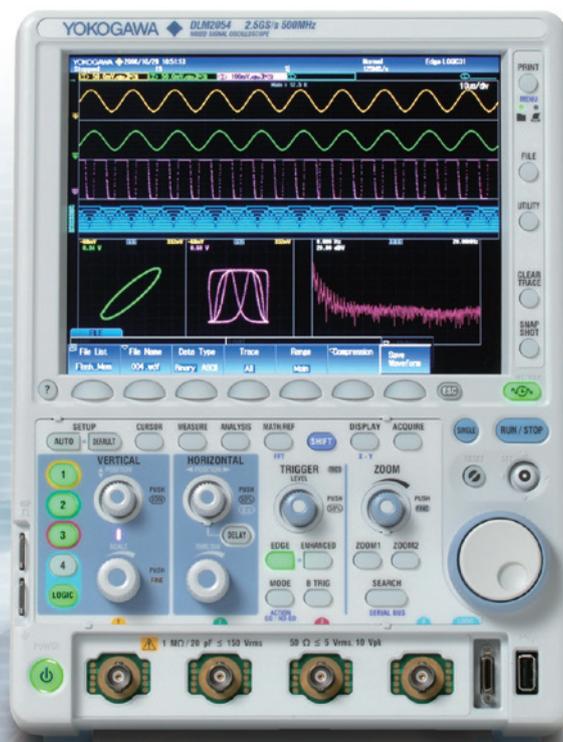# DLM 2000 Series

Mixed Signal Oscilloscope

Lineup includes 200 MHz, 350 MHz, 500 MHz bandwidth models

Lightweight and compact

Large 8.4-inch LCD display

Long memory: Up to 250 M points (with /M3 option)

High speed sampling: Up to 2.5 GS/s (1.25 GS/s with 4 ch)

DLM 2000

3-Year Warranty C E

Usability
Compact & intuitive operation

YOKOGAWA ◆ 2008/10/29 16:04:04
Stopped
Normal
Edge CH1
Main : 62.5 k
50ns/div
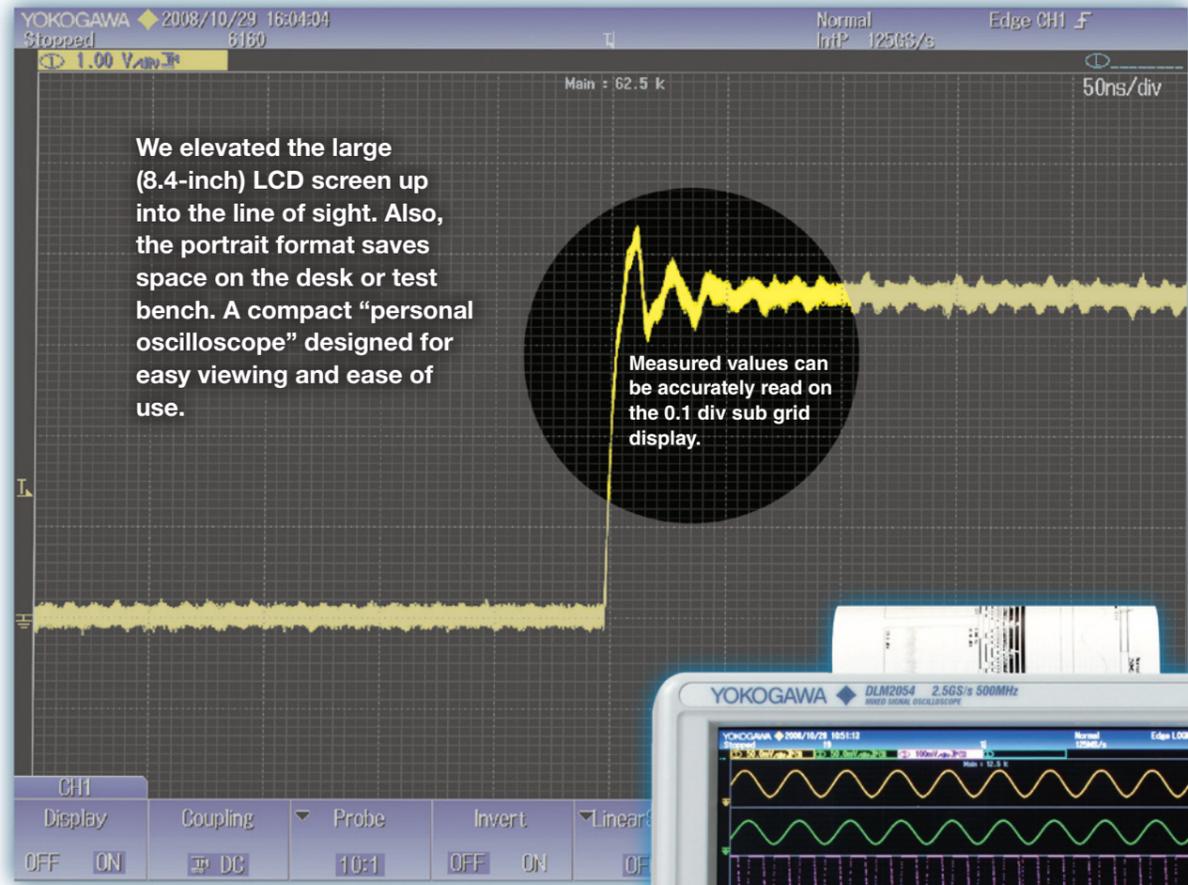
We elevated the large (8.4-inch) LCD screen up into the line of sight. Also, the portrait format saves space on the desk or test bench. A compact "personal oscilloscope" designed for easy viewing and ease of use.

Measured values can be accurately read on the 0.1 div sub grid display.

CH1
Display | Coupling | Probe | Invert | Linear
OFF ON | DC | 10:1 | OFF ON | OF
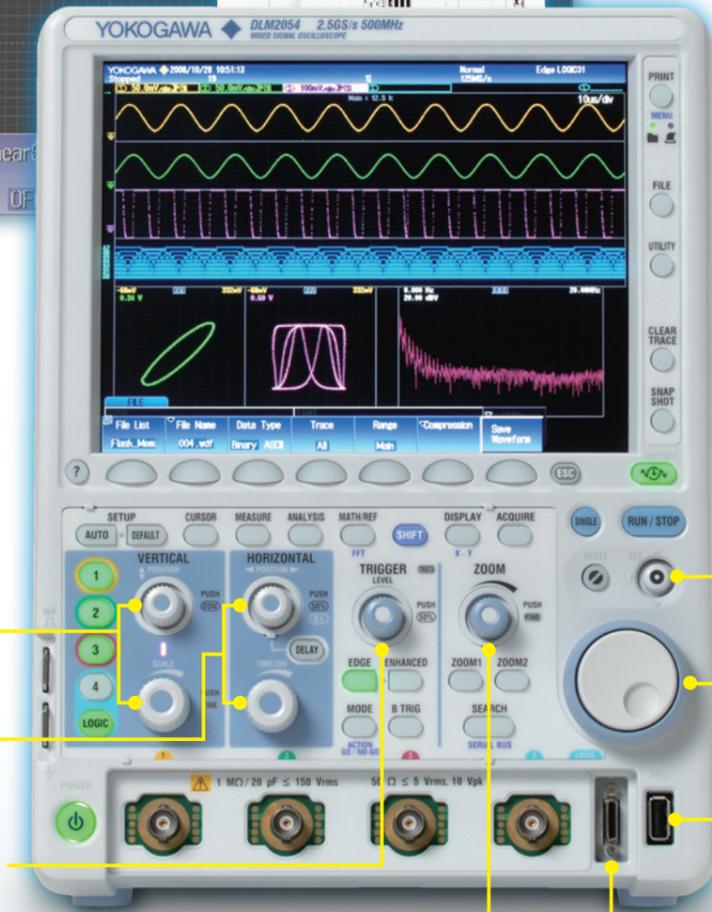
Easy-to-Use & Easy-to-See

Easy to use. Portrait body + large screen makes display easy to see.

Large screen in a compact body
Footprint is approximately 2/3 the size of an A4 size paper (depth of approximately 200 mm)

Vertical position and vertical scale knobs

Horizontal position and horizontal scale knobs

Trigger control keys and level knob

Zoom control keys and magnification knob

4-way selector button
For moving the cursor up/down/left/right

Jog shuttle
For changing values and moving cursors

USB peripheral connection terminal

Logic input connector

Flexibility
Switch between analog and logic channels

Flexible MSO input

Four channels is not sufficient to view the functioning of digital control circuits. The DLM2000 series converts 4 ch of analog input to 8-bit logic, and functions as a 3 ch analog + 8-bit logic MSO (mixed signal oscilloscope).

Switch

**4 ch analog**

3 ch analog + 8-bit logic

The performance of up to 11 inputs by converting to logic

Using logic input, up to 11 input signals can be observed simultaneously as 3 ch of analog and 8-bit logic. It is not only possible to use logic input for observation of data and control signals, or as a trigger source, but also for logic input analysis of I²C, SPI and some other serial busses.

Logic probe for the DLM2000

Example of logic probe connection
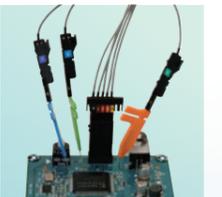
Fast data processing with ScopeCORE

With our proprietary ScopeCORE fast data processing IC, real time display is possible even when simultaneously measuring multichannel signals of 11 inputs.

ScopeCORE fast data processing IC

DLM 2000 Series

Capacity
Best-in-class long memory

Large capacity memory up to 250 Mpoints

Long memory is necessary to keep high speed sample rate in long term measurement.

<Basic Formula> Measuring time = Memory length/Sample rate

If 250 Mpoints (Memory expansion option /M3) is installed, Max. 0.2 sec waveform can be captured even at 1.25 GS/s sample rate when taking 2 ch measurements in Single mode.

Relationship between measuring time and sample rate in 250 Mpoint

Sample rate	Maximum measuring time
1.25 GS/s	0.2 s
125 MS/s	2 s
12.5 MS/s	20 s
1.25 MS/s	200 s
125 kS/s	2000 s
62.5 kS/s	5000 s

Caution is needed when using oscilloscope that does not have enough memory, which can cause lack of sample rate and possible failure capturing accurate waveform.

Sample rate is too low.

Sample rate is fairly high.
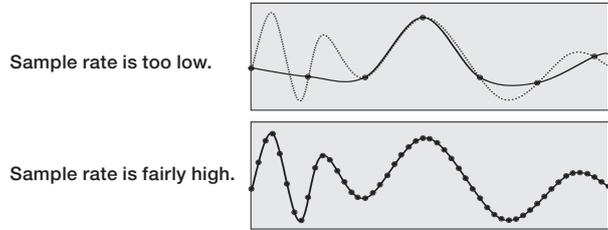
Waveform in 250 Mpoints can be magnified up to × 200000.


Zoom 1 ×1000

Zoom 2 ×200000
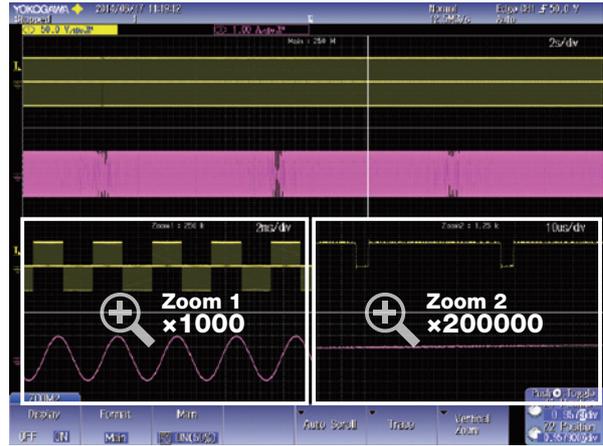
Detailed waveform measured for 20 seconds are shown in 20 milliseconds and 100 microseconds span.

Zoom & search function

With 2 different zoom location at the same time and variety of search function lets you pull out and display necessary data effectively.

Zoom two locations simultaneously

Because the DLM2000 series lets you set zoom factors independently, you can display two zoomed waveforms with different time axis scales at the same time. Also, using the Auto Scroll function, you can automatically scroll waveforms captured in long memory and change the zoomed location. With Auto Scroll you can choose forward, backward, fast-forward, scroll speed, and other control options.


Zoom 1

Zoom 2
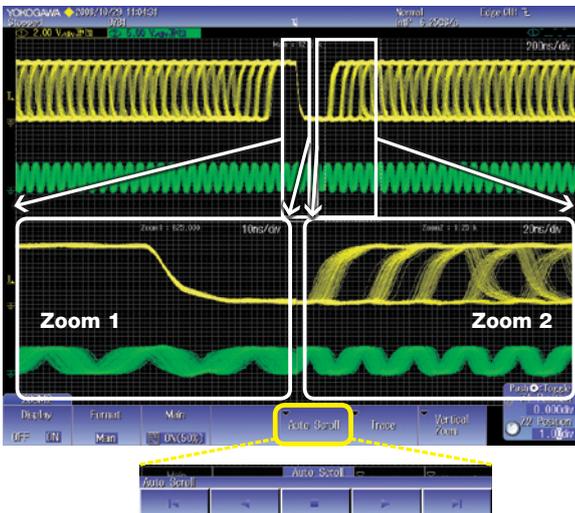
Auto Scroll menu

Zoom Search function

This function searches captured waveforms in the long memory and displays waveforms that meet the search criteria in the zoom area. The locations of the found waveforms are marked on screen (▼shows the current location).

• **Waveform search criteria**

Edge, edge (with conditions), state pattern, pulse width, state width, serial bus (only on models with the serial bus analysis option)


Search results marked
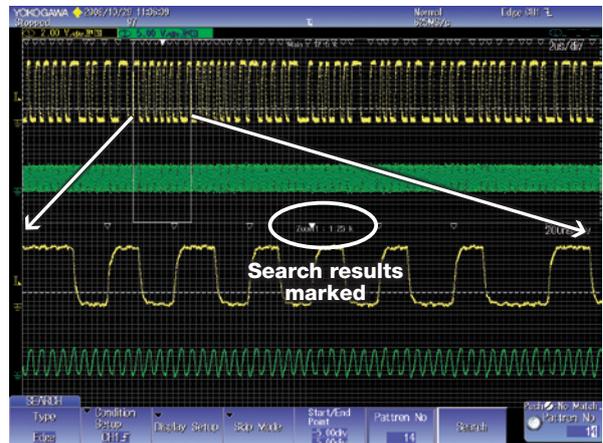
Waveform search using edge criterion

Originality

Original History function

Automatically save previously captured waveforms

You can replay waveforms later on, so you'll never miss an abnormal waveform

With the DLM2000 series, up to 50000 previously captured waveforms can be saved in the acquisition memory. With the History function, you can display just one or all of the previously captured waveforms (history waveforms) on screen. You can also perform cursor measurement, computation, and other operations on history waveforms. Using the History function, you can analyze rarely-occurring abnormal signals.

HISTORY

#1   #2   #3   #50000
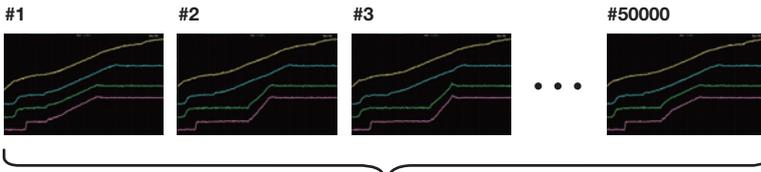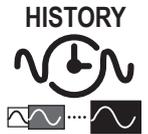
Can reproduce channels and their relationship which is difficult to view in accumulate display mode.

Extract abnormal waveform

Accumulate display mode   **Single acquisition display mode**

History search function

Various search methods are available to search waveform which meet your requirements up to 50000 waveform history records.

Example of specified waveform search

Zone created from measured waveforms

Place square zone and search

Searching for waveforms that pass through or do not pass through a rectangular zone placed on screen.
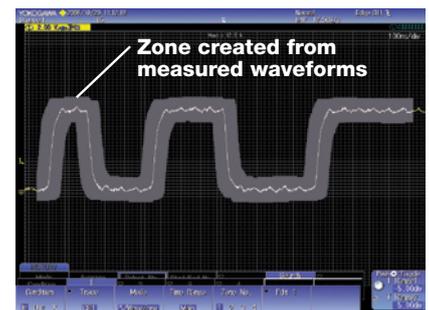
Searching for waveforms in zones created by moving measured waveforms up/down/left/right.

Replay function

You can automatically play back, pause, fast forward, and rewind waveform history record.

Functionality

Large selection of triggers and filters

Real time filter with optimum noise reduction supports a wide range of frequencies (from 8 kHz to 200 MHz)
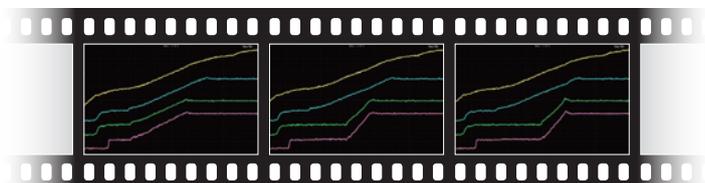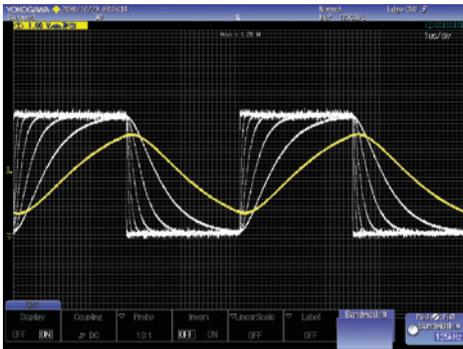
The DLM2000 series has two types of filters, one processed at the input circuit and one based on MATH functions. These filters are effective for rejecting unwanted signals, allowing observation of only the desired bandwidths.

Real time filters	Computed digital filters

Each channel has 14 low pass filters available from 8 kHz to 200 MHz. Waveforms of limited bandwidths are stored in internal memory.

**Cutoff frequencies**: 200 MHz, 100 MHz, 20 MHz, 10 MHz, 5 MHz, 2 MHz, 1 MHz, 500 kHz, 250 kHz, 125 kHz, 62.5 kHz, 32 kHz, 16 kHz, and 8 kHz

The input waveform can be filtered using an IIR filter, which is a MATH function. Filtered waveforms can be displayed at the same time as the input waveform for comparison. You can select low pass or high pass filters.

Cutoff frequency setting range: 0.01 Hz to 500 MHz

Processing with built-in filters
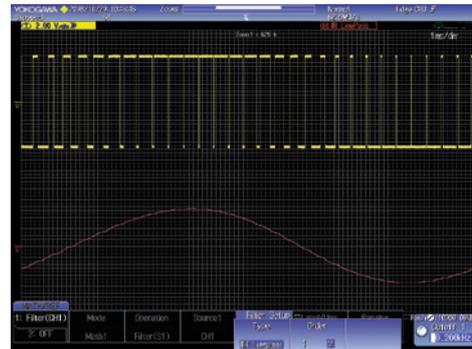
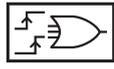**Filtering of a PWM waveform using computation**

Trigger Function capturing combined analog/digital complex waveforms

The DLM2000 series comes with a variety of easy-to-configure triggers combining analog and logic inputs such as edge, enhanced, and B triggers.

Edge trigger ——— Edge

Enhanced triggers ——— Edge OR

— Edge (qualified)
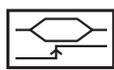
— State
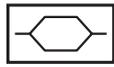
— Pulse width
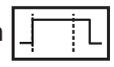
— State width
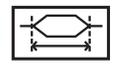
— Serial (optional)
FlexRay/CAN/CAN FD/LIN/
SENT/PSI5/UART/I²C/SPI
(standard) user-defined

— TV   NTSC/PAL/SDTV/
HDTV/user defined

B triggers ——— A Delay B

— A to B(n)

— Dual bus
(combination trigger of 2 serial busses)

—Trigger function example—

•A to B(n) trigger

Example: Trigger on the 7th edge of signal on B. This is effective for measurements with shifted timing, such as non-standard video signal vertical/horizontal periods or motor reference position pulses and drive pulses.

Input signal A

Input signal B   ① ② ③ ④ ⑤ ⑥ ⑦   ↑Trigger
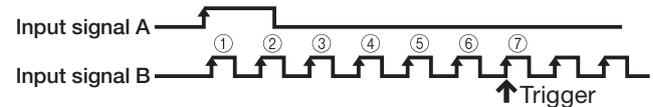
•Serial pattern trigger (user defined)

Example: Trigger on an arbitrarily set pattern of up to 128 bits. This is effective for detecting ID/Data and other portions of proprietary communication formats.

HHHH-LHLH-LLLL
(Arbitrary pattern) ↑Trigger
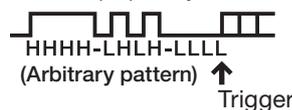
Pattern configuration screen

•Dual bus trigger

Example: Trigger on a combination of CAN and LIN bus triggers. I²C + SPI bus triggers, and other combinations are possible.

Trigger when either LIN or CAN bus signal conditions become true

Input signal A CAN

Input signal B LIN
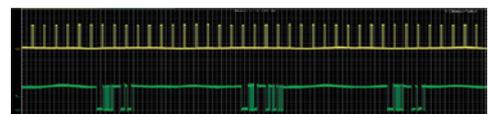
Utility

Range of functions that help operation efficiency

Displays trends of peak-to-peak or pulse width per cycle

—Measure function and statistics—

Twenty-nine waveform parameters are included such as: maximum, minimum, peak-to-peak, pulse width, period, frequency, rise/fall time, and duty ratio. Automated measurement can be performed using up to 30 of these waveform parameters. Also, waveform parameters can be measured repeatedly, and the statistical values displayed (mean, maximum, minimum, standard deviation, etc.).
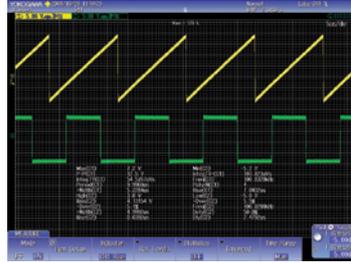
—Trend and histogram displays—

Waveform parameters such as period, pulse width, and amplitude can be measured repeatedly and displayed in graphs. In a single screen you can observe period-by-period fluctuations, compute amplitudes every screen using multiple waveforms, and display amplitudes as trends. You can also display histograms referencing the voltage or time axis using values from repeated automated measurement of waveform parameters.

Trend display of waveform parameters
Histogram display using the time axis

Measures voltage/time differences automatically

—Cursor Measurement—

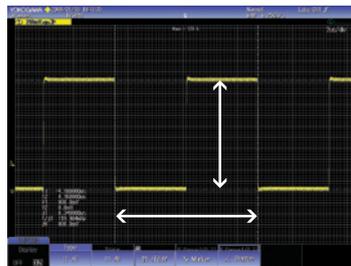Cursors can be placed on the displayed waveform from signal data, and various measurement values at the intersection of the cursor and waveform can be displayed. There are five types of cursor; ΔT, ΔV, ΔT& ΔV, Marker, Degree Cursor.

Simultaneous level and time difference measurement with the ΔT&ΔV cursor

Analyzes frequency spectrums

—FFT analysis—

Up to 2 FFT analyses can be performed simultaneously. FFT can be performed on computed waveforms in addition to the actual waveforms on CH1 to CH4. Analysis can be performed on limited bandwidth waveforms by filtering, periodic changes of rotary objects, and other phenomena.
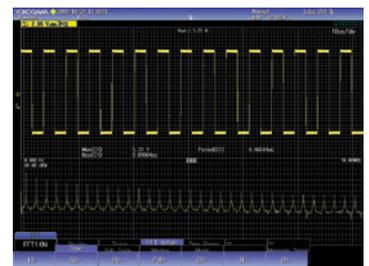
FFT analysis

Keeps waveforms with one push

—Snapshot—

By pressing the SNAPSHOT key to the lower right of the screen, you can freeze a white trace of the currently displayed waveform on the screen. You can press the key repeatedly and conveniently leave traces for comparing multiple waveforms. Also, snapshot data recorded on screen can be saved or loaded as files, and can be recalled for use as reference waveforms when making comparisons.

"SNAP SHOT" key
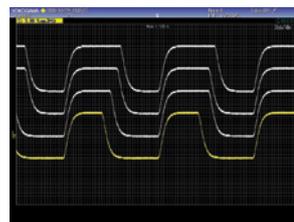
Using snapshots (white waveforms)

Displays stored files in thumbnail format

—Thumbnails of saved files—

Thumbnails of waveform data, waveform image data, and Wave-Zone files can be displayed. The image and file names are shown so that you can view screen image contents while copying or deleting files. A file can be enlarged to confirm the data.
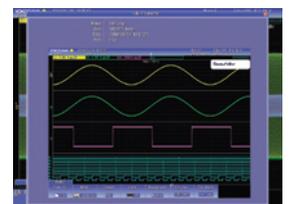
Thumbnails of saved files   **Thumbnail can be viewed full-size**

Has a GO/NO-GO function

—Action on trigger—

GO/NO-GO can be determined using trigger conditions, zone waveforms, measurement parameters, and other criteria. For NO-GO, actions can be carried out at the same time such as sounding a buzzer, saving the current waveform, or sending notification to a designated e-mail address. Waveforms in which an abnormality occurred can be saved for confirmation and analysis of the phenomena at a later time.

Abnormal waveform detected

Action specified for NO-GO

Buzzer   Output to printer

Save waveform data file   E-mail transmission
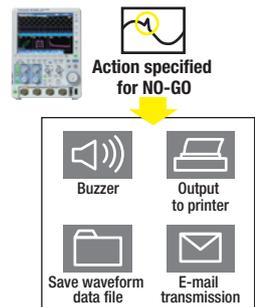
Can check functions with graphical online help

You can view detailed graphical explanations of the oscilloscope's functions by pressing the "?" key in the lower left of the screen. This lets you get help on functions and operations on screen without having to consult the user's manual.

Specialty
Analysis option for application

Serial analysis function options (/F1 to /F11)

—UART (RS232)/I²C/SPI/CAN/CAN FD/LIN/FlexRay/SENT/PSI5/CXPI—

Triggers for embedded systems and in-vehicle bus signals are supported along with decode display analysis (serial bus analysis option only on 4 ch models. Trigger functions of some of the serial buses are not supported). Logic input can also be used for specific serial buses (UART, I²C, SPI, SENT).

Intelligent serial bus auto setup: Complicated trigger and decode settings such as bit rate and threshold level are automatically detected by DLM2000.

Simultaneous analyses of four different busses: Up to four busses can be analyzed simultaneously. Waveforms and analysis results from busses with different speeds can be displayed using 2 Zoom windows.

Inputs supported for serial bus analysis

	I²C	SPI	UART	LIN	CAN	CAN FD	FlexRay	SENT	PSI5	CXPI
Analog input	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Logic input	Yes	Yes	Yes	NA	NA	NA	NA	Yes	NA	NA
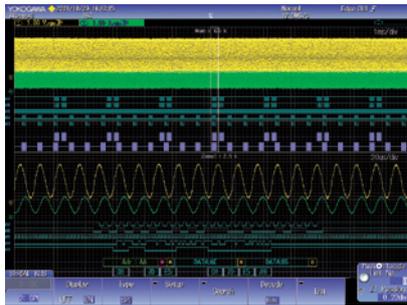
Simultaneous analyses of I²C and SPI

Four bus decode and list display

Power supply analysis option (/G3, /G4)

Dedicated power supply analysis options are available (4 ch models only) for switching loss, joule integral (I²t), SOA (safe operating area) analysis, harmonic analysis of power supply current based on EN61000-3-2, and other power parameter measurement such as active power, power factor etc.

Switching loss analysis

Utilizing the long memory capability, voltage and current waveforms over long cycles can be input for computation of switching loss (V(t) × i(t)).
A wide variety of switching loss analyses are supported, including turn-on/off loss calculation, loss including continuity loss, and loss over long cycles of 50 Hz/60 Hz power line.

Power parameter measurement

Automated measurement of power parameters for up to two pairs of voltage and current waveforms, such as active power, apparent power, power factor etc. Values can be statistically processed and caluculated.
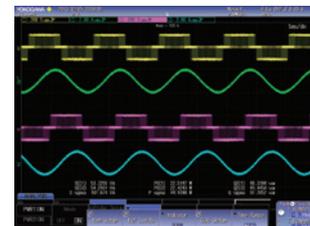
Connectivity
Wide range of interface and software

Broad Connectivity and Easier Control
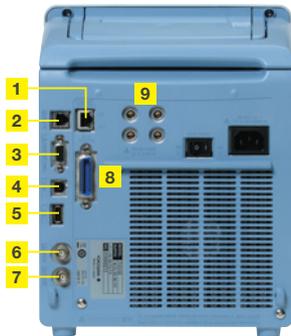
1. Ethernet (optional)
2. GO/NO-GO output terminal
3. RGB video signal output terminal
4. USB-PC connection terminal
5. USB peripheral connection terminal
6. External trigger input
7. Trigger output
8. GP-IB connection terminal (optional)
9. Probe power terminal (optional)

Sends waveform, screen, and settings data
Remote control
Mail transmission
(GO/NO-GO action)

1000BASE-T/100BASE-TX/10BASE-T compliant adapters (hubs and routers)

USB (standard on rear panel)
Sends waveform, screen, and settings data
Remote control

Ethernet (/C10, /C11 options)

Supports USB storage, USB mouse and keyboard.

mouse   keyboad

On PCs
DLM2000's internal storage can be recognized by a PC as an external USB storage device. Transferring files is easy even when a USB thumb drive can't be used.

Software Control
http://tmi.yokogawa.com/ea/products/oscilloscopes/oscilloscopes-application-software/

	Free Software	Optional Software Trial version available
Off-line waveform display and analysis	**XviewerLITE –Basic check–** Zoom, V-cursor, conversion to CSV format	**Xviewer –Advanced Analysis–** Advanced and useful functions are supported. Good for precise, off-line waveform analysis. • Waveform observation and analysis • Cursor, Parameteric Measure • Statistical Analysis • Multiple file display • Advanced waveform operations • Comment, marking, printing and making report • Optional Math computation feature • Remote monitor • Instruments communication function • Transferring waveform & image files
Waveform monitoring on a PC	**XWirepuller** Remote monitor and operation Transferring image files	
Data transfer to a PC		
Command control Custom software development	**Control library "TMCTL"** For Visual Studio **DL-Term** Interactive tool **LabVIEW instrument driver**	**MATLAB Tool Kit** Remote control from MATLAB and data file importing.

Main Specification

Models

Model name	Frequency bandwidth	Input terminal	Max. sample rate
DLM2022 (710105)	200 MHz	2 analog channels	1.25 GS/s (interleave mode off) 2.5 GS/s (interleave mode on)
DLM2032 (710115)	350 MHz		
DLM2052 (710125)	500 MHz		
DLM2024 (710110)	200 MHz	4 analog channels or 3 analog channels + 8 bit logic	
DLM2034 (710120)	350 MHz		
DLM2054 (710130)	500 MHz		

Analog Signal input

Input channels
Analog input — DLM20x2: CH1, CH2
DLM20x4: CH1 to CH4 (CH1 to CH3 when using logic input)

Input coupling setting — AC, DC, DC50 Ω, GND

Input impedance
Analog input — 1 MΩ ±1.0%, approximately 20 pF
50 Ω ±1.0% (VSWR 1.4 or less, DC to 500 MHz)

Voltage axis sensitivity setting range — 1 MΩ 2 mV/div to 10 V/div (steps of 1-2-5)
50 Ω 2 mV/div to 500 mV/div (steps of 1-2-5)

Max. input voltage — 1 MΩ 150 Vrms
50 Ω Must not exceed 5 Vrms or 10 Vpeak

Max. DC offset setting range
1 MΩ 2 mV/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 2 mV/div to 50 mV/div ±1 V
100 mV/div to 500 mV/div ±5 V

Vertical-axis (voltage-axis)
DC accuracy[1] — ±(1.5% of 8 div + offset voltage accuracy)

Offset voltage accuracy[1] — 2 mV to 50 mV/div ±(1% of setting + 0.2 mV)
100 mV to 500 mV/div ±(1% of setting + 2 mV)
1 V to 10 V/div ±(1% of setting + 20 mV)

Frequency characteristics (–3 dB attenuation when inputting a sinewave of amplitude ±3div)[1][2]

		DLM202x	DLM203x	DLM205x
1 MΩ (when using passive probe)	100 mV to 100 V/div	200 MHz	350 MHz	500 MHz
	20 mV to 50 mV/div	150 MHz	300 MHz	400 MHz
50 Ω	10 mV to 500 mV/div	200 MHz	350 MHz	500 MHz
	2 mV to 5 mV/div	150 MHz	300 MHz	400 MHz

Isolation between channels — Maximum bandwidth: –34 dB (typical value)

Residual noise level[3] — The larger of 0.4 mV rms or 0.05 div rms (typical value)

A/D resolution — 8 bit (25 LSB/div) Max. 12 bit (in High Resolution mode)

Bandwidth limit — FULL, 200 MHz, 100 MHz, 20 MHz, 10 MHz, 5 MHz, 2 MHz, 1 MHz, 500 kHz, 250 kHz, 125 kHz, 62.5 kHz, 32 kHz, 16 kHz, 8 kHz (can be set for each channel)

Maximum sample rate — Real time sampling mode Interleave OFF 1.25 GS/s
Interleave ON 2.5 GS/s
Repetitive sampling mode 125 GS/s

Maximum record length (Points)

		Repeat	Single	Single Interleave
2 ch model	/M1S	6.25 M	25 M	62.5 M
4 ch model	/M1	6.25 M	25 M	62.5 M
	/M2	12.5 M	62.5 M	125 M
	/M3	25 M	125 M	250 M

Ch-to-Ch deskew — ±100 ns

Time axis setting range — 1 ns/div to 500 s/div (steps of 1-2-5)

Time base accuracy[1] — ±0.002%

Max. acquisition rate[4] — Approx. 20000 waveform/sec/ch (Accumulation mode)

Dead time in N Single mode — Approx. 2.2 μs (approx. 450000 waveforms/sec/ch)

Logic Signal Input (4 ch model only)

Number of inputs	8 bit (excl. 4 ch input and logic input)
Maximum toggle frequency[1]	Model 701988: 100 MHz, Model 701989: 250 MHz
Compatible probes	701988, 701989 (8 bit input) (701980, 701981 are available)
Min. input voltage	701988: 500 mVp-p, 701989: 300 mVp-p
Input range	Model 701988: ±40 V, Model 701989: threshold ±6 V
Max. nondestructive input voltage	±40 V (DC + ACpeak) or 28 Vrms (when using 701989)
Threshold level setting range	Model 701988: ±40 V (setting resolution of 0.05 V) Model 701989: ±6 V (setting resolution of 0.05 V)
Input impedance	701988: Approx. 1 MΩ/approx. 10 pF 701989: Approx. 100 kΩ/approx. 3 pF
Maximum sampling rate	1.25 GS/s

Maximum record length (Points)

	Repeat	Single
/M1	6.25 M	25 M
/M2	12.5 M	62.5 M
/M3	25 M	125 M

Triggers

Trigger modes	Auto, Auto Level, Normal, Single, N-Single		

Trigger type, trigger source

A triggers	Edge	CH1 to CH4, Logic, EXT, LINE	
	Edge OR	CH1 to CH4	
	Edge Qualified	CH1 to CH4, Logic, EXT	
	State	CH1 to CH4, Logic	
	Pulse width	CH1 to CH4, Logic, EXT	
	State width	CH1 to CH4, Logic	
	TV	CH1 to CH4	
	Serial Bus	I²C (optional)	CH1 to CH4, Logic
		SPI (optional)	CH1 to CH4, Logic
		UART (optional)	CH1 to CH4, Logic
		FlexRay (optional)	CH1 to CH4
		CAN (optional)	CH1 to CH4
		CAN FD (optional)	CH1 to CH4
		LIN (optional)	CH1 to CH4
		SENT (optional)	CH1 to CH4, Logic
		PSI5 (optional)	CH1 to CH4
		User defined	CH1 to CH4
AB triggers	A Delay B	10 ns to 10 s (Edge, Edge Qualified, State, Serial Bus)	
	A to B(N)	1 to 10⁹ (Edge, Edge Qualified, State, Serial Bus)	
	Dual Bus	Serial Bus only	

Trigger level setting range	CH1 to CH4	±4 div from center of screen
Trigger level setting resolution	CH1 to CH4	0.01 div (TV trigger: 0.1 div)
Trigger level accuracy[1]	CH1 to CH4	±(0.2 div + 10% of trigger level)
Window Comparator	Center/Width can be set on individual Channels from CH1 to CH4	

Display

Display[5]	8.4-inch TFT color liquid crystal display, 1024 × 768 (XGA)

Functions

Waveform acquisition modes	Normal, Envelope, Average	
High Resolution mode	Max. 12 bit (the resolution of the A/D converter can be improved equivalently by placing a bandwidth limit on the input signal)	
Sampling modes	Real time, interpolation, repetitive sampling	
Accumulation	Select OFF, Intensity (waveform frequency by brightness), or Color (waveform frequency by color) Accumulation time: 100 ms to 100 s, Infinite	
Roll mode	Enabled at 100 ms/div to 500 s/div (depending on the record length setting)	
Zoom function	Two zooming windows can be set independently (Zoom1, Zoom2)	
	Zoom factor	×2 to 2.5 points/10 div (in zoom area)
	Scroll	Auto Scroll
	Search functions	Edge, Edge Qualified, State, Pulse Width, State Width, I²C (optional), SPI (optional), UART (optional), CAN (optional), CAN FD (optional), LIN (optional), FlexRay (optional), SENT (optional), PSI5 (optional), CXPI (optional)
History memory	Max. data (record length 1.25 k Points, with) /M1 or /M1S: 10000, /M2: 20000, /M3: 50000	
	History search	Select Rect, Wave, Polygon, or Parameter mode
	Replay function	Automatically displays the history waveforms sequentially
	Display	Specified or average waveforms
Cursor	Types	ΔT, ΔV, ΔT & ΔV, Marker, Degree
Snapshot	Currently displayed waveform can be retained on screen	

Computation and Analysis Functions

Parameter measurement	Max, Min, P-P, High, Low, Amplitude, Rms, Mean, Sdev, IntegTY+, IntegTY, +Over, −Over, Pulse Count, Edge Count, V1, V2, ΔT, Freq, Period, Avg Freq, Avg Period, Burst, Rise, Fall, +Width, −Width, Duty, Delay
Statistical computation of parameters	Max, Min, Mean, σ, Count
Statistics modes	Continuous, Cycle, History

Trend/Histogram display of wave parameters	Up to 2 trend or histogram display of specified wave parameters
Computations (MATH)	+, −, ×, Filter (Delay, Moving Avg, IIR Lowpass, IIR Highpass), Integ, Count (Edge, Rotary), user defined math (optional)
Computable no. of traces	2 (Math1, Math2) (1 trace for 2 ch model)
Max. computable memory length	/M1, /M1S: 25 MPoints, /M2: 62.5 MPoints, /M3: 125 MPoints
Reference function	Up to 2 traces (REF1/REF2) of saved waveform data can be displayed and analyzed
Action-on-trigger	Actions: Buzzer, Print, Save, Mail
GO/NO-GO	Modes: Rect, Wave, Polygon, Parameter Actions: Buzzer, Print, Save, Mail
XY	Displays XY1, to XY2 and T-Y simultaneously
FFT	Number of points: 1.25 k, 12.5 k, 25 k, 125 k, 250 k Window functions: Rectangular, Hanning, Flat-Top FFT Types: PS (LS, RS, PSD, CS, TF, CH are available with /G2 or /G4 option)
Histogram	Displays a histogram of acquired waveforms
User-defined math[6] (/G2 and /G4 options)	The following operators can be arbitrarily combined in equations: +, −, ×, /, SIN, COS, TAN, ASIN, ACOS, ATAN, INTEG, DIFF, ABS, SQRT, LOG, EXP, LN, BIN,DELAY, P2 (power of 2), PH, DA, MEAN, HLBT, PWHH, PWLL, PWHL, PWLH, PWXX, FV, DUTYH, DUTYL, FILT1, FILT2 The maximum record length that can be computed is the same as the standard math functions.

Power supply analysis (/G3 and /G4 options)[6]		
Power analysis	For Pwr1 and Pwr2, selectable from 4 analysis types Deskwing between the voltage and current waveforms can be executed automatically.	
	Switching loss	Measurement of total loss and switching loss, power waveform display, Automatic measurement and statistical analysis of power analysis items (Wp, Wp+, Wp−, Abs.Wp, P, P+, P−, Abs.P, Z)
	Safety operation area	SOA analysis by X-Y display, using voltage as X axis, and current as Y axis is possible
	Harmonic analysis	Basic comparison is possible with following standard Harmonic emission standard IEC61000-3-2 edition 2.2, EN61000-3-2 (2000), IEC61000-4-7 edition 2
	Joule integral	Joule integral (I²t) waveform display, automatic measurement and statistical analysis is possible
Power Measurement	Automated measurement of power parameters for up to two pairs of voltage and current waveforms. Values can be statistically processed and calculated.	
	Measurement parameters	Urms, Unm, Udc, Urmn, Uac, U+pk, U−pk, Up−p, Irms, Imn, Idc, Irmn, Iac, I+pk, I−pk, Ip−p, P, S, Q, Z, λ, Wp, Wp+, Wp−, Abs.Wp, q, q+, q−, Abs.q, Avg Freq (voltage, current)

Common Features of Serial Bus Signal Analysis Functions (/F1 to /F11 Options)

Analysis result display	Decoded information is displayed together with waveforms or in list form.
Auto setup function	A threshold value, time axis scale, voltage axis scale and other bus-specific parameters such as a bit rate and recessive level are automatically detected. Trigger conditions are set based on the detected result and decoded information is displayed. (The type of a bus signal needs to be specified in advance.)
Search function	Search of all waveforms for a position that matches a pattern or condition specified by data information.
Analysis result saving function	Analysis list data can be saved to CSV-format files. Trend data can be also saved for SENT signals.

I²C Bus Signal Analysis Functions (/F2 and /F3 Options)[6]

Applicable bus	I²C bus Bus transfer rate: 3.4 Mbit/s max. Address mode: 7 bit/10 bit
	SM bus Complies with System Management Bus
Analyzable signals	CH1 to CH4, Logic input, or M1 to M2
I²C Trigger modes	Every Start, Address & Data, Non-Ack, General Call, Start Byte, HS Mode
Analyzable no. of data	300000 bytes max.
List display items	Analysis no., time from trigger position (Time (ms)),1st byte address, 2nd byte address, R/W, Data, Presence/absence of ACK, information

SPI Bus Signal Analysis Functions (/F2 and /F3 Options)[6]

Trigger types	3 wire, 4 wire After assertion of CS, compares data after arbitrary byte count and triggers.
Analyzable signals	CH1 to CH4, Logic input, M1 to M2
Byte order	MSB, LSB
Field definition	Field size (4 to 32 bits), Enabled bit range
Analyzable no. of data	300000 bytes max.
List display items	Analysis no., time from trigger position (Time (ms)), Data 1, Data 2

UART Signal Analysis Functions (/F1 and /F3 Options)[6]

Bit rate	115200 bps, 57600 bps, 38400 bps, 19200 bps, 9600 bps, 4800 bps, 2400 bps, 1200 bps, User Define (an arbitrary bit rate from 1 k to 1 Mbps with resolution of 100 bps)

Analyzable signals	CH1 to CH4, logic input, or M1 to M2
Data format	Select a data format from the following 8 bit (Non Parity), 7 bit Data + Parity, 8 bit + Parity
UART Trigger modes	Every Data, Data, Error (Framing, Parity)
Analyzable no. of frames	300000 frames max.
List display items	Analysis no., time from trigger position (Time(ms)), Data (Bin, Hex) display, ASCII display, and Information.

CAN Bus Signal Analysis Functions (/F4, /F6, /F7 and /F8 Options)[6]

Applicable bus	CAN version 2.0A/B, Hi-Speed CAN (ISO11898), Low-Speed CAN (ISO11519-2)
Analyzable signals	CH1 to CH4, M1 to M2
Bit rate	1 Mbps, 500 kbps, 250 kbps, 125 kbps, 83.3 kbps, 33.3 kbps User Define (an arbitrary bit rate from 10 kbps to 1 Mbps with resolution of 100 bps)
CAN bus Trigger modes	SOF, ID/Data, ID OR, Error (Error Frame, Stuff, CRC), Message and signal (enabled when loading physical values/symbol definitions)
Analyzable no. of frames	100000 frames max.
List display items	Analysis no., time from trigger position (Time (ms)), Frame type, ID, DLC, Data, CRC, presence/absence of Ack, information
Auxiliary analysis functions	Field jump functions

CAN FD Bus Signal Analysis Functions (/F7 and /F8 Options)[6]

Applicable bus		CAN FD (ISO 11898-1:2015 and non-ISO)
Analyzable signals		CH1 to CH4, M1 to M2
Bit rate	Arbitration	1 Mbps, 500 kbps, 250 kbps, User Define (an arbitrary bit rate from 20 kbps to 1 Mbps with resolution of 100 bps)
	Data	8 Mbps, 5 Mbps, 4 Mbps, 2 Mbps, 1 Mbps, 500 kbps, User Define (an arbitrary bit rate from 250kbps to 10Mbps with resolution of 100 bps)
CAN FD bus trigger modes		SOF, ID, ID OR, Error Frame, Message (enabled when loading physical values/symbol definitions)
Auto setup function		Auto setting of bit rate, recessive Level, threshold value, time axis scale, voltage axis scale, and display of analysis results
Analyzable no. of frames		50000 frames max.
List display items		Analysis no., time from trigger position (Time (ms)), Frame type, ID, DLC, Data, CRC, presence/absence of Ack, information
Auxiliary analysis functions		Field jump functions

LIN Bus Signal Analysis Functions (/F4, /F6, /F7 and /F8 Options)[6]

Applicable bus	LIN Rev. 1.3, 2.0, 2.1
Analyzable signals	CH1 to CH4, M1 to M2
Bit rate	19.2 kbps, 9.6 kbps, 4.8 kbps, 2.4 kbps, 1.2 kbps User Define (an arbitrary bit rate from 1 kbps to 20 kbps with resolution of 10 bps)
LIN bus Trigger modes	Break Synch, ID/Data, ID OR, and Error trigger
Analyzable no. of frames	100000 frames max.
List display items	Analysis no., time from trigger position (Time (ms)), ID, ID-Field, Data, CheckSum, information
Auxiliary analysis functions	Field jump functions

CXPI Bus Signal Analysis Functions (/F4, /F6, /F7 and /F8 Options)[6] [8]

Applicable bus	CXPI JASO D 015-3:2015
Analyzable signals	CH1 to CH4, M1 to M2
Bit rate	19.2 kbps, 9.6 kbps, 4.8 kbps, User Define (an arbitrary bit rate from 4 kbps to 50 kbps with resolution of 10 bps)
Analyzable no. of frames	10000 frames max.
List display items	Analysis no., time from trigger position (Time (ms)), ID, DLC, W/S, CT, Data, CRC, error information, Wakeup/Sleep

FlexRay Bus Signal Analysis Functions (/F5, /F6 and /F8 Options)[6]

Applicable bus	FlexRay Protocol Version 2.1
Analyzable signals	CH1 to CH4, M1 to M2
Bit rate	10 Mbps, 5 Mbps, 2.5 Mbps
FlexRay bus Trigger modes	Frame Start, Error, ID/Data, ID OR
Analyzable no. of frames	5000 frames max.
List display items	Analysis no., time from trigger position (Time(ms)), Segment (Static or Dynamic), Indicator, FrameID, PayLoad length, Cycle count, Data, Information

SENT Signal Analysis Functions (/F9 and /F11 Options)[6]

Applicable standard		J2716 JAN2010 and older
Analyzable signals		CH1 to CH4, logic input, or M1 to M2
Clock period		1 us to 100 us with resolution of 0.01 us
Data type	Fast channel	Nibbles/User Defined
	Slow channel	Short/Enhanced
SENT trigger modes		Start of fast channel
Analyzable no. of frames		100000 frames max.
List display items	Fast channel	Analysis no., time from trigger position (Time (ms)), Sync/Cal period, Tick, Status & Comm, Data, CRC, frame length, information

	Slow channel	Analysis no., time from trigger position (Time (ms)), ID, Data, CRC, information
Auxiliary analysis functions		Trend functions (up to 4 trend waveforms)

PSI5 Signal Analysis Functions (/F10 and /F11 Options)[6]

Applicable standard	PSI5 Airbag (V2.2) [7]
Analyzable signals	CH1 to CH4, M1 to M2
Bit rate	189 kbps, 125 kbps, User Define (10.0 k to 1000.0 kbps, with resolution of 0.1 kbps)
PSI5 Trigger modes	Sync, Start Bit, Data
Analyzable no. of frames	400000 frames max.
List display items	Analysis no., time from trigger position, time from Sync, slot no., Data, Parity/CRC, Information
Auxliary analysis function	Trend functions (up to 4 trend waveforms)

GP-IB (/C1 and /C11 Options)

Electromechanical specifications	Conforms to IEEE std. 488-1978 (JIS C 1901-1987)
Protocol	Conforms to IEEE std. 488.2-1992

Auxiliary Input

Rear panel I/O signal	External trigger input (DLM20x2: front panel), external trigger output, GO-NOGO output, video output
Probe interface terminal (front panel)	2 terminals (DLM20x2), 4 terminals (DLM20x4)
Probe power terminal (rear panel)	2 terminals (/P2 option), 4 terminals (/P4 option)

Internal Storage (Standerd model, /C9 Option)

Capacity	Standard model: 300 MB, /C9 option: 7.2 GB

Built-in Printer (/B5 Option)

Built-in printer	112 mm wide, monochrome, thermal

USB Peripheral Connection Terminal

Connector	USB type A connector × 2 (front panel × 1, rear panel × 1)
Electromechanical specifications	USB 2.0 compliant
Supported transfer standards	Low Speed, Full Speed, High Speed
Supported devices	USB Printer Class Ver. 1.0 compliant EPSON/HP (PCL) inkjet printers USB Mass Storage Class Ver. 1.1 compliant mass storage devices* Please contact your local YOKOGAWA sales office for model names of verified devices

USB-PC Connection Terminal

Connector	USB type B connector × 1
Electromechanical specifications	USB 2.0 compliant
Supported transfer standards	High Speed, Full Speed
Supported class	USBTMC-USB488 (USB Test and Measurement Class Ver. 1.0)

Ethernet (/C10 and /C11 Options)

Connector	RJ-45 connector × 1
Transmission methods	Ethernet (1000BASE-T/100BASE-TX/10BASE-T)
Supported services	Server: FTP, HTTP, VXI-11　Client: FTP, SMTP, SNTP, LPR, DHCP, DNS

General Specifications

Rated supply voltage	100 to 240 VAC
Rated supply frequency	50 Hz/60 Hz
Maximum power consumption	170 VA
External dimensions	226 (W) × 293 (H) × 193 (D) mm (when printer cover is closed, excluding protrusions)
Weight	Approx. 4.2 kg, With no options
Operating temperature range	5℃ to 40℃

*1 Measured under standard operating conditions after a 30-minute warm-up followed by calibration.
　Standard operating conditions: Ambient temperature: 23℃ ±5℃
　　　　　　　　　　　　　　　 Ambient humidity: 55 ±10% RH
　Error in supply voltage and frequency: Within 1% of rating
*2 Value in the case of repetitive phenomenon. The frequency bandwidth of a single-shot phenomenon is the smaller of the two values, DC to sampling frequency/2.5 or the frequency bandwidth of the repetitive phenomenon.
*3 When the input section is shorted, the acquisition mode is set to Normal, accumulation is OFF, and the probe attenuation is set to 1:1.
*4 Acquisition rate does not vary with an increase or decrease in channels.
*5 The LCD may include a few defective pixels (within 4 ppm over the total number of pixels including RGB).
*6 For 4 ch model only.
*7 Sync signal from ECU and the signal from sensors are analyzed.
*8 If the trigger function is required, please contact our sales representative.

External Dimensions

Unit: mm

193　　293　　226
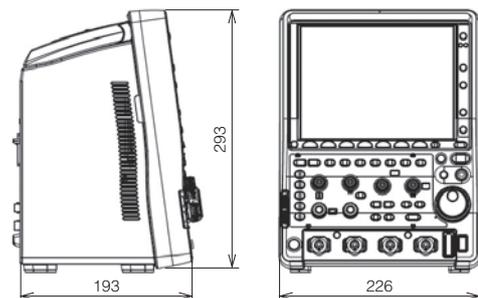
Model and Suffix Codes

Model	Suffix code	Description
710105		Digital Oscilloscope DLM2022 2ch, 200MHz
710110[*1]		Mixed Signal Oscilloscope DLM2024 4ch, 200MHz
710115		Digital Oscilloscope DLM2032 2ch, 350MHz
710120[*1]		Mixed Signal Oscilloscope DLM2034 4ch, 350MHz
710125		Digital Oscilloscope DLM2052 2ch, 500MHz
710130[*1]		Mixed Signal Oscilloscope DLM2054 4ch, 500MHz
Power cord	-D	UL/CSA standard
	-F	VDE standard
	-Q	BS standard
	-R	AS standard
	-H	GB standard
	-N	NBR standard
Language	-HE	English Menu and Panel
	-HC	Chinese Menu and Panel
	-HK	Korean Menu and Panel
	-HG	German Menu and Panel
	-HF	French Menu and Panel
	-HL	Italian Menu and Panel
	-HS	Spanish Menu and Panel
Option	/LN	No switchable logic input (4 ch model only)
	/B5	Built-in printer (112 mm)
	/M1[*2] (standard)	Memory expansion option (4 ch model only) During continuous measurement: 6.25 Mpoints; Single mode: 25 Mpoints (when interleave mode ON: 62.5 Mpoints)
	/M2[*2]	Memory expansion option (4 ch model only) During continuous measurement: 12.5 Mpoints; Single mode: 62.5 Mpoints (when interleave mode ON: 125 Mpoints)
	/M3[*2]	Memory expansion option (4 ch model only) During continuous measurement: 25 Mpoints; Single mode: 125 Mpoints (when interleave mode ON: 250 Mpoints)
	/M1S (standard)	Memory expansion option (2 ch model only) During continuous measurement: 6.25 Mpoints; Single mode: 25 Mpoints (when interleave mode ON: 62.5 Mpoints)
	/P2[*3]	Probe power for 2 ch models
	/P4[*3]	Probe power for 4 ch models
	/C1[*4]	GP-IB Interface
	/C10[*4]	Ethernet Interface
	/C11[*4]	GP-IB + Ethernet Interface
	/C9	Internal storage (7.2 GB)
	/G2[*5]	User defined math (4 ch model only)
	/G3[*5]	Power supply analysis function (4 ch model only)
	/G4[*5]	Power supply analysis function (includes /G2) (4 ch model only)
	/F1[*6]	UART trigger and analysis (4 ch model only)
	/F2[*6]	I2C + SPI trigger and analysis (4 ch model only)
	/F3[*6]	UART + I2C + SPI trigger and analysis (4 ch model only)
	/F4[*7]	CAN + LIN trigger and analysis + CXPI analysis[*13] (4 ch model only)
	/F5[*7]	FlexRay trigger and analysis (4 ch model only)
	/F6[*7]	CAN + LIN + FlexRay trigger and analysis + CXPI analysis[*13] (4 ch model only)
	/F7[*7]	CAN + CAN FD + LIN trigger and analysis + CXPI analysis[*13] (4 ch model only)
	/F8[*7]	CAN + CAN FD + LIN + FlexRay trigger and analysis + CXPI analysis[*13] (4 ch model only)
	/F9[*8]	SENT analysis (4 ch model only)
	/F10[*8]	PSI5 analysis (4 ch model only)
	/F11[*8]	SENT+PSI5 analysis (4 ch model only)
	/EX22[*9]	Attach two 701946 probes (For 2ch, 200 MHz models)
	/EX24[*9]	Attach four 701946 probes (For 4ch, 200 MHz models)
	/EX52[*10]	Attach two 701946 probes (For 2ch, 350/500 MHz models)
	/EX54[*10]	Attach four 701946 probes (For 4ch, 350/500 MHz models)

Standard Main Unit Accessories
Power cord (1 set), Passive probe[*11], Protective front cover (1 set), Soft carrying case for probes (1 set), Printer roll paper (for /B5 option) 1 roll, User's manuals[*12]

*1: Logic probes sold separately. Please order the model 701988/701989 accessory logic probes separately.
*2: One of these must be selected.
*3: Specify this option when using current probes or other differential probes that don't support probe interface.
*4 to *8: Only one from the each note can be selected at a time.
*9: The 701938 probes are not included when this option is selected.
*10: The 701939 probes are not included when this option is selected.
*11: 701938 (for 710105 and 710110) or 701939 (for 710115, 710120, 710125 and 710130), per number of channels. When either /EX22 or/EX24 option is selected, no 701938 is included. When either /EX52 or /EX54 option is selected, no 701939 is included.
*12: Operation guide as the printed material, and User's manual as CD-ROM are included.
*13: If the trigger function is required, please contact our sales representative.

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Additional Option License for DLM2000[*1]

Model	Suffix code	Description
709810	-G2	User defined math (4 ch model only)
	-G3	Power supply analysis function (4 ch model only)
	-G4	Power supply analysis function (includes G2) (4 ch model only)
	-F1	UART trigger and analysis (4 ch model only)
	-F2	I2C + SPI trigger and analysis (4 ch model only)
	-F3	UART + I2C + SPI trigger and analysis (4 ch model only)
	-F4	CAN + LIN trigger and analysis + CXPI analysis[*2] (4 ch model only)
	-F5	FlexRay trigger and analysis (4 ch model only)
	-F6	CAN + LIN + FlexRay trigger and analysis + CXPI analysis[*2] (4 ch model only)
	-F7	CAN + CAN FD + LIN trigger and analysis + CXPI analysis[*2] (4 ch model only)
	-F8	CAN + CAN FD + LIN + FlexRay trigger and analysis + CXPI analysis[*2] (4 ch model only)
	-F9	SENT analysis (4 ch model only)
	-10	PSI5 analysis (4 ch model only)
	-11	SENT+PSI5 analysis (4 ch model only)
	-X1	F4 -> F7/F6 -> F8 (add CAN FD)

*1: Separately sold license product (customer-installable).
*2: If the trigger function is required, please contact our sales representative.

Accessory Models

Name	Model	Specification
Logic probe (PBL100)	701988	1 MΩ input resistance, toggle frequency of 100 MHz
Logic probe (PBL250)	701989	100 kΩ input resistance, toggle frequency of 250 MHz
Passive probe[*1]	701938	10 MΩ (10:1), 200 MHz, 1.5 m
Passive probe[*1]	701939	10 MΩ (10:1), 500 MHz, 1.3 m
Miniature passive probe	701946	10 MΩ (10:1), 500 MHz, 1.3 m
Passive probe (wide temperature range)	702906	10 MΩ (10:1), 200 MHz, 2.5 m −40°C to +85°C
FET probe[*1]	700939	DC to 900 MHz bandwidth, 2.5 MΩ/1.8 pF
100:1 voltage probe	701944	DC to 400 MHz bandwidth, 1.2 m, 1000 Vrms
100:1 voltage probe	701945	DC to 250 MHz bandwidth, 3 m, 1000 Vrms
Differential probe	701920	DC to 500 MHz bandwidth, max. ±12 V
Differential probe	701921	DC to 100 MHz bandwidth, max. ±700 V
Differential probe	701922	DC to 200 MHz bandwidth, max. ±20 V
Differential probe (PBDH1000)	701924	DC to 1 GHz bandwidth, 1MΩ, max. ±25 V
Differential probe	701926	DC to 50 MHz bandwidth, 5000 Vrms/7000 Vpeak
Differential probe (PBDH0150)	701927	DC to 150 MHz bandwidth, max. ±1400 V
Differential probe	700924	DC to 100 MHz bandwidth, max. ±1400 V
Differential probe	700925	DC to 15 MHz bandwidth, max. ±500 V
Current probe[*2]	701917	DC to 50 MHz bandwidth, 5 Arms, High-sensitivity
Current probe[*2]	701918	DC to 120 MHz bandwidth, 5 Arms, High-sensitivity
Current probe (PBC050)[*2]	701929	DC to 50 MHz bandwidth, 30 Arms
Current probe (PBC100)[*2]	701928	DC to 100 MHz bandwidth, 30 Arms
Current probe[*2]	701930	DC to 10 MHz bandwidth, 150 Arms
Current probe[*2]	701931	DC to 2 MHz bandwidth, 500 Arms
Deskew correction signal source	701936	For deskew correction
Printer roll paper	B9988AE	Lot size is 10 rolls, 10 meters each
Probe stand	701919	Round base, 1 arm
Soft carrying case	701964	With 3 pockets for storage

*1: Please refer to the Probes and Accessories brochure for probe adapters.
*2: Current probes' maximum input current may be limited by the number of probes used at a time.

Accessory Software

Name	Model	Specification
MATLAB tool kit	701991	MATLAB plug-in
Xviewer	701992-SP01	Standard version
	701992-GP01	With MATH functions

Yokogawa's Approach to Preserving the Global Environment

• Yokogawa's electrical products are developed and produced in facilities that have received ISO14001 approval.

• In order to protect the global environment, Yokogawa's electrical products are designed in accordance with Yokogawa's Environmentally Friendy Product Design Guidelines and Product Design Assessment Criteria.

This is a Class A instrument based on Emission standards EN61326-1 and EN55011, and is designed for an industrial environment.
Operation of this equipment in a residential area may cause radio interference, in which case users will be responsible for any interference which they cause.

NOTE

⚠ Before operating the product, read the user's manual thoroughly for proper and safe operation.