product data

XL 3000-series

Microwave Frequency Counters

Ultimate frequency counting

- Simultaneous Frequency and Power measurements
- Wide frequency range from 10 Hz to 60 GHz
- Compact, portable, rugged and battery operated
- High stability Oven-controlled Crystal timebases and ultra-stable Rubidium option
- Short acquisition time (<60ms)
- 5 year warranty
- Outstanding performance/price ratio

Perfect solution in the field...

The 3000-series of combined microwave counters and power meters, providing simultaneous measurement of both frequency and power, suits both field, lab bench and test rack environments.

For ***field applications*** like installation, maintenance and calibration of microwave links, radar CW, microwave transmitters, DAB or DTV links, satellite ground stations or radio base stations, the models in the 3000-series give you ultra-high accuracy in a portable compact, lightweight and rugged design. A weather-resistant instrument back-pack is included.

Atomic clock accuracy in a true portable format: You can bring cal lab accuracy out into the field thanks to an integrated rubidium or high-stability OCXO oscillator. Since both frequency and power verification are standard measurements in field installation and maintenance, you can have both instruments in one box, meaning less to carry around. The same input connector is used for both measurements, which simplifies operation. An optional battery pack is used in environments where no AC power is available, or to keep an OCXO continuously heated during transport for optimum performance. The battery typically provides over 3 hours of continuous operation and automatically charges whenever the counter is connected to the AC mains.

Very Easy to Use: To eliminate operator mistakes, the instruments are very easy to use and require no costly training. The front panel controls are self-explanatory and the read out of result is unambiguous due to the bright LED display which ensures full visibility, whether in full sunlight or in the dark.

Lower operating costs than any competitive solution: In addition to the very affordable purchase price, the instruments are very durable and reliable, and will give you trouble-free operation year after year. A 5 year warranty comes with each instrument.

...or on the bench

For ***bench ant test systems applications*** like R&D, Service, incoming inspection, quality control and manufacturing test of RF components, systems or subassemblies, microwave transmitters/receivers, radar equipment etc, the models in the 3000-series gives you ultra-high performance and remote GPIB connectivity.

Three instruments in one: Measurements are accurate and fast, with less than 60 ms acquisition time. With the Rubidium oscillator option, you will not only get a high-accuracy microwave counter, but also a 10 MHz reference output frequency for the local lab or for the ATE-rack, where you can supply other instruments with an atomic frequency standard. In Test Systems you save valuable space by integrating three instruments in one package; a mm frequency counter, a power meter and a frequency reference.

Oscillator Options

A wide choice of internal time base oscillators are available; the standard TCXO oscillator, two high stability OCXO oscillators, and a Rubidium Frequency Standard. Please see table below for specs.

Telecommunication professionals often have a requirement to measure and verify base station reference oscillators at remote sites. These base station oscillators must be calibrated very accuratly. The optional internal Rubidium Frequency Standard, along with the standard 0.01 Hz resolution in Band 1 meets this requirement, by displaying accurate digits in only 10s.

The Rubidium option counters require four minutes of warmup time and provide measurements only when fully stable - accuracy and reliabilty you can count on!

Oscillator Options Available	Standard TCXO (Note 1)	Option 112 OCXO	Option 120 OCXO	Option 125 Rubidium (Note 2)
Short term stability:	5.1×10^{-9} (t=1s, Allan Dev.)	5×10^{-10} (t=1s, Allan Dev.)	5×10^{-12} (t=1s, Allan Dev.)	1.4×10^{-11} (t=1s, Allan Dev.)
Aging/day:	n.s.	3×10^{-9}	4×10^{-10}	n.s.
Aging/month:	n.s.	n.s.	n.s.	5×10^{-11}
Aging/year:	7.6×10^{-7} (after 45 days)	5×10^{-7}	1×10^{-7} (after 30 days)	2×10^{-10}
Warm-up (time): @ 25°C	4×10^{-7} in 5 min.	1×10^{-8} in 20 min.	5×10^{-8} in 5 min.	5.1×10^{-10} after 4 min. 1×10^{-10} after 10 min. 2×10^{-11} after 60 min.
Temperature: (0°C to 50°C)	1×10^{-6}	1×10^{-8}	7×10^{-9}	3×10^{-11}
MAINS change: (±10%)	5×10^{-9}	1×10^{-9}	2×10^{-9}	N/A

Note 1: The standard TCXO oscillator is installed in the basic unit unless an optional oscillator is selected.

Note 2: Selection of Rubidium Oscillator Option 125 extends the counter chassis depth from 333 mm (13.1 in.) to 368 mm (14.5 in.). Rubidium Oscillator Option 125 is not available with Battery Option 150 counters.

Technical Specifications

Measuring modes

Frequency Band 1

Range: 10 Hz to 120 MHz (model 3120, 3200, 3260);
10 Hz to 100 MHz (model 3400A, 3460, 3600; 1 MΩ);
50 MHz to 250 MHz (model 3400A, 3460, 3600; 50Ω)

Resolution: 0.01 Hz, 1 Hz

Accuracy: ±1 count, ±time base accuracy

Frequency Band 2

Range: 120 MHz to 12.4/20/26,5 GHz (model 3120, 3200, 3260);
200 MHz to 40/46/60 GHz (model 3400A, 3460A, 3600)

Resolution: 1 Hz to 1 MHz in decade steps

Accuracy: ±1 count, ±time base accuracy

Power Band 2

Frequency range: Full frequency range (band 2)

Power range: -35 to +10 dBm

Resolution: 0.1 dBm

Accuracy: ±1 dBm to 26.5 GHz, typical
±2 dBm to 26.5-40 GHz, typical
±3 dBm at 60 GHz, typical

Measurement time: Freq. meas. time +15 ms

Band 1 Specifications

Band 1 Input; 1/1 MΩ

Frequency range: 10 Hz to 120 MHz (model 3120, 3200, 3260)
10 Hz to 100 MHz (model 3400A, 3460A, 3600)

Sensitivity: 25 mVrms

Dynamic range: 25 mV to 1 Vrms

Coupling: AC

Impedance: 1 MΩ/25 pF

Damage level: 250 VAC+DC to 400 Hz, decreasing to 5V at 1 MHz; 5V from 1 MHz to 120 MHz

Connectors: BNC female

Band 1 Input; 1/50 MΩ

(Models 40 GHz and above: 3400A, 3460A&3600)

Frequency range: 50 Hz to 250 MHz

Sensitivity: -25 dBm

Dynamic range: -25 dBm to +10 dBm

Coupling: AC

Impedance: 50Ω nom.

Damage level: +25 dBm

Connectors: BNC female

Band 2 Specifications

Common Specs

(Models 3120, 3200, 3260, 3400A, 3460A, 3600)

Dynamic range: Min. sens. to +10 dBm

Coupling: AC

Impedance: 50Ω nom.

Automatic Amplitude Discrimination: 10 dB separation between 2 signals within 30 MHz, 20 dB otherwise

Integrated Kickback noise: -50 dBm typical

AM tolerance: Any modulation index, provided the minimum signal is not less than the sensitivity spec.

FM tolerance: 20 MHz P-P

Signal acquisition time: <60 ms

Damage level: +25 dBm (for mod 3600 +23 dBm)

VSWR: 2:1 typical (mod 3120/3200/3260)
3:1 typical (mod 3400A/3460A/3600)

Overload indicator: On at +10 dBm nom. to 26.5 GHz, increasing to +15 dBm at 46 GHz, to +20 dBm at 60 GHz

Model 3120 (12.4 GHz)

Frequency range: 120 MHz to 12.4 GHz

Sensitivity: -30 dBm

Connectors: N female

Model 3200 (20 GHz)

Frequency range: 120 MHz to 20 GHz

Sensitivity: -25 dBm

Connectors: N female

Model 3260 (26.5 GHz)

Frequency range: 120 MHz to 26.5 GHz

Sensitivity: -25 dBm

Connectors: SMA female plug

Model 3400A (40 GHz)

Frequency range: 200 MHz to 40 GHz

Sensitivity: -30 dBm to 26.5 GHz
-25 dBm to 40 GHz

Connectors: 2.92 mm female plug

Model 3460A (46 GHz)

Frequency range: 200 MHz to 46 GHz

Sensitivity: -30 dBm to 26.5 GHz
-20 dBm to 46 GHz

Connectors: 2.92 mm female plug

Model 3600 (60 GHz)

Frequency range: 200 MHz to 60 GHz

Sensitivity: -25 dBm to 40 GHz
-15 dBm at 60 GHz
(-20 dBm at 60 GHz typ)

Connectors: 1.85 mm female plug

Additional Technical Data

General

Gate time: 1s, 0.1s, 0.01s & 1.0 ms

Display time: 0.3 s, 3.0 s, Infinite, & Min

Self-test: All digits segments, all LED's, 10 MHz clock, & GPIB address

Display: 11 digits/0.5'' high LED, Overload, decimal point & sign. Simultaneous displays Frequency (with 0.1 MHz resolution) and Power.

Display legend: Hz, kHz, MHz, GHz & dBm

Status indicators: BAND 1, (or BAND 1/1 MΩ, BAND 1/50Ω), BAND 2, EXT REF, DISPLAY TIME, REMOTE, GATE, ΔF, OVERLOAD (band 2 only), POWER METER (band 2 only), & STANDBY

ΔF: Difference between stored and measured frequency

GPIB (IEEE 488 Std-1978)

Programmable: BAND 1, (or BAND 1/1 MΩ, BAND 1/50Ω), BAND 2, RESET, TEST, ΔF

Functions/Controls: DISPLAY TIME, POWER METER, STANDBY & RESOLUTION

Environmental

Operating temp: 0°C to 50°C (std CW)
-0°C to 40°C (battery operation)

Storage temp: -40°C to 71°C (std CW)
-10°C to 40°C (battery operation)

Relative humidity: 95% ±5%, 10°C to 30°C; 75% ±5%, to 40°C; 45% ±5%, >40°C

Vibration limits: 2g

Burn-In: Failure-free burn-in of no less than 100 hours at 40°C

Pollution degree: 1 (no pollution) (EN 61010-1)

Transient overvoltage: Install. Cat II (EN 61010-1)

Cooling: Microwave counters do not contain nor require a cooling fan

Mechanical

Power DC: 11-28 VDC; 20 VA (Std. CW); 12-28 VDC (Opt. 150); 18-28 VDC (Opt. 125)

Power AC MAINS: 90-130 VAC or 180-265 VAC, 45 Hz-440 Hz; 25 VA

Weight Net: 3.6 kg (8 lbs.)/Battery Option 5 kg. (11 lbs)

Weight Shipping: 5.5 kg (12 lbs.)/Battery Option 6.8 kg. (15 lbs)

Internal/External Reference Oscillator

10 MHz ref osc out: 10 MHz, 1 Vrms into 5Ω

Ext ref osc in: 2, 5 or 10 MHz/>0.2 Vrms/1 kΩ

Connectors (IN/OUT): BNC female (rear panel)

Reliability

MTBF: >32,000 hours (MIL-HDBK-217E)

MTTR: 30.92 minutes (MIL-HDBK-472)

Standards Compilance

EC (European Union):
EMC Emissions: Certified to EN 55022:1987 Class B
EMC Immunity: Certified to EN 50082-1:1992
Safety (LVD): Complies with EN 61010-1

ISO 9001:
The Quality System for design and manufacture is registered and certified by TUV Essen to IS

Montreal Protocol: Nil return

Ordering Information

Basic models

3120	Frequency counter 10 Hz to 12.4 GHz
3200	Frequency counter 10 Hz to 20 GHz
3260	Frequency counter 10 Hz to 26.5 GHz
3400A	Frequency counter 10 Hz to 40 GHz
3460A	Frequency counter 10 Hz to 46 GHz
3600	Frequency counter 10 Hz to 60 GHz

Accessories Included

1. One (1) Operating/Maintenance manual
2. One (1) AC power cord, 2 meters

Options/Accessories

150	Battery Option, rechargeable sealed lead/acid battery (3h op time)
170	Rack Ears, RETMA (HxW) 88.9 mm x 482.6 mm (3.5''x 19'')
213	Factory Calibration of microwave counters with TCXO oscillators
214	Factory Calibration of microwave counters with OCXO oscillators
302	Hard shell Case
326	Watertight Case, for severe environmental conditions
336	Weather-Resistant Instrument Back-Pack
320	Spare Battery, 12V/2.3 Ah Rechargable
305	Spare Operating and Maintenance Manual
315	Adapter: V (m) to K (f) (model 3600 only)
316	Adapter: V (f) to WR15 (model 3600 only)
317	Adapter: V (f) to WR19 (model 3600 only)
318	Coax cable, 0.5 m V (m) to V (m) (<60 GHz)
319	Coax cable, 1.0 m V (m) to V (m) (<60 GHz)

Specifications subject to change without notice

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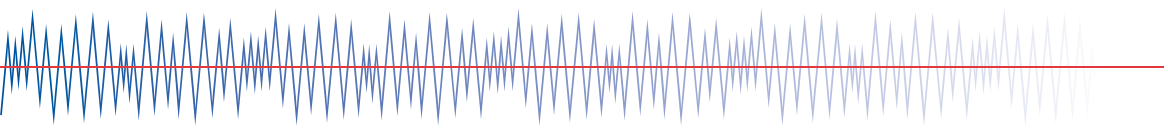
- Experts in time & frequency calibration, measurement and analysis



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Incorporating XL Microwave