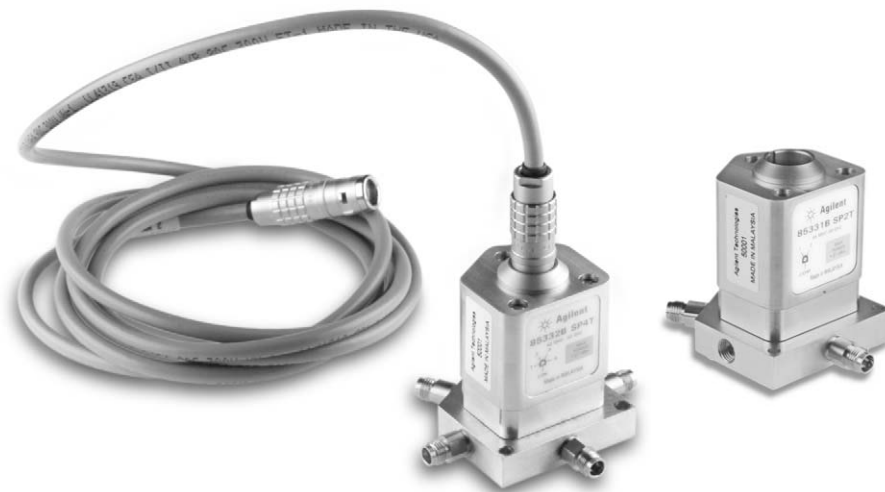
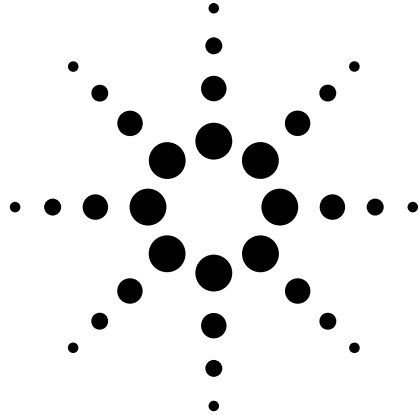


Agilent 85331B/85332B Solid State Switches

85331B SP2T 45 MHz to 50 GHz

85332B SP4T 45 MHz to 50 GHz

Technical Overview



Key Features

- Maximizes your operating frequency range from 45 MHz up to 50 GHz
- Minimizes cross-talk with a high port-to-port isolation of above 90 dB
- Increases your switching speed, typically less than 1 μ s, suitable for high speed applications



Agilent Technologies

Description

The Agilent 85331B and 85332B are absorptive PIN diode solid state switches which provide superior performance in terms of high isolation and fast switching speed across a broad operating frequency range. The absorptive solid state switches are designed for high frequency, single- SP2T/SP4T operation and are extremely useful for applications in instrumentation, communications, radar, and many other test systems that require high speed RF & microwave switching.

The absorptive characteristic of the switches, provide a good impedance match, which is key to achieving accurate measurements.

Each output port has a PIN diode in series. The DC bias is used to turn on and off the pin diode depending on which port to select. There are some PIN diodes that shunt to ground in RF path, to improve the isolation of the switches.

Applications

Figure 1 shows a typical configuration with the PIN switches connected to the source antenna and antenna under test.

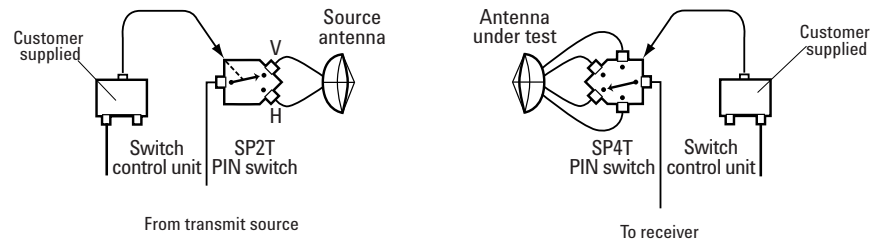


Figure 1. A typical multiple-channel, multiple frequency system configuration

Far-field antenna measurements

These products are ideally suited for antennas with multiple test ports, or applications that require measuring the co- and cross-polarization. One PIN switch can switch transmit polarization, and a second PIN switch can switch between the separate test ports of the antenna. With this technique, the co- and cross-polarization response of each test port can be measured in one rotation of the antenna.

Near-field antenna measurements

For near-field applications, both the co- and cross-polarized response of an antenna can be measured at multiple frequencies in a single scan across the antenna. For the dual polarized response, a PIN switch can be used to rapidly switch between the two probe polarizations.

Radar cross-section measurements

For Radar cross-section (RCS) applications, the ability to rapidly switch transmit and receive polarization allows full polarimetric RCS measurements to be made quickly and easily.

Complex switch configurations

Complex PIN switch trees with multiple outputs can be easily configured. Figure 2 shows conceptually how multiple PIN switches can be configured. Configurations such as these are used in making phased-array antenna measurements.

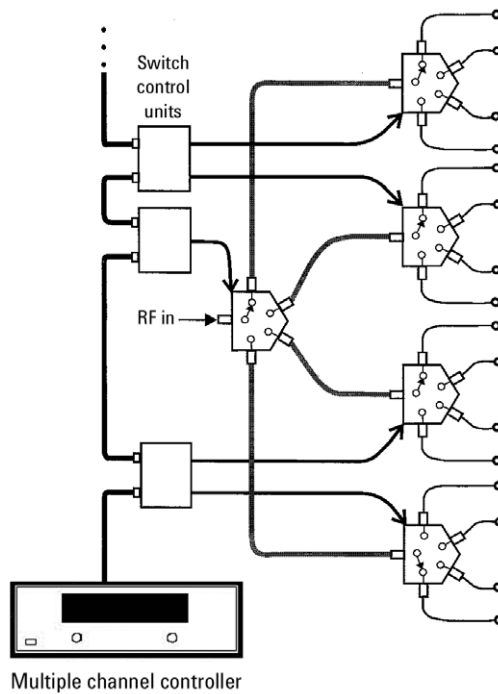


Figure 2. Example of a 1P16T switch configuration constructed from modular components

Specifications

Specifications refer to the performance standards or limits against which the PIN diode switches are tested.

Typical characteristics are included for additional information only and they are not specifications. These are denoted as "typical", "nominal" or "approximate".

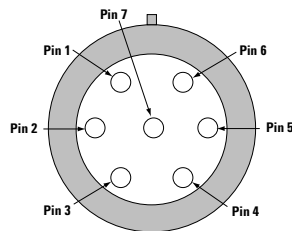
Table 1. 85331/32B specifications

| 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 | -2.0 | -85 | -19.0 | -10.0 | -10.0 |
| | 0.5 to 18 | -4.5 | -90 | -19.0 | -10.0 | -10.0 |
| | 18 to 26.5 | -6.0 | -90 | -12.5 | -6.0 | -5.5 |
| | 26.5 to 40 | -10.0 | -85 | -10.0 | -6.0 | -4.5 |
| | 40 to 50 | -15.5 | -75 | -6.0 | -4.5 | -4.0 |
| 85332B SP4T | 0.045 to 0.5 | -2.0 | -85 | -19.0 | -9.0 | -10.0 |
| | 0.5 to 18 | -4.5 | -90 | -19.0 | -9.0 | -10.0 |
| | 18 to 26.5 | -7.0 | -90 | -12.5 | -5.0 | -5.5 |
| | 26.5 to 40 | -12.0 | -85 | -10.0 | -4.5 | -4.0 |
| | 40 to 50 | -21.5 ¹ -15.5 ² | -75 | -6.0 | -4.5 | -4.0 |

Typical switching speed: less than 1 μ s. (The switch module can switch from one port to another in less than 1 μ s.)

Table 2. Absolute maximum rating for 85331/32 B solid state switches

| | Min | Nominal | Max | Unit |
|-----------------------------------|-------|---------|-------|------|
| RF input power (average) | | | +27 | dBm |
| Vdc bias turn on a port | -6.65 | -7 | -7.35 | V |
| Current drawn for On port | | 40 | | mA |
| Vdc bias turn off a port | 5.98 | 6.3 | 6.62 | V |
| Current drawn for Off port | | 120 | | mA |



Pin 1 = Port 1 on/off bias
 Pin 2 = Port 2 on/off bias
 Pin 3 = Port 3 on/off bias (not connected for 85331B)
 Pin 4 = Port 4 on/off bias (not connected for 85331B)
 Pin 5 = Common/ground (0VDC)
 Pins 6, 7 = Not connected

Figure 3. Bias connector pin locations

1. COM port-to-port 1 & 4.
 2. COM port-to-port 2 & 3.

Environmental Specifications

The 85331/32B switches are designed to fully comply with Agilent Technologies' product operating environment specifications. The following summarizes the environmental specifications for these products.

Temperature:

| | |
|-----------|---|
| Operating | –20 °C to 55 °C |
| Storage | –40 °C to 70 °C |
| Cycling | –45 °C to 70°C, 10 cycles @ 20 °C per minute, 20 minutes dwell time per MIL-STD-833F, Method 1010.8, Condition C (modified) |

Humidity:

| | |
|-----------|---|
| Operating | 5% to 95% at to +40 °C or less (non condensing) |
| Storage | 5% to 95% at to +65 °C or less (non condensing) |

Shock:

| | |
|---------------------|--|
| Half-sine, smoothed | 100 G @ 6 ms, 3 shock pulses per orientation |
|---------------------|--|

Vibration:

| | |
|------------------|--|
| Broadband random | 50 to 2000 Hz, 7.0 G rms, 15 minutes, per MIL-STD-833F, Method 2026-1 (modified) |
|------------------|--|

Altitude:

| | |
|-----------|-------------------------------|
| Operating | < 4,600 meters (15,000 feet) |
| Storage | < 15,300 meters (50,000 feet) |

ESD Immunity:

| | |
|-------------------|--|
| Contact discharge | 15 kV (to outer conductor) per IEC 61000-4-2 |
| Air discharge | 6 kV (to center pin) per IEC 61000-4-2 |

Mechanical Dimensions

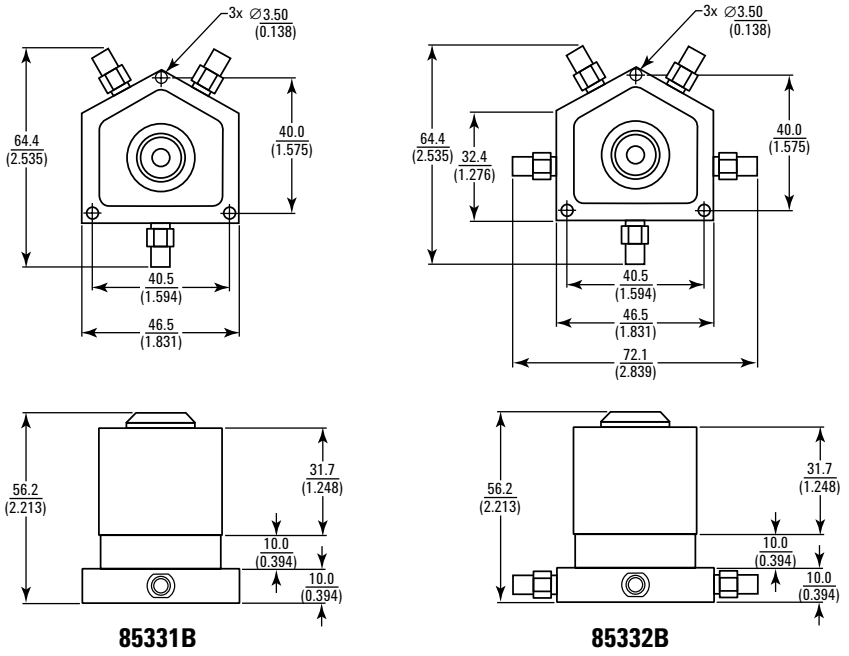


Figure 4. Product mechanical outline

Dimensions are in mm (inches) nominal, unless otherwise specified.

Size and Weight

57 mm (2.24") x 65 mm (2.56mm) x 73 mm (2.88mm) 0.36 kg (0.79 lbs)

Typical Performance 85331B

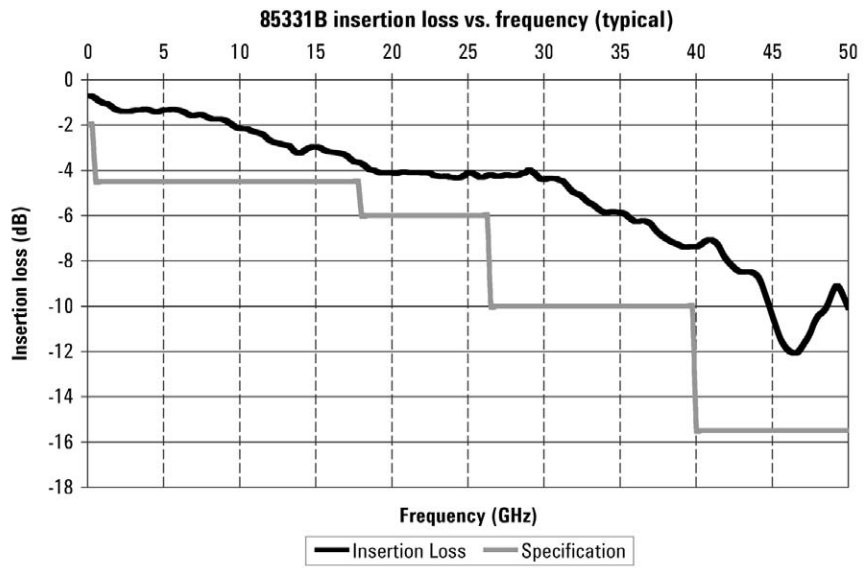


Figure 5. 85331B insertion loss vs. frequency (typical)

Typical Performance

85331B *(continued)*

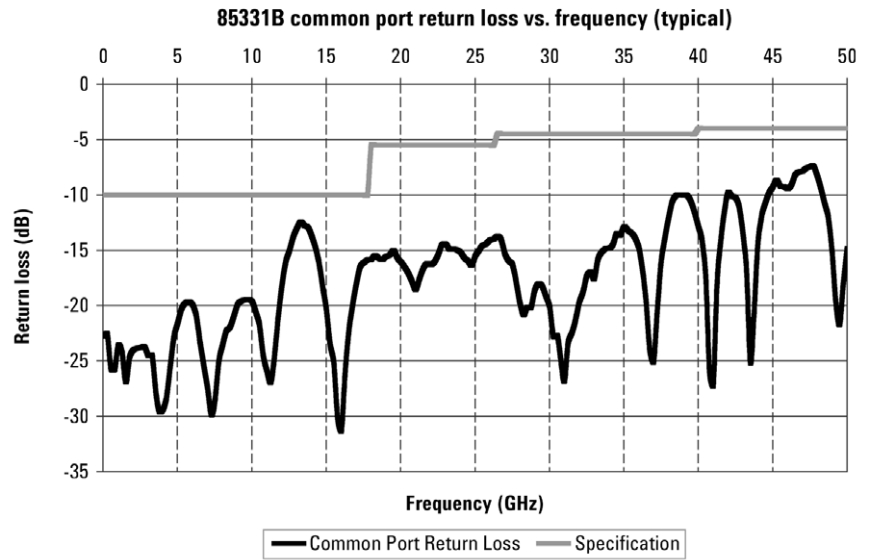


Figure 6. 85331B common port return loss vs. frequency (typical)

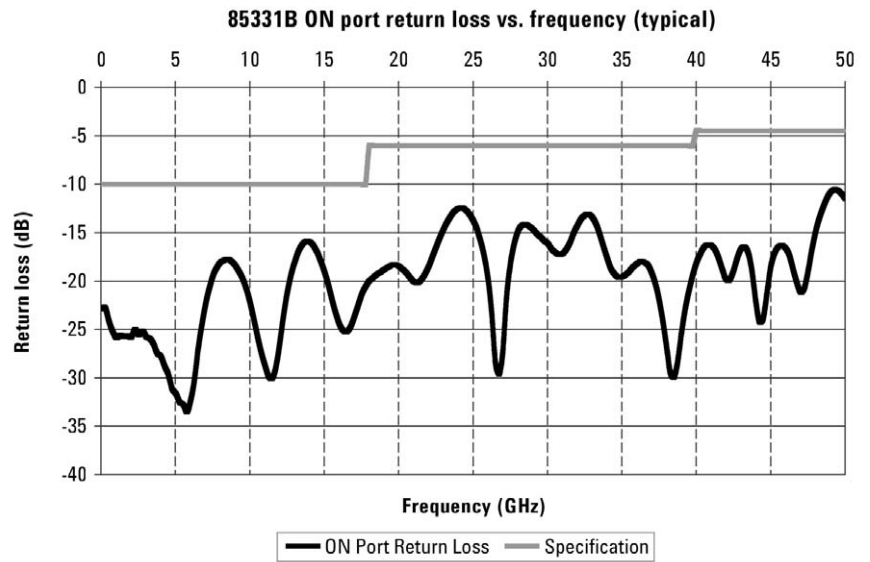


Figure 7. 85331B ON port return loss vs. frequency (typical)

Typical Performance

85331B (continued)

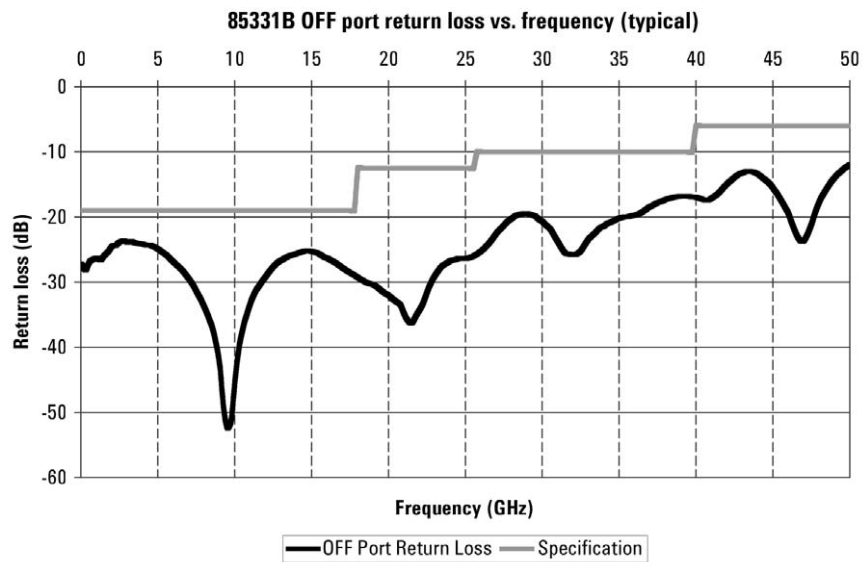


Figure 8. 85331B OFF port return loss vs. frequency (typical)

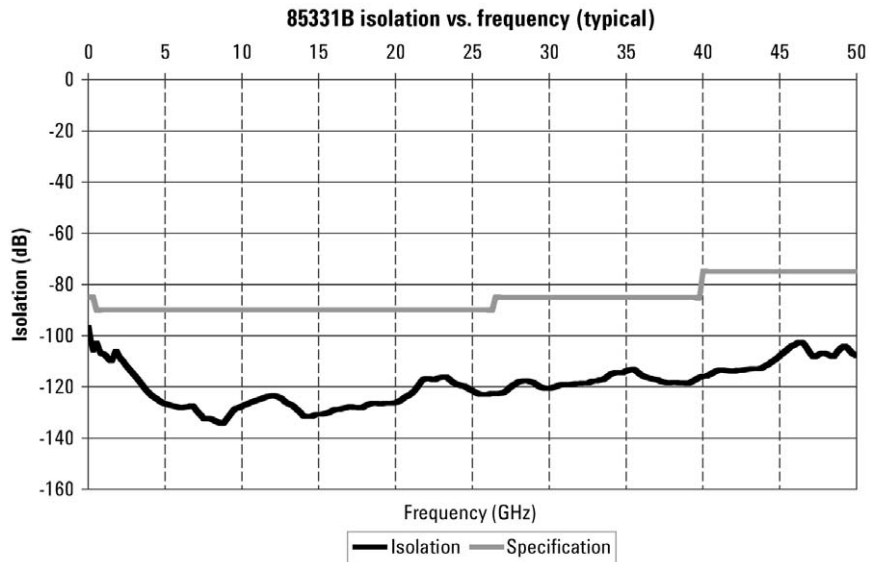


Figure 9. 85331B isolation vs. frequency (typical)

Typical Performance 85332B

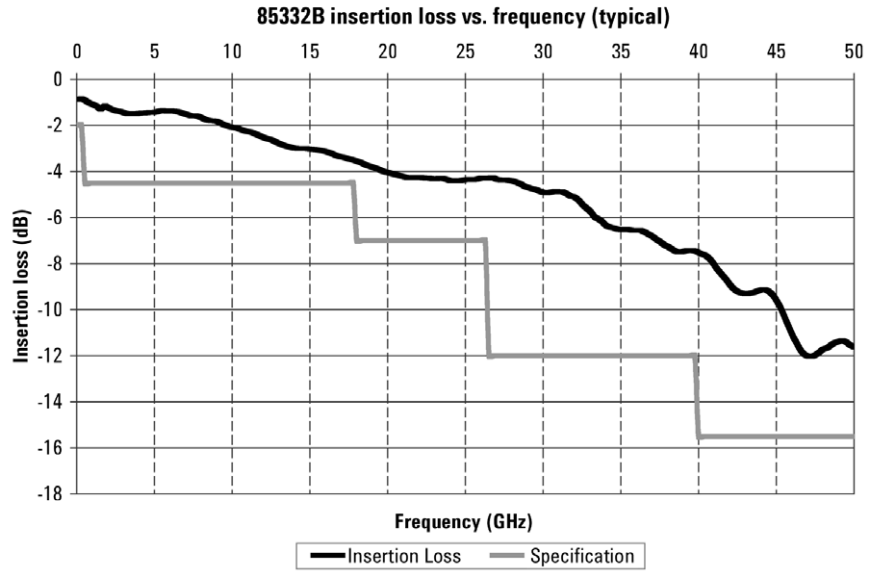


Figure 10. 85332B insertion loss vs. frequency (typical)

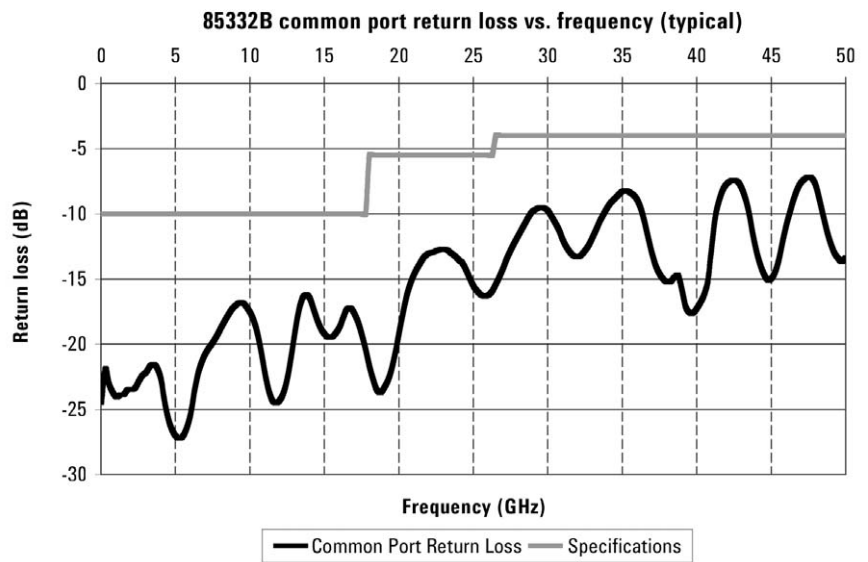


Figure 11. 85332B common port return loss vs. frequency (typical)

Typical Performance

85332B *(continued)*

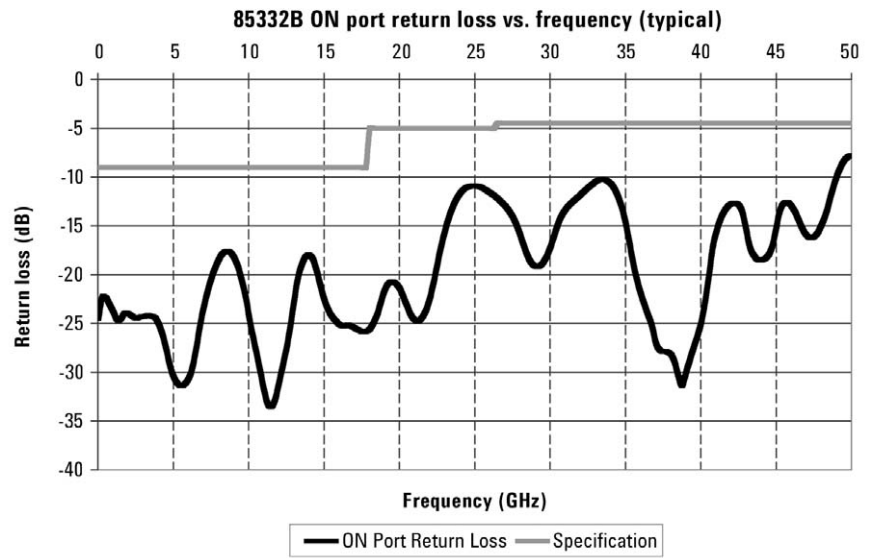


Figure 12. 85332B ON port return loss vs. frequency (typical)

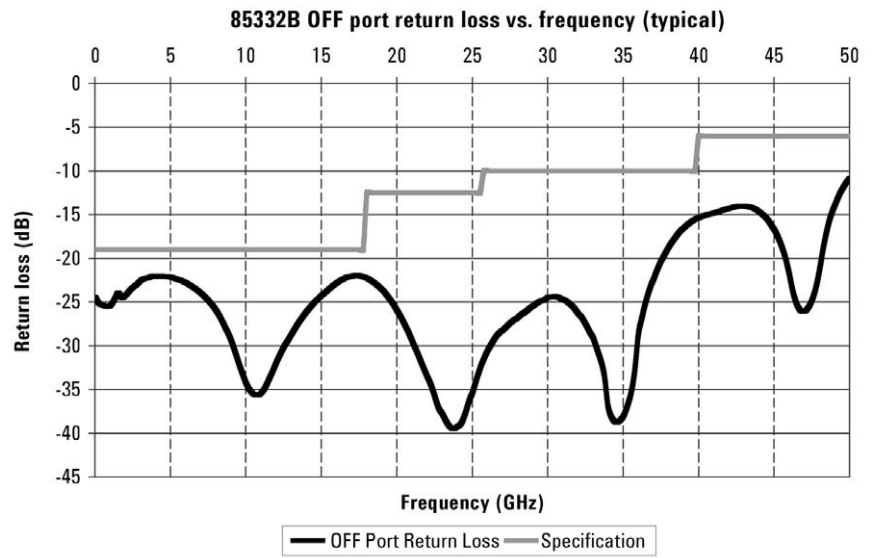


Figure 13. 85332B OFF port return loss vs. frequency (typical)

Typical Performance

85332B (continued)

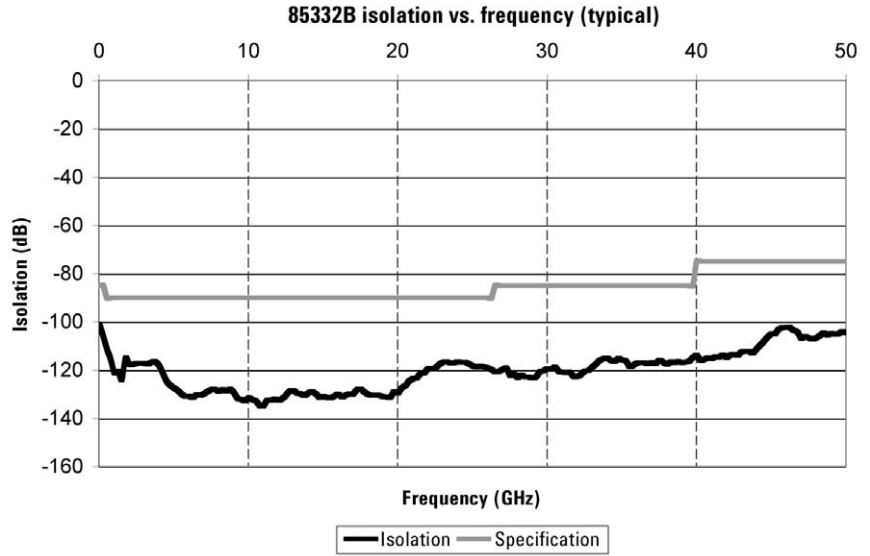


Figure 14. 85332B isolation vs. frequency (typical)

Ordering Information

| | |
|----------------|---|
| 85331B | SP2T 45 MHz to 50 GHz solid state switch |
| Options | |
| 85331B-001 | Switch control cable - 1 meter |
| 85331B-002 | Switch control cable - 2 meter |
| 85331B-005 | Switch control cable - 5 meter |
| 85331B-010 | Switch control cable - 10 meter |
| 85331B-015 | Switch control cable - 15 meter |
| 85332B | SP4T 45 MHz to 50 GHz solid state switch |
| Options | |
| 85332B-001 | Switch control cable - 1 meter |
| 85332B-002 | Switch control cable - 2 meter |
| 85332B-005 | Switch control cable - 5 meter |
| 85332B-010 | Switch control cable - 10 meter |
| 85332B-015 | Switch control cable - 15 meter |

Web Resource

<http://www.agilent.com/find/mta>

Related Literature

N9397A/C Solid State Switches, Flyer, literature number 5989-3729EN
N9397A/C Solid State Switches, Technical Overview, literature number 5989-4031EN
Solid State Switches, Application Note, literature number 5989-5189EN
Agilent Antenna Test, Selection Guide, literature number 5968-6759E



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