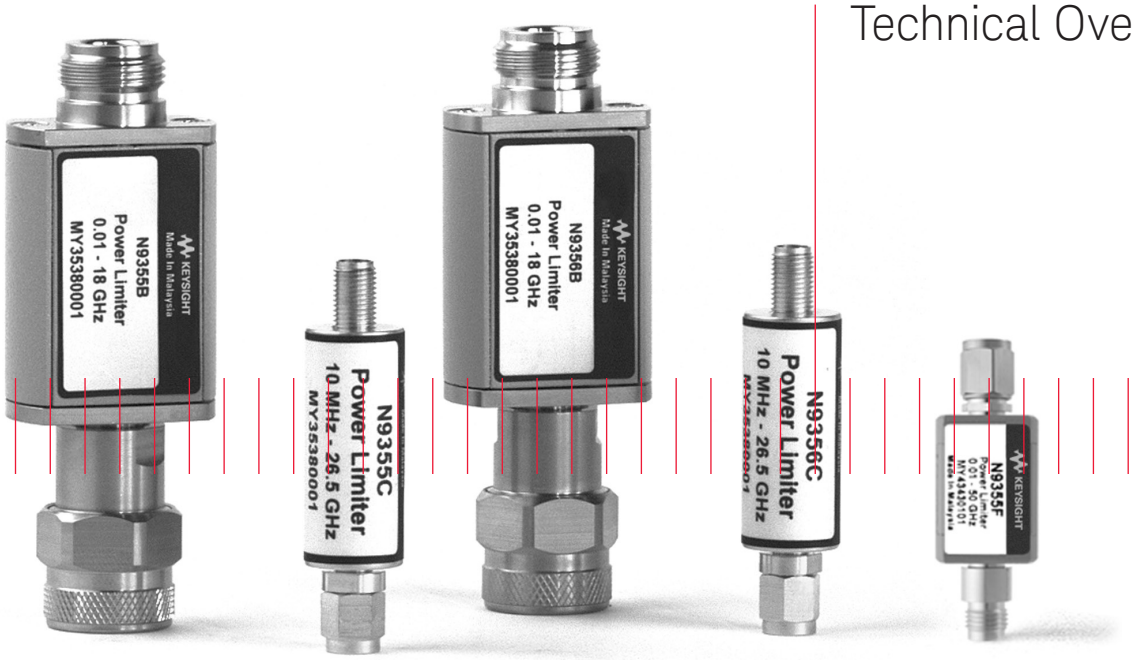
Keysight N9355/6 Power Limiters 0.01 to 18, 26.5 and 50 GHz

High Performance Power Limiters

Technical Overview



KEYSIGHT TECHNOLOGIES

Introduction

- Broad frequency range up to 50 GHz maximizes the operating range of your instrument
- High power protection prevents damage by undesired ESD and excess RF power
- Exceptional return loss improves calibration accuracy
- Low insertion loss maximizes available power
- Bi-directional utilization eliminates orientation errors
- Integrated DC block provides protection from DC transients

Description

N9355/6 Series of high performance power limiters are designed for high volume manufacturers and R&D sectors in telecommunications, component test, and aerospace/defense industries. Keysight Technologies power limiters provide the best broadband input protection from excess RF power, DC transients and ESD, for a variety of RF and microwave instruments and components. For example, the input circuitry of spectrum analyzers, network analyzers, frequency counters or amplifiers can be protected from unintentional inputs up to 3 watts average power. At even greater power levels, failure mode for the limiter is either an open circuit or a short circuit to ground, thereby protecting the instrument from damage.

N9355B and N9356B

The Keysight N9355B and N9356B are 10 MHz to 18 GHz limiters that come with power limiting thresholds of 10 and 25 dBm, respectively. Both versions are furnished with a high quality male and female Type-N connectors on each side.

N9355C and N9356C

The Keysight N9355C and N9356C are wideband 10 MHz to 26.5 GHz limiters that come with power limiting thresholds of 10 and 25 dBm, respectively. Both versions are furnished with a high quality male and female 3.5 mm connector on each side.

N9355F

The Keysight N9355F is a wideband 10 MHz to 50 GHz limiter that comes with a power limiting threshold of 10 dBm. It is furnished with a high quality male and female 2.4 mm connector on each side.

Application

Our limiters offer superb low insertion loss and linear operation at low input levels while providing protection against transients or short duration overloads. Typical applications are shown in Figures 1 and 2. In Figure 1, port 2 of an ENA is protected from an inadvertent overload due to high-level signals from the amplifier under test. In Figure 2, the input mixer of a spectrum analyzer is protected from an inadvertent overload due to high-level signals from an antenna.

Keysight limiters also include a DC block integrated into both input and output ports that will block signals below 10 MHz and pass signals up to 50 GHz.

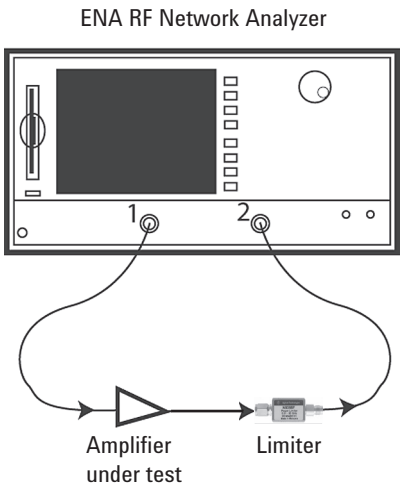


Figure 1. Typical application

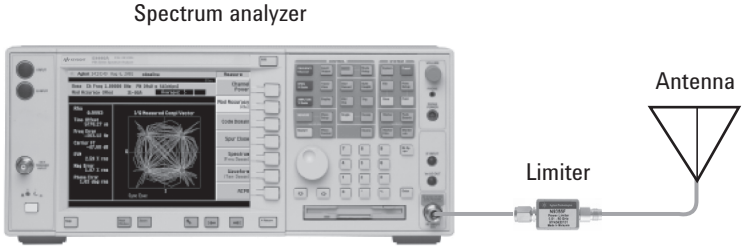


Figure 2. Typical application

Specifications

Specifications describe the limiter's warranted performance over the temperature range 0 to +55 °C (except where noted). Supplemental and typical characteristics are intended to provide typical but non-warranted performance parameters. These are denoted as "typical," "nominal" or "approximate."

Power limiters	**N9355B**	**N9356B**	**N9355C**	**N9356C**	**N9355F**
Frequency range	0.01 to 18 GHz	0.01 to 18 GHz	0.01 to 26.5 GHz	0.01 to 26.5 GHz	0.01 to 50 GHz
Frequency response					
Insertion loss	< 1.75 dB	< 1.75 dB	< 2 dB	< 2.25 dB	0.01 to 26.5 GHz < 2 dB 26.5 to 40 GHz < 2.75 dB 40 to 50 GHz < 3.5 dB
Return loss (VSWR)	> 15 dB[1] (1.43)	> 15 dB[1] (1.43)	> 15 dB[1] (1.43)	> 15 dB[1] (1.43)	> 10 dB[1] (1.92)
Impedance	50 Ω nominal	50 Ω nominal	50 Ω nominal	50 Ω nominal	50 Ω nominal
Maximum input power levels					
Continuous	1W	6W	1W	4W	0.63 W
Limiting threshold	10 dBm typical	25 dBm typical	10 dBm typical	25 dBm typical	10 dBm typical
Maximum leakage power[2]	24 dBm	27 dBm	24 dBm	27 dBm	24 dBm
Maximum DC voltage					
at 25 °C	30 V	30 V	30 V	30 V	30 V
at 85 °C	16 V	16 V	16 V	16 V	16 V
Turn on time	< 100 ps	< 100 ps	< 100 ps	< 100 ps	< 100 ps
Connectors	Type-N	Type-N	3.5 mm	3.5 mm	2.4 mm

1. *Return loss specification from 10 MHz to 30 MHz is 8.5 dB (VSWR: 2.2)*
2. *At maximum continuous input power level.*

Environmental Specifications

The N9355/6 limiters are designed to fully comply with Keysight Technologies' product operating environment specifications. The following summarizes the environmental specifications for these products.

Temperature	
Operating	0 to +55 °C
Storage	–40 to +70 °C
Cycling	–65 to +150 °C, 10 cycles at 20 °C per minute, 20 minutes dwell time per MIL-STD-833F, Method 1010.8, Condition C (modified)
Humidity	
Operating	85 °C and 85% RH, 10 days, per JESD22-A101-B (modified)
Shock	
Half-sine, smoothed	1000 G at 0.5 ms, 3 shock pulses per orientation, 18 total per MIL-STD-833F, Method 2002.4, Condition B (modified)
Vibration	
Broadband random	50 to 2000 Hz, 7.3 G rms, 15 minutes, per MIL-STD-833F, Method 2026-1 (modified)
Altitude	
Non-operating	15,000 feet / 4.6 km
ESD immunity	
	2.0 kV for N9355B/C/F per MIL-STD-833B center contact discharge 6.0 kV for N9356B/C per IEC1000-4-2 center contact discharge

Mechanical Dimension

	N9355B	N9356B	N9355C	N9356C	N9355F
Length mm (inches)	82.2 (3.236)	82.2 (3.236)	55.2 (2.17)	55.2 (2.17)	47.5 (1.870)
Net weight kg (lb)	0.085 (0.187)	0.085 (0.187)	0.015 (0.033)	0.015 (0.033)	0.016 (0.035)

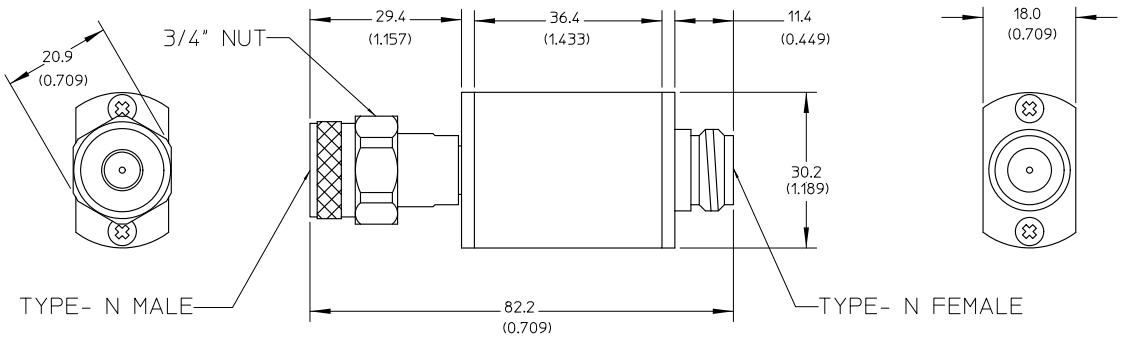


Figure 3. N9355/6B product outline

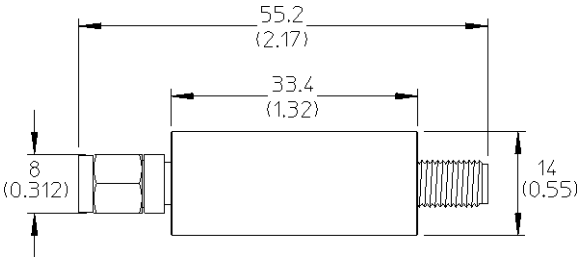


Figure 4. N9355/6C product outline

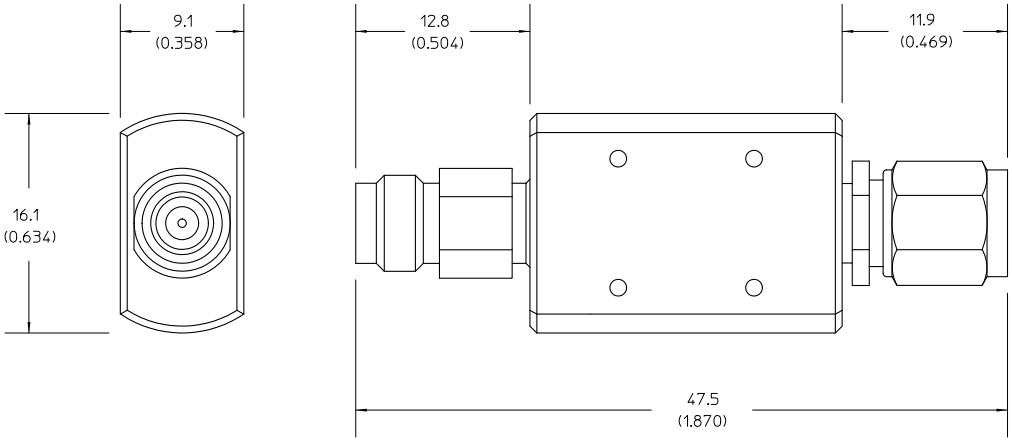


Figure 5. N9355F product outline

Supplement Characteristics (Typical)

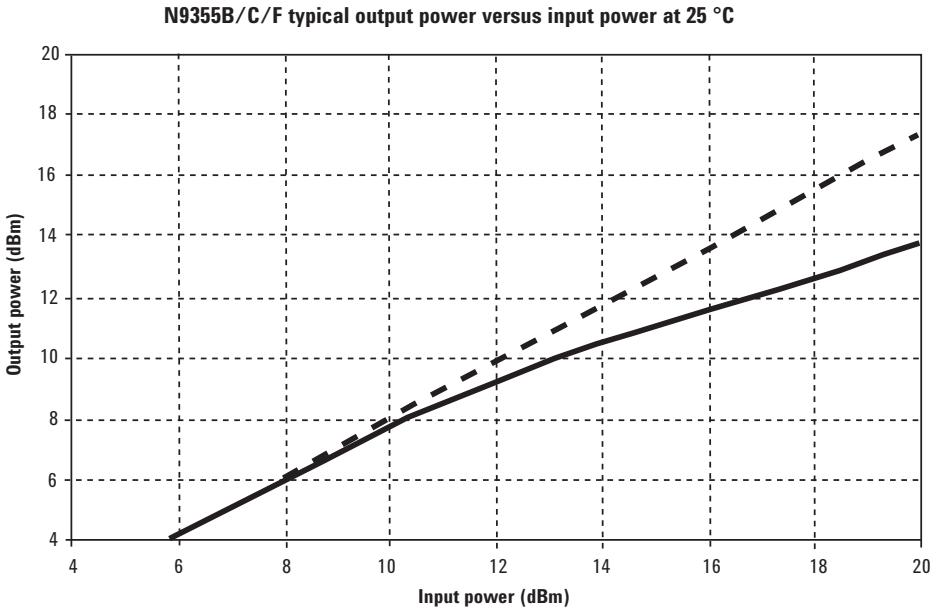


Figure 6. N9355B/C/F typical output versus input power

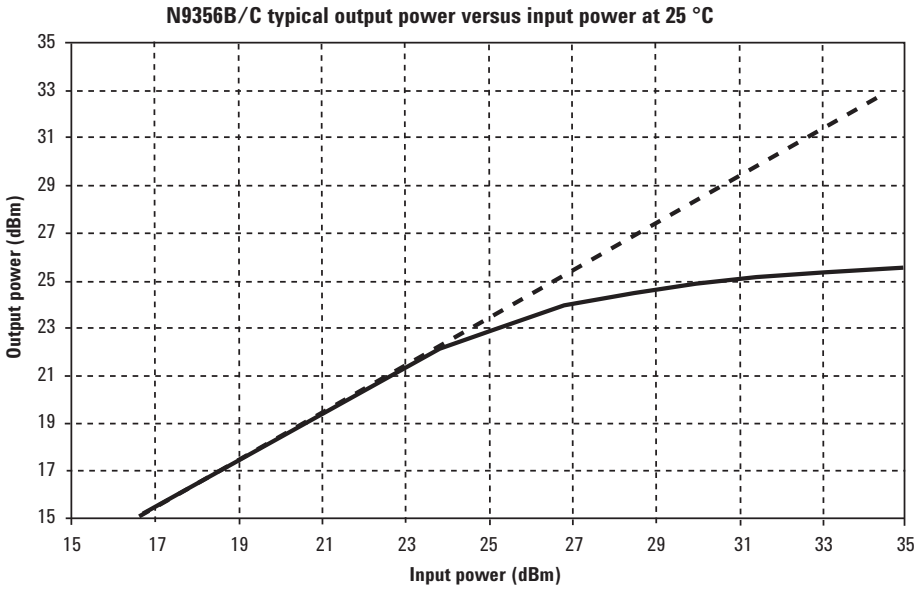


Figure 7. N9356B/C typical output versus input power

Supplement Characteristics (Typical) *(continued)*

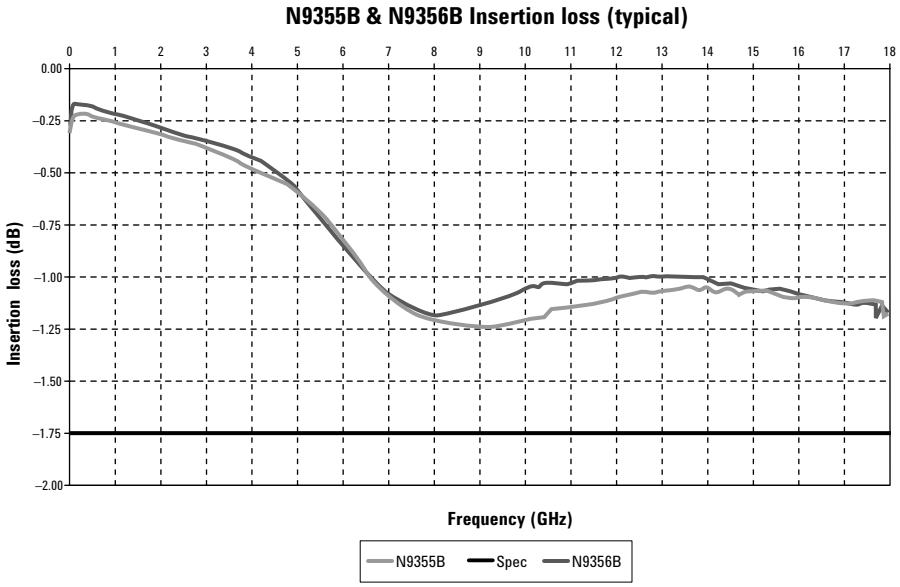


Figure 8. N9355/6B typical insertion loss versus frequency

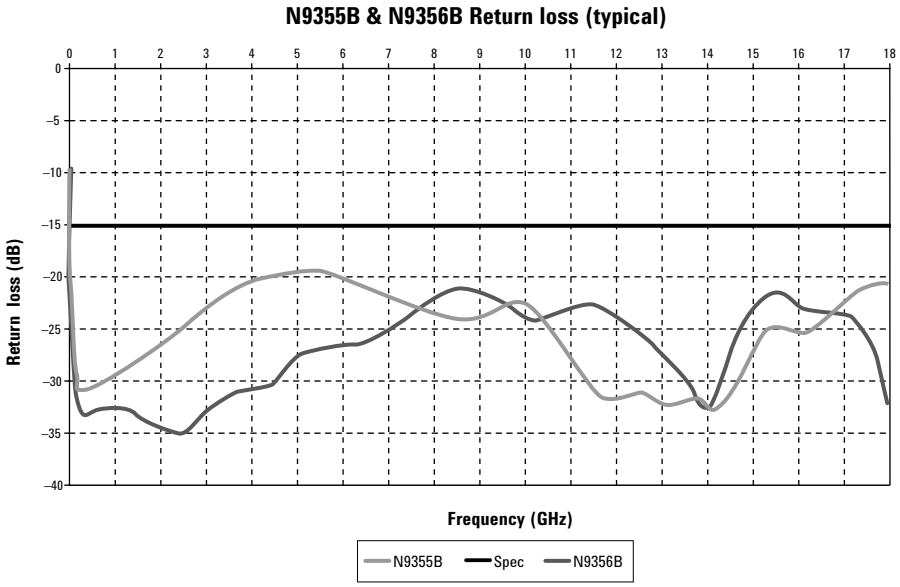


Figure 9. N9355/6B typical return loss versus frequency

Supplement Characteristics (Typical) *(continued)*

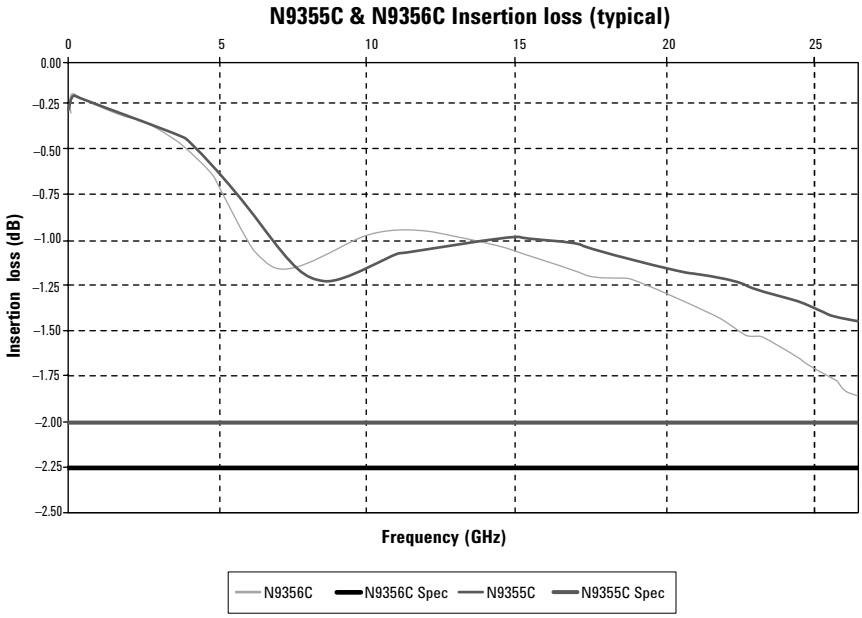


Figure 10. N9355/6C typical insertion loss versus frequency

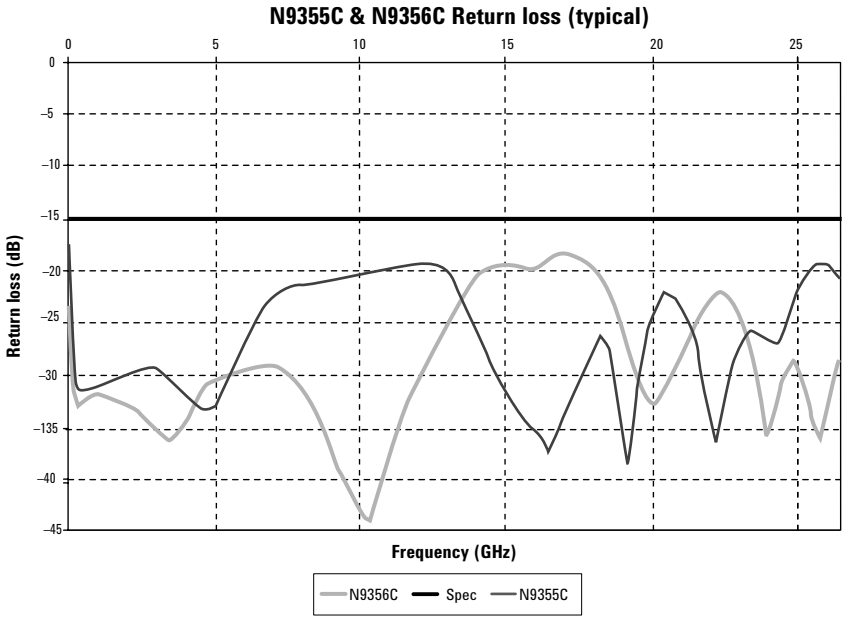


Figure 11. N9355/6C typical return loss versus frequency

Supplement Characteristics (Typical) *(continued)*

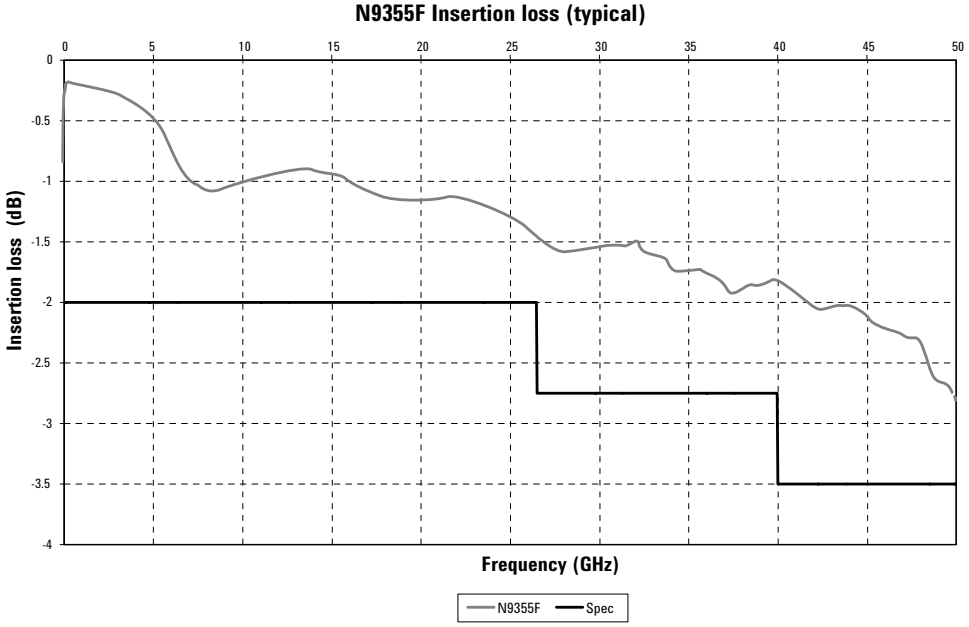


Figure 12. N9355F typical insertion loss versus frequency

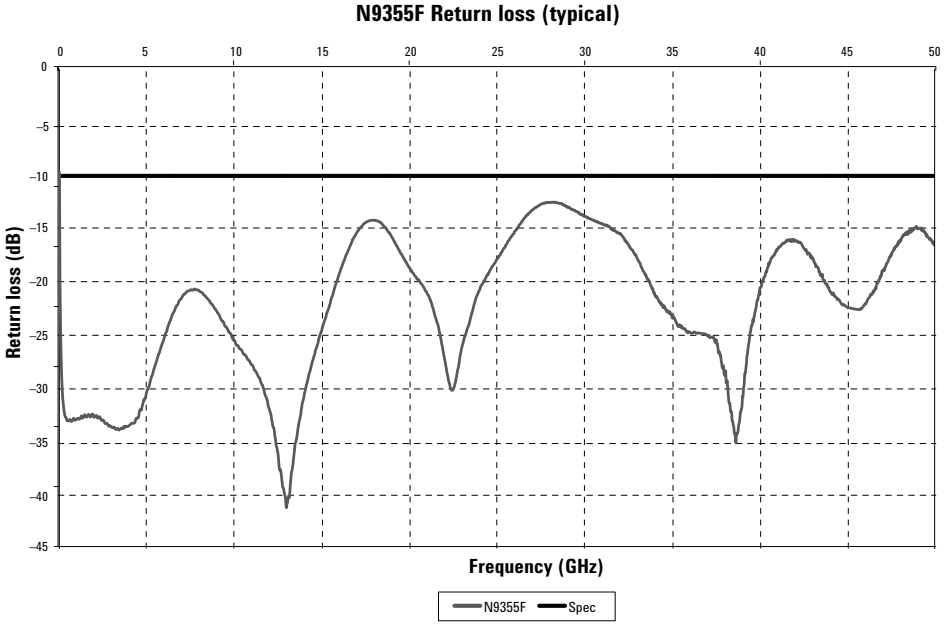


Figure 13. N9355F typical return loss versus frequency

Ordering Information

N9355B	0.01 to 18 GHz power limiter with 10 dBm limiting threshold
N9355C	0.01 to 26.5 GHz power limiter with 10 dBm limiting threshold
N9356B	0.01 to 18 GHz power limiter with 25 dBm limiting threshold
N9356C	0.01 to 26.5 GHz power limiter with 25 dBm limiting threshold
N9355F	0.01 to 50 GHz power limiter with 10 dBm limiting threshold

Related Keysight Literature

Publication title	Pub number
Keysight N9355/6 Power Limiters Flyer	5989-3740EN
Keysight N9355/6 Power Limiters Application Note	5989-4880EN

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