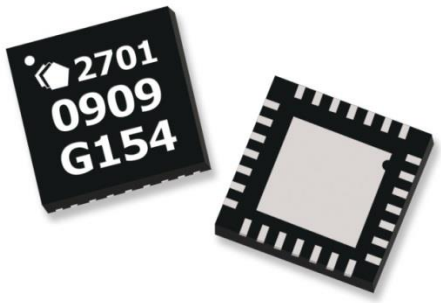
TGA2701-SM

3 Watt C-Band Power Amplifier

General Description

The Qorvo TGA2701-SM is a packaged 35 dBm Power Amplifier for C-band applications. The TGA2701-SM provides a nominal 35 dBm of output power at an input power level of 22 dBm with a small signal gain of 18 dB. Nominal TOI is 42 dBm and noise figure is 7.5 dB.

The TGA2701-SM is an overmold QFN 6 x 6 mm surface mount package. It is ideally suited for low cost emerging markets such as point to point radio and communications.



Product Features

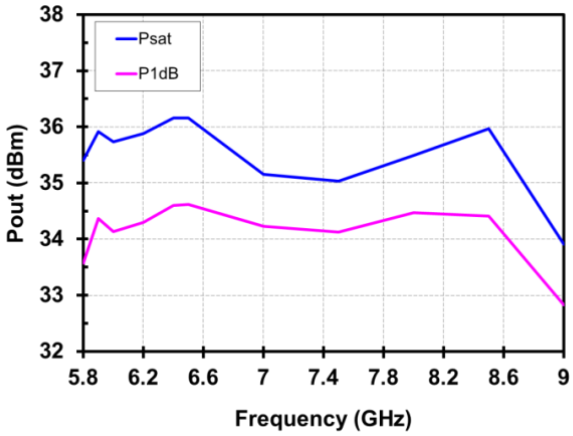
- Frequency Range: 5.9–9.0 GHz
- Saturation Power: 35 dBm
- P1dB: 34 dBm
- Gain: 18 dB
- TOI: 42 dBm
- PAE: 37%
- NF: 7.5 dB
- Bias: V_D = 6 V, I_D = 1.0 A, V_G = -0.6 V Typical
- Package Dimensions: 6 x 6 x 0.85 mm

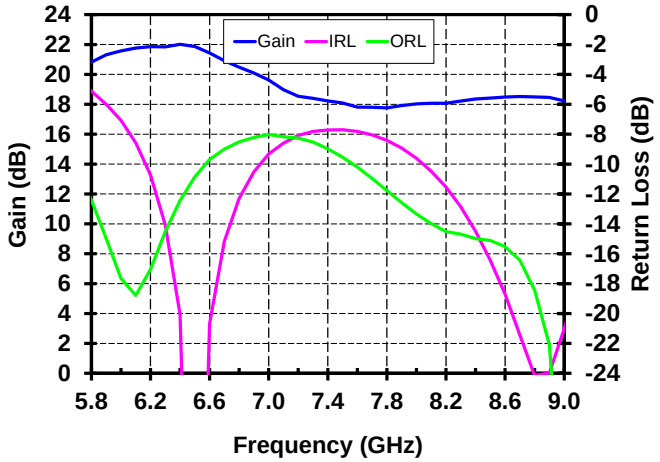
Applications

- Point-to-Point Radio
- Communications

Measured Performance

Bias conditions: V_D = 6 V, I_D = 1.0 A, V_G = -0.6 V Typical





Ordering Information

Part	Description
TGA2701-SM	Power Amplifier, Shipping Tray, Qty 50
TGA2701-SMEVB	TGA2701-SM Evaluation Board, Qty 1

Absolute Maximum Ratings 1/

Symbol	Parameter	Value/Range	Notes
V_D-V_G	Drain to Gate Voltage	9.2 V	
V_D	Drain Voltage	8 V	2/
V_G	Gate Voltage Range	-1.2 to +0.5 V	
I_D	Drain Current	3.85 A	2/
I_G	Gate Current Range	-14 to 126 mA	
P_{IN}	Input Continuous Wave Power	29 dBm	
T-channel	Channel Temperature	200 ºC	2/

Notes:

1. These ratings represent the maximum operable values for this device. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device and / or affect device lifetime. These are stress ratings only, and functional operation of the device at these conditions is not implied.
2. Combinations of supply voltage, supply current, input power, and output power shall not exceed the maximum power dissipation listed in Table IV

Recommended Operating Conditions

Symbol	Parameter 1/	Value/Range
V_D	Drain Voltage	6 V
I_{DQ}	Drain Current	1.0 A
I_D Drive	Drain Current under RF Drive	1.6 A
V_G	Gate Voltage	-0.6 V

Notes:
1. See assembly diagram for bias instructions.

Electrical Specifications

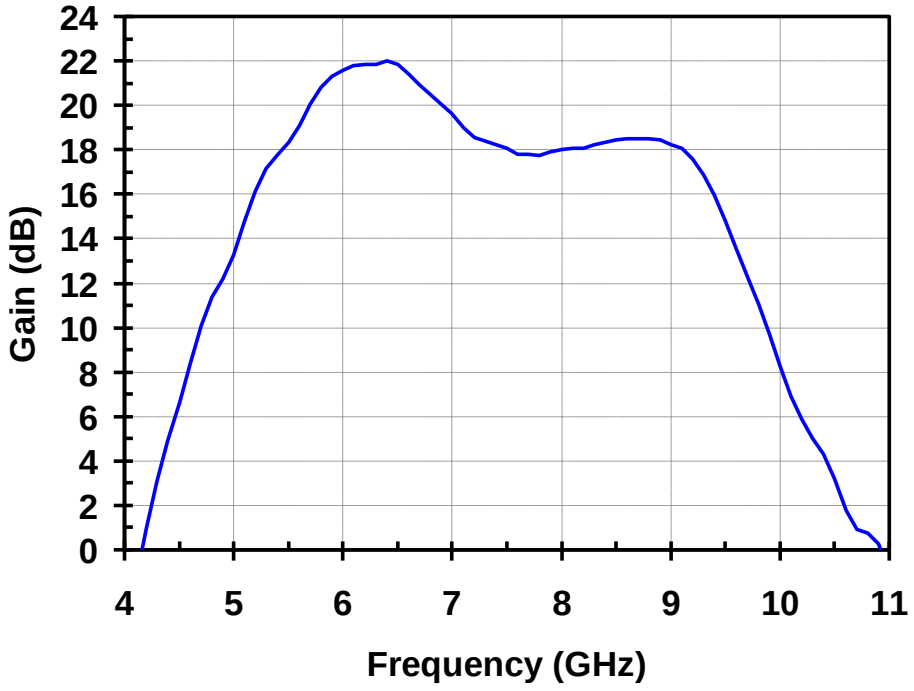
Bias: V_D = 6 V, I_D = 1.0 A, V_G = -0.6 V Typical, 25 °C

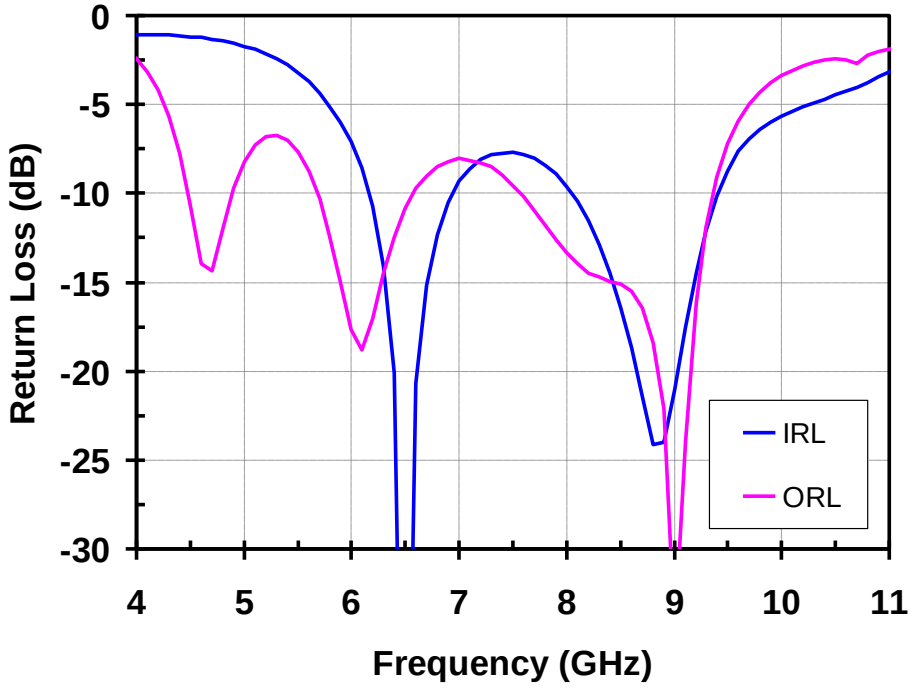
Data are de-embedded to reference lines

	Parameter	Test Conditions	Min	Normal	Max	Units
Gain	Small Signal Gain	F = 5.9 – 9 GHz	16	18	22	dB
IRL	Input Return Loss	F = 5.9 – 9 GHz		-10		dB
ORL	Output Return Loss	F = 5.9 – 9 GHz		-10		dB
P_{SAT}	Saturated Output Power	F = 5.9 – 8.5 GHz F = 9 GHz	34 33	35 34		dBm
P1dB	Output Power @ 1dB Compression	F = 5.9 – 9 GHz		34		dBm
TOI	Output TOI	F = 5.9 – 8.5 GHz F = 9 GHz Pout = 20 dBm/tone	39 37	42 40		dBm
NF	Noise Figure	F = 5.9 – 9 GHz		7.5		dB
	Gain Temperature Coefficient	F = 5.9 – 9 GHz		-0.03		dB/°C
	Power Temperature Coefficient	F = 5.9 – 9 GHz		-0.01		dBm/°C

Performance Plots, Small Signal

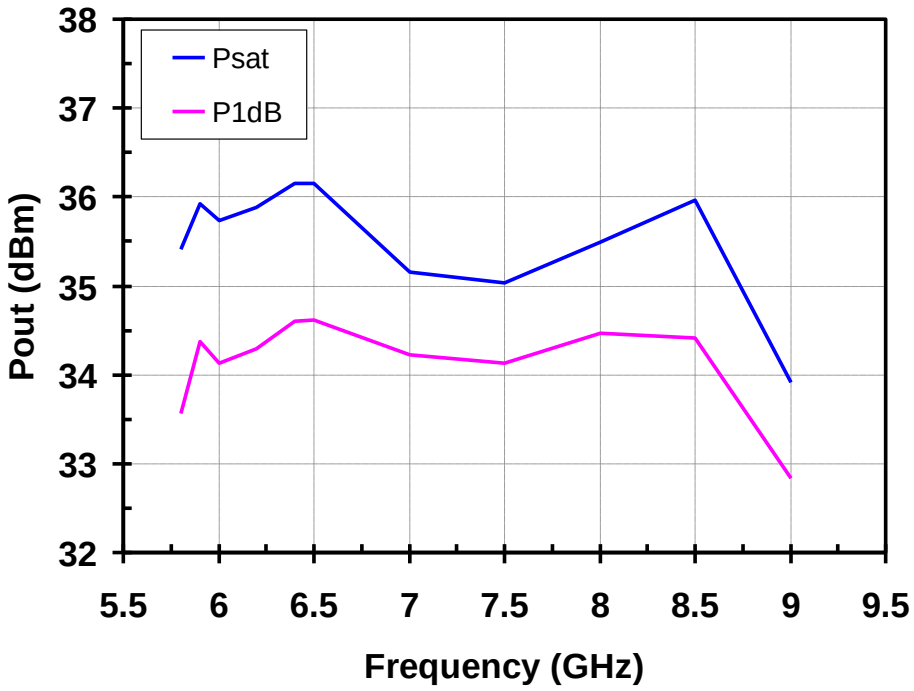
Bias conditions: V_D = 6 V, I_D = 1000 mA, V_G = -0.6 V Typical, 25 °C

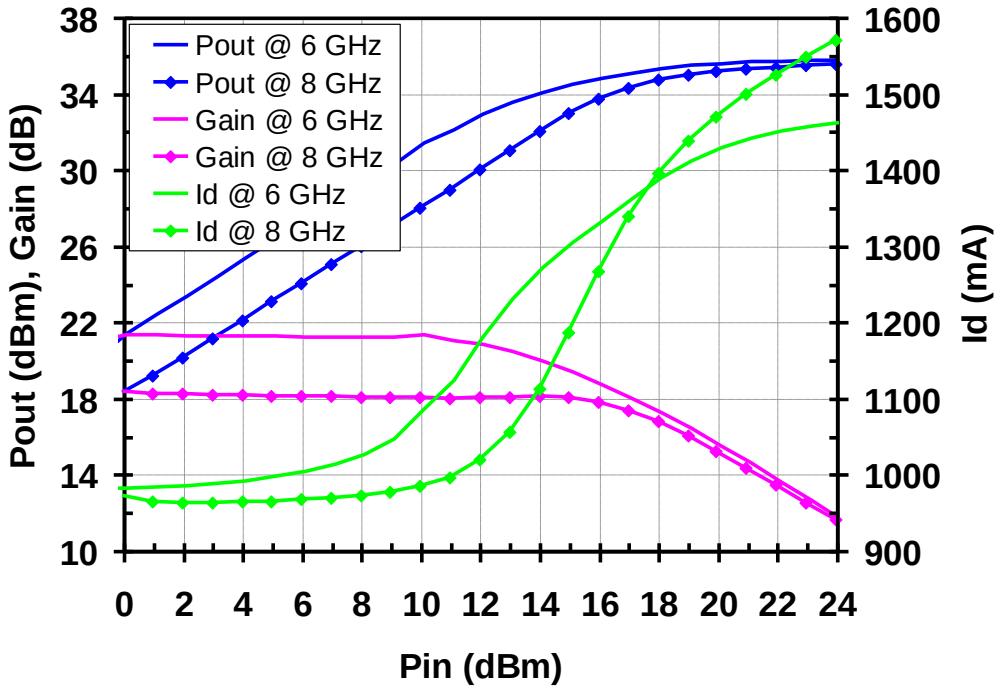




Performance Plots, Power

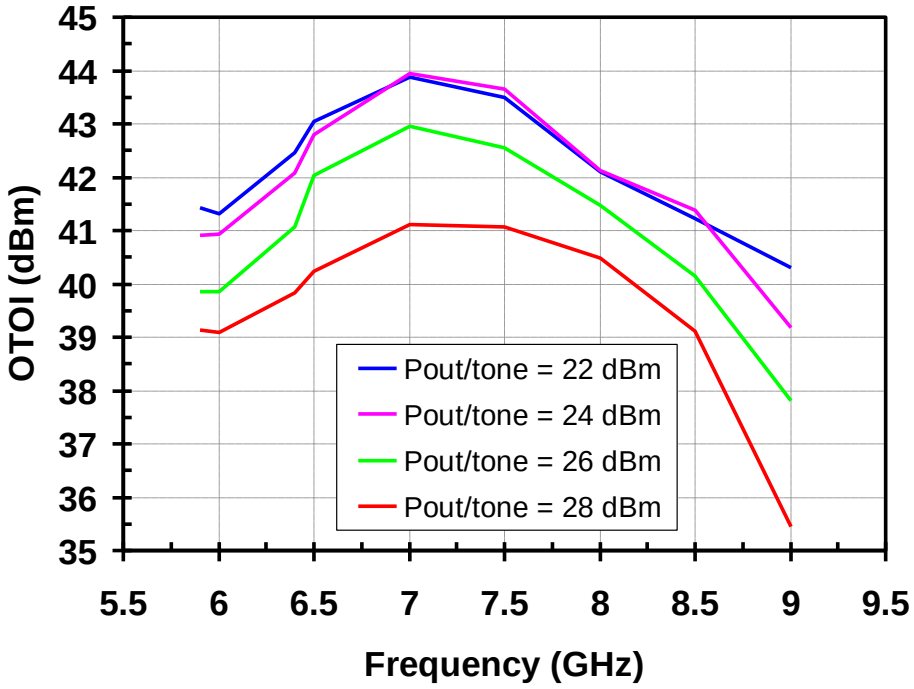
Bias conditions: V_D = 6 V, I_D = 1000 mA, V_G = -0.6 V Typical, 25 °C

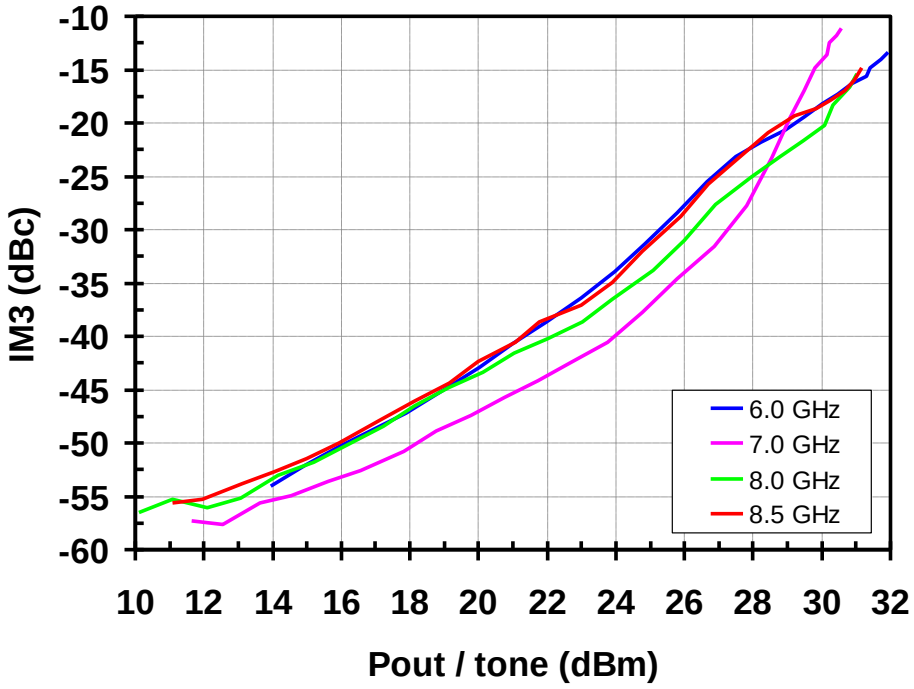




Performance Plots, Linearity

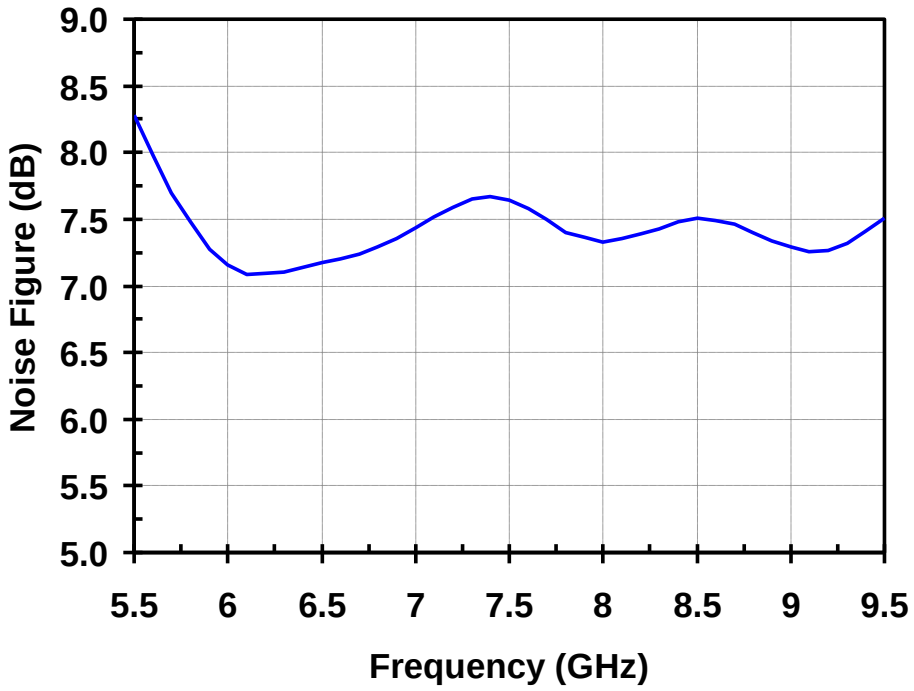
Bias conditions: V_D = 6 V, I_D = 1000 mA, V_G = -0.6 V Typical, 25 °C





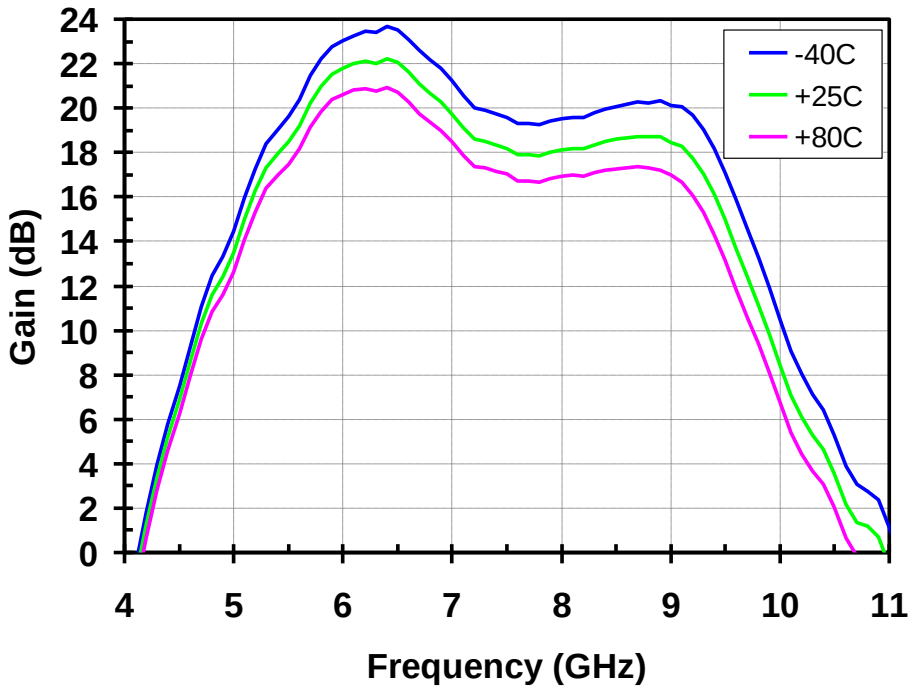
Performance Plots, Noise Figure

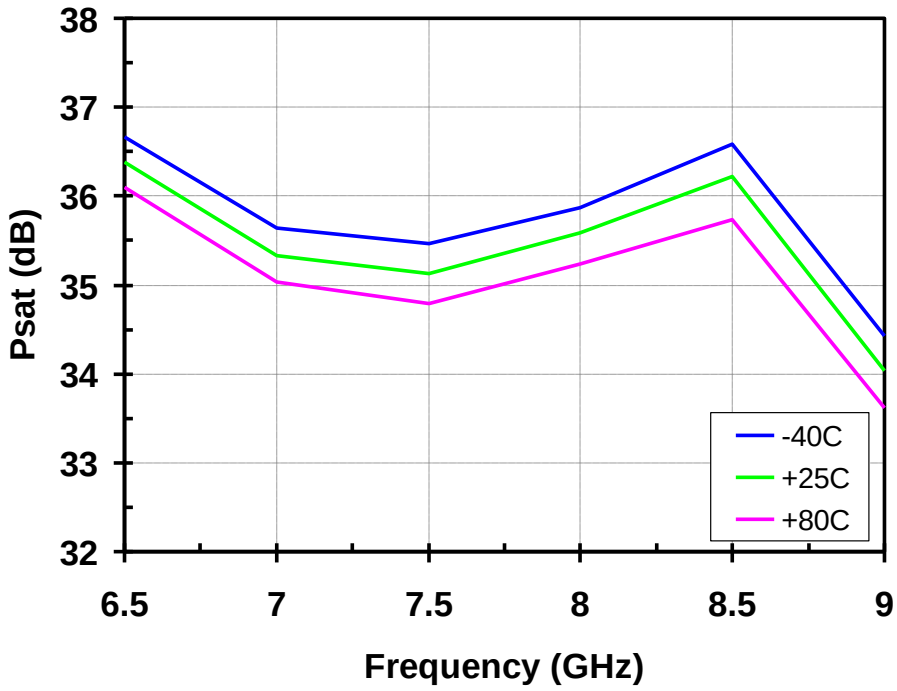
Bias conditions: V_D = 6 V, I_D = 1000 mA, V_G = -0.6 V Typical, 25 °C



Performance Plots vs Temperature

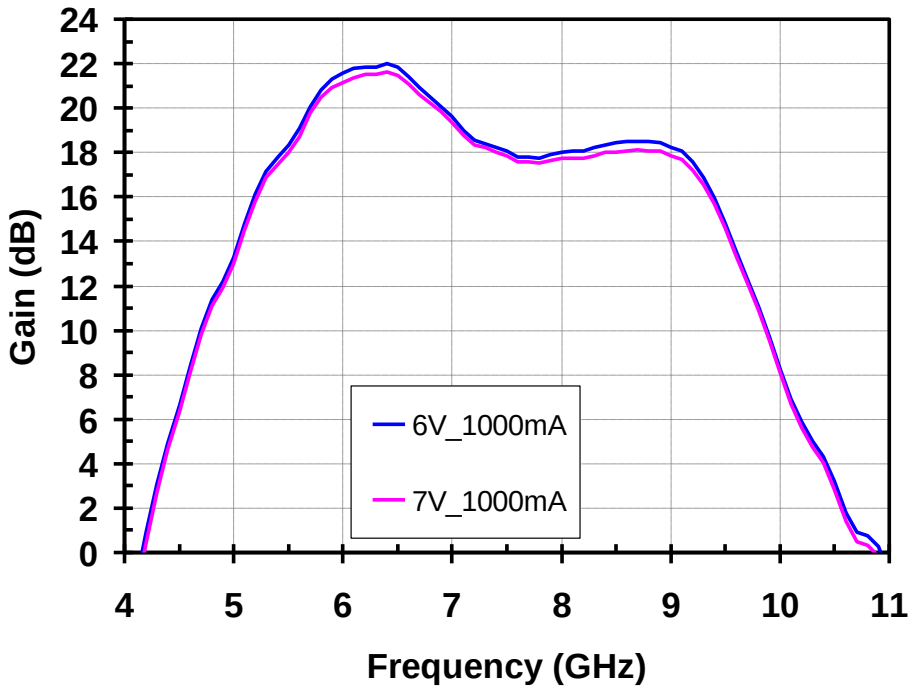
Bias conditions: V_D = 6 V, I_D = 1000 mA, V_G = -0.6 V Typical

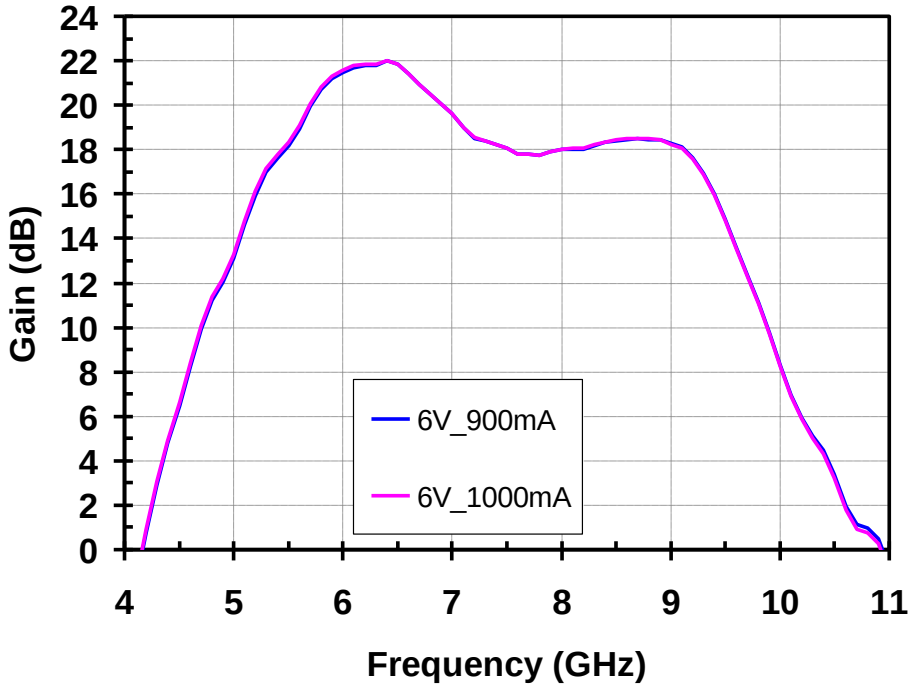




Small Signal Gain vs Bias

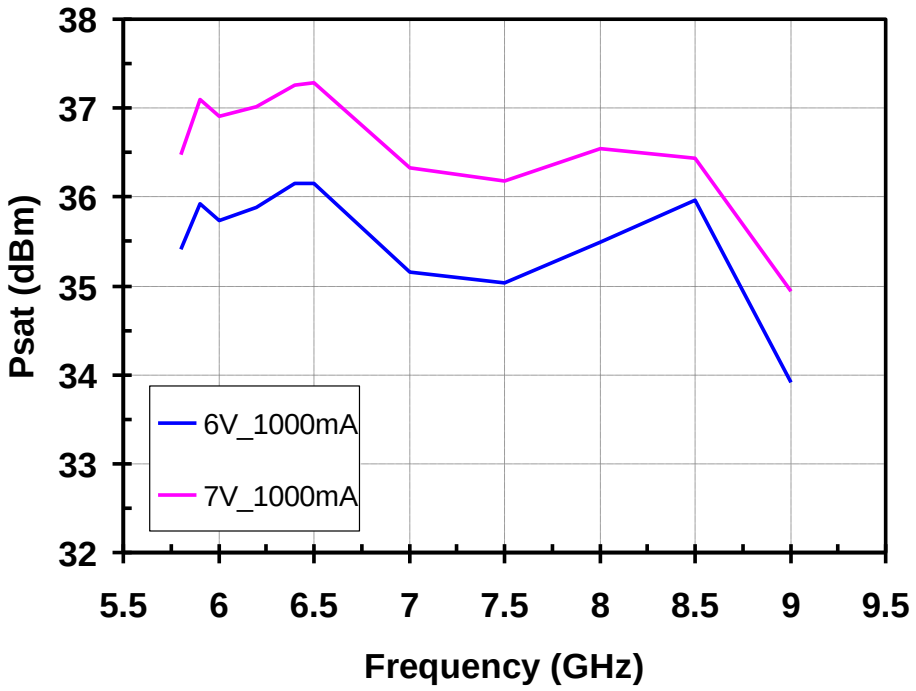
Bias conditions: Varies

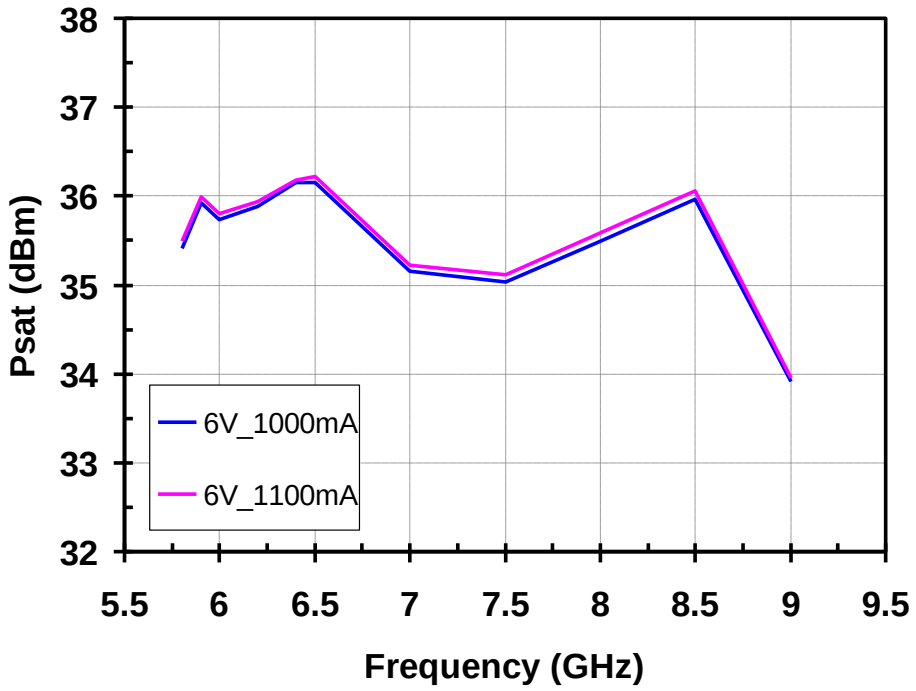




Power vs Bias

Bias conditions: Varies

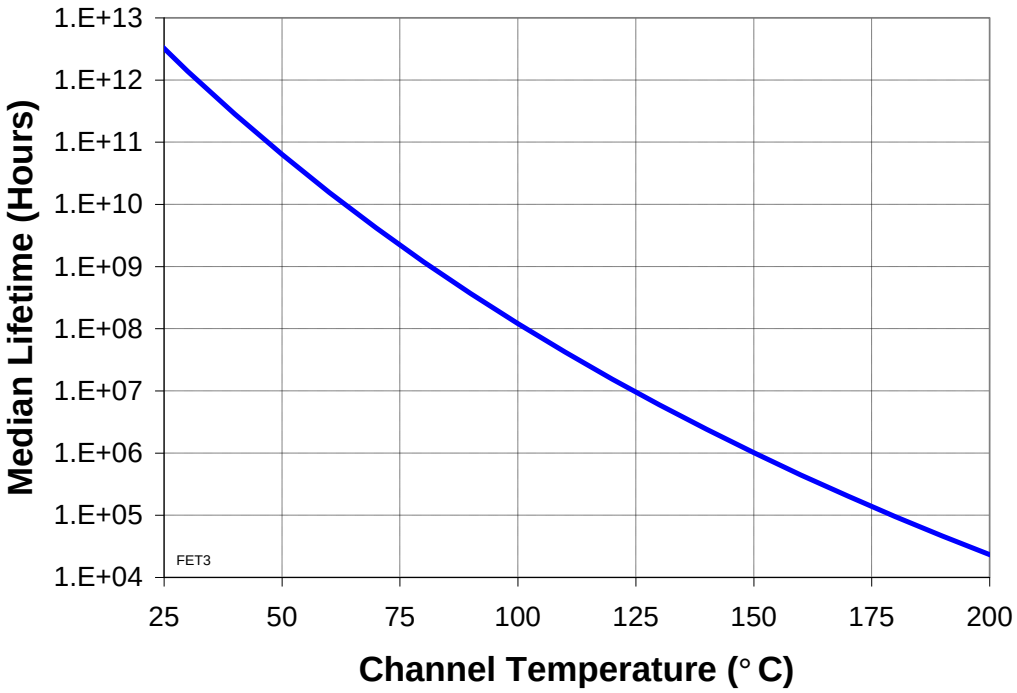




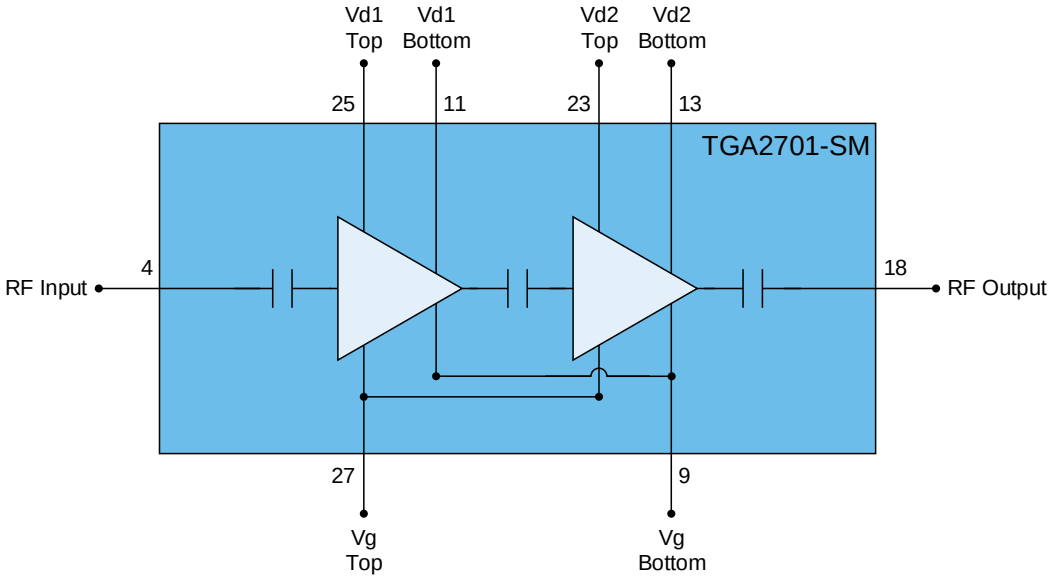
Thermal and Reliability Information

Parameter	Test Conditions	Value
Maximum Power Dissipation	$T_{BASEPLATE}$ = 85 °C	P_D = 18.5 W Tchannel = 200 °C
Thermal Resistance, θjc	V_D = 6 V I_D = 1A P_D = 6 W $T_{BASEPLATE}$ = 85 ºC	θjc = 6.2 °C/W Tchannel = 122 °C Tm = 1.3E+7Hrs
Thermal Resistance, θjc Under RF Drive	V_D = 6 V I_D = 1.6 A P_{OUT} = 35.5 dBm P_D = 6 W $T_{BASEPLATE}$ = 85 ºC	θjc = 6.2 °C/W Tchannel = 122 °C Tm = 1.3E+7 Hrs
Mounting Temperature		Refer to Assembly Note and Solder Reflow Profiles
Storage Temperature		-65 to 150 °C

Median Lifetime (Tm) vs. Channel Temperature



Electrical Schematic



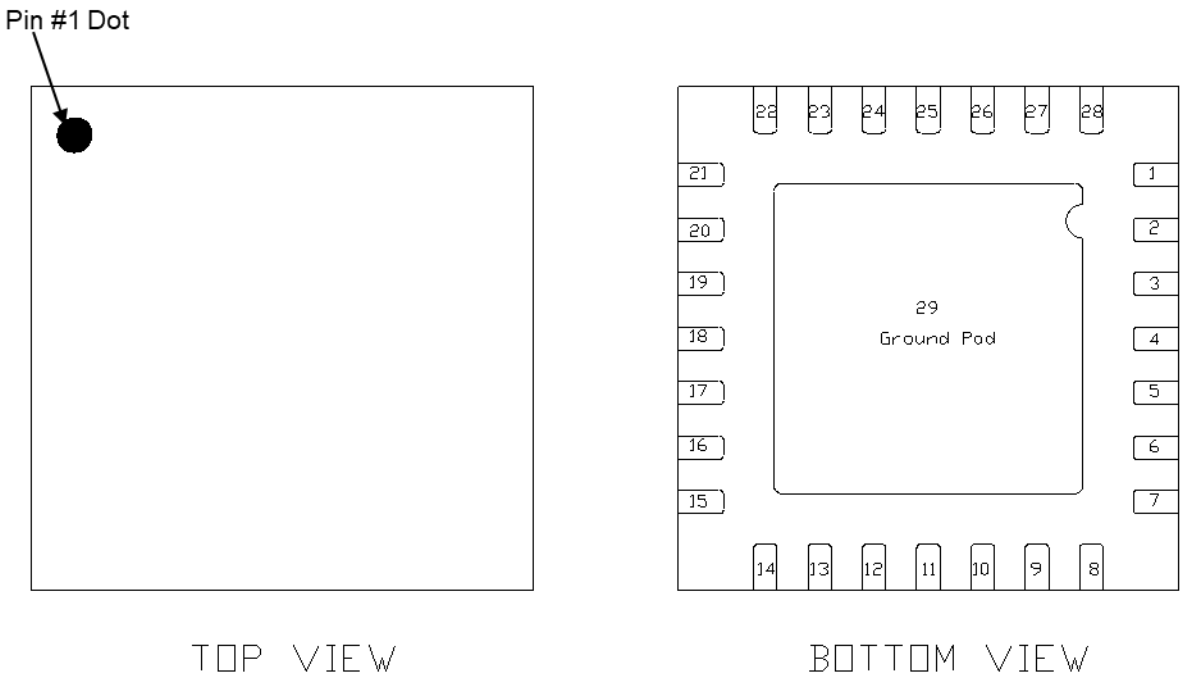
Bias Procedures

Bias-up Procedure
V_G (combined V_G_Top & V_G_Bottom) set to -1.2 V
V_D (combined all four V_D) set to +6 V
Adjust V_G more positive until I_{DQ} is 1 A. This will be ~ V_G = -0.6 V

Bias-down Procedure
Turn off RF signal
Reduce V_G to -1.2 V. Ensure Id ~ 0 mA
Turn V_D to 0 V

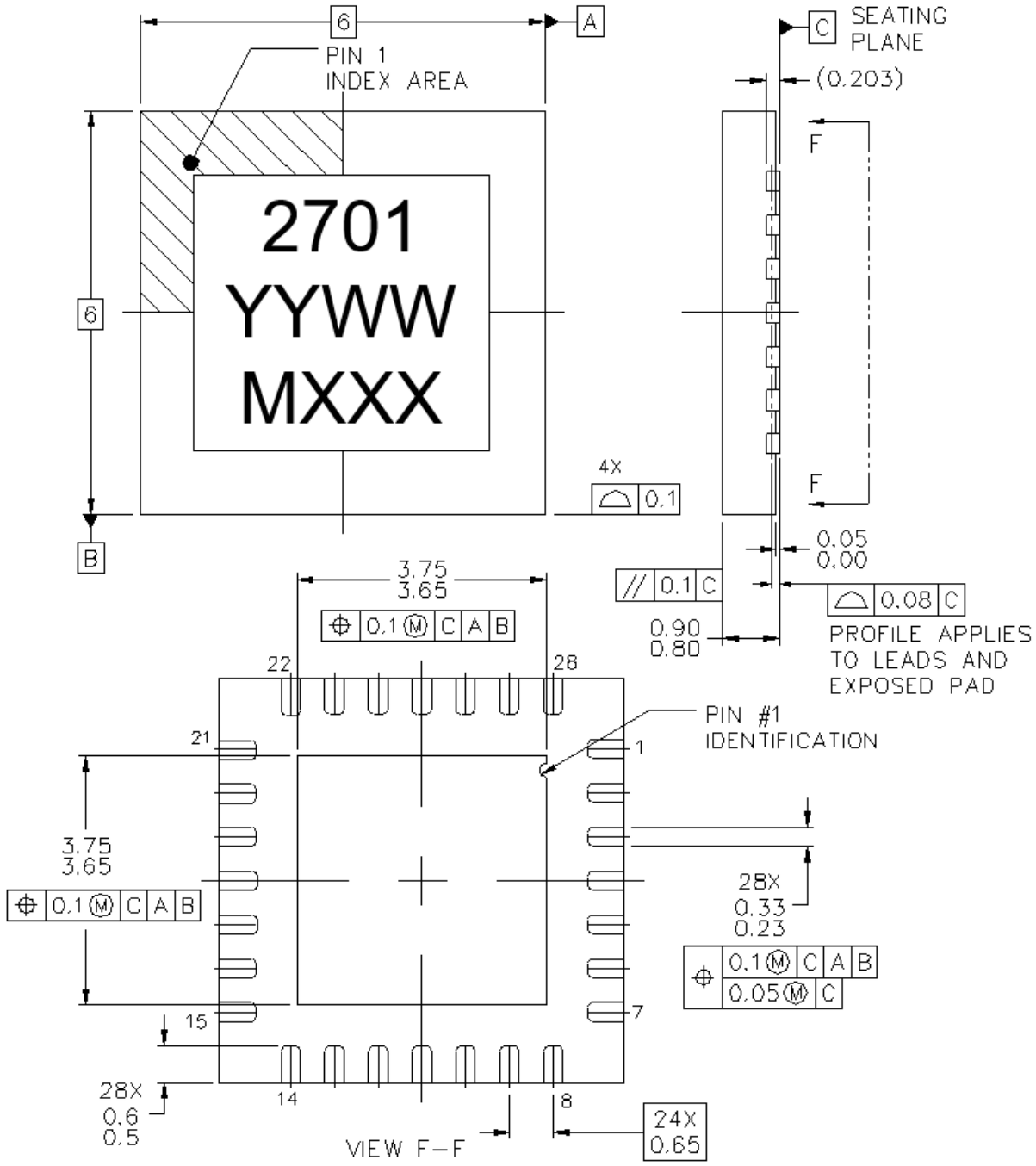
Package Pin Assignments

Package Pinout



Pin	Description
4	RF Input, DC blocked
9	V_G_Bottom
11	V_{D1}_Bottom
13	V_{D2}_Bottom
18	RF Output, DC blocked
23	V_{D2}_Top
25	V_{D1}_Top
27	V_G_Top
29	Ground
1, 2, 3, 5, 6, 7, 8, 10, 12, 14, 15, 16, 17, 19, 20, 21, 22, 24, 26, 28	No internal connections

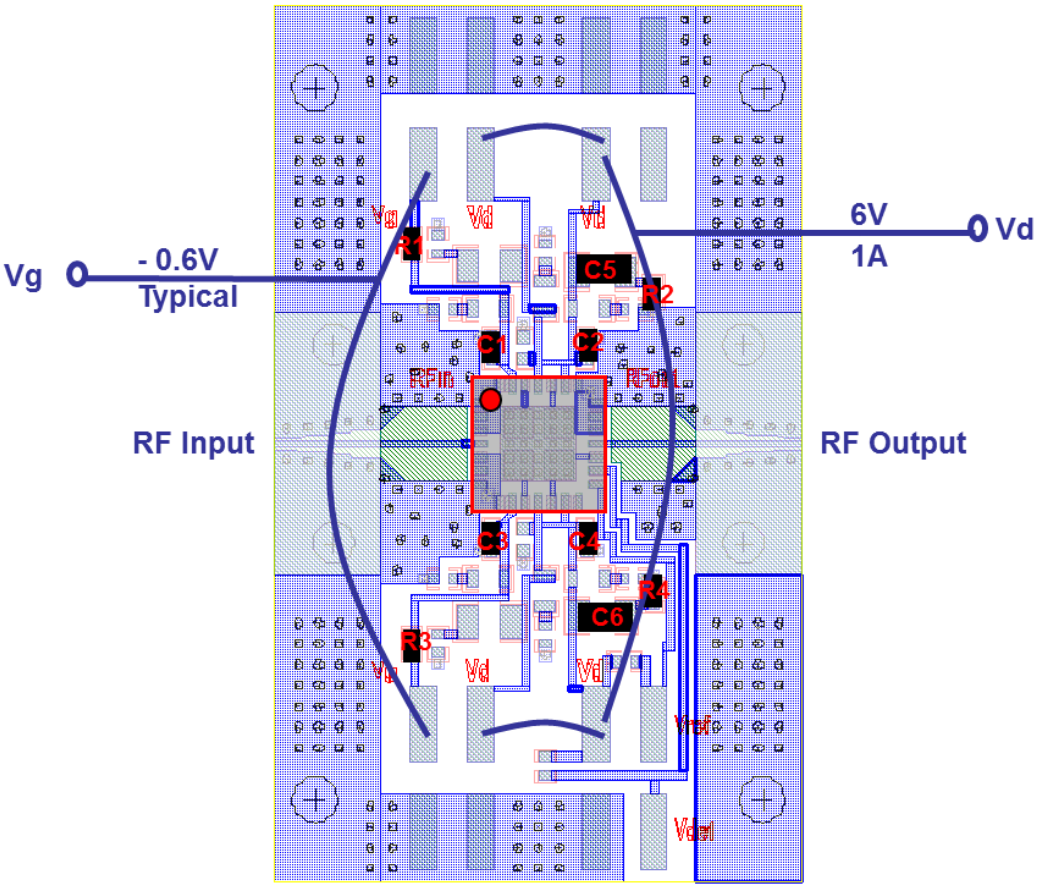
Mechanical Drawing



Notes:

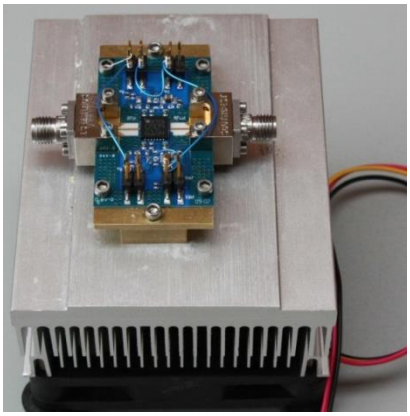
1. Dimensions in mm
2. The package is mold encapsulated with NiPdAu plated leads.
3. Package Marking: 2701: Part Number, YY = Part Assembly Year, WW = Part Assembly Week, MXXX = Batch ID

Recommended Assembly Board



Part	Description
C1, C2, C3, C4	1000 pF Capacitor (0402)
C5, C6	1 uF Capacitor (0805)
R1, R2, R3, R4	0 Ohm Resistor Jumper (0402)

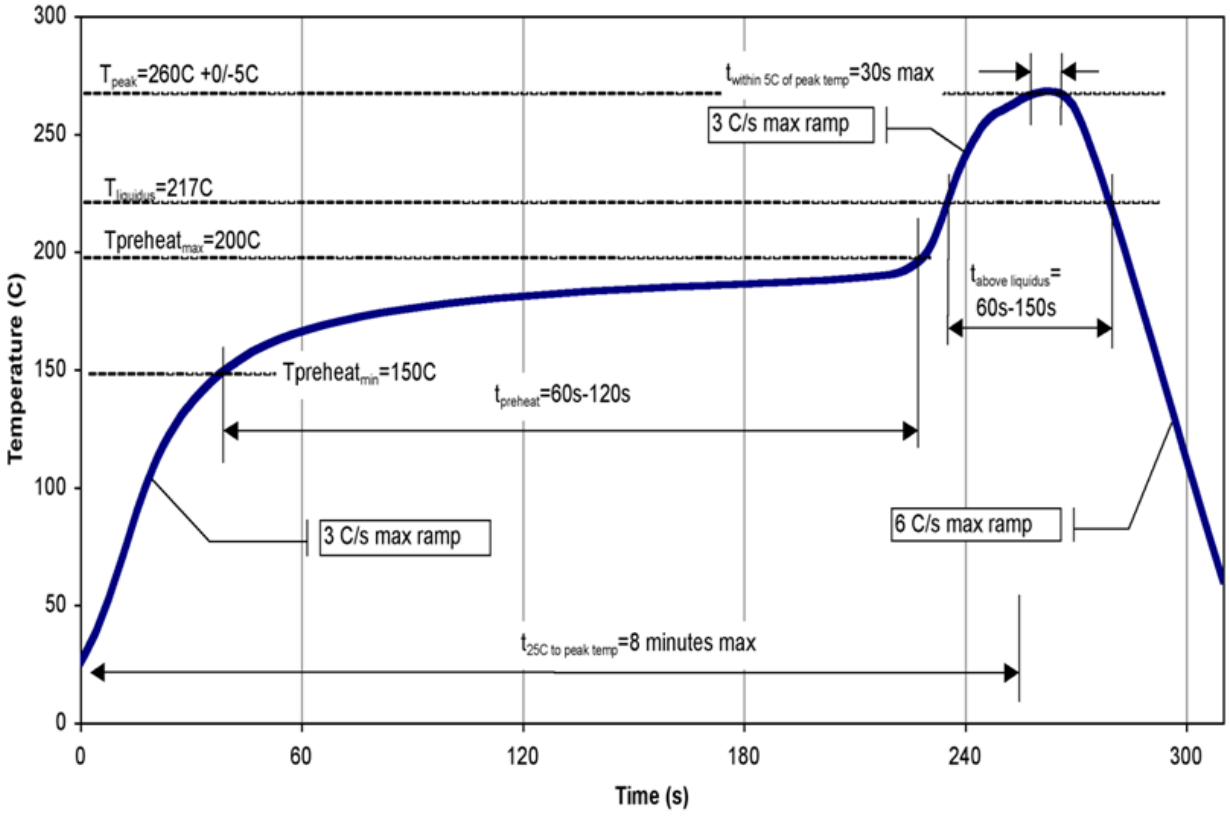
Board is 8 mil thick RO4003 with 1oz copper cladding.
Board is mounted on metal block and adequate heatsinking with fan is required.



Solderability

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

Recommended Soldering Temperature Profile



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	TBD	ESDA / JEDEC JS-001-2012
ESD – Charged Device Model (CDM)	TBD	ESDA / JEDEC JS-002-2014
MSL – Convection Reflow 260 °C	3	JEDEC standard IPC/JEDEC J-STD-020

Caution!
ESD-Sensitive Device

RoHS Compliance

This part is compliant with 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 ($C_{15}H_{12}Br_4O_2$) 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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Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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