

Agilent RF & Microwave Switches

Performance you can count on

The advertisement features a central graphic of a circuit board with a cluster of white circles of varying sizes. Two circular callouts highlight different switch types: 'Solid state switches' in the upper right and 'Electromechanical switches' in the lower left. The background is a gradient of blue and green.

Solid state switches

Electromechanical switches

Key Features

- High reliability and exceptional repeatability ensure excellent measurement accuracy
- Excellent RF specifications optimize your test system measurement capability
- Broad selection of switches provides configuration flexibility for various applications

Agilent RF & Microwave Switches

Agilent switches are designed with high accuracy and repeatability for automated test and measurement, signal monitoring and routing applications. These switches provide excellent performance with a wide variety in configurations to meet all your switching requirements:

Bypass switches insert or remove a test component from a signal path.

SPDT switches route signals from input to two output paths.

Multiport switches allow a single input and multiple (three or more) output paths.

Transfer switches can be used to switch between two inputs and two outputs, as a drop-out switch, for signal reversal, as a SPDT switch, or to bypass a test component.

Matrix switches can be individually connected via internal microwave switches to form an RF path. They can be configured for blocking 1 x 5, 2 x 4, or 3 x 3 switching applications.

Applications

Electromechanical switches and solid state switches are widely used in both basic signal routing and application-specific switch matrices such as tree matrix, full access matrix, bypassing an active device, multi-source/multi-DUT switching etc.

Did you know that Agilent electromechanical switches¹ offer.....

- A typical switching life that is two times the guaranteed specifications. For example, the specified switching life for 87106A is 5 million cycles, but in actuality the 87106A can typically work up to more than 10 million cycles.
- Guaranteed insertion loss repeatability of 0.03 dB up to 5 million cycles. This is made possible in Agilent switches with a unique “wiping action” mechanism in the contact area.
- Maximum input power of 100 W at 4 GHz at 25 °C under cold switching conditions, which means the RF signal is removed before switching is performed. Cold switching results in lower contact stress and longer life.

1. Applies to all Agilent SP4T, SP6T, transfer and matrix switches except 876xK/M.

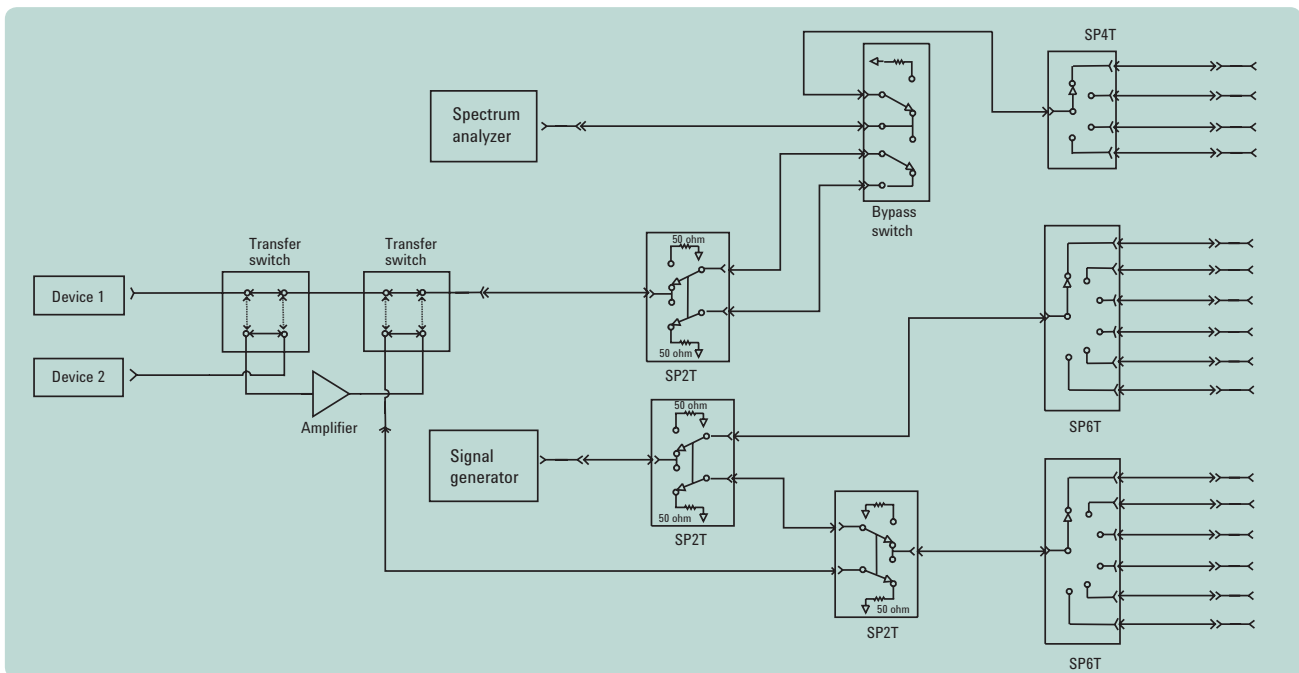


Figure 1. Agilent switches can be used in many different configurations.

Electromechanical switches

Agilent electromechanical switches are available in many different configurations with operating life up to 10 million cycles. With a guaranteed insertion loss repeatability of 0.03 dB up to 5 million cycles these switches ensure accurate system measurements and reduce calibration intervals. Unmatched isolation, typically > 90 dB at 4 GHz, reduces sources of random errors. TTL drive option is available for most switches.

| Agilent model number | Frequency | Terminated (T)/ Unterminated (U) | Guaranteed operating life (n million cycle) | Repeatability (dB) | Min isolation (dB) | Max insertion loss (dB) | Max SWR | RF connectors |
|---|----------------|-------------------------------------|--|-----------------------|------------------------|----------------------------|---------|----------------------|
| Bypass switch (4-port) | | | | | | | | |
| 8763A | DC to 4 GHz | T | 1 | 0.03 | 100 | 0.25 | 1.20 | SMA (f) |
| 8763B | DC to 18 GHz | T | 1 | 0.03 | 90 | 0.50 | 1.30 | SMA (f) |
| 8763C | DC to 26.5 GHz | T | 1 | 0.50 | 50 | 1.25 | 1.80 | 3.5 mm (f) |
| N1811TL | DC to 26.5 GHz | T | 5 | 0.03 | 60 | 0.80 | 1.60 | SMA (f) |
| Bypass switch (5-port) | | | | | | | | |
| 8764A | DC to 4 GHz | U | 1 | 0.03 | 100 | 0.25 | 1.20 | SMA (f) |
| 8764B | DC to 18 GHz | U | 1 | 0.03 | 90 | 0.50 | 1.30 | SMA (f) |
| 8764C | DC to 26.5 GHz | U | 1 | 0.50 | 50 | 1.25 | 1.80 | 3.5 mm (f) |
| N1812UL | DC to 26.5 GHz | U | 5 | 0.03 | 60 | 0.80 | 1.60 | SMA (f) |
| Single-pole double-throw (SPDT) switch | | | | | | | | |
| 8762A | DC to 4 GHz | T | 1 | 0.03 | 100 | 0.25 | 1.20 | SMA (f) |
| 8762F ¹ | DC to 4 GHz | T | 1 | 0.03 | 100 | 0.40 | 1.30 | Mini SMB (m) |
| 8765A | DC to 4 GHz | U | 5 | 0.03 | 101 | 0.30 | 1.20 | SMA (f) |
| 8765F ¹ | DC to 4 GHz | U | 5 | 0.03 | 90 | 0.40 | 1.20 | Mini SMB (m) |
| 8761A | DC to 18 GHz | U | 1 | 0.03 | 45 | 0.80 | 1.35 | SMA (f) ² |
| 8761B | DC to 18 GHz | U | 1 | 0.03 | 45 | 0.80 | 1.35 | SMA (f) ² |
| 8762B | DC to 18 GHz | T | 1 | 0.03 | 90 | 0.50 | 1.30 | SMA (f) |
| 8765B | DC to 20 GHz | U | 5 | 0.03 | 65 | 0.70 | 1.70 | SMA (f) |
| 8762C | DC to 26.5 GHz | T | 1 | 0.50 | 50 | 1.25 | 1.80 | 3.5 mm (f) |
| 8765C | DC to 26.5 GHz | U | 5 | 0.03 | 50 | 0.97 | 1.70 | 3.5 mm (f) |
| N1810UL | DC to 26.5 GHz | U | 5 | 0.03 | 60 | 0.80 | 1.60 | SMA (f) |
| N1810TL | DC to 26.5 GHz | T | 5 | 0.03 | 60 | 0.80 | 1.60 | SMA (f) |
| 8765D | DC to 40 GHz | U | 5 | 0.03 | 50 | 1.67 | 1.50 | 2.4 mm (f) |
| Single-pole triple-throw (SP3T) switch | | | | | | | | |
| 8766K | DC to 26.5 GHz | U | 5 | 0.05 | Isolation ³ | 3.43 | 1.80 | 3.5 mm (f) |
| Single-pole four-throw (SP4T) switch | | | | | | | | |
| 87104A | DC to 4 GHz | T | 5 | 0.03 | 100 | 0.36 | 1.20 | SMA (f) |
| 87204A | DC to 4 GHz | T | 5 | 0.03 | 100 | 0.36 | 1.20 | SMA (f) |
| L7104A | DC to 4 GHz | T | 2 | 0.03 | 90 | 0.36 | 1.20 | SMA (f) |
| L7204A | DC to 4 GHz | U | 2 | 0.03 | 90 | 0.36 | 1.20 | SMA (f) |
| 87104B | DC to 20 GHz | T | 5 | 0.03 | 70 | 0.60 | 1.70 | SMA (f) |
| 87204B | DC to 20 GHz | T | 5 | 0.03 | 70 | 0.60 | 1.70 | SMA (f) |
| L7104B | DC to 20 GHz | T | 2 | 0.03 | 65 | 0.60 | 1.70 | SMA (f) |
| L7204B | DC to 20 GHz | U | 2 | 0.03 | 65 | 0.60 | 1.70 | SMA (f) |
| 87104C | DC to 26.5 GHz | T | 5 | 0.03 | 65 | 0.70 | 1.70 | SMA (f) |
| 87204C | DC to 26.5 GHz | T | 5 | 0.03 | 65 | 0.70 | 1.70 | SMA (f) |
| L7104C | DC to 26.5 GHz | T | 2 | 0.03 | 60 | 0.70 | 1.70 | SMA (f) |
| L7204C | DC to 26.5 GHz | U | 2 | 0.03 | 60 | 0.70 | 1.70 | SMA (f) |
| 8767K ⁴ | DC to 26.5 GHz | U | 5 | 0.05 | Isolation ³ | 3.43 | 1.80 | 3.5 mm (f) |
| 8767M ⁴ | DC to 50 GHz | U | 5 | 0.03 | 45 | 2.60 | 2.30 | 2.4 mm (f/m) |
| Single-pole five-throw (SP5T) switch | | | | | | | | |
| 8768K ⁴ | DC to 26.5 GHz | U | 5 | 0.05 | Isolation ³ | 3.43 | 1.80 | 3.5 mm (f) |
| 8768M ⁴ | DC to 50 GHz | U | 5 | 0.05 | 45 | 2.60 | 2.30 | 2.4 mm (f/m) |
| Single-pole six-throw (SP6T) switch | | | | | | | | |
| 87106A | DC to 4 GHz | T | 5 | 0.03 | 100 | 0.36 | 1.20 | SMA (f) |
| 87206A | DC to 4 GHz | T | 5 | 0.03 | 100 | 0.36 | 1.20 | SMA (f) |
| L7106A | DC to 4 GHz | T | 2 | 0.03 | 90 | 0.36 | 1.20 | SMA (f) |
| L7206A | DC to 4 GHz | U | 2 | 0.03 | 90 | 0.36 | 1.20 | SMA (f) |
| 87106B | DC to 20 GHz | T | 5 | 0.03 | 70 | 0.60 | 1.70 | SMA (f) |
| 87206B | DC to 20 GHz | T | 5 | 0.03 | 70 | 0.60 | 1.70 | SMA (f) |
| L7106B | DC to 20 GHz | T | 2 | 0.03 | 65 | 0.60 | 1.70 | SMA (f) |
| L7206B | DC to 20 GHz | U | 2 | 0.03 | 65 | 0.60 | 1.70 | SMA (f) |
| 87106C | DC to 26.5 GHz | T | 5 | 0.03 | 65 | 0.70 | 1.70 | SMA (f) |
| 87206C | DC to 26.5 GHz | T | 5 | 0.03 | 65 | 0.70 | 1.70 | SMA (f) |
| L7106C | DC to 26.5 GHz | T | 2 | 0.03 | 60 | 0.70 | 1.70 | SMA (f) |
| L7206C | DC to 26.5 GHz | U | 2 | 0.03 | 60 | 0.70 | 1.70 | SMA (f) |
| 8769K ⁴ | DC to 26.5 GHz | U | 5 | 0.05 | Isolation ³ | 3.43 | 2.05 | 3.5 mm (f) |
| 8769M ⁴ | DC to 50 GHz | U | 5 | 0.03 | 45 | 2.60 | 2.30 | 2.4 mm (f/m) |
| Double-pole double-throw (transfer) switch | | | | | | | | |
| 87222C | DC to 26.5 GHz | U | 5 | 0.03 | 67 | 0.86 | 1.65 | SMA (f) |
| L7222C | DC to 26.5 GHz | U | 2 | 0.03 | 57 | 0.86 | 1.65 | SMA (f) |
| 87222D | DC to 40 GHz | U | 5 | 0.03 | 60 | 1.20 | 1.70 | 2.92 mm (f) |
| 87222E | DC to 50 GHz | U | 5 | 0.05 | 60 | 1.15 | 1.70 | 2.4 mm (f) |
| Matrix switch [3x3, 2x4 & 1x5] | | | | | | | | |
| 87406B | DC to 20 GHz | T | 5 | 0.03 | 70 | 1.00 | 1.90 | SMA (f) |
| 87606B | DC to 20 GHz | T | 5 | 0.03 | 70 | 1.00 | 1.90 | SMA (f) |

1. 75 ohm impedance

2. Only applicable when all ports have the same connector type. Connector options available: Type-N (m/f) / APC-7 / UT-250 Coax / SMA (m/f) / 50 ohm termination

3. Varies with frequency and port selected

4. Insertion loss stated is from common port to the furthest port

New products launched after January 2007

Solid state switches

Agilent solid state switches provide fast throughput in manufacturing with an industry-leading settling time and are designed with exceptionally high isolation, to minimize cross talk. Agilent solid state switches are based on two technologies, FET and PIN diode, which each have their own distinct characteristics.

Agilent FET solid state switches are broadband switches which operates from kHz to GHz and have low video leakage, typically < 10 mVpp. This feature can prevent possible damage to sensitive devices such as RFIC components.

Agilent PIN diode solid state switches provide excellent switching speed for applications in ultra-fast automated test systems.

| Agilent model number | Frequency (GHz) | FET/PIN-diode | Min Isolation (dB) | Max insertion loss (dB) port (dB) | Max return loss for OFF port (dB) | Max return loss for ON port (dB) | Return loss for COM | Typical settling time | Video leakage (typ) |
|---|------------------|---------------|--------------------|-----------------------------------|-----------------------------------|----------------------------------|---------------------|-----------------------|---------------------|
| Single-pole double-throw (SPDT) switch | | | | | | | | | |
| U9397A | 300 kHz - 8 GHz | FET | 100 | 3.5 | 18 | 15 | 15 | 5 μ s | 10 mVpp |
| U9397C | 300 kHz - 18 GHz | FET | 90 | 6.5 | 13 | 10 | 10 | 5 μ s | 10 mVpp |
| P9402A | 100 MHz - 8 GHz | PIN-diode | 80 | 3.2 | 15 | 15 | 15 | 380 ns | 2.7 Vpp |
| P9402C | 100 MHz - 18 GHz | PIN-diode | 80 | 4 | 10 | 10 | 10 | 380 ns | 2.7 Vpp |
| 85331B | 45 MHz - 50 GHz | PIN-diode | 75 | 15.5 @ 26.5 GHz | 6 | 4.5 | 4 | 1 μ s | 0.8 Vpp |
| Single-pole four-throw (SP4T) switch | | | | | | | | | |
| P9404A | 100 MHz - 8 GHz | PIN-diode | 80 | 3.5 | 15 | 15 | 15 | 450 ns | 2.7 Vpp |
| P9404C | 100 MHz - 18 GHz | PIN-diode | 80 | 4.5 | 10 | 10 | 10 | 450 ns | 2.7 Vpp |
| 85332B | 45 MHz - 50 GHz | PIN-diode | 75 | 15.5 @ 26.5 GHz | 6 | 4.5 | 4 | 1 μ s | 0.8 Vpp |

Note: All solid state switches come with SMA(f) connectors except 85331/2B with 2.4 mm (f).

New products launched after January 2007

Related Products

11713A/B/C attenuator/switch driver

34980A multifunction switch/measurement unit

L4445A microwave switch/attenuator driver

Related Literatures

How operating life and repeatability of Agilent's electromechanical switches minimize system uncertainty, literature number 5989-6085EN

Power Handling Capability of Electromechanical Switches, literature number 5989-6032EN

How to Drive the Agilent Microwave Matrix and Transfer Switch via the E8483A Microwave Switch, literature number 5988-2893EN

Video Leakage and Why you should be concern about it, literature number 5989-6086EN

Selecting the right switch technology for your application, literature number 5989-5189EN

Web Resources

For more information on Agilent Test Accessories
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Printed in USA, July 26, 2007
5989-6947EN



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