



## ULTRAMINIATURE BROADBAND ATTENUATOR RELAYS



| SERIES | RELAY TYPE                         |
|--------|------------------------------------|
| A152   | Attenuator Relay series, DC- 5 GHz |

### DESCRIPTION

The Series A152 highly repeatable ultraminiature attenuator relays are designed for attenuating RF signals in 50-ohm systems over a frequency range from DC to 5 GHz. Their low profile and small grid spacing makes them ideal for use when packaging density is a prime consideration. The A152 relays eliminate the need for additional external resistors/attenuators.

These single section, switchable attenuator relays have an internal matched thin film attenuator pad in a "Pi" configuration. Relays are available in a fixed increment of 20 dB.

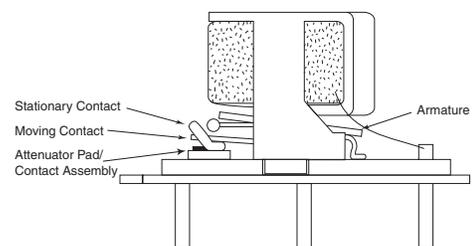
### The A152 feature:

- Unique uni-frame motor design which provides high magnetic efficiency and mechanical rigidity.
- Minimum mass components and welded construction for maximum resistance to shock and vibration.
- Advanced cleaning techniques which assures internal cleanliness.
- Gold plated, precious metal contacts, which provide excellent intermodulation performance.
- Flat amplitude vs. frequency response.
- High isolation between control and signal path.
- Stable attenuation vs. temperature.
- Excellent phase linearity.
- Highly resistant to ESD.

Patent No. 5,315,273

| ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS |                           |
|---|---------------------------|
| Temperature (Ambient)                     | -65°C to +125°C           |
| Vibration (Note 1)                        | 10 g's to 2000 Hz         |
| Shock (Note 1)                            | 30 g's,<br>6 ms half sine |
| Enclosure                                 | Hermetically sealed       |
| Weight                                    | 0.11 oz. (3.12g) max.     |

### INTERNAL CONSTRUCTION



**GENERAL ELECTRICAL SPECIFICATIONS (-65°C to +125°C unless otherwise noted)(Notes 2 & 3)**

|                              |   |   |
|------------------------------|---|---|
| <b>Contact Life Ratings</b>  | 10,000,000 cycles (typical) at low level          |   |
| <b>Operate Time (Note 8)</b> | <b>Max.</b>                                       | 4.0 ms max. at nominal rated coil voltage |
|                              | <b>Typ.</b>                                       | 2.0 ms max. at nominal rated coil voltage |
| <b>Insulation Resistance</b> | 1,000 MΩ min. between mutually isolated terminals |   |
| <b>Dielectric Strength</b>   | 350 (Vrms/60 Hz) @ atmospheric pressure           |   |

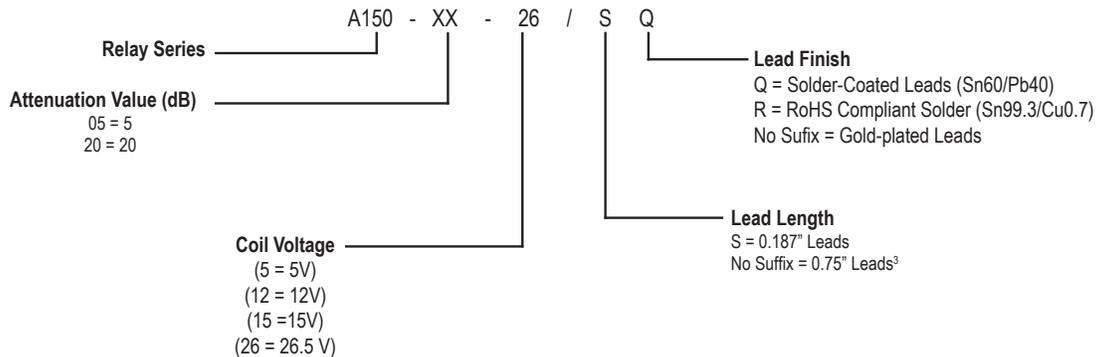
**DETAILED ELECTRICAL SPECIFICATIONS (-65°C to +125°C unless otherwise noted)(Note 3)**

| <b>BASE PART NUMBERS (A152)</b>    |             | <b>A152-dB-5</b> | <b>A152-dB-12</b> | <b>A152-dB-15</b> | <b>A152-dB-26</b> |
|------------------------------------|-------------|------------------|-------------------|-------------------|-------------------|
| <b>Coil Voltage (Vdc)</b>          | <b>Nom.</b> | 5.0              | 12.0              | 15                | 26.5              |
|                                    | <b>Max.</b> | 5.8              | 16.0              | 20.0              | 32.0              |
| <b>Coil Resistance (Ohms ±20%)</b> |             | 50               | 390               | 610               | 1,560             |
| <b>Pick-Up Voltage (Vdc, Max.)</b> |             | 3.8              | 9.0               | 11.3              | 18.0              |

**GENERAL PERFORMANCE (-55°C to +85°C)**

| <b>PARAMETER</b>                 | <b>MINIMUM</b> | <b>TYPICAL</b> | <b>MAXIMUM</b> |
|----------------------------------|----------------|----------------|----------------|
| <b>Operating Frequency (GHz)</b> | 0.0            | -              | 5.0            |
| <b>Power (W) (Notes 5 and 6)</b> | -              | -              | 1.0            |
| <b>Impedance (Ω)</b>             | -              | 50             | -              |

**Part Numbering System (Notes 11 & 12)**



**NOTES:**

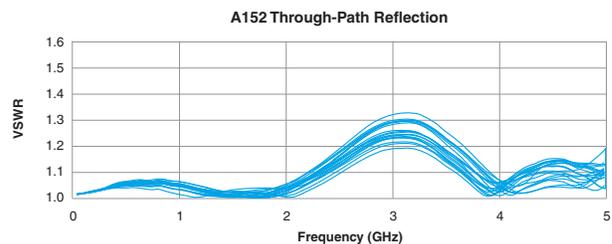
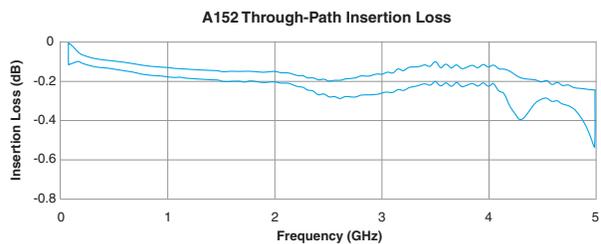
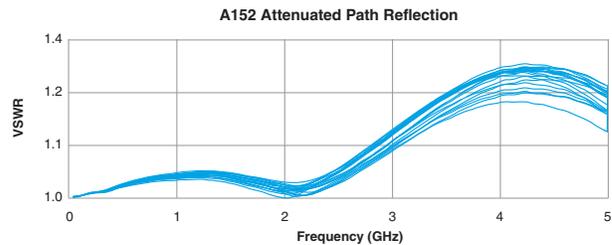
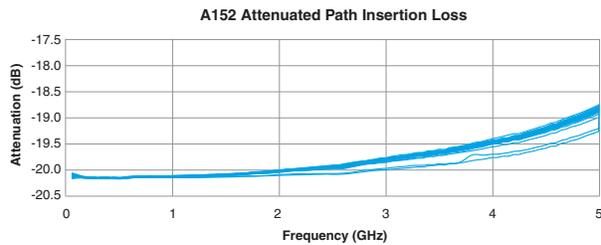
- Contacts will exhibit no contact chatter in excess of 10 μs or transfer in excess of 1 μs.
- "Typical" characteristics are based on available data and are best estimates. No on-going verification tests are performed.
- Unless otherwise specified, parameters are initial values.
- Relays may be operated at higher frequencies with reduced RF performance.
- For optimal RF performance, solder case to RF ground plane.
- Attenuation values shown are with reference to the through path (low loss state).
- Power handling for case temperatures of -55°C to +55°C is 1 Watt. Derate power handling 25 mW/°C above +55°C. Case measurement point is adjacent to the relay tab.
- Do not operate coil at maximum coil voltage continuously.
- Insert attenuation value, see part numbering system.
- Switching time includes bounce.
- The slash and characters appearing after the slash are not marked on the relay.
- Unless otherwise specified, relays will be supplied with gold-plated.

**RF Performance (-55°C to +85°C)**

| BASE PART NUMBERS (RF180)     | RANGE      | TYPICAL   | MAXIMUM |
|-------------------------------|------------|-----------|---------|
| <b>Insertion Loss (dB)</b>    | DC - 1 GHz | 0.1       | 0.25    |
|                               | 1 - 2 GHz  | 0.2       | 0.35    |
|                               | 2 - 3 GHz  | 0.3       | 0.055   |
|                               | 3-5 GHz    | See Graph |         |
| <b>VSWR (Through Path)</b>    | DC - 1 GHz | 1.10      | 1.20    |
|                               | 1 - 2 GHz  | 1.20      | 1.25    |
|                               | 2 - 3 GHz  | 1.25      | 1.30    |
|                               | 3-5 GHz    | See Graph |         |
| <b>VSWR (Attenuated Path)</b> | DC - 1 GHz | 1.20      | 1.25    |
|                               | 1 - 2 GHz  | 1.30      | 1.35    |
|                               | 2 - 3 GHz  | 1.40      | 1.45    |
|                               | 3-5 GHz    | See Graph |         |

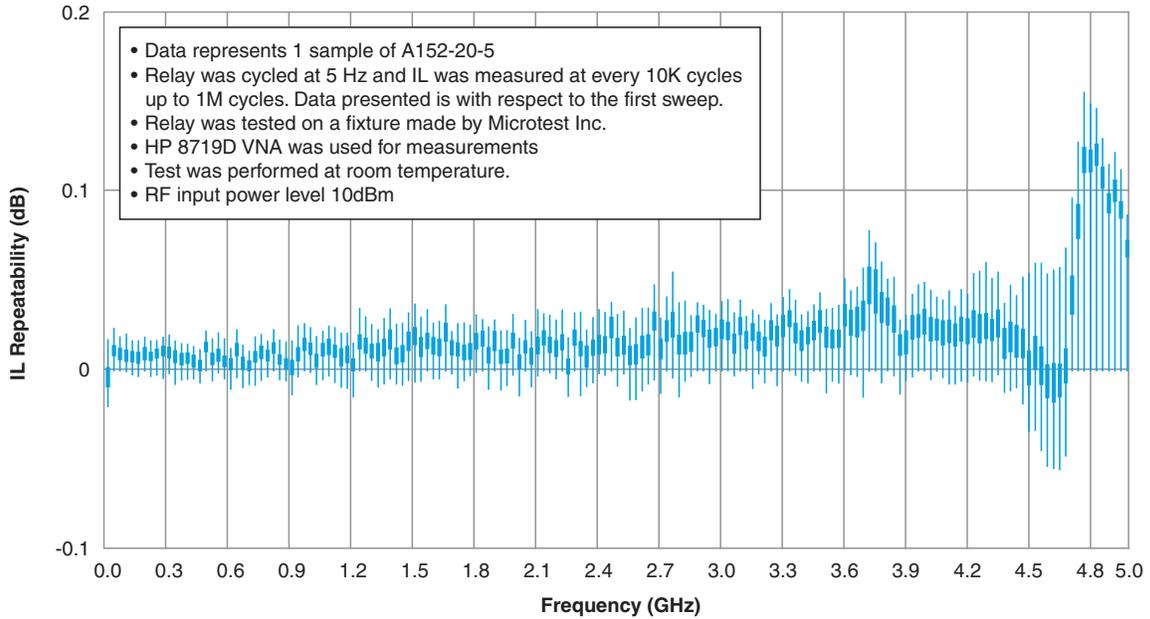
| ATTENUATION (dB) | RANGE      | MINIMUM | TYPICAL | MAXIMUM |
|------------------|------------|---------|---------|---------|
| <b>5</b>         | DC - 1 GHz | 4.75    | 5.0     | 5.25    |
|                  | 1 - 2 GHz  | 4.62    | 5.0     | 5.38    |
|                  | 2 - 3 GHz  | 4.37    | 5.0     | 5.63    |
| <b>20</b>        | DC - 1 GHz | 19.8    | 20.0    | 20.2    |
|                  | 1 - 2 GHz  | 19.6    | 20.0    | 20.4    |
|                  | 2 - 3 GHz  | 19.0    | 20.0    | 21.0    |

**TYPICAL RF CHARACTERISTICS**

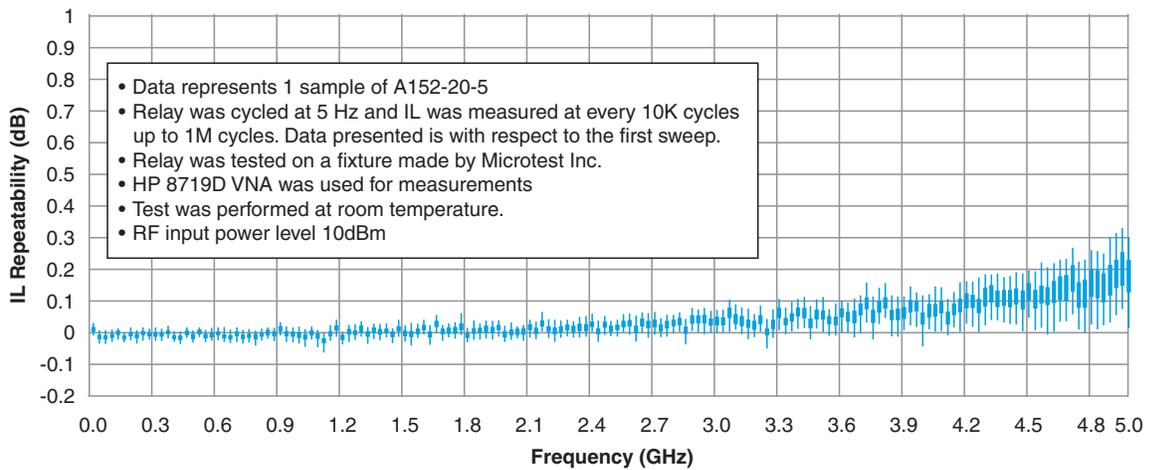


**TYPICAL RF INSERTION LOSS REPEATABILITY CHARACTERISTICS**

**A152 Insertion Loss Repeatability  
(Through Path)**



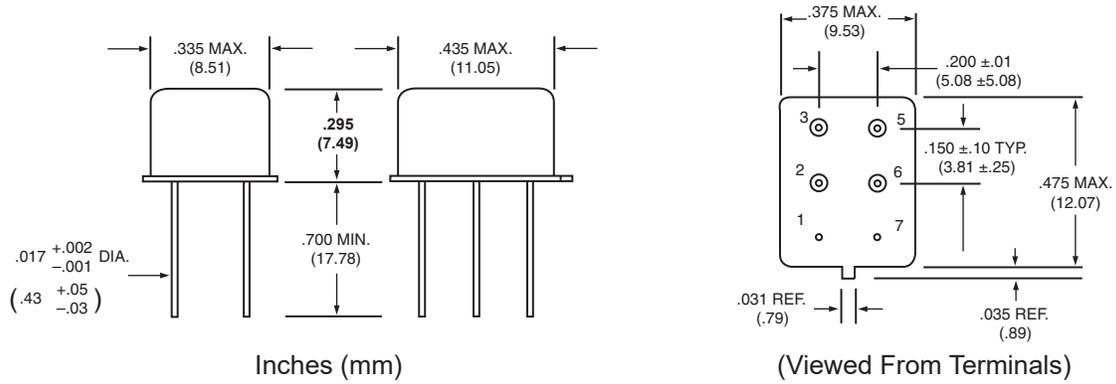
**A152 Insertion Loss Repeatability  
(Attenuated Path)**



**RF INSERTION LOSS REPEATABILITY NOTES**

1. TEST CONDITIONS:
  - a. FIXTURE: CUSTOM PLUG-IN TEST FIXTURE.
  - b. RELAY HEADER IS IN CONTACT WITH, BUT NOT SOLDERED TO, GROUND PLANE.
  - c. TEST PERFORMED AT ROOM AMBIENT TEMPERATURE.
  - d. CONTACT SIGNAL LEVEL: 10 DBM.
2. DATA PRESENTED HEREIN REPRESENTS TYPICAL CHARACTERISTICS AND IS NOT INTENDED FOR USE AS SPECIFICATION LIMITS.
3. INSERTION LOSS REPEATABILITY MEASURED OVER FREQUENCY RANGE FROM 3 MHZ TO 5 GHZ.

**OUTLINE DIMENSIONS**



**SCHEMATIC DIAGRAMS**

