

Variable Analogue Phase Shifter 17-21 GHz

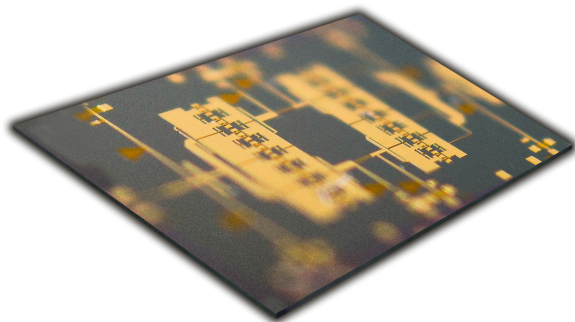
K-PS-1721

A MMIC analogue phase-shifter enabling more than 350° phase variation across the 17–21 GHz frequency band.

Overview

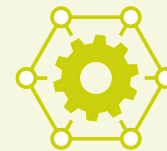
With excellent matching and very low insertion loss variation over all phases and frequencies (± 1.9 dB), and excellent phase tracking over the complete frequency range (less than $\pm 15^\circ$), this MMIC offers an alternative to digital phase shifters where any required phase delay is achievable with the phase set by varying the control voltage (VD) in the range of -0.5 to 0.7 V.

As the underside of the die is gold plated, this MMIC is compatible with precision die attach methods, as well as thermo-compression and thermosonic wire bonding, making it ideal for MCM and hybrid microcircuit applications.



Features

- 17-21 GHz
- 6 dB insertion loss
- 9 dB return loss
- 350° phase variation
- Evaluation board available



Applications

- Frequency translation
- Beam Steering Antenna
- Phased arrays
- IOT
- Security
- Satellite downlinks

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Specification Overview

| Parameter | Min | Typ | Max | Unit |
|--|------|-----|------|---------|
| Frequency | 17 | | 21 | (GHz) |
| Phase Variation | 0 | | 350 | Degrees |
| Insertion Loss | | 6 | 8 | (dB) |
| Insertion Loss Variation (over frequency, all voltages) | | | ±1.9 | (dB) |
| Phase Variation (over frequency, all voltages) | | | ±15 | Degrees |
| Control Voltage (VD) | -0.7 | | 1.9 | (V) |

Notes
All tests carried out
at 25°C

Absolute Maximum Ratings

| Parameter | Rating |
|-----------------------|-----------------|
| RF Power | 20 dBm |
| VD | 5 V |
| ID | 20 mA |
| Storage Temperature | -65°C to +175°C |
| Channel Temperature | +175°C |
| Operating Temperature | -40°C to +85°C |



CAUTION!
ESD – Sensitive Device

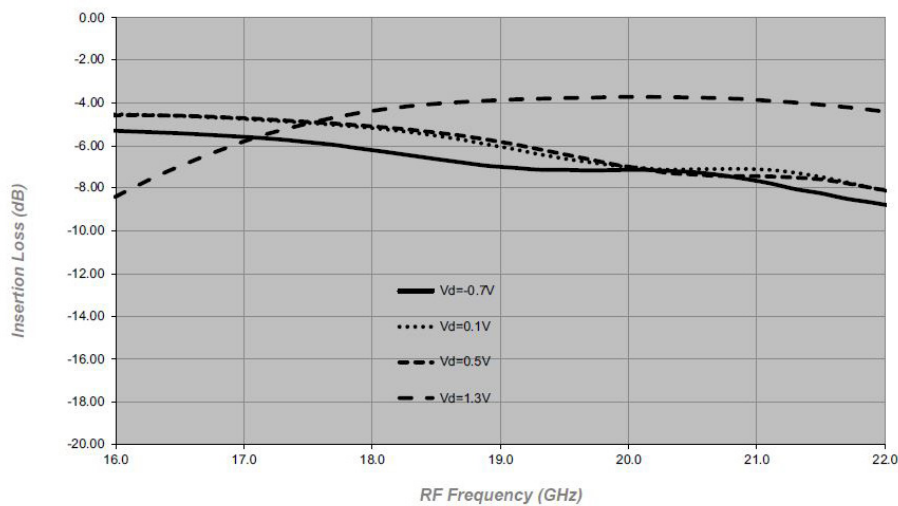
ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features proprietary protection circuitry, damage may occur on devices subjected to ESD. Proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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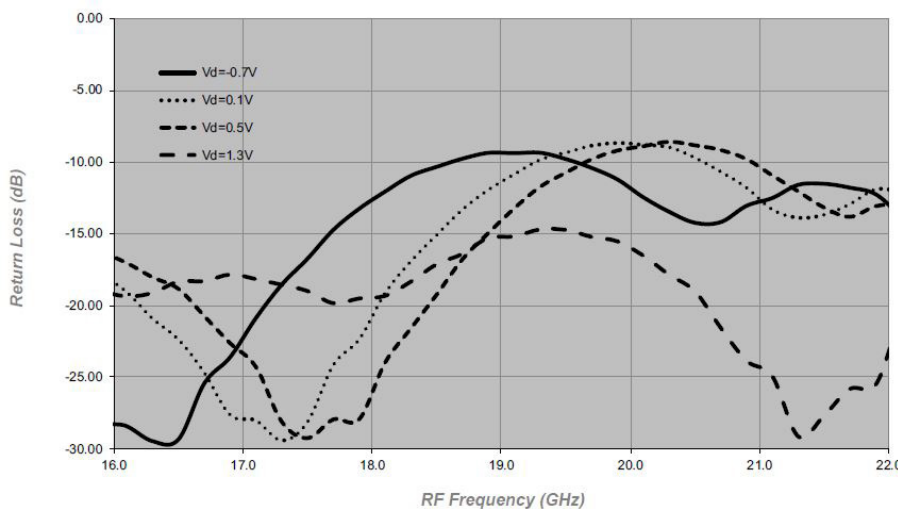
Measured Performance Data

Test conditions: 16-22 GHz frequency band; -0.7-1.9 V control voltage variation

Insertion Loss

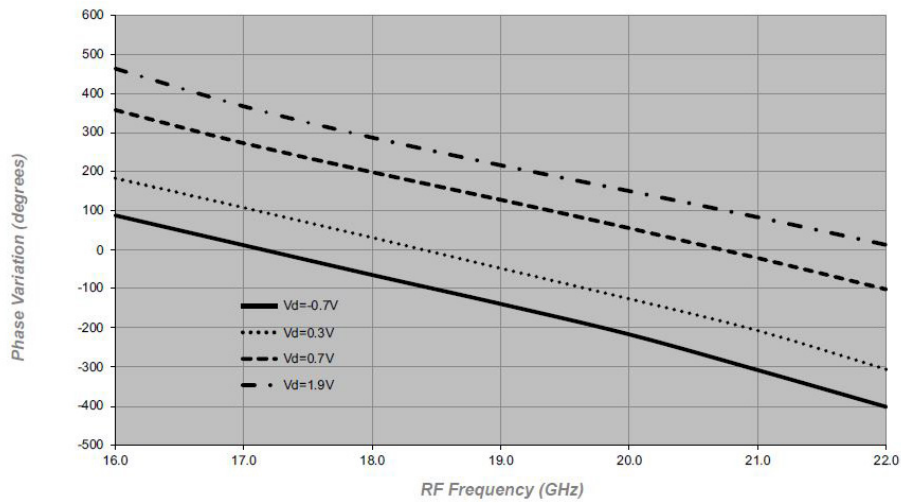


Output Return Loss

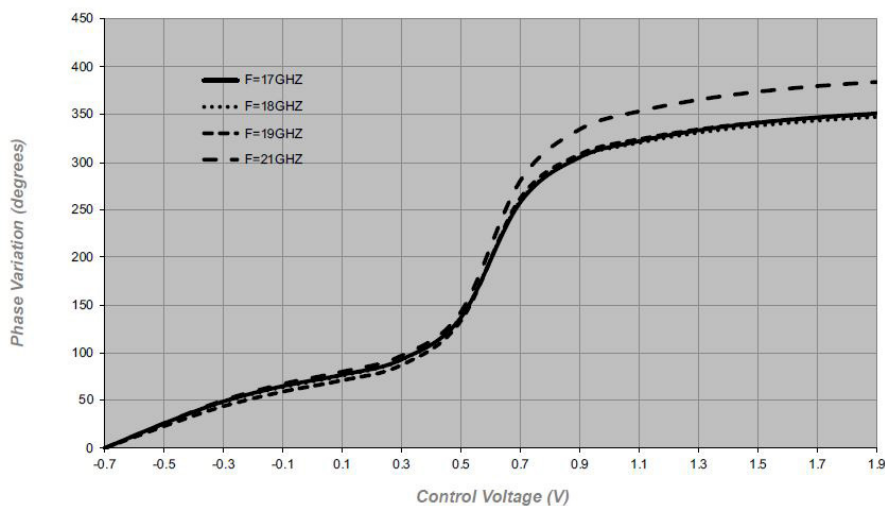


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Absolute Phase Shift

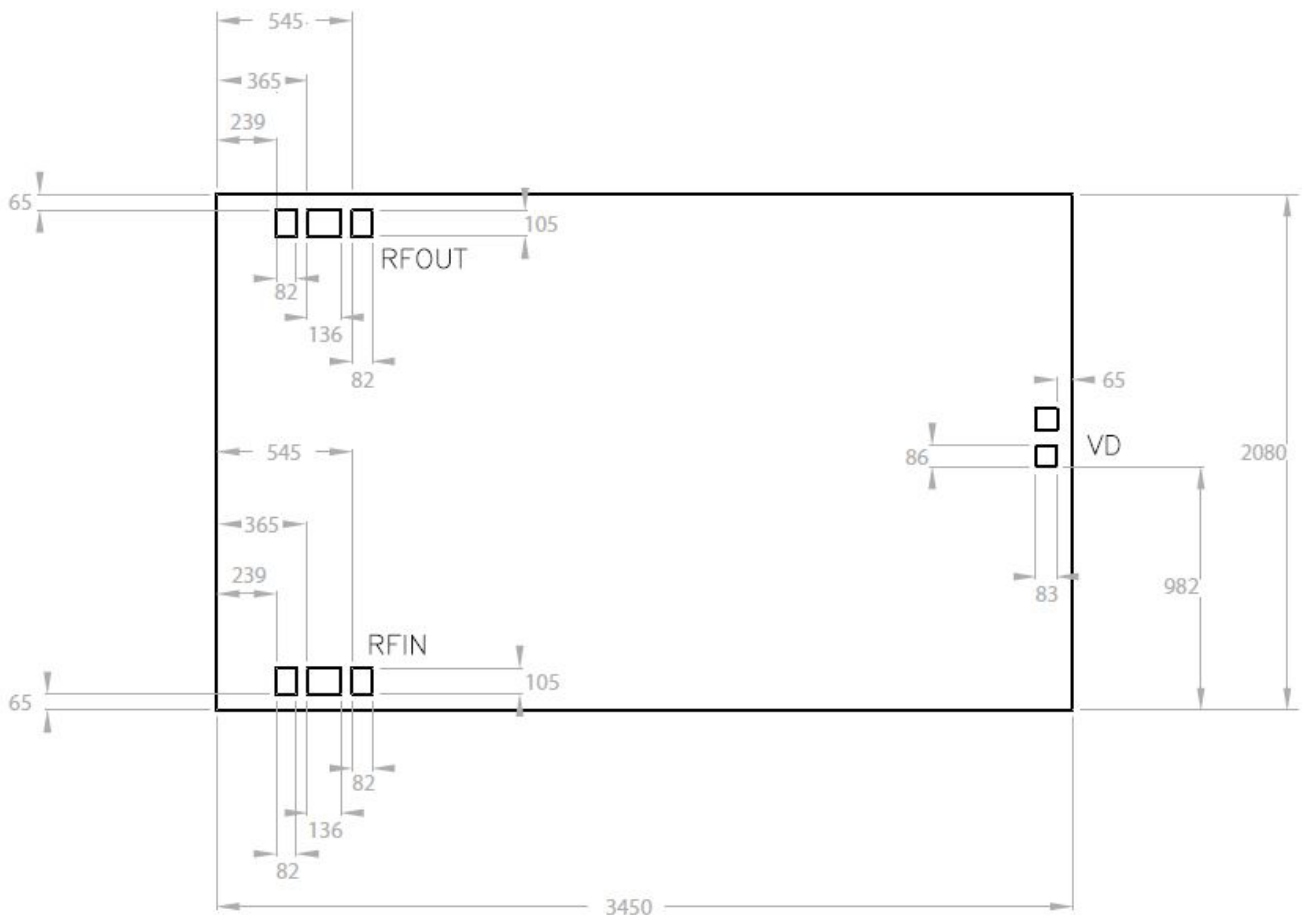


Relative Phase Shift



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Outline Drawing



Notes

1. All dimensions are in μm
2. Typical DC bond pads are $86 \times 83 \mu\text{m}$ square
3. RF bond pads are $105 \times 136 \mu\text{m}$ square
4. Gold backside metallisation
5. Backside metal is ground
6. Die thickness is $100 \mu\text{m}$

Die Packing Information

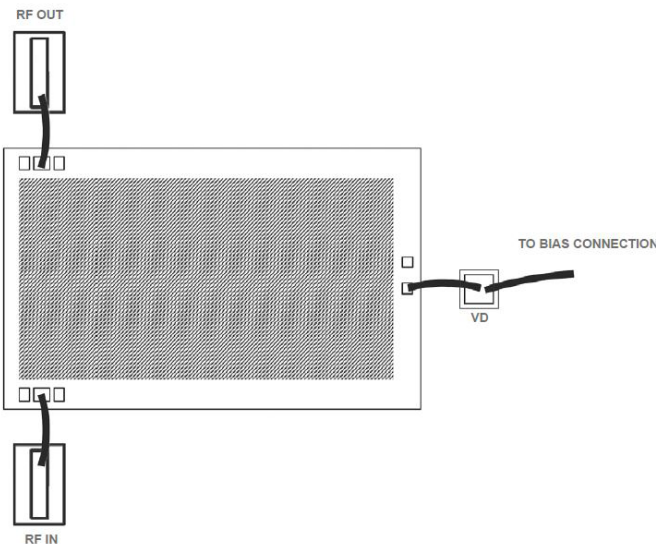
All dies are delivered using gel-paks unless otherwise requested

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Pad Descriptions

| Name | Description |
|--------|--|
| RFIN | Input RF pad. This pad is AC coupled |
| RFOUT | Output RF pad. This pad is AC coupled |
| VD | Voltage phase control pad |
| BOTTOM | The die backside must be connected to RF/DC ground |

Connection Configurations



General Notes On Assembly

Die should be mounted on conductive material such as gold-plated metal to provide a good ground and suitable heat sink, if necessary.

1. Attaching the die using Au/Sn preforms is preferable. The Eutectic melt for Au/Sn occurs at approximately 280 °C so the die (plus mount and preform) is initially heated up to 180 °C and then it is heated for approximately 10 seconds to 280 °C using a nitrogen heat gun. The device will survive 10 seconds at this temperature. The static breakdown for GaAs devices is approximately 330°C.
2. Pure, dry nitrogen should be used as the heat source.
3. If the device cannot be lifted/ placed by a vacuum device, then ESD die-lifting tweezers are preferable.
4. Aluminium wire must not be used.

Contact Information

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