

FEATURES

- InGaP HBT Technology
- High Efficiency:
 39 % @ +28 dBm output
- Zero Quiescent Current in Switch Mode
- Internal Voltage Regulation
- Optimized for a 50 Ω System
- Low Profile Surface Mount Package: 1 mm
- CDMA 1XRTT, 1xEV-DO Compliant
- RoHS Compliant Package, 250 °C MSL-3
- Suitable for BC10 (806-824 MHz) Applications band

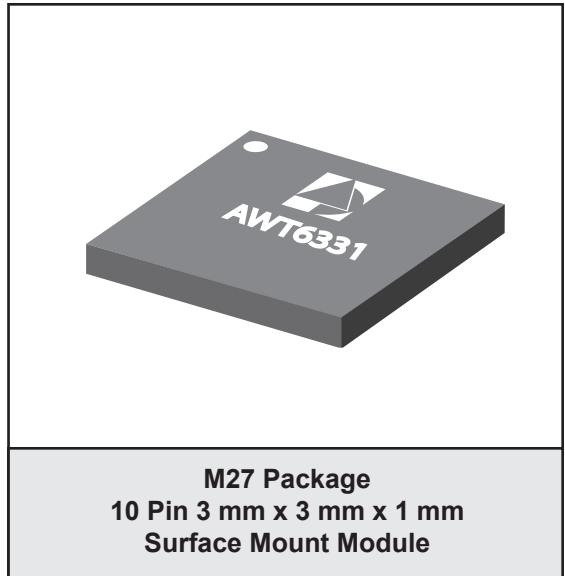
APPLICATIONS

- CDMA/EVDO Cell-band Wireless Handsets and Data Devices

PRODUCT DESCRIPTION

The AWT6331 is a new product in the revolutionary ZeroIC™ PA family. The AWT6331 uses ANADIGICS' exclusive InGaP-Plus™ technology, which combines HBT and pHEMT devices on the same die, to enable state-of-the-art reliability, temperature stability, and ruggedness.

The AWT6331 has a unique architecture with two RF inputs. One input drives the power amplifier while the other input drives an RF switch that bypasses the power amplifier, going directly to the RF output. The mode control logic selects the PA or the RF switch. In



RF switch mode, current consumption is less than 10 μA, reducing the average current consumption 70% more than a HELP2™ PA over the CDG profile. Its integrated voltage regulator eliminates the need for external components further reducing size and BOM cost. The 3 mm x 3 mm x 1 mm surface mount package incorporates matching networks optimized for output power, efficiency, and linearity in a 50 Ω system.

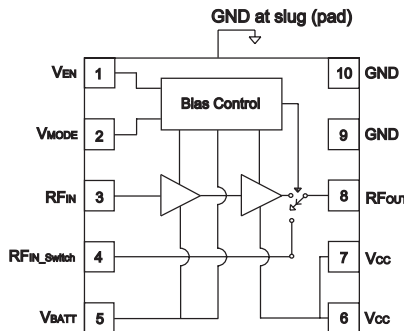


Figure 1: Block Diagram

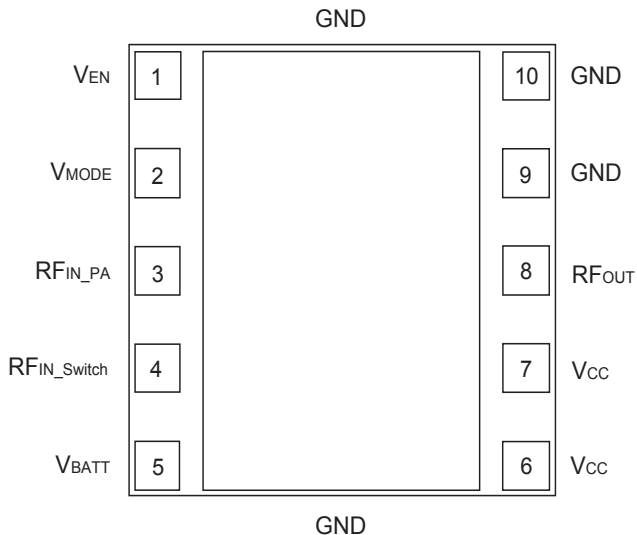


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

| PIN | NAME | DESCRIPTION |
|-----|-------------------------|--------------------|
| 1 | V _{EN} | PA Enable Voltage |
| 2 | V _{MODE} | Mode Control |
| 3 | RF _{IN_PA} | RF Input to PA |
| 4 | RF _{IN_SWITCH} | RF Input to Switch |
| 5 | V _{BATT} | Battery Voltage |
| 6 | V _{CC} | Supply Voltage |
| 7 | V _{CC} | Supply Voltage |
| 8 | RF _{OUT} | RF Output |
| 9 | GND | Ground |
| 10 | GND | Ground |

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

| PARAMETER | MIN | MAX | UNIT |
|--|-----|------|------|
| Supply Voltage (V_{CC} and V_{BATT}) | 0 | +5 | V |
| Mode Control Voltage (V_{MODE}) | 0 | +3.5 | V |
| Enable Voltage (V_{EN}) | 0 | +3.5 | V |
| RF Input Power (P_{IN}) to PA | - | +10 | dBm |
| RF Input Power (P_{IN}) to Switch | - | +20 | dBm |
| 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) | 824 | - | 849 | MHz | |
| Supply Voltage (V_{CC} and V_{BATT}) | +3.2 | +3.4 | +4.2 | V | |
| Enable Voltage (V_{EN}) | +2.2 0 | +2.4 - | +3.1 +0.5 | V | PA "on", Switch "on" PA "shut down" |
| Mode Control Voltage (V_{MODE}) | +2.2 0 | +2.4 - | +3.1 +0.5 | V | PA Mode Switch Mode |
| RF Output Power (P_{OUT}) | 27.5 ⁽¹⁾ | 28.0 | - | dBm | CDMA |
| Case Temperature (T_C) | -30 | - | +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) For operation at $V_{CC} = +3.2$ V, P_{OUT} is derated by 0.5 dB.

Table 4: Electrical Specifications - CDMA Operation (IS-95 Modulation)
(T_C = +25 °C, V_{BATT} = V_{CC} = +3.4 V, V_{EN} = +2.4 V, 50 Ω system)

| PARAMETER | MIN | TYP | MAX | UNIT | COMMENTS |
|---|---------|--------------|-------------|--------|--|
| Gain Insertion Loss | 25 - | 28 0.7 | 30.5 1.5 | dB | P _{OUT} = +28 dBm, V _{MODE} = +2.4 V V _{MODE} = 0 V |
| Adjacent Channel Power at ±885 kHz offset ⁽¹⁾ Primary Channel BW = 1.23 MHz Adjacent Channel BW = 30 kHz | - - | -50 -70 | -46.5 - | dBc | P _{OUT} = +28 dBm, V _{MODE} = +2.4 V V _{MODE} = 0 V |
| Adjacent Channel Power at ±1.98 MHz offset ⁽¹⁾ Primary Channel BW = 1.23 MHz Adjacent Channel BW = 30 kHz | - - | -58.5 -70 | -56 - | dBc | P _{OUT} = +28 dBm, V _{MODE} = +2.4 V V _{MODE} = 0 V |
| Isolation | 32 | 40 | - | dB | RF _{OUT} to RF _{IN_SWITCH} , V _{MODE} = +2.4 V, PA "on" |
| Power-Added Efficiency ⁽¹⁾ | 36 | 39 | - | % | P _{OUT} = +28 dBm, V _{MODE} = +2.4 V |
| Enable Current | - | <0.1 | 0.25 | mA | through V _{EN} pin, V _{EN} = +2.4 V |
| Mode Control Current | - | <0.01 | 0.1 | mA | through V _{MODE} pin, V _{MODE} = +2.4 V |
| Leakage Current | - | <10 | 15 | μA | V _{CC} = +4.2 V, V _{EN} = 0 V, V _{MODE} = 0 V or +2.4 V |
| | - | <10 | 18 | | V _{CC} = +4.2 V, V _{EN} = +2.4 V, V _{MODE} = 0 V, Switch Mode |
| Noise in Receive Band | - | -135 | -133 | dBm/Hz | 869 MHz to 894 MHz |
| Harmonics 2fo 3fo, 4fo | - - | -40 -45 | -30 -30 | dBc | CW Measurement |
| Input Impedance | - | - | 2:1 | VSWR | |
| Spurious Output Level (all spurious outputs) | - | - | -65 | dBc | P _{OUT} ≤ +28 dBm In-band Load VSWR < 5:1 Out-of-band Load VSWR < 10:1 Applies over all operating conditions |
| Load mismatch stress with no permanent degradation or failure | 8:1 | - | - | VSWR | Applies over all operating conditions |

Notes:

(1) PAE and ACP limit applies at 836.5 MHz (IS-95 modulation).

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 a logic low levels (see Operating Ranges table) to both the V_{EN} and V_{MODE} voltages.

Power Modes

The power amplifier may be placed in either a Low Power mode or a High Power mode by applying the appropriate logic level (see Operating Ranges table) to the V_{MODE} voltage. The Power Control table lists the recommended modes of operation for various applications.

Table 5: Power Control

| APPLICATION | P_{OUT} LEVELS | POWER MODE | V_{EN} | V_{MODE} |
|----------------------|------------------|------------|----------|------------|
| CDMA - Switch Bypass | -* | Low | +2.4 V | 0 V |
| Shutdown | -* | Low | 0 V | +2.4 V |
| CDMA - PA | All | High | +2.4 V | +2.4 V |
| Shutdown | - | Shutdown | 0 V | 0 V |

*Dependent upon typical output power from Transceiver and phone design.

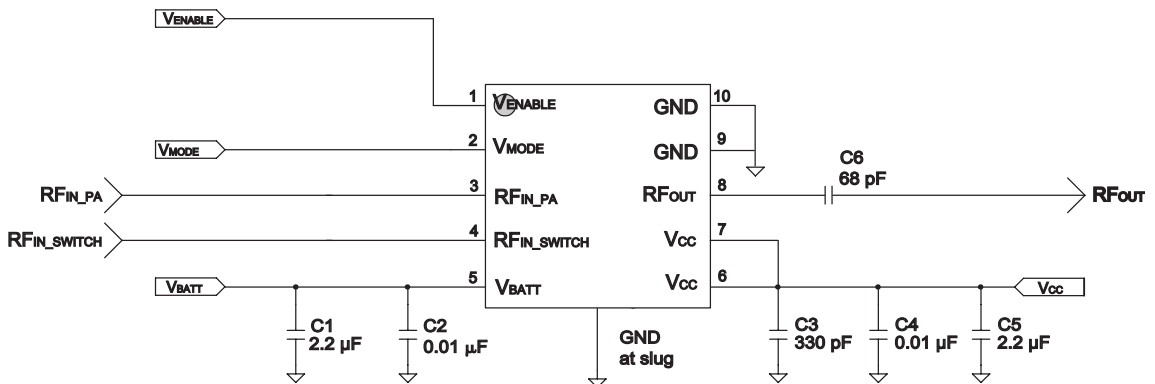
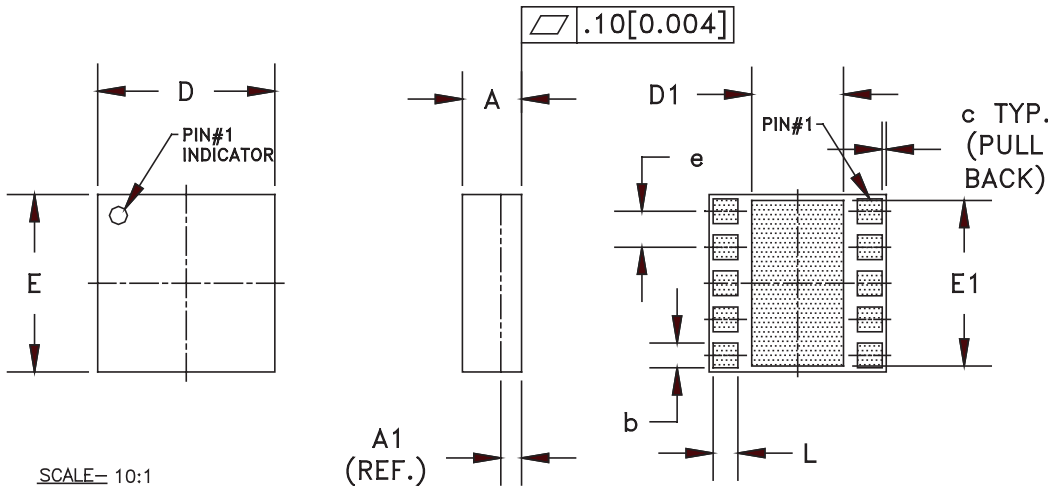


Figure 3: Application Circuit

PACKAGE OUTLINE



SCALE= 10:1

| S _W B _{OL} | MILLIMETERS | | | INCHES | | | NOTE |
|--------------------------------|-------------|------|------|--------------|-------|-------|------|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. | |
| A | 0.91 | 1.01 | 1.11 | 0.035 | 0.039 | 0.043 | — |
| A1 | 0.35 (REF.) | | | 0.014 (REF.) | | | — |
| b | 0.33 | — | 0.52 | 0.013 | — | 0.020 | 3 |
| c | — | 0.10 | — | — | 0.004 | — | — |
| D | 2.88 | 3.00 | 3.12 | 0.113 | 0.118 | 0.123 | — |
| D1 | 1.57 | — | 1.82 | 0.062 | — | 0.072 | 3 |
| E | 2.88 | 3.00 | 3.12 | 0.113 | 0.118 | 0.123 | — |
| E1 | 2.75 | — | 2.85 | 0.108 | — | 0.112 | 3 |
| e | 0.61 | | | 0.024 | | | 3 |
| L | 0.33 | — | 0.52 | 0.013 | — | 0.020 | 3 |

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.
4. UNLESS SPECIFIED DIMENSIONS ARE SYMMETRICAL ABOUT CENTER LINES SHOWN.

Figure 4: M27 Package Outline - 10 Pin 3 mm x 3 mm x 1 mm Surface Mount Module

TOP BRAND

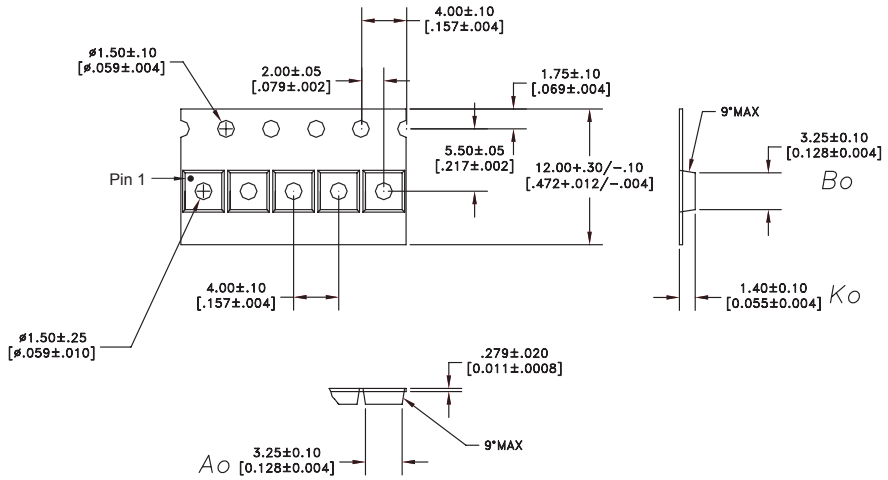


NOTES:

1. ANADIGICS LOGO SIZE: NONE
2. PART NUMBER: FOUR DIGIT NUMERICAL
3. WAFER LOT NUMBER: LLLL = LOT NUMBER
NN = WAFER I.D.
4. PIN 1 INDICATOR: LASER DOT
5. B.O.M. #: BBBB
6. COUNTRY CODE: CC = TH-for-THAILAND, TW-for-TAIWAN
CC = PH-for-PHILIPPINES, CH-for-CHINA
7. TYPE : ARIAL
SIZE : 1,5-POINT
COLOR : LASER

Figure 5: Branding Specification

COMPONENT PACKAGING



NOTES:

- 1. MATERIAL: 3000 (CARBON FILLED POLYCARBONATE)
100% RECYCLABLE.

DIMENSIONS ARE IN MILLIMETERS [INCHES]

DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994

Figure 6: Tape & Reel Packaging

Table 6: Tape & Reel Dimensions

| PACKAGE TYPE | TAPE WIDTH | POCKET PITCH | REEL CAPACITY | MAX REEL DIA |
|--------------------|------------|--------------|---------------|--------------|
| 3 mm x 3 mm x 1 mm | 12 mm | 4 mm | 2500 | 7" |

ORDERING INFORMATION

| ORDER NUMBER | TEMPERATURE RANGE | PACKAGE DESCRIPTION | COMPONENT PACKAGING |
|---------------|-------------------|---|-------------------------------------|
| AWT6331RM27Q7 | -30 °C to +85 °C | RoHS Compliant 10 Pin 3 mm x 3 mm x 1 mm Surface Mount Module | Tape and Reel, 2500 pieces per Reel |
| AWT6331RM27P9 | -30 °C to +85 °C | RoHS Compliant 10 Pin 3 mm x 3 mm x 1 mm Surface Mount Module | Partial Tape and Reel |

**ANADIGICS, Inc.**

141 Mount Bethel Road
Warren, New Jersey 07059, U.S.A.

Tel: +1 (908) 668-5000

Fax: +1 (908) 668-5132

URL: <http://www.anadigics.com>

E-mail: Mktg@anadigics.com

IMPORTANT NOTICE

ANADIGICS, Inc. reserves the right to make changes to its products or to discontinue any product at any time without notice. The product specifications contained in Advanced Product Information sheets and Preliminary Data Sheets are subject to change prior to a product's formal introduction. Information in Data Sheets have been carefully checked and are assumed to be reliable; however, ANADIGICS assumes no responsibilities for inaccuracies. ANADIGICS strongly urges customers to verify that the information they are using is current before placing orders.

WARNING

ANADIGICS products are not intended for use in life support appliances, devices or systems. Use of an ANADIGICS product in any such application without written consent is prohibited.