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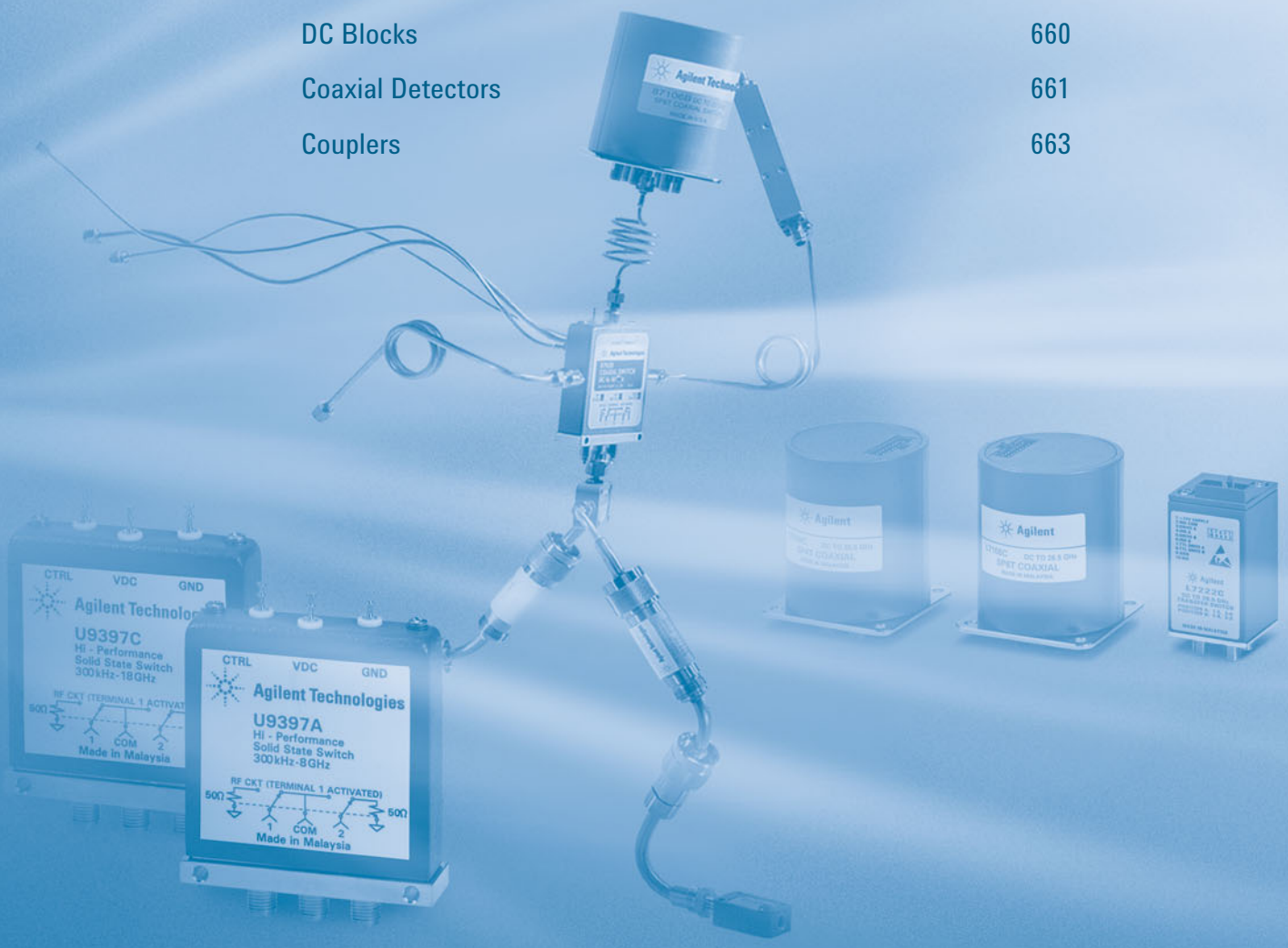
RF & MICROWAVE TEST ACCESSORIES



83006A
83017A
83018A
83020A
83050A
83051A
87405B
87405C
87415A

- **Ultra broadband to 50 GHz**
- **Up to 1 watt output power**
- **Compact size**

Microwave System Amplifiers

Use these amplifiers to increase output power from microwave sources and to increase test system measurement speed with improved dynamic range. Drive a variety of narrowband travelling wave tubes with a single driver solution that is highly reliable and low in cost to maintain year after year. With excellent noise figure relative to its broad bandwidth and high gain, these amplifiers can make significant improvement to system noise figure. By using feedback to an external source ALC input, system designers can level output power at the test port, negating the effects of post sweeper reflections and losses. Place power where you need it with a remotely-locatable DC power supply. The amplifier and the power supply are provided with a 2-m DC bias cable.

Agilent 87405B/C preamplifiers operate from 100 MHz up to 18 GHz. The reliable gain and low noise figure of these preamplifiers help reduce system errors and improve the overall system performance. A convenient probe-power bias, makes the portable 87405B/C preamplifiers ideal as front end preamplifiers for a variety of Agilent instrument such as PSA, ESA and MXA spectrum analyzers.

Specifications (+20°C to +30°C)

Model	Frequency (GHz)	Power out Psat (dBm)	Power out P1dBC (dBm)	Gain dB (min)	Noise Figure (dB typ.)	Detected Output	DC Bias volt/amp	RF Connectors (Input/Output)
83006A	0.01 to 26.5	+18 typ. 0.01 to 10 GHz +16 typ. 10 to 20 GHz +14 typ. 20 to 26.5 GHz	+13, 0.01 to 20 GHz +10, 20 to 26.5 GHz	20	13, 0.01 to 0.1 GHz 8, 0.1 to 18 GHz 13, 18 to 26.5 GHz	No	+12 V at 450 mA –12 V at 50 mA	3.5 mm (f)
83017A	0.5 to 26.5	+20 typ. 0.5 to 20 GHz +15 typ. 20 to 26.5 GHz	+18, 0.5 to 20 GHz +13, 20 to 26.5 GHz***	25	8, 0.5 to 20 GHz 13, 20 to 26.5 GHz	Yes	+12 V at 700 mA –12 V at 50 mA	3.5 mm (f)
83018A	2 to 26.5	+24, 2 to 20 GHz +21, 20 to 26.5 GHz	+22, 2 to 20 GHz +17, 20 to 26.5 GHz	27, 2 to 20 GHz 23, 20 to 26.5 GHz	10, 2 to 20 GHz 13, 20 to 26.5 GHz	Yes	+12 V at 2 A –12 V at 50 mA	3.5 mm (f)
83020A	2 to 26.5	+30, 2 to 20 GHz +30, 20 to 26.5 GHz*	+28, 2 to 20 GHz +28, 20 to 26.5 GHz*	30, 2 to 20 GHz 27, 20 to 26.5 GHz	10, 2 to 20 GHz 13, 20 to 26.5 GHz	Yes	+15 V at 3.2 A –15 V at 40 mA	3.5 mm (f)
83050A	2 to 50	+20, 2 to 40 GHz +19, 40 to 50 GHz**	+15, 2 to 40 GHz +13, 40 to 50 GHz	21	6, 2 to 26.5 GHz 10, 26.5 to 50 GHz	No	+12 V at 830 mA –12 V at 50 mA	2.4 mm (f)
83051A	0.045 to 50	+12, 0.045 to 45 GHz +10, 45 to 50 GHz	+8, 0.045 to 45 GHz +6, 45 to 50 GHz	23	12, 0.045 to 2 GHz 6, 2 to 26.5 GHz 10, 26.5 to 50 GHz	No	+12 V at 425 mA –12 V at 50 mA	2.4 mm (f)
87405B	0.01 to 4	+10 typ.	+8	22 – 27	5	No	+15 V at 105 mA	N (f)/N (m)
87405C	0.1 to 18	+18 typ. 0.1 to 4 GHz +17 typ. 4 to 18 GHz	+15, 0.1 to 4 GHz +14, 4 to 18 GHz	25	6, 0.1 to 4 GHz 4.5, 4 to 18 GHz	No	+15 V at 140 mA –15 V at 140 mA 0 V at 140 mA	N (f)/N (m)
87415A	2 to 8	+26 typ.	+23	25	13	No	+12 V at 900 mA	SMA (f)

* –0.7 dB/GHz (20<f<26.5)
** –0.2 dB/GHz (40<f<50)
*** –0.75 dB/GHz (20<f<26.5)

Dimensions

83006A, 83017A, 83050A, 83051A, 87415A: 45 mm H x 103 mm W x 132 mm L (1.8 in x 4 in x 5.2 in)
83018A: 76 mm H x 114 mm W x 212 mm L (8.3 in x 3 in x 4.5 in)
83020A: 87 mm H x 202 mm W x 275 mm L (10.8 in x 3.4 in x 8 in)
87405B: 28 mm H x 28 mm W x 110 mm L (1.1 in x 1.1 in x 4.3 in)
87405C: 40.3 mm H x 18 mm W x 98.3 mm L

Weight

83006A, 83017A, 83050A, 83051A, 87415A: .64 kg (1.4 lb);
83018A: 1.8 kg (4 lb); **83020A:** 3.9 kg (8.5 lb);
87405B: 0.233 kg (0.6 lb)
87405C: 0.22 kg (0.485 lb)

Bias Cable

2-m cable with a connector on one end and bare wires on the other, shipped with the amplifiers below
83006A, 83017A, 83018A, 83050A, 83051A, 87415A: p/n 83006-60004
83020A: p/n 83020-60004
2-m cable to connect between amplifier and power supplies, shipped with power supplies below
87421A: p/n 83006-60005
87422A: p/n 87422-60001, 83006-60005

Power Supply	AC Input Voltage	DC Output Voltage/Current	Output Power	Size (H, W, D)
87421A	100 to 240 VAC 50/60 Hz	+12 V at 2.0 A, –12 V at 200 mA	25 W max	57 mm, 114 mm, 176 mm (2.3 in, 4.5 in, 6.9 in)
87422A	100 to 240 VAC 50/60 Hz	+15 V at 3.3 A, –15 V at 50 mA +12 V at 2.0 A, –12 V at 200 mA	70 W max	86 mm, 202 mm, 276 mm (3.4 in, 8.0 in, 10.9 in)

Key Literature

For more information, visit our web site: **www.agilent.com/find/mta**

11713B/C Attenuator/Switch Driver

The Agilent 11713B/C attenuator/switch drivers provide remote or front panel drive control for programmable attenuators and electro-mechanical switches. Designed with both with both benchtop and ATE environments in mind, 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. Front panel push-buttons and an easy-to-read LCD display simplify setup of functions such as voltage, TTL functions, IP address, etc.

The 11713B/C is a LXI Class C compliant instrument, so it can be easily controlled and triggered remotely using a full-featured graphical web interface. This feature is used in high-volume production environments. Software instrument drivers such as IVI-COM provide programming compatibility with popular application development environments and support PC industry standards such as Component Object Model (COM). Standard GPIB connectivity supports automated programmed scripting and ensures backward compatibility to Agilent 11713A attenuator/ switch drivers.

34980A Multifunction Switch/Measure Unit for RF & Microwave Switching

The 34980A offers plug-in modules for RF and microwave switching and attenuation. This can be accomplished with either on-board RF & microwave switches, or with the 34945A/EXT microwave switch/attenuator driver module. The 34945A/EXT module provides power and control signals for the most popular microwave switches and attenuators. One 34945A/EXT can drive up to 64 switch coils – equivalent to 32 SPDT switches. Additional 34945EXT boards can be added to accommodate up to 512 coils from one 34980A mainframe. Distribution boards enable simple connections to external switches and attenuators.

The 34941A/42A plug-in modules are configured with four independent 1x4 RF multiplexers for switching signals up to 3 GHz. Multiple banks can be connected together to create a larger multiplexer. The 34945A/46A plug-in modules offer single-pole, double-throw switches in either 4 GHz or 20 GHz configurations. These modules internally mount two or three independent coaxial switches on the module.

E1368A, E1369A and E1370A VXI Attenuator/ Switch Drivers

Agilent's VXI family of instrumentation includes modules for microwave switching and attenuation control up to 18.0 GHz. E1368A contains three factory-installed SPDT switches such as the 8762B which features all-port termination, DC to 18.0 GHz. E1369A is identical to the E1368A except the switches are not included. This allows user-substitution of 8763 or 8764 transfer switches. E1370A allows the user to customize the internal configuration for 8766 series multiport switches or 8494/95/96/97 step attenuators.

Key Literature & Web Link

For more information, visit our web site: **www.agilent.com/find/mta**

Ordering Information

11713B Attenuator/Switch Driver (must order 1 option)
- **11713B-STD** 1 Bank of Outputs, Single Voltage 24 V Supply
- **11713B-LXI** 1 Bank of Outputs, Single Voltage 24 V Supply, LAN (LXI-C), USB

11713C Attenuator/Switch Driver 2 Banks of Outputs, Tri & External Voltage Supply, LAN (LXI-C), USB

34980A Multifunction Switch/Measure Unit
- **34941A** Quad 1x4 50-ohm 3 GHz RF Multiplexer
- **34942A** Quad 1x4 75-ohm 1.5 GHz Multiplexer
- **34945A** (with **34945EXT**) Microwave Switch/Attenuator Driver
- **34946A** Dual 1x2 SPDT Terminated Microwave Switch
- **34947A** Triple 1x2 SPDT Unterminated Microwave Switch

E1368A 18 GHz Microwave Switch
E1369A Microwave Switch Driver
E1370A Microwave Switch/Step Attenuator Driver

Solid State Switches

U9397A
U9397C
85331B
85332B

- **High isolation**
- **Low video leakage**
- **Fast settling time**
- **Broad frequency range**

U9397A & U9397C

85331B & 85332B

Solid State Switches

Agilent's solid state switches provide superior performance with high isolation and fast switching speed across a broad operating frequency range. These absorptive switches are designed for high frequency, single-pole double-throw (SPDT) and single-pole-four-throw (SP4T) operations. Applications include instrumentation, communications, radar, antenna and many other test systems that require high speed RF and microwave switching.

U9397A/C FET Solid State Switch

Agilent U9397A and U9397C FET solid state switches, SPDT provide superior performance in terms of video leakage, isolation, settling time, and insertion loss across a broad frequency (300 KHz to 8 GHz). The U9397A/C is particularly suitable for measuring sensitive components, such as mixers and amplifiers, where video leakage may cause damage or reliability issues.

85331B/32B Solid State Switch

The Agilent 85331B (SPDT) and 85332B (SP4T) are absorptive PIN diode solid state switches which provide a superior performance in terms of isolation and fast switching speed across a broad frequency range of 45 MHz to 50 GHz. These absorptive switches are designed for high frequency usage and are extremely useful for applications in instrumentation, communications, radar and many other test systems that require high speed RF and microwave switching.

U9397A/C Specifications

	U9397A	U9397C
Frequency Range	300 KHz to 8 GHz	300 KHz to 18 GHz
Insertion Loss	<3.0 dB (300 KHz to 4 GHz) <5.0 dB (300 KHz to 8 GHz)	<3.5 dB (4 to 8 GHz) <6.5 dB (8 to 18 GHz)
Isolation	100 dB	90 dB
Return Loss (ON and common port)	>15 dB	>10 dB
Return Loss (OFF port)	>18 dB	>13 dB
Settling Time	350 µs	350 µs
Switching Speed Rise/Fall[1]	5/0.5 µs (typical)	5/0.5 µs (typical)
Video Leakage	<10 mVpp	<10 mVpp
Characteristic Impedance	50 Ω (nominal)	50 Ω (nominal)
Connectors	SMA (f)	SMA(f)

[1] Switching speed is based on 10% to 90% RF.

85331B/32B Specifications

Model Number	Frequency Range (GHz)	Insertion Loss (dB)	Isolation (dB)	Return Loss (OFF Port) (dB)	Return Loss (ON Port) (dB)	Return Loss (COM Port) (dB)
85331B SP2T	0.045 to 0.5 0.5 to 18 18 to 26.5 26.5 to 40 40 to 50	–2.0 –4.5 –6.0 –10.0 –15.5	–85 –90 –90 –85 –75	–19.0 –19.0 –12.5 –10.0 –6.0	–10.0 –10.0 –6.0 –6.0 –4.5	–10.0 –10.0 –5.5 –4.5 –4.0
85332B SP4T	0.045 to 0.5 0.5 to 18 18 to 26.5 26.5 to 40 40 to 50	–2.0 –4.5 –7.0 –12.0 –21.5 –15.5	–85 –90 –90 –85 –75	–19.0 –19.0 –12.5 –10.0 –6.0	–9.0 –9.0 –5.0 –4.5 –4.5	–10.0 –10.0 –5.5 –4.0 –4.0

U9397A
U9397C
85331B
85332B

Key Literature & Web Link

For more information, visit our web site:
www.agilent.com/find/mta

Ordering Information

U9397A 8 GHz High-performance FET Solid State Switch
U9397C 18 GHz High-performance FET Solid State Switch
85331B SP2T 45 MHz to 50 GHz Solid State Switch
85332B SP4T 45 MHz to 50 GHz Solid State Switch

For 85331B & 85332B

Option 001 Switch Control Cable – 1 meter
Option 002 Switch Control Cable – 2 meter
Option 005 Switch Control Cable – 5 meter
Option 010 Switch Control Cable – 10 meter
Option 015 Switch Control Cable – 15 meter
Option 102 Switch Control Cable (one end bare wire) – 2 meter
Option 115 Switch Control Cable (one end bare wire) – 15 meter
Option 201 Switch Control Unit

N1810UL
N1810TL
N1811TL
N1812UL

- **Low SWR**
- **Low insertion loss**
- **High isolation – up to 134 dB @ 4 GHz**
- **Long life – 5 million cycles**
- **Excellent repeatability**

N181x Series

Coaxial Switches

Featuring unparalleled reliability and the longest life available, Agilent switches are the clear choice for high volume wireless communications manufacturing test. All switches utilize magnetically latched solenoids and break-before-make RF contacts for test simplicity. In precision measurements and monitoring applications where insertion loss repeatability is crucial, these switches will operate in excess of 5 million cycles with better than 0.03 dB of insertion loss repeatability at 25°C.

N1810UL – Unterminated Latching SPDT

The 1810UL is a single-pole, double throw switch available in the frequency range from DC to 26.5 GHz.

N1810TL – Terminated Latching SPDT

The 1810TL is a single-pole, double throw switch available in the frequency range from DC to 26.5 GHz. The unused port is terminated into 50 Ω, making it ideal for applications where source matching is required.

N1811TL – Terminated Latching Bypass

The 1811TL is a terminated bypass switch available in the frequency range from DC to 26.5 GHz. The switch's internal load can terminate the device under test when in the through mode (up to 1 watt). Because of its compact design, it is ideal for drop-in, drop-out applications.

N1812UL – Unterminated Latching 5-port

The 1812UL is a versatile, unterminated 5-port switch available in the range of frequency from DC to 26.5 GHz. In bypass switch applications, the fifth port can be terminated externally with a high power termination. It can also be utilized for signal path reversal or as a calibration port.

General Operating Characteristics: N181x series

Switching Speed	Repeatability	Life	Impedance
<15 ms	<0.03 db typical	5 mil cycles	50 Ω

Standard Performance Specifications: N181x series

Isolation	= 90 – 1.132 x F, where F is specified in GHz				
(dB)	**DC**	**4 GHz**	**12.4 GHz**	**20 GHz**	**26.5 GHz**
	90	85	76	67	60
Insertion	= 0.35 + 0.45/26.5 x F, where F is specified in GHz				
Loss (dB)	**DC**	**4 GHz**	**12.4 GHz**	**20 GHz**	**26.5 GHz**
	0.35	0.42	0.56	0.69	0.80
SWR		**DC to 4 GHz**	**4 to 12.4 GHz**	**12.4 to 20 GHz**	**20 to 26.5 GHz**
		1.15	1.25	1.30	1.60

Optional High Performance Specifications: N181x series

Isolation	= 125 – 1.321 x F, where F is specified in GHz				
(dB)	**DC**	**4 GHz**	**12.4 GHz**	**20 GHz**	**26.5 GHz**
Opt. 301	125	120	109	99	90
Insertion	= 0.2 + 0.017 x F, where F is specified in GHz				
Loss (dB)	**DC**	**4 GHz**	**12.4 GHz**	**20 GHz**	**26.5 GHz**
Opt. 302	0.15	0.27	0.41	0.53	0.65
SWR		**DC to 4 GHz**	**4 to 12.4 GHz**	**12.4 to 20 GHz**	**20 to 26.5 GHz**
Opt. 302		1.10	1.20	1.23	1.45

Key Literature

N1810/1/2 Coaxial Switches Product Overview, p/n 5968-9653E

Ordering Information

N1810UL, N1810TL, N1811TL, N1812UL

Frequency
- **002** DC to 2 GHz w/SMA(f) RF Connector
- **004** DC to 4 GHz w/SMA(f) RF Connector
- **020** DC to 20 GHz w/SMA(f) RF Connector
- **026** DC to 26.5 GHz w/SMA(f) RF Connector

Voltage
- **105** 5 volts
- **115** 15 volts
- **124** 24 volts

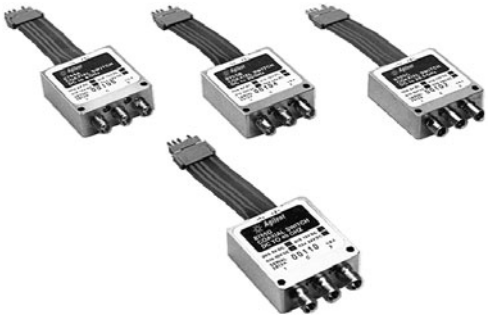
DC Connector
- **201** D-subminiature 9 pin (f)
- **202** Solder lugs

Options

Performance (chose any)
- **301** Higher Isolation (see specs)
- **302** Low SWR and Insertion Loss (see specs)

Drive (chose any)
- **401** TTL/5V CMOS Compatible Drive
- **402** Position Indicators
- **403** Current Interrupts

Ordering example: For an unterminated 5-port switch, operating up to 20 GHz, with 15 volt coils, D-sub connector, TTL drive, and high isolation, the order should look as follows: **N1812UL-020, -115, -201, -301, -401**



Coaxial Switches

Agilent coaxial switches feature low SWR, low insertion loss, excellent isolation and exceptional repeatability of 0.03 dB for more than 1 million switching cycles. Agilent offers a broad line of coaxial switches, covering up to 40 GHz, for use in test and measurement applications. All switches use magnetically-latched solenoids and break-before-make RF contacts for test simplicity.

8761 Series

8761A/B is a SPDT switch which operates up to 18 GHz. Each port features six connector options plus 50 Ω termination for design flexibility. These switches offer exceptional repeatability of 0.03 dB over 1 million switching cycles.

8762 Series

8762A/B/C switches operate up to 26.5 GHz. These switches provide 50 Ω match termination at all ports. Control voltage options T15 and T24 are compatible with TTL/5 V CMOS drive circuitry. Another model, 8762F is designed for 75 Ω transmission lines, making it valuable for commercial communication applications up to 4 GHz.

8763 Series

8763A/B/C switches operate up to 26.5 GHz. They are preferred for drop-out or drop-in applications due to their compact design. These switches are used to automatically insert or remove a test component from a signal path. One port is internally terminated. Options T15 and T24 are available for TTL/5 V CMOS compatibility.

8764 Series

8764A/B/C switches are available in three models up to 26.5 GHz. These switches are similar to the 8763, but with the internal termination replaced with a fifth port. The fifth port can be utilized for signal path reversal or as a calibration port. Options T15 and T24 offer TTL/5 V CMOS compatibility.

8765 Series

8765A/B/C/D/F are available in four models up to 40 GHz, as well as a 75 Ω model to 4 GHz. These SPDT switches offer exceptional repeatability of 0.03 dB over 5 million switching cycles. Unlike the 8762 switches, they do not have internal, switched RF loads or DC current interrupts. Coil voltage options cover the complete range from 5 Vdc to 24 Vdc. Since the coils are not interrupted, the coil voltage may be continuous or may be switched off after 15 ms.

Key Literature & Web Link

www.agilent.com/find/mta

Ordering Information

8761A/B Coaxial Switches
Specify voltage and connectors (including built-in 50 Ω terminations) by alphabetic suffix on the switch model number and the appropriate 3-digit option number. Specify all connectors.
8761A 12 to 15 V Supply Voltage
8761B 24 to 30 V Supply Voltage
Connector Options (Port 1, Port 2, Port C):

Option Code	Connector Type
100/200/300	Type-N Female
101/201/301	Type-N Male
102/202/302	7-mm Threaded Sleeve (APC-7®)[1]
103/203/303	7-mm Coupling Nut (APC-7)[1]
104/204/304	7-mm for UT-250 Coax
105/205/305	3-mm Female (SMA)
106/206/306	3-mm Male (SMA)
107/207/307	50-ohm Termination

8762, 8763, 8764 Coaxial Switches
Specify the frequency and voltage by the alphabetic suffix and option number. The standard model has 24 V supply voltage.
8762A SPDT, DC to 4 GHz
8762B SPDT, DC to 18 GHz
8762C SPDT, DC to 26.5 GHz
8762F SPDT, DC to 4 GHz, 75 Ω
8763A 4-Port, DC to 4 GHz
8763B 4-Port, DC to 18 GHz
8763C 4-Port, DC to 26.5 GHz
8764A 5-Port, DC to 4 GHz
8764B 5-Port, DC to 18 GHz
8764C 5-Port, DC to 26.5 GHz
8765 Coaxial Switches
A voltage option must be ordered with the switch. Specify frequency, voltage, DC connectors, and ribbon cable extension options by alphabetic suffix and option number.
8765A SPDT, DC to 4 GHz
8765B SPDT, DC to 20 GHz
8765C SPDT, DC to 26.5 GHz
8765D SPDT, DC to 40 GHz
8765F SPDT, DC to 4 GHz, 75 Ω

[1] Either option will connect to a standard, sexless, 7-mm connector. To daisy-chain two 8761A's you must use one option 102, 202, or 302 and one option 103, 203, or 303 on the two mating connectors. If you have two of the same options, you will need to use a cable with two standard 7-mm connectors.

8761 – 5 Series Specifications

Model	Frequency Range (GHz)	SWR 50 Ω Nominal	Insertion Loss	Isolation	Switching Speed	Repeat-ability[2]	Life[3]	RF Connectors	Dimensions W x H x D (mm)	Shipping Weight (g)
8761A SPDT Unterminated	DC to 18	<1.2 to 12.4 GHz <1.25 to 18 GHz	<0.5 dB to 12.4 GHz <0.8 dB to 18 GHz	>50 dB to 12.4 GHz >45 dB to 18 GHz	35 to 50 mS	0.03 dB	1 x 10[6]		38 x 41 x 38	300
8761B SPDT Unterminated	DC to 18	<1.2 to 12.4 GHz <1.25 to 18 GHz	<0.5 dB to 12.4 GHz <0.8 dB to 18 GHz	>50 dB to 12.4 GHz >45 dB to 18 GHz	35 to 50 mS	0.03 dB	1 x 10[6]		38 x 41 x 38	300
8762A SPDT Terminated	DC to 4	<1.1 to 2 GHz <1.2 to 4 GHz	<0.2 dB to 2 GHz <0.25 dB to 4 GHz	>100 dB to 4 GHz	<30 mS	0.03 dB	1 x 10[6]	SMA (f)	53 x 14 x 54	220
8762B SPDT Terminated	DC to 18	<1.10 to 2 GHz <1.2 to 12.4 GHz <1.3 to 18 GHz	<0.2 dB to 2 GHz <0.5 dB to 18 GHz	>90 dB to 18 GHz	<30 mS	0.03 dB	1 x 10[6]	SMA (f)	53 x 14 x 54	220
8762C SPDT Terminated	DC to 26.5	<1.15 to 2 GHz <1.25 to 12.4 GHz <1.4 to 18 GHz <1.8 to 26.5 GHz	<0.25 dB to 2 GHz <0.5 dB to 18 GHz <1.25 dB to 26.5 GHz	>90 dB to 18 GHz >50 dB to 26.5 GHz	<30 mS	0.03 dB to 18 GHz 0.05 dB to 26.5 GHz	1 x 10[6]	3.5 mm (f)	53 x 14 x 54	220
8762F SPDT, 75 Ω Terminated	DC to 4	<1.15 to 1 GHz <1.3 to 4 GHz	<0.4 dB to 4 GHz	>100 dB to 4 GHz	<30 mS	0.03 dB	1 x 10[6]	75 Ω, SMB (m)	53 x 14 x 54	300
8763A Coaxial Terminated	DC to 4	<1.1 to 2 GHz <1.2 to 4 GHz	<0.2 dB to 2 GHz <0.25 dB to 4 GHz	>100 dB to 4 GHz	<30 mS	0.03 dB	1 x 10[6]	SMA (f)	53 x 14 x 54	220
8763B Coaxial Terminated	DC to 18	<1.10 to 2 GHz <1.2 to 12.4 GHz <1.3 to 18 GHz	<0.2 dB to 2 GHz <0.5 dB to 18 GHz	>90 dB to 18 GHz	<30 mS	0.03 dB	1 x 10[6]	SMA (f)	53 x 14 x 54	220
8763C Coaxial Terminated	DC to 26.5	<1.15 to 2 GHz <1.25 to 12.4 GHz <1.4 to 18 GHz <1.8 to 26.5 GHz	<0.25 dB to 2 GHz <0.5 dB to 18 GHz <1.25 to 26.5 GHz	>90 dB to 18 GHz >50 dB to 26.5 GHz	<30 mS	0.03 dB to 18 GHz 0.05 dB to 26.5 GHz	1 x 10[6]	3.5 mm (f)	53 x 14 x 54	220
8764A Coaxial Unterminated	DC to 4	<1.1 to 2 GHz <1.2 to 4 GHz	<0.2 dB to 2 GHz <0.25 dB to 4 GHz	>100 dB to 4 GHz	<30 mS	0.03 dB	1 x 10[6]	SMA (f)	53 x 14 x 54	220
8764B Coaxial Unterminated	DC to 18	<1.10 to 2 GHz <1.2 to 12.4 GHz <1.3 to 18 GHz	<0.2 dB to 2 GHz <0.5 dB to 18 GHz	>90 dB to 18 GHz	<30 mS	0.03 dB	1 x 10[6]	SMA (f)	53 x 14 x 54	220
8764C Coaxial Unterminated	DC to 26.5	<1.15 to 2 GHz <1.25 to 12.4 GHz <1.4 to 18 GHz <1.8 to 26.5 GHz	<0.25 dB to 2 GHz <0.5 dB to 18 GHz <1.25 dB to 26.5 GHz	>90 dB to 18 GHz >50 dB to 26.5 GHz	<30 mS	0.03 dB to 18 GHz 0.05 dB to 26.5 GHz	1 x 10[6]	3.5 mm (f)	53 x 14 x 54	220
8765A SPDT Unterminated	DC to 4	<1.2 to 4 GHz	0.2 + 0.025 f (GHz) max <0.2 to 4 GHz[1]	110 – 2.25 x f (GHz) min >120 dB to 4 GHz	<15 mS	0.03 dB	5 x 10[6]	SMA (f)	33 x 14 x 45	200
8765B SPDT Unterminated	DC to 20	<1.2 to 4 GHz <1.35 to 12.4 GHz <1.45 to 18 GHz <1.7 to 20 GHz	0.2 + 0.025 f (GHz) max <0.2 to 4 GHz[1] <0.5 to 20 GHz[1]	110 – 2.25 x f (GHz) min >120 dB to 4 GHz >90 dB to 20 GHz	<15 mS	0.03 dB	5 x 10[6]	SMA (f)	33 x 14 x 45	200
8765C SPDT Unterminated	DC to 26.5	<1.25 to 4 GHz <1.45 to 18 GHz <1.7 to 26.5 GHz	0.25 + 0.027 f (GHz) max <0.2 to 4 GHz[1] <0.5 to 20 GHz[1] <0.7 to 26.5 GHz[1]	110 – 2.25 x f (GHz) min >120 dB to 4 GHz >90 dB to 20 GHz >60 dB to 26.5 GHz	<15 mS	0.03 dB	5 x 10[6]	3.5 mm (f)	33 x 14 x 45	200
8765D SPDT Unterminated	DC to 40	<1.25 to 4 GHz <1.45 to 26.5 GHz <1.7 to 40 GHz	0.2 + 0.23 f (GHz) max <0.2 to 4 GHz[1] <0.5 to 20 GHz[1] <0.7 to 26.5 GHz[1] 0.75 + 00.023 f (GHz) max <1.0 to 40 GHz[1]	110 – 2.25 x f (GHz) min >120 dB to 4 GHz >90 dB to 20 GHz >60 dB to 26.5 GHz >50 dB to 40 GHz	<15 mS	0.03 dB	5 x 10[6]	2.4 mm (f) 2.92 mm (f)	33 x 14 x 45	200
8765F SPDT, 75 Ω Unterminated	DC to 4	<1.15 to 1 GHz <1.20 to 4 GHz	<0.18 dB to 1 GHz <0.24 dB to 2 GHz <0.40 dB to 4 GHz	>100 dB to 1 GHz >90 dB to 4 GHz	<15 mS	0.03 dB	5 x 10[6]	75 Ω, SMB (m)	33 x 14 x 45	200

[1] Typical insertion loss.
[2] Measured at 25°C.
[3] Cycles per section minimum.

For more information, visit our web site: **www.agilent.com/find/mta**

- **Guaranteed repeatability of 0.03 dB up to 2 million cycles**
- **Operating life of 5 million cycles typical**
- **Unmatched isolation, 90 dB minimum at 12 GHz**
- **Economically priced**

Transfer – Economical High Performance

L Series – L7222C

The L7222C 4-port coaxial transfer switch provides flexibility and simplification of design in signal routing and conditioning applications. Operating from DC to 26.5 GHz, these switches provide exceptional 0.03 dB insertion loss repeatability warranted for 2 million cycles. The L7222C's high isolation between ports, typically >90 dB, reduces the influence of signals from other channels and system measurement uncertainties, making them ideal for use in large, multitiered switching systems. The L7222C can be used in a variety of applications, such as a drop-out switch, switching two inputs and two outputs, or signal reversal switching.

L7104C

L7222C

L7106C

Multiport – Economical High Performance, Terminated

L Series – L7104A/B/C and L7106A/B/C

L7104A/B/C and L7106A/B/C multiport switches are available in 3 models up to 26.5 GHz. These switches offer a warranted repeatability of 0.03 dB for 2 million cycles. The L7104A/B/C single-pole-4-throw (SP4T) and L7106A/B/C, SP6T operate from DC to 26.5 GHz with excellent isolation, VSWR, 1.2 maximum, and with an input power of 1 W avg./50 W peak (15 s max). These switches provide the life and reliability required for automated test and measurement, signal monitoring and routing application at an economical price.

Multiport – Economical High Performance, Unterminated

L Series – L7204A/B/C and L7206A/B/C

L7204A/B/C and L7206A/B/C are unterminated multiport switches which operate at frequency range up to 26.5 GHz. These switches offer a warranted repeatability of 0.03 dB for 2 million cycles. The L7204A/B/C, SP4T and L7206A/B/C, SP6T operate from DC to 26.5 GHz with excellent isolation, VSWR, 1.2 maximum, and with an input power of 1 W avg./100 W peak (15 s max). These switches provide the life and reliability for automated test and measurement, signal monitoring and routing application at an economical price.

Key Literature & Web Link

For more information, visit our web site: **www.agilent.com/find/mta**

Ordering Information

L7104A DC to 4 GHz, SP4T, terminated
L7104B DC to 20 GHz, SP4T, terminated
L7104C DC to 26.5 GHz, SP4T, terminated
L7204A DC to 4 GHz, SP4T, unterminated
L7204B DC to 20 GHz, SP4T, unterminated
L7204C DC to 26.5 GHz, SP4T, unterminated
L7106A DC to 4 GHz, SP6T, terminated
L7106B DC to 20 GHz, SP6T, terminated
L7106C DC to 26.5 GHz, SP6T, terminated
L7206A DC to 4 GHz, SP6T, unterminated
L7206B DC to 20 GHz, SP6T, unterminated
L7206C DC to 26.5 GHz, SP6T, unterminated
L7XXX-100 Solder Terminals to replace Ribbon Cable
L7XXX-UK6 Commercial Calibration Test Data with Certificate
L7XXX-T24 TTL/5 V CMOS Compatible Option
L7222C DC to 26.5 GHz Transfer Switch

11713B/C Attenuator Switch Driver
Drives up to 10 sections of switches or attenuators

5061-0969 Accessory Cable
Viking connector to bare tinned wires (60 inches long). Use to connect 11713B to L7104/204/106/206 with Option 100. One required with L7104/L7204 Option 100; two required with L7106/L7206 Option 100

Model	Frequency Range (GHz)	SWR	Insertion Loss (db)	Isolation	Switching Time (max)	Repeatability (max)	Life	Connector	Dimension W x H x D (mm)
L7104/L7204A L7106/L7206A	DC to 4 GHz	1.2 maximum	0.3 + 0.015 x frequency (GHz)	90 dB minimum	15 ms	0.03 dB	2 million	SMA (f)	57.15 x 71.53 x 57.15
L7104/L7204B L7106/L7206B	DC to 20 GHz	1.2 maximum, DC to 4 GHz 1.35 maximum, 4 to 12.4 GHz 1.45 maximum, 12.4 to 18 GHz 1.7 maximum, 18 to 20 GHz	0.3 + 0.015 x frequency (GHz)	90 dB minimum, DC to 12 GHz 70 dB minimum, 12 GHz to 15 GHz 65 dB minimum, 15 to 20 GHz	15 ms	0.03 dB	2 million	SMA (f)	57.15 x 71.53 x 57.15
L7104/L7204C L7106/L7206C	DC to 26.5 Hz	1.2 maximum, DC to 4 GHz 1.35 maximum, 4 to 12.4 GHz 1.45 maximum, 12.4 to 18 GHz 1.7 maximum, 18 to 26.5 GHz	0.3 + 0.015 x frequency (GHz)	90 dB minimum, DC to 12 GHz 70 dB minimum, 12 GHz to 15 GHz 65 dB minimum, 15 to 20 GHz 60 dB minimum, 20 to 26.5 GHz	15 ms	0.03 dB	2 million	SMA (f)	57.15 x 71.53 x 57.15
L7222C	DC to 26.5	1.65 maximum at 26.5 GHz	0.2 + 0.025 x frequency (GHz)	110 dB – 2.0 x frequency (GHz)	15 ms	0.03 dB	2 million	SMA (f)	31.75 x 56.80 x 23.11

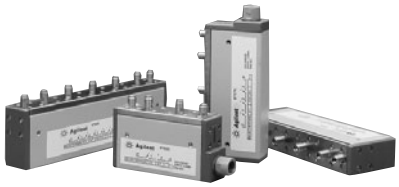
87104
87106
87204
87206
87222
87406B
87606B
8766
8767
8768
8769

- **Guaranteed repeatability of 0.03 dB up to 5 million cycles**
- **Operating life of 10 million cycles, typical**
- **Low SWR**
- **Low insertion loss**
- **High isolation – >90 dB at 12 GHz**


87222C/D/E


87406B


87204B


8766

Transfer Switches – High Performance

The 87222C/E 4-port, coaxial transfer switches offer versatility in a number of applications from drop-out to signal reversal. They provide exceptional repeatability <0.03 dB, a low insertion loss and high isolation. The 87222C operates from DC – 26.5 GHz, 87222D to 40 GHz, and are warranted for 5 million cycles. The 87222E operates from DC – 50 GHZ. The option 161 87222C/D/E provides a 10-pin connector while Option 100 includes solder terminals. Option 201 provides a mounting bracket.

Matrix Switches – High Performance, Terminated

87406/606 Series

The 87406B and 87606B 6-port, coaxial matrix switches will provide a valuable tool for 3 x 3, 2 x 4, and 1 x 5 configurations. These high performance matrix switches offer excellent repeatability and life greater than 5 million cycles. The 87406B, 87606B operate from DC to 20 GHz with excellent isolation, VSWR <2.0:1, and with an input power of 1 W avg./50 W peak (10 μs max).

Multiport – High Performance, Terminated

87104/106 and 87204/206 Series

87104A/B/C and 87106A/B/C multiport switches are available in 3 models up to 26.5 GHz. These switches offer exceptional repeatability of 0.03 dB over 5 million switching cycles. 87104 is a Single-Pole-4-throw (SP4T) and 87106 is a SP6T function. Both switches have internal solid-state logic that automatically programs the non-used ports to a matched load when any one port is programmed to "on." This relieves the user from having to provide external logic drive pulses.

Multiport – Low Profile, Unterminated

8766/67/68/69K Series

8766/67/68/69K series switches are modified versions of the 8494/95/96/97 series step attenuators (DC – 26.5 GHz) for applications requiring a single-pole, 3-throw, 4-throw, 5-throw or 6-throw coaxial switch. The switch ports are unterminated. These switches offer exceptional repeatability of 0.03 dB over 5 million switching cycles. The switches are available with several optional cables and connectors to make them compatible with standard 14-pin DIP sockets. Isolation and insertion loss vary with frequency, and depend upon the port selected.

Key Literature & Web Link

For more information, visit our web site: **www.agilent.com/find/mta**

Ordering Information

87104A[1] SP4T, DC to 4 GHz
87104B[1] SP4T, DC to 20 GHz
87104C[1] SP4T, DC to 26.5 GHz
87106A[1] SP6T, DC to 4 GHz
87106B[1] SP6T, DC to 20 GHz
87106C[1] SP6T, DC to 26.5 GHz
87204A SP4T, DC to 4 GHz
87204B SP4T, DC to 20 GHz
87204C SP4T, DC to 26.5 GHz
87206A SP6T, DC to 4 GHz
87206B SP6T, DC to 20 GHz
87206C SP6T, DC to 26.5 GHz
87222C Transfer, DC to 26.5 GHz
87222D Transfer, DC to 40 GHz
87222E Transfer, DC to 50 GHz
87406B Matrix, DC to 20 GHz
- **87406B-100** Solder Terminals
- **87406B-161** 16-pin DIP with Ribbon Cable
- **87406B-T24**[2] TTL/5 V CMOS Compatible Logic
- **87406B-024** 24 Vdc without TTL Logic
- **87406B-UK6** Commercial Calibration Test Data with Certificate

87606B Matrix, DC to 20 GHz
- **87606B-100** Solder Terminals
- **87606B-161** 16-pin DIP with Ribbon Cable
- **87606B-024**[2] 24 Vdc without TTL Logic
- **87606B-UK6** Commercial Calibration Test Data with Certificate

8766K, 8767K, 8768K, 8769K Coaxial Switches
Specify RF connectors (and frequency), supply voltages, DC connectors by option number. Standard unit is 24 Vdc, 3.5-mm (f) RF connectors (DC to 26.5 GHz), and Viking-type DC connector
8766K SP3T Multi-Port Switch
8767K SP4T Multi-Port Switch
8768K SP5T Multi-Port Switch
8769K SP6T Multi-Port Switch
- **876xK-002** SMA (f) Connectors
- **876xK-004** 3.5 mm (f)
- **876xK-008** 8-inch Ribbon Cable w/DIP Connector
- **876xK-011** 5 Vdc Supply Voltages
- **876xK-015** 15 Vdc Supply Voltages
- **876xK-016** 16-inch Ribbon Cable w/DIP Connector
- **876xK-024** 24 V Solenoids
- **876xK-060** 5 foot DC Control Cable, 12 pin "Viking"
- **876xK-UK6** Commercial Calibration Test Data with Certificate

[1] Provides sensing capability with 87130A.
[2] Not available with 87204, 87206, or 87606 switches.

87104/6, 87204/6, 87222C/E, 87406B/606B, 8766/7/8/9 Series Specifications

Model	Frequency Range (GHz)	SWR (50 Ω Nominal)	Insertion Loss (db)	Isolation (db)	Switching Time (max)	Repeat-ability[1]	Life (min.)	RF Connectors	Dimensions W x H x D (mm)	Shipping Weight (g)
87104A/204A SP4T	DC to 4	<1.2 to 4 GHz	0.3 + 0.015 x f (GHz)	>100 to 4 GHz	15 ms	0.03 dB	5,000,000 cycles	SMA (f)	57 x 74 x 57	229
87104B/204B SP4T	DC to 20	<1.2 to 4 GHz <1.35 to 12.4 GHz <1.45 to 18 GHz <1.7 to 20 GHz	0.3 + 0.015 x f (GHz)	>100 to 12 GHz >80 to 15 GHz >70 to 20 GHz	15 ms	0.03 dB	5,000,000 cycles	SMA (f)	57 x 74 x 57	229
87104C/204C SP4T	DC to 26.5	<1.7 to 20 to 26.5 GHz	0.3 + 0.015 x f (GHz)	>65 20 to 26.5 GHz	15 ms	0.03 dB	5,000,000 cycles	SMA (f)	57 x 74 x 57	229
87106A/206A SP6T	DC to 4	<1.2 to 4 GHz	0.3 + 0.015 x f (GHz)	>100 to 4 GHz	15 ms	0.03 dB	5,000,000 cycles	SMA (f)	57 x 74 x 57	229
87106B/206B SP6T	DC to 20	<1.2 to 4 GHz <1.35 to 12.4 GHz <1.45 to 18 GHz <1.7 to 20 GHz	0.3 + 0.015 x f (GHz)	>100 to 12 GHz >80 to 15 GHz >70 to 20 GHz	15 ms	0.03 dB	5,000,000 cycles	SMA (f)	57 x 74 x 57	229
87106C/206C SP6T	DC to 26.5	<1.7 to 20 to 26.5 GHz	0.3 + 0.015 x f (GHz)	>65 20 to 26.5 GHz	15 ms	0.03 dB	5,000,000 cycles	SMA (f)	57 x 74 x 57	229
87222C	DC to 26.5	<1.1 to 2 GHz <1.15 to 4 GHz <1.25 to 12.4 GHz <1.4 to 20 GHz <1.65 to 26.5 GHz	0.2 + 0.025 x f (GHz)	120 – 2.0 x f (GHz) at DC to 26.5 GHz	15 ms	0.03 dB	5,000,000 cycles	SMA (f)	32 x 69 x 32	100
87222D	DC to 40	<1.3 to 12.4 GHz <1.4 to 25 GHz <1.7 to 40 GHz	0.2 + 0.025 x f (GHz)	120 – 2.0 x f (GHz) at DC to 26.5 GHz >60 at 26.5 to 40 GHz	15 ms	0.03 dB	5,000,000 cycles	2.92 mm (f)	32 x 69 x 32	100
87222E	DC to 50	<1.3 to 12.4 GHz <1.4 to 20 GHz <1.5 to 30 GHz <1.6 to 40 GHz <1.7 to 50 GHz	0.15 + 0.020 x f (GHz)	120 – 2.0 x f (GHz) at DC to 26.5 GHz >60 at 26.5 to 50 GHz	15 ms	0.03 dB DC to 26.5 GHz 0.05 dB 26.5 to 50 GHz	5,000,000 cycles	2.4 mm (f)	32 x 69 x 32	100
87406B/606B	DC to 20	<1.21 to 4 <1.35 to 10 <1.5 to 15 <1.7 to 18 <1.9 to 20	0.34 + 0.033 x f (GHz)	>100 dB to 12 GHz >80 dB to 15 GHz >70 dB to 20 GHz	15 ms	0.03 dB	5,000,000 cycles	SMA (f)	57 x 74 x 57	229
8766K SP3T	DC to 26.5 or DC to 18 for Option 002	<1.3 to 8 GHz <1.5 to 12.4 GHz <1.6 to 18 GHz <1.8 to 26.5 GHz	Port 1: 0.2 dB + 0.05 dB/GHz Port 2: 0.2 dB + 0.06 dB/GHz	Consult Technical Data Sheet	20 ms	0.03 dB	5,000,000 cycles	3.5 mm (f)	45 x 23 x 82	178
8767K SP4T	DC to 26.5 or DC to 18 for Option 002	<1.3 to 8 GHz <1.5 to 12.4 GHz <1.6 to 18 GHz <1.8 to 26.5 GHz	Port 3: 0.2 dB + 0.08 dB/GHz Port 4: 0.25 dB + 0.095 dB/GHz		20 ms	0.03 dB	5,000,000 cycles	3.5 mm (f)	45 x 23 x 105	235
8768K SP5T	DC to 26.5 or DC to 18 for Option 002	<1.3 to 8 GHz <1.5 to 12.4 GHz <1.6 to 18 GHz <1.8 to 26.5 GHz	Port 5: 0.25 dB + 0.108 dB/GHz Port 6: 0.25 dB + 0.12 dB/GHz		20 ms	0.03 dB	5,000,000 cycles	3.5 mm (f)	45 x 23 x 133	292
8769K SP6T	DC to 26.5 or DC to 18 for Option 002	<1.3 to 8 GHz <1.55 to 12.4 GHz <1.8 to 18 GHz <2.05 to 26.5 GHz			20 ms	0.03 dB	5,000,000 cycles	3.5 mm (f)	45 x 23 x 160	349

[1] Measured at 25°C.

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84904
84905
84906
84907
84908

High-Performance Programmable Step Attenuators – DC to 50 GHz

84904K/L/M (0 – 11, 1 dB steps)

84905M (0 – 60, 10 dB steps)

84906K/L (0 – 90, 10 dB steps)

84907K/L (0 – 70, 10 dB steps)

84908M (0 – 65, 5 dB steps)

The 84904/905/906/907/908 family of programmable step attenuators offers unmatched attenuation performance to 50 GHz. The K model brings superior accuracy and reliability to 26.5 GHz, while the L model offers unparalleled performance to 40 GHz and the M to 50 GHz.

Agilent step attenuators consist of 3 or 4 cascaded sections of specific attenuation values, e.g., 1, 2, 4, 5, 10, 20 and 40 dB. These families offer the selection, performance, accuracy and reliability expected from Agilent attenuators: attenuation ranges of 11, 70, or 90 dB, 1 dB and 10 dB step sizes, 5 million cycles per section, better than 0.03 dB repeatability, connector size options and the choice of male or female connectors.

Programmable step attenuators feature electromechanical designs which achieve 20 milliseconds switching time, including settling time. The permanent magnet latching allows automatic interruption of the DC drive voltage to cut power consumption and simplify circuit design. They are equipped with 10-pin DIP sockets (m) with interconnect cables available.

84904/6/7K and L

84904/6/7K/L Specifications

Model	Frequency Range (GHz)	Attenuation Range	Maximum SWR Std (Option 006)	Insertion Loss 0 dB Setting	Repeat-ability[1]	Life[2]	Shipping Weight
84904K **84904L**	DC to 26.5 DC to 40	0 to 11 dB 1 dB steps	1.3 (1.5) to 12.4 GHz 1.7 (1.9) to 34 GHz 1.8 (2.0) to 40 GHz	0.8 dB + 0.04 dB/GHz	0.03 dB	5×10^6	291 g (10.3 oz)
84906K **84906L**	DC to 26.5 DC to 40	0 to 90 dB 10 dB steps	1.3 (1.5) to 12.4 GHz 1.7 (1.9) to 34 GHz 1.8 (2.0) to 40 GHz	0.8 dB + 0.04 dB/GHz	0.03 dB	5×10^6	291 g (10.3 oz)
84907K **84907L**	DC to 26.5 DC to 40	0 to 70 dB 10 dB steps	1.25 (1.4) to 12.4 GHz 1.5 (1.7) to 34 Gz 1.7 (1.9) to 40 GHz	0.6 dB + 0.03 dB/GHz	0.03 dB	5×10^6	229 g (8.1 oz)

Sensitivity Power: dB/watt (temperature dB/°C): 0.001 (0.0001)
Power Rating: 1 W ave, 50 W peak, 10 µs max. pulse width
Supply Voltage/Speed/Power: 20 to 30 V/<20 ms/2.7 W

[1] Measured at 25°C.
[2] Cycles per section minimum.

Attenuation Accuracy DC to 26.5 GHz	26.5 to 40 GHz
1 dB: 0.4 dB	1 dB: 0.6 dB
2 dB: 0.5 dB	2 dB: 0.6 dB
3 dB: 0.7 dB	3 dB: 0.8 dB
4 dB: 0.7 dB	4 dB: 0.8 dB
5 dB: 0.7 dB	5 dB: 0.8 dB
6 dB: 0.7 dB	6 dB: 0.9 dB
7 dB: 0.8 dB	7 dB: 1.1 dB
8 dB: 0.8 dB	8 dB: 1.1 dB
9 dB: 0.85 dB	9 dB: 1.2 dB
10 dB: 0.9 dB	10 dB: 1.3 dB
11 dB: 1.10 dB	11 dB: 1.5 dB
10 dB: 0.5 dB	10 dB: 0.5 dB
20 dB: 0.6 dB	20 dB: 0.6 dB
30 dB: 0.7 dB	30 dB: 0.7 dB
40 dB: 1.0 dB	40 dB: 1.0 dB
50 dB: 1.2 dB	50 dB: 1.2 dB
60 dB: 1.6 dB	60 dB: 1.6 dB
70 dB: 1.9 dB	70 dB: 1.9 dB
80 dB: 2.7 dB	80 dB: 2.7 dB
90 dB: 2.9 dB	90 dB: 2.9 dB

Key Literature & Web Link

For more information, visit our web site: **www.agilent.com/find/mta**

Ordering Information

Attenuators
84904K 0 to 11 dB, 1 dB steps, 26.5 GHz
84904L 0 to 11 dB, 1 dB steps, 40 GHz
84904M 0 to 11 dB, 1 dB steps, 50 GHz
84905M 0 to 60 dB, 10 dB steps, 50 GHz
84908M 0 to 65 dB, 5 dB steps, 50 GHz
84906K 0 to 90 dB, 10 dB steps, 26.5 GHz
84906L 0 to 90 dB, 10 dB steps, 40 GHz
84907K 0 to 70 dB, 10 dB steps, 26.5 GHz
84907L 0 to 70 dB, 10 dB steps, 40 GHz
- **84907L-006** Female 2.92-mm Connectors (L models only)
- **84907L-011** 5 Vdc Supply Voltage
- **84907L-015** 15 Vdc Supply Voltage
- **84907L-024** 24 Vdc Supply Voltage
- **84907L-100** Male 2.4-mm Connector (L models only)
- **84907L-104** Male 3.5-mm Connector (K models only)
- **84907L-106** Male 2.92-mm Connector (L models only)
- **84907L-UK6** Commercial Calibration Test Data with Certificate

Agilent 84904/5/8 M Attenuation Data Uncertainties

Attenuation (dB)	DC to 2 GHz	2 to 20 GHz	20 to 40 GHz	40 to 50 GHz
0	±0.0305	±0.0546	±0.1256	±0.1597
1 – 11	±0.0297	±0.0515	±0.1238	±0.1699
15	±0.0342	±0.0516	±0.1263	±0.1968
20	±0.0334	±0.0521	±0.1240	±0.1849
25	±0.0358	±0.0522	±0.1251	±0.1997
30	±0.0432	±0.0535	±0.1283	±0.2219
35	±0.0729	±0.1050	±0.2521	±0.3918
40	±0.0729	±0.1050	±0.2521	±0.3918
45	±0.0774	±0.1051	±0.2546	±0.4187
50	±0.0766	±0.1056	±0.2523	±0.4068
55	±0.0790	±0.1057	±0.2534	±0.4216
60	±0.0864	±0.1070	±0.2566	±0.4438
65	±0.1161	±0.1585	±0.3804	±0.6137

Attenuation Setting

Attenuation Accuracy (±–dB; referenced from 0 dB setting):

Model Number 84904M

Attenuator Setting (dB):	1	2	3	4	5	6	7	8	9	10	11
Frequency Range											
DC to 18 GHz	0.35	0.45	0.55	0.55	0.55	0.55	0.60	0.60	0.65	0.70	0.80
18 to 26.5 GHz	0.40	0.50	0.70	0.70	0.70	0.70	0.80	0.80	0.85	0.90	1.10
26.5 GHz to 40 GHz	0.60	0.60	0.80	0.80	0.80	0.90	1.10	1.10	1.20	1.30	1.50
40 to 50 GHz	0.60	0.70	0.80	0.80	0.80	0.90	1.10	1.10	1.20	1.30	1.50

Model Number 84905M

Attenuator Setting (dB):	10	20	30	40	50	60
DC to 40 GHz	0.5	0.6	0.7	1.0	1.2	1.6
40 to 50 GHz	0.7	0.8	1.0	1.3	1.5	1.8

Model Number 84908M

Attenuator Setting (dB):	5	10	15	20	25	30	35	40	45	50	55	60	65
DC to 40 GHz	0.5	0.5	0.6	0.6	0.7	0.7	1.0	1.0	1.2	1.2	1.6	1.6	1.8
40 to 50 GHz	0.7	0.7	0.8	0.8	1.0	1.0	1.3	1.3	1.5	1.5	1.8	1.8	2.0

Note: Step-to-step accuracy is the maximum variation from the nominal step size when changing attenuation values. It is a second specification on accuracy, and is used in combination with the absolute accuracy specifications to limit maximum allowable variation from nominal. Typical step-to-step accuracy for the 84905M and 84908M is ±1.0 dB to 50 GHz; for the 84904M is ±0.5 to 50 GHz.

Specifications

Maximum Insertion Loss	84904M	84905M	84908M
DC to 40 GHz (in dB 0 dB position, f = frequency in GHz)	(0.8 + 0.04*f)	(0.6 + 0.03*f)	(0.8 + 0.04*f)
40 to 50 GHz	3.0	2.6	3.0

Note: At 75°C, increase insertion loss by 0.006*f (where f = frequency in GHz).

SWR			
DC to 12.4 GHz	1.3	1.25	1.3
12.4 to 34 GHz	1.7	1.5	1.7
34 to 40 GHz	1.8	1.7	1.8
40 to 50 GHz	3.0	2.6	3.0

Attenuation Temperature Coefficient: Less than 0.0001 dB/dB/°C
Power Sensitivity: 0.001 dB/Watt
RF Input Power (Maximum): 1 Watt average, 50 Watts peak (10 microseconds max. pulse width)
Life (Minimum): 2 million cycles per section
Repeatability: 0.03 dB, typical
Environmental Capabilities: (Up to 2 million cycles)
Temperature, Operating: –20°C to +75°C
Temperature, Non-operating: –55°C to +85°C
Altitude, Operating: 4,570 meters (15,000 feet)
Altitude, Non-operating: 137,000 meters (50,000 feet)
Humidity: Cycling 10 days, 65°C at 95% RH
Shock, Operating: 10 Gs, 6 ms, on six sides, three blows
Shock, Non-operating: 500 Gs, 0.5 ms, in six directions
Vibration, Operating: 5 Gs, 34 to 500 Hz; 2 Gs, 500 to 2000 Hz

EMC: Radiated interference is within the requirements of MIL-STD-461 method RE02, VDE 0871 and CISPR Publication II

Mechanical Information

Net Weight
84904M: 291 grams (10.3 oz)
84905M: 229 grams (8.1 oz)
84908M: 291 grams (10.3 oz)

Mounting Position (any)

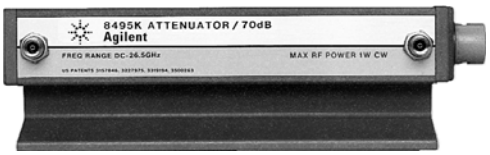
RF Connectors
2.4 mm female connectors (Option 101)
2.4 mm female and 2.4 mm male (Option 100)

Switching Speed
Maximum 20 milliseconds including settling time

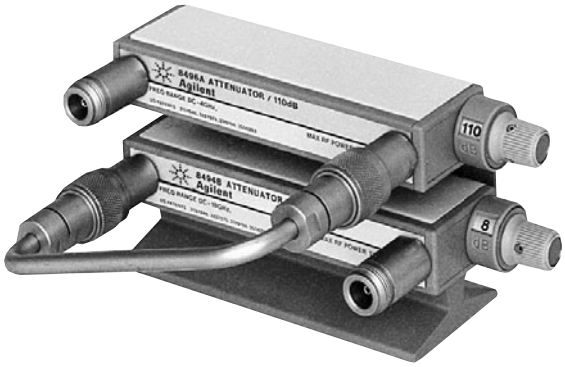
Solenoids	Coil Voltage	Switching Current	Nominal Coil Impedance
Option 024	24 V (20 to 30 V)	125 mA (at 24 V)	185 Ohms
Option 015	15 V (13 to 22 V)	188 mA (at 15 V)	80 Ohms
Option 011	5 V (4.5 to 7 V)	325 mA (at 5 V)	17 Ohms

Switching current is current per section; approximately 10 ms duration before internal contacts open the coil circuit

8495D



8495K



11716A

Programmable and Manual Step Attenuators DC – 26.5 GHz

8494A/B/G/H (0 to 11 dB, 1 dB steps)
8495A/B/D/G/H/K (0 to 70 dB, 10 dB steps)
8496A/B/G/H (0 to 110 dB, 10 dB steps)
8497K (0 to 90 dB, 10 dB steps)

The 8494/95/96/97 family of step attenuators offer fast, precise signal level control in three frequency ranges, DC to 4 GHz, DC to 18 GHz and DC to 26.5 GHz. They feature exceptional repeatability and reliability in a wide range of frequency, attenuation and connector options.

Attenuation repeatability is specified to be less than 0.03 dB (0.05 dB, 18 to 26.5 GHz) for 5 million cycles per section. This assures low measurement uncertainty and high user confidence when designed into automatic test systems. Electromechanical step attenuators offer low SWR, low insertion loss and high accuracy required by high-performance test and measurement equipment.

Precision plated leaf-spring contacts remove attenuator sections (miniature tantalum nitride thin-film T-pads on sapphire and alumina substrates) from the signal path. Unique process controls and material selection ensure unmatched life and contact repeatability.

Programmable Models

Miniature drive solenoids in the programmable models keep switching time, including settling, down to less than 20 milliseconds. Once switched, strong permanent magnets hold the solenoids (and attenuation value) in place. Current interrupts automatically disconnect solenoid current, simplifying driver circuit design and minimizing heat dissipation. Programming is done through a 12-pin Viking socket or optional ribbon cables with DIP plugs.

11716A/C Attenuator Interconnect Kits

Quickly and conveniently connect 1 dB step and 10 dB step attenuators together to achieve greater dynamic range with 1 dB steps. The 11716A/C interconnect kits contain a rigid RF cable, mounting bracket, and necessary hardware to connect any pair of 8494/95/96/97 attenuators in series (see photo above). Attenuators must be ordered separately.

Key Literature & Web Link

For more information, visit our web site: **www.agilent.com/find/mta**

Ordering Information

11716A Interconnect Kit (Type-N)
11716C Interconnect Kit (SMA)

8494/5/6/7 Series Specifications

Model (Switching Mode)	Frequency Range (GHz)	Attenuation Range (dB)	Maximum SWR	Insertion Loss @ 0 dB	Attenuation Accuracy	Power Rating, Minimum Life	Solenoid Voltage Speed Power	Size, Shipping Weight	Connector Options
8494A (Manual)	DC to 4	0 to 11 1 dB steps	1.5	0.6 dB + 0.09 dB/GHz	±0.2 dB: 1 to 2 dB ±0.3 dB: 3 to 6 dB ±0.4 dB: 7 to 10 dB ±0.5 dB: 11 dB	1 W avg. 100 W peak 10 µs max. 5 million cycles per section	—	73 mm W x 43 mm H x 159 mm D (2.9 in x 1.7 in x 6.2 in) 0.9 kg (2 lb)	001 002 003
8494G (Programmable)							20 to 30 V <20 ms 2.7 W	79 mm W x 43 mm H x 168 mm D (3.1 in x 1.7 in x 6.6 in) 0.9 kg (2 lb)	See Note 1
8494B (Manual)	DC to 18	0 to 11 1 dB steps	1.5 to 8 GHz 1.6 to 12.4 GHz 1.9 to 18 GHz	0.6 dB + 0.09 dB/GHz	**DC to 12.4 GHz** ±0.3 dB: 1 to 2 dB ±0.4 dB: 3 to 4 dB ±0.5 dB: 5 to 6 dB ±0.6 dB: 7 to 10 dB ±0.7 dB: 11 dB	1 W avg. 100 W peak 10 µs max. 5 million cycles per section	—	73 mm W x 43 mm H x 159 mm D (2.9 in x 1.7 in x 6.2 in) 0.9 kg (2 lb)	001 002 003 See Note 1
8494H (Programmable)					**12.4 to 18 GHz** ±0.7 dB: 1 to 5 dB ±0.8 dB: 6 to 9 dB ±0.9 dB: 10 to 11 dB		20 to 30 V <20 ms 2.7 W	79 mm W x 43 mm H x 168 mm D (3.1 in x 1.7 in x 6.6 in) 0.9 kg (2 lb)	
8495A (Manual)	DC to 4	0 to 70 10 dB steps	1.35	0.4 dB + 0.07 dB/GHz	Refer to technical data sheet*	1 W avg. 100 W peak 10 µs max. 5 million cycles per section	—	73 mm W x 43 mm H x 130 mm D (2.9 in x 1.7 in x 5.1 in) 0.9 kg (2 lb)	001 002 003
8495G (Programmable)							20 to 30 V <20 ms 2.7 W	79 mm W x 43 mm H x 141 mm D (3.1 in x 1.7 in x 5.5 in) 0.9 kg (2 lb)	See Note 1
8495B (Manual)	DC to 18	0 to 70 10 dB steps	1.35 to 8 GHz 1.5 to 12.4 GHz 1.7 to 18 GHz	0.4 dB + 0.07 dB/GHz	Refer to technical data sheet*	1 W avg. 100 W peak 10 µs max. 5 million cycles per section	—	73 mm W x 43 mm H x 130 mm D (2.9 in x 1.7 in x 5.1 in) 0.9 kg (2 lb)	001 002 003
8495H (Programmable)							20 to 30 V <20 ms 2.7 W	79 mm W x 43 mm H x 141 mm D (3.1 in x 1.7 in x 5.5 in) 0.9 kg (2 lb)	See Note 1
8495D (Manual)	DC to 26.5	0 to 70 10 dB steps	1.25 to 6 GHz 1.45 to 12.4 GHz 1.9 to 18.0 GHz 2.2 to 26.5 GHz	0.4 dB + 0.09 dB/GHz	Refer to technical data sheet*	1 W avg. 100 W peak 10 µs max. 5 million cycles per section	—	52 mm W x 43 mm H x 159 mm D (2.1 in x 1.7 in x 6.2 in) 0.9 kg (2 lb)	004 3.5 mm See Note 1
8495K (Programmable)							20 to 30 V <20 ms 2.7 W	52 mm W x 43 mm H x 168 mm D (2.1 in x 1.7 in x 6.6 in) 0.9 kg (2 lb)	
8496A (Manual)	DC to 4	0 to 110 10 dB steps	1.5	0.6 dB + 0.09 dB/GHz	Refer to technical data sheet*	1 W avg. 100 W peak 10 µs max. 5 million cycles per section	—	73 mm W x 43 mm H x 159 mm D (2.9 in x 1.7 in x 6.2 in) 0.9 kg (2 lb)	001 002 003
8496G (Programmable)							20 to 30 V <20 ms 2.7 W	79 mm W x 43 mm H x 168 mm D (3.1 in x 1.7 in x 6.6 in) 0.9 kg (2 lb)	See Note 1
8496B (Manual)	DC to 18	0 to 110 10 dB steps	1.5 to 8 GHz 1.6 to 12.4 GHz 1.9 to 18 GHz	0.6 dB + 0.09 dB/GHz	Refer to technical data sheet*	1 W avg. 100 W peak 10 µs max. 5 million cycles per section	—	73 mm W x 43 mm H x 159 mm D (2.9 in x 1.7 in x 6.2 in) 0.9 kg (2 lb)	001 002 003
8496H (Programmable)							20 to 30 V <20 ms 2.7 W	79 mm W x 43 mm H x 168 mm D (3.1 in x 1.7 in x 6.6 in) 0.9 kg (2 lb)	See Note 1
8497K (Programmable)	DC to 26.5	0 to 90 10 dB steps	1.25 to 6 GHz 1.45 to 12.4 GHz 1.6 to 18.0 GHz 1.8 to 26.5 GHz	0.4 dB + 0.09 dB/GHz	Refer to technical data sheet*	1 W avg. 100 W peak 10 µs max. 5 million cycles per section	5 V or 24 V	52 mm W x 43 mm H x 143 mm D (2.1 in x 1.7 in x 5.6 in) 0.9 kg (2 lb)	004 3.5 mm See Note 1

Note 1: 8494/5/6/7 orders must specify connector option. See ordering example.
Option 001 N(f)
Option 002 SMA(f)
Option 003 APC-7
Option 004 3.5 mm (8495D/K, 8497K only)
Option UK6 Commercial Calibration Test Data with Certificate

* **www.agilent.com/find/mta**

How to Order the 8494/5/6/7 Series Attenuators

Each order must include basic model number, suffix letter, and connector option.

Ordering example: 849**4** **A** Option **001**

4	**A**	**001**
4 (1 dB step, 11 dB max)	**A** (Manual, DC to 4 GHz)	**001** (N female)
5 (10 dB step, 70 dB max)	**B** (Manual, DC to 18 GHz)	**002** (SMA female)
6 (10 dB step, 110 dB max)	**D** (Manual, DC to 26.5 GHz)[1]	**003** (APC-7)
7 (10 dB step, 90 dB max)	**G** (Programmable, DC to 4 GHz)	**004** (3.5 mm female)[1]
	H (Programmable, DC to 18 GHz)	
	K (Programmable, DC to 26.5 GHz)[1]	

[1] Option 004 is only available on D and K models, other options not available on D/K models.

8490D

8493A/B/C Series

8490G

8498A High Power Attenuator

The 8498A Option 030 is designed to meet the needs of high-power attenuation applications in the RF and microwave frequency range. It is a 25-watt average, 30 dB fixed attenuator with a frequency of DC to 18 GHz. The maximum peak power specification is 500 watts (DC to 5.8 GHz) and 125 watts (5.8 to 18 GHz). Available only in a 30 dB version, the unit offers a 1.3 SWR and ±1 dB accuracy at 18 GHz. Large heat-dissipating fins keep the unit cool even under continuous maximum input power conditions.

8491A/B, 8493A/B/C Fixed Attenuators

Agilent coaxial fixed attenuators provide precise attenuation, flat frequency response, and low SWR over broad frequency ranges. Attenuators are available in nominal attenuations of 3 dB and 6 dB, as well as 10 dB increments from 10 dB to 60 dB. These attenuators are swept-frequency tested to ensure they meet specifications at all frequencies. Calibration points are provided on a nameplate chart attached to each unit.

8490D/G High-Frequency Fixed Attenuators

Agilent coaxial fixed attenuators have been the standard for accurate flat response and low SWR. The 8490D offers an exceptional performance to 50 GHz using 2.4 mm connectors and the 8490G to 67 GHz using 1.85 mm connectors. Attenuation values available are 3, 6, 10, 20, 30 and 40 dB. Ideally suited for extending the range of sensitive power meters, or for use as calibration standards, these broadband attenuators are manufactured with the same meticulous care as their lower frequency counterparts.

8490D/G, 8491A/B/C, 8492A, 8493A/B/C, 8498A Specifications

Model	Frequency Range (GHz)	SWR (max.)	Input Power (max.)		Attenuation Accuracy (±dB) 3 dB Opt 003	6 dB Opt 006	10 dB Opt 010	20 dB Opt 020	30 dB Opt 030	40 dB Opt 040	50 dB Opt 050	60 dB Opt 060	Connectors
8490D	DC to 50	DC to 26.5 GHz: 1.15 (1.08 Opt 040 only) 26.5 to 40 GHz: 1.25 (1.15 Opt 040 only) 40 to 50 GHz: 1.45 (1.25 Opt 040 only)	1 W avg. 100 W peak	DC to 26.5 26.5 to 50	+0.9 –0.5 +1.8 –0.5	+0.9 –0.6 +1.8 –0.6	+0.9 –0.6 +1.3 –0.6	+1.3 –0.8 +1.7 –0.8	+1.3 –0.8 +1.7 –0.8	+2.5 –1.8 +2.5 –1.8	—	—	— 2.4 mm
8490G	DC to 67	DC to 26.5 GHz: 1.15 (1.10 Opt 040 only) 26.5 to 50 GHz: 1.25 (1.15 Opt 040 only) 50 to 67 GHz: 1.45 (1.25 Opt 040 only)			±0.3	±0.3	±0.3	±0.3	±0.3	±0.6	—	—	1.85 mm
8491A 3 to 30 dB 40 to 60 dB	DC to 12.4	1.2 to 8 GHz[1] 1.3 to 12.4 GHz[1]	2 W avg. 100 W peak		0.3	0.3	0.5	0.5	1.0	1.5	1.5	2	N (m,f)
8491B 3 to 30 dB 40 to 60 dB	DC to 18	1.2 to 8 GHz[2] 1.3 to 12.4 GHz[2] 1.5 to 18 GHz[2]	2 W avg. 100 W peak		0.3	0.3 to 12.4 GHz 0.4 to 18 GHz	0.6	0.6 to 12.4 GHz 1.0 to 18 GHz	1.0	1.5	1.5	2	N (m,f)
8493A 3 to 20 dB 30 dB	DC to 12.4	1.2 to 8 GHz[1] 1.3 to 12.4 GHz[1]	2 W avg. 100 W peak		0.3	0.3	0.5	0.5	1.0	—	—	—	SMA (m,f)
8493B 3 to 20 dB 30 dB	DC to 18	1.2 to 8 GHz[2] 1.3 to 12.4 GHz[2] 1.5 to 18 GHz[2]	2 W avg. 100 W peak		0.3	0.3 to 12.4 GHz 0.4 to 18 GHz	0.6	0.6 to 12.4 GHz 1.0 to 18 GHz	1.0	—	—	—	SMA (m,f)
8493C 3 to 30 dB 40 dB	DC to 26.5	1.1 to 8 GHz 1.15 to 12.4 GHz 1.25 to 26.5 GHz[3]	2 W avg. 100 W peak		0.5 to 18 GHz 1.0 to 26.5 GHz	0.6 0.6	0.3 to 18 GHz 0.5 to 26.5 GHz	0.5 0.6	0.7 1	1.0 1.3	— —	— —	3.5 mm (m,f)
8498A 30 dB	DC to 18	1.15 to 8 GHz 1.25 to 12.4 GHz 1.30 to 18 GHz	25 W avg. 500 W peak (DC to 5.8 GHz) 125 W peak (5.8 to 18 GHz) 500 W/ms max. per pulse		—	—	—	—	1.0	—	—	—	N (m,f)

[1] For 3 dB, SWR is 1.25 to 8 GHz, 1.35 to 12.4 GHz. [2] For 3 dB, SWR is 1.25 to 8 GHz, 1.35 to 12.4 GHz and 1.5 to 18 GHz. [3] For 6 dB option, SWR is 1.27 at 12 GHz to 26.5 GHz.

11581A, 11582A Attenuator Sets

A set of four Agilent attenuators – 3, 6, 10, and 20 dB – are furnished in a handsome walnut accessory case. The 11581A set consists of 8491A attenuators and the 11582A of 8491B attenuators. These sets are ideal for calibration labs or where precise knowledge of attenuation and SWR is desired. Also includes commercial calibration certificate with test data.

Key Literature & Web Link

For more information, visit our web site: **www.agilent.com/find/mta**

Ordering Information

8491A, 8491B, 8493A, 8493B, 8493C, 8498A
Opt UK6 – Commercial Calibration Test Data with Certificate
11581A 3, 6, 10, 20 dB 8491A Set
11582A 3, 6, 10, 20 dB 8491B Set

N9355B
N9356B
N9355C
N9356C
N9355F

- **Maximum input power of 3 Watts**
- **Maximum insertion loss of 2.75 dB**
- **Minimum return loss of 15 dB (SWR of 1.43)**
- **Integrated DC block**
- **Bi-directional functionality**

N9355 & N9356 Series

N9355/56 Power Limiter Series

Agilent offers a series of industry-leading limiters, specifically designed to provide input protection for RF and microwave instruments and components used in telecommunication, component test, aerospace and defense industries. This product includes five unique designs with different frequency ranges and limiting thresholds. The N9355/56 series of high performance limiters will safe-guard your investments from damage due to excess RF power, DC transients and electro-static-discharge.

N9355B and N9356B Power Limiters

The Agilent N9355B and N9356B power limiters operate at frequency ranges from 10 MHz to 18 GHz with a limiting threshold of 10 and 25 dBm respectively. Both are furnished with a pair of premium quality male and female Type-N connectors.

N9355C & N9356C Power Limiters

The Agilent N9355C and N9356C wideband limiters operate from 10 MHz to 26.5 GHz with a limiting threshold of 10 and 25 dBm respectively. Both are furnished with a pair of premium quality male and female 3.5 mm connectors.

N9355F Power Limiter

The Agilent N9355F is an ultra-broadband limiter operating from 10 MHz to 50 GHz with a limiting threshold of 10 dBm. It is furnished with a pair of premium quality male and female 2.4 mm connectors.

Specifications

Model Number	N9355B	N9356B	N9355C	N9356C	N9355F
Frequency Range	0.01 to 18 GHz	0.01 to 18 GHz	0.01 to 26.5 GHz	0.01 to 26.5 GHz	0.01 to 50 GHz
Frequency Response Insertion Loss	<1.75 dB	<1.75 dB	<2 dB	<2.25 dB	0.01 to 26.5 GHz <2 dB 26.5 to 40 GHz <2.75 dB 40 to 50 GHz <3.5 dB
Return Loss (VSWR)>	15 dB[1]	15 dB[1]	15 dB[1]	15 dB[1]	10 dB[1]
Impedance	50 Ω nominal	50 Ω nominal	50 Ω nominal	50 Ω nominal	50 Ω nominal
Maximum Input Power Levels Continuous	1 W	6 W	1 W	4 W	0.63 W
Limiting Threshold	10 dBm typical	25 dBm typical	10 dBm typical	25 dBm typical	10 dBm typical
Max. Leakage Power[2]	24 dBm	27 dBm	24 dBm	27 dBm	24 dBm
Maximum DC Voltage **@25 °C** **@85 °C**	 30 V 16 V	 30 V 16 V	 30 V 16 V	 30 V 16 V	 30 V 16 V
Turn on Time	<100 ps	<100 ps	<100 ps	<100 ps	<100 ps
Connectors	Type-N	Type-N	3.5 mm	3.5 mm	2.4 mm

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

Key Literature & Web Link

For more information, visit our web site: **www.agilent.com/find/mta**

Ordering Information

N9355B 0.01 to 18 GHz Power Limiter, 10 dBm Limiting Threshold
N9355C 0.01 to 26.5 GHz Power Limiter, 10 dBm Limiting Threshold
N9356B 0.01 to 18 GHz Power Limiter, 25 dBm Limiting Threshold
N9356C 0.01 to 26.5 GHz Power Limiter, 25 dBm Limiting Threshold
N9355F 0.01 to 50 GHz Power Limiter, 10 dBm Limiting Threshold

N9398C
N9398F
N9398G
N9399C
N9399F

N9398C/F/G and N9399C/F

N9398/N9399 Series

The N9398C/F/G and N9399C/F DC blocks offer a new level of blocking with a broadband performance specified from 50 KHz right up to 67 GHz. They are designed to apply AC drive signals to a device while eliminating any DC voltage or current components, these DC blocks feature a broad frequency range, excellent return loss, very low insertion loss and excellent temperature stability.

Specifications

	N9398C	N9399C	N9398F	N9399F	N9398G
Frequency Range	50 KHz to 26.5 GHz	700 KHz to 26.5 GHz	50 KHz to 50 GHz	700 KHz to 50 GHz	700 KHz to 67 GHz
Insertion Loss	0.9 dB	1.2 dB	0.9 dB (50 KHz to 26.5 GHZ) 1.0 dB (26.5 to 50 GHz)	1.2 dB	0.9 dB (700 KHz to 26.5 GHz) 1.0 dB (26.5 to 67 GHz)
Return Loss	10 dB (50 to 300 KHz) 17 dB (300 KHz to 26.5 GHz)	10 dB (50 to 2 MHz) 17 dB (2 MHz to 26.5 GHz)	10 dB (50 to 300 KHz) 15 dB (300 KHz to 50 GHz)	10 dB (700 KHz to 2 MHz) 15 dB (2 MHz to 50 GHz)	10 dB (700 KHz to 2 MHz) 15 dB (2 MHz to 67 GHz)
Rise Time	3 ps (typical)	3 ps (typical)	2 ps (typical)	2 ps (typical)	2 ps (typical)
Group Delay	118 ps (typical)	118 ps (typical)	78 ps (typical)	78 ps (typical)	76 ps (typical)
Max DC Working Voltage	16 V	50 V	16 V	50 V	16 V
Connector Type	3.5 mm (m-f)	3.5 mm (m-f)	2.4 mm (m-f)	2.4 mm (m-f)	1.85 mm (m-f)

Key Literature & Web Link

For more information, visit our web site: **www.agilent.com/find/mta**

Ordering Information

N9398C DC Block, 16 V, 50 KHz to 26.5 GHz, 3.5 mm
N9399C DC Block, 50 V, 700 KHz to 26.5 GHz, 3.5 mm
N9398F DC Block, 16 V, 50 KHz to 50 GHz, 2.4 mm
N9399F DC Block, 16 V, 700 KHz to 50 GHz, 2.4 mm
N9398C DC Block, 16 V, 700 KHz to 67 GHz, 1.85 mm

8474 Series

8471D/E

83036C

Planar-Doped Barrier Detectors

8471D/E

The 8471D/E are economy detectors based on the Planar-Doped Barrier (PDB) diodes. The PDB diodes give them superior frequency response, square-law response, and temperature performance. The 8471D has a BNC (m) input connector and a frequency range of 100 kHz to 2 GHz, making it ideal for use in RF and low microwave applications. The 8471E has a SMA (m) input connector and a SMC (m) output connector. Its frequency range is 10 MHz to 12 GHz. Both models come with a negative polarity output, option 301; a positive polarity output can be specified as Option 103.

8473D

The 8473D detector was the first gallium arsenide PDB diode introduced. It features broadband performance and excellent flatness vs. frequency, along with superior temperature stability. The 8473D is available with a 3.5-mm (m) RF connector and a BNC (f) output connector.

High-Performance Planar-Doped Barrier Detectors

8474B/C/E

Utilizing a gallium arsenide PDB diode as the detecting element, these detectors offer superior performance when compared to earlier detector designs. They feature extremely flat frequency response over their entire band of operation (typically better than ±1 dB to 50 GHz) and very good frequency response stability versus temperature.

The 8474 detectors are available with BNC(f) (0.01 to 18 GHz), Type N (0.01 to 18 GHz), 3.5 mm (mates with SMA, 0.01 to 33 GHz), or 2.4 mm (0.01 to 50 GHz) connectors.

Broadband Directional Detector

83036C

The 83036C is a broadband microwave power sampler that operates in much the same way as a directional coupler and detector combination. It is composed of a resistive bridge and PDB diode that yields a very broadband device with excellent frequency response, superior temperature response and square-law response characteristics.

The maximum SWR is 1.7 above 50 MHz on both the input and output ports. Directivity of 14 dB matches that of most miniature couplers currently available. The maximum insertion loss is 2.2 dB.

Low-Barrier Schottky Diode Detectors

423B, 8470B, 8472B, 8473B/C

These Low-Barrier Schottky Diode (LBSD) detectors have been widely used for many years in a variety of applications including leveling and power sensing. They offer good performance and ruggedness. Matched pairs (Option 001) offer very good detector tracking. A video load option (Option 002) extends the square-law region to at least 0.1 mW(–10 dBm).

Key Literature

For more information, visit our web site: **www.agilent.com/find/mta**

Planar-Doped Barrier Diode Detectors Specifications

Model	Freq. Range (GHz)	Freq. Response (dB)	Max. SWR	Low-level Sensitivity	Max. Input (Peak or Average)	Short-term Max. Input (<1 min.)	Optimum Square-Law Load[2]	Positive/ Negative Polarity Output	Input/ Output Connector
8471D	0.0001 to 2	±0.2 to 1 GHz ±0.4 to 2 GHz	1.23 to 1 GHz 1.46 to 2 GHz	>0.5 mV/µW	100 mW	0.7 W	Opt. 102	Opt. 103 Opt. 301	BNC (m) BNC (f)
8471E	0.01 to 12	±0.23 to 4 GHz ±0.6 to 8 GHz ±0.85 to 12 GHz	1.2 to 4 GHz 1.7 to 8 GHz 2.4 to 12 GHz	>0.4 mV/µW	200 mW	0.75 W	No	Opt. 103 Opt. 301	SMA (m) SMC (m)
8473D	0.01 to 33	±0.25 to 14 GHz ±0.40 to 26.5 GHz ±1.25 to 33 GHz	1.2 to 14 GHz 1.36 to 26.5 GHz 2.96 to 33 GHz	>0.4 mV/µW	200 mW	1 W	No	Opt. 003 Opt. 301	3.5 mm (m) BNC (f)
8474B[1]	0.01 to 18	±0.35 to 18 GHz	1.3 to 18 GHz	>0.4 mV/µW	200 mW	0.75 W	Opt.102	Opt. 103 Opt. 301	Type N (m) BNC (f)
8474C[1]	0.01 to 33	±0.45 to 26.5 GHz ±0.70 to 33 GHz	1.4 to 26.5 GHz 2.2 to 33 GHz	>0.4 mV/µW	200 mW	0.75 W	No	Opt. 103 Opt. 301	3.5 mm (m) SMC (m)
8474E	0.01 to 50	±0.4 to 26.5 GHz ±0.6 to 40 GHz ±1.0 to 50 GHz	1.2 to 26.5 GHz 1.6 to 40 GHz 2.8 to 50 GHz	>0.4 mV/µW	200 mW	0.75 W	No	No	2.4 mm (m) SMC (m)

[1] Octave band options available (see Data Sheet).
[2] Defined as ±0.5 from ideal square law response.

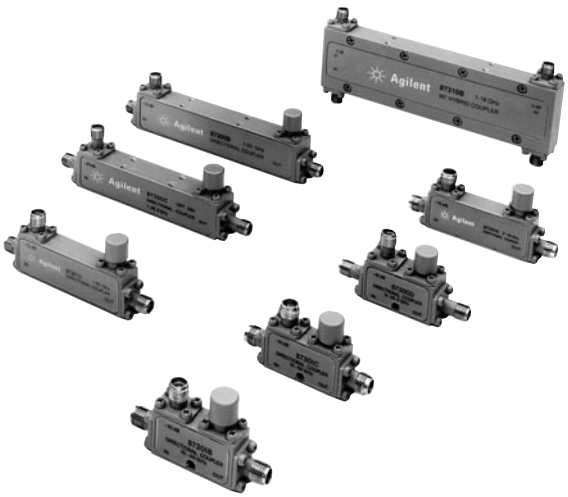
Broadband Directional Detector Specifications

Model	Freq. Range (GHz)	Freq. Response (dB)	Max. SWR Input/Output (50 Ω Nom.)	Max. Thru Line Loss (dB)	Low-level Sensitivity	Min. Directivity (dB)	Max. Input (Into 50 Ω Load) w/ 2:1 Source Match	Max. Input (Into Open) w/ 2:1 Source Match	Input/ Output Connector
83036C	0.01 to 26.5	±1.0	1.7	2.2	18 mV/µW	14	32 dBm	21 dBm	3.5 mm (f)

Low-Barrier Schottky Diode Detectors Specifications

Model	Freq. Range (GHz)	Freq. Response (dB)	Max. SWR (50 Ω Nom.)	Low-level Sensitivity (mV/µW)	Max. Input (Peak or Average)	Short-term Max. Input (<1 min.)	Matched Response Opt. 001[2]	Optimum Square-law Load[1]	Positive/ Negative Polarity Output	Input/ 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 (typical)	±0.2 dB to 12.4 GHz	Opt. 002	Opt. 003 Opt. 301	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 (typical)	±0.2 dB to 12.4 GHz ±0.3 to 18 GHz	Opt. 002	Opt. 003 Opt. 301	APC-7 BNC (f) N (m) BNC (f)
8472B	0.01 to 18	±0.3 to 12.4 GHz ±0.5 to 15 GHz ±0.6 to 18 GHz	1.15 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 (typical)	±0.2 dB to 12.4 GHz ±0.3 to 18 GHz	Opt. 002	Opt. 003 Opt. 301	SMA (m) BNC (f) SMA (m) OSSM (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 (typical)	±0.2 dB to 12.4 GHz ±0.3 to 18 GHz	Opt. 002	Opt. 003 Opt. 301	3.5 mm (m) BNC (f)
8473C	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 4 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 (typical)	±0.2 dB to 12.4 GHz ±0.3 to 18 GHz ±0.5 to 26.5 GHz	Opt. 002	Opt. 003 Opt. 301	3.5 mm (m) BNC (f)

[1] Defined as ±0.5 from ideal square law response.
[2] Option 001 provides two matched detectors.



87300B/C/D, 87301B/C/D/E, 87310B

87300 Series Directional Couplers

This line of compact, broadband directional couplers is ideal for signal monitoring, or when combined with a coaxial detector, for signal leveling. Available in a variety of frequency ranges, they can be matched to specific applications. The Agilent 8474 series coaxial detectors are recommended if output detection is desired. The 87300B is supplied with SMA (f) connectors, the 87300C/D has 3.5-mm (f) connectors, and the 87301D has 2.4-mm (f) standard or optional 2.92-mm (f) connectors.

87310B Hybrid Coupler

87310B is a 3 dB hybrid coupler, intended for applications requiring a 90 degree phase difference between output ports. In that sense, it is different from typical power dividers and power splitters, which have matched signal phase at their output ports. The 87310B features SMA (f) connectors.

87300 Series Specifications

Model	Freq. Range (GHz)	Nominal Coupling & (dB) Variation	Directivity (dB)	Max. SWR	Insertion Loss (dB)
87300B	1 to 20	10 ± 0.5	>16	1.35	<1.5
87300C	1 to 26.5	10 ± 1	>14 to 12.4 GHz >12 to 26.5 GHz	1.35 to 12.4 1.5 to 26.5	<1.2 to 12.4 <1.7 to 26.5
87300D	6 to 26.5	10 ± 0.5	>13	1.4	<1.3
87301B	10 to 46	10 ± 0.7	>10	1.8	<1.9
87301C	10 to 50	10 ± 0.7	>10	1.8	<1.9
87301D	1 to 40	13 ± 1	>14 to 20 >10 to 40	1.5 to 20 1.7 to 40	<1.2 to 20 <1.9 to 40
87310B	1 to 18	3 ± 0.5	—	1.35	<2.0
87301E	2 to 50	10 ± 1	>13 to 26.5 >10 to 50	1.5 to 26.5 1.8 to 50	<2.0

773D Directional Coupler and 772D Dual-Directional Coupler

The 772D and 773D are high-performance couplers designed for broadband swept measurements in the 2 to 18 GHz range. The 773D is ideal for leveling broadband sources when used with an 8474B detector. (See also the 83036C directional detector.) For reflectometer applications, the 772D is the best coupler to use with power sensors and power meters. Forward and reverse power measurements on transmitters, components or other broadband systems are made simpler using the 772D. The broadband design allows the use of a single test setup and calibration for tests spanning the entire 2 to 18 GHz frequency range.

772D and 773D

775D to 779D Dual-Directional Couplers

The economical 775D-778D couplers cover octave frequency spreads of more than 2:1, each centered on one of the important VHF/UHF bands. With their high directivity and mean coupling accuracy of ±0.5 dB, these are ideal couplers in reflectometer applications. The close tracking of the auxiliary arms makes these couplers particularly useful for reflectometers. Power ratings are 50 W average, 500 W peak.

772-779D, 11691D, 11692D Specifications

Model	Freq. Range (GHz)	Nominal Coupling (dB)	Max. Coupling Variation (dB)	Min. Directivity (dB)	SWR Primary Line Max. (50 Ω Nom.)
772D	2 to 18	20	±1.0	2 to 12.4: 30 12.4 to 18: 27	2 to 12.4: 1.28 12.4 to 18: 1.4
773D	2 to 18	20	±1.0	2 to 12.4: 30 12.4 to 18: 27	1.21 1.27
775D[1]	0.45 to 0.94	20	±1	40	1.15
776D[1]	0.94 to 1.9	20	±1	40	1.15
777D	1.9 to 4	20	±0.4	30	1.2
778D	0.1 to 2	20	±1.5	0.1 to 1 GHz: 36[2] 1 to 2 GHz: 32[2]	1.1
779D	1.7 to 12.4	20	±0.75	1.7 to 4 GHz: 30 4 to 12.4 GHz: 26	1.2
11691D	2 to 18	20	±1.0	2 to 8 GHz: 30[4] (supplies only at 8 GHz to 15 GHz) 8 to 18 GHz: 26[3]	1.3 1.5
11692D	2 to 18	20	±1 incident to test port	2 to 8 GHz: 30[5] 8 to 18 GHz: 26[3]	2 to 12.4 GHz: 1.3 12.4 to 18 GHz: 1.4

[1] Maximum auxiliary arm tracking: 0.3 dB for 776D; 0.5 dB for 777D.
[2] 30 dB, 0.1 to 2 GHz, input port.
[3] 24 dB with Type-N connector on the test port (11692D) or on the input port (11691D).
[4] Directivity at input port.
[5] Directivity at test port; at input port directivity is 21 dB; 2 to 18 GHz.

87302C, 87303C, and 87304C Hybrid Power Dividers

The 87302C, 87303C, and 87304C power dividers are compact, hybrid microwave couplers designed for power splitting applications that require minimal insertion loss and high isolation.

The 87302C covers the entire 0.5 to 26.5 GHz frequency range with a maximum insertion loss of 1.9 dB. The 87303C and 87304C cover the frequency range of 1 to 26.5 GHz and 2 to 26.5 GHz with an even lower insertion loss of 1.6 dB and 1.4 dB, respectively. These hybrid power dividers are excellent for any application requiring low loss power division. They typically exhibit an insertion loss that is 1 to 2 dB lower than an equivalent resistive power divider.

Model	Freq. Range (GHz)	Band Segments	Insertion Loss (dB)	Isolation (dB)
87302C	0.5 to 26.5	0.5 to 18 GHz 18 to 26 GHz	1.5 1.9	19 19
87303C	1.0 to 26.5	1.0 to 18 GHz 18 to 26.5 GHz	1.2 1.6	19 21
87304C	2.0 to 26.5	2.0 to 18 GHz 18 to 26.5 GHz	1.1 1.4	19 18

Power Rating: 10 W, CW (2:1 maximum SWR)
Connectors: 3.5 mm (f), SMA compatible