



# RF-LAMBDA

LEADER OF RF BROADBAND SOLUTIONS

RFDAT0040G5A

## Absorptive Digital Control Attenuator 0.1 – 40GHz



### Features

- Ultra Wide Band Operation 0.1-40GHz
- 1dB LSB Steps to 31dB
- Single Positive Control Line Per Bit

### Typical Applications

- Wireless Infrastructure
- Military and Aerospace
- Test and Measurement

Electrical Specifications,  $T_A = +25^{\circ}\text{C}$ ,  $V_{dd} = +5\text{V}$ ,  $V_{ss} = -5\text{V}$  &  $V_{CTL} = 0 / +5\text{V}$

| Description`                                            | PN:RFDAT0040G5A                |           |     |       |           |     |       |           |     |                        |
|---------------------------------------------------------|--------------------------------|-----------|-----|-------|-----------|-----|-------|-----------|-----|------------------------|
|                                                         | Absorptive Digital Attenuator  |           |     |       |           |     |       |           |     |                        |
| Parameters                                              | Min                            | Typ       | Max | Min   | Typ       | Max | Min   | Typ.      | Max | Units                  |
| Frequency Range                                         | 0.1-18                         |           |     | 18-30 |           |     | 30-40 |           |     | GHz                    |
| Attenuation Range                                       | 30                             | 31        |     | 29    | 30        |     | 29    | 30        |     | dB                     |
| Attenuation Flatness:<br>(Referenced to Insertion Loss) |                                | $\pm 1.0$ |     |       | $\pm 1.5$ |     |       | $\pm 2.0$ |     | dB                     |
| Control Bits                                            |                                |           | 5   |       |           | 5   |       |           | 5   | Bit                    |
| Control Step size                                       | 1                              |           |     | 1     |           |     | 1     |           |     | dB                     |
| Insertion Loss                                          |                                | 4.5       | 5.0 |       | 6.0       | 7.5 |       | 7.5       | 8.5 | dB                     |
| Insertion Loss Temperature<br>Coefficient               |                                | 0.003     |     |       | 0.003     |     |       | 0.003     |     | dB/ $^{\circ}\text{C}$ |
| Input VSWR( All Atten. States)                          |                                | 1.6       | 1.7 |       | 1.9       | 2.0 |       | 1.9       | 2.2 | : 1                    |
| Output VSWR ( All Atten. States)                        |                                | 1.6       | 1.7 |       | 1.9       | 2.0 |       | 1.9       | 2.2 | : 1                    |
| Input 0.1 dB Compression Point<br>(Po.1dB)              |                                |           | 25  |       |           | 25  |       |           | 25  | dBm                    |
| IP3 Input                                               |                                | 43        |     |       | 43        |     |       | 43        |     | dBm                    |
| Switching Speed                                         |                                |           | 200 |       |           | 200 |       |           | 200 | ns                     |
| Weight                                                  | 1.06                           |           |     |       |           |     |       |           |     | ounces                 |
| Impedance                                               | 50                             |           |     |       |           |     |       |           |     | $\Omega$               |
| Bias Current ( +5V /- 5V )                              | 25/25                          |           |     |       |           |     |       |           |     | mA                     |
| Input / Output Connectors                               | 2.92mm-Female                  |           |     |       |           |     |       |           |     |                        |
| Interface and Control Connector                         | MICRO-D9(Female)               |           |     |       |           |     |       |           |     |                        |
| Finish                                                  | Gold Plated                    |           |     |       |           |     |       |           |     |                        |
| Material                                                | Aluminum                       |           |     |       |           |     |       |           |     |                        |
| Sealing                                                 | Hermetically Sealed (Optional) |           |     |       |           |     |       |           |     |                        |

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### Absolute Maximum Ratings

|                     |                 |
|---------------------|-----------------|
| Biasing             | +5V±10%/-5V±10% |
| TTL Control Voltage | 0~0.8V / 2.8~5V |

### Ordering Information

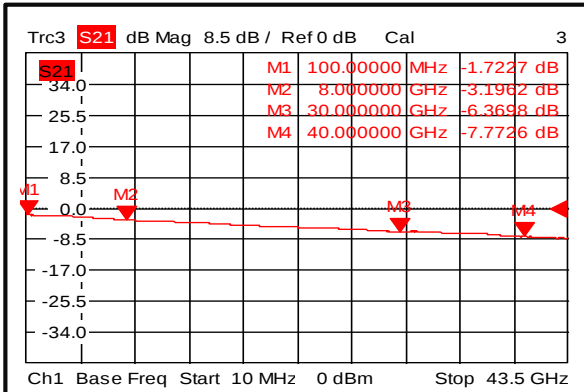
| Part No.     | ECCN  | Description                          |
|--------------|-------|--------------------------------------|
| RFDAT0040G5A | EAR99 | 0.1-40GHz Digital Control Attenuator |

### Environmental Specifications and Test Standards

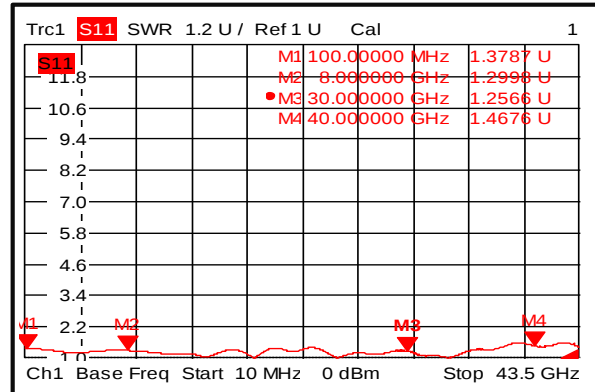
| Parameter                        | Standard      | Description                                                                                                                                                                                                     |
|----------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operational Temperature          | MIL-STD-39016 | -45°C~+85°C                                                                                                                                                                                                     |
| Storage Temperature              |               | -55°C~+125°C                                                                                                                                                                                                    |
| Thermal Shock                    |               | 1 Hour@ -45°C → 1 Hour @ +85°C (5 Cycles)                                                                                                                                                                       |
| Random Vibration                 |               | Acceleration Spectral Density 6 (m/s)<br>Total 92.6 RMS                                                                                                                                                         |
| Electrical & 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                         | MIL-STD-883   | Standard: 30,000 Ft (Epoxy Sealed Controlled Environment)<br>Optional: Hermetically Sealed (60,000 ft. 1.0 PSI min)                                                                                             |
| Hermetically Sealed (Optional)   |               | MIL-STD-883 (For Hermetically Sealed Units)                                                                                                                                                                     |

### Typical Performance Plots

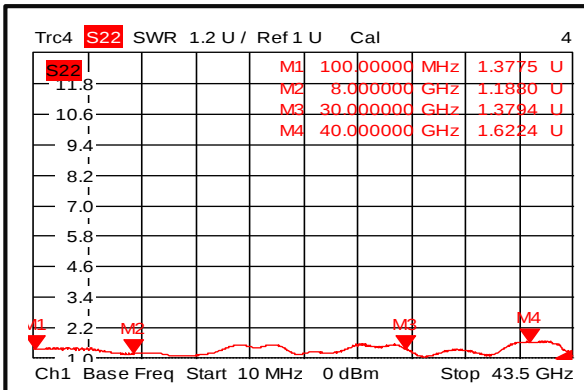
#### Insertion Loss @+25°C



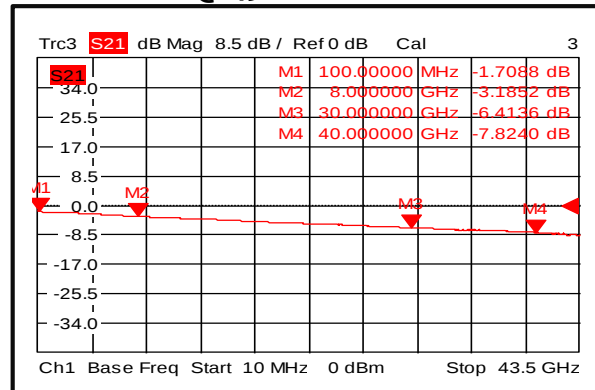
#### Input VSWR @+25°C



#### Output VSWR @+25°C



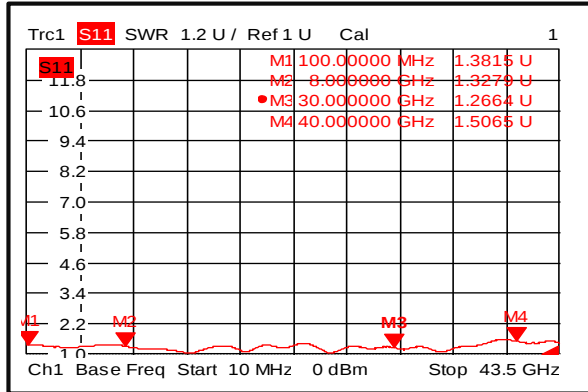
#### Insertion Loss @-45°C



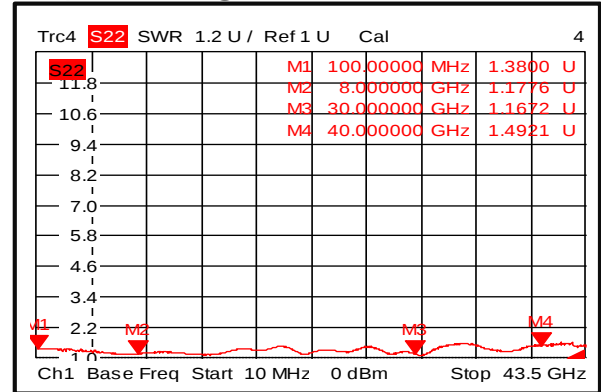
Absorptive Digital Control Attenuator 0.1 – 40 GHz



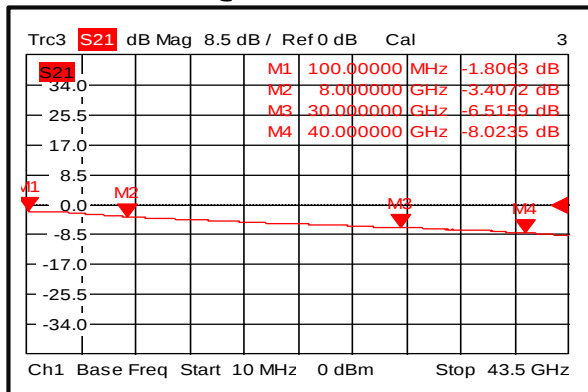
### Input VSWR @-45°C



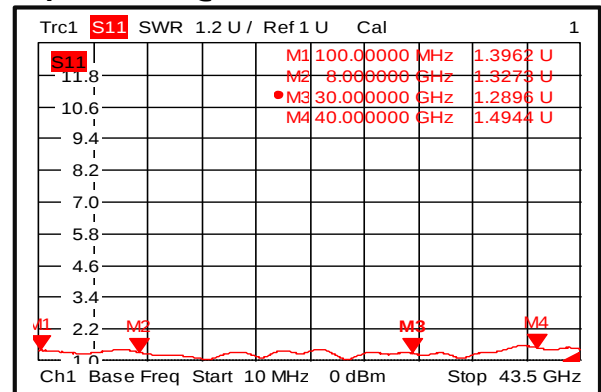
### Output VSWR @-45°C



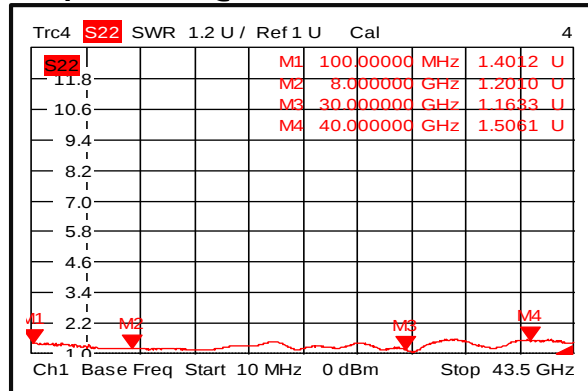
### Insertion Loss @+85°C



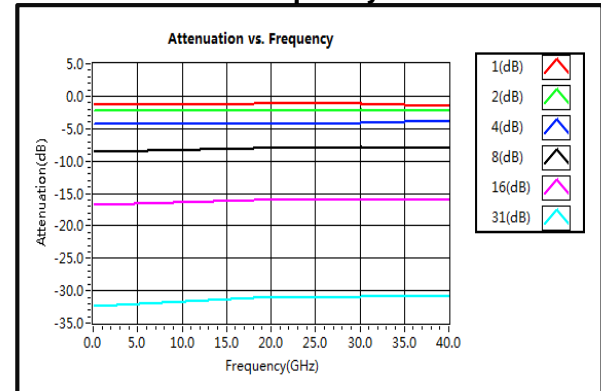
### Input VSWR @+85°C



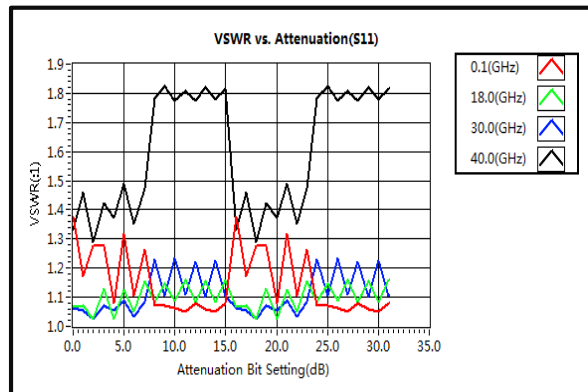
### Output VSWR @+85°C



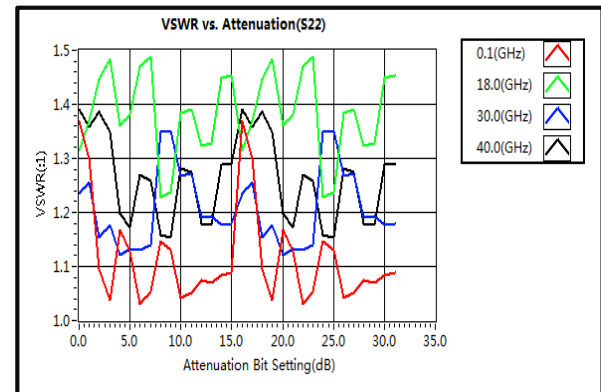
### Attenuation vs. Frequency



### VSWR vs. Attenuation

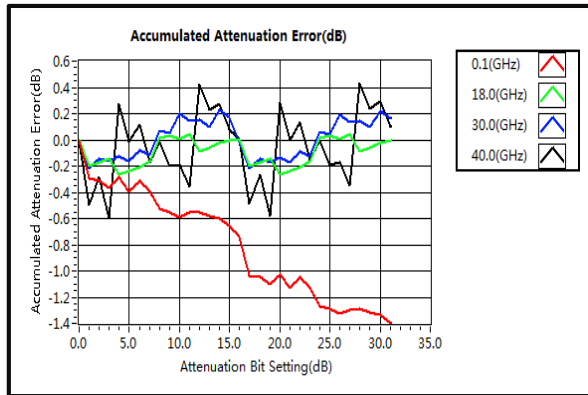


### VSWR vs. Attenuation

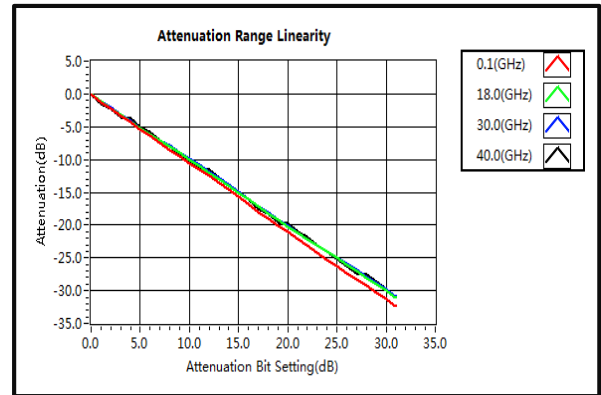




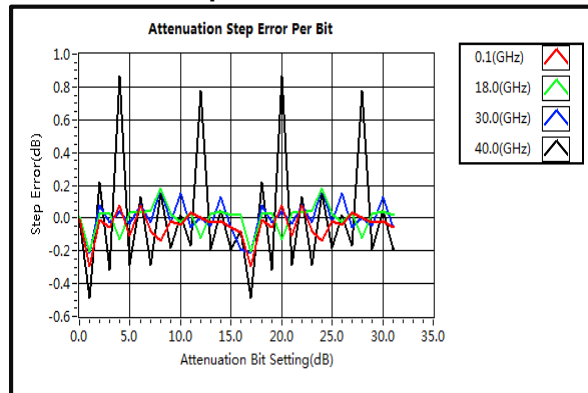
### Accumulated Attenuation Error



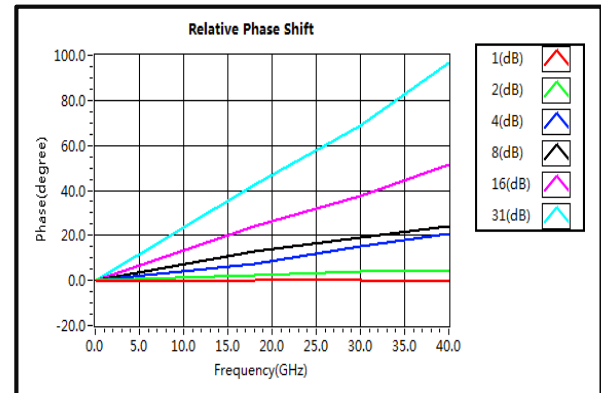
### Attenuation Range Linearity



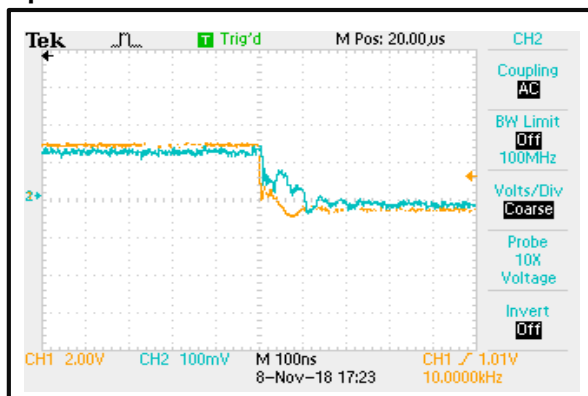
### Attenuation Step Error Per Bit



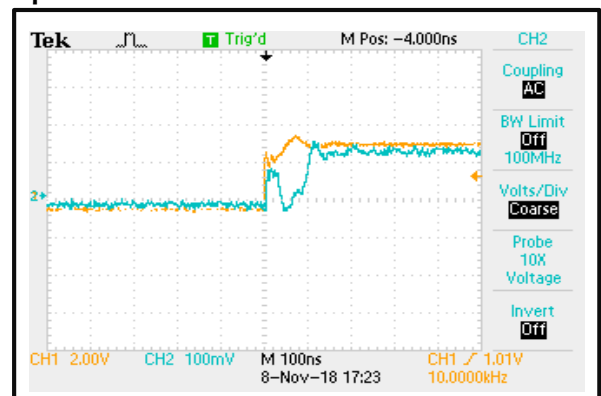
### Relative Phase Shift



### Speed



### Speed





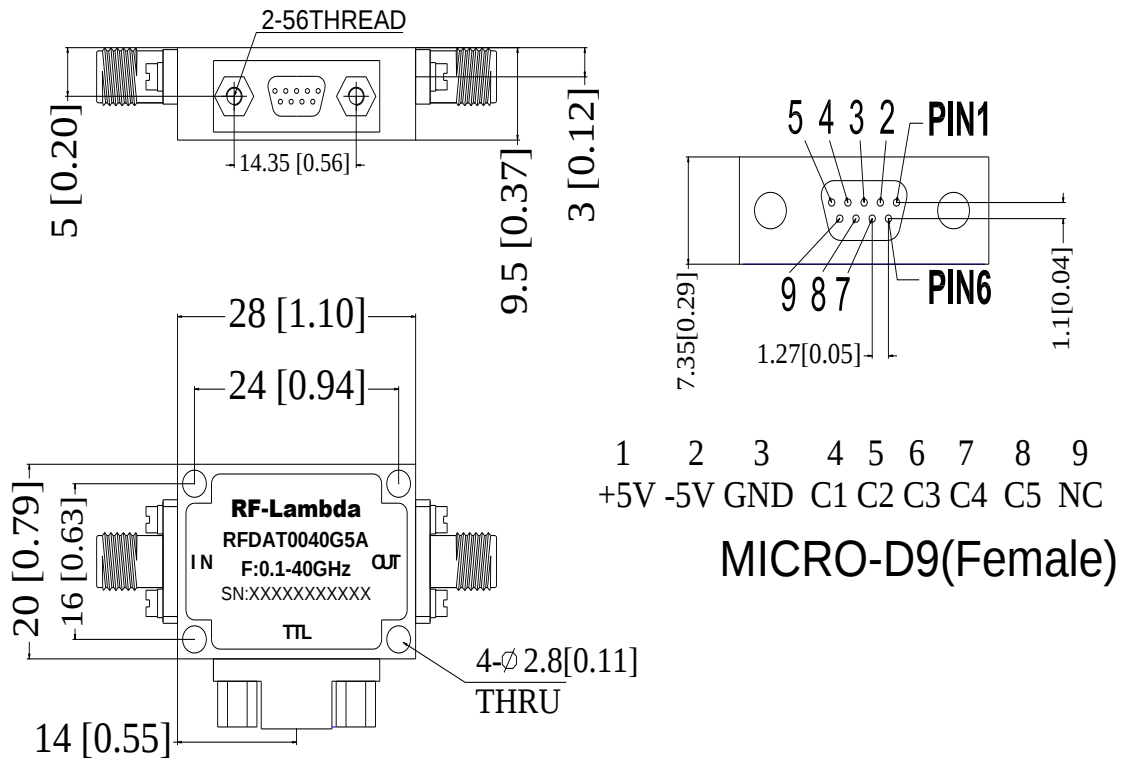
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## Outline Drawing:

All Dimensions in mm [inches]



Truth Table

| Control Voltage Input |    |    |    |    | Attenuation State |
|-----------------------|----|----|----|----|-------------------|
| C5                    | C4 | C3 | C2 | C1 |                   |
| 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              |

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