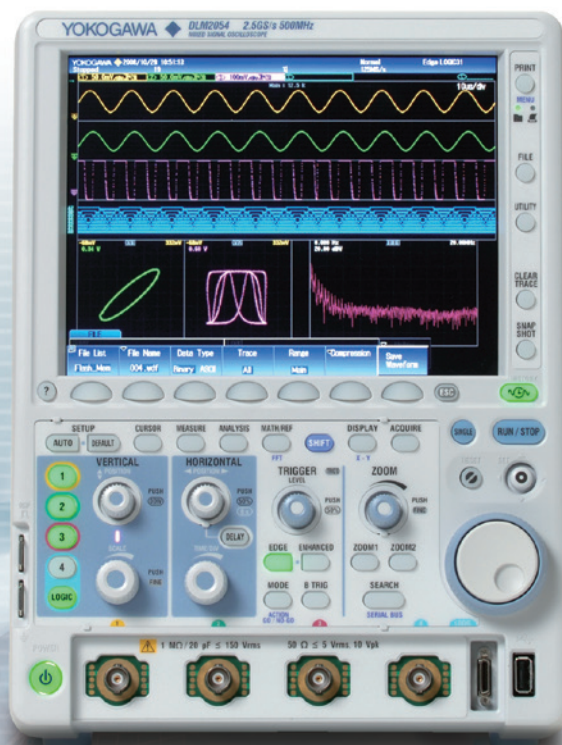


YOKOGAWA 

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

For more information, go to

tmi.yokogawa.com

Test & Measurement Instruments

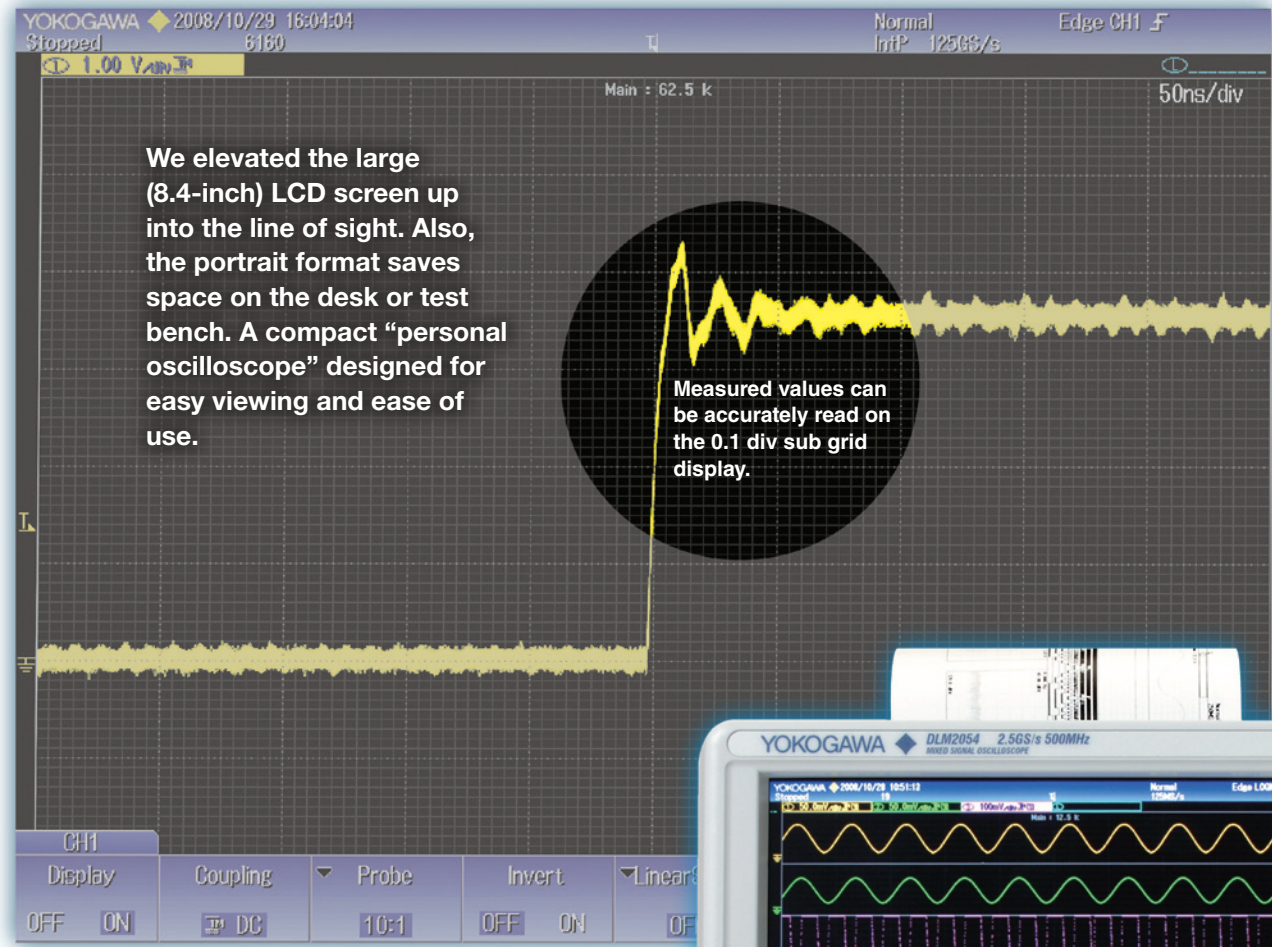


 3-Year Warranty 

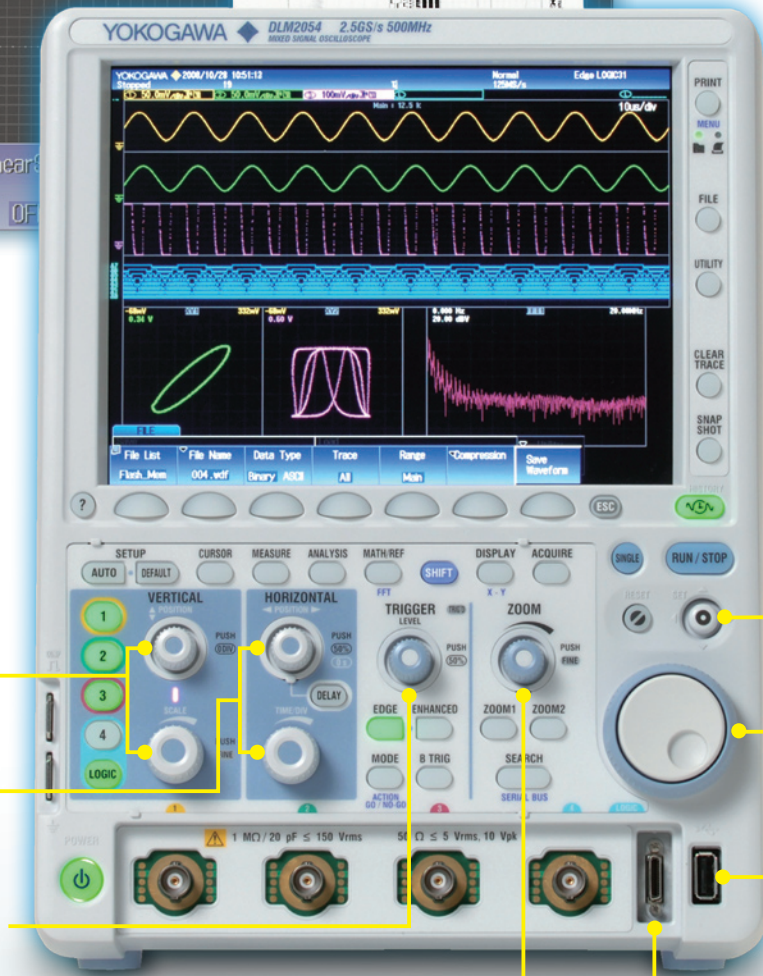
Bulletin 7101-00E

Usability

Compact & intuitive operation



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.



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 81/2 x 11 sheet of paper (depth of approximately 8)

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

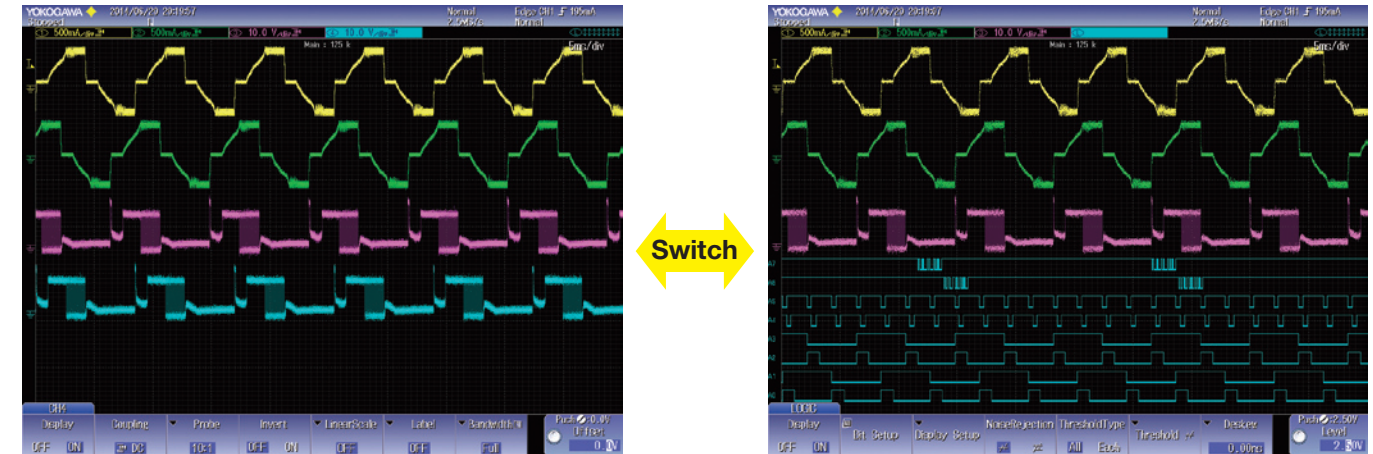
Logic input connector

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).



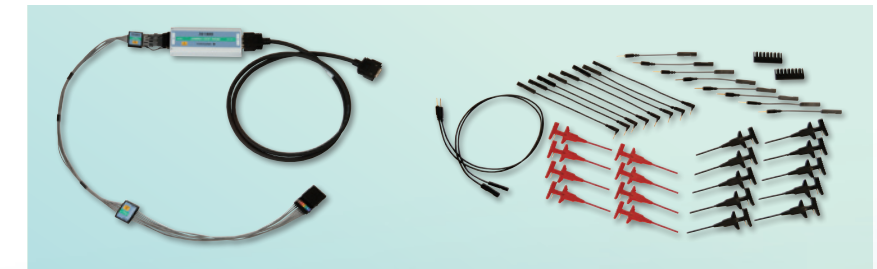
4 ch analog

3 ch analog + 8-bit logic

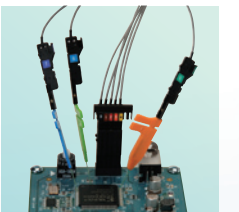
The performance of up to 11 inputs by converting to logic

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 and SPI 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

Large capacity memory up to 250 Mpoints

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

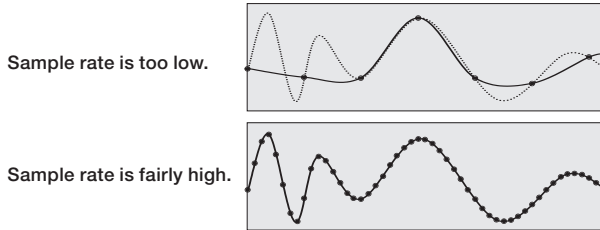
<Basic Formula> Measuring time = Memory length/Sample rate

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.



Waveform in 250 Mpoints can be magnified up to x 200000.



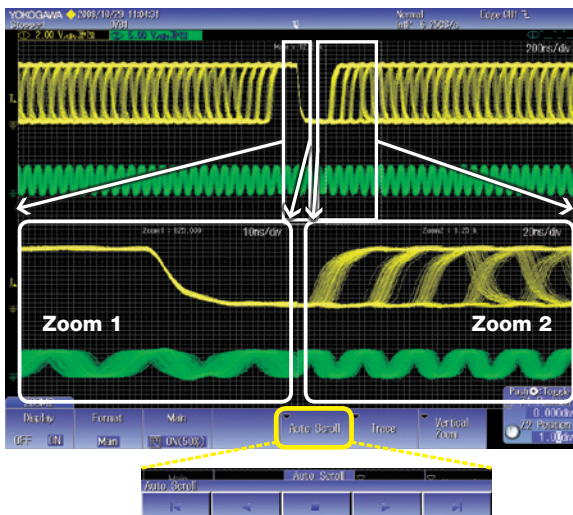
Detailed waveform measured for 20 seconds are shown in 20 milliseconds and 100 microseconds span.

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.



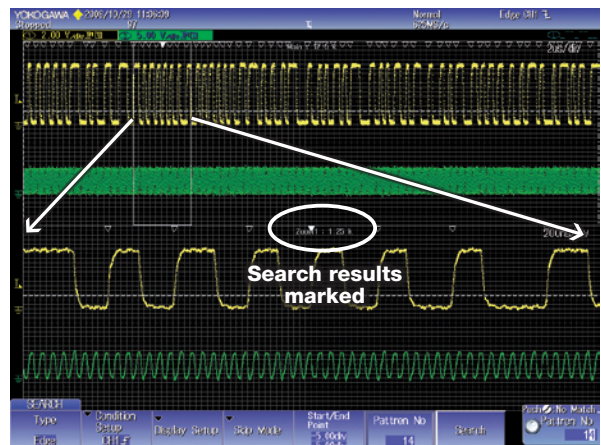
Auto Scroll menu

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)

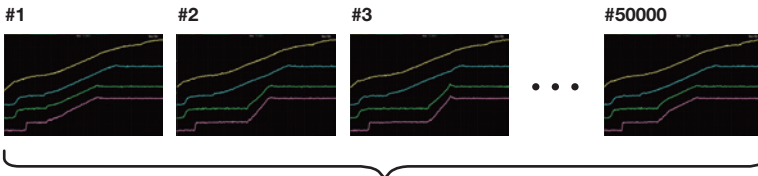


Waveform search using edge criterion

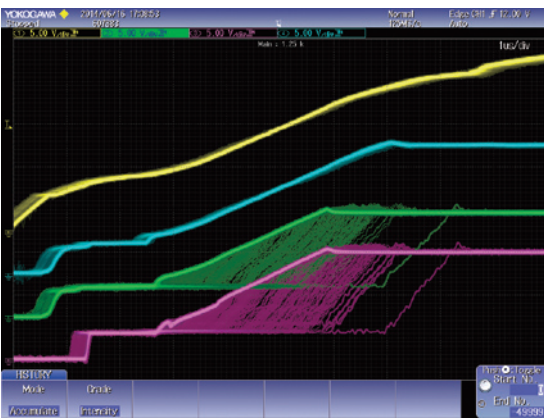
Automatically save previously captured waveforms

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

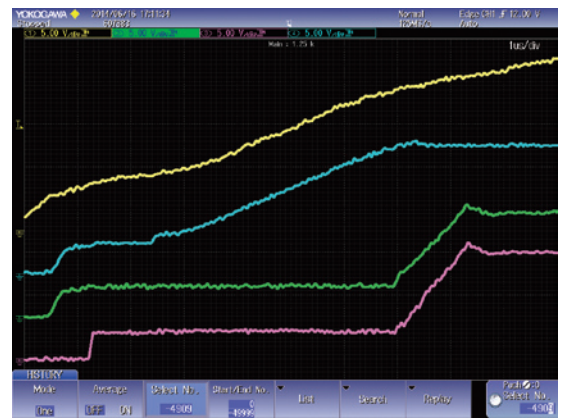
With the DLM2000 series, up to 50000 previously captured waveforms can be saved in the acquisition memory. With the History function, you can display just one or all of the previously captured waveforms (history waveforms) on screen. You can also perform cursor measurement, computation, and other operations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



Can reproduce channels and their relationship which is difficult to view in accumulate display mode.



Accumulate display mode

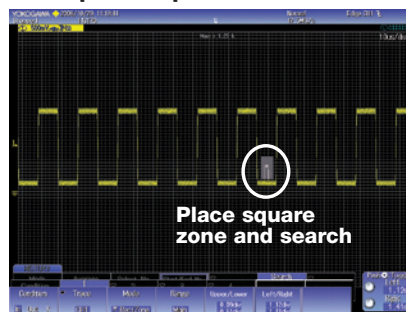


Single acquisition display mode

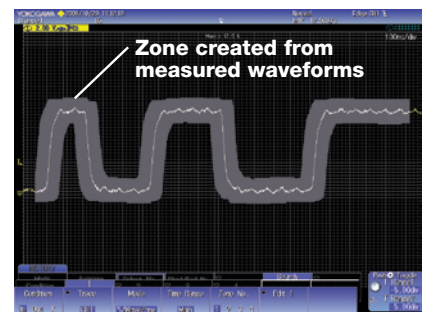
History search function

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

Example of specified waveform search



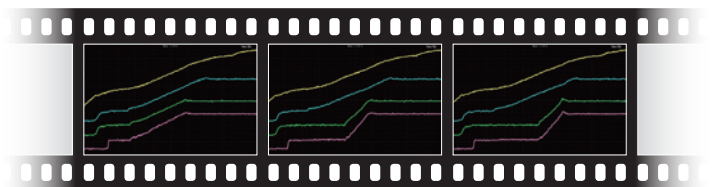
Searching for waveforms that pass through or do not pass through a rectangular zone placed on screen.



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

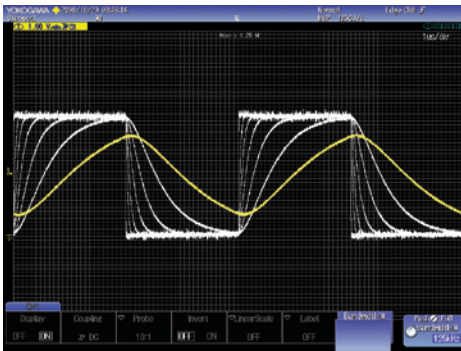
Real time filter with optimum noise reduction supports a wide range of frequencies (from 8 kHz to 200 MHz)

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

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



Processing with built-in filters

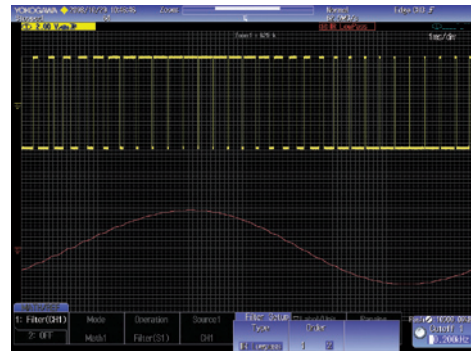
Computed digital filters

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

Input signal

Computed waveform



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.

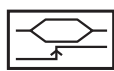
Edge trigger — Edge

Enhanced triggers

Edge OR



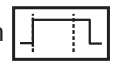
Edge (qualified)



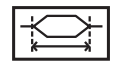
State



Pulse width



State width



Serial (optional)

FlexRay/CAN/CAN FD/LIN/
SENT/UART/I²C/SPI
(standard) user-defined

TV

NTSC/PAL/SDTV/
HDTV/user defined

B triggers

A Delay B

A to B(n)

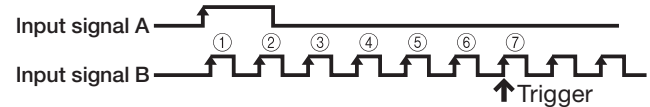
Dual bus

(combination trigger of 2 serial busses)

— Trigger function example —

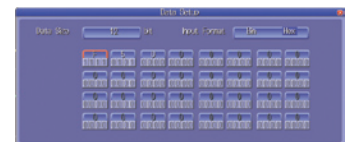
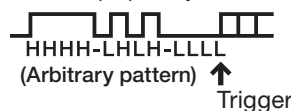
•A to B(n) trigger

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.



•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.



Pattern configuration screen

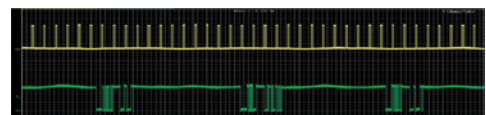
•Dual bus trigger

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



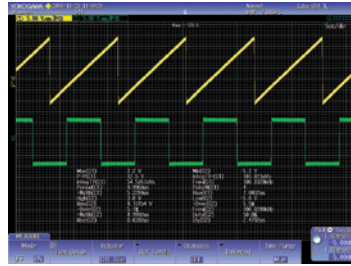
Utility

Range of functions that help operation efficiency

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

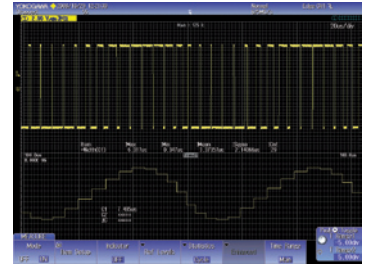
— Measure function and statistics —

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.

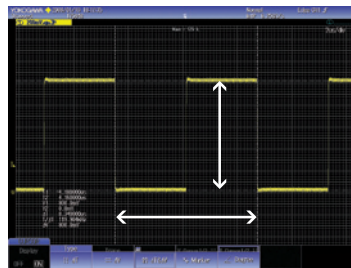


Trend display of waveform parameters
Histogram display using the time axis

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 , $\Delta T \& \Delta V$, Marker, Degree Cursor.

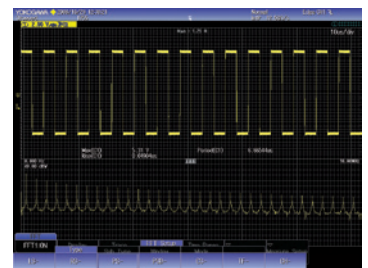


Simultaneous level and time difference measurement with the $\Delta T \& \Delta V$ cursor

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

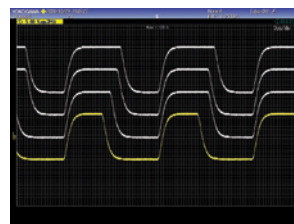
Keeps waveforms with one push

— 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)

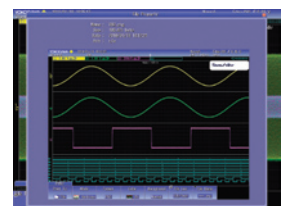
Displays stored files in thumbnail format

— 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



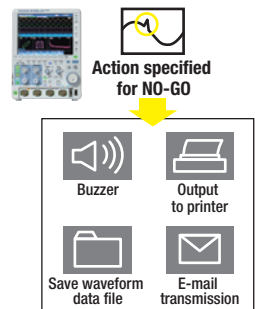
Thumbnail can be viewed full-size

Has a GO/NO-GO function

— Action on trigger —

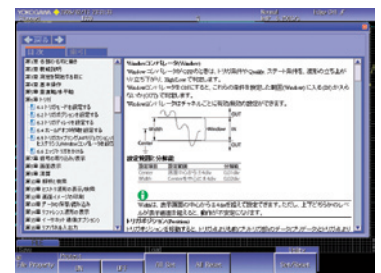
GO/NO-GO can be determined using trigger conditions, zone waveforms, measurement parameters, and other criteria. For NO-GO, actions can be carried out at the same time such as sounding a buzzer, saving the current waveform, or sending notification to a designated e-mail address. Waveforms in which an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

Abnormal waveform detected



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 /F9)

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

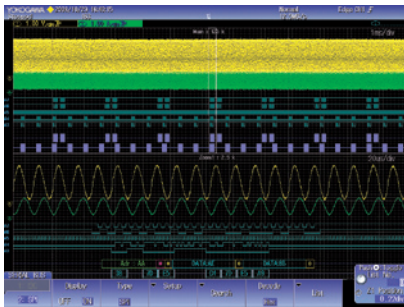
Triggers for embedded systems and in-vehicle bus signals are supported along with decode display analysis (serial bus analysis option only on 4 ch models). Logic input can also be used for serial buses (excluding FlexRay, CAN, CAN FD and LIN).

Inputs supported for serial bus analysis

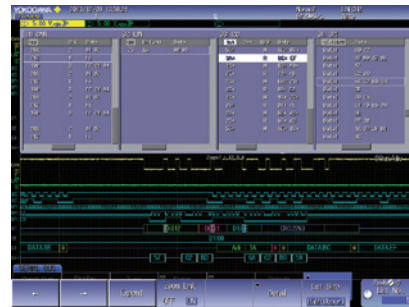
| | I ² C | SPI | UART | LIN | CAN | CAN FD | FlexRay | SENT |
|--------------|------------------|-----|------|-----|-----|--------|---------|------|
| Analog input | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Logic input | Yes | Yes | Yes | NA | NA | NA | NA | Yes |

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.



Simultaneous analyses of I²C and SPI



Four bus decode and list display

Related Accessories

PBDH1000 differential probe (701924)
1.0 GHz bandwidth
1 MΩ, approximately 1.1 pF
Maximum differential input voltage range: ±25 V



Differential probe (701920)
DC to 500 MHz bandwidth
100 kΩ, approximately 2.5 pF
Maximum differential input voltage range: ±12 V



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 calculated.



Related Accessories



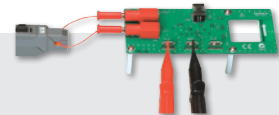
Differential probe (701926)
DC to 50 MHz
5000 Vrms/7000 Vpeak



PBDH0150 Differential probe (701927)
DC to 150 MHz
1000 Vrms/ ±1400 Vpeak

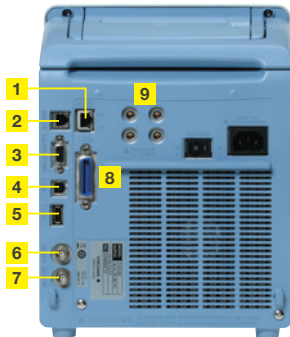


PBC100/PBC050 Current probe (701928/701929)
DC to 100 MHz (701928)
DC to 50 MHz (701929)
30 Arms

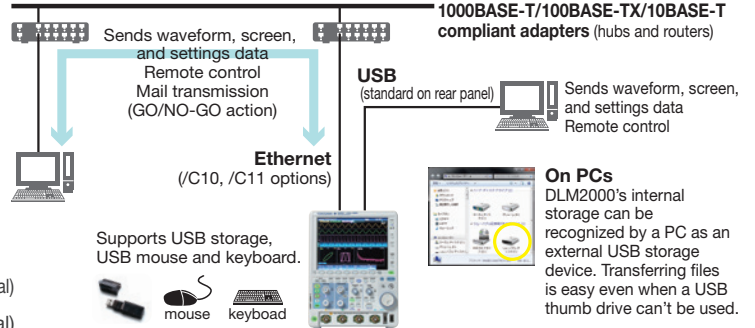


Deskew correction signal source (701936)

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)



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 monitoring on a PC

XWirepuller
Remote monitor and operation
Transferring image files

- Waveform observation and analysis
- Cursor, Parametric 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

Data transfer to a PC

Command control
Custom software development

Control library "TMCTL" For Visual Studio

MATLAB Tool Kit

DL-Term Interactive tool

LabVIEW instrument driver

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) |
| DLM2032 (710115) | 350 MHz | | |
| DLM2052 (710125) | 500 MHz | 4 analog channels or 3 analog channels + 8 bit logic | 2.5 GS/s (interleave mode on) |
| DLM2024 (710110) | 200 MHz | | |
| DLM2034 (710120) | 350 MHz | | |
| DLM2054 (710130) | 500 MHz | | |

| Analog Signal input | | | |
|--|---|---|--------|
| Input channels | DLM20x2: CH1, CH2 | | |
| Analog input | 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 | |
| Maximum record length (Points) | Repetitive sampling mode | | 125 GS/s | |
| | | | | |
| Ch-to-Ch deskew | | 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 |
| Time axis setting range | /M2 | 12.5 M | 62.5 M | 125 M |
| | /M3 | 25 M | 125 M | 250 M |
| | | | | |
| 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 M Ω /approx. 10 pF 701989: Approx. 100 k Ω /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 | I ² C (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 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 10 ⁹ (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 $\pm(0.2$ 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 x 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 $\times 2$ to 2.5 points/10 div (in zoom area) |
| | Scroll Auto Scroll |
| | Search functions Edge, Edge Qualified, State, Pulse Width, State Width, I ² C (optional), SPI (optional), UART (optional), CAN (optional), CAN FD (optional), LIN (optional), FlexRay (optional), SENT (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) | + , - , \times , 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: + , - , \times , /, 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 Deskewing 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 (I^2t) 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, Urms, Uac, U+pk, U-pk, Up-p, Irms, Imn, Idc, Irms, 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) |
| I ² C Bus Signal Analysis Functions (/F2 and /F3 Options) ⁶ | |
| Applicable bus | I ² C 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 |
| I ² C Trigger modes | Every Start, Address & Data, Non-Ack, General Call, Start Byte, HS Mode |
| Analysis results displays | Analysis no., time from trigger position (Time (ms)), 1st byte address, 2nd byte address, R/W, Data, Presence/absence of ACK, information |
| Auto setup function | Auto setting of threshold value, time axis scale, voltage axis scale, and display of analysis results |
| Analyzable no. of data | 300000 bytes max. |
| Search function | Searches data that matches specified address pattern, data pattern, and acknowledge bit condition |
| Analysis results save function | Analysis list data can be saved to CSV-format files |
| 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 |
| Auto setup function | Auto setting of threshold value, time axis scale, voltage axis scale, and display of analysis results |
| Analyzable no. of data | 300000 bytes max. |
| Decode bit length | Specify data interval (1 to 32 bits), decode start point, and data length |
| Analysis results displays | Analysis no., time from trigger position (Time (ms)), Data 1, Data 2 |
| Auxiliary analysis functions | Data search function |
| Analysis result save function | Analysis list data can be saved to CSV-format files |
| UART Bus Signal Analysis Functions (/F1 and /F3 Options) ⁶ | |
| Bit rate | 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, user defined (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) |
| Auto setup function | Auto setting of bit rate, threshold value, time axis scale, voltage axis scale, and display of analysis results |
| Analyzable no. of frames | 300000 frames max. |
| Analysis results displays | Analysis no., time from trigger position (Time(ms)), Data (Bin, Hex) display, ASCII display, and Information. |
| Auxiliary analysis functions | Data search |
| Analysis result save function | Analysis list data can be saved to CSV-format files |

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 defined (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) |
| 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 | 100000 frames max. |
| Analysis results displays | Analysis no., time from trigger position (Time (ms)), Frame type, ID, DLC, Data, CRC, presence/absence of Ack, information |
| Auxiliary analysis functions | Data search and field jump functions |
| Analysis result save function | Analysis list data can be saved to CSV-format files |

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. |
| Analysis results displays | Analysis no., time from trigger position (Time (ms)), Frame type, ID, DLC, Data, CRC, presence/absence of Ack, information |
| Auxiliary analysis functions | Data search and field jump functions |
| Analysis result save function | Analysis list data can be saved to CSV-format files |

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 defined (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 |
| Auto setup function | Auto setting of bit rate, threshold value, time axis scale, voltage axis scale, and display of analysis results |
| Analyzable no. of frames | 100000 frames max. |
| Analysis results displays | Analysis no., time from trigger position (Time (ms)), ID, ID-Field, Data, CheckSum, information |
| Auxiliary analysis functions | Data search and field jump functions |
| Analysis result save function | Analysis list data can be saved to CSV-format files |

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 |
| Auto setup function | Auto setting of bit rate, threshold value, time axis scale, voltage axis scale, and display of analysis results |
| Analyzable no. of frames | 5000 frames max. |
| Analysis results displays | Analysis no., time from trigger position (Time(ms)), Segment (Static or Dynamic), Indicator, FrameID, Payload length, Cycle count, Data, Information |
| Auxiliary analysis function | Data search |
| Analysis result save function | Analysis list data can be saved to CSV-format files |

SENT Signal Analysis Functions (/F9 Option)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 |
| Auto setup function | Auto setting of clock period, nibble number, pause pulse, threshold value, time axis scale, voltage axis scale, and display of analysis results |
| Analyzable no. of frames | 100000 frames max. |
| Analysis results displays | 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 | Data search and trend functions |
| Analysis result save function | Analysis list data and trend data can be saved to CSV-format files |

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 (Standard 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 x 2 (front panel x 1, rear panel x 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 x 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 x 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) x 293 (H) x 193 (D) mm (when printer cover is closed, excluding protrusions) |
| Weight | Approx. 4.2 kg, With no options |
| Operating temperature range | 5°C to 40°C |

^{*1} Measured under standard operating conditions after a 30-minute warm-up followed by calibration.

Standard operating conditions: Ambient temperature: 23°C ±5°C

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.

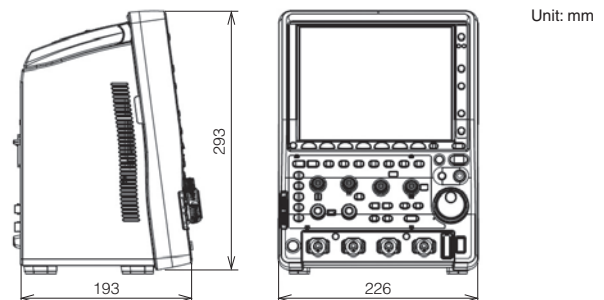
^{*3} When the input section is shorted, the acquisition mode is set to Normal, accumulation is OFF, and the probe attenuation is set to 1:1.

^{*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.

External Dimensions



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 |
| | /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 | I ² C + SPI trigger and analysis (4 ch model only) |
| | /F3 ⁶ | UART + I ² C + SPI trigger and analysis (4 ch model only) |
| | /F4 ⁷ | CAN + LIN trigger and analysis (4 ch model only) |
| | /F5 ⁷ | FlexRay trigger and analysis (4 ch model only) |
| | /F6 ⁷ | FlexRay+CAN+LIN trigger and analysis (4 ch model only) |
| | /F7 ⁷ | CAN+CAN FD+LIN trigger and analysis (4 ch model only) |
| | /F8 ⁷ | FlexRay+CAN+CAN FD+LIN trigger and analysis (4 ch model only) |
| /F9 | SENT analysis (4 ch model only) | |
| /EX22 ⁸ | Attach two 701946 probes (For 2ch, 200 MHz models) | |
| /EX24 ⁸ | Attach four 701946 probes (For 4ch, 200 MHz models) | |
| /EX52 ⁹ | Attach two 701946 probes (For 2ch, 350/500 MHz models) | |
| /EX54 ⁹ | Attach four 701946 probes (For 4ch, 350/500 MHz models) | |

- *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 7: Only one from the each note can be selected at a time.
 *8: The 701938 probes are not included when this option is selected.
 *9: The 701939 probes are not included when this option is selected.

Standard Main Unit Accessories

| Part Name | Quantity |
|--|------------------------|
| Power cord | 1 |
| Passive probe, model 701938 (200 MHz, 1.5 m) For models 710105, 710110 ¹ | Per number of channels |
| Passive probe, model 701939 (500 MHz, 1.3 m) For models 710115, 710120, 710125, 710130 ² | Per number of channels |
| Protective front cover | 1 |
| Soft carrying case for probes | 1 |
| Printer roll paper (for /B5 option) | 1 roll |
| User's manuals ³ | 1 set |

- *1: The 701938 probes are not included when /EX22 or /EX24 is selected.
 *2: The 701939 probes are not included when /EX52 or /EX54 is selected.
 *3: Operation guide as the printed material, and User's manual as CD-ROM are included.

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Additional Option License for DLM2000¹

| 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 | I ² C + SPI trigger and analysis (4 ch model only) |
| | -F3 | UART + I ² C + SPI trigger and analysis (4 ch model only) |
| | -F4 | CAN + LIN trigger and analysis (4 ch model only) |
| | -F5 | FlexRay trigger and analysis (4 ch model only) |
| | -F6 | FlexRay + CAN + LIN trigger and analysis (4 ch model only) |
| | -F7 | CAN+CAN FD+LIN trigger and analysis (4 ch model only) |
| -F8 | FlexRay+CAN+CAN FD+LIN trigger and analysis (4 ch model only) | |
| -F9 | SENT analysis (4 ch model only) | |
| -X1 | F4 -> F7/F6 -> F8 (add CAN FD) | |

¹: Separately sold license product (customer-installable).

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 |
| FET probe | 700939 | DC to 900 MHz bandwidth, 2.5 MΩ/1.8 pF |
| Active probe (PBA1000) | 701912 | DC to 1 GHz bandwidth, 100 kΩ/0.9 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 | 701917 | DC to 50 MHz bandwidth, 5 Arms, High-sensitivity |
| Current probe | 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: As the accessories for 701938, 701939 probe, various adapters are available. Please refer to DL series Accessories brochure.
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 Friendly 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.