TS-81000
DC~1 GHz, 4 CH, 15 traces

TS-80600
DC~600 MHz, 4 CH, 15 traces

There is the world, only Analog can capture it!
State of the art Analog Oscilloscope

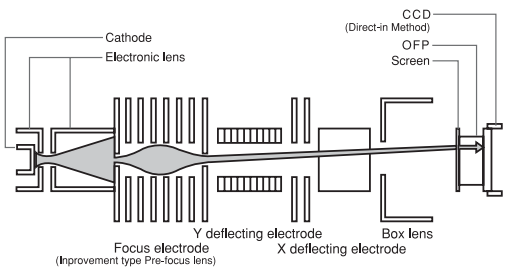
As technology advanced rapidly, it is getting more and more difficult to assure accurate waveform. Conventional analog oscilloscopes do not have enough brightness to observe infrequent signals and digital scopes do not have sufficient high sampling rates. Now there's a solution. IWATSU TS-81000/80600 ultra-high brightness oscilloscopes are introduced. Featuring all the power of an analog oscilloscope plus a high-speed scan converter tube, the TS-81000/80600 can easily store one-shot signals up to 1GHz/600MHz, as well as displays slow repetition rate signals for long periods without screen burn. The IWATSU TS-81000/80600 are the ultimate waveform observation tool for the digital age.

- ***Ultra high Writing Speed of 10div/ns can capture 6div amplitude, 500ps rise time pulse***
- ***DC – 1GHz/600MHz (50Ω), DC – 500MHz (1MΩ, Passive Probes are optional), 4CH***
- ***Sharp traces and High resolution color display 800 x 480dots***
- ***Versatile output Interface and Documentation functions***
  〈 Built-in printer, LAN Interface, ATA card slot, Video output (NTSC/VGA) 〉

Newly developed CCD(Charge-coupled device) scan converter tube

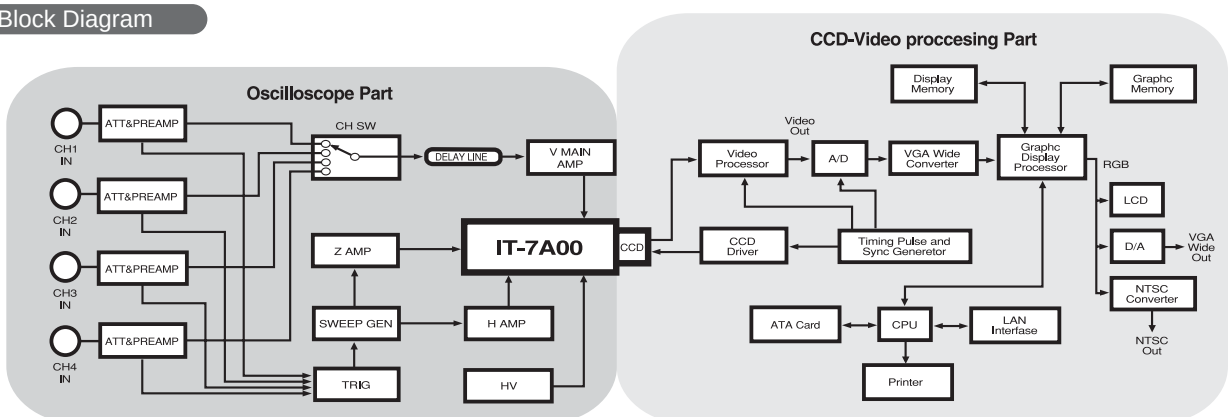
The scan converter tube is a mechanically reliable and extremely durable high-speed storage tube based on our advanced CRT technology. Featuring a simple design much less complex than that of a conventional oscilloscope CRT used for observation, this scan converter features a CCD (charge-coupled device) that can read waveform information drawn on the screen at any sweep rate directly via an OFP (Optical Fiber Plate).

Sectional Plan



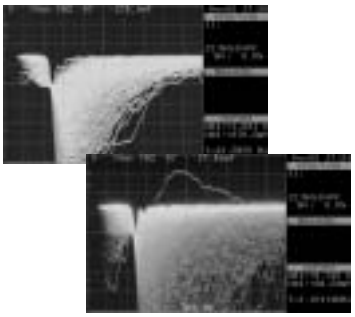
(CCD scan converter tube)

Block Diagram



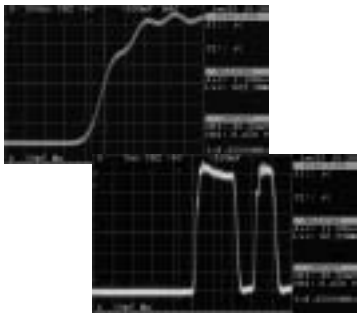
■ Photo multiplier tube

Output signal voltage variation of Photo multiplier tube.
The TS-81000/80600 can display some of irregular signals with slight brightness difference.



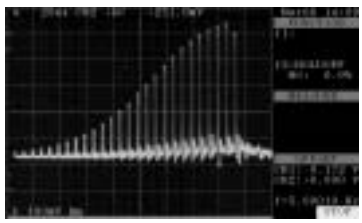
■ Blue laser diode

The reading and writing signal of the laser diode has been sped up along with high density of optical storage media.
The TS-81000/80600 can provide solutions to engineers with the 1GHz/600MHz widest frequency bandwidth.



■ High power laser waveform

High-brightness analog oscilloscopes meets for continuous low-repetition rate pulse signal.
The TS-81000/80600 can provide new safety evaluation style as for high power laser with video output and LAN interface.



■ EMC (Electro Magnetic Compatibility)

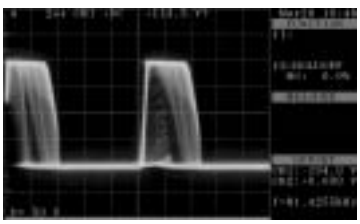
1GHz oscilloscopes are recommended to use for checking of Electro discharge waveform of IEC61000-4-2 standard.
The TS-81000 has ability to storage high-speed single-shot signal like the picture. It is also possible to automatically output stored single-shot waveform.

■ Large-capacity transmission

Digitized video data is sent via high-speed serial transmission line.
The TS-81000 accurately displays subtle variation such as overshoot of serial data signal waveforms.

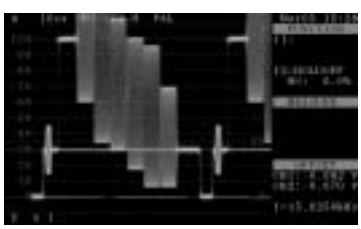
■ Evaluation of Power-factor improvement circuit (Power supply)

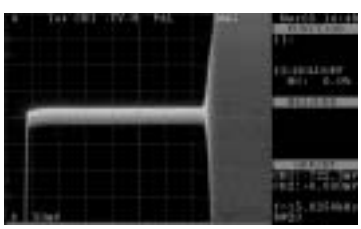
The TS-81000/80600 displays jitter contained waveforms with brightness variation in real time.

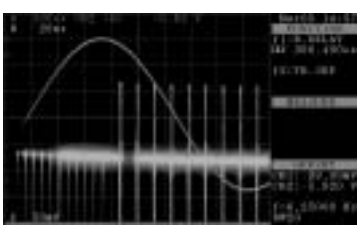


■ Video signal

TS-81000/80600 displays details of video signal accurately. It can clearly show slow repetition video signal details with ultra-high brightness in persistence function.
The TS-81000/80600 has suitable functions for video signal such as TV trigger including HD-TV, two kinds of Video scales, TV clamp, 4field selector and dual delay, etc.







※TV1, TV2 and custom graficule are selectable.

Unique!

State of the art Analog Storage Oscilloscope with Ultra-high brightness!

Maximum writing speed of 10div/ns, Sharp traces and 800 x 480dots high resolution color display!

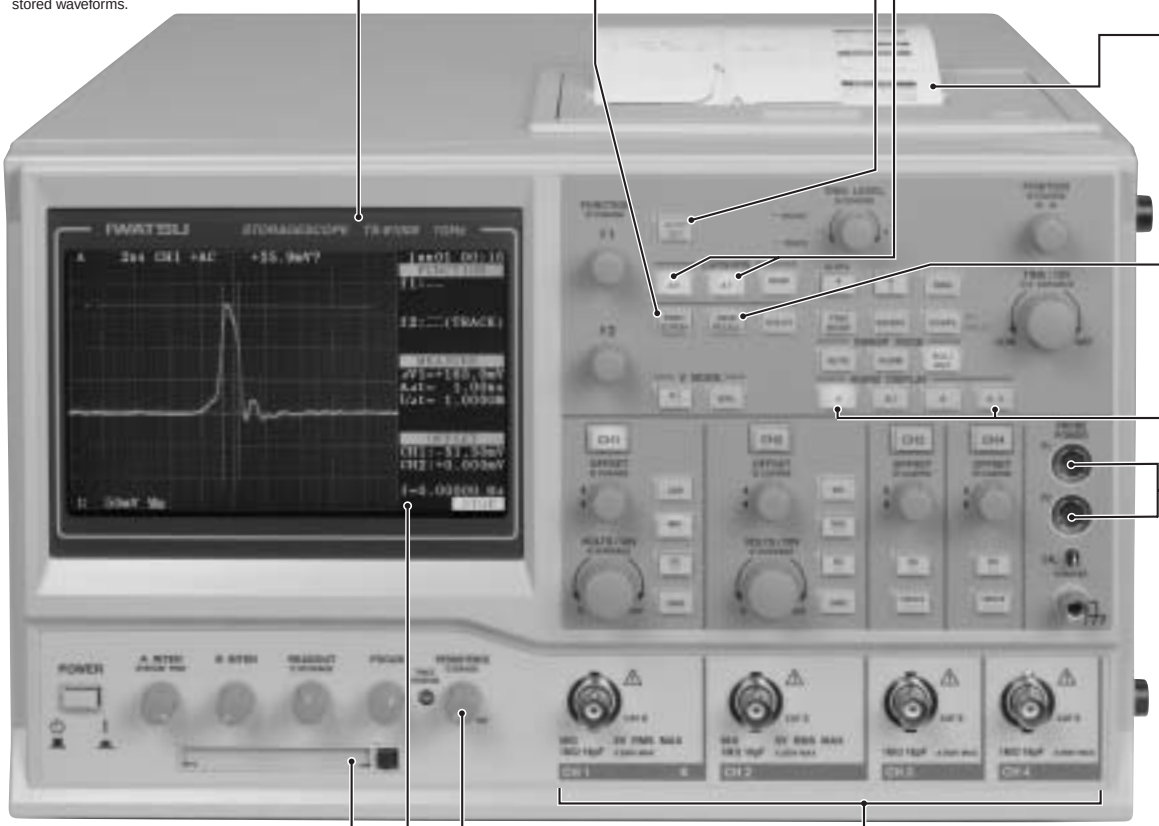
Difficulty in trouble-shooting are typically single-shot phenomena or intermittent phenomena or noises.
The TS-81000/80600 can precisely capture irregular noises in clear display. Among its many powerful features are: 1,000 times brightness than conventional analog oscilloscopes, DC-1GHz/600MHz bandwidth, waveform acquisition of up to 1 million times per second and variable time persistence function.
Moreover, as implementation of the CCD scan converter tube allows no fear of burning and no limit on viewing time. The video output connector allows waveform to be transferred to a personal computer equipped with a video capture card or ethernet interface (10Base-T).

High resolution 5.8-inch color LCD (800 x 480dots)
The newly developed scan converter tube provides a sharp, bright waveform display. Individual colors can be assigned from seven colors (white, red, blue, yellow, magenta, light blue, green) to persistence and stored waveforms.

Print screen
Hard copy to the built-in printer, ATA card and Network.

Quick Auto setup
At the touch of a key, input waveforms can be displayed in the optimum range on the LCD display. Applicable to both CH1 and CH2 with a frequency range from 50Hz to 200MHz.

Cursor measurement
ΔV and Δt can be selected with one-touch operation. Simultaneous 4-cursors measurement is also available.



Built-in Printer
Built-in thermal printer can hard copy displayed waveform. (Print speed max. 10mm/sec)

Save/Recall
Up to 256 panel setups and 6 reference waveforms can be saved/recalled.

Dual delay
Two delay times are provided for B sweeps, allowing delay expansion at two positions.

2 power supply connectors for active proves
SFP-5A(1GHz)/SFP-4A(800MHz) FET probes and SS-240(50MHz) current probe can be used.
※The FET probes and current probe are optionally available.

1GHz/600MHz maximum frequency bandwidth
CH1 and CH2 have the highest 1GHz/600MHz frequency bandwidth and 500MHz frequency bandwidth for CH3 and CH4. (DC-1GHz 50Ω, DC-500MHz 1MΩ, passive probe SS-101R is optionally available.)
※DC-6GHz, 10:1 optional probe SS-090 is also available.

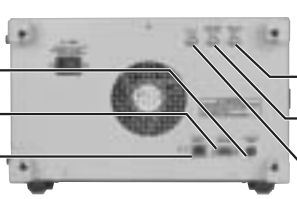
PC card slot
Stores display image and set-up data

Built-in 6-digit frequency counter
(2Hz to 1GHz/600MHz, accuracy ±0.01%)

Persistence
The persistence time can be set from 0 to infinity. Color display is also available.

※Please visit our web site and confirm our recommendation for PCMCIA card
http://www.iti.iwatsu.co.jp

Rear panel



S Video output (NTSC)
RGB output (VGA-Wide)
Ethernet I/F (10Base-T)

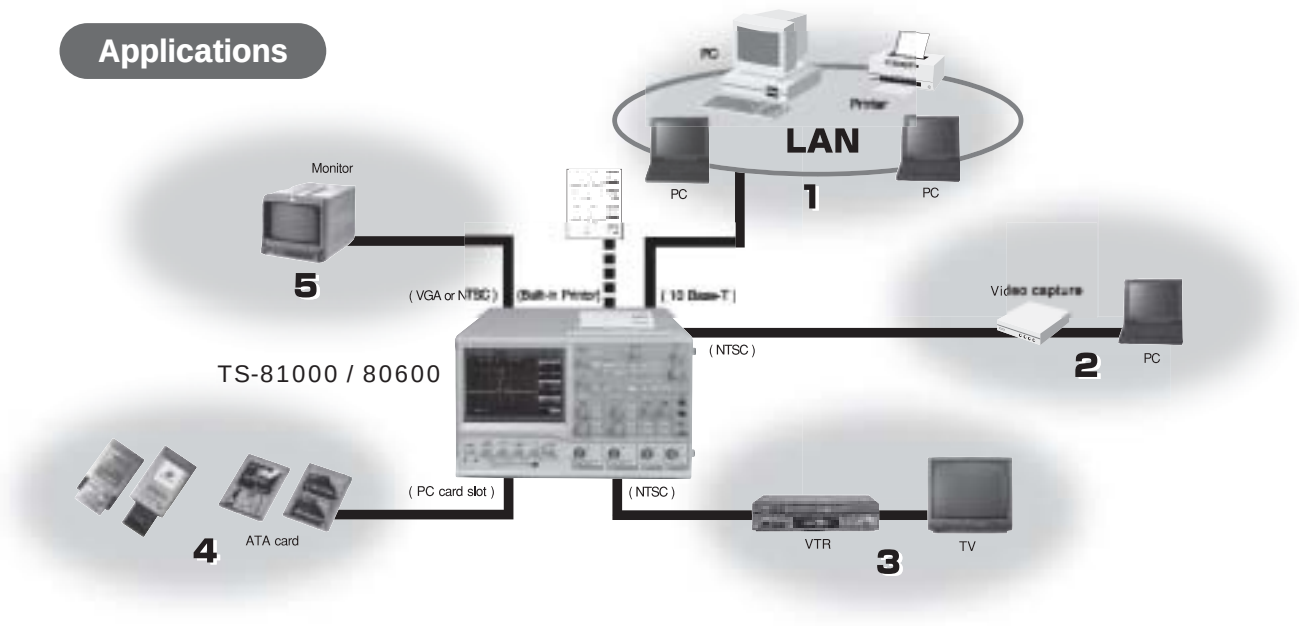
Video output (Composite, 1V)
Z axis input (0.5Vp-p, DC – 5MHz)
CH2 signal output (20mV/div, 500MHz/300MHz)

Enhanced documentation functions!

Built-in thermal printer, LAN environment, Personal Computers, External printers, Video recorders, Monitors, ATA cards etc. Various output interfaces are provided.

1. LAN interface allows you to externally control TS-81000/80600 through network. Net work printer function is also supported.
2. Video capture is available with Personal Computer and video capture card(NTSC).
3. It is possible to check by recording for a long time on VTR.
4. Since ATA card slot is standard, waveform and setting conditions can be stored to ATA card (Smart Media, Compact Flush Card etc.).
5. It is possible to observe with large-size monitor so you can share measured results.

Applications



■ Remoto control through LAN

Remote control is available through LAN. Video signal(NTSC, VGA) can be delivered.Real time waveform observation is available without any load for network.

※Remote control software is required.

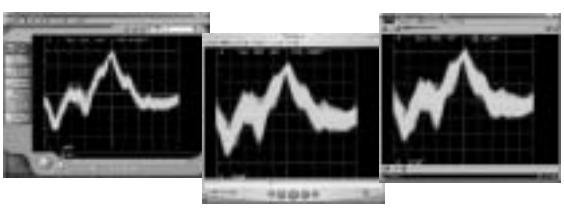
Please visit our web site to download
"Remote Control" and "Network Printer Gateway" software
http://www.iti.iwatsu.co.jp

■ Network printer support

Hard copy to printers which connected to LAN is available by using "Network Printer Gateway" software.

■ NTSC output

It is possible to store displayed waveform as a Moving Picture after exchange of Video signal by using video capture unit.



■ Saving as a numeric data file from displayed waveform

It is possible to exchange displayed waveform to numeric data. The picture displays graph written by CALC application software.

Specifications

Display section
- **Type** 5.8-inch color LCD (800 x 480dots)
  8div x 10div (60dots/div, Graticules selectable)

Storage CRT
- **Type** 2-inch dia., CCD scan converter tube (380,000pixels)
- **Persistence characteristics**
  - **Fastest writing speed** 10div/ns
  - **Persistence time** Valuable, infinite persistence

Vertical deflection system (Y axis)
- **Mode** CH1, CH2, CH3, CH4, ADD(CH1±CH2), ALT/CHOP(555kHz±1%)
- **CH1, CH2**
  - **Sensitivity Range** 50Ω :5mV/div~1V/div 8steps (1-2-5)
    1MΩ :5mV~5V/div 10steps (1-2-5)
  - **Variable** adjustable less than 1/2.5
  - **Accuracy** ±2%
  - **Frequency bandwidth(-3dB)**
    50Ω : DC~1GHz(10mV~1V/div,TS-81000)
    DC~600MHz(10mV~1V/div,TS-80600)
    DC~500MHz(5mV~9.9mV/div)
    1MΩ : DC~500MHz(10mV~5V/div) at the tip of SS-101R probe
    DC~350MHz(5mV~9.9mV) at the tip of SS-101R probe
    ✚Passive probe Model SS-101R is optional
  - **Rise time** 350ps, 50Ω 10mV~1V/div(TS-81000)
    583ps, 50Ω 10mV~1V/div(TS-80600)
    (Calculated from freq. Bandwidth x rise time = 0.35)
  - **Offset voltage** 5mV~50mV/div : ±1V
    100mV~500mV/div : ±10V
    1V~5V/div : ±100V
  - **Offset accuracy** ±(1.5%+0.5% of full scale + 1mV)
  - **Input RC** 50Ω :±2%
    1MΩ :±1% // 16pF
    (DC1MΩ 5mV~5V/div, AC1MΩ 100mV~5V/div)
  - **Input coupling** DC50Ω, DC1MΩ, AC1MΩ, GND
  - **Max. input voltage** 50Ω :5Vrms
    1MΩ :250Vmax(DC + Peak AC, at 5kHz or less)
- **CH3, CH4**
  - **Sensitivity Range** 100mV/div, 500V/div
  - **Accuracy** ±2%
  - **Frequency Bandwidth(-3dB)** DC~500MHz
  - **Offset voltage** 100mV/div : ±1V
    500mV/div : ±5V
  - **Input RC** 1MΩ : ±1% // 16pF
  - **Input coupling** DC, AC
  - **Max. input voltage** 1MΩ :250Vmax (DC + Peak AC, at 5kHz or less)
- **ADD**
  - **Frequency Bandwidth(-3dB)**
    DC~ 1GHz(10mV~ 1V/div) at 50Ω input(TS-81000)
    DC~ 600MHz(10mV~ 1V/div) at 50Ω input(TS-80600)
- **Lower cutoff for AC couple** 10Hz(-3dB)
- **Bandwidth limit** 20MHz, 200MHz selectable
- **CH Skew** adjustable CH1 - CH4(1MΩ)
- **Probe sense** 10:1, 100:1 detection
- **Signal delay time** 20ns or more
- **Trace separation** more than 4div

Triggering
- **A triggering**
  - **Frequency** DC - 1GHz(TS-81000) / DC - 600MHz(TS-80600)
  - **Signal sources** CH1, CH2, CH3, CH4, LINE
  - **Coupling** DC:DC - fmax
    AC:100Hz - fmax
    HF-REJ:attenuated at 10kHz or more
    LF-REJ:attenuated at 10kHz or less
  - **Slope** +, –
  - **Sensitivity**

DC - 10MHz	0.4div
- 100MHz	1.0div
- fmax	2.0div

    50Ω 5mV/div~9.9mV/div fmax: 500MHz
    50Ω 10mV/div~1V/div fmax: 1GHz(TS-81000)
    fmax: 600MHz(TS-80600)
- **B triggering**
  - **Frequency** DC - 500MHz
  - **Signal sources** CH1, CH2, CH3, CH4
  - **Coupling** DC:DC - 500MHz
    AC:100Hz - 500MHz
    HF-REJ:attenuated at 10kHz or more
    LF-REJ:attenuated at 10kHz or less
  - **Slope** +, –
  - **Sensitivity**

DC - 10MHz	0.4div
- 100MHz	1.0div
- 500MHz	2.0div

- **TV triggering** NTSC, PAL, CUSTOM
  Line select (1 to 3000), Field select (1,2,4,8)
  CUSTOM (includes HDTV)
  - **Slope** +, –
  - **Sensitivity** 1.5 - 8.0div
    TV clamp available
- **Event trigger**
  - **Count mode** range:1~65535
    Max count frequency: 50MHz
  - **Burst mode** range: 0.15 µs~9.99s

Horizontal deflection system (Y axis)
- **Horizontal display** A, ALT, B, X-Y
- **A sweep**
  - **Sweep mode** AUTO, NORMAL, SINGLE
  - **Max. sweep time** 200ps/div(TS-81000), 500ps/div(TS-80600)
  - **Range** 2ns~200ms/div 25steps, 1-2-5(TS-81000)
    5ns~200ms/div 24steps, 1-2-5(TS-80600)
  - **Variable** 2ns~600ms/div(TS-81000)
    5ns~600ms/div(TS-80600)
  - **Accuracy I(*1)** ±2% (5ns~200ms/div) over center 8div
    ±3% (2ns/div) over center 8div
  - **Accuracy II (*1)** ±5% (5ns~200ms/div) any 2div within center 8div
    ±6% (2ns/div) over center 8div
    (*1) 20ns or 1div for the beginning of the sweep and 20ns for the end of sweep should be excluded. Add 1% when VARIABLE is ON
- **B sweep**
  - **Delay method** Triggered delay (TRIG'D DELAY)
    Continuous delay (RUNS AFTER DELAY)
  - **Max. sweep rate** 200ps/div(TS-81000), 500ps/div(TS-80600)
  - **Range** 2ns~20ms/div 22steps, 1-2-5(TS-81000)
    5ns~20ms/div 21steps, 1-2-5(TS-80600)
  - **Accuracy I (*2)** ±2% (5ns~20ms/div) over center 8div
    ±3% (2ns/div) over center 8div
  - **Accuracy II (*2)** ±5% (5ns~20ms/div) any 2div within center 8div
    ±6% (2ns/div) over center 8div
    (*2) 20ns or 1div for the beginning of the sweep and 20ns for the end of sweep should be excluded.
- **Dual delay** Available
- **Sweep magnification** x 10
- **Delay jitter** less than 1/50000
- **Hold off time** variable 1s. max.

X-Y
- **X axis** CH1
  - **Sensitivity** Same as CH1
  - **Frequency bandwidth** 10MHz(-3dB)
- **Y axis** CH1, CH2, CH3, CH4
  - **Sensitivity** Same as each CH
  - **Frequency bandwidth** Same as each CH
- **X-Y phase difference** Within 3° (DC~5MHz)

CAL signal
- **Waveform** Square-wave
- **Frequency** 1kHz ±0.1%
- **Output voltage** 0.6V ±1%

CH2 OUT
- **Amplitude** 20mV/div ±20% (50Ω load)
- **Frequency bandwidth** 500MHz(-3dB) 50Ω, 10mV/div~ (TS-81000)
  300MHz(-3dB) 50Ω, 10mV/div~ (TS-80600)
- **Output resistance** 50Ω ±10%

Z AXIS IN
- **Intensity modulation voltage** 0.5Vp-p
- **Polarity** Dark with positive voltage and brighter with negative voltage
- **Frequency range** DC~5MHz
- **Input resistance** 5kΩ ±20%
- **Max. input voltage** ±40V max.

Probe power supply
- **Connectors** 2
- **Suitable probes** SFP-4A, SFP-5A, SS-240

Auto Setup
- **Auto Setup** Input sensitivity, Offset, TIME/DIV, Trigger level
  Amplitude: 30mV~35V
  Frequency: 50Hz~200MHz

Cursor measurement
- **Δt** Relative time difference measurement with cursor
  Resolution 1/60div
- **ΔV** Relative voltage difference measurement with cursor
  Resolution 1/60div

Frequency counter
- **Frequency bandwidth** 2Hz～1GHz(TS-81000)
  2Hz～600MHz(TS-80600)
- **Digit** 6digits, accuracy ±0.01%

Clock
- **Display** Month/Date/Time/Minute
- **Accuracy** ±50ppm

Interface
- **Remote control** 10Base-T (Ethernet)
- **PC card slot** ATA card available (PCMCIA Type II)
- **External Monitor out** VGA WIDE
- **NTSC output (Composite, S out)**
  Amplitude: 1Vp-p ±0.3V 75Ω
  Output resistance: approx. 75Ω (AC coupling)
- **Built-in printer** Line Thermal Printer
  Printing speed: 10mm/sec
  Paper size : width 112mm, length 25m

Power supply
- **Voltage range** 100V～240V AC 50/60Hz
- **Power consumption** 200VA max (with printer operation)
- **In the Standby mode** approx. 5VA max.

Weight and dimensions
- **Dimensions** approx. 198H x 332W x 406L mm
  (accessories and projections are not included)
- **Weight** approx. 10kg
  (accessories and options are not included)

Environmental conditions
- **Performance guaranteed temperature** +10˚C～+35˚C
- **Operating range Temperature**
  0～+40˚C
  +5～+40˚C (Built-in printer operation temperature)
- **Humidity** 90% / 40˚C
- **Storage range Temperature** -20˚C - +60˚C 80% RH
- **Operating** 2,000m, air pressure of approx. 79kPa
- **Non operating** 15,000m, air pressure of approx. 12kPa
- **Preheating time** These specifications are guaranteed after power has been on for 30 minutes or more.

Accessories Instruction manual (1), Power cord (1), Printer thermal paper (1)

SCOPE WAGONS

●MT-600

Carrying capacity:Max.less than 60Kg
(50Kg for tray,10Kg for bottom tray)

●MT-45

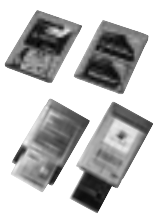
Carrying capacity:Max.less than 50Kg
(30Kg for tray,20Kg for bottom tray)

OUTPUT DEVICES

■For PC

●Video capture

●ATA card



＊Please visit our web site and confirm our recommendation for PCMCIA card.
http://www.iti.iwatsu.co.jp

PROBES

■Passive Probes

●SS-101R
10:1,DC～500MHz,1.2m

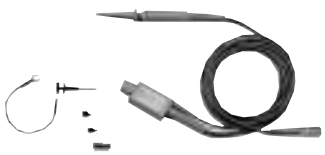
＊Any proves are not provided as standard accessory.

●SS-090
10:1,DC～6GHz,
500Ω(at 50Ω),1m

●SS-078R
100:1,DC～250MHz,2.5kV

■FET Probes

●SFP-5A 1GHz,1.9pF
●SFP-4A 800MHz,2.15pF



■Current Probes

●SS-240 DC～50MHz,
Max.15Ap-p(DC+ACpeak)

■High-voltage diviger

●D-401
400:1,15MHz,15kV

■High-voltage Probes

●HV-P60 2000:1,60kV,50MHz
●HV-P30 1000:1,30kV,50MHz

HV-P60

HV-P30

■Clips

◎Mini Clips

●HP-1 0.8 to 2.54mm,length 30mm,10pcs/set
●FP-7L 0.3 to 1.0mm length14mm,10pcs/set
●FP-2S 0.2 to 0.5mm,length 8mm,10pcs/set
●FP-7 0.3 to 1.0mm,length1.3mm,10pcs/set

GR-CF

●GR-CF Probe exchange with FP-7L×2(suitable for SS-101R)

COAXIAL PARTS

●BB-50M1 1GHz,0.5W

●BB-50M10 300MHz,5W

●B-50D3 3GHz,2W,3terminals

●BB-120C/BB-150C
BNC-BNC 1.2m&1.5m

●AA-20B 2GHz,20dB,0.5W

●BNC cable B
BNC-Alligator Clips, 1.5m

PRINTER PAPER

●TF50KS-E2
112mm width 25m length
10roles/1Box

＊1roll is attached as standard accessory.