



Features

- 8W Power Amplifier.
- 39 dBm Saturated Pulsed Output Power.
- 20dB small signal gain.
- Bare Die with dual sided bias.
- 100% on-wafer DC & RF Power tested
- 100% visual inspection to MIL-STD-883

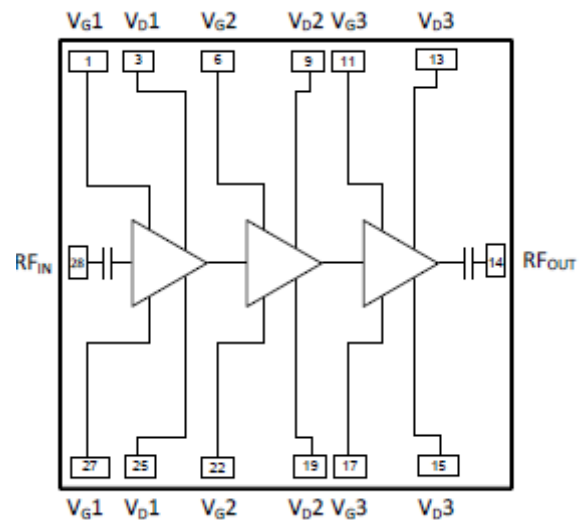
Application

- Communication systems
- Radar applications

Description

The ICP1639-DIE is a three stage GaAs power amplifier MMIC with an operating frequency 14.5-17.5GHz. The PA has a pulsed saturated output power of 39dBm and a gain of 20dB.

Functional Diagram



Electrical Specifications: Freq. = 14.5-17.5GHz, T_A = 25°C, Duty Cycle 5% Pin = 23dBm

Parameter	Units	Min.	Typ.	Max.
Gain	dB	—	21	—
Gain Flatness	dB	—	+/-1.0	—
Input Return Loss	dB	—	10.0	—
Output Return Loss	dB	—	6.0	—
Output Power 3dB 14.5-15GHz 15.0-17.5GHz	dBm	35.0 37.5	37.5 39.0	—
Drain Bias Voltage	V	—	8.0	—
Gate Bias Voltage	V	—	-0.9	—
Current	A	—	5.0	7.0

Absolute Maximum Ratings

Parameter	Absolute Maximum
Max Input Power	+30 dBm
Drain Voltage	+8.5 V
Drain Current	7.5A
Gate Voltage	-0.5V < V _G < -2V
Operating Temperature	-40°C to +85°C
Junction Temperature	+175°C
Storage Temperature	-65°C to +165°C

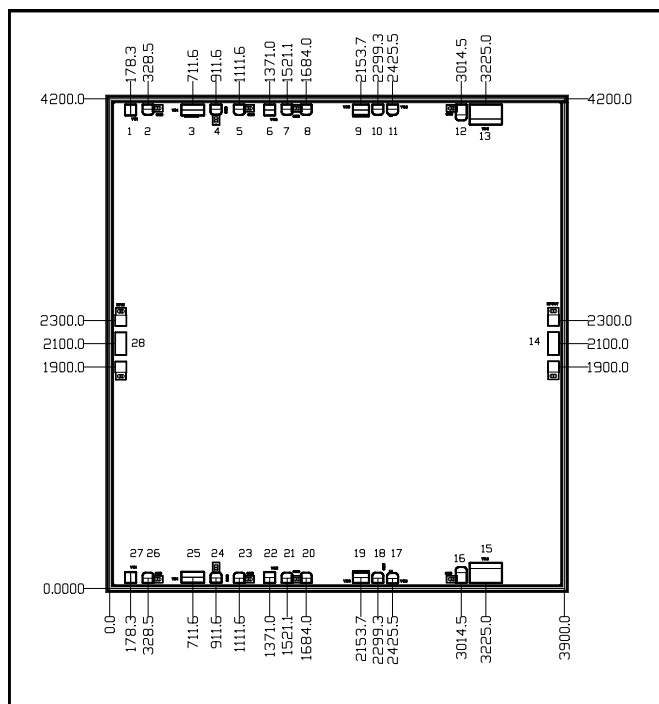
Ordering Information

Part No.	Description
ICP1639-1-110I	Bare die in Gel-Pack trays
ICP1639-1-503U	Evaluation Board with K-Type connectors

Exceeding any one or combination of these limits may cause permanent damage to this device. IconicRF does not recommend sustained operation near these survivability limits. MTTF > 1x10⁶ hours at nominal operating conditions T_J < +175°C



Package Outline



Bond Pads

Pad Number	Description
1, 27	VG1
3,25	VD1
6, 22	VG2
9,19	VD2
11,17	VG3
13,15	VD3
2,4,5,7,8,10,12,16,18,23,24,26	GND
14	RF OUT
28	RF IN

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Biasing

The VG1, VG2, VG3 must be biased on one side of the Die. VD1 and VD2 must be biased on one side of the die only, on the opposite side to VG. The VD3 must be biased on both sides.

The PA should always be biased on by applying the gate voltage before the drain voltage. To turn off the PA the drain voltage should be removed before the gate voltage.

Optimal bias voltages should be VG=-0.9V and VD=8V.

Decoupling

Each DC pin (VG, VD) must have a 100pF DC bypass capacitor as close to the die as possible. Additional 2.2uF capacitors are required on the gate side VG1, VG2, VG3 and a drain capacitance of 0.01uF must be added to the DC drain feed lines.

Assembly Guidance

The product is 0.075mm (0.003") thick with ground vias through to the backside of the chip. Connection to a microstrip substrate with 50ohm lines should be made with the substrate as close as possible to the chip.

Die attach of component using adhesive

- Vacuum collets are preferred method of pickup
- Silver sintered epoxy is recommended.

Die attach of component using eutectic

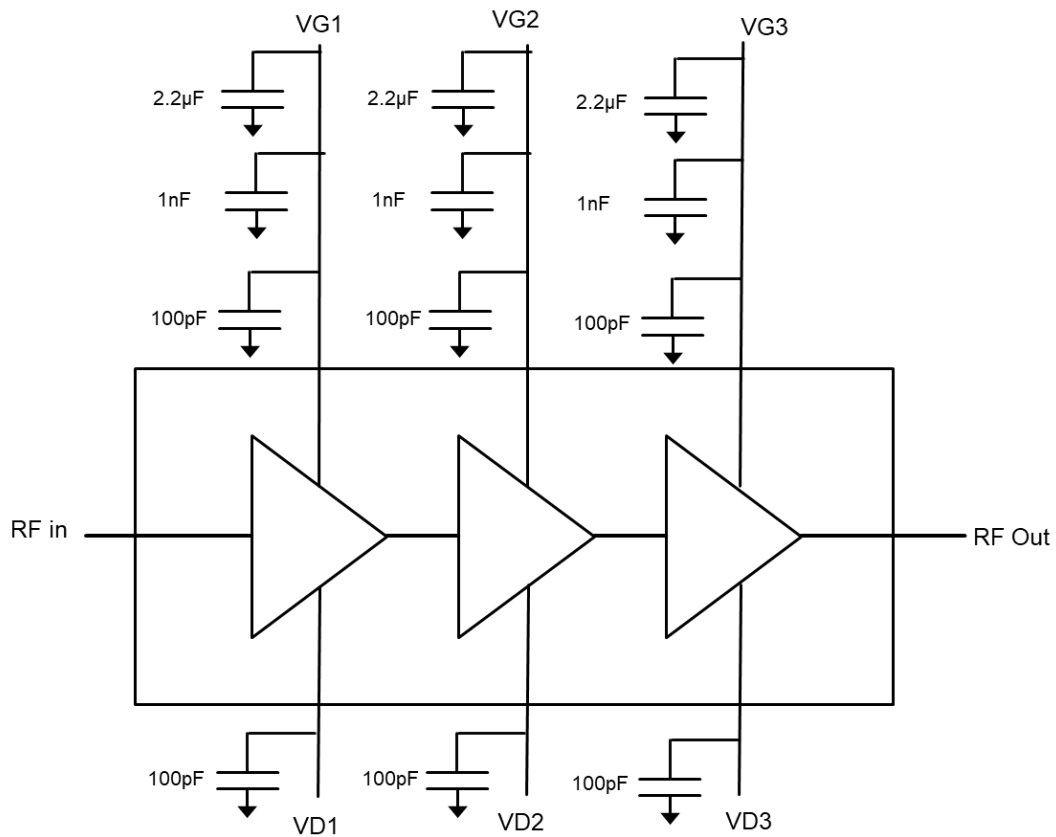
- Flux-less gold-tin (AuSn) (80% Au, 20% Sn with a melting point of 280°C) preform is preferred between the die and attached surface.
- Recommended preform should be approximately 0.0012" thick.
- Die bonder using heated collet with a temperature of 310°C and die scrubbing should be used to ensure wetting and prevent formation of voids.
- Exposure to extreme temperature should be kept to a minimum.
- The optimum die attach environment is nitrogen atmosphere.
- Gold Germanium preforms should be avoided.

Interconnect assembly Notes

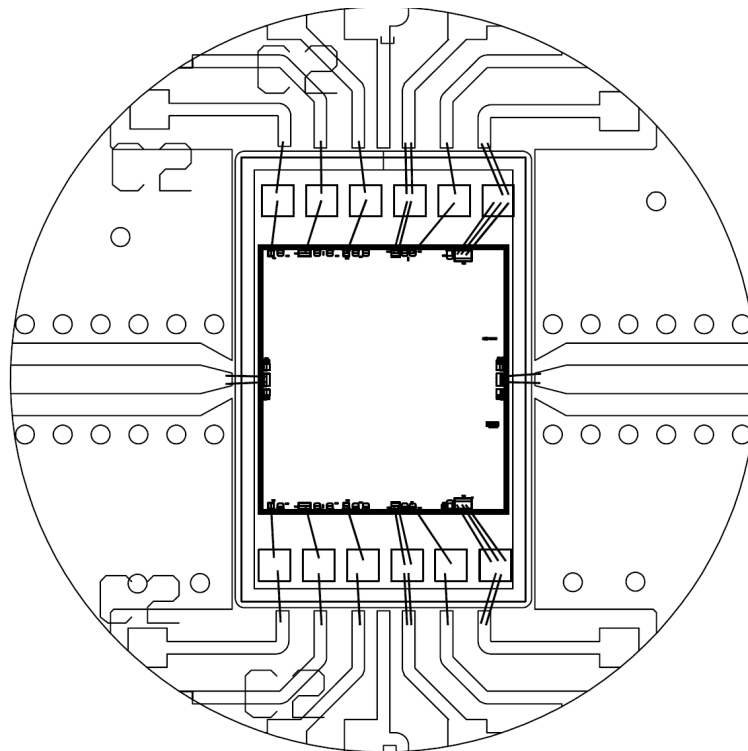
- Ball Bonding and ribbon bonding is preferred technique
- Recommended wire is 0.076mm x 0.0013mm (0.003" x 0.0005") gold ribbon 99.99% pure gold with 0.5-2% elongation to minimize inductance on the RF port.
- Force, time and ultrasonic parameters are critical
- Bond Wire diameter of 1.0mil is recommended
- Aluminum wire bonding is not recommended



Application Schematic



Bonding Diagram





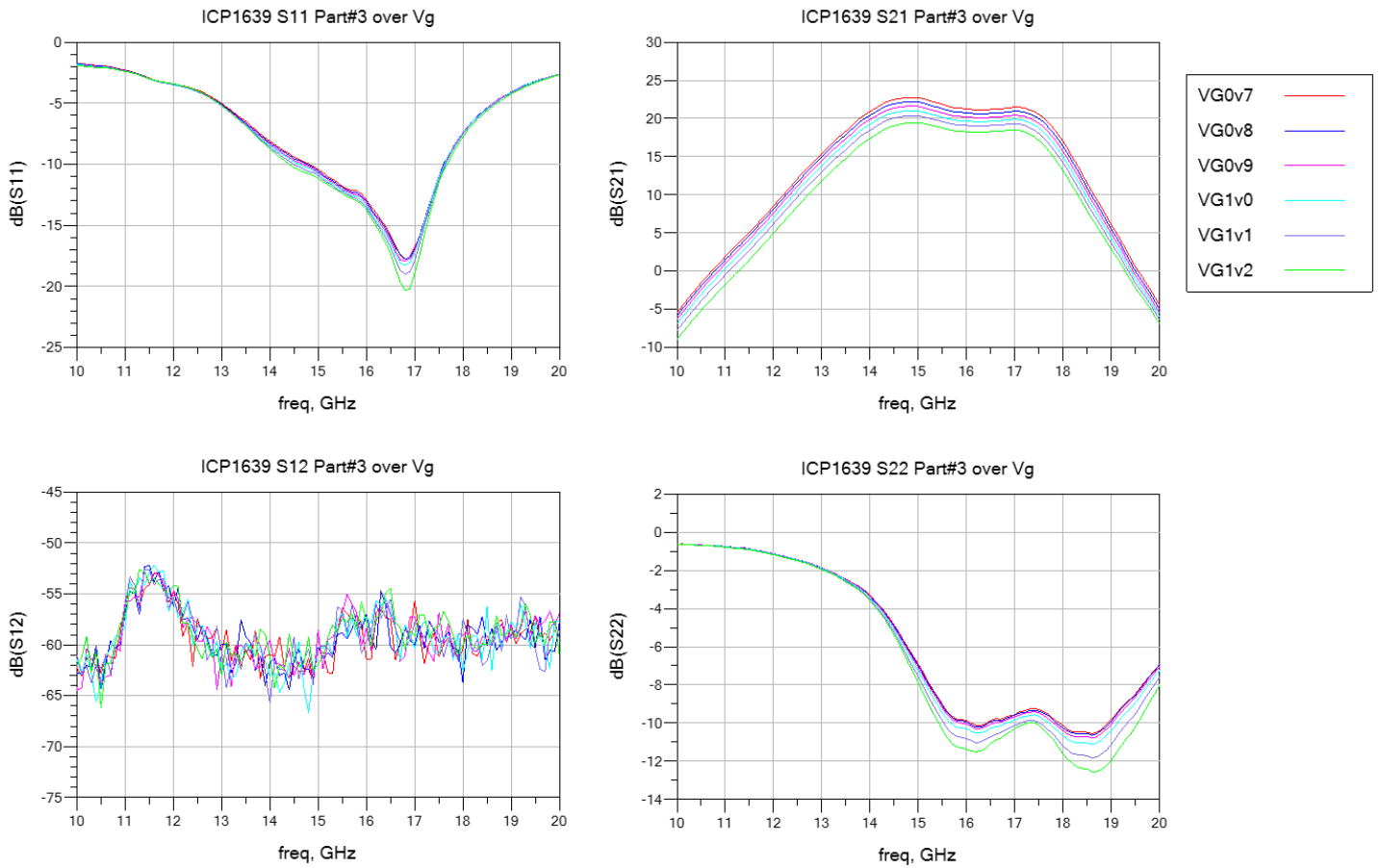
ICP1639

14.5-17.5GHz 8W GaN PA MMIC

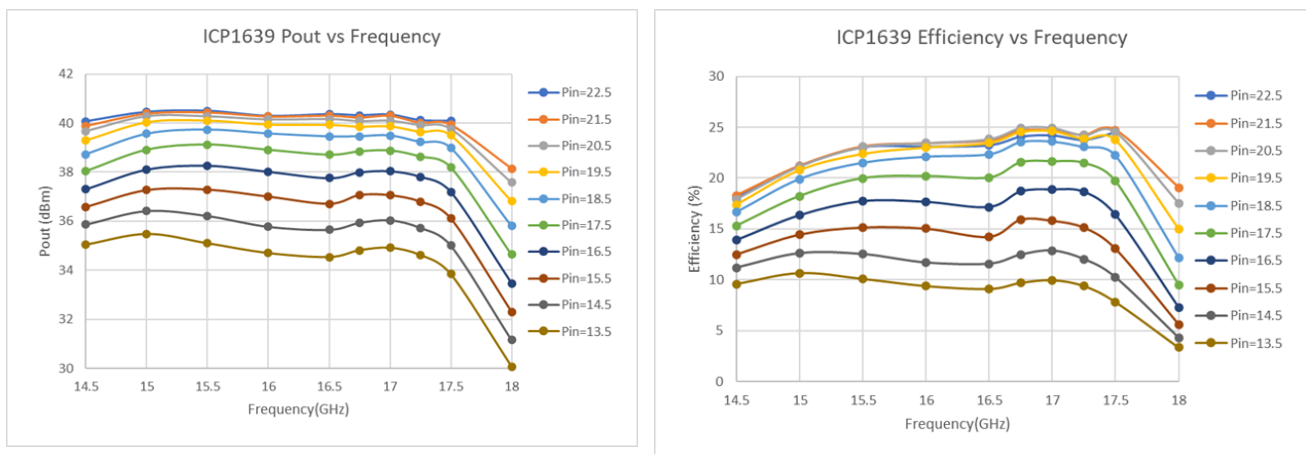
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Typical RF Performance | Test Conditions unless otherwise stated | $V_D=8V$, Temperature=25°C, Duty Cycle=5% of 100 μ S



Typical RF Performance | Test Conditions unless otherwise stated | $V_D=8V$ VG=-0.9V, Temperature=25°C, Duty Cycle=5% 5 μ S





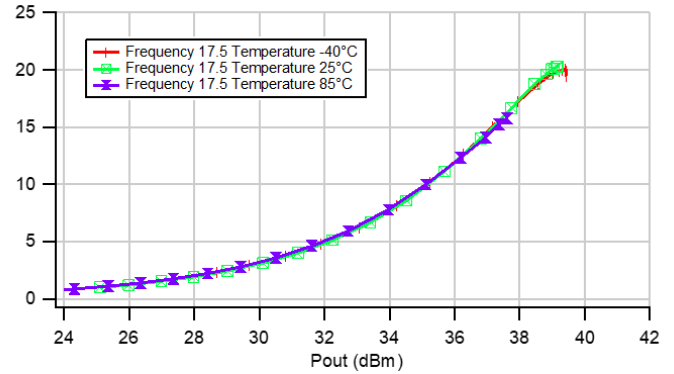
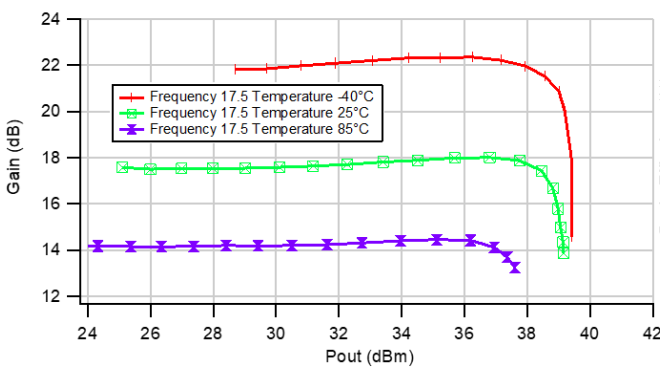
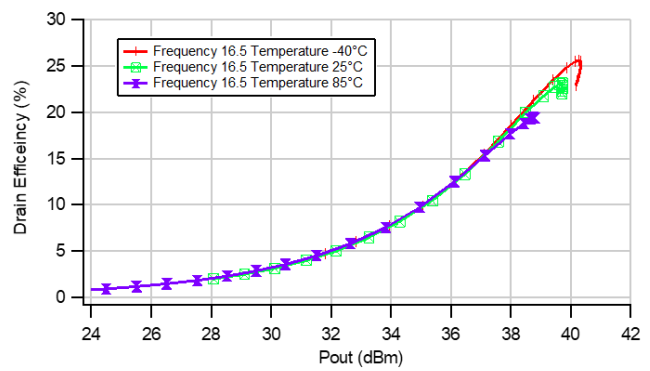
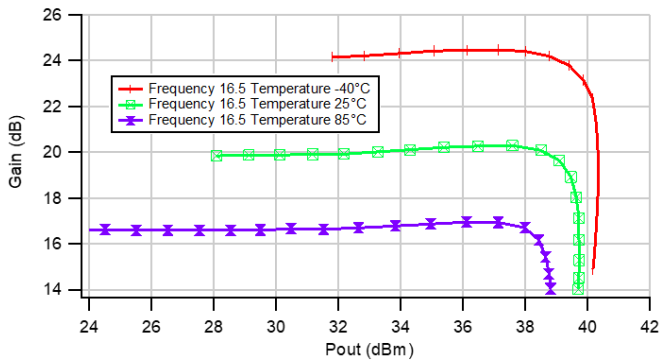
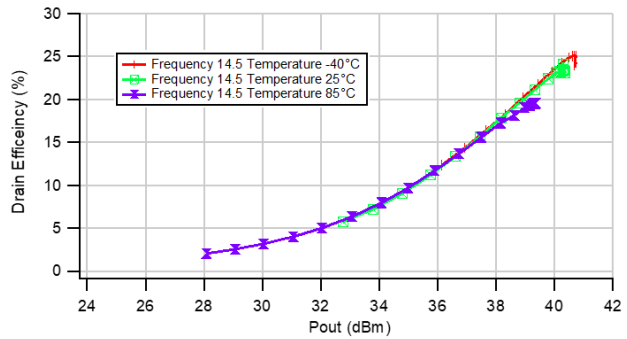
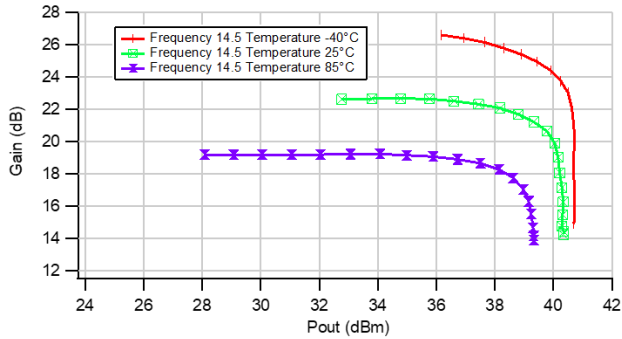
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14.5-17.5GHz 8W GaN PA MMIC

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Typical RF Performance | Test Conditions unless otherwise stated | $V_D=8V$ $V_G=-0.9V$, Duty Cycle=5% of 100 μ S





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ICONIC RF Ltd, Innovation Factory, 385 Springfield Road, Belfast, BT12 7DG, United Kingdom

Web: WWW.ICONICRF.COM
Email: INFO@ICONICRF.COM