Ultra-High Writing Speed Analog Storage Oscilloscope

The TS-8500 ultra-high writing speed analog storage oscilloscope allows precise observation of high-speed single shot phenomena and sporadic noise (glitch).
A newly-developed scan converter tube makes it possible for this scope to capture noise which appears in repetitive signals as well as high-speed single shot phenomena.
Featuring the same high levels of operability and basic performance as our popular 470 MHz/400 MHz analog oscilloscopes (SS-7840H/SS-7840), this scope requires no special training or operation, making it an ideal solution to the common problems encountered every day in electronics engineering.

TS-8500
DC – 500 MHz, 4 CH

■ Ultra-high speed storage capability

Newly-developed scan converter tube allows capture of single shot phenomena even at the highest sweep rate.
For instance, it can display the leading edge of a 6.25 div amplitude, 1 nsec rise-time pulse or any part of a 3.2 div amplitude, 500 MHz sine wave in a single shot sweep.

■ Maximum writing speed for all ranges and guaranteed wide bandwidth from DC to 500 MHz

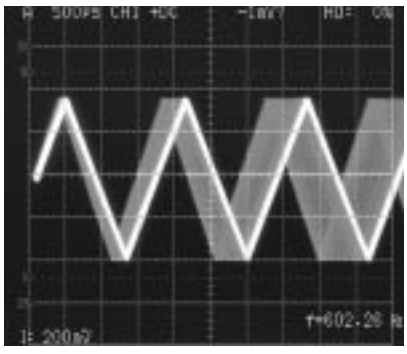
Unlike a digital storage oscilloscope, the TS-8500's waveform display capability and frequency bandwidth are not dependent on the sweep range. As a result, aliasing does not occur.

■ "Burn-free" because waveforms are stored by the CCD

■ NTSC video output

Connect the TS-8500 to a video printer for quick, easy printouts. You can also connect this scope directly to a personal computer via a video board, for waveform processing.

■ Persistence function allows waveforms to be overwritten

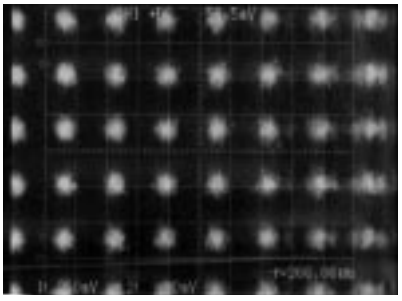


■ Time base dual delay function

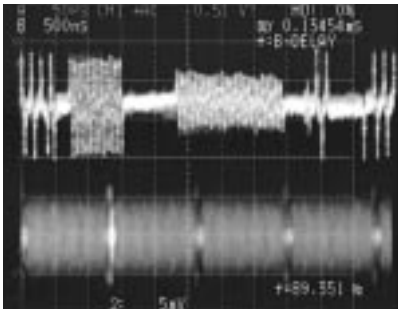
Two independent delay time settings are provided for B sweeps, allowing delay magnification of two signals.

■ Examples of observed waveforms

- **Constellation waveform**
  Shows phase and jitter of a 256QAM signal. This is one of the modem evaluation methods. Jitter can be checked by the size of the spot waveform while the phase can be evaluated by the shape of a square formed by four spots.



- **Read-write signal for hard disk driver by using B-trigger**



Specifications

■ Display 5.5-inch, TFT color LCD (240 x 320 dots)
■ Storage CRT CCD scan converter tube (430 x 600 dots)
■ Fastest writing speed 5 div/ns
■ Persistence time Variable to infinity
■ Vertical deflection system (Y axis)
Vertical mode CH1, CH2, CH3, CH4, ADD (CH1 + CH2), ALT, CHOP

● CH1, CH2
Sensitivity
Range 2 mV/div – 5 V/div, 11-step (1-2-5)
Variable adjuster 2 mV/div – 12.5 V/div, continuously variable
Accuracy ±2%
Frequency bandwidth
Bandwidth DC – 500 MHz, -3 dB
Band limit DC – 20 MHz or DC – 100 MHz
Note: The lower limit frequency is 10 Hz with AC coupling.
Rise time Approx. 700 ps
Note: Use the following formula.

$$Tr = \frac{350}{\text{Bandwidth [MHz]}} \text{ [ns]}$$

Signal delay time 20 ns or more (delay time on the screen)
Input coupling AC, DC, GND
Input RC 1 MΩ ± 1.5% // 16 pF ± 2 pF,
50 Ω input: 50 Ω ±1%

Max. input voltage
1 MΩ input ±400 V max. (DC + AC peak)
50 Ω input 5 Vrms max.
VSWR 1.35 or less (with DC – 500 MHz, 50 Ω)
Offset voltage

Vertical range	Offset voltage
2 mV/div – 50 mV/div	±1 V
0.1 V/div – 0.5 V/div	±10 V
1 V/div – 5 V/div	±100 V

Polarity switching CH2 only
Probe sense 1:1, 10:1, 100:1

● CH3, CH4
Sensitivity
Range 100 mV/div, 500 mV/div
Accuracy ±2%
Frequency bandwidth DC – 500 MHz, -3 dB
Input coupling AC, DC
Input RC 1 MΩ, ±1.5%//16 pF ±3 pF
Max. input voltage ±400 V max. (DC + AC peak)
Probe sense 1:1, 10:1, 100:1

■ Triggering
● A triggering
Source CH1, CH2, CH3, CH4, LINE
Coupling AC, DC, HF-REJ, LF-REJ
Slope +, –
Sensitivity

Frequency	Amplitude
DC – 10 MHz	0.4 div
10 MHz – 100 MHz	1.0 div
100 MHz – 500 MHz	2.0 div

● B triggering
Source CH1, CH2, CH3, CH4
Coupling AC, DC, HF-REJ, LF-REJ
Slope +, –
Sensitivity

Frequency	Amplitude
DC – 10 MHz	0.4 div
10 MHz – 100 MHz	1.0 div
100 MHz – 250 MHz	2.0 div

● TV trigger
Format NTSC, PAL (SECAM), HDTV
Trigger mode TV-V (ODD, EVEN, BOTH), TV-H
TV line ODD, EVEN, BOTH, selectable
NTSC 1 H – 525 H
PAL (SECAM) 1 H – 625 H
HDTV 1 H – 1125 H
TV clamp
Clamp position Back porch level
Clamp level Within ±1 div
Signal amplitude 1.5 div – 8 div
● Event trigger
Count mode
Count range 1 – 65535
Max. count frequency 50 MHz
Burst mode
Burst time range 0.15 µs – 9.99 s
● AUTO SETUP
Input channel CH1, CH2
Frequency range 50 Hz – 100 MHz

■ Horizontal deflection system (X axis)
Display (HORIZ DISPLAY) A, ALT, B, X-Y
● A sweep
Sweep mode AUTO, NORMAL, SINGLE
Sweep time
Max. sweep time 500 ps/div
Range 5 ns/div – 500 ms/div, (1-2-5 step) switchable in 25 steps
Hold-off time Variable
● B sweep
Delay TRIG'D DELAY
RUNS AFTER DELAY

Sweep time
Max. sweep time 500 ps/div
Range 5 ns/div – 20 ms/div, (1-2-5 step) switchable in 21 steps
Accuracy ±2%
Delay jitter 1/20000 at 1 ms/div for A sweep, 500 ns/div for B sweep
Dual delay Possible
● Sweep magnification
Magnifier X10
■ X-Y operation
● X axis (CH1)
Sensitivity
Range Same as CH1
Accuracy ±2%
Frequency response DC – 10 MHz, -3 dB
● Y axis CH1, CH2, CH3, CH4, ADD
Phase difference Within 3˚ (DC – 5 MHz)
■ CAL (calibration signal)
Waveform Square-wave
Frequency 1 kHz, ±0.1%
Duty ratio 49% – 51%
Output voltage 0.6 V, ±1%
■ CH2 OUT
Output voltage 20 mV/div, ±30% (50 Ω load)
Frequency bandwidth 200 MHz, -3 dB (50 Ω load)
Output resistance 50 Ω, ±20%
■ Probe power
Connector number 2
Voltage +12 V, –12 V
■ VIDEO OUT NTSC, 1 Vp-p ±0.3 V
■ Z AXIS IN
Intensity modulation voltage 0.5 Vp-p or more
Polarity With positive voltage, dark; with negative voltage, bright
Frequency range DC – 5 MHz
Input resistance 5 kΩ ±20%
Max. input voltage ±40 V max.
■ Cursor measurement Time difference (Δt), voltage difference (ΔV)
■ Counter
Display digits 5-digit (A trigger source)
Accuracy ±0.01%
Frequency measurement range 2 Hz – 500 MHz
■ Save/Recall Max. 256 panel settings
Backup time Approx. 27,000H (at 25˚C)
■ Power supply
Voltage range AC 100 V – 240 V
Frequency range 50/60 Hz
Power consumption Max. 140 VA
■ Weight and dimensions
Weight Approx. 8.5 kg (without accessories)
Dimensions Approx. 320W x 160H x 420L mm
■ Environmental conditions
Performance guaranteed temperature 10˚C – 35˚C
Operating range
Temperature 0°C – 40°C
Humidity 90% RH (0˚C – 40˚C)
Storage range
Temperature -20°C – 70°C
Humidity 80% RH (-20˚C – 70˚C)
■ Accessories Power cord (x1), probe (SS-101R) (x2), panel cover (1), fuse (x2), operation manual (x1), accessory bag (x1)