# DIGITAL OSCILLOSCOPES

YOKOGAWA

## 701530 & 701540
## Digital Oscilloscopes
## DL 1540C & DL 1540CL

**DL 1540C (701530)**
216 × 268 × 278mm 4.9kg
(8.50 × 10.55 × 10.94" 10.8lbs)

**DL 1540CL (701540)**
216 × 268 × 278mm 5.2kg
(8.50 × 10.55 × 10.94" 11.5lbs)

RS-232-C
Centronics

SCSI
GP-IB

CE

3-Year Warranty

★
Safety Standards; EN61010-1
Emission Standard; EN61362 Class A
Immunity Standard; EN61362

The DL1540C/DL1540CL is a new portable digital oscilloscope that has a color TFT LCD and packs many advanced features into a small case. In addition to impressive basic specifications, we have maintained the multi-channel and long memory features common to all YOKOGAWA oscilloscopes. The color display makes it easier to read oscilloscope data, and the unit is about 1 kg lighter than conventional digital oscilloscopes. These improvements make it easier to efficiently measure increasingly complex and diverse signals, helping to improve the efficiency of the development process.

## FEATURES

- **6.4-inch Color TFT LCD with Wide Viewing Angle**
  The display clearly identifies waveforms displayed on multiple channels.
- **Small and Lightweight (approx. 5 kg)**
  The unit weighs about 1 kg less than conventional models.
- **200 MS/s Maximum Sampling Rate, 150 MHz Analog Bandwidth**
- **Maximum Record Length: 2 M Words for DL1540CL, 120 k Words for DL1540C**
- **Maximum Screen Refresh Rate: 60 Hz**
- **Color Printing Feature**
  The oscilloscope can be connected to an external color printer through a commercially available GP-IB/Centronics conversion adapter for direct color printing.
- **VGA Output (option)**
- **2.1GB Internal Hard Disk Drive (option for DL1540CL only)**
- **Built-in Printer (option)**
  The built-in printer can be used to print out screen shots and enlarged waveforms (long copies), and for real-time printing.
- **Pulse Counting Function**
  This function automatically counts the number of pulse waveforms in a specified interval.
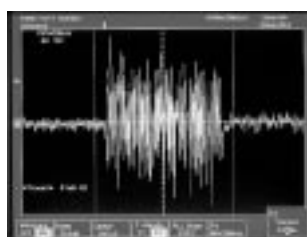
- **The DL1540CL, is Available with a New I$^2$C*[1] Bus Analysis Option. This Turns the DL1540CL into an I$^2$C Bus Analyzer.**
  *1: Serial interfaces between ICs are widely used in consumer electronics. Applications include computers, personal digital assistants (PDAs), and multimedia devices such as DVD players and car navigation systems.

Example application : I$^2$C bus of VTR

SDA
SCL

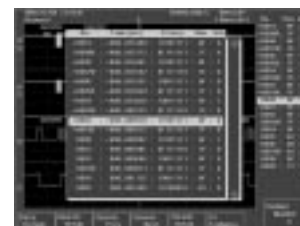| CPU | EEPROM | Tuner | Tape speed control | Image quality adjustment |
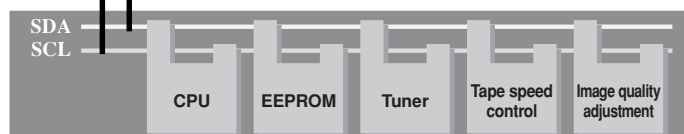
- **A Variety of Trigger Functions**
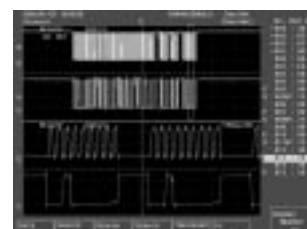  Trigger types are start condition, Non-Ack, conbination of address and data pattern

- **Powerful Data Analysis Functions**
  Waveform data are analyzed in a time series, and analyzed results are decoded and displayed one byte at a time.

- **Repidly Data Search Functions**
  This functions rapidly seach for specified addresses and data in the analyzed result.

# DIGITAL OSCILLOSCOPES

## DL1540C & DL1540CL

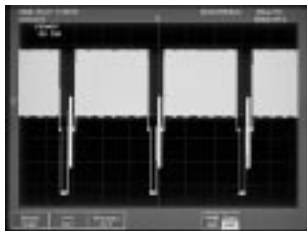## FUNCTIONS

### ■ WAVEFORM CAPTURING FUNCTIONS

### ● Long Memory

• For high-fidelity signal capturing or extended waveform capturing

The DL1540C/DL1540CL can capture targeted waveforms in long memory. The maximum capacity is 120 k words for the DL1540C and 2 M words for the DL1540CL.

All measurements taken by the DL1540C/DL1540CL are divided into fixed intervals. Only the maximum and minimum values in each interval are displayed on the screen (peak-to-peak (P-P) compression). Compression makes it possible to display more waveform data on a single screen.

At a given sampling rate, a longer measurement memory makes it possible to capture signals at a finer time resolution so as to display higher fidelity waveforms. During repeat measurements, a portion of memory can be used for signal capturing. The maximum amount is 10 k words with the DL1540C and 100 k words with the DL1540CL. This feature is useful for purposes such as capturing the signals on a single track in a single step during the process of developing and evaluating optical recording media.

### ● Zoom Function

• Simultaneously displays entire waveform and waveform enlargement

The DL1540C/DL1540CL compresses all measurements captured in long memory and then displays the measurements on the screen. The zoom feature is not used to enlarge data on the Main screen (P-P compressed data). Instead, it allows you to select and zoom in on a particular portion of the entire amount of data stored in acquisition memory.

An entire waveform and an enlarged area are simultaneously displayed on the Main Zoom screen, so the enlarged area in the Main Zoom box is easy to identify. The optional built-in printer can be used to print just the enlarged portion of the waveform.
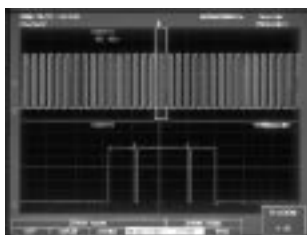
### ● History Memory Function

• Stores captured waveform screens and redisplays the desired waveform

When waveforms are displayed on an oscilloscope while troubleshooting an electric circuit, an abnormal waveform that appears momentarily will unfortunately disappear quickly from the screen and be replaced by the next waveform. The history memory function is designed to overcome this problem. It stores a maximum of 100 past waveform screens (extending back from the currently observed waveform), making it possible to redisplay an abnormal waveform that is no longer on the screen. It is also possible to stack all of the screens stored history memory on the LCD. The history memory function splits up long memory so that it can be used more effectively.

The sequential store function is also useful. This function displays waveforms meeting certain preset conditions after they are measured a specified number of times. By eliminating the need to display a waveform after every single measurement, the sequential store function reduces the dead time involved in signal capturing.

History Memory Time Stamp Display

### ● Color Accumulate

• Effective during jitter measurement and evaluation

The DL1540C/DL1540CL has a 6.4-inch color TFT LCD with a wide viewing angle to facilitate waveform identification. The color accumulate feature makes it possible to identify the rate of incidence of a given measurement based on the color assigned to it. As a result, it is easy to distinguish between normal and rare abnormal signals and to perform jitter evaluations.

The color accumulate feature makes it possible to display rates of incidence of various measurements in addition to voltage levels and time-axis data.

### ● Fast Screen Refresh Rate

• Screen refreshing is fast even with a large number of observed waveforms or during simultaneous waveform processing

Oscilloscopes with fast screen refresh rates normally experience a slowdown in the refresh rate when the number of observed waveforms is increased or during processes such as automated measurement of waveform parameters. The DL1540C/DL1540CL was designed first and foremost to minimize the waveform acquisition interval in order to ensure that the desired waveforms are reliably captured. The maximum screen refresh rate is 60 Hz, even when all channels are used. Signal processing may even be added without lowering the screen refresh rate during waveform observation.
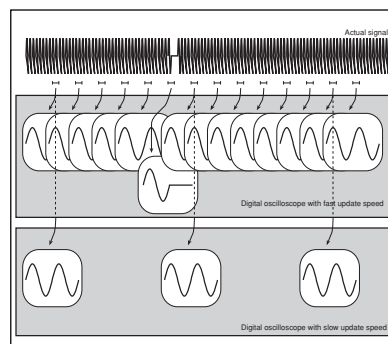
● **Envelope and Roll Modes**
  • Select the optimum display mode based on the measured signal speed

  The envelope mode always captures signals at a fast 100 MS/s sampling rate, regardless of the time-axis setting. This function is effective for purposes such as observing high-frequency noise on a measured signal, and observing surge signals that occur intermittently.
  The roll mode is used to display low-speed signals on the screen as

  if they were being recorded on recorder chart paper. In roll mode, a waveform flows from right to left on the screen. The oscilloscope always keeps two screens of data in memory, so a waveform can be redisplayed after it disappears from the left side of the screen.


Roll Mode Display

## ■ WAVEFORM ANALYSIS FUNCTIONS
● **Automated Measurement of Display Parameters**
  • Select from over 20 different parameters

  Waveform parameters such as maximum voltage, frequency, duty ratio, and RMS can be measured automatically. Parameter measurements are automatically calculated inside the oscilloscope to prevent human reading errors from affecting measurements. The ALL Scan EXEC function, which measures

  all points in the acquisition data captured in long memory, can be used for highly precise waveform parameter calculations. A total of 24 automatically measured parameters can be displayed on four channels.
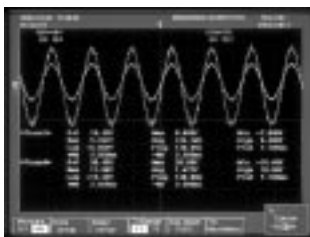


● **Pulse Counting Function**
  • Calculates and displays the number of pulses automatically

  This feature can be used to automatically calculate the number of pulses for waveforms in a range specified by the cursor. This function automatically counts pulse signals from stepping motors and other equipment, providing rotational angle data. It can also count track error signals from optical disks and

  other media in order to evaluate the amount of pickup movement. The pulse count function is also useful for counting interrupt signals during software debugging. The ALL Scan EXEC function can be used for accurate counting even on P-P compressed waveforms.
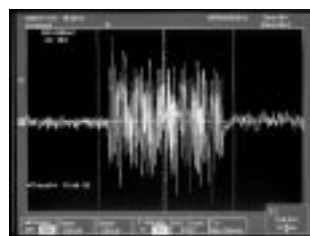

Measurement of Track Error Signal on an Optical Disk

● **Waveform Calculation Function**
  • For calculating power and other parameters

  The waveform calculation function can be used to perform calculations such as addition, subtraction, and multiplication

  between channels. The phase shift between channels can be applied to calculations with the phase shift feature. It is also possible to correct the phase shift between input signals in calculating parameters such as consumed power.
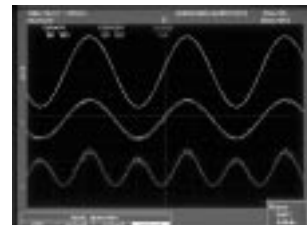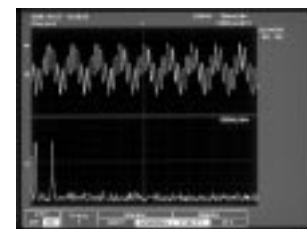

MATH Calculation Waveform Example

● **FFT Analysis**
  • For analysis of frequency components

  The FFT function is used in combination with the cursor to read signal parameters such as frequency components and signal level. A rectangular window (RECT) or a Hanning window (HANNING) can be selected as the time window. It is easy to measure the frequency or level at a given position using the cursor.


FFT Calculation Waveform Example

● **Linear Scaling Function**
  • Allows the user to convert voltage units into physical values

  This feature converts measured voltages to physical values, allowing sensor signal outputs to be read directly. When a set scaling coefficient A and an offset B are entered, the scaled value is calculated based on the following equation:

  $$Y \text{ (scaled value)} = A \cdot X \text{ (measurement)} + B$$

  Parameters can then measured automatically based on the scaling value. Scaled values can be set in the desired unit of measurement (e.g., mA, A, kg, Pa, rpm, m/s). This feature is useful for directly reading sensor signal outputs.



● **Cursor Measurement**
  • Measurement lines that move over the screen

  When vertical or horizontal cursors are set on the screen, a parameter difference (e.g., time difference or voltage difference) between the cursors can be read as a physical value. The degree cursor function can be used to display a phase offset from a reference position as a degree (deg) value. This

  function is useful with measurements that require measuring a phase difference, such as measurements involving an encoder, motor or engine. Cursors can be combined with the zoom function to obtain higher-resolution measurements.

● **GO/NO-GO Evaluation**
  • Waveform check and automatic identification of abnormal waveforms

  With this function, a zone or waveform parameter is specified for a measured waveform, and the measured signal is evaluated to automatically determine which action to perform. The following actions can be selected based on this evaluation:
  • Print data on the built-in printer
  • Save acquisition data or P-P compressed data (to a floppy disk or an internal HDD*)
  • Save screen image date (to a floppy disk or an internal HDD*)
  Evaluations can be performed on four channels simultaneously, and it is possible to set AND or OR conditions for an evaluation.
  *: An optional internal hard disk drive is available with the DL1540CL.
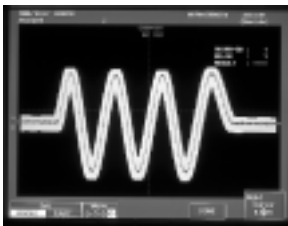


**Zone Evaluation Measurement Example**
A created area is used as a reference in evaluating an input signal.  Vertical and horizontal ranges are established around the reference waveform to create the evaluation area.  Area data on as many as four waveforms can be stored internally.  An evaluation can be made based on the input signal when it enters the evaluation area, or when it exits the evaluation area.



**Parameter Evaluation Setting Screen**
A range is set for the parameter selected for waveform parameter measurement. An evaluation can be made when an input signal enters or exits the range.

■ **WAVEFORM RECORDING**
                    * An optional built-in printer is required to print captured waveforms.

● **Hard Copies, Long Copies and Real-time Printing**
  • Printing screen waveforms

  The optional built-in printer can be used to print screenshots. The printer can output hard copies on 112 mm (width) thermal paper.  In addition to screenshot hard copies, settings and parameter measurements can be printed at the same time.
  The long copy function allows you to print an enlarged waveform spread over multiple pages (several tens of pages).  This feature can be used to zoom in on a desired area and print just that area.
  The built-in printer can also be used like a recorder to continuously print low-speed signals.  The chart speed can be varied based on the time-axis range setting. The maximum speed is 16.7 mm per second. When used in envelope mode, this function can be used to print even high-speed surge signals (microsecond- and nanosecond-order signals) that cannot be captured with a recorder.
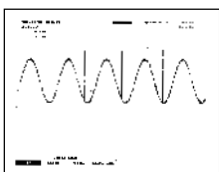


Hard Copy Printout Example
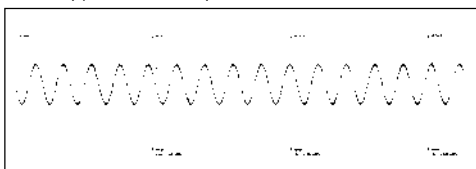


Real-time Printout Example

● **Saving and Loading Waveform Data and Settings**
  • Saving in binary and ASCII formats

  Displayed waveform data and settings can be saved and loaded through the methods shown below.
  • Saving and loading waveform data
    P-P compressed data can be saved and acquisition data can be saved to floppy disks or internal HDD* in both binary and ASCII formats.
    P-P compressed data can be loaded and acquisition data can be loaded from floppy disks or internal HDD* in binary format only.
    As many as four waveforms can be stored in or recalled from nonvola tile memory (P-P compressed data only).
  • Saving and loading settings
    Settings can be saved to and loaded from floppy disks or internal HDD*.
    As many as four settings can be stored in or recalled from nonvolatile memory.
    *: An optional internal hard disk drive is available with the DL1540CL.

● **Output to an External Color Printer**
  • To print color screens on A4 paper

  A commercially available GP-IB/Centronics conversion adapter can be connected to the standard GP-IB interface on the oscilloscope to print data on an external color printer.
  The following printer commands are supported: BJ (black and white and color), ESC-P (black and white and color), ESC-P2 (ESC-P raster: black and white and color), LIPS3 (black and white), PR201 (black and white), PCL5 (black and white and color)



● **Color Image Files**
  • To add color images to your reports

  With the DL1540C/DL1540CL, screenshots can be saved to the standard floppy disk as image files. Screenshot files can be saved in BMP, PostScript, TIFF and HP-GL formats.  It is easy to create a report containing waveform images by simply inserting screenshots when creating the report in a word processor. Screenshots can be enlarged or reduced as desired, eliminating the need for cutting and pasting.  Screenshot image files can also be sent as email attachments.
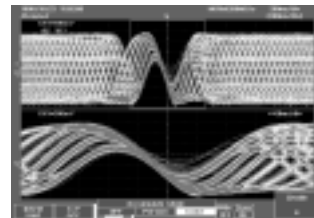


Color Image Example
(half-tone image)



It is easy to create reports containing waveform images in a word processor.



FD
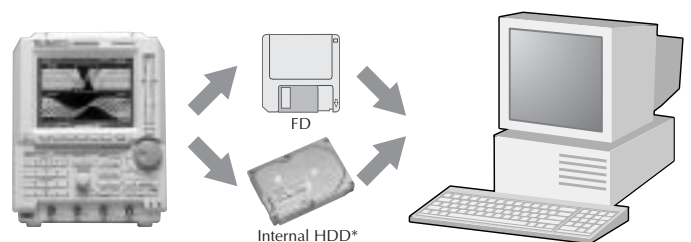
Internal HDD*

* An optional internal hard disk drive with the DL1540CL.

● **Snap Shot**
• The color display makes waveform comparison easier

The snap shot function makes it easy to compare waveforms on the screen.
It allows a displayed waveform to be saved on the screen through a single touch action. Saved waveforms can be compared with newly captured waveforms.
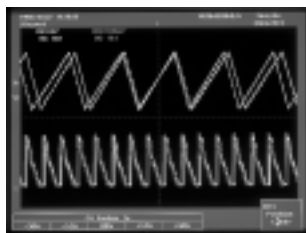Waveforms saved with the snap shot function are displayed in white on the screen, making it easy to distinguish them from a newly captured color waveform. Any number of snap shot waveforms can be stacked on the screen. To clear snap shot waveforms from the screen, simply press the Clear key.
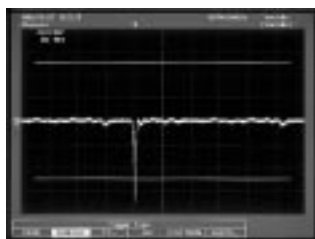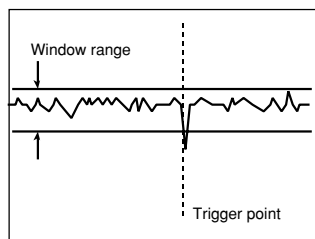
■ **A WEALTH OF TRIGGER FUNCTIONS**
● **The DL1540C/DL1540CL Supports a Wide Variety of Triggers.**
Edge trigger ................ This trigger is activated by ordinary edges.
Window trigger .......... This trigger is set as a given fixed voltage range (window). It is activated when the trigger source level either enters or exits the voltage range.

Window range

Trigger point

TV trigger ................... This trigger is used to capture video signals (NTSC, PAL, HDTV).
OR trigger (optional) .... This trigger is activated when any of the trigger conditions set on a given channel is established.
Pattern trigger (optional) ...... With this trigger, conditions are set on each channel. It is activated when a combination of trigger conditions among the channels is established.
Pulse width trigger (optional) ..... This trigger is activated based on a comparison of the input pulse width against a specified time span which determines whether the pulse width is short or long. It is also possible to set a time-out trigger, which is activated when a specified time span elapses without a change in a pulse state (high level or low level).

Trigger point
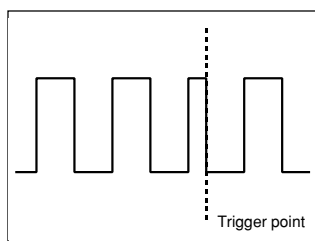
● **Action On Trigger**
• To reliably and automatically record (save) captured waveform data

Each time a trigger is activated and a waveform is captured and displayed on the screen, this feature automatically prints the waveform on the built-in printer or saves it as a file. The Action On trigger is useful for purposes such as data acquisition during automated continuous tests.
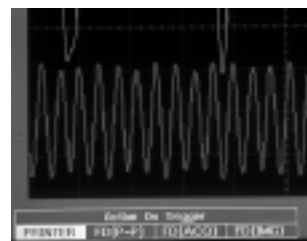
Action On Trigger Setting Screen

■ **Connecting the DL1540C/DL1540CL to Peripheral Units**
● **GP-IB Interface**
The GP-IB interface allows you to control DL1540C/DL1540CL settings through a PC and transfer data to a PC using communication software. An external printer can be directly connected to the oscilloscope via a commercially available GP-IB / Centronics conversion adapter.

● **VGA Output (Optional)**
The VGA output port can be connected to an external monitor to display waveforms on the monitor. A commercially available VGA/NTSC converter can be used for extended waveform recording in video format.

● **GO/NO-GO Evaluation Output (for DL1540CL only; when option /C8 is selected)**
Waveform evaluations made with the GO/NO-GO function are output as TTL level signals. If option /C8 is not selected, then option /V1 can be selected to add a VGA output connector.

GO/NO-GO
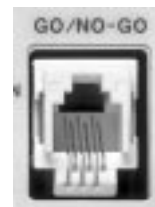
● **Trigger Output**
The trigger output port can be used to output a signal to an external device when a trigger is activated.

● **Trigger Input/External Clock Input**
This port is used to input an external input signal or a clock signal serving as a time reference.

● **SCSI interface (for DL1540CL only; when option /C8 is selected)**
The SCSI interface lets you connect external SCSI devices, such as magneto-optical drives or hard disk drives. If option /C8 is not selected, an option box connector is provided as a standard feature.

● **Option Box Connector**
The option box connector is used to control a 700926 isolator or SCSI interface unit through the oscilloscope. It can also be used as an output terminal for the GO/NO-GO evaluation.

# DIGITAL OSCILLOSCOPES

## DL1540C & DL1540CL

◆ YOKOGAWA

● **Connection with Isolator (700926) (Separately purchased)**
An insulated input unit can be combined with the DL1540C/ DL1540CL for isolated input measurement of floating signals or other signals at a maximum rate of 200 MS/s. The isolated input unit can also be controlled through the DL1540C/ DL1540CL. Isolated measurements can be performed at 100 MS/s.

● **Connection with RS-232-C Unit (700927) (Separately purchased)**
The RS-232-C unit allows you to control DL1540C/DL1540CL settings through a PC and transfer data to a PC using communication software. The unit also has a terminal for outputting a GO/NO-GO evaluation signal.

● **Connection with SCSI Interface Unit (700930) (Separately purchased)**
The SCSI interface unit allows you to save waveform data, settings, and screenshots to an external MO drive, hard disk, or ZIP drive.

## SPECIFICATIONS

### Vertical Unit

| | |
|---|---|
| Number of input channels: | 4 |
| Vertical resolution: | 8 bits (in normal mode) (25 LSB/div) |
| | 9 bits (in smoothing mode) |
| | 12 bits (after averaging with a 256 weighting) |
| Maximum sampling rate: | Normal 200 MS/s(using half of the available channels) |
| | 100 MS/s (using all channels) |
| | Equivalent time: 20 GS/s |
| Effective storage frequency (-3dB): | |
| | Repeated waveform DC to 150 MHz [*1] |
| | Single waveform     DC to 80 MHz [*2] |
| | (using half of the available channels) |
| | DC to 40 MHz [*2] |
| | (using all channels) |
| Sensitivity: | 1 mV/div [*3] to 5 V/div |
| DC accuracy [*4]: | At 100 mV/div ±(1.5% of 8 div + 1 LSB) |
| | At 1 mV/div    ±(5% of 8 div + 1 LSB) |
| | Other ranges   ±(2.5% of 8 div + 1 LSB) |
| Offset voltage accuracy: | 1 m to 50 mV/div ±(2.5% of setting + 0.2 mV) |
| | 100 m to 500 mV/div ±(1% of setting + 2 mV) |
| | 1 to 5 V/div ±(2.5% of setting + 20 mV) |
| | Inter-channel isolation: -40 dB (typical value [*5] for the same range) |
| Maximum input voltage: | 250 V (DC + AC peak) (max. 1 kHz) |
| | (CAT I & II, 177 V rms) |
| Input impedance: | 1 MW ±1.5% (approximately 25 pF) |
| Input coupling: | AC / DC / GND |

### Horizontal Unit

| | |
|---|---|
| Sweep time: | 5 ns/div to 50 s/div |
| Time-axis accuracy: | ±(0.01% + 500 ps) [*6] |
| Maximum record length (DL1540CL): | |
| | 2 M words (2 channels at the same time) |
| | 1 M word (3 or 4 channels at the same time) |
| Maximum record length (DL1540C): | |
| | 120 k words (2 channels at the same time) |
| | 56 k words (3 or 4 channels at the same time) |
| External clock input: | EXT CLOCK IN input 40 Hz to 15 MHz [*7] |
| | CH4 input [*11] 40 Hz to 80 MHz [*7] |

### Trigger

| | |
|---|---|
| Modes: | AUTO / AT-LVL / NORMAL |
| | SGL (S) [*9] / SGL (L) [*9] |
| | SINGLE [*10] / N-SGL: sequential store |
| Sources: | CH1 / CH2 / CH3 / CH4 / EXT / LINE |
| Coupling: | AC / DC / HF Rej |
| Sensitivity: | 1 div p-p (DC to 150 MHz) |
| Types: | Edge |
| | NTSC / PAL / HDTV |
| | Window [*8] |
| | OR (optional) |
| | Pattern (optional) |
| | Pulse width (optional) |
| External trigger input: | Range        ±6 V |
| | Level        1.5V / 0.15 V |
| | Frequency band DC to 15 MHz |

### Screen Refresh Rate

| | |
|---|---|
| Using one channel: | Maximum 60 Hz |
| Using all channels: | Maximum 60 Hz |

### Display

| | |
|---|---|
| Display: | 6.4-inch color TFT LCD with wide viewing angle |
| Resolution: | 640 × 480 (Approximately 0.02% of the total number of pixels in the LCD unit may be defective.) |
| Waveform resolution: | 501 × 401 (601 × 401 in wide display mode) |
| Display types: | Zoom    MAIN / ZOOM / Main Zoom |
| | X-Y      T-Y / X-Y / T-Y & X-Y |
| Accumulate display (stack): | PERSIST  Stacking in one color. |
| | COLOR    Stacking in eight colors encoded according to the rate of incidence of various measurements. |
| Number of display traces: | Maximum 8 traces |
| | Four captured waveforms and four enlarged waveforms (in Zoom mode) |

### Extended Functions

| | |
|---|---|
| Calculation: | Addition, subtraction, multiplication, FFT (1000-point power spectrum) |
| GO/NO-GO evaluation: | Zone evaluation: All waveforms can be evaluated at the same time. |
| Parameter evaluation: | Evaluations can be made based on a combination of four parameters. |
| Automated measurement | of waveform parameters: |
| | As many as 23 parameters can be measured per trace. Parts can be measured simultaneously on all traces, and automated measurements can be displayed on the screen. As many as 24 parameters can be displayed. |
| Measured parameters: | Peak to Peak (P-P), maximum value (MAX), minimum value (MIN), most frequent high voltage value (HIGH), most frequent low voltage value (LOW), average value (AVG), root mean square (RMS), overshoot (OVERSHOOT), undershoot (UNDERSHOOT), rise time (RISE), fall time (FALL), frequency (FREQ), period (PERIOD), +duty (High duty ratio), +WIDTH (High pulse width), –WIDTH (Low pulse width), INTEG1 TY, INTEG2 TY (area calculated TY), INTEG1 XY, INTEG2 XY (area calculated XY), DELAY (edge rise or fall time difference), burst width (BURST), pulse count (PlsN) |
| Supported image formats | for saving data: |
| | HP-GL, PostScript, TIFF, BMP |
| Snapshot: | An unlimited number of waveforms can be accumulated on the screen by pressing the snapshot key. |

## I²C bus analysis function (option for DL1540CL only)

• Applicable bus

| | |
|---|---|
| I²C bus: | Bus transfer rate:  Maximum 400 kbps |
| | Address mode:     7 bit |
| SM bus: | Complies with System Management Bus |

• Analysis Functions

| | |
|---|---|
| Detailed data display mode: | Data transferred time starting at trigger point |
| | Data (simultaneous binary and hex notation) |
| | Acknowledgement exist/not exist |
| Waveform & data display mode: | Simultaneous display of data (hex notation) and waveform |
| Maximum analyzed data size: | 1000 bytes before and after a trigger point |

• Trigger

| | |
|---|---|
| Trigger source: | CH1: SCL |
| | CH2: SDA |
| | CH3, CH4: Analog signal inputs |
| Start trigger: | Based on start conditions |
| Non-ACK trigger: | When there is no acknowledgement |
| Address trigger: | Comparison with set address |
| Data trigger: | Comparison with set data (one or two bytes can be set) |
| Byte count trigger: | Maximum count setting is 8191 |
| Combination trigger: | Address, Data and Byte Count trigger types combined |
| Mixed pattern trigger: | Trigger consisting of parallel pattern of CH3/CH4 analog signals and I2C bus analysis trigger types can be set |

## External Interfaces

• GP-IB interface
Electrical and mechanical specifications:

| | |
|---|---|
| | Conforming to IEEE std. 488-1978 |
| Protocol: | Conforming to IEEE std. 488.2-1987 |

• RS-232-C interface (available through RS-232-C interface unit)

| | |
|---|---|
| Baud rates: | 75 / 150 / 300 / 600 / 1200 / 2400 / 4800 / 9600 / 19200 |

• Centronics interface
Supported print commands:

BJ, ESC-P, ESC-P2, LIPS3, PR201, PCL5 (available through GPIB/Centronics adapter)

• SCSI interface (available through special SCSI interface unit)

## SCSI Interface (DL1540CL, when option /C8 is selected)

| | |
|---|---|
| Standard: | SCSI, ANSI X3. 131-1986 |
| Connector Type: | Half-pitch 50-pin |
| Connector pin assignment: | Unbalanced (single-end) |

(or available through special SCSI interface unit)

## Signal I/O

| | |
|---|---|
| • TRIG OUT: | TTL level |
| • GO/NO-GO evaluation: | TTL level (through option box connector) |

• VGA video signal output (optional)

| | |
|---|---|
| Connector type: | D-Sub 15-pin (VGA VIDEO OUT) |
| Output format: | VGA compatible |

## 3.5-inch FDD

| | |
|---|---|
| Usable disk types: | 640 kB / 720 kB / 1.2 MB / 1.44 MB |
| Format: | MS-DOS* |

## Internal Hard Disk Drive (option for DL1540CL only)

| | |
|---|---|
| Number of Drive: | 1 |
| Size: | 3.5 inches |
| Capacity: | 2.1 GB |
| Windows compatibility: | The internal Hard Disk Drive can be connected to a PC running Windows95, Windows98 or WindowsNT via the SCSI interface. |
| SCSI ID: | 4 (fixed) |

## Built-in printer (optional)

| | |
|---|---|
| Printer type: | Thermal head |
| Dot density: | 6 dots per mm |
| Paper width: | 112 mm |
| Real-time printing: | Maximum chart speed is 16.7 mm per second. (Works with time-axis ranges slower than 500 ms/div.) |

## General Specifications

| | |
|---|---|
| Operating temperature range: | 5 to 40°C |
| Operating humidity range: | 20 to 85% RH (without printer) |
| | 35 to 85% RH (with printer) |
| Source voltage: | 100 to 120 V AC / 220 to 240 V AC (switches automatically) |
| Source frequency: | 50 / 60 Hz |
| Power consumption: | 280 VA max |
| External dimensions: | 216 mm (W) × 268 mm (H) × 278 mm (D) (excluding protrusions) |
| Weight: | Approximately 4.9 kg (DL1540C) |
| | Approximately 5.2 kg (DL1540CL) |

*1:  In range of 5 V/div to 10 mV/div.  DC to 80 MHz at 5 mV/div; DC to 20 MHz at 2 mV/div or 1 mV/div.

*2:  In range of 5 V/div to 5 mV/div. DC to 20 MHz at 2 mV/div or 1 mV/div.

*3:  1 mV/div can be obtained by 2 mV/div zooming.

*4:  At reference temperature (23 ±2°C, 55 ±10% RH) 30 minutes after warmup, following calibration.

*5:  A typical value is a common or average value; there is no guarantee of a precise value.

*6:  At reference temperature (23 ±2°C, 55 ±10% RH) 30 minutes after warmup.

*7:  Continuous clock signal only.

*8:  Only works with CH1.

*9:  DL1540C

*10: DL1540CL

# DIGITAL OSCILLOSCOPES

## DL1540C & DL1540CL

## AVAILABLE MODELS

### DL1540C/DL1540CL Model and Suffix Codes

| Model | Suffix Code | Model |
|---|---|---|
| 701530 | | DL1540C digital oscilloscope |
| 701540 | | DL1540CL digital oscilloscope |
| Power cable | - D | UL,CSA standard |
| | - F | VDE standard |
| | - Q | BS standard |
| | - R | AS standard |
| Options | /B5 | Built-in printer *1 |
| | /F1 | Enhanced trigger *2 |
| | /F5 | I²C bus analysis function *2 (701540 only) |
| | /E1 | Additional probes (2) *3 |
| | /V1 | VGA output *4 |
| | /C8 | 2.1-GB internal hard drive *4, *5 (701540 only) |

*1) One roll of paper (B9850NX) is included.
*2) /F1 and /F5 cannot both be selected. /F5 includes /F1 (extended trigger function).
*3) Two probes (700998) are included with the oscilloscope.
*4) /V1 and /C8 cannot both be selected. The option box cannot be used when /C8 is selected.
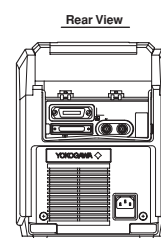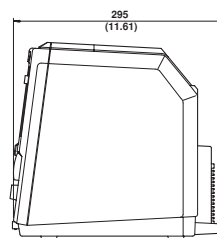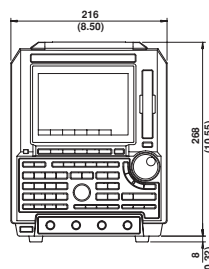*5) When option /C8 is selected, the SCSI interface and GO/NO-GO output connector are included.

### Standard Accessories

| Product | Quantity |
|---|---|
| Power cable | 1 |
| Probe (700998) | 2 |
| Set of manual | 1 |
| Soft case (B9918EZ; for probes, etc.) | 1 |
| Front cover (B9957DG) | 1 |

### Spare Parts

| Product | Code | Specifications | Order Quantity |
|---|---|---|---|
| Roll paper for printer | B9850NX | 30 meters (one roll = 1 unit) | 5 |
| 150 MHz passive probe | 700998 | Switching between 10:1 and 1:1; 1.5 meters | 1 |
| Soft case | B9918EZ | For probes, etc. | 1 |
| Front cover | B9957DG | For protecting TFT LCD and front panel | 1 |

### Accessories for 700998 Probe (optional)

| Product | Code | Specifications | Order Quantity |
|---|---|---|---|
| Miniclip converter | B9852CR | Probe accessory (1/unit) | 1 |
| BNC adapter | B9852CS | Probe accessory (1/unit) | 1 |
| Ground lead (miniclip type) | B9852CT | Probe accessory (1/unit) | 1 |
| 50 Ω terminator | 700976 | Through type | 1 |

### Accessories (optional)

| Product | Code | Specifications | Order Quantity |
|---|---|---|---|
| Carrying case | 700915 | 340 mm (W) × 290 mm (H) × 225 mm (D) | 1 |
| Soft carrying case | 700914 | 324 mm (W) × 324 mm (H) × 235 mm (D) | 1 |
| RS-232-C interface unit | 700927 | Option box connector connection | 1 |
| SCSI interface unit | 700930 | Option box connector connection | 1 |
| Front cover | 700917 | Transparent type | 1 |

### Related Products

| Product | Code | Specifications | Order Quantity |
|---|---|---|---|
| Insulated input unit | 700926 | 2CH, DC to 30 MHz (-3 dB) | 1 |
| Insulated probe | 700929 | For insulated input unit | 1 |
| Differential probe | 700925 | 15 MHz bandwidth | 1 |



Soft case (for probes, etc.)    Carrying case    Soft carrying case

## DIMENSIONS

Unit: mm(inch)



216 (8.50)    295 (11.61)    Rear View

268 (10.55)    8 (0.32)