AWB7224

728 - 768 MHz
Small-Cell Power Amplifier Module

PRELIMINARY DATA SHEET - Rev 1.1

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
- Picocell, Femtocell, Home Nodes
- Customer Premises Equipment (CPE)

PRODUCT DESCRIPTION

The AWB7224 is a fully matched, Multi-Chip-Module (MCM) designed for picocell, femtocell, and customer premises equipment (CPE) applications. Consisting of two parallel path high linearity, high efficiency power amplifiers, the device meets the extremely demanding needs of small cell infrastructure architectures. Designed for LTE, WCDMA and HSDPA air interfaces operating in the 728 MHz to 768 MHz bands, the AWB7224 delivers up to +27 dBm of LTE (E-TM1.1) power through an external 90-degree hybrid coupler, with an ACPR of -47 dBc. The device operates from a convenient +4.5 V supply and provides 29 dB of RF gain. The AWB7224 is manufactured using an advanced InGaP HBT MMIC technology offering state-of-the-art reliability, temperature stability, and ruggedness. Its 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.

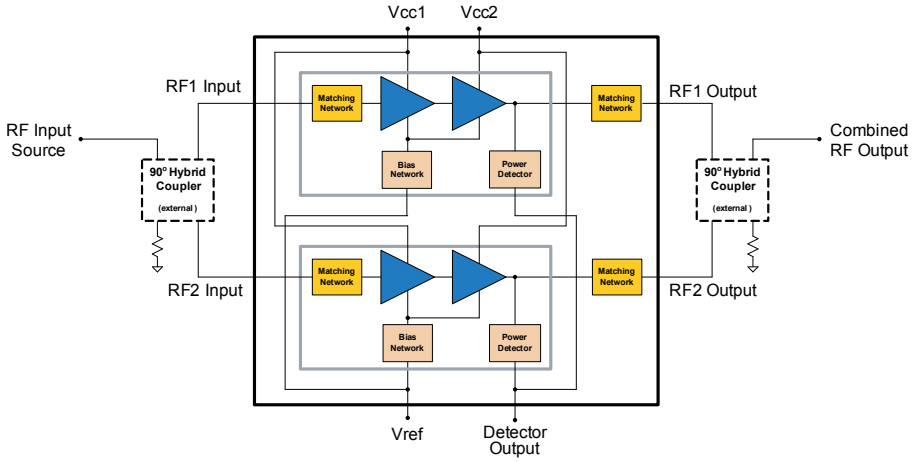


Figure 1: Block Diagram

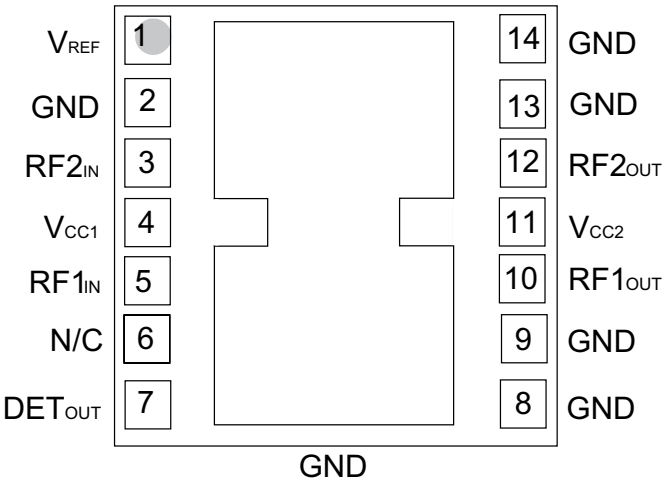


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

PIN	NAME	DESCRIPTION
1	V_{REF}	Reference Voltage
2	GND	Ground
3	$RF2_{IN}$	RF2 Input
4	V_{CC1}	Supply Voltage
5	$RF1_{IN}$	RF1 Input
6	N/C	No Connection
7	DET_{OUT}	Detector Output
8	GND	Ground
9	GND	Ground
10	$RF1_{OUT}$	RF1 Output
11	V_{CC2}	Supply Voltage
12	$RF2_{OUT}$	RF2 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}) (1)	-	+30	dBm
ESD Rating Human Body Model (2) Charged Device Model (3)	 Class 1C Class IV	 - -	
MSL Rating (4)	4	-	
Junction Temperature (T_j)	-	+150	°C
Storage Temperature (T_{STG})	-40	+150	°C

Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Notes:
(1) At output of external 90° hybrid coupler.
(2) JEDEC JS-001-2010.
(3) JEDEC JESD22-C101D.
(4) 260 °C peak reflow.

Table 3: Operating Ranges

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Operating Frequency (f)	728	-	768	MHz	
Supply Voltage (V_{CC})	+3.6	+4.5	+4.65	V	
Reference Voltage (V_{REF})	+2.75 0	+2.85 -	+2.95 +0.5	V	PA "on" PA "shut down"
RF Output Power (P_{OUT})	-	+27	-	dBm	Using external 90° hybrid couplers
Case Temperature (T_C)	-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.

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)	-	29	-	dB	728 - 768 MHz
ACPR (1), (2), (3) @ 10 MHz @ 20 MHz	 - -	 -47 -57	 - -	dBc	
Power-Added Efficiency (1), (2), (3)	-	13	-	%	
Thermal Resistance	-	17	-	°C/W	Junction to Case
Quiescent Current (Icq)	-	265	-	mA	
Reference Current	-	10	-	mA	through V_{REF} pin
Leakage Current	-	3	10	µA	V_{CC} = +5 V, V_{REF} = 0 V
Harmonics (2) 2fo 3fo, 4fo	 - -	 -50 -60	 - -	dBc	
Input Return Loss (2)	-	20	-	dB	
Output Return Loss (2)	-	20	-	dB	
P1dB	-	+35.5	-	dBm	CW tone
Spurious Output Level (2) (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 (2)	8:1	-	-	VSWR	V_{CC} = +4.5 V, P_{OUT} = + 27 dBm Applies over full operating temperature range

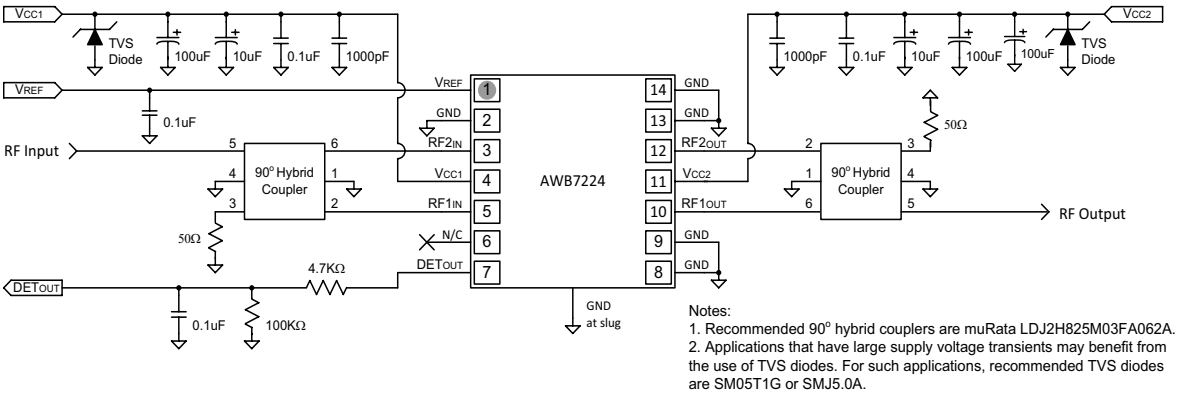
Notes:
(1) ACPR and Efficiency measured at 748 MHz.
(2) P_{OUT} = +27 dBm, using specified external 90° hybrid couplers.
(3) LTE E-TM1.1 (10 MHz).

APPLICATION INFORMATION

To ensure proper performance, refer to all related Application Notes on the ANADIGICS web site: http://www.anadigics.com

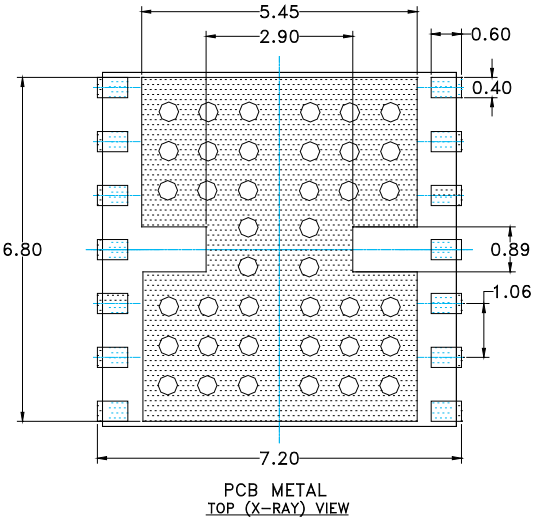
Shutdown Mode

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. Recommended 90° hybrid couplers are muRata LDJ2H825M03FA062A.
2. 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.

Figure 3: Application Circuit Schematic

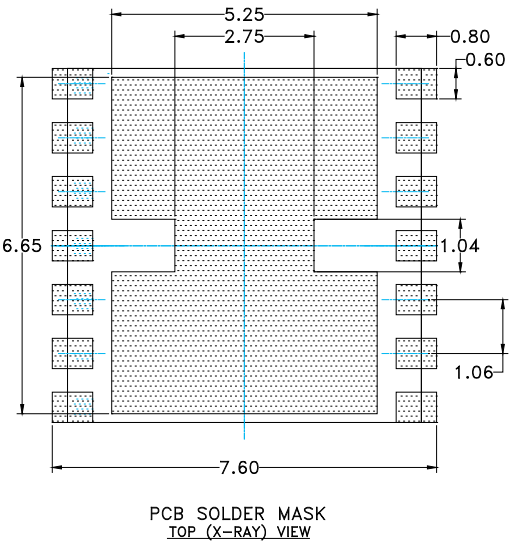


NOTES:

(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.



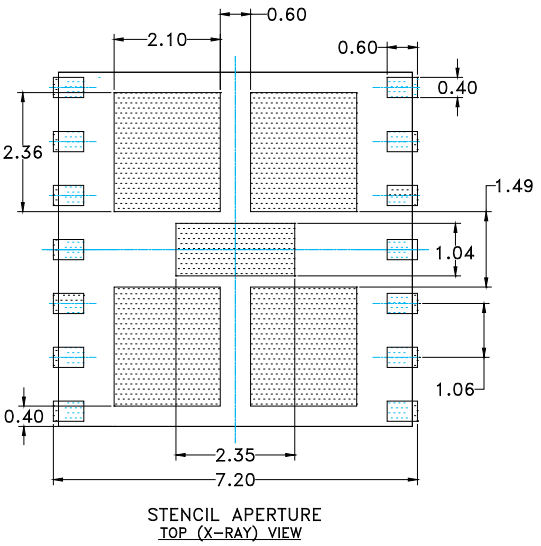
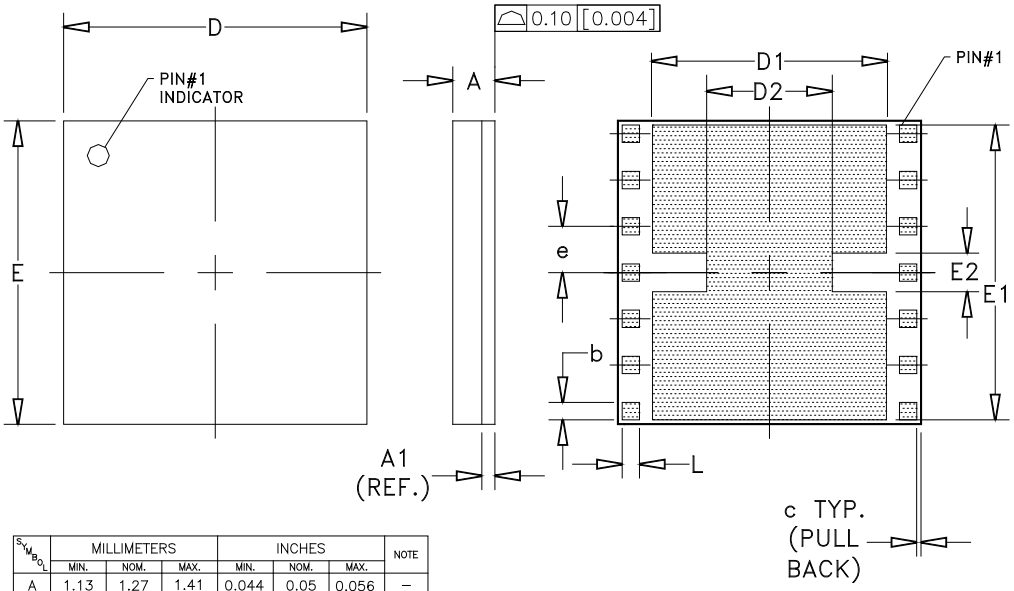


Figure 4: PCB Footprint

PACKAGE OUTLINE



SYMBOL	MILLIMETERS			INCHES			NOTE
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
A	1.13	1.27	1.41	0.044	0.05	0.056	–
A1	0.27 (REF)			0.011 (REF)			–
b	0.387	0.400	0.413	0.0152	0.0157	0.0162	14X
c	–	0.10	–	–	0.004	–	–
D	6.88	7.00	7.12	0.270	0.275	0.280	–
D1	5.30	5.45	5.60	0.208	0.214	0.220	–
D2	2.87	2.90	2.93	0.113	0.114	0.115	
E	6.88	7.00	7.12	0.270	0.275	0.280	–
E1	6.78	6.80	6.82	0.266	0.267	0.268	–
E2	0.86	0.89	0.92	0.034	0.035	0.036	
e	1.07			0.0421			6X
L	0.387	0.400	0.413	0.0152	0.0157	0.0162	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

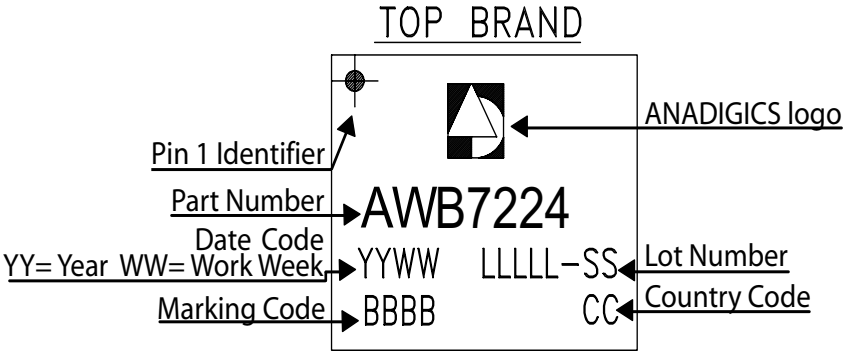


Figure 6: Branding Specification

COMPONENT PACKAGING

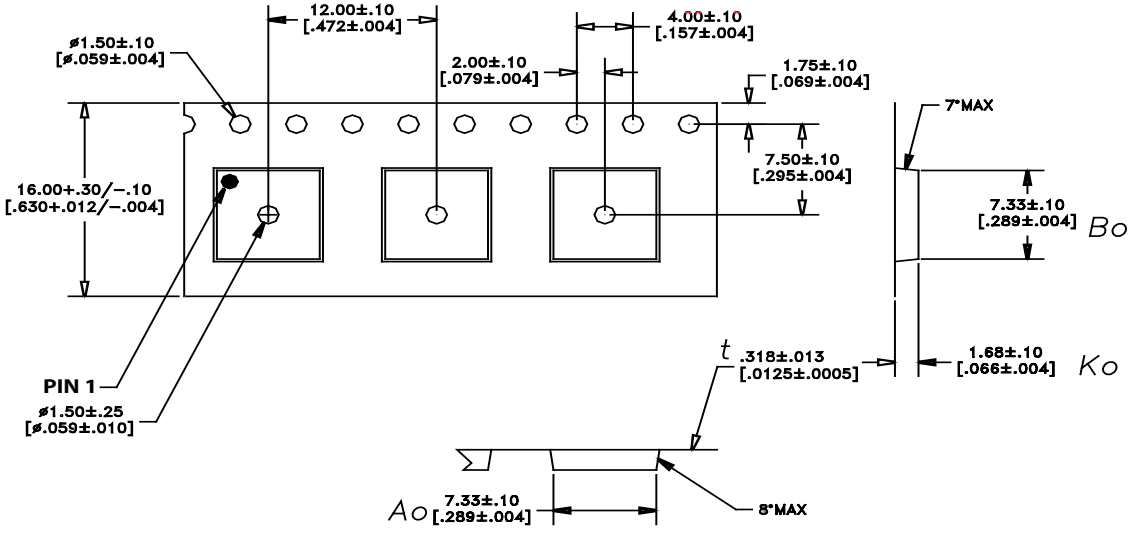


Figure 7: Tape & Reel Packaging

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
AWB7224P8	-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

ANADIGICS, Inc.
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