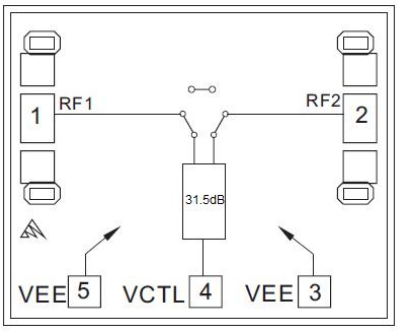
# GDA-0007-1A

## GaAs MMIC Digital Attenuator Chip, DC-7GHz

### Performance characteristics:

Frequency range: DC-7GHz Insertion loss: 1.5dB@7GHz
Attenuation range: 32dB
Bit Count: 1 digit
Additional phase shift: 1.0°
50Ohm input/output
100% on-chip testing
Chip size: 1.36x 0.95 x 0.1mm

### Functional Block Diagram:




### Product Introduction:

GDA-0007-1A is a GaAs MMIC integrated parallel driven 1-bit Digital attenuator chip, with a frequency range covering DC~7GHz and an insertion loss of 1.5dB. GDA-0007-1A has an internal integrated driver with a switching speed of 40ns. The chip through-hole metallization process ensures good grounding, and the back is metallized, suitable for eutectic sintering or conductive adhesive bonding processes.

| Usage restriction parameter [1] | |
|---|---|
| Control voltage range | -0.5V～+5.5V |
| Power supply voltage | -6V |
| Maximum input power | +24dBm |
| Working temperature | -55 ~ +85°C |
| Storage temperature | -65 ~ +150°C |

【1】 Exceeding any of the above maximum limits may result in permanent damage.

| Electrical parameters(Ta=+25°C) | | | | |
|---|---|---|---|---|
| Index | Minimum value | Typical value | Maximum value | Unit |
| Frequency range | DC~7 | | | GHz |
| Insertion loss | - | - | 1.5 | dB |
| Attenuation range | 32 | | | dB |
| Attenuation number | 1 | | | bite |
| Attenuation accuracy (all frequency bands) | -1.0 ~ +0.2 | | | dB |
| Phase fluctuation (full frequency band) | 0.5 ~1.5 | | | degree |
| Input return loss | 15 | 21 | - | dB |
| Output Return Loss | 15 | 21 | - | dB |
| Switching speed | - | - | 40 | ns |
| P-1dB | - | 23 | - | dBm |

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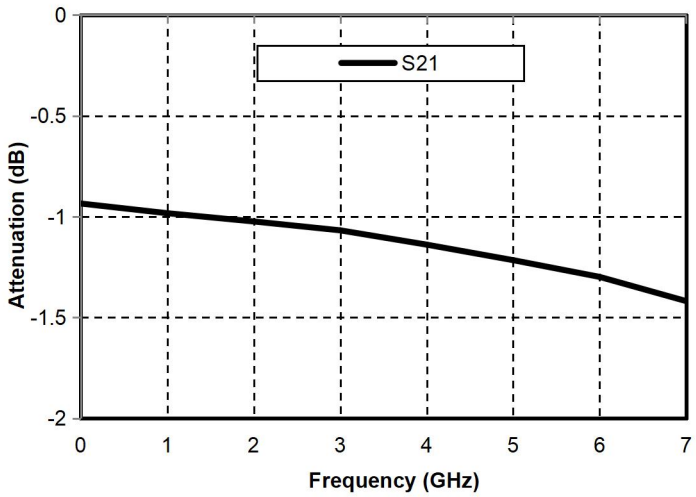
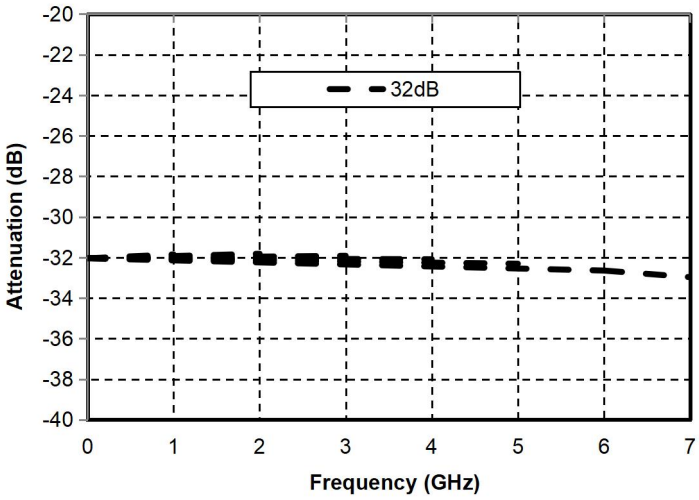
### Main indicator testing curve

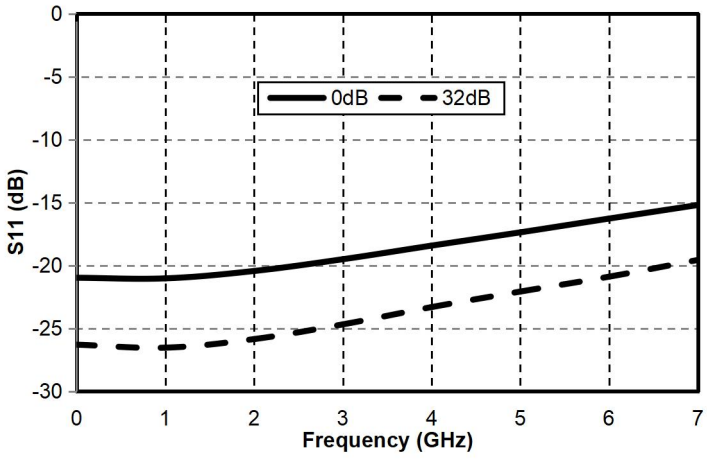
Insertion loss vs. Frequency



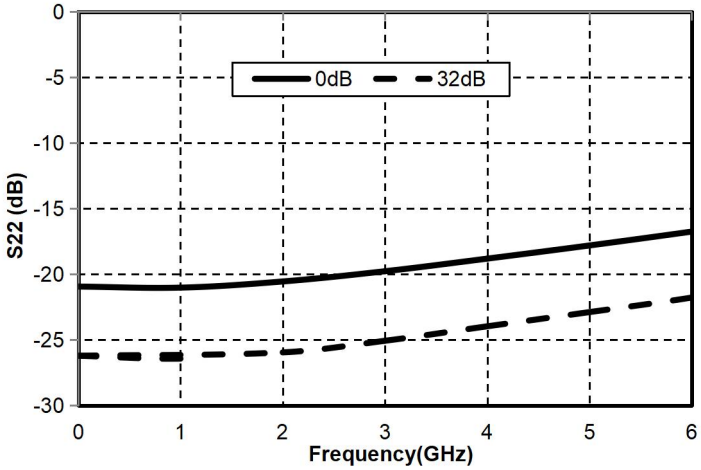

Reference attenuation state vs. Frequency



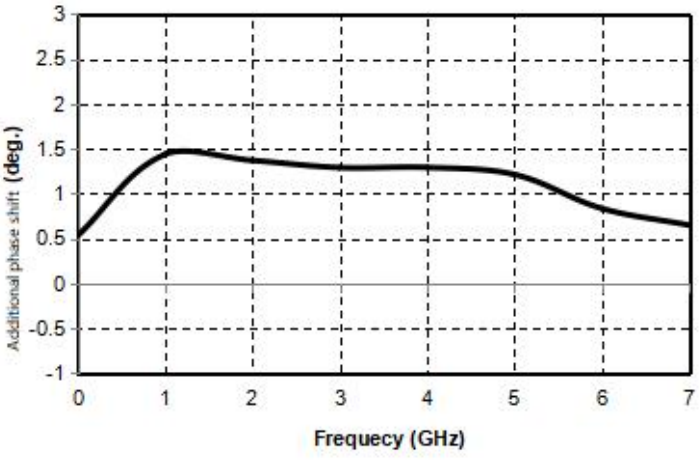

Input echo vs. Frequency



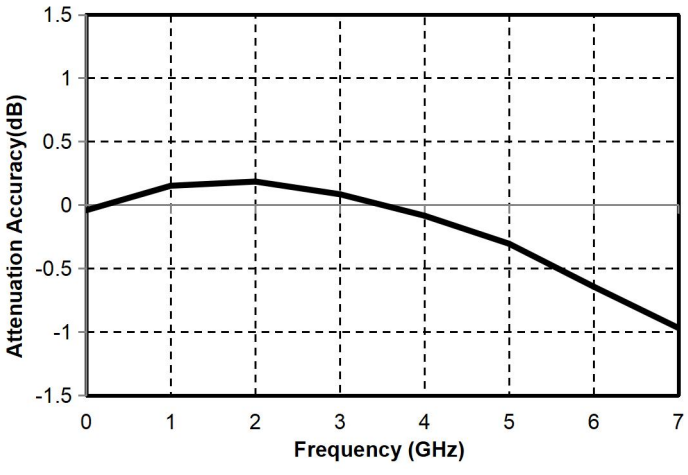

Output echo vs. Frequency




Attenuation additional phase shift vs. Frequency




Attenuation accuracy vs. Frequency





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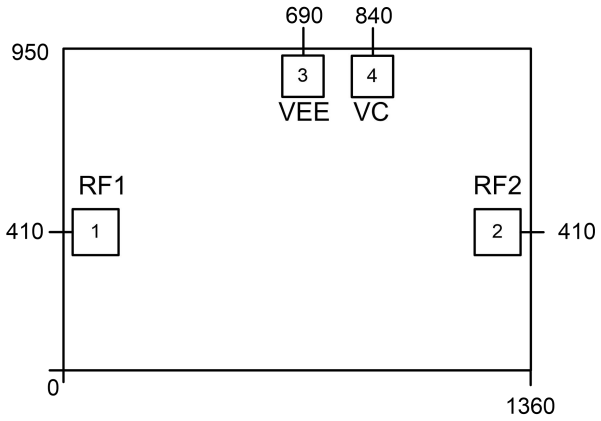
### External structure[2]




[2]The units in the figure are all micrometers.

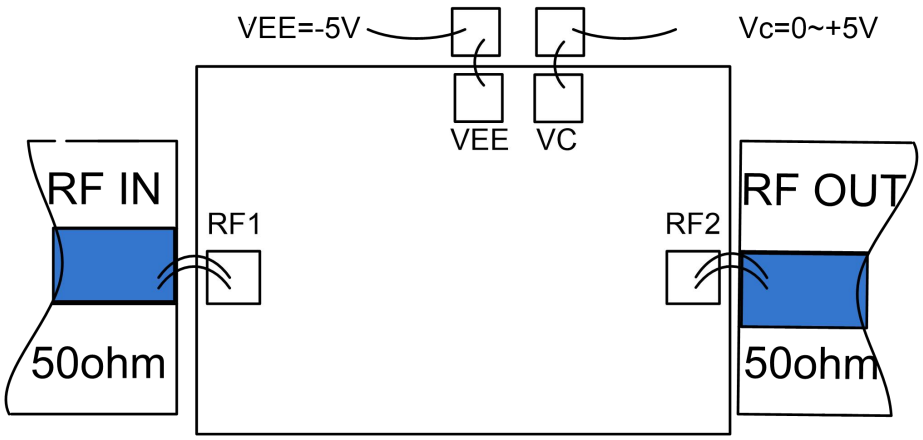
| Definition of bonding pressure point | | |
|---|---|---|
| Bond point number | Functional symbols | Function Description |
| 1 | RF1 | The signal input terminal is externally connected to a 50 ohm circuit, and there is no integrated DC isolation capacitor inside the chip |
| 2 | RF2 | The signal output terminal is externally connected to a 50 ohm circuit, and there is no integrated DC isolation capacitor inside the chip |
| 3 | VEE | Bias voltage |
| 4 | VC | Control Port |
| Chip bottom | GND | The bottom of the chip needs to have sufficient and good contact with RF and DC ground |

| Truth table | |
|---|---|
| Attenuation state | VC |
| 0dB | 0V |
| 32dB | 5V |

| control voltage | |
|---|---|
| State | Bias condition |
| Low (0) | 0 ~ 2.7V |
| High (1) | 3 .5~ 5V |

| Bias voltage and current | | |
|---|---|---|
| VEE Range= -5Vdc±10% | | |
| VEE (Vdc) | IEE (Typ.)(mA) | IEE (Max.)(mA) |
| -5V | 1 | 1.3 |

## Suggested assembly diagram




## Precautions for use

- The chip needs to be stored in a container with anti-static function and stored in a nitrogen environment.
- Attempting to clean the surface of bare chips using wet chemical methods is prohibited.
- Please strictly comply with ESD protection requirements to avoid static damage to bare chips.
- Routine operation: Please use precision pointed tweezers to remove the bare chip. During the operation, avoid tools or fingers touching the surface of the chip.
- Suggestion for mounting operation: Bare chip installation can use AuSn solder eutectic sintering or conductive adhesive bonding process. The installation surface must be clean and flat.
- Sintering process: It is recommended to use AuSn solder sheets with a gold tin ratio of 80/20. The working surface temperature reached 255 ℃, and the tool (vacuum chuck) temperature reached 265 ℃. When a high-temperature mixed gas (nitrogen to hydrogen ratio of 90/10) is blown onto the chip, the temperature at the top of the tool should be raised to 290 ℃. Do not let the chip stay above 320 ℃ for more than 20 seconds. The friction time should not exceed 3 seconds.
- Bonding process: The amount of conductive adhesive applied should be as small as possible. After placing the chip in the installation position, the conductive adhesive can be vaguely visible around it. Please follow the information provided by the conductive adhesive manufacturer for curing conditions.
- Suggestion for bonding operation: Both spherical or wedge-shaped bonding should be used Φ 0.025mm (1mil) gold wire. Thermal ultrasonic bonding temperature is 150 ℃. The pressure of the spherical bonding cutter is 40-50GF, and the pressure of the wedge bonding cutter is 18-22GF. Use as little ultrasonic energy as possible. The bonding process starts at the pressing point on the chip and ends at the packaging (or substrate).