# Keysight Technologies
# RF & Microwave Attenuators

Performance you can count on

KEYSIGHT TECHNOLOGIES

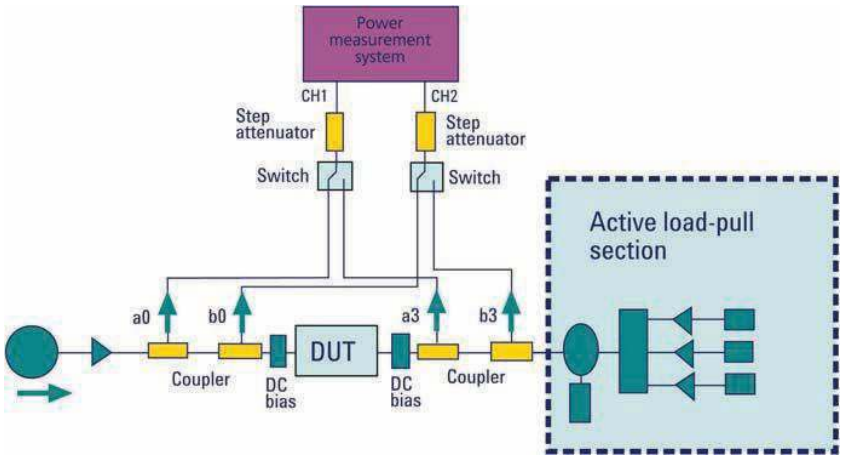
## Key Features

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

# Keysight RF & Microwave Attenuators

Keysight Technologies, Inc. coaxial fixed and step attenuators are designed for use in a wide variety of signal conditioning and level control applications. Attenuators are generally used to reduce signal levels, improve matching impedances of sources and loads, and measure the gain or loss of two-port devices.

**Applications**




## Coaxial Fixed Attenuators

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

### Coaxial Fixed Attenuators

| | | Attenuation Accuracy | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model number | Frequency | 3 dB | 6 dB | 10 dB | 20 dB | 30 dB | 40 dB | 50 dB | 60 dB | Maximum SWR | Maximum input average power (W) | Maximum input peak power (W) | RF connectors |
| 8491A | DC to 12.4 GHz | 0.3 | 0.3 | 0.5 | 0.5 | 1.0 | 1.5 | 1.5 | 2.0 | 1.30 | 2 | 100 | N (m,f) |
| 8493A | DC to 12.4 GHz | 0.3 | 0.3 | 0.5 | 0.5 | 1.0 | - | - | - | 1.30 | 2 | 100 | SMA (m,f) |
| 8491B | DC to 18 GHz | 0.3 | 0.4 | 0.6 | 1.0 | 1.0 | 1.5 | 1.5 | 2.0 | 1.50 | 2 | 100 | N (m,f) |
| 8493B | DC to 18 GHz | 0.3 | 0.4 | 0.6 | 1.0 | 1.0 | - | - | - | 1.50 | 2 | 100 | SMA (m,f) |
| 8498A | DC to 18 GHz | - | - | - | - | 1.0 | - | - | - | 1.30 | 25 | 125 | N (m,f) |
| 8493C | DC to 26.5 GHz | 1.0 | 0.6 | 0.5 | 0.6 | 1.0 | 1.3 | - | - | 1.25 | 2 | 100 | 3.5 mm (m,f) |
| 8490D | DC to 50 GHz | 1.8 | 1.8 | 1.3 | 1.7 | 1.7 | 2.5 | - | - | 1.45 | 1 | 100 | 2.4 mm (m,f) |
| 8490G | DC to 67 GHz | 1.8 | 1.8 | 1.3 | 1.7 | 1.7 | 2.5 | - | - | 1.45 | 1 | 100 | 1.95 mm |

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

## Manual Step Attenuators

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

| Manual Step Attenuators | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Model number | Frequency | Attenuation range (dB) | Attenuation step (dB) | Insertion loss (dB) at 0 dB | Maximum SWR | Maximum input average power (W) | Maximum input peak power (W) | Operating life (n million cycles/ section) | Repeatability (dB) |
| 8494A | DC to 4 GHz | 0 to 11 | 1 | 0.96 | 1.50 | 1 | 100 | 5 | ± 0.03 dB max |
| 8495A | DC to 4 GHz | 0 to 70 | 10 | 0.68 | 1.35 | 1 | 100 | 5 | ± 0.03 dB max |
| 8496A | DC to 4 GHz | 0 to 110 | 10 | 0.96 | 1.50 | 1 | 100 | 5 | ± 0.03 dB max |
| 8494B | DC to 18 GHz | 0 to 11 | 1 | 2.22 | 1.90 | 1 | 100 | 5 | ± 0.03 dB max |
| 8495B | DC to 18 GHz | 0 to 70 | 10 | 1.66 | 1.70 | 1 | 100 | 5 | ± 0.03 dB max |
| 8496B | DC to 18 GHz | 0 to 110 | 10 | 2.22 | 1.90 | 1 | 100 | 5 | ± 0.03 dB max |
| 8495D | DC to 26.5 GHz | 0 to 70 | 10 | 3.95 | 2.20 | 1 | 100 | 5 | ± 0.03 dB max to 18 GHz, ± 0.05 dB max to 26.5 GHz |

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

## Programmable Step Attenuators

Keysight programmable step attenuators offer fast, precise signal-level control up to 50 GHz, with switching time of less than 20 ms. Unmatched attenuation repeatability of less than 0.03 dB up to 5 million cycles per section ensures low measurement uncertainty and reduces calibration cycles when installed into test systems. Automatic GPIB/USB/LAN drive control is achieved with the 11713B/C attenuator/switch driver.

**Programmable Step Attenuators**

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

## Interconnect Kits

11716A Type-N interconnect kit
11716C SMA interconnect kit
11716D 2.9 mm interconnect kit
11716E 3.5 mm interconnect kit
11716F 2.4 mm interconnect kit

11716A/C/D/E/F interconnect kits can be used to connect any two of the Keysight 8494/95/96, 84904/8M, 84904/6L, or 84904/6K attenuators in series to achieve broader attenuation ranges with 1 dB attenuation step.

| Attenuator | Interconnection Kit |
|---|---|
| 8494x, 8495x, 8496x | 11716A/C |
| 84904L, 84906L, Option 006, 106 | 11716D |
| 84904L, 84906L, Option 101, 100 | 11716F |
| 84904K, 84906K | 11716E |

## Interconnect Kits continued

| Attenuator type | Frequency range | Attenuator 1 | Attenuator 2 | Attentuation range | Attenuntion step |
|---|---|---|---|---|---|
| Manual | DC to 4 GHz | 8494A | 8495A | 81 | 1 |
| Manual | DC to 4 GHz | 8494A | 8496A | 121 | 1 |
| Manual | DC to 18 GHz | 8494B | 8495B | 84 | 1 |
| Manual | DC to 18 GHz | 8494B | 8496B | 121 | 1 |
| Programmable | DC to 4 GHz | 8494G | 8495G | 81 | 1 |
| Programmable | DC to 4 GHz | 8494G | 8496G | 121 | 1 |
| Programmable | DC to 18 GHz | 8494H | 8495H | 81 | 1 |

## Attenuator Sets

Sets of four coaxial fixed attenuators with attenuations of 3, 6, 10 and 20 dB are provided in a walnut accessory case. These sets are ideal for calibration labs or where precise knowledge of attenuation and SWR is desired.

| Attenuator sets | Coaxial fixed attenuator model number | Attenuation |
|---|---|---|
| 11581A | 8491A | 3, 6, 10 and 20 dB |
| 11582A | 8491B | 3, 6, 10 and 20 dB |
| 11853C | 8493C | 3, 6, 10 and 20 dB |

## Related Products

11713A/B/C attenuator/switch driver
34980A multifunction switch/measurement unit
L4445A microwave switch/attenuator driver

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