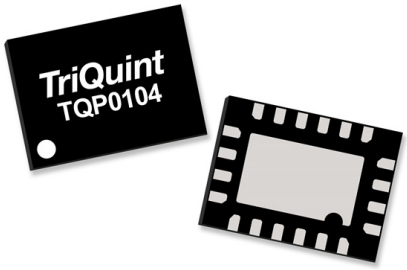
TQP0104

30 W, DC to 4 GHz, GaN Power Transistor

Applications

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

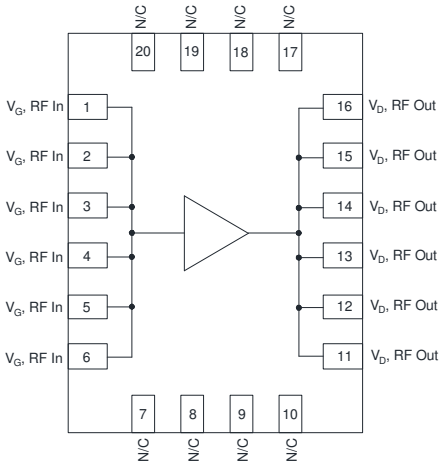


20 Pin 3x4mm QFN

Product Features

- Operating Frequency Range: DC to 4 GHz
- Output Power (P_{SAT}): 30 W
- Drain Efficiency: 64%
- Linear Gain: 17 dB
- Package Dimensions: 3 x 4 x 0.85 mm

Functional Block Diagram



General Description

The TQP0104 is a wide band over-molded QFN discrete GaN power amplifier. The device is a single stage unmatched power amplifier transistor.

The TQP0104 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 TQP0104 can also be used as a driver in a macrocell base station power amplifier.

The wide bandwidth of the TQP0104 makes it suitable for many different applications from DC to 4 GHz. TQP0104 can deliver P_{SAT} of 30 W at 28 to 32 V operation.

Lead-free and ROHS compliant.

Pin Configuration

Pin No.	Label
1-6	RF IN, V_G
7-10, 17-20	N/C
11-16	RF OUT, V_D
Backside Paddle	RF/DC GND

Ordering Information

Part No.	ECCN	Description
TQP0104	EAR99	30 W, DC to 4 GHz, GaN PA
TQP0104-2.6-EVB	EAR99	2.5-2.7 GHz Eval Board
TQP0104-2.1-DOH	EAR99	2.1 GHz Doherty Eval Board

Absolute Maximum Ratings

Parameter	Rating
Gate Voltage (V_G)	–6 V
Drain Voltage (V_D)	+40 V
Peak RF Input Power	35 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})		60		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 = –2.73 V, V_D = 32 V, I_{CQ} = 70 mA, T = 25°C, 2.6 GHz single-ended applications circuit

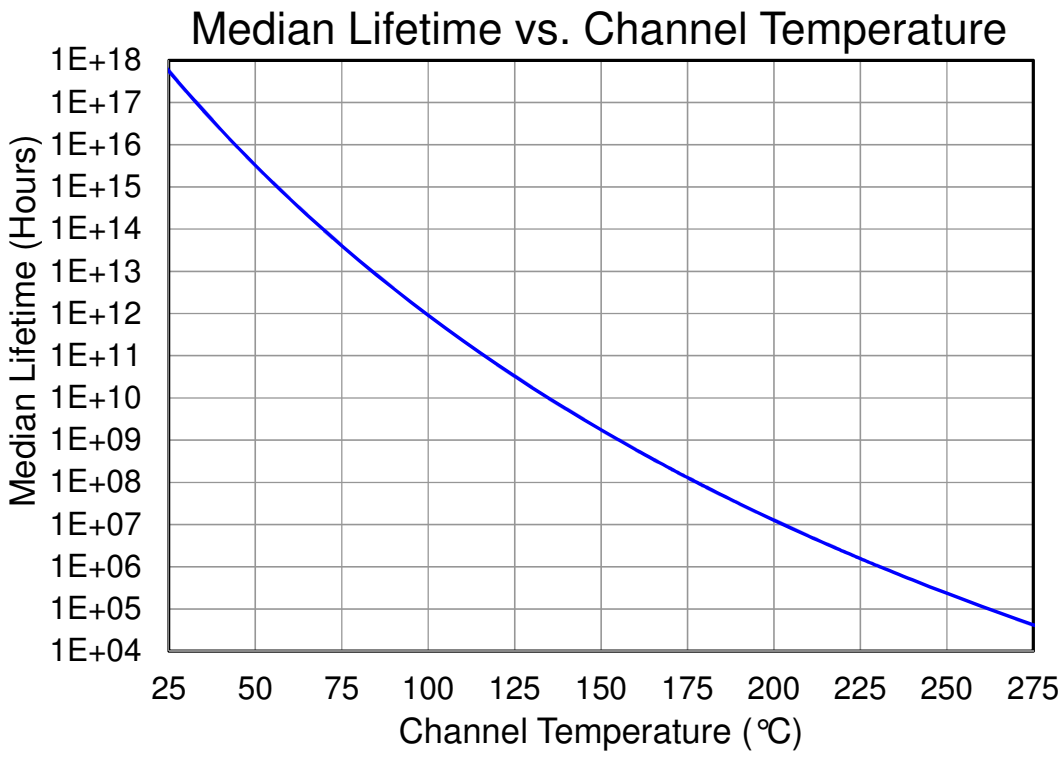
Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		DC		4000	MHz
Quiescent Current		60	70	80	mA
Linear Gain	P_{OUT} = 33 dBm, Pulsed (10% duty cycle, 100 µs width)	15	17		dB
P3dB	Pulsed (10% duty cycle, 100 µs width)	44.0	44.6		dBm
Drain Efficiency	P3dB	60	64		%
Input Return Loss			11		dB

Thermal Information

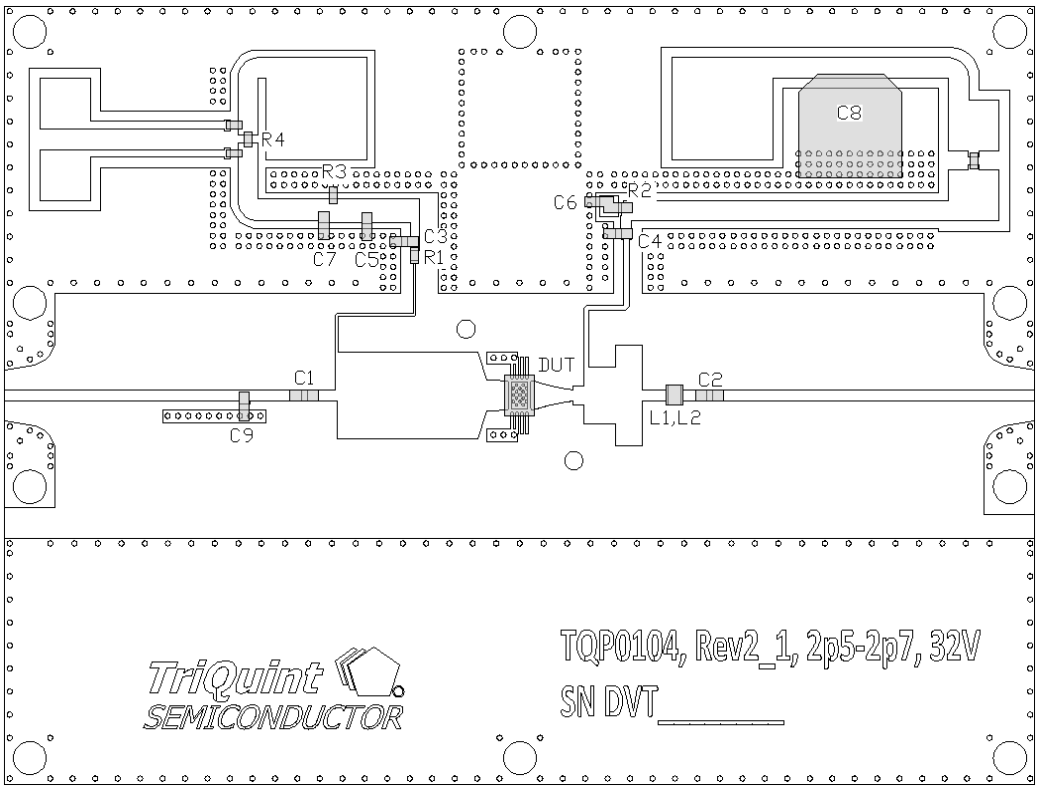
Parameter	Conditions	Value	Units
Thermal Resistance at Average Power (θ_{JC})	T_{CASE} = 85°C, T_{CH} = 128.0°C, CW: P_{DISS} = 8.83 W, P_{OUT} = 1.90 W	4.9	°C/W
Thermal Resistance at Saturated Power (θ_{JC})	T_{CASE} = 85°C, T_{CH} = 173.3°C, CW: P_{DISS} = 16.80 W, P_{OUT} = 30.55 W	5.3	°C/W

Notes:
1. Thermal resistance measured to package backside.

Median Lifetime



TQP0104 Single-Ended Evaluation Board Layout (2500-2700 MHz)



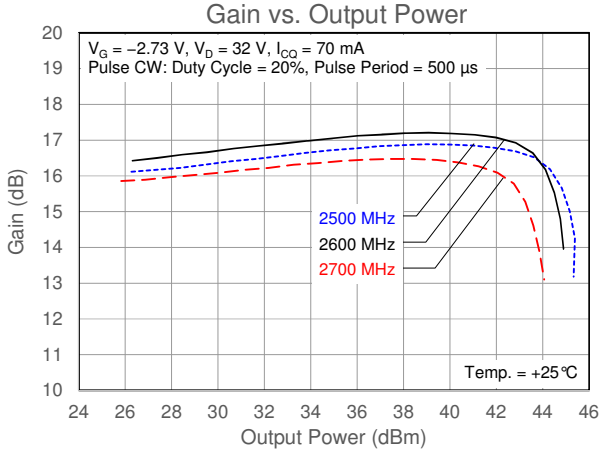
Bill of Materials – TQP0104 Single-Ended Evaluation Board (2500-2700 MHz)

Reference Des.	Value	Description	Manuf.	Part Number
C1, C2, C3, C4	10.0 pF	Capacitor	ATC	600S
L1, L2	1.8 nH	Inductor	Coilcraft	0603HP
C9	1.5 pF	Capacitor	ATC	600S
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	

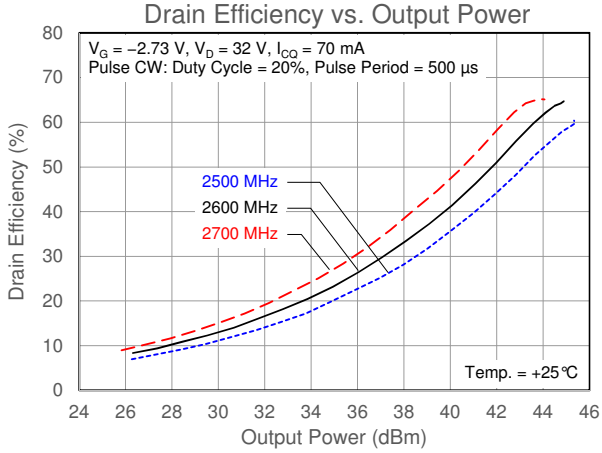
Performance Plots – TQP0104 Single-Ended Eval. Board (2500-2700 MHz)

Test conditions unless otherwise noted: V_D = 32 V, I_{CQ} = 70 mA, T = 25°C, 2.6 GHz single-ended application circuit

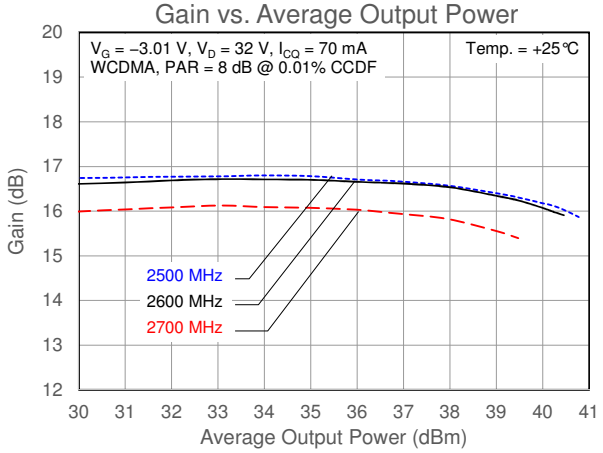
Gain vs. Output Power



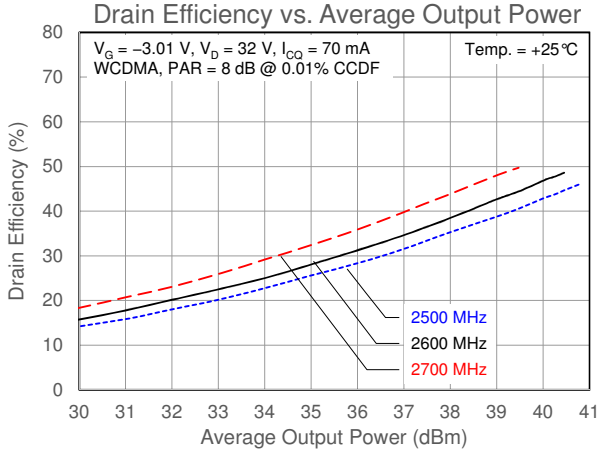
Drain Efficiency vs. Output Power



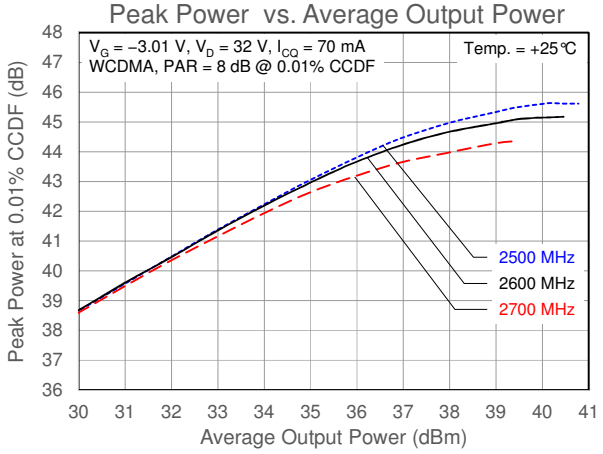
Gain vs. Average Output Power



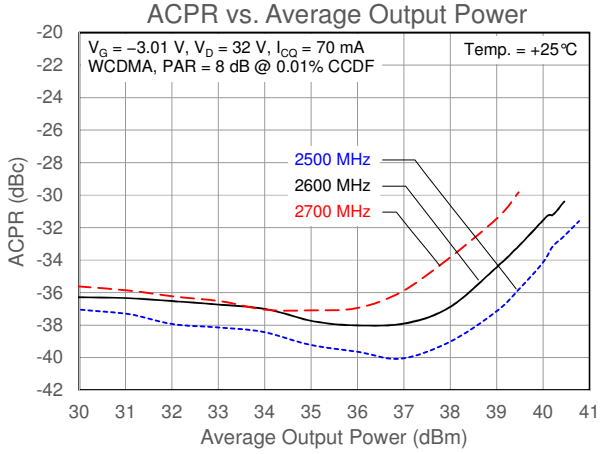
Drain Efficiency vs. Average Output Power



Peak Power vs. Average Output Power

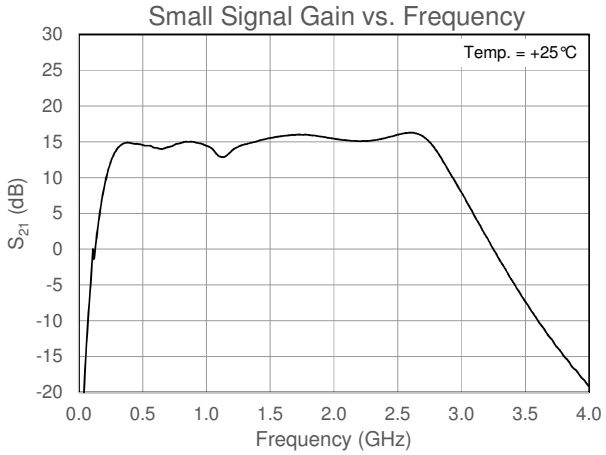


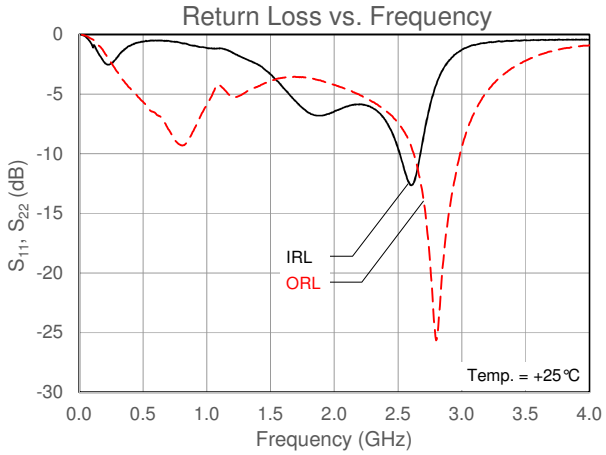
ACPR vs. Average Output Power



Performance Plots – TQP0104 Single-Ended Eval. Board (2500-2700 MHz)

Test conditions unless otherwise noted: V_D = 32 V, I_{CQ} = 70 mA, T = 25°C, 2.6 GHz single-ended application circuit

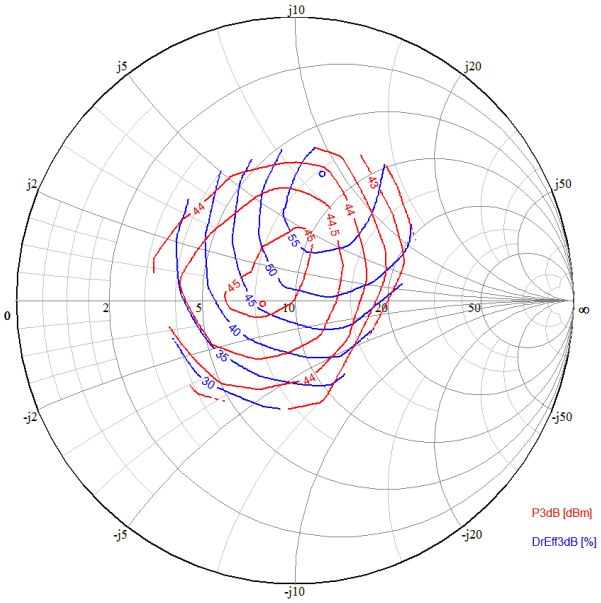




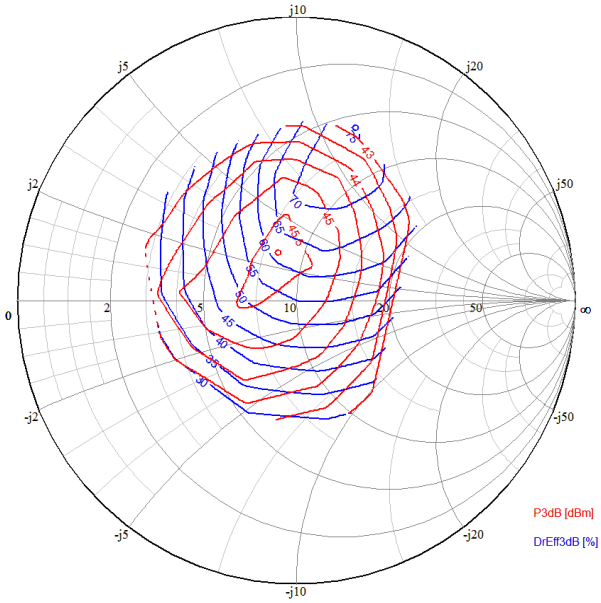
Load Pull Plots

Test conditions unless otherwise noted: V_D = 32 V, I_{CQ} = 70 mA, T = °C, Pulse CW (duty cycle = 20%, pulse period = 500 µs)

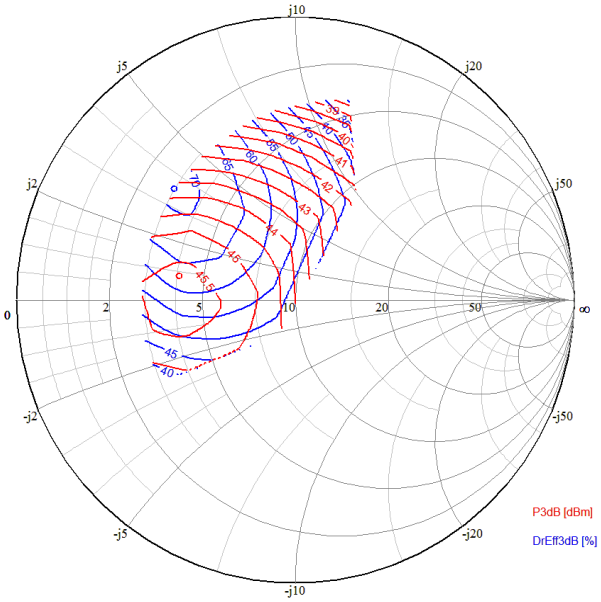
Load Pull at 1.9 GHz



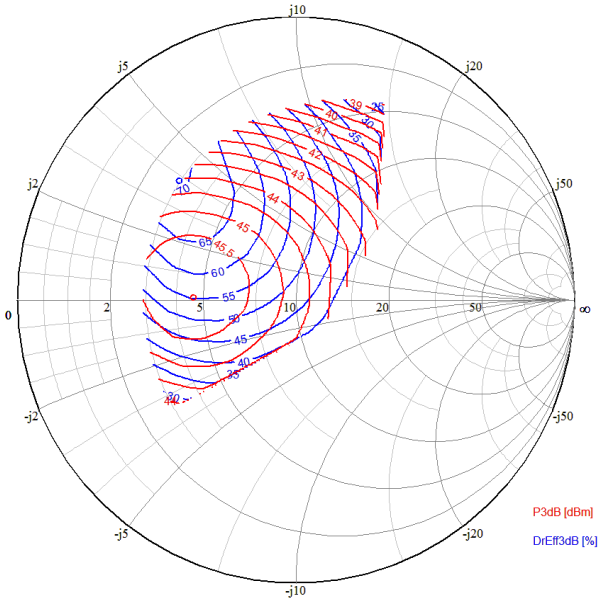
Load Pull at 2.1 GHz



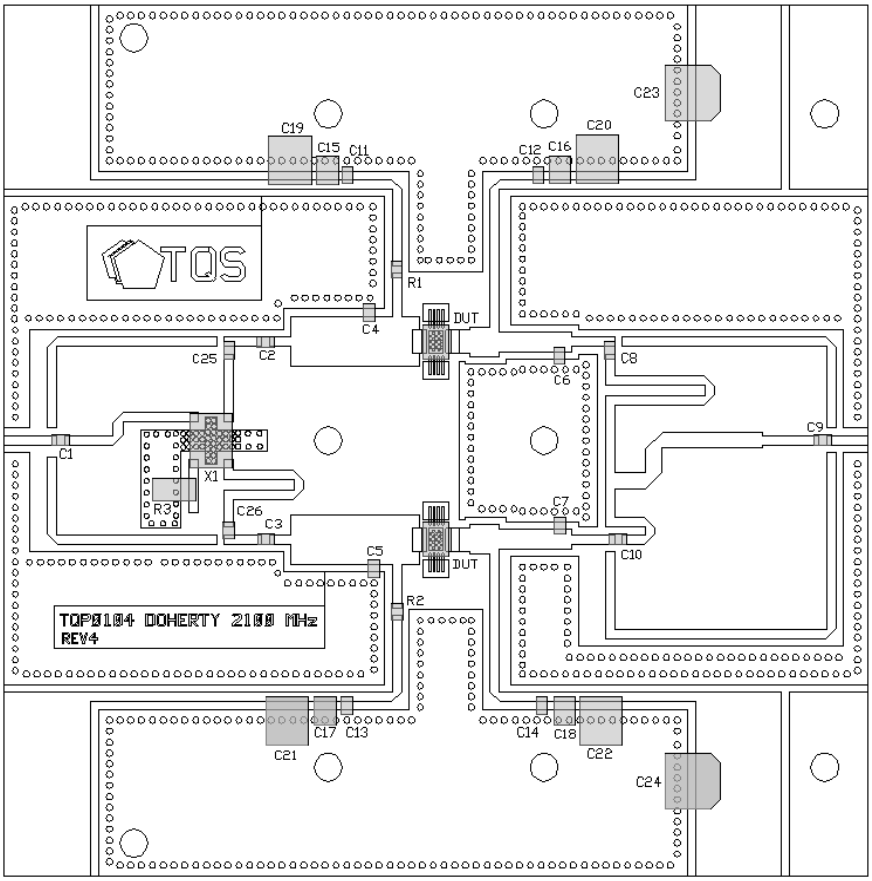
Load Pull at 2.6 GHz



Load Pull at 3.5 GHz



TQP0104 Doherty Evaluation Board Layout (2110-2170 MHz)

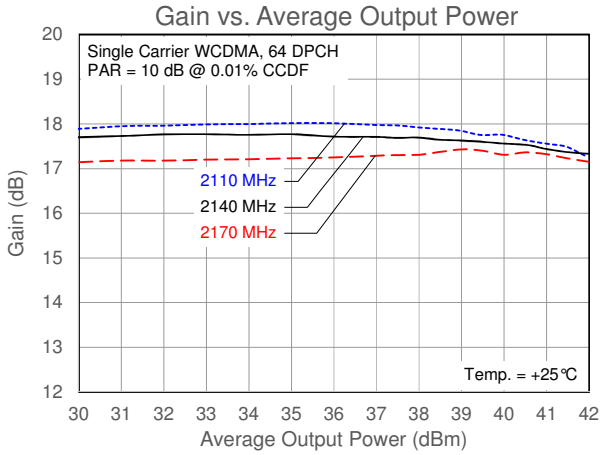


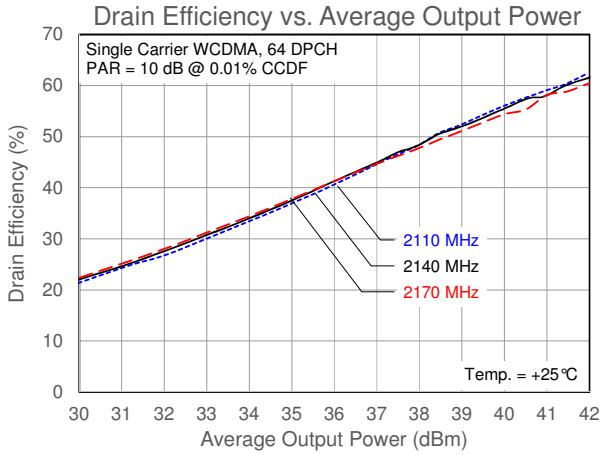
Bill of Materials – TQP0104 Doherty Evaluation Board (2110-2170 MHz)

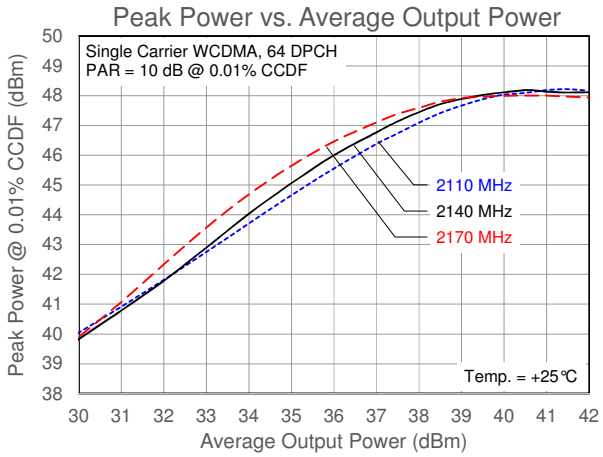
Reference Des.	Value	Description	Manuf.	Part Number
C1, C2, C3, C8, C9, C10, C11, C12, C13, C14, C25, C26	33 pF	Capacitor	ATC	600F
C4, C5	3.3 pF	Capacitor	ATC	600S
C6, C7	1.8 pF	Capacitor	ATC	600S
C15, C16, C17, C18	1 µF	Capacitor		
C19, C20, C21, C22	10 µF	Capacitor		
C23, C24	220 µF	Capacitor, Electrolytic	United Chemi-Con	
R1, R2	10 Ω	Resistor		
R3	50 Ω	Resistor, 10 W	ATC	CS12010T0050GBK
X1		Hybrid Coupler, 2.0-2.3 GHz	Anaren	JP503S/JP503AS

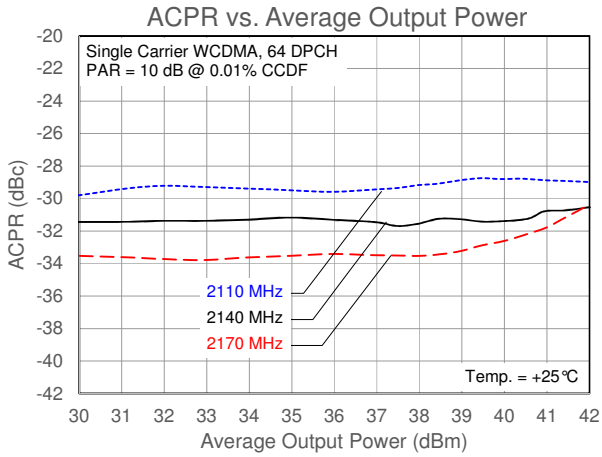
Performance Plots – TQP0104 Doherty Evaluation Board (2110-2170 MHz)

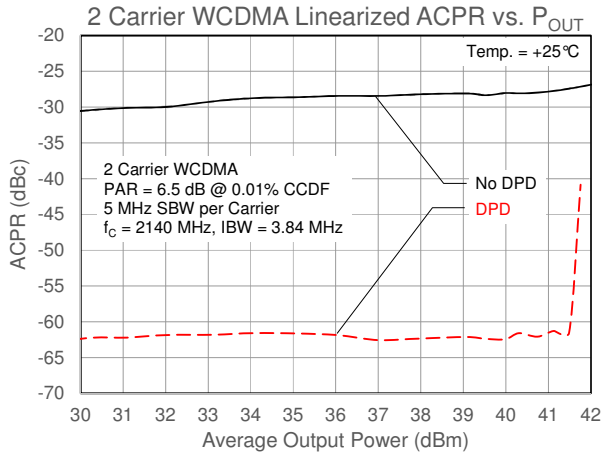
Test conditions unless otherwise noted: $V_{G,CARRIER}$ = –2.81 V, $V_{G,PEAKING}$ = –4.7 V, V_D = 32 V, I_{CQ} = 100 mA, T = 25°C, 2.1 GHz Doherty application circuit



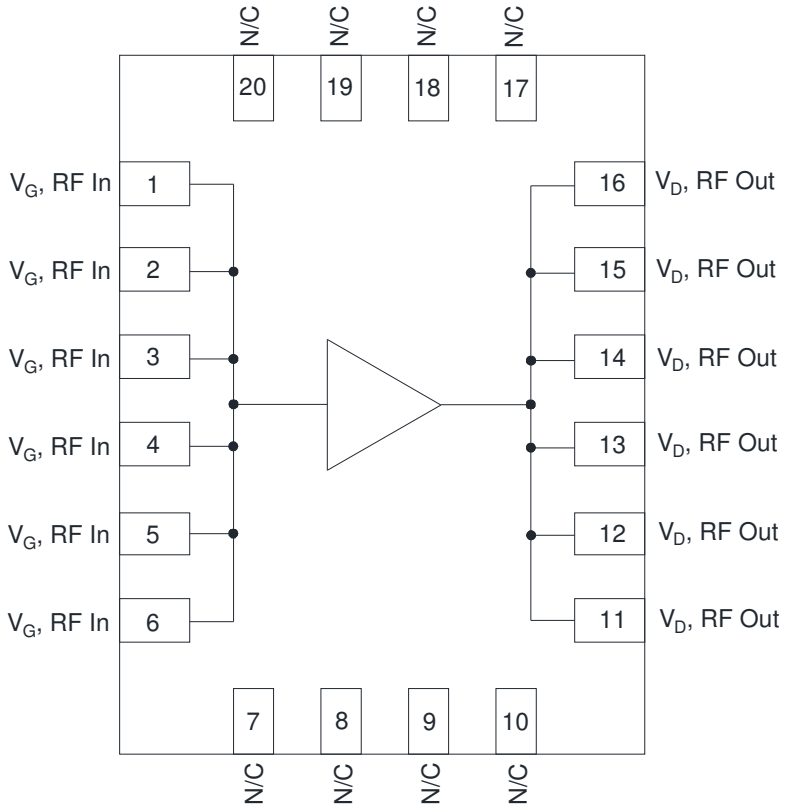








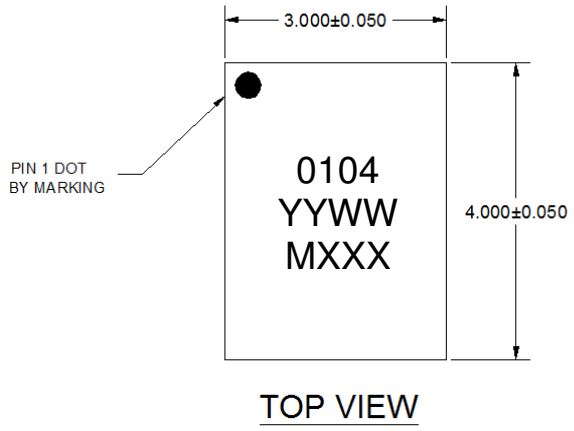
Pin Configuration and Description



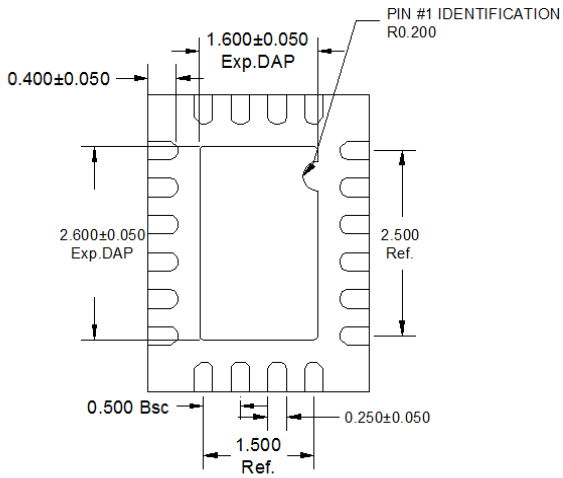
Pin No.	Label	Description
1, 2, 3, 4, 5, 6	RF IN, V_G	RF Input, Gate Bias
7, 8, 9, 10, 17, 18, 19, 20	N/C	No Connection
11, 12, 13, 14, 15, 16	RF OUT, V_D	RF Output, Drain Bias
Backside Paddle	RF/DC GND	RF/DC Ground

Package Marking and Dimensions

Marking: Part ID – 0104
Year/Workweek – YYWW
"M" + Lot Number – MXXX

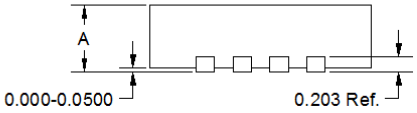


TOP VIEW



BOTTOM VIEW

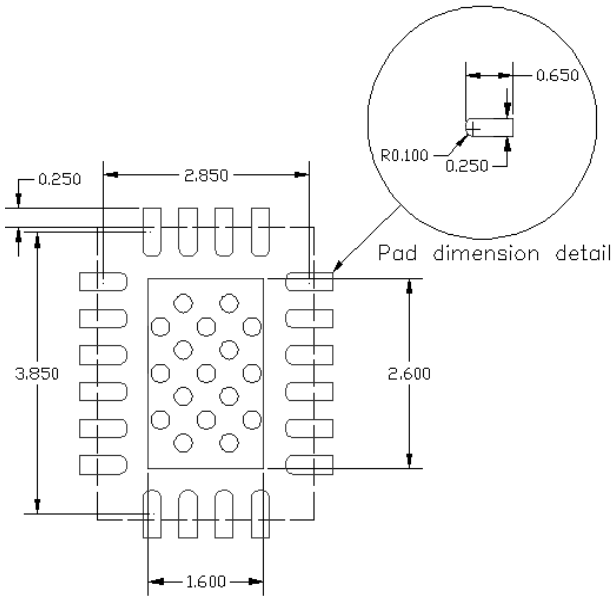
		QFN
A	MAX.	0.900
	NOM.	0.850
	MIN.	0.800

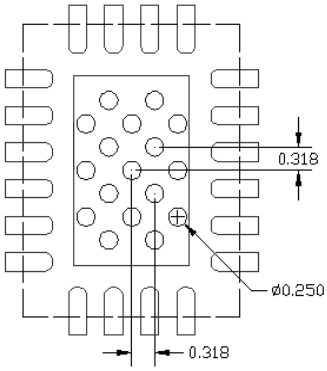


SIDE VIEW

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 1B
Value: Passes ≥ 600 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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For technical questions and application information: **Email:** btsapplications@tqs.com

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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

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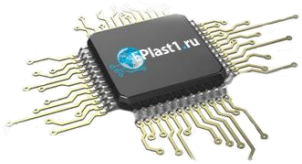
- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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