

CNT-90XL

60 GHz Microwave Counter/Analyzer

A Revolution in Microwave Frequency Counting

- Speed: 250k measurements/s to internal memory
- CW and burst measurement of frequency & power
- Resolution: 14 digits display
- Statistical analysis including Histogram, trend & modulation domain display
- Frequency range: 27, 40, 46 or 60 GHz models
- Unique ease-of-use: Multi-parameter display & graphical presentation of results
- USB & GPIB as standard
- Outstanding performance/price ratio
- 2 instruments in one - Microwave Counter/Analyzer & 300 MHz general-purpose timer/counter



With the new CNT-90XL Microwave Counter/Analyzer, Pendulum Instruments now offers **The Ultimate Tool** for measurement, analysis and calibration of **Microwave** Frequency and Power. Whether in test systems, on the R&D bench, in the calibration lab or out in the field, the CNT-90XL is the state-of-the-art Microwave Counter/Analyzer and outperforms any existing Microwave counter on the market. The CNT-90XL is the worlds fastest Microwave counter with integrated power meter and offers a unique ease-of-use with graphical display and improved control over measurement at an outstanding price.

Fastest Microwave Counter on the Market

The new CNT-90XL Microwave Counter/Analyzers set new milestones for microwave frequency counting and outperforms any microwave counter on the market regarding resolution, speed and acquisition time. The measurement speed is up to 250 000 frequency samples/s, for advanced statistical analysis.

It is intended for *several applications*, such as:

- Microwave link carrier calibration
- Satellite communication equipment testing
- YIG and VCO testing
- RF and microwave instrumentation calibration
- RF components and modules testing

Product features and benefits:

- Fast high-resolution frequency or power measurements, very short acquisition time of 25 ms (Auto) or zero (Manual)
- Burst measurements via Ext. arming
- High sensitivity (-33 dBm)
- Statistical processing and graphical histogram, trend and modulation display
- Affordable microwave frequency counting

Graphical Display

The graphical display shows frequency changes over time directly on-screen, e.g. fast power switching or FM. Built-in statistical processing presents numerical stability data and also frequency distribution histograms on-screen for analysis of frequency stability or modulation.

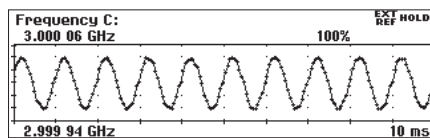


Fig. 1: 1 kHz FM with 12 ppm modulation depth

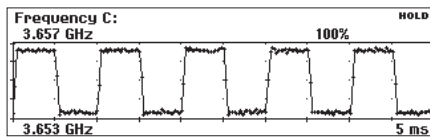


Fig. 2: Pulse modulated frequency

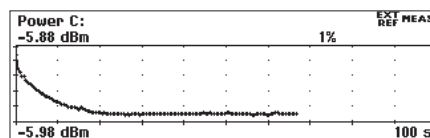


Fig. 3: Generator start-up power settling

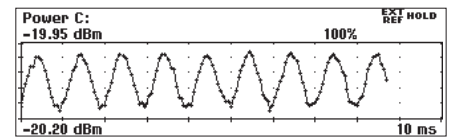


Fig. 4: Very small AM on carrier is visualized

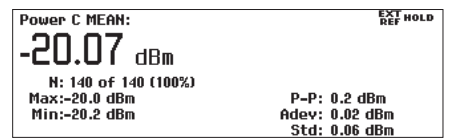


Fig. 5: Numeric statistics screen of the AM signal above

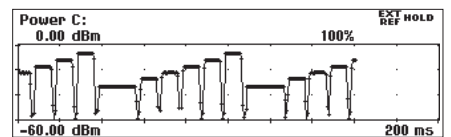


Fig. 6: Power step from generator (-30 to -5 dBm in 5 dBm steps) NOTE: output is turned off shortly betw. power steps

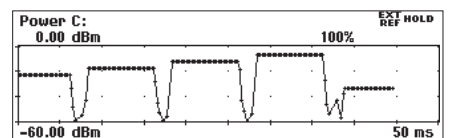


Figure 7: Power step (close up)

CNT-90XL Specifications

INLAY to Product Data CNT-90/91

The CNT-90XL performs measurements on inputs A (300 MHz), input B (300 MHz) and input C (27, 40, 46 or 60 GHz). The specification below only refers to the input C measurements of frequency and power.

For the timer/counter measurements except Frequency on inputs A and B, as well as general CNT-90 data, please consult the CNT-90 data sheet

Measuring Functions

Frequency A, B, C

Range:

Input A, B: 0.001 Hz to 300 MHz

Input C: 300 MHz to 27, 40, 46 or 60 GHz

Resolution: 12 digits in 1s measuring time

Acquisition C: Auto or Manual

Acquisition time: 25 ms in Auto (typ.)

Aux. Parameters:

Input A, B: Vmax, Vmin, Vp-p

Input C: Power C in dBm or W

Frequency burst A, B, C

Range:

Input A, B: 0.001 Hz to 300 MHz

Input C: 300 MHz to 27, 40, 46 or 60 GHz

Acquisition C: Manual

Aux. Parameters: PRF

Period A, B (single or average), C (average)

Range:

Input A, B: 3.3 ns to 1000s

Input C: 3.3 ns down to 37, 25, 22 or 17 ps

Resolution: 100 ps (single); 12 digits/s (average)

Acquisition C: Auto or Manual (within ± 40 MHz)

Acquisition time: 25 ms in Auto (typ.)

Aux. Parameters: See Freq. A, B, or C measurements

Ratio A/B, B/A, C/A, C/B

Range: (10^{-9}) to 10^{11}

Input Frequency:

Input A, B: 0.1 Hz to 300 MHz

Input C: 300 MHz to 27, 40, 46 or 60 GHz

Aux. Parameters: Freq 1, Freq 2

Power C

Range:

Power: -35 dBm to +10 dBm

Frequency: 300 MHz to 27, 40, 46 or 60 GHz

Display units: dBm (default) or W

Resolution: 0.01 dBm @100ms measuring time

Accuracy (typ.): <1 dBm to 27 GHz;

<2 dBm to 40 GHz;

<3 dBm to 60 GHz

Acquisition: Auto or Manual (within ± 40 MHz)

Acquisition time: 20 to 30 ms in Auto (typ.)

Aux. Parameters: Frequency C

Input Specifications

Inputs A and B

Frequency Range:

DC-Coupled: DC to 300 MHz

AC-Coupled: 10 Hz to 300 MHz

Sensitivity: 15mVrms (DC to 200MHz)

25mVrms (200 to 300MHz)

Attenuation: x1, x10

Dynamic Range (x1): 30 mV p-p to 10V p-p within ± 5 V window

Analog Noise Reduction Filter: Nominal 100 kHz, RC-type.

Digital Low Pass Filter: 1 Hz to 50 MHz cut-off frequency

Impedance: 1 M Ω // 20 pF or 50 Ω (VSWR $\leq 2:1$)

Max Voltage Without Damage:

1 M Ω : 350V (DC + AC pk) to 440 Hz, falling to 12V rms (x1) at 1 MHz

50 Ω : 12V rms

Connector: BNC

Input C

Freq. Range: 0.3 to 27, 40, 46, 60 GHz depending on model

Operating input voltage range :

0.3 to 18 GHz: -33 to +13 dBm

18 to 20 GHz: -29 to +13 dBm

20 to 27 GHz: -27 to +13 dBm

27 to 40 GHz: -23 to +13 dBm

40 to 46 GHz: -17 to +13 dBm

46 to 60 GHz: -15 to +10 dBm

Impedance: 50 Ω nominal, AC coupled

VSWR:

0.3 to 27 GHz: <2.0:1 (typ.)

27 to 46 GHz: <2.5:1 (typ.)

46 to 60 GHz: <3.0:1 (typ.)

FM tolerance:

Manual acq.: 50 MHz p-p; freq C >3.5 GHz

30 MHz p-p; freq C <3.5 GHz

Auto acq.: 20 MHz p-p; for any freq C and modulation frequency > 0.1 MHz

AM tolerance: Any modulation index (minimum signal must be within sensitivity range)

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

Max Voltage Without Damage: +27dBm (27, 40, 46 GHz models)

+25dBm (60 GHz model)

Overload indication: ON when input C power >+10dBm

Connector: 27 GHz: SMA

40 and 46 GHz: 2.92 mm sparkplug female

60 GHz: 1.85 mm sparkplug female (all connectors are field replaceable)

Auxiliary Functions

External Start and Stop Arming

Arming can be used to synchronize the frequency and power measurements with the start of a burst signal. Minimum burst length must exceed 100 μ s.

Modes: Start and Stop Arming

Input Channels: A, B or E (Ext. Arming input)

Start Time Delay Range: 20 ns to 2s, 10 ns resolution

Statistics

Functions: Maximum, Minimum, Mean, Δ max-Min, Standard Deviation and Allan Deviation

Display: Numeric, histograms or trend plots

Sample Size: 2 to 2 x 10⁹ samples

Limit Qualifier: OFF or Capture values above/below/inside or outside limits

Mathematics

Functions: (K*X+L)/M, (K/X+L)/M or X/M-1. X is current reading and K, L and M are constants; set via keyboard or as frozen reference value (X₀)

Other Functions

Measuring Time: 20 ns to 1000s

Timebase Reference: Internal, External or Automatic

Display Hold: Freezes result, until a new measurement is initiated via Restart

Stored Instrument Set-ups: 20

Display: Backlit graphics LCD; 320*97 pixels

Interfaces: GPIB (IEEE 488.2, SCPI) and USB

Max. measuring speed

To PC: Individual meas.: 500/s (40/s for Freq. C)

Block meas.: 5000/s (block size 10k measurements)

To internal mem.: up to 250k/s (max 750k stored results)

General Specifications

Environmental Data

Class: MIL-PRF-28800F, Class 3

Operating Temp: 0°C to +50°C

Storage Temp: -40°C to +71°C

Humidity: 5%-95% (10°C-30°C)

5%-75% (30°C-40°C)

5%-45% (40°C-50°C)

Altitude: 4 600m

Vibration: Random and sinusoidal according to MIL-PRF-28800F, Class 3

Shock: Half-sine 30G per MIL-PRF-28800F Bench handling

Transit drop test: According to MIL-PRF-28800F

Safety: EN 61010-1, pollution degree 2, meas cat I, CSA C22.2 No 1010-1, CE

EMC: EN 61326 (1997); A1 (1998), increased test levels according to EN 50082-2, Group 1, Class B, CE

Mains power: 90 to 265V rms, 45 to 440 Hz, <40W

Dimensions and Weight

Width x Height x Depth: 210x90x395 mm (8.25x3.6x15.6 in)

Weight: Net 2.7 kg (5.8 lb), Shipping app. 3.5 kg (app. 7.5 lb)

Ordering Information

Basic Models

CNT-90XL-27G 27 GHz Microwave Counter/Analyzer incl. Standard Time Base

CNT-90XL-40G 40 GHz Microwave Counter/Analyzer including Standard Time Base

CNT-90XL-46G 46 GHz Microwave Counter/Analyzer including Standard Time Base

CNT-90XL-60G 60 GHz Microwave Counter/Analyzer including Standard Time Base

Included with Instrument: 18 months product warranty, line cord, user documentation on CD, and Certificate of Calibration

Time Base Options

Option 19/90 Medium Stability Time Base; 0.2 ppm/month

Option 30/90 Very High Stability Oven Time Base; 0.01 ppm/month

Option 40/90 Ultra High Stability Oven Time Base; 0.003 ppm/month

Optional Accessories

Option 22/90 Rack-Mount Kit

Option 27 Carrying Case - soft

Option 27H Heavy-duty Hard Transport Case

Option 29/90 TimeView Modulation domain Analysis SW for CNT-90XL

Option 90/01 Calibration Certificate with Protocol; Standard oscillator

Option 90/06 Cal. Cert.; Oven oscillator

Option 90/00 Cal. Cert. Frequency ageing/week

Option 95/05 3 years extended warranty

Option 95/05 5 years extended warranty

Specifications subject to change without prior notice

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- Experts in time & frequency calibration, measurement and analysis

Pendulum Instruments is a company of the Orolia Group