

1. FEATURES

The Hitachi portable read-out oscilloscope provides measurement reliability and ease of operation by employing a microprocessor. The major features are:

(1) Measurement information display

The measurement information including the sweep speed, the delay time, the UNCAL display, and the voltage sensitivity of the vertical axis (Cursor Readout type only) is alphanumerically displayed on the CRT.

Since troublesome setting operation procedures are eliminated, an operator can concentrate on the displayed data for measurement.

(2) Measurement value display (Cursor Readout type only)

The distance between the two cursors displayed can read out the following:

ΔV : Voltage between the reference cursor and the delta cursor

ΔT : Time between the reference cursor and the delta cursor

$1/\Delta T$: Reciprocal of the time

The displayed data eliminates troublesome and time consuming calculation procedures. Moreover, miscalculation of the scales is completely avoided.

(3) Automatic time base range setting

At a press of the AUTO button, an optimum time base range is automatically set. (A signal period from 1.6 to 4 cycles approx. is displayed.)

The time base range is automatically changed to a corresponding change in input signal period.

(4) Frequency counter (Cursor Readout type only)

The A TRIG signal frequency can be measured.

(5) Trigger lock

Since complicated pulse train waveforms are hard to trigger on, performing the trigger lock function enables sweep independent triggering.

The "sweep time plus holdoff time" is fixed and a stable trigger is obtained at any time range.

(6) Channel input Quad channel input (V-1585, V-1085 on

Besides CH1 and CH2, CH3 and CH4 provided with 0.5 V/DIV and 0.1 V/DIV range selection capabilities are provided for easy digital signal measurement.

(7) Bandwidth

V-1585, V-1085, V-1565, V-1065A, V-1560, V-1060

DC-100MHz (2mV/div: DC-20MHz)

V-695, V-665A, V-660

DC-60MHz (2mV/div: DC-10MHz)

(8) High sensitivity

High sensitivity of 2 mV/div is provided.

(9) Internal graticule

Internal graticule lines eliminate parallax-viewing error between the trace and the graticule lines.

(10) Delayed sweep

With delayed sweep, a portion of the signal can be magnified for more accurate measurement and time comparison. The delay time is digitally displayed on the CRT.

(11) Auto trigger level

Auto measuring of trigger level is employed, so that trigger level range is matched to the trigger signal for maximum trigger sensitivity and stability.

(12) TV triggering

Exclusive TV sync separator circuit technology provides stable TV signal measurements on fields, frames and lines.

(13) Memory backup (V-1585, V-1085 only)

The panel conditions are retained for more than 48 hours after power off. Therefore, it is not necessary to perform the panel settings when performing the same measurement the day after tomorrow.

10. SPECIFICATIONS

	V-1585 V-1085	V-1565 V-1065A	V-1560 V-1060	V-695 V-665A	V-660
CRT					
Graticule	6-inch screen with internal graticule 0%, 10%, 90% and 100% markers 8 × 10 DIV (1 DIV = 1cm)	←	←	←	←
Phosphor	P31	←	←	←	←
Accelerating potential	17kV approx.	←	←	12kV approx.	←
External intensity modulation	Coupling: DC coupling Voltage: 5V or more Maximum input voltage: 30V (DC + AC peak or 30Vp-p AC at 1kHz or less Bandwidth: DC to 5MHz	←	←	←	←
Vertical deflection system					
Sensitivity	<CH1 and CH2> 2mV/DIV to 5V/DIV ±3% (switchable in 11 steps) Continuously variable	←	←	←	←
	<CH3 and CH4> 0.1V/DIV and 0.5V/DIV ±3% selectable	Not provided	←	←	←

	V-1585 V-1085	V-1585 V-1065A	V-1560 V-1060	V-695 V-665A	V-660
Bandwidth	DC to 100MHz -3dB 2mV/DIV: DC to 20MHz -3dB AC low pass:10Hz	←	←	DC ~60MHz DC ~10MHz	←
Rise time	3.5ns approx. 2mV/DIV: 17.5ns approx.	←	←	5.9ns approx. 35ns approx.	←
Delay time	Leading edge can be monitored	←	←	←	←
Maximum input voltage	400V (DC + AC peak) at 1kHz or less	←	←	←	←
Input coupling	<CH1 and CH2> AC, DC, GND	←	←	←	←
	<CH3 and CH4> AC, DC	Not provided	←	←	←
Input impedance	1M ohms + 1.5%, 23pF approx.	←	←	←	←
Display modes	CH1, CH2, DUAL, CHOP (250kHz approx.) QUAD, ADD (DIFF mode can be established when the CH2 is in the INVERT mode.)	QUAD mode is not provided	←	←	←
Bandwidth limiting function	20MHz	←	←	10MHz	←
Polarity selection	± (CH2 only)	←	←	←	←

	V-1585 V-1085		V-1565 V-1065A	V-1560 V-1060	V-695 V-665A	V-660
Common-mode rejection ratio	20dB minimum at 20MHz		←	←	10MHz	←
X-Y operation	X-axis, Y-axis selectable		←	←	←	←
Sensitivity	X axis	CH1, CH2 2mV to 5V/div ± 5%	←	←	←	←
		CH3, CH4 0.1V, 0.5V/div ± 5%	Not provided	←	←	←
			EXT 0.1V/div ± 5% EXT ÷ 10 1V/div ± 5%	←	←	←
	Y axis 2mV to 5V/DIV ± 3%		←	←	←	←
	Phase error	3° or less from DC to 50kHz		←	←	←
X bandwidth	DC to 500kHz (-3dB)		←	←	←	←
Horizontal deflection system						
Trigger mode	Norm trigger, auto trigger		←	←	←	←
Sweep mode	Main sweep, continuous delay sweep, alternate sweep, single sweep		←	←	←	←
Trigger source	A: CH1, CH2, ALT, CH3, CH4 LINE (ALT is available at NORM trigger) B: Follows A sweep.		CH1, CH2, EXT (AC, DC, DC ÷ 10), LINE	←	←	←

	V-1585 V-1085	V-1565 V-1065A	V-1560 V-1060	V-695 V-665A	V-660
TV trigger	Exclusive sync separator circuit provided Sync polarity: –	←	←	←	←
Trigger sensitivity					
NORM mode	See table 10-1	See table 10-2	←	See table 10-3	←
AUTO mode	See table 10-4	See table 10-5	←	See table 10-6	←
TV mode	Sync signal INT:1div or more	INT: 1div or more EXT: 200mVp-p or more	←	←	←
Trigger level: Variable range					
AUTO	Automatically corresponds to the trigger signal	←	←	←	←
NORM	± 4DIV or more	INT: ± 4div or more EXT: ± 0.4V or more EXT: ÷ 10 ± 4V or more	←	←	←
Slope	±	←	←	←	←
External input impedance	Not provided	1MΩ ± 5%, 25pF ± 6pF	←	←	←

	V-1585 V-1085	V-1565 V-1065A	V-1560 V-1060	V-695 V-665A	V-690									
External input voltage	Not provided	400V(DC + AC peak) at 1kHz	←	←	←									
Sweep time A(main) sweep B(delay) sweep	50ns/DIV to 0.5s/DIV Continuously variable (UNCAL) 50ns/DIV to 50ms/DIV	←	←	←	←									
Accuracy	<table><tr><td></td><td>10 to 35°C</td><td>0 to 50°C</td></tr><tr><td>X1</td><td>± 3 %</td><td>± 4 %</td></tr><tr><td>MAG × 10</td><td>± 4 %</td><td>± 6 %</td></tr></table>		10 to 35°C	0 to 50°C	X1	± 3 %	± 4 %	MAG × 10	± 4 %	± 6 %	←	←	←	←
	10 to 35°C	0 to 50°C												
X1	± 3 %	± 4 %												
MAG × 10	± 4 %	± 6 %												
Sweep magnification	X10	←	←	←	←									
Maximum sweep rate	5ns/DIV	←	←	←	←									
Hold off time	Variable	←	←	←	←									
Delay time	1μs to 5s	←	←	←	←									
Delay jitter	1/20,000 or less	←	←	←	←									
Alternate separation	Variable	←	←	←	←									
Trigger lock function	Provided	←	←	←	←									
Auto range function	Provided	←	←	←	←									

	V-1585 V-1085	V-1565 V-1065A	V-1560 V-1060	V-695 V-665A	V-660
Single sweep function	Provided	←	←	←	←
Frequency counter Frequency measurement	Source: A trigger signal	←	Not provided	Same as V-1585, V-1085	Not provided
Measuring range	20Hz to 100MHz See table 10-7	50Hz to 100MHz See table 10-8	Not provided	50Hz to 60MHz See table 10-9	Not provided
Time base error (15°C to 35°C)	100PPM See table 10-7	100PPM See table 10-8	Not provided	100PPM See table 10-9	Not provided
Memory backup function	The panel condition can be maintained for 48 hours or more after the power switch is turned to OFF.	Not provided	←	←	←
Readout function (Panel setting display)	Vertical axis: V/DIV (CH1, CH2), UNCAL, probe conversion	←	Not provided	Same as V-1585, V-1085	Not provided
	Sweep speed: S/DIV, UNCAL, MAG(converted value)	←	←	←	←
	Other: Delay time	←	←	←	←
Cursor readout function	Voltage difference ΔV : Δ -REF Time difference ΔT : Δ -REF	←	Not provided	Same as V-1585, V-1085	Not provided

	V-1585 V-1085	V-1565 V-1065A	V-1560 V-1060	V-695 V-665A	V-660
Cursor readout function	Frequency $1/\Delta V$: Δ -REF	←	Not provided	Same as V-1585, V-1085	Not provided
External output TRIGGER SIGNAL OUT	Output voltage: 25mV/DIV approx. (Full scale on the CRT) 50-ohm termination Frequency response: DC to 10MHz Output impedance: 50ohms approx.	←	Not provided	Same as V-1585, V-1085	Not provided
Calibration Waveform Voltage	1kHz $\pm 20\%$, square wave 0.5V $\pm 1\%$	←	←	←	←
Power supply	90V to 250V AC 48 to 440Hz	←	←	←	←
	42W approx.	40W approx.	←	←	←
Others Dimensions	310(W) $\times$ 130(H) $\times$ 370(D)mm approx. (12.2(W) $\times$ 5.1(H) $\times$ 14.6(D)in. approx.)	275(W) $\times$ 130(H) $\times$ 360(D)mm approx. (10.8(W) $\times$ 5.1(H) $\times$ 14.2(D)in. approx.)	←	←	←
Weight	7kg approx. (15.4lb. approx.)	6kg approx. (13.2lb. approx.)	←	←	←
Ambient temperature	Operation: 0 to 50°C (32 to 122°F)	←	←	←	←

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Ambient temperature	Safe operating: 10 to 35°C (50 to 95°F) Storage: -20 to 70°C (-4 to 158°F)	←	←	←	←
Humidity	Operating mode: 35 to 85% Non-operating mode: 45 to 85%	←	←	←	←
EMI	VDE 0871, Category B	←	←	←	←

Table 10-1

Frequency	DC to 20MHz	20MHz to 100MHz
CH1, CH2	0.35 div	1.5 div
CH3, CH4	0.5 div	1.5 div

Table 10-2

Frequency	DC to 20MHz	20MHz to 100MHz
INT	0.35 div	1.5 div
EXT	50 mV	150 mV

Table 10-3

Frequency	DC to 10MHz	10MHz to 60MHz
INT	0.35 div	1.5 div
EXT	50 mV	150 mV

Table 10-4

Frequency	30Hz to 100Hz	100Hz to 20MHz	20MHz to 100MHz
CH1, CH2	1.5 div	1 div	1.5 div
CH3, CH4	1.5 div	1 div	1.5 div

Table 10-5

Frequency	30Hz to 100Hz	100Hz to 20MHz	20MHz to 100MHz
INT	1.5 div	1 div	1.5 div
EXT	150mV	100mV	150mV

Table 10-6

Frequency	30Hz to 100Hz	100Hz to 10MHz	10MHz to 60MHz
EXT	1.5 div	1 div	1.5 div
INT	150mV	100mV	150mV

Table 10-7

Ranges	Display format	Resolution	Accuracy
$20\text{Hz} \leq f < 100\text{Hz}$	99.99Hz	0.01Hz	Ref. signal ± 1 LSD
$100\text{Hz} \leq f < 1\text{kHz}$	999.9Hz	1.0Hz max	
$1\text{kHz} \leq f < 10\text{kHz}$	9.999kHz	0.002kHz max	
$10\text{kHz} \leq f < 100\text{kHz}$	99.99kHz	0.04kHz max	
$100\text{kHz} \leq f < 1\text{MHz}$	999.9kHz	0.1kHz	
$1\text{MHz} \leq f < 10\text{MHz}$	9.999MHz	0.002MHz max	
$10\text{MHz} \leq f < 100\text{MHz}$	99.99MHz	0.01MHz	
$100\text{MHz} \leq f$	(999.9MHz)	Not specified	

Table 10-8

Ranges	Display format	Resolution	Accuracy
$50\text{Hz} \leq f < 100\text{Hz}$	99.99Hz	0.01Hz	Ref. signal ± 1 LSD
$100\text{Hz} \leq f < 1\text{kHz}$	999.9Hz	1.0Hz max	
$1\text{kHz} \leq f < 10\text{kHz}$	9.999kHz	0.002kHz max	
$10\text{kHz} \leq f < 100\text{kHz}$	99.99kHz	0.04kHz max	
$100\text{kHz} \leq f < 1\text{MHz}$	999.9kHz	0.1kHz	
$1\text{MHz} \leq f < 10\text{MHz}$	9.999MHz	0.002MHz max	
$10\text{MHz} \leq f < 100\text{MHz}$	99.99MHz	0.01MHz	
$100\text{MHz} \leq f$	(999.9MHz)	Not specified	

Table 10-8

Ranges	Display format	Resolution	Accuracy
$50\text{Hz} \leq f < 100\text{Hz}$	99.99Hz	1.00Hz	Ref. signal ± 1 LSD
$100\text{Hz} \leq f < 1\text{kHz}$	999.9Hz	1.0Hz max	
$1\text{kHz} \leq f < 10\text{kHz}$	9.999kHz	0.002kHz max	
$10\text{kHz} \leq f < 100\text{kHz}$	99.99kHz	0.04kHz max	
$100\text{kHz} \leq f < 1\text{MHz}$	999.9kHz	0.1kHz	
$1\text{MHz} \leq f < 10\text{MHz}$	9.999MHz	0.002MHz max	
$10\text{MHz} \leq f < 60\text{MHz}$	59.99MHz	0.01MHz	
$60\text{MHz} \leq f$	(59.99MHz)	Not specified	