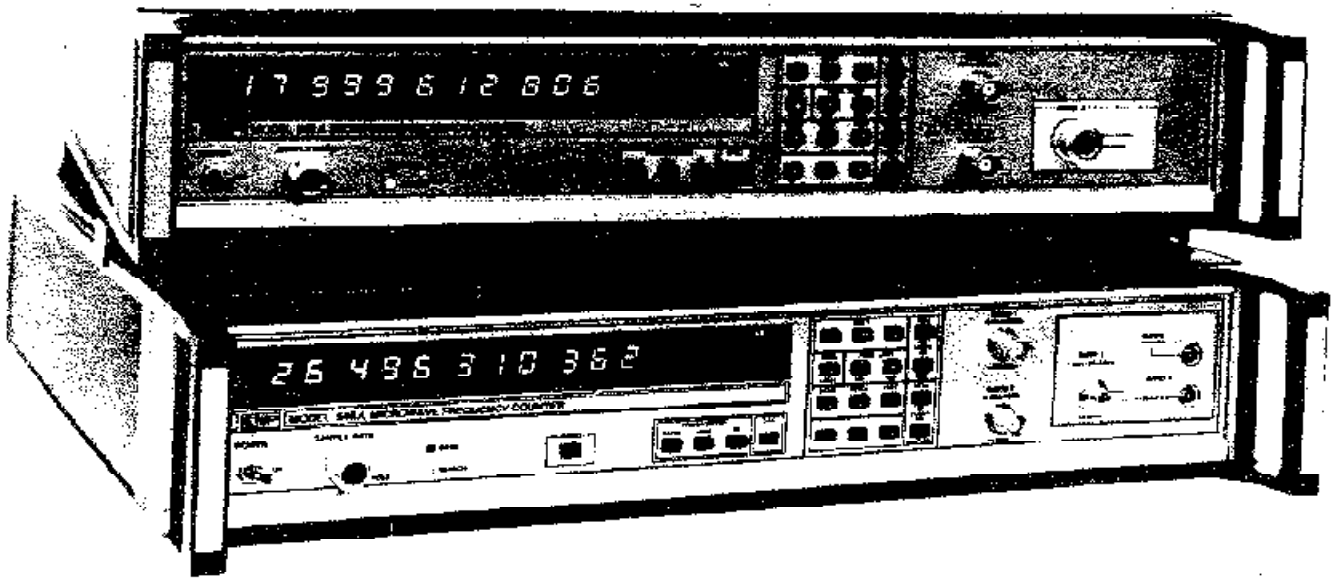
Section 1
General Information



DESCRIPTION

The 54XA series counters are microprocessor-based heterodyne instruments. The 545A and 548A span the frequency range from 10 Hz to 18 GHz and 10 Hz to 26.5 GHz, respectively. The model 548A, when equipped with frequency extension capability (Option 06), is used in conjunction with a remote sensor (See Model 590) to measure up to 110 GHz.

Using keyboard control, the 54XA series counters provide frequency offsets and frequency selectivity. Options include Power Measurement, full Systems capability via GPIB or BCD/Remote Programming and D/A Converter output.

Full frequency range is covered in three bands. Band 1 is a high impedance input (1 M ohm/20 pF), and spans a 10 Hz to 100 MHz range, with a sensitivity of 25 mV RMS. Band 2 has an input impedance of 50 ohms, a 10 MHz to 1 GHz range, with a sensitivity of −20 dBm. Band 3 has an input impedance of 50 ohms nominal over a range of 1 GHz to 18 (or 26.5) GHz, and a sensitivity to −30 dBm. For frequencies above 26.5 GHz a remote sensor, with an appropriate waveguide input, is called Band 4.

Measurements are presented on a 12 digit LED display that is sectionalized to read GHz, MHz, kHz, and Hz. When the optional power measurement function is activated, the digits on the far right display power in dBm with .1 dB resolution, and frequency resolution is limited to 100 kHz.

SPECIFICATIONS

BAND 1	
RANGE	10 Hz to 100 MHz
SENSITIVITY	25 mV rms
IMPEDANCE	1 MΩ/20 pF
CONNECTOR	BNC (female)
MAX. INPUT LEVEL	120 V rms *
DAMAGE LEVEL	150 V rms *
	* (Above 1 KHz max. input will decrease at 6 dB/octave down to 3.0 V rms.)

BAND 2	
RANGE	10 MHz to 1 GHz
SENSITIVITY	-20 dBm
DYNAMIC RANGE	30 dB
IMPEDANCE	50Ω Nominal
CONNECTOR	BNC (female)
MAX. INPUT LEVEL	+10 dBm
DAMAGE LEVEL	+27 dBm
ACQUISITION TIME	< 50 msec

BAND 3		
RANGE	1 GHz to 18 GHz (26.5 GHz for model 548A)	
SENSITIVITY	-30 dBm: 1.0 GHz to 12.4 GHz -25 dBm: 12.4 GHz to 18 GHz	-20 dBm: 18 GHz to 22 GHz -15 dBm: 22 GHz to 26.5 GHz
DYNAMIC RANGE	1 GHz to 12.4 GHz, 37 dB 12.4 GHz to 18 GHz, 32 dB	18 GHz to 22 GHz, 27 dB 22 GHz to 26.5 GHz, 22 dB
IMPEDANCE	50Ω Nominal	
CONNECTOR	Model 545A - Precision type N, (female) Model 548A - APC - 3.5 (female)	
MAX. INPUT LEVEL	+7 dBm	
DAMAGE LEVEL	5 Watts (+37 dBm)	
ACQUISITION TIME	~ 250 msec Independent of frequency	
AUTO AMPLITUDE DISCRIMINATION	(Automatic amplitude discrimination of two frequencies) 10 dB	
FM MODULATION	20 MHz P-P up to 10 MHz rate	
VSWR	< 2.5:1 typical	
FREQUENCY LIMIT	Keyboard control of desired limits (standard). Counter will measure largest signal within programmed limits. Signal outside operating band must be separated by at least 100 MHz from either limit. For signals more than 10 dB above desired signal, separation is typically 200 MHz	

TIME BASE	
FREQUENCY	10 MHz TCXO
AGING RATE	$< \lvert 1 \times 10^{-7} \rvert$ per month
SHORT TERM	$< \lvert 1 \times 10^{-9} \rvert$ rms for one second averaging time.
TEMPERATURE	$< \lvert 1 \times 10^{-6} \rvert$ 0° to +50°C
LINE VARIATION	$< \lvert 1 \times 10^{-7} \rvert \pm 10\%$ change.
WARM UP TIME	NONE
OUTPUT FREQUENCY	10 MHz, square-wave, 1 V p-p minimum into 50 ohms
EXT. TIME BASE	Requires 10 MHz, 1 V p-p minimim into 300 ohms.

SPECIFICATIONS, continued

GENERAL	
RESOLUTION	Front panel keyboard input select 1 Hz to 1 GHz
MEASUREMENT TIME	1 msec for 1 KHz resolution 1 sec for 1 Hz resolution
DISPLAY	12 digit LED sectionalized
ACCURACY	± 1 count ± time base error
TEST	Front panel selected diagnostics
SAMPLE RATE	Controls time between measurements variable from 100 msec typ. to 10 sec. Switchable Hold position holds display indefinitely.
RESET	Resets display to zero and initiates new reading
OFFSETS	Keyboard control of frequency offsets (standard) and power offsets (standard with power measurement Option 02). Displayed frequency (power) is offset by entering value to 1 Hz resolution (0.1 dB power).
OPERATION TEMP.	0°C to 50°C
POWER	100/120/220/240/VAC ± 10% (selectable) 50 to 60 Hz, 60 VA typical
WEIGHT, NET	~ 26 lbs. (11.8 kg)
WEIGHT, SHIPPING	~ 32 lbs. (14.5 kg)
DIMENSIONS (HWD)	3.5" x 16.75" x 14.0" (89 mm X 425 mm X 356 mm)
ACCESSORIES FURNISHED	Power Cord and Manual

BAND 4
Used with 578/06 Counter and 500 Frequency Extension Kit

OPTION	91	92	93	94	95	96
SELECT BAND	41	42	43	44	42 or 43	41 or 42
Waveguide Band	Ka	U	E	W	V	Q
Range	26.5–40 GHz	40–60 GHz	60–90 GHz	90–110 GHz	50–75 GHz	33–50 GHz
Sensitivity (typ)	–25dBm (–20 dBm min)	–25 dBm	–25 dBm	–25 dBm	–25 dBm	–25 dBm
Waveguide Size	WR–28	WR–19	WR–12	WR–10	WR–15	WR–22
Waveguide Flange	UG–599/U	UG–383/U	UG–387/U	UG–387/U	UG–385/U	UG–383/U
Max. Input (typ)	+5 dBm	+5 dBm	+5 dBm	+5 dBm	+5 dBm	+5 dBm
Damage Level	+10 dBm	+10 dBm	+10 dBm	+10 dBm	+10 dBm	+10 dBm
Acquisition Time (typ)	<2.5 sec	<2.5 sec	<2.5 sec	<2.5 sec	<2.5 sec	<2.5 sec

EXAMPLE: If desired measurement is 60 – 90 GHz, the required equipment is:

Model 578 with Option 06 – Extended Frequency and
Model 500 – Extended Frequency Cable Kit with Option 93 – Remote Sensor

SPECIFICATIONS, continued

OPTIONS

See Section 10 for detailed information.

01 D TO A CONVERTER
DAC will convert any three consecutively displayed digits into an analog voltage output on rear panel.

02 POWER METER
1 to 18/26.5 GHz will measure sine wave amplitude to 0.1 dBm resolution from sensitivity to -10 dBm; from -10 dBm to overload and display 0.2 dBm resolution simultaneously with frequency.
Power offset to 0.1 dB resolution, selectable from front panel.
Option will not degrade the basic performance of the counter.

TIME BASE OSCILLATOR OPTIONS:

	03	04	05
AGING RATE/24 HOURS (After 72 hour warm-up)	$< 5 \times 10^{-9}$	$< \lvert 1 \times 10^{-9} \rvert$	$< 5 \times 10^{-10}$
SHORT TERM STABILITY (1 second average)	$< 1 \times 10^{-10}$ rms	$< 1 \times 10^{-10}$ rms	$< 1 \times 10^{-10}$ rms
0° to +50°C TEMPERATURE STABILITY	$< \lvert 5 \times 10^{-8} \rvert$	$< \lvert 3 \times 10^{-8} \rvert$	$< \lvert 3 \times 10^{-8} \rvert$
± 10% LINE VOLTAGE CHANGE	$< \lvert 5 \times 10^{-10} \rvert$	$< \lvert 2 \times 10^{-10} \rvert$	$< \lvert 2 \times 10^{-10} \rvert$

06 EXTENDED FREQUENCY CAPABILITY —548A
Use in conjunction with models 590 Frequency Extension kit

07 REMOTE PROGRAMMING/BCD OUTPUT

08 GPIB – Provides programming and output capability per IEEE 488-1978.

09 REAR INPUT

10 CHASSIS SLIDES