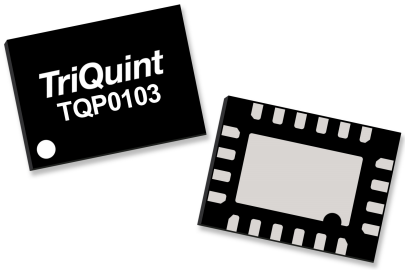
TQP0103

15 W, DC to 4 GHz, GaN Power Transistor

Applications

- W-CDMA / LTE
- Macrocell Base Station Driver
- Microcell Base Station
- Small Cell
- Active Antenna
- General Purpose Applications

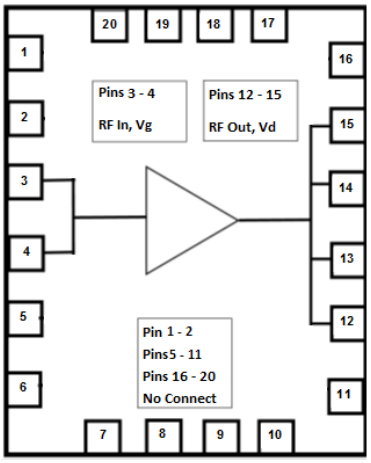


20 Pin 3x4mm QFN

Product Features

- Operating Frequency Range: DC to 4 GHz
- Output Power (P_{SAT}): 15 W
- Drain Efficiency: 64%
- Linear Power Gain: 19 dB
- Package Dimensions: 3 x 4 x 0.85 mm

Functional Block Diagram



General Description

The TQP0103 is a wide band over-molded QFN discrete power amplifier. The device is a single stage unmatched power amplifier transistor.

The TQP0103 can be used in Doherty architecture for the final stage of a base station power amplifier for small cell, microcell, and active antenna systems. The TQP0103 can also be used as a driver in a macrocell base station power amplifier.

The wide bandwidth of the TQP0103 makes it suitable for many difference applications from DC to 4 GHz. TQP0103 can deliver P_{SAT} of 15 W at 28 to 32 V operation.

Lead-free and ROHS compliant.

Pin Configuration

Pin No.	Label
1-2, 5-11, 16-20	N/C
3-4	RF IN, V_G
12-15	RF OUT, V_D
Backside Paddle	RF/DC GND

Ordering Information

Part No.	ECCN	Description
TQP0103	EAR99	15 W, DC to 4 GHz, GaN PA
TQP0103-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
RF Input Power Over Drive above P_{IN} at 31 dBm P_{OUT}, 50 Ω, T = 25°C	8 dB
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)	28	32		V
Quiescent Current (I_{CQ})		70		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: F_C = 2600 MHz, T = 25°C

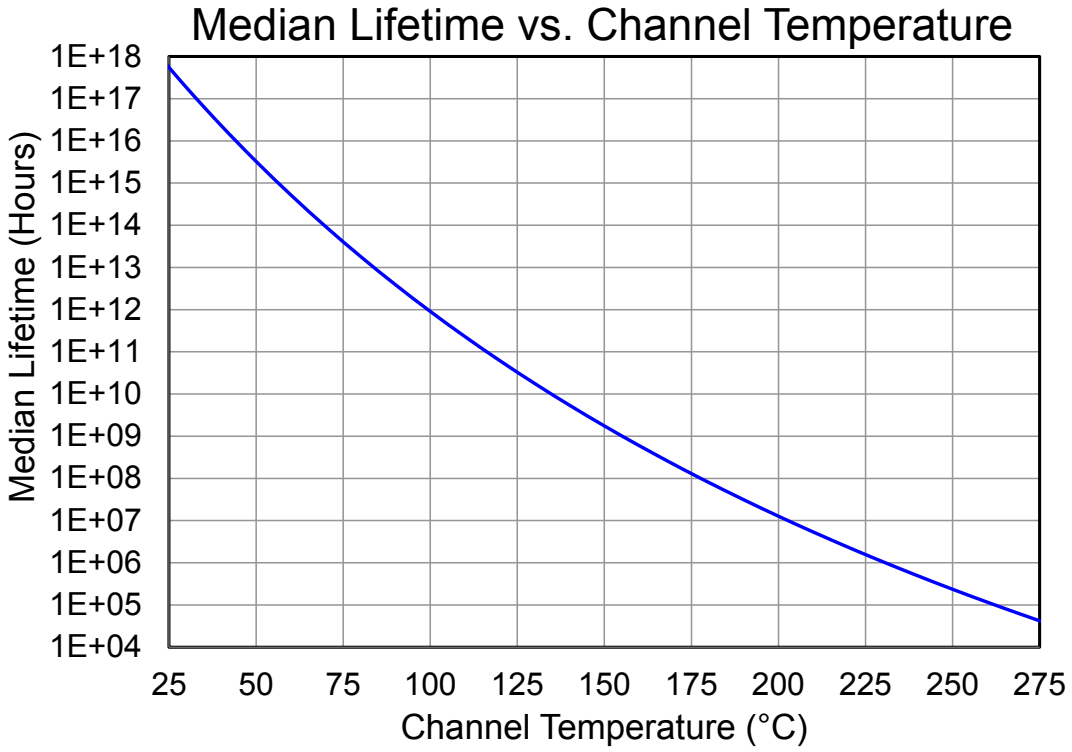
Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		DC		4000	MHz
Quiescent Current			70		mA
Linear Power Gain			19		dB
P3dB	Pulsed, 20% Duty Cycle, 500 µs width		43.5		dBm
Drain Efficiency	P3dB		64		%
Input Return Loss			14		dB

Electrical Specifications

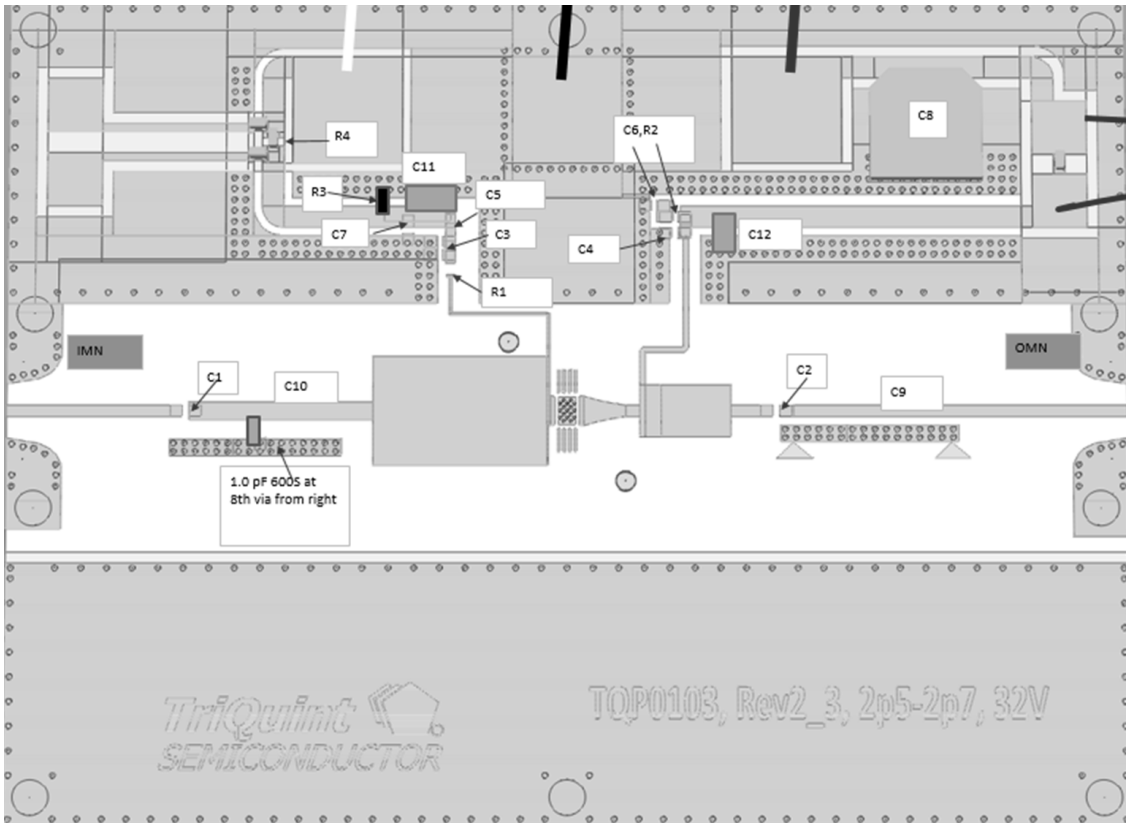
Parameter	Conditions	Value	Units
Thermal Resistance at Average Power (θ_{JC})	T_{CASE} = 85°C, T_{CH} = 135.2°C, CW: P_{DISS} = 7.03 W, P_{OUT} = 1.44 W	7.1	°C/W
Thermal Resistance at Saturated Power (θ_{JC})	T_{CASE} = 85°C, T_{CH} = 184.0°C, CW: P_{DISS} = 12.75 W, P_{OUT} = 22.49 W	7.8	°C/W

Notes:
1. Thermal resistance measured to package backside.

Median Lifetime



Evaluation Board Layout

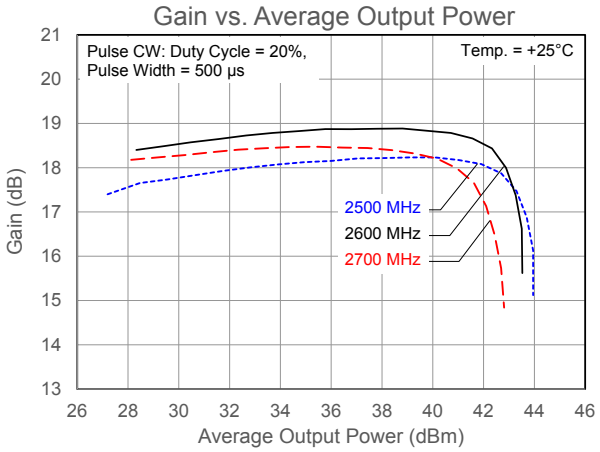


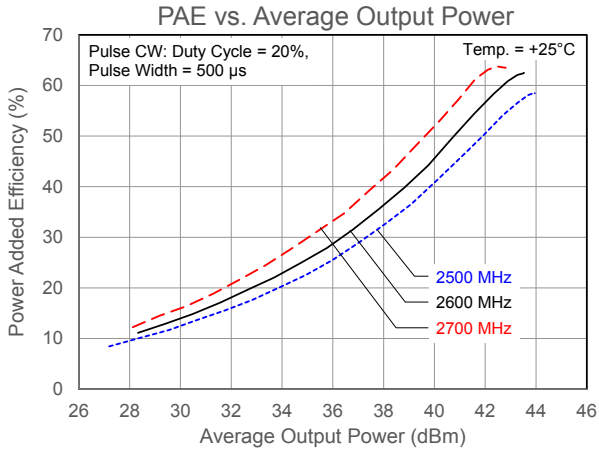
Bill of Materials

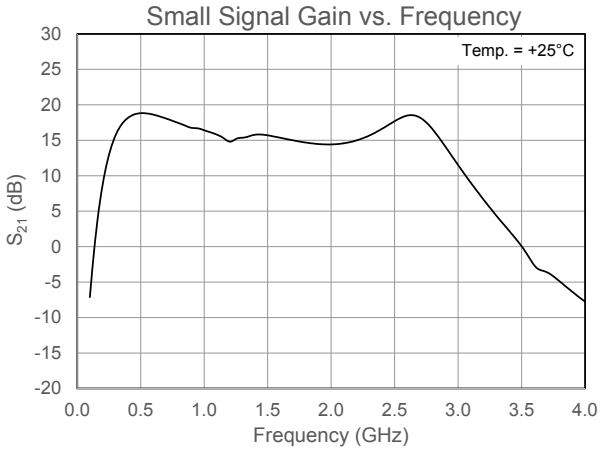
Reference Des.	Value	Description	Manuf.	Part Number
Connectors	N/A	SMA-type Connectors	Gigalane	CONNECTOR, SMA (PSF-S00-000)
C1, C3, C4	10.0 pF	Capacitor	ATC	600S
C2	22.0 pF	Capacitor	ATC	600S
C9	0.5 pF	Capacitor (DNP)		
R1	20 Ω	Resistor	Venkel	0603-8 LCR
C5, C6	1000 pF	Capacitor	various	
R2	10 Ω	Resistor	Venkel	0603-8 LCR
R3	1000 Ω	Resistor	Venkel	0603-8 LCR
C7	1 µF	Capacitor	various	
R4	0 Ω	Jumper	Venkel	0603-8 LCR
C8	220 µF	Capacitor, Electrolytic	various	
C10	1.0 pF	Capacitor	ATC	600S
C11	10 µF	Capacitor, X7R Ceramic		
C12	1 µF	Capacitor	AVX	1C105K

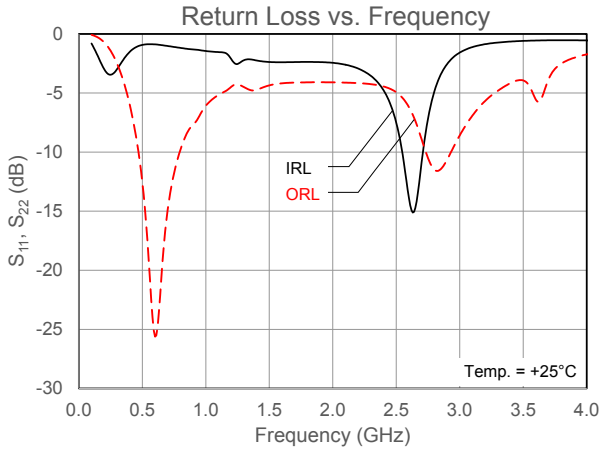
Performance Plots

Test conditions unless otherwise noted: V_G = −2.833 V, V_D = 32 V, I_{CQ} = 70 mA, Pulse CW: Duty Cycle = 20%, Period = 500 µs

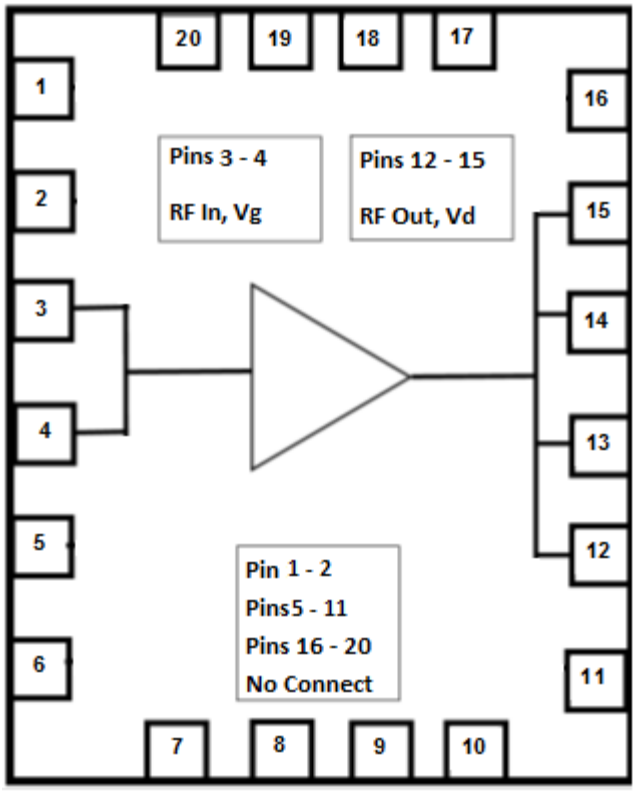








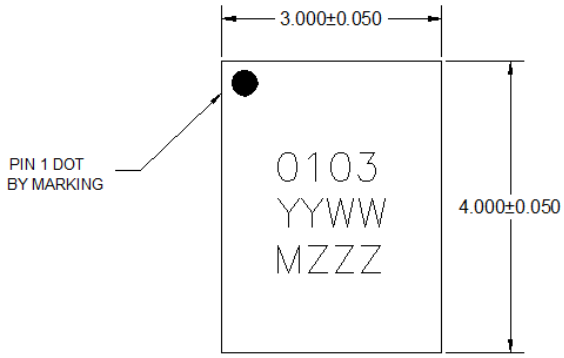
Pin Configuration and Description



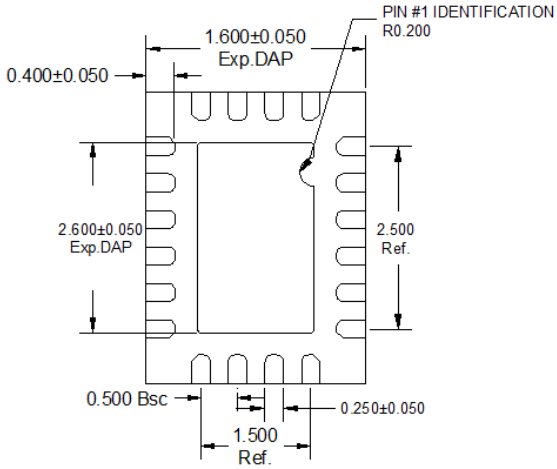
Pin No.	Label	Description
1, 2, 5, 6, 7, 8, 9, 10, 11, 16, 17, 18, 19, 20	N/C	No Connection
3, 4	RF IN, V_G	RF Input, Gate Bias
12, 13, 14, 15	RF OUT, V_D	RF Output, Drain Bias
Backside Paddle	RF/DC GND	RF/DC Ground

Package Marking and Dimensions

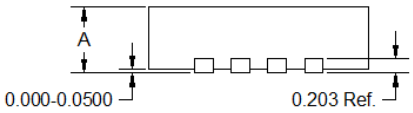
Marking: Part ID – 0103
Year/Workweek – YYWW
"M" + Lot Number – MZZZ



TOP VIEW



BOTTOM VIEW

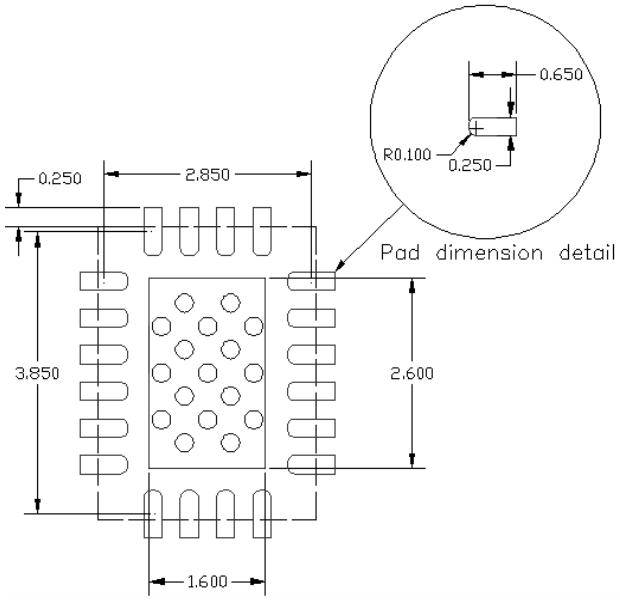


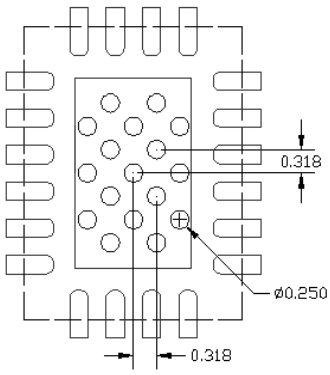
SIDE VIEW

		QFN
A	MAX.	0.900
	NOM.	0.850
	MIN.	0.800

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: TBD
Value: TBD
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

ESD Rating: TBD
Value: TBD
Test: Charged Device Model (CDM)
Standard: JEDEC Standard JESD22-C101

MSL Rating

MSL Rating: TBD
Test: 260°C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020

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

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