

## Absorptive Digital Control Attenuator 0.1GHz-43.5GHz



### Product Description

RFDAT0040G5A is an absorptive digital control attenuator with a frequency range of 0.1 to 43.5GHz.

The maximum power input of this attenuation is 25dBm. The insertion loss is 6.0dB with a typical attenuation range of 30dB.

The working temperature of this product is between - 40°C and + 85°C.

### Features

- Absorptive Digital Control Attenuator
- 1dB LSB Steps to 31dB
- Single Positive Control Line Per Bit

### Typical Applications

- Wireless Infrastructure
- Military and Aerospace Applications
- Test Instrumentation
- Radar Systems
- 5G Wireless Communications
- Microwave Radio Systems
- TR Modules
- Research and Development
- Cellular Base Stations

### Electrical Specifications ( $T_A = +25^\circ\text{C}$ ), $V_{DD} = +5\text{V}$ , $V_{SS} = -5\text{V}$ & $V_{CTL} = 0 / +5\text{V}$

| Parameter                                               | Min                                            | Typ       | Max | Min | Typ        | Max | Min | Typ       | Max | Units  |
|---------------------------------------------------------|------------------------------------------------|-----------|-----|-----|------------|-----|-----|-----------|-----|--------|
| Frequency Range                                         |                                                | 0.1-18    |     |     | 18-30      |     |     | 30-43.5   |     | GHz    |
| Attenuation Range                                       | 30                                             | 31        |     | 28  | 30         |     | 28  | 30        |     | dB     |
| Attenuation Flatness:<br>(Referenced to Insertion Loss) |                                                | $\pm 1.0$ |     |     | $\pm 1.5$  |     |     | $\pm 2.0$ |     | dB     |
| Control Bits                                            |                                                |           |     |     | 5          |     |     |           |     | Bit    |
| Control Step Size                                       |                                                | 1         |     |     | 1          |     |     | 1         |     | dB     |
| Insertion Loss                                          |                                                | 4.5       | 5.0 |     | 6.0        | 7.5 |     | 8.0       | 9.0 | dB     |
| Insertion Loss Temperature Coefficient                  |                                                | 0.003     |     |     | 0.003      |     |     | 0.003     |     | dB/ °C |
| Input VSWR<br>(All Atten. States)                       |                                                | 1.6       | 1.7 |     | 1.9        | 2.0 |     | 1.9       | 2.2 | : 1    |
| Output VSWR<br>(All Atten. States)                      |                                                | 1.6       | 1.7 |     | 1.9        | 2.0 |     | 1.9       | 2.2 | : 1    |
| Input 0.1dB Compression Point<br>(P0.1dB)               |                                                |           | 25  |     |            | 25  |     |           | 25  | dBm    |
| IP3 Input                                               |                                                | 43        |     |     | 40         |     |     | 38        |     | dBm    |
| Switching Speed                                         |                                                |           |     |     | 200 Max.   |     |     |           |     | ns     |
| Bias Current ( +5V /- 5V )                              |                                                |           |     |     | 10/10 Max. |     |     |           |     | mA     |
| Weight                                                  |                                                |           |     |     | 0.036 Max. |     |     |           |     | lbs.   |
| Impedance                                               |                                                |           |     |     | 50         |     |     |           |     | Ohms   |
| Input / Output Connectors                               | 2.92mm-Female (Input) – 2.92mm-Female (Output) |           |     |     |            |     |     |           |     |        |
| Interface and Control Connector                         | MICRO-D9 (Female)                              |           |     |     |            |     |     |           |     |        |
| Package                                                 | Epoxy Sealed (Standard)                        |           |     |     |            |     |     |           |     |        |
|                                                         | Hermetically Sealed (Optional)                 |           |     |     |            |     |     |           |     |        |

### Absolute Maximum Ratings

| Parameter       | Rating          |
|-----------------|-----------------|
| Biasing Voltage | +5V±10%/-5V±10% |
| RF Input Power  | +25dBm          |

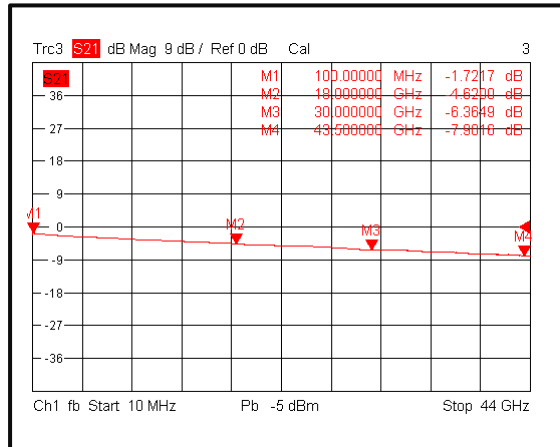
### Environmental Specifications and Test Standards

| Parameter                         | Description                                                                                                                                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operational Temperature           | -40°C to +85°C<br>(Case Temperature)                                                                                                                                                                            |
| Storage Temperature               | -50°C to +105°C                                                                                                                                                                                                 |
| Thermal Shock                     | -40°C → +85°C<br>(5 Cycles / 10 hours)                                                                                                                                                                          |
| *Random Vibration                 | MIL-STD-202G<br>Table 214-I, Test Condition Letter C<br>1.5 Hours Per Axis                                                                                                                                      |
| High Temperature Burn In          | Temperature +85°C for 72 Hours                                                                                                                                                                                  |
| Shock                             | 1. Weight >20g, 50g half sine wave for 11ms, Speed variation 3.44m/s<br>2. Weight <=20g, 100g Half sine wave for 6ms, Speed variation 3.75m/s<br>3. Total 18 times (6 directions, 3 repetitions per direction). |
| Altitude                          | Standard: 30,000 Ft (Epoxy Sealed Controlled Environment)<br>Optional: Hermetically Sealed (60,000 ft. 1.0 PSI min)                                                                                             |
| Hermetically Sealed<br>(Optional) | MIL-STD-883 (For Hermetically Sealed Units)                                                                                                                                                                     |

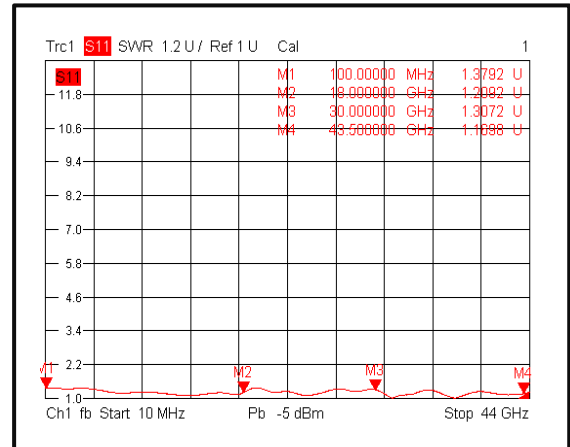
\*For vibration testing details please see additional information section.

**Typical Performance Plots**

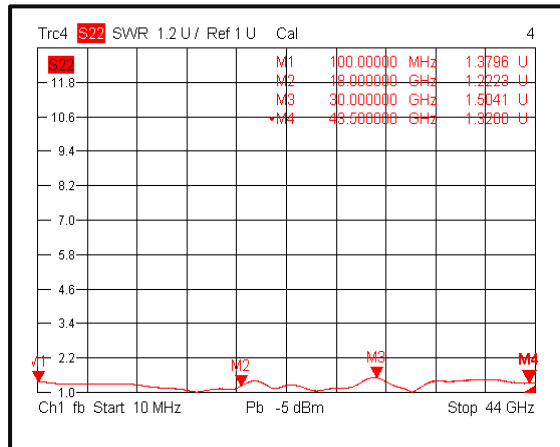
**Insertion Loss @+25°C**



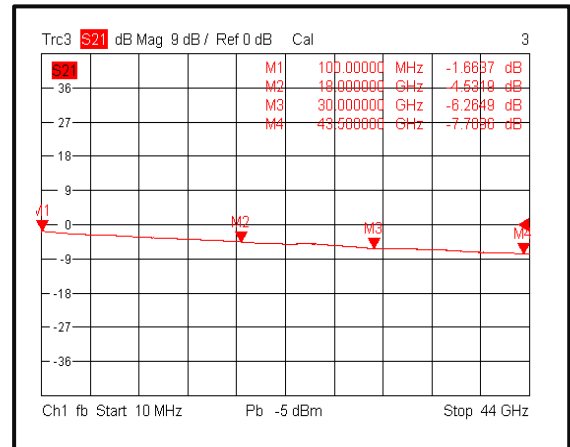
**Input VSWR @+25°C**



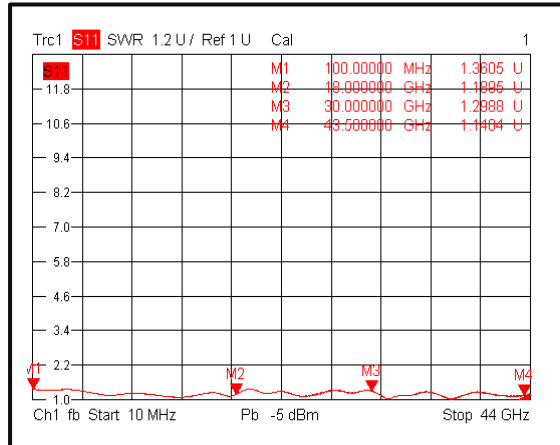
**Output VSWR @+25°C**



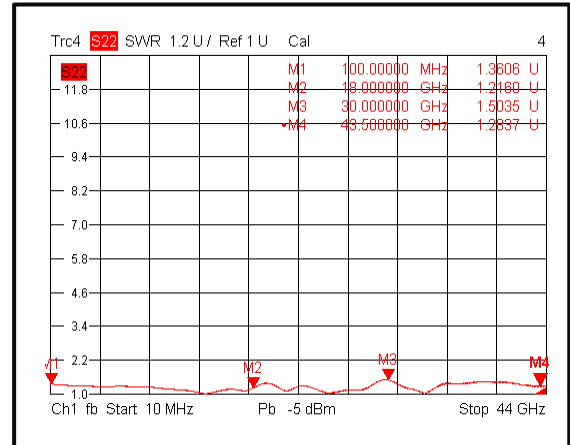
**Insertion Loss @-40°C**



**Input VSWR @-40°C**

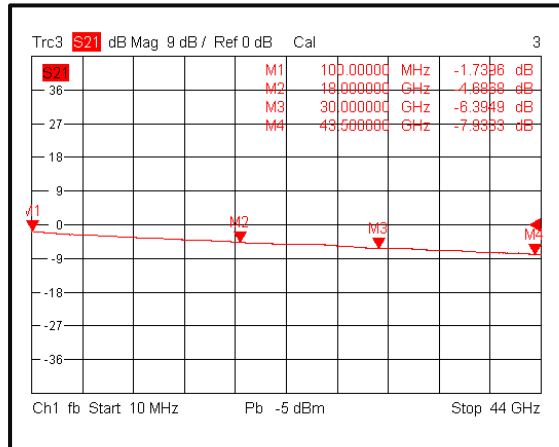


**Output VSWR @-40°C**

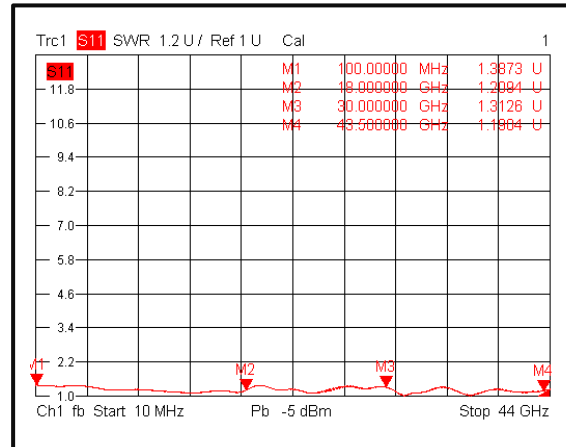


Typical Performance Plots

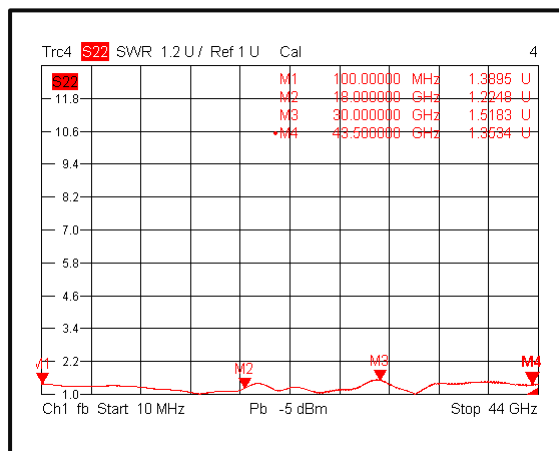
Insertion Loss @+85°C



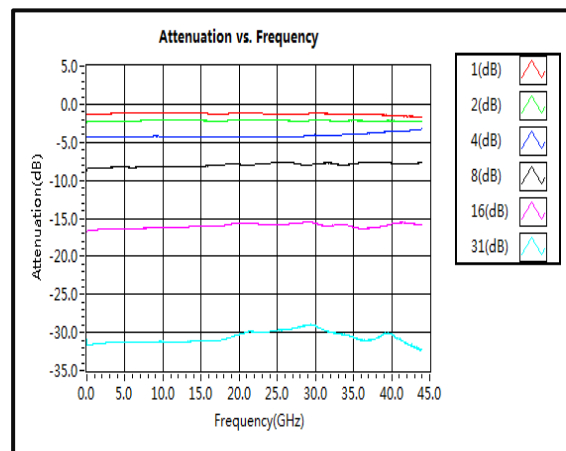
Input VSWR @+85°C



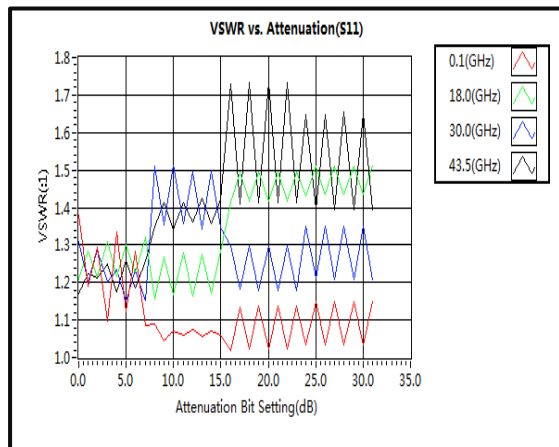
Output VSWR @+85°C



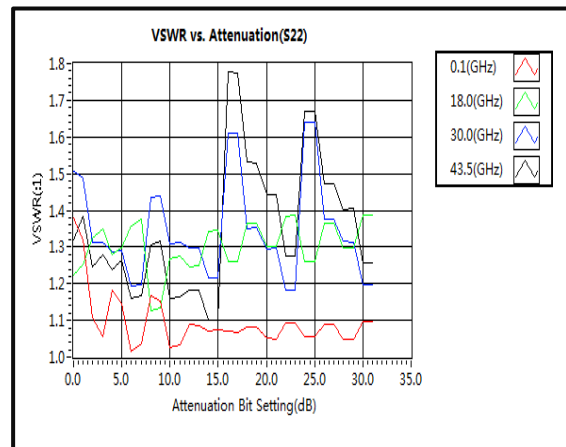
Attenuation vs. Frequency



VSWR vs. Attenuation (S11)

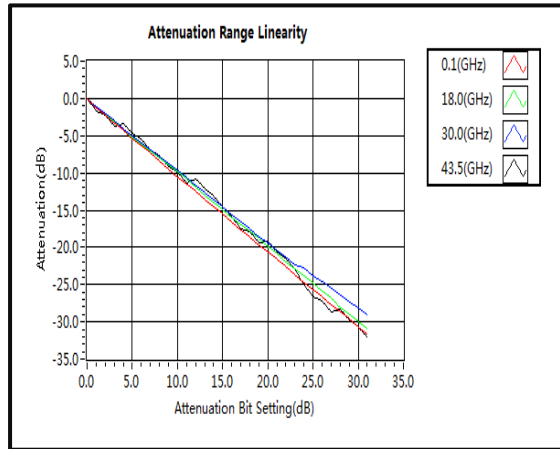


VSWR vs. Attenuation (S22)

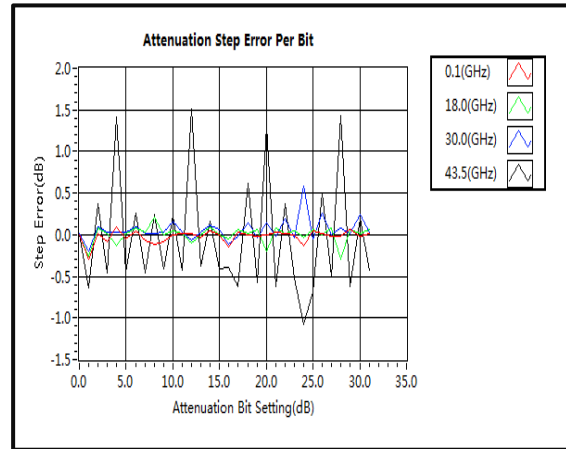


**Typical Performance Plots**

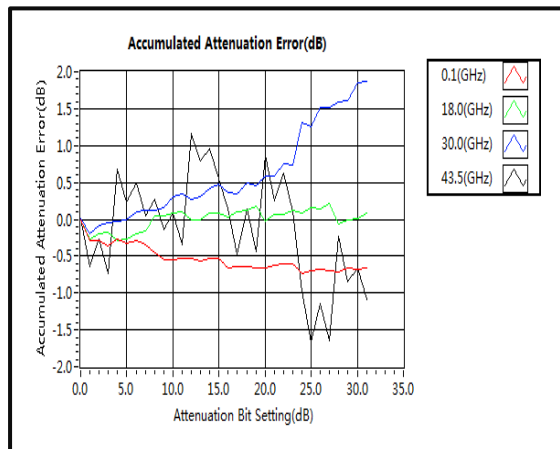
**Attenuation Range Linearity**



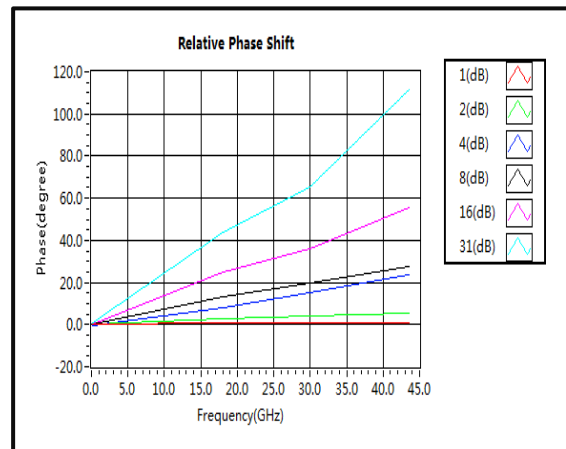
**Attenuation Step Error Per Bit (dB)**



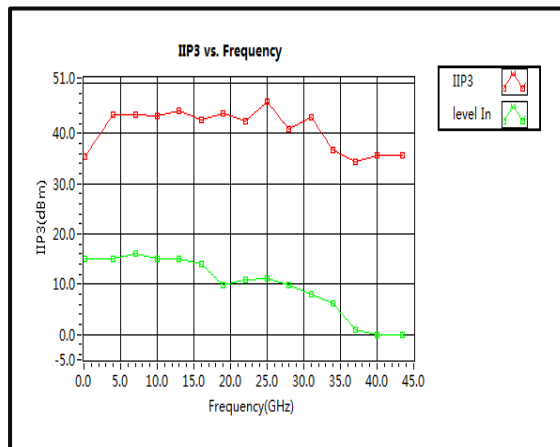
**Accumulated Attenuation Error (dB)**



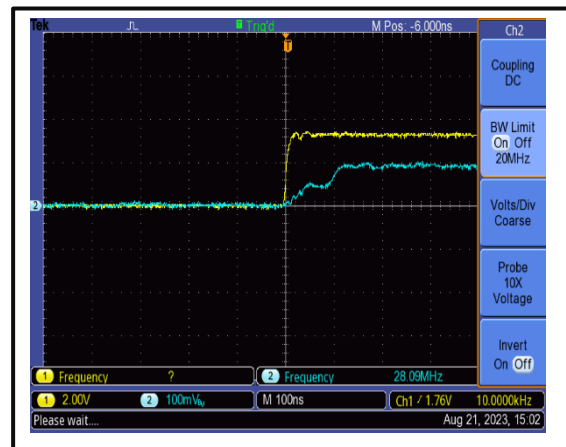
**Relative Phase Shift**



**IIP3**

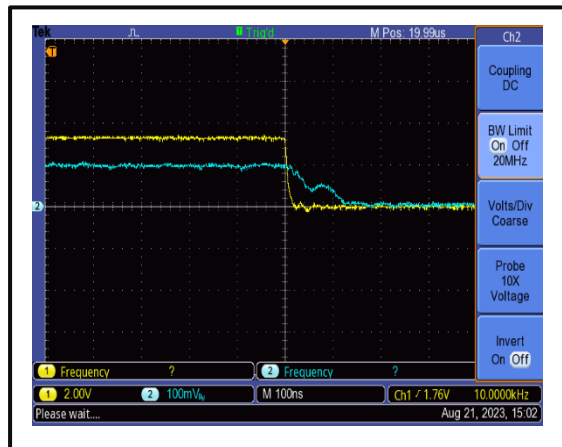


**Speed**

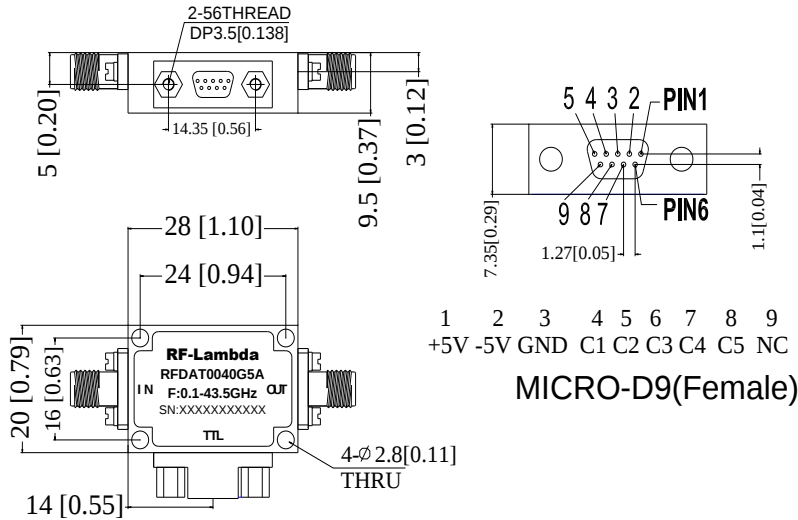


**Typical Performance Plots**

**Speed**



**Outline Drawing**

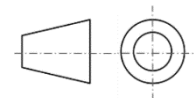


**Truth Table**

| TTL Control Voltage THRESHOLD |    |    |    |    |  | Low(0)=0~0.8V     |
|-------------------------------|----|----|----|----|--|-------------------|
|                               |    |    |    |    |  | High(1)=2.8~5V    |
| Control Input TTL             |    |    |    |    |  | Attenuation State |
| C5                            | C4 | C3 | C2 | C1 |  | Reference IL      |
| 1                             | 1  | 1  | 1  | 1  |  | Reference IL      |
| 1                             | 1  | 1  | 1  | 0  |  | 1dB               |
| 1                             | 1  | 1  | 0  | 1  |  | 2dB               |
| 1                             | 1  | 0  | 1  | 1  |  | 4dB               |
| 1                             | 0  | 1  | 1  | 1  |  | 8dB               |
| 0                             | 1  | 1  | 1  | 1  |  | 16dB              |
| 0                             | 0  | 0  | 0  | 0  |  | 31dB              |

**Notes:**

1. Package Material: Aluminum
2. Finish: Gold Plated
3. All dimensions are in millimeters [inches].
4. Housing Tolerances  $\pm 0.1$  [0.004] unless otherwise specified.
5. Standard torque wrench must be used to secure RF connectors.



**Additional Information**

**Documentation**

**Webpage**

ESD Policy

[https://rflambda.com/pdf/rflambda\\_esd\\_control.pdf](https://rflambda.com/pdf/rflambda_esd_control.pdf)

Connector Torque Specifications

[https://www.rflambda.com/pdf/Torque\\_Specifications.pdf](https://www.rflambda.com/pdf/Torque_Specifications.pdf)

Random Vibration Test Standard

[https://www.rflambda.com/pdf/rflambda\\_random\\_vibration\\_MIL-STD-202G.pdf](https://www.rflambda.com/pdf/rflambda_random_vibration_MIL-STD-202G.pdf)

Ordering Information

| Part Number  | Modification             | Description                               |
|--------------|--------------------------|-------------------------------------------|
| RFDAT0040G5A | Connectors 2.92mm-Female | 0.1GHz-43.5GHz Digital Control Attenuator |

Important Notice

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