid ():	Approx. 0.5 div of hysteresis	
	High ():	Approx. 1.0 div of hysteresis	
Selectable trigger level range	CH1 to CH8[1]:	±4 div from the screen center	
	EXT:	±2 V (±2 V range)	
		±20 V (±20 V range)	
Trigger level resolution	CH1 to CH8[1]:	0.01 div (0.1 div for TV triggers)	
	EXT:	5 mV (±2 V range)	
		50 mV (±20 V range)	
Trigger level accuracy	CH1 to CH8[1]:	±0.04 div	
	EXT[3]:	±(50 mV + 10% of the trigger level) (±2 V range)	
		±(500 mV + 10% of the trigger level) (±20 V range)	
External trigger probe attenuation setting	1:1/10:1		
Trigger sensitivity	CH1 to CH8[1]:	0.6 div_{P-P}	DC to the maximum bandwidth (noise rejection low)
	EXT[3]:	100 mV_{P-P}	DC to 100 MHz (±2 V range)
		$1V_{P-P}$	DC to 100 MHz (±20 V range)
Trigger position	Can be set as a percentage of the display record length in 0.1% steps		
Selectable trigger delay range	–(Time length of the post-trigger section) to +10 s		
Selectable hold-off time range	20 ns to 10 s		

1 CH1 to CH4 for DLM5034, DLM5054
2 Logic C0 to C7 and D0 to D7 are part of the /L32 option.
3 Under standard operating conditions (see section 6.12) after warm-up

Item	Specifications	
Trigger type (A trigger)		
	Edge:	Triggers on the edge of a single trigger source The source can be selected from CH1 to CH8[1], Logic, EXT, and LINE. The slope can be set to rise, fall, or both. (Slope cannot be selected for LINE.)
	Edge OR:	Triggers when any of the edge trigger conditions of multiple trigger sources is met The source can be selected from CH1 to CH8.[1] The slope can be set to rise, fall, or both.
	Pattern:	Triggers on the edge of the clock channel signal when the parallel pattern conditions of multiple trigger sources are met If the clock channel is set to None, triggers are activated based on the parallel pattern conditions. The sources can be selected from CH1 to CH8[1] and Logic for both edge and parallel pattern conditions. The slope can be set to rise, fall, or both. The parallel pattern logic is AND or OR. The condition is Enter, Exit, True, or False. If the clock channel is set to None and the condition is True or False, you can set a time condition. The time condition can be set to More than, Less than, Inside, Outside, or Timeout. For details on the time settings and time accuracies, see “Pulse Width.”
	Pulse Width:	Triggers on the pulse width of a single trigger source The source can be selected from CH1 to CH8,[1] and Logic.
		More than: Triggers when the time length during which the condition is met is longer than Time, and the condition changes to not met Time: 2 ns to 10 s, resolution: 2 ns
		Less than: Triggers when the time length during which the condition is met is shorter than Time, and the condition changes to not met Time: 4 ns to 10 s, resolution: 2 ns
		Inside: Triggers when the time length during which the condition is met is longer than Time1 but shorter than Time2 and the condition changes to not met Time1: 2 ns to (10 s-2 ns), resolution: 2 ns Time2: 4 ns to 10 s, resolution: 2 ns Minimum spacing between Time1 and Time2: 2 ns
		Outside: Triggers when the time length during which the condition is met is shorter than Time1 or longer than Time2 and the condition changes to not met Time1: 2 ns to (10 s-2 ns), resolution: 2 ns Time2: 4 ns to 10 s, resolution: 2 ns Minimum spacing between Time1 and Time2: 2 ns
		Timeout: Triggers when the time length during which the condition is met exceeds Time Time: 4 ns to 10 s, resolution: 2 ns
		Time accuracy:[2] CH1 to CH8:[1] ±(0.002% of setting + 450 ps) Logic: ±(0.002% of setting + 1 ns)
		Minimum time detection width: 1 ns (typical value[3])
	Rise/Fall Time:	Triggers on the rise time or fall time or both of a single trigger source The source can be selected from CH1 to CH8.[1] Time condition can be set to More than, Less than, Inside, or Outside. For details on the time settings and time accuracies, see “Pulse Width.”
	Runt:	Triggers on the runt pulse of a single trigger source The source can be selected from CH1 to CH8.[1] Based on two levels, upper level and lower level, triggers can be activated on a positive runt pulse not greater than the upper level or a negative runt pulse no less than the lower level or both. Further, triggers can be activated on the runt pulse time described earlier. The time condition can be set to None, More than, Less than, Inside, or Outside. For details on the time settings and time accuracies, see “Pulse Width.”
	Timeout:	Triggers when the pulse width of a single trigger source exceeds the set time The source can be selected from CH1 to CH8,[1] and Logic. This is the same as Timeout of the Pulse Width trigger. For details on the time settings and time accuracies, see “Pulse Width.”

1 CH1 to CH4 for DLM5034, DLM5054
2 Under standard operating conditions (see section 6.12) after warm-up
3 Typical values represent typical or average values. They are not strictly warranted.

6.2 Triggering Section

Item	Specifications	
	Window:	Triggers when the window conditions of a single trigger source are met. The source can be selected from CH1 to CH8.[1] Triggers when the source enters or exits from the voltage span set with the upper and lower levels. Further, triggers can be activated on the time that the source remains inside or outside the voltage span. The time condition can be set to None, More than, Less than, Inside, Outside, or Timeout. For details on the time settings and time accuracies, see “Pulse Width.”
	Window OR:	Triggers on the OR of the window conditions of multiple trigger sources. The source can be selected from CH1 to CH8.[1] Triggers when the source enters or exits from the voltage span set with the upper and lower levels of each channel. Enter or exist can be set separately for each source.
	Interval:	Triggers on the time from the rising to the next rising edge or the time from the falling to the next falling edge of a single trigger source. The source can be selected from CH1 to CH8,[1] and Logic. The time condition can be set to None, More than, Less than, Inside, Outside, or Timeout. For details on the time settings and time accuracies, see “Pulse Width.”
	FlexRay[2]:	Triggers on a FlexRay bus signal The source can be selected from CH1 to CH8.[1] Mode: Frame Start, Error, ID/Data, ID OR Bit Rate: 2.5 Mbps, 5 Mbps, 10 Mbps Bus channel: A, B
	CAN[2]:	Triggers on a CAN (Controller Area Network) bus signal The source can be selected from CH1 to CH8.[1] Mode: SOF, Error, ID/Data, ID OR Bit Rate: 33.3 kbps, 83.3 kbps, 125 kbps, 250 kbps, 500 kbps, 1 Mbps, or User Define For User Define, you can set a value from 10 kbps to 1 Mbps in 0.1-kbps steps.
	CAN FD[2]:	Triggers on a CAN FD (CAN with Flexible Data-Rate) bus signal (ISO or non-ISO) The source can be selected from CH1 to CH8.[1] Mode: SOF, Error, ID/Data, ID OR, FDF, ESI Bit Rate: Arbitration phase 250 kbps, 500 kbps, 1 Mbps, or User Define For User Define, you can set a value from 20 kbps to 1 Mbps in 0.1-kbps steps. Data phase 500 kbps, 1 Mbps, 2 Mbps, 4 Mbps, 5 Mbps, 8 Mbps, or User Define For User Define, you can set a value from 250 kbps to 10 Mbps in 0.1-kbps steps.
	LIN[2]:	Triggers on a LIN (Local Interconnect Network) bus signal The source can be selected from CH1 to CH8.[1] Mode: Break Synch, Error, ID/Data, ID OR Bit Rate: 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, or User Define For User Define, you can set a value from 1 kbps to 20 kbps in 0.01-kbps steps.
	CXPI[2]:	Triggers on a CXPI (Clock Extension Peripheral Interface) bus signal The source can be selected from CH1 to CH8.[1] Mode: SOF, Error, PTYPE, ID/Data, ID OR, Wakeup/Sleep Bit Rate: 4800 bps, 9600 bps, 19200 bps, or User Define For User Define, you can set a value from 4 kbps to 50 kbps in 0.01-kbps steps.
	SENT[2]:	Triggers on a SENT signal The source can be selected from CH1 to CH8,[1] and Logic. Mode: Every Fast CH, Fast CH S&C (Status & Communication), Fast CH Data, Every Slow CH, Slow CH ID/Data, Error Clock period: 1 µs to 100 µs (0.01µs resolution)

1 CH1 to CH4 for DLM5034, DLM5054

2 FlexRay, CAN, CAN FD, LIN, CXPI, SENT, PSI5 Airbag, UART, I^2C, and SPI are options.

Item	Specifications	
	PSI5 Airbag[1]:	Triggers on PSI5 Airbag signal The source can be selected from CH1 to CH8.[2] Mode: Sync, Start Bit, Frame in Slot, Data, Error Bit Rate: 125 kbps, 189 kbps, or User Define For User Define, you can set a value from 10 kbps to 1 Mbps in 0.1-kbps steps.
	UART[1]:	Triggers on a UART (RS232) signal The source can be selected from CH1 to CH8,[2] and Logic. Mode: Every Data, Error, Data Format: 8bit No Parity, 7bit Parity, 8bit Parity Bit Rate: 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps or User Define For User Define, you can set a value from 200 bps to 10 Mbps in 0.5-bps steps.
	I^2C[1]:	Triggers on a I^2C bus signal The source can be selected from CH1 to CH8,[2] and Logic. Mode: Every Start, Address Data, NON ACK, General Call, Start Byte, HS Mode
	SPI[1]:	Triggers on an SPI (Serial Peripheral Interface) bus signal The source can be selected from CH1 to CH8,[2] and Logic. Mode: 3wire, 4wire
	User Define:	Triggers on a general-purpose serial communication signal The source can be selected from CH1 to CH8.[2] Data source, enable source, clock source, and latch source can be specified. Bitrate: 200 Mbps maximum (with clock) 1 kbps to 50 Mbps (without clock) Bit length: 1 bit to 128 bits
	TV:	Triggers on the specified field number, line number, or polarity in video signals of various broadcasting formats. The source can be selected from CH1 to CH8.[2] Mode: NTSC: Triggers on an NTSC (525/60/2) signal PAL: Triggers on an PAL (625/50/2) signal SDTV: Triggers on an SDTV (480/60p) signal HDTV: Triggers on the following HDTV signals 1080/60i, 1080/50i, 720/60p, 1080/25p, 1080/24p, 1080/24sF, 1080/60p UserdefTV: You can trigger on any TV signal by selecting standard or high definition, setting the Hsync period, and setting the sync guard. Sync guard can be set to a value from 60 to 90% of the Hsync value in 1% steps. Polarity: Pos, Neg HF Rej: NTSC/PAL: 300 kHz (fixed) SDTV/HDTV: OFF (fixed) UserdefTV: Off or 300 kHz Line: 5 to 1054 (NTSC), 2 to 1251 (PAL), 8 to 2251 (SDTV), 2 to 2251 (HDTV), 2 to 2251 (UserdefTV), ALL Field: 1, 2, X Frame Skip: 1, 2, 4, 8
AB trigger	Triggers on the combined conditions of the B trigger conditions and A trigger conditions Some trigger types cannot be specified depending on the AB trigger type shown below. The specifications of the types that trigger B can be set to are the same as those of trigger A. Serial bus trigger can only be used on either trigger A or trigger B. (See “Trigger type (A trigger)” in section 6.2, “Triggering Section.”)	
	OFF:	Triggers only on the trigger A conditions (the trigger B conditions are not used).
	A Delay B:	After the trigger A conditions are met and the specified amount of time elapses, the instrument triggers when the trigger B conditions are met. Trigger B cannot be set to Pattern (with time conditions), Pulse Width, Rise/Fall Time, RUNT, Timeout, Window (with time conditions), or TV. Time setting: 10 ns to 10 s
	A to B (N):	After the trigger A conditions are met, the instrument triggers when the trigger B conditions are met N times. Trigger B cannot be set to Pattern (with time conditions), Pulse Width, Rise/Fall Time, RUNT, Timeout, Window (with time conditions), or TV. Count setting: 1 to 10^9
Forced trigger	A trigger that is forced, regardless of whether the trigger conditions are met.	

1 FlexRay, CAN, CAN FD, LIN, CXPI, SENT, PSI5 Airbag, UART, I2C, and SPI are options.
2 CH1 to CH4 for the DLM5034, DLM5054

6.3 Time Axis

Item	Specifications
Selectable time scale range	1 ns/div to 500 s/div
Timebase accuracy[1]	When shipped or calibrated: ±2.5 ppm Variation with time: ±1.0 ppm/year
Measurement time axis accuracy[1]	CH1 to CH8[2]: Time base accuracy ± (50 ps + 1 sample period) Logic: Timebase accuracy ± (200 ps + 1 sample period)

1 Under standard operating conditions (see section 6.12) after warm-up
2 CH1 to CH4 for the DLM5034, DLM5054

6.4 Display

Item	Specifications
Display	12.1-inch (30.7 cm) color TFT LCD (capacitive touch panel)
Display screen size	245.76 mm (width) × 184.32 mm (height)
Resolution of the entire screen*	1024×768 (XGA)
Resolution of the waveform display	1000×640

* The LCD may include a few defective pixels (within 3 ppm over the total number of pixels including RGB).
The LCD may contain some pixels that are always illuminated or that never illuminate. Note that these are not defects.

6.5 Features

Vertical and Horizontal Control

Item	Specifications
Channel on/off	CH1 to CH8[1] and Logic can be turned on and off independently. At the maximum record length, all even-numbered channels and Logic (C, D)[2] are automatically turned off.
Logic waveform bus display	Bus display is possible on the selected bits (A0 to A7, B0 to B7, C0 to C7[2], D0 to D7[2]) of the logic waveform.
Logic waveform state display	Displays logic signals that have been sampled on the edges of a clock source. Even when the input signal changes, a state is retained until the clock source edge changes. For the clock source, select from the logic waveform bits (A0 to A7, B0 to B7, C0 to C7[2], D0 to D7[2]).
Vertical position	Turning the vertical position knob moves the vertical position of a waveform in the range of ±4 div. Analog waveform: A waveform can be moved in the range of ±4 div from the center of the waveform display frame. CH1 to CH8[1] are moved separately. Logic waveform: The logic waveforms can be moved in the range of ±4 div from the center of the waveform display frame. Press the vertical position knob to reset the position to its default value.
Vertical scale	The vertical scale knob can be used to set the vertical scale. Press the SCALE knob to switch between a mode in which you can set values in 1-2-5 steps or a mode in which you can set values in detail (FINE). For the selectable range when using 1-2-5 steps, see “Analog Signal Input” in Section 6.1, “Signal Input Section.” FINE vertical scale is achieved through digital zooming. If you change the scale while the instrument is stopped, you can vertically expand or reduce waveforms. Logic waveforms can be expanded to three different display-size levels.
Input filter	Bandwidth limit can be set independently for CH1 to CH8.[1] For the available filter types, see "Bandwidth limit" in section 6.1, "Signal Input Section.”
Offset canceling	Offset canceling can be turned on and off collectively for CH1 to CH8.[1] OFF: Does not apply the specified offset to the result of cursor measurements, computations, and automated measurement of waveform parameters. ON: Applies the specified offset to the result of cursor measurements, computations, and automated measurement of waveform parameters.
Inverted display	Waveforms can be inverted around the vertical position for CH1 to CH8[1] separately. Configuration and measurement values are executed on the waveforms before the inversion.
Linear scaling	The scaling factor, offset value, and unit can be set independently for CH1 to CH8.[1]
Logic signal threshold level preset	You can choose from the following preset threshold level settings. CMOS (5 V) = 2.50 V, CMOS (3.3 V) = 1.65 V, CMOS (2.5 V) = 1.25 V, CMOS (1.8 V) = 0.90 V, and ECL = –1.30 V
Deskewing	Deskewing is possible on CH1 to CH8[1] and Logic input signals. For logic waveforms, adjustment is possible at the port (pod (8 bit)) level, but not at the bit level. The adjustable range is ±1 µs in 0.01 ns steps. Triggers are activated on the deskewed signals, but the deskewing on the trigger side is in 400 ps steps.
Horizontal position	Horizontal position knob can be used to set the trigger position and trigger delay. The knob is set to the following functions depending on the DELAY key LED state. LED off: Trigger position LED on: Trigger delay For trigger position and trigger delay specification details, see “Trigger position” or “Selectable trigger delay range” in section 6.2, “Triggering Section.”
Delay canceling	You can select whether to apply the specified delay to the time measurement values. ON: Measures time with the trigger position set to 0 s (does not apply the delay to time measurement). OFF: Measures time with the trigger point set to 0 s (applies the delay to time measurement).
Time scale setting	The time scale can be set using the TIME/DIV knob. For the selectable range, see “Selectable time scale range” in section 6.3, “Time Axis.” If you change the time scale while the instrument is stopped, you can expand or reduce waveforms along the time axis.

1 CH1 to CH4 for the DLM5034, DLM5054
2 Logic C0 to C7 and D0 to D7 are part of the /L32 option.

Item	Specifications
Roll mode	The instrument switches to roll mode display when the trigger mode is set to Auto, Auto Level, or Single for the following time scale ranges. For details on the trigger modes, see “Trigger modes” in section 6.2, “Triggering Section.” 2.5 M points or less 100 ms/div to 500 s/div 5 M points 200 ms/div to 500 s/div 12.5 M points 500 ms/div to 500 s/div 25 M points 1 s/div to 500 s/div 50 M points 2 s/div to 500 s/div 125 M points 5 s/div to 500 s/div 250 M points 10 s/div to 500 s/div 500 M points 20 s/div to 500 s/div

Waveform Acquisition and Display

Item	Specifications
Acquisition modes	Normal, Envelope, and Averaging are available. Normal: Normal sampling without special processing. Envelope: From the data sampled at the maximum real-time sample rate, the instrument acquires the maximum and minimum values for each memory acquisition interval. Average: Averages normally sampled data over multiple acquisitions. Exponential averaging is performed when the trigger mode is set to Auto, Auto Level, or Normal, and linear averaging is performed when the trigger mode is set to Single. The trigger mode is handled as Normal when N Single is specified. The attenuation constant for exponential averaging and the linear average count can be set to a value from 2 to 1024 in 2^n steps. Averaging cannot be used on logic waveforms. For details on the trigger modes, see “Trigger modes” in section 6.2, “Triggering Section.”
Sampling mode	Select from three sampling modes: real-time, repetitive, and interpolation. When you use a short time scale that would cause the sample rate to exceed the real-time sampling maximum sample rate with the specified record length kept constant, the instrument operates as follows: For the maximum sample rates, see “Maximum sample rate” in section 6.1, “Signal Input Section.” RealTime: Achieves the required time scale by reducing the display record length. Interpolation: Performs interpolation sampling. If you decrease the time scale further and the upper limit of the interpolation sampling rate is exceeded, the instrument reduces the display record length to achieve the required time scale. Repetitive: Performs repetitive sampling. If you decrease the time scale further and the upper limit of the repetitive sampling rate is exceeded, the instrument reduces the display record length to achieve the required time scale.
High resolution mode	Improves the analog waveform S/N ratio by combining the high resolution mode and the digital filter. Improves the vertical resolution up to 12 bits.
Record length	Standard model: 1.25k Points, 12.5k Points, 125k Points, 1.25M Points, 2.5M Points, 5M Points, 12.5M Points, 25M Points (single only), 50M Points (single only), 125M Points (odd channel single only) Models with the /M1S or /M1 option: 1.25k Points, 12.5k Points, 125k Points, 1.25M Points, 2.5M Points, 5M Points, 12.5M Points, 25M Points, 50M Points (single only), 125M Points (single only), 250M Points (odd channel single only) Models with the /M2S or /M2 option: 1.25k Points, 12.5k Points, 125k Points, 1.25M Points, 2.5M Points, 5M Points, 12.5M Points, 25M Points, 50M Points, 125M Points (single only), 250M Points (single only), 500M Points (odd channel single only)
History	Automatically saves history waveforms (past waveforms that have been acquired using the same acquisition conditions). Cannot be used in average mode, repetitive sampling mode, or roll mode. Cannot be used at record lengths that only allow single trigger mode. The maximum number of acquisitions that can be held is as follows: Standard model: Up to 20000 acquisitions (when the record length is set to 1.25 k points) Models with the /M1S or /M1 option: Up to 50000 acquisitions (when the record length is set to 1.25 k points) Models with the /M2S or /M2 option: Up to 100000 acquisitions (when the record length is set to 1.25 k points)

Item	Specifications
Zoom	Expands waveforms vertically (analog waveforms only) and horizontally (along the time axis). Two locations, Zoom1 and Zoom2, can be expanded. Separate magnification settings can be specified for each location. Auto scrolling and searching are available as supplementary features of the zoom feature. For details, see “Searching Waveforms” under “Computation, Analysis, and Searching” in Section 6.5, “Functions.” Vertical zoom Zoom source waveform: CH1 to CH8,[1] Math1 to Math8[2] Zoom position: The center position to zoom in on the zoom source waveform can be specified. Selectable range: ±4 div Zoom factor: Selectable range: 1 to 10 Time axis zoom Zoom position: The center position to zoom on the main waveform can be specified. Selectable range: ±5 div Zoom factor: Can be set using the time scale magnification knob. Press the knob to switch between Coarse and Fine. When set to Coarse, the value can be set in 1-2-5 steps. When set to Fine, the value can be set more finely. The selectable range is from 2 or 2.5 times to the magnification that corresponds to 2.5 points/10 div or 3.125 points/10 div. If the record length or time axis is changed, the instrument retains the zoom factor as much as possible. Auto scroll feature: Automatically moves the zoom position in the specified direction.
Display format	1, 2, 3, 4, 6, 8 divided windows are available. The number of divisions can be set to auto. When set to auto, the number of divisions is selected automatically according to the number of displayed traces. The zoom window can be synchronized to the main window or set to 1, 2, 3, 4, 6, 8 divided windows. When a zoom window and the main window are displayed at the same time, you can set the vertical display area of the main window to 20% or 50%.
Display interpolation	Select dot display of sample points, sine interpolation display, linear interpolation display, or pulse interpolation display.
Graticule	Dot grid, line grid, frame, and cross hair are available. Further, the fine grid can be turned on and off. The normal grid appears in front of the waveforms, and the fine grid appears in the back of the waveforms.
Auxiliary display on and off	Scale values and waveform labels can be turned on and off.
LCD backlight adjustment	The LCD backlight can be turned off manually or automatically (automatically turns off when a specified time elapses with no key activity). The brightness can be adjusted. When the backlight turns off, pressing any key will turn it back on. The brightness can be adjusted between level 1 and 10 (10 levels).
X-Y display	Four X-Y waveforms, XY1 to XY4, can be displayed (XY1 and XY2 on the DLM5034 and DLM5054). X-Y waveforms are displayed in their dedicated window and can be displayed simultaneously with T-Y waveforms. Specify the X-Trace, Y-Trace, and the X-Y display time range. XY1, XY2 X-Trace: CH1 to CH4, Math1 to Math4 Y-Trace: CH1 to CH4, Math1 to Math4 XY3, XY4 X-Trace: CH5 to CH8, Math5 to Math8 Y-Trace: CH5 to CH8, Math5 to Math8 Time range: –5 div to +5 div on the time-domain waveform (VT waveform) screen
Accumulation	Accumulates waveforms with gradually decreasing intensity for the specified amount of time. The accumulation time can be set to a value from 100 ms to 100 s or to infinite. Intensity and color modes can be selected. Intensity: Accumulates waveforms using separate channel colors with gradually decreasing intensity. Color: Displays the intensity in intensity mode using different colors.
Snapshot	Retains the waveform that is currently being displayed on the screen as a snapshot waveform. Snapshot waveforms can be saved and loaded.
Clear trace	Clears all displayed waveforms.

1 CH1 to CH4 for DLM5034, DLM5054
2 Math1 to Math4 for DLM5034, DLM5054

Computation, Analysis, and Searching

Item	Specifications
Computation	Eight computations, Math1 to Math8, can be performed (Math1 to Math4 on the DLM5034 and DLM5054). Sources are as follows: Math1: CH1 to CH4 Math2: CH1 to CH4, Math1 Math3: CH1 to CH4, Math1, Math2 Math4: CH1 to CH4, Math1 to Math3 Math5: CH5 to CH8 Math6: CH5 to CH8, Math5 Math7: CH5 to CH8, Math5, Math6 Math8: CH5 to CH8, Math5 to Math7 The following computation types are available. Standard model: Operators+, –, *, Filter, Integ, Count (Edge/Rotary) User-defined computation (option): Expressions can be created by combining the following operators and constants. Operators: +, –, *, /, ABS, SQRT, LOG, LN, EXP, P2, SIN, ASIN, COS, ACOS, TAN, ATAN, PH, DIFF, INTEG, FILT1, FILT2, HLBT, MEAN, DELAY, BIN, PWHH, PWHL, PWLH, PWLL, PWXX, FV, DUTYH, DUTYL, DA Constants: K1 to K4, 0 to 9, PI, e, fs, 1/fs, Exp, Measure
FFT	Four FFT (Fast Fourier Transform) waveforms, FFT1 to FFT4, (FFT1 and FFT2 on the DLM5034 and DLM5054) can be displayed. Source: CH1 to CH8,[1] Math1 to Math8[2] Range: Main, Zoom1, Zoom2 FFT Points: 1.25 k, 2.5 k, 12.5 k, 25 k, 125 k, 250 k, 1.25 Mpoints (waveforms in the above range is sampled down to the specified FFT Points.) Window: Rectangular, Hanning, and flattop Mode: Normal, Max Hold, Average If the user-defined computation option is installed, The following types and sub types can be selected for the FFT. Type: LS-, RS-, PS-, PSD-, CS-, TF-, CH- Sub type: MAG, LOGMAG, PHASE, REAL, IMAG
Reference waveforms	Eight reference waveforms, Ref1 to Ref8, can be displayed (Ref1 to Ref4 on the DLM5034 and DLM5054). Saved waveforms and channel waveforms can be loaded into Ref1 to Ref8.[3] Ref1 to Ref8[3] use the Math1 to Math8[2] traces, respectively. Therefore, Ref and Math cannot be used simultaneously.
Serial bus signal analysis[4]	FlexRay, CAN, CAN FD (ISO or non-ISO), LIN, CXPI, SENT, PSI5 Airbag, UART, I^2C, SPI, and user-defined serial bus data can be analyzed and displayed. The instrument can decode frames, fields, and other information from the waveform displayed on the screen. Then, it can display the decoded results and the waveform together on the screen and display and save a list of detailed decoded results . For SENT and PSI5 Airbag signals, trend display is also possible. If you set search conditions and perform a search, you can display the waveform expanded with the beginning of the frame, field, or data that meets the search conditions in the center. The instrument can analyze and search the waveforms of up to four serial bus signals. The instrument can search up to 50000 points on the selected serial bus signal.

1 CH1 to CH4 for the DLM5034, DLM5054
2 Math1 to Math4 for the DLM5034, DLM5054
3 Ref1 to Ref4 for the DLM5034, DLM5054
4 FlexRay, CAN, CAN FD, LIN, CXPI, SENT, PSI5 Airbag, UART, I^2C, and SPI are options.

Item	Specifications
History waveform display and searching	The instrument can search for history waveforms that meet the specified conditions and display them as well as display a list of the timestamps of those waveforms. You can set a search condition to search for history waveforms that enter a rectangular zone (Simple) or search on the AND or OR logic of eight conditions.* The following five search modes are available. OFF: No conditions. RectZone: Rectangular zone. Cannot be used on Logic or FFT waveforms. WaveZone: Waveform zone. Cannot be used on XY, Logic or FFT waveforms. PolygonZone: Polygonal zone. Cannot be used on Logic or FFT waveforms. Parameter: Zone between the upper and lower limits of one waveform parameter. The search criterion is either the source waveform entering or exiting the search range.
Searching Waveforms	Searches the displayed waveform for locations that meet the specified conditions and zooms in on the detected points. Up to 50000 points can be detected within the specified search range. Search feature: Searches for a specific area after a specific time (Start Point, End Point) on the displayed waveform and displays the result in the zoom window. The selectable range for Start Point and End Point is ±5 div. Search Type: Edge, Pattern, Pulse Width, Timeout
Cursor measurement	The following cursors are available. ΔT, ΔV, ΔT & ΔV, Marker, Degree
Automated measurement of waveform parameters	The following waveform parameters can be automatically measured. • Items that are measured over the entire specified range of data and are irrelevant to the period: Max, Min, P-P, High, Low, Amplitude, Rms, Mean, Sdev (AC RMS), IntegTY+, IntegTY, +Over, –Over, Pulse Count, Edge Count • Items that are measured in the first period in the specified range: Freq, Period, Burst, +Width, –Width, Duty, Rise, Fall, Delay • Items that are measured over all periods in the specified range: AvgFreq, AvgPeriod • ΔT & ΔV cursor values: V1, V2, ΔT For logic signals, the following items are selectable. Freq, Period, AveFreq, Duty, Pulse Count, Delay In cycle mode, the following items are valid. Max, Min, P-P, High, Low, Amplitude, Rms, Mean, Sdev (AC RMS), IntegTY+, IntegTY, +Over, –Over The maximum total number of items that can be displayed in Area1 and Area2 on the screen is 30.
Statistical processing of waveform parameters	The following three statistical processing functions are available. Continuous: Calculates statistics on normal measurement that is performed multiple times. Cycle: Calculates statistics on the measurement of each period of the displayed waveform. History: Calculates statistics on the measurements of multiple history waveforms. The statistical processing results are as follows: Statistical items: Max, Min, Mean, σ, Count The maximum total number of items that can be displayed on the screen is 9.
Trend display and histogram display of waveform parameters	Up to two trends or histograms of the specified measurement items can be displayed.
Enhanced parameter measurement	Performs automated measurement of waveform parameters on the second area (Area2). In addition to the area for the normal automated measurement of waveform parameters (Area1; described earlier), you can specify another area for performing additional automated measurement of waveform parameters (Area2). In addition, calculations can be performed using the automated measurement values of waveform parameters. The maximum total number of items that can be displayed in Area1 and Area2 on the screen is 30.
Frequency distribution analysis	Counts the frequency of data occurrence in a specified area and displays the values in a histogram. You can select whether to count the frequency on the voltage or time axis. The mean, standard deviation, maximum value, minimum value, peak value, median, etc., can be measured on the histogram. You can set up to two histogram source waveforms (Hist1, Hist2).
Action-on-trigger	A specific action can be executed when the instrument triggers. You can set the number of times to execute the action on the basis of the number of waveform acquisitions or the number of determinations. Actions: Beeping, screen image printing or saving, waveform data saving, mail transmission

* Four for the DLM5034 and DLM5054

6.5 Features

Item	Specifications
GO/NO-GO determination	A specific action can be executed when the GO/NO-GO result is NO-GO. You can set the number of times to execute the action on the basis of the number of waveform acquisitions or the number of determinations. Up to eight conditions[1] can be set, and Determinations can be made on the AND or OR of eight conditions.[1] The following five search modes are available. OFF: No conditions. Rect-Zone: Rectangular zone. Cannot be used on FFT waveforms. Wave-Zone: Waveform zone. Cannot be used on XY or FFT waveforms. Polygon-Zone: Polygonal zone. Cannot be used on FFT waveforms. Parameter: Zone between the upper and lower limits of one waveform parameter. The reference is either the source waveform entering or exiting the reference range. Actions Beeping, screen image printing or saving, waveform data saving, mail transmission
Power supply analysis feature (option)	You can select and execute the analysis feature or power measurement feature.
	Analysis feature: One of the following analyses can be executed. • Switching loss analysis (SW Loss): The total loss and the switching loss of N cycles can be measured. Items such as power waveforms and measured values can be displayed, and statistics can be computed. The following five locations can be displayed with indicators: the Turn On start and end points of the first found cycle, the following Turn Off start and end points, and the following Turn On start point. The conduction loss computation method can be selected from the following: U × I RDS (on) × I^2 VCE (sat) × I The items whose switching losses can be measured automatically are listed below. P: Turn On, On, Turn Off, Total Wp: Turn On, On, Turn Off, Total In addition, statistical processing can be applied to the above items. For details on statistical processing, see “Statistical processing of waveform parameters,” described earlier. • Safe Operating Area (SOA): An X-Y display can be created with voltage input plotted on the X-axis and current input plotted on the Y-axis. • Harmonic analysis (Harmonics): Simple comparisons can be made between the harmonics and harmonic current emission standard limits. THD and RMS can be displayed. IEC 61000-3-2 Edition 4.0 EN 61000-3-2(2006) IEC 61000-4-7 Edition 2.1 • Joule integral (I^2t): Items such as Joule integral waveforms and measured values can be displayed, and statistics can be computed. The item whose Joule integral can be measured automatically is shown below. I^2t
	Power measurement feature: Up to four power measurements[2] can be performed simultaneously. The items that can be measured automatically are shown below. U+pk, U–pk, Up-p, Urms, Udc, Uac, Umn, Urmn, Avg Freq (of voltage), , S, P, Q, Z, λ, Wp, Wp+, Wp–, Abs.Wp , I+pk, I–pk, Ip-p, Irms, Idc, Iac, Imn, Irmn, Avg Freq (of current), q, q+, q–, Abs.q In addition, statistical processing can be applied to the above items. For details on statistical processing, see “Statistical processing of waveform parameters,” described earlier.
	The auto deskew feature automatically deskews the time difference between the voltage and current waveforms. Auto deskew uses voltage and current signals of the deskew signal sources (701936; sold separately) that are received through probes connected to voltage channels and current channels, respectively. For information about the deskew range, see “Deskewing” under “Vertical and Horizontal Control” described earlier.

1 Four for the DLM5034 and DLM5054
2 Two for the DLM5034 and DLM5054

Screen Image Printing and Saving

Item	Specifications
Built-in printer (option)	Prints screen images in the specified output format on the built-in printer. Hardcopy(with Menu): Prints the displayed screen image. Hardcopy(without Menu): Prints only the waveform area of the displayed screen image. The menu is not printed. If cursor measurements or automatically measured results are displayed, they are printed below the waveform area.
USB printer	Prints screen images on an external USB printer. Color can be turned on or off. HP inkjet printers are supported.
Network printer	Prints screen images on an external printer via Ethernet. Color can be turned on or off. HP inkjet and laser printers are supported. Hardcopy(with Menu): Prints the displayed screen image. Hardcopy(without Menu): Prints only the waveform area of the displayed screen image. The menu is not printed. If cursor measurements or automatically measured results are displayed, they are printed below the waveform area.
File	Saves a screen image to the specified storage device using one of the following save modes. The storage device can be set to internal storage or USB storage. The output format is PNG, BMP, or JPEG. Available color settings are OFF, ON, ON (Rev), and ON (Gray). Hardcopy(with Menu): Saves the displayed screen image. Hardcopy(without Menu): Saves only the waveform area of the displayed screen image. The menu is not saved. If cursor measurements or automatically measured results are displayed, they are printed below the waveform area. Wide: Saves a screen image whose time axis is magnified twice. The menu is not saved. If cursor measurements or automatically measured results are displayed, they are printed below the waveform area.

Saving Data

Item	Specifications
Waveform data	Saves waveform data (including history waveforms) to the specified storage device.[1] The saved data can be loaded into the instrument. Available data formats are binary (.wdf) and ASCII (.csv). Only binary (.wdf) files can be loaded into the instrument. Specify the data format, waveform to be saved, history range, window to be saved (Main, Zoom1, Zoom2), compression mode (OFF, P-P, Decimation). When loading the data, set the load destination to ACQ memory or Ref1 (Math1) to Ref8 (Math8).[2] If waveform data is loaded into the ACQ memory, the data is cleared when you start waveform acquisition.
Setup data	Saves setup data to the specified storage device.[1] The saved data can be loaded into the instrument.
Setup data (storage and recall)	Up to three sets of setup data can be stored and loaded from the internal memory.
Other types of data	The displayed screen image can be saved. Waveform zones can be saved and loaded. Polygonal zones can be loaded. Snapshot waveforms can be saved and loaded. Automatically measured waveform parameters can be saved. Serial bus analysis results can be saved. FFT waveform data can be saved. Histogram data can be saved. History timestamps can be saved. Symbol data can be loaded.

1 The storage device can be set to internal storage or USB storage.
2 Ref1 (Math1) to Ref4 (Math4) for the DLM5034 and DLM5054

Other Features

Item	Specifications
Default setup	Resets the instrument to its factory default settings. The following settings are not reset: date and time settings, communication interface settings, settings stored to the internal memory, language settings, and font size of measured values. The Undo command can be used to revert to the previous settings.
Auto setup	Automatically sets the voltage scale, time scale, trigger, and other settings to the most suitable values for the input signals. The Undo command can be used to revert to the previous settings.
Serial bus auto setup[1]	Auto setup can be executed on the basis of the selected serial bus type (FlexRay, CAN, CAN FD, LIN, CXPI, SENT, PSI5 Airbag, UART, I^2C, SPI) and trigger source. The instrument can automatically set the bit rate, source level, and other settings and trigger on the basis of these settings.
Calibration	Auto calibration and manual calibration are available.
System configuration	The date, time, and message language can be specified. The click sound can be turned on and off.
Time synchronization feature	Synchronization source: Supports IEEE 1588-2008 (PTP v2) (slave only) Supports PTP packets of Layer3 (UDP/IPv4) and Layer2 (Ethernet) Supports Ordinary Clock Supports E2E delay correction Supports 2-step Sync messages Synchronized items: Instrument clock, sampling clock Synchronization accuracy: ±200 ns (typical value[2], 1000BASE-T without using an Ethernet switch)
Probe compensation signal output	Transmits signals from the front-panel probe compensation signal output terminals (approx. 1-V_{p-p} and approx. 1-kHz rectangular wave).
Overview	Allows you to view the instrument system status.
Additional option licenses	Computation, trigger, analysis, and other options can be purchased and added.
Self-test	Memory, accuracy, keyboard, printer, and synchronous operation feature tests are available.
Menu language	The menu language can be changed.
Help	Displays a description of the settings. Available in English and Japanese.

1 Serial bus auto setup is available on models with the serial bus option.
2 Typical values represent typical or average values. They are not strictly warranted.

6.6 Built-in Printer (Option)

Item	Specifications
Print system	Thermal line dot system
Dot density	8 dots/mm
Sheet width	112 mm

6.7 Storage

Internal Storage

Item	Specifications
Media type	Standard model: SD memory card /C8 option: SSD
Capacity	Standard model: Approx. 1.7 GB /C8 option: Approx. 64 GB

USB Storage Device*

Item	Specifications
Compatible USB storage devices	Mass storage device compatible with USB Mass Storage Class Ver. 1.1
Available space	8 TB Partition format: GPT/MBR, format type: exFAT/FAT32/FAT16

* For USB port specifications, see section 6.8, “USB Ports for Peripherals.”

6.8 USB Ports for Peripherals

Item	Specifications
Connector type	USB type A (receptacle)
Electrical and mechanical	USB Rev. 2.0 compliant
Supported transfer modes	LS (Low Speed; 1.5 Mbps), FS (Full Speed; 12 Mbps), HS (High Speed; 480 Mbps)
Number of ports	2
Power supply	5 V, 500 mA (each port)
Compatible devices	Mouse devices that comply with USB HID Class Ver. 1.1 104 (US) or 109 (Japanese) keyboards that comply with USB HID Class Ver. 1.1 HP Inkjet printers compatible with USB Printer Class Ver. 1.0 Mass storage device compatible with USB Mass Storage Class Ver. 1.1 USB HUB Device
Number of connectable devices	Hub: 1 per port Mouse, keyboard, and printer: 1 of each Mass storage devices: 2 Up to six devices can be connected including the hub

6.9 Auxiliary I/O Section

External Trigger Input (TRIGGER IN)

Item	Specifications
Connector type	BNC
Input bandwidth*	DC to 100 MHz
Input impedance	Approx. 1 MΩ, approx. 16 pF
Maximum input voltage	±40 V (DC + AC peak) or 28 Vrms (At 1 MHz and higher, the voltage decreases at 20 dB/decade down to ±5 V (DC+ACpeak) or 2 Vrms.)
Input range	±2 V ±20 V
Trigger level	±2 V. The resolution is 5 mV (for the ±2 V range). ±20 V. The resolution is 50 mV (for the ±20 V range).

* Under standard operating conditions (see section 6.12) after warm-up

Trigger Output (TRIGGER OUT)

Item	Specifications
Connector type	BNC
Output level	3.3 V CMOS
Output impedance	Approx. 50 Ω
Output logic	⊓ (negative logic) and ⊔ (positive logic) switchable
Output delay time	600 ns or less*
Output hold time	Negative logic: Low level: 500 ns min. High level: 50 ns min. Positive logic: High level: 500 ns min. Low level: 50 ns min.

* When deskewing is not used

Video Signal Output (VIDEO OUT)

Item	Specifications
Connector type	D-sub 15 pin (receptacle)
Output type	Analog RGB output
Output resolution	XGA-compliant output, 1024 × 768 dots, approx. 60-Hz Vsync (66.7 MHz dot clock frequency)

GO/NO-GO Determination Output

Item	Specifications
Connector type	RJ-12 modular jack
Signal	GO OUT, NO-GO OUT
Output level	TTL compatible
Compliant cable	Four-wire modular cable

Front Panel Probe Interface Terminal

Item	Specifications
Output terminals	DLM5034, DLM5054: 4 DLM5038, DLM5058: 8
Output voltage	±12 V ± 5% (up to 2.0 A in combination with the side panel probe power terminal), ±5 V ± 5% (up to 1.6 A total)
Usable probes	Differential probes (701924, 701925, 701927, 702921, 702922), current probes (701928, 701929)

Side Panel Probe Power Terminal (option)

Item	Specifications
Output terminals	DLM5034, DLM5054: 4 DLM5038, DLM5058: 8
Output voltage	±12 V (up to 2.0 A in combination with the front panel probe power terminal)
Usable probes	FET probe (700939), current probe (701917, 701918, 701930, 701931, 701932, 701933, 702915, 702916), differential probes (700924, 700925, 701920, 701921, 701922, 701926, 701977, 701978, 702923, 702924)

Synchronous Operation I/O (SYNC)

Item	Specifications
Connector type	26-pin half pitch (female)
Compliant cable	Connection cable (701982-01, 701982-02)

6.10 Computer Interface

GP-IB (option)

Item	Specifications
Electrical and mechanical	Complies with IEEE St'd 488-1978 (JIS C 1901-1987)
Functional specifications	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0
Protocol	Complies with IEEE St'd 488.2-1992
Code	ISO (ASCII) codes
Mode	Addressable mode
Address	Talker and listener addresses can be specified from 0 to 30.
Clear remote mode	Remote mode can be cleared with the SHIFT+CLEAR TRACE key (except during Local Lockout).

USB for PC Connection

Item	Specifications
Connector type	USB type B (receptacle)
Electrical and mechanical	USB Rev. 3.0 compliant
Supported transfer modes	FS (Full Speed) mode (12 Mbps), HS (High Speed) mode (480 Mbps), SS (Super Speed) mode (5 Gbps)
Number of ports	1
Supported protocols	Functions as a device that conforms to one of the following two protocols. USBTMC-USB488 (USB Test and Measurement Class Ver. 1.0)* Communication commands can be used through USB. Mass Storage Class Ver. 1.1 Only reading is possible from the instrument's internal storage through PC access. (Operations, such as formatting, are not possible.)
PC system requirements	A PC with a USB port, running the English or Japanese version of Windows 10 (32 bit or 64 bit) or Windows 11

* A separate driver is required.

Ethernet

Item	Specifications
Connector type	RJ-45 connector
Ports	1
Electrical and mechanical specifications	IEEE 802.3 compliant
Transmission system	Ethernet (1000BASE-T, 100BASE-TX, 10BASE-T)
Communication protocol	TCP/IP
Supported services	Server: FTP, VXI-11, Socket, HTTP (Web) Client: FTP (Net Drive), SMTP (Mail), SNTP, LPR (Net Print), DHCP, DNS, PTP
PC system requirements	A PC running the English or Japanese version of Windows 10 (32 bit or 64 bit) or Windows 11

6.11 Synchronous Operation (DLMsync, Optional)

Item	Specifications
Connection method	Using a connection cable (701982-01, 701982-02), connect two of the following instruments: DLM5034, DLM5054, DLM5038, DLM5058.
Synchronized items	Measurement start/stop, sampling clock, clock (time), trigger
Inter-unit sampling skew	When the connection cable (701982-01) is used: 20.20 ns (typical value*) When the connection cable (701982-02) is used: 27.90 ns (typical value*) Adjustable within ±50 ps using the deskew feature
Inter-unit skew adjustment (Deskew) feature	Adjusts the inter-unit sampling skew Adjustment range: 15.0 ns to 35.0 ns (0.05 ns resolution)

* Typical values represent typical or average values. They are not strictly warranted.

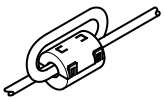
6.12 General Specifications

Item	Specifications	
Standard operating conditions	Ambient temperature:	23 ± 5°C
	Ambient humidity:	55 ± 10%RH
	Supply voltage and frequency errors:	Within ±1% of rating
Warm-up time	At least 30 minutes	
Storage environment	Temperature:	–20 to 60°C
	Humidity:	20 to 80% RH (no condensation)
	Altitude:	3000 m or less
Operating environment	Temperature:	5 to 40°C
	Humidity:	20 to 80%RH (when the printer is not in use; no condensation) 35 to 80%RH (when the printer is in use; no condensation)
	Altitude:	2000 m or less
Installation	Indoors use	
Recommended calibration period	1 year	
Rated supply voltage	100 to 120 VAC, 220 to 240 VAC (auto switching)	
Permitted supply voltage range	90 to 132 VAC, 198 to 264 VAC	
Rated supply frequency	50/60 Hz	
Permitted supply frequency range	48 to 63 Hz	
Power fuse	Built in (not replaceable)	
Maximum power consumption	290 VA (when the printer is in use)	
Withstand voltage (between the power supply and case)	1.5 kVAC for 1 minute	
Insulation resistance (between the power supply and case)	500 VDC, 10 MΩ or more	
Dimensions	426 mm (W) × 266 mm (H) × 180 mm (D), with the printer cover closed, excluding protrusions	
Weight	Approx. 7.3 kg (excluding options)	
Instrument cooling method	Forced air cooling, outlet on the rear	
Installation orientation	Horizontal or tilted using the movable leg or stand Other installation orientations are prohibited. Stacking prohibited.	
Battery backup	The clock is backed up with the internal lithium battery. Battery life: Approx. five years (at an ambient temperature of 25°C)	
Safety standards	Compliant standards EN 61010-1 Overvoltage Category II[1] Pollution degree 2[2] EN IEC 61010-2-030 Measurement Category Other (O)[3]	

1 The overvoltage category is a value used to define the transient overvoltage condition and includes the rated impulse withstand voltage. The overvoltage category II applies to electrical equipment that is powered through a fixed installation, such as a switchboard.

2 Pollution Degree applies to the degree of adhesion of a solid, liquid, or gas that deteriorates withstand voltage or surface resistivity. Pollution degree 2 applies to normal indoor atmospheres (with only non-conductive pollution).

3 The measurement category of this instrument's signal input terminals is Other (O). Do not use it to measure the main power supply or for Measurement Categories II, III, and IV.
Measurement category O applies to measurement of circuits that are not directly connected to a main power source. This category applies to measurement of secondary electric circuits in equipment across a transformer. The estimated transient overvoltage that may appear at the instrument's signal input terminals is 1600 V.
Measurement category II applies to measurement of circuits, such as household electric appliances and portable electric tools, that are connected to low-voltage installations.
Measurement category III applies to measurement of facility circuits, such as distribution boards and circuit breakers.
Measurement category IV applies to measurement of power source circuits, such as entrance cables to buildings and cable systems, for low-voltage installations.

Item	Specifications
Emissions	Compliant standards EN 61326-1 Class A EN 61326-2-1 EN 55011 Class A Group 1* EMC Regulatory Arrangement in Australia and New Zealand EN 55011 Class A, Group 1* Korea Electromagnetic Conformity Standard (한국 전자파적합성기준) (Applies to the DLM5034, DLM5038, DLM5054, and DLM5058) EN 61000-3-2, EN IEC 61000-3-2 EN 61000-3-3 This product is classified as Class A (for use in industrial environments). Operation of this product in a residential area may cause radio interference. When a measurement lead or probe is connected or when the device under measurement is connected to the instrument, the emission requirements may no longer be met. In such cases, the user will be required to correct the interference.
	Cable conditions Probe power cable Attach a ferrite-core (TDK: ZCAT2035-0930A, YOKOGAWA: A1190MN) to the instrument end of the cable by passing the cable twice through the core (see the figure below). Trigger output cable Attach a ferrite core (TDK: ZCAT2035-0930A, YOKOGAWA: A1190MN) to the instrument end of a BNC cable. Use cables that are 3 m or less in length. Video signal output cable Attach a ferrite core (TDK: ZCAT2035-0930A, YOKOGAWA: A1190MN) to each end of a D-Sub 15-Pin VGA shielded cable. Use cables that are 3 m or less in length. GP-IB Cable Use a shielded cable that is 3 m in length or less. Ethernet cable Use Ethernet cables that are 30 m or less in length. USB cable for peripherals Attach a ferrite-core (TDK: ZCAT2035-0930A, YOKOGAWA: A1190MN) to the instrument end of a USB cable by passing the cable twice through the core (see the figure below). Use cables that are 3 m or less in length. USB cable for PCs Attach a ferrite core (TDK: ZCAT2035-0930A, YOKOGAWA: A1190MN) to the instrument end of a USB cable. Use cables that are 3 m or less in length. GO/NO-GO output cable Use the dedicated GO/NO-GO cable (YOKOGAWA: 366973), which is sold separately. Attach a ferrite-core (TDK: ZCAT2035-0930A, YOKOGAWA: A1190MN) to the instrument end of the cable by passing the cable twice through the core (see the figure below). Logic signal input cable Use a logic probe cable. Attach a ferrite core (TDK: ZCAT2035-0930A, YOKOGAWA: A1190MN) to the instrument end. Synchronous operation cable Use a connection cable (YOKOGAWA: 701982-01, 701982-02), which is sold separately. **Example of passing the cable through twice** 

* Group 1: Equipment that does not intentionally generate or use radio-frequency (RF) energy

Item	Specifications
Immunity	Compliant standards EN 61326-1 Table 2 (for use in industrial locations) (Applies to the DLM5034, DLM5038, DLM5054, and DLM5058) EN 61326-2-1 When a measurement lead or probe is connected or when the device under measurement is connected to the instrument, the immunity requirements may no longer be met. In such cases, the user will be required to take appropriate measures.
	Influence in the immunity testing environment (criteria A) Noise increase: 500 µV/div to 10 mV/div: ±4 div 20 mV/div to 10 V/div: ±2 div Test conditions: 2.5 GS/s, envelope mode Cable conditions: Same as the emission cable conditions Test items: 1. Static discharge: EN 61000-4-2 Air discharge: ±8 kV. Contact discharge: ±4 kV. Criteria B. 2. Radiated immunity: EN 61000-4-3 80 MHz to 1 GHz, 10 V/m, 1.0 GHz to 6.0 GHz, 3 V/m, Criteria A 3. Conducted immunity: EN 61000-4-6 10 V, Criteria A 4. EFT/Burst: EN 61000-4-4 Power line: ±2 kV. Signal line: ±1 kV, Criteria B 5. Surge immunity: EN 61000-4-5 ±1 kV between lines, ±2 kV common, Criteria B 6. Voltage dip and interruptions: EN 61000-4-11 1 cycle, both polarities, 100%, criteria B Other tests, criteria C Definitions of criteria A, B, and C Criteria A: During testing, "influence in the immunity testing environment" described above is met. Criteria B: The instrument continues to function and is controllable throughout testing. The instrument does not change operation modes, and data changes do not persist. Criteria C: During testing, temporary degradation of performance or loss of functionality occurred, the correction of which required user operation or system reset.
Environmental standards*	EU RoHS Directive compliant

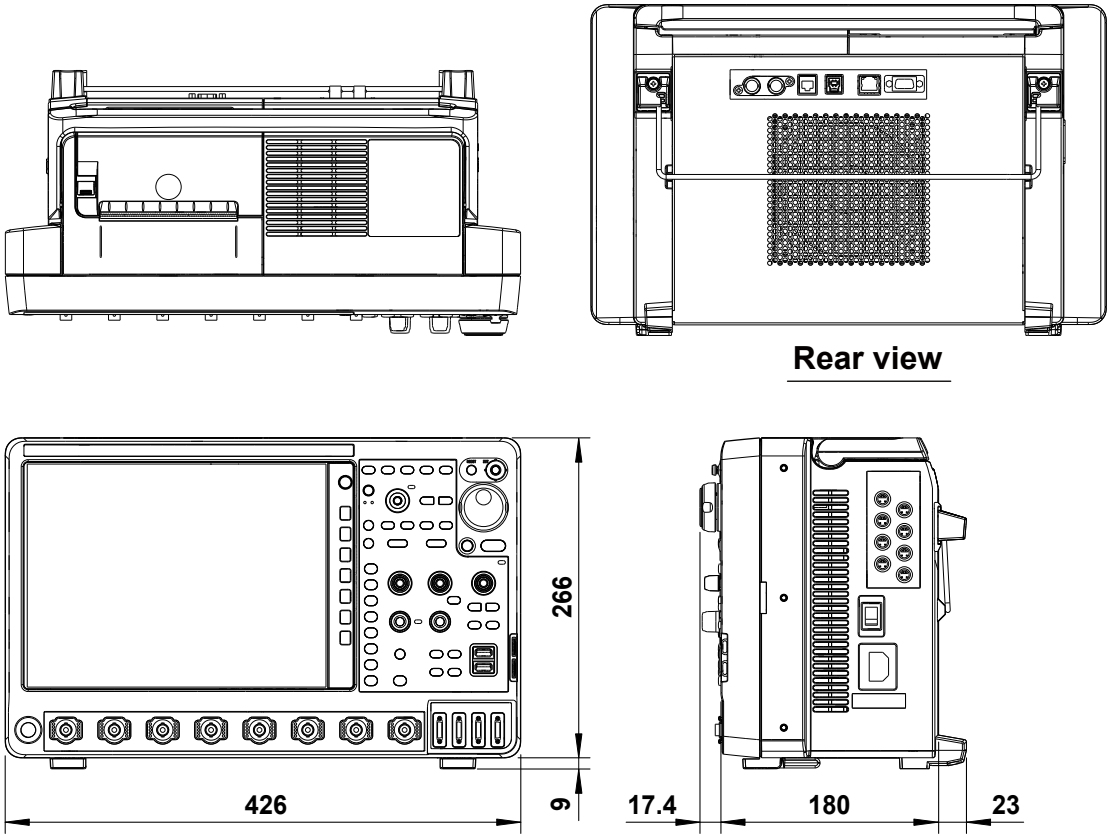
* For conformity to environmental regulations and/or standards other than EU, contact your nearest YOKOGAWA office (PIM113-01Z2).

6.13 External Dimensions

Instrument

Unit: mm

Unless otherwise specified, tolerances are ±3% (however, tolerances are ±0.3 mm when below 10 mm).



Appendix 1 Relationship between the Time Scale, Sample Rate, and Record Length

The sample rate is determined by the time scale and record length settings.

Sample rate = Record length/(time scale [s/div] × 10 [div])

To change the sample rate, change the time scale or set record length.

Changing the Sample Rate after Setting the Time Scale

Change the set record length to change the sample rate.

Example: To measure at a sample rate of 1.25 GS/s using a 10 µs/div time scale

1. Set the time scale to 10 µs/div.
2. Press **ACQUIRE** to display the ACQUIRE menu.
3. Press the **Record Length** soft key, and from the menu that appears, select 125 kPoints.
   The sample rate shown on the screen changes to 1.25 GS/s.
   On the table under “When the Set Record Length Is 125 kpoint,” provided later, you can confirm that the sample rate is 1.25 GS/s when the time scale (Time/div) is set to 10 µs/div.

Note

For the relationship between the sample rate and time scale for each set record length, see the following pages.

Changing the Sample Rate after Setting the Set Record Length

Turn the TIME/DIV knob to change the time scale, which also changes the sample rate.

Example: To measure at a sample rate of 12.5 MS/s using a set record length of 1.25 kPoints

1. Change the set record length to 1.25 kPoints.
2. On the table under “When the Set Record Length Is 1.25 kpoint” on the next page, confirm that the time scale (Time/div) is 10 µs/div when the sample rate is set to 12.5 MS/s.
3. Turn the **TIME/DIV** knob to change the time scale to 10 µs/div.
   The sample rate shown on the screen changes to 12.5 MS/s.

When the Set Record Length Is 1.25 kpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	50	250 k	50	250 k	50	250 k	50	250 k	50	250 k	50	250 k
200 s	50	100 k	50	100 k	50	100 k	50	100 k	50	100 k	50	100 k
100 s	50	50 k	50	50 k	50	50 k	50	50 k	50	50 k	50	50 k
50 s	50	25 k	50	25 k	50	25 k	50	25 k	50	25 k	50	25 k
20 s	50	10 k	50	10 k	50	10 k	50	10 k	50	10 k	50	10 k
10 s	50	5 k	50	5 k	50	5 k	50	5 k	50	5 k	50	5 k
5 s	50	2.5 k	50	2.5 k	50	2.5 k	50	2.5 k	50	2.5 k	50	2.5 k
2 s	62.5	1.25 k	62.5	1.25 k	62.5	1.25 k	62.5	1.25 k	62.5	1.25 k	62.5	1.25 k
1 s	125	1.25 k	125	1.25 k	125	1.25 k	125	1.25 k	125	1.25 k	125	1.25 k
500 ms	250	1.25 k	250	1.25 k	250	1.25 k	250	1.25 k	250	1.25 k	250	1.25 k
200 ms	625	1.25 k	625	1.25 k	625	1.25 k	625	1.25 k	625	1.25 k	625	1.25 k
100 ms	1.25 k	1.25 k	1.25 k	1.25 k	1.25 k	1.25 k	1.25 k	1.25 k	1.25 k	1.25 k	1.25 k	1.25 k
50 ms	2.5 k	1.25 k	2.5 k	1.25 k	2.5 k	1.25 k	2.5 k	1.25 k	2.5 k	1.25 k	2.5 k	1.25 k
20 ms	6.25 k	1.25 k	6.25 k	1.25 k	6.25 k	1.25 k	6.25 k	1.25 k	6.25 k	1.25 k	6.25 k	1.25 k
10 ms	12.5 k	1.25 k	12.5 k	1.25 k	12.5 k	1.25 k	12.5 k	1.25 k	12.5 k	1.25 k	12.5 k	1.25 k
5 ms	25 k	1.25 k	25 k	1.25 k	25 k	1.25 k	25 k	1.25 k	25 k	1.25 k	25 k	1.25 k
2 ms	62.5 k	1.25 k	62.5 k	1.25 k	62.5 k	1.25 k	62.5 k	1.25 k	62.5 k	1.25 k	62.5 k	1.25 k
1 ms	125 k	1.25 k	125 k	1.25 k	125 k	1.25 k	125 k	1.25 k	125 k	1.25 k	125 k	1.25 k
500 µs	250 k	1.25 k	250 k	1.25 k	250 k	1.25 k	250 k	1.25 k	250 k	1.25 k	250 k	1.25 k
200 µs	625 k	1.25 k	625 k	1.25 k	625 k	1.25 k	625 k	1.25 k	625 k	1.25 k	625 k	1.25 k
100 µs	1.25 M	1.25 k	1.25 M	1.25 k	1.25 M	1.25 k	1.25 M	1.25 k	1.25 M	1.25 k	1.25 M	1.25 k
50 µs	2.5 M	1.25 k	2.5 M	1.25 k	2.5 M	1.25 k	2.5 M	1.25 k	2.5 M	1.25 k	2.5 M	1.25 k
20 µs	6.25 M	1.25 k	6.25 M	1.25 k	6.25 M	1.25 k	6.25 M	1.25 k	6.25 M	1.25 k	6.25 M	1.25 k
10 µs	12.5 M	1.25 k	12.5 M	1.25 k	12.5 M	1.25 k	12.5 M	1.25 k	12.5 M	1.25 k	12.5 M	1.25 k
5 µs	25 M	1.25 k	25 M	1.25 k	25 M	1.25 k	25 M	1.25 k	25 M	1.25 k	25 M	1.25 k
2 µs	62.5 M	1.25 k	62.5 M	1.25 k	62.5 M	1.25 k	62.5 M	1.25 k	62.5 M	1.25 k	62.5 M	1.25 k
1 µs	125 M	1.25 k	125 M	1.25 k	125 M	1.25 k	125 M	1.25 k	125 M	1.25 k	125 M	1.25 k
500 ns	250 M	1.25 k	250 M	1.25 k	250 M	1.25 k	250 M	1.25 k	250 M	1.25 k	250 M	1.25 k
200 ns	625 M	1.25 k	625 M	1.25 k	625 M	1.25 k	625 M	1.25 k	625 M	1.25 k	625 M	1.25 k
100 ns	1.25 G	1.25 k	1.25 G	1.25 k	1.25 G	1.25 k	1.25 G	1.25 k	1.25 G	1.25 k	1.25 G	1.25 k
50 ns	2.5 G	1.25 k	2.5 G	1.25 k	2.5 G	1.25 k	1.25 G	625	2.5 G	1.25 k	2.5 G	1.25 k
20 ns	2.5 G	500	5 G	1 k	5 G	1 k	1.25 G	250	5 G	1 k	5 G	1 k
10 ns	2.5 G	250	12.5 G	1.25 k	12.5 G	1.25 k	1.25 G	125	12.5 G	1.25 k	12.5 G	1.25 k
5 ns	2.5 G	125	25 G	1.25 k	25 G	1.25 k	1.25 G	62.5	25 G	1.25 k	25 G	1.25 k
2 ns	2.5 G	50	62.5 G	1.25 k	62.5 G	1.25 k	1.25 G	25	62.5 G	1.25 k	62.5 G	1.25 k
1 ns	2.5 G	25	125 G	1.25 k	125 G	1.25 k	1.25 G	12.5	125 G	1.25 k	125 G	1.25 k

Values outside of the thick borders have been calculated in real-time sampling mode.

: Roll mode

When the Set Record Length Is 12.5 kpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	50	250 k	50	250 k	50	250 k	50	250 k	50	250 k	50	250 k
200 s	50	100 k	50	100 k	50	100 k	50	100 k	50	100 k	50	100 k
100 s	50	50 k	50	50 k	50	50 k	50	50 k	50	50 k	50	50 k
50 s	50	25 k	50	25 k	50	25 k	50	25 k	50	25 k	50	25 k
20 s	62.5	12.5 k	62.5	12.5 k	62.5	12.5 k	62.5	12.5 k	62.5	12.5 k	62.5	12.5 k
10 s	125	12.5 k	125	12.5 k	125	12.5 k	125	12.5 k	125	12.5 k	125	12.5 k
5 s	250	12.5 k	250	12.5 k	250	12.5 k	250	12.5 k	250	12.5 k	250	12.5 k
2 s	625	12.5 k	625	12.5 k	625	12.5 k	625	12.5 k	625	12.5 k	625	12.5 k
1 s	1.25 k	12.5 k	1.25 k	12.5 k	1.25 k	12.5 k	1.25 k	12.5 k	1.25 k	12.5 k	1.25 k	12.5 k
500 ms	2.5 k	12.5 k	2.5 k	12.5 k	2.5 k	12.5 k	2.5 k	12.5 k	2.5 k	12.5 k	2.5 k	12.5 k
200 ms	6.25 k	12.5 k	6.25 k	12.5 k	6.25 k	12.5 k	6.25 k	12.5 k	6.25 k	12.5 k	6.25 k	12.5 k
100 ms	12.5 k	12.5 k	12.5 k	12.5 k	12.5 k	12.5 k	12.5 k	12.5 k	12.5 k	12.5 k	12.5 k	12.5 k
50 ms	25 k	12.5 k	25 k	12.5 k	25 k	12.5 k	25 k	12.5 k	25 k	12.5 k	25 k	12.5 k
20 ms	62.5 k	12.5 k	62.5 k	12.5 k	62.5 k	12.5 k	62.5 k	12.5 k	62.5 k	12.5 k	62.5 k	12.5 k
10 ms	125 k	12.5 k	125 k	12.5 k	125 k	12.5 k	125 k	12.5 k	125 k	12.5 k	125 k	12.5 k
5 ms	250 k	12.5 k	250 k	12.5 k	250 k	12.5 k	250 k	12.5 k	250 k	12.5 k	250 k	12.5 k
2 ms	625 k	12.5 k	625 k	12.5 k	625 k	12.5 k	625 k	12.5 k	625 k	12.5 k	625 k	12.5 k
1 ms	1.25 M	12.5 k	1.25 M	12.5 k	1.25 M	12.5 k	1.25 M	12.5 k	1.25 M	12.5 k	1.25 M	12.5 k
500 µs	2.5 M	12.5 k	2.5 M	12.5 k	2.5 M	12.5 k	2.5 M	12.5 k	2.5 M	12.5 k	2.5 M	12.5 k
200 µs	6.25 M	12.5 k	6.25 M	12.5 k	6.25 M	12.5 k	6.25 M	12.5 k	6.25 M	12.5 k	6.25 M	12.5 k
100 µs	12.5 M	12.5 k	12.5 M	12.5 k	12.5 M	12.5 k	12.5 M	12.5 k	12.5 M	12.5 k	12.5 M	12.5 k
50 µs	25 M	12.5 k	25 M	12.5 k	25 M	12.5 k	25 M	12.5 k	25 M	12.5 k	25 M	12.5 k
20 µs	62.5 M	12.5 k	62.5 M	12.5 k	62.5 M	12.5 k	62.5 M	12.5 k	62.5 M	12.5 k	62.5 M	12.5 k
10 µs	125 M	12.5 k	125 M	12.5 k	125 M	12.5 k	125 M	12.5 k	125 M	12.5 k	125 M	12.5 k
5 µs	250 M	12.5 k	250 M	12.5 k	250 M	12.5 k	250 M	12.5 k	250 M	12.5 k	250 M	12.5 k
2 µs	625 M	12.5 k	625 M	12.5 k	625 M	12.5 k	625 M	12.5 k	625 M	12.5 k	625 M	12.5 k
1 µs	1.25 G	12.5 k	1.25 G	12.5 k	1.25 G	12.5 k	1.25 G	12.5 k	1.25 G	12.5 k	1.25 G	12.5 k
500 ns	2.5 G	12.5 k	2.5 G	12.5 k	2.5 G	12.5 k	1.25 G	6.25 k	2.5 G	12.5 k	2.5 G	12.5 k
200 ns	2.5 G	5 k	5 G	10 k	5 G	10 k	1.25 G	2.5 k	5 G	10 k	5 G	10 k
100 ns	2.5 G	2.5 k	12.5 G	12.5 k	12.5 G	12.5 k	1.25 G	1.25 k	12.5 G	12.5 k	12.5 G	12.5 k
50 ns	2.5 G	1.25 k	25 G	12.5 k	25 G	12.5 k	1.25 G	625	25 G	12.5 k	25 G	12.5 k
20 ns	2.5 G	500	62.5 G	12.5 k	62.5 G	12.5 k	1.25 G	250	62.5 G	12.5 k	62.5 G	12.5 k
10 ns	2.5 G	250	125 G	12.5 k	125 G	12.5 k	1.25 G	125	125 G	12.5 k	125 G	12.5 k
5 ns	2.5 G	125	250 G	12.5 k	250 G	12.5 k	1.25 G	62.5	250 G	12.5 k	250 G	12.5 k
2 ns	2.5 G	50	250 G	5 k	250 G	5 k	1.25 G	25	250 G	5 k	250 G	5 k
1 ns	2.5 G	25	250 G	2.5 k	250 G	2.5 k	1.25 G	12.5	250 G	2.5 k	250 G	2.5 k

Values outside of the thick borders have been calculated in real-time sampling mode.

: Roll mode

When the Set Record Length Is 125 kpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	50	250 k	50	250 k	50	250 k	50	250 k	50	250 k	50	250 k
200 s	62.5	125 k	62.5	125 k	62.5	125 k	62.5	125 k	62.5	125 k	62.5	125 k
100 s	125	125 k	125	125 k	125	125 k	125	125 k	125	125 k	125	125 k
50 s	250	125 k	250	125 k	250	125 k	250	125 k	250	125 k	250	125 k
20 s	625	125 k	625	125 k	625	125 k	625	125 k	625	125 k	625	125 k
10 s	1.25 k	125 k	1.25 k	125 k	1.25 k	125 k	1.25 k	125 k	1.25 k	125 k	1.25 k	125 k
5 s	2.5 k	125 k	2.5 k	125 k	2.5 k	125 k	2.5 k	125 k	2.5 k	125 k	2.5 k	125 k
2 s	6.25 k	125 k	6.25 k	125 k	6.25 k	125 k	6.25 k	125 k	6.25 k	125 k	6.25 k	125 k
1 s	12.5 k	125 k	12.5 k	125 k	12.5 k	125 k	12.5 k	125 k	12.5 k	125 k	12.5 k	125 k
500 ms	25 k	125 k	25 k	125 k	25 k	125 k	25 k	125 k	25 k	125 k	25 k	125 k
200 ms	62.5 k	125 k	62.5 k	125 k	62.5 k	125 k	62.5 k	125 k	62.5 k	125 k	62.5 k	125 k
100 ms	125 k	125 k	125 k	125 k	125 k	125 k	125 k	125 k	125 k	125 k	125 k	125 k
50 ms	250 k	125 k	250 k	125 k	250 k	125 k	250 k	125 k	250 k	125 k	250 k	125 k
20 ms	625 k	125 k	625 k	125 k	625 k	125 k	625 k	125 k	625 k	125 k	625 k	125 k
10 ms	1.25 M	125 k	1.25 M	125 k	1.25 M	125 k	1.25 M	125 k	1.25 M	125 k	1.25 M	125 k
5 ms	2.5 M	125 k	2.5 M	125 k	2.5 M	125 k	2.5 M	125 k	2.5 M	125 k	2.5 M	125 k
2 ms	6.25 M	125 k	6.25 M	125 k	6.25 M	125 k	6.25 M	125 k	6.25 M	125 k	6.25 M	125 k
1 ms	12.5 M	125 k	12.5 M	125 k	12.5 M	125 k	12.5 M	125 k	12.5 M	125 k	12.5 M	125 k
500 µs	25 M	125 k	25 M	125 k	25 M	125 k	25 M	125 k	25 M	125 k	25 M	125 k
200 µs	62.5 M	125 k	62.5 M	125 k	62.5 M	125 k	62.5 M	125 k	62.5 M	125 k	62.5 M	125 k
100 µs	125 M	125 k	125 M	125 k	125 M	125 k	125 M	125 k	125 M	125 k	125 M	125 k
50 µs	250 M	125 k	250 M	125 k	250 M	125 k	250 M	125 k	250 M	125 k	250 M	125 k
20 µs	625 M	125 k	625 M	125 k	625 M	125 k	625 M	125 k	625 M	125 k	625 M	125 k
10 µs	1.25 G	125 k	1.25 G	125 k	1.25 G	125 k	1.25 G	125 k	1.25 G	125 k	1.25 G	125 k
5 µs	2.5 G	125 k	2.5 G	125 k	2.5 G	125 k	1.25 G	62.5 k	2.5 G	125 k	2.5 G	125 k
2 µs	2.5 G	50 k	5 G	100 k	5 G	100 k	1.25 G	25 k	5 G	100 k	5 G	100 k
1 µs	2.5 G	25 k	12.5 G	125 k	12.5 G	125 k	1.25 G	12.5 k	12.5 G	125 k	12.5 G	125 k
500 ns	2.5 G	12.5 k	25 G	125 k	25 G	125 k	1.25 G	6.25 k	25 G	125 k	25 G	125 k
200 ns	2.5 G	5 k	62.5 G	125 k	62.5 G	125 k	1.25 G	2.5 k	62.5 G	125 k	62.5 G	125 k
100 ns	2.5 G	2.5 k	125 G	125 k	125 G	125 k	1.25 G	1.25 k	125 G	125 k	125 G	125 k
50 ns	2.5 G	1.25 k	250 G	125 k	250 G	125 k	1.25 G	625	250 G	125 k	250 G	125 k
20 ns	2.5 G	500	250 G	50 k	250 G	50 k	1.25 G	250	250 G	50 k	250 G	50 k
10 ns	2.5 G	250	250 G	25 k	250 G	25 k	1.25 G	125	250 G	25 k	250 G	25 k
5 ns	2.5 G	125	250 G	12.5 k	250 G	12.5 k	1.25 G	62.5	250 G	12.5 k	250 G	12.5 k
2 ns	2.5 G	50	250 G	5 k	250 G	5 k	1.25 G	25	250 G	5 k	250 G	5 k
1 ns	2.5 G	25	250 G	2.5 k	250 G	2.5 k	1.25 G	12.5	250 G	2.5 k	250 G	2.5 k

Values outside of the thick borders have been calculated in real-time sampling mode.

: Roll mode

When the Set Record Length Is 1.25 Mpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	250	1.25 M	250	1.25 M	250	1.25 M	250	1.25 M	250	1.25 M	250	1.25 M
200 s	625	1.25 M	625	1.25 M	625	1.25 M	625	1.25 M	625	1.25 M	625	1.25 M
100 s	1.25 k	1.25 M	1.25 k	1.25 M	1.25 k	1.25 M	1.25 k	1.25 M	1.25 k	1.25 M	1.25 k	1.25 M
50 s	2.5 k	1.25 M	2.5 k	1.25 M	2.5 k	1.25 M	2.5 k	1.25 M	2.5 k	1.25 M	2.5 k	1.25 M
20 s	6.25 k	1.25 M	6.25 k	1.25 M	6.25 k	1.25 M	6.25 k	1.25 M	6.25 k	1.25 M	6.25 k	1.25 M
10 s	12.5 k	1.25 M	12.5 k	1.25 M	12.5 k	1.25 M	12.5 k	1.25 M	12.5 k	1.25 M	12.5 k	1.25 M
5 s	25 k	1.25 M	25 k	1.25 M	25 k	1.25 M	25 k	1.25 M	25 k	1.25 M	25 k	1.25 M
2 s	62.5 k	1.25 M	62.5 k	1.25 M	62.5 k	1.25 M	62.5 k	1.25 M	62.5 k	1.25 M	62.5 k	1.25 M
1 s	125 k	1.25 M	125 k	1.25 M	125 k	1.25 M	125 k	1.25 M	125 k	1.25 M	125 k	1.25 M
500 ms	250 k	1.25 M	250 k	1.25 M	250 k	1.25 M	250 k	1.25 M	250 k	1.25 M	250 k	1.25 M
200 ms	625 k	1.25 M	625 k	1.25 M	625 k	1.25 M	625 k	1.25 M	625 k	1.25 M	625 k	1.25 M
100 ms	1.25 M	1.25 M	1.25 M	1.25 M	1.25 M	1.25 M	1.25 M	1.25 M	1.25 M	1.25 M	1.25 M	1.25 M
50 ms	2.5 M	1.25 M	2.5 M	1.25 M	2.5 M	1.25 M	2.5 M	1.25 M	2.5 M	1.25 M	2.5 M	1.25 M
20 ms	6.25 M	1.25 M	6.25 M	1.25 M	6.25 M	1.25 M	6.25 M	1.25 M	6.25 M	1.25 M	6.25 M	1.25 M
10 ms	12.5 M	1.25 M	12.5 M	1.25 M	12.5 M	1.25 M	12.5 M	1.25 M	12.5 M	1.25 M	12.5 M	1.25 M
5 ms	25 M	1.25 M	25 M	1.25 M	25 M	1.25 M	25 M	1.25 M	25 M	1.25 M	25 M	1.25 M
2 ms	62.5 M	1.25 M	62.5 M	1.25 M	62.5 M	1.25 M	62.5 M	1.25 M	62.5 M	1.25 M	62.5 M	1.25 M
1 ms	125 M	1.25 M	125 M	1.25 M	125 M	1.25 M	125 M	1.25 M	125 M	1.25 M	125 M	1.25 M
500 µs	250 M	1.25 M	250 M	1.25 M	250 M	1.25 M	250 M	1.25 M	250 M	1.25 M	250 M	1.25 M
200 µs	625 M	1.25 M	625 M	1.25 M	625 M	1.25 M	625 M	1.25 M	625 M	1.25 M	625 M	1.25 M
100 µs	1.25 G	1.25 M	1.25 G	1.25 M	1.25 G	1.25 M	1.25 G	1.25 M	1.25 G	1.25 M	1.25 G	1.25 M
50 µs	2.5 G	1.25 M	2.5 G	1.25 M	2.5 G	1.25 M	1.25 G	625 k	2.5 G	1.25 M	2.5 G	1.25 M
20 µs	2.5 G	500 k	5 G	1 M	5 G	1 M	1.25 G	250 k	5 G	1 M	5 G	1 M
10 µs	2.5 G	250 k	12.5 G	1.25 M	12.5 G	1.25 M	1.25 G	125 k	12.5 G	1.25 M	12.5 G	1.25 M
5 µs	2.5 G	125 k	25 G	1.25 M	25 G	1.25 M	1.25 G	62.5 k	25 G	1.25 M	25 G	1.25 M
2 µs	2.5 G	50 k	62.5 G	1.25 M	62.5 G	1.25 M	1.25 G	25 k	62.5 G	1.25 M	62.5 G	1.25 M
1 µs	2.5 G	25 k	125 G	1.25 M	125 G	1.25 M	1.25 G	12.5 k	125 G	1.25 M	125 G	1.25 M
500 ns	2.5 G	12.5 k	250 G	1.25 M	250 G	1.25 M	1.25 G	6.25 k	250 G	1.25 M	250 G	1.25 M
200 ns	2.5 G	5 k	250 G	500 k	250 G	500 k	1.25 G	2.5 k	250 G	500 k	250 G	500 k
100 ns	2.5 G	2.5 k	250 G	250 k	250 G	250 k	1.25 G	1.25 k	250 G	250 k	250 G	250 k
50 ns	2.5 G	1.25 k	250 G	125 k	250 G	125 k	1.25 G	625	250 G	125 k	250 G	125 k
20 ns	2.5 G	500	250 G	50 k	250 G	50 k	1.25 G	250	250 G	50 k	250 G	50 k
10 ns	2.5 G	250	250 G	25 k	250 G	25 k	1.25 G	125	250 G	25 k	250 G	25 k
5 ns	2.5 G	125	250 G	12.5 k	250 G	12.5 k	1.25 G	62.5	250 G	12.5 k	250 G	12.5 k
2 ns	2.5 G	50	250 G	5 k	250 G	5 k	1.25 G	25	250 G	5 k	250 G	5 k
1 ns	2.5 G	25	250 G	2.5 k	250 G	2.5 k	1.25 G	12.5	250 G	2.5 k	250 G	2.5 k

Values outside of the thick borders have been calculated in real-time sampling mode.

: Roll mode

When the Set Record Length Is 2.5 Mpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	500	2.5 M	500	2.5 M			500	2.5 M	500	2.5 M		
200 s	1.25 k	2.5 M	1.25 k	2.5 M			1.25 k	2.5 M	1.25 k	2.5 M		
100 s	2.5 k	2.5 M	2.5 k	2.5 M			2.5 k	2.5 M	2.5 k	2.5 M		
50 s	5 k	2.5 M	5 k	2.5 M			5 k	2.5 M	5 k	2.5 M		
20 s	12.5 k	2.5 M	12.5 k	2.5 M			12.5 k	2.5 M	12.5 k	2.5 M		
10 s	25 k	2.5 M	25 k	2.5 M			25 k	2.5 M	25 k	2.5 M		
5 s	50 k	2.5 M	50 k	2.5 M			50 k	2.5 M	50 k	2.5 M		
2 s	125 k	2.5 M	125 k	2.5 M			125 k	2.5 M	125 k	2.5 M		
1 s	250 k	2.5 M	250 k	2.5 M			250 k	2.5 M	250 k	2.5 M		
500 ms	500 k	2.5 M	500 k	2.5 M			500 k	2.5 M	500 k	2.5 M		
200 ms	1.25 M	2.5 M	1.25 M	2.5 M			1.25 M	2.5 M	1.25 M	2.5 M		
100 ms	2.5 M	2.5 M	2.5 M	2.5 M			2.5 M	2.5 M	2.5 M	2.5 M		
50 ms	5 M	2.5 M	5 M	2.5 M			5 M	2.5 M	5 M	2.5 M		
20 ms	12.5 M	2.5 M	12.5 M	2.5 M			12.5 M	2.5 M	12.5 M	2.5 M		
10 ms	25 M	2.5 M	25 M	2.5 M			25 M	2.5 M	25 M	2.5 M		
5 ms	50 M	2.5 M	50 M	2.5 M			50 M	2.5 M	50 M	2.5 M		
2 ms	125 M	2.5 M	125 M	2.5 M	Repetitive sampling mode cannot be used with this record length.		125 M	2.5 M	125 M	2.5 M	Repetitive sampling mode cannot be used with this record length.	
1 ms	250 M	2.5 M	250 M	2.5 M			250 M	2.5 M	250 M	2.5 M		
500 µs	500 M	2.5 M	500 M	2.5 M			500 M	2.5 M	500 M	2.5 M		
200 µs	1.25 G	2.5 M	1.25 G	2.5 M			1.25 G	2.5 M	1.25 G	2.5 M		
100 µs	2.5 G	2.5 M	2.5 G	2.5 M			1.25 G	1.25 M	2.5 G	2.5 M		
50 µs	2.5 G	1.25 M	5 G	2.5 M			1.25 G	625 k	5 G	2.5 M		
20 µs	2.5 G	500 k	12.5 G	2.5 M			1.25 G	250 k	12.5 G	2.5 M		
10 µs	2.5 G	250 k	25 G	2.5 M			1.25 G	125 k	25 G	2.5 M		
5 µs	2.5 G	125 k	50 G	2.5 M			1.25 G	62.5 k	50 G	2.5 M		
2 µs	2.5 G	50 k	125 G	2.5 M			1.25 G	25 k	125 G	2.5 M		
1 µs	2.5 G	25 k	250 G	2.5 M			1.25 G	12.5 k	250 G	2.5 M		
500 ns	2.5 G	12.5 k	250 G	1.25 M			1.25 G	6.25 k	250 G	1.25 M		
200 ns	2.5 G	5 k	250 G	500 k			1.25 G	2.5 k	250 G	500 k		
100 ns	2.5 G	2.5 k	250 G	250 k			1.25 G	1.25 k	250 G	250 k		
50 ns	2.5 G	1.25 k	250 G	125 k			1.25 G	625	250 G	125 k		
20 ns	2.5 G	500	250 G	50 k			1.25 G	250	250 G	50 k		
10 ns	2.5 G	250	250 G	25 k			1.25 G	125	250 G	25 k		
5 ns	2.5 G	125	250 G	12.5 k			1.25 G	62.5	250 G	12.5 k		
2 ns	2.5 G	50	250 G	5 k			1.25 G	25	250 G	5 k		
1 ns	2.5 G	25	250 G	2.5 k			1.25 G	12.5	250 G	2.5 k		

Values outside of the thick borders have been calculated in real-time sampling mode.

: Roll mode

When the Set Record Length Is 5 Mpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	1 k	5 M	1 k	5 M			1 k	5 M	1 k	5 M		
200 s	2.5 k	5 M	2.5 k	5 M			2.5 k	5 M	2.5 k	5 M		
100 s	5 k	5 M	5 k	5 M			5 k	5 M	5 k	5 M		
50 s	10 k	5 M	10 k	5 M			10 k	5 M	10 k	5 M		
20 s	25 k	5 M	25 k	5 M			25 k	5 M	25 k	5 M		
10 s	50 k	5 M	50 k	5 M			50 k	5 M	50 k	5 M		
5 s	100 k	5 M	100 k	5 M			100 k	5 M	100 k	5 M		
2 s	250 k	5 M	250 k	5 M			250 k	5 M	250 k	5 M		
1 s	500 k	5 M	500 k	5 M			500 k	5 M	500 k	5 M		
500 ms	1 M	5 M	1 M	5 M			1 M	5 M	1 M	5 M		
200 ms	2.5 M	5 M	2.5 M	5 M			2.5 M	5 M	2.5 M	5 M		
100 ms	5 M	5 M	5 M	5 M			5 M	5 M	5 M	5 M		
50 ms	10 M	5 M	10 M	5 M			10 M	5 M	10 M	5 M		
20 ms	25 M	5 M	25 M	5 M			25 M	5 M	25 M	5 M		
10 ms	50 M	5 M	50 M	5 M			50 M	5 M	50 M	5 M		
5 ms	100 M	5 M	100 M	5 M			100 M	5 M	100 M	5 M		
2 ms	250 M	5 M	250 M	5 M	Repetitive sampling mode cannot be used with this record length.		250 M	5 M	250 M	5 M	Repetitive sampling mode cannot be used with this record length.	
1 ms	500 M	5 M	500 M	5 M			500 M	5 M	500 M	5 M		
500 µs	625 M	3.125 M	625 M	3.125 M			625 M	3.125 M	625 M	3.125 M		
400 µs	1.25 G	5 M	1.25 G	5 M			1.25 G	5 M	1.25 G	5 M		
200 µs	2.5 G	5 M	2.5 G	5 M			1.25 G	2.5 M	2.5 G	5 M		
100 µs	2.5 G	2.5 M	5 G	5 M			1.25 G	1.25 M	5 G	5 M		
50 µs	2.5 G	1.25 M	10 G	5 M			1.25 G	625 k	10 G	5 M		
20 µs	2.5 G	500 k	25 G	5 M			1.25 G	250 k	25 G	5 M		
10 µs	2.5 G	250 k	50 G	5 M			1.25 G	125 k	50 G	5 M		
5 µs	2.5 G	125 k	100 G	5 M			1.25 G	62.5 k	100 G	5 M		
2 µs	2.5 G	50 k	250 G	5 M			1.25 G	25 k	250 G	5 M		
1 µs	2.5 G	25 k	250 G	2.5 M			1.25 G	12.5 k	250 G	2.5 M		
500 ns	2.5 G	12.5 k	250 G	1.25 M			1.25 G	6.25 k	250 G	1.25 M		
200 ns	2.5 G	5 k	250 G	500 k			1.25 G	2.5 k	250 G	500 k		
100 ns	2.5 G	2.5 k	250 G	250 k			1.25 G	1.25 k	250 G	250 k		
50 ns	2.5 G	1.25 k	250 G	125 k			1.25 G	625	250 G	125 k		
20 ns	2.5 G	500	250 G	50 k			1.25 G	250	250 G	50 k		
10 ns	2.5 G	250	250 G	25 k			1.25 G	125	250 G	25 k		
5 ns	2.5 G	125	250 G	12.5 k			1.25 G	62.5	250 G	12.5 k		
2 ns	2.5 G	50	250 G	5 k			1.25 G	25	250 G	5 k		
1 ns	2.5 G	25	250 G	2.5 k			1.25 G	12.5	250 G	2.5 k		

Values outside of the thick borders have been calculated in real-time sampling mode.

: Roll mode

When the Set Record Length Is 12.5 Mpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	2.5 k	12.5 M	2.5 k	12.5 M	Repetitive sampling mode cannot be used with this record length.		2.5 k	12.5 M	2.5 k	12.5 M	Repetitive sampling mode cannot be used with this record length.	
200 s	6.25 k	12.5 M	6.25 k	12.5 M			6.25 k	12.5 M	6.25 k	12.5 M		
100 s	12.5 k	12.5 M	12.5 k	12.5 M			12.5 k	12.5 M	12.5 k	12.5 M		
50 s	25 k	12.5 M	25 k	12.5 M			25 k	12.5 M	25 k	12.5 M		
20 s	62.5 k	12.5 M	62.5 k	12.5 M			62.5 k	12.5 M	62.5 k	12.5 M		
10 s	125 k	12.5 M	125 k	12.5 M			125 k	12.5 M	125 k	12.5 M		
5 s	250 k	12.5 M	250 k	12.5 M			250 k	12.5 M	250 k	12.5 M		
2 s	625 k	12.5 M	625 k	12.5 M			625 k	12.5 M	625 k	12.5 M		
1 s	1.25 M	12.5 M	1.25 M	12.5 M			1.25 M	12.5 M	1.25 M	12.5 M		
500 ms	2.5 M	12.5 M	2.5 M	12.5 M			2.5 M	12.5 M	2.5 M	12.5 M		
200 ms	6.25 M	12.5 M	6.25 M	12.5 M			6.25 M	12.5 M	6.25 M	12.5 M		
100 ms	12.5 M	12.5 M	12.5 M	12.5 M			12.5 M	12.5 M	12.5 M	12.5 M		
50 ms	25 M	12.5 M	25 M	12.5 M			25 M	12.5 M	25 M	12.5 M		
20 ms	62.5 M	12.5 M	62.5 M	12.5 M			62.5 M	12.5 M	62.5 M	12.5 M		
10 ms	125 M	12.5 M	125 M	12.5 M			125 M	12.5 M	125 M	12.5 M		
5 ms	250 M	12.5 M	250 M	12.5 M			250 M	12.5 M	250 M	12.5 M		
2 ms	625 M	12.5 M	625 M	12.5 M			625 M	12.5 M	625 M	12.5 M		
1 ms	1.25 G	12.5 M	1.25 G	12.5 M			1.25 G	12.5 M	1.25 G	12.5 M		
500 µs	2.5 G	12.5 M	2.5 G	12.5 M			1.25 G	6.25 M	2.5 G	12.5 M		
200 µs	2.5 G	5 M	5 G	10 M			1.25 G	2.5 M	5 G	10 M		
100 µs	2.5 G	2.5 M	12.5 G	12.5 M			1.25 G	1.25 M	12.5 G	12.5 M		
50 µs	2.5 G	1.25 M	25 G	12.5 M			1.25 G	625 k	25 G	12.5 M		
20 µs	2.5 G	500 k	62.5 G	12.5 M			1.25 G	250 k	62.5 G	12.5 M		
10 µs	2.5 G	250 k	125 G	12.5 M			1.25 G	125 k	125 G	12.5 M		
5 µs	2.5 G	125 k	250 G	12.5 M			1.25 G	62.5 k	250 G	12.5 M		
2 µs	2.5 G	50 k	250 G	5 M			1.25 G	25 k	250 G	5 M		
1 µs	2.5 G	25 k	250 G	2.5 M			1.25 G	12.5 k	250 G	2.5 M		
500 ns	2.5 G	12.5 k	250 G	1.25 M			1.25 G	6.25 k	250 G	1.25 M		
200 ns	2.5 G	5 k	250 G	500 k			1.25 G	2.5 k	250 G	500 k		
100 ns	2.5 G	2.5 k	250 G	250 k			1.25 G	1.25 k	250 G	250 k		
50 ns	2.5 G	1.25 k	250 G	125 k			1.25 G	625	250 G	125 k		
20 ns	2.5 G	500	250 G	50 k			1.25 G	250	250 G	50 k		
10 ns	2.5 G	250	250 G	25 k			1.25 G	125	250 G	25 k		
5 ns	2.5 G	125	250 G	12.5 k			1.25 G	62.5	250 G	12.5 k		
2 ns	2.5 G	50	250 G	5 k			1.25 G	25	250 G	5 k		
1 ns	2.5 G	25	250 G	2.5 k			1.25 G	12.5	250 G	2.5 k		

Values outside of the thick borders have been calculated in real-time sampling mode.

: Roll mode

When the Set Record Length Is 25 Mpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	5 k	25 M	5 k	25 M			5 k	25 M	5 k	25 M		
200 s	12.5 k	25 M	12.5 k	25 M			12.5 k	25 M	12.5 k	25 M		
100 s	25 k	25 M	25 k	25 M			25 k	25 M	25 k	25 M		
50 s	50 k	25 M	50 k	25 M			50 k	25 M	50 k	25 M		
20 s	125 k	25 M	125 k	25 M			125 k	25 M	125 k	25 M		
10 s	250 k	25 M	250 k	25 M			250 k	25 M	250 k	25 M		
5 s	500 k	25 M	500 k	25 M			500 k	25 M	500 k	25 M		
2 s	1.25 M	25 M	1.25 M	25 M			1.25 M	25 M	1.25 M	25 M		
1 s	2.5 M	25 M	2.5 M	25 M			2.5 M	25 M	2.5 M	25 M		
500 ms	5 M	25 M	5 M	25 M			5 M	25 M	5 M	25 M		
200 ms	12.5 M	25 M	12.5 M	25 M			12.5 M	25 M	12.5 M	25 M		
100 ms	25 M	25 M	25 M	25 M			25 M	25 M	25 M	25 M		
50 ms	50 M	25 M	50 M	25 M			50 M	25 M	50 M	25 M		
20 ms	125 M	25 M	125 M	25 M			125 M	25 M	125 M	25 M		
10 ms	250 M	25 M	250 M	25 M			250 M	25 M	250 M	25 M		
5 ms	500 M	25 M	500 M	25 M			500 M	25 M	500 M	25 M		
2 ms	1.25 G	25 M	1.25 G	25 M	Repetitive sampling mode cannot be used with this record length.		1.25 G	25 M	1.25 G	25 M	Repetitive sampling mode cannot be used with this record length.	
1 ms	2.5 G	25 M	2.5 G	25 M			1.25 G	12.5 M	2.5 G	25 M		
500 µs	2.5 G	12.5 M	5 G	25 M			1.25 G	6.25 M	5 G	25 M		
200 µs	2.5 G	5 M	12.5 G	25 M			1.25 G	2.5 M	12.5 G	25 M		
100 µs	2.5 G	2.5 M	25 G	25 M			1.25 G	1.25 M	25 G	25 M		
50 µs	2.5 G	1.25 M	50 G	25 M			1.25 G	625 k	50 G	25 M		
20 µs	2.5 G	500 k	100 G	25 M			1.25 G	250 k	100 G	25 M		
10 µs	2.5 G	250 k	250 G	25 M			1.25 G	125 k	250 G	25 M		
5 µs	2.5 G	125 k	250 G	12.5 M			1.25 G	62.5 k	250 G	12.5 M		
2 µs	2.5 G	50 k	250 G	5 M			1.25 G	25 k	250 G	5 M		
1 µs	2.5 G	25 k	250 G	2.5 M			1.25 G	12.5 k	250 G	2.5 M		
500 ns	2.5 G	12.5 k	250 G	1.25 M			1.25 G	6.25 k	250 G	1.25 M		
200 ns	2.5 G	5 k	250 G	500 k			1.25 G	2.5 k	250 G	500 k		
100 ns	2.5 G	2.5 k	250 G	250 k			1.25 G	1.25 k	250 G	250 k		
50 ns	2.5 G	1.25 k	250 G	125 k			1.25 G	625	250 G	125 k		
20 ns	2.5 G	500	250 G	50 k			1.25 G	250	250 G	50 k		
10 ns	2.5 G	250	250 G	25 k			1.25 G	125	250 G	25 k		
5 ns	2.5 G	125	250 G	12.5 k			1.25 G	62.5	250 G	12.5 k		
2 ns	2.5 G	50	250 G	5 k			1.25 G	25	250 G	5 k		
1 ns	2.5 G	25	250 G	2.5 k			1.25 G	12.5	250 G	2.5 k		

Values outside of the thick borders have been calculated in real-time sampling mode.
If there is no memory option, acquisition with this record length is performed in single mode.

: Roll mode

When the Set Record Length Is 50 Mpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation*		Repetitive		RealTime		Interpolation*		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	10 k	50 M	10 k	50 M			10 k	50 M	10 k	50 M		
200 s	25 k	50 M	25 k	50 M			25 k	50 M	25 k	50 M		
100 s	50 k	50 M	50 k	50 M			50 k	50 M	50 k	50 M		
50 s	100 k	50 M	100 k	50 M			100 k	50 M	100 k	50 M		
20 s	250 k	50 M	250 k	50 M			250 k	50 M	250 k	50 M		
10 s	500 k	50 M	500 k	50 M			500 k	50 M	500 k	50 M		
5 s	1 M	50 M	1 M	50 M			1 M	50 M	1 M	50 M		
2 s	2.5 M	50 M	2.5 M	50 M			2.5 M	50 M	2.5 M	50 M		
1 s	5 M	50 M	5 M	50 M			5 M	50 M	5 M	50 M		
500 ms	10 M	50 M	10 M	50 M			10 M	50 M	10 M	50 M		
200 ms	25 M	50 M	25 M	50 M			25 M	50 M	25 M	50 M		
100 ms	50 M	50 M	50 M	50 M			50 M	50 M	50 M	50 M		
50 ms	100 M	50 M	100 M	50 M			100 M	50 M	100 M	50 M		
20 ms	250 M	50 M	250 M	50 M			250 M	50 M	250 M	50 M		
10 ms	500 M	50 M	500 M	50 M			500 M	50 M	500 M	50 M		
5 ms	625 M	31.25 M	625 M	31.25 M			625 M	31.25 M	625 M	31.25 M		
4 ms	1.25 G	50 M	1.25 G	50 M	Repetitive sampling mode cannot be used with this record length.		1.25 G	50 M	1.25 G	50 M	Repetitive sampling mode cannot be used with this record length.	
2 ms	2.5 G	50 M	2.5 G	50 M			1.25 G	25 M	2.5 G	50 M		
1 ms	2.5 G	25 M	5 G	50 M			1.25 G	12.5 M	5 G	50 M		
500 µs	2.5 G	12.5 M	10 G	50 M			1.25 G	6.25 M	10 G	50 M		
200 µs	2.5 G	5 M	25 G	50 M			1.25 G	2.5 M	25 G	50 M		
100 µs	2.5 G	2.5 M	50 G	50 M			1.25 G	1.25 M	50 G	50 M		
50 µs	2.5 G	1.25 M	100 G	50 M			1.25 G	625 k	100 G	50 M		
20 µs	2.5 G	500 k	250 G	50 M			1.25 G	250 k	250 G	50 M		
10 µs	2.5 G	250 k	250 G	25 M			1.25 G	125 k	250 G	25 M		
5 µs	2.5 G	125 k	250 G	12.5 M			1.25 G	62.5 k	250 G	12.5 M		
2 µs	2.5 G	50 k	250 G	5 M			1.25 G	25 k	250 G	5 M		
1 µs	2.5 G	25 k	250 G	2.5 M			1.25 G	12.5 k	250 G	2.5 M		
500 ns	2.5 G	12.5 k	250 G	1.25 M			1.25 G	6.25 k	250 G	1.25 M		
200 ns	2.5 G	5 k	250 G	500 k			1.25 G	2.5 k	250 G	500 k		
100 ns	2.5 G	2.5 k	250 G	250 k			1.25 G	1.25 k	250 G	250 k		
50 ns	2.5 G	1.25 k	250 G	125 k			1.25 G	625	250 G	125 k		
20 ns	2.5 G	500	250 G	50 k			1.25 G	250	250 G	50 k		
10 ns	2.5 G	250	250 G	25 k			1.25 G	125	250 G	25 k		
5 ns	2.5 G	125	250 G	12.5 k			1.25 G	62.5	250 G	12.5 k		
2 ns	2.5 G	50	250 G	5 k			1.25 G	25	250 G	5 k		
1 ns	2.5 G	25	250 G	2.5 k			1.25 G	12.5	250 G	2.5 k		

Values outside of the thick borders have been calculated in real-time sampling mode.
If there is no memory option or with the /M1S option or /M1 option, acquisition with this record length is performed in single mode.
* If there is no memory option, with this record length, interpolation mode cannot be used.

: Roll mode

When the Set Record Length Is 125 Mpoint

(This record length can be selected on all models)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation*		Repetitive		RealTime		Interpolation*		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	25 k	125 M	25 k	125 M			25 k	125 M	25 k	125 M		
200 s	62.5 k	125 M	62.5 k	125 M			62.5 k	125 M	62.5 k	125 M		
100 s	125 k	125 M	125 k	125 M			125 k	125 M	125 k	125 M		
50 s	250 k	125 M	250 k	125 M			250 k	125 M	250 k	125 M		
20 s	625 k	125 M	625 k	125 M			625 k	125 M	625 k	125 M		
10 s	1.25 M	125 M	1.25 M	125 M			1.25 M	125 M	1.25 M	125 M		
5 s	2.5 M	125 M	2.5 M	125 M			2.5 M	125 M	2.5 M	125 M		
2 s	6.25 M	125 M	6.25 M	125 M			6.25 M	125 M	6.25 M	125 M		
1 s	12.5 M	125 M	12.5 M	125 M			12.5 M	125 M	12.5 M	125 M		
500 ms	25 M	125 M	25 M	125 M			25 M	125 M	25 M	125 M		
200 ms	62.5 M	125 M	62.5 M	125 M			62.5 M	125 M	62.5 M	125 M		
100 ms	125 M	125 M	125 M	125 M			125 M	125 M	125 M	125 M		
50 ms	250 M	125 M	250 M	125 M			250 M	125 M	250 M	125 M		
20 ms	625 M	125 M	625 M	125 M			625 M	125 M	625 M	125 M		
10 ms	1.25 G	125 M	1.25 G	125 M			1.25 G	125 M	1.25 G	125 M		
5 ms	2.5 G	125 M	2.5 G	125 M			1.25 G	62.5 M	2.5 G	125 M		
2 ms	2.5 G	50 M	5 G	100 M	Repetitive sampling mode cannot be used with this record length.		1.25 G	25 M	5 G	100 M	Repetitive sampling mode cannot be used with this record length.	
1 ms	2.5 G	25 M	12.5 G	125 M			1.25 G	12.5 M	12.5 G	125 M		
500 µs	2.5 G	12.5 M	25 G	125 M			1.25 G	6.25 M	25 G	125 M		
200 µs	2.5 G	5 M	62.5 G	125 M			1.25 G	2.5 M	62.5 G	125 M		
100 µs	2.5 G	2.5 M	125 G	125 M			1.25 G	1.25 M	125 G	125 M		
50 µs	2.5 G	1.25 M	250 G	125 M			1.25 G	625 k	250 G	125 M		
20 µs	2.5 G	500 k	250 G	50 M			1.25 G	250 k	250 G	50 M		
10 µs	2.5 G	250 k	250 G	25 M			1.25 G	125 k	250 G	25 M		
5 µs	2.5 G	125 k	250 G	12.5 M			1.25 G	62.5 k	250 G	12.5 M		
2 µs	2.5 G	50 k	250 G	5 M			1.25 G	25 k	250 G	5 M		
1 µs	2.5 G	25 k	250 G	2.5 M			1.25 G	12.5 k	250 G	2.5 M		
500 ns	2.5 G	12.5 k	250 G	1.25 M			1.25 G	6.25 k	250 G	1.25 M		
200 ns	2.5 G	5 k	250 G	500 k			1.25 G	2.5 k	250 G	500 k		
100 ns	2.5 G	2.5 k	250 G	250 k			1.25 G	1.25 k	250 G	250 k		
50 ns	2.5 G	1.25 k	250 G	125 k			1.25 G	625	250 G	125 k		
20 ns	2.5 G	500	250 G	50 k			1.25 G	250	250 G	50 k		
10 ns	2.5 G	250	250 G	25 k			1.25 G	125	250 G	25 k		
5 ns	2.5 G	125	250 G	12.5 k			1.25 G	62.5	250 G	12.5 k		
2 ns	2.5 G	50	250 G	5 k			1.25 G	25	250 G	5 k		
1 ns	2.5 G	25	250 G	2.5 k			1.25 G	12.5	250 G	2.5 k		

Values outside of the thick borders have been calculated in real-time sampling mode.
Acquisition when you specify this record length is performed in single mode.

* If there is no memory option or with the /M1S or /M1 option, interpolation mode cannot be used with this record length.

: Roll mode

When the Set Record Length Is 250 Mpoint

(Selectable on models with the /MS1, /M1, /M2S or /M2 option)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	50 k	250 M					50 k	250 M				
200 s	125 k	250 M					125 k	250 M				
100 s	250 k	250 M					250 k	250 M				
50 s	500 k	250 M					500 k	250 M				
20 s	1.25 M	250 M					1.25 M	250 M				
10 s	2.5 M	250 M					2.5 M	250 M				
5 s	5 M	250 M					5 M	250 M				
2 s	12.5 M	250 M					12.5 M	250 M				
1 s	25 M	250 M					25 M	250 M				
500 ms	50 M	250 M					50 M	250 M				
200 ms	125 M	250 M					125 M	250 M				
100 ms	250 M	250 M					250 M	250 M				
50 ms	500 M	250 M					500 M	250 M				
20 ms	1.25 G	250 M					1.25 G	250 M				
10 ms	2.5 G	250 M					1.25 G	125 M				
5 ms	2.5 G	125 M					1.25 G	62.5 M				
2 ms	2.5 G	50 M					1.25 G	25 M				
1 ms	2.5 G	25 M	Interpolation mode and Repetitive sampling mode cannot be used with this record length.				1.25 G	12.5 M	Interpolation mode and Repetitive sampling mode cannot be used with this record length.			
500 µs	2.5 G	12.5 M					1.25 G	6.25 M				
200 µs	2.5 G	5 M					1.25 G	2.5 M				
100 µs	2.5 G	2.5 M					1.25 G	1.25 M				
50 µs	2.5 G	1.25 M					1.25 G	625 k				
20 µs	2.5 G	500 k					1.25 G	250 k				
10 µs	2.5 G	250 k					1.25 G	125 k				
5 µs	2.5 G	125 k					1.25 G	62.5 k				
2 µs	2.5 G	50 k					1.25 G	25 k				
1 µs	2.5 G	25 k					1.25 G	12.5 k				
500 ns	2.5 G	12.5 k					1.25 G	6.25 k				
200 ns	2.5 G	5 k					1.25 G	2.5 k				
100 ns	2.5 G	2.5 k					1.25 G	1.25 k				
50 ns	2.5 G	1.25 k					1.25 G	625				
20 ns	2.5 G	500					1.25 G	250				
10 ns	2.5 G	250					1.25 G	125				
5 ns	2.5 G	125					1.25 G	62.5				
2 ns	2.5 G	50					1.25 G	25				
1 ns	2.5 G	25					1.25 G	12.5				

Acquisition when you specify this record length is performed in single mode.

: Roll mode

When the Set Record Length Is 500 Mpoint

(Selectable on models with the /M2S or /M2 option)

Mode Setting	High Resolution Mode OFF						High Resolution Mode ON					
	RealTime		Interpolation		Repetitive		RealTime		Interpolation		Repetitive	
Time/div	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)	Sample Rate (S/s)	Display Record Length (Point)
500 s	100 k	500 M					125 k	500 M				
200 s	250 k	500 M					250 k	500 M				
100 s	500 k	500 M					500 k	500 M				
50 s	1 M	500 M					1 M	500 M				
20 s	2.5 M	500 M					2.5 M	500 M				
10 s	5 M	500 M					5 M	500 M				
5 s	10 M	500 M					10 M	500 M				
2 s	25 M	500 M					25 M	500 M				
1 s	50 M	500 M					50 M	500 M				
500 ms	100 M	500 M					100 M	500 M				
200 ms	250 M	500 M					250 M	500 M				
100 ms	500 M	500 M					500 M	500 M				
50 ms	625 M	312.5 M					625 M	312.5 M				
40 ms	1.25 G	500 M					1.25 G	500 M				
20 ms	2.5 G	500 M					1.25 G	250 M				
10 ms	2.5 G	250 M					1.25 G	125 M				
5 ms	2.5 G	125 M					1.25 G	50 M				
2 ms	2.5 G	50 M	Interpolation mode and Repetitive sampling mode cannot be used with this record length.				1.25 G	25 M	Interpolation mode and Repetitive sampling mode cannot be used with this record length.			
1 ms	2.5 G	25 M					1.25 G	12.5 M				
500 µs	2.5 G	12.5 M					1.25 G	6.25 M				
200 µs	2.5 G	5 M					1.25 G	2.5 M				
100 µs	2.5 G	2.5 M					1.25 G	1.25 M				
50 µs	2.5 G	1.25 M					1.25 G	625 k				
20 µs	2.5 G	500 k					1.25 G	250 k				
10 µs	2.5 G	250 k					1.25 G	125 k				
5 µs	2.5 G	125 k					1.25 G	62.5 k				
2 µs	2.5 G	50 k					1.25 G	25 k				
1 µs	2.5 G	25 k					1.25 G	12.5 k				
500 ns	2.5 G	12.5 k					1.25 G	6.25 k				
200 ns	2.5 G	5 k					1.25 G	2.5 k				
100 ns	2.5 G	2.5 k					1.25 G	1.25 k				
50 ns	2.5 G	1.25 k					1.25 G	625				
20 ns	2.5 G	500					1.25 G	250				
10 ns	2.5 G	250					1.25 G	125				
5 ns	2.5 G	125					1.25 G	62.5				
2 ns	2.5 G	50					1.25 G	25				
1 ns	2.5 G	25					1.25 G	12.5				

Acquisition when you specify this record length is performed in single mode.

: Roll mode

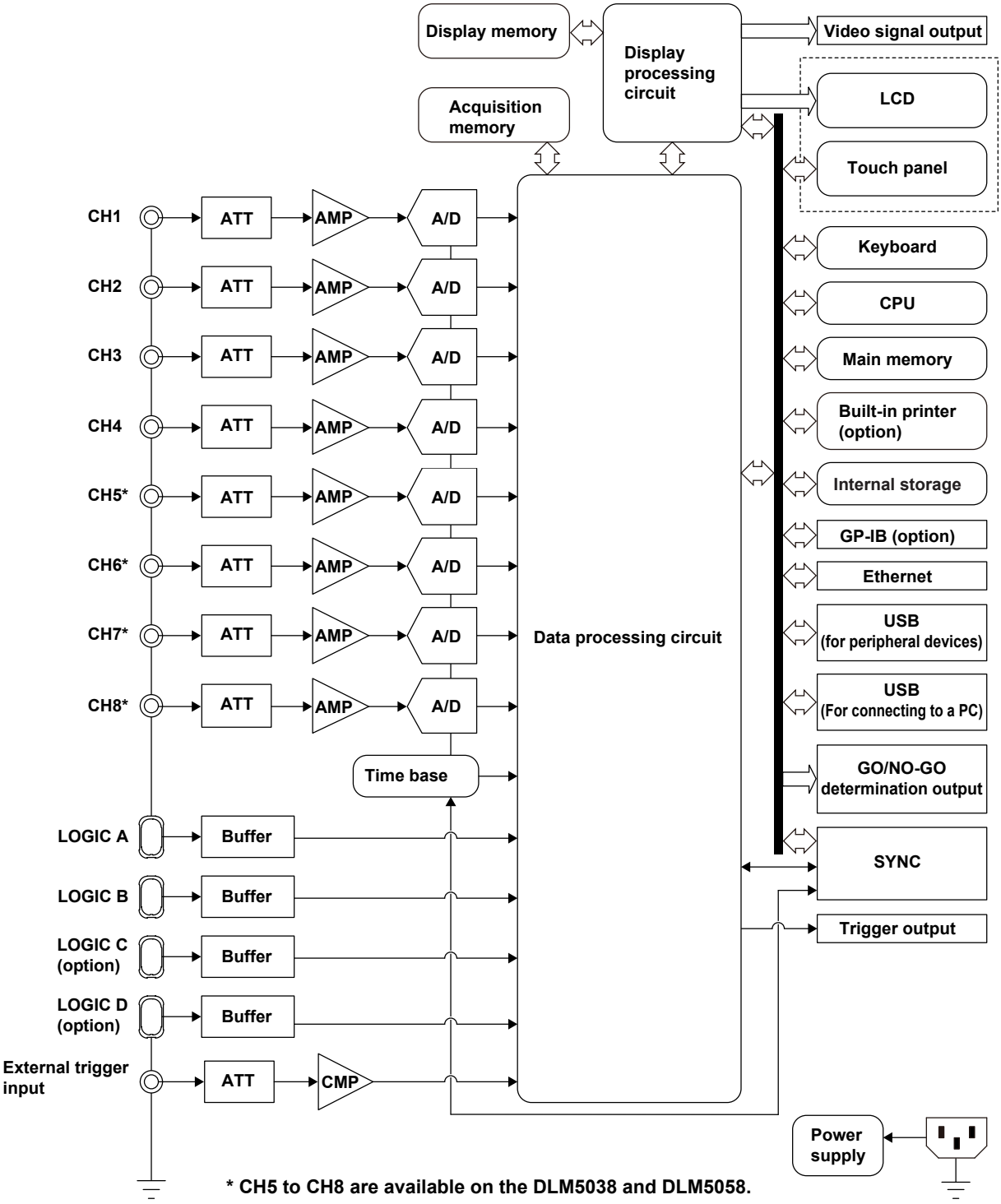
Appendix 2 USB Keyboard Key Assignments

Panel Operation on the Instrument	USB keyboard
ACQUIRE	CTRL+A
MATH/REF	CTRL+B
Executing an PRINT	CTRL+C
DISPLAY	CTRL+D
ENHANCED	CTRL+E
FILE	CTRL+F
ACTION, GO/NO-GO	CTRL+G
HISTORY	CTRL+H
Resetting to factory default settings	CTRL+I
Execute auto setup	CTRL+J
ANALYSIS	CTRL+K
LOGIC	CTRL+L
MEASURE	CTRL+M
CURSOR	CTRL+N
SEARCH	CTRL+O
Set the trigger level to 50%	CTRL+P
Execute CLEAR TRACE	CTRL+Q
Execute RESET	CTRL+R
SHIFT on	CTRL+S
TRIGGER MODE	CTRL+T
UTILITY	CTRL+U
Set the vertical position to 0 div	CTRL+V
EDGE	CTRL+W
ZOOM2	CTRL+X
B TRIG	CTRL+Y
ZOOM1	CTRL+Z
CH1	CTRL+1
CH2	CTRL2
CH3	CTRL3
CH4	CTRL4
CH5	CTRL5
CH6	CTRL6
CH7	CTRL7
CH8	CTRL8
Executing an HELP	CTRL+/
Turn the touch panel feature on and off	CTRL+[
Executing an SET	CTRL+ENTER
Executing an ESC	Esc
FFT	CTRL+SHIFT+B
PRINT MENU	CTRL+SHIFT+C
X-Y	CTRL+SHIFT+D
SERIAL BUS	CTRL+SHIFT+O
Set the horizontal position to 50%	CTRL+SHIFT+P
CH UTIL	CTRL+SHIFT+U
Switch the SCALE knob between FINE mode and 1-2-5 step mode	CTRL+SHIFT+V
Execute FORCE TRIG	CTRL+SHIFT+Y
Switch the ZOOM knob between FINE mode and 1-2-5 step mode	CTRL+SHIFT+X
Select soft key 1	F1
Select soft key 2	F2
Select soft key 3	F3
Select soft key 4	F4
Select soft key 5	F5

Panel Operation on the Instrument	USB keyboard
Select soft key 6	F6
Select soft key 7	F7
DELAY	F9
Executing an SINGLE	F11
Execute RUN/STOP	F12
Execute SNAP SHOT	Pause
Increase the magnification (ZOOM knob)	CTRL+INSERT
Increase the vertical position (▲▼ POSITION knob)	CTRL+HOME
Increase the trigger position (◀ POSITION ▶ knob)	CTRL+PAGE UP
Decrease the magnification (ZOOM knob)	CTRL+DELETE
Decrease the vertical position (▲▼ VERTICAL POSITION knob)	CTRL+END
Decrease the trigger position (◀ POSITION ▶ knob)	CTRL+PAGE DOWN
Move ● right	CTRL+→
Move ● left	CTRL+←
Move ● down	CTRL+↓
Move ● up	CTRL+↑
Increase the trigger level	Insert
Decrease the trigger level	Delete
Increase the vertical scale (SCALE knob)	Home
Decrease the vertical scale (SCALE knob)	End
Increase the time scale (TIME/DIV knob)	Page Up
Decrease the time scale (TIME/DIV knob)	Page Down

Appendix 3 Block Diagram

Block Diagram of the Instrument



Signal Flow of the Instrument

The signals received through the signal input terminals are first applied to the vertical control circuit consisting of attenuators (ATT) and pre-amps (AMP). At the attenuators and pre-amps, the input signal amplitude is adjusted according to the input coupling, probe attenuation, voltage scale (SCALE), offset voltage, and other settings.

The adjusted input signals are then applied to the A/D converters. At the A/D converters, the voltage levels are converted into digital data.

The digital data undergoes digital filtering as well as sampling and envelope processing at the sample rate corresponding to the time scale setting (TIME/DIV) in the data processing circuit. Then, the data is written in the acquisition memory. In addition, averaging and sorting of repetitive samples are performed in the data processing circuit.

Here the data is converted into waveform display data by the data processing circuit, transferred to the display processing circuit, and stored in the display memory.

The data stored in the display memory is displayed as waveforms on the LCD.

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