

## Digital Storage Oscilloscope

# DCS-8300

100MS/s Acquisition (40MS/s 2 Acquisition)  
100MHz 2 channel.

### OUTLINE

The DCS-8300 offers you both easy operation part of an analog oscilloscope and high functionality part of a digital oscilloscope. As it employs high-intensity CRT high-speed single event can be observed easily. The DCS-8300 has a variety of trigger functions to catch many different waveform. It also has a 40 MS/s AD converter in each channel and a maximum sampling speed of 100MS/s is achieved in 1 channel mode. A large capacity of 16K words memory for each channel makes long-term record storage possible. For front panel settings up to 100 steps can be stored, which enables recall of frequently used settings, etc. by a touch of a button. A selection of optional interface (GP-IB or RS-232C) is also available. When these options are used, the DCS-8300 can be controlled by PC, or waveform data can be stored in PC.

### FEATURES

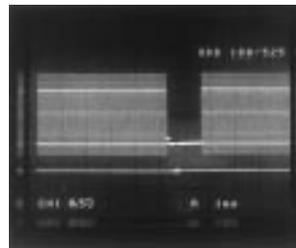
#### 100 MS/s (1CH) High-speed sampling

When the DCS-8300 is used by the 1 channel mode, high-speed sampling at 100 MS/s is available. It is possible the measurement of high speed events. The highest sampling rate by 2 channel mode is 40 MS/s.

#### Large capacity 16K words memory

16K words of acquisition memory and 2K words of reference memory are provided for each channel.

#### [TV line counter]



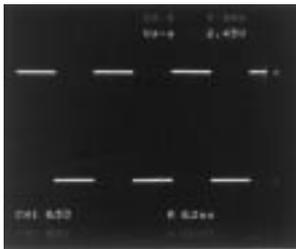
For television signal synchronization, a line counter is also provided. By selecting the frame line number to be checked, the required line number can be observed.

RS-232C  
OPTION

GP-IB  
OPTION



[Parameter Auto Measurement Function]



It is possible to measure the voltage, frequency and period automatically just input the signal. Especially for voltage measurement, measurement mode is automatically selected according to the input selector. For example, when the AC input is selected, "Peak-to-Peak" voltage is automatically measured, and when the DC input is selected, DC voltage is measured automatically.

[Automatic setup function]



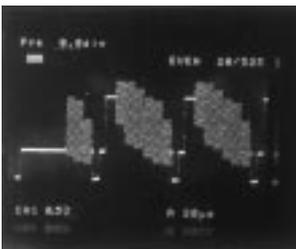
By pressing the AUTO SET key, setup operations for the voltage range and time range are automatically performed.

[Pre-trigger]

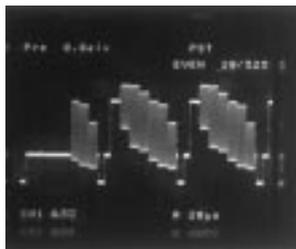


Observation of the waveform before the triggered point is possible. A maximum of 80 div. before triggering point can be observed.

[Overwrite function]



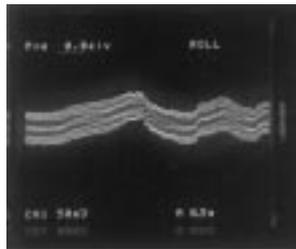
Overwrite OFF



Overwrite ON

In this mode, the waveform of a signal subsequently input is displayed without erasing the currently displaying waveform. With this function, it is easy to observe the jitter component or amplitude fluctuation of the waveform.

[Single roll]

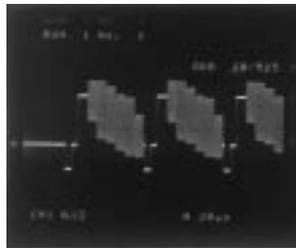


Setting "Single" in the roll mode enters the single roll mode. When the trigger signal is input at this mode, the displayed waveform freezes after the data corresponding to the value set for pre-triggering has been updated.

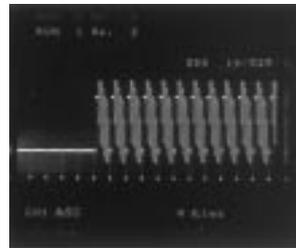
[±2% accuracy]

In order to obtain highly accurate measurements, both the voltage axis (except for 1mV, 2mV range) and the time axis ensure ±2% accuracy. (under ambient conditions of 10 to 35°C temperature and less than 85% humidity)

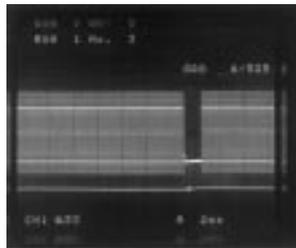
100-Step Programming



Step 1



Step 2



Step 3

The DCS-8300 provided 100 steps programming capability for store/re-call operations for the front panel setting values. When the frequently used panel settings are previously programmed, they can be recalled with a touch of a button. This function greatly reduces the time required for measurements.

Options

When the optional GP-IB or RS-232C interface is installed, the DCS-8300 can be controlled by external controller. It is possible the control of the DCS-8300 from an external PC or stores the waveform data into the PC.

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## SPECIFICATIONS

### [Real-time block]

<b>CRT</b>	
Type	150mm rectangular, with internal graticule
Accelerating voltage	Approx. 17kV
Effective area	8div. × 10div. (1div.=10mm)
Vertical axis (Common for CH1, CH2)	
Operating modes	CH1, CH2, ADD, ALT, CHOP
Sensitivity	1mV/div., 2mV/div. : ± 5% 5mV/div. to 5V/div. : ± 2%
Attenuator	1mV/div. to 5V/div., 1-2.5 step, (fine adjustment)
Input impedance	1MΩ ± 1%, approx. 20pF
<b>Frequency response</b>	
DC	DC to 100MHz, (- 3dB) (5mV/div to 5V/div.) DC to 20MHz, (- 3dB) (1mV/div, 2mV/div.)
AC	5Hz to 100MHz, (- 3dB) (5mV/div to 5V/div.) 5Hz to 20MHz, (- 3dB) (1mV/div to 2mV/div.)
Rise time	Approx. 3.5ns (5mV/div. to 5v/div.) Approx. 17.5ns (1mV/div., 2mV/div.)
Signal delay time	Can confirm the leading edge with the square wave that has a rise time less than the unit.
Crosstalk	Below - 40dB (at 1kHz)
Polarity inversion	CH2 only
CHOP Frequency	Approx. 250kHz
Maximum input voltage	800Vp-p or 400V (DC + AC peak)
<b>Horizontal axis</b>	
Operating modes	Set to X-Y mode by H MODE CH1 : Y-axis, CH2 : X-axis
Sensitivity	1mV/div, 2mV/div : ± 5%, 5mV/div to 5V/div : ± 3%
Input impedance	Same as Vertical axis (CH2)
<b>Frequency response</b>	
DC	DC to 1MHz, (- 3dB)
AC	5Hz to 1MHz, (- 3dB)
X-Y phase difference	Below 3 degrees at 100kHz
Maximum input voltage	Same as vertical axis (CH2)
<b>Sweep</b>	
Sweep modes	A sweep, B sweep, ALT
<b>Sweep time</b>	
A	0.5s/div to 50ns/div ± 2% in 1-2.5 steps, 22 ranges, and fine adjustment
B	50ms/div to 50ns/div ± 2% in 1-2.5 steps, 19 ranges
Magnified sweep	× 10 ± 5% (± 8% less than 0.5 μs/div)
Linearity	± 3% (10MAG ± 5%)
Delay mode	Continuous delay, triggered delay
Delay time	0.5s/div to 50ns/div ; continuously variable from 0.2div. ~ 10div.
Delay time error	± (3% of set value + 1% of f.s.) + (0 to 300ns)
Delay jitter	10,000 : 1 of 10 times of the A sweep time
Hold off	A Sweep : Continuously variable from NORM
Trace separation	B separation from A is continuously adjustable to approx. ± 4 div.
<b>Triggering</b>	
Trigger sources	VERT, CH1, CH2, LINE, EXT
Mode	AUTO, NORM, FIX, SINGLE
Trigger coupling	AC, HFrej, DC, TV-FRAME, TV-LINE

### Trigger sensitivity

Trigger coupling	Synced frequency range	Internal sensitivity		External sensitivity	
		NORM	FIX	NORM	FIX
DC	DC to 50MHz	1div.	1.5div.	100mV	150mV
	50MHz to 100MHz	1.5div.	2div.	150mV	200mV
AC	10Hz to 50MHz	1div.	1.5div.	100mV	150mV
	50MHz to 100MHz	1.5div.	2div.	150mV	200mV
HFrej	Minimum triggering amplitude increases above 10kHz				
TV	TV-F, TV-L Comp.video	1.5div.	1.5div.	150mV	150mV

Calibration voltage	1Vp-p ± 1%	1kHz ± 1%
<b>External trigger</b>		
Input impedance	1MΩ ± 1%, approx. 20pF	
Max. input voltage	100Vp-p or 50V (DC + AC Peak, 1kHz or less)	
<b>CH1 Signal output</b>		
Output voltage	Approx. 50mVp-p/div	
Output impedance	Approx. 50Ω	
Frequency response	5mV to 5V/div. : 100Hz to 100MHz (- 3dB) 1mV to 2mV/div. : 100Hz to 20MHz (- 3dB)	
Trace rotation	Enables trace rotation adjustment by semi-fixed controller on the panel	

[Storage block] \*Note : [ ] dual channel.

Vertical axis	
Vertical resolution	8bit (25dot/div.)
Dynamic range	± 5div
Effective storage frequency	
DC	DC to 40 MHz [16MHz] (sine interpolation)
AC	5Hz to 40 MHz [16MHz] (sine interpolation)
Effective rise time	Below 16ns [40ns] (With linear interpolation)
frequency response	
DC	DC to 40MHz (- 3dB) (5mV/div to 5V/div) DC to 20MHz (- 3dB) (1mV/div, 2mV/div)
AC	5Hz to 40MHz (- 3dB) (5mV/div to 5V/div) 5Hz to 20MHz (- 3dB) (1mV/div, 2mV/div)
Memory capacity	
NORM sampling	
Display memory (data)	2 KW/CH (200dot/div)
Display memory (REF)	2 KW/CH
Acquisition memory	16KW/CH
REF memory	2 KW/CH
Roll mode	
Display memory (data)	2KW/CH (200dot/div.)
Display memory (REF)	2KW/CH
Acquisition memory	16KW/CH
REF memory	2KW/CH
Memory backup	Battery backed up for approx. 30,000 hrs. (at normal temperature)
Acquisition memory	16KW/CH
REF memory	2KW/CH
Sweep time • Display mode	
NORM sampling	50ns/div. to 500s/div. (50ns/div. to 1μs [2μs]/div. in the MAG range) (Maximum sampling rate : 100MS/s [40MS/s])
Peak detector	10μs/div. to 500s/div.
Roll mode	0.2s/div. to 500s/div.
Storage mode	
AUTO	Same as NORM for the same period, free-running data updating in other cases.
NORM	Data updated each time an acceptable trigger is received.
SINGLE	Data is stored with the first acceptable triggering after resetting and held
AVG (Averaging)	Average of 4 or 16 or 64 times
SMT (Smoothing)	Data writing point will be averaged following 32 words.
PST (Persistence)	Mutual display of maximum and minimum values in storage, and initialization by PST RESET.
PEAK	25ns glitch detection
ROLL	NORM : Continuous recording and updating of data on the CRT. SINGLE : After receiving the acceptable trigger, the pre-triggering data is updated and the data is stored.

#### Magnification, Compression

Magnification	By pressing × 10 MAG under Hold conditions, 10-times magnification is obtained by linear interpolation around the CRT center.
Interpolation	Linear interpolation, sign interpolation
Trigger • Delay	
Pre-trigger	NORM : 0 to 10 div., 0 to 80 div (at 16KW/CH) (in 2.5div steps) ROLL-SINGLE : 0div. to 80div.(in 2.5div steps)
X - Y	
Effective storage frequency range	DC to 16MHz ( - 3dB Adjustable sampling rate for the SWEEP TIME /DIV.)
External clock	Carries out sampling by first transition of signals input from the external clock terminal when setting SWEEP TIME/DIV to EXT.
Input impedance	Approx. 10kΩ
Maximum input voltage	84Vpp or 42V (DC + AC peak, 1kHz or below)
Input signal level	TTL "L" level : + 0.8V or less "H" level : + 2.7V or more
Input signal frequency range	DC to 10MHz (1 kHz in roll mode)
Input signal duty ratio	20% to 80% (DC to 5MHz) 40% to 60% (5MHz to 10MHz)
Waveform calculation	+, -

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## [Readout block]

Panel setup value	CH1/CH2 scale factor (with probe detector), V-UNCAL, ADD, INVERT, A/B Sweep scale factor (MAG calculation, "*" displayed in MAG mode), Sweep-UNCAL, DELAY TIME, B TRIG'D, X-Y, Sampling waveform in X-Y mode, Display control, setup value storage function, Pre-trigger point, REF memory setup condition, Menu, OUTPUT
Cursor measurement ( $\Delta V1$ only in X-Y mode)	
$\Delta V1$	: Voltage display calculated using CH1 scale factor
$\Delta V2$	: Voltage display calculated using CH2 scale factor
$\Delta T$	: Time display calculated using A sweep scale factor
$\Delta 1/T$	: Frequency display calculated using A sweep scale factor
VOLTS/DIV or TIME/DIV UNCAL mode	
RATIO	: Voltage ratio/Time ratio display using 5 div. of screen readout as 100%
PHASE	: Phase difference display using 5 div. of screen readout as 360°
Resolution/Measurement accuracy	10 bits / $\pm 4\%$
Measurement range	Vertical $\pm 3.6$ div. minimum from CRT center Horizontal $\pm 4.6$ div. minimum from CRT center
Parameter auto measurement	Each parameter is measured and displayed for the selected signal as the sync signal source from either CH1 or CH2
Frequency (FRQ)	Mode selectable in Cursor mode. Measurement/display calculated by internal counter
Frequency range	2 Hz to 100 MHz
Effective digits/Accuracy:	3 digits / 0.01% $\pm 1$ digit
Measurement sensitivity	Same as trigger sensitivity
Period (PER)	Mode selectable in Cursor mode. Measurement/display calculated by internal counter
Measurement range	0.5 s to 10 ns
Effective digits/Accuracy	3 digits / 0.01% $\pm 1$ digit
Measurement sensitivity	Same as trigger sensitivity
AC voltage (Vp-p)	Mode selectable in cursor mode. Peak-to-peak voltage measurement /display
Measurement range	0.5 div. - within effective screen area
Frequency range	2 Hz to 100 MHz
Effective digits/Accuracy	3 digits / 10 Hz to 40 Hz: $\pm \{8\% + \text{attenuator setup value V/div.} \times 0.04 \text{ div.}\}$ , 40 Hz to 100 kHz: $\pm \{3\% + \text{attenuator setup value (V/div.)} \times 0.04 \text{ div.}\}$
DC voltage (DCV)	Mode selectable in cursor mode. Average DC voltage measurement /display
Sensitivity	0.5 div. - within effective screen area
Effective digits/Accuracy	3 digits / $\pm \{3\% + \text{attenuator setup value (V/div.)} \times 0.04 \text{ div.}\}$

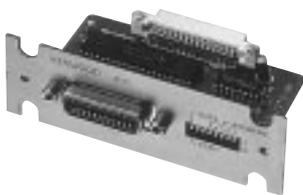
Auto setup	Automatically setup of Vertical axis attenuator, Sweep range, Vertical position, Horizontal position values for CH1 and CH2
Period	1.5 to 5 periods (H.VARIABLE CAL mode, with input signal up to 10 MHz)
Amplitude	Within effective screen area (within 1/2 of effective screen area in 2-channel mode)
Frequency (sine wave)	50 Hz to 100 MHz
Position	Vertical axis: Almost at CRT center in single phenomenon mode. 2-channel mode: Approx. +2 div. (CH1), approx. -2 div. (CH2) from the CRT center. Horizontal axis: Starts from the left end of on-screen scale
Program step	Max. 100 steps (can be divided up to 5 groups)
Backup	Panel setup values are backed up by built-in battery. Battery life: Approx. 30,000 hours (in room temperature). Factory-default values resume when built-in battery is expired.

## [Power Supply block & Others]

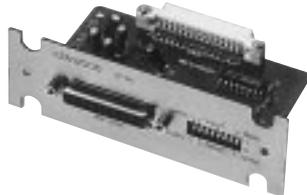
Power requirements & input voltage/Frequency	AC 100/120/220/230 V ( $\pm 10\%$ as input fluctuation), 50/60 Hz
Power consumption (AC 100 V input)	Max. 77 W, 94 VA
Insulating voltage	AC 1.5 kV, 1 minute
Insulating resistance	100M $\Omega$ or more with DC 500 V
Dimensions	305 (W) $\times$ 150 (H) $\times$ 400 (D) mm (344 $\times$ 165 $\times$ 459 mm, maximum dimensions)
Weight	Approx. 9.9 kg
Operating environment (indoor use only)	
Altitude	Below 2000 m
Overvoltage category	II
Pollution	2
Operating temperature/humidity	0 to 40°C, below 85%
Storage temperature/humidity	- 20 to 70°C, below 85%
Accessories	
Probe ( $\times 2$ )	PC-51: 10 M $\Omega$ $\pm 2\%$ , 12.5 pF $\pm 10\%$ , 1/10
Operation Manual	(1)
Adjusting screwdriver	(1)
Power cable	(1)
Applicable standard	
Safety standard	EN61010-I & A2 (1995)
EMI	EN55011 (1991) CLASS B FCC47CFR, PART15, SUBPART B, CLASS B
Immunity	IEC801-2 (1991) 8k VAD IEC801-3 (1984) 3V/m EIC801-4 (1988)

[Options]

- OUTPUT ..... Makes possible mounting of optional IF-10 or IF-20R (but simultaneous mounting is not possible)
  
- IF-10 ..... GP-IB interface (complies with IEEE-488 1978)
  - Operation ..... Plots out the screen waveform and screen readout data to the GP-IB interface plotter. (TALK ONLY, HP-GL command)
  - Outputs and inputs screen numerical data and outputs screen readout data through GP-IB interface computer. (TALK/LISTEN)
  
- IF-20R ..... EIA RS-232C interface
  - Operation ..... Plots out the screen waveform and screen readout data to the RS-232C interface plotter. (HP-GL command)
  - Outputs and inputs screen numerical data and outputs screen readout data through RS-232C interface.
  - Prints out screen waveform and screen readout data with an RS-232C printer (only with the model DPU-412 available from SII (Seiko Instruments)).
  - Outputs and controls panel setup data.
  - Baud rate ..... 9600/1200 bps
  - Transfer type ..... Data length: 8 bits.  
Parity: none.  
Stop bit: 1 bit or more.  
Delimiter: CR+LF  
Handshake: CTS-RTS
  
- RT-5371 ..... Remote Controller
  - Operation ..... Program step up/down/reset



GP-IB Interface for DCS-8300  
**IF-10**



EIA RS-232C Interface for DCS-8300  
**IF-20R**



Remote controller  
Operation program step up/down/reset  
**RT-5371**

DCS-8300 Rear panel



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