100 Series EMC Probes

Description

The 100 series EMC probes are designed for identifying and fixing EMC problems. The 100A, 100B, and 100C are loop probes, and are sensitive to magnetic fields. The 100D is a stub probe, and is sensitive to electric fields.

The loop probes have integrated electrostatic shields, providing isolation from common-mode signals. As a result, these probes deliver excellent repeatability. The different loop sizes allow the user to select the optimum probe for a given frequency, providing the optimum sensitivity and spatial resolution.

The 100D stub probe, with its narrow tip, offers the highest spatial resolution. It is ideally suited to tasks such as tracking EMC sources down to the individual pins of an IC.

Because of the planar construction of the probes, even the large loops are only 0.11" thick, allowing the probe to be inserted into narrow seams and gaps.

Distribution in the UK & Ireland

Lambda

Characterisation, Measurement & Analysis

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Features

- An integrated electrostatic shield in the loop probes eliminates common-mode pickup.
- Multiple loop sizes offer optimum sensitivity and spatial resolution at different frequencies.
- Probe dimensions optimized for access to tight spaces.
- Calibrated sensitivity up to 3 GHz, depending on model. Usable to beyond 6 GHz.
- Can be driven by a signal source to generate fields for electromagnetic susceptibility testing.

Applications

- Finding sources of EMC emissions problems.
- Injecting fields into circuits to identify those which are EMC-susceptible.
- Noninvasive probing of RF circuits. The probes can be used to measure the signals present on an operational PC board. For example, using a preamplifier, the probes can measure the characteristics of an oscillator, such as frequency, sidebands, and phase noise.

Specifications

Dimensions:

Length, excluding connector: 6.35”
Probe tip thickness: 0.11”

Table 1

Model Number	Tip Diameter (in)	Loop Diameter (in)
100C (large loop)	1.0	0.85
100A (medium loop)	0.5	0.4
100B (small loop)	0.25	0.15
100D (stub)	.08	N/A

Sensitivity:

100 A/B/C Loop Probes

The probe output power into a 50 ohm load and the magnetic flux density are related by the following equation:

Pout = X + 20*log10(B) + 20*log10(F) , or alternatively,
20*log10(B) = Pout – X - 20*log10(F)
Where

B is the magnetic flux density, in tesla
F is the frequency of the received signal, in megahertz
Pout is the probe output power into 50 ohms, in dBm
X is a scale factor from the table below:

Table 2

Model Number	X	3 dB Frequency (MHz)	First Resonance (MHz)
100C (large loop)	85.1	50	500
100A (medium loop)	65.2	1000	2600
100B (small loop)	42.2	3100	>6000

100D Stub Probe

The probe output power into a 50 ohm load and the electric field strength are related by the following equation:

Pout = -113.2 + 20*log10(E) + 20*log10(F), or alternatively,
20*log10(E) = Pout + 113.2 - 20*log10(F)
Where

E is the electric field strength, in volts/meter
F is the frequency of the received signal, in Megahertz
Pout is the probe output power into 50 ohms, in dBm

Frequency Response:

100 A/B/C Loop Probes

The above equation is accurate within 3 dB from DC to the 3 dB point indicated in table 2. The probes are usable at higher frequencies, but the sensitivity is uncalibrated. The first notch in the frequency response of the probes occurs at the first resonance listed in the table. Figure 1 shows the response of the probes vs. frequency.

100D Stub Probe

Stub probes tend to be less repeatable than shielded loop probes, due to the presence of common-mode currents flowing on the outer surface of the probe or attached cable. As signals are measured, it is common to see a few dB of variation in output power as the user changes their grip on the probe or the attached cable. Because of this, the sensitivity of the 100D is not guaranteed. Typical sensitivity of the probe is shown in figure 2.

RF Connector:

SMB male, 50 ohms

Warranty

1 year warranty
30 day unconditional return policy

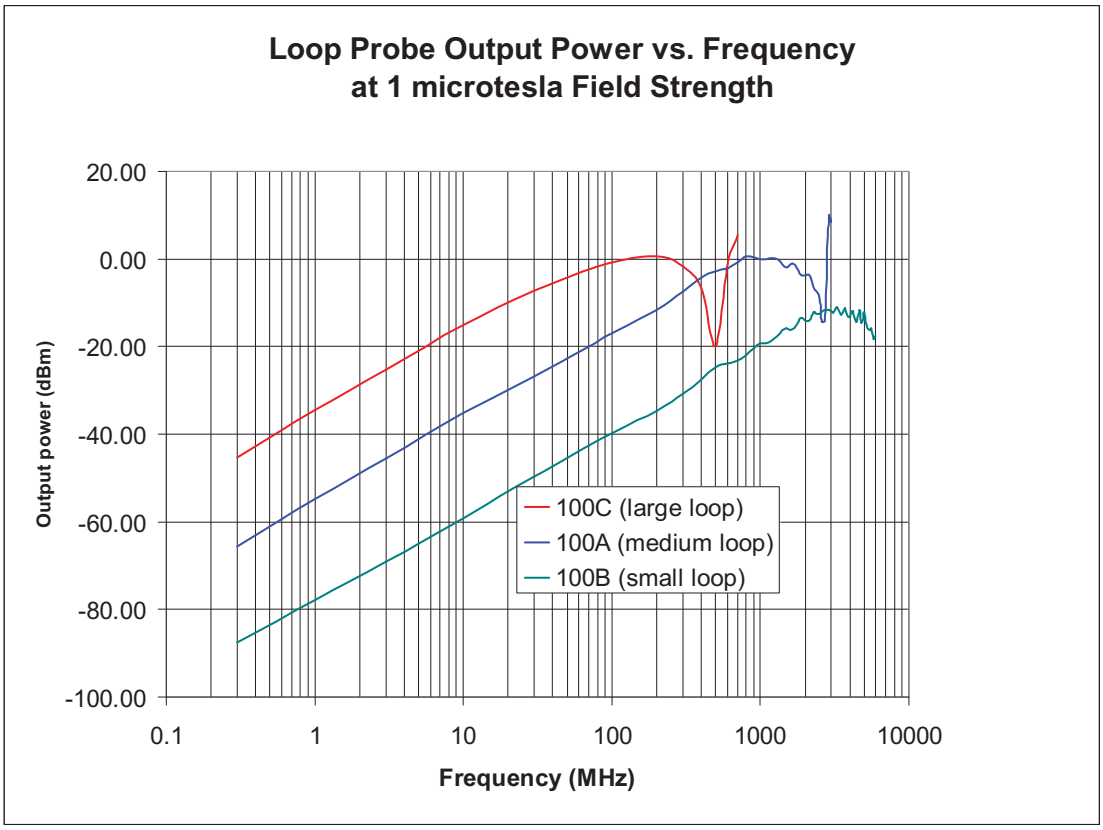

Figure 1

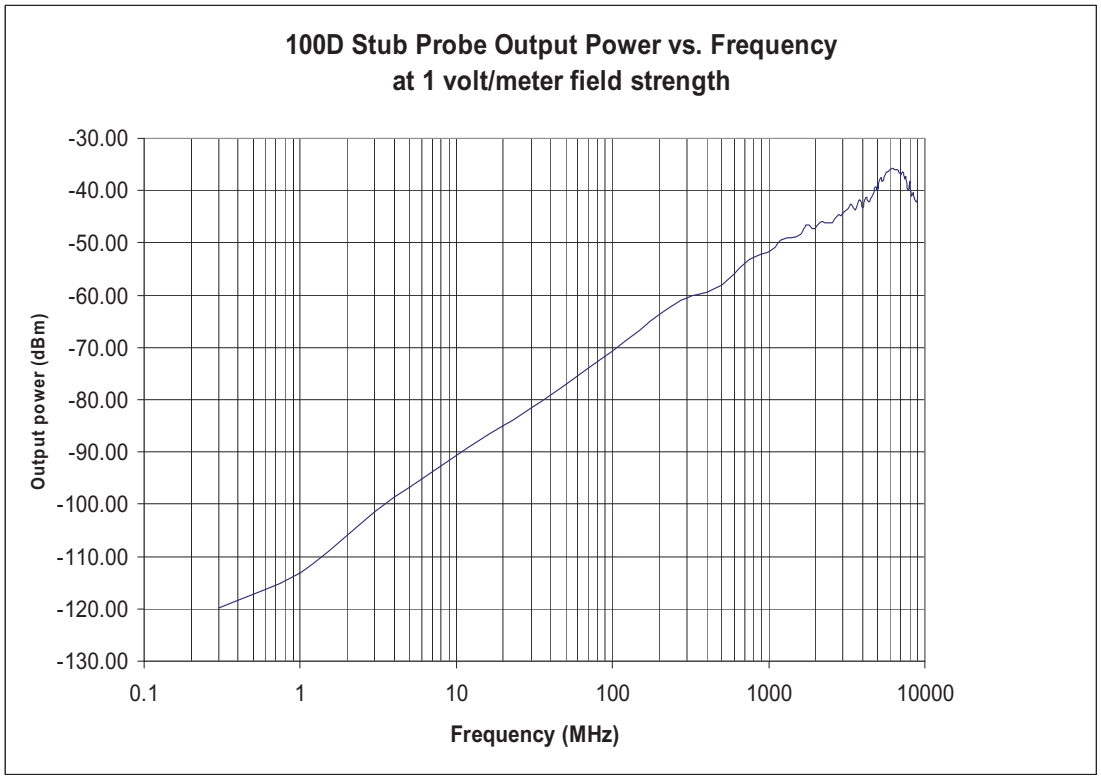

Figure 2

150A EMC Probe Amplifier

Description

The 150A EMC probe amplifier is a low-noise, wide-bandwidth amplifier designed for use with the Beehive Electronics 100 series EMC probes.

The 150A is typically placed between the EMC probe and the spectrum analyzer. Its high gain and low noise improve the system sensitivity dramatically. This higher sensitivity allows the user to widen the spectrum analyzer resolution bandwidth, resulting in faster sweeps and measurements. Depending on the model of spectrum analyzer used, sensitivity can be improved by 20 to 30 dB.

Features

- High gain and low noise improves measurement sensitivity and speed.
- Wide bandwidth allows it to be used with all 100 series probes.
- RF input and output protected against ESD and DC power.
- AC power supply included.
- Standard 50 ohm inputs and outputs allow it to be used in any application requiring a low noise amplifier.

Specifications

Gain

32 dB

Frequency Response

100 kHz to 6.0 GHz: +/- 1.5 dB

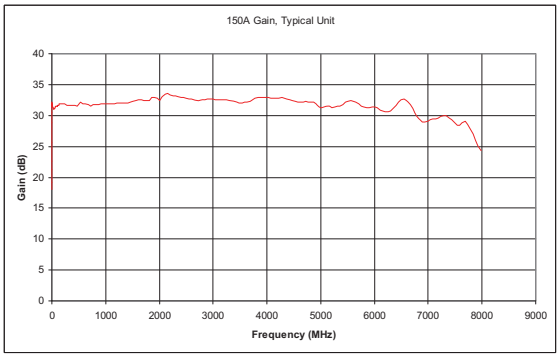

Fig 1: Typical frequency response

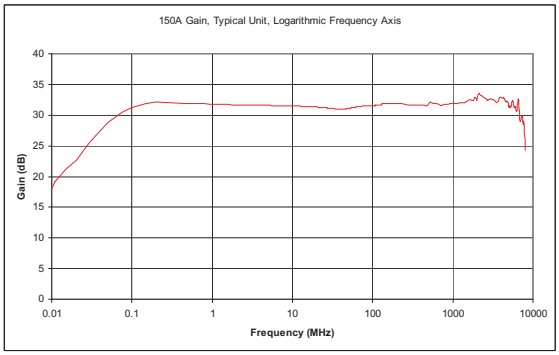

Fig 2: Typical freq. response, log scale

Noise Figure

5 dB typical, 100 kHz to 4.0 GHz
6 dB typical, 4.0 GHz to 6.0 GHz

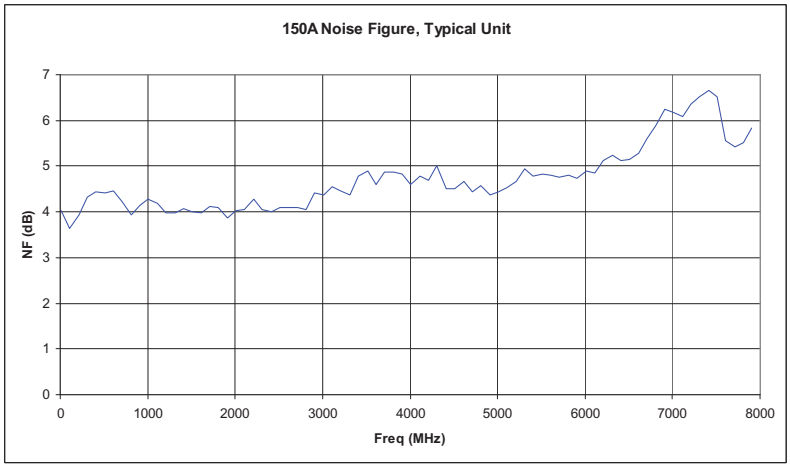

Fig 3: Typical noise figure

1dB Output Compression Point

+10 dBm, 100 kHz - 2 GHz
+5 dBm, 2 GHz – 6 GHz

Port Characteristics

Impedance

50 ohms nominal

Maximum Input Power

+15 dBm

Maximum DC Voltage

+/- 10 VDC

Connector

SMA female

Power

DC power input: +9VDC, 150 mA
Connector: DC power jack, 2mm center pin, positive center
Universal power supply (100-240 VAC, 50/60 Hz) included

Environmental

Operating temperature:	0C to 55C
Storage temperature:	-20C to 70C

Dimensions

Height:	1.4”
Width:	4.3”
Depth:	4.2”

Warranty

1 year warranty
30 day unconditional return policy

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The 100D is a stub probe and is sensitive to electric fields. The 100D stub probe, with its narrow tip, offers the highest spatial resolution. It is ideally suited to tasks such as tracking EMC sources down to the individual pins of an IC.

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Multiple loop sizes offer optimum sensitivity and spatial resolution at different frequencies. Probe dimensions optimized for access to tight spaces. Calibrated sensitivity up to 3 GHz, depending on model. Usable to beyond 6 GHz. Can be driven by a signal source to generate fields for electromagnetic susceptibility testing.

Model No.	Tip Diameter (in)	Loop Diameter (in)
100A (medium loop)	0.5 (12.7mm)	0.4 (10.1mm)
100B (small loop)	0.25 (6.35mm)	0.15 (3.8mm)
100C (large loop)	1.0 (25.4mm)	0.85 (21.6mm)
100D (stub)	0.08 (2.0mm)	N/A

Part No.	Description	Order Code
101A	EMC Probe Set. Contains 100A, 100B, 100CC & 100D EMC Probes	**68127**
101A-KIT	101A EMC Probe Set and 112A Probe-Type N Cable Save 6% 100A, 100B, 100C and 100D EMC Probes	**73672**
100A	Medium-loop magnetic field EMC Probe fitted with SMB Connector	**68123**
100B	Small-loop magnetic field EMC probe fitted with SMB Connector	**68124**
100C	Large-loop magnetic field EMC Probe fitted with SMB Connector	**68125**
100D	Electric field EMC Probe fitted with SMB Connector	**68126**
100X-CR	Calibration report for 100 series EMC Probe	**68128**
150A	EMC Probe Amplifier, 30 dB Gain, frequency response 100 kHz to 6 GHz fitted with SMA (Female) Connector	**68131**
114A	Amplifier-Type N cable. Connects 150A EMC probe amplifier to spectrum analysers or other instruments	**68135**
110A	EMC SMA (Male) to SMB (Male) Probe Cable. Double-shielded small diameter cable DC to 6 GHz.	**68132**
112A	Probe-Type N Cable. Terminated with SMB and N-Type plug connector	**68133**
0309-0001	SMA probe adapter	**68129**
0309-0006	BNC probe adapter	**68130**
135A	RF Helmholtz Coil for verification of EMC probes	**68137**

https://www.lambdaphoto.co.uk/beehive.html