

## Applications

- Military Radar
- Electronic Warfare
- Test Equipment

## Product Features

- Frequency Range: 2 to 18 GHz
- $P_{SAT}$ : 40 dBm at  $V_D = 30$  V
- PAE: 20% Typical
- Small Signal Gain: 10 dB
- Return Loss: 15 dB
- Bias:  $V_D = 30$  V,  $I_{DQ} = 500$  mA,  $V_G = -2.3$  V Typical
- Technology: 0.25- $\mu$ m GaN on SiC
- Dimensions: 5.66 x 2.67 x 0.5 mm

## General Description

The Qorvo TGA2573-2-TS is a wideband, high power GaN HEMT amplifier fabricated on Qorvo's production 0.25- $\mu$ m GaN on SiC process. Operating from 2 to 18 GHz, it achieves 40 dBm saturated output power, 20% PAE, and 10 dB small signal gain at a drain bias of 30 V.

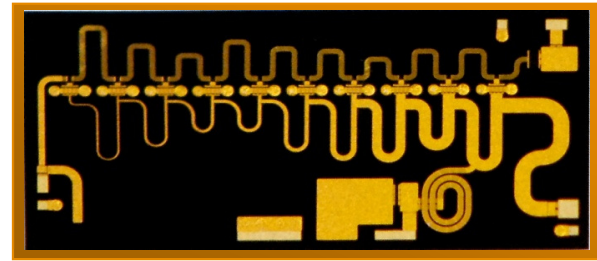
The TGA2573-2-TS is a 4-mil thick GaN die mounted on a 15 mil thick Cu-Mo-Cu carrier. This provides the customer a known good die attach to assist in thermal management and provide easier handling

Fully matched to 50  $\Omega$  and with integrated DC blocking caps on both RF ports, the TGA2573-2-TS is ideally suited to support both commercial and defense related applications.

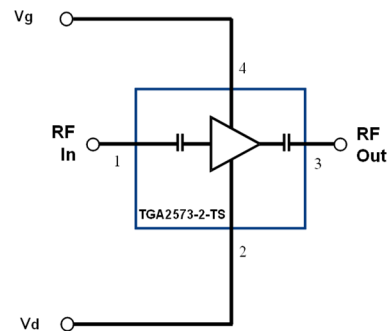
The TGA2573-2-TS is 100% DC and RF tested on-wafer to ensure compliance to performance specifications.

Lead-free and RoHS compliant.

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## Functional Block Diagram



## Pad Configuration

Pad No.	Symbol
1	RF In
2	$V_D$
3	RF Out
4	$V_G$

## Ordering Information

Part	ECCN	Description
TGA2573-2-TS	3A611.x	Die on Thermal Spreader

### Absolute Maximum Ratings

Parameter	Value
Drain Voltage ( $V_D$ ) <sup>(1)</sup>	40 V
Gate Voltage Range ( $V_G$ )	-8 to 0 V
Drain-to-Gate Voltage ( $V_{DG}$ )	80 V
Drain Current ( $I_D$ ) <sup>(1) (2)</sup>	1.3 A
Gate Current ( $I_G$ ) @ $T = 85$ °C	-4 to 11 mA
Power Dissipation ( $P_{DISS}$ )	30 W
RF Input Power, CW, 50 $\Omega$ , $T = 25$ °C ( $P_{IN}$ ) <sup>(1)</sup>	35 dBm
Channel Temperature ( $T_{CH}$ )	275 °C
Mounting Temperature (30 Seconds)	320 °C
Storage Temperature	-55 to 150 °C

Operation of this device outside the parameter ranges given above may cause permanent damage. These are stress ratings only, and functional operation of the device at these conditions is not implied.

### Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Drain Voltage ( $V_D$ )		30	35	V
Drain Current ( $I_D$ )		500		mA
Drain Current Under RF Drive ( $I_{D\_DRIVE}$ ) <sup>(1)</sup>		1200		mA
Gate Voltage ( $V_G$ )		-2.3		V

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

### Electrical Specifications

Test conditions unless otherwise noted: 25 °C,  $V_D = 30$  V,  $I_{DQ} = 500$  mA,  $V_G = -2.3$  V Typical

Parameter	Typical	Units
Operational Frequency Range	2 to 18	GHz
Small Signal Gain	10	dB
Input Return Loss	15	dB
Output Return Loss	15	dB
Output Power at Saturation (Input Power = 35 dBm)	40	dBm
Output Power at 30 dBm Input Power	38	dBm
Power Added Efficiency	20	%
Output TOI at $P_{out}/tone = 25$ dBm	45	dBm
Noise Figure	6	dB
Small Signal Gain Temperature Coefficient	-0.02	dB/°C
Output Power Temperature Coefficient	-0.005	dBm/°C

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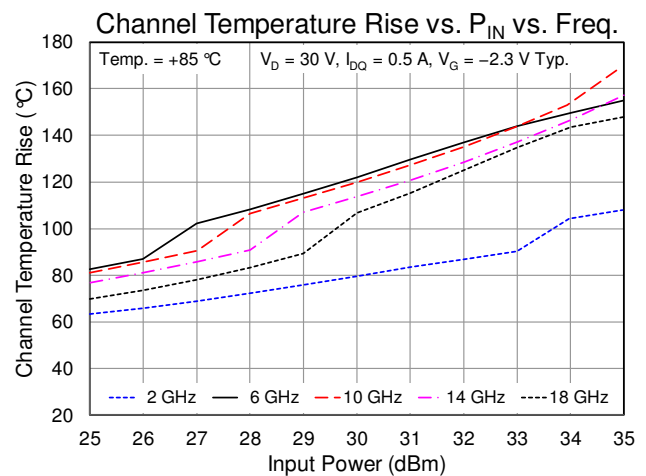
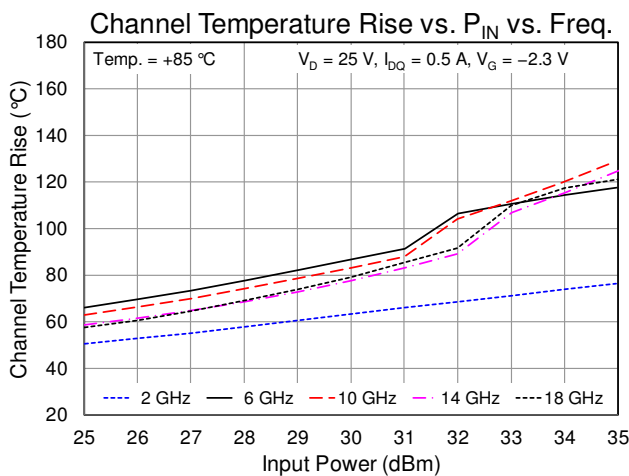
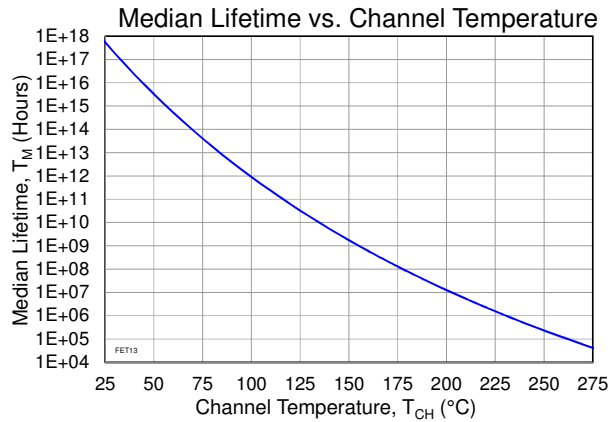
### Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance ( $\theta_{JC}$ ) <sup>(1)</sup>	$P_{DISS} < 17\text{ W}$	5.4	$^{\circ}\text{C/W}$
	$17\text{ W} < P_{DISS} < 27\text{ W}$	6.0	$^{\circ}\text{C/W}$
	$P_{DISS} > 27\text{ W}$	6.2	$^{\circ}\text{C/W}$
Channel Temperature ( $T_{CH}$ )	$V_D = 30\text{ V}$ , $I_D = 500\text{ mA}$ ,	166	$^{\circ}\text{C}$
Median Lifetime ( $T_M$ )	$P_{DISS} = 15\text{ W}$ , $T_{BASE} = 85\text{ }^{\circ}\text{C}$	$3.2 \times 10^8$	Hrs
Maximum Channel Temperature ( $T_{CH}$ ), Under RF Drive	See plots below		

Notes:

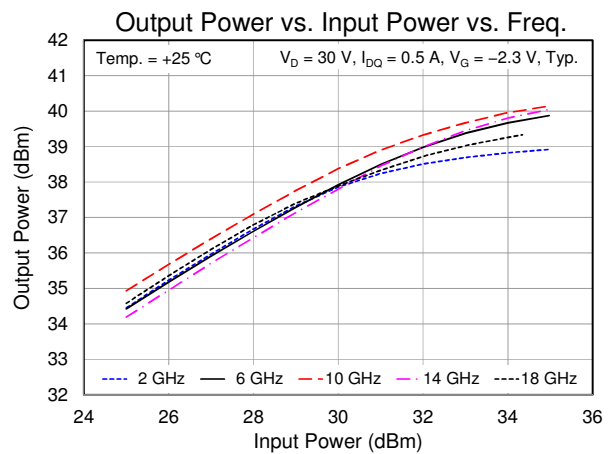
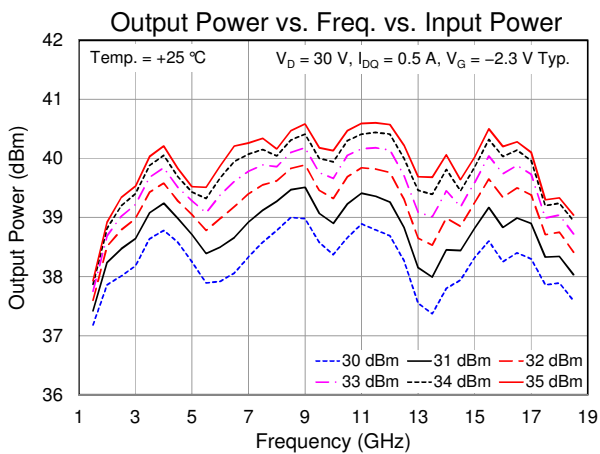
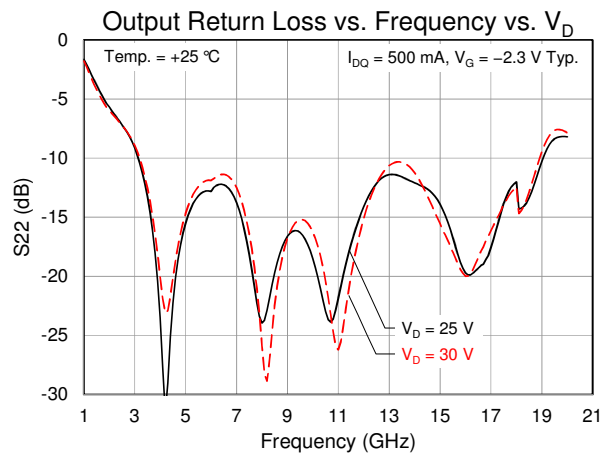
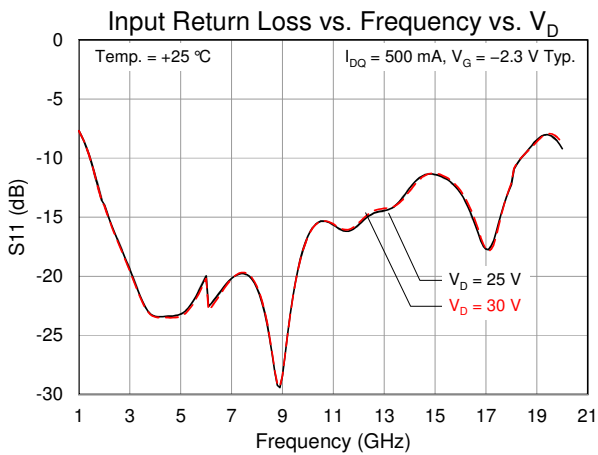
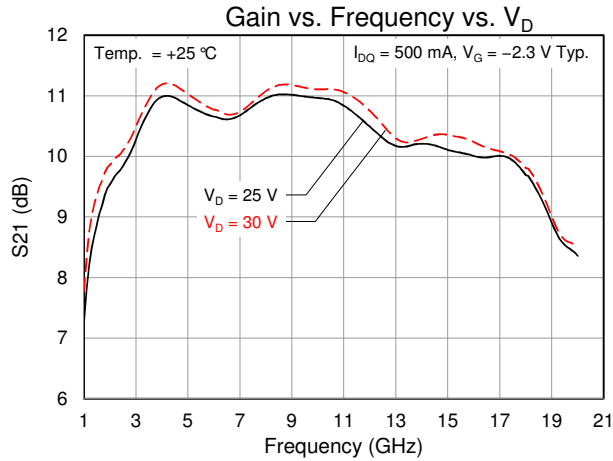
1. Thermal resistance measured to back of carrier.

### Median Lifetime and Channel Temperature Rise



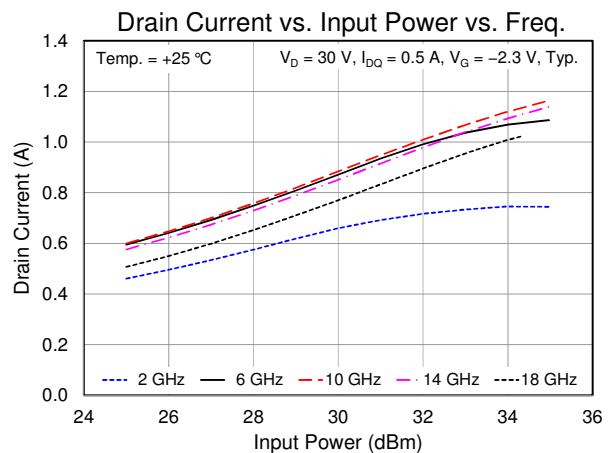
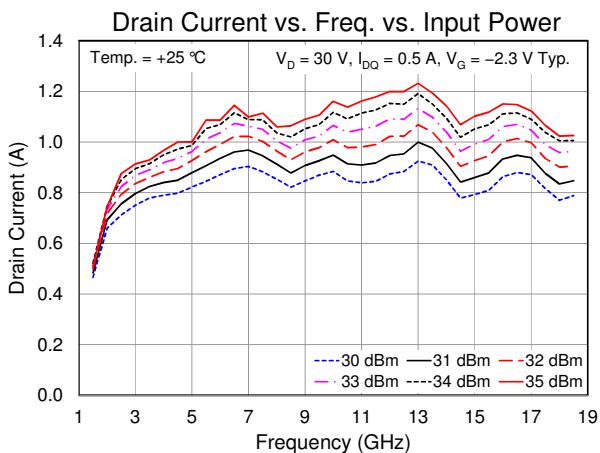
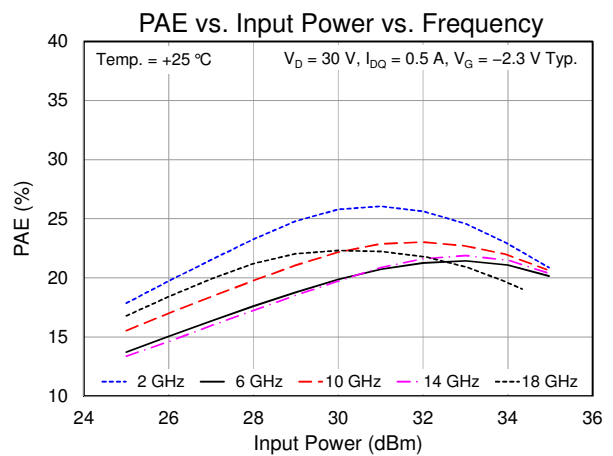
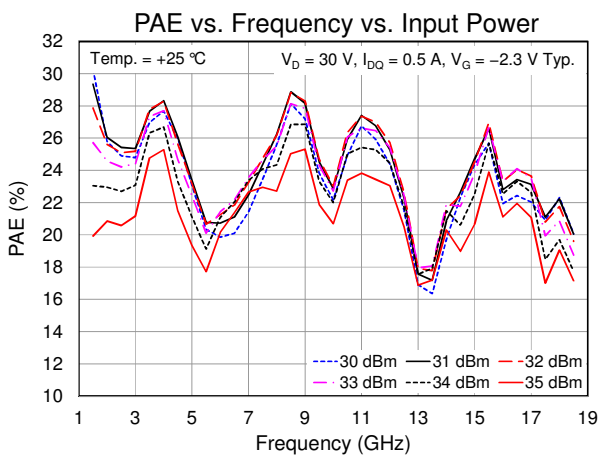
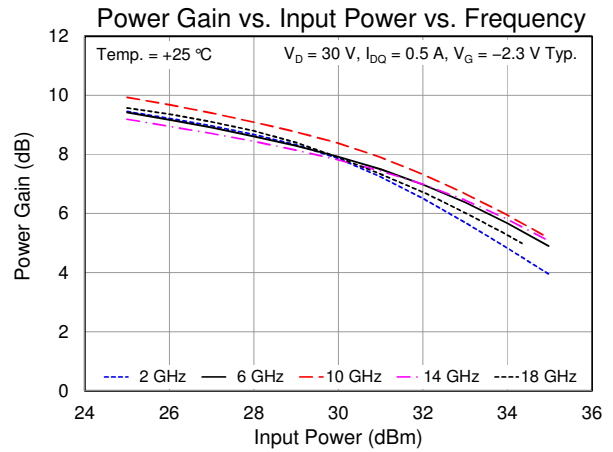
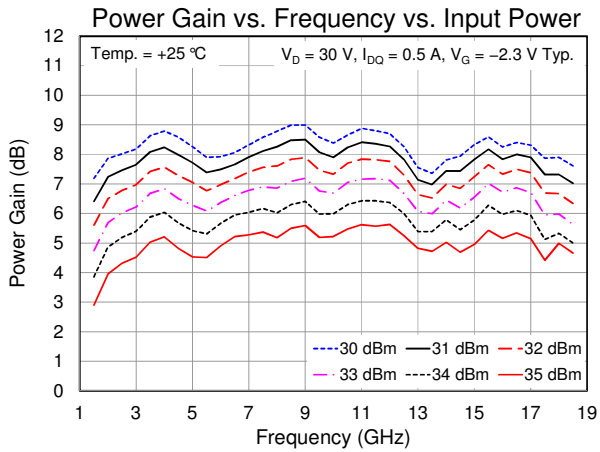
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**Typical Performance**



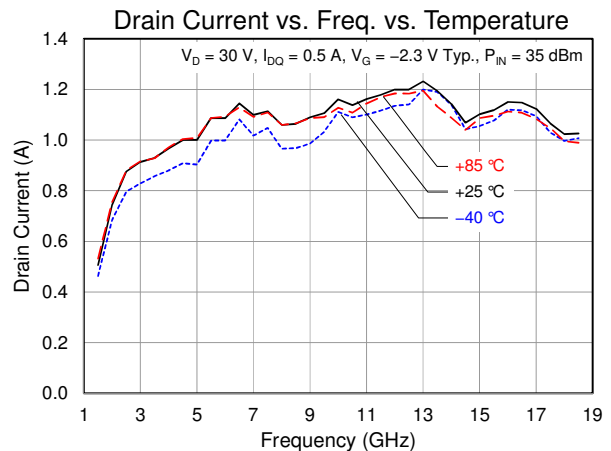
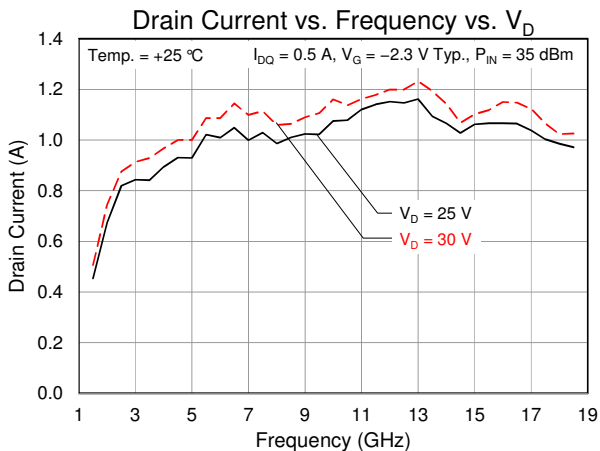
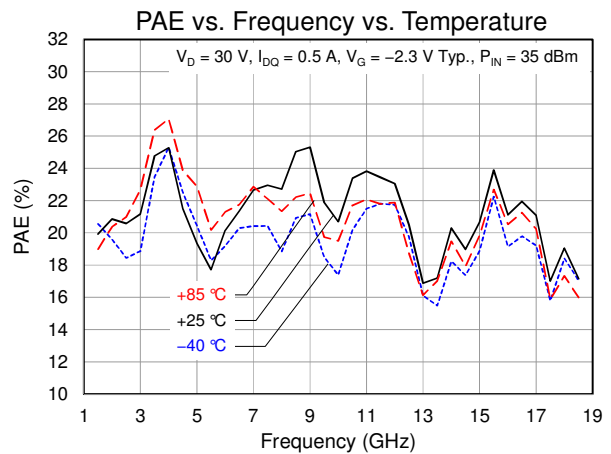
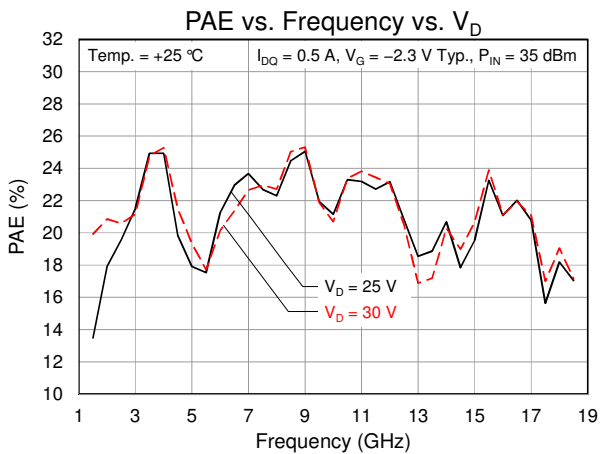
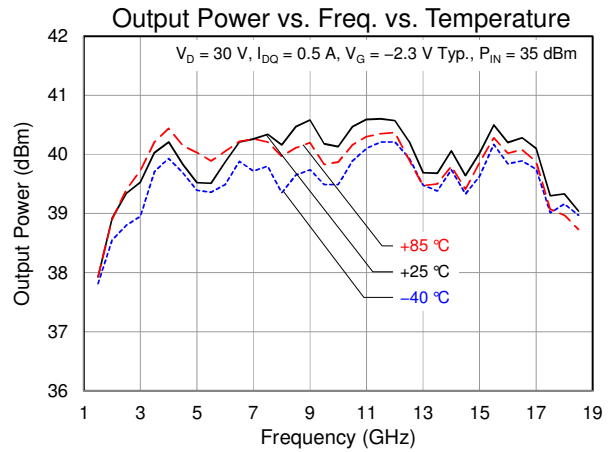
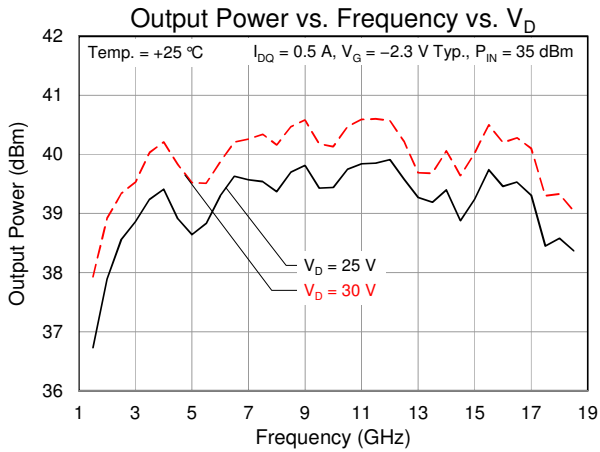
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**Typical Performance**



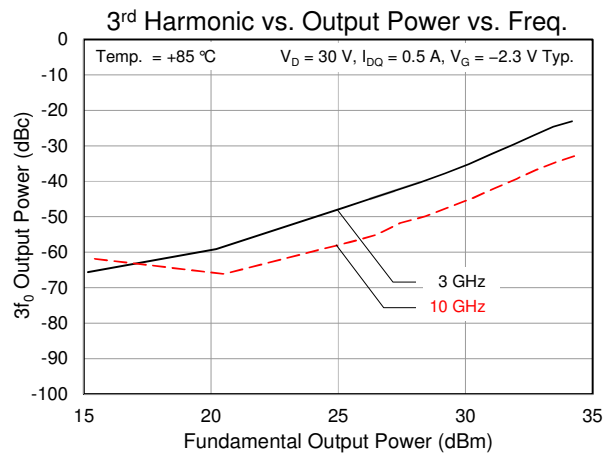
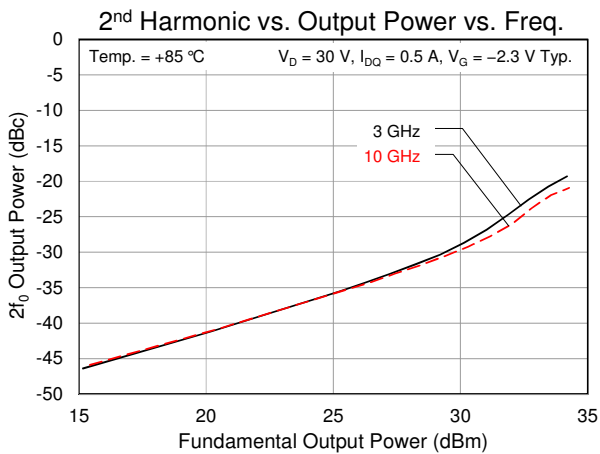
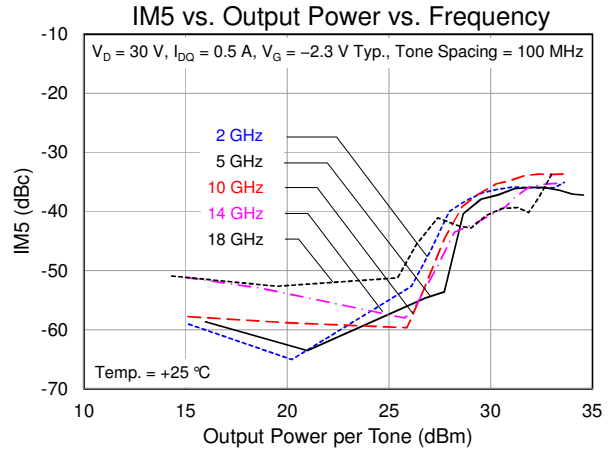
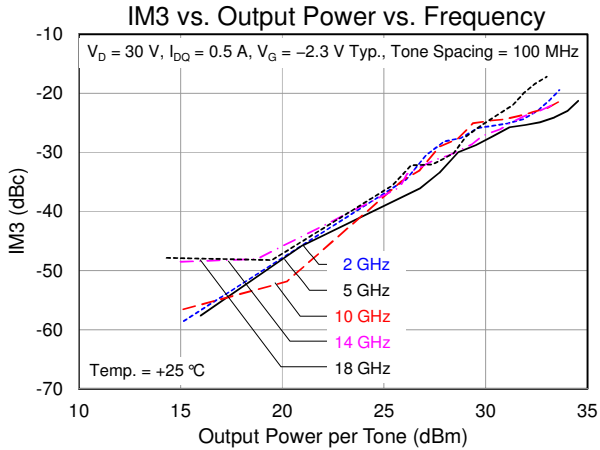
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**Typical Performance**



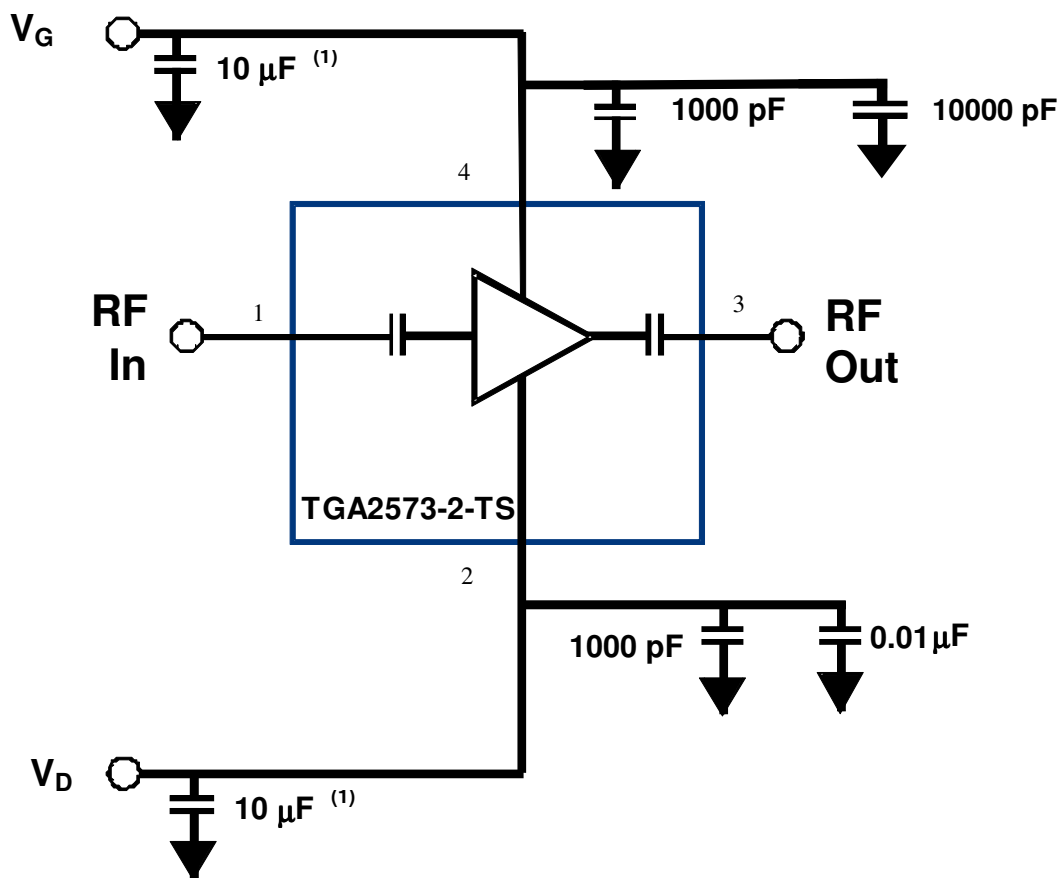
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**Typical Performance**



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**Application Circuit**



Notes:

1. Additional bypass capacitors may be required at this location. The value of these capacitors varies by application. Variables include power supply impedance, power supply stability with reactive loads, and the inductance from the power supply to this assembly. One to 47 uF tantalum capacitors are commonly used here.

**Bias-up Procedure**

1. Set I<sub>D</sub> limit to 1.3 A, I<sub>G</sub> limit to 3 mA
2. Apply -5.0 V to V<sub>G</sub>
3. Apply +30 V to V<sub>D</sub>
4. Adjust V<sub>G</sub> more positive until I<sub>DQ</sub> = 500 mA (V<sub>G</sub> ~ -2.3 V Typical)
5. Apply RF signal

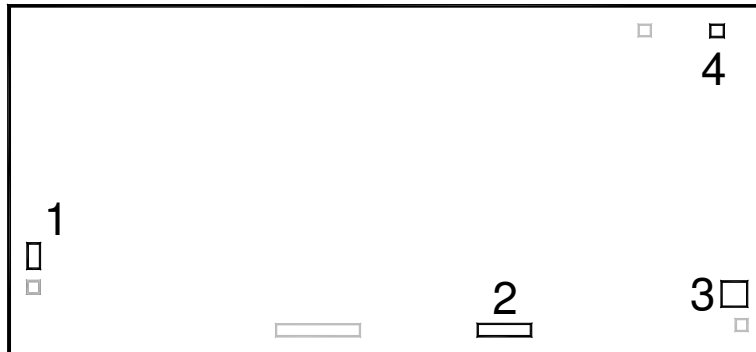
**Bias-down Procedure**

1. Turn off RF signal
2. Reduce V<sub>G</sub> to -5.0 V. Ensure I<sub>DQ</sub> ~ 0 mA
3. Set V<sub>D</sub> to 0 V
4. Turn off V<sub>D</sub> supply
5. Turn off V<sub>G</sub> supply

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## Bond Pad Description

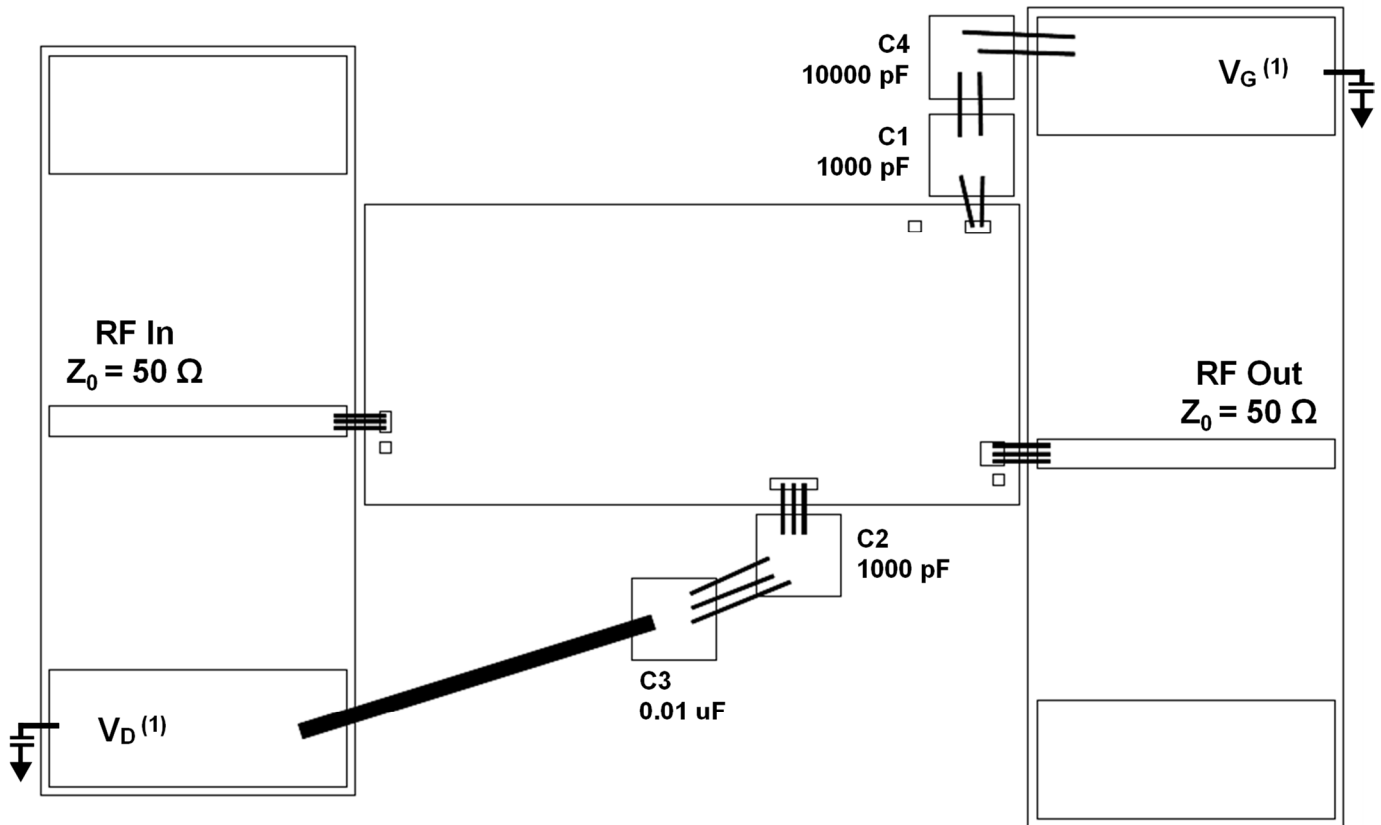


## Bond Pads

Pad No.	Symbol	Description
1	RF In	Input; matched to 50 $\Omega$
2	V <sub>D</sub>	Drain voltage; bias network is required; see Application Circuit on page 8 as an example
3	RF Out	Output, matched to 50 $\Omega$
4	V <sub>G</sub>	Gate voltage; bias network is required; see Application Circuit on page 8 as an example
Backside	GND	Backside of carrier

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**Assembly Drawing**



Notes:

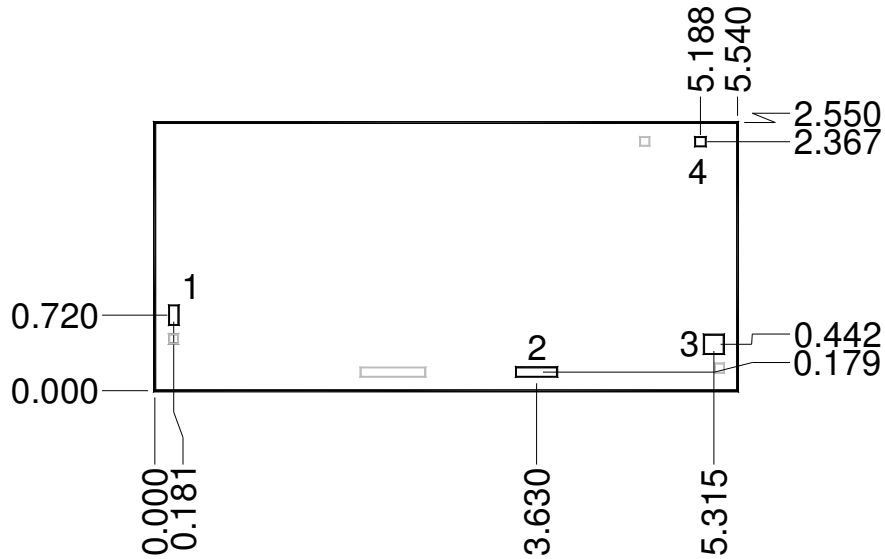
1. See Application Circuit page 8 Note 1

**Bill of Material**

Ref Des.	Value	Description	Manufacturer	Part Number
C1, C2	1000 pF	Cap, 50 V, 10%, Single Layer	various	
C3	0.01 μF	Cap, 50 V, 10%, SMD	various	
C4	10000 pF	Cap, 50 V, 10%, Single Layer	various	

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**Mechanical Information**



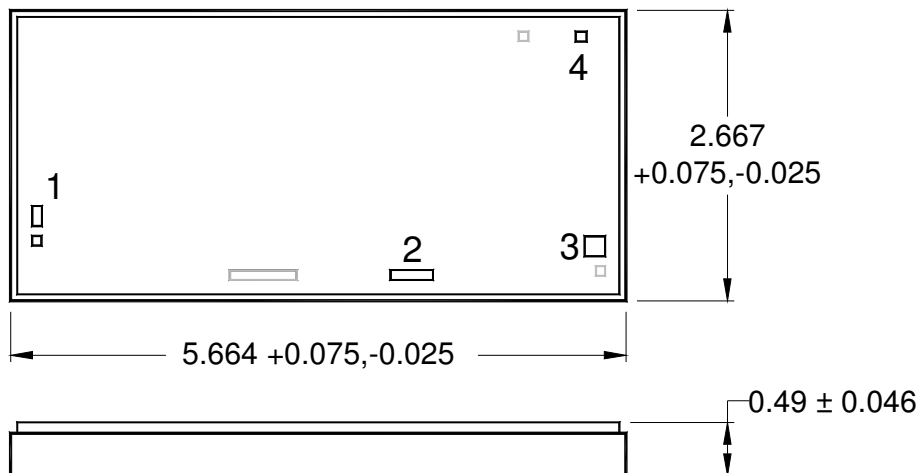
Unit: millimeters  
 Thickness: 0.10  
 Die x, y size tolerance:  $\pm 0.050$   
 Chip edge to bond pad dimensions are shown to center of pad  
 Ground is backside of die

**Bond Pad Dimensions**

Pad No.	Symbol	Pad Size
1	RF In	0.100 x 0.195
2	V <sub>D</sub>	0.400 x 0.100
3	RF Out	0.200 x 0.195
4	V <sub>G</sub>	0.110 x 0.100

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**Mechanical Information – Die on Carrier**



Unit: millimeters  
 Material for carrier:  
     Cu-Mo-Cu  
     Thickness: 0.381 ± 0.025  
 Plating for carrier:  
     Gold (Au) over Nickel (Ni)  
 MMIC die is attached to carrier using solder  
 MMIC die is nominally centered on carrier.

**Assembly Notes**

Component placement assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Devices with small pad sizes should be bonded with 0.0007-inch wire.

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## 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 State 3A611.x

### RoHS Compliance

This part is compliant with the 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment), as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- PFOS Free
- SVHC Free

## Contact Information

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

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