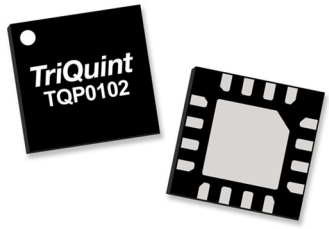
TQP0102

5 W, DC to 4 GHz, GaN Power Transistor

Applications

- Small Cell Base Station
- Microcell Base Station Driver
- Active Antenna
- General Purpose Applications

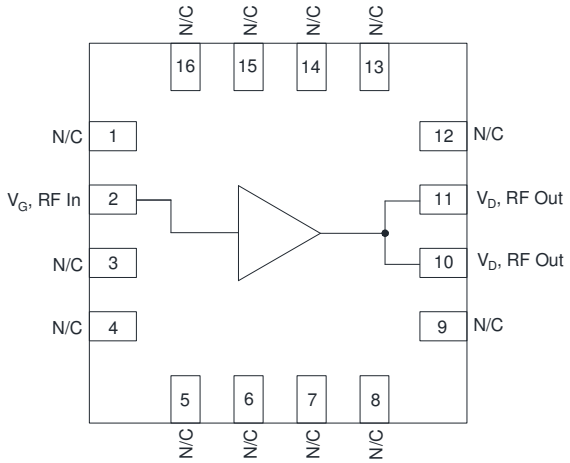


16 Pin 3x3mm QFN

Product Features

- Operating Frequency Range: DC to 4 GHz
- Output Power (P_{SAT}): 5 W
- Drain Efficiency: 68%
- Linear Gain: 19 dB
- Package Dimensions: 3 x 3 x 0.85 mm

Functional Block Diagram



General Description

The TQP0102 is a wide band over-molded QFN discrete GaN power amplifier. The device is a single stage unmatched power amplifier transistor.

The TQP0102 can be used in Doherty architecture for the final stage of a base station power amplifier for small cell applications. The TQP0102 can also be used in microcell and active antenna applications.

The wide bandwidth of the TQP0102 makes it suitable for many different applications from DC to 4 GHz. TQP0102 can deliver P_{SAT} of 5 W at 28 to 32 V operation.

Lead-free and ROHS compliant.

Pin Configuration

Pin No.	Label
1, 3-9, 12-16	N/C
2	RF IN, V_G
10-11	RF OUT, V_D
Backside Paddle	RF/DC GND

Ordering Information

Part No.	ECCN	Description
TQP0102	EAR99	5 W, DC to 4 GHz, GaN PA
TQP0102-PCB	EAR99	2.5-2.7 GHz Evaluation Board

Absolute Maximum Ratings

Parameter	Rating
Gate Voltage (V_G)	–6 V
Drain Voltage (V_D)	+40 V
Peak RF Input Power	29 dBm
VSWR Mismatch, P1dB Pulse (20% duty cycle, 100 µs width), T = 25°C	10:1
Storage Temperature	–65 to +150°C

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Operating Temperature	–40		+105	°C
Gate Voltage (V_G)		–2.9		V
Drain Voltage (V_D)		32		V
Quiescent Current (I_{CQ})		25		mA
T_{CH} for >10^6 hours MTTF			225	°C

Electrical performance is measured under conditions noted in the electrical specifications table. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications

Test conditions unless otherwise noted: V_G = –2.67 V, V_D = 32 V, I_{CQ} = 25 mA, T = 25°C, 2.6 GHz single-ended application circuit

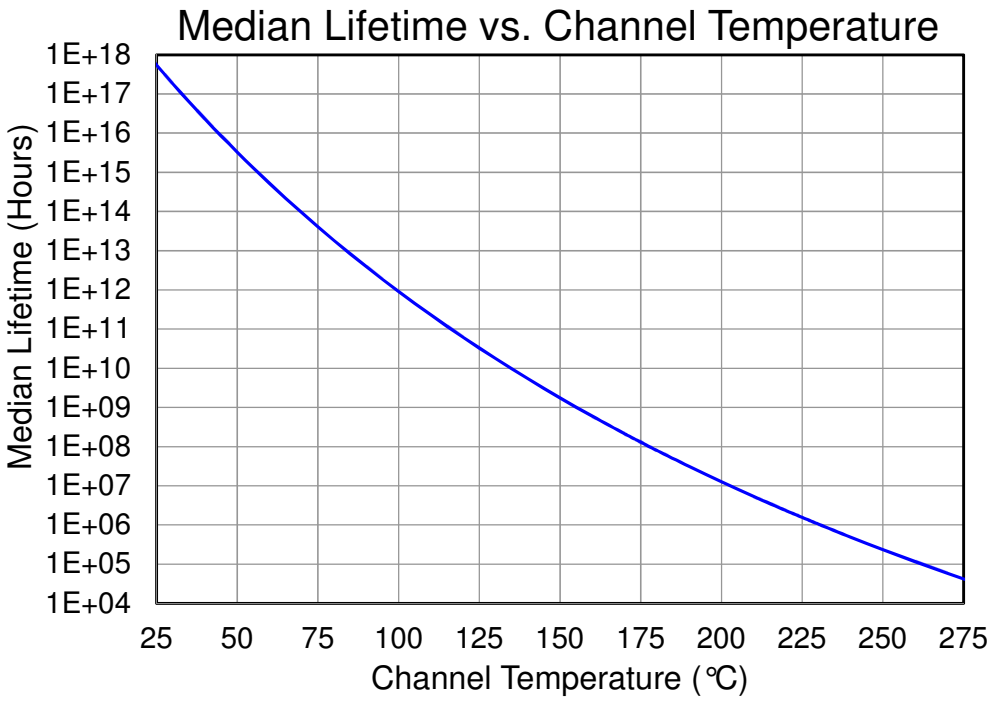
Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		DC		4000	MHz
Quiescent Current		20	25	30	mA
Linear Gain	P_{OUT} = 25 dBm, Pulsed (10% duty cycle, 100 µs width)	17	19		dB
P3dB	Pulsed (10% duty cycle, 100 µs width)	36.5	37		dBm
Drain Efficiency	P3dB	60	65		%
Input Return Loss	Measured in EVB		10		dB

Thermal Information

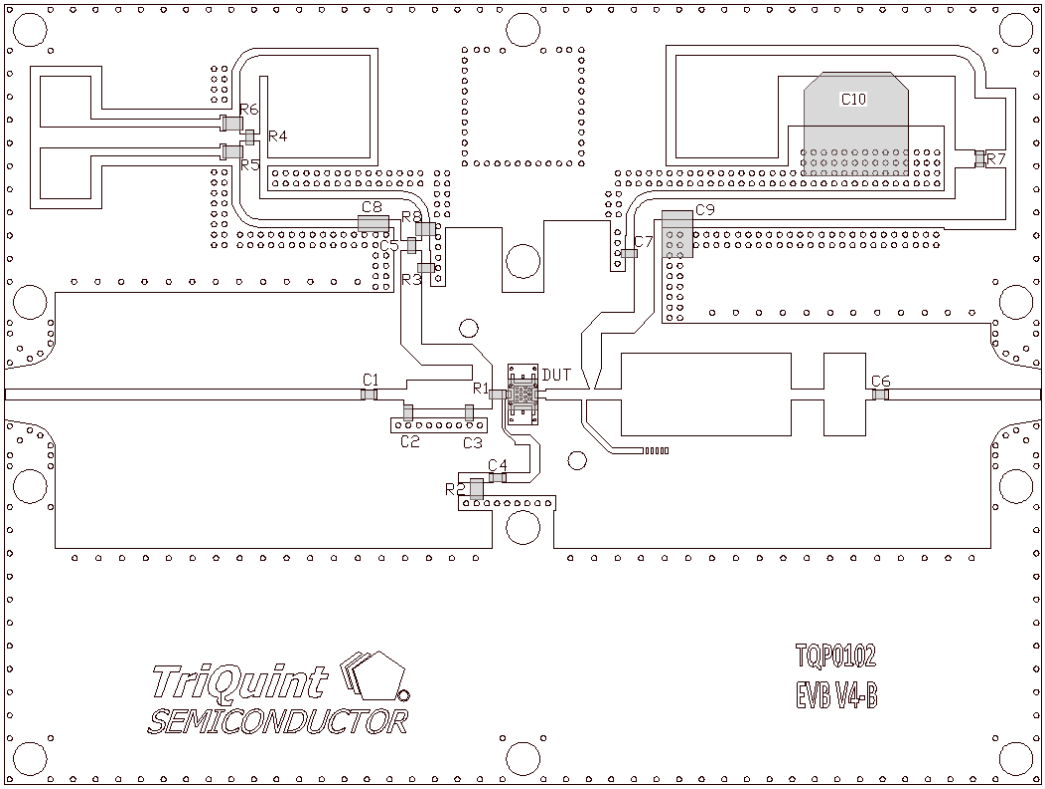
Parameter	Conditions	Value	Units
Thermal Resistance at Average Power (θ_{JC})	T_C = 85°C, T_{CH} = 114.1°C, CW: P_{DISS} = 1.59 W, P_{OUT} = 0.35 W	18.3	°C/W
Thermal Resistance at Saturated Power (θ_{JC})	T_C = 85°C, T_{CH} = 135.1°C, CW: P_{DISS} = 2.65 W, P_{OUT} = 5.59 W	18.9	°C/W

Notes:
1. Thermal resistance measured to package backside.

Median Lifetime



Evaluation Board Layout

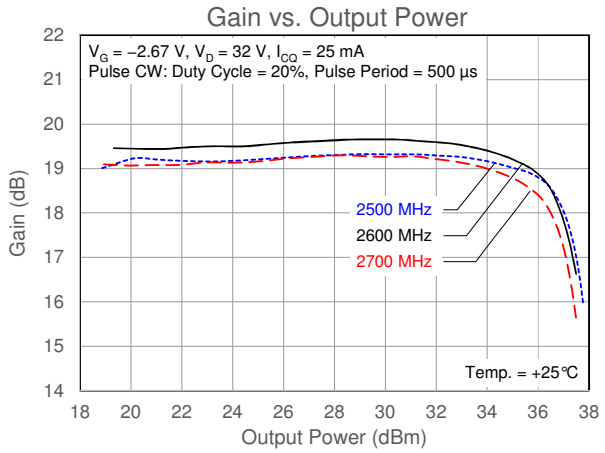


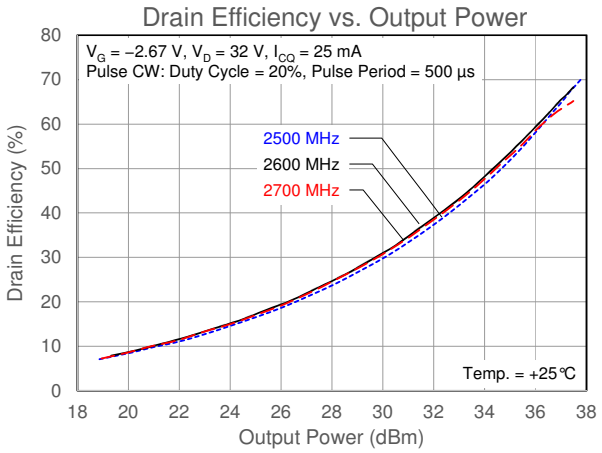
Bill of Materials

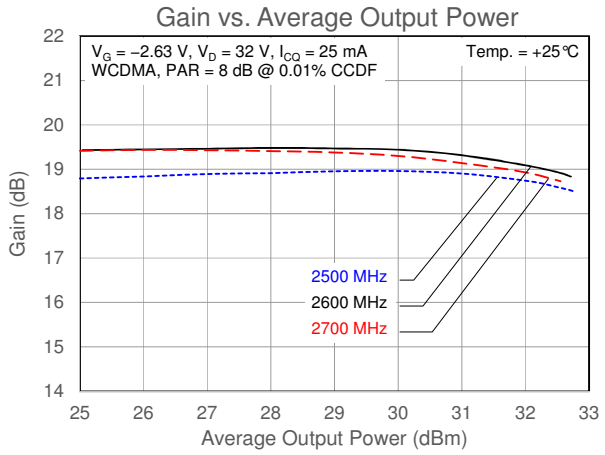
Reference Des.	Value	Description	Manuf.	Part Number
C1, C4, C5, C6, C7	22 pF	Capacitor, 0603	ATC	600S220BT250XT
C2, C3	0.7 pF	Capacitor, 0.5 pF, 0603	ATC	600S005BT250XT
C8	10 µF	Capacitor, 6.3 V, 0612	TDK	C1632X5R0J106M130AC
C9	1 µF	Capacitor, 1812	AVX	18121C105KAT2A
C10	220 µF	Capacitor, 10x10 mm, 50 V	United Chem Con	EMVY500ADA221MJA0G
R1	2.5 Ω	Resistor, 2.5 Ω, 0603	Venkel	CR0603
R2	75 Ω	Resistor, 75 Ω, 0805	Venkel	CR0805
R3	10 Ω	Resistor, 1/10 W 1% 0603	Venkel	ERJ-3EKF10R0V
R8	1 kΩ	Resistor, 0805	Venkel	RES 1k OHM 0805
R3, R4	10 Ω	Resistor, 1/10 W 1% 0603	Venkel	ERJ-3EKF10R0V
R5, R6			DNP	
R7			DNP	

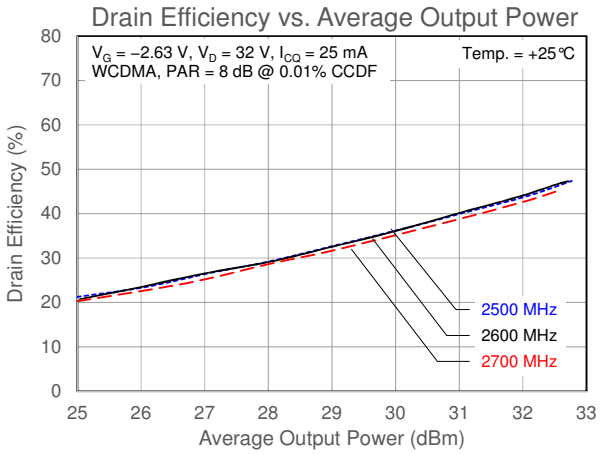
Performance Plots

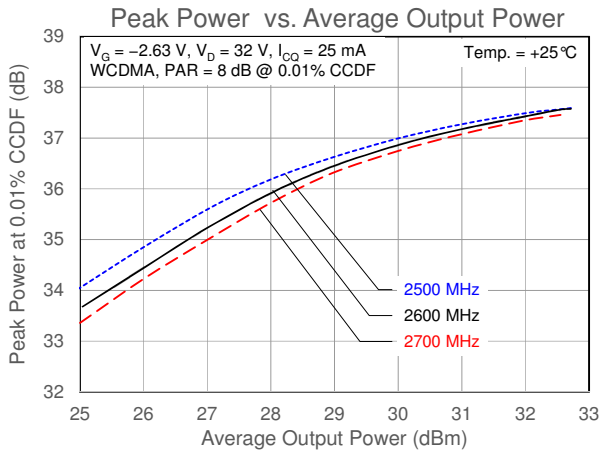
Test conditions unless otherwise noted: V_D = 32 V, I_{CQ} = 25 mA, T = 25°C, 2.6 GHz single-ended application circuit

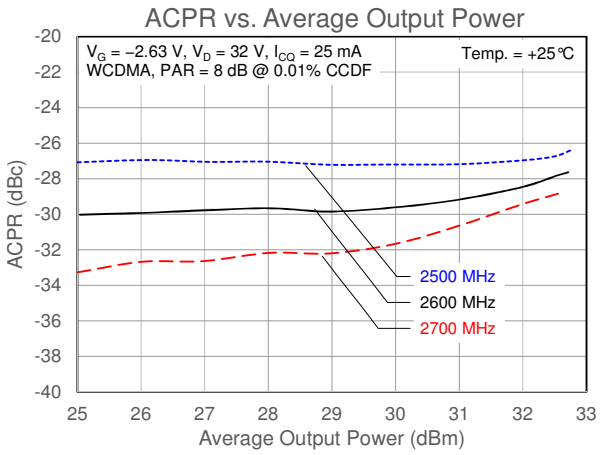






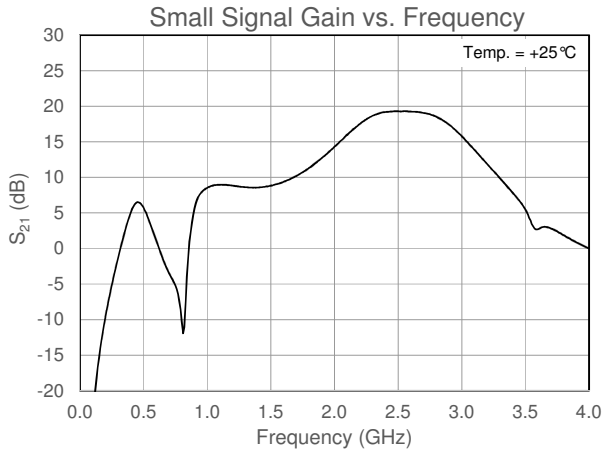


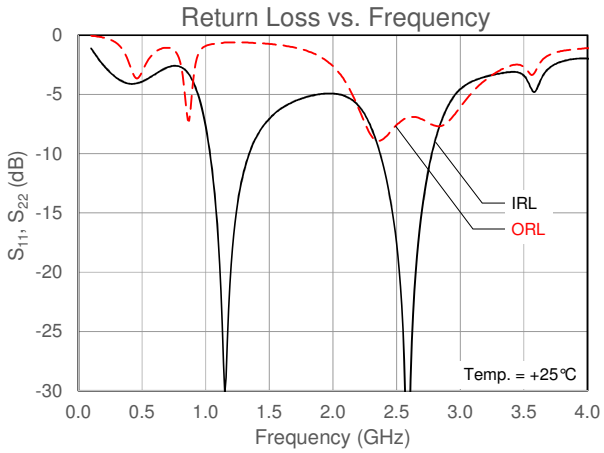




Performance Plots

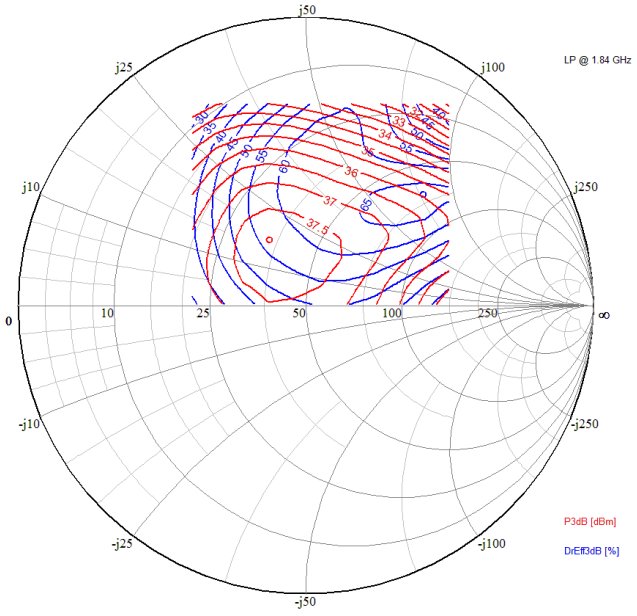
Test conditions unless otherwise noted: V_D = 32 V, I_{CQ} = 25 mA, T = 25°C, 2.6 GHz single-ended application circuit

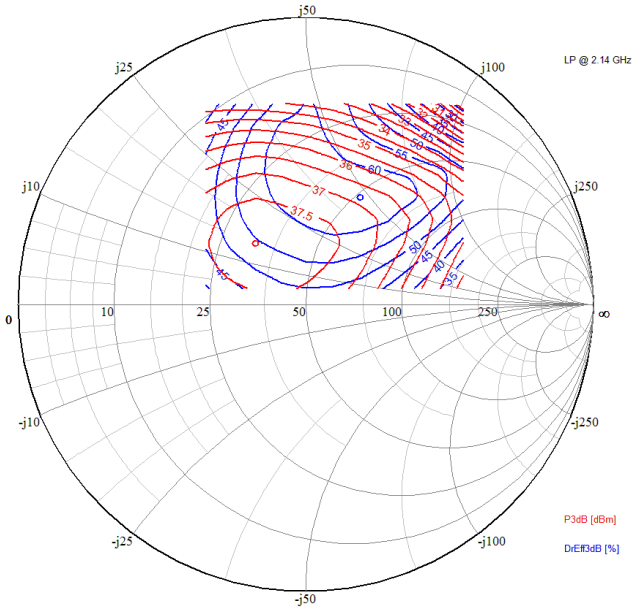


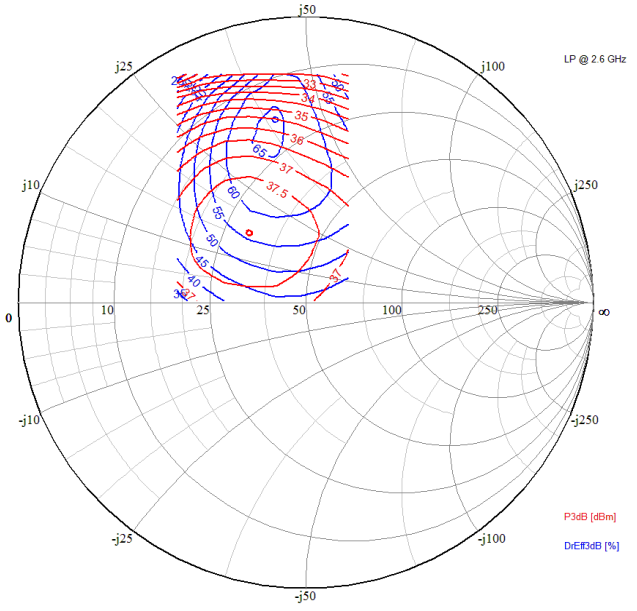


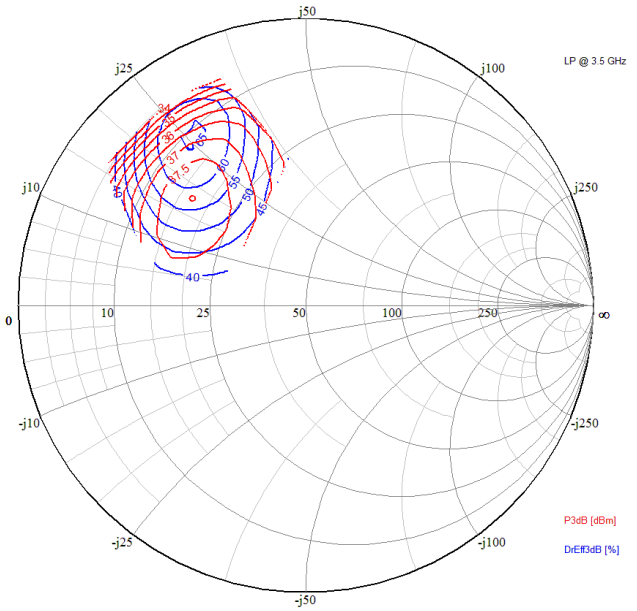
Load Pull Plots

Test conditions unless otherwise noted: V_D = 32 V, I_{CQ} = 25 mA, T = 25°C, Pulse CW (duty cycle = 20%, pulse period = 500 µs)

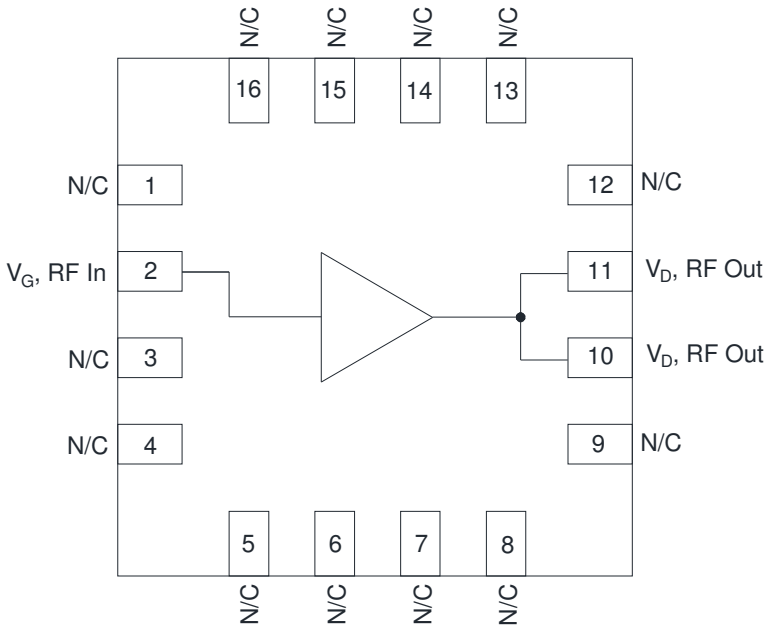








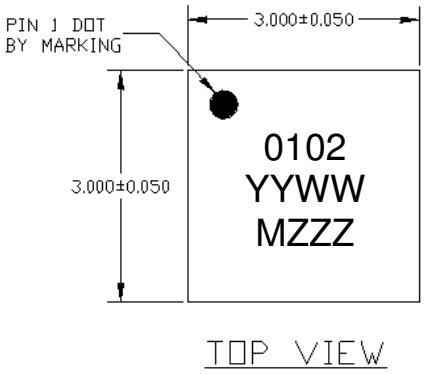
Pin Configuration and Description



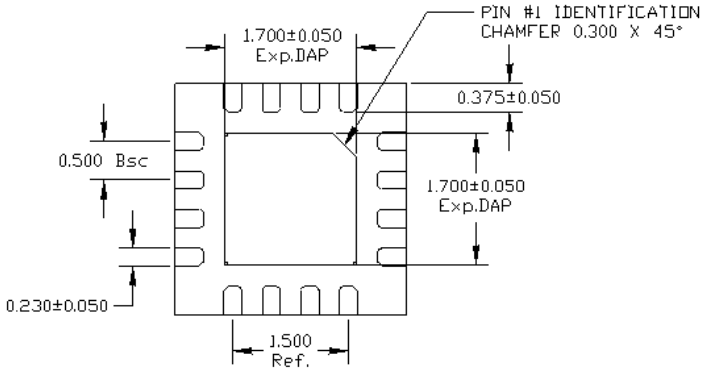
Pin No.	Label	Description
1, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15, 16	N/C	No Connection
2	RF IN, V_G	RF Input, Gate Bias
10, 11	RF OUT, V_D	RF Output, Drain Bias
Backside Paddle	RF/DC GND	RF/DC Ground

Package Marking and Dimensions

Marking: Part ID – 0102
Year/Workweek – YYWW
"M" + Lot Number – MZZZ

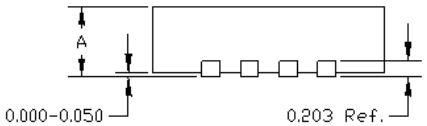


TOP VIEW



BOTTOM VIEW

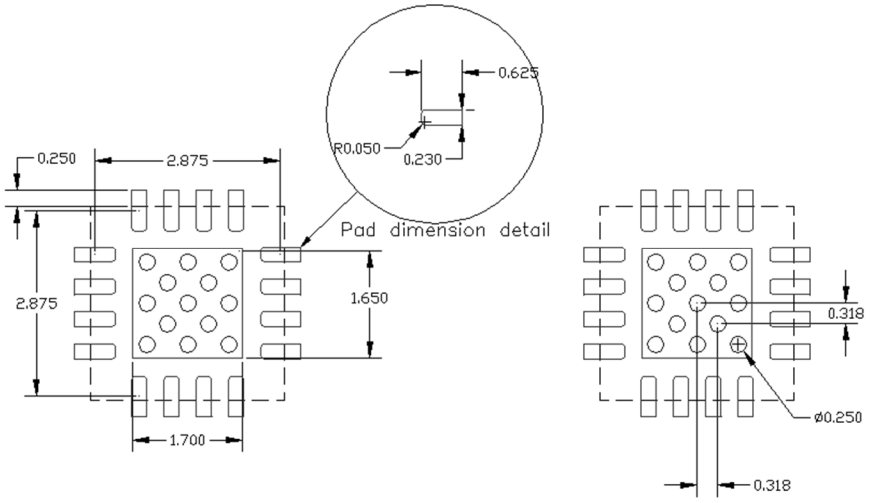
			QFN
A	MAX.		0.900
	NOM.		0.850
	MIN.		0.800



TOP VIEW

Notes:
1. All dimensions are in millimeters. Angles are in degrees.

PCB Mounting Pattern



Notes:
1. All dimensions are in millimeters. Angles are in degrees.

Product Compliance Information

ESD Sensitivity Ratings

Caution! ESD-Sensitive Device

ESD Rating: Class 1A
Value: Passes ≥ 250 V
Test: Human Body Model (HBM)
Standard: JEDEC Standard JS-001-2012

ESD Rating: Class C3
Value: Passes ≥ 1000 V
Test: Charged Device Model (CDM)
Standard: JEDEC Standard JESD22-C101F

MSL Rating

MSL Rating: Level 3
Test: 260°C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020D.1

ECCN

US Department of Commerce EAR99

Solderability

Compatible with both lead-free (260°C maximum reflow temperature) and tin/lead (245°C maximum reflow temperature) soldering processes.

Contact plating: NiPdAu

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 ($C_{15}H_{12}Br_4O_2$) 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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