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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



DATA SHEET

AWB7129: 925 to 960 MHz Small-Cell Power Amplifier Module

Applications

- LTE, WCDMA and HSDPA air interfaces
- Picocell, femtocell, home nodes
- Customer premises equipment
- Data cards and terminals

Features

- InGaP HBT technology
- -47 dBc ACPR @ ± 10 MHz, +24.5 dBm
- 30 dB gain
- High efficiency
- Low transistor junction temperature
- Internally matched for a 50 Ω system
- Low-profile miniature surface-mount package; halogen free and RoHS compliant
- Multi-carrier capability
- Surface-mount package (14-pin, 7 x 7 x 1.3 mm) (MSL3, 260 °C per JEDEC J-STD-020)



Description

The AWB7129 is a highly linear, fully matched, power amplifier module designed for picocell, femtocell, and customer premises equipment (CPE) applications. Its high-power efficiency and low adjacent channel power levels meet the extremely demanding needs of small cell infrastructure architectures. Designed for LTE, WCDMA and HSDPA air interfaces operating in the 925 to 960 MHz band, the AWB7129 delivers up to +24.5 dBm of LTE (E-TM1.1) power with an ACPR of -47 dBc. It operates from a convenient +4.2 V supply and provides 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.

A functional block diagram is shown in Figure 1. The pin configuration and package are shown in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.



Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.

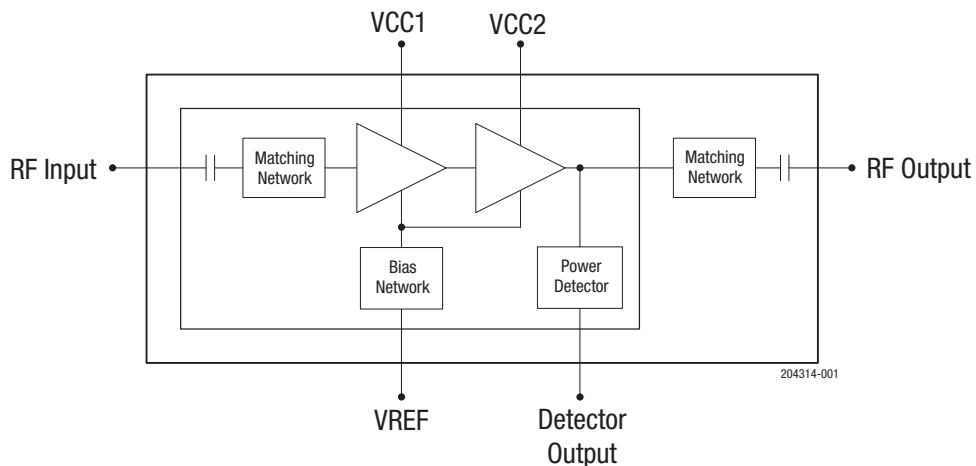


Figure 1. AWB7129 Block Diagram

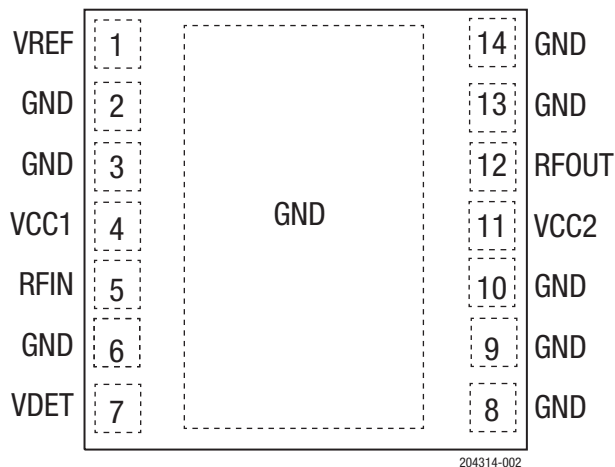


Figure 2. AWB7129 Pinout (Top View)

Table 1. AWB7129 Signal Pin Descriptions

| Pin | Name | Description | Pin | Name | Description |
|-----|------|-------------------|-----|-------|----------------|
| 1 | VREF | Reference voltage | 8 | GND | Ground |
| 2 | GND | Ground | 9 | GND | Ground |
| 3 | GND | Ground | 10 | GND | Ground |
| 4 | VCC1 | Supply voltage | 11 | VCC2 | Supply voltage |
| 5 | RFIN | RF input | 12 | RFOUT | RF output |
| 6 | GND | Ground | 13 | GND | Ground |
| 7 | VDET | Detector voltage | 14 | GND | Ground |

Electrical and Mechanical Specifications

The absolute maximum ratings of the AWB7129 are provided in Table 2. Recommended operating conditions are specified in Table 3, and DC characteristics are shown in Table 4. Electrical specifications are provided in Table 5.

The state of the AWB7129 is determined by the logic provided in Table 6.

Table 2. AWB7129 Absolute Maximum Ratings¹

| Parameter | Symbol | Minimum | Maximum | Units |
|-------------------------------|------------------|---------|---------|-----------------|
| Supply voltage | V _{CC} | 0 | +5 | V |
| Logic control voltage | V _{CTL} | 0 | +3.5 | V |
| RF output power | P _{OUT} | | +28 | dBm (modulated) |
| RF input power | P _{IN} | | +10 | dBm, CW |
| Juncture temperature | T _J | | +150 | °C |
| Storage temperature | T _{STG} | -40 | +150 | °C |
| Electrostatic discharge: | ESD | | | |
| Human Body Model, Class 1C | | | 2000 | V |
| Charged Device Model, Class 4 | | | 1000 | V |

¹ Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

ESD HANDLING: *Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.*

Table 3. AWB7129 Recommended Operating Conditions

| Parameter | Symbol | Min | Typ | Max | Units |
|-------------------------------|------------------|-------|-------|-------|-------|
| Operating frequency | f | 925 | | 960 | MHz |
| Supply voltage | V _{CC} | +3.2 | +4.2 | +4.5 | V |
| Reference voltage: | | | | | |
| PA on | V _{REF} | +2.80 | +2.85 | +2.90 | V |
| PA off | | 0 | | +0.5 | V |
| RF output power ¹ | P _{OUT} | | +24.5 | | dBm |
| Case temperature ² | T _c | -40 | | +85 | °C |

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. AWB7129 Electrical Specifications¹
(T_C = +25 °C, V_{CC} = +4.2 V, V_{REF} = +2.85 V, 50 Ω system)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|---|-----------------|--|-----|------------|------------|------------|
| Gain ² | G | | 28 | 30 | 35 | dB |
| ACPR: ^{1,2,3} @ 10 MHz @ 20 MHz | | | | -47 -57 | -45 | dBc dBc |
| Power-added efficiency ^{1,2,3} | | | 14 | 16.4 | | % |
| Thermal resistance | R _{JC} | Junction to case | | 23 | | °C/W |
| Supply current ^{1,2,3} | | Total through VCC pins | | 410 | 480 | mA |
| Quiescent current | I _{cq} | | 100 | 140 | 180 | mA |
| Reference current | | Through VREF pin | 3.0 | 5.0 | 8.0 | mA |
| Leakage current | | V _{CC} = +4.5 V, V _{REF} = 0 V | | 1.8 | 5 | μA |
| Harmonics: ^{1,2} 2fo 3fo, 4fo | | | | -55 -60 | -40 -55 | dBc dBc |
| Input return loss | | | | 12 | 10 | dB |
| Spurious output level (all spurious outputs) | | P _{OUT} ≤ +24.5 dBm, in-band load VSWR < 5:1, Out-of-band load VSWR < 10:1, applies over all voltage and temperature operating ranges | | | -60 | dBc |
| Load mismatch stress with no permanent degradation or failure | | V _{CC} = +4.2 V, P _{IN} = 0 dBm Applies over full operating temperature range | 8:1 | | | VSWR |

¹ ACPR and efficiency measured at 942.5 MHz.

² P_{OUT} = +24.5 dBm.

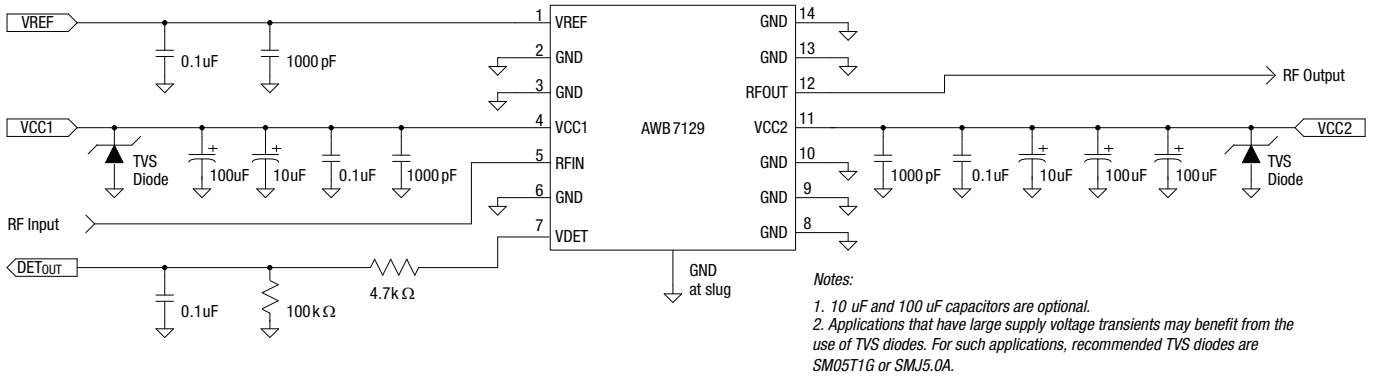
³ LTE E-TM1.1 (10 MHz)

Evaluation Board Description

The AWB7129 Evaluation Board is used to test the performance of the AWB7129 linear power amplifier. A schematic of a typical application circuit is shown in Figure 3.

Shutdown Mode

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



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Figure 3. AWB7129 Application Circuit Schematic

Package Dimensions

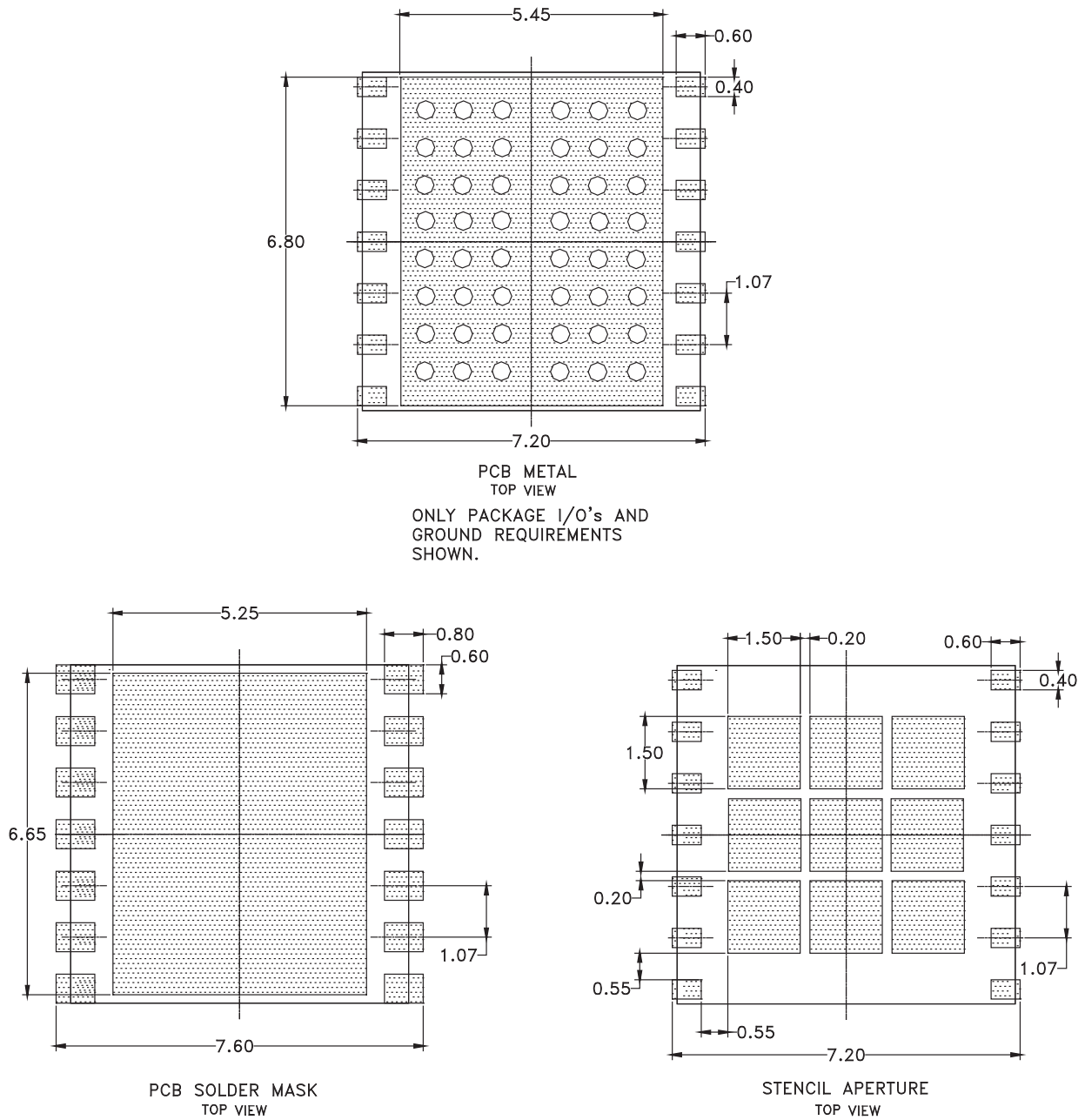
The PCB layout footprint for the AWB7129 is shown in Figure 4. Typical part markings are noted in Figure 5. Package dimensions are shown in Figure 6, and tape and reel dimensions are provided in Figure 7.

Package and Handling Information

Since the device package is sensitive to moisture absorption, it is baked and vacuum packed before shipping. Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The AWB7129 is rated to Moisture Sensitivity Level 3 (MSL3) at 260 °C. It can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information*, document number 200164.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.



Notes:

1. Unless specified, dimensions are symmetrical about center lines shown.
2. Dimensions are in millimeters.
3. Vias shown in PCB Metal View are for reference only. Number and size of thermal vias required are dependent on heat dissipation requirements and the PCB process capability.

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Figure 4. PCB Layout Footprint

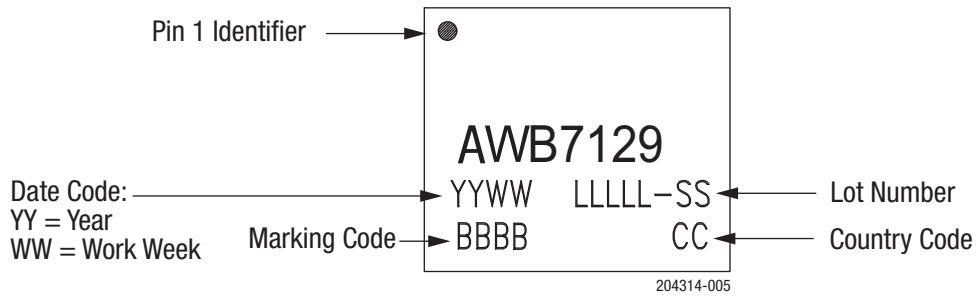
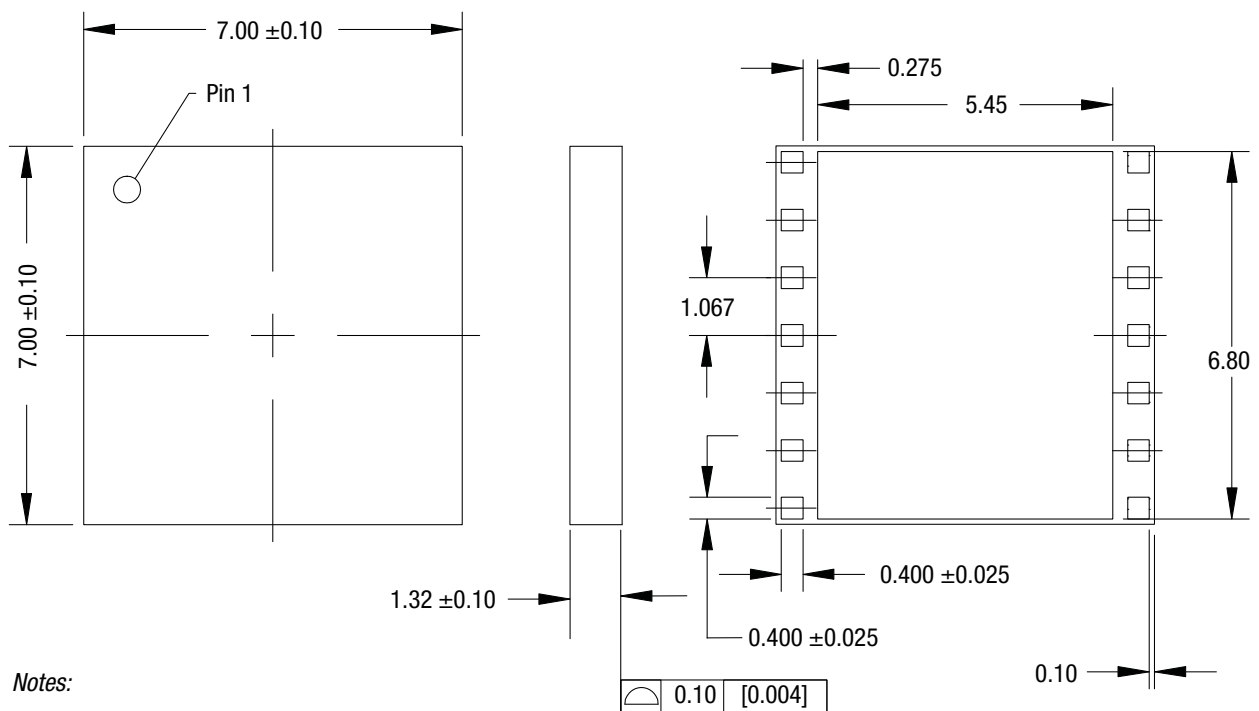


Figure 5. Typical Part Markings (Top View)



Notes:

1. All dimensions are in millimeters.
2. Unless specified otherwise, tolerance = ± 0.076 [0.003].
3. Pads (including center) are shown as uniform size for reference only.
Actual pad size and location will vary within the minimum and maximum dimensions according to the specific laminate design.

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Figure 6. AWB7129 Package Dimensions

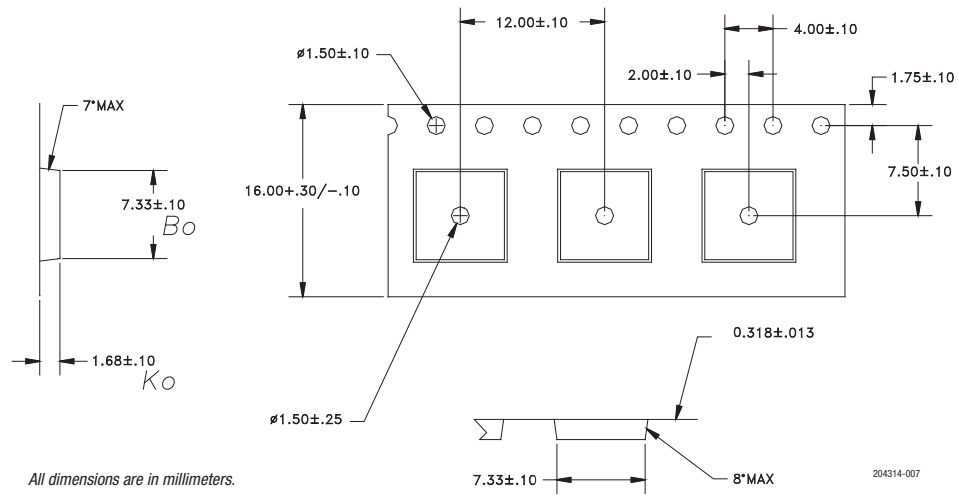


Figure 7. AWB7129 Tape and Reel Dimensions

Ordering Information

| Product Description | Product Part Number | Packaging |
|--|---------------------|-------------------------------------|
| AWB7129P8: 925 to 960 MHz Small-Cell PA Module | AWB7129P8 | Tape and reel, 2500 pieces per reel |

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