

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

Technical Overview



High Performance Power Limiters

- 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. Agilent's 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 Agilent 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 pair of high quality male and female Type-N connectors.

N9355C and N9356C

The Agilent 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 pair of high quality male and female 3.5 mm connectors.

N9355F

The Agilent 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 pair of high quality male and female 2.4 mm connectors.



Application

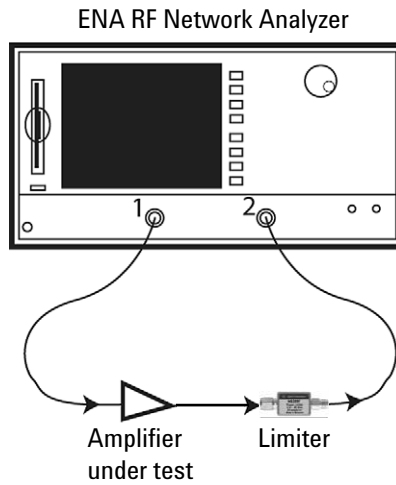


Figure 1. Typical application

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.

Agilent 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 2. Typical application

Specifications

Specifications describe the limiter's warranted performance over the temperature range 0 °C 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				
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
Max. leakage power ²	24 dBm	27 dBm	24 dBm	27 dBm	24 dBm
Maximum DC voltage					
@ 25 °C			30 V		
@ 85 °C			16 V		
Turn on time			< 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 Agilent Technologies' product operating environment specifications. The following summarizes the environmental specifications for these products.

Temperature :

Operating	0 °C to +55 °C
Storage	-40 °C to +70 °C
Cycling	-65 °C to +150 °C, 10 cycles @ 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 @ 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)

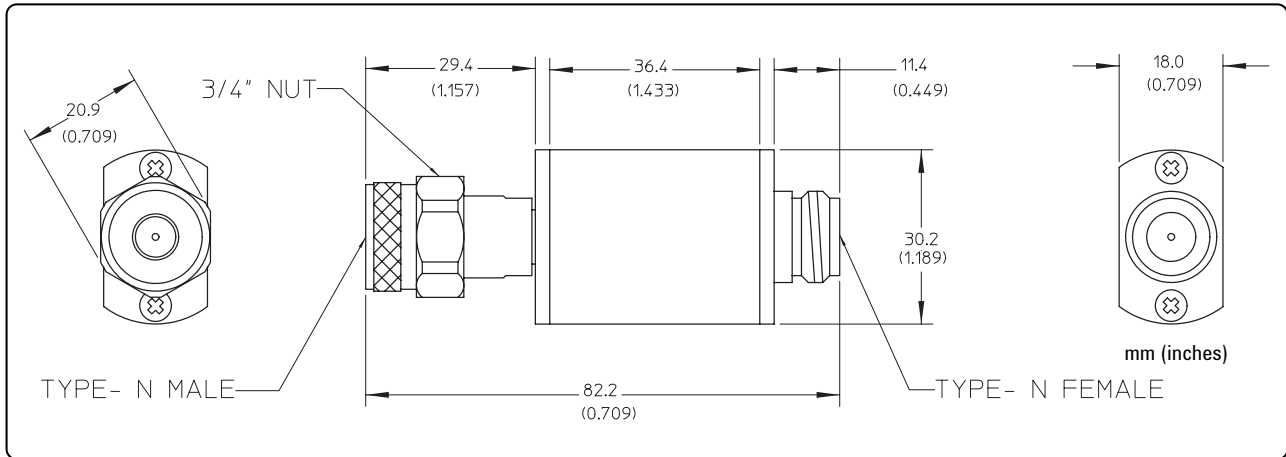


Figure 3. N9355/6B product outline

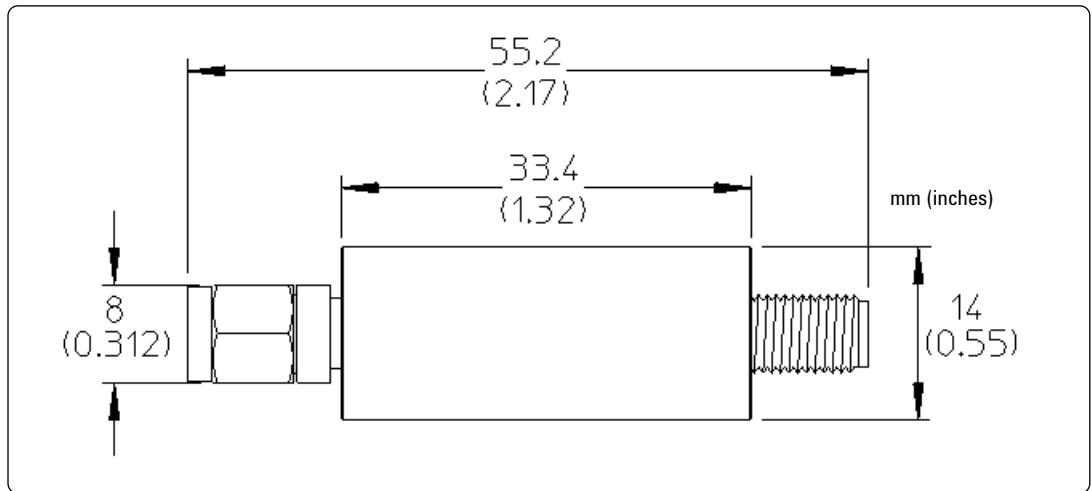


Figure 4. N9355/6C product outline

**Mechanical
Dimension
Continued**

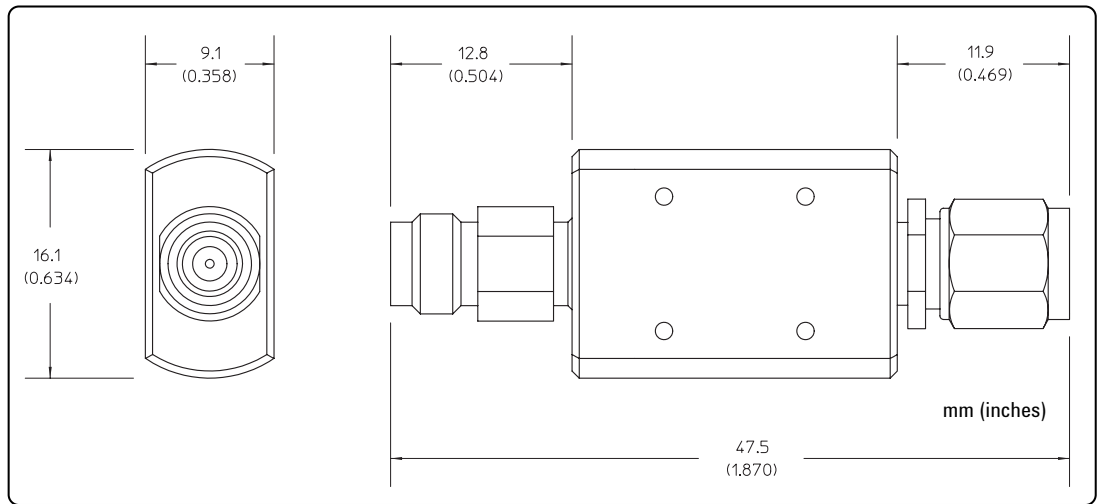


Figure 5. N9355F product outline

Supplement Characteristics (Typical)

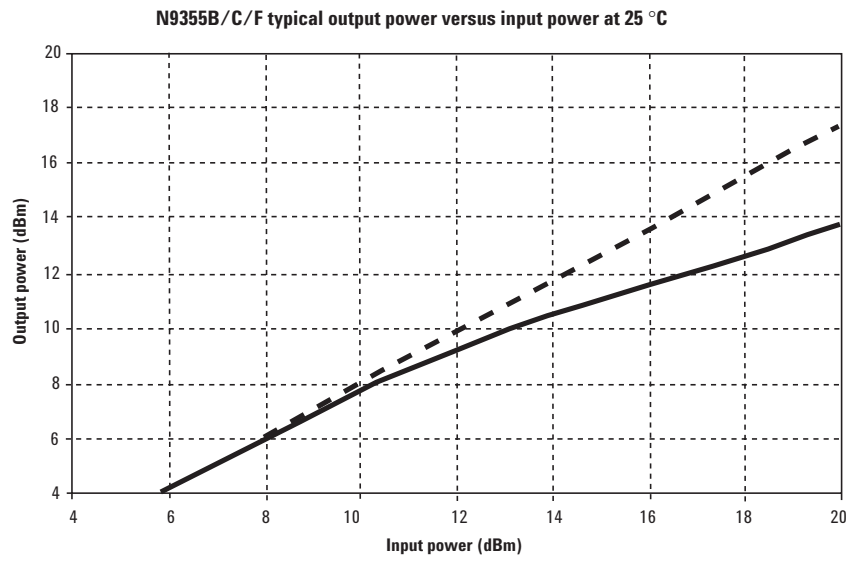


Figure 6. N9355B/C/F typical output versus input power

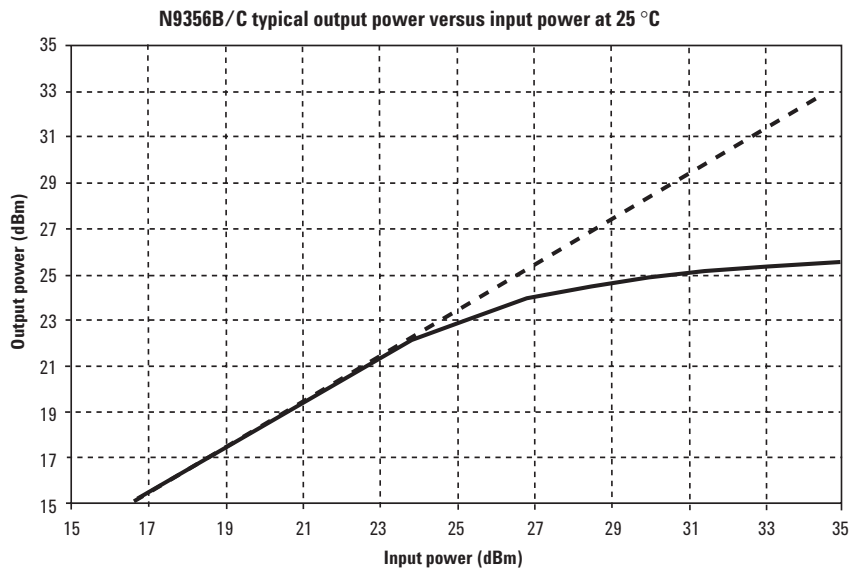


Figure 7. N9356B/C typical output versus input power

**Supplement
Characteristics
(Typical)
Continued**

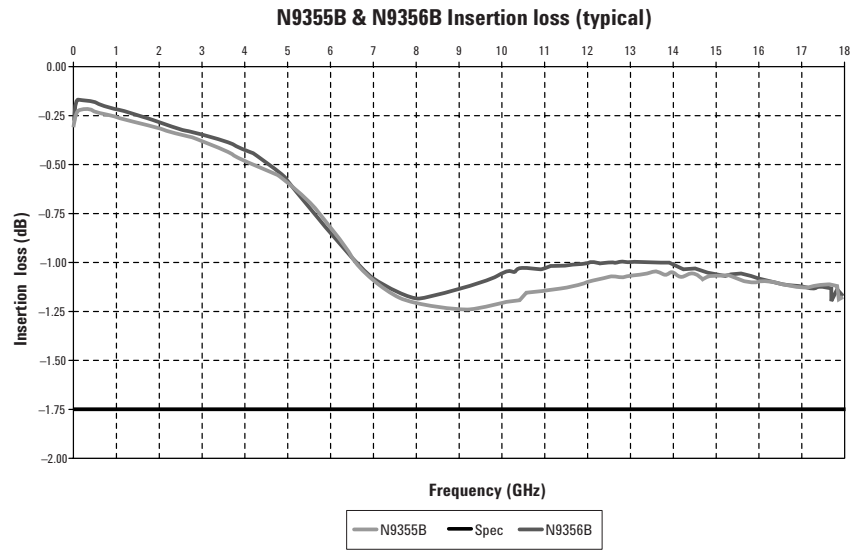


Figure 8. N9355/6B typical insertion loss versus frequency

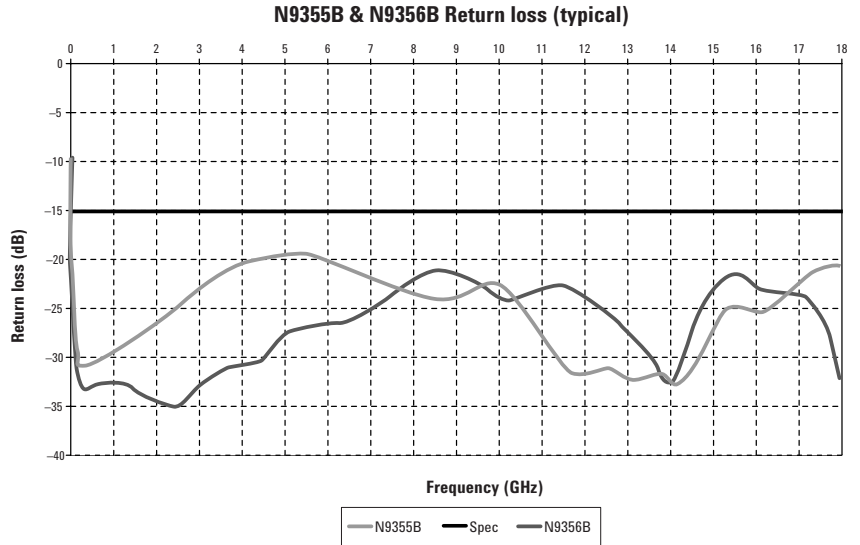


Figure 9. N9355/6B typical return loss versus frequency

**Supplement
Characteristics
(Typical)
Continued**

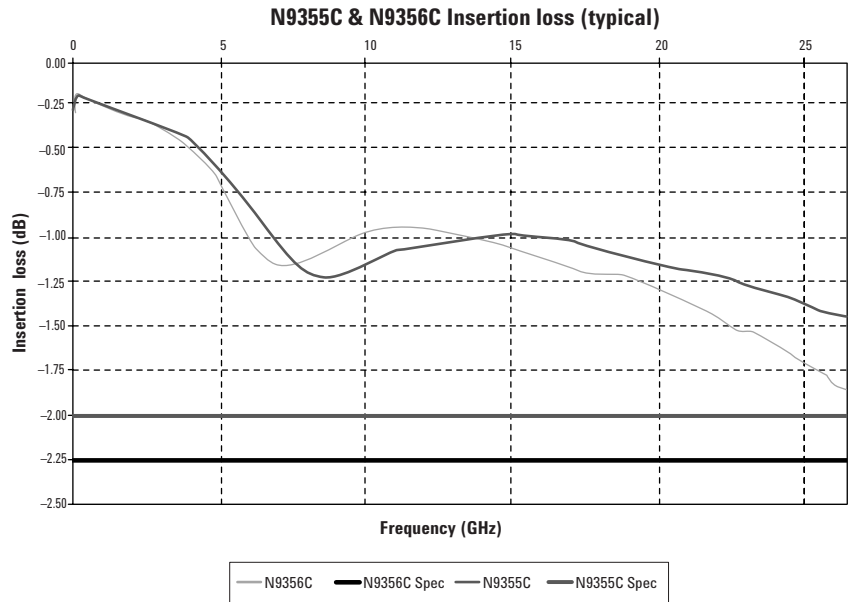


Figure 10. N9355/6C typical insertion loss versus frequency

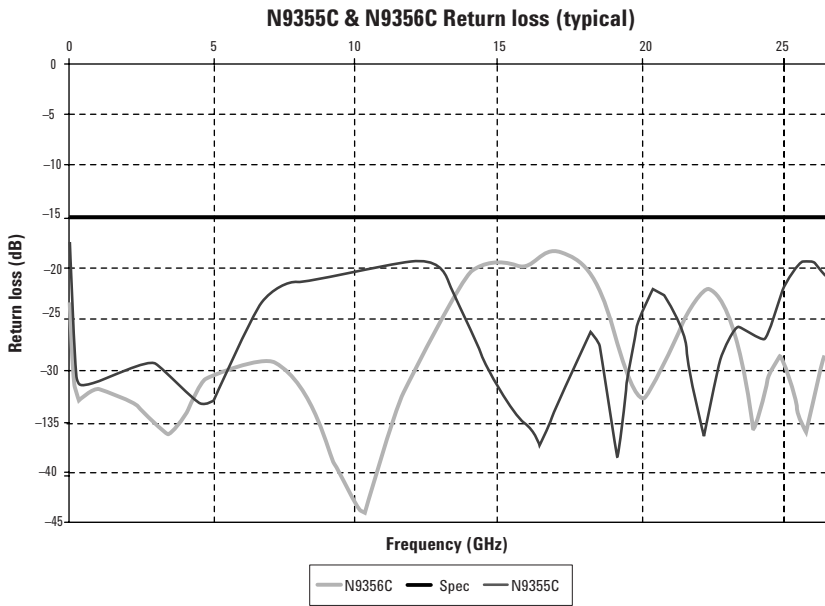


Figure 11. N9355/6C typical return loss versus frequency

**Supplement
Characteristics
(Typical)
Continued**

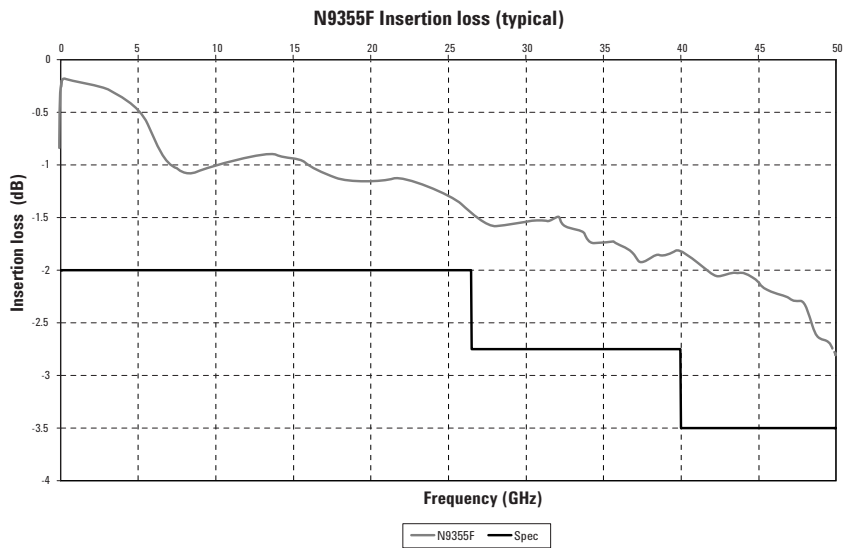


Figure 12. N9355F typical insertion loss versus frequency

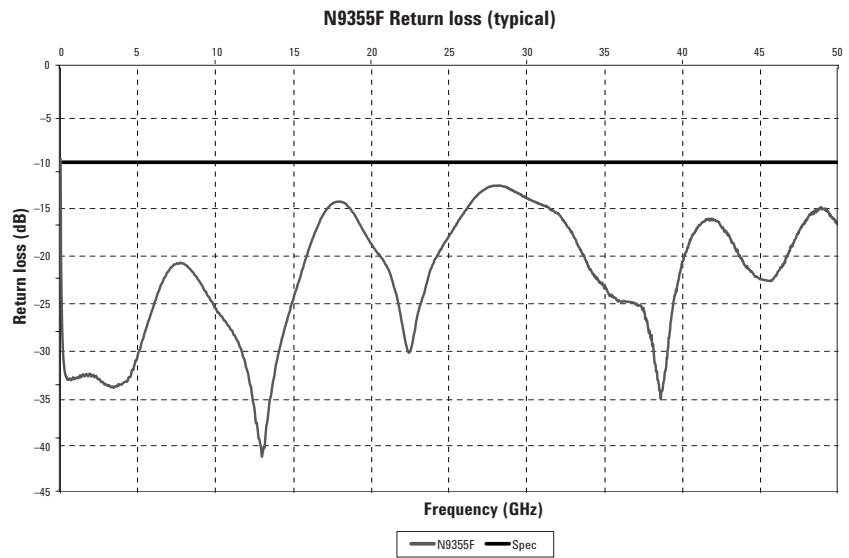


Figure 13. N9355F typical return loss versus frequency

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 Product Literature

- 1) *Agilent N9355/6 Power Limiter Flyer*, literature number 5989-3740EN
- 2) *Agilent N9355/6 Power Limiter Application Note*, literature number 5989-4880EN

Web resource

<http://www.agilent.com/find/mta>



Agilent Email Updates

www.agilent.com/find/emailupdates

Get the latest information on the products and applications you select.



Agilent Direct

www.agilent.com/find/agilentdirect

Quickly choose and use your test equipment solutions with confidence.



www.agilent.com/find/open

Agilent Open simplifies the process of connecting and programming test systems to help engineers design, validate and manufacture electronic products. Agilent offers open connectivity for a broad range of system-ready instruments, open industry software, PC-standard I/O and global support, which are combined to more easily integrate test system development.

www.agilent.com

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you receive your new Agilent equipment, we can help verify that it works properly and help with initial product operation.

Your Advantage

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office.

Phone or Fax

United States:

(tel) 800 829 4444
(fax) 800 829 4433

Canada:

(tel) 877 894 4414
(fax) 800 746 4866

China:

(tel) 800 810 0189
(fax) 800 820 2816

Europe:

(tel) 31 20 547 2111

Japan:

(tel) (81) 426 56 7832
(fax) (81) 426 56 7840

Korea:

(tel) (080) 769 0800
(fax) (080) 769 0900

Latin America:

(tel) (305) 269 7500

Taiwan:

(tel) 0800 047 866
(fax) 0800 286 331

Other Asia Pacific Countries:

(tel) (65) 6375 8100
(fax) (65) 6755 0042

Email: tm_ap@agilent.com

Contacts revised: 09/26/05

**The complete list is available at:
www.agilent.com/find/contactus**

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2005, 2006
Printed in USA, May 3, 2006
5989-3637EN



Agilent Technologies