DUAL TRACE OSCILLOSCOPE

Model - KM-20-10 : 20MHz Oscilloscope

KM-20-20 : 20MHz Oscilloscope With Frequency Counter

These 20MHz Oscilloscope are dual - channel oscilloscope with maximum sensitivity of 1 mV/DIV. The time base provides a maximum sweep time of 0.2 mS/DIV. When magnified by 10, the sweep speed is 20nS/DIV. These oscilloscope employ a 6-inch rectangular type TOSHIBA cathode-ray tube with red internal graticule.

These oscilloscopes are sturdy, easy to operate and exhibit high operational reliability.

GENERAL SPECIFICATIONS

Input Power	AC 110/220V ±10%
Power Consumption	App. 40 VA
Weight	Approx. 8kg.
Frequency	50/60 Hz
Dimension	310(W) x 150(H) x 455(D)mm.

FEATURES :

- ✴ **High luminance, internal graticule Toshiba CRT**
- ✴ **Japanese electronic encoder, light handy and reliable**
- ✴ **Fully sealed long live vertical mode switch**
- ✴ **ALT Triggering Function. Two independent signals simultaneous observation.**
- ✴ **Triggering Level Lock Function, Automatic Synchronize Function.**
- ✴ **Built - in 6 Digit Frequency Counter. (* available in model KM-20-20)**
- ✴ **High intensity CRT with high acceleration voltage : The CRT is a high beam transmission, high intensity type with a high acceleration voltage of 2KV. It displays clear readable traces even at high sweep speeds.**
- ✴ **The Oscilloscope has a trigger level lock function which makes the triggering adjustment unnecessary.**
- ✴ **Alternate triggering : Even an observation of two waveforms of different frequencies, the waveform of the each channel is stably triggered.**
- ✴ **TV sync triggering : The oscilloscope has a sync separator circuit for triggering of TV-V and TV-H signals.**
- ✴ **CHI Output : Terminated 50 W output of channel 1 signal available on rear panel for driving frequency counter or other instruments.**
- ✴ **Z-Axis Input : Intensity modulation capability permits time or frequency markers to be added. Trace blank with positive signal, TTL compatible.**
- ✴ **X-Y operation : Set the switch to X-Y. Then the instrument works as an X-Y oscilloscope. CH1 can be applied as horizontal deflection (X-axis) while CH2 provide vertical deflection (Y-axis).**

SPECIFICATIONS

VERTICAL AXIS	Sensitivity	5mV ~ 20V/DIV
	Sensitivity accuracy	3% (x5 MAG : 5%)
	Vernier vertical sensitivity	To 1/2.5 or less of panel-indicated value.
	Frequency bandwidth	DC ~ 20MHz (x5 MAG:DC ~ 7MHz) AC coupling:Low limit frequency10Hz. (with reference to 100KHz, 8DIV. Frequency response with-3dB.)
	Rise time	Approx.17.5nS (x5MAG:Approx.50nS)
	Input impedance	Approx. 1M ohm // Approx. 25pF
	Square wave characteristics	Overshoot: 5% (At10mV/DIV range) Other distortions and other ranges : 5% added to the above value.
	DC balance shift Linearity	Adjustable on panel. ±0.1 DIV of amplitude change when waveform of 2 DIV at graticule center is moved vertically.

All Specifications are subject to change without prior notice

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VERTICAL AXIS	Vertical modes	CH1 : CH1 single channel. CH2 : CH2 single channel. DUAL : CH1 and CH2 are displayed. ALT or CHOP selectable at any sweep rate. ADD: CH1 + CH2 algebraic addition.
	Chopping repetition frequency	Approx. 250KHz
	Input coupling	AC, GND, DC
	Maximum input voltage	300V peak (AC : frequency 1 KHz or lower). When set probe switch at 1:1, the maximum effective readout is 40Vpp (14Vrms at sine wave), or set probe switch at 10:1, the maximum effective readout is 400Vpp (140Vrms at sine wave).
	Common mode rejection ratio	50:1 or better at 50KHz sinusoidal wave. (When sensitivities of CH1 and CH2 are set equally)
	Isolation between channels	>1000:1 at 50KHz
	(At 5mV/DIV range)	>30:1 at 20MHz
	CH1 signal output	At least 20 mV/DIV into a 50 ohm termination. Bandwidth is 50Hz to at least 5MHz.
	CH2 INV BAL.	Balanced point variation : 1 DIV(Reference at center graticule.)

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TRIGGERING	**Triggering source**	CH1, CH2, LINE, EXT(CH1 and CH2 can be selected only when the vertical mode is DUAL or ADD. In ALT mode, if the TRIG. ALT switch is pushed in, it can be use for alternate triggering of two different source.
	Coupling	AC : 20 Hz to full bandwidth
	Slope	+ / -
	Sensitivity	20 Hz ~ 2 MHz : 0.5 DIV, TRIG - ALT : 2 DIV, EXT : 200 mV
		2 ~ 20 MHz : 1.5 DIV
		TRIG - ALT : 3 DIV, EXT : 800 mV
		TV : Sync pulse more than 1 div (EXT : 1V)
	Triggering modes	AUTO: Sweeps run in the free mode when no triggering input signal is applied. (Applicable for repetitive signals of frequency 25Hz or over.) NORM: When no triggering signal is applied, the trace is in the ready state and not displayed. TV-V : This setting is used when observing the entire vertical picture of television signal. TV-H : This setting is used when observing the entire horizontal picture of television signal. (Both TV-V and TV-H synchronize only when the synchronizing signal is negative)
	EXT triggering signal input **Input impedance** **Max. input voltage**	Approx. : 1M ohm // approx.25pF 300V (DC + AC peak), AC: Frequency not higher than 1KHz
HORIZIONAL AXIS	**Sweep time**	0.2 Sec ~ 0.5 Sec / DIV, 20 steps in 1-2-5 sequence
	Sweep time accuracy	+/-3%
	Vernier sweep time control	1/2.5 of panel-indicated value
	Sweep magnification	10 times
	x10MAG sweep time accuracy	+/-5% (20nSec~50nSec are uncalibrated)
	Linearity	+/-3%, x10MAG: +/-5% (20ns and 50ns are uncalibrated)
	Position shilft caused by x 10MAG	Within 2 DIV. at CRT screen center
X-Y MODE	**Sensitivity**	Same as vertical axis. (X-axis: CH1 input signal; Y-axis:CH2 input signal).
	Frequency bandwidth	DC to at least 500KHz
	X-Y phase difference	3° at DC ~ 50KHz

SPECIFICATIONS

Z AXIS	**Sensitivity**	20Vp-p (Positive-going signal decreases intensity)
	Frequency bandwidth	DC ~ 2 MHz
	Input resistance	Approx. 47K ohm
	Max. input voltage	30V (DC+AC peak, AC frquency 1KHz)
CALIBRATION VOLTAGE	**Waveform**	Positive-going square wave
	Frequency	Approx. 1 KHz
	Duty ratio	Within 48:52
	Output voltage	2Vp-p +/-2%
	Output impedance	Approx. 1 K ohm.
CRT	**Type**	6-inch rectangular type, internal graticule.
	Phosphor	P31
	Acceleration voltage	Approx. 2KV
	Effective screen size	8 x 10 DIV (1 DIV=10mm(0.39in)
	Graticule	Internal
	Trace rotation	Provided

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