

Applications

- Commercial and Military Radar
- Communications
- Electronic Warfare (EW)

Product Features

- Frequency Range: 6 - 12 GHz
- Push-Pull Configuration
- Low Harmonic Content; ≤ -40 dBc at Psat
- Small Signal Gain: > 27 dB
- Power: > 32 dBm
- PAE: > 15 %
- IM3: < -20 dBc
- Input Return Loss > 15 dB
- Output Return Loss > 10 dB
- Bias: $V_D = 25$ V, $I_{DQ} = 200$ mA
- Package Dimensions: 5.0 x 5.0 x 1.42 mm

General Description

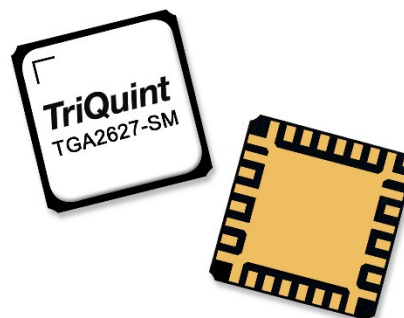
TriQuint's TGA2627-SM is a push-pull driver amplifier fabricated on TriQuint's TQGaN25 0.25um GaN on SiC production process. The TGA2627-SM operates from 6 to 12 GHz and provides 32 dBm of output power with 18 dB of large signal gain and greater than 20 % power-added efficiency. The push-pull topology yields > 40 dB of harmonic suppression at Psat.

Using GaN MMIC technology and air-cavity ceramic QFN packaging, the TGA2627-SM provides a low cost driver solution that provides the added benefit of operating on the same voltage rail as the corresponding GaN HPA. It can also serve as the output power amplifier on lower power architectures.

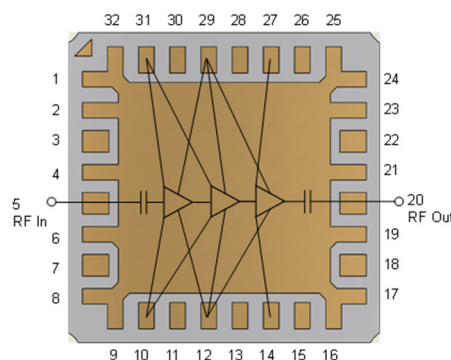
The TGA2627-SM is offered in a 5x5 mm air-cavity QFN with an aluminum nitride base and LCP lid. It is well-matched to 50 ohms and includes integrated DC blocking caps on both RF ports allowing for simple system integration.

Lead-Free & RoHS compliant.

Evaluation Boards are available on request.



Functional Block Diagram



Pad Configuration

Pad Number	Symbol
1-4, 6-9, 11, 13, 15-19, 21-26, 28, 30, 32	GND
5	RF Input
10, 31	V_{G12}
12, 29	V_D
14, 27	V_{G3}
20	RF Output

Ordering Information

Part	ECCN	Description
TGA2627-SM	EAR99	6 -12 GHz GaN Driver Amplifier

Absolute Maximum Ratings

Parameter	Value
Drain Voltage (V_D)	40 V
Gate Voltage Limits (V_G)	-8 V / 0 V
Drain Current (I_D)	550 mA
Gate Current (I_G @ $T_{CH} = 200\text{ }^{\circ}\text{C}$)	-1.4 / 11.2 mA
Power Dissipation, 85 $^{\circ}\text{C}$ (P_{diss})	12.3 W
Input Power, CW, 50 Ω ¹	30 dBm
Input Power, CW, VSWR 10:1 ¹	27 dBm
Channel Temperature (T_{CH})	275 $^{\circ}\text{C}$

Notes:

1. $V_D = 25\text{ V}$, $I_{DQ} = 40\text{ mA}$, $T_B = 85\text{ }^{\circ}\text{C}$

Recommended Operating Conditions

Parameter	Value
Drain Voltage (V_D)	25 V
Gate Voltage (V_G), typical	-2.33 V
Quiescent Drain Current (I_{DQ})	200 mA
Operating Drain Current (I_{D_DRIVE})	430 mA

Electrical Specifications

Test conditions, unless otherwise noted: $T = 25\text{ }^{\circ}\text{C}$, $V_D = 25\text{ V}$, $I_{DQ} = 200\text{ mA}$, part mounted to EVB (page 11)

Parameter	Min	Typical	Max	Units
Operating Frequency Range	6		12	GHz
Output Power (@ $P_{in} = 13\text{ dBm}$)		> 32		dBm
Power Added Efficiency (@ $P_{in} = 13\text{ dBm}$)		> 15		%
Small Signal Gain		> 27		dB
Input Return Loss		> 16		dB
Output Return Loss		> 10		dB
IM3 ($P_{OUT}/\text{tone} < 26\text{ dBm}$)		< -20		dBc
2 nd Harmonic Suppression		≤ -40		dBc
3 rd Harmonic Suppression		≤ -40		dBc
Output Power Temperature Coefficient		-0.012		dB/ $^{\circ}\text{C}$

Specifications

Thermal and Reliability Information

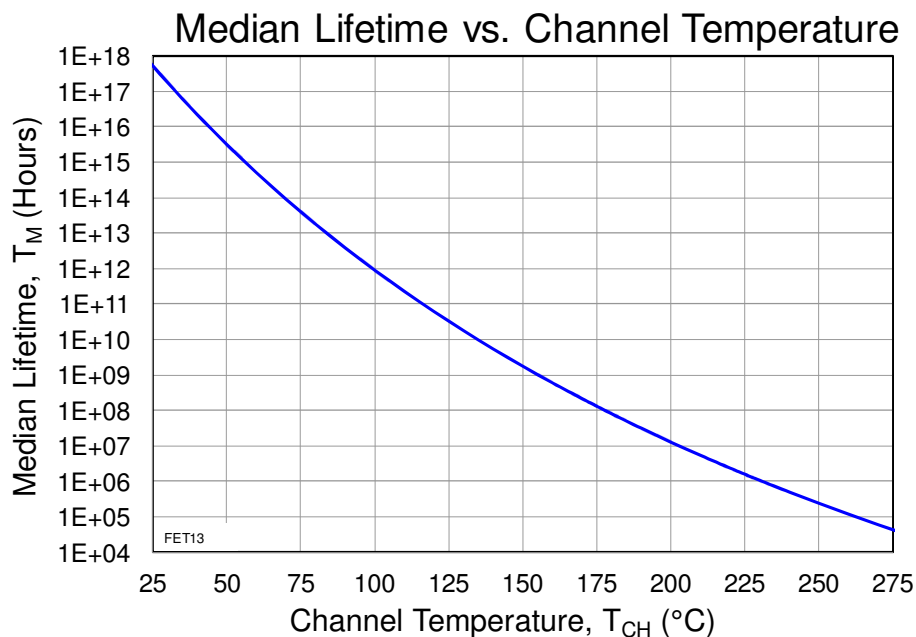
Parameter	Conditions	Value	Units
Thermal Resistance (θ_{JC}) ⁽¹⁾	$T_{PKG} = 85^{\circ}\text{C}$, $V_D = 25\text{ V}$, $I_{DQ} = 200\text{ mA}$, $I_{D_DRIVE} = 390\text{ mA}$, $P_{IN} = 15\text{ dBm}$, $P_{OUT} = 31\text{ dBm}$, $P_{DISS} = 8.5\text{ W}$	10.6	$^{\circ}\text{C/W}$
Channel Temperature (T_{CH}) ⁽¹⁾		175	$^{\circ}\text{C}$
Median Lifetime (T_M)		1.3E08	Hrs

Note:

1. Die mounted to 12mil aluminum nitride base using conductive epoxy; package backside temperature fixed at 85°C .

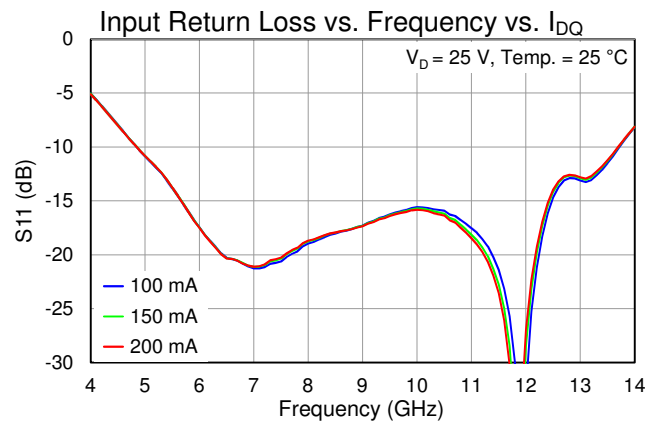
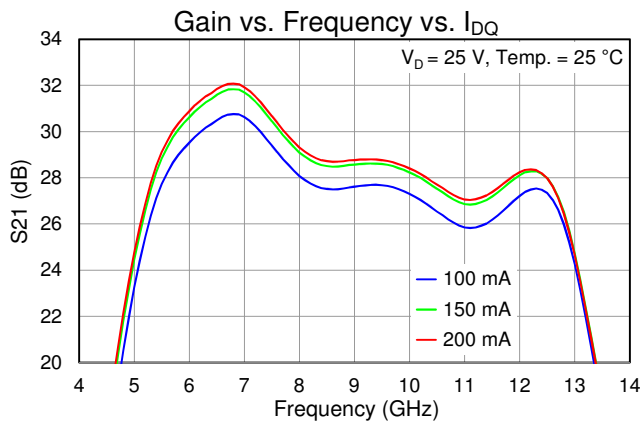
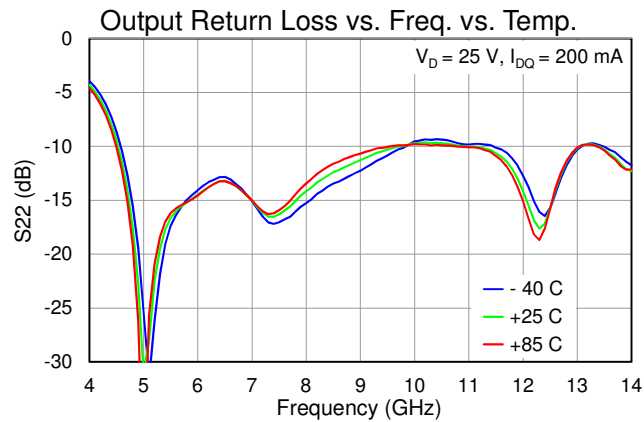
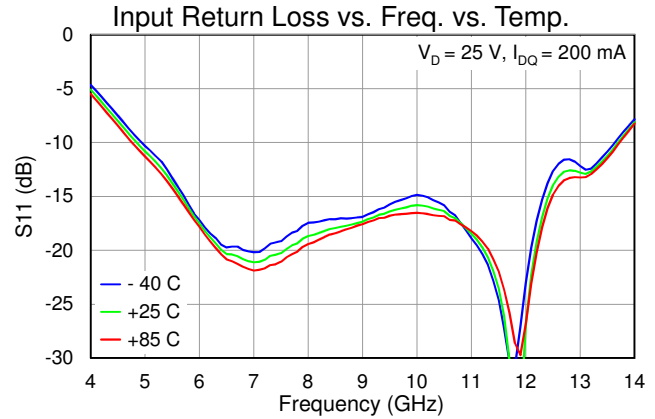
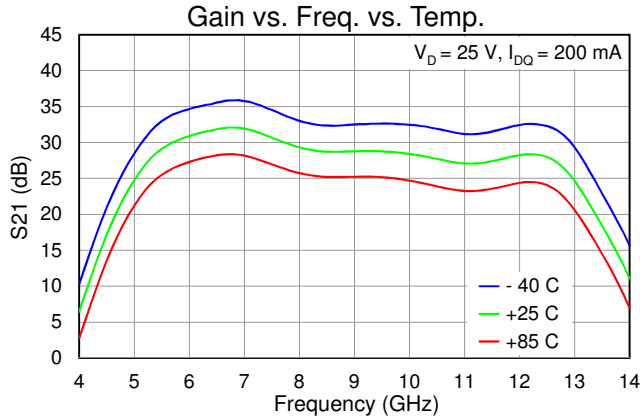
Median Lifetime

Test Conditions: 40 V; Failure Criterion = 10% reduction in I_{D_MAX}



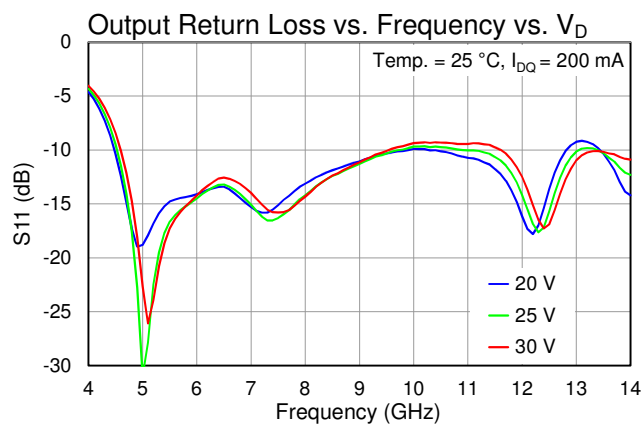
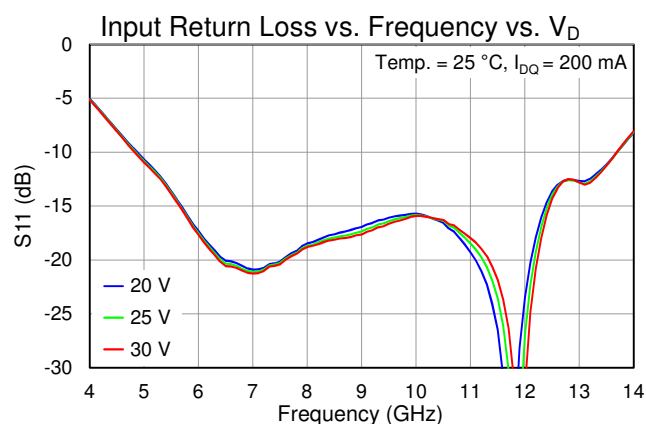
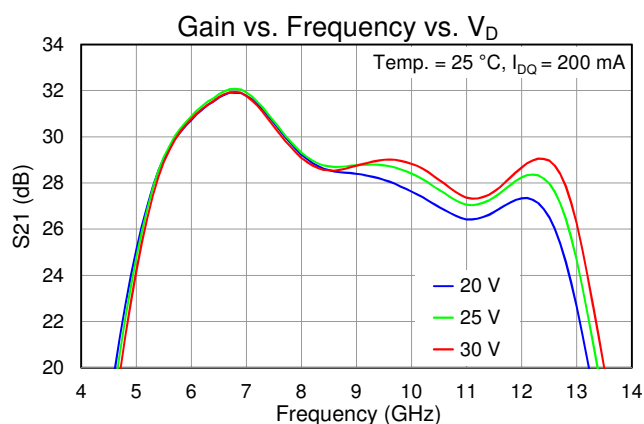
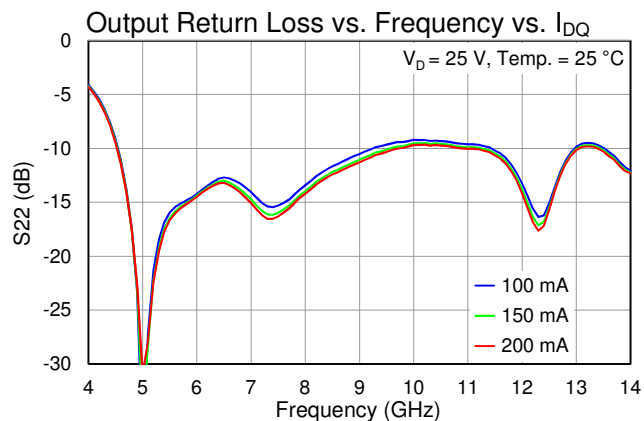
Typical Performance

Test conditions, unless otherwise noted: $T = 25\text{ }^{\circ}\text{C}$, part mounted to EVB (page 11)



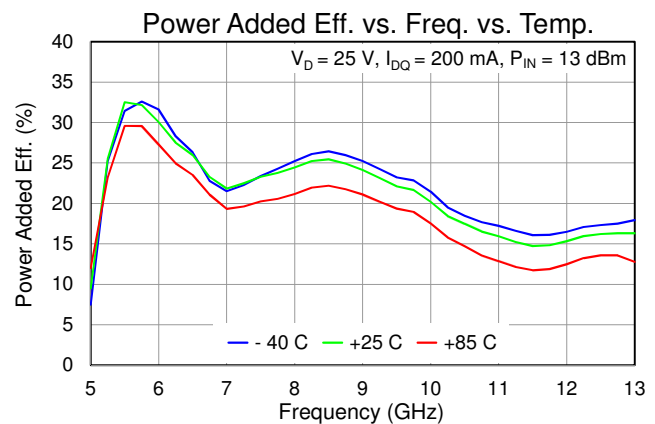
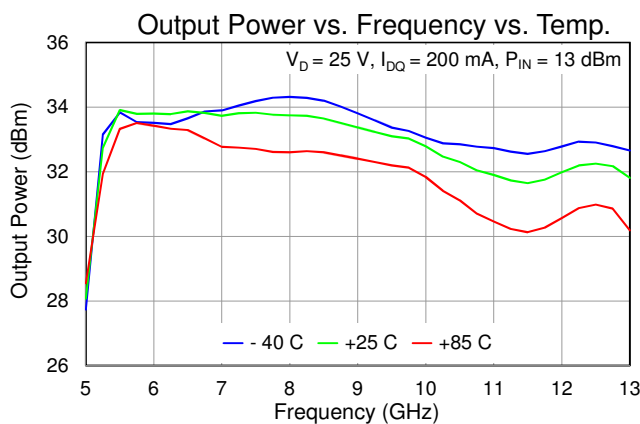
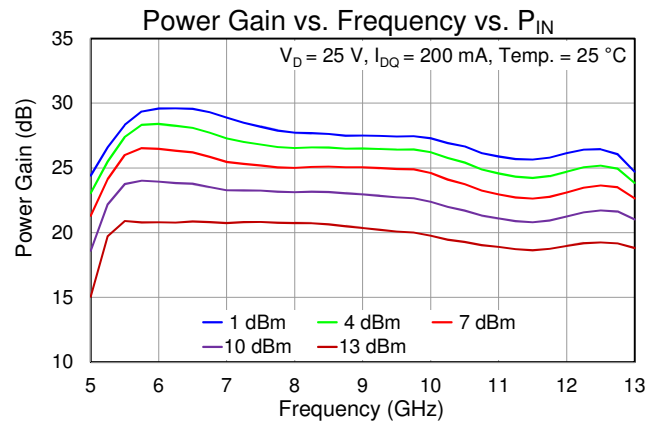
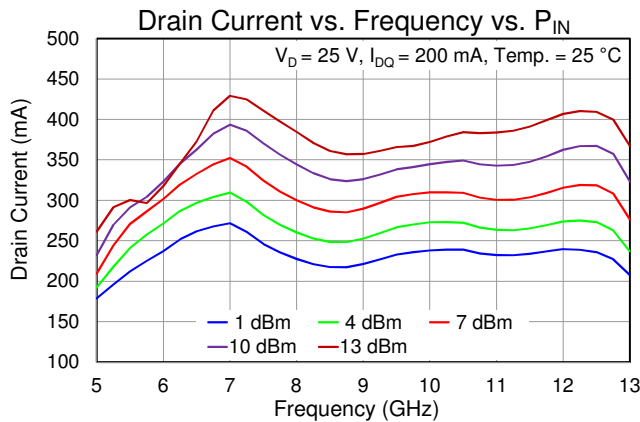
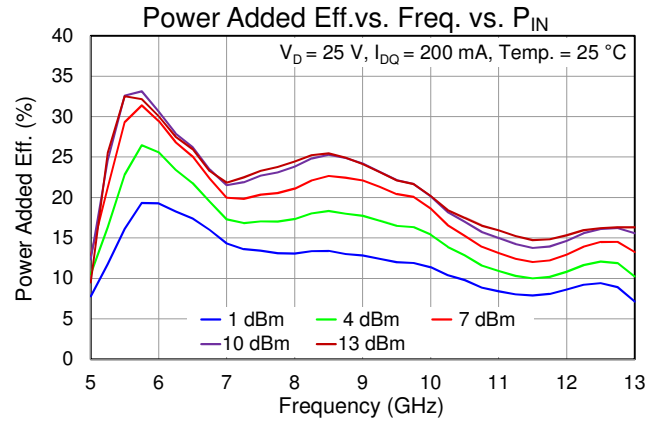
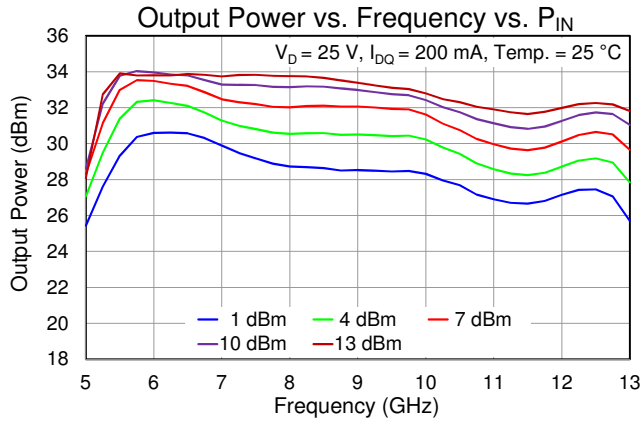
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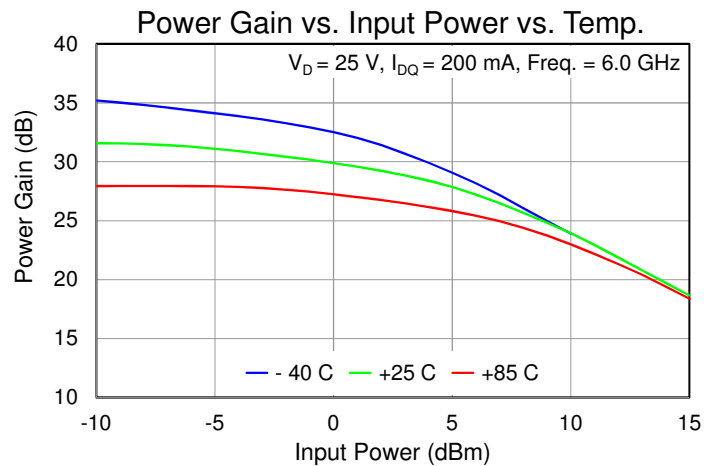
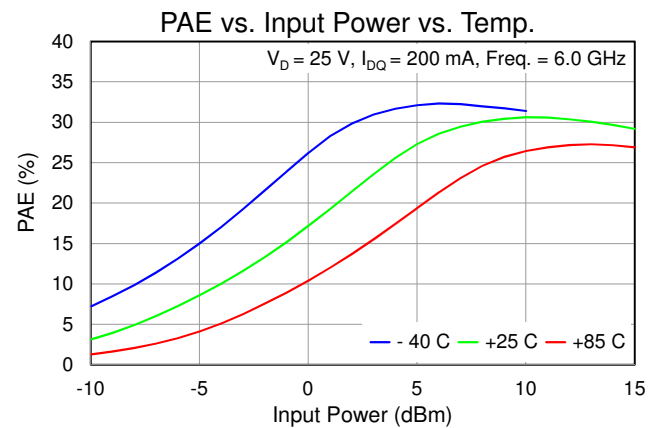
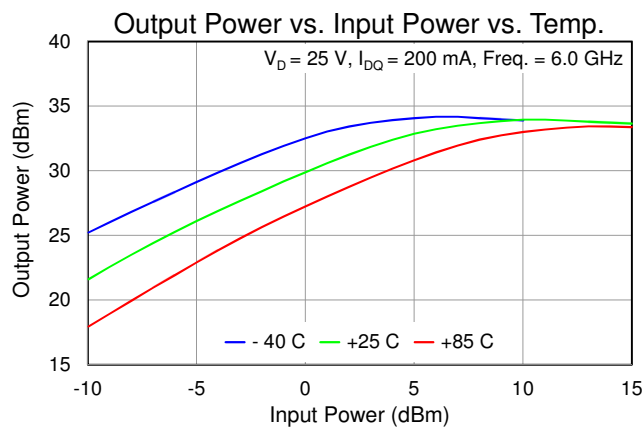
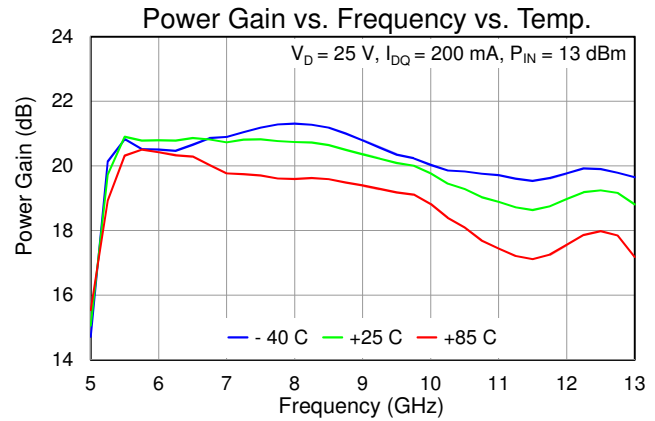
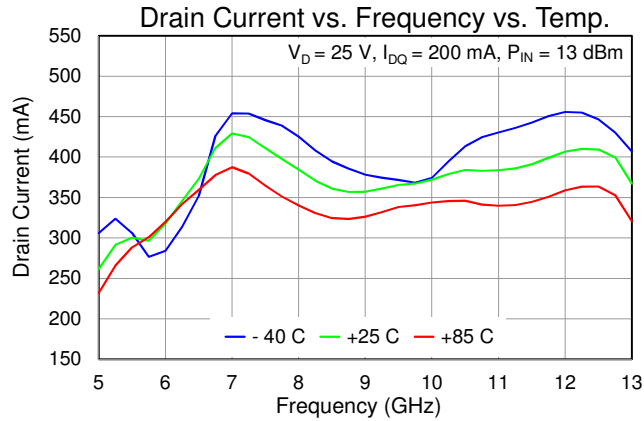
Typical Performance

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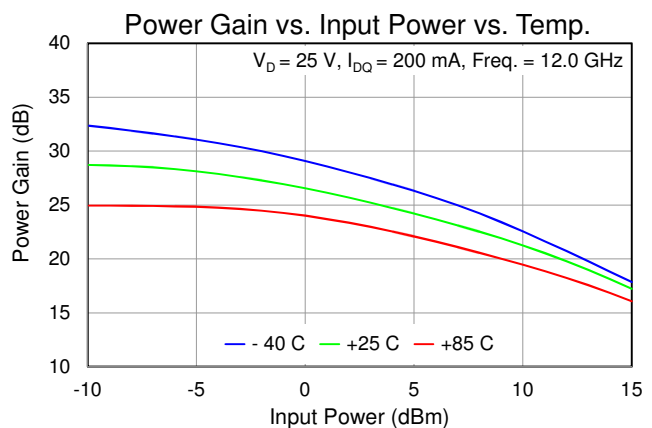
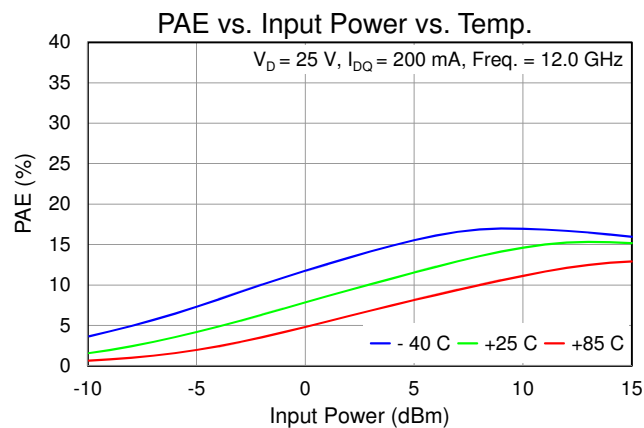
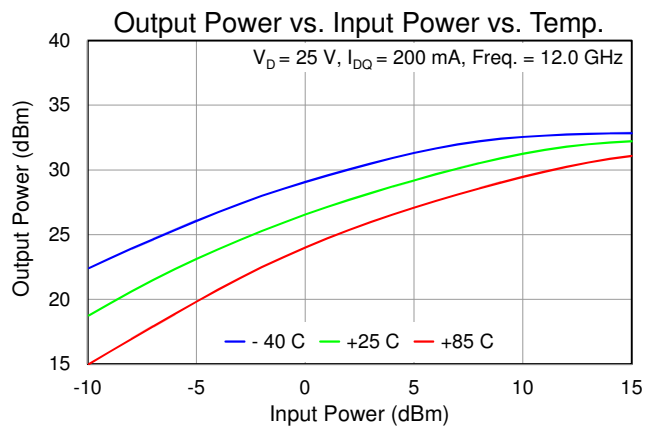
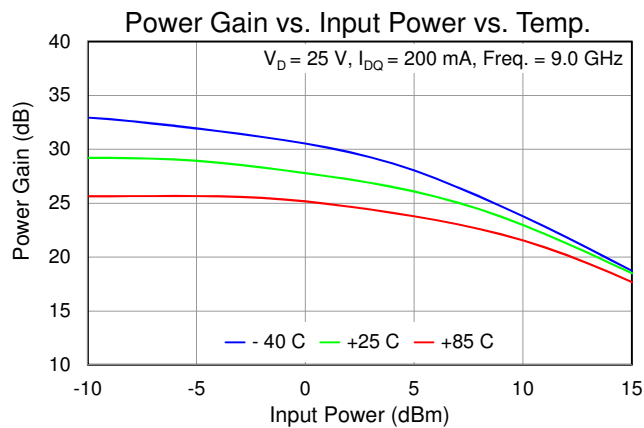
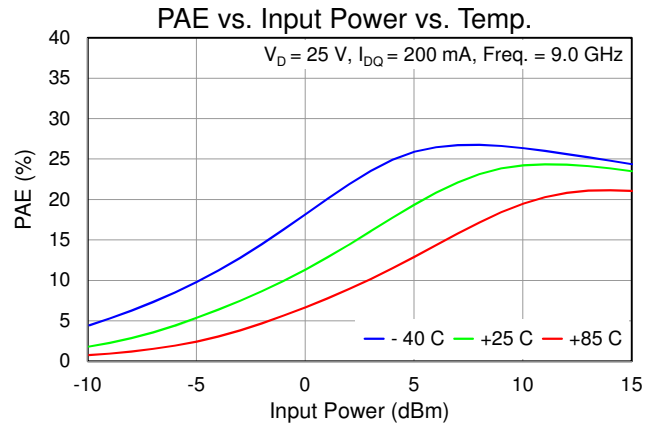
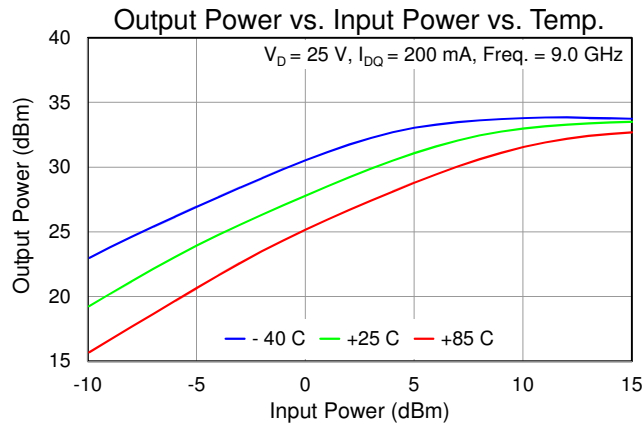
Typical Performance

Test conditions, unless otherwise noted: T = 25 °C, part mounted to EVB (page 11)



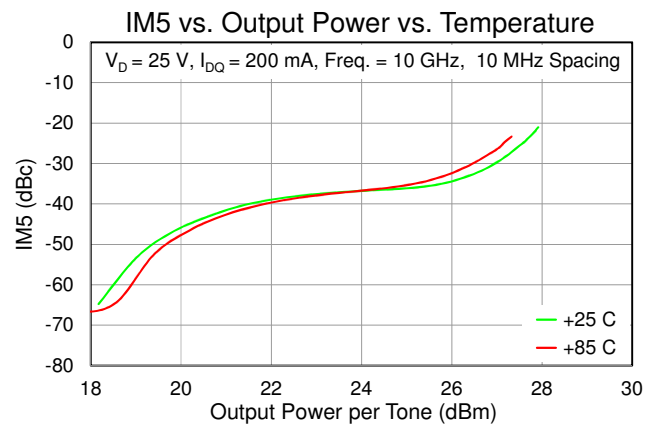
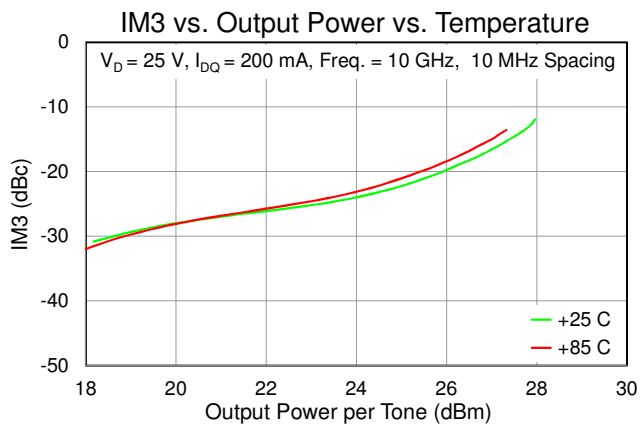
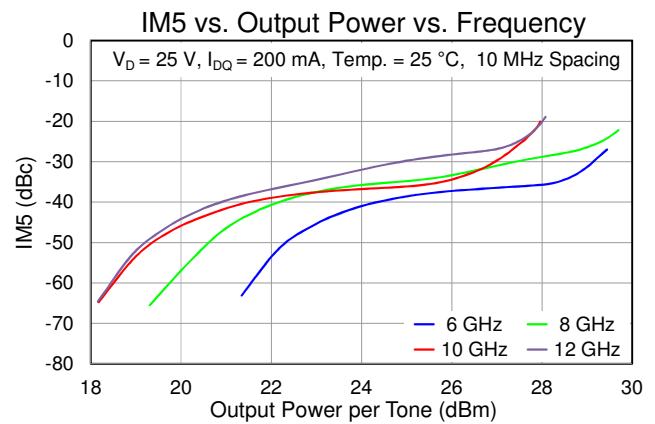
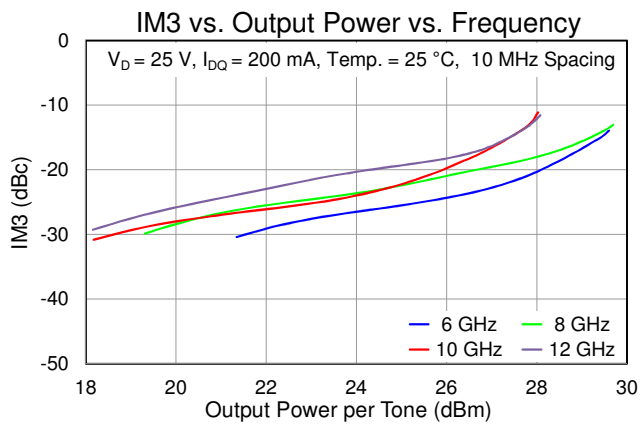
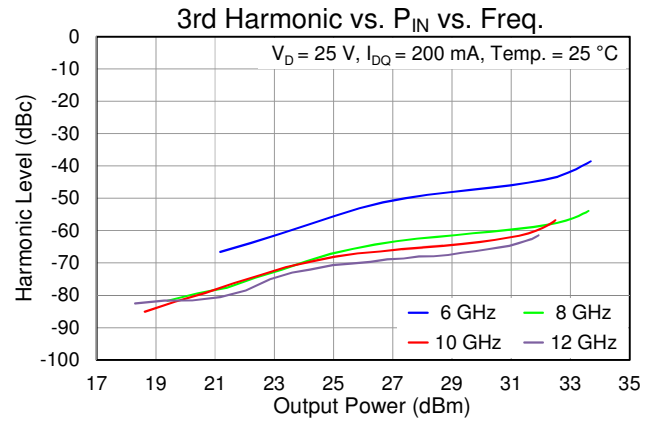
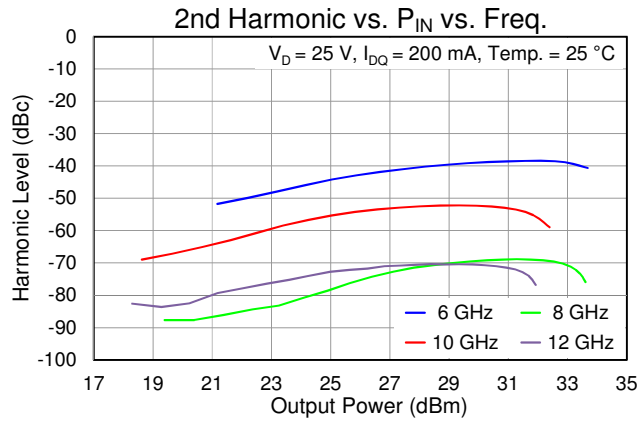
Typical Performance

Test conditions, unless otherwise noted: $T = 25\text{ }^{\circ}\text{C}$, part mounted to EVB (page 11)

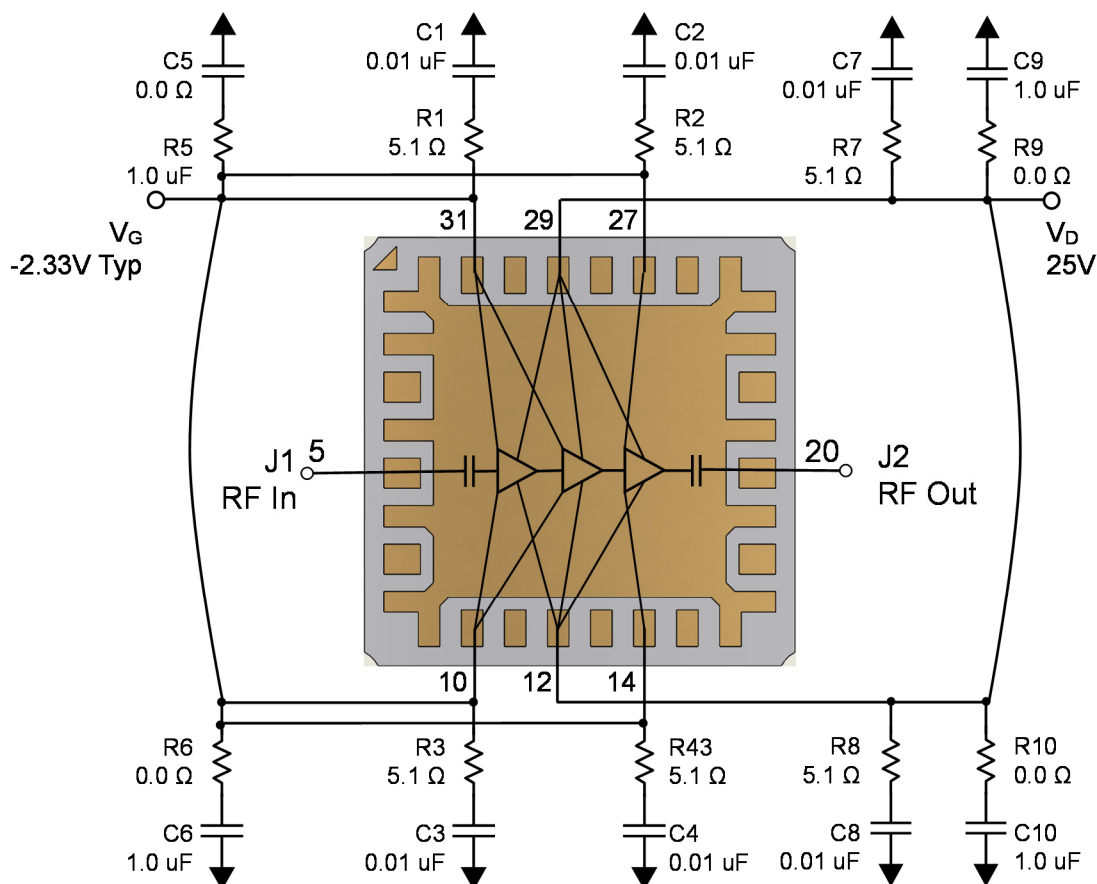


Typical Performance

Test conditions, unless otherwise noted: $T = 25\text{ }^{\circ}\text{C}$, part mounted to EVB (page 11)



Application Circuit



Bias-up Procedure

1. Set I_D limit to 400 mA, I_G limit to 4.5 mA
2. Set V_G to -5.0V
3. Set V_D +25V
4. Adjust V_G more positive until $I_{DQ} = 200$ mA
5. Apply RF signal

Bias-down Procedure

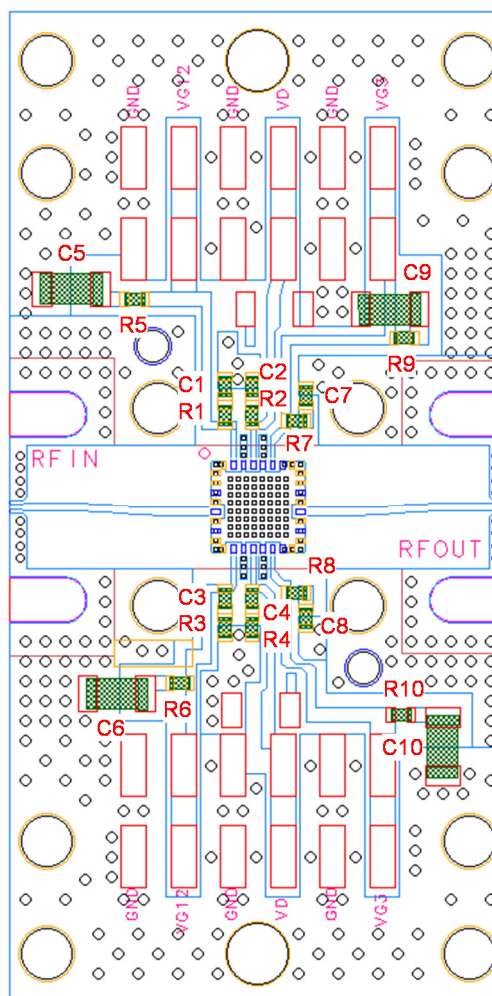
1. Turn off RF signal
2. Set V_G to -5.0V. Ensure $I_{DQ} \sim 0$ mA
3. Set V_D to 0V
4. Turn off V_D supply
5. Turn off V_G supply

Applications Information

Evaluation Board Layout

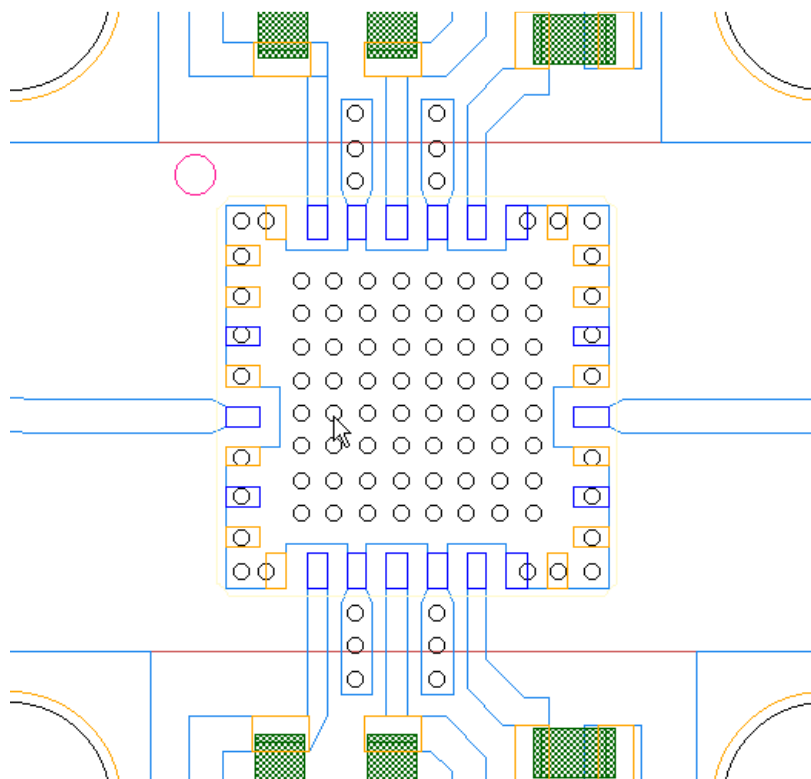
RF Layer is 0.008" thick Rogers Corp. RO4003C, $\epsilon_r = 3.38$. Metal layers are 0.5 oz. copper. The microstrip line at the connector interface is optimized for the Southwest Microwave end launch connector 1092-02A-5.

The pad pattern shown has been developed and tested for optimized assembly at TriQuint Semiconductor. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.



Bill of Materials

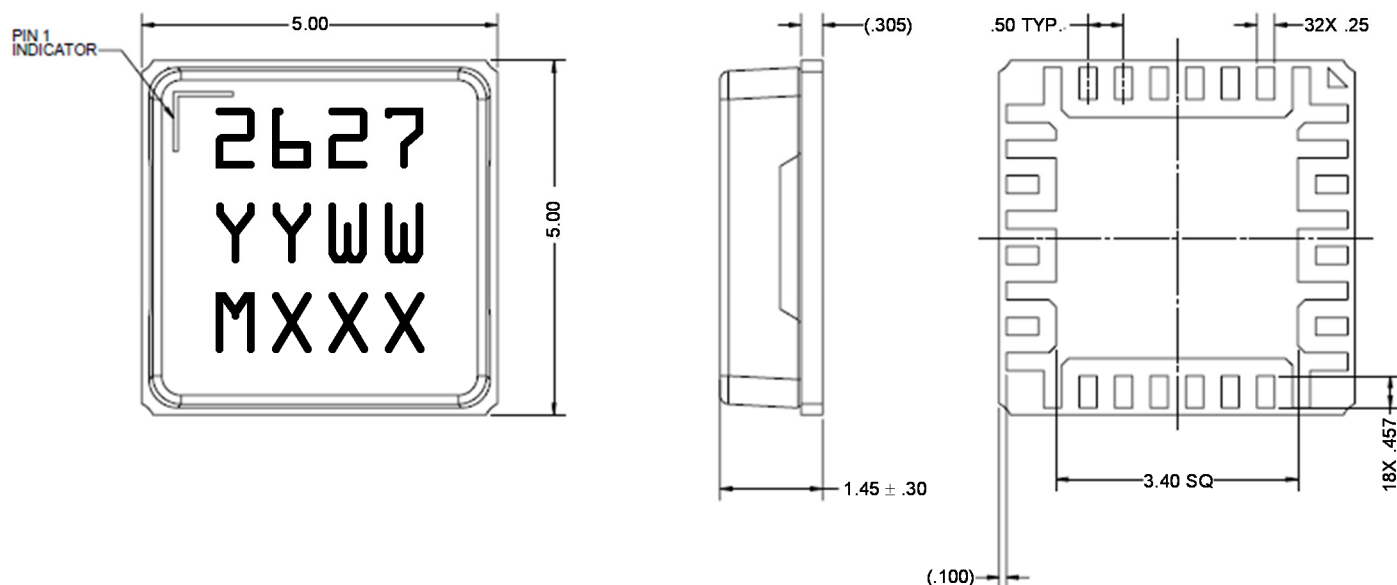
Ref. Designation	Value	Description	Manufacturer	Part Number
C1 – C4, C7, C8	0.01 pF	Cap., 50V, 10% X7R, 0402 case	Various	
C5, C6, C9, C10	1.0 uF	Cap., 50V, 10% X5R, 1206 case	Various	
R1 – R4, R7, R8	5.1 Ohms	Resistor, 0402 case	Various	
R5, R6, R9, R10	0.0 Ohms	Resistor, 0402 case	Various	

Mounting Detail

Note:

Multiple vias should be employed under package center paddle to minimize inductance and thermal resistance.

Mechanical Information

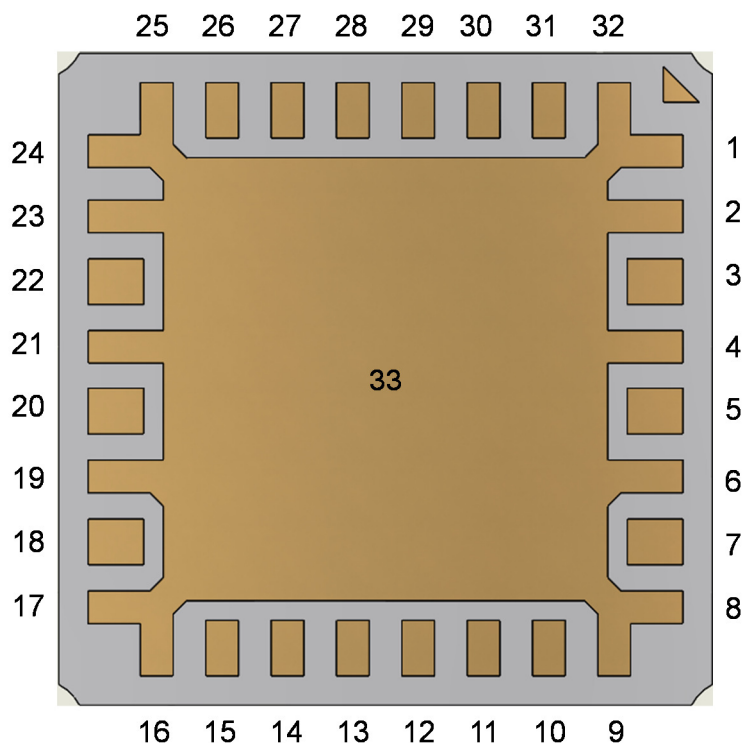


The TGA2627-SM will be marked with the “ZZZZ” and “YYWW” designators and a lot code marked below the part designator. Here, the “ZZZZ” will be “2627”. The “YY” represents the last two digits of the year the part was manufactured, the “WW” is the work week, and the “XXXX” is an auto-generated number.

This package is lead-free/RoHS-compliant. This package is compatible with both lead free and tin-lead soldering processes.

Dimensions are in millimeters.

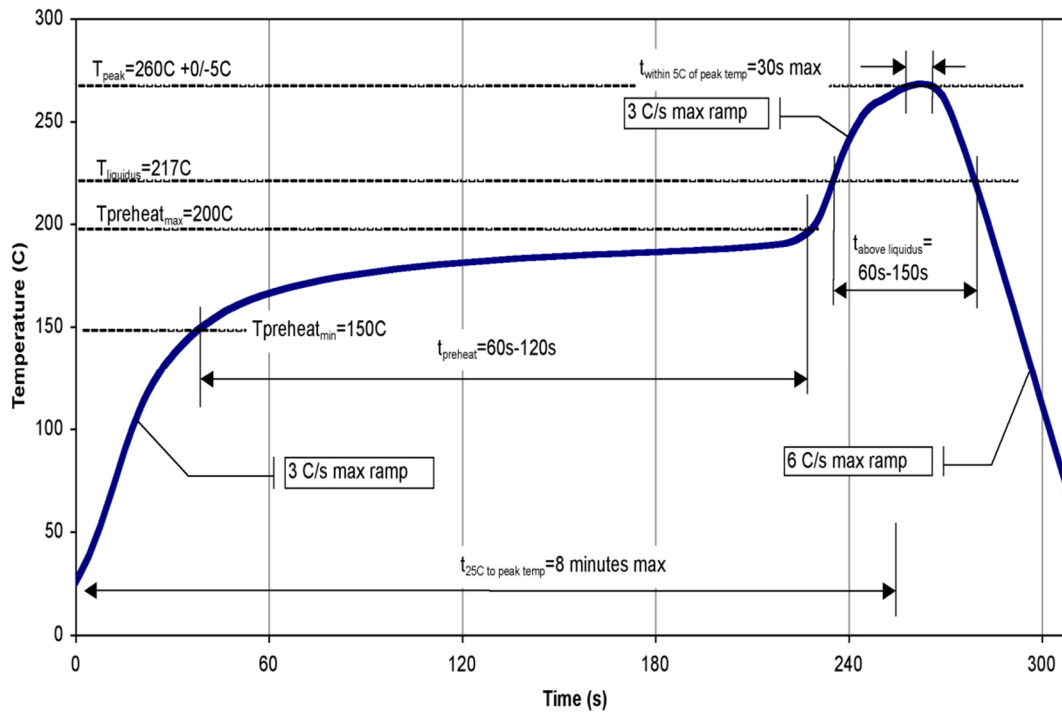
Pad Description



Bottom view of package base

Pin Number	Label	Description
1-4, 6-9, 11, 13, 15-19, 21-26, 28, 30, 32	GND	Connected to ground paddle (33); must be grounded to PCB to improve isolation.
5	RF Input	RF input, matched to 50 Ω , DC blocked
10, 31	V_{G12}	Gate voltage, 1 st and 2 nd stages. Bias network required on both sides.
12, 29	V_D	Drain voltage. Bias network required on both sides.
14, 27	V_{G3}	Gate voltage, 3 rd stage. Bias network required on both sides.
20	RF Output	RF output, matched to 50 Ω , DC blocked
33	GND	Backside paddle. Multiple vias should be employed to minimize inductance and thermal resistance.

Recommended Soldering Temperature Profile



Product Compliance Information

ESD Sensitivity Ratings



Caution! ESD-Sensitive Device

ESD Rating: TBD
Value: TBD
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

ECCN

US Department of Commerce: EAR99

Solderability

Compatible with the latest version of J-STD-020 Lead free solder, 260 °C.

MSL Rating

TBD at 260 °C convection reflow
The part is rated Moisture Sensitivity Level TBD
JEDEC standard IPC/JEDEC J-STD-020.

RoHS-Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C15H12Br4O2) Free
- PFOS Free
- SVHC Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

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Tel: +1.972.994.8465
Fax: +1.972.994.8504

For technical questions and application information: Email: info-products@tgs.com

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