TGA2576-2-FL

2.5 to 6 GHz 40W GaN Power Amplifier

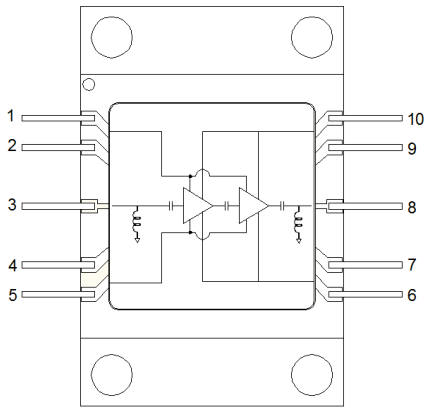
Applications

- Communications
- Electronic Warfare
- Test Instrumentation
- EMC Amplifier

Product Features

- Frequency Range: 2.5 to 6 GHz
- P_{SAT}: 46.5 dBm @ P_{IN} = 26 dBm, CW
- PAE: 36%
- Small Signal Gain: 29 dB
- Bias: V_D = 30 V, I_{DQ} = 1.55 A, V_G = –2.5 V Typical
- Dimensions: 11.4 x 17.3 x 3.0 mm.

Functional Block Diagram



General Description

Qorvo's TGA2576-2-FL is a wideband power amplifier fabricated on Qorvo's proven 0.25um GaN on SiC production technology. Operating from 2.5 to 6 GHz, the TGA2576-2-FL achieves 40W of saturated output power, greater than 36% power-added efficiency and 29dB small signal gain.

For ideal thermal management and handling, the TGA2576-2-FL is offered in a CuW-based flanged packaged and can operate in both CW and pulsed modes.

Both RF ports are fully matched to 50Ω, the TGA2576-2-FL is ideally suited to support a variety of commercial and defense related applications.

Lead-free and RoHS compliant

Evaluation Boards are available up on request.

Pin Configuration

Pin No.	Symbol
1, 5	V_G
2, 4, 7, 9	N/C
3	RF IN
6, 10	V_D
8	RF OUT

Ordering Information

Part	ECCN	Description
TGA2576-2-FL	3A001.b.2.a.4	2.5 to 6 GHz 40W GaN PA

Absolute Maximum Ratings

Parameter	Value
Drain Voltage (V_D)	40 V
Gate Voltage (V_G)	–5 to 0 V
Drain Current (I_D)	5000 mA
Gate Current (I_G)	–18 to 35 mA
Power Dissipation (P_{DISS})	93 W
RF Input Power, CW, 50 Ω, T = 25°C	28 dBm
Channel tremperature (T_{CH})	275°C
Mounting Temperature (30 Seconds)	260°C
Storage Temperature	–40 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	Value
Drain Voltage (V_D)	30 V
Drain Current (I_{DQ})	1550 mA
Drain Current Under RF Drive (I_{D_DRIVE})	4300 mA
Gate Voltage (V_G)	-2.5 V

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

Electrical Specifications

Test conditions unless otherwise noted: 25°C, V_D = 30 V, I_{DQ} = 1550 mA, V_G = –2.5 V Typical, CW

Parameter	Min	Typical	Max	Units
Operational Frequency Range	2.5		6	GHz
Small Signal Gain		29		dB
Output Power at Saturation (Pin = 26 dBm)		46.5		dBm
Power-Added Efficiency (Pin = 26 dBm)		36 (Mid-band)		%
Gain Temperature Coefficient		-0.02		dB/°C
Power Temperature Coefficient		-0.02		dBm/°C

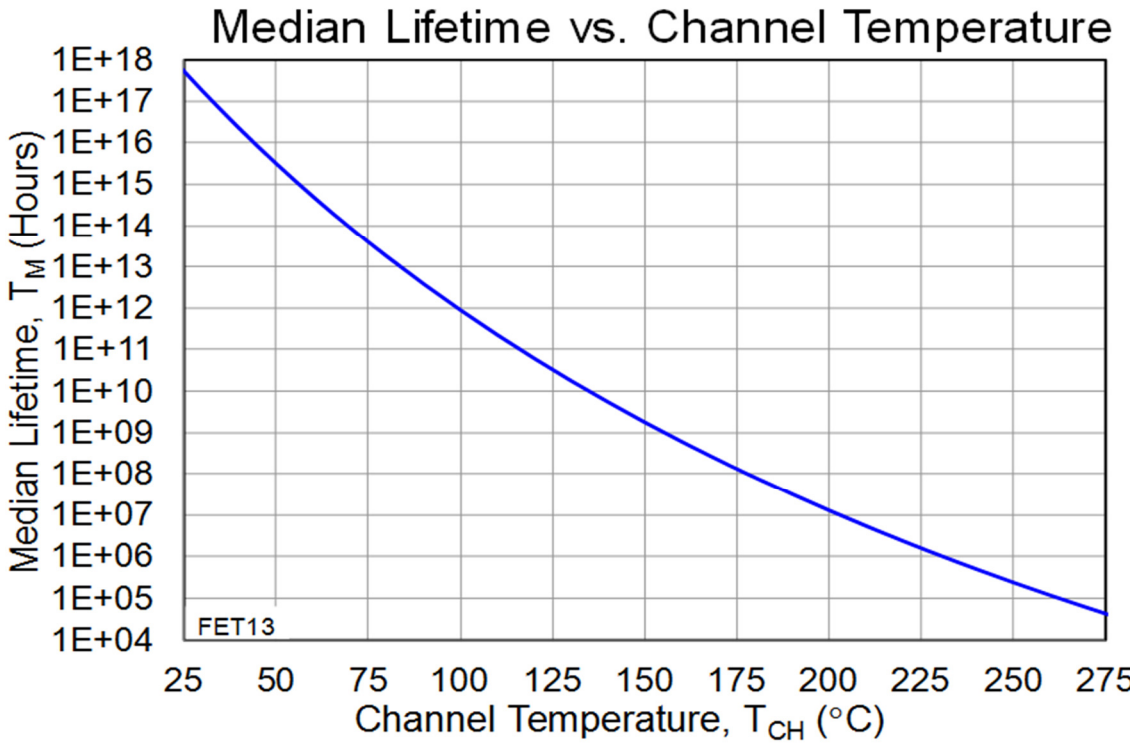
Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC}) (1)	T_{BASE} = 85°C	2.04	°C/W
Channel Temperature Under RF Drive (T_{CH})	V_D = **30** V, I_{D_Drive} = 3600 mA, P_{OUT} = 46 dBm, P_{DISS} = 68 W	224	°C
Median Lifetime Under RF Drive (T_M)		1.69 x 10^6	Hours

Notes:
1. Measured from junction to center of package backside.

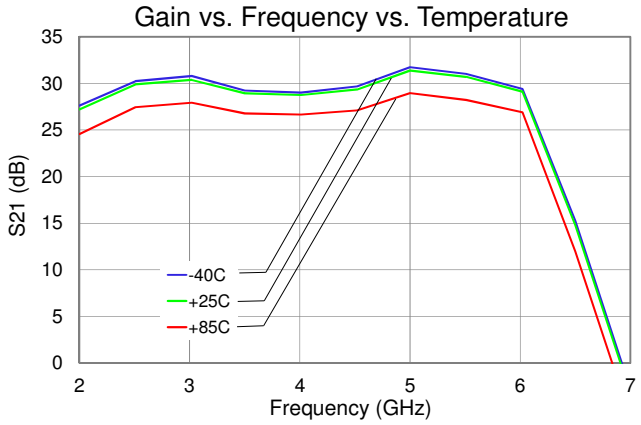
Median Lifetime

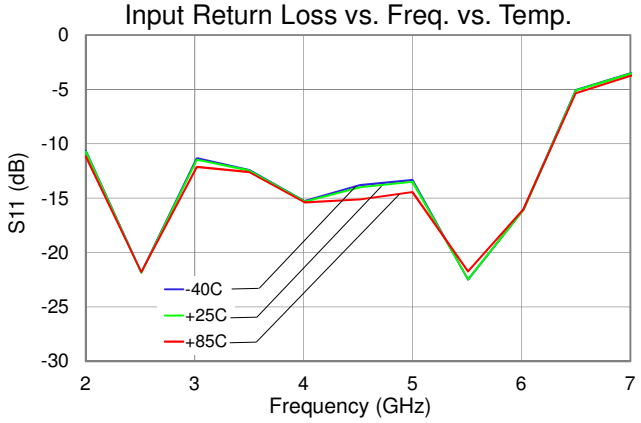
Test Conditions: V_D = 40V; Failure Criteria is 10% reduction in I_{D_MAX}

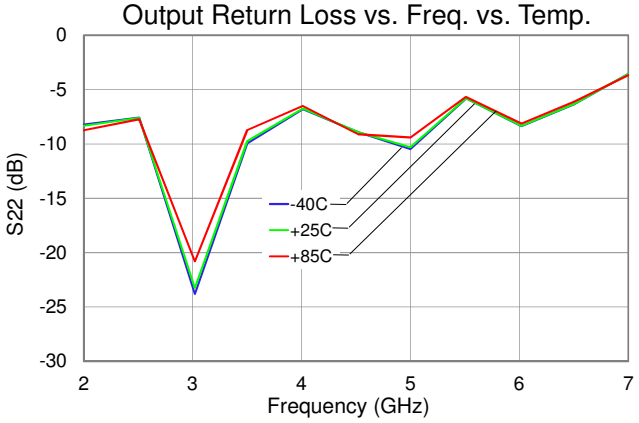


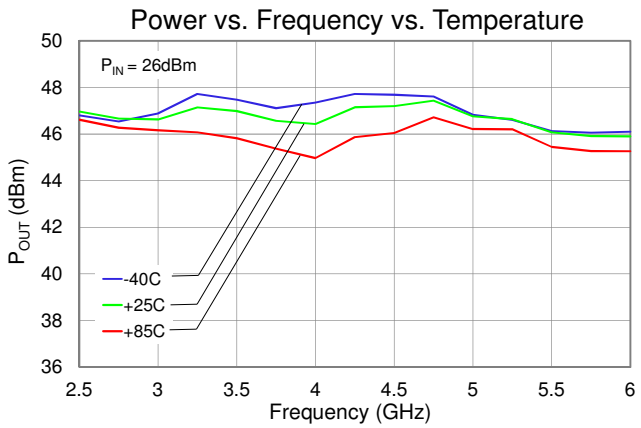
Typical Performance

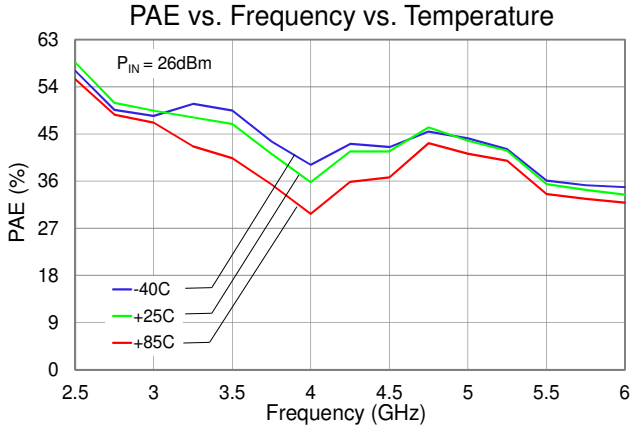
Conditions unless otherwise specified: V_D = 30V, I_{DQ} = 1.55A, V_G = -2.5V Typical, CW





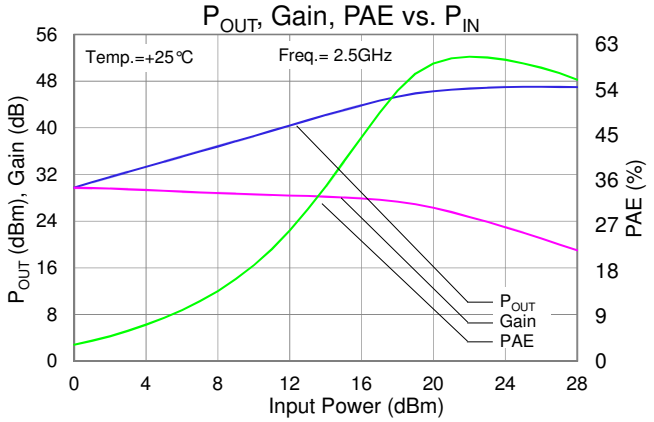


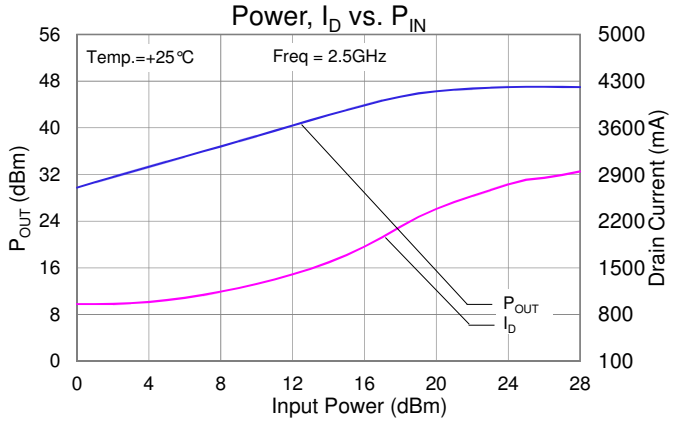


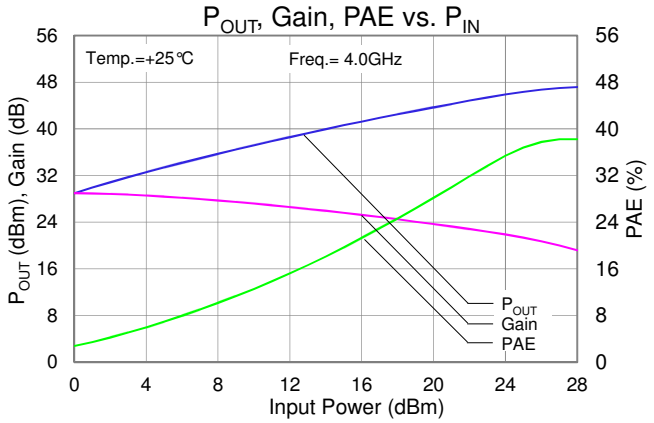


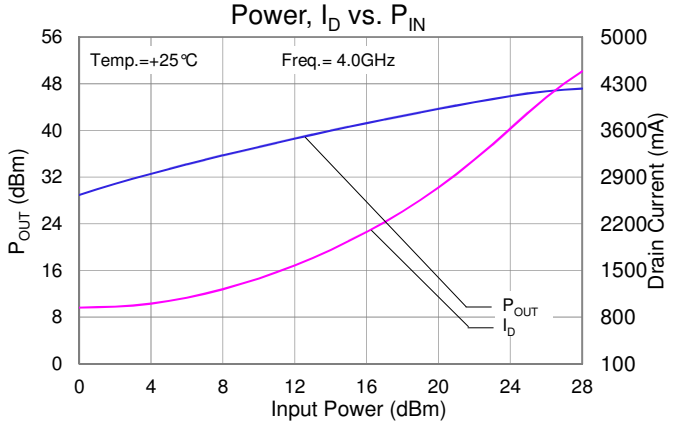
Typical Performance (con't.)

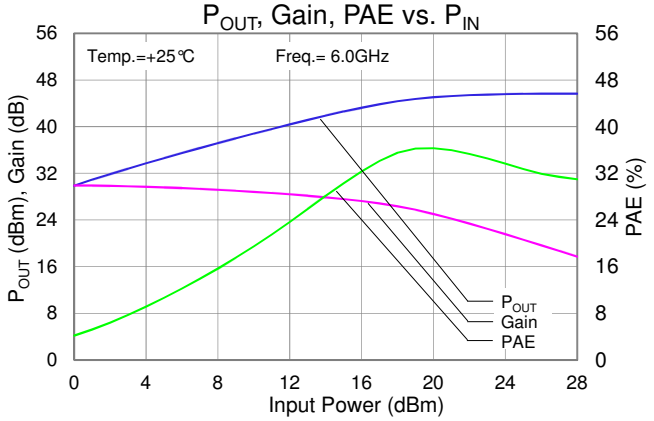
Conditions unless otherwise specified: V_D = 30V, I_{DQ} = 1.55A, V_G = -2.5V Typical, CW

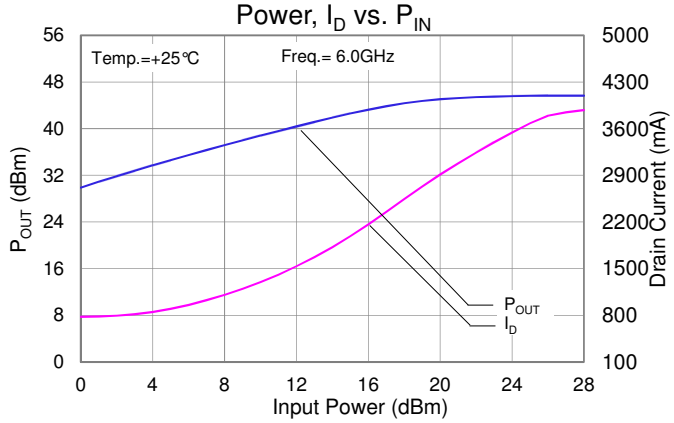






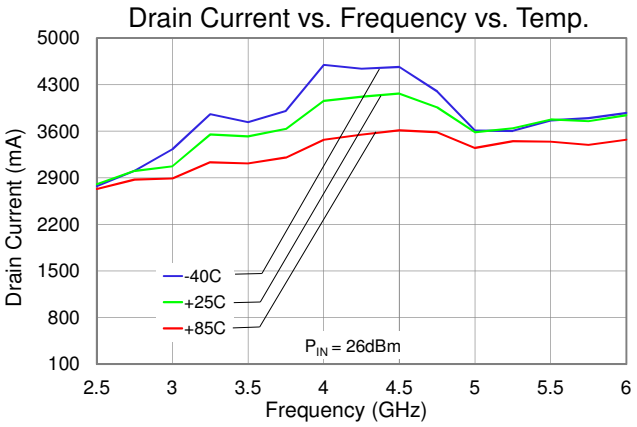


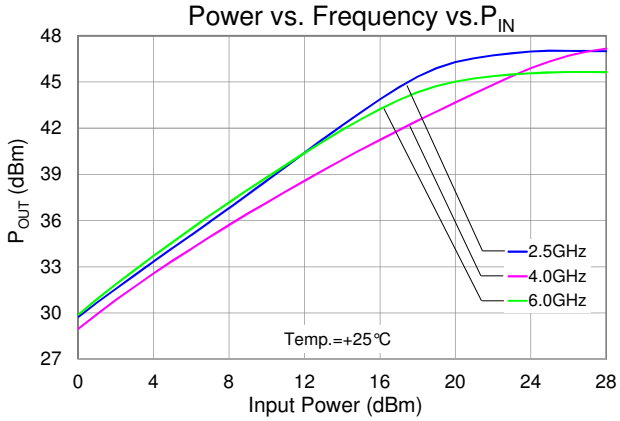




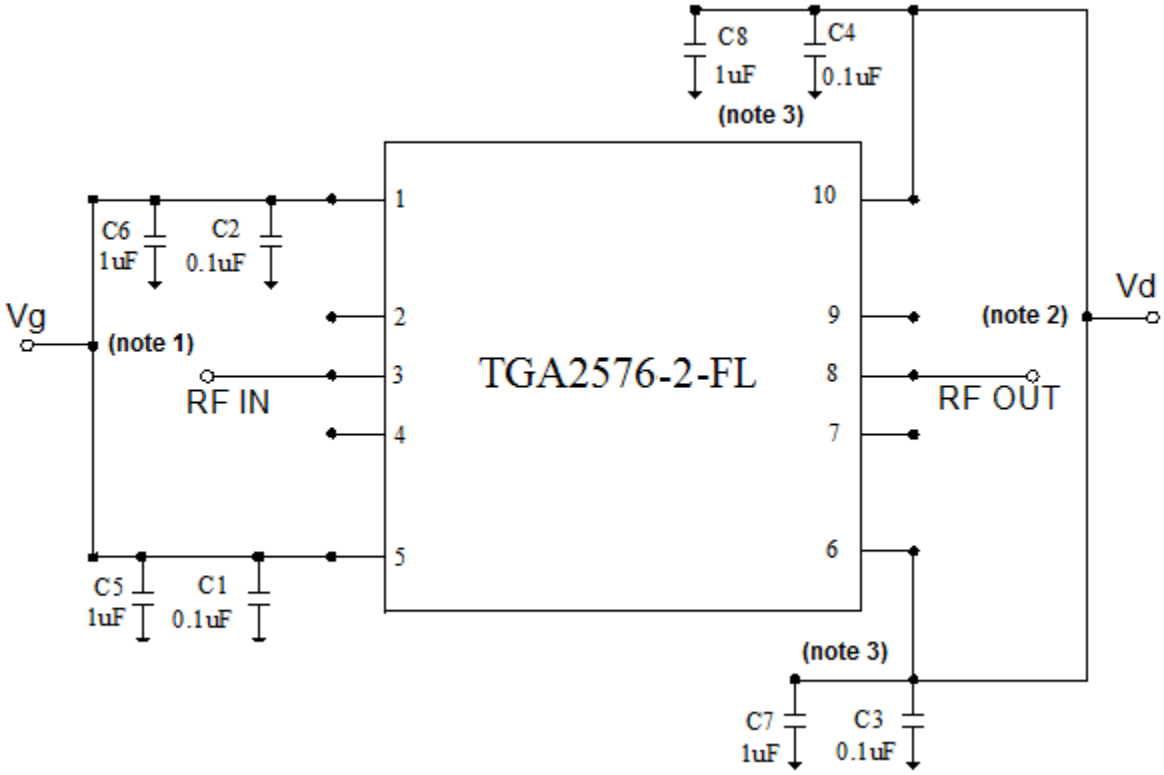
Typical Performance (con't.)

Conditions unless otherwise specified: V_D = 30V, I_{DQ} = 1.55A, V_G = -2.5V Typical, CW





Application Circuit



Notes:

1. V_G must be biased from both sides (Pins 1 and 5).
2. V_D must be biased from both sides (Pins 6 and 10).
3. Remove caps for pulsed drain operation.

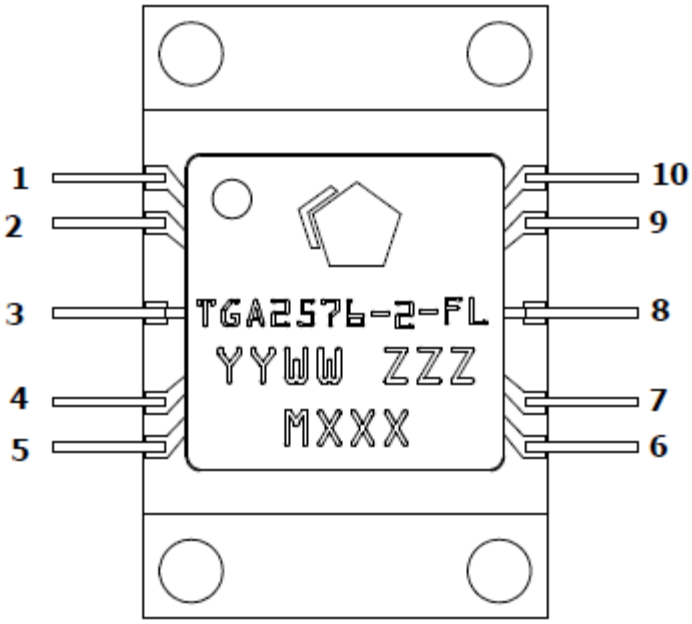
Bias-up Procedure

1. Set I_D to 4.5A, I_G to 20mA
2. V_G set to –5.0V.
3. V_D set to +30V.
4. Adjust V_G until I_{DQ} ~ 1550 mA (V_G ~ -2.5V Typical)
5. Turn on RF supply.

Bias-down Procedure

1. Turn off RF signal.
2. Reduce V_G to –5.0V. Ensure I_{DQ} ~ 0 mA.
3. Set V_D to 0V.
4. Set V_G to 0V.

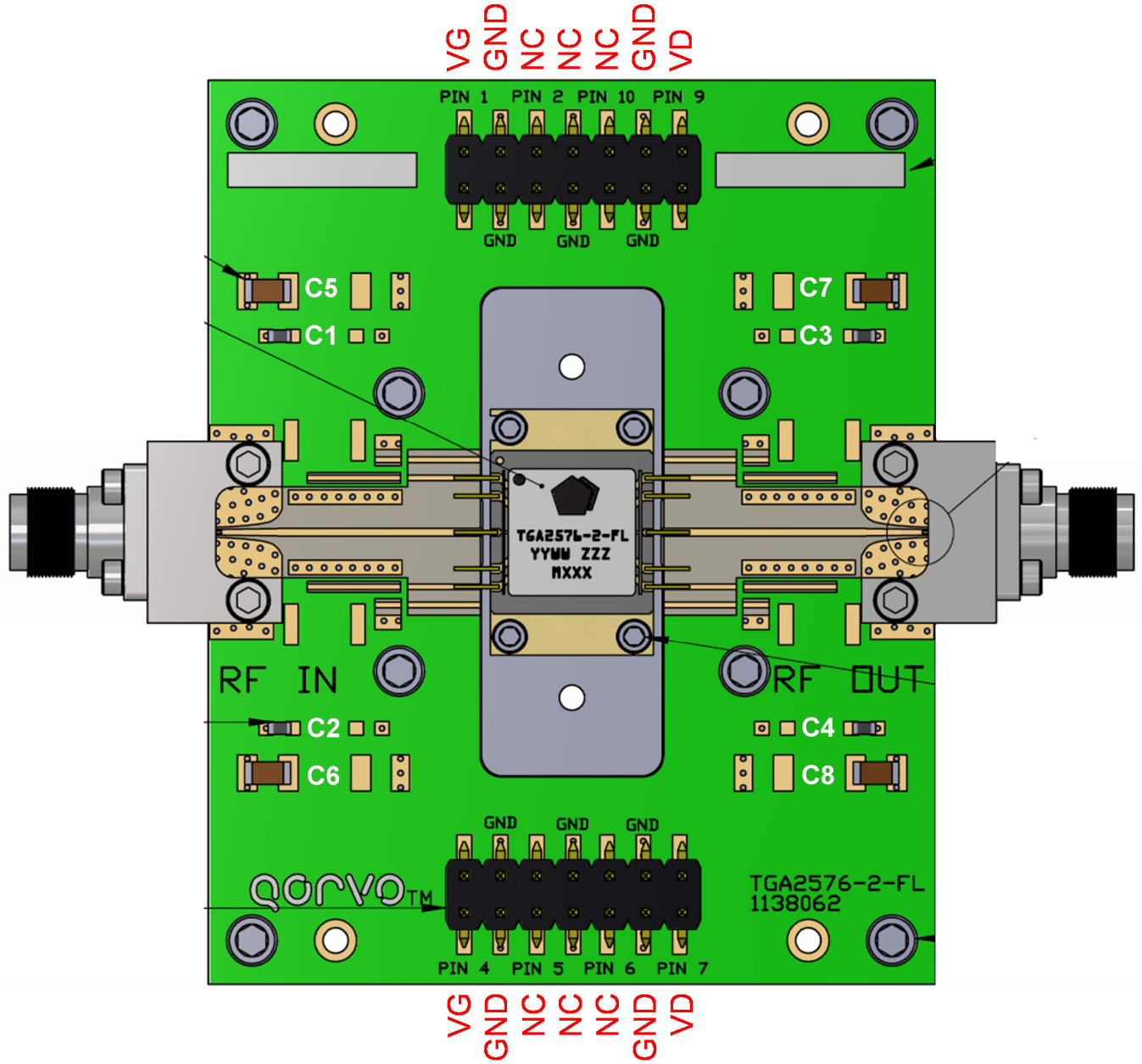
Pin Description



Pin	Symbol	Description
1, 5	V_G	Gate voltage. (1)
2, 4, 7, 9	N/C	No internal connection; may be grounded or left open on PCB.
3	RF IN	Input; matched to 50 Ω; DC shorted to ground.
6, 10	V_D	Bottom side Drain voltage. (2)
8	RF OUT	Output; matched to 50 Ω; DC shorted to ground.
	(Package Base)	RF and DC ground.

Notes:
1. Bias network is required; must be biased from both sides (Pins 1 and 5); see Application Circuit on page 7 as an example.
2. Bias network is required; must be biased from both sides (Pins 6 and 10); see Application Circuit on page 7 as an example.

Evaluation Board Layout



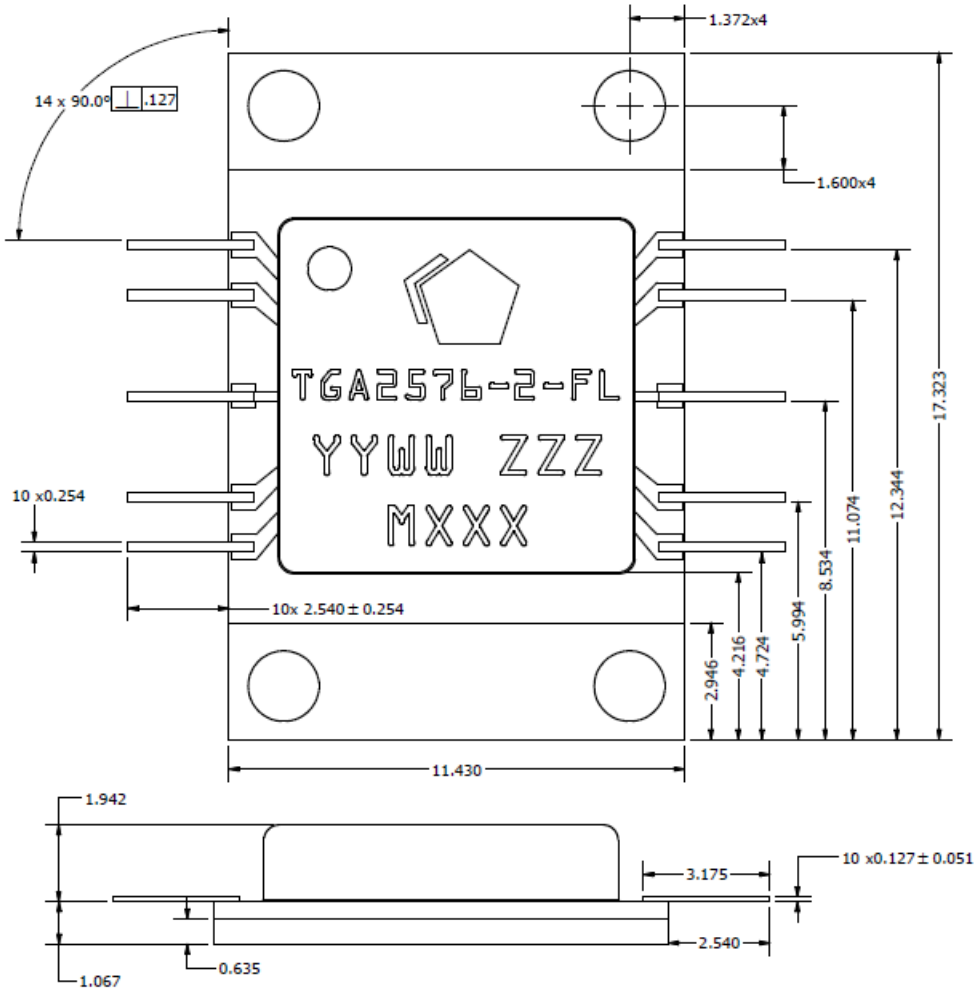
Bill of Material

Reference Des.	Value	Description	Manuf.	Part Number
C1 – C4	0.1 µF	Cap, 0603, 50 V, 10%, X7R	Various	
C5 – C8	1 µF	Cap, 1206, 50 V, 10%, X7R	Various	

Note: Can remove C3, C4, C7, C8 for pulsed operation.

Mechanical Information – Package Information and Dimensions

Marking: Part number – TGA2576-2-FL
Year/week/lot code - YYWW ZZZ
Batch ID – MXXX



Notes:

1. Unless specified otherwise, dimensions are in millimeters (mm).
2. Unless specified otherwise, tolerances are ± 0.127
3. Materials:
   - Package base: Copper Tungsten (CuW) composite
   - Package lid: LCD (liquid crystal polymer)
   - Package leads: Kovar, MIL I 23011C Class 1
   - Plating finish: Gold (Au) 1.27um minimum over Nickel (Ni) 2.54 to 8.89um

Assembly Notes

1. 0-80 screws are recommended for mounting the TGA2576-2-FL to the board.
2. To improve the thermal and RF performance, we recommend the following:
   a) Apply thermal compound or 4 mils indium shim between the package and the board.
   b) Attach a heat sink to the bottom of the board and apply thermal compound or 4 mils indium shim between the heat sink and the board.
3. Apply solder to each pin of the TGA2576-2-FL.