SKYWORKS®

AWB7232

2.3 - 2.4 GHz
Small-Cell Power Amplifier Module

Data Sheet - Rev 2.3

FEATURES

- InGaP HBT Technology
- -47 dBc ACPR @ ±10 MHz, +27 dBm
- 29 dB Gain
- High Efficiency
- Low Transistor Junction Temperature
- Matched for a 50 Ω System
- Low Profile Miniature Surface Mount Package; RoHS Compliant
- Multi-Carrier Capability

14 Pin 7 mm x 7 mm x 1.3 mm
Surface Mount Module

APPLICATIONS

- LTE, WCDMA and HSDPA Air Interfaces
- FDD and TDD Systems
- Picocell, Femtocell, Home Nodes
- Customer Premises Equipment (CPE)
- Data Cards and Terminals

PRODUCT DESCRIPTION

The AWB7232 is a fully matched, Multi-Chip-Module (MCM) designed for picocell, femtocell, and customer premises equipment (CPE) applications. Its high linearity and efficiency meet the extremely demanding needs of small cell infrastructure architectures. Designed for LTE,WCDMA and HSDPA air interfaces operating in the 2.3 GHz to 2.4 GHz band, the AWB7232 delivers up to +27 dBm of LTE (E-TM1.1) power with an ACPR of -47 dBc. It operates from a convenient +4.5 V supply and provides 29 dB of gain. The device is manufactured using an advanced InGaP HBT MMIC technology offering state-of-the-art reliability, temperature stability, and ruggedness. The self-contained 7 mm x 7 mm x 1.3 mm surface mount package incorporates RF matching networks optimized for output power, efficiency, and linearity in a 50 Ω system.

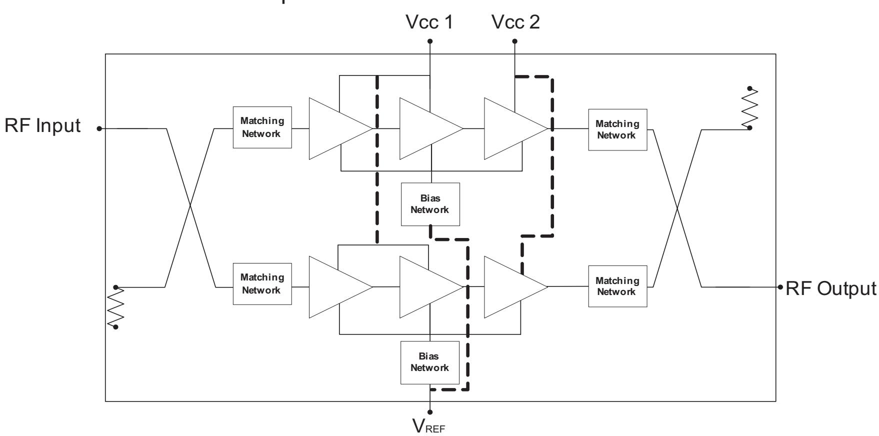

Figure 1: Block Diagram

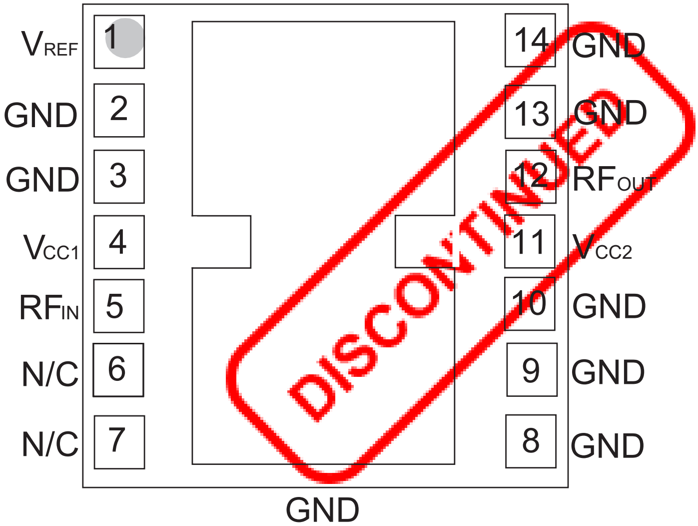

Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

PIN	NAME	DESCRIPTION
1	V_{REF}	Reference Voltage
2	GND	Ground
3	GND	Ground
4	V_{CC1}	Supply Voltage
5	RF_{IN}	RF Input
6	N/C	No Connection
7	N/C	No Connection
8	GND	Ground
9	GND	Ground
10	GND	Ground
11	V_{CC2}	Supply Voltage
12	RF_{OUT}	RF Output
13	GND	Ground
14	GND	Ground

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage (V_{CC})	0	+5	V
Reference Voltage (V_{REF})	0	+3.5	V
RF Output Power (P_{OUT})	-	+30	dBm, modulated
RF Input Power (P_{IN})	-	+10	dBm, CW
ESD Rating Human Body Model (1) Charged Device Model (2)	 Class 1C Class IV	 - -	
MSL Rating (3)	4	-	
Junction Temperature (T_J)	-	+150	°C
Storage Temperature (T_{STG})	-40	+150	°C

Functional operation is not implied under these conditions. Exceeding any one or a combination of the Absolute Maximum Rating Conditions may cause permanent damage to the device. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Notes:
(1) JEDEC JS-001-2010.
(2) JEDEC JESD22-C101D.
(3) 260 °C peak reflow.

Table 3: Operating Ranges

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Operating Frequency (f)	2300	-	2400	MHz	
Supply Voltage (V_{CC})	+3.6	+4.5	+4.65	V	
Reference Voltage (V_{REF})	+2.80 0	+2.85 -	+2.90 +0.5	V	PA "on" PA "shut down"
RF Output Power (P_{OUT}) (1)	-	+27	-	dBm	
Case Temperature (T_C) (2)	-40	-	+85	°C	

The device may be operated safely over these conditions; however, parametric performance is guaranteed only over the conditions defined in the electrical specifications.

Notes:
(1) Typ RF Output Power is used during production test.
(2) Case Temperature references the board temperature at the ground paddle on the backside of the package.

Table 4: Electrical Specifications
(T_C = +25 °C, V_{CC} = +4.5 V, V_{REF} = +2.85 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Gain (2)	26.5	29	33	dB	
ACPR (1), (2), (3) @ 10 MHz @ 20 MHz	- -	-47 -57	-45 -54	dBc	
Power-Added Efficiency (1), (2), (3)	12	15	-	%	
Thermal Resistance (R_{JC}) (4)	-	11.2	-	°C/W	Junction to Case
Supply Current (1), (2), (3)	-	740	925	mA	total through V_{CC} pins
Quiescent Current (Icq)	-	250	300	mA	
Reference Current	10	14	19	mA	through V_{REF} pin
Leakage Current	-	3	10	µA	V_{CC} = +4.65 V, V_{REF} = 0 V
Harmonics $2f_O$, $4f_O$ $3f_O$	- -	-50 -45	-45 -40	dBc	
Input Return Loss	15	18	-	dB	
Output Return Loss	15	18	-	dB	
P1dB	-	+34.5	-	dBm	CW Tone
RF Switching Time (5) Rise Time (PA “off” to “on”) Fall Time (PA “on” to “off”)	- -	- -	12 4	µs	V_{CC} = +4.5 V, V_{REF} switched between 0 V and +2.85 V
Spurious Output Level (all spurious outputs)	-	-	-60	dBc	P_{OUT} ≤ +27 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all voltage and temperature operating ranges
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	V_{CC} = +4.5 V, P_{OUT} = +27 dBm Applies over full operating temperature range

Notes:
(1) Measured at 2350 MHz.
(2) P_{OUT} = +27 dBm.
(3) E-TM1.1 LTE 10 MHz BW.
(4) Use only V_{CC2} (pin 11) current when calculating device junction temperature.
(5) Rise Time defined from time at which V_{REF} is switched from 0 V to +2.85 V, to time at which the RF output power achieves 90% of the average steady-state “on” level; Fall Time defined from time at which V_{REF} is switched from +2.85 V to 0 V, to time at which the RF output power decreases to 10% of the average steady-state “on” level.

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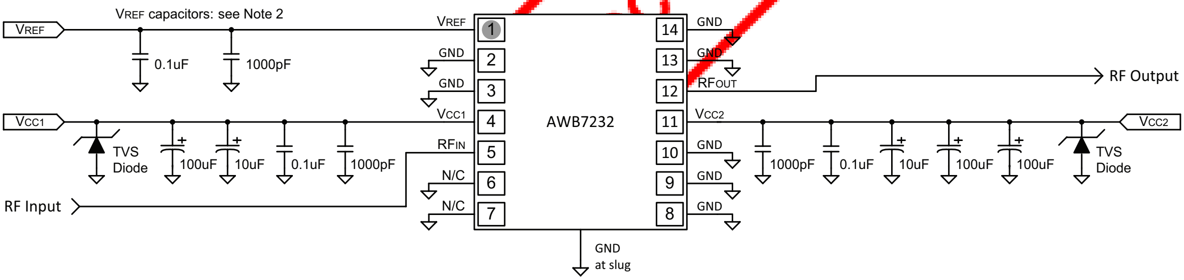
APPLICATION INFORMATION

To ensure proper performance, refer to all related Application Notes.

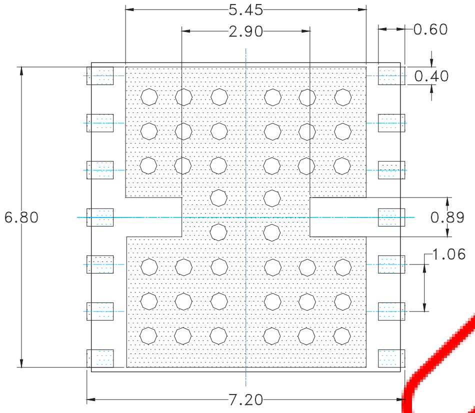
Shutdown Mode

The power amplifier may be placed in a shutdown mode by applying logic low levels (see Operating Ranges table) to the V_{REF} voltage.



Notes:
1. Applications that have large supply voltage transients may benefit from the use of TVS diodes. For such applications, recommended TVS diodes are SM05T1G or SMJ5.0A.
2. To achieve the RF Switching Time specifications listed in Table 4, the maximum recommended capacitance on the V_{REF} line is 0.01µF. The noise on the V_{REF} line should be kept as low as possible to minimize required capacitance.

Figure 3: Application Circuit Schematic



PCB METAL
TOP (X-RAY) VIEW

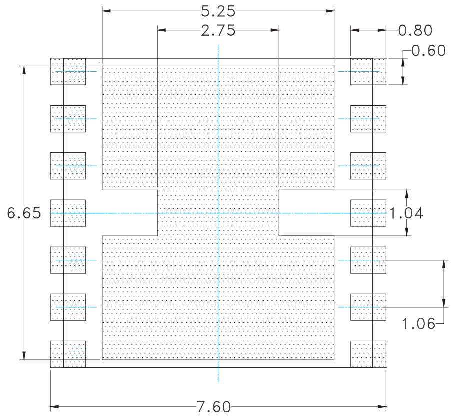
ONLY PACKAGE I/O's AND
GROUND REQUIREMENTS
SHOWN.

NOTES:

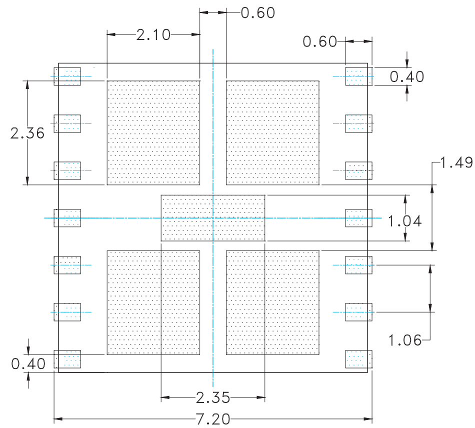
(1) UNLESS SPECIFIED DIMENSIONS ARE SYMMETRICAL ABOUT CENTER LINES SHOWN.

(2) DIMENSIONS IN MILLIMETERS.

(3) VIAS SHOWN IN PCB METAL VIEW ARE FOR REFERENCE ONLY. NUMBER & SIZE OF THERMAL VIAS REQUIRED DEPENDENT ON HEAT DISSIPATION REQUIREMENT AND THE PCB PROCESS CAPABILITY.



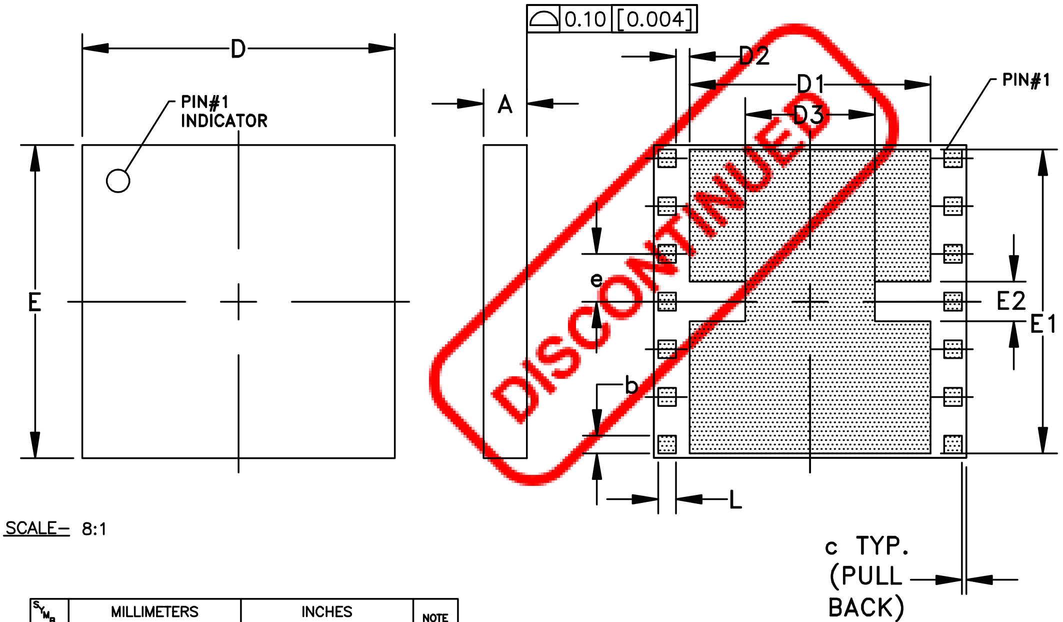
PCB SOLDER MASK
TOP (X-RAY) VIEW



STENCIL APERTURE
TOP (X-RAY) VIEW

Figure 4: PCB Footprint

PACKAGE OUTLINE



SYMBOL	MILLIMETERS			INCHES			NOTE
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
A	1.17	1.27	1.37	0.046	0.05	0.054	–
b	0.375	0.400	0.425	0.0148	0.0157	0.0167	14X
c	–	0.10	–	–	0.004	–	–
D	6.90	7.00	7.10	0.272	0.276	0.280	–
D1	–	5.40	–	–	0.213	–	–
D2	–	0.30	–	–	0.0118	–	
D3	–	2.90	–	–	0.114	–	
E	6.90	7.00	7.10	0.272	0.276	0.280	–
E1	–	6.80	–	–	0.268	–	–
E2	–	0.89	–	–	0.035	–	
e	–	1.067	–	–	0.0420	–	6X
L	0.375	0.400	0.425	0.0148	0.0157	0.0167	14X

NOTES:

1. CONTROLLING DIMENSIONS: MILLIMETERS
2. UNLESS SPECIFIED TOLERANCE=±0.076[0.003].
3. PADS (INCLUDING CENTER) SHOWN UNIFORM SIZE FOR REFERENCE ONLY. ACTUAL PAD SIZE AND LOCATION WILL VARY WITHIN MIN. AND MAX. DIMENSIONS ACCORDING TO SPECIFIC LAMINATE DESIGN.

Figure 5: Package Outline - 14 Pin 7 mm x 7 mm x 1.3 mm Surface Mount Module

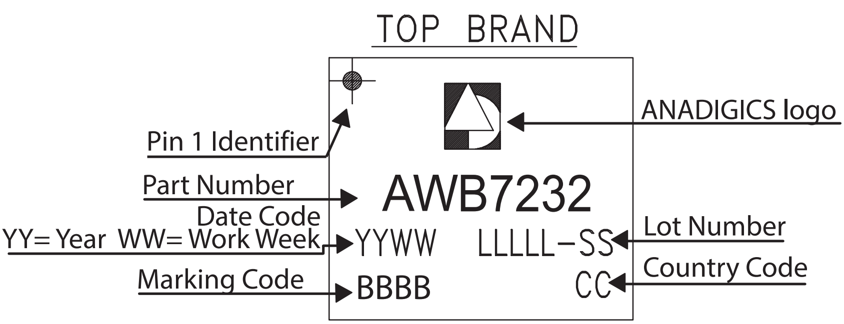


Figure 6: Branding Specification

COMPONENT PACKAGING

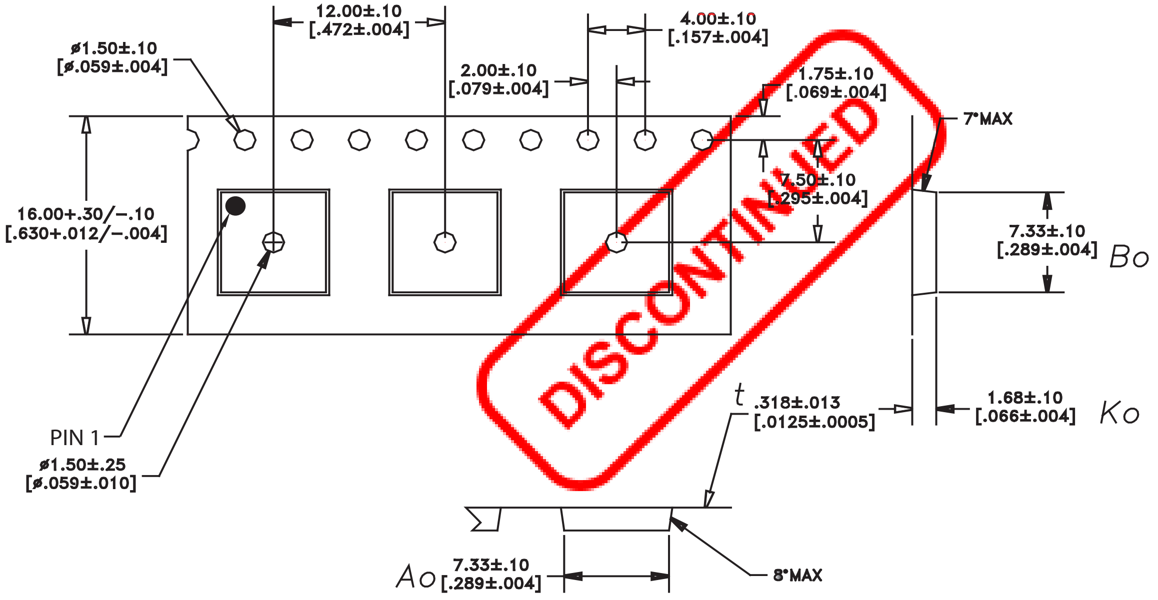


Figure 7: Tape & Reel Packaging

Table 5: Tape & Reel Dimensions

PACKAGE TYPE	TAPE WIDTH	POCKET PITCH	REEL CAPACITY	MAX REEL DIA
7 mm x 7 mm x 1.3 mm	16 mm	12 mm	2500	13"

ORDERING INFORMATION

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
AWB7232P7	-40 °C to +85 °C	RoHS-compliant 14 Pin 7 mm x 7 mm x 1.3 mm Surface Mount Module	Loose in Bag
AWB7232P8	-40 °C to +85 °C	RoHS-compliant 14 Pin 7 mm x 7 mm x 1.3 mm Surface Mount Module	Tape and Reel, 2500 pieces per Reel
AWB7232P9	-40 °C to +85 °C	RoHS-compliant 14 Pin 7 mm x 7 mm x 1.3 mm Surface Mount Module	Partial Reel

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