

FEATURES

- InGaP HBT Technology
- 2.5% EVM @ +28 dBm (OFDMA)
- 31 dB Gain
- Integrated Step Attenuator
- Integrated Output Power Detector
- High Efficiency
- Low Transistor Junction Temperature
- Matched for a 50 Ω System
- Low Profile Miniature Surface Mount Package; RoHS Compliant

APPLICATIONS

- WiMAX and LTE Air Interfaces
- Picocell, Femtocell, Home Nodes
- Customer Premises Equipment (CPE)
- Data Cards and Terminals



PRODUCT DESCRIPTION

The AWB7221 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 WiMAX and LTE air interfaces operating in the 2.30 GHz to 2.70 GHz band, the AWB7221 delivers up to +28 dBm of WiMAX power with exceptionally low EVM. It operates from a convenient

+4.2 V supply and provides more than 30 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.

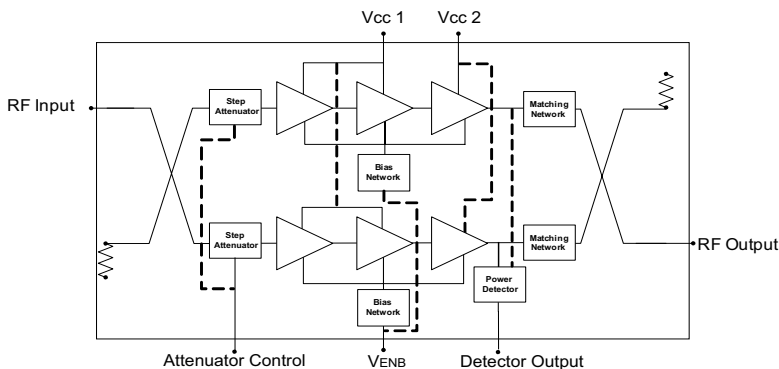


Figure 1: Block Diagram

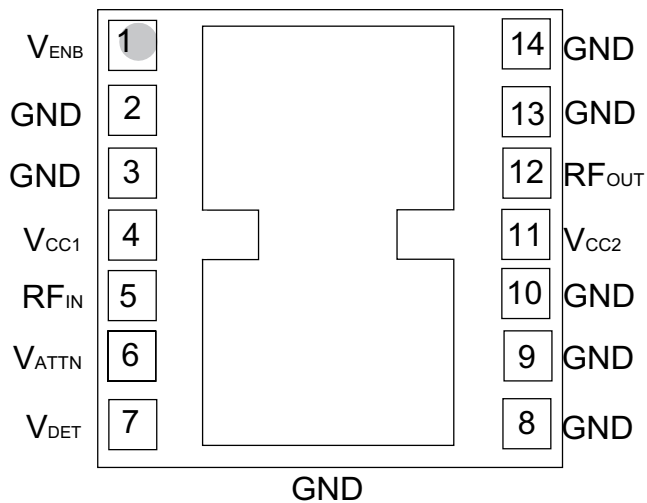


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

| PIN | NAME | DESCRIPTION |
|-----|------------|--------------------|
| 1 | V_{ENB} | Enable Voltage |
| 2 | GND | Ground |
| 3 | GND | Ground |
| 4 | V_{CC1} | Supply Voltage |
| 5 | RF_{IN} | RF Input |
| 6 | V_{ATTN} | Attenuator Control |
| 7 | V_{DET} | Detector Output |
| 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 |
| Enable Voltage (V_{ENB}) | 0 | +3.2 | V |
| Attenuator Control Voltage (V_{ATTN}) | - | +3.7 | V |
| RF Input Power (P_{IN}) | - | +3.0 | dBm |
| 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.

Table 3: Operating Ranges

| PARAMETER | MIN | TYP | MAX | UNIT | COMMENTS |
|--|------------|------------|--------------|--------|---|
| Operating Frequency (f) | 2300 | - | 2700 | MHz | |
| Supply Voltage (V_{CC}) | +3.3 | +4.2 | +4.5 | V | |
| Enable Voltage (V_{ENB}) | +2.80 0 | +2.85 - | +3.1 +0.5 | V | PA "on" PA "shut down" |
| Attenuator Control Voltage (V_{ATTN}) Logic High Logic Low | +2.3 0 | - - | +3.7 +0.7 | V V | Attenuator Enabled Attenuator Disabled |
| RF Output Power (P_{OUT}) | - | +28 | - | dBm | |
| 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 - 16 QAM P_{USC} Zone
(T_C = +25 °C, V_{CC} = +4.2 V, V_{ENB} = +2.85 V, 50 Ω system)

| PARAMETER | MIN | TYP | MAX | UNIT | COMMENTS |
|--|----------------------------|----------------------------|--|------|---|
| Gain ⁽²⁾ | - | 31 | - | dB | |
| Attenuation | - | 23 | - | dB | V _{ATTN} = 2.5 V |
| Spectrum Mask ^{(1) (2)} @ offset A @ offset B @ offset C @ offset D @ offset E @ offset F | - - - - - - | - - - - - - | -13 -13 -19 -25 -25 -25 | dBm | 10 MHz Channel Bandwidth WiMAX Forum Band Class 3A MMRT |
| Power-Added Efficiency ^{(1) (2)} | - | 17.5 | - | % | |
| Collector Current (I _{CC}) ^{(1) (2)} | - | 850 | - | mA | |
| EVM ⁽²⁾ | - | 2.5 | 3.5 | % | |
| Thermal Resistance (R _{JC}) ⁽³⁾ | - | 13 | - | °C/W | Junction to Case |
| Power Detector Output @ 28 dBm @ 18 dBm | - - | 1.30 1.0 | - - | V | RL (Load Resistor) = 100 kΩ |
| Quiescent Current (I _{cq}) | - | 200 | - | mA | |
| V _{ENB} Current | - | 7 | 10 | mA | pin 1; V _{ENB} = +2.85 V |
| V _{ATTN} Current | - | 160 | - | μA | pin 6; V _{ATTN} = +2.5 V |
| Leakage Current | - | 50 | - | μA | V _{CC} = +4.5 V, V _{ENB} = 0 V |
| Harmonics ⁽²⁾ 2fo, 4fo 3fo | - - - | -60 -55 | -45 -45 | dBc | |
| Input Return Loss | - | -15 | - | dB | |
| Spurious Output Level ⁽²⁾ (all spurious outputs) | - | - | -60 | dBc | 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 _{IN} = 0 dBm Applies over full operating temperature range |

Notes:

(1) Spectrum Mask and Efficiency measured at 2500 MHz.

(2) P_{OUT} = +28 dBm.(3) Use only V_{CC2} (pin 11) current when calculating device junction temperature.

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_{ENB} voltage.

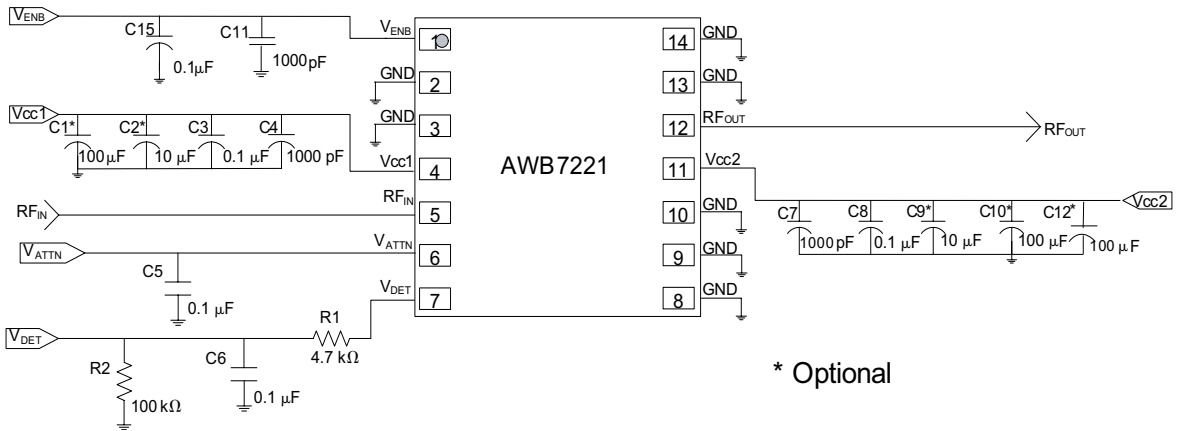
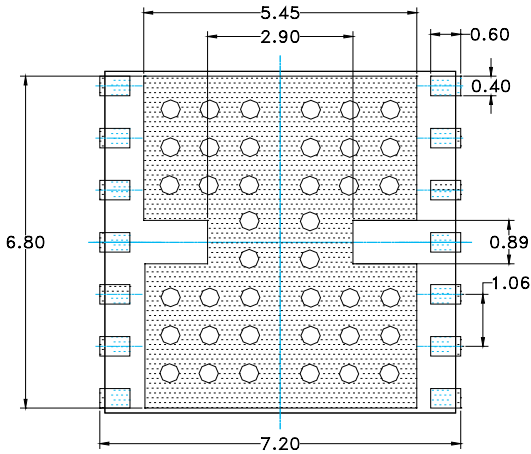


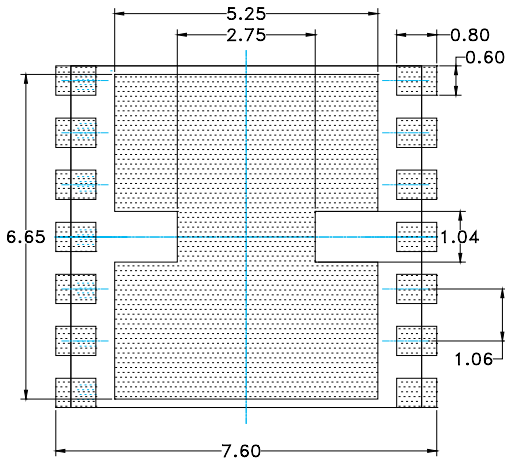
Figure 3: Application Circuit Schematic



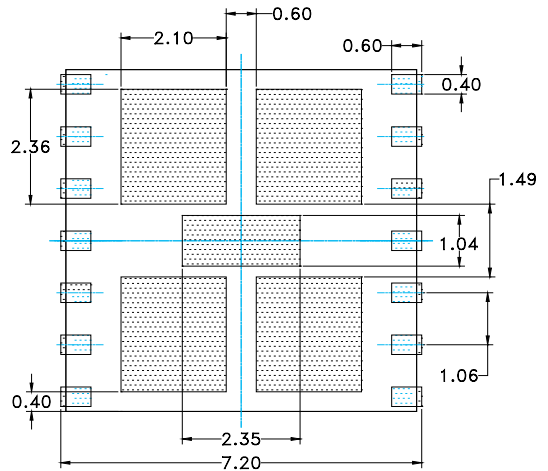
PCB METAL
TOP (X-RAY) VIEW
ONLY PACKAGE I/O's AND
GROUND REQUIREMENTS
SHOWN.

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.



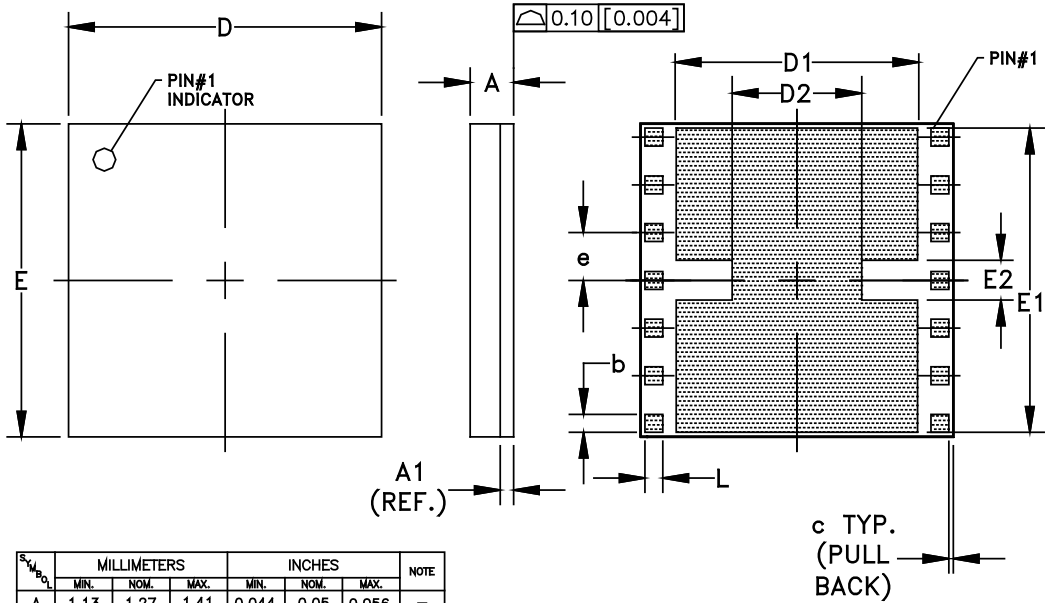
PCB SOLDER MASK
TOP (X-RAY) VIEW



STENCIL APERTURE
TOP (X-RAY) VIEW

Figure 4: PCB Footprint

PACKAGE OUTLINE



| DIM. | 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: M52 Package Outline - 14 Pin 7 mm x 7 mm x 1.3 mm Surface Mount Module

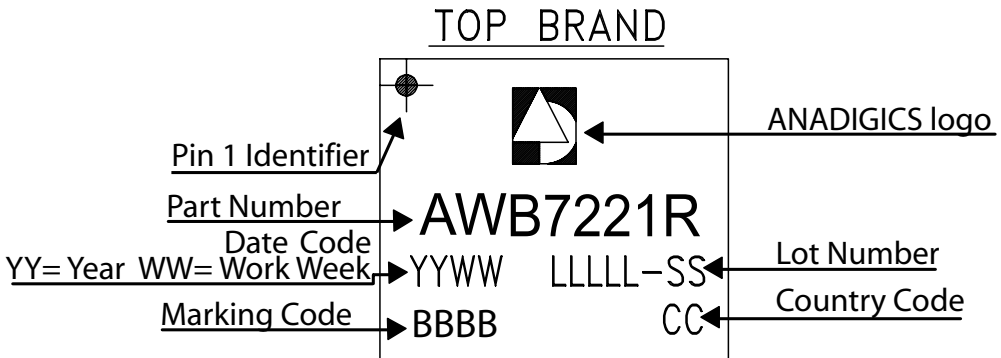


Figure 6: Branding Specification

COMPONENT PACKAGING

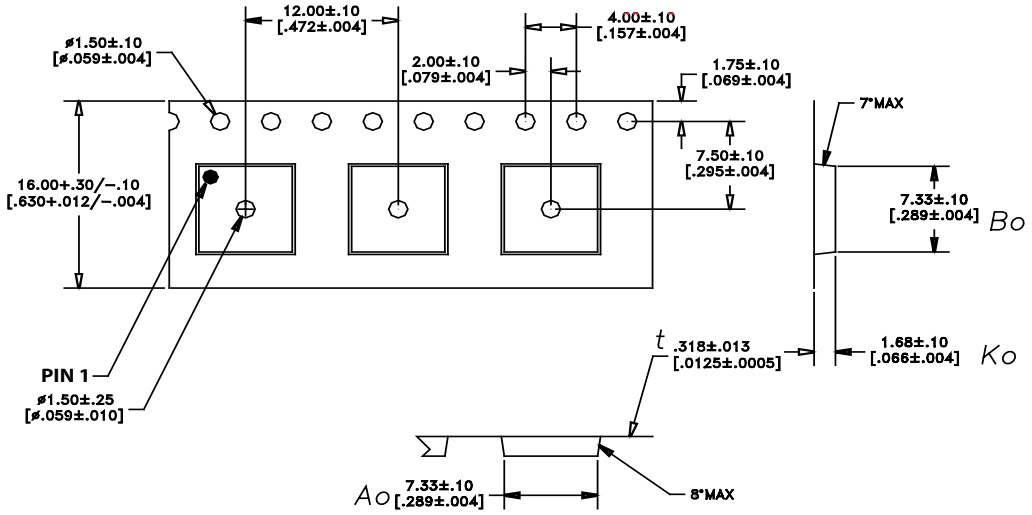


Figure 7: Tape & Reel Packaging

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 |
|---------------|-------------------|---|-------------------------------------|
| AWB7221RM52P8 | -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 |

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