Wide Dynamic Range

USB *Smart* Power Sensor PWR-6GHS

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



CASE STYLE: JL1504

The Big Deal

- Measure power levels down to -30 dBm
- Fast Measurement rate: 30 ms
- Cost effective power measurements
- USB control with full software support

Typical Applications

- Turn any Windows or Linux PC into a Power Meter
- Lab & benchtop testing
- Signal level calibration in production test systems
- Power monitoring in remote installations / base-stations
- Bluetooth / Wi-Fi / 4G / 5G bands covered

Model No.	Description
PWR-6GHS	**USB *smart* Power Sensor**

Included Accessories

PWR-SEN-6GHS	Power Sensor Head
USB-CBL+	USB cable (See Ordering Information)

Refer to user guide for compliance information

Product Overview

Mini-Circuits' PWR-6GHS is a low cost compact sensor-head that turns any PC with a USB port into an average power meter for CW (continuous waveform) signals. The sensor has a 50 dB input dynamic range allowing measurement of RF powers down to -30 dBm, over 1 to 6000 MHz.

The USB HID interface is "plug & play" compatible, meaning no driver installation is required. Full software support is provided, including our user-friendly GUI application for Windows and a full API with programming instructions for Windows and Linux environments (both 32-bit and 64-bit systems).
Download from http://www.minicircuits.com/softwaredownload/pm.html

Key Features

Feature	Advantages
Low power measurement @ 30 ms speed	Accurate and fast power measurements @ 30 ms all the way down to -30 dBm facilitates test applications with high loss and rapid power variations
Automatic measurement compensation	Power measurements are automatically adjusted by the sensor to maintain accuracy with variations in the ambient temperature and across the bandwidth of the sensor
No User calibration required	Accurate power measurements can commence as soon as the sensor is connected since it does not require any zero or reference measurements
Excellent impedance match	Input VSWR of 1.10:1 typ reduces measurement errors due to impedance mismatch

Trademarks: Windows is a registered trademark of Microsoft Corporation in the United States and other countries. Linux is a registered trademark of Linus Torvalds. Pentium is a registered trademark of Intel Corporation. Neither Mini-Circuits nor the Mini-Circuits PWR-series power sensors are affiliated with or endorsed by the owners of the above referenced trademarks

Mini-Circuits and the Mini-Circuits logo are registered trademarks of Scientific Components Corporation.

Mini-Circuits®
www.minicircuits.com P.O. Box 35166, 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]		1 - 6000	-30	-	+20	dBm
VSWR		1 - 6000	-	1.10	1.30	:1
Uncertainty of Power Measurement at 25ºC	at -30 to +5 dBm [3,4]	1 - 3000	-	± 0.10	± 0.30	dB
		3000 - 6000	-	± 0.15	± 0.30	dB
	at +5 to +15 dBm	1 - 3000	-	± 0.15	± 0.30	dB
		3000 - 6000	-	± 0.15	± 0.30	dB
	at +15 to +20 dBm	1 - 3000	-	± 0.20	± 0.40	dB
		3000 - 6000	-	± 0.20	± 0.40	dB
Uncertainty of Power Measurement at 0ºC to 50ºC	at -30 to +5 dBm [3,4]	1 - 3000	-	± 0.25	-	dB
		3000 - 6000	-	± 0.25	-	dB
	at +5 to +15 dBm	1 - 3000	-	± 0.20	-	dB
		3000 - 6000	-	± 0.20	-	dB
	at +15 to +20 dBm	1 - 3000	-	± 0.35	-	dB
		3000 - 6000	-	± 0.30	-	dB
Linearity at 25ºC		1 - 6000	-	± 3.0	-	%
Measurement Resolution		1 - 6000	0.01	-	-	dB
Averaging Range		1 - 6000	1	-	999	-
Measurement Speed	at Low Noise Mode	1 - 6000	-	100	-	msec
	at Faster Mode		-	30	-	
Current (via host USB)		1 - 6000	-	40	70	mA

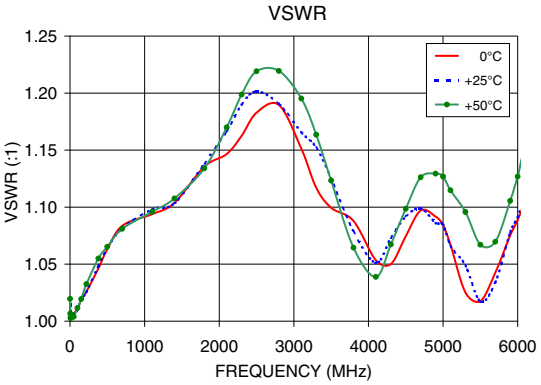
[1] All specifications apply to continuous wave (CW) signals.
[2] Maximum continuous safe operational power limit: +23 dBm. Performance is guaranteed up to +20 dBm.
[3] When using Faster mode at high frequencies below -20dBm, use of averaging is recommended to prevent noise errors.
[4] When using Faster mode below -20dBm, accuracy value may increase by up to 0.2 dB relative to Low noise mode

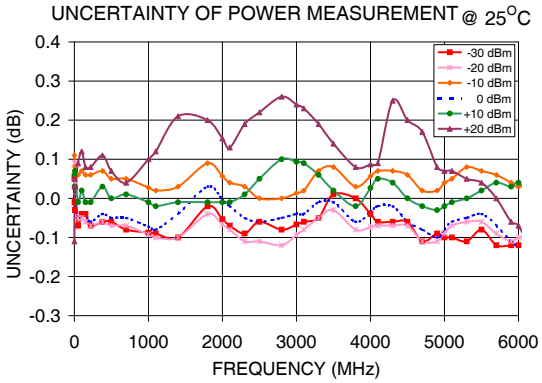
Absolute Maximum Ratings

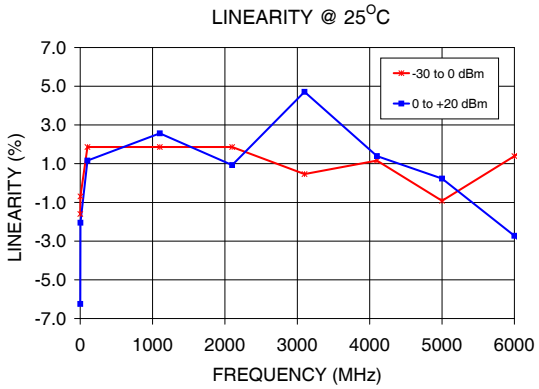
Parameter	Ratings
Operating Temperature	0°C to 50°C
Storage Temperature	-30°C to 70°C
DC Voltage at RF port	15 V
CW Power	+27 dBm

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.

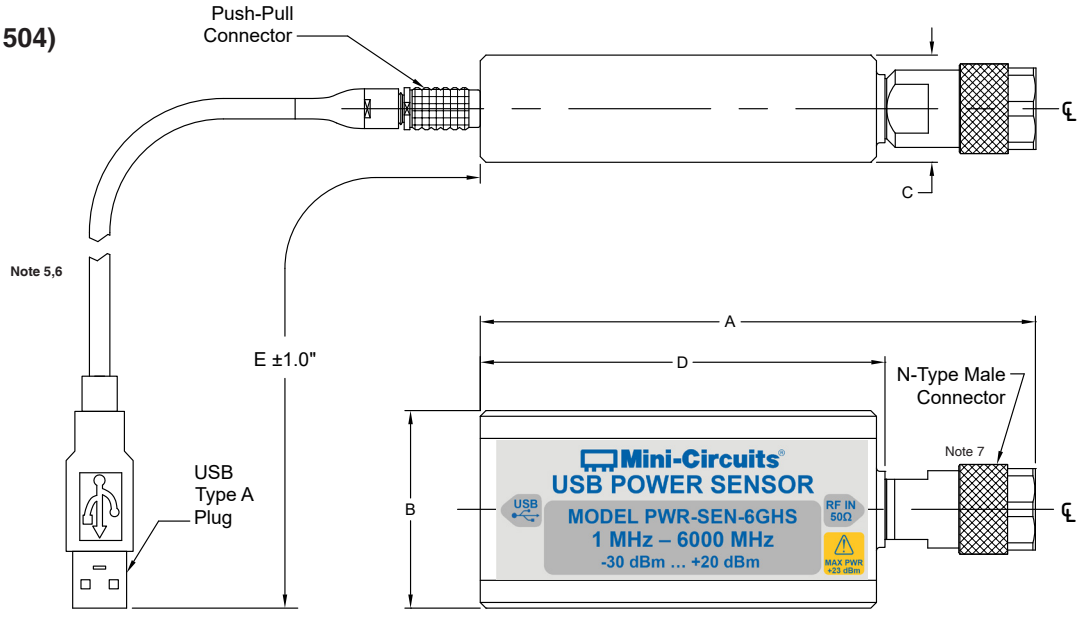
Typical Performance Curves







Outline Drawing (JL1504)



Outline Dimensions (inch / mm)

A	B	C	D	E	WT. GRAMS
4.89 124.2	**1.74** 44.2	**.95** 24.1	**3.50** 88.9	**81.9** 2080	250

[5] Power sensor to be used with the supplied conrol cable only.
[6] Length shown for USB-CBL+. USB-CBL-2+ length is :15.2 in / 385 mm
[7] Maximum torque 8 in-lb (90 N-cm).

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 http://www.minicircuits.com/softwaredownload/pm.html.
- Please contact **testsolutions@minicircuits.com** for support

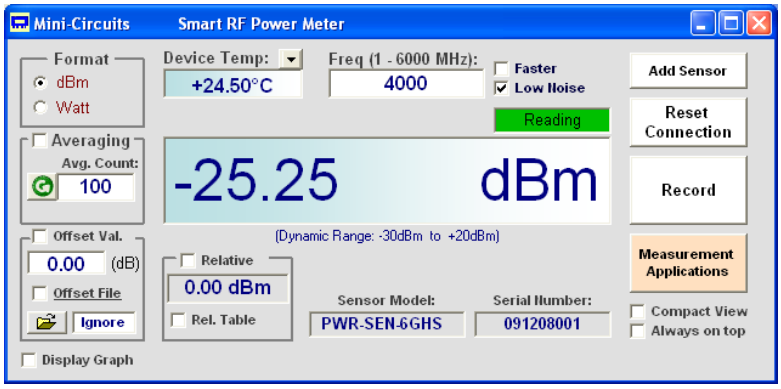
Minimum System Requirements

Parameter	Requirements	
Interface	USB HID	
System requirements	GUI:	Windows 7 or later
	USB API (ActiveX & .Net)	Windows 7 or later and programming environment with ActiveX or .NET support
	USB direct programming support	Linux, Windows 7 or later
Hardware	Intel i3 (or equivalent) or later	
Control cable (supplied)	Power sensor to be used with the supplied USB cable only	

Graphical User Interface (GUI) for Windows

Key Features:

- Set compensation frequency and monitor power measurement
- Configure measurement offsets and relative power readings
- Set measurement mode (speed and averaging)
- Control multiple power sensors at once
- Schedule data recording
- Guided measurements for a variety of applications (characterizing a two port device, power monitoring, etc.)



Application Programming Interface (API)

Windows Support:

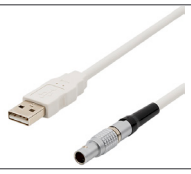
- API DLL files exposing the full power sensor functionality See programming manual at https://www.minicircuits.com/softwaredownload/Prog_Manual-4-Power_Meter.pdf for details
  - ActiveX COM DLL file for creation of 32-bit programs
  - .Net library DLL file for creation of 32 / 64-bit programs
- Supported 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. See programming manual at https://www.minicircuits.com/softwaredownload/Prog_Manual-4-Power_Meter.pdf for details

Ordering Information

Model	Description
PWR-6GHS	USB *Smart* Power Sensor

Included Accessories	Part No.	Description
	PWR-SEN-6GHS	Power Sensor Head
	USB-CBL+[8]	6.6 ft data cable with USB Type-A plug connector

[8] Power Sensor to be used with the supplied control cable only.

Optional Accessories	Description
USB-CBL+ (spare)	6.6 ft data cable with USB Type-A plug connector
USB-CBL-2+	15 in data cable with USB Type-A plug connector
NF-SM50+	N-Type Female to SMA Male Adapter
NF-SF50+	N-Type Female to SMA Female Adapter
NF-BM50+	N-Type Female to BNC Male Adapter

Calibration	Description	
CALSEN-6GHS	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-Circuits' 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

USB Power Sensor PWR-6GHS

Typical Performance Data

FREQ. (MHz)	VSWR (:1)		
	0˚C	+25˚C	+50˚C
1	1.02	1.02	1.02
10	1.00	1.00	1.00
20	1.01	1.00	1.00
52	1.01	1.01	1.00
69	1.01	1.01	1.01
86	1.01	1.01	1.01
100	1.02	1.01	1.01
120	1.02	1.01	1.01
137	1.02	1.02	1.02
154	1.02	1.02	1.02
200	1.03	1.03	1.03
400	1.04	1.05	1.06
600	1.07	1.07	1.07
800	1.09	1.09	1.09
1000	1.10	1.11	1.10
1200	1.11	1.12	1.12
1400	1.12	1.13	1.13
1600	1.13	1.13	1.13
1800	1.13	1.13	1.13
2000	1.12	1.12	1.12
2200	1.12	1.12	1.12
2400	1.12	1.13	1.13
2600	1.13	1.14	1.15
2800	1.15	1.16	1.16
3000	1.16	1.17	1.17
3200	1.18	1.17	1.17
3400	1.19	1.18	1.17
3600	1.20	1.19	1.18
3800	1.19	1.20	1.19
4000	1.18	1.19	1.20
4200	1.17	1.18	1.19
4400	1.16	1.16	1.18
4600	1.15	1.15	1.15
4800	1.14	1.12	1.12
5000	1.12	1.10	1.09
5200	1.10	1.08	1.06
5400	1.09	1.06	1.03
5600	1.06	1.04	1.02
5800	1.05	1.04	1.04
6000	1.04	1.06	1.06

LINEARITY @ -30 to 0 dBm	
FREQ (MHz)	- (%)
1	-1.60
3	-0.69
100	1.86
1100	1.86
2100	1.86
3100	0.46
4100	1.16
5000	-0.92
6000	1.39
7100	3.99
8000	8.89

LINEARITY @ 0 to +20 dBm	
FREQ (MHz)	- (%)
1	-6.24
3	-2.05
100	1.16
1100	2.57
2100	0.93
3100	4.71
4100	1.39
5000	0.23
6000	-2.73
7100	-7.10
8000	-7.96

Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

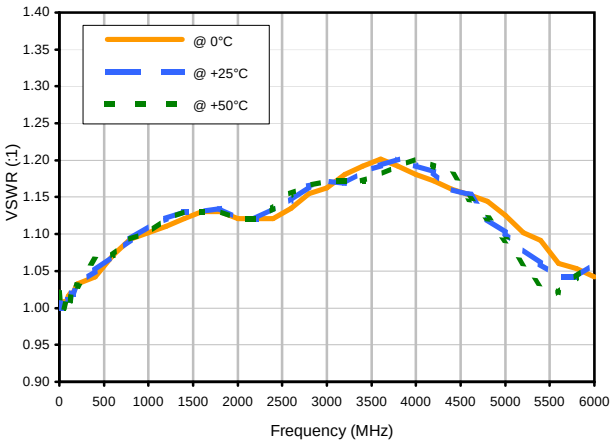
Typical Performance Data

FREQ. (MHz)	UNCERTAINTY OF POWER MEASUREMENT @ 25°C (dBm)			
	-30	0	+10	+20
1	0.12	-0.02	0.00	0.15
2	0.13	-0.02	0.09	0.22
5	0.08	-0.02	0.07	0.25
10	0.09	-0.03	0.06	0.27
17	0.04	0.05	0.09	0.21
29	0.05	0.03	0.08	0.19
40	0.03	0.01	0.09	0.20
50	0.05	0.04	0.11	0.28
61	0.01	0.03	0.11	0.28
73	0.02	0.03	0.10	0.27
83	0.01	0.03	0.09	0.27
94	0.04	0.00	0.09	0.29
100	0.02	0.01	0.09	0.29
152	0.00	0.02	0.06	0.03
222	0.01	0.00	0.05	-0.05
300	-0.01	0.04	0.11	0.11
403	0.00	0.00	0.06	0.07
500	0.01	0.05	0.10	0.11
619	-0.02	0.02	0.08	0.07
716	-0.03	0.00	0.06	0.08
810	-0.02	0.00	0.03	0.02
913	-0.03	-0.01	0.01	-0.07
1000	-0.02	-0.01	0.02	-0.12
1209	-0.01	-0.02	-0.04	-0.11
1461	0.01	0.04	0.06	-0.02
1621	-0.07	-0.10	-0.12	-0.32
2000	-0.03	0.01	0.07	-0.12
2217	-0.09	-0.08	-0.08	-0.24
2470	-0.01	0.01	0.01	-0.13
2722	-0.04	0.00	-0.05	-0.21
3000	-0.12	-0.07	-0.10	-0.20
3226	-0.11	-0.03	-0.01	-0.10
3478	-0.09	0.01	0.00	-0.06
3730	-0.16	-0.07	-0.05	-0.10
4000	-0.09	-0.04	-0.06	-0.12
4235	0.01	0.00	-0.09	-0.30
4487	0.00	0.02	-0.08	-0.20
4739	0.02	0.05	-0.01	-0.16
5000	0.03	0.01	-0.04	-0.10
5243	0.04	0.05	0.00	-0.01
5496	-0.02	0.00	-0.06	-0.06
5748	0.06	0.03	0.01	0.00
6000	0.07	0.06	0.04	0.03

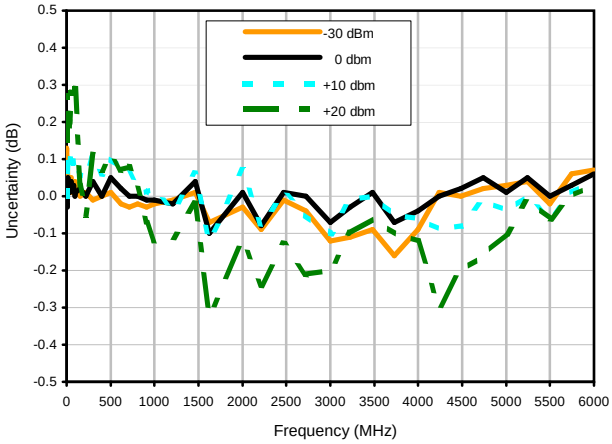
Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

Typical Performance Curves

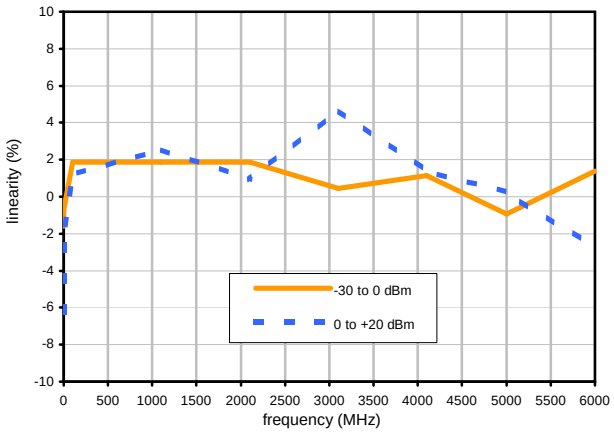
VSWR



UNCERTAINTY OF POWER MEASUREMENT @ 25˚C



LINEARITY @ 25˚C

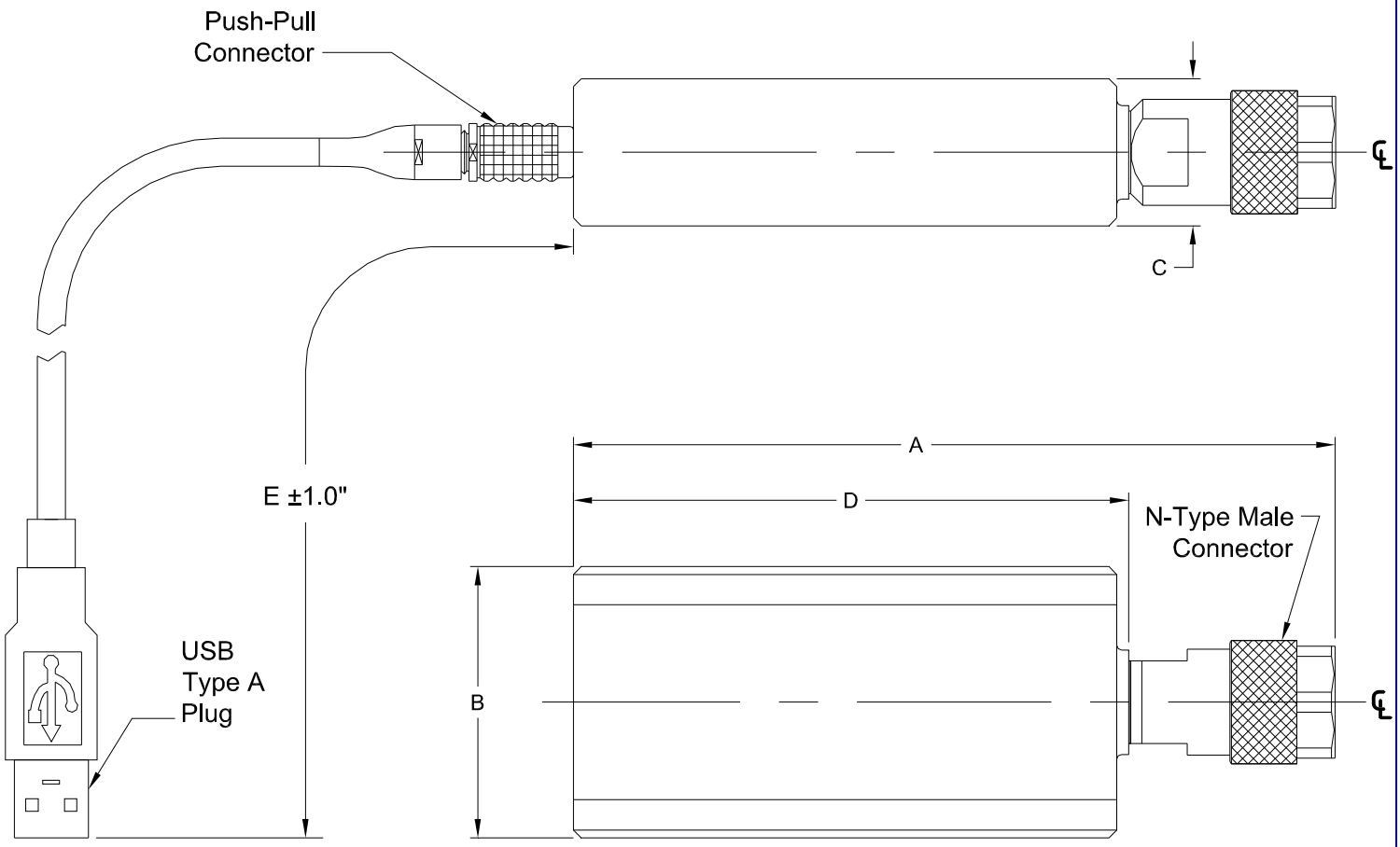


Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

Case Style JL

Outline Dimensions

JL1504



CASE#	A	B	C	D	E	WT. GRAMS
JL1504	4.89 (124.2)	1.74 (44.2)	.95 (24.1)	3.50 (88.9)	81.9 (2080)	250

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3 Pl. ± .015

Notes:

1. Case material: Plastic.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
*Mini-Circuits **ISO 9001 & ISO 14001** Certified*

This document and its contents are the property of Mini-Circuits

Mini-Circuits

Environmental Specifications **ENV50**

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-0° to 50° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-30° to 70° C Ambient Environment	Individual Model Data Sheet
Operating and Storage Humidity	5% to 85% RH (non-condensing)	Ambient
Bench Handling Test	Bench Top Tip 45° & Drop	MIL-PRF-28800F
Transit Drop Test	Free Fall Drop, 20 cm (7.9 inches)	MIL-PRF-28800F Class 3

This document and its contents are the property of Mini-Circuits