



## AWT6307R

HELP2™ Cellular CDMA 3.4 V/28 dBm  
Linear Power Amplifier Module  
Data Sheet - Rev 2.1

### FEATURES

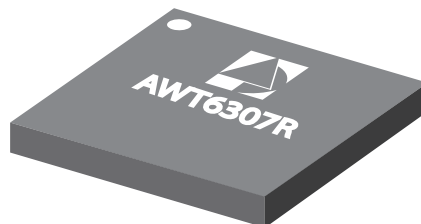
- InGaP HBT Technology
- High Efficiency:  
40 % @ +28 dBm output  
21 % @ +16 dBm output
- Low Quiescent Current: 15 mA
- Low Leakage Current in Shutdown Mode: <1  $\mu$ A
- Internal Voltage Regulation
- Optimized for a 50  $\Omega$  System
- Low Profile Surface Mount Package: 1 mm
- CDMA 1XRTT, 1xEV-DO Compliant
- Pinout Enables Easy Phone Board Migration From 4 mm x 4 mm Package
- RoHS Compliant Package, 250 °C MSL-3
- Suitable for BC10 (806-824 MHz) applications

### APPLICATIONS

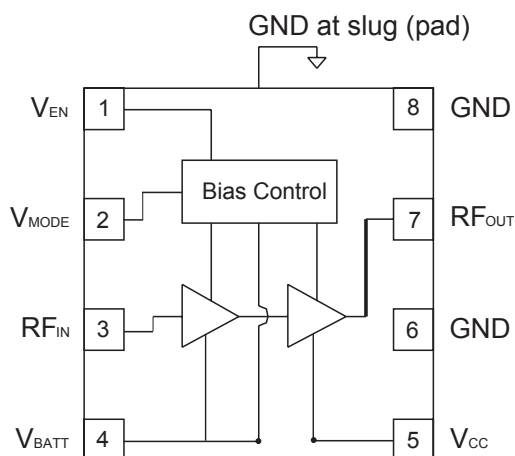
- CDMA/EVDO Cell-band Wireless Handsets and Data Devices

### PRODUCT DESCRIPTION

The AWT6307R meets the increasing demands for higher efficiency and smaller footprint in CDMA 1X handsets. The package pinout was chosen to enable handset manufacturers to switch from a 4 mm x 4 mm PA module with few layout changes while reducing board area requirements by 44 %. The AWT6307R 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 AWT6307R is part of ANADIGICS' High-Efficiency-at-Low-Power (HELP™) family of CDMA power amplifiers, which deliver low quiescent currents and significantly greater efficiency without a costly external DAC or DC-DC converter. Through selectable bias modes, the AWT6307 achieves optimal efficiency across different output power levels, specifically at low- and mid-range power levels where the PA typically operates, thereby dramatically increasing handset talk-time and standby-time. Its built-in voltage regulator eliminates the need for external voltage regulation components. 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  $\Omega$  system.



**M9 Package**  
**8 Pin 3 mm x 3 mm x 1 mm**  
**Surface Mount Module**



**Figure 1: Block Diagram**

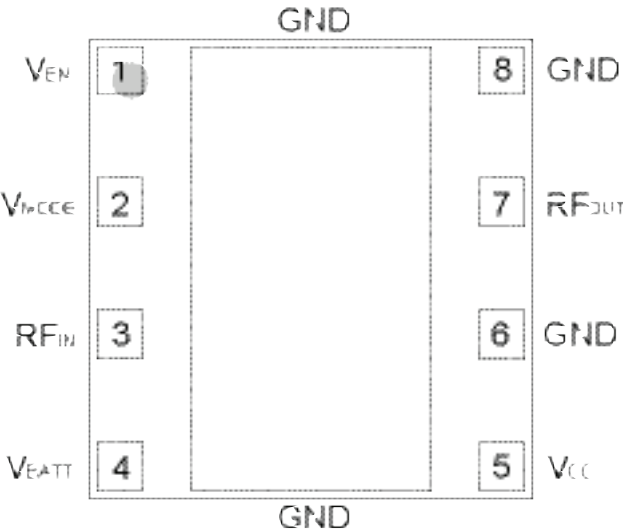


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

| PIN | NAME       | DESCRIPTION       |
|-----|------------|-------------------|
| 1   | $V_{EN}$   | PA Enable Voltage |
| 2   | $V_{MODE}$ | Mode Control      |
| 3   | $RF_{IN}$  | RF Input          |
| 4   | $V_{BATT}$ | Battery Voltage   |
| 5   | $V_{CC}$   | Supply Voltage    |
| 6   | GND        | Ground            |
| 7   | $RF_{OUT}$ | RF Output         |
| 8   | 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 ( $P_{IN}$ )                | -   | +10  | 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<br>0           | +2.4<br>- | +3.1<br>+0.5 | V    | PA "on"<br>PA "shut down"       |
| Mode Control Voltage ( $V_{MODE}$ )        | +2.2<br>0           | +2.4<br>- | +3.1<br>+0.5 | V    | Low Bias Mode<br>High Bias Mode |
| RF Output Power ( $P_{OUT}$ )              | 27.5 <sup>(1)</sup> | 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**  
**(T<sub>C</sub> = +25 °C, V<sub>BATT</sub> = V<sub>CC</sub> = +3.4 V, V<sub>EN</sub> = +2.4 V, 50 Ω system, IS-95 uplink waveform)**

| PARAMETER                                                                                                                      | MIN            | TYP               | MAX               | UNIT   | COMMENTS                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------|-------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gain                                                                                                                           | 25<br>15<br>16 | 27<br>17<br>17.5  | 30<br>19<br>20    | dB     | P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.4 V<br>P <sub>OUT</sub> = +17 dBm, V <sub>MODE</sub> = +2.4 V,<br>V <sub>CC</sub> = +3.7 V |
| Adjacent Channel Power<br>at ± 885 kHz offset <sup>(1)</sup><br>Primary Channel BW = 1.23 MHz<br>Adjacent Channel BW = 30 kHz  | -<br>-<br>-    | -50<br>-57<br>-55 | -47<br>-47<br>-47 | dBc    | P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.4 V<br>P <sub>OUT</sub> = +17 dBm, V <sub>MODE</sub> = +2.4 V,<br>V <sub>CC</sub> = +3.7 V |
| Adjacent Channel Power<br>at ± 1.98 MHz offset <sup>(1)</sup><br>Primary Channel BW = 1.23 MHz<br>Adjacent Channel BW = 30 kHz | -<br>-         | -63<br>-61        | -57<br>-57        | dBc    | P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.4 V                                                                                        |
| Power-Added Efficiency <sup>(1)</sup>                                                                                          | 37<br>17       | 40<br>21          | -<br>-            | %      | P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.4 V                                                                                        |
| Quiescent Current (I <sub>q</sub> )                                                                                            | -              | 15                | 20                | mA     | V <sub>MODE</sub> = +2.4 V, Low Bias                                                                                                                                                                 |
| Enable Current                                                                                                                 | -              | 0.4               | 0.8               | mA     | through V <sub>EN</sub> pin, V <sub>MODE</sub> = +2.4 V                                                                                                                                              |
| Battery Current                                                                                                                | -              | 2.5               | 5                 | mA     | through V <sub>BATT</sub> pin, V <sub>MODE</sub> = +2.4 V                                                                                                                                            |
| Mode Control Current                                                                                                           | -              | 0.5               | 0.8               | mA     | through V <sub>MODE</sub> pin, V <sub>MODE</sub> = +2.4 V                                                                                                                                            |
| Leakage Current                                                                                                                | -              | <1                | 5                 | μA     | V <sub>CC</sub> = +4.2 V, V <sub>EN</sub> = 0 V,<br>V <sub>MODE</sub> = 0 V                                                                                                                          |
| Noise in Receive Band                                                                                                          | -              | -133              | -131              | dBm/Hz | 869 MHz to 894 MHz                                                                                                                                                                                   |
| Harmonics<br>2fo<br>3fo, 4fo                                                                                                   | -<br>-         | -42<br>-50        | -30<br>-30        | dBc    |                                                                                                                                                                                                      |
| Input Impedance                                                                                                                | -              | -                 | 2:1               | VSWR   |                                                                                                                                                                                                      |
| Spurious Output Level<br>(all spurious outputs)                                                                                | -              | -                 | -65               | dBc    | P <sub>OUT</sub> ≤ +28 dBm<br>In-band Load VSWR < 5:1<br>Out-of-band Load VSWR < 10:1<br>Applies over all operating<br>conditions                                                                    |
| Load mismatch stress with no<br>permanent degradation or failure                                                               | 8:1            | -                 | -                 | VSWR   | Applies over all operating<br>conditions                                                                                                                                                             |

Notes:

(1) PAE and ACP limit applies at 836.5 MHz.

## APPLICATION INFORMATION

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

### Shutdown Mode

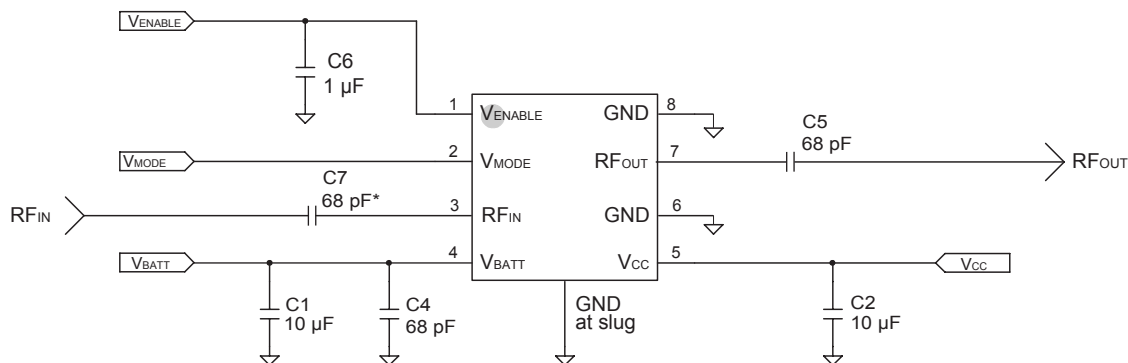
The power amplifier may be placed in a shutdown mode by applying a logic low levels (see Operating Ranges table) to both the  $V_{REF}$  and  $V_{MODE}$  voltages.

### Bias Modes

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

**Table 5: Bias Control**

| APPLICATION       | P <sub>OUT</sub> LEVELS | LOGIC    | V <sub>EN</sub> | V <sub>MODE</sub> |
|-------------------|-------------------------|----------|-----------------|-------------------|
| CDMA - low power  | ≤+16dBm                 | Low      | +2.4 V          | +2.4 V            |
| CDMA - high power | >+16 dBm                | High     | +2.4 V          | 0 V               |
| Shutdown          | -                       | Shutdown | 0 V             | 0 V               |

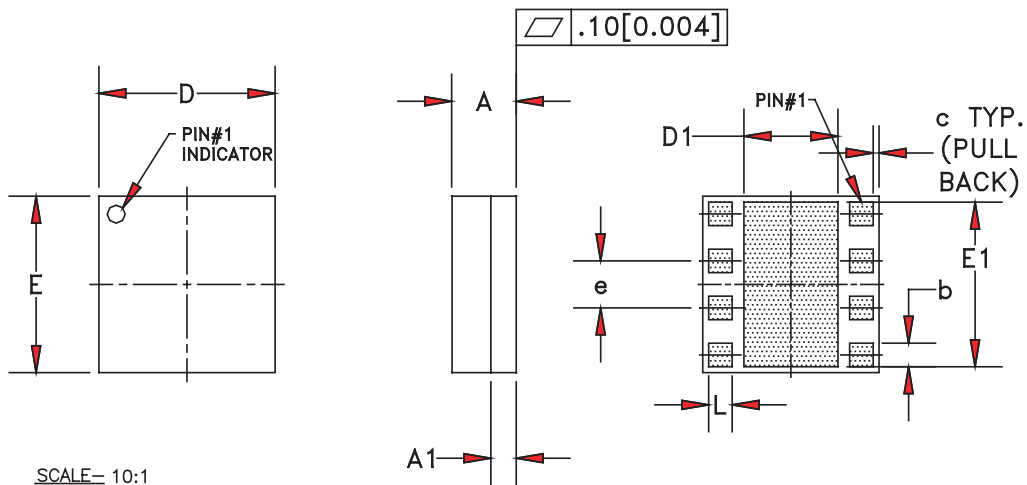


Note:

\* This capacitor is only needed if a DC voltage is present on the RF input pin

**Figure 3: Application Circuit**

## PACKAGE OUTLINE



| S <sub>W</sub> B <sub>0</sub> | MILLIMETERS |      |      | INCHES     |       |       | NOTE |
|-------------------------------|-------------|------|------|------------|-------|-------|------|
|                               | MIN.        | NOM. | MAX. | MIN.       | NOM.  | MAX.  |      |
| A                             | 0.90        | 1.00 | 1.10 | 0.035      | 0.039 | 0.043 | —    |
| A1                            | —           | 0.35 | —    | —          | 0.013 | —     | —    |
| b                             | 0.35        | —    | 0.60 | 0.013      | —     | 0.024 | 3    |
| c                             | —           | 0.10 | —    | —          | 0.004 | —     | —    |
| D                             | 2.88        | 3.00 | 3.12 | 0.113      | 0.118 | 0.123 | —    |
| D1                            | 1.20        | —    | 1.50 | 0.047      | —     | 0.060 | 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                             | 0.80 BSC    |      |      | 0.0315 BSC |       |       | —    |
| L                             | 0.35        | —    | 0.60 | 0.013      | —     | 0.024 | 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: M9 Package Outline - 8 Pin 3 mm x 3 mm x 1 mm Surface Mount Module

## TOP BRAND

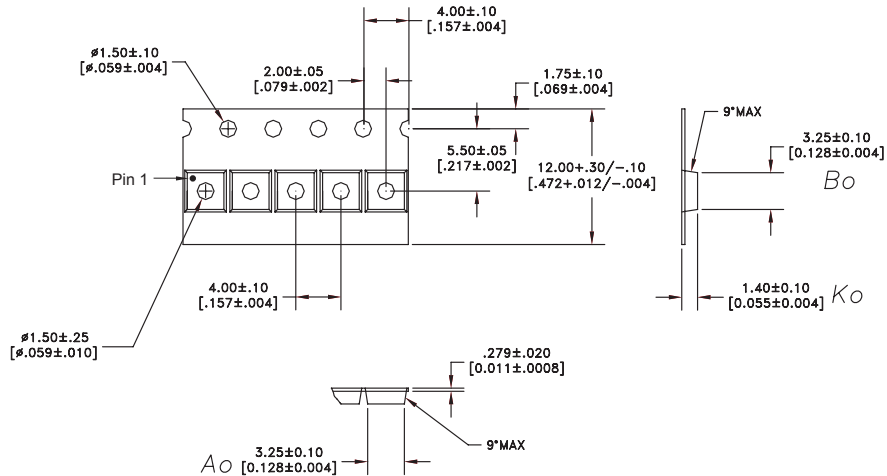


## NOTES:

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                 |
|--------------|-------------------|--------------------------------------------------------------------|-------------------------------------|
| AWT6307RM9Q7 | -30 °C to +85 °C  | RoHS Compliant 8 Pin<br>3 mm x 3 mm x 1 mm<br>Surface Mount Module | Tape and Reel, 2500 pieces per Reel |

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