9. Appendix

9.1 Appendix a Specifications

9.1.1 Oscilloscope

Only if other instructions are provided, are all technical specifications applicable to the probe with the 10X attenuation switch setting and the HDS series digital type oscilloscope. In order to be up to these specifications, the oscilloscope should meet the following requirement.

■   The instrument should operate continuously for more than 30 minutes under the specified operating temperature.

■   If the operating temperature is up to or larger than 5 Celsius degrees, the system function menu must be opened to make the system perform a "Auto- calibration" procedure.

Except those specifications marked with the word **Typical**, all specifications can be up to.

Sampling

Sampling modes	Normal sampling
	Peak detection
	Average value
Sampling rate	100 MS/s

Input

Input coupling	DC, AC
Input impedance	1M Ω ±2% connected in parallel with 20pF±5pF
Probe attenuation coefficient	1X, 10X, 100X, 1000X
Max. Input voltage	400V (peak)
Channel delay time（typical）	150ps

Horizontal

Sampling rate range	10S/s～100MS/s
Waveform interpolation	（sin x）/x
Record length	6K points on each channel
Scanning speed range（S/div）	5ns/div～5s/div, stepping in the "1-2.5-5" mode.
Sampling rate and relay time accuracy	±100ppm(any time interval which is equal to or larger than 1ms)
Time interval（△T)measurement accuracy（full bandwidth）	Single: ± (1 sampling interval time+100ppm × reading+0.6ns)
	>average 16 : ±(1 sampling interval time +100ppm× reading+0.4ns)

Vertical

Analog digital converter（A/D）	With the resolution of 8 bits, make sampling on both channels synchronously.
Sensitivity range （V/div）	5mV/div～5V/div（at the input BNC）
Displacement range	±50V(500mV～5V),±1V(5mV～200mV)
Analog bandwidth	20MHz
Single bandwidth	Full bandwidth
Low frequency response （ AD coupling, -3dB）	≥5Hz（at the BNC ）
Rise time（typical one at the BNC）	≤17.5ns
DC gain accuracy	±5%
DC measurement accuracy（average value sampling mode）	The voltage difference (△V) between any two points on the waveform after averaging the captured waveforms more than 16: ±(5% reading + 0.05 divisions).

Trigger

Trigger sensitivity （Edge triggering）	DC coupling	CH1 and CH2: 1div(DC～full bandwidth)
	AC coupling	Same as the DC coupling when it is equal to or larger than 50Hz.
Triggering level range		±6 divisions from the screen center
Triggering level accuracy (typical) which is applicable to the signal with rise and fall time equal to or longer than 20ns	±0.3 divisions	
Trigger displacement	655 divisions for pre-triggering and 4 divisions for post-triggering	
Make a 50% level setting (Typical).	Operation with the input signal frequency equal to or larger than 50Hz.	
Trigger sensitivity (Video triggering and typical mode)	2 divisions of peak-to-peak value	
Signal system and line/field frequency (Video triggering mode)	Support the NTSC, PAL and SECAM broadcasting systems of any field or line frequency.	

Measurement

Cursor measurement	Voltage difference (△V) and time difference (△T) between cursors
Auto measurement	Peak-to-Peak voltage, mean voltage, root mean square value, frequency and period.

Probe

	1X position	10X position
Bandwidth	Up to 6 MHz (DC)	Up to full bandwidth (DC)
Attenuation rate	1: 1	10: 1
Compensation range	20pf～40pf	
Input resistance	1MΩ±2％	10MΩ±2％
Input impendence	85pf～115pf	14.5pf～17.5pf
Input voltage	150 V DC	300 V DC

9.1.2 Meter

Voltage (VDC)

Input Impedance: 10MΩ.

Max. Input Voltage: 1000V (DC or AC peak-to-peak value)

Range	Accuracy	Resolution
400.0mv	±1.5%±2digit	100uV
4.000V	±1%±1 digit	1mV
40.00V		10mV
400.0V		100mV

Voltage (VAC)

Input Impedance: 10MΩ.

Max. Input Voltage: 750V (AC, virtual value)

Frequency range: from 40Hz to 400Hz.

Display: Virtual value of the sine wave

Range	Accuracy	Resolution
4.000V	±1%±3 digits	1mV
40.00V		10mV
400.0V		100mV

Direct Current (DC)

Range	Accuracy	Resolution
40.00mA	±1.5%±1 digit	10uA
400.0mA	±1.5%±1 digit	100uA
10A	±3%±3 digit	10mA

Alternating Current (AC)

Range	Accuracy	Resolution
40.00mA	±1.5%±3 digit	10uA
400.0mA	±2%±1 digit	100uA
10A	±5%±3digit	10mA

Resistance

Range	Accuracy	Resolution
400.0 Ω	±1%±3 digit	0.1Ω
4.000KΩ	±1%±1 digit	1Ω
40.00KΩ		10Ω
400.0KΩ		100Ω
4.000MΩ		1KΩ
40.00MΩ	±1.5%±3 digit	10KΩ

Capacitance

Range	Accuracy	Resolution
51.20nF	±3%±3 digit	10pF
512.0nF		100pF
5.120uF		1nF
51.20uF		10nF
100uF		100nF

Diode

Voltage reading: 0 V ～1.5 V.

On-off Test

There is a beep sound when the on-resistance is less than 30Ω.

9.1.3 General Specifications

Basic parameter

Mechanical dimension	18 cm×11.5cm×4cm
Weight	645 g
Power consumption	＜ 6 W
Display type	3.8" color liquid crystal display
Display resolution	320 (horizontal) ×240 (vertical) pixels
Display color	4096 colors

Power Adapter

Power supply	100-240 V AC 50/60Hz

Power output	8.5 VDC
Current output	1500 mA

Working environment

Temperature

Operation

Used battery   0 to 50 °C (32 to 122 °F)

Power adapter   0 to 40 °C (32 to 104 °F)

Storage.   -20 to +60 °C (-4 to 140 °F)

Temperature

Operation:

0   to 10 °C (32 to 50 °F)   no condensation

10 to 30 °C (50 to 86 °F)   95 %

30 to 40 °C (86 to 104 °F)   75 %

40 to 50 °C (104 to 122 °F)   45 %

storage

-20 to +60 °C (-4 to +140 °F).   no condensation

9.2 Appendix B: Maintenance and Cleaning

9.2.1 Maintenance

Do not store or place the instrument in locations where the liquid crystal display (LCD) may be directly exposed to the sunshine for a long time.

Be careful: Do not spray liquid into the instrument.

Cleaning

Inspect the instrument and the probe frequently in accordance with operating conditions. Clean the outer surface of the instrument according to the following steps:

1. Wipe off the floating dust outside of the instrument and the probe by using soft cloth. When cleaning the LCD, do not scuff the transparent LCD protective screen.
2. Wipe the instrument in power off status by soft cloth that is moist but not dripping. It is allowed to be cleaned by soft detergent or fresh water. Do not use any abrasive chemical detergent to avoid the instrument or the probe being damaged.

Warning: Before running, please confirm that the instrument has been dried out so as to avoid electrical short circuit and personal injury caused by moisture.

9.2.2 Storage of Oscilloscope

If the test tool is to be stored for a long time, it is required to charge the lithium battery before