USB / Ethernet

Integrated Frequency Counter & Power Meter FCPM-6000RC

50Ω -30 dBm to +20 dBm, 1 MHz to 6000 MHz

The Big Deal

- Automatically synchronized power & frequency measurements
- **USB** *and* **Ethernet** control
- Includes GUI with measurement applications software, simplifying complex measurements
- Measurement speed 30ms



CASE STYLE: JL2029 **Software Package**

Included Accessories

Model No.	Description	Qty.
USB-RJ45-CBL-7+	2.6 ft. USB cable	1

RoHS Compliant
See our web site for RoHS Compliance methodologies and qualifications

Applications

- Production testing systems
- Field testing & remote location monitoring
- automatic, scheduled data collection
- Evaluate high-power, multi-port devices with built-in virtual couplers/attenuators & other software tools.

Product Overview

Mini-Circuits' FCPM-6000RC Integrated Frequency Counter & Power Meter is a compact (5.00 x 2.66 x 1.36") precision test device controlled via USB or Ethernet (HTTP and Telnet protocols) or operated as standalone test instrument. It simplifies test setups by enabling synchronized frequency and power measurements from a single device. The unit features an LCD display allowing convenient readings directly off the measurement head, while our user-friendly GUI software enables easy remote test management via USB or Ethernet.

Full software support is provided, including our user-friendly GUI application for Windows and a full API and programming instructions for both Windows and Linux environments (32-bit and 64-bit systems). The latest version of the full software package can be downloaded from **https://www.minicircuits.com/softwaredownload/fcpm.html** at any time.

Key Features

Feature	Advantages
USB & Ethernet control	USB HID and Ethernet (HTTP / Telnet) interfaces provide easy compatibility with a wide range of software setups and programming environments
'Measurement Application' GUI software built-in	Automated measurement setups which allow the user to perform measurements on RF components such as Couplers, Filters, Amplifiers, etc., display numerical data and graphs, and analyze the data.
LCD character display	LCD character display providing the frequency and power readings, as well as information on the unit's status.
Operates with external or internal reference	The FCPM-6000RC can operate either synchronized with an external 10 MHz reference signal or independently, using its internal reference depending on user preference.
No calibration required before taking measurement	The FCPM-6000RC does not require any reference signal for calibration, reducing test time and simplifying operation.
5V power supply	Powered via USB plug from PC, AC adapter or from commercially available Power Over Ethernet (PoE) splitter with 5V output.

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www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

Electrical Specifications (CW) [1], -30 dBm to +20 dBm, 1 to 6000 MHz

Parameter		Freq. Range (MHz)	Min.	Typ.	Max.	Units
Dynamic range [2,3,4]	@ 25ºC	1 - 5700	-30	–	+20	dBm
		5700 - 6000	-28	–	+20	
	@ 0ºC to 50ºC	1 - 6000	-27	–	+20	
VSWR		1 - 6000	–	1.05	1.25	:1
Uncertainty of Power Measurement @ 25ºC	@ -30 to +5 dBm [5,6]	1 - 3000	–	± 0.10	± 0.30	dB
		3000 - 6000	–	± 0.15	± 0.30	dB
	@ +5 to +15 dBm	1 - 3000	–	± 0.15	± 0.30	dB
		3000 - 6000	–	± 0.15	± 0.30	dB
	@ +15 to +20 dBm	1 - 3000	–	± 0.20	± 0.40	dB
		3000 - 6000	–	± 0.20	± 0.40	dB
Uncertainty of Power Measurement @ 0ºC to 50ºC	@ -30 to +5 dBm [5,6]	1 - 3000	–	± 0.25	–	dB
		3000 - 6000	–	± 0.25	–	dB
	@ +5 to +15 dBm	1 - 3000	–	± 0.20	–	dB
		3000 - 6000	–	± 0.20	–	dB
	@ +15 to +20 dBm	1 - 3000	–	± 0.35	–	dB
		3000 - 6000	–	± 0.30	–	dB
Power Linearity @ 25ºC		1 - 6000	–	± 3.0	–	%
Power Resolution		1 - 6000	0.01	–	–	dB
Frequency Resolution		1 - 40 MHz	–	1	–	Hz
		40-190 MHz	–	10	–	
		190-6000 MHz	–	100	–	
Frequency Uncertainty (@1 sec measurement sample time) [4,7]		1 - 40 MHz	–	±2	–	Hz
		40-190 MHz	–	±20	–	
		190-1400 MHz	–	±200	–	
		1400 - 6000 MHz	–	±800	–	
Averaging Range		1 - 6000	1	–	999	–
Frequency Aging	Using int. Reference	–	–	–	±1.0	ppm/year
Measurement Speed (for power meas.)	@ Low Noise Mode	1 - 6000	–	100	–	msec
	@ Faster Mode		–	30	–	
Sample time (for frequency meas.) [8]		–	100	1000	3000	msec
Input Impedance		–	–	50	–	Ω
Reference In Frequency		–	–	10	–	MHz
Reference In Impedance		–	–	50	–	Ω
Reference In Power		–	-5	–	+10	dBm
Supply Voltage	via USB port	1 - 6000	4.5	5	5.5	V
Current (via USB port, in USB control)		1 - 6000	–	370	500	mA
Current (via USB port, in Ethernet control)		1 - 6000	–	380	500	mA
Ethernet communication		Supports both Telnet and HTTP protocols over TCP/IP with dynamic(DHCP) or static IP				

[1] All specifications apply to continuous wave (CW) signals.
[2] Maximum continuous safe operational power limit: +23 dBm. Performance is guaranteed up to +20 dBm.
[3] The FCPM-6000RC can operate down to -32 dBm, however performance is guaranteed only in the range specified in the table.
[4] Minimum power for Frequency measurement at 190-240 MHz may degrade by up to 3 dB due to measurement band switching.
[5] When using Faster mode at high frequencies below -20dBm, use of averaging is recommended to prevent noise errors.
[6] When using Faster mode power reading below -20dBm, uncertainty value may increase by up to 0.2 dB relative to Low noise mode power reading.
[7] Accuracy shown using external 10 MHz reference synchronized to test signal. Using Internal Reference adds 2 ppm of tested frequency to the accuracy values shown.
[8] Software function set by user, default option 1000 mec.

Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature	0°C to 50°C
Storage Temperature	-30°C to 70°C
V_{USB} Max.	6 V
DC Voltage @ RF port	15 V
RF Power(CW) @ RF port	+25 dBm
DC Voltage @ Reference Input	25 V
RF Power(CW) @ Reference Input	+13 dBm

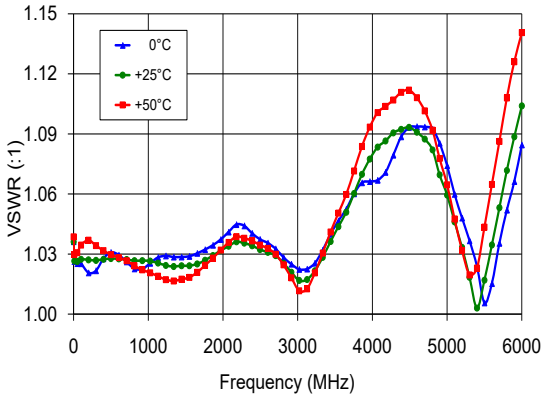
Permanent damage may occur if any of these limits are exceeded. Operating in the range between operating power limits and absolute maximum ratings for extended periods of time may result in reduced life and reliability.

Connections

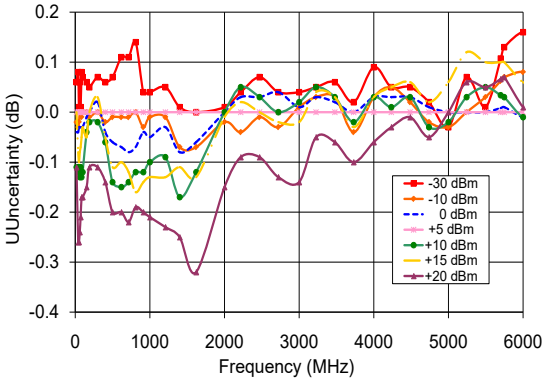
Reference Input	(BNC-Female)
Signal Input	(N-Typ-Male)
Power & Control	(Push-Pull connector)

Typical Performance Curves

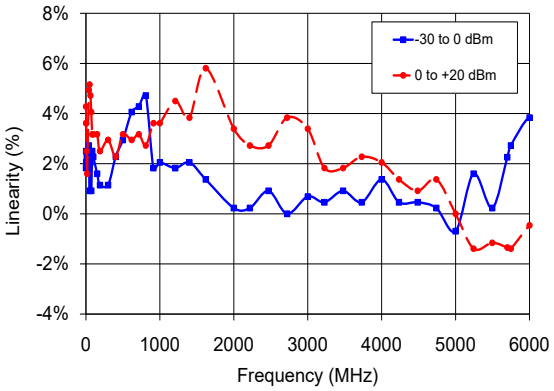
VSWR



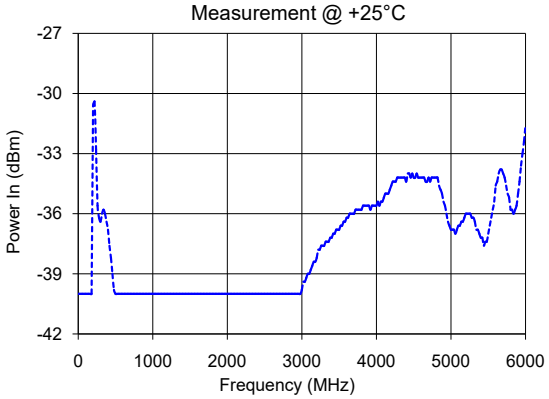
Uncertainty of Power Measurement @ +25°C



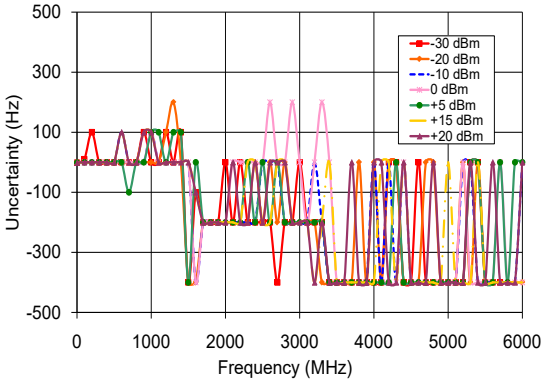
Linearity @ +25°C



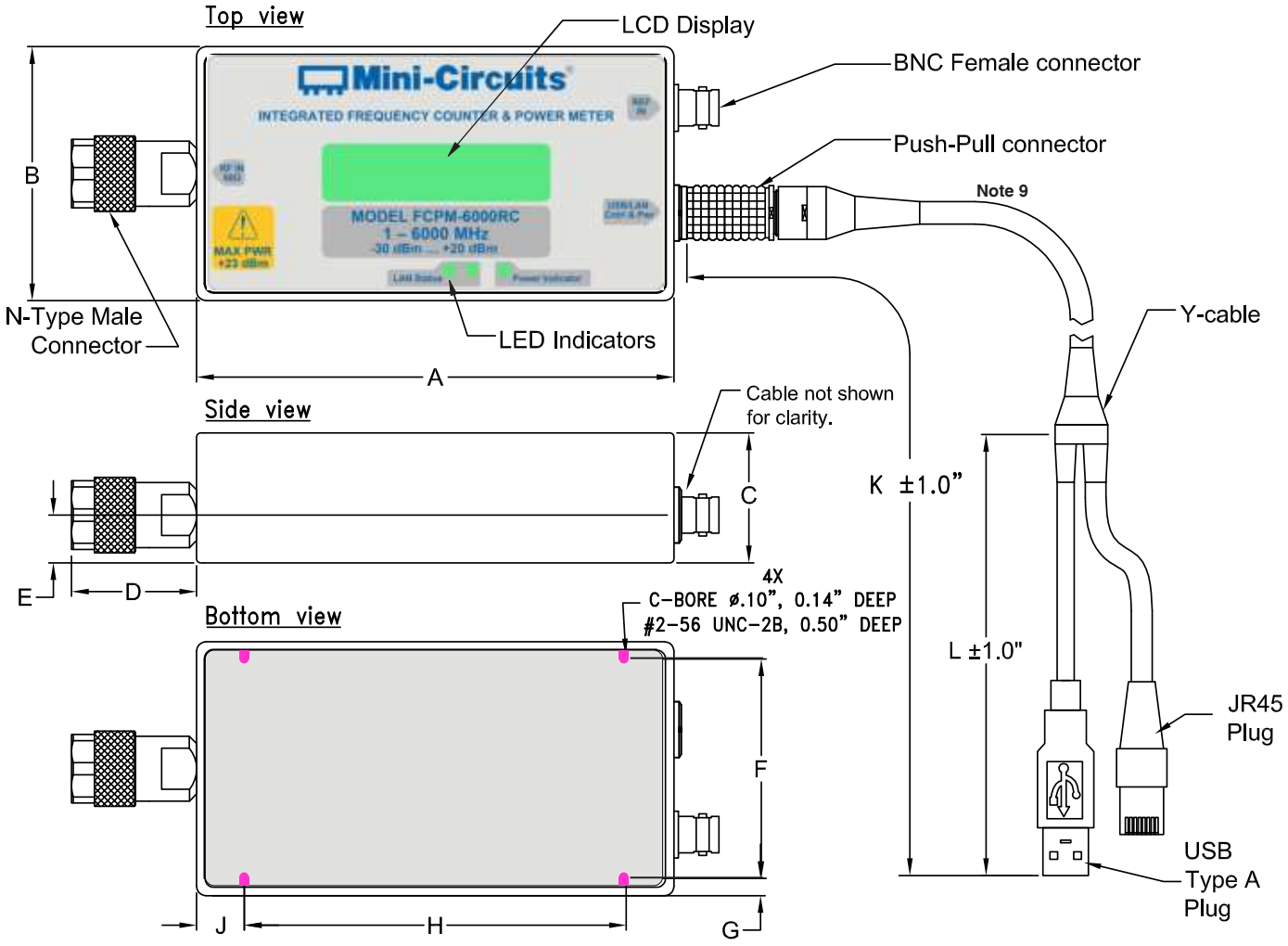
Typ. Input Power Threshhold for Frequency Measurement @ +25°C



Uncertainty of Frequency Measurement @ +25°C



Outline Drawing (JL2029)



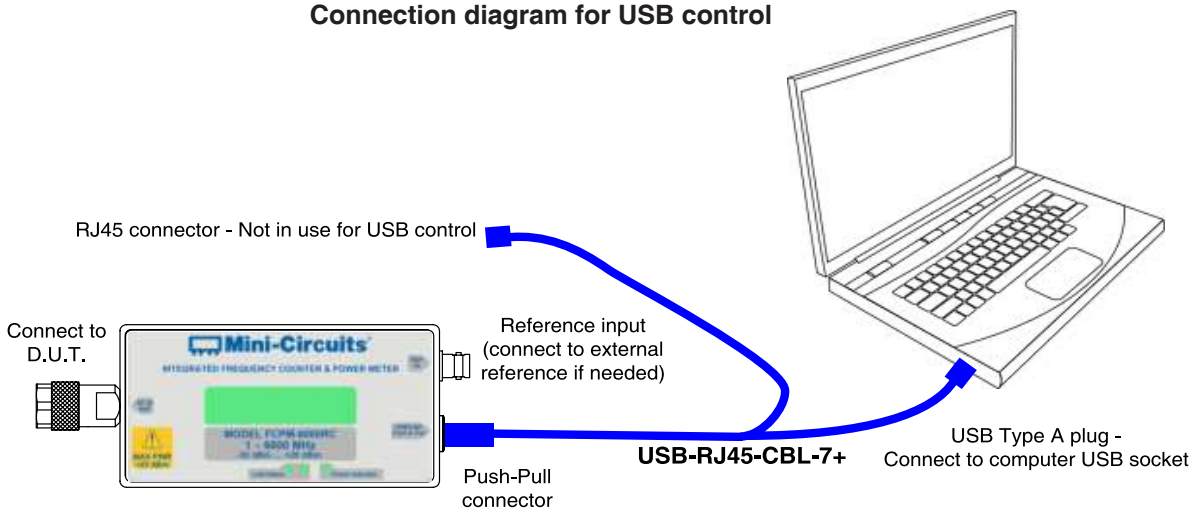
Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J	K	L	WT. GRAMS
5.00 (127.0)	**2.66** (67.6)	**1.36** (34.5)	**1.31** (33.3)	**0.50** (12.7)	**2.300** (58.42)	**0.18** (4.6)	**4.000** (101.60)	**0.50** (12.7)	**81** (2057)	**20** (508)	500

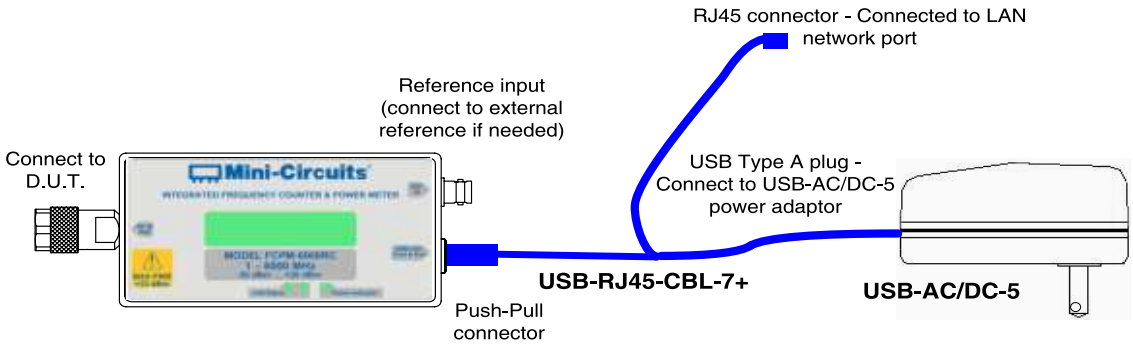
[9] FCPM-6000RC to be used with the supplied control cable only.

Connection diagrams

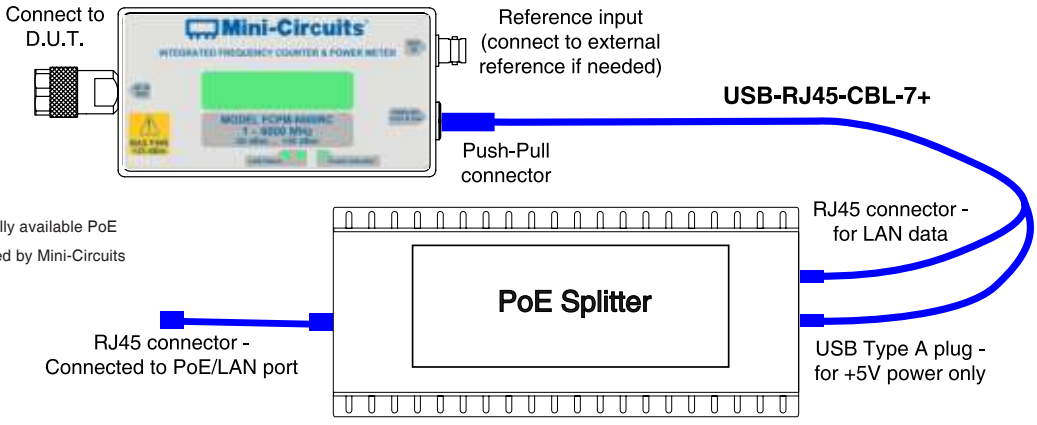
Connection diagram for USB control



Connection diagram for Ethernet control, using power adapter



Connection diagram for Ethernet control, using PoE system



Note: Commercially available PoE splitter not supplied by Mini-Circuits

Software & Documentation Download:

- Mini-Circuits' full software and support package including user guide, Windows GUI, DLL files, programming manual and examples can be downloaded free of charge from **https://www.minicircuits.com/softwaredownload/fcpm.html**.
- Please contact **testsolutions@minicircuits.com** for support

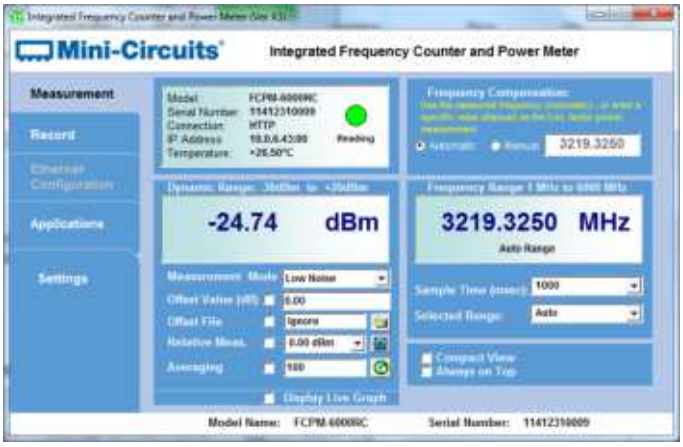
Minimum System Requirements

Parameter	Requirements	
Interface	USB HID or HTTP Get/Post or Telnet protocols	
System requirements	GUI:	Windows 32 & 64 bit systems from Windows 98 up to Windows 10
	USB API (ActiveX & .Net)	Windows 32 & 64 bit systems with ActiveX or .Net support from Windows 98 up to Windows 10
	USB direct programming support	Linux, Windows systems from Windows 98 up to Windows 10
	HTTP or Telnet	Any computer with a network port and Ethernet-TCP/IP (HTTP or Telnet protocols) support
Hardware	Pentium® II or higher, RAM 256 MB	
Y control cable for USB and Ethernet (supplied)	Model to be used with the supplied control cable only	

Graphical User Interface (GUI) for Windows

Key Features:

- Automatically synchronized power and frequency measurements.
- Relative and Average power measurements
- Setting measurement speed for power and frequency independantly.
- Freq. & Power measurment data recording
- Measurement application tools
- online graphical display of power measurement
- USB, HTTP or Telnet control of FCPM
- Setting Ethernet configuration



Application Programming Interface (API)

Windows Support:

- API DLL files exposing the full power sensor functionality
  - ActiveX COM DLL file for creation of 32-bit programs
  - .Net library DLL file for creation of 32 / 64-bit programs
- HTTP Get/Post and Telnet protocols use SCPI commands to provide full control.
- Supported by most common programming environments (refer to application note **AN-49-001** for summary of tested environments)

Linux Support:

- Full power sensor control in a Linux environment is achieved by way of USB interrupt commands.

Ordering Information

Model	Description
FCPM-6000RC	Integrated Frequency Counter & Power Meter

Included Accessories	Part No.	Description
	USB-RJ45-CBL-7+	6.6 ft (2 m) "Y" data cable with USB Type-A and RJ45 plug connectors [9]

[9] FCPM-6000RC to be used with the supplied control cable only.

Optional Accessories	Description
USB-AC/DC-5	AC/DC 5V_{DC} Power Adapter with US, EU, IL, UK, AUS, and China power plugs [10,11]
USB-RJ45-CBL-7+ (spare)	6.6 ft (2 m) "Y" data cable with USB Type-A and RJ45 plug connectors
NF-SM50+	N-Type Female to SMA Male Adapter (For mating with SMA devices).
NF-SF50+	N-Type Female to SMA Female Adapter
NF-BM50+	N-Type Female to BNC Male Adapter.

[10] Power plugs for other countries are also available, if you need a power plug for a country not listed in the table please contact **testsolutions@minicircuits.com** for support.
[11] The USB-AC/DC-5 may be used to provide the 5V_{DC} power input via USB port if operating with Ethernet control. Not required if using USB control.

Calibration	Description	
CAL-FCPM-6000RC	Calibration Service	Click Here

Additional Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp