



# Agilent RF and Microwave Test Accessories Selection Guide



Agilent Technologies

# About Agilent's RF and Microwave Test Accessories Product Portfolio 2010

The Agilent Technologies 2010 RF and Microwave Test Accessories Product Portfolio allows you to quickly and conveniently research the highest quality RF and microwave test accessories in the industry. Our test accessories are the result of decades of innovation in creating the building blocks used in our test and measurement products and solutions. We've evolved these key technologies into a broad line of RF and microwave test accessories for use in your test and measurement solutions.

In addition to this, please refer to the MTA catalog 5968-4314EN for complete product specifications, and visit our Web Site (**[www.agilent.com/find/mta](http://www.agilent.com/find/mta)**) for the latest news, product and support information. We encourage you to visit the site, where you can obtain updated technical information and download technical literature on Agilent's high-performance RF and microwave test accessories.

# New RF and Microwave Test Accessories

Agilent's RF and microwave test accessories complete your measurement solutions.

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Choose from over 200 accessories that provide superior RF performance to optimize your equipment performance. Unmatched quality and reliability and ultra-broadband frequency help you meet the demands of today's devices.

Find the newest products below:

## RF Probes

*High frequency active differential probes for in-circuit measurements.*

<b>U1818A</b> Active Differential Probe, 100 kHz to 7 GHz .....	page 54
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## Attenuation Control Units

*Attenuation control unit, DC to 6/18/26.5 GHz, 0 to 101/121 dB attenuation with 1 dB step size. Designed for WLAN and WiMAX™ device manufacturing test, mobile handset base transceiver station (BTS) handover testing.*

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## Attenuator/Switch Drivers

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DC Power Supplies

**1** From DC to light, with Agilent you have confidence in clean power, precise input signals, accurate output measurements and accessories that ensure signal fidelity throughout.

**2** Choose products from a single vendor and gain the confidence of a single point of accountability at every stage from configuring and ordering to installation and operation.



Attenuators



RF Signal Generators

Function/Arbitrary Waveform Generators



Data Acquisition and Switch/Measure Units

Switches



DC Power Analyzer

# Confidence IN... INPUT DEVICE UNDER TEST OUTPUT ...Confidence OUT



GPIB and Instrument Control Products



Data Acquisition and Switch/Measure Units

Switches



Digital Multimeters



RF Power Meter



Adapters



RF Spectrum Analyzer



Amplifiers

**3** Agilent's 70 plus years of test and measurement expertise gives you the added resource of application advice and technical support if your confidence ever needs a boost.



Oscilloscopes

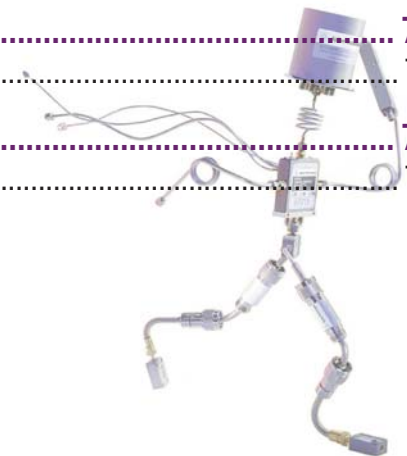


Frequency Counters

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The background of the slide is a dark purple color. It features a complex network of thin, light blue lines connecting various nodes. Some nodes are represented by small, glowing white circles, while others are larger, multi-pointed star-like shapes with a white center and a reddish-pink glow. The overall effect is that of a digital or neural network.

# Amplifiers

# 1



## Agilent RF & Microwave Amplifiers

Agilent amplifiers offer ultra-broad bandwidths – such as 0.01 to 26.5 GHz, 0.045 to 50 GHz, and ranges in between. These high-performance amplifiers eliminate crossover networks and multiple power supplies from multiple narrow band amplifiers. Excellent noise figure and high gain, up to 30 dB, significantly reduces test system noise figure, thus increasing the dynamic range. High output power improves recovery of system losses and boost available power in ATE systems.

### Key Features:

- Broadband performance up to 50 GHz optimizes the operating range of your test systems
- Excellent noise figure and high gain significantly reduce overall test system noise figure
- High output power boosts available power for measurements



*Preamplifier*



*System Amplifier*



## Agilent RF & Microwave Amplifiers

### Product Specifications

Model	Frequency range (GHz)	Output power at $P_{sat}$ (dBm)	Output power at $P_{1dB}$ (dBm)	Gain (dB) (min)	Noise figure (dB) (typical)	Bias (nom)	RF connectors (input/output)
Preamplifiers							
87405B	0.01 to 4 GHz	7 at 4 GHz	8 at 4 GHz	22	5 at 4 GHz	+15 V at 105 mA	Type N (m.f)
87405C	0.1 to 18 GHz	17 at 18 GHz	15 at 4 GHz 14 at 18 GHz	25	6 at 4 GHz 4.5 at 18 GHz	+15 V at 140 mA -15 V at 3 mA	Type N (m.f)
87415A	2 to 8 GHz	26 at 8 GHz	23 at 8 GHz	25	13 at 8 GHz	+12 V at 900 mA	SMA (f)
System amplifiers							
83006A	0.01 to 26.5 GHz	18 at 10 GHz 16 at 20 GHz 14 at 26.5 GHz	13 at 20 GHz 10 at 26.5 GHz	20	13 at 0.1 GHz 8 at 18 GHz 13 at 26.5 GHz	+12 V at 450 mA -12 V at 50 mA	3.5 mm (f)
83017A <sup>1</sup>	0.5 to 26.5 GHz	20 at 20 GHz 15 at 26.5 GHz	18 at 20 GHz 13 at 26.5 GHz <sup>2</sup>	25	8 at 20 GHz 13 at 26.5 GHz	+12 V at 700 mA -12 V at 50 mA	3.5 mm (f)
83018A <sup>1</sup>	2 to 26.5 GHz	24 at 20 GHz 21 at 26.5 GHz	22 at 20 GHz 17 at 26.5 GHz	27 dB at 20 GHz 23 dB at 26.5 GHz	10 at 20 GHz 13 at 26.5 GHz	+12 V at 2 mA -12 V at 50 mA	3.5 mm (f)
83020A <sup>1</sup>	2 to 26.5 GHz	30 at 20 GHz 25 at 26.5 GHz <sup>2</sup>	27 at 20 GHz 23 at 26.5 GHz	30 dB at 20 GHz 27 dB at 26.5 GHz	10 at 20 GHz 13 at 26.5 GHz	+15 V at 3.2 mA -15 V at 50 mA	3.5 mm (f)
83050A	2 to 50 GHz	20 at 40 GHz 17 at 50 GHz <sup>3</sup>	15 at 40 GHz 13 at 50 GHz	21	6 at 26.5 GHz 10 at 50 GHz	+12 V at 830 mA -12 V at 50 mA	2.4 mm (f)
83051A	0.045 to 50 GHz	12 at 45 GHz 10 at 50 GHz	8 at 45 GHz 6 at 50 GHz	23	12 at 2 GHz 6 at 26.5 GHz 10 at 50 GHz	+12 V at 425 mA -12 V at 50 mA	2.4 mm (f)

1. 83017A, 83018A and 83020A include internal directional detectors with BNC (f) DC connectors for external leveling applications

2.  $\Delta f = f(\text{GHz}) - 20$

3.  $\Delta f = f(\text{GHz}) - 40$

For more details on Agilent amplifiers and ordering information see the "Agilent RF and Microwave Amplifiers", literature number 5989-6949EN

For more information on Agilent Amplifiers, please visit [www.agilent.com/find/amplifiers](http://www.agilent.com/find/amplifiers)



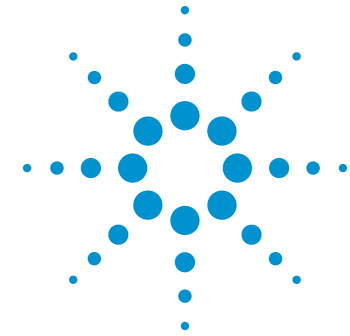
# Attenuators

# 2

- Coaxial Fixed Attenuators
- Manual Step Attenuators
- Programmable Step Attenuators
- Attenuation Control Unit

## Agilent RF & Microwave Coaxial Fixed Attenuators

Agilent coaxial fixed attenuators provide precise attenuation, flat frequency response and low SWR over broad frequency ranges. These attenuators are available in normal attenuations of 3, 6, 10, 20, 30, 40, 50 and 60 dB that cater to various applications and setups.



Coaxial fixed attenuators:  
8491A (top), 8490G (right),  
8498A (far right)

### Key Features

- High reliability and exceptional repeatability reduce downtime
- Excellent RF specifications optimize test system measurement capability
- Broad portfolio of attenuation and connector options provide configuration flexibility



# Agilent RF & Microwave Coaxial Fixed Attenuators

## Product Specifications



Coaxial fixed attenuator (8493A)

Coaxial Fixed Attenuator													
Model	Frequency	Attenuation accuracy								Maximum SWR	Maximum input average power (W)	Maximum input peak power (W)	RF connectors
		3 dB	6 dB	10 dB	20 dB	30 dB	40 dB	50 dB	60 dB				
8491A	DC to 12.4 GHz	0.3	0.3	0.5	0.5	1.0	1.5	1.5	2.0	1.30	2	100	N (m,f)
8493A	DC to 12.4 GHz	0.3	0.3	0.5	0.5	1.0	–	–	–	1.30	2	100	SMA (m,f)
8491B	DC to 18 GHz	0.3	0.4	0.6	1.0	1.0	1.5	1.5	2.0	1.50	2	100	N (m,f)
8493B	DC to 18 GHz	0.3	0.4	0.6	1.0	1.0	–	–	–	1.50	2	100	SMA (m,f)
8498A	DC to 18 GHz	–	–	–	–	1.0	–	–	–	1.30	25	125	N (m,f)
8493C	DC to 26.5 GHz	1.0	0.6	0.5	0.6	1.0	1.3	–	–	1.25	2	100	3.5 mm (m,f)
8490D	DC to 50 GHz	4.8	7.8	11.3	21.7	31.7	42.5	–	–	1.45	1	100	2.4 mm (m,f)
8490G	DC to 67 GHz	4.8	7.8	11.3	21.5	31.7	42.5	–	–	1.45	1	100	1.85 mm (m,f)

## Coaxial Fixed Attenuator Option

Models	Option	Option description <sup>2</sup>
8490D, 8491A,	001	3 dB attenuation
8491B, 8493A,	006	6 dB attenuation
8493B, 8493C,	010	10 dB attenuation
8498A	020	20 dB attenuation
	030	30 dB attenuation
	040	40 dB attenuation <sup>1</sup>
	050	50 dB attenuation <sup>1</sup>
	060	60 dB attenuation <sup>1</sup>
	UK6	Commercial calibration test data with certifications

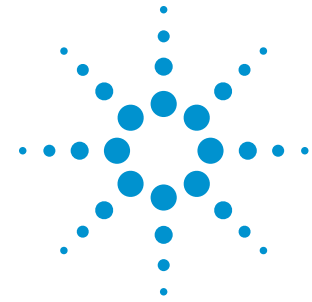
1. Not available on all models, see specification table.

2. Each order must specify an attenuation option.

For more details on Agilent attenuators and ordering information see “Agilent RF and Microwave Attenuators”, literature number 5989-6948EN

For more information on Agilent attenuators, please visit:  
[www.agilent.com/find/attenuators](http://www.agilent.com/find/attenuators)

## Agilent RF & Microwave Manual Step Attenuators



Agilent manual step attenuators offer fast, precise signal-level control up to 26.5 GHz. Unmatched attenuation repeatability of less than 0.03 dB up to 5 million cycles per section ensures low measurement uncertainty. Attenuation range of 121 dB in 1 dB step can be achieved by cascading 2 attenuators in series.



*Manual step attenuators*

### Key features

- High reliability and exceptional repeatability reduce downtime
- Excellent RF specifications optimize test system measurement capability
- Broad portfolio of attenuation and connector options provide configuration flexibility



**Agilent Technologies**



## Agilent RF & Microwave Manual Step Attenuators

### Product specifications

Manual step attenuator									
Model	Frequency (GHz)	Attenuation range (dB)	Attenuation step (dB)	Insertion loss (dB) at 0 dB	Maximum SWR	Maximum input average power (W)	Maximum input peak power (W)	Operating life (in million cycles/section)	Repeatability (5 million cycles per section)
8494A	DC to 4	0 to 11	1	0.96	1.50	1	100	5	± 0.03 dB max
8495A	DC to 4	0 to 70	10	0.68	1.35	1	100	5	± 0.03 dB max
8496A	DC to 4	0 to 110	10	0.96	1.50	1	100	5	± 0.03 dB max
8494B	DC to 18	0 to 11	1	2.22	1.90	1	100	5	± 0.03 dB max
8495B	DC to 18	0 to 70	10	1.66	1.70	1	100	5	± 0.03 dB max
8496B	DC to 18	0 to 110	10	2.22	1.90	1	100	5	± 0.03 dB max
8495D	DC to 26.5	0 to 70	10	3.95	2.22	1	100	5	± 0.03 dB max to 18 GHz, ± 0.05 dB max to 26.5 GHz

\* All product models listed above offer RF connector options for N(f) / SMA(f) / APC-7 except 8495D which only offers 3.5 mm (f) RF connectors.

### Manual step attenuator option

Models	Option type	Option description
	001	N (f)
8494A/ 8495A/ 8496A/	002	SMA (f)
	004	3.5 mm (f) <sup>1</sup>
8494B/ 8495B/ 8496B/	024	24 Vdc
	011	5 Vdc
8495D	UK6	Commercial calibration test data with certifications

\* Each order must include RF connector option

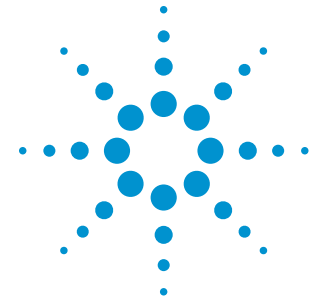
1. Available with Agilent 8495 only.

For more details on Agilent attenuators and ordering information see the "Agilent RF and Microwave Attenuators", literature number 5989-6948EN

For more information on Agilent amplifiers, please visit

[www.agilent.com/find/attenuators](http://www.agilent.com/find/attenuators)

## Agilent RF & Microwave Programmable Step Attenuators



Agilent programmable step attenuators offer fast, precise signal-level control up to 50 GHz, with switching time of less than 20 ms.

Unmatched attenuation repeatability of less than 0.03 dB up to 5 million cycles per section ensures low measurement uncertainty and reduces calibration cycles when installed into test systems.

Automatic GPIB/USB/LAN drive control is achieved with the 11713B/C attenuator/switch driver.



### Programmable Step Attenuators

- High reliability and exceptional repeatability reduce downtime
- Excellent RF specifications optimize test system measurement capability
- Broad portfolio of attenuation and connector options provide configuration flexibility



# Quick Fact Sheet

## Product Specifications

Programmable step attenuator									
Model number	Frequency (GHz)	Attenuation range (dB)	Attenuation step (dB)	Insertion loss (dB) @ 0 dB	Maximum SWR	Maximum input average power (W)	Maximum input peak power (W)	Operating life (in million cycles/section)	Repeatability
8494G	DC to 4	0 to 11	1	0.96	1.50	1	100	5	± 0.03 dB max (5 million cycles per section)
8495G	DC to 4	0 to 70	10	0.68	1.35	1	100	5	± 0.03 dB max (5 million cycles per section)
8496G	DC to 4	0 to 110	10	0.96	1.50	1	100	5	± 0.03 dB max (5 million cycles per section)
8494H	DC to 18	0 to 11	1	2.22	1.90	1	100	5	± 0.03 dB max (5 million cycles per section)
8495H	DC to 18	0 to 70	10	1.66	1.70	1	100	5	± 0.03 dB max (5 million cycles per section)
8496H	DC to 18	0 to 110	10	2.22	1.90	1	100	5	± 0.03 dB max (5 million cycles per section)
8495K	DC to 26.5	0 to 70	10	3.95	2.20	1	100	5	± 0.03 dB max to 18 GHz, ± 0.05 dB max to 26.5 GHz (5 million cycles per section)
8497K	DC to 26.5	0 to 90	10	2.79	1.80	1	100	5	± 0.03 dB max to 18 GHz, ± 0.05 dB max to 26.5 GHz (5 million cycles per section)
84904K	DC to 26.5	0 to 11	1	1.86	2.00	1	50	5	± 0.03 dB max (5 million cycles per section)
84906K	DC to 26.5	0 to 90	10	1.86	2.00	1	50	5	± 0.03 dB max (5 million cycles per section)
84907K	DC to 26.5	0 to 70	10	1.40	1.90	1	50	5	± 0.03 dB max (5 million cycles per section)
84904L	DC to 40	0 to 11	1	2.40	2.00	1	50	5	± 0.03 dB max (5 million cycles per section)
84906L	DC to 40	0 to 90	10	2.40	2.00	1	50	5	± 0.03 dB max (5 million cycles per section)
84907L	DC to 40	0 to 70	10	1.80	1.90	1	50	5	± 0.03 dB max (5 million cycles per section)
84904M	DC to 50	0 to 11	1	3.00	3.00	1	50	5	± 0.03 dB max *
84905M	DC to 50	0 to 60	10	2.60	2.60	1	50	5	± 0.03 dB max *
84908M	DC to 50	0 to 65	5	3.00	3.00	1	50	5	± 0.03 dB max *

\* Typical

### RF connector options:

- 1) 849xG/H offers N (f) / SMA (f) / APC-7
- 2) 849xK offers only 3.5 mm (f)
- 3) 8490xK offers 3.5 mm (f) / 3.5 mm (f/m)

- 4) 8490xL offers 2.4 mm (f), 2.92 mm (f) / 2.4 mm (f/m) / 2.92 mm (f/m)
- 5) 8490xM offers 2.4 mm (f/m) / 2.4 mm (f/f)

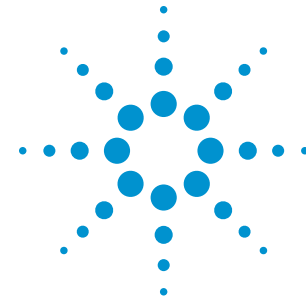
## Programmable Step Attenuator Option

Agilent 8494/95/96/97 series ordering example		
Models	Option type	Option description
8494G/ 8494H/ 8495G/ 8495H/ 8495K/ 8496G/ 8496H/ 8497K	001	N (f) <sup>G, H</sup>
	002	SMA (f) <sup>G, H</sup>
	004	3.5 mm (f) <sup>2, K</sup>
	024	24 Vdc
	011	5 Vdc
	060	12-pin viking connector <sup>G, H, K</sup>
	016	16-inch ribbon cable with 14-pin DAP plug <sup>G, H, K</sup>
	UK6	Commercial calibration test data with certifications
Agilent 84904/905/906/907/908 series ordering example *		
84904K/ 84904L/ 84904M/ 84905M/ 84906K/ 84906L/ 84907K/ 84907L/ 84908M	024	24 Vdc
	011	5 Vdc
	012	6 Vdc
	104	3.5 mm (f) drive cable end, 3.5 mm (m) opposite end <sup>K</sup>
	004	3.5 mm (f) both ends <sup>K</sup>
	006	2.92 mm (f) both ends <sup>L</sup>
	100	2.4 mm (f) drive cable end, 2.4 mm (m) opposite end <sup>L, M</sup>
	106	2.92 mm (f) drive cable end, 2.92 mm (m) opposite end
	101	2.4 mm (f) both ends <sup>L, M</sup>

1. Each order must include RF connector option \* Drive cable not included
  2. Available with 8495/97 only
- G. G-models  
H. H-models  
K. K-models  
L. L-models  
M. M-models

[www.agilent.com/find/mta](http://www.agilent.com/find/mta)

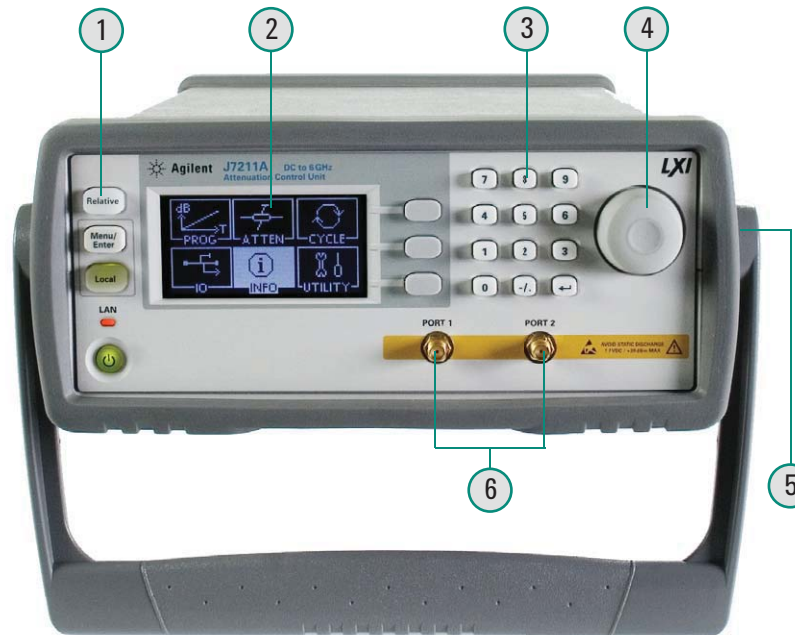
# Agilent J7211A/B/C Attenuation Control Units



*Every Step Counts....*

## Key features

- **0.03 dB RF repeatability per section for entire 5 million cycles**  
Minimize system uncertainty and system setup cost
- **Excellent attenuation accuracy and flatness**  
Maximize measurement accuracy
- **Agilent calibrated data correction value**  
Allow accurate and precise measurement
- **Application specific attenuation sweep function**  
Set your desired attenuation, step size, dwell time and number of cycles to suite your application requirement



1. Measurement relative to a specific attenuation value
2. 6 value-added features for application-specific purposes
3. Soft-keypad for easy attenuation value settings
4. Intensity rotary knob for easy navigation
5. Built-in half-rack (2U) with handle; high portability
6. RF connector options of SMA, Type-N and 3.5 mm (J7211C)

## Complete connectivity-standard!

Powered by LXI class C compliance 



**Agilent Technologies**

## Quick Fact Sheet

# Agilent J7211A/B/C Attenuation Control Units

### Product specification

Model	J7211A	J7211B	J7211C
Frequency range	DC to 6 GHz	DC to 18 GHz	DC to 26.5 GHz
Attenuation range	0 to 121 dB	0 to 121 dB	0 to 121 dB
Attenuation step size	1, 5 and 10 dB	1, 5 and 10 dB	1, 5 and 10 dB
Insertion loss (at 0 dB)	< 2.5 dB	< 5.00 dB	< 5.00 dB
Return loss (VSWR)	< 14 dB (1.50)	< 10 dB (1.90)	< 7 dB (2.61)
RF repeatability	0.03 dB	0.03 dB	0.05 dB
Maximum power input	1 W (+30 dBm)	1 W (+30 dBm)	1 W (+30 dBm)
Switching speed	20 ms	20 ms	20 ms
Operating life	5 million cycles	5 million cycles	5 million cycles

For more detail information on Agilent attenuation control unit, please refer to product literature number 5989-8323EN

LXI is the LAN-based successor to GPIB, providing faster, more efficient connectivity. Agilent is a founding member of the LXI consortium.

[www.lxistandard.org](http://www.lxistandard.org)



### Ordering information

Model	Option	Description
J7211A	001	Type-N (f) connector
	002	SMA (f) connector
	UK6	Commercial calibration certificate with test data
J7211B	001	Type-N (f) connector
	002	SMA (f) connector
	UK6	Commercial calibration certificate with test data
J7211C <sup>1</sup>	UK6	Commercial calibration certificate with test data

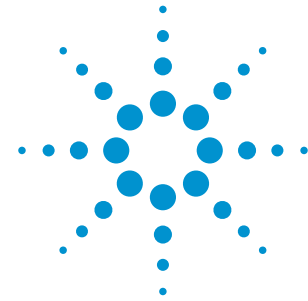
*1. 3.5 mm (f) connectors only*

[www.agilent.com/find/mta](http://www.agilent.com/find/mta)

# Attenuators/Switch Drivers

3

## Agilent 11713B/C Attenuator Switch Driver



### Designed for your ATE systems

Agilent attenuator/switch drivers provide remote or front panel drive control for programmable attenuators and electromechanical or solid state switches. These attenuator/switch drivers provide an intuitive user interface, a variety of switching options, software programmability, and remote control features for quick, easy design validation and automated testing.

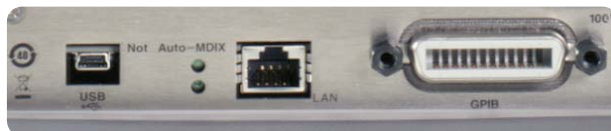


### Key features

- **User-friendly interface**  
Quick setup, switching, and remote control of small scale ATE
- **Multiple connectivity options**  
GPIB, USB or LAN for easy remote integration
- **External VDC port connects**  
Compatible with any type of switch and provides forward compatibility with Agilent 11713A
- **Built-in counter**  
Monitor the life cycle of attenuators and switches

### Complete connectivity-standard!

Powered by LXI class C compliance 



**Agilent Technologies**

## Quick Fact Sheet

### Product specifications

Specifications describe warranted performance over the temperature range 0 to +55 °C after one hour of continuous operation, unless otherwise noted.

Model 11713B/C	
Drive power supply	
Voltage	+24 ±5% +5 ±5% (11713C only) +15 ±5% (11713C only)
Current	1.7 A maximum continuous current Contact pairs 1 through 8, 9, 0, maximum current of 0.7 A per contact
Remote programming	
Interface	GPIB interface operates to IEEE 488.2 and IEC65 10/100 BaseT LAN interface USB 2.0 interface
Command language	SCPI standard interface commands, Agilent 11713A backward compatible
GPIB compatibility	SH0, AH1, T0, TE0, L2, LE0, SR0, RL1, PP0, DC0, DT0, C0
Supplemental specifications and characteristics	
Supplemental characteristics are intended to provide useful information. They are typical but non-warranted performance parameters.	
Line power	85 to 264 Vac, automatic selection, 47 to 63 Hz 100 VA maximum
Response time	100 µs maximum for contact pairs 1 through 8 20 ms maximum for contact pairs 9 and 0
Driver life	> 2,000,000 switchings at 0.7 A for contact pairs 9 and 0
Maximum load inductance	500 mH
Maximum load capacitance	< 0.01 µF for contact pairs 9 and 0

For more detail information on Agilent attenuator/switch driver, please refer to product literature number 5989-6696EN

Download or order from [www.agilent.com/find/mta](http://www.agilent.com/find/mta)

To find a distributor in your area, go to [www.agilent.com/find/distributors](http://www.agilent.com/find/distributors)



[www.lxistandard.org](http://www.lxistandard.org)

LXI is the LAN-based successor to GPIB, providing faster, more efficient connectivity. Agilent is a founding member of the LXI consortium.

### Ordering information

Model	Option	Description
11713B/ 11713C	STD <sup>1</sup>	Standard configuration, full compatibility to 11713A
	LXI <sup>1</sup>	LXI class C configuration, additional USB/LAN connectivity
	001	Viking connector to 10-pin DIP connector
	101	Viking connector to viking connector
	201	Viking connector to 12-pin conductor cable, bare wire
	301	Viking connector to (4) ribbon cables
	401	Dual-viking connector to 16-pin DIP connector
	501	Viking connector to (4) 9-pin Dsub connectors
	502	Viking connector to (2) 9-pin Dsub connectors
	601	Viking connector to 16-pin DIP connector
	701	Viking connector to 14-pin DIP connector
	801	Viking connector to (4) 10-pin DIP connectors
	908	Rack mount kit for one instrument
	909	Rack mount kit for two instruments

1. Only for 11713B

### 11713B/C Comparison chart

Model	11713B	11713C
Drives up to	2 programmable attenuators and 2 electromechanical/solid state switches	4 programmable attenuators and 4 electromechanical/solid state switches
Drives up to	10 SPDT switches <sup>1</sup>	20 SPDT switches <sup>1</sup>
Voltage	24 V	5, 15, 24 V
Voltage drive	1	2 independent banks of outputs
Attenuators types	Any Agilent 8494/5/6/7, Agilent 84904/6/7K/L/M	Any attenuator or switches <sup>2</sup>
Switches types	Any Agilent 8761, 8762, 8765 series, or U9397A/C	Any attenuator or switches <sup>2</sup>
Connectivity	GPIB with option for USB, LAN (LXI Class C)	GPIB, USB, LAN (LXI Class C)
Backwards compatibility with 11713A	Yes	Yes

1. The amount of switches and attenuators that can be driven will depend on the type of switch configuration and the attenuator sections.
2. Accepts most attenuators and switches available today.

[www.agilent.com/find/mta](http://www.agilent.com/find/mta)



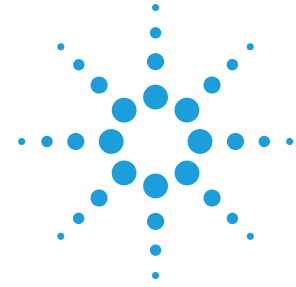


DC Blocks

4

## Agilent DC Blocks

The Agilent DC blocks offer a new level of DC blocking with performance specified from 50 kHz all the way up to 67 GHz. Precision coaxial connector interfaces ensure an excellent impedance match across wide bandwidths and come in a variety of RF connectors to fit your application needs. Two choices of DC Voltage ratings make these suitable for a wide range of applications.



### Key features

- Maximize your operating frequency range from 50 kHz up to 67 GHz
- Improve calibration accuracy with exceptional return loss >15 dB at 67 GHz
- Maximum available power with <0.9 dB insertion loss
- 2 choices of DC voltage rating (16 V and 50 V) for a wide range of applications



## Agilent DC Blocks

### Product specifications

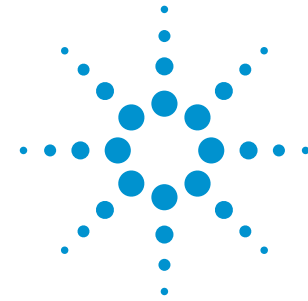
Model	Frequency range	Insertion loss	Return loss	Rise time	Group delay	Max DC working voltage	Connector type
N9398C	50 kHz to 26.5 GHz	0.9 dB	10 dB (50 to 300 kHz) 17 dB (300 kHz to 26.5 GHz)	3 ps (typical)	118 ps (typical)	16 V	3.5 mm (m-f)
N9399C	700 kHz to 26.5 GHz	1.2 dB	10 dB (700 kHz to 2 MHz) 17 dB (2 MHz to 26.5 GHz)	3 ps (typical)	118 ps (typical)	50 V	3.5 mm (m-f)
N9398F	50 kHz to 50 GHz	0.9 dB (50 kHz to 26.5 GHz) 1.0 dB (26.5 to 50 GHz)	10 dB (50 to 300 kHz) 15 dB (300 kHz to 50 GHz)	2 ps (typical)	78 ps (typical)	16 V	2.4 mm (m-f)
N9399F	700 kHz to 50 GHz	1.2 dB	10 dB (700 kHz to 2 MHz) 15 dB (2 MHz to 50 GHz)	2 ps (typical)	78 ps (typical)	50 V	2.4 mm (m-f)
N9398G	700 kHz to 67 GHz	0.9 dB (50 kHz to 26.5 GHz) 1.0 dB (26.5 to 67 GHz)	10 dB (700 kHz to 2 MHz) 15 dB (2 MHz to 67 GHz)	2 ps (typical)	76 ps (typical)	16 V	1.85 mm (m-f)
11742A	45 MHz to 26.5 GHz	1.2 dB	26 dB (45 MHz to 8 GHz) 24 dB (8 GHz to 12.4 GHz) 19 dB (12.4 GHz to 26.5 GHz)	-	-	50 V	3.5 mm (m-f)

# 5

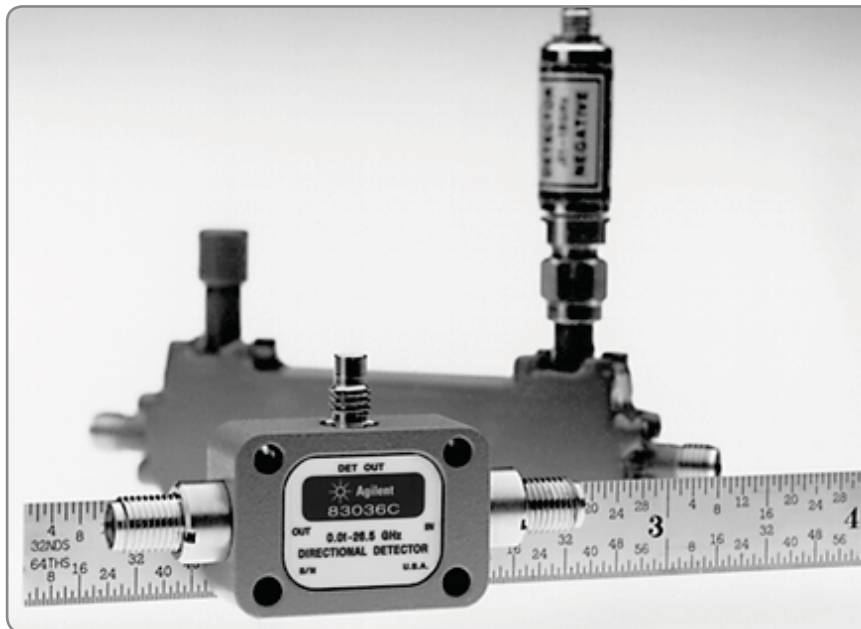
## Detectors

- Broadband Directional Detectors
- Low Barrier Schottky Diode Detectors
- Planar Doped Barrier Diode Detectors

## Agilent RF & Microwave Broadband Directional Detectors



The Agilent 83036C is a broadband microwave power sampler which operates in the same fashion as a traditional coupler-detector combination, but with improved frequency response and a much smaller size. The directional detector is designed to perform over 10 MHz to 26.5 GHz frequency band with +/-1.0 dB of output voltage variation at room temperature. The directional detector is capable of operating with greater than one watt of input power when terminated with well-matched source and load impedance. An input power derating curve is provided for calculating the maximum input power for other source and load impedance.



### Superior RF Performance

- **Exceptional flatness**  
+1 dB
- **Extremely broadband**  
0.01 to 26.5 GHz
- **Compact size**
- **Environmentally rugged**



## Agilent RF & Microwave Broadband Directional Detectors

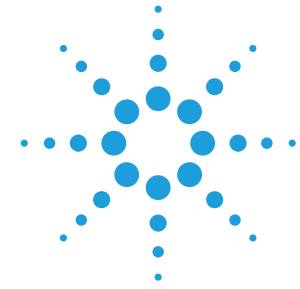
### Product Specification

Broadband Directional Detectors								
Model	Frequency (GHz)	Frequency response	Max. SWR input/output (50 $\Omega$ nom)	Max. thru line loss (dB)	Low level sensitivity (mV/ $\mu$ W)	Max input power <sup>1</sup> (into 50 $\Omega$ load)	Max input power <sup>1</sup> (into open)	Input/output connector
83036C	0.01 to 26.5	$\pm 0.1$	1.23 to 1 GHz	2.2	18	32 dBm	21 dBm	3.5 mm (f)

1. with 2:1 source match

For more information on Agilent Detectors, please visit [www.agilent.com/find/detectors](http://www.agilent.com/find/detectors)

## Agilent RF & Microwave Low Barrier Schottky Diode Detectors



Agilent offers a complete family of high performance Low Barrier Schottky Diode Detectors which cover the 10 MHz to 26.5 GHz frequency range. These general purpose components are widely used for CW and pulsed power detection, leveling of sweepers, and frequency response testing of other microwave components. These detectors do not require a dc bias and can be used with common oscilloscopes, thus their simplicity of operation and excellent broadband performance make them useful measurement accessories.



### Superior RF Performance

- Excellent broadband flatness
- Low broadband SWR
- High burnout protection
- Environmentally rugged
- Field replaceable diode elements



## Agilent RF & Microwave Low Barrier Schottky Diode Detectors

### Product Specifications

Model	Frequency (GHz)	Frequency response	Maximum SWR	Low level sensitivity (mV/μW)	Max operating input power	Typical short term maximum input power (< 1 minute)	Video impedance	RF bypass capacitance (nom)	Input connector	Output connector
423B	0.01 to 12.4	± 0.3 to 12.4 GHz	1.15 to 4 GHz 1.3 to 12.4 GHz	> 0.5	200 mW	1 W	1.3 kΩ	50 pF	Type-N (m)	BNC (f)
8470B	0.01 to 18	± 0.3 to 12.4 GHz ± 0.5 to 15 GHz ± 0.6 to 18 GHz	1.15 to 4 GHz 1.3 to 15 GHz 1.7 to 18 GHz	> 0.5	200 mW	1 W	1.3 kΩ	50 pF	APC-7 (m)	BNC (f)
8472B	0.01 to 18	± 0.3 to 12.4 GHz ± 0.5 to 15 GHz ± 0.6 to 18 GHz	1.2 to 4.5 GHz 1.35 to 7 GHz 1.5 to 12.4 GHz 1.7 to 18 GHz	> 0.5	200 mW	1 W	1.3 kΩ	50 pF	SMA (m)	BNC (f)
8473B	0.01 to 18	± 0.3 to 12.4 GHz ± 0.6 to 18 GHz	1.2 to 4 GHz 1.5 to 18 GHz	> 0.5	200 mW	1 W	1.3 kΩ	30 pF	3.5 mm (m)	BNC (f)
33330B	0.01 to 18	± 0.3 to 12.4 GHz ± 0.6 to 18 GHz	1.2 to 4 GHz 1.5 to 18 GHz	> 0.5	200 mW	1 W	1.3 kΩ	30 pF	3.5 mm (m)	SMC (m)
8473C	0.01 to 26.5	± 0.3 to 12.4 GHz ± 0.6 to 20 GHz ± 1.5 to 26.5 GHz <sup>1</sup>	1.2 to 40 GHz 1.5 to 18 GHz 2.2 to 26.5 GHz	> 0.5 to 18 GHz > 0.18 to 26.5 GHz	200 mW	1 W	1.3 kΩ	30 pF	3.5 mm (m)	BNC (f)
33330C	0.01 to 26.5	± 0.3 to 12.4 GHz ± 0.6 to 20 GHz ± 1.5 to 26.5 GHz	1.2 to 40 GHz 1.5 to 18 GHz 2.2 to 26.5 GHz	> 0.5 to 18 GHz > 0.18 to 26.5 GHz	200 mW	1 W	1.3 kΩ	30 pF	3.5 mm (m)	SMC (m)

1. From a -3.3 dB linear slope beginning at 20 GHz

### Ordering Examples

Model	Option type	Option description
33330B/ 33330C	001	Matched response
	003	Positive polarity
423B/ 8470B/ 8472B/ 8473B/ 8473C	001	Matched response
	002	Optimum square law load
	003	Positive output polarity
	100	OSSM output connector <sup>1</sup>
	101	SAM connector <sup>1</sup>
	301	Negative polarity <sup>1</sup>
	401	No matched response <sup>1</sup>
C21	Sealed to resist moisture and test data provided <sup>2</sup>	

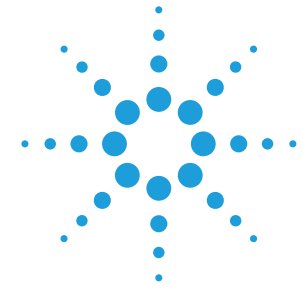
1. Only for 8472B

2. Only for 8473B

For more information on Agilent Detectors, please visit [www.agilent.com/find/detectors](http://www.agilent.com/find/detectors)



## Agilent RF & Microwave Planar Doped Barrier Diode Detectors



Agilent Planar-Doped Barrier (PDB) detectors, combines the best characteristics of point-contact and low barrier Schottky to provide performance never before achievable. This new PDB diode technology provides detectors with broadband-flatness, excellent square-law response, and low SWR.



Agilent 8471D/E



Agilent 8473D



Agilent 8474B/C/E

### Superior RF Performance

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



## Agilent RF & Microwave Planar Doped Barrier Diode Detectors

### Product Specifications

Model	Frequency (GHz)	Frequency response	Maximum SWR	Low level sensitivity (mV/μW)	Max operating input power	Typical short term maximum input power (< 1 minute)	Video impedance	RF bypass capacitance (nom)	Input connector	Output connector
8471D	0.01 to 2	± 0.2 to 1 GHz	1.23 to 1 GHz	> 0.5	100 mW	0.7 W	1.5 kΩ	6800 pF	BNC (m)	BNC (f)
		± 0.4 to 2 GHz	1.46 to 2 GHz							
8471E	0.01 to 12	± 0.23 to 4 GHz	1.2 to 4 GHz	> 0.4	200 mW	0.75 W	1.5 kΩ	30 pF	SMA (m)	SMC (m)
		± 0.6 to 8 GHz	1.7 to 8 GHz							
		± 0.85 to 12 GHz	2.4 to 12 GHz							
8473D	0.01 to 33	± 0.25 to 14 GHz	1.2 to 14 GHz	> 0.4	200 mW	1 W	1.5 kΩ	30 pF	3.5 mm (m)	BNC (f)
		± 0.4 to 26.5 GHz	1.4 to 26.5 GHz							
		± 1.25 to 33 GHz	2.0 to 33 GHz							
		(± 2.0 dB to 40 GHz)	(3.0 typical to 40 GHz)							
8474B	0.01 to 18	± 0.35 to 18 GHz	1.3 to 18 GHz	> 0.4	200 mW	0.75 W	1.5 kΩ	27 pF	Type-N (m)	BNC (f)
8474C	0.01 to 33	± 0.4 to 26.5 GHz	1.4 to 26.5 GHz	> 0.4	200 mW	0.75 W	1.5 kΩ	27 pF	3.5 mm (m)	SMC (m)
		± 0.7 to 33 GHz	2.2 to 33 GHz	> 0.34 to 50 GHz						
8474E	0.01 to 50	± 0.3 to 26.5 GHz	1.2 to 26.5 GHz	> 0.4 to 40 GHz	200 mW	0.75 W	1.5 kΩ	27 pF	2.4 mm (m)	SMC (m)
		± 0.6 to 40 GHz	1.6 to 40 GHz							
		± 1.0 to 50 GHz	2.8 to 50 GHz							

### Ordering Examples

Model	Option type	Option description
8471D	102	Square law load
	103	Positive polarity
8471E	004	4 GHz operation
	103	Positive polarity
8473D	003	Positive output
8474B	002	0.01 to 2 GHz octave only
	004	2 to 4 GHz octave only
	008	4 to 8 GHz octave only
	102	Square law load
8474C	103	Positive polarity
	008	4 to 8 GHz octave only
	012	8 to 12.4 GHz octave only
8474E	033	26.5 to 33 GHz octave only
	103	Positive polarity

For more information on Agilent Detectors, please visit [www.agilent.com/find/detectors](http://www.agilent.com/find/detectors)

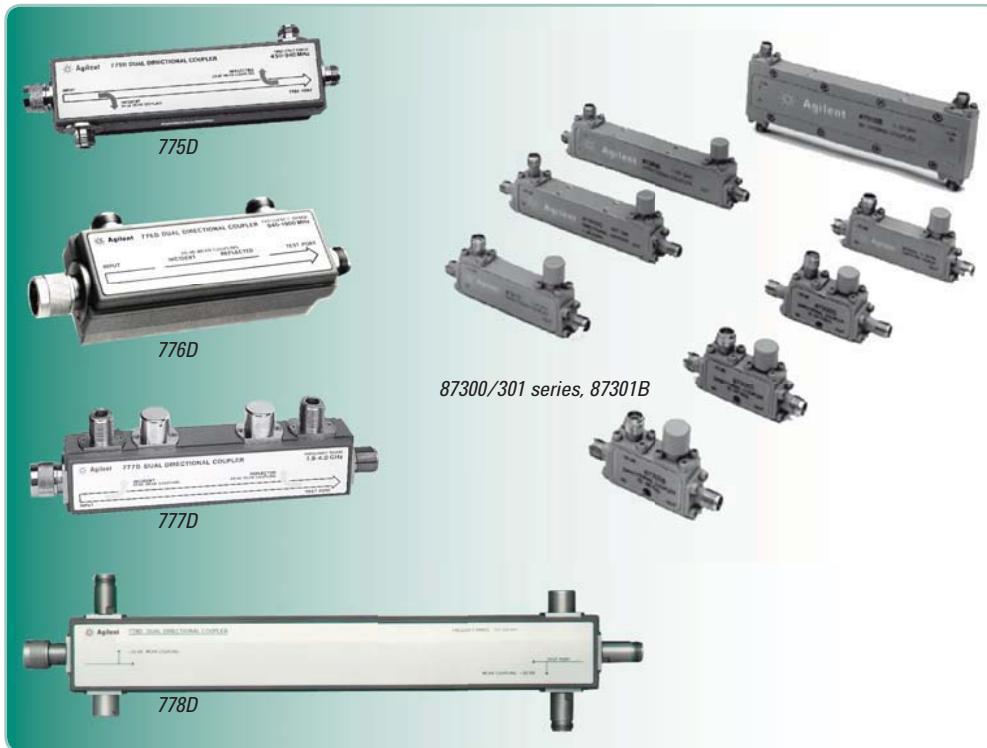
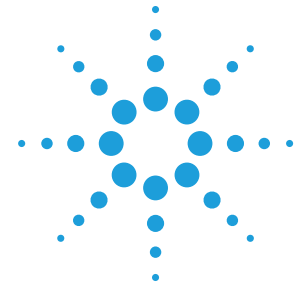


Couplers

6

## Agilent Couplers

The Agilent couplers consists of hybrid coupler, broadband directional coupler, single directional coupler, and dual directional coupler. This is a complete line of coaxial single and dual port directional couplers, bridges for isolating, separating, and combining RF and microwave signals in applications such as power monitoring, source leveling, swept transmission, and reflection measurements.



### Key features

- Broadband couplers maximize your operating frequency up to 50 GHz
- Excellent directivity of min 40 dB for higher measurement accuracy
- Low SWR (<1.1 dB) minimizes mismatch errors



## Agilent Couplers

### Product specifications

Model	Frequency range (GHz)	Coupling	Amplitude imbalance	Phase imbalance	Isolation	Maximum SWR (dB)	Insertion loss (dB)	Power rating average, peak	Connectors
<b>Hybrid Coupler</b>									
87310B	1 to 18	3 dB	±0.5 dB at each port, centered at -3 dB	±10 Degrees	>17 dB	1.35	<2.0	20 W, 3 kW	SMA (f)

Model	Frequency range (GHz)	Nominal coupling & variation (dB)	Directivity (dB)	Maximum SWR (dB)	Insertion loss (dB)	Power rating average, peak
<b>Broadband Directional Coupler</b>						
87300B	1 to 20	10 ±0.5	>16	1.35	<1.5	20 W, 3 kW
87300C	1 to 26.5	10 ±1.0	>14 to 12.4 GHz >12 to 26.5 GHz	1.35 to 12.4 GHz 1.5 to 26.5 GHz	<1.2 to 12.4 GHz <1.7 to 26.5 GHz	20 W, 3 kW
87300D	6 to 26.5	10 ±0.5	>13	1.4	<1.3	20 W, 3 kW
87301B	10 to 46	10 ±0.7	>10	1.8	<1.9	20 W, 3 kW
87301C	10 to 50	10 ±0.7	>10	1.8	<1.9	20 W, 3 kW
87301D	1 to 40	13 ±1.0	>14 to 20 GHz >10 to 40 GHz	1.5 to 20 GHz 1.7 to 40 GHz	<1.2 to 20 GHz <1.9 to 40 GHz	20 W, 3 kW
87301E	2 to 50	10 ±1.0	>13 to 26.5 GHz >10 to 50 GHz	1.5 to 26.5 GHz 1.8 to 50 GHz	<2.0	20 W, 3 kW
<b>Single Directional Coupler</b>						
773D <sup>1</sup>	2 to 18	20 ±0.9	>30 to 12.4 GHz >27 to 18 GHz	1.2	<0.9	50 W, 250 W
<b>Dual Directional Coupler</b>						
772D <sup>1</sup>	2 to 18	20 ±0.9	>30 to 12.4 GHz >27 to 18 GHz	1.28 to 12.4 GHz 1.4 to 18 GHz	<1.5	50 W, 250 W
775D <sup>2</sup>	0.45 to 0.94	20 ±1	>40	1.15	<0.40	50 W, 500 W
776D <sup>2</sup>	0.94 to 1.9	20 ±1	>40	1.15	<0.35	50 W, 500 W
777D <sup>2</sup>	1.9 to 4	20 ±0.4	>30	1.2	<0.75	50 W, 500 W
778D	0.1 to 2	20 ±1.5	>36 to 1 GHz <sup>3</sup> >32 to 2 GHz <sup>3</sup>	1.1	<0.60	50 W, 500 W

1. See data sheet for typical out of band data from 0.1 to 2 GHz and 18 to 20 GHz.  
 2. Maximum auxiliary arm tracking: 0.3 dB for Agilent 776D; 0.5 dB for Agilent 777D.  
 3. 30 dB to 2.0 GHz, input port.

### Ordering information

Model	Option	Standard connector	
		Primary line	Auxiliary arm
772D	STD	APC-7, APC-7	N(f)
	001	N(f), N(f)	N(f)
773D	STD/101	APC-7, APC-7	N(f)
	001	N(f), N(f)	N(f)
	010	N(m), N(f)	N(f)
775D/ 777D	002	N(f), N(m)	N(f)
	STD	N(m), N(f)	N(f)
778D	STD	N(f), N(m)	N(f), N(f)
	011	APC-7, N(f)	N(f), N(f)
	012	N(m), N(f)	N(f)
87301D	240	2.4 mm(f), 2.4 mm(f)	2.4 mm(f)
	292	2.92 mm(f), 2.92 mm(f)	2.92 mm(f)
87300B	-	SMA (f), SMA (f)	SMA (f)
87300C	-	3.5 mm(f), 3.5 mm(f)	3.5 mm(f)
87300D	-	3.5 mm(f), 3.5 mm(f)	3.5 mm(f)
87301B	-	2.92 mm(f), 2.92 mm(f)	2.92 mm(f)
87301C	-	2.4 mm(f), 2.4 mm(f)	2.4 mm(f)
87301E	-	2.4 mm(f), 2.4 mm(f)	2.4 mm(f)
87310B	-	SMA (m), SMA (m)	SMA (m)

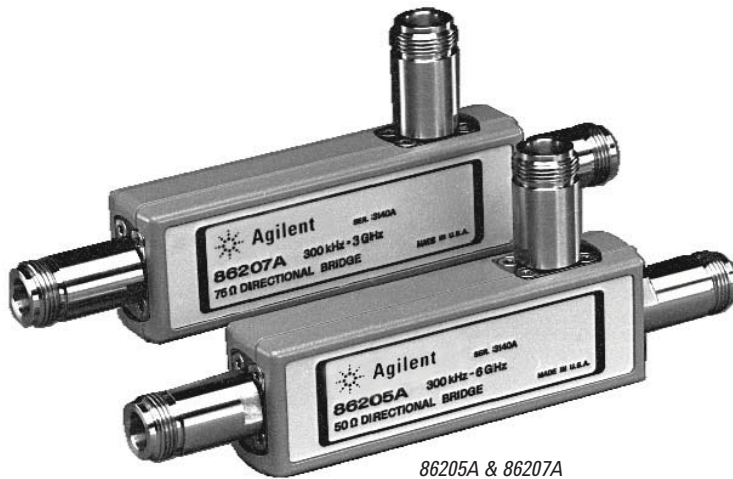
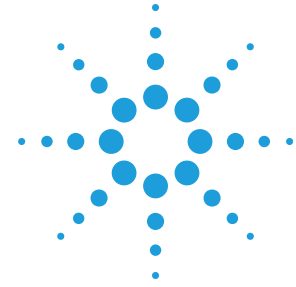
The background of the slide is a dark purple color. It features a complex network of thin, light blue lines representing connections between various nodes. Some nodes are represented by small, glowing white circles, while others are represented by larger, multi-pointed starburst shapes in a reddish-orange hue. The overall effect is that of a dense, interconnected web or network structure.

## RF Bridges

# 7

## Agilent RF Bridges

The Agilent high directivity RF bridges offer unparalleled performance in a variety of general purpose applications. They are ideal for accurate reflection measurements and signal-leveling applications. They combine the directivity and broadband frequency range of directional bridges; the low insertion loss and flat coupling factor of directional couplers. This bridge can be use with the Agilent ENA Series RF network analyzers.



86205A & 86207A

### Key features

- Wide frequency range from 300 kHz to 6 GHz
- Excellent 40 dB directivity allows you to measure high return loss devices and good port match lets you measure low return loss devices
- Flat coupling factor of  $\pm 0.2$  dB for power leveling



## Agilent RF Bridges

### Product specifications

Model	86205A	86207A
Frequency range	300 kHz to 6 GHz	300 kHz to 3 GHz
Impedance	50 $\Omega$	75 $\Omega$
Directivity (min)	30 dB, 0.3 MHz to 5 MHz	30 dB, 0.3 MHz to 5 MHz
	40 dB, 5 MHz to 2 GHz	40 dB, 5 MHz to 1.3 GHz
	30 dB, 2 GHz to 3 GHz	35 dB, 1.3 GHz to 2 GHz
	20 dB, 3 GHz to 5 GHz (typical)	30 dB, 2 GHz to 3 GHz (typical)
	16 dB, 5 GHz to 6 GHz (typical)	
Return loss (min)	23 dB, 0.3 MHz to 2 GHz	20 dB, 0.3 MHz to 1.3 GHz
	20 dB, 2 GHz to 3 GHz	18 dB, 1.3 GHz to 2 GHz
	18 dB, 3 GHz to 5 GHz (typical)	18 dB, 2 GHz to 3 GHz (typical)
	16 dB, 5 GHz to 6 GHz (typical)	
Insertion loss (max)	1.5 dB, +0.1 dB/GHz	1.5 dB, +0.1 dB/GHz
Coupling factor (nom)	(<3 GHz) 16.0 dB, +0.15 dB/GHz	(<3 GHz) 16.0 dB, +0.15 dB/GHz
	(>3 GHz) 16.5 dB, -0.20 dB/GHz	

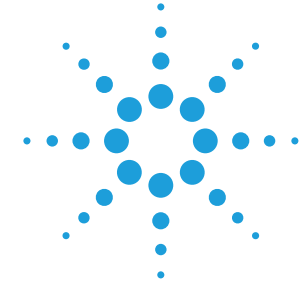




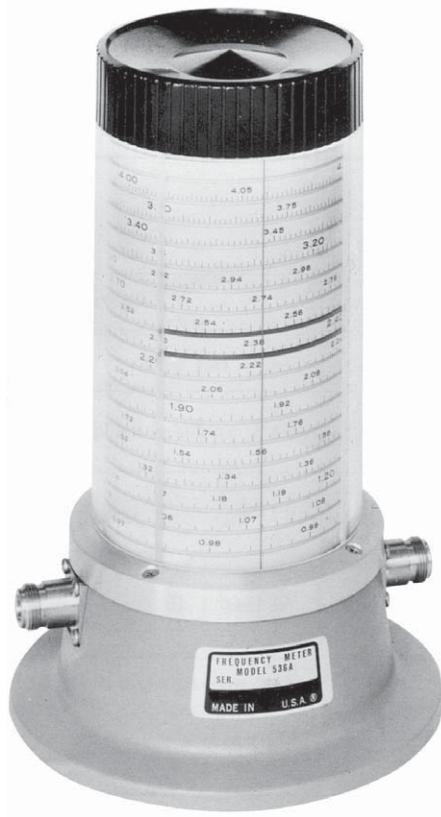
# Frequency Meters

# 8

## Agilent RF & Microwave Frequency Meter



The Agilent 537A direct-reading frequency meter measures frequencies from 3.7 to 12.5 GHz quickly and accurately. Its long scale length and numerous calibration marks provide high resolution. This is particularly useful when measuring frequency differences or small frequency changes. Frequency is read directly in GHz so interpolation or charts are not required.



**Agilent 537A**

### Key features

- Broadband from 3.7 to 12.5 GHz, suitable for military use
- Direct-reading, easy to use, reliable meter measurements with 0.17% accuracy
- High resolution (in calibrated increments of 10 MHz), easy to read dialBuilt-in counter
- No spurious resonances at any setting ensures accuracy
- Rugged design for ease-of-use in the field



## Agilent RF & Microwave Frequency Meter

### Product Specifications

Model	Frequency range	Reflection coefficient	Dial accuracy	Overall accuracy	Minimum dip at resonance	Calibration increment	Connector	Dimensions mm (in)
537A	3.7 to 12.5 GHz	0.33 (2.0 SWR, 9.5 dB return loss)	0.10%	0.17% *	1 dB	10 MHz	Type-N (f)	118 x 146 x 89 (4.6 x 5.8 x 3.5)

\* Includes allowance of +/- 0.02% for 0 to 100% relative humidity, +/- 0.0016% per °C from 13 to 33 °C and 0.03% backlash.

For more detail information on Agilent Frequency Meter, please refer to product literature number 5952-1250



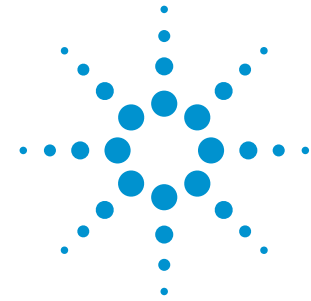
# Power Limiters

# 9

# Agilent Power Limiter

## Protect Your Investment from Excess RF Power, DC Transients, and ESD

Agilent power limiters are designed for input protection of electronic components for communications, telemetry, radar systems and high frequency instrumentation technologies. Agilent power limiters provide customers with a choice of operating frequency range and limiting threshold to suit their applications. With the combination of excellent insertion loss and return loss, these limiters will safe-guard your customers investment from damage due to excess RF power, DC transients or Electro-Static-Discharge (ESD).



N9355B & N9356B



N9355F



11930A & 11930B



N9356C

### Key features

- **High power protection**  
Prevents damage by undesired ESD and excess RF power
- **Exceptional return loss > 15 dB at 50 GHz**  
Improved calibration accuracy
- **Low insertion loss < 1.75 dB at 18 GHz**  
Maximizes available power
- **Bi-directional**  
Utilization eliminates orientation errors



## Agilent Power Limiter

### Product specifications

Model	Impedance ( $\Omega$ ) (nominal)	Frequency range	Insertion loss	Return loss	Maximum continuous RF input power (Watts)	Limited threshold (dBm) (typical)	Maximum DC voltage (V)	Input/output connectors
11867A	50	DC to 1.8 GHz	< 0.75	> 20 dB	10	0	N/A	Type-N
11930A	50	DC to 6 GHz	< 1.0 dB DC to 3 GHz < 1.5 dB 3 to 6 GHz	> 22 dB 30 kHz to 3 GHz > 20 dB 3 to 6 GHz	3	30	30	APC-7 (7 mm)
11930B	50	5 MHz to 6.5 GHz <sup>3</sup>	< 1.0 dB DC to 3 GHz <sup>2</sup> < 1.5 dB 3 to 6.5 GHz	> 21 dB 16 MHz to 3 GHz <sup>2</sup> > 17 dB 3 to 6.5 GHz	3	30	30	Type-N
N9355B	50	10 MHz to 18 GHz	< 1.75 dB	> 15 dB <sup>1</sup>	1	10	30	Type-N
N9356B	50	10 MHz to 18 GHz	< 1.75 dB	> 15 dB <sup>1</sup>	6	25	30	Type-N
N9355C	50	10 MHz to 26.5 GHz	< 2 dB	> 15 dB <sup>1</sup>	1	10	30	3.5 mm
N9356C	50	10 MHz to 26.5 GHz	< 2.25 dB	> 15 dB <sup>1</sup>	4	25	30	3.5 mm
N9355F	50	10 MHz to 50 GHz	< 2 dB 10 MHz to 26.5 GHz < 2.75 dB 26.5 to 40 GHz < 3.5 dB 40 to 50 GHz	> 10 dB <sup>1</sup>	0.63	10	30	2.4 mm

Supplemental characteristics are intended to provide information useful in applying the instrument by giving typical, but non-warranted, performance parameters. These are denoted as "typical", or "nominal".

1. 10 to 30 MHz return loss specification is 8.5 dB.
2. 5 to 16 MHz insertion and return loss limited by internal blocking capacitor.
3. 6 to 6.5 GHz typical

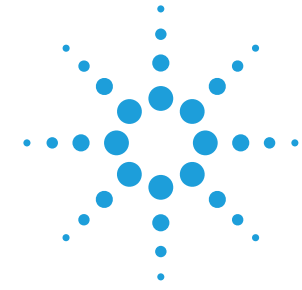
The background is a dark purple color with a complex network of thin, glowing blue lines that intersect to form a web-like structure. At various points where these lines intersect, there are small, multi-pointed starburst or asterisk-like shapes that appear to be glowing or emitting light. The overall effect is that of a digital or neural network visualization.

Power Dividers

10

## Agilent Power Dividers

Agilent power dividers are an RF and microwave accessory construct by equivalent resistance of  $50 \Omega$ , it's used to divide power equally in a uniform transmission line for comparison measurements. The power divider provides a good impedance match at both the output arms when the input is terminated in the system characteristic impedance ( $50 \Omega$ ). Once a good source match has been achieved, the power divider may be used to divide the output into equal signals for comparison measurements.



### Key Measurements

- Broad operating frequency range up to 50 GHz eliminates the need for multiple dividers
  - Excellent amplitude ( $\pm 0.3$  dB) and phase tracking ( $\pm 2^\circ$ ) ensures highly accurate power division
    - Low SWR 1.67 at 50 GHz minimizes measurement uncertainty



## Quick Fact Sheet

### Agilent Power Dividers

#### Product Specifications

Model	Frequency	Max SWR	Maximum insertion loss (dB)	Minimum isolation (dB)	Maximum amplitude tracking (dB) <sup>1</sup>	Maximum phase tracking (°) <sup>1</sup>
11636A	DC to 18 GHz	1.35	6.0 typ <sup>2</sup>	-	0.5 <sup>3</sup>	±2 ° typ
11636B	DC to 26.5 GHz	1.29	7.5	-	0.25 <sup>3</sup>	±2 ° typ
11636C	DC to 50 GHz	1.67	8.5	-	0.30 <sup>4</sup>	±2 °
87302C	0.5 to 18 GHz	1.45	1.5 <sup>5</sup>	19	0.3	6
	18 to 26.5 GHz	1.6	1.9 <sup>5</sup>	19	0.5	10
87303C	1.0 to 18 GHz	1.45	1.2 <sup>5</sup>	19	0.3	6
	18 to 26.5 GHz	1.6	1.6 <sup>5</sup>	21	0.5	10
87304C	2.0 to 18 GHz	1.45	1.1 <sup>5</sup>	19	0.3	6
	18 to 26.5 GHz	1.6	1.4 <sup>5</sup>	18	0.5	10

1. Amplitude and phase tracking are the ratio of one output to the other in dB or degrees, respectively

2. 5.8 to 7.2 dB up to 10 GHz; 5.8 to 7.5 dB up to 18 GHz

3. at 18 GHz

4. at 50 GHz

5. Insertion loss is in addition to 3 dB coupling loss

For more detail information on Agilent Power Divider, please refer to product literature number 5989-6698EN

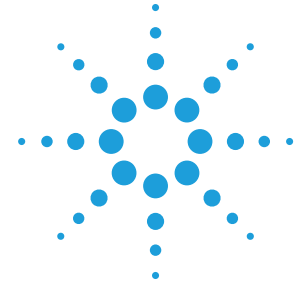


# Power Splitters

# 11

## Agilent Power Splitters

Agilent power splitters feature excellent match and tracking between outputs, operating from DC to 50 GHz. These power splitters are recommended for external source leveling and ratio measurements.



11667A



11667B



11667C



11667L

### Key features

- Excellent output SWR 1.10 at the auxiliary arm when used for source leveling or ratio measurement applications
- Unmatched tracking between outputs as low as 0.20 dB from DC to 50 GHz ensures minimum measurement uncertainty



## Quick Fact Sheet

### Agilent Power Splitters

#### Product specifications

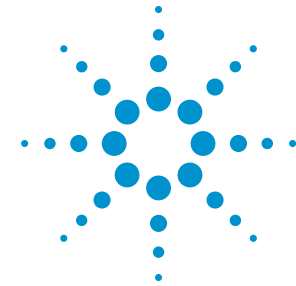
Model	Frequency range	Equivalent output SWR (nominal 50 $\Omega$ )	Maximum input power	Nominal insertion loss (input to either output)	Tracking between any two ports	Connectors
11667A	DC to 18 GHz	1.10: DC to 4 GHz	0.5 W	7 dB	0.20 dB to 8 GHz	N (f) all ports
11667A Option 002		1.33: DC to 18 GHz			0.25 dB to 18 GHz	Option 002: N (f) in, APC-7 out
11667B	DC to 26.5 GHz	1.22	0.5 W	7 dB	< 0.25 dB	3.5 mm (f) all ports
11667C	DC to 50 GHz	1.65	0.5 W	8.5 dB	< 0.40 dB	2.4 mm (f) all ports
11667L	DC to 2 GHz	1.78	0.5 W	6.6 dB	< 0.20 dB	BNC (f)

# 12

## RF Probes

### Active Differential Probes

## Agilent U1818A/B 7/12 GHz Active Differential Probes



The U1818A/B provides a high frequency probing solution for R&D and quality assurance engineers performing RF/Microwave and high-speed digital design and validation in wireline, wireless communications and aerospace/defense industries while taking full advantage of Agilent's RF analyzers capability.

### Key Application

- General Purpose RF
- Design, Test & Validation
- Oscillator and PLL

### The probe

**can...** measure both single ended and differential signals

probe RF traces without removing any components

be used with NA to perform response calibration



High Frequency probing with Agilent's MXA signal analyzer

### Key Features

- Broad bandwidth with flat frequency response,  $\pm 1.5$  dB, which ensures excellent measurement accuracy and helps users achieve the best product specifications
- Low noise floor,  $< -130$  dBm/Hz at 10 MHz to 12 GHz, which allows measurements to be made at low signal amplitude
- Convenient biasing from Agilent's RF and microwave instruments probe power port or bench top power supply for user flexibility



## Agilent U1818A/B 7/12 GHz Active Differential Probes

### Product Specifications (Typical)

Model	Frequency	Input impedance at 1 MHz	Nominal probe attenuation	Maximum CW input power	Maximum DC input voltage	Common mode rejection
U1818A	100 kHz to 7 GHz	Single Ended: 25 K $\Omega$	- 10 dB	16 dBm	+/- 10 V	< 2 GHz: 35 dB
U1818B	100 kHz to 12 GHz	Differential: 50 K $\Omega$				2 to 12 GHz: < 30 dB

\* The U1818A/B active differential probes comes with a selection of a probe power cable or a banana plug power cable

Check out the application note “High Frequency Probing Solutions for Time and Frequency Domain Applications”, literature number 5989-4837EN

### Probe Head Options

Model	Description
N5380A	12 GHz differential SMA adapter
N5381A	12 GHz differential solder-In
N5382A	12 GHz differential browser
N5425/6A	12 GHz differential ZIF probe head/tip
E2695A	Differential SMA probe head

### Related Accessories

Model	Description
11582B	Minimum loss attenuator pad
N2880A	In-line attenuator kit
N2881A	DC blocking capacitor
N2784A	1-arm probe positioner
N2785A	2-arm probe positioner
N2787A	3D probe positioner
N5450A	Extreme temperature extension cable

# 13

## Electro-Mechanical Switches

- L-series EM Switches
- Low Cost SPDT Switches
- High Performance Multiport Switches
- High Performance SPDT Switches
- Bypass Switches
- High Performance Transfer Switches
- High Performance Matrix Switches





## Agilent L-Series EM Switches

Agilent's L-Series switches offer high-performance capability at a fraction of the cost. For example, 40% cheaper than Agilent's high-performance switches, the L-Series offers 0.03 dB insertion loss repeatability guaranteed up to 2 million cycles and exceptional isolation. Agilent's low-cost switches provide the performance you need from DC to 26.5 GHz.



L7104A/B/C, L7204A/B/C, L7106A/B/C, L7206A/B/C and L7222C

### Superior performance with guaranteed specifications to 26.5 GHz

- **Guaranteed performance:** < 0.03 dB insertion loss repeatability guaranteed for 2 million cycles
- **Long operating life:** 5 million cycles (typical)
- **High isolation:** Typically > 85 dB at 26.5 GHz
- **Unique design:** Wiping action mechanism eliminates particle buildup to ensure reliable switching
- **Broad frequency range:** DC to 4, 20, or 26.5 GHz
- **Economical price:** Minimizes budgetary constraints



## Quick Fact Sheet

RF & microwave coaxial fixed attenuators											
Model	Frequency	Termination	Average power	Peak power	Isolation	Insertion loss	SWR	Speed	Life cycle	Driving voltage	RF connectors
SP4T											
L7104A	DC to 4 GHz	Terminated	1 W	50 W	90 dB	0.36 dB	1.2	15 ms	2 million	24 Vdc	SMA (f)
L7204A	DC to 4 GHz	Unterminated	2 W	100 W	90 dB	0.36 dB	1.2	15 ms	2 million	24 Vdc	SMA (f)
L7104B	DC to 20 GHz	Terminated	1 W	50 W	90 dB	0.6 dB	1.45	15 ms	2 million	24 Vdc	SMA (f)
L7204B	DC to 20 GHz	Unterminated	2 W	100 W	90 dB	0.6 dB	1.45	15 ms	2 million	24 Vdc	SMA (f)
L7104C	DC to 26.5 GHz	Terminated	1 W	50 W	60 dB	0.7 dB	1.7	15 ms	2 million	24 Vdc	SMA (f)
L7204C	DC to 26.5 GHz	Unterminated	2 W	100 W	60 dB	0.7 dB	1.7	15 ms	2 million	24 Vdc	SMA (f)
SP6T											
L7106A	DC to 4 GHz	Terminated	1 W	50 W	90 dB	0.36 dB	1.2	15 ms	2 million	24 Vdc	SMA (f)
L7206A	DC to 4 GHz	Unterminated	2 W	100 W	90 dB	0.36 dB	1.2	15 ms	2 million	24 Vdc	SMA (f)
L7106B	DC to 20 GHz	Terminated	1 W	50 W	90 dB	0.6 dB	1.45	15 ms	2 million	24 Vdc	SMA (f)
L7206B	DC to 20 GHz	Unterminated	2 W	100 W	90 dB	0.6 dB	1.45	15 ms	2 million	24 Vdc	SMA (f)
L7106C	DC to 26.5 GHz	Terminated	1 W	50 W	60 dB	0.7 dB	1.7	15 ms	2 million	24 Vdc	SMA (f)
L7206C	DC to 26.5 GHz	Unterminated	2 W	100 W	60 dB	0.7 dB	1.7	15 ms	2 million	24 Vdc	SMA (f)
Transfer											
L7222C	DC to 26.5 GHz	Unterminated	1 W	60 W	57 dB	0.9 dB	1.65	15 ms	2 million	24 Vdc	SMA (f)

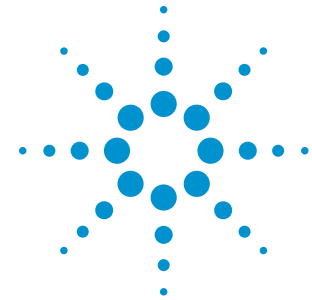
### L-Series EM switch options

Model	Option type	Option	Option description
L7104A/ L7204A/ L7104B/ L7204B/ L7104C/ L7204C/	Control Logic	T24	TTL/5V CMOS compatible logic with 24 Vdc supply
		024	24 Vdc
L7106A/ L7206A/ L7106B/ L7206B/ L7106C/ L7206C	DC Connectors	161	Ribbon receptacle
		100	Solder Terminals
L7222C	DC Connectors	161	10-PIN DIP
		100	Solder terminals and 10-PIN DIP
	Accessories	201	Mounting brackets; assembly required

For more details on the Agilent EM switches and ordering information see the *"Agilent RF and Microwave Switch Selection Guide"*, literature number 5989-6031EN

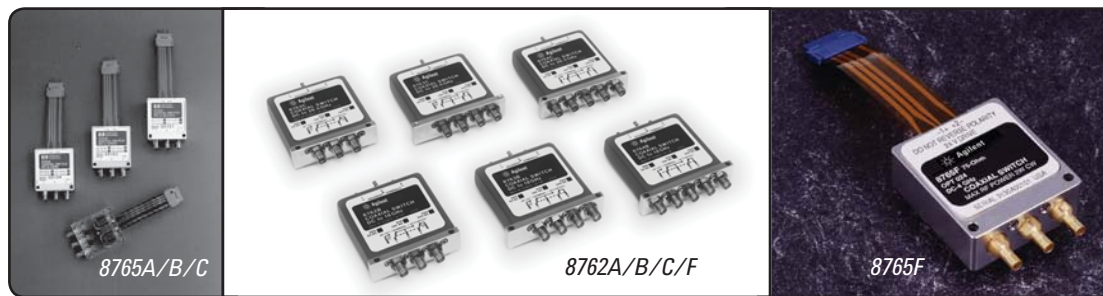
For more information on Agilent switches, please visit [www.agilent.com/find/switches](http://www.agilent.com/find/switches)

# Agilent Low Cost Electromechanical SPDT Switches



Agilent's economical SPDT switches offer 50  $\Omega$  and 75  $\Omega$  high-performance capability at a fraction of the cost.

Agilent SPDT switches provide the performance you need from DC to 40 GHz.



## Features

- Current interrupts
- Position indication capability

Superior performance with guaranteed specifications to 40 GHz

## Superior RF Performance

- **Insertion loss:**
  - < 0.25 dB to 2 GHz
  - < 0.5 dB to 18 GHz
  - < 1.25 dB to 26.5 GHz
- **Isolation:**
  - > 90 dB to 18 GHz
  - > 50 dB to 26.5 GHz
- **Broad frequency range:**
  - DC to 4, 18, 26.5, and 40 GHz



# Agilent Low Cost Electromechanical SPDT Switches

## Product specifications

Model	Frequency (GHz)	Termination	Average power (W)	Peak power (W)	Isolation (dB)	Insertion loss (dB)	SWR	Speed (ms)	Life cycle (million)	Driving voltage (Vdc)	RF connectors
Low Cost Electromechanical SPDT											
8762A	DC to 4	Terminated	1	100	90	0.25	1.2	30	1	5, 15, 24	SMA (f)
8762B	DC to 18	Terminated	1	100	90	0.5	1.3	30	1	5, 15, 24	SMA (f)
8762C	DC to 26.5	Terminated	1	100	50	1.25	1.8	30	1	5, 15, 24	3.5 mm
8762F <sup>1</sup>	DC to 4	Terminated	1	100	90	0.4	1.3	30	1	24	mini SMB (m)
8765A	DC to 4	Unterminated	2	100	100	0.3	1.7	15	5	5, 10, 15, 24	SMA (f)
8765B	DC to 20	Unterminated	2	100	54	0.7	1.7	15	5	5, 15, 24	SMA (f)
8765C	DC to 26.5	Unterminated	2	100	50	0.2	1.7	15	5	5, 10, 15, 24	3.5 mm
8765D	DC to 40	Unterminated	2	100	50	1.12	1.5	15	5	5, 10, 15, 24	2.4 mm
8765F <sup>1</sup>	DC to 4	Unterminated	2	100	90	0.4	1.2	15	5	5, 10, 15, 24	mini SMB (m)
High Power SPDT											
8761A	DC to 18	Unterminated	1	100	45	0.8	1.15	50	1	12	SMA (f) <sup>2</sup>
8761B	DC to 18	Unterminated	1	100	45	0.8	1.15	50	1	26	SMA (f) <sup>2</sup>

1. 75 Ω impedance
2. See ordering information

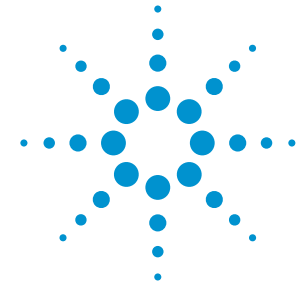
For more details on the Agilent EM switches and ordering information see the “Agilent RF and Microwave Switch Selection Guide”, literature number 5989-6031EN

For more information on Agilent switches, please visit [www.agilent.com/find/switches](http://www.agilent.com/find/switches)

## Ordering information

Model	Option type	Option	Option description
8761A/ 8761B	Coil voltage	A	12 to 15 Vdc
		B	24 to 30 Vdc
	Connector code option	0	N (f)
		1	N (m)
		2	APC-7 threaded sleeve
		3	APC-t coupling unit
		4	7 mm for UT-250 coax
		5	SMA (f)
		6	SMA (m)
		7	50 Ω termination (for port 1 and port 2 only)
8762A/ 8762B/ 8762C	Coil voltage	024	24 Vdvc
		T24	TTL/5V CMOS compatible logic with 24 Vdc supply
		011	5 Vdc
		015	15 Vdc
		T15	TTL/5V CMOS compatible logic with 15 Vdc supply
8762F	Coil voltage	024	24 Vdvc
		011	5 Vdc
		015	15 Vdc
8765A/ 8765B/ 8765C/ 8765D/ 8765F	Coil voltage	005	5 Vdc with 3-inch ribbon cable
		305	5 Vdc with solder terminals
		010	10 Vdc with 3-inch ribbon cable
		310	10 Vdc with solder terminals
		015	15 Vdc with 3-inch ribbon cable
		315	15 Vdc with solder terminals
		024	24 Vdc with 3-inch ribbon cable
		324	24 Vdc with solder terminals
	RF connector	241	2.4 mm (f) (for 8765D only)
		292	2.92 mm (f)
DC connector	108	8-inch ribbon cable extension	
	116	16-inch ribbon cable extension	

# Agilent High Performance Multiport Switches



Agilent's high-performance electromechanical coaxial switches provide reliable switching in signal routing, switch matrices, and ATE systems. With 0.03 dB insertion loss repeatability guaranteed up to 5 million cycles (10 million typical) and exceptional isolation, Agilent high-performance switches provide the performance you need from DC to 50 GHz.



Agilent 8766/67/  
68/69 Series.



Agilent 87104/106 Series  
and 87204/206 Series.

## High Performance

Superior performance with guaranteed specifications to 50 GHz

- **Guaranteed performance**  
< 0.03 dB insertion loss repeatability guaranteed for 5 million cycles
- **Long operating life**  
10 million cycles (typical)
- **High isolation**  
Typically > 85 dB at 26.5 GHz
- **Low SWR**  
Minimize measurement uncertainty
- **Unique design**  
Wiping action mechanism eliminates particle buildup to ensure reliable switching
- **Broad frequency range**  
DC to 4, 20, 26.5, 40 or 50 GHz



## Agilent High Performance Multiport Switches

Model	Frequency (GHz)	Termination	Average power (W)	Peak power (W)	Isolation (dB)	Insertion loss (dB)	SWR	Speed (ms)	Life cycle (million)	Driving voltage (Vdc)	RF connectors
SP3T											
8766K	DC to 26.5	Unterminated	1	100	60	1.5	1.8	20	5	5, 15, 24	3.5 mm (f)
SP4T											
87104A	DC to 4	Terminated	1	50	100	0.36	1.2	15	5	24	SMA (f)
87204A	DC to 4	Terminated	1	50	100	0.36	1.2	15	5	24	SMA (f)
87104B	DC to 20	Terminated	1	50	70	0.6	1.45	15	5	24	SMA (f)
87204B	DC to 20	Terminated	1	50	70	0.6	1.45	15	5	24	SMA (f)
87104C	DC to 26.5	Terminated	1	50	65	0.7	1.7	15	5	24	SMA (f)
87204C	DC to 26.5	Terminated	1	50	65	0.7	1.7	15	5	24	SMA (f)
87104D	DC to 40	Terminated	1	50	65	0.7	1.95	15	5	24	2.92 mm (f)
8767K	DC to 26.5	Unterminated	1	100	60	1.5	1.8	20	5	5, 15, 24	3.5 mm (f)
8767M	DC to 50	Unterminated	1	100	60	2.7	2.3	20	5	5, 15, 24	2.4 mm (f)
SP5T											
8768K	DC to 26.5	Unterminated	1	100	60	1.5	1.8	20	5	5, 15, 24	3.5 mm (f)
8768M	DC to 50	Unterminated	1	100	60	2.7	2.3	20	5	5, 15, 24	2.4 mm (f)
SP6T											
87106A	DC to 4	Terminated	1	50	100	0.36	1.2	15	5	24	SMA (f)
87206A	DC to 4	Terminated	1	50	100	0.36	1.2	15	5	24	SMA (f)
87106B	DC to 20	Terminated	1	50	70	0.6	1.45	15	5	24	SMA (f)
87206B	DC to 20	Terminated	1	50	70	0.6	1.45	15	5	24	SMA (f)
87106C	DC to 26.5	Terminated	1	50	65	0.7	1.7	15	5	24	SMA (f)
87206C	DC to 26.5	Terminated	1	50	65	0.7	1.7	15	5	24	SMA (f)
87106D	DC to 40	Terminated	1	50	65	0.7	1.95	15	5	24	2.92 mm (f)
8769K	DC to 26.5	Unterminated	1	100	60	1.5	2.05	20	5	24	3.5 mm (f)
8769M	DC to 50	Unterminated	1	100	60	2.7	2.3	20	5	5, 15, 24	2.4 mm (f/m)

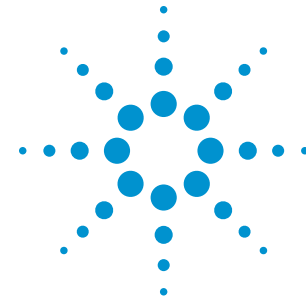
For more details on Agilent EM Switches and ordering information see the “*Agilent RF and Microwave Switch Selection Guide*”, literature number 5989-6031EN

For more information on Agilent switches, please visit: [www.agilent.com/find/switches](http://www.agilent.com/find/switches)

## High Performance Multiport Switch Option

Model	Option type	Option	Option description
87104A / 87104B / 87104C / 87104D / 87106A / 87106B / 87106C / 87106D	Control logic	T24	TTL/5V CMOS compatible logic with 24 Vdc supply
		024	24 Vdc
	DC connectors	161	Ribbon receptacle
		100	Solder Terminals
	Coil voltage	024	24 Vdc
		011	5 Vdc
015		15 Vdc	
8766K / 8767K / 8768K / 8769K	RF connector	002	SMA (f) (Use to 18 GHz only)
		004	3.5 mm (f)
DC connectors	060	5 feet DC control cable; 12-pin viking	
	016	16-inch ribbon cable extension	

# Agilent High Performance Electromechanical SPDT Switches

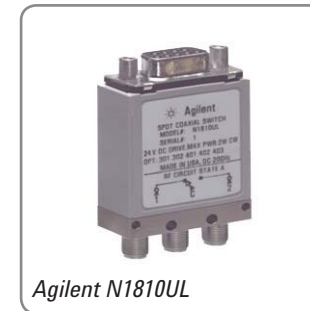


Agilent's high-performance electromechanical coaxial switches provide reliable switching in signal routing, switch matrices and ATE systems.

With 0.03 dB insertion loss repeatability guaranteed up to 5 million cycles (10 million cycles typical) and exceptional isolation, Agilent high-performance switches provide the performance you need from DC to 26.5 GHz.

## Superior performance with guaranteed specifications to 26.5 GHz

- **Guaranteed performance**  
< 0.03 dB insertion loss repeatability guaranteed for 5 million cycles
- **Long operating life**  
10 million cycles (typical)
- **High isolation**  
Typically > 85 dB at 26.5 GHz
- **Broad frequency range**  
DC to 4, 20, and 26.5 GHz



## Agilent High Performance Electromechanical SPDT Switches

### Product specifications

Model	Frequency (GHz)	Termination	Average power (W)	Peak power (W)	Isolation (dB)	Insertion loss (dB)	SWR	Speed (ms)	Life cycle (million)	Driving voltage (Vdc)	RF connectors
N1810TL	DC to 26.5	Terminated	1	50	60	0.8	1.6	15	5	5, 15, 24	SMA (f)
N1810UL	DC to 26.5	Unterminated	1	50	60	0.8	1.6	15	5	5, 15, 24	SMA (f)

### High performance SPDT option

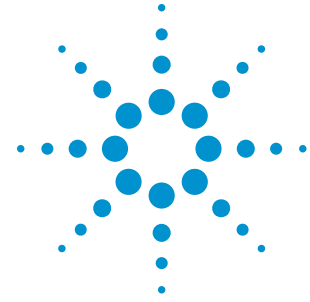
Model	Option type	Option	Option description
N1810TL/ N1810UL	Frequency range	004	DC to 4 GHz
		020	DC to 20 GHz
		026	DC to 26.5 GHz
	Coil voltage	105	5 Vdc and includes Option 402
		115	15 Vdc
		124	24 Vdc
	DC connector	201	D-submini 9 pin (f)
		202	Solder lugs
	Performance	301	High isolation
		302	Low SWR & insertion loss
		UK6	Calibration certificate with test data
	Drive	401	TTL/5V CMOS compatible
402		Position indicator	

For more details on the Agilent EM switches and ordering information see the *"Agilent RF and Microwave Switch Selection Guide"*, literature number 5989-6031EN

For more information on Agilent switches, please visit [www.agilent.com/find/switches](http://www.agilent.com/find/switches)



## Agilent Electromechanical Bypass Switches



Agilent's electromechanical bypass switches provide reliable switching in signal routing, switch matrices and ATE systems. With 0.03 dB insertion loss repeatability guaranteed up to 5 million cycles (10 million cycles typical) and exceptional isolation, Agilent bypass switches provide the performance you need from DC to 26.5 GHz.



Agilent 8763A/B/C



Agilent N1812UL



Agilent N1811TL

### High performance

- **Guaranteed performance**  
< 0.03 dB insertion loss repeatability guaranteed for 5 million cycles
- **Long operating life**  
10 million cycles (typical)
- **High isolation**  
Typically > 85 dB at 26.5 GHz



## Product specifications

Model	Frequency (GHz)	Termination	Average power (W)	Peak power (W)	Insertion loss (dB)	SWR	Speed (ms)	Life cycle (million)	Driving voltage (Vdc)	RF connectors
N1811TL	DC to 26.5	Terminated	1	50	0.8	1.6	15	5	5, 15, 24	SMA (f)
N1812UL	DC to 26.5	Unterminated	1	50	0.8	1.6	15	5	5, 15, 24	SMA (f)
8763A	DC to 4	Terminated	1	100	0.25	1.2	30	1	5, 15, 24	SMA (f)
8763B	DC to 8	Terminated	1	100	1.3	1.3	30	1	5, 15, 24	SMA (f)
8763C	DC to 26.5	Terminated	1	100	1.8	1.8	30	1	5, 15, 24	3.5 mm (f)
8764A	DC to 4	Unterminated	2	100	0.25	0.25	30	1	5, 15, 24	SMA (f)
8764B	DC to 8	Unterminated	2	100	0.5	0.5	30	1	5, 15, 24	SMA (f)
8764C	DC to 26.5	Unterminated	2	100	1.25	1.25	30	1	5, 15, 24	3.5 mm (f)

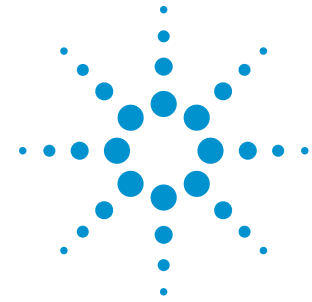
## Agilent bypass switch option

Model	Option type	Option	Option description
N1811TL/ N1812UL	Frequency range	004	DC to 4 GHz
		020	DC to 20 GHz
		026	DC to 26.5 GHz
	Coil voltage	105	5 Vdc and includes option 402
		115	15 Vdc
		124	24 Vdc
	DC connector	201	D-submini 9 pin (f)
		202	Solder lugs
	Performance	301	High isolation
		302	Low SWR & insertion loss
		UK6	Calibration certificate with test data
	Drive	401	TTL/5V CMOS compatible
402		Position indicator	
8763A/ 8763B/ 8763C/ 8764A/ 8764B/ 8764C	Drive	T15	TTL/5V CMOS compatible logic with 15 Vdc supply
		T24	TTL/5V CMOS compatible logic with 24 Vdc supply
	Coil voltage	024	24 Vdc
		011	5 Vdc
		015	15 Vdc

For more details on Agilent EM switches and ordering information see the “*Agilent RF and Microwave Switch Selection Guide*”, literature number 5989-6031EN

For more information on Agilent Amplifiers, please visit [www.agilent.com/find/switches](http://www.agilent.com/find/switches)

## Agilent High Performance Electromechanical Transfer Switches



Agilent 87222C/D/E

Agilent's electromechanical transfer switches provide reliable switching in signal routing, switch matrices and ATE systems. With 0.03 dB insertion

loss repeatability guaranteed up to 5 million cycles and exceptional isolation, Agilent transfer switches provide the performance you need from DC to 50 GHz.

### Superior performance with guaranteed specifications to 50 GHz

- **Guaranteed performance** - < 0.03 dB insertion loss repeatability guaranteed for 5 million cycles
- **Long operating life** - 5 million cycles
- **Low SWR** - Minimize measurement uncertainty
- **Unique design** - Wiping action mechanism eliminates particle buildup to ensure reliable switching
- **Broad frequency range** - DC to 26.5, 40, and 50 GHz



## Agilent High Performance Electromechanical Transfer Switches

### Product specifications

Model	Frequency (GHz)	Termination	Average power	Peak power	Isolation	Insertion loss	SWR	Speed	Life cycle	Driving voltage	RF connectors
87222C	DC to 26.5	Unterminated	1 W	50 W	40 dB	0.9 dB	1.65	15 ms	5 million	24 Vdc	SMA (f)
87222D	DC to 40	Unterminated	1 W	50 W	60 dB	1.2 dB	1.7	15 ms	5 million	24 Vdc	2.92 mm (f)
87222E	DC to 50	Unterminated	1 W	50 W	60 dB	1.15 dB	1.7	15 ms	5 million	24 Vdc	2.4 mm (f)

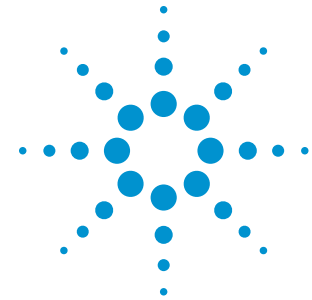
### Agilent transfer switch option

Model	Option type	Option	Option description
87222C/ 87222D/ 87222E	DC Connectors	161	10-PIN DIP
		100	Soler terminals and 10-PIN DIP
	Accessories	201	Mounting brackets; assembly required

For more details on the Agilent EM switches and ordering information see the “*Agilent RF and Microwave Switch Selection Guide*”, literature number 5989-6031EN

For more information on Agilent switches, please visit [www.agilent.com/find/switches](http://www.agilent.com/find/switches)

## Agilent High Performance Electromechanical Matrix Switches



Agilent's electromechanical matrix switches provide reliable switching in signal routing, switch matrices and ATE systems.

With 0.03 dB insertion loss repeatability guaranteed up to 5 million cycles and exceptional isolation, Agilent matrix switches provide the performance you need from DC to 20 GHz.



Agilent 87406B & 87606B

- **Guaranteed Performance**  
< 0.03 dB insertion loss repeatability guaranteed for 5 million cycles
- **Long operating life**  
10 million cycles (typical)
- **Low SWR**  
Minimize measurement uncertainty
- **Unique design**  
Wiping action mechanism eliminates particle buildup to ensure reliable switching

## Agilent High Performance Electromechanical Matrix Switches

### Product Specifications

Model	Frequency (GHz)	Termination	Average power (W)	Peak power (W)	Isolation	Insertion loss (dB)	SWR	Speed (ms)	Life cycle (million)	Driving voltage (Vdc)	RF connectors
87406B	DC to 20	Terminated	1	50	70	1	1.9	15	5	24	SMA (f)
87606B	DC to 20	Terminated	1	50	70	1	1.9	15	5	24	SMA (f)

### Agilent Matrix Switch Option

Model	Option type	Option	Option description
87406B	DC connectors	161	16-PIN DIP
		100	Soler terminals and 16-PIN DIP
	Control logic	T24	TTL/5V CMOS compatible logic with 24 Vdc supply
		024	24 Vdc
87606B	DC connectors	161	16-PIN DIP
		100	Soler terminals and 16-PIN DIP

For more details on Agilent EM switches and ordering information see the “Agilent RF and Microwave Switch Selection Guide”, literature number 5989-6031EN

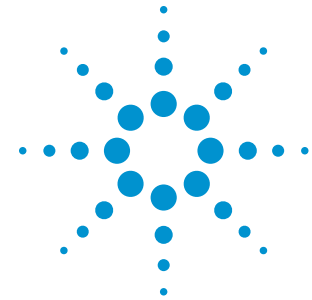
For more information on Agilent Amplifiers, please visit [www.agilent.com/find/switches](http://www.agilent.com/find/switches)



Solid State Switches

14

# Agilent Solid State Switches



Superior performance with high isolation

Fast switching speed across a broad operating frequency range

Safe, accurate test for sensitive RFIC components

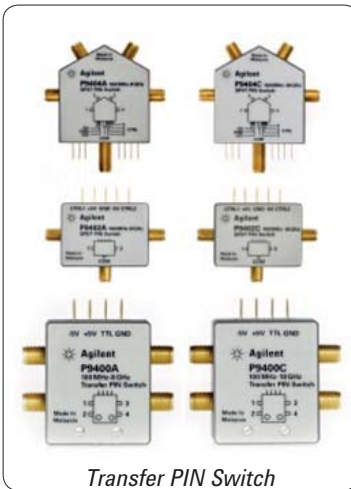
Exceptional long operating life



FET SPDT Switch



FET Hybrid SPDT



Transfer PIN Switch

## Typical performance

- **Fast switching speed**  
350  $\mu$ s (typical)
- **High isolation**  
> 100 dB at 8 GHz
- **Low video leakage**  
Prevent damage to sensitive components
- **Broad frequency range**  
From kHz to 8, 18, or 50 GHz and low frequency testing
- **Exceptional long operating life**

There are three types of solid state switches

- PIN diode switches
- Field-effect transistor (FET) switches
- Hybrid switches (FET and PIN diode)





# Agilent Solid State Switches

## Product specifications

Solid State Switches										
Model	Frequency	Termination	Isolation (dB)	Insertion loss (dB)	Return loss for ON port (dB)	Switching speed rise/fall (Typ)	Typical video leakage (mVpp)	Connector	Input power (average)	Driving voltage (V)
PIN SPDT										
P9402A	100 MHz to 8 GHz	Absortive	80	3.2	15	380 ns	3400	SMA (f)	23 dB	5
P9402C	100 MHz to 18 GHz	Absortive	80	4	10	380 ns	3400	SMA (f)	23 dB	5
85331B	45 MHz to 50 GHz	Absortive	75	15.5 at 26.5 GHz	4.5	1.5 $\mu$ s	7000	2.4 mm (f)	27 dB	7
PIN SP4T										
P9404A	100 MHz to 8 GHz	Absortive	80	3.5	15	350 ns	2800	SMA (f)	27 dB	5
P9404C	100 MHz to 18 GHz	Absortive	80	4.5	10	350 ns	2800	SMA (f)	27 dB	5
85332B	45 MHz to 50 GHz	Absortive	75	15.5 at 26.5 GHz	4.5	1.5 $\mu$ s	7000	2.4 mm (f)	27 dB	7
PIN transfer										
P9400A	100 MHz to 8 GHz	NA	80	3.5	15	200 ns	600	SMA (f)	23 dB	5
P9400C	100 MHz to 18 GHz	NA	80	4.2	10	200 ns	600	SMA (f)	23 dB	5
FET SPDT										
U9397A	300 kHz to 8 GHz	Absortive	100	3.5	15	5/0.51 $\mu$ s	10	SMA (f)	29 dB	12 to 24
U9397C	300 kHz to 18 GHz	Absortive	90	6.5	10	5/0.51 $\mu$ s	10	SMA (f)	27 dB	12 to 24
FET transfer										
U9400A	300 kHz to 8 GHz	NA	100	3.5	15	4/0.51 $\mu$ s	5	SMA (f)	29 dB	11 to 26
U9400C	300 kHz to 18 GHz	NA	90	6.5	10	5/1 $\mu$ s	5	SMA (f)	27 dB	11 to 26

*Solid state switches are standard and do not require option selection*

For more details on the Agilent solid state switches and ordering information see the "Agilent RF and Microwave Switch Selection Guide", literature number 5989-6031EN

For more information on Agilent switches, please visit [www.agilent.com/find/switches](http://www.agilent.com/find/switches)

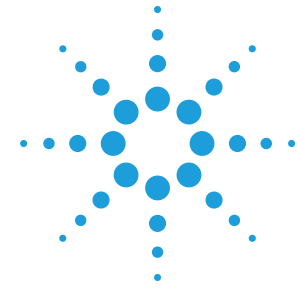
[www.agilent.com/find/mta](http://www.agilent.com/find/mta)

# 15

## Terminations (Loads)

## Agilent Termination(Loads)

The Agilent Termination/loads are widely used as accessories for both broadband and narrowband measurement instruments. Agilent's family of fixed and sliding loads includes both general purpose grade loads as well as loads intended for use as calibration standards.



### Key features

- Low RF leakage and a clearly defined reference plane
- Tantalum nitride on sapphire thinfilm technology for exceptional long-term impedance stability
- Gold plated beryllium copper used for the connector contacts for the best possible wear resistance characteristics



## Agilent Termination(Loads)

### Product specifications

Model	Impedance	Frequency range (GHz)	VSWR	Max power	Connectors type	Length mm (In)	Diameter mm (In)
909A	50 Ω	DC to 18	DC to 4 GHz: 1.05 4 to 12.4 GHz: 1.1 12.4 to 18 GHz: 1.25	2 W avg. 300 W peak	APC-7	51 (2)	23 (0.9)
909C	50 Ω	DC to 2	1.005	1/2 W avg. 100 W peak	APC-7	51 (2)	22 (0.9)
909D	50 Ω	DC to 26.5	DC to 3 GHz: 1.02 3 to 6 GHz: 1.036 6 to 26.5 GHz: 1.12	2 W avg. 100 W peak	3.5 mm (m)	23 (0.9)	9 (0.4)
909E	75 Ω	DC to 3	2 to 3 GHz: 1.02	1/2 W avg. 100 W peak	N (m)	51 (2)	21 (0.8)
909F	50 Ω	DC to 18	DC to 5 GHz: 1.005 5 to 6 GHz: 1.01 6 to 18 GHz: 1.15		APC-7	51 (2)	22 (0.9)
85138A	50 Ω	DC to 50	DC to 26.5 GHz: 1.065		2.4 mm (m)	-	-
85138B	50 Ω		26.5 to 40 GHz: 1.118 40 to 50 GHz: 1.220		2.4 mm (m)	-	-

### Ordering information

Model	Option	Description
909A	012	N Male Connector
	013	N Female Connector
909C	012	N Male Connector
	013	N Female Connector
909D	011	3.5 mm female termination
	040	3.5 mm male termination dc to -4 GHz 1.01 max SWR
909E	011	Type-N female connector
909F	012	N Male Connector
	013	N Female Connector



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The screenshot shows the Agilent Technologies website interface. At the top, there's a navigation bar with links for 'Products & Services', 'Technical Support', 'Industries & Applications', and 'United States'. Below that is a search bar with the text 'All Test & Measurement' and a 'Go' button. The main content area is titled 'RF & Microwave Test Accessories' and has tabs for 'Overview' and 'Library'. Under 'Description', there are links for 'Save 12% on Select RF & MW Test Accessories' and 'Special option test accessories to be discontinued December 1, 2009'. The 'More Information' section lists several product categories: 'New RF and Microwave Test Accessories', 'RF & Microwave Switches' (Solid State SPDT, EM Bypass, SPDT, matrix, multiport & transfer switches, with associated drivers & cables...), 'Attenuators, Fixed' (Fixed coaxial attenuators & attenuator sets for signal conditioning & level control...), 'Attenuators, Variable' (Manual & programmable step attenuators, 1 & 10 dB steps, to 50 GHz, associated drivers & cables...), and 'Attenuator/Switch Drivers'.

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