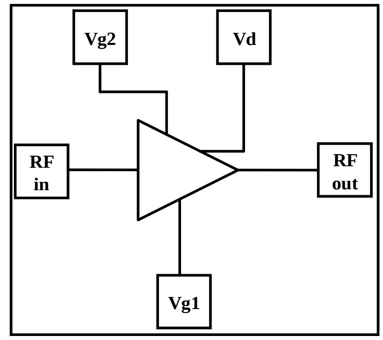
2 – 40 GHz Ultra-Wideband Amplifier

Features

- **Frequency Range: 2-40 GHz**
- **7±1.0 dB Nominal Gain**
- **Input Return Loss > 10 dB**
- **Output Return Loss > 10 dB**
- **Reverse Isolation > 30dB**
- **5 dBm Nominal P1dB**
- **DC decoupled Input & Output**
- **0.15-um InGaAs pHEMT Technology**
- **Chip Size : 3.0 mm x 1.5 mm x 0.1 mm**

Functional Diagram



Typical Applications

- **Wideband LNA/Gain block**
- **Electronic warfare**
- **Test Instrumentation**

Description

The AMT2175101 is an Ultra wideband pHEMT GaAs MMIC designed to operate over 2.0 GHz to 40.0 GHz frequency range. The design employs a 7-stage, cascode-connected pHEMT structure to ensure flat gain and good return loss. The device offers a typical small signal gain of 7 dB over the operating frequency band and has a Noise figure of less than 7.2 dB in entire band. The Input & output are matched to 50Ω with a VSWR better than 2:1. The chip is unconditionally stable.
The AMT2175101 is suitable for a variety of wideband electronic warfare systems such as radar warning receivers, jammers and instrumentation. In addition, the chip may also be used as a gain block. The die is fabricated using a reliable 0.15µm InGaAs pHEMT technology.

Absolute Maximum Ratings (1)

Parameter	Absolute Maximum	Units
Positive DC Supply	8	V
RF Input Power	20	dBm
Supply current	150	mA
Operating Temperature	-55 to +85	^oC
Storage Temperature	-65 to +150	^oC

1. Operation beyond these limits may cause permanent damage to the component

Electrical Specifications [1] @ T_A = 25°C, Z_o =50 Ω, Vd = 6.0V, Vg2 = 2.0 V, Vg1 =-0.20V

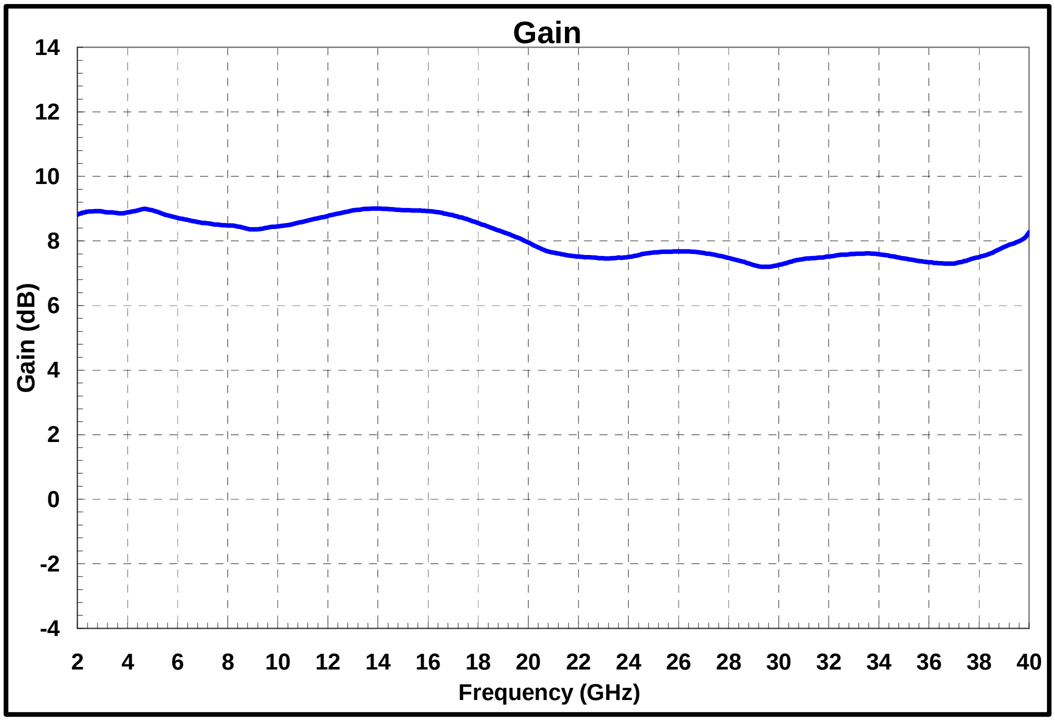
Parameter	Min.	Typ.	Max.	Units
Frequency	2.0	-	40.0	GHz
Gain	6.0	7	8.5	dB
Gain Flatness	-	±0.75	-	dB
Noise Figure	-	5.0	-	dB
Input Return Loss	10	12	-	dB
Output Return Loss	10	12	-	dB
Output Power (P1dB)	-	5	-	dBm
Output Third Order Intercept(IP3)	-	15	-	dBm
Supply Current	-	55	90	mA

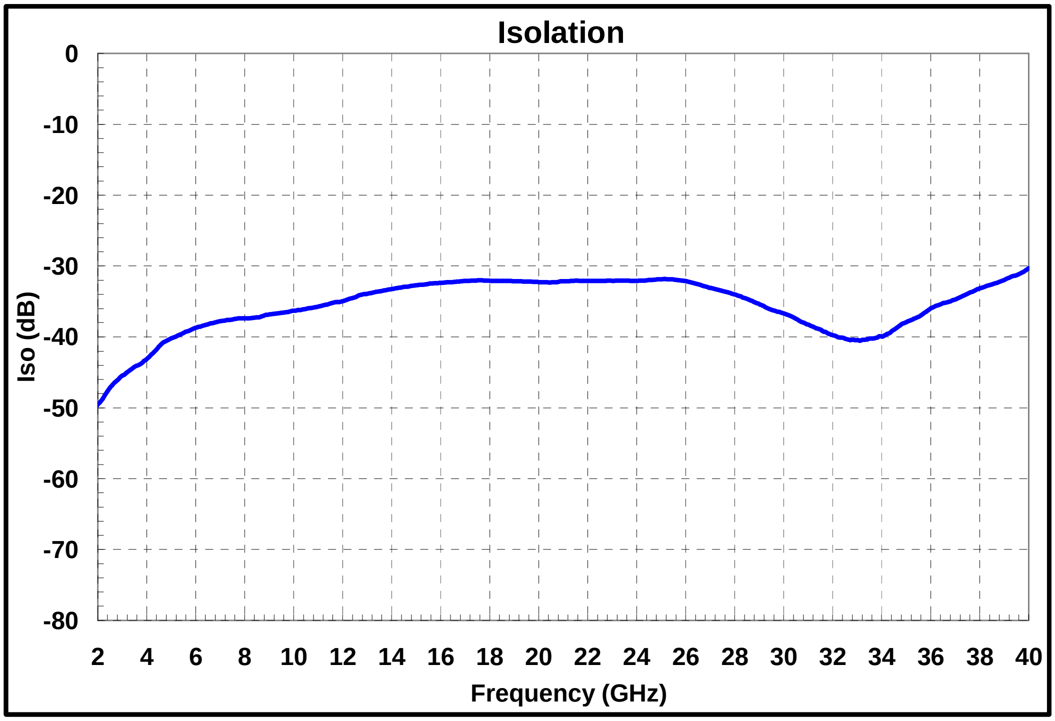
Note:

1. Electrical specifications mentioned above are measured in a test fixture.
2. For optimal performance, the gate voltage Vg1 should be tuned to achieve a drain current of 55mA (typ.).
3. The negative gate supply (Vg1) can be tuned from 0V to -0.35V.
4. By varying the Vg1, the gain & current can be controlled to the user requirements.

Test fixture data

Vd= +6.0V, Vg2=+2.0V & Vg1 = -0.2V, Current =55 mA, $T_A = 25\,^oC$





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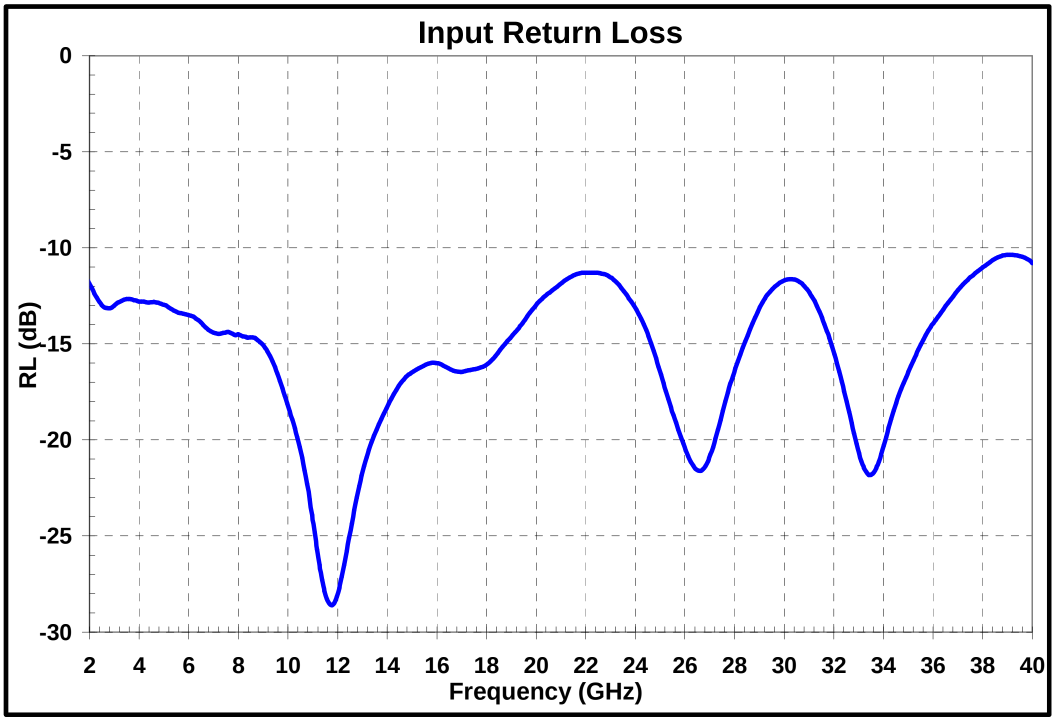
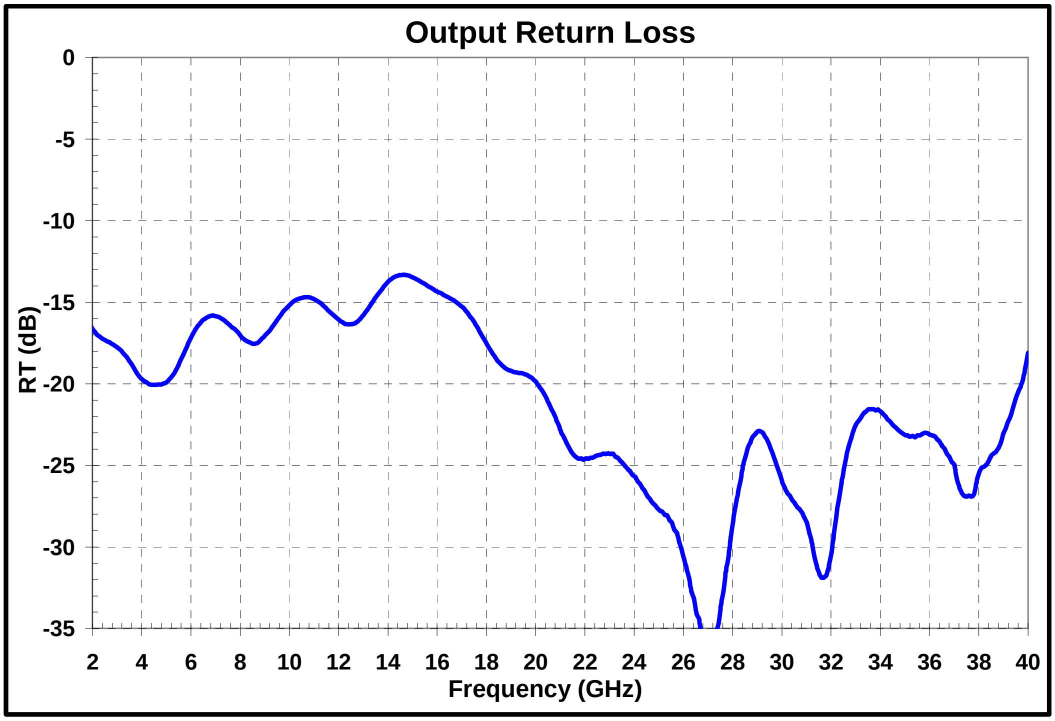
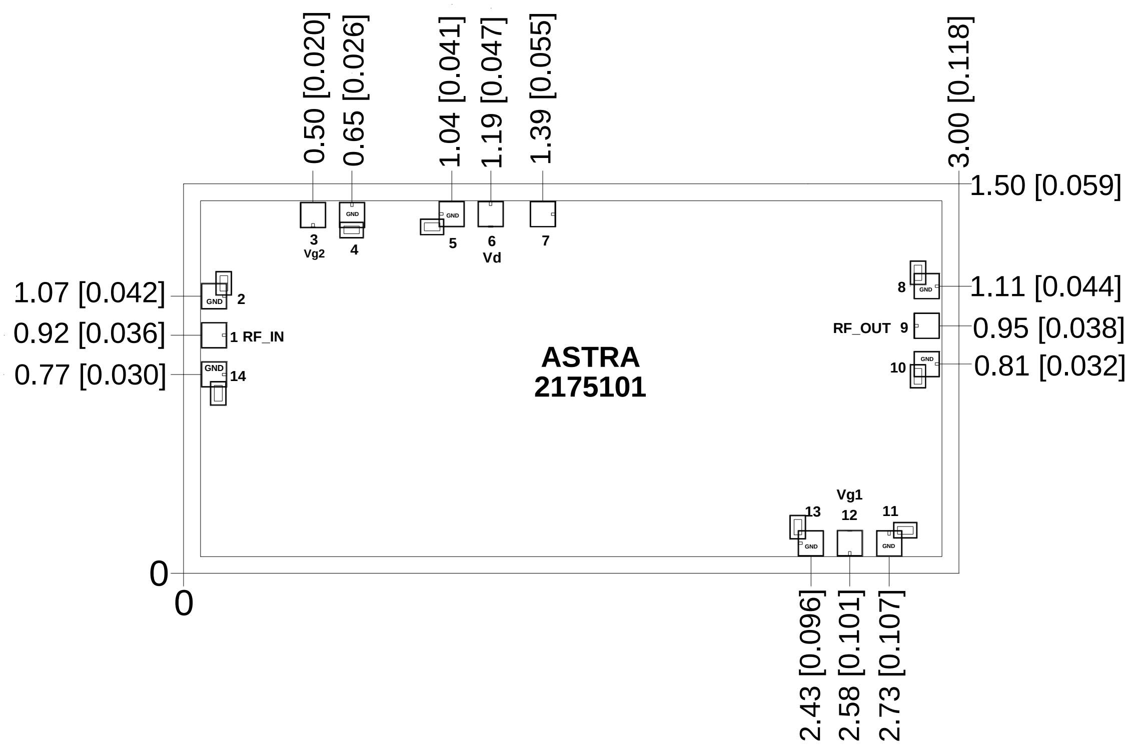




Mechanical Characteristics

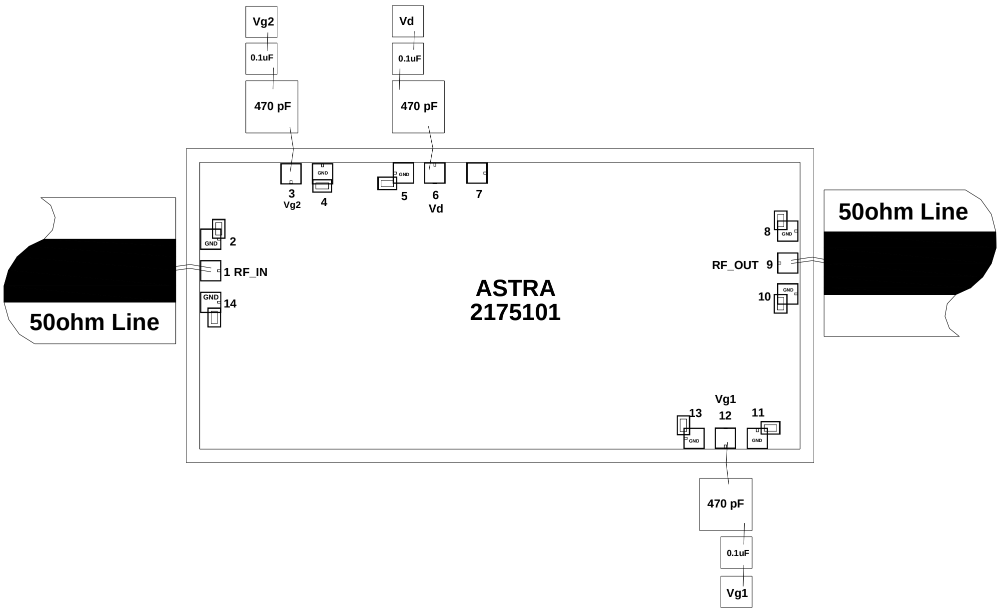


Units: millimeters (inches)

Note:

1. All RF and DC bond pads are 100µm x 100µm
2. Pad no. 1 : RF In
3. Pad no. 9: RF out
4. Pad no. 6: Vd
5. Pad no.12: Vg1
6. Pad no. 3: Vg2

Recommended Assembly Diagram



Note :

1. Two 1 mil (0.0254mm) bond wires of minimum length should be used for RF input and output.
2. Two 1 mil (0.0254mm) bond wires of minimum length should be used from chip bond pad to 470pF capacitor.
3. Input and output 50 ohm lines are on 5 mil RT Duroid substrate
4. 0.1 µF capacitors may be additionally used as a second level of bypass for reliable operation
5. The RF input & output ports are DC decoupled on-chip.

Die attach: For Epoxy attachment, use of a two-component conductive epoxy is recommended. An epoxy fillet should be visible around the total die periphery. If Eutectic attachment is preferred, use of fluxless AuSn (80/20) 1-2 mil thick preform solder is recommended. Use of AuGe preform should be strictly avoided.

Wire bonding: For DC pad connections use either ball or wedge bonds. For best RF performance, use of 150 - 200µm length of wedge bonds is advised. Single Ball bonds of 250-300µm though acceptable, may cause a deviation in RF performance.

GaAs MMIC devices are susceptible to Electrostatic discharge. Proper precautions should be observed during handling, assembly & testing

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