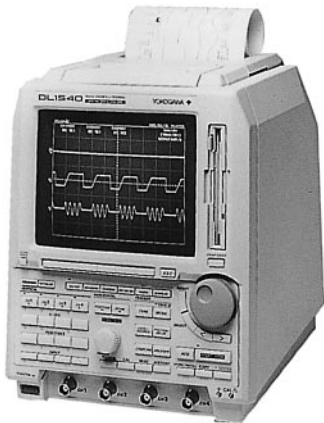


701510/701520/701505/701515 Digital Oscilloscopes DL1540/DL1540L/DL1520/DL1520L



DL1540(701510)
215 × 268 × 295mm 6kg
(8-1/2 × 10-9/16 × 11-5/8" 13.2 lbs)



DL1540L(701520)
215 × 268 × 295mm 6kg
(8-1/2 × 10-9/16 × 11-5/8" 13.2 lbs)



★ Safety Standards; EN61010
EMI Standard; EN55011 Group 1 Class A
Immunity Standard; EN50082-2: 1995

The DL1500 Series Digital Oscilloscopes are high performance personal digital oscilloscope in a compact and light body.

FEATURES

- Full range 4 channels (DL1540/DL1540L)
- Max. 200 MS/s(8 bits)
- 150 MHz analog bandwidth
- Max. 2M words (DL1540L)
1M words (DL1520L)
120k words (DL1540)
20k words (DL1520)
- Approx. 6 kg (DL1540L/DL1540/DL1520L/ DL1520)
- Footprint smaller than A4
- Built-in 3.5-inch FDD
- Built-in printer (option)

DL1500 SERIES

| | | DL1540L | DL1540 | DL1520L | DL1520 |
|----------------------|------------------------------|-----------|-----------|-----------|------------|
| Basic Specifications | Number of input channels | 4 | 4 | 2 | 2 |
| | Max. Sampling rate | 200 MS/s | 200 MS/s | 200 MS/s | 200 MS/s |
| | Max. record length | 2M word | 120k word | 1M word | 20k word*1 |
| | Frequency bandwidth | 150MHz | 150MHz | 150MHz | 150MHz |
| | Advanced trigger | Option | Option | NA | NA |
| Interface | 3.5 inch FDD | Std. | Std. | Std. | Std. |
| | Option box control connector | Std. | Std. | NA | NA |
| | Centronics | NA | NA | Std.*2 | Std.*2 |
| | RS-232-C | Option | Option | Std.*2 | Std.*2 |
| | GP-IB | Std. | Std. | Std.*2 | Std.*2 |
| Functions | Built-in printer | Option | Option | Option | Option |
| | Snap shot | Available | Available | Available | Available |
| | History memory | Available | Available | Available | NA |
| | Sequential store | Available | Available | Available | NA |

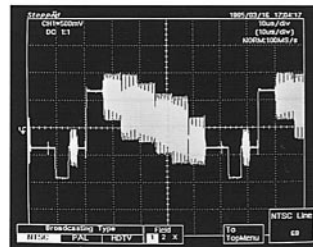
*1: In Roll mode. *2: Varies depending on the model.

FUNCTIONS

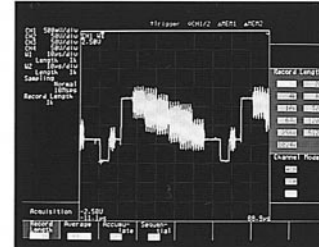
■ SIGNAL OBSERVATION USING LONG MEMORY

● Capturing Signals Using Long Memory for Accurate Waveforms

The DL1520/DL1540 can continuously capture signals using a record length of up to 10k words, and the DL1540L/DL1520L using a record length of up to 100k words. Within the desired observation period, the DL1520/DL1540 can thus capture signals at a time resolution (sampling rate) of 10 times that for signals captured using a record length of 1k word, and the DL1540L/DL1520L at a time resolution of 100 times. (You can use a longer record length when capturing a single-shot signal, or when using the roll mode.)



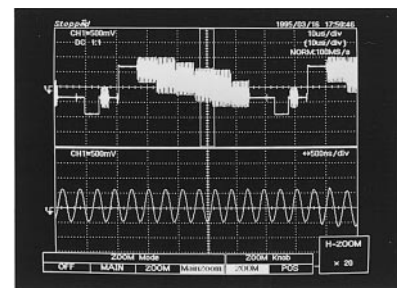
Observation using a 10-kword record length (signal capture using DL1540)



Observation using a 1-kword record length (signal capture using DL2200)

● Zoom Function Displays Eight Traces Simultaneously, Zooming in Quickly and Easily on Waveform Details

Zooming is an important function in a digital oscilloscope with a long record length. The DL1500 series inherits the popular intuitive, high-speed zooming function of the DL4000 series. The DL1500 series eliminates problem of which trace to assign the zoom trace to. This scope allows you to display the captured trace and the zoomed trace at the same time.



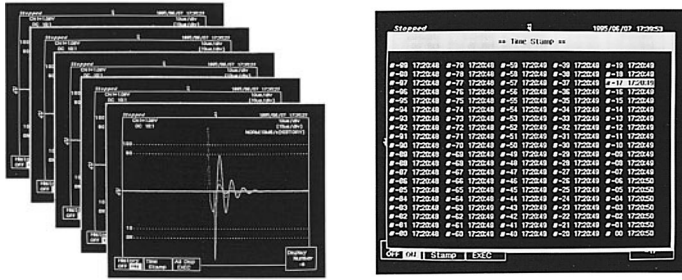
DIGITAL OSCILLOSCOPES & DIGITAL SCOPES



DL1540/DL1540L/DL1520/DL1520L

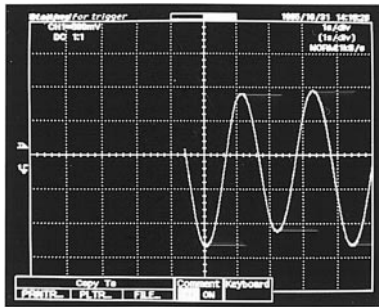
- **Recall Any Waveform with The History Memory Function (DL1540/DL1540L/DL1520L only)**

With a conventional digital oscilloscope, the contents of the memory are updated at every trigger. So once a waveform is updated, there is no way to bring the previous waveform back. However, the history memory function of the DL1540/DL1540L/DL1520L stores the last 100 displays.



- **Roll Mode for Maximum Sampling Speed of 200 kS/s**

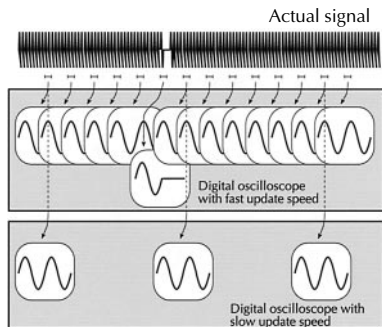
Roll mode is ideal for observing low frequency signals of around 10 Hz, which is difficult to do with a conventional analog oscilloscope. The roll mode allows a maximum sampling speed of 20 kS/s for the DL1520/DL1540, or 200 kS/s for the DL1540L/DL1520L.



- **Screen Update Speed Independent of Number of Traces Displayed or Waveform Processing Type**

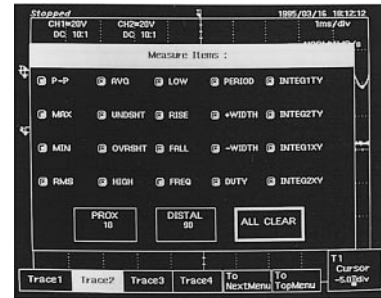
As shown in the figure below, it is easy to overlook an irregular event if the digital oscilloscope has a slow screen update speed. With most digital oscilloscopes, the screen update speed falls as the number of waveforms displayed is increased, or when signal processing such as automatic measurement of the waveform parameters is taking place.

The DL1500 Series has been designed primarily for measuring waveforms; hence signals are measured without reducing the screen update speed even when the number of waveforms displayed is increased or signal processing is added.



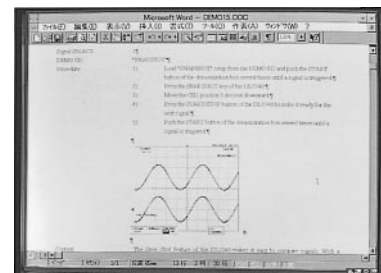
- **A SINGLE OSCILLOSCOPE TO PERFORM EVERYTHING, FROM PROCESSING TO RECORDING OF THE CAPTURED SIGNAL (Optional built-in printer is needed to print captured waveforms)**

- **Automatic Waveform Parameter Measurement Function**
With this function you can automatically measure the maximum voltage, frequency and other parameters of a waveform.



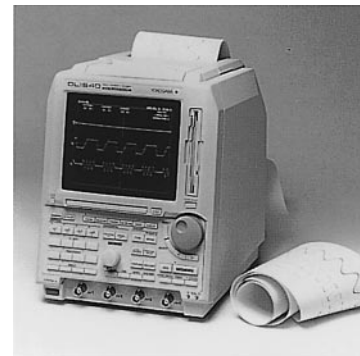
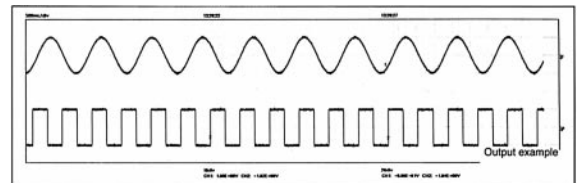
- **Compiling a Report Using a Hard Copy/Image File**

By using the built-in 3.5-inch FDD that supports three MS-DOS modes, you can save waveform data, panel setting information and hard copy images from the screen. You then simply import the hard copy of the screen directly into a word processor document when writing a report or paper using a PC with Windows.



- **Real-time Printing Function Captures 20 ns Pulse Signals**

The real-time printing function continuously records low-speed signals to the built-in thermal printer. The chart speed runs at up to 16.7 mm/s, and the speed can be changed by setting the time axis.



DL1540/DL1540L/DL1520/DL1520L

- **Short Copy Function Outputs a Screen Hard Copy in Just 10 Seconds**

This function outputs a hard copy of a waveform displayed on the screen to the built-in printer. You can even attach to the screen hard copy the panel setting information that was used to capture the waveform.

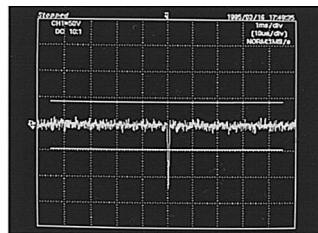
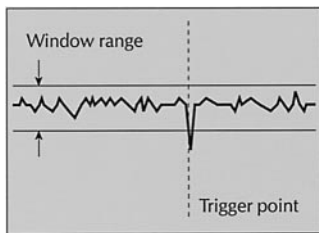
- **Long Copy Function Records Signals in Expanded Form after Storing Them in Long Memory**

With the long copy function of the DL1500 Series, you can print out signals in expanded form after first storing them in the memory. When using the zoom function, an expanded screen can only be displayed one page at a time on the CRT. By using the Long Copy function, you can print an expanded diagram containing many pages of the expanded waveforms.

- **A WEALTH OF TRIGGER FUNCTIONS**

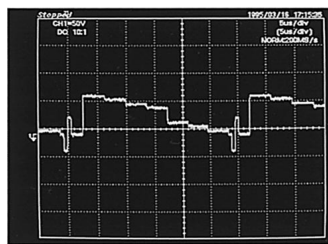
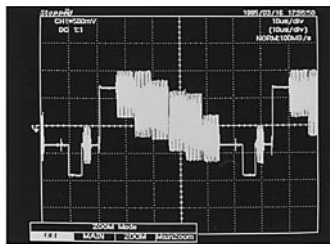
- **Window Trigger**

A trigger occurs when the incoming signal crosses one of the upper or lower level thresholds which you set in advance. So you can capture signals even if you don't know the polarity of the noise component on the DC line.



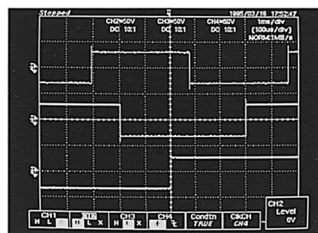
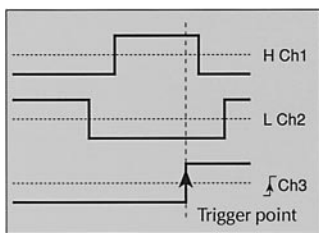
- **TV Trigger**

You can apply a trigger to NTSC, PAL and HDTV signals and specify the number of lines of the signal to be captured. (The HDTV trigger is supported only by the DL1540/DL1540L.)



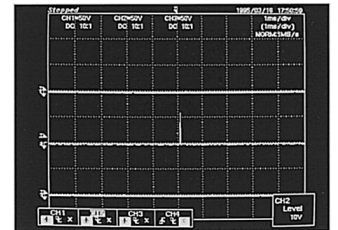
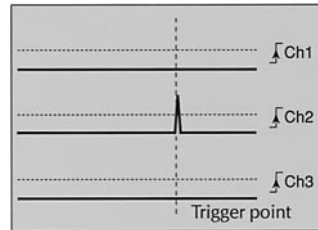
- **Pattern Trigger (Option for DL1540/DL1540L Only)**

By assigning High, Low, or Don't Care to each channel, you can trigger on a combination of signals. You can also assign the signal in one channel as the trigger source.



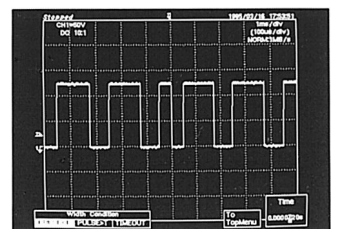
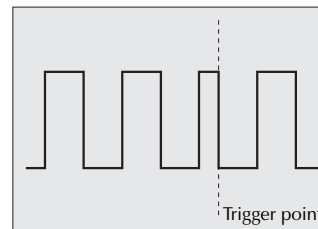
- **OR Trigger (Option for DL1540/DL1540L Only)**

A trigger occurs when any one of the trigger conditions which are set for each channel is satisfied.



- **Pulse Width Trigger, Timeout (Option for DL1540/DL1540L Only)**

A trigger occurs when the pulse width becomes narrower or wider than the defined width. In the case of the timeout trigger, a trigger occurs when the next signal is not detected within a certain time.



DIGITAL OSCILLOSCOPES & DIGITAL SCOPES



DL1540/DL1540L/DL1520/DL1520L

SPECIFICATIONS

Vertical section

| | |
|--------------------------------------|--|
| Number of input channels: | 4 (DL1540/DL1540L); 2 (DL1520/DL1520L) |
| Vertical resolution: | 8 bits (normal) (25LSB/div) 9 bits (smoothing) 12 bits (after averaging with 256 weight) |
| Max sampling rate: | |
| Normal | 200 MS/s (when half of the number of available channels are in use) 100 MS/s (when all channels are in use) Equivalent time 20 GS/s |
| Effective storage frequency (-3 dB): | |
| Repetitive waveform | DC to 150 MHz *1 |
| Single shot waveform | DC to 80 MHz *2 (When half of the number of available channels are in use) DC to 40 MHz *2 (When all channels are in use) |
| Sensitivity: | 1 mV/div *3 to 5 V/div (DL1540/DL1540L) 2 mV/div to 5 V/div (DL1520/DL1520L) |
| DC accuracy **: | 100 mV/div ±(1.5% of 8 div + 1 LSB) 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 set value + 0.2 mV) 100 m to 500 mV/div ±(1% of set value + 2 mV) 1 to 5 V/div ±(2.5% of set value + 20 mV) |
| Interchannel isolation: | -40 dB (typical value *3 in the same range) |
| Max input voltage: | 250 V (DC + AC peak) (1 kHz max) (CAT I & II, 177 Vrms) |
| Input impedance: | 1 MΩ ± 1.5% (approx. 25 pF) |
| Input coupling: | AC/DC/GND |

Horizontal section

| | |
|------------------------------|---|
| Sweep time: | 5 ns/div to 50 s/div |
| Time axis accuracy: | ±(0.01% + 500 ps)*6 |
| Max record length (DL1540L): | 2M words (2 channels use) 1M word (3 or 4 channels use) |
| Max record length (DL1520L): | 1M words (1 channel use) 400k word (2 channels use) |
| Max record length (DL1540): | 120k words (2 channels use) 56k words (3 or 4 channels use) |
| Max record length (DL1520): | 20k words (roll mode) 10k words (other mode) |
| External clock input: | |
| (DL1540/DL1540L): | EXT CLOCK IN input 40 Hz to 15 MHz *7 CH4 input *11 40 Hz to 80 MHz *7 |
| (DL1520/DL1520L): | 40 Hz to 80 MHz |

Trigger

| | |
|--------------|---|
| Mode: | AUTO/AT-LVL/NORMAL SGL(S) *9/SGL(L)*9 SINGLE *10/N-SGL; Sequential store *12 |
| Source: | CH1 /CH2 /CH3 *11 /CH4 *11 /EXT /LINE |
| Slope: | Rise/Fall/Both |
| Coupling: | AC/DC/HFRej |
| Sensitivity: | 1 div p-p (DC to 150 MHz) |
| Type: | Edge TV *8 NTSC/PAL/HDTV *11 Window *8 OR (option *11) Pattern (option *11) Pulse width (option *11) |

External trigger input

| | |
|-----------------------------------|--|
| (DL1540/DL1540L): | |
| Range | ±6 V |
| Level | 1.5 V/ 0.15 V |
| Frequency range | DC to 15 MHz |
| (DL1520/DL1520L): | |
| Range | ±10 V ±1 V |
| Level | |
| Range | ±10 V range: ±10 V ±1 V range: ±1 V |
| Resolution | ±10 V range: 40 mV ±1 V range: 4 mV |
| Input sensitivity (DC to 100 MHz) | ±10 V range: 2 Vp-p ±1 V range: 200 mVp-p |

Screen update speed

| | |
|----------------------|------------------|
| 1 channel in use: | Max 60 screens/s |
| All channels in use: | Max 60 screens/s |

Display

| | |
|-----------------------------|---|
| CRT: | 7-inch, raster scan, amber (540 × 432 dots) |
| Number of displayed traces: | Max 8 traces (zoom mode) (DL1540/DL1540L) (4 captured + 4 magnified) traces Max 6 traces (zoom mode) (DL1520/ DL1520L) (2 captured + 2 magnified + 2Math) traces |

Extension functions

| | |
|---|--|
| Computation: | +, -, x, FFT (1000-point power spectrum) |
| GO/NO-GO function: | Zone: Up to 4 traces Parameter: Up to 4 parameters |
| Automatic waveform parameter measurement: | Up to 21 items for each trace. Parameters for all traces can be measured simultaneously, and the result of automatic measurement displayed. Up to 24 items can be displayed. |
| Image format saving: | HP-GL, PostScript, TIFF, and BMP formats |
| Snapshot: | By pressing the snapshot key, an infinite number of waveforms can be kept on the CRT screen. |
| Accumulation: | 0.1 to 60 s, INFINITE (infinite period) |

Communication

| | |
|---|----------------------------------|
| GP-IB interface | |
| Electrical and mechanical specifications: | Conform to IEEE st'd. 488-1978 |
| Protocol: | Conforms to IEEE st'd 488.2-1987 |

RS-232-C interface

| | |
|---|--|
| [RS-232-C interface unit (optional accessory) required for use with the DL1540 and the DL1540L] | |
| Baud rate: | 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200 bps |

Centronics interface

| | |
|---|------------------------------|
| [Available for the -C3 model of the DL1520 and the DL1520L] | |
| Supported printer commands: | ESC/P, LIPS3, PC-PR201, PCL5 |

SCSI interface

| | |
|---|--|
| [SCSI interface unit (optional accessory) required for the DL1540 and the DL1540L. Available for -C4 model of the DL1520L.] | |
| Supported SCSI devices and conditions | |
| HD drive: | Drive formattable by the EZ-SCSI |
| MO drive: | Up to 640MB type which is formattable by the EZ-SCSI |
| Zip drive: | Iomega Zip drive compatible |

Signal input/output

| | |
|--|---|
| TRIG OUT *11: | TTL level |
| GO/NO-GO evaluation output *11: | TTL level (from option box control connector) |
| GO/NO-GO operation condition output *11: | TTL level (from option box control connector) |
| Calibration output: | 1 kHz, 1 Vp-p, square wave |

3.5-inch FDD

| | |
|---------------------------|---------------------------------|
| Types of supported disks: | 640 KB, 720 KB, 1.2 MB, 1.44 MB |
| Format: | MS-DOS |

Built-in printer (option)

| | |
|--------------------|---|
| Printing method: | Thermal line dot method |
| Dot density: | 6 dots/mm |
| Paper width: | 112 mm |
| Realtime printing: | Max 16.7 mm/s chart speed (Available from a time axis range of 500 ms/div and slower) |

General specifications

| | |
|------------------------------|---|
| Operation temperature range: | 5 to 40°C |
| Operation humidity range: | 20 to 85% RH (when not using the printer) 35 to 85% RH (when using the printer) |
| Supply voltage: | 100 to 120 V AC/ 220 to 240 V AC DL1540/DL1540L Automatically switched DL1520/DL1520L Select from the above |
| Supply frequency: | 50/60 Hz |
| Power consumption: | 280 VA max |
| External dimensions: | 215(W) × 268(H) × 295(D) mm (Excluding projections) |
| Weight: | Approx. 6 kg (DL1540/DL1540L/DL1520/DL1520L main unit only) |

DIGITAL OSCILLOSCOPES & DIGITAL SCOPES

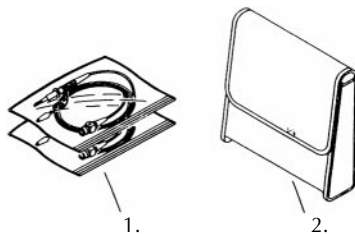


DL1540/DL1540L/DL1520/DL1520L

- *1: Between 5 V/div and 10 mV/div ranges.
For 5 mV/div: DC to 80 MHz. For 2 mV/div and 1 mV/div: DC to 20 MHz.
- *2: Between 5 V/div and 5 mV/div ranges.
For 2 mV/div and 1 mV/div: DC to 20 MHz.
- *3: 1 mV/div is realized by zooming of 2 mV/div.
- *4: Standard operating conditions (23±2°C, 55±10% RH).
After 30 minutes warmup, and after calibration.
- *5: A "typical" value is a representative or average value. It is not a strictly guaranteed value.
- *6: Standard operating conditions (23±2°C, 55±10% RH).
After 30 minutes warmup.
- *7: Continuous clock signal only.
- *8: Supported by CH1 only.
- *9: DL1540 only.
- *10: DL1540L/DL1520/DL1520L only.
- *11: DL1540/DL1540L only.
- *12: DL1540/DL1540L/DL1520L only.

● Standard Accessories

| No. | Item | Quantity |
|-----|--------------------------------------|----------|
| – | Power cable | 1 |
| 1. | Probe | 2 |
| – | Set of manuals | 1 |
| 2. | Soft case (for storing probes, etc.) | 1 |
| – | Front cover (700916) | 1 |



● Accessories (optional)

| Item | Code | Description | Order Q'ty |
|-----------------------|--------|----------------------------------|------------|
| 50Ω terminator | 700976 | Through type | 1 |
| Carrying case | 700915 | 340(W)×290(H)×225(D) mm | 1 |
| RS-232-C unit | 700927 | Exclusively for DL1540/DL1540L | 1 |
| TV signal output unit | 700928 | Exclusively for DL1540/DL1540L*1 | 1 |
| SCSI interface unit | 700930 | Exclusively for DL1540/DL1540L*2 | 1 |

- *1: For the DL1540, the firmware version 1.10 or later is required.
- *2: For the DL1540 and the DL1540L, the firmware version 1.20 or later is required.



Carrying case



RS-232-C unit



TV signal output unit



SCSI interface unit

AVAILABLE MODELS

● DL1540/DL1540L

| Model | Suffix code | Description |
|---------------|-------------|------------------------------|
| 701510 | | DL1540 Digital Oscilloscope |
| 701520 | | DL1540L Digital Oscilloscope |
| Power voltage | -1 | 100 to 120 V AC |
| | -5 | 220 to 240 V AC |
| Power cable | -D | UL, CSA standard |
| | -F | VDE standard |
| | -Q | BS standard |
| | -R | SAA standard |
| Options | /B5 | Built-in printer |
| | /F1 | Enhanced trigger |
| | /E1 | Two additional 700998 probes |

● DL1520 / DL1520L

| Model | Suffix code | Description |
|---------------|-------------|------------------------------|
| 701505 | | DL1520 Digital Oscilloscope |
| 701515 | | DL1520L Digital Oscilloscope |
| Power voltage | -1 | 100 to 120 V AC |
| | -5 | 220 to 240 V AC |
| Power cable | -D | UL, CSA standard |
| | -F | VDE standard |
| | -Q | BS standard |
| | -R | SAA standard |
| Communication | -C1 | GP-IB interface |
| | -C2 | RS-232-C interface |
| | -C3 | GP-IB & Centronics interface |
| | -C4 | GP-IB & SCSI interface*1 |
| Options | /B5 | Built-in printer |

- *1: Available for the DL1520L only.

● Spare Parts

| Item | Code | Description | Order Q'ty |
|--------------------------|---------|--|------------|
| Roll paper for printer | B9850NX | 30 m (one roll/unit) | 5 |
| 150 MHz passive probe | 700998 | 10 MΩ (10:1), 1.5 m (1/unit) | 1 |
| Soft case | B9918EZ | For storing probes, etc. | 1 |
| Front cover | 700916 | For protecting the CRT and the front panel | 1 |
| Printer connecting cable | B9916TB | 1 m (exclusively for DL1520) | 1 |

DIMENSIONS

Unit: mm (inch)

