Freescale Semiconductor
Technical Data

Document Number: MMZ25332B
Rev. 0, 5/2012

RoHS

Heterojunction Bipolar Transistor Technology (InGaP HBT)

High Efficiency/Linearity Amplifier

MMZ25332BT1

1800–2800 MHz, 26.5 dB
33 dBm
InGaP HBT

QFN 3×3
PLASTIC

The MMZ25332B is a 2–stage, high linearity InGaP HBT broadband amplifier designed for femtocell, picocell, WLAN (802.11g/n), W–CDMA, TD–SCDMA and LTE wireless broadband applications. It provides exceptional linearity for LTE and W–CDMA air interfaces with an ACPR of –50 dBc at an output power of up to 22 dBm, covering frequencies from 1800–2800 MHz. It operates from a supply voltage of 3 to 5 volts. The amplifier is fully input matched, requires minimal external matching on the output and is housed in a cost–effective, surface mount QFN 3×3 package. The device offers state–of–the–art reliability, ruggedness, temperature stability and ESD performance.

- Typical Performance: V_{CC1} = V_{CC2} = V_{BIAS} = 5 Volts, I_{CQ} = 400 mA

Frequency	P_{out} (dBm)	G_{ps} (dB)	ACPR (dBc)	PAE (%)	Test Signal
2140 MHz	22	27.0	–50.0	7.0	W–CDMA
2620 MHz	21	26.0	–50.0	5.0	LTE 20 MHz

Features

- Frequency: 1800–2800 MHz
- P1dB: 33 dBm @ 2500 MHz
- Power Gain: 26.5 dB @ 2500 MHz
- OIP3: 48 dBm @ 2500 MHz
- EVM < 3% @ 26.5 dBm P_{out}, WiMAX (802.16e)
- Active Bias Control (adjustable externally)
- Single 3 to 5 Volt Supply
- Single–ended Power Detector
- Cost–effective QFN Surface Mount Package
- In Tape and Reel. T1 Suffix = 1,000 Units per 12 mm, 7 inch Reel.

Table 1. Typical CW Performance (1)

Characteristic	Symbol	1800 MHz	2500 MHz	2800 MHz	Unit
Small–Signal Gain (S21)	G_p	27.6	26.5	25.0	dB
Input Return Loss (S11)	IRL	–26	–17	–16	dB
Output Return Loss (S22)	ORL	–9	–17	–16	dB
Power Output @ 1dB Compression	P1dB	32	33	32	dBm

1. V_{CC1} = V_{CC2} = V_{BIAS} = 5 Vdc, T_A = 25°C, 50 ohm system, CW Application Circuit

Table 2. Maximum Ratings

Rating	Symbol	Value	Unit
Supply Voltage	V_{CC}	6	V
Supply Current	I_{CC}	1200	mA
RF Input Power	P_{in}	30	dBm
Storage Temperature Range	T_{stg}	–65 to +150	°C
Junction Temperature (2)	T_J	150	°C

2. For reliable operation, the junction temperature should not exceed 150°C.

Table 3. Thermal Characteristics

Characteristic	Symbol	Value (3)	Unit
Thermal Resistance, Junction to Case Case Temperature 92°C, V_{CC1} = V_{CC2} = V_{BIAS} = 5 Vdc	$R_{\theta JC}$	16	°C/W

3. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers.* Go to http://www.freescale.com/rf. Select Documentation/Application Notes – AN1955.

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Table 4. Electrical Characteristics (V_{CC1} = V_{CC2} = V_{BIAS} = 5 Vdc, 2500 MHz, T_A = 25°C, 50 ohm system, in Freescale CW Application Circuit)

Characteristic	Symbol	Min	Typ	Max	Unit
Small-Signal Gain (S21)	G_p	25	26.5	—	dB
Input Return Loss (S11)	IRL	—	-17	—	dB
Output Return Loss (S22)	ORL	—	-17	—	dB
Power Output @ 1dB Compression	P1dB	—	33	—	dBm
Third Order Output Intercept Point, Two-Tone CW	OIP3	—	48	—	dBm
Noise Figure	NF	—	5.8	—	dB
Supply Current (1)	I_{CQ}	356	390	412	mA
Supply Voltage (1)	V_{CC}	—	5	—	V

Table 5. ESD Protection Characteristics

Test Methodology	Class
Human Body Model (per JESD22-A114)	3A
Machine Model (per EIA/JESD22-A115)	B
Charge Device Model (per JESD22-C101)	IV

Table 6. Moisture Sensitivity Level

Test Methodology	Rating	Package Peak Temperature	Unit
Per JESD22-A113, IPC/JEDEC J-STD-020	1	260	°C

1. For reliable operation, the junction temperature should not exceed 150°C.

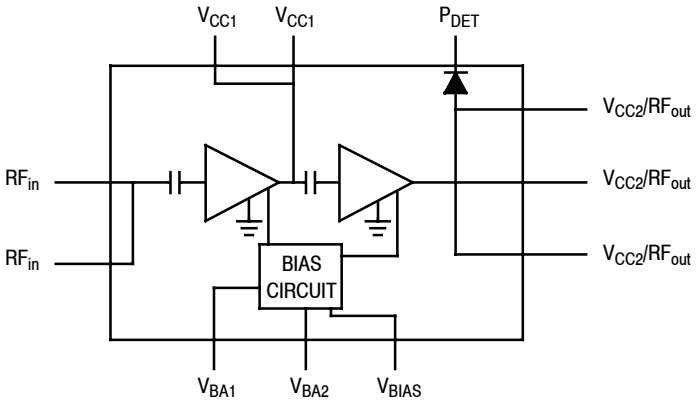


Figure 1. Functional Block Diagram

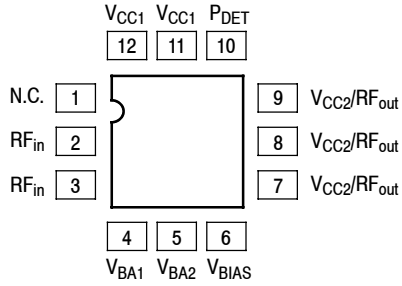
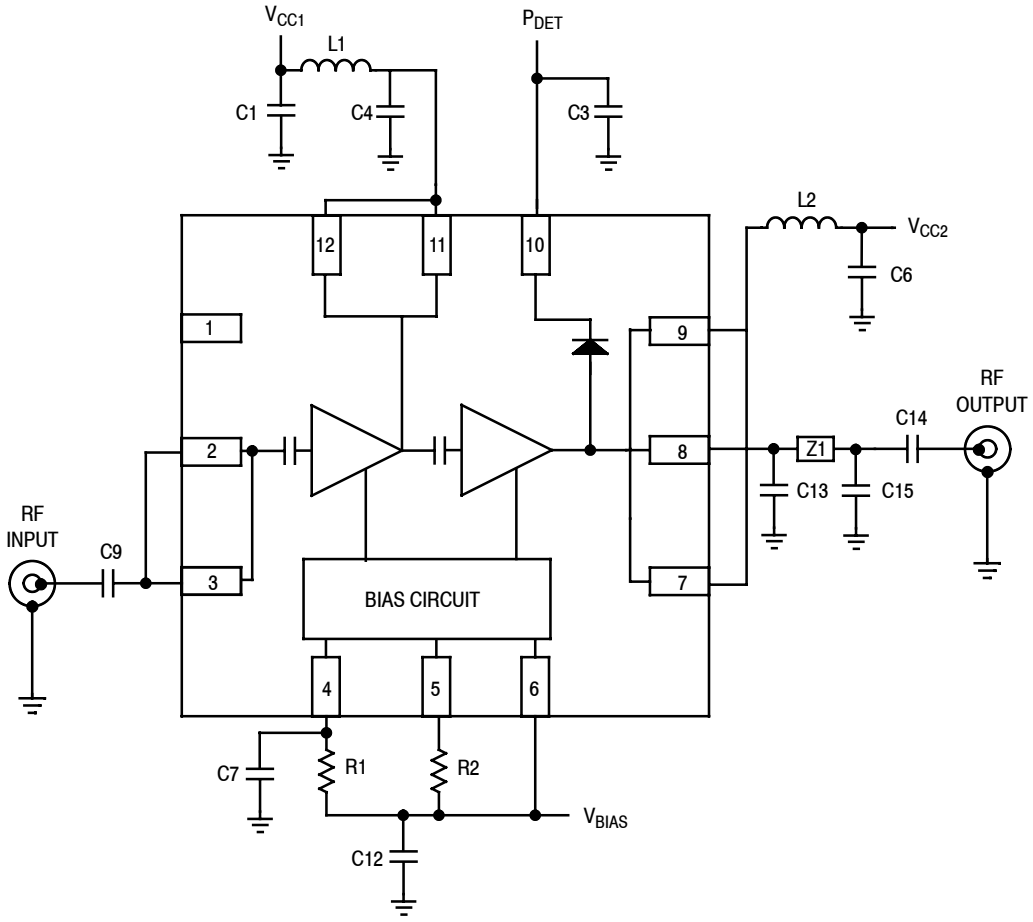


Figure 2. Pin Connections



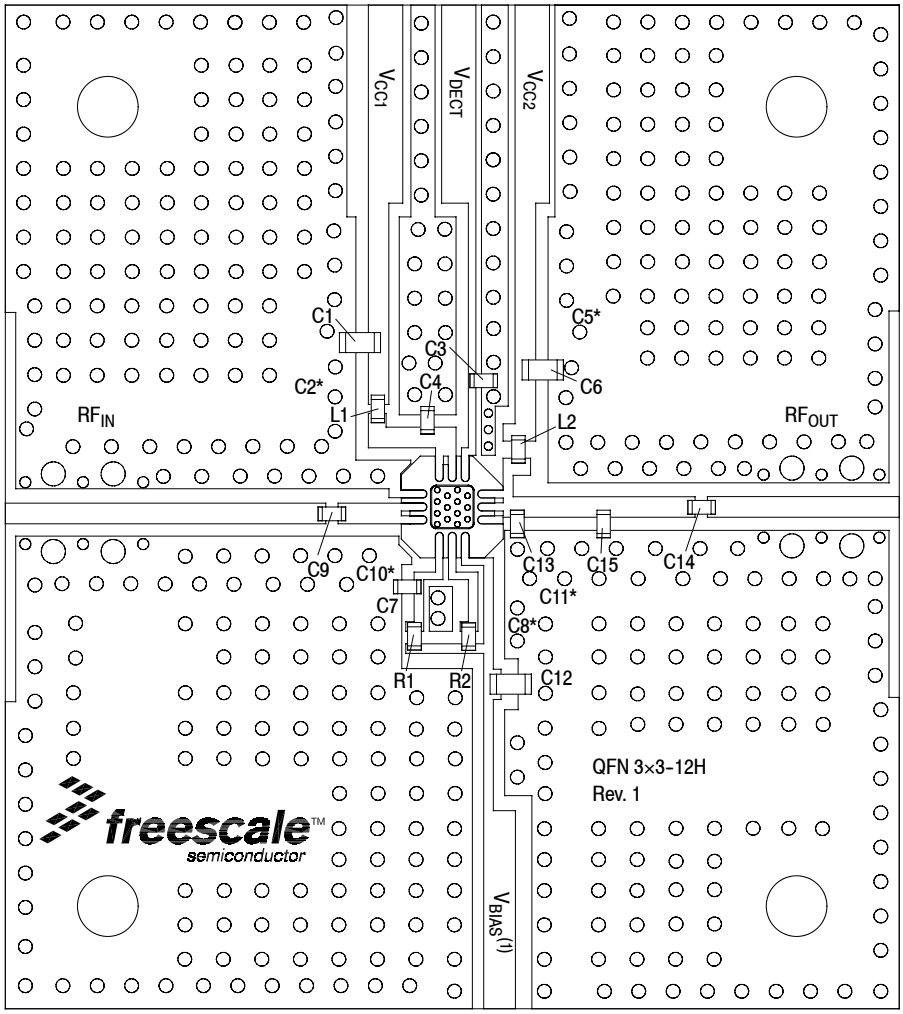
Z1 0.155″ × 0.030″ Microstrip

Figure 3. MMZ25332BT1 Test Circuit Schematic — 2500 MHz, 5 Volt Operation

Table 7. MMZ25332BT1 Test Circuit Component Designations and Values — 2500 MHz, 5 Volt Operation

Part	Description	Part Number	Manufacturer
C1, C12	1 μF Chip Capacitors	GRM155R61A105KE15	Murata
C2, C5, C8, C10, C11	Components Not Placed		
C3	470 pF Chip Capacitor	GRM1555C1H471JA01D	Murata
C4	7.5 pF Chip Capacitor	04023J7R5BBS	AVX
C6	4.7 μF Chip Capacitor	GRM188R60J475KE19D	Murata
C7	120 pF Chip Capacitor	GRM1555C1H121JA01D	Murata
C9, C14	22 pF Chip Capacitor	04023J22R0BBS	AVX
C13	2.4 pF Chip Capacitor	04023J2R4BBS	AVX
C15	1.8 pF Chip Capacitor	04023J1R8BBS	AVX
L1	24 nH Chip Inductor	0603HC-24NXJLW	Coilcraft
L2	22 nH Chip Inductor	0603HC-22NXJLW	Coilcraft
R1	1.2 kΩ, 1/16 W Chip Resistor	RC0402JR-071K20L	Yageo
R2	330 Ω, 1/16 W Chip Resistor	RC0402JR-07330RL	Yageo
PCB	0.014″, ε_r = 3.7	FR408	Isola

Note: Component numbers C2, C5, C8, C10 and C11 are labeled on board but not placed.



(1) V_{BIAS} [Board] supplies V_{BA1}, V_{BA2} and V_{BIAS} [Device].
Note: Component numbers C2*, C5*, C8*, C10* and C11* are labeled on board but not placed.

Figure 4. MMZ25332BT1 Test Circuit Component Layout — 2500 MHz, 5 Volt Operation

Table 7. MMZ25332BT1 Test Circuit Component Designations and Values — 2500 MHz, 5 Volt Operation

Part	Description	Part Number	Manufacturer
C1, C12	1 μF Chip Capacitors	GRM155R61A105KE15	Murata
C2, C5, C8, C10, C11	Components Not Placed		
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C4	7.5 pF Chip Capacitor	04023J7R5BBS	AVX
C6	4.7 μF Chip Capacitor	GRM188R60J475KE19D	Murata
C7	120 pF Chip Capacitor	GRM1555C1H121JA01D	Murata
C9, C14	22 pF Chip Capacitor	04023J22R0BBS	AVX
C13	2.4 pF Chip Capacitor	04023J2R4BBS	AVX
C15	1.8 pF Chip Capacitor	04023J1R8BBS	AVX
L1	24 nH Chip Inductor	0603HC-24NXJLW	Coilcraft
L2	22 nH Chip Inductor	0603HC-22NXJLW	Coilcraft
R1	1.2 kΩ, 1/16 W Chip Resistor	RC0402JR-071K20L	Yageo
R2	330 Ω, 1/16 W Chip Resistor	RC0402JR-07330RL	Yageo
PCB	0.014″, ε_r = 3.7	FR408	Isola

(Test Circuit Component Designations and Values table repeated for reference.)

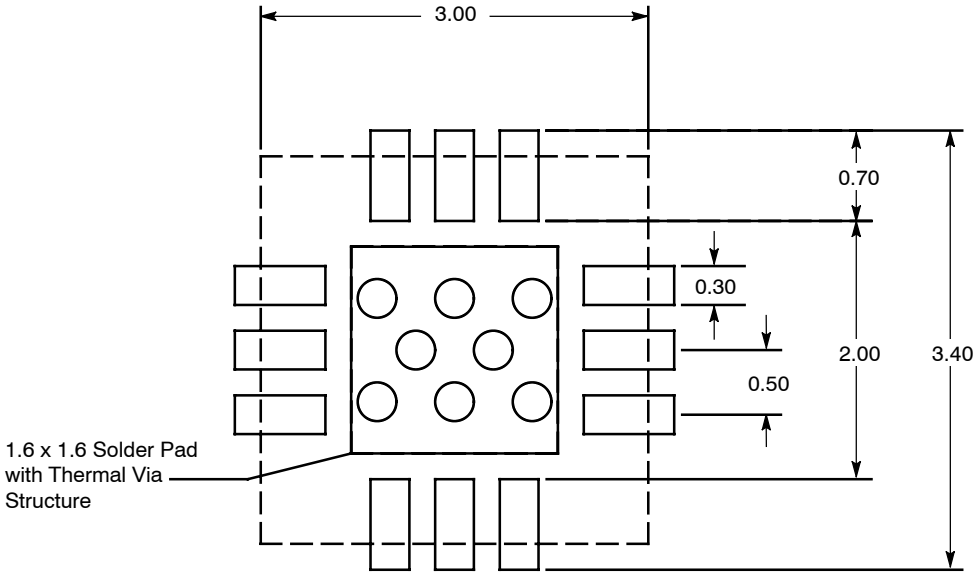
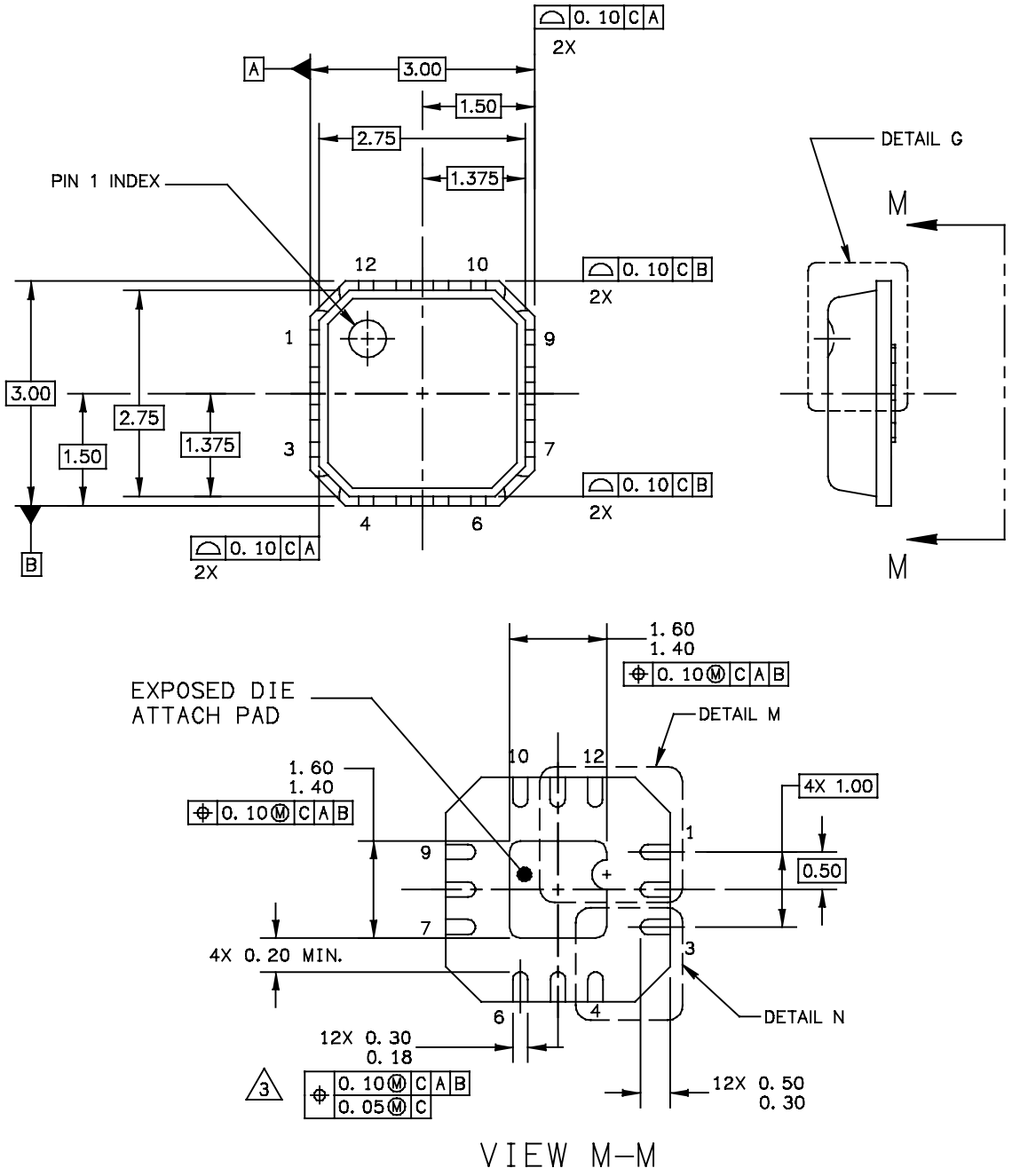


Figure 5. PCB Pad Layout for QFN 3x3

Figure 6. Product Marking

PACKAGE DIMENSIONS



VIEW M–M

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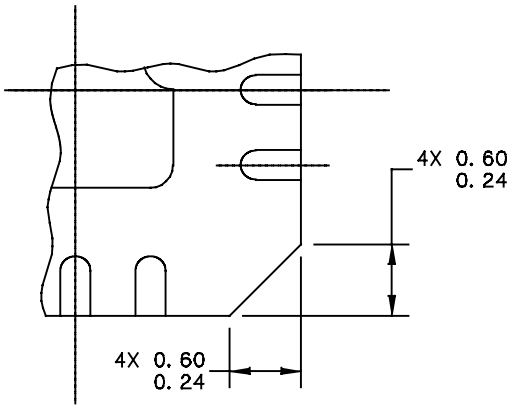
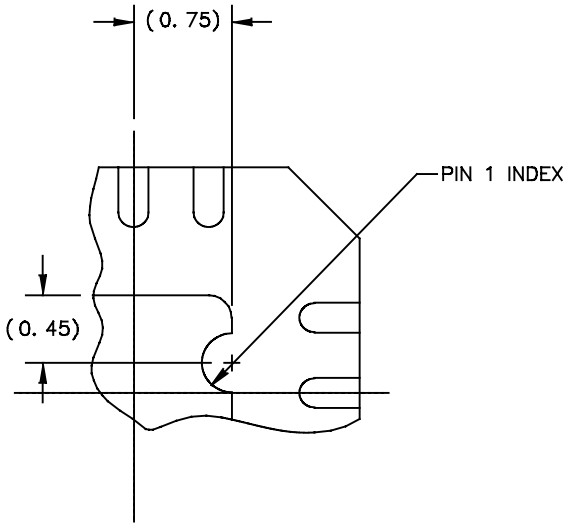
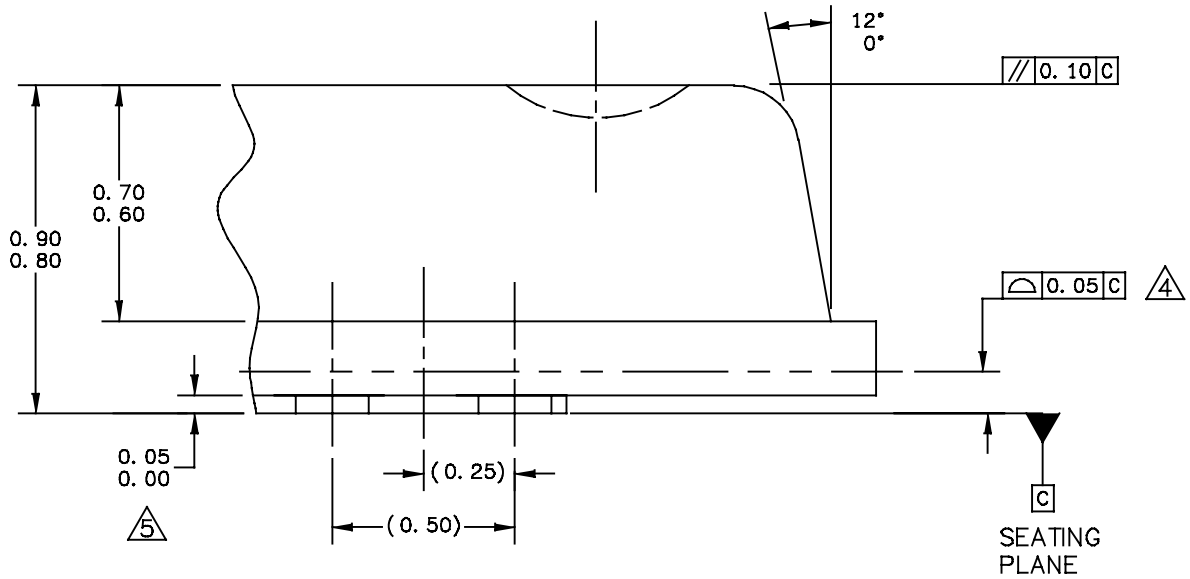
TITLE: THERMALLY ENHANCED QUAD FLAT NON–LEADED PACKAGE (QFN) 12 TERMINAL, 0.5 PITCH (3X3X0.85)	DOCUMENT NO: 98ASA00227D	REV: O
	CASE NUMBER: 2131–01	14 MAY 2010
	STANDARD: NON–JEDEC	



DETAIL N
CORNER CONFIGURATION



DETAIL M
PIN 1 BACKSIDE INDEX



DETAIL G
VIEW ROTATED 90° CW

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PRODUCT DOCUMENTATION, SOFTWARE AND TOOLS

Refer to the following documents, software and tools to aid your design process.

Application Notes

- AN1955: Thermal Measurement Methodology of RF Power Amplifiers

Software

- .s2p File

Development Tools

- Printed Circuit Boards

For Software and Tools, do a Part Number search at http://www.freescale.com, and select the “Part Number” link. Go to the Software & Tools tab on the part’s Product Summary page to download the respective tool.

REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
0	May 2012	• Initial Release of Data Sheet

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