Agilent 8474A/B/C/E

Coaxial GaAs Microwave Detectors

Data Sheet

0.01 to 18, 33, 40, 50 GHz

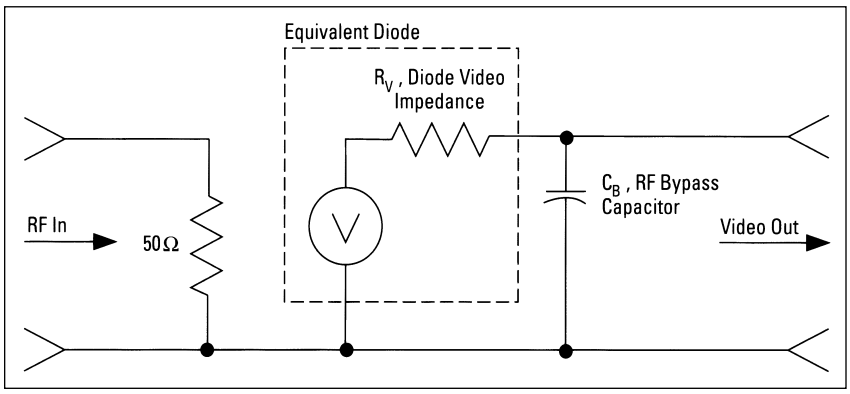

Figure 1. Equivalent circuit for Agilent 8474A/B/C/E with typical parameter

Typical values:
R_V (diode video impedance) ≈ 1.5kΩ*
C_B (RF bypass capacitor) ≈ 27pF nominal

$$\text{TR (10 to 90\% risetime)} \approx 2.2 \frac{(R_{LOAD})(R_V)}{R_{LOAD} + R_V} (C_B + C_{LOAD}) = \frac{0.35}{BW}$$

* @ 25 °C and $P_{IN} \leq 20$ dBm (see figure 7)

Features and Description

- Exceptional Flatness
- Broadband from 0.01 to 50 GHz
- Extremely Temperature Stable
- Environmentally Rugged

The Agilent Technologies 8474 series of coaxial detectors are specifically designed for use in microwave instrumentation and systems. These detectors utilize a GaAs diode matched to a 50 ohm transmission line with a miniature thin film circuit.

The diodes are a Planar-Doped Barrier (PDB) structure fabricated by use of Molecular Beam Epitaxy technology. This combination yields a device which has superior characteristics to point-contact and low-barrier Schottky devices. These characteristics are reflected in frequency response specification and in square law response vs. frequency (figure 7) with PDB detectors showing a maximum square law response variation of 3% from 2 to 18 GHz vs. 9.5% for Schottky detectors.

These detectors are extremely rugged with high resistance to ESD damage and are less sensitive to temperature change than either point-contact or Schottky diodes. These products offer 10 MHz to 50 GHz performance with the 2.4 mm connector (Agilent 8474E) or narrower frequency coverage with APC-7 Type N or SMA-compatible 3.5 mm connectors. There is no need to order matched pairs because the frequency tracking is better than the original matched pair specifications.

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Detector Performance Characteristics

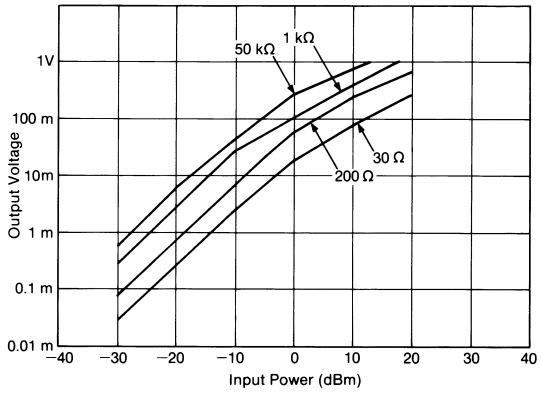


Figure 2. Typical transfer characteristics (T_R = 25 °C)

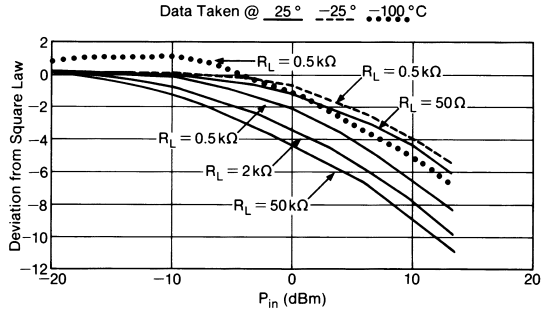


Figure 3. Typical square law deviation

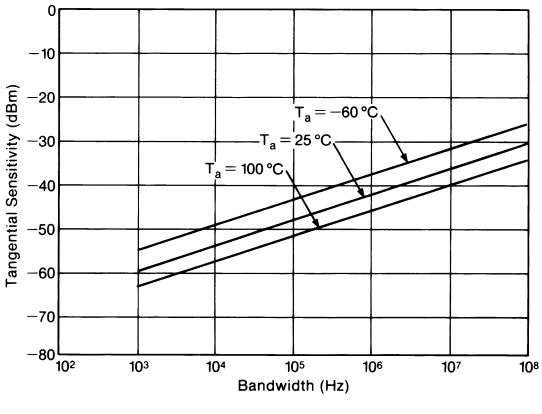


Figure 4. Typical tangential sensitivity

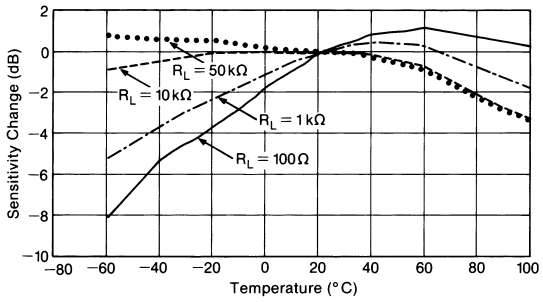


Figure 5. Typical output response with temperature ($P_{IN} \leq$ 20 dBm)

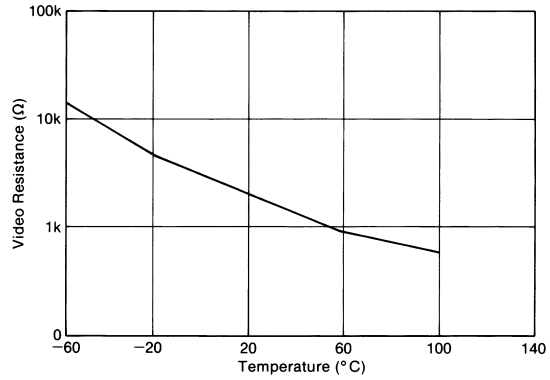


Figure 6. Typical video impedance variation with temperature

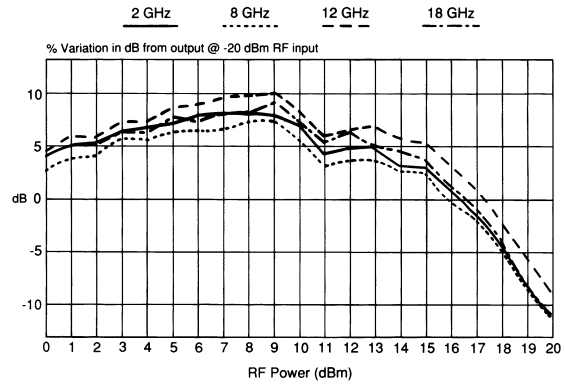
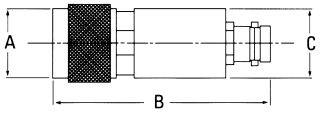


Figure 7. Typical square law deviation due to frequency

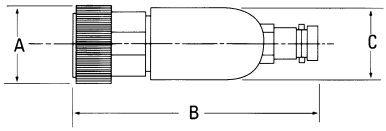
Specifications

	8474A	8474B	8474C	8474E
Frequency Range	0.01-18 GHz	0.01-18 GHz	0.01-33 GHz	0.01-50 GHz
Frequency Response	±0.25 dB from 0.01 to 12.4 GHz ±0.35 dB from 12.4 to 18 GHz	±0.35 dB	±0.45 dB from 0.01 to 26.5 GHz ±0.7 dB from 26.5 to 33 GHz	±0.4 dB from 0.01 to 26.5 GHz ±0.6 dB from 26.5 to 40 GHz ±1.0 dB from 40 to 50 GHz
SWR	<1.15 .01-12.4 GHz <1.2 12.4-18 GHz	<1.3	<1.4 .01-26.5 GHz <2.2 26.5-33 GHz	<1.2 .01-26.5 GHz <1.6 26.5-40 GHz <2.8 40-50 GHz
Low-level Sensitivity	>0.4 mV/µW	>0.4 mV/µW	>0.4 mV/µW	>0.4 mV/µW >0.34 mV/µW 40-50 GHz
Max. Operating Inputs	200 mW	200 mW	200 mW	200 mW
Typical Short-Term Max. Input	0.75 Watt (<1 min.)	0.75 Watt (<1 min.)	0.75 Watt (<1 min.)	0.75 Watt (<1 min.)
Noise (µV peak-to-peak with CW power applied to produce 100mV output, 400 kHz BW	<50 µV	<50 µV	<50 µV	<50 µV
STD Output Polarity	Negative	Negative	Negative	Negative

Note: Above specifications are at 25 °C and ≤20 dBm unless otherwise specified.



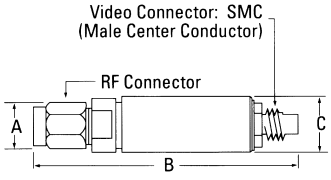
Agilent 8474A



Agilent 8474B

Mechanical Information

		8474A	8474B	8474C	8474E
Dimensions mm (inches)	**A**	22.20 (0.87)	20.82 (0.82)	7.9 (0.31)	7.9 (0.31)
	B	61.97 (2.44)	59.86 (2.36)	41.15 (1.62)	37.36 (1.47)
	C	18.68 (.074)	18.68 (0.74)	9.7 (0.38)	7.6 (0.30)
Input Connector		APC-7	Type N (m)	3.5 mm (m) SMA Compatible	2.4 mm (m) 1.85 mm Compatible
Output Connector		BNC (f)	BNC (f)	SMC (m)	SMC (m)
Net Weight		85.3 grams (3 oz.)	85.3 grams (3 oz.)	13.9 grams (0.49 oz.)	9.1 grams (0.32 oz.)



Agilent 8474C/E

8474A Options	002	004	008	012	018
Frequency Range (GHz)	.01-2	2-4	4-8	8-12.4	12.4-18
Frequency Response (dB)	±0.2	±0.2	±0.2	±0.2	±0.3
SWR	<1.09	<1.1	<1.5	<1.2	<1.22

8474B Options	002	004	008
Frequency Range (GHz)	.01-2	2-4	4-8
Frequency Response (dB)	±0.25	±0.25	±0.25
SWR	<1.09	<1.1	<1.2

8474C Options	008	012	026	033
Frequency Range (GHz)	4-8	8-12.4	18-26.5	26.5-33
Frequency Response (dB)	±0.2	±0.25	±0.3	±0.3
SWR	<1.16	<1.2	<1.41	<2.2

8474E Options	026	040	050
SWR	<1.22	<1.63	<2.84
Low Level Sens (mV/µW)	>0.4	>0.4	>0.34

Environmental

Operating Temperature*	-65 to 100 °C
Temperature Cycling (non-operating)	MIL-STD 883, Method 1010.1: (-65 to 100 °C)
Vibration	MIL-STD 883, Method 2007: (0.6″ D.A. 20 to 80 Hz, 20g, 80 to 200 Hz)
Shock	MIL-STD 883, Method 2002.1: (500g, 0.5 msec)
Acceleration	MIL-STD 883, Method 2001: (500g)
Altitude	MIL-STD 883, Method 1001: (50,000 ft., 15,240m)
Salt Atmosphere	MIL-STD 883, Method 1009.1: (48 hr., 5% solution)
Moisture Resistance	MIL-STD 883, Method 1004.1: (25 to 40 °C, 95% RH)
RFI	MIL-STD 461B
ESD	10 hits at 25 kV to the body, not the center conductor

* 8474A/B specified for 0 °C - 75 °C

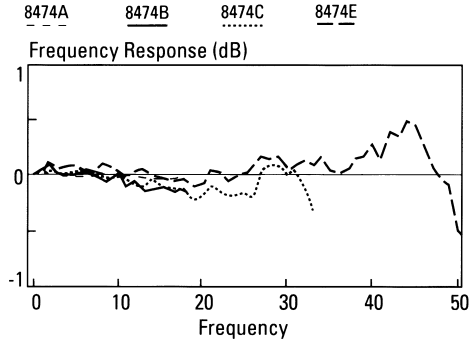


Figure 8. Typical frequency response

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. Support is available for at least five years beyond the production life of the product. 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 use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

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 on-site education and training, as well as design, system integration, project management, and other professional 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.

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