

30 to 3000 MHz GaN Power Amplifier

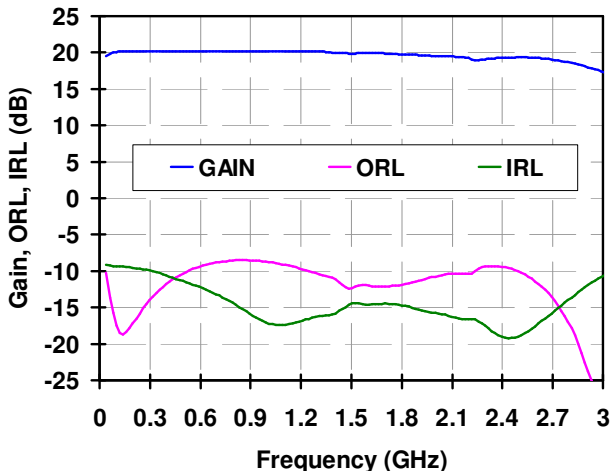
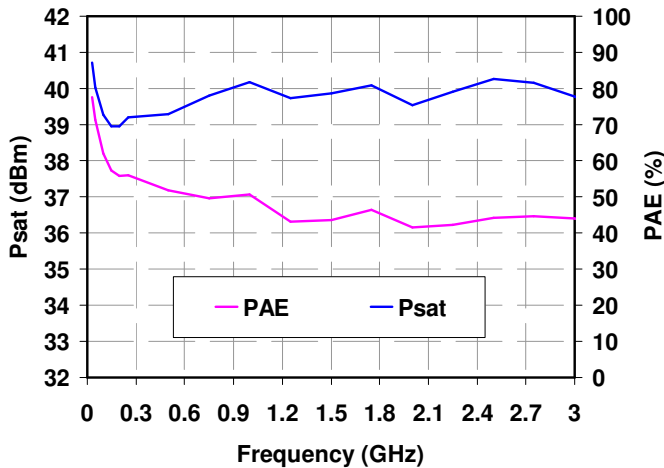


Key Features

- Frequency Range: 30 to 3000 MHz
- Psat: 39.5 dBm, P1dB: 35 dBm
- PAE: >40%
- Small Signal Gain: 19.5 dB
- TOI: 43 dBm
- NF: 4 dB
- Bias: Vd = 30 V, Idq = 360 mA, Vg = -3.32 V Typical
- Package Dimensions: 25.15 x 14.48 x 4.85 mm

Measured Performance

Bias conditions: Vd = 30 V, Idq = 360 mA, Vg = -3.32 V, Typical



Primary Application

- Military Communication

Product Description

The TGA2540-FL Power Amplifier provides 19.5 dB of small signal gain and greater than 8 W of output power across 30 to 3000 MHz band. The TGA2540-FL is designed using TriQuint's standard 0.25- μ m GaN HEMT production process.

The TGA2540-FL is available in a 4 lead flange mount package and is ideally suited for wideband communication transceivers.

Evaluation boards are available upon request.

Lead-free and RoHS compliant.

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Datasheet subject to change without notice.

Table I
Absolute Maximum Ratings 1/

Symbol	Parameter	Value	Notes
Vd-Vg	Drain to Gate Voltage	65 V	
Vd	Drain Voltage	40 V	<u>2/</u>
Vg	Gate Voltage Range	-30 to 0 V	
Id	Drain Current	850 mA	<u>2/</u>
Ig	Gate Current Range	-2.4 to 1.5 mA	
Pin	Input Continuous Wave Power	28 dBm	<u>2/</u>
Tchannel	Channel Temperature	200 °C	

- 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.

Table II
Recommended Operating Conditions

Symbol	Parameter <u>1/</u>	Value
Vd	Drain Voltage	30 V
Id	Drain Current	360 mA
Id_Drive	Drain Current under RF Drive	740 mA
Vg	Gate Voltage	-3.32 V

- 1/ See assembly diagram for bias instructions.

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Table III
RF Characterization Table

Bias: Vd = 30 V, Idq = 360 mA, Vg = -3.32 V, Typical

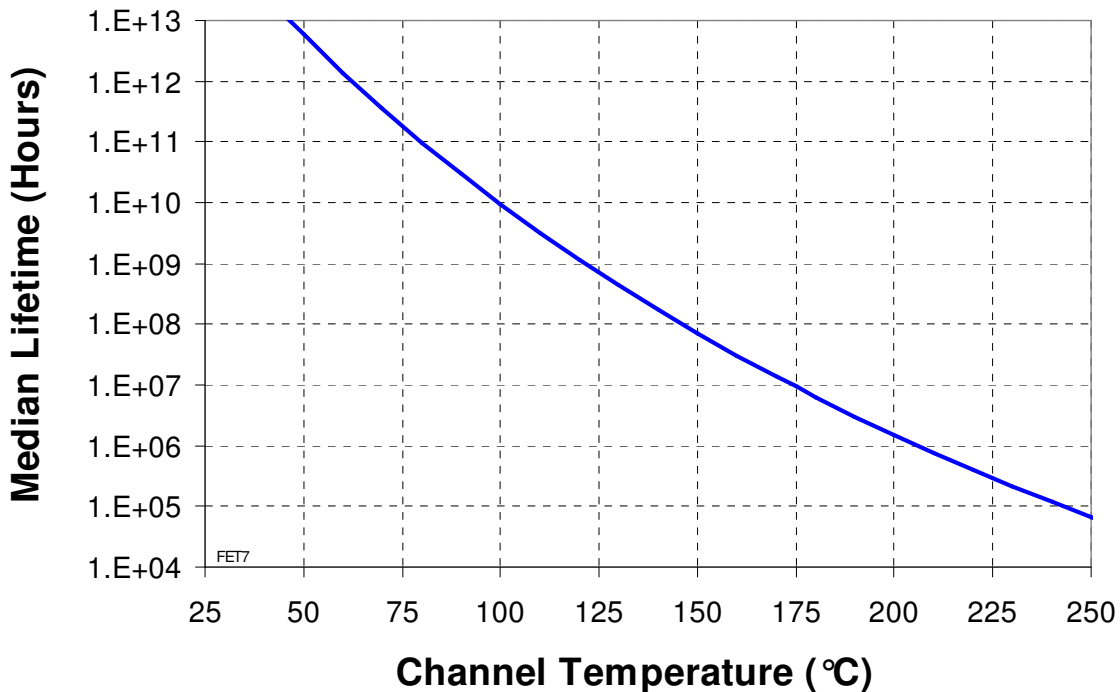
SYMBOL	PARAMETER	TEST CONDITIONS	MIN	NOMINAL	MAX	UNITS
Gain	Small Signal Gain	f = 30 - 3000 MHz	-	19.5	-	dB
IRL	Input Return Loss	f = 30 - 3000 MHz	-	12	-	dB
ORL	Output Return Loss	f = 30 - 3000 MHz	-	10	-	dB
Psat	Saturated Output Power	f = 30 - 3000 MHz	-	39.5	-	dBm
P1dB	Output Power @ 1dB Compression	f = 30 - 3000 MHz	-	35	-	dBm
TOI	Output TOI	f = 30 - 3000 MHz	-	43	-	dBm
NF	Noise Figure	f = 30 - 3000 MHz	-	4	-	dB

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Table IV
Power Dissipation and Thermal Properties

Parameter	Test Conditions	Value	Notes
Maximum Power Dissipation	Tbaseplate = 70 °C	Pd = 18.8 W Tchannel = 200 °C Tm = 1.3E+5 Hrs	
Thermal Resistance, θ_{JC}	Vd = 30 V Id = 360 mA Pd = 10.8 W Tbaseplate = 70 °C	θ_{JC} = 6.9 °C/W Tchannel = 145 °C Tm = 4.1E+6 Hrs	
Thermal Resistance, θ_{JC} Under RF Drive	Vd = 30 V Id = 740 mA Pout = 39.5 dBm Pd = 13.3 W Tbaseplate = 70 °C	θ_{JC} = 6.9 °C/W Tchannel = 162 °C Tm = 1.3E+6 Hrs	
Mounting Temperature	30 seconds	180 °C	
Storage Temperature		-65 to 150 °C	

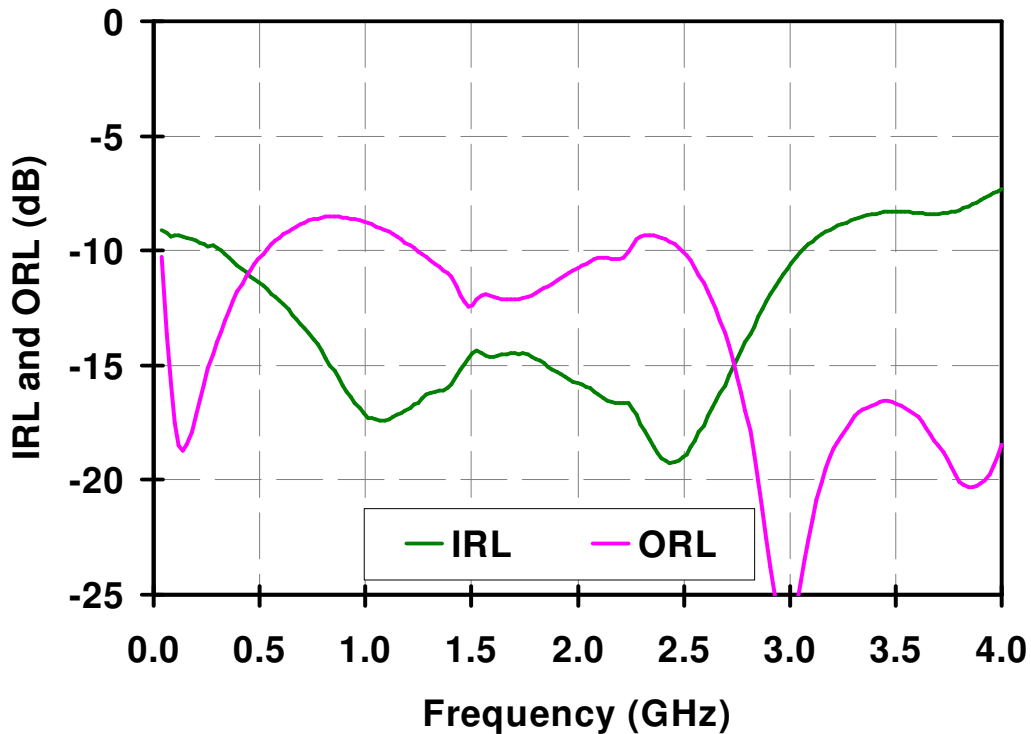
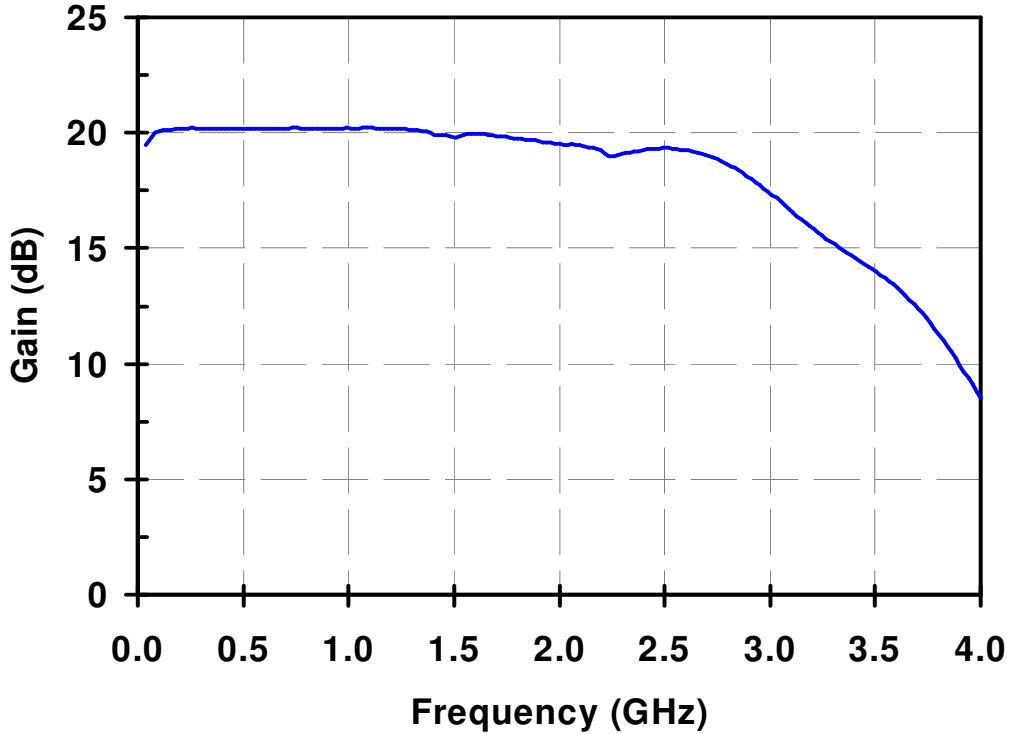
Median Lifetime vs Channel Temperature



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Measured Data

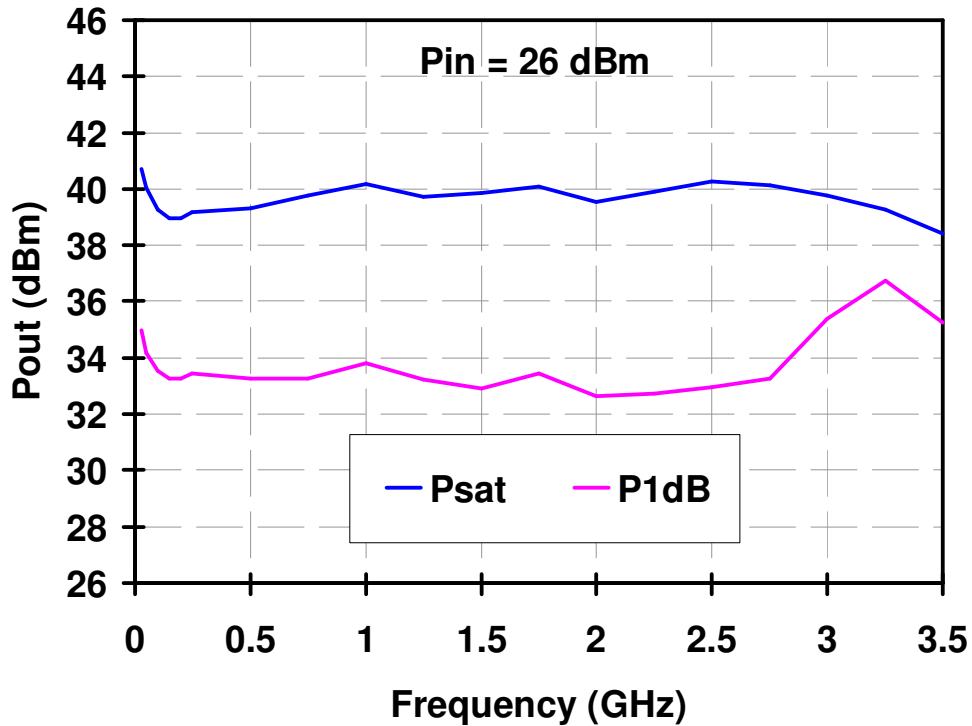
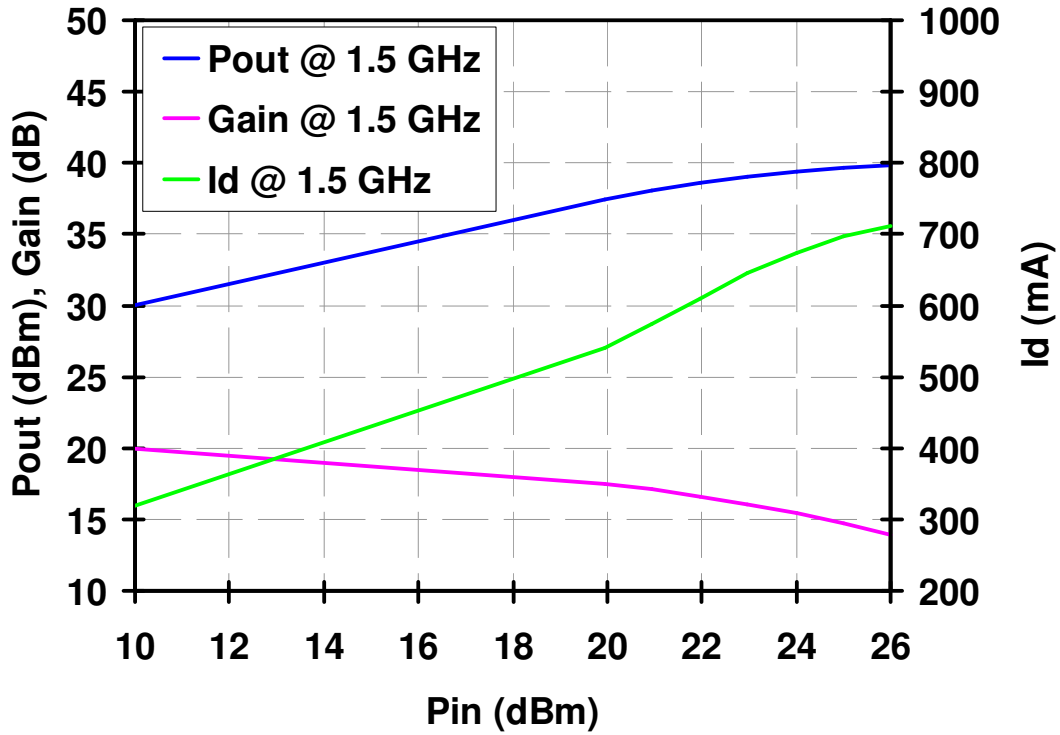
Bias conditions: $V_d = 30\text{ V}$, $I_{dq} = 360\text{ mA}$, $V_g = -3.32\text{ V}$, Typical



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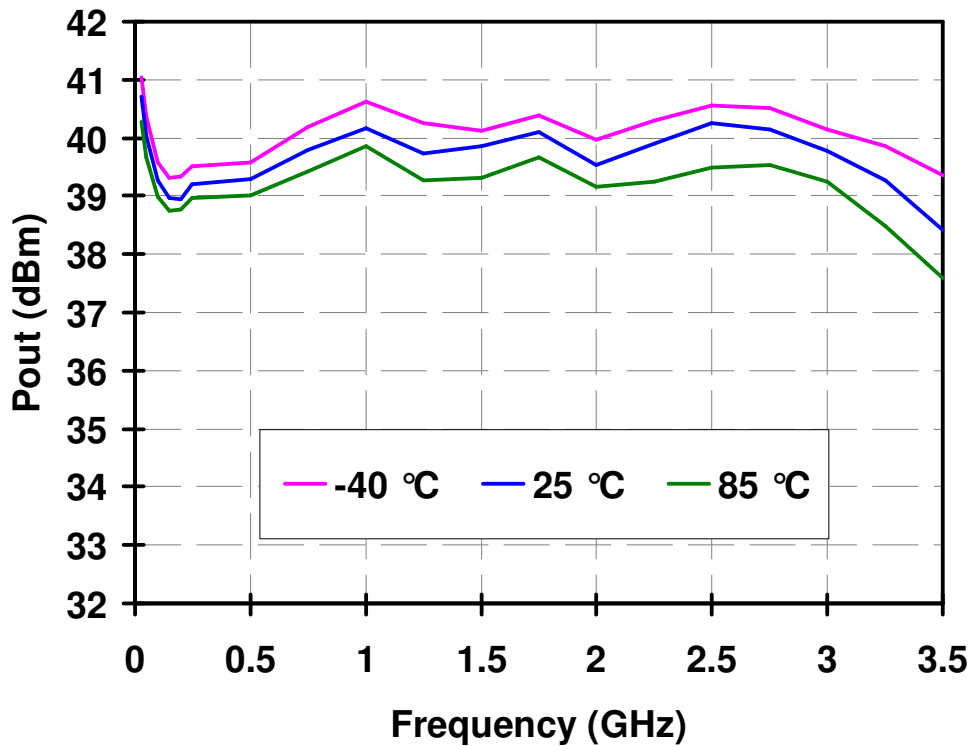
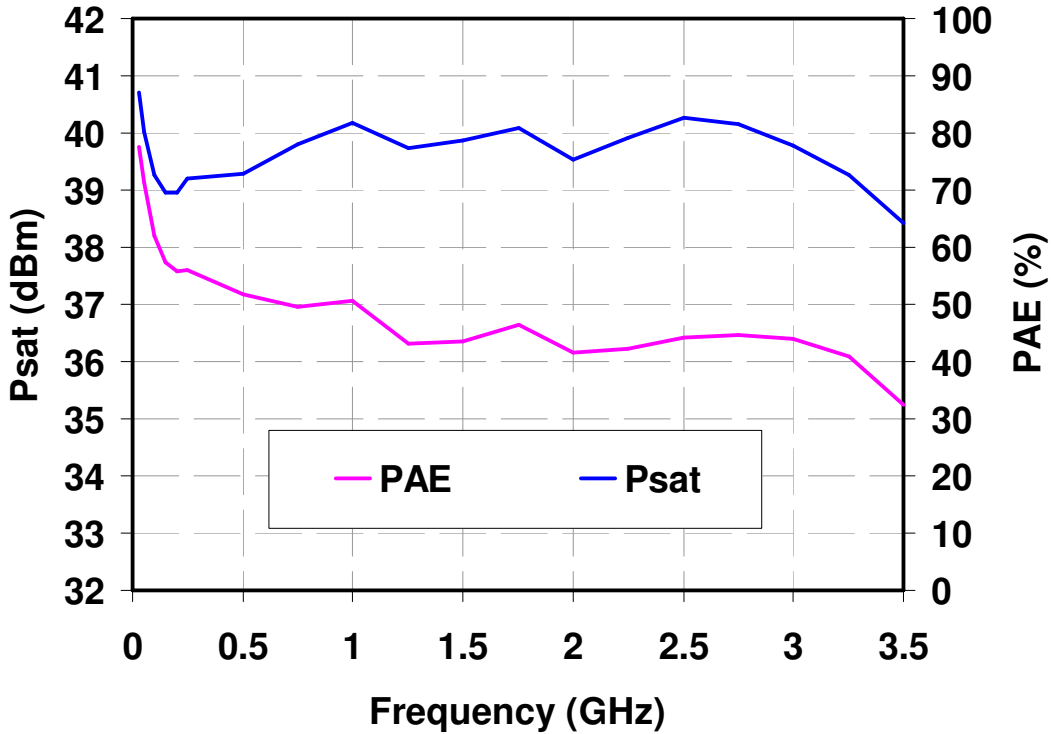
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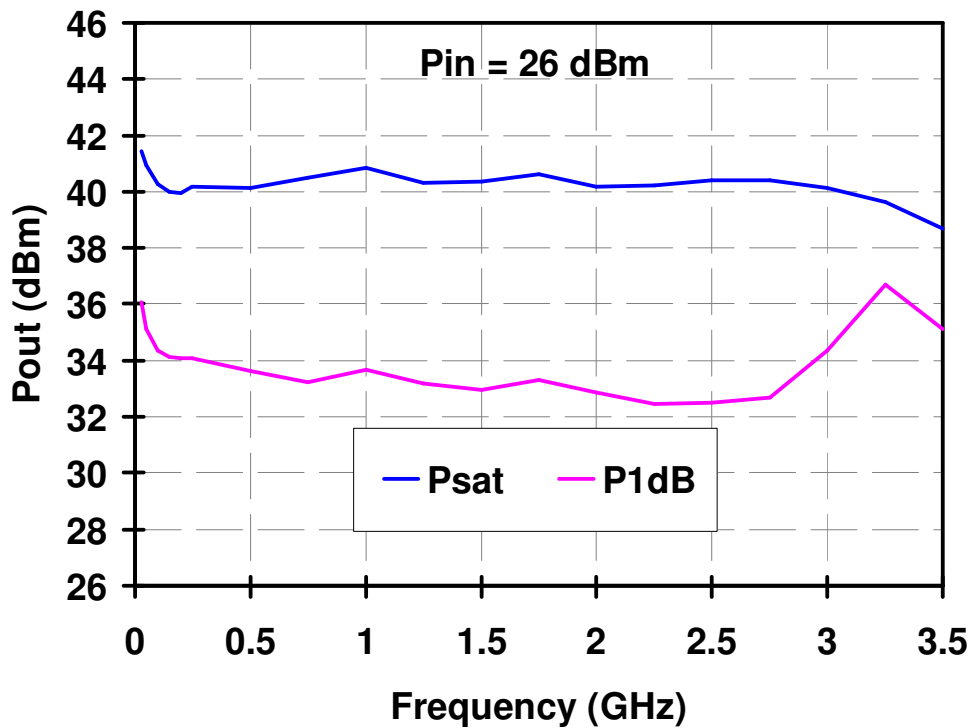
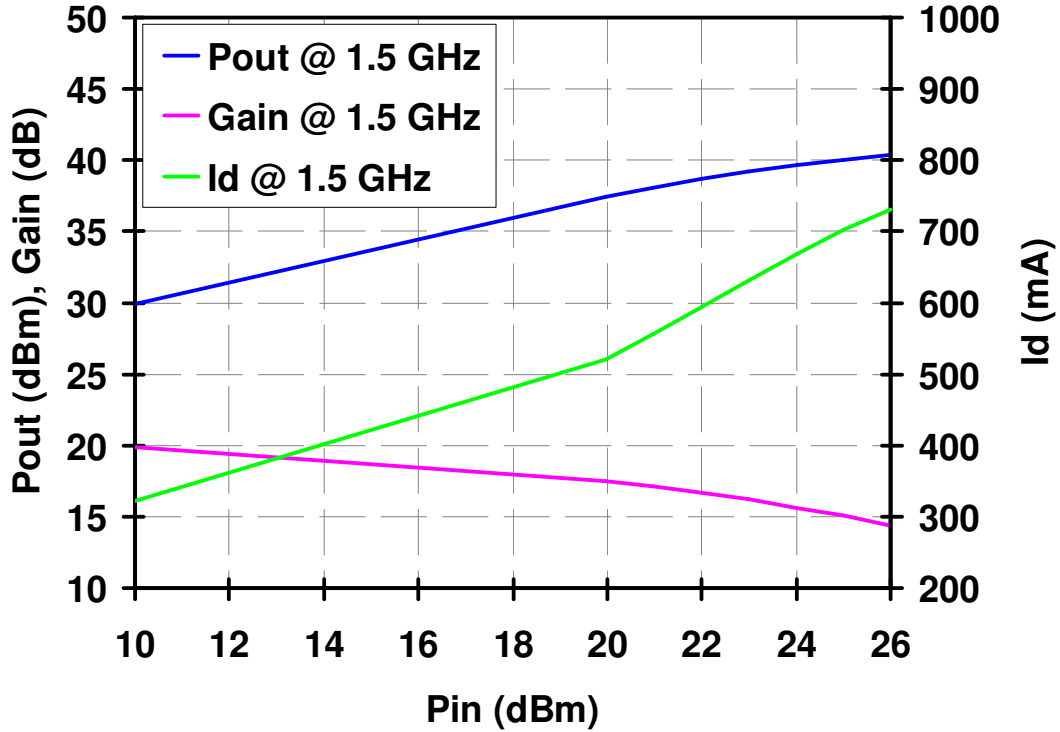
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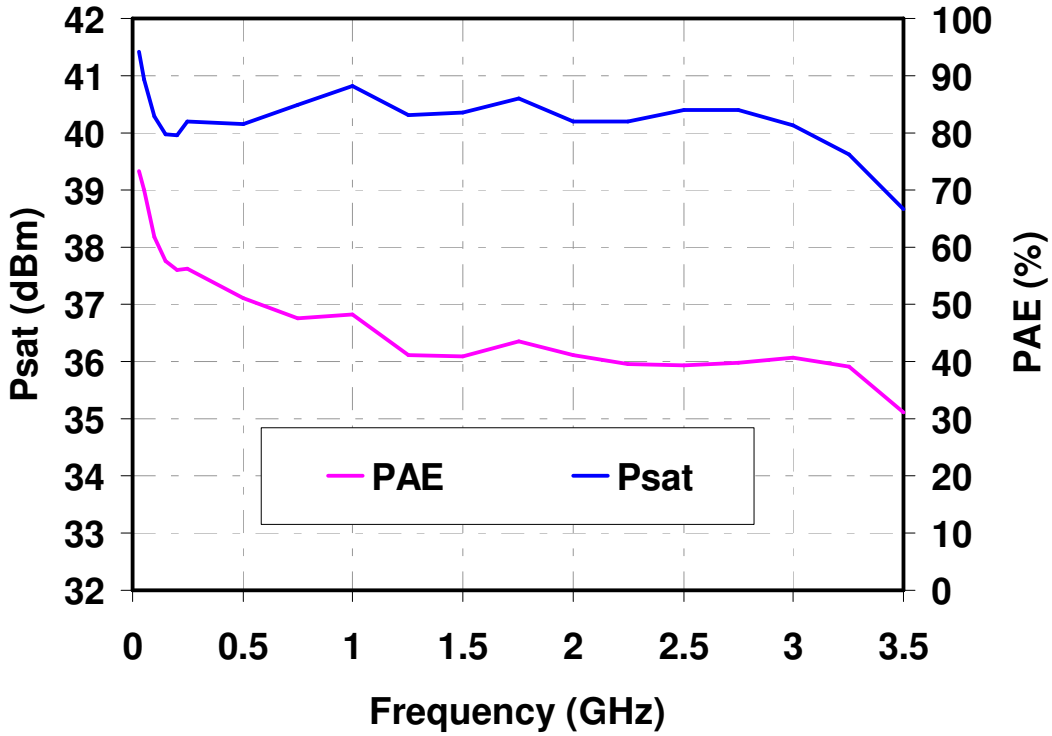
Bias conditions: $V_d = 35\text{ V}$, $I_{dq} = 360\text{ mA}$, $V_g = -3.35\text{ V}$, Typical



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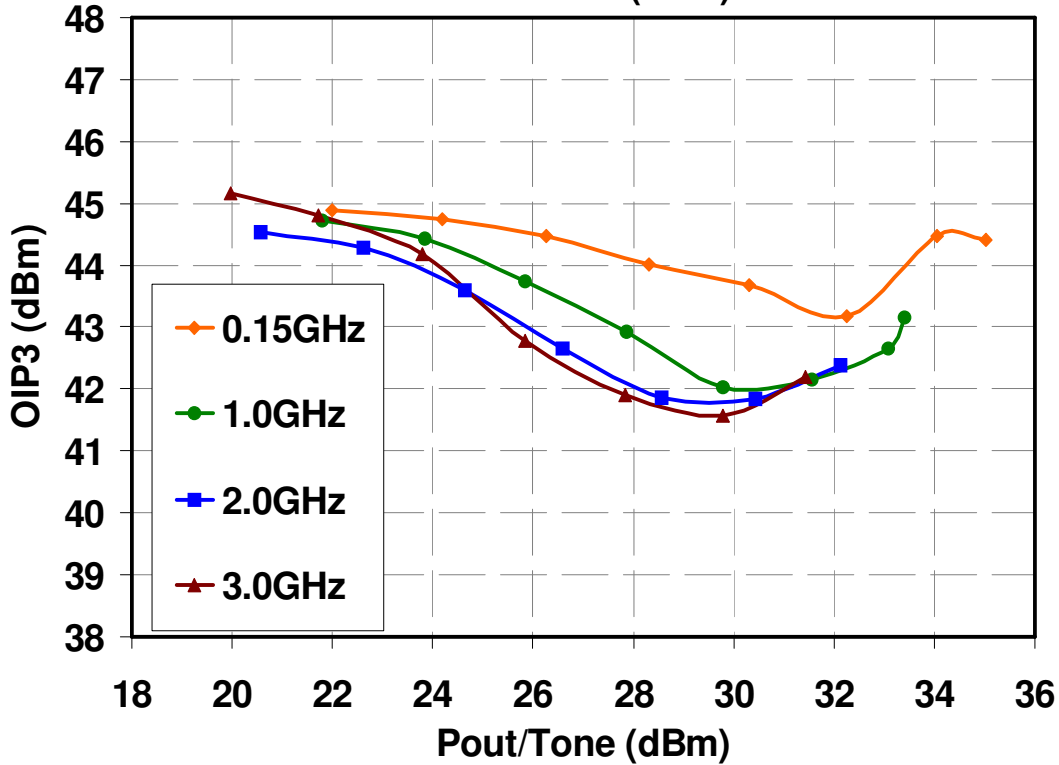
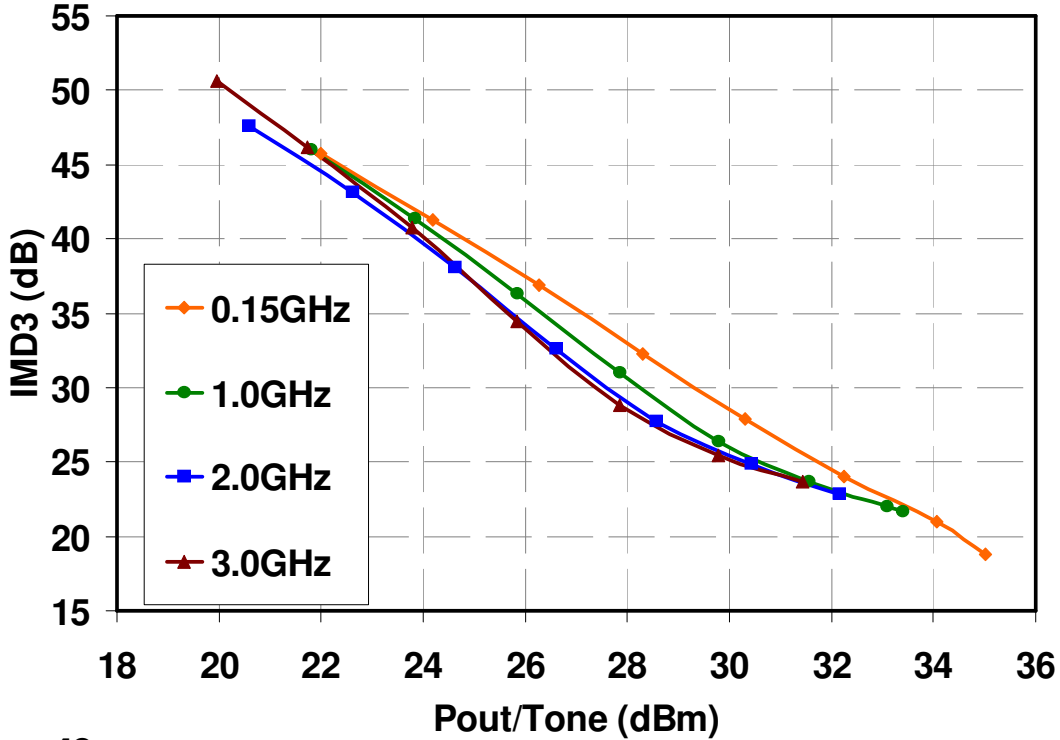
Bias conditions: $V_d = 35\text{ V}$, $I_{dq} = 360\text{ mA}$, $V_g = -3.35\text{ V}$, Typical



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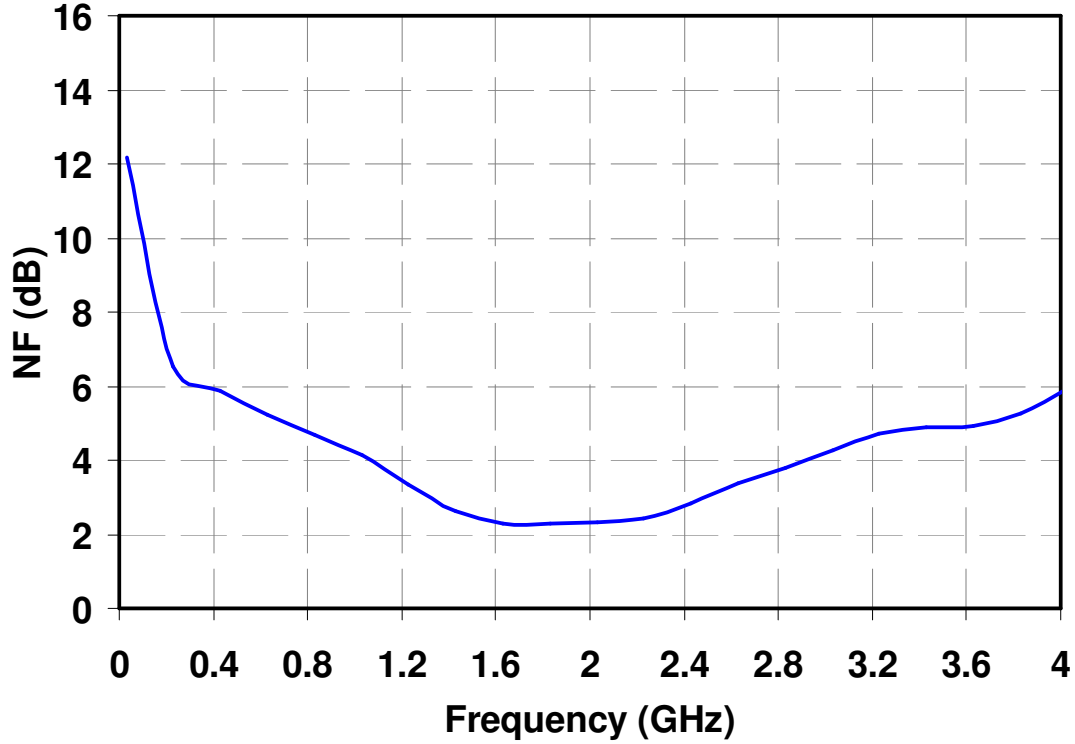
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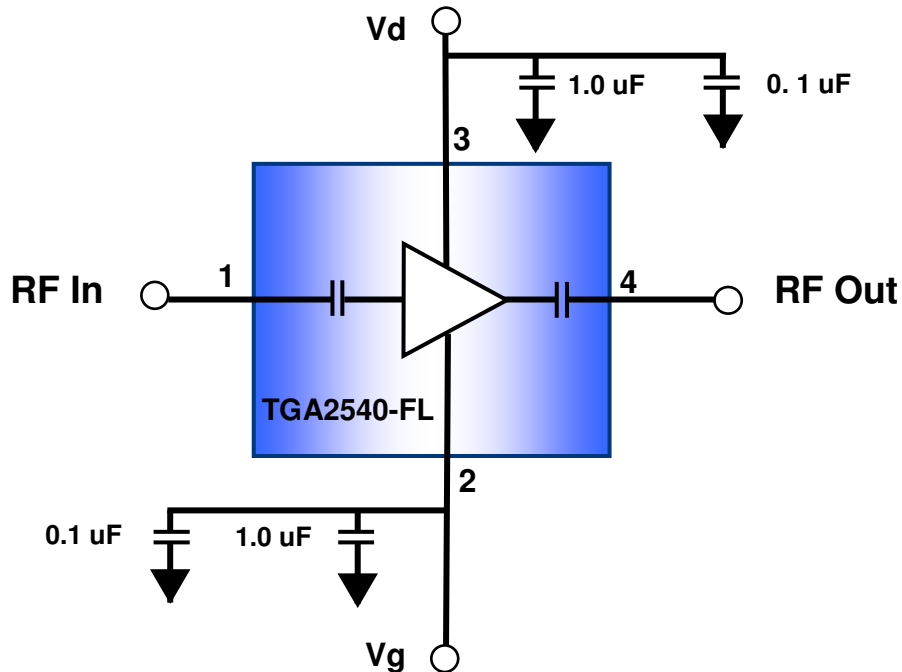
Measured Data

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Electrical Schematic



Bias Procedures

Bias-up Procedure

Set Vg to -6.0 V

Set Vd to +30 V

Adjust Vg more positive until Id is 360 mA.
This will be Vg ~ -3.3 V

Apply RF signal to input

Bias-down Procedure

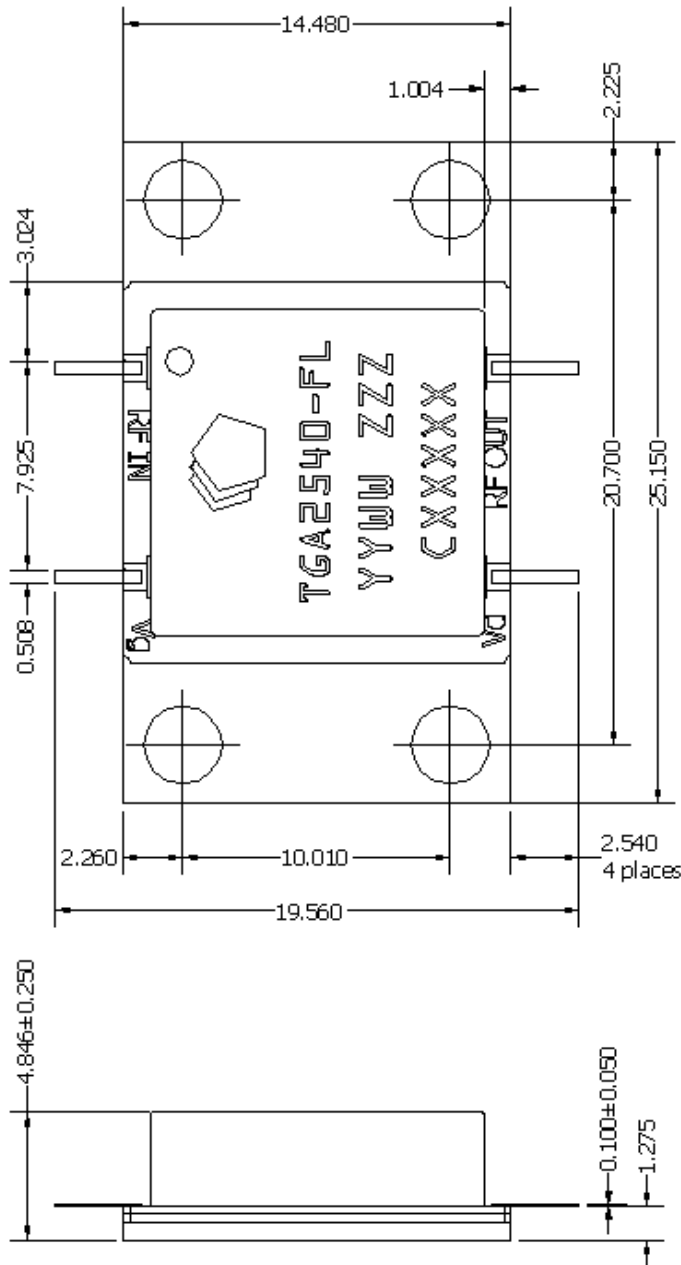
Turn off RF supply

Reduce Vg to -6.0V. Ensure Id ~ 0 mA

Turn Vd to 0 V

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Mechanical Drawing

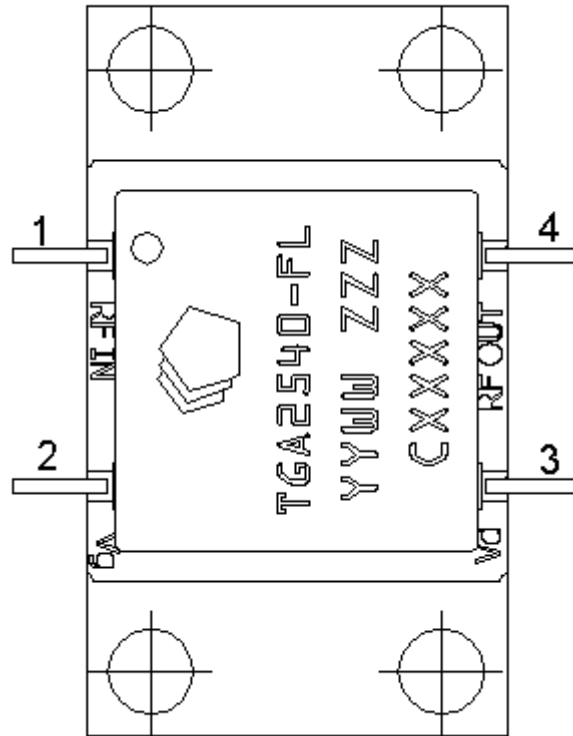


All dimensions are in mm.

GaN MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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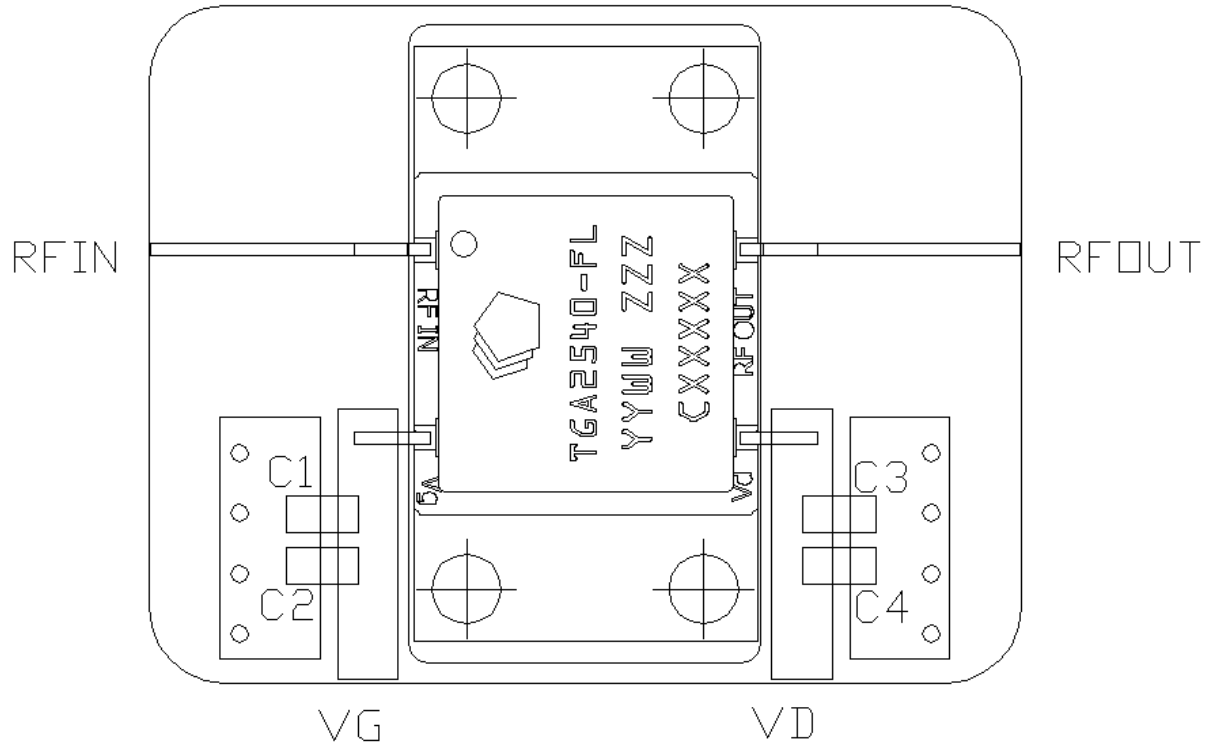
Package Pin out



Pin 1	RF In
Pin 2	Vg
Pin 3	Vd
Pin 4	RF Out

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Recommended Evaluation Board Layout



Board Material: Roger 4350; Thickness: 0.010 in.

Designators	Values
C1	1 uF
C2	0.1 uF
C3	1 uF/ 100 V
C4	0.1 uF/ 100 V

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Assembly of a TGA2540-FL Package

1. Clean the board or module with alcohol. Allow it to fully dry.
2. Nylock screws are recommended for mounting the TGA2540-FL to the board.
3. To improve the thermal and RF performance, we recommend a heat sink attached to the bottom of the TGA2540-FL and/or apply Indium alloy shim (80In/15Pb/ 5Ag) to the bottom of TGA2540-FL.
4. Apply solder to each pin of TGA2540-FL.
5. Clean the assembly with alcohol.

Ordering Information

Part	ECCN	Package Style
TGA2540-FL	XI(c)	Flange (Package bolted down)

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