Agilent 8474B/C/E Coaxial GaAs Microwave Detectors

0.01 to 50 GHz

Data Sheet

Features and description

- Exceptional flatness
- Broadband from 0.01 to 50 GHz
- Extremely temperature stable
- Environmentally rugged

The 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 (8474E) or narrower frequency coverage with APC-7 Type N or SMA-compatible 3.5 mm and 2.92 mm connectors. There is no need to order matched pairs because the frequency tracking is better than the original matched pair specifications.

*@ 25û C and PIN ≤ 20 dBm (see Figure 7)

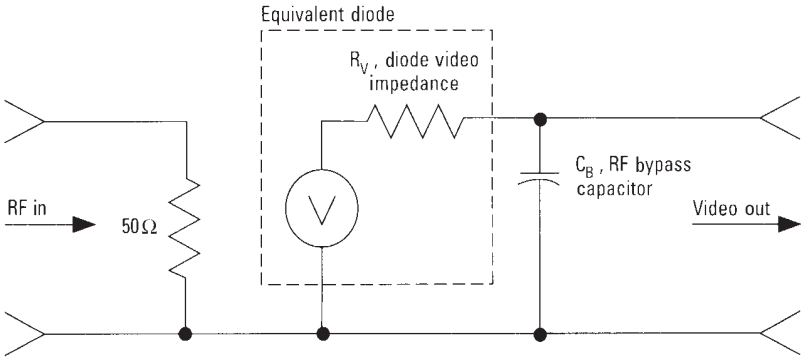

Figure 1. Equivalent circuit for 8474A/B/C/D/E with typical parameters

Typical values:

R_V (diode video impedance) = 1.5 kΩ*
C_B (RF bypass capacitor) = 27 pF nominal

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

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Detector performance characteristics

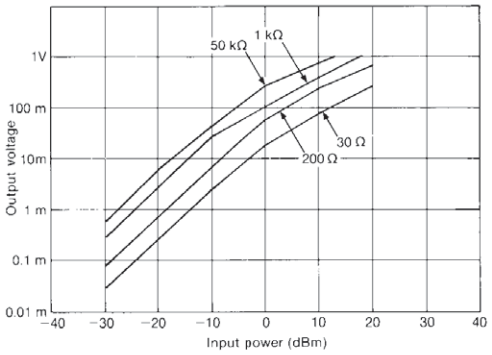


Figure 2. Typical transfer characteristics (Ta = 25° C).

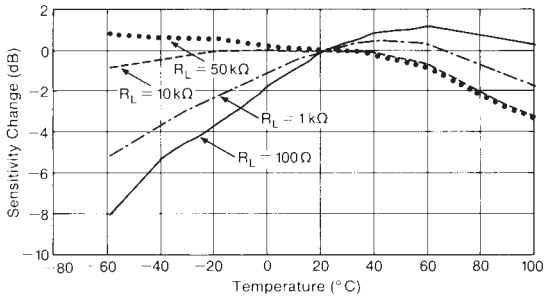


Figure 5. Typical output response with temperature. (Pin ≤ 20 dBm)

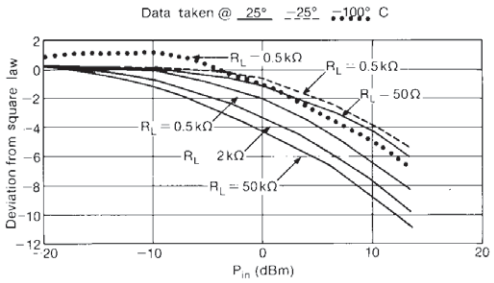


Figure 3. Typical square law deviation.

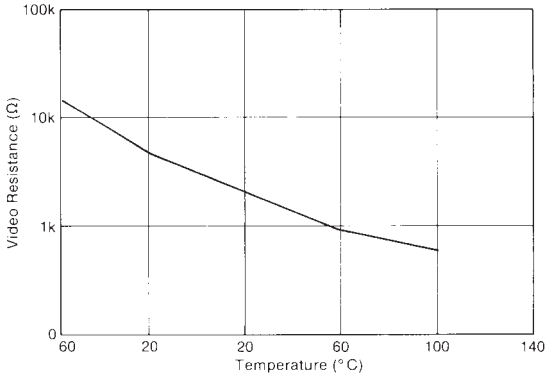


Figure 6. Typical video impedance variation with temperature.

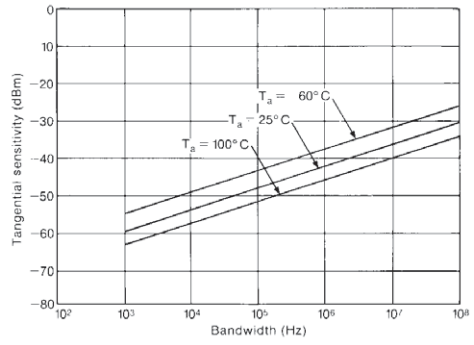


Figure 4. Typical tangential sensitivity.

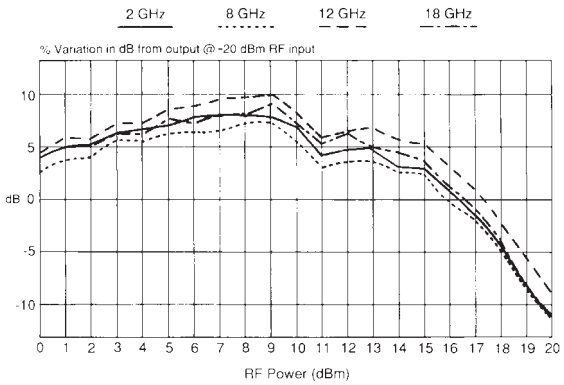


Figure 7. Typical square law deviation due to frequency.

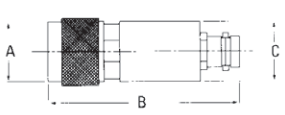
Specifications

	8474B	8474C	8474E
Frequency range:	0.01-18 GHz	0.01-33 GHz	0.01-50 GHz
Frequency response	±0.35 dB	±0.45 dB from 0.01 to 26.5 GHz	±0.4 dB from 0.01 to 26.5 GHz
		±0.7 dB from 26.5 to 33 GHz	±0.6 dB from 26.5 to 40 GHz ±1.0 dB from 40 to 50 GHz
SWR:	<1.3	<1.4 .01-26.5 GHz <2.2 26.5-33 GHz	<1.2 .01-26.5 GHz <1.6 26.5-40GHz <2.8 40-50 GHz
Low-level sensitivity:	>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
Typical short-Term max. input:	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 100 MV output, 400 kHz BW)	<50 μV	<50 μV	<50 μV
STD output polarity:	negative	negative	negative

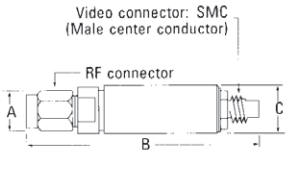
Note: Above specifications are at 25° C and ≤20 dBm unless otherwise specified.

Mechanical information

	8474B	8474C	8474E
Dimensions mm (inches)	20.82 (0.82) 59.86 (2.36) 18.68 (0.74)	7.9 (0.31) 41.15 (1.62) 9.7 (0.38)	7.9 (0.31) 37.36 (1.47) 7.6 (0.30)
Input connector:	Type N (m)	3.5 mm (m) SMA compatible	2.4 mm (m) 1.85 min compatible
Output connector:	BNC (f)	SMC (m)	SMC (m)
Net weight:	85.3 grams (3 oz.)	13.9 grams (0.49 oz.)	9.1 grams (0.32 oz.)



8474B



8474C/E

8474B Options	002	004	008	012	018	
Frequency range (GHz):	.01-2	2-4	4-8	8-12.4	12.4-18	
Frequency response (dB):	±0.25	±0.25	±0.25	±0.25	±0.35	
SWR:	<1.09	<1.1	<1.2	<1.3	<1.31	
8474C Options	**004**	**008**	**012**	**018**	**026**	**033**
Frequency range (GHz):	2-4	4-8	8-12.4	12.4-18	18-26.5	26.5-33
Frequency response (dB):	±0.2	±0.2	±0.25	±0.3	±0.3	±0.3
SWR:	<1.1	<1.16	<1.2	<1.3	<1.41	<2.2

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, 15,240 m)
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 25kV to the body, not the center conductor.

Ordering Information

Model	Option Number	Option Description
8474B	002	0.01 to 2 GHz octave only
	004	2 to 4 GHz octave only
	008	4 to 8 GHz octave only
	102[1]	Square law load
	103	Positive Polarity
8474C	008	4 to 8 GHz octave only
	012	8 to 12.4 GHz octave only
	033	26.5 to 33 GHz octave only
	103	Positive Polarity

1. Option 102 external square law load extends the square law region of the detector with deviation of +/- 0.5 dB from the ideal square law response.

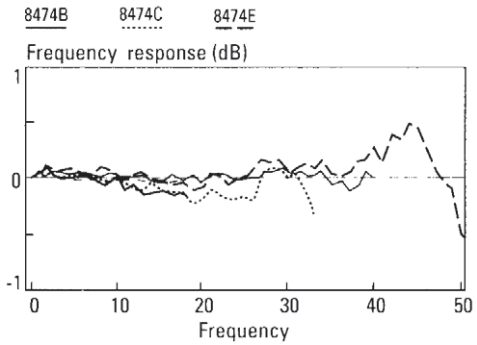


Figure 8. Typical frequency response.

* 8474A/B specified for 0° C - 75° C.

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