SPECIFICATIONS

	BAND 0 (CW ONLY)
Frequency Range	100 Hz to 250 MHz
Sensitivity	-15 dBm
Connector	BNC
Input Impedance	50 Ω, nominal
Maximum Input	+7 dBm
Damage Level	+20 dBm
FM Tolerance	Carrier must remain in band
Measurement Time ③	
100 Hz Resolution	200 ms
>100 Hz Resolution	$\frac{1}{RES} + 85$ ms
Accuracy ③	ACC = timebase error ±1 count

	BAND 1
Frequency Range	250 MHz to 1 GHz
Sensitivity	-15 dBm
Connector	BNC
Input Impedance	50 Ω nominal
Maximum Input	+7 dBm
Damage Level	+24 dBm
Amplitude Discrimination	10 dB (>100 MHz separation)
FM Tolerance	Carrier must remain in band
Acquisition Time ③	$AC = \frac{1}{MinPRF} + 0.055$
Measurement Time ③	
Pulse	$MT = \frac{(4)(PP)}{(GW)(RES)} + 0.1$
CW	$MT = \frac{4}{(GW)(RES)} + 0.1$
Maximum Video Feedthrough ③ (signal frequency must be >250 MHz)	
Video Frequency >250 MHz	$MV = SL - 20\text{ dB}$
Video Frequency <250 MHz	$MV = SL - 20\text{ dB} + \left(40 \log x \frac{250\text{ MHz}}{fvideo}\right)$
Gate Error ③	$GE = \pm\frac{0.07}{GW}$

SPECIFICATIONS (Continued)

BAND 1 (Continued)

Distortion Error ③	$DE = \pm \frac{0.03}{PW - (3 \times 10^{-8})}$
Averaging Error ③	$AE = \pm 2\sqrt{\frac{RES}{(GW)(AVG)}}$
Accuracy ③	
Pulse	ACC = ±GE ±DE ±AE ± timebase error
CW	ACC = timebase error ±1 count (Based on 10 averages)

BAND 2

Frequency Range	EIP 1230A: 950 MHz to 26.5 GHz EIP 1231A: 950 MHz to 20.0 GHz
Sensitivity	950 MHz to 20 GHz: -20 dBm 20 to 26.5 GHz: -10 dBm
Input Impedance	50 Ω nominal
Connector	EIP 1230A: APC 3.5 EIP 1231A: Precision Type N
Maximum Input	+7 dBm
Damage Level	
Pulse	+53 dBm (<1 μs pulse width, 0.1% duty cycle)
CW	+45 dBm
Amplitude Discrimination	15 dB (>50 MHz separation)
Frequency Limits	Instrument will ignore signals outside of frequency limits.① Resolution: 10 MHz Accuracy: ±50 MHz
Center Frequency	Instrument will lock on signals ≤50 MHz from entered center frequency. Resolution: 10 MHz
FM Tolerance (Up to 10 MHz rate)	20 MHz (p-p)
Acquisition Time ③	
Pulse	
Frequency Limits (Default)	$AQ = 2(FH)\left[(4 \times 10^{-12}) + \frac{(4 \times 10^{-8})}{MinPRF}\right] + \frac{60}{MinPRF} + \frac{(2 \times 10^{-5})(PP)}{GW} + 0.35$
Center Frequency	$AQ = \frac{72}{MinPRF} + \frac{(2 \times 10^{-5})(PP)}{GW} + 0.2$

SPECIFICATIONS (Continued)

	BAND 2 (Continued)
CW	
Frequency Limits (Default)	$AQ = 2(FH)\left[(4 \times 10^{-12}) + \frac{(4 \times 10^{-8})}{MinPRF}\right] + \frac{60}{MinPRF} + 0.25$
Center Frequency	$AQ = \frac{72}{MinPRF} + 0.2$
Measurement Time ③	
Pulse	$MT = \frac{PP}{(GW)(RES)} + 0.2$
CW	$MT = \frac{1}{RES} + 0.2$
Maximum Video Feedthrough	20 dB above signal level
Gate Error ③	$GE = \pm \frac{0.01}{GW}$
Distortion Error ③	$DE = \pm \frac{0.03}{PW - (3 \times 10^{-8})}$
Averaging Error ③	$AE = \pm \sqrt{\frac{RES}{(GW)(AVG)}}$
Accuracy ③	
Pulse	ACC = ±GE ±DE ±AE ± timebase error
CW	ACC = timebase error ±1 count (Based on 10 averages)

	BAND 3 (Option 002)
Frequency Range	26.5 to 170 GHz
Sensitivity	-20 dBm (-25 dBm typical) -15 dBm (110-170 GHz)
Connector	Depends on remote sensor used
Maximum Input	+5 dBm
Damage Level	+10 dBm
Amplitude Discrimination	20 dB
Center Frequency	Instrument assumes any signals present to be in the range ±2 GHz from the specified center frequency and calculates the harmonic number based on this assumption.
FM Tolerance	
Auto Mode	20 MHz p-p
Center Frequency	150 MHz p-p ②

SPECIFICATIONS (Continued)

BAND 3 (Option 002) (Continued)

Acquisition Time ③

Pulse

Auto Mode $AQ = \frac{70}{MinPRF} + \frac{(6 \times 10^{-3})(PP)}{GW} + 0.25$

Center Frequency $AQ = \frac{70}{MinPRF} + \frac{(8 \times 10^{-4})(PP)}{GW} + 0.25$

CW $AQ = \frac{70}{MinPRF} + 0.25$

Measurement Time ③

Pulse $MT = \frac{(4)(PP)}{(GW)(RES)} + 0.15$

CW $MT = \frac{4}{RES} + 0.15$

Maximum Video Feedthrough 15 mV p-p

Gate Error ③ $GE = \pm \frac{0.03}{GW}$

Distortion Error ③ $DE = \pm \frac{0.02}{PW - (3 \times 10^{-8})}$

Averaging Error ③ $AE = \pm 2\sqrt{\frac{RES}{(GW)(AVG)}}$

Accuracy ③

Pulse ACC = ±GE ±DE ±AE ± timebase error

CW ACC = timebase error ± n^2 counts

$n = \frac{\text{frequency}}{20\ \text{GHz}}$

REMOTE SENSORS

Model 1230A can have its maximum frequency extended, in bands, up to 170 GHz. This requires Option 002, a Frequency Extension Cabling Kit (EIP 890), and one or more of the following remote sensors:

Remote Sensor	Frequency Range (GHz)	Waveguide Size	Waveguide Flange
091	26.5 - 40	WR-28	UG-599/U
092	40 - 60	WR-19	UG-383/U

Remote Sensor	Frequency Range (GHz)	Waveguide Size	Waveguide Flange
094	90 - 110	WR-10	UG-387/U
095	50 - 75	WR-15	UG-385/U
096	33 - 50	WR-22	UG-383/U
097	26.5 - 50	K-Conn. ③	Coaxial
098	110 - 170	WR-6	UG-387/U

STANDARD TIMEBASE

Crystal Frequency	10 MHz (TCXO)
Stability	
Aging Rate	$<1 \times 10^{-7}$/month
Short Term	$<1 \times 10^{-9}$ RMS, 1 s average
Temperature	$<1 \times 10^{-6}$, 0 to 50 °C
Line Variation	$<1 \times 10^{-7}$, ±10% line voltage change
Warm-up Time	30 minutes
Output Frequency	10 MHz square wave, 1 V p-p minimum, into 50 Ω.
External Timebase	Requires 10 MHz square wave, 1 V p-p min., into 300 Ω.

OPTION 006 - OVENIZED HIGH STABILITY TIMEBASE (SC-CUT)

Frequency	10 MHz
Aging Rate	$<5 \times 10^{-10}$/day (after 24 hour warm-up), 1×10^{-7}/year
Short Term Stability (1 second average)	$<1 \times 10^{-10}$ rms
0 to °C Temperature Stability	$<3 \times 10^{-8}$
±10% line voltage change	$<2 \times 10^{-10}$
Warm-up time (at 25 °C)	Within 5×10^{-9} of final value 10 minutes after turn-on Within 1×10^{-9} of final value 30 minutes after turn-on
Phase Noise	-120 dBc/Hz at 10 Hz from carrier

PULSE PARAMETERS

Pulse Width	50 ns to CW
Minimum Profile Window	15 ns
Pulse Repetition Frequency	1 Hz to 4 MHz
Minimum Off Time	200 ns (will count CW)
Minimum On/Off Ratio	15 dB

SPECIFICATIONS (Continued)

PULSE WIDTH MEASUREMENT	
Range	50 ns to 1 s
Resolution	10 ns
Accuracy ③	±20 ns ± (timebase error)(PW)
Measurement Points	6 dB (±1.5 dB) below peak

PULSE PERIOD MEASUREMENT	
Range	250 ns to 1 s
Resolution	10 ns
Accuracy ③	±20 ns ± (timebase error)(PP)
Measurement Points	6 dB (±1.5 dB) below peak

GENERAL	
VXIbus Specifications	
Compatibility	Full compliance with VXIbus Specification Rev. 1.3/1.4
Device Type	Message-based instrument
Protocol	Word serial
Module Size	C-size, three slots wide
Weight	12.5 lbs (Add 1.2 lbs for Option 002 and 0.5 lbs for Option 006.)
Peak Module Current	+5 V: 1.9 A +12 V: 1.0 A - Add 0.6 A for Option 002. Add 0.7 A for Option 006. -12 V: 0.2 A - Add 0.1 A for Option 002. +24 V: 1.0 A -5.2 V: 2.0 A -2 V: 0.75 A
Dynamic Module Current	+5 V: 0.35 A +12 V: 0.08 A -12 V: 0.03 A +24 V: 0.10 A -5.2 V: 0.22 A -2 V: 0.08 A
Cooling	1 mm H_2O @ 4.7 liters/s
Resolution	1 kHz to 1 GHz (100 Hz in Band 0)
Gate Time	10 ms to 1 µs (dependent upon resolution)