

Applications

- Small Cells / Repeaters / DAS
- Wireless Infrastructure
- Wireless Backhaul
- Portable Radios
- LTE / WCDMA / CDMA

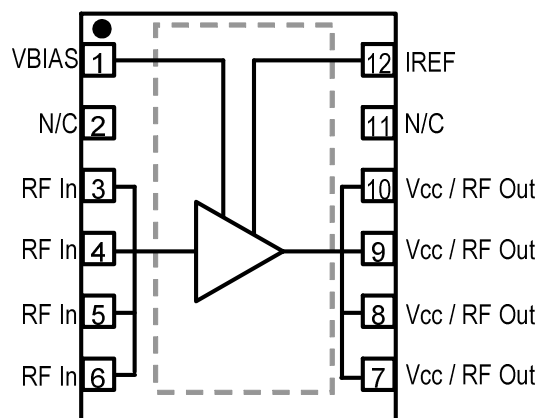
TBD

12 Pin 4x5 mm DFN Package

Product Features

- 400-2700 MHz
- +39.2 dBm P1dB
- 15.7 dB Gain
- +12 V Supply Voltage
- +49.4dBm OIP3
- -50 dBc ACLR @ 30dBm Pavg, 1C-WCDMA
- Fast Shut-Down Capability
- Internal Active Bias and Temp Compensation
- Input Overdrive Protection
- Lead-free / RoHS-compliant

Functional Block Diagram



General Description

The TQP3301 is a high dynamic range broadband power amplifier in a surface mount package. The single-stage amplifier at 2140 MHz has 15.7 dB Gain, +39.3dBm P1dB, +49.3dBm OIP3 while drawing 600mA from a 12V supply at a linear Pout of +30dBm.

The TQP3301 uses a high reliability +12V InGaP/GaAs HBT process technology. The device incorporates proprietary bias circuitry to compensate for variations in linearity and current draw over temperature. The device does not require any negative bias voltage; an internal active bias allows the TQP3301 to operate directly off a commonly used +12V supply and has the added feature of a +5V power down control pin. RoHS-compliant 4x5mm DFN package is surface mountable to allow for low manufacturing costs to the end user.

Pin Configuration

Pin No.	Label
1	V _{BIAS}
2, 11	N/C
3, 4, 5, 6	RF IN
7, 8, 9, 10	RF Output / V _{CC}
12	I _{REF}
Backside paddle	RF / DC GND

Ordering Information

Part No.	Description
TQP3301	0.7-2.9 GHz 12V 8W Power Amplifier
Standard T/R size = 1000 pcs on a 7" reel.	

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-55 to 150°C
RF Input Power, CW, 50Ω, T=25°C	TBD
Supply Voltage (V _{CC})	+15V
Power Dissipation	TBD

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

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Supply Voltage (V _{CC})		12.0		V
T _{CASE}	-40		+85	°C
T _j for >10 ⁶ hours MTTF			TBD	°C

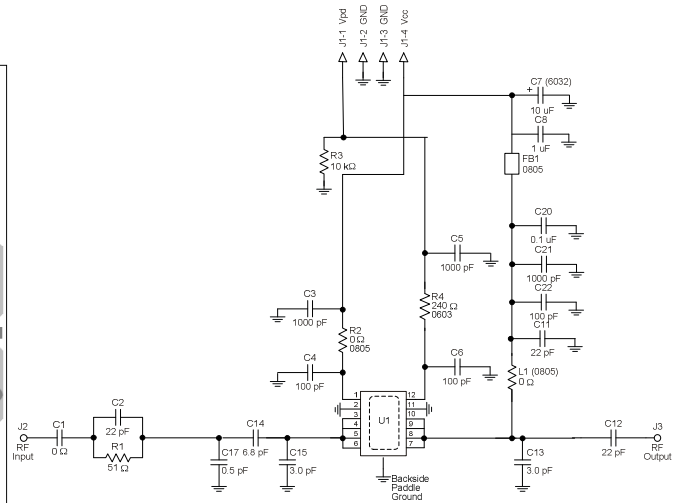
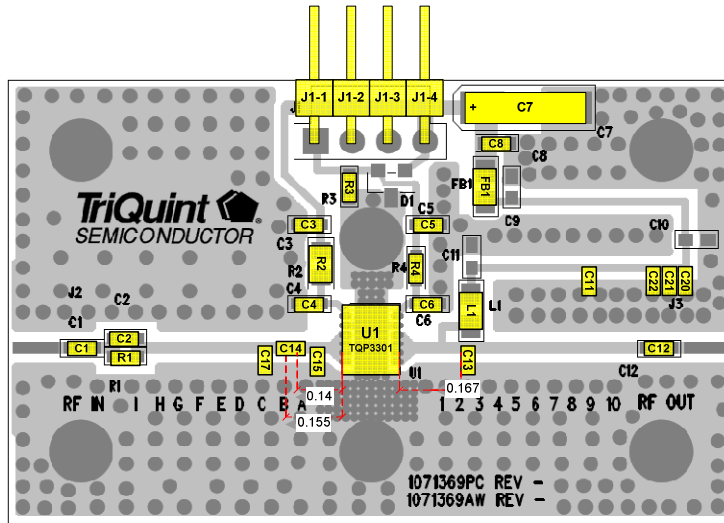
Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications

Test conditions unless otherwise noted: V_{CC} = +12V, V_{PD} = +5V, Temp = +25°C, using tuned application circuit

Parameter	Conditions	Min	Typ	Max	Units
Operational Frequency Range		400		2700	MHz
Test Frequency			2140		MHz
Gain			15.7		dB
Input Return Loss			15.5		dB
Output Return Loss			8.5		dB
OIP3			+49.4		dBm
P _{out} at ACPR = -50dBc	1C-WCDMA, PAR: 8dB		+29.3		dBm
P _{out} at ACPR = -46dBc	LTE, 2C, 10MHz BW, PAR: 8dB		+30		dBm
Collector Efficiency	P _{out} = +30 dBm		13.5		%
Output P1dB			+39.2		dBm
Operating Current, I _{CC}			600		mA
Quiescent Current, I _{CO}			500		mA
Reference Current, I _{REF}			10		mA
Thermal Resistance, θ _{Jc}			TBD		°C/W

Schematic and Layout: TQP3301-PCB2140



Bill of Material: TQP3301-PCB2140

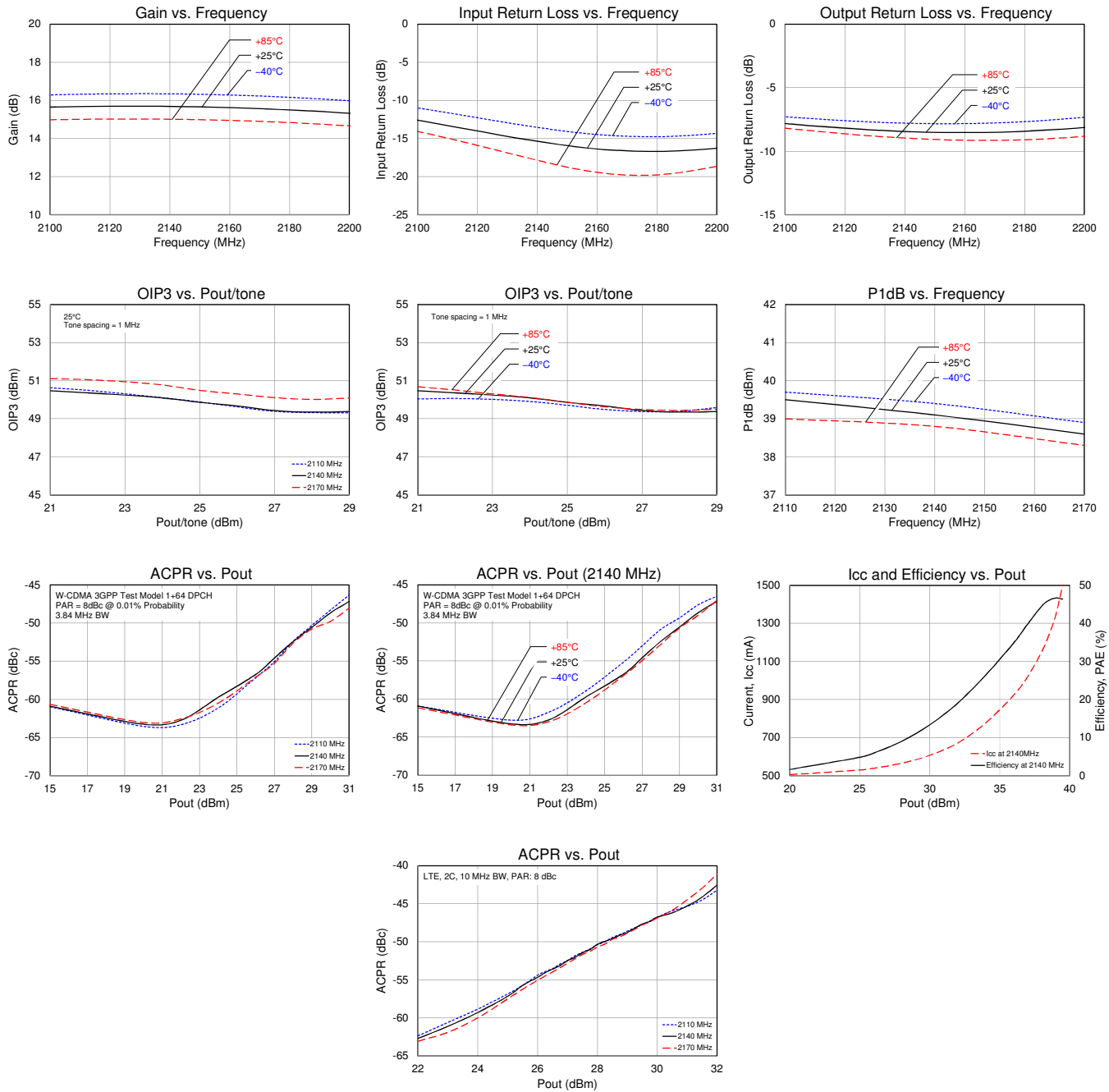
Reference Des.	Value	Description	Manuf.	Part Number
U1	n/a	TQP3301	TriQuint	TQP3301
C7	10 uF	CAP, 6032, 10%, 15V, TANT	Various	
C8	1 uF	CAP, 0603, 10%, 10V, X5R	Various	
C20	0.1 uF	CAP, 0603, 10%, 16V, X7R	Various	
C3,C5,C21	1000 pF	CAP, 0603, 5%, 50V, NPO/COG	Various	
C4,C6,C22	100 pF	CAP, 0603, 5%, 50V, COG	Various	
C2,C11,C12	22 pF	CAP, 0603, 5%, 50V, NPO/COG	Various	
C13,C15	3.0 pF	CAP, 0603, ± 0.05 PF, 50V, ACCU-P	AVX	06035J3R0ABSTR
C17	0.5 pF	CAP, 0603, ± 0.1 pF, 50V, NPO/COG	Murata	GQM1885C2AR50BB01J
C14	6.8 pF	CAP, 0603, ± 0.05 PF, 50V, ACCU-P	AVX	06035J6R8BBSTR
FB1, L1, R2	0 Ω	RES, 0805, 1/10W, CHIP, SMD	Various	
C1	0 Ω	RES, 0603, 1%, 1/16W, CHIP	Various	
R1	51 Ω	RES, 0603, 1%, 1/16W, CHIP	Various	
R4	240 Ω	RES, 0603, 1%, 1/16W, CHIP	Various	
R3	10 k Ω	RES, 0603, 5%, 1/16W, CHIP	Various	

Typical Performance: TQP3301-PCB2140

Test Conditions: $V_{CC}=+12$ V, $V_{PD} = +5$ V, $I_{CQ} = 500$ mA, Temp.=+25°C, 50 Ω System

Parameter	Conditions	Typical Value			Units
Frequency		2110	2140	2170	MHz
Gain		15.7	15.7	15.6	dB
Input Return Loss		13.5	15.5	16.5	dB
Output Return Loss		8	8.5	8.5	dB
Output P1dB		+39.5	+39.1	+38.6	dBm
Output IP3	Pout= +27 dBm/tone, $\Delta f = 1$ MHz	+49.4	+49.4	+50.1	dBm
Pout at ACLR = -50dBc	8.0dB PAR, 1C WCDMA	+29.2	+29.3	+29.5	dBm
Operating Current, I_{CC} at 30dBm Pout		600			mA
Collector Efficiency, PAE at 30dBm Pout		13.5			%

Typical Performance Plots: TQP3301-PCB2140

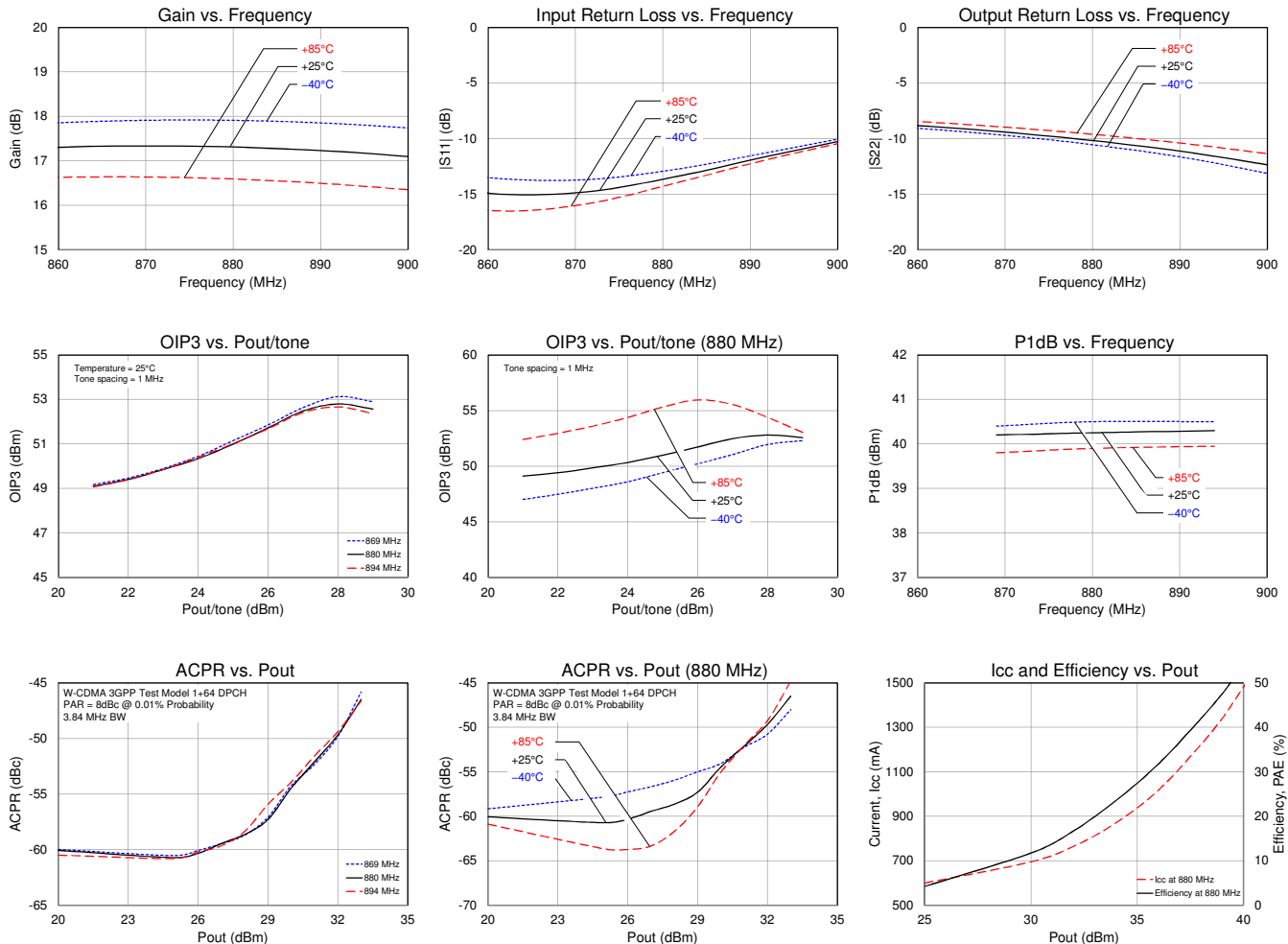


Typical Performance: TQP3301-PCB880

Test Conditions: $V_{CC}=+12$ V, Temp.=+25°C, 50Ω System

Parameter	Conditions	Typical Value			Units
Frequency		869	880	894	MHz
Gain		17.3	17.3	17.1	dB
Input Return Loss		14.8	13.5	11.5	dB
Output Return Loss		9.5	10.3	11.5	dB
Output P1dB		+40.2	+40.2	+40.3	dBm
Output IP3	Pout= +27 dBm/tone, $\Delta f=1$ MHz	+52.6	+52.5	+52.4	dBm
Pout at ACLR = -50dBc	8.0dB PAR, 1C WCDMA	+31.9	+31.8	+31.7	dBm
Operating Current, I_{CC} at 30dBm Pout		680			mA
Collector Efficiency, PAE at 30dBm Pout		12			%

Typical Performance Plots: TQP3301-PCB880



Evaluation Board Bias Procedure

Following bias procedure is recommended to ensure proper functionality of TQP3301.

Bias.	Voltage (V)
V _{CC}	+12
V _{PD}	+5

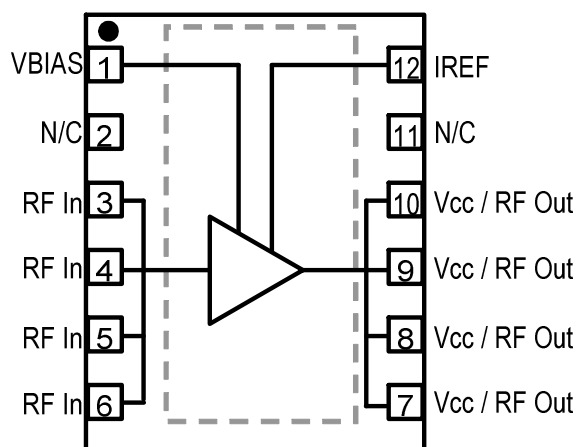
Turn-on Sequence:

1. Attach input and output loads onto the evaluation board.
2. Turn on power supply V_{CC} = +12V.
3. Turn on power supply V_{PD} = +5V.
4. Turn on RF power.

Turn-off Sequence:

1. Turn off RF power.
2. Turn off power supply V_{PD} = +5V.
3. Turn off power supply V_{CC} = +12V.

Pin Configuration and Description



Pin No.	Label	Description
1	V _{BIAS}	Voltage supply for active bias for the amp. Connect to same supply voltage as V _{cc} .
2, 11	N/C	No internal connection. This pin can be grounded or N/C on PCB. Land pads should be provided for PCB mounting integrity.
3, 4, 5, 6	RF IN	RF Input. DC Voltage present, blocking cap required. Requires matching for operation.
7, 8, 9, 10	RF Output / V _{CC}	RF Output. DC Voltage present, blocking cap required
12	I _{REF}	Reference current into internal active bias current mirror. Current into I _{REF} sets device quiescent current. Also, can be used as on/off control.
Backside Paddle	RF/DC GND	Multiple Vias should be employed to minimize inductance and thermal resistance. Use recommended via pattern shown under mounting configuration and ensure good solder attach for optimum thermal and electrical performance

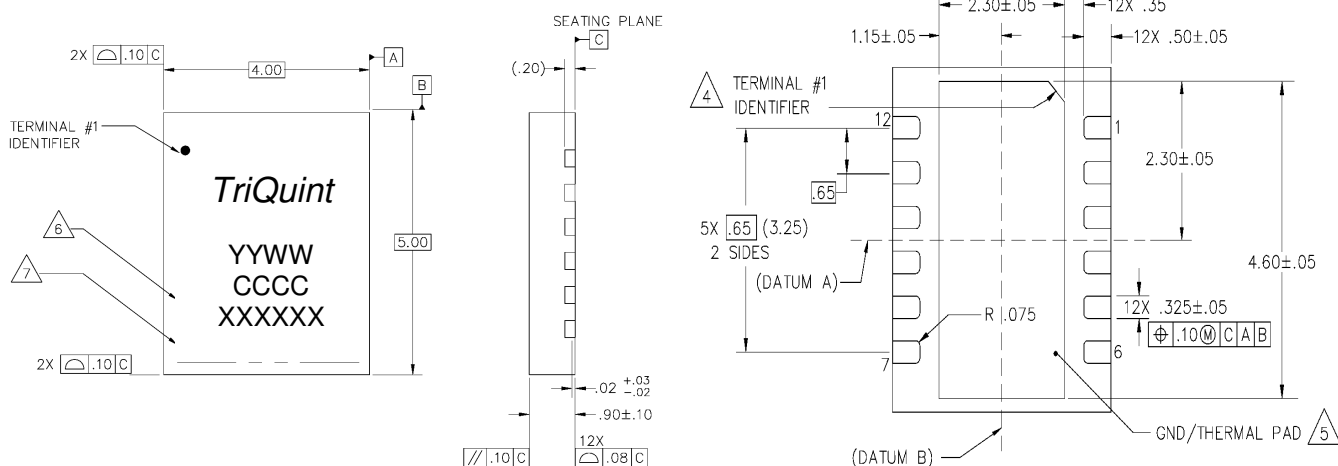
Mechanical Information

Package Marking and Dimensions

Marking: Part number – TQP3301

Year, Week, Country code – YYWW CCCC

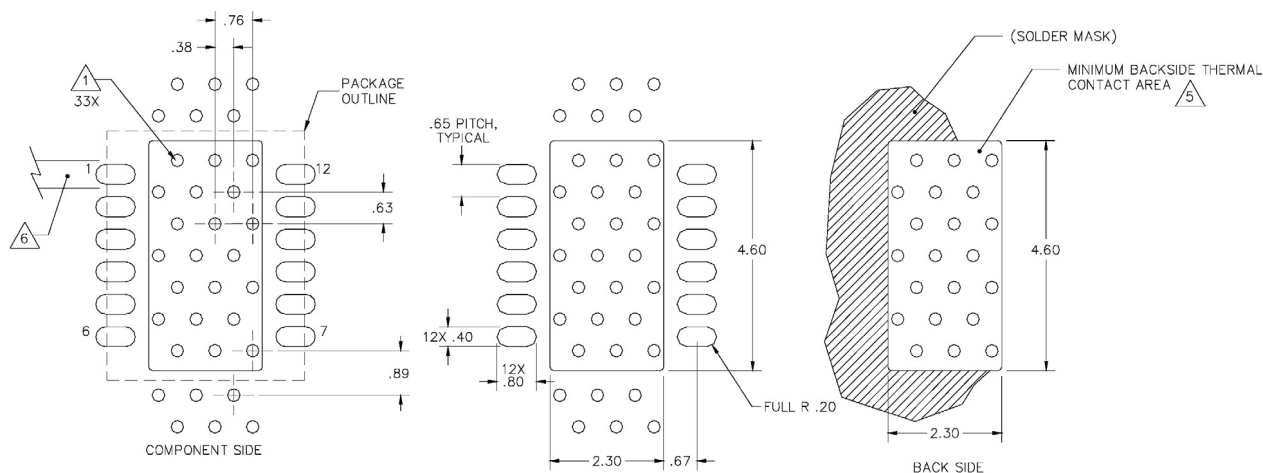
Assembly code - XXXXXX



Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Except where noted, this part outline conforms to JEDEC standard MO-220, Issue E (Variation VGGC) for thermally enhanced plastic very thin fine pitch quad flat no lead package (QFN).
3. Dimension and tolerance formats conform to ASME Y14.4M-1994.
4. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.

PCB Mounting Pattern



Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.
3. Vias are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation. We recommend a 0.35mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25 mm (0.10").
4. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.

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: Level 3
Test: 260°C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020

Solderability

Compatible with both lead-free (260 °C max. reflow temperature) and tin/lead (245 °C max. 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 (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free

Contact Information

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