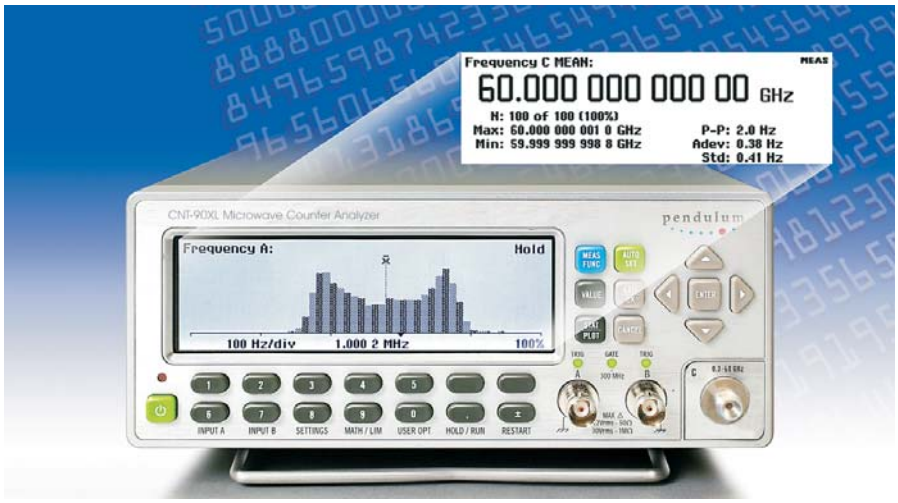
product data

CNT-90XL

60 GHz Microwave Counter/Analyzer

A REVOLUTION IN MICROWAVE FREQUENCY ANALYSIS

- 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 acquistion 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.

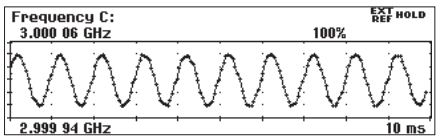


Fig. 1: 1 kHz FM with 12 ppm modulation depth

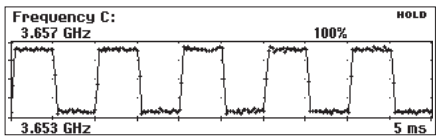


Fig. 2: Pulse modulated frequency

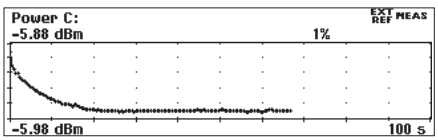


Fig. 3: Generator start-up power settling

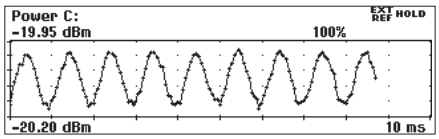


Fig. 4: Very small AM on carrier is visualized

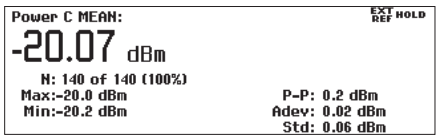


Fig. 5: Numeric statistics screen of the AM signal above

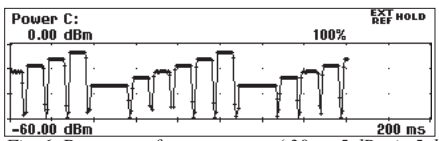


Fig. 6: Power step from generator (-30 to -5 dBm in 5 dBm steps) NOTE: output is turned off shortly betw. power steps

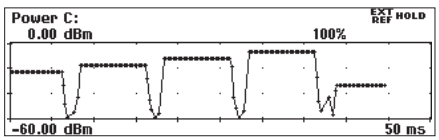


Figure 7: Power step (close up)

pendulum

Incorporating XL Microwave

CNT-90XL Specifications

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:
Input A, B: none
Input C: Auto or Manual (within ±40 MHz)
Acquisition time: 25 ms in Auto (typ.)
Aux. Parameters:
Input A, B: Vmax, Vmin, Vp-p
Input C: Power C in dBm

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

Range:

Input A, B: 3.3 ns to 1000s
Input C: 4 ns down to 37, 25, 22 or 17 ps
Resolution: 100 ps (single); 12 digits/s (average)
Acquisition: Auto or Manual (within ±40 MHz)
Acquisition time: 25 ms in Auto (typ.)
Aux. Parameters: Power C in dBm

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
Resolution: 0.01 dBm @100ms measuring time
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 ±5V window
Analog Noise Reduction Filter: Nominal 100 kHz, RC-type.
Digital Low Pass Filter: 1 Hz to 50 MHz cut-off frequency
Impedance: 1 MΩ // 20 pF or 50Ω (VSWR≤2:1)
Max Voltage Without Damage:
1 MΩ: 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: 0.25 to 27, 40, 46, 60 GHz depending on model
Operating input voltage range :
0.25 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: 50Ω nominal, AC coupled
VSWR:
0.25 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: ±20 MHz (Auto acq.); ±50 MHz (Man.)
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)
Connector:
27 GHz: SMA
40 GHz: 2.92 mm sparkplug female
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 lenght must exceed 10µs.

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, Δmax-Min, Standard Deviation and Allan Deviation
Display: Numeric, histograms or trend plots
Sample Size: 2 to 2 x 10^9 samples
Limit Qualifier: OFF or Capture values above/below/inside or outside limits

Mathematics

Functions: (K*X+L)/M and (K/X+L)/M. X is current reading and K, L and M are constants; set via keyboard or as frozen reference value (X_0)

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 (!EEE 488.2, SCPI) and USB

Max. measuring speed
To PC: 40/s (individual), 5000/s (block)
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 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

4031 601 90101 - rev. 02 October2006

US: Pendulum Instruments Inc
5811 Racine Street; Oakland, CA 94609-1519, USA
Voice:(510)-428-9488 Fax: (510)-428-9469

International: Pendulum Instruments AB
PO Box 20020, SE-16102 Bromma, Sweden
Voice: +46 8 598 51057 Fax:+46 8 598 51040

Pendulum Instruments
www.pendulum-instruments.com

- Experts in time & frequency calibration, measurement and analysis