SPECIFICATIONS

CRT

Model:	150KTM31
Type:	Rectangular, with internal graticule
Accelerating potential:	20kV
Display area:	8 div x 10 div (1 div = 1 cm)

VERTICAL AXIS (Channel 1 and Channel 2 identical specifications)

Sensitivity	5mV/div to 5V/div (X1 mode) 1 mV/div to 1V/div (X5 mode) 500μV/div (Cascaded operation, CH1 to CH2)
Accuracy:	± 2% (10 ~ 35°C) ± 4% (0 ~ 50°C) ± 7% (Cascaded operation, CH1 to CH2)
Attenuator:	5mV/div to 5V/div in 1-2-5 sequence, all 10 ranges with fine adjustment. between steps.
Input resistance:	1 MΩ ± 1%
Input capacitance:	Approx 22pF
Frequency response	
DC:	DC to 100 MHz (–3 dB) DC to 140 MHz (–6 dB) (unapplied x 5 GAIN mode) DC to 70 MHz (–3 dB) Cascaded operation, CH1 to CH2
AC:	5 Hz to 100 MHz (–3 dB) 5 Hz to 140 MHz (–6 dB) (unapplied x 5 GAIN mode) 7 Hz to 70 MHz (–3 dB), Cascaded operation, CH1 to CH2
Risetime:	3.5ns
Signal delay time:	Approx 10ns as displayed on CRT screen
Crosstalk:	–40 dB minimum
Operating modes:	
CH1	CH1, single trace
CH2	CH2, single trace
DUAL	CH1 and CH2, dual trace
ADD	CH1 + CH2 (added) display
QUAD	CH1 ~ CH4, quad trace
ALT	Dual or quad trace alternating
CHOP	Dual or quad trace chopped
CHOP frequency:	Approx 250 kHz, adjustable
Channel polarity:	Normal or inverted, CH2 only inverted
⚠ Maximum input voltage:	800 Vp-p or 400V (dc + ac peak)
Maximum undistorted amplitude:	8 divisions, minimum (DC to 100 MHz)
Bandwidth limiting:	Vertical system bandwidth with the 20 MHz BW pushbutton switch pushed is approximately 20 MHz
Delay time difference	
CH1 to CH2:	Less than 0.5ns
CH1, CH2 to CH3, CH4:	Less than 1ns

VERTICAL AXIS (Channel 3 and Channel 4 common specifications)

Sensitivity	0.1V/div, 1V/div ± 2%
Attenuator:	1/1, 1/10
Input resistance:	1 MΩ ± 1%
Input capacitance:	Approx. 22 pF
Input coupling mode:	DC only
Frequency response:	DC to 100 MHz (–3 dB) DC to 140 MHz (–6 dB)
Risetime:	3.5ns
Signal delay time:	Same as CH1 and CH2
Maximum allowable voltage	
DC component:	± 0.5V or less (ac + dc) (± 5V, 1/10 attenuated)
AC component:	1 Vp-p (10 Vp-p, 1/10 attenuated) or less
⚠Maximum input voltage:	400V (dc + ac peak)

HORIZONTAL AXIS (Channel 2 input)

Modes:	X-Y mode is switch selectable (HORIZ DISPLAY)
X-Y mode:	CH1: Y-axis CH2: X-axis
Sensitivity:	Same as CH2
Accuracy:	Same as CH2
Input resistance:	Same as CH2
Input capacitance:	Same as CH2
Frequency response:	
DC:	DC to 5 MHz (–3 dB) DC to 7 MHz (–6 dB)
AC:	5 Hz to 5 MHz (–3 dB) 5 Hz to 7 MHz (–6 dB)
X-Y phase difference:	Less than 3° at 100 kHz

SWEEP

Modes	(switchable with the HORIZ DISPLAY switch):
A	A sweep
ALT	B sweep waveform is displayed as an intensified portion of the A sweep and B sweep alternating
A-INT-B	B sweep waveform is displayed as an intensified portion of the A sweep.
B DLY'D	Delayed B sweep

SPECIFICATIONS

DUAL	Dual sweep – A and B sweeps, independently
X-Y	X-Y display mode
A sweep time:	20 ns/div to 0.5s/div in 23 ranges, in 1-2-5 sequence, verninier control provides fully adjustable sweep time between steps.
B sweep time:	20ns/div to 50ms/div in 20 ranges, in 1-2-5 sequence.
Accuracy:	±2% (10 ~ 35°C) ±4% (0 ~ 50°C)
Sweep magnification:	X10 ±5% (10 ~ 35°C) ±6% (0 ~ 50°C)
Linearity:	20ns/div to 0.5s/div ±3% (±5% with X10 magnification)
HOLDOFF:	Continuously adjustable for A sweep from NORM to X5
Trace separation:	B positionable up to 4 divisions separated from A sweep, continuously adjustable.
Delay method:	Continuous delay, Trigger delay
Delay time:	0.2 to 10 times the sweep time from 200ns to 0.5s, continuously adjustable.
Time difference measurement accuracy:	±(1% of measurement + 0.1% of full scale) (10 ~ 35°C) ±4% (0 ~ 50°C)
Delay jitter:	1/20000 of the full scale sweep time.

TRIGGERING

A TRIG

A trigger modes:	AUTO, NORM, SINGLE, FIX: at the center of the waveform
Trigger source:	V MODE, CH1, CH2, (EXT) CH3 1/1 and 1/10, LINE
Coupling modes:	AC, LFREJ, HFREJ, DC, VIDEO VIDEO-LINE sync automatically selected at sweep times of 50 μs/div to 20ns/div. VIDEO-FRAME sync automatically selected at sweep times of 0.5s/div to 0.1ms/div.
Trigger level:	±90° adjustable
Polarity:	+/–

B TRIG

B trigger modes:	STARTS AFTER DELAY, TRIGGERABLE AFTER DELAY
Trigger source:	CH1, CH2, (EXT) CH4 1/1 and 1/10
Coupling modes:	AC, LFREJ, HFREJ, DC
Trigger level:	±90° adjustable
Polarity:	+/–

TRIGGER SENSITIVITY (A AND B)

COUPLING	FREQ RANGE	MINIMUM SYNC AMPLITUDE		
		INT	EXT	EXT 1/10
DC	DC ~ 20 MHz DC ~ 50 MHz DC ~ 100 MHz	0.5 div 1.0 div 1.5 div	50 mV 100 mV 210 mV	0.5V 1.0V 2.1V
AC	Same as for DC but with increased minimum level for below 20 Hz.			
AC HFREJ	Increased minimum level below 20 Hz and above 30 kHz.			
AC LFREJ	Increased minimum level below 30 kHz.			
VIDEO	FRAME/LINE	0.5 div	50 mV	0.5V

Table-1

AUTO: Same as above specifications for above 50 Hz.

FIX:	40 Hz ~ 20 MHz 1.0 div (100 mV) 40 Hz ~ 100 MHz 1.5 div (210 mV)
Jitter:	0.5ns maximum at 100 MHz 2ns/div sweep rate (X10 MAG on)

CALIBRATING VOLTAGE AND CURRENT

1 kHz	±3% Positive square wave
1V	±1% (10 ~ 35°C) ±2% (0 ~ 50°C)
10 mA	±2% (10 ~ 35°C) ±4% (0 ~ 50°C)

INTENSITY MODULATION

Input signal:	TTL level, intensity decreasing with more positive levels
Input impedance:	Approx. 10 kΩ
Usable frequency range:	DC to 10 MHz
⚠Maximum input voltage:	50V (dc + ac peak)

VERTICAL AXIS OUTPUT

	Sampled CH1 output
Output voltage:	50 mVp-p/div (into 50Ω load)
Output impedance:	Approx. 50Ω
Frequency response:	DC to 100 MHz (–3 dB) (into 50Ω load)

GATE OPUTPUT (A and B)

Output voltage:	Approx. 1.5V positive gate (into 500Ω load)

TRACE ROTATION

Electrical, adjustable

POWER SUPPLY

Line voltage:	90 ~ 264 V
Line frequency:	45 ~ 400 Hz
Power consumption:	Approx. 55 W (into 100 V, 50 Hz)

SPECIFICATIONS

DIMENSIONS

Width:	284 mm (328 mm)
Height:	138 mm (150 mm)
Depth:	400 mm(471mm)
	( ) dimensions include protrusions from basic case outline dimensions.

WEIGHT 7.4 kg

ENVIRONMENT

Operating temperature and humidity for guaranteed specifications:	10 ~ 35°C, 85% maximum RH
Full operating range:	0 ~ 50°C, 90% maximum RH
Storage temperature and humidity range:	−20 ~ +70°C 80% maximum
Altitude:	
Operating:	5000 m
Non-operating:	12000 m

CRT 150KTM31 SPECIFICATIONS

Screen and shape

Dimensions

Overall length;	380 mm Max.
Face plate dimensions;	149.3 ±3.0 mm
Screen shape;	Rectangular flat face, internal graticule, metal back
Deflection and focusing system;	Electrostatic deflection, electrostatic focusing and post-deflection acceleration
Color;	Green
Persistence;	Midium short
Useful display area;	Y axis.....80 mm X axis.....100 mm

Heating

Heater voltage;	6.0 V
Heater current;	75 mA
Weight;	Approx. 1.1 kg

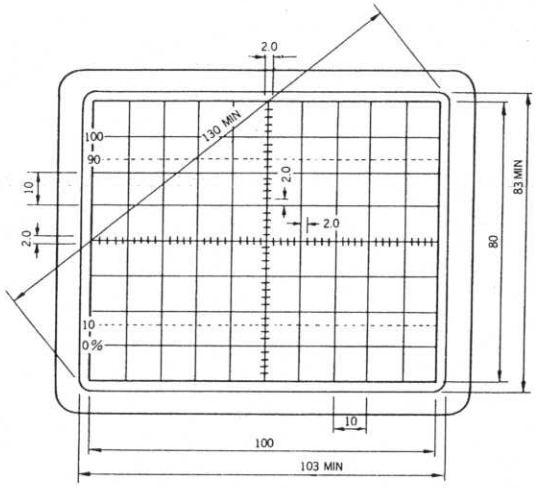

Fig. 1

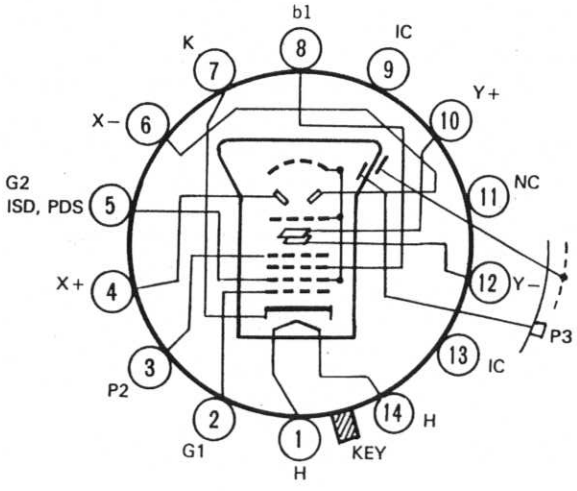

Fig. 2