



## AWT6136

450 MHz CDMA 3.4V/29.5dBm

Linear Power Amplifier Module

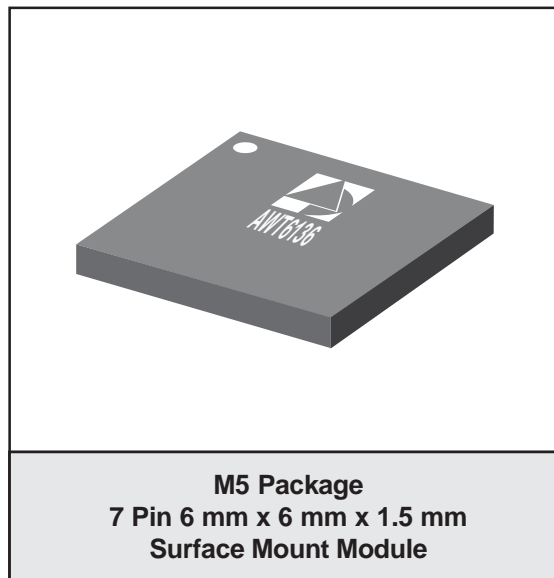
PRELIMINARY DATA SHEET - Rev 1.6

### FEATURES

- InGaP HBT Technology
- High Efficiency 37% CDMA
- Low Receive Band Noise (NRx) -132 dBm/Hz @ 10 MHz offset
- Low Leakage Current (<math><5 \mu\text{A}</math>)
- SMT Module Package
- Small Foot Print (6 mm x 6 mm)
- 50  $\Omega$  Input and Output Matching
- Low Quiescent Current ( $I_{cq} = 60 \text{ mA Typ}$ )
- Shut Down and Mode Control
- CDMA 2000 1XRTT Compliant
- RoHS Compliant Package Option, 250 °C MSL-3

### APPLICATIONS

- 450 MHz Single Mode CDMA Wireless Handsets and Wireless Local Loop



### PRODUCT DESCRIPTION

The AWT6136 is a high power, high efficiency amplifier module for CDMA wireless handset applications. The device is manufactured on an advanced InGaP HBT MMIC technology offering state-of-the-art reliability, temperature stability and ruggedness. A low power quiescent current mode

is digitally controlled to reduce power drain on the system battery. The 6 mm x 6 mm x 1.5 mm laminate package is self contained, incorporating 50  $\Omega$  input and output matching networks optimized for output power, linearity, and efficiency.

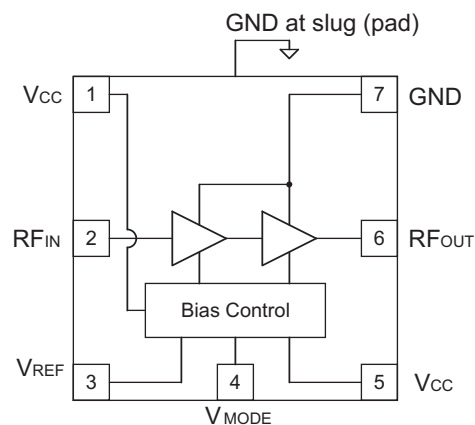


Figure 1: Block Diagram

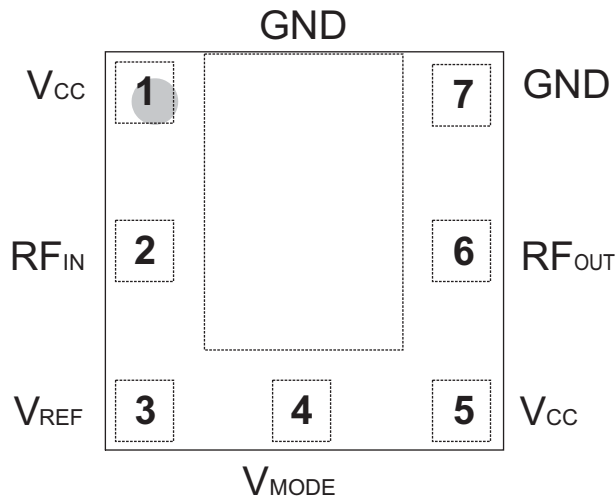


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

| PIN | NAME              | DESCRIPTION       |
|-----|-------------------|-------------------|
| 1   | V <sub>CC</sub>   | Supply Voltage    |
| 2   | RF <sub>IN</sub>  | RF Input Signal   |
| 3   | V <sub>REF</sub>  | Reference Voltage |
| 4   | V <sub>MODE</sub> | Mode Control      |
| 5   | V <sub>CC</sub>   | Supply Voltage    |
| 6   | RF <sub>OUT</sub> | RF Output         |
| 7   | GND               | Ground            |

## ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

| PARAMETER                           | MIN | MAX  | UNIT |
|-------------------------------------|-----|------|------|
| Supply Voltage ( $V_{CC}$ )         | 0   | +5   | V    |
| Mode Control Voltage ( $V_{MODE}$ ) | 0   | +3.4 | V    |
| Reference Voltage ( $V_{REF}$ )     | 0   | +3.4 | 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)             | 450                  | -          | 460          | MHz  |                                 |
| Supply Voltage ( $V_{CC}$ )         | +3.2                 | +3.4       | +4.2         | V    |                                 |
| Reference Voltage ( $V_{REF}$ )     | +2.80<br>0           | +2.90<br>- | +3.1<br>+0.5 | V    | PA"on"<br>PA"shut down"         |
| Mode Control Voltage ( $V_{MODE}$ ) | +2.5<br>0            | +2.90<br>- | +3.1<br>+0.5 | V    | Low Bias Mode<br>High Bias Mode |
| RF Output Power ( $P_{OUT}$ )       | +29.0 <sup>(1)</sup> | +29.5      | -            | dBm  | CDMA, $V_{CC} = +3.4V$          |
| Case Temperature ( $T_C$ )          | -10                  | -          | +90          | °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  $V_{CC} = +3.2 V$  and  $T_C = +90 °C$ ,  $P_{OUT}$  is derated by 0.5 dB.

**Table 4: Electrical Specifications – CDMA Operation**  
**(T<sub>C</sub> = +25 °C, V<sub>CC</sub> = +3.4 V, V<sub>REF</sub> = +2.90 V, 50 Ω system)**

| PARAMETER  | MIN      | TYP          | MAX        | UNIT   | COMMENTS   |
|--|----------|--------------|------------|--------|--|
| Gain   | 26<br>25 | 28.5<br>27.5 | 30<br>29   | dB     | P <sub>OUT</sub> = +29.5 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.90 V             |
| Gain Variation   | -        | 0.4          | 1.0        | dB     |  |
| 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>-   | -50<br>-58   | -47<br>-47 | dB     | P <sub>OUT</sub> = +29.5 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.90 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>-   | -62<br>-68   | -59<br>-59 | dB     | P <sub>OUT</sub> = +29.5 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.90 V             |
| Power-Added Efficiency <sup>(1), (2)</sup>   | 33<br>6  | 37<br>7      | -<br>-     | %      | P <sub>OUT</sub> = +29.5 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.90 V             |
| Quiescent Current (I <sub>q</sub> )  | -        | 61           | 75         | mA     | through V <sub>CC</sub> pins, V <sub>MODE</sub> = +2.90 V  |
| Reference Current  | -        | 6.5          | 9          | mA     | through V <sub>REF</sub> pin, PA "on"  |
| Mode Control Current   | -        | 0.8          | 1.0        | mA     | through V <sub>MODE</sub> pin,<br>V <sub>MODE</sub> = +2.90 V  |
| Leakage Current  | -        | <1           | 5          | μA     | V <sub>CC</sub> = +4.2 V, V <sub>REF</sub> = 0 V,<br>V <sub>MODE</sub> = 0 V   |
| Noise in Receive Band  | -        | -132         | -130       | dBm/Hz | f <sub>o</sub> +10 MHz, P <sub>OUT</sub> ≤ +29.5 dBm   |
| Harmonics<br>2f <sub>o</sub><br>3f <sub>o</sub> , 4f <sub>o</sub>  | -<br>-   | -36<br>-44   | -30<br>-35 | dBc    | P <sub>OUT</sub> ≤ +29.5 dBm   |
| Input Impedance  | -        | -            | 2:1        | VSWR   |  |
| Spurious Output Level<br>(all spurious outputs)  | -        | -            | -70        | dBc    | P <sub>OUT</sub> ≤ +29.5 dBm<br>In-band Load VSWR < 5:1<br>Out-of-band Load VSWR < 10:1<br>Applies over all operating ranges |
| Load mismatch stress with no<br>permanent degradation or failure   | 10:1     | -            | -          | VSWR   | Applies over all operating ranges  |

## Notes:

(1) P<sub>OUT</sub> is derated by 0.5 dB for IS-98 / CDMA 2000 operation.

(2) Efficiency spec applies at 455 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 both the  $V_{REF}$  and  $V_{MODE}$  voltages.

### High Bias Mode

The power amplifier may be placed in a high bias mode by applying a logic low level (see Operating Ranges table) to the  $V_{MODE}$  voltage.

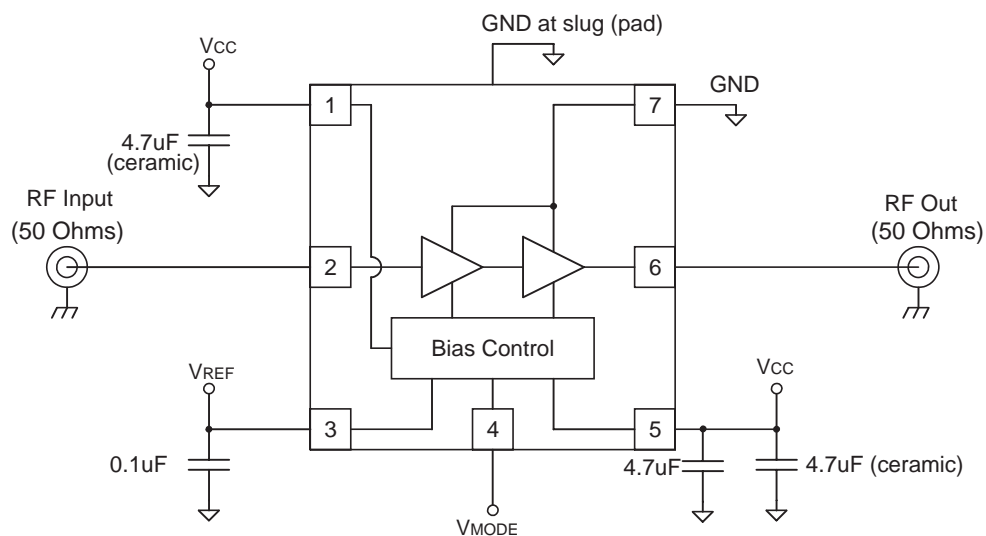
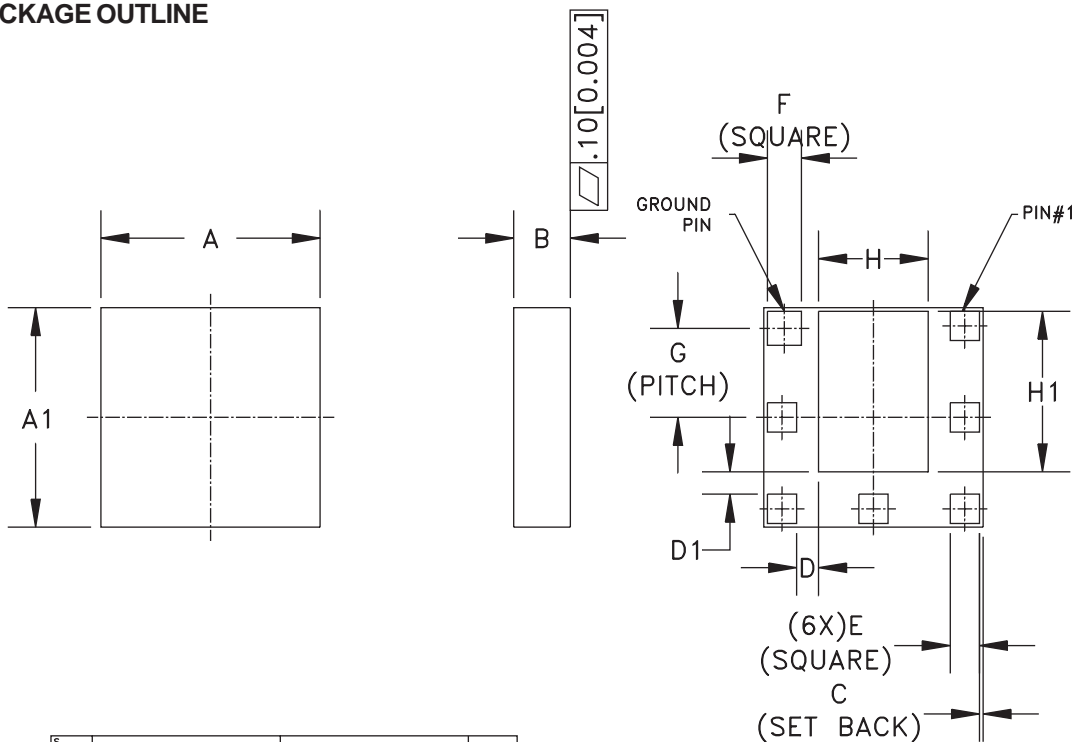


Figure 3: Application Circuit Schematic

**AWT6136**

**PACKAGE OUTLINE**

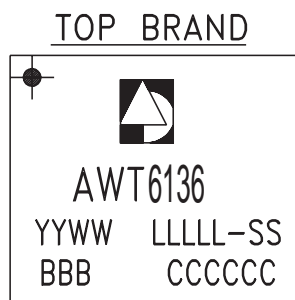


| SYMBOL | MILLIMETERS |      |      | INCHES    |       |       | NOTE |
|--------|-------------|------|------|-----------|-------|-------|------|
|        | MIN.        | NOM. | MAX. | MIN.      | NOM.  | MAX.  |      |
| A      | 5.88        | 6.00 | 6.12 | 0.231     | 0.236 | 0.241 | -    |
| A1     | 5.88        | 6.00 | 6.12 | 0.231     | 0.236 | 0.241 | -    |
| B      | 1.30        | 1.55 | 1.70 | 0.051     | 0.061 | 0.067 | -    |
| C      | -           | 0.10 | -    | -         | 0.004 | -     | -    |
| D      | -           | 0.60 | -    | -         | 0.024 | -     | -    |
| D1     | -           | 0.60 | -    | -         | 0.024 | -     | -    |
| E      | -           | 0.81 | -    | -         | 0.032 | -     | -    |
| F      | -           | 0.89 | -    | -         | 0.035 | -     | -    |
| G      | 2.50 BSC    |      |      | 0.098 BSC |       |       | 3    |
| H      | -           | 3.00 | -    | -         | 0.118 | -     | -    |
| H1     | -           | 4.39 | -    | -         | 0.173 | -     | -    |

**NOTES:**

1. CONTROLLING DIMENSIONS: MILLIMETERS
2. UNLESS SPECIFIED TOLERANCE=±0.076[0.003].
3. REFERENCE ONLY.

**Figure 4: M5 Package Outline - 7 Pin 6 mm x 6 mm x 1.5 mm Surface Mount Module (Low Band)**

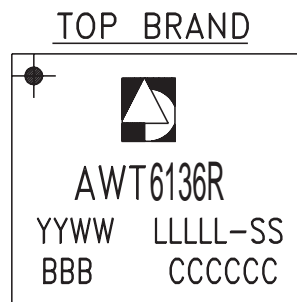


**NOTES:**

1. ANADIGICS LOGO SIZE: X=0.080±0.010 Y=0.095±0.010
2. PART #: AWT6136
3. YEAR AND WORK WEEK: YYWW: YY = YEAR, WW = WORK WEEK
4. LOT - Wafer I.D.: LLLLL-SS = Wafer/Lot I.D.
5. PIN 1 INDICATOR: MOLD NOTCH -or- INK DOT
6. BOM #: BBB
7. COUNTRY CODE: CCCCC
8. TYPE : ELITE  
SIZE : AS LARGE AS POSSIBLE  
COLOR : WHITE or SILVER INK MARKED

**Figure 5: Branding Specification**

**AWT6136**



**NOTES:**

1. ANADIGICS LOGO SIZE: X=0.080±0.010 Y=0.095±0.010
2. PART #: AWT6136R
3. YEAR AND WORK WEEK: YYWW: YY = YEAR, WW = WORK WEEK
4. LOT - Wafer I.D.: LLLLL-SS = Wafer/Lot I.D.
5. PIN 1 INDICATOR: MOLD NOTCH -or- INK DOT
6. BOM #: BBB
7. COUNTRY CODE: CCCCC
8. TYPE : ELITE  
SIZE : AS LARGE AS POSSIBLE  
COLOR : WHITE or SILVER INK MARKED

**Figure 6: RoHS Compliant Branding Specification**

AWT6136

COMPONENT PACKAGING

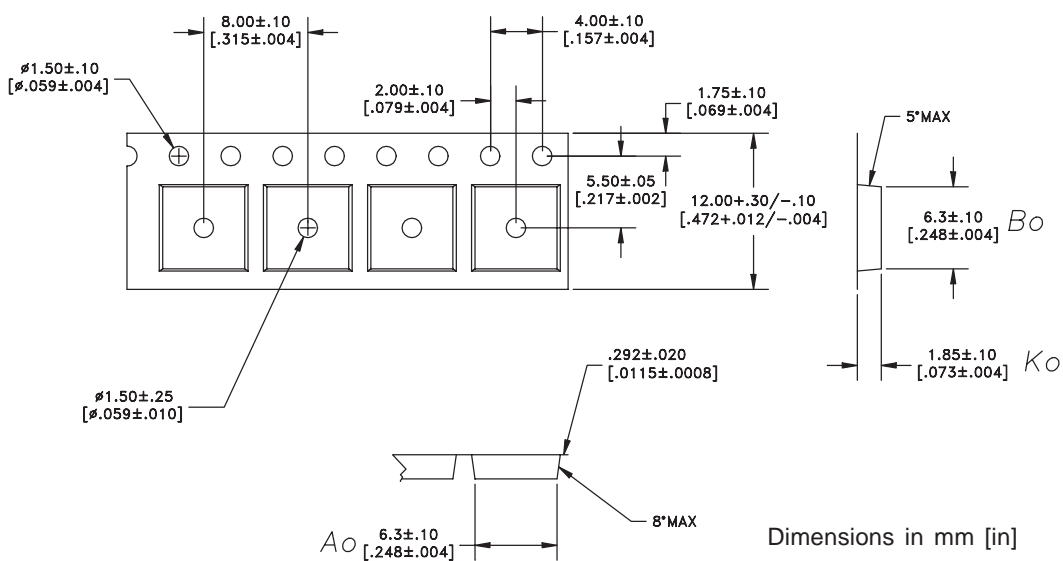


Figure 6: Tape & Reel Packaging

Table 5: Tape & Reel Dimensions

| PACKAGE TYPE   | TAPE WIDTH | POCKET PITCH | REEL CAPACITY | MAX REEL DIA |
|----------------|------------|--------------|---------------|--------------|
| 6 x 6 x 1.5 mm | 12mm       | 8mm          | 2500          | 13"          |



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**ORDERING INFORMATION**

| ORDER NUMBER | TEMPERATURE RANGE | PACKAGE DESCRIPTION   | COMPONENT PACKAGING                 |
|--------------|-------------------|---|-------------------------------------|
| AWT6136M5P8  | -10 °C to +90 °C  | 7 Pin<br>6 x 6 x 1.5 mm<br>Surface Mount Module                         | Tape and Reel, 2500 pieces per Reel |
| AWT6136RM5P8 | -10 °C to +90 °C  | RoHS Compliant<br>7 Pin<br>6 mm x 6 mm x 1.5 mm<br>Surface Mount Module | Tape and Reel, 2500 pieces per Reel |



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