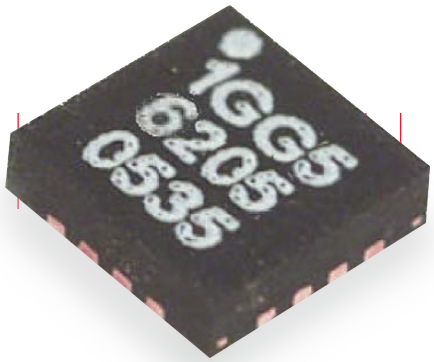
Keysight 1GG5-6205
DC to 13.5 GHz Packaged Integrated GaAs Diode Limiter

Data Sheet



Features

- RoHS compliant
- ESD protection:
  3000V human body model
- Insertion loss:
  1.0 dB typ.
- Port match:
  S_{11} and S_{22} –15 dB typ.
- Power handling:
  P_{-1dB} 25 dBm typ.
- Distortion:
  SHI > 100 dBm typ.
  THI +43 dBm typ.
  TOI +43 dBm typ.

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Description

The 1GG5-6205 is a 13.5 GHz GaAs integrated diode limiter that can be used to protect sensitive RF circuits from excess RF power, DC transients, and ESD.

The circuit contains Planar– Doped–Barrier (PDB) diodes with integrated matching networks and is fabricated the Keysight Technologies, Inc. GaAs diode process. The barrier height of each diode element and the number of diode elements in each "stack" are optimized for low distortion when P_{in} < 15 dBm, while limiting transmitted power when P_{in} > 25 dBm.

Absolute maximum ratings[1]

Symbol	Parameters/conditions	Min	Max	Units
P_{cont}	Continuous input power		33	dBm
I_{cont}	Continuous DC current		169	mA
V_{cont}	Continuous DC voltage		7	V
T_A	Backside temperature	–55	75	°C
T_{max}	Maximum assembly temperature[2]		300	°C
T_{stg}	Storage temperature	–65	165	°C

1. Operation in excess of any one of these conditions may result in permanent damage to this device. T_A = 25 °C except for T_{max} and T_{stg}.
2. Sixty-second maximum.

DC specifications/physical properties[1]

Symbol	Parameters/conditions	Min	Typ	Max	Units
Vfwd	Forward voltage @ 1 mA RF in/out pad to Gnd pad of diode stack		5.3		V
Rthru	DC through resistance		1		Ω

1. Measured on Wafer with T_{chuck} = 25 °C unless otherwise noted.

RF specifications[1]

Symbol	Parameters/conditions		Min	Typ	Max	Units
IL	Insertion loss	3 GHz 13.5 GHz		0.3 1.0		dB
RL	Return loss (S11 + S22)	3 GHz 13.5 GHz		23 15		dBm
P_{-1dB}	Incident power @ 1 dB gain compression	3 GHz 13.5 GHz		26 25		dBm
SHI	Second harmonic intercept	3 GHz 13.5 GHz		> 100 > 100		dBm
THI	Third harmonic intercept	3 GHz 13.5 GHz		50 43		dBm
TOI	Third order intercept	3 GHz 13.5 GHz		49 43		dBm

1. Measured on wafer with T_{chuck} = 25 °C. Numbers shown are over 0 - 50 GHz band unless otherwise specified.

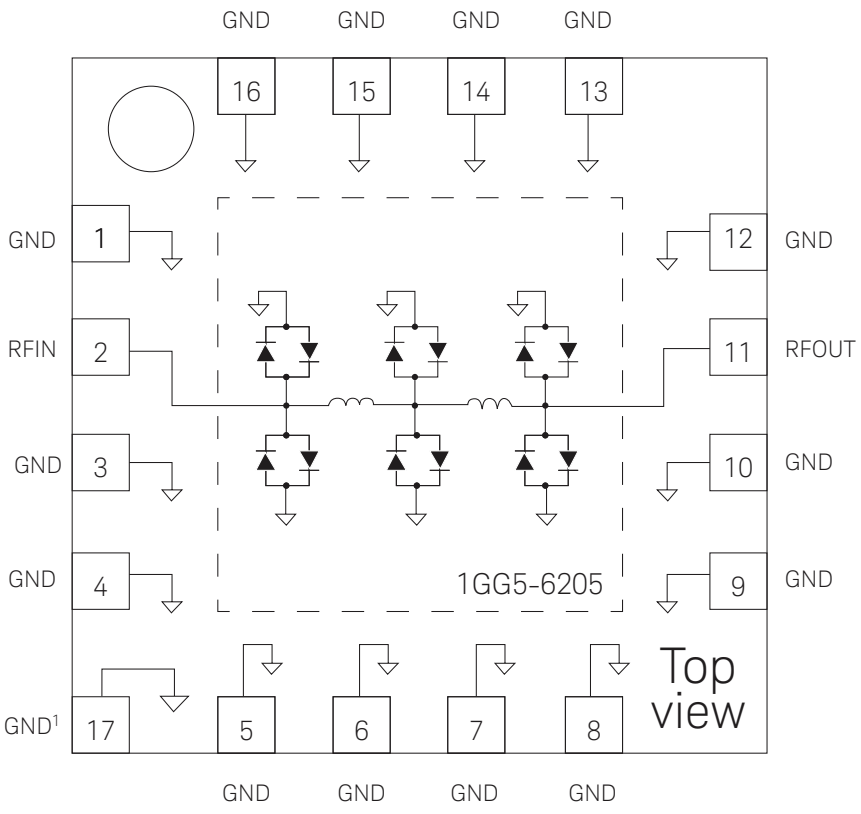

Figure 1. 1GG5-6205 schematic

Notes:

Discrete MIM chip capacitors are connected to the shunt diode stacks of the input limiter MMIC to allow DC offsets of the RFIN pins.

1. Pin 17 is the center heat slug. This must be connected to RF/DC ground. Use “filled” vias to prevent solder voids.

Applications

The 1GG5-6205 can be used as an RF limiter, a Reverse Power Protection (RPP) device, and as an ESD and DC transient protector.

As a limiter, the incident power at 1 dB gain compression (P_{-1dB}) is 26.5 dBm at 9 GHz, and drops to 25 dBm at 20 GHz.

As an ESD protection device, the 1GG5-6205 can protect ESD sensitive components, the degree of protection depending on the protected components characteristics. ESD damage level for the 1GG5-6205 by itself is greater than 6 kV (measured with an IEC801–2, 150 pF, 330 ohm contact ESD generator).

Figure 2. 1GG5-6205 tape and reel label

Biasing and Operation

The 1GG5-6205 needs no bias, and is symmetric.

Tape and Reel

The 1GG5-6205 component is available in tape and reel format See Figure 2 for tape and reel label.

Moisture Compatibility

Injection mold components are moisture-sensitive. The product is tested to the Moisture and Reflow Sensitivity Level as per IPC/Jedec J-STD-020 and must be mounted within 168 hours of opening the shipping container. Store and handle parts for reflow and for rework per IPC/Jedec J-STD-033B.

Figure 3. Moisture sensativity label

RoHS Compliance

This device is RoHS Compliant. This means the component meets the requirements of the European Parliament and the Council of the European Union *Restriction of Hazardous Substances* Directive 2011/65/EU, commonly known as *RoHS*. The six regulated substances are lead, mercury, cadmium, chromium VI (hexavalent), polybrominated biphenyls (PBB) and polybrominated biphenyl ethers (PBDE). RoHS compliance implies that any residual concentration of these substances is below the RoHS Directive's maximum concentration values (MVC); being less than 1000 ppm by weight for all substances except for cadmium which is less than 100 ppm by weight.

Assembly Techniques

The QFN SMT package is compatible with industry standard solder-reflow attach processes.

Diodes are ESD sensitive. ESD preventive measures must be employed in all aspects of handling and assembly. Diode ESD precautions, handling considerations, and bonding methods are critical factors in successful diode performance and reliability. Keysight Technologies, Inc. *Beam Lead Diode Bonding and Handling Procedures - Application Note,* literature number 5991-3513EN provides basic information on these subjects.

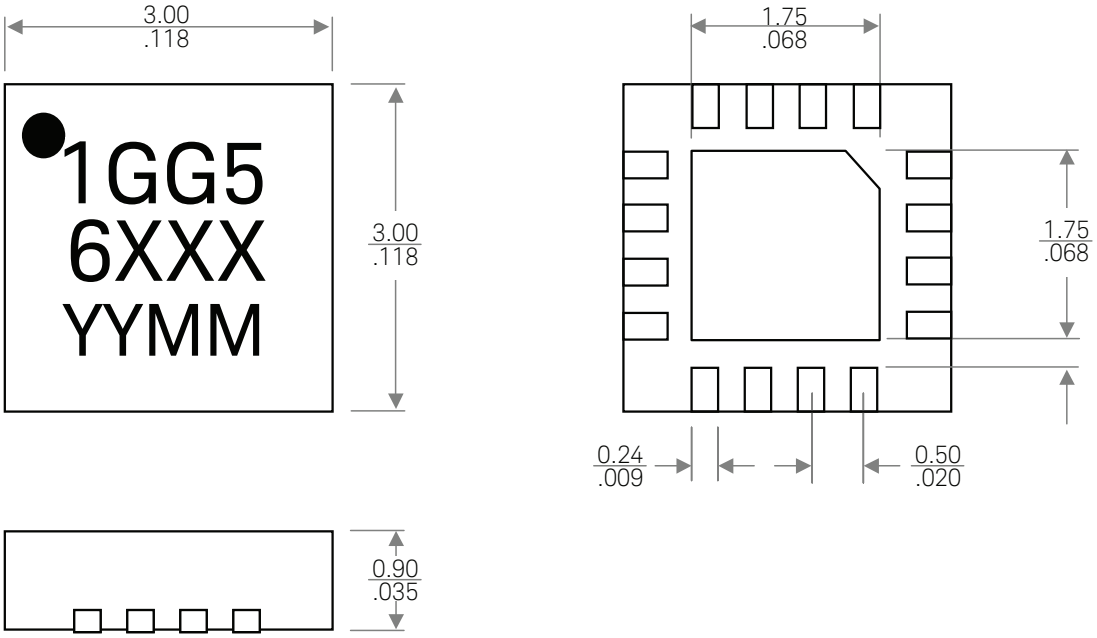

Figure 4. 3 X 3 mm QFN dimensions

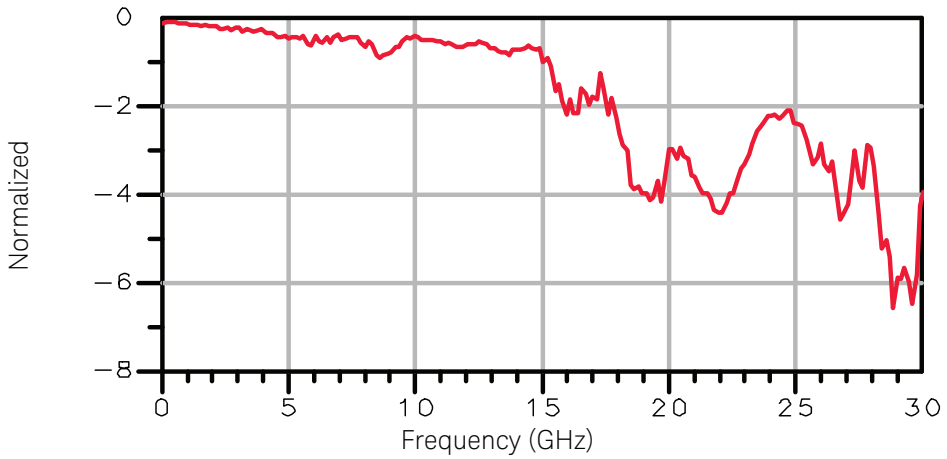

Figure 5. S_{21} normalized to PCB through

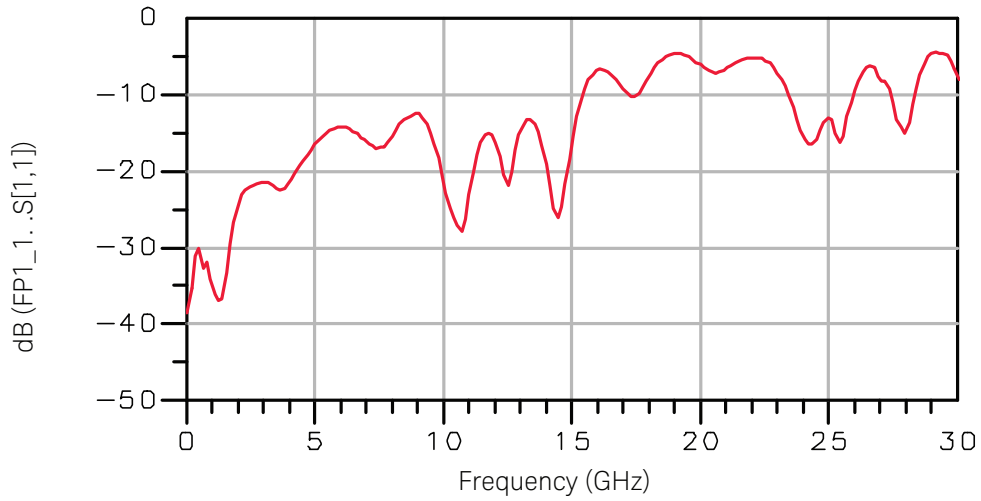

Figure 6. S_{11} (not gated)

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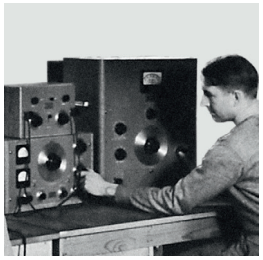

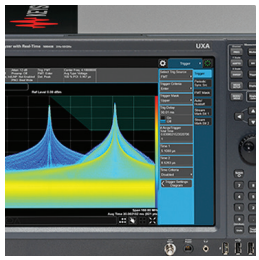

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This data sheet contains a variety of typical and guaranteed performance data. The information supplied should not be interpreted as a complete list of circuit specifications. Customers considering the use of this, or other Keysight Technologies GaAs ICs, for their design should obtain the current production specifications from Keysight. In this data sheet the term typical refers to the 50th percentile performance. For additional information contact Keysight at MMIC_Helpline@keysight.com.

The product described in this data sheet is **RoHS Compliant** and **RoHS Process Compatible** with a maximum temperature of 260 °C and a maximum of 3 temperature cycles.

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