



**AWT6275**

HELP™ IMT/WCDMA 3.4V/27.5dBm

Linear Power Amplifier Module

PRELIMINARY DATA SHEET - Rev 1.8

## FEATURES

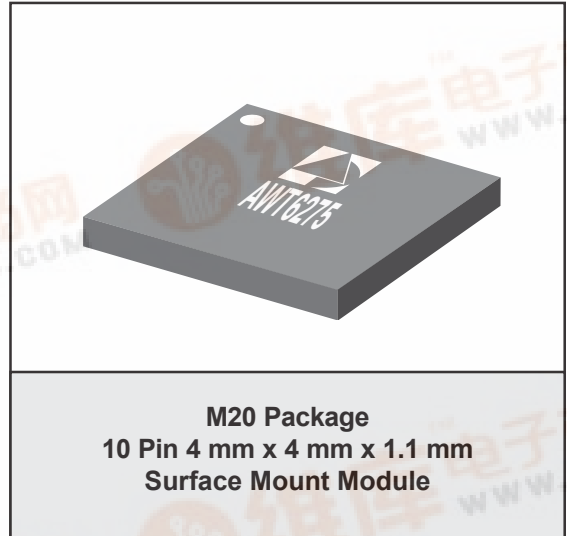
- InGaP HBT Technology
- High Efficiency:
  - 43% @  $P_{OUT} = +27.5$  dBm
  - 21% @  $P_{OUT} = +16$  dBm
  - 15% @  $P_{OUT} = +7$  dBm
- Low Quiescent Current: 16 mA
- Low Leakage Current in Shutdown Mode:  $<1$   $\mu$ A
- $V_{REF} = +2.85$  V (+2.75 V min over temp)
- Optimized for a 50  $\Omega$  System
- Low Profile Miniature Surface Mount Package Option: 1.1 mm Max
- RoHS Compliant Package, 250  $^{\circ}$ C MSL-3
- HSDPA Capable

## APPLICATIONS

- Dual Band WCDMA Wireless Handsets
- Dual Mode 3GPP Wireless Handsets

## PRODUCT DESCRIPTION

The AWT6275 meets the increasing demands for higher output power in UMTS handsets. The PA module is optimized for  $V_{REF} = +2.85$  V, a requirement for compatibility with the Qualcomm® 6250 chipset. The device is manufactured on an advanced InGaP HBT MMIC technology offering state-of-the-art reliability, temperature stability, and ruggedness. Selectable



bias modes that optimize efficiency for different output power levels, and a shutdown mode with low leakage current, increase handset talk and standby time. The self-contained 4 mm x 4 mm x 1.5 mm surface mount package incorporates matching networks optimized for output power, efficiency, and linearity in a 50  $\Omega$  system.

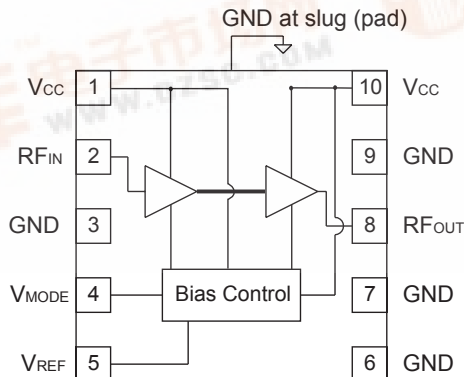


Figure 1: Block Diagram



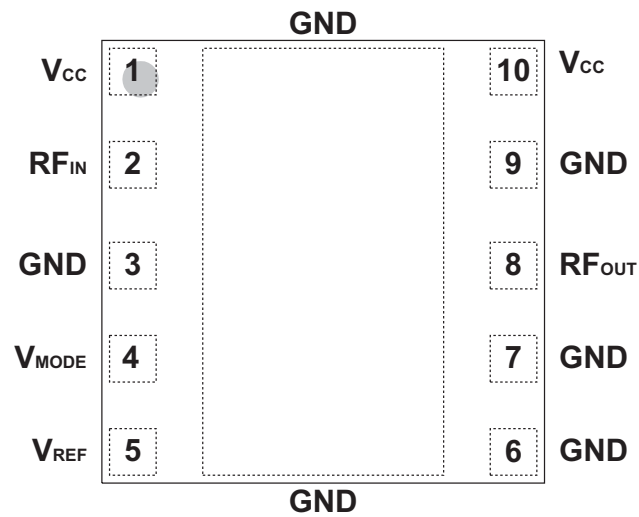


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

| PIN | NAME       | DESCRIPTION          |
|-----|------------|----------------------|
| 1   | $V_{CC}$   | Supply Voltage       |
| 2   | $RF_{IN}$  | RF Input             |
| 3   | GND        | Ground               |
| 4   | $V_{MODE}$ | Mode Control Voltage |
| 5   | $V_{REF}$  | Reference Voltage    |
| 6   | GND        | Ground               |
| 7   | GND        | Ground               |
| 8   | $RF_{OUT}$ | RF Output            |
| 9   | GND        | Ground               |
| 10  | $V_{CC}$   | Supply Voltage       |

## 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   | +3.5 | V    |
| Reference Voltage ( $V_{REF}$ )     | 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)             | 1920                 | -            | 1980          | MHz  |                                                  |
| Supply Voltage ( $V_{CC}$ )         | +3.2<br>-            | +3.4<br>+1.5 | +4.2<br>-     | V    | $P_{OUT} \leq +27.5$ dBm<br>$P_{OUT} \leq 7$ dBm |
| Reference Voltage ( $V_{REF}$ )     | +2.75<br>0           | +2.85<br>-   | +2.95<br>+0.5 | V    | PA "on"<br>PA "shut down"                        |
| Mode Control Voltage ( $V_{MODE}$ ) | +2.3<br>0            | +2.85<br>-   | +3.1<br>+0.5  | V    | Low Bias Mode<br>High Bias Mode                  |
| RF Output Power ( $P_{OUT}$ )       | +27.0 <sup>(1)</sup> | +27.5        | -             | dBm  |                                                  |
| Case Temperature ( $T_C$ )          | -20                  | -            | +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,  $P_{OUT}$  is derated by 0.5 dB.*

**Table 4: Electrical Specifications**  
**(T<sub>C</sub> = +25 °C, V<sub>CC</sub> = +3.4 V, V<sub>REF</sub> = +2.85 V, 50 Ω system)**

| PARAMETER                                                        | MIN                | TYP                | MAX               | UNIT   | COMMENTS                                                                                                                                                                                               |
|------------------------------------------------------------------|--------------------|--------------------|-------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gain                                                             | 24.5<br>13.5<br>12 | 26.5<br>15.5<br>14 | 29<br>17.5<br>16  | dB     | P <sub>OUT</sub> = +27.5 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V<br>P <sub>OUT</sub> = +7 dBm, V <sub>CC</sub> = 1.5 V,<br>V <sub>MODE</sub> = +2.85 V |
| ACLR1 at 5 MHz offset <sup>(1)</sup>                             | -<br>-<br>-        | -41<br>-43<br>-40  | -38<br>-38<br>-38 | dBc    | P <sub>OUT</sub> = +27.5 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V<br>P <sub>OUT</sub> = +7 dBm, V <sub>CC</sub> = 1.5 V,<br>V <sub>MODE</sub> = +2.85 V |
| ACLR2 at 10 MHz offset                                           | -<br>-<br>-        | -58<br>-52<br>-57  | -48<br>-48<br>-48 | dBc    | P <sub>OUT</sub> = +27.5 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V<br>P <sub>OUT</sub> = +7 dBm, V <sub>CC</sub> = 1.5 V,<br>V <sub>MODE</sub> = +2.85 V |
| Power-Added Efficiency <sup>(1)</sup>                            | 39<br>18<br>12     | 43<br>21<br>15     | -<br>-<br>-       | %      | P <sub>OUT</sub> = +27.5 dBm, V <sub>MODE</sub> = 0 V<br>P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V<br>P <sub>OUT</sub> = +7 dBm, V <sub>CC</sub> = 1.5 V,<br>V <sub>MODE</sub> = +2.85 V |
| Quiescent Current (I <sub>q</sub> )                              | -                  | 16                 | 22                | mA     | V <sub>MODE</sub> = +2.85 V, V <sub>CC</sub> = 3.4 V                                                                                                                                                   |
| Reference Current                                                | -                  | 3.6                | 5                 | mA     | through V <sub>REF</sub> pin                                                                                                                                                                           |
| Mode Control Current                                             | -                  | 0.3                | 1                 | mA     | through V <sub>MODE</sub> pin, V <sub>MODE</sub> = +2.85 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                                            | -                  | -141               | -138              | dBm/Hz | 2110 MHz to 2170 MHz                                                                                                                                                                                   |
| Harmonics<br>2fo<br>3fo, 4fo                                     | -<br>-<br>-        | -45<br>-50         | -40<br>-45        | dBc    | P <sub>OUT</sub> ≤ +27.5 dBm                                                                                                                                                                           |
| Input Impedance                                                  | -                  | -                  | 2:1               | VSWR   |                                                                                                                                                                                                        |
| Spurious Output Level<br>(all spurious outputs)                  | -                  | -                  | -70               | dBc    | P <sub>OUT</sub> ≤ +27.5 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 | 10:1               | -                  | -                 | VSWR   | Applies over full operating range                                                                                                                                                                      |

Notes:

(1) ACLR and Efficiency measured at 1950 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.

## 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.

Three operating modes are recommended to optimize current consumption. High Bias/High  $V_{CC}$  operating mode is for  $P_{OUT}$  levels  $\geq 16$  dBm. At  $\sim 16$ dBm - 7 dBm, the PA should be "Mode Switched" to Low Bias Mode. For  $P_{OUT}$  levels  $\leq \sim 7$  dBm, the  $V_{CC}$  can be switched to 1.5 V (Low Bias Mode is also used for this  $P_{OUT}$  range).

Table 5: Bias Control

| APPLICATION       | $P_{OUT}$ LEVELS              | BIAS MODE | $V_{REF}$ | $V_{MODE}$ | $V_{CC}$    |
|-------------------|-------------------------------|-----------|-----------|------------|-------------|
| CDMA - low power  | $\leq +7$ dBm                 | Low       | +2.85 V   | +2.85 V    | $\geq +1.5$ |
| CDMA - med power  | $7 \leq P_{OUT} \leq +16$ dBm | Low       | +2.85 V   | +2.85 V    | +3.4        |
| CDMA - high power | $> +16$ dBm                   | High      | +2.85 V   | 0 V        | +3.4        |
| Shutdown          | -                             | Shutdown  | 0 V       | 0 V        | -           |

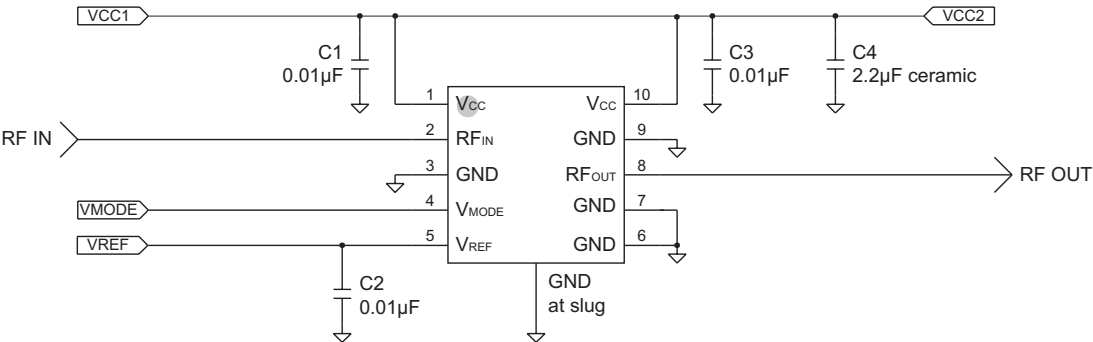
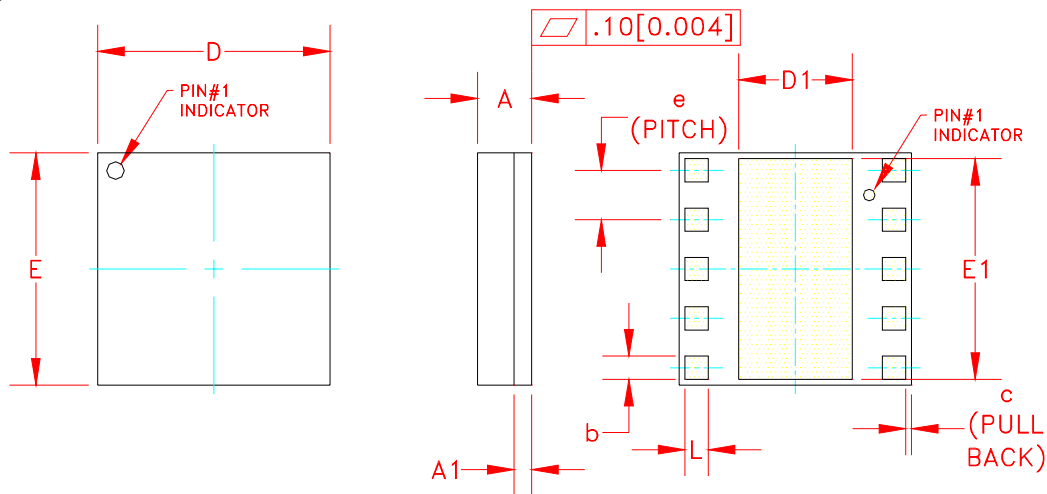


Figure 3: Application Circuit Schematic

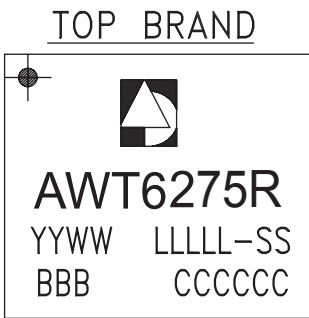
AWT6275



| Symbol | MILLIMETERS |      |      | INCHES |       |       | NOTE |
|--------|-------------|------|------|--------|-------|-------|------|
|        | MIN.        | NOM. | MAX. | MIN.   | NOM.  | MAX.  |      |
| A      | 0.85        | 0.95 | 1.05 | 0.033  | 0.037 | 0.041 | —    |
| A1     | —           | 0.30 | —    | —      | 0.012 | —     | —    |
| b      | 0.35        | —    | 0.60 | 0.013  | —     | 0.024 | 3    |
| c      | —           | 0.10 | —    | —      | 0.004 | —     | —    |
| D      | 3.88        | 4.00 | 4.12 | 0.152  | 0.157 | 0.162 | —    |
| D1     | 1.90        | —    | 2.20 | 0.075  | —     | 0.086 | —    |
| E      | 3.88        | 4.00 | 4.12 | 0.152  | 0.157 | 0.162 | —    |
| E1     | 3.75        | —    | 3.85 | 0.148  | —     | 0.152 | —    |
| e      | —           | 0.85 | —    | —      | 0.033 | —     | 3    |
| 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.

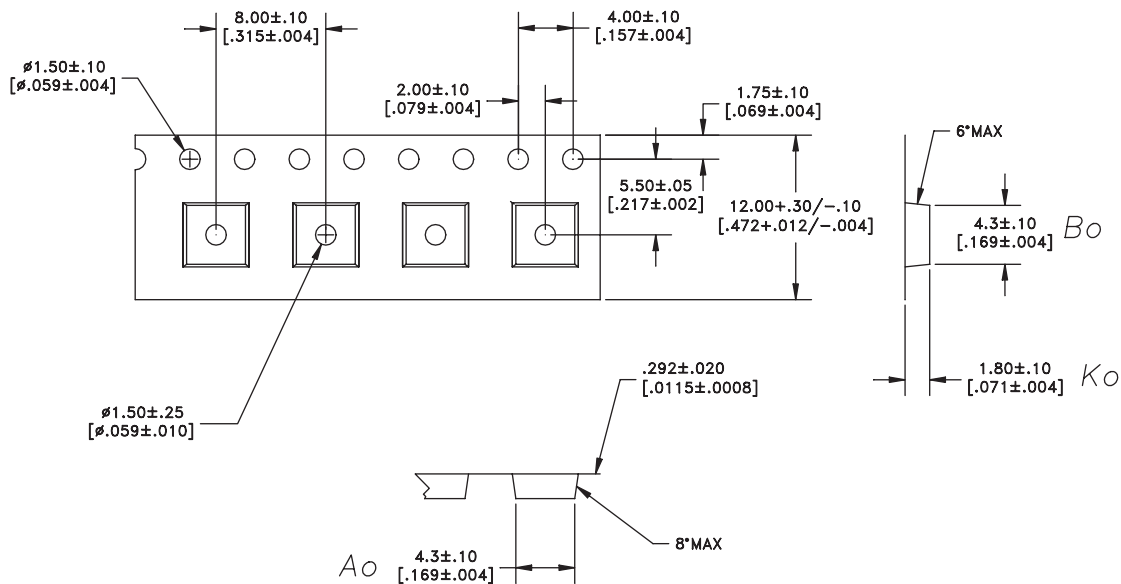
Figure 4: M20 Package Outline - 10 Pin 4 mm x 4 mm x 1.1 mm Surface Mount Module



- NOTES:
1. ANADIGICS LOGO SIZE: X=0.040±0.010 Y=0.048±0.010
  2. PART # AWT6275R
  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  
LASER MARKED

Figure 5: Branding Specification - M20 Package

COMPONENT PACKAGING



DIMENSIONS ARE IN MILLIMETERS [INCHES]  
STANDARD TOLERANCES

Figure 6: Tape & Reel Packaging

Table 6: Tape & Reel Dimensions

| PACKAGE TYPE         | TAPE WIDTH | POCKET PITCH | REEL CAPACITY | MAX REEL DIA |
|----------------------|------------|--------------|---------------|--------------|
| 4 mm x 4 mm x 1.5 mm | 12 mm      | 8 mm         | 2500          | 13"          |

**AWT6275**

**ORDERING INFORMATION**

| ORDER NUMBER  | TEMPERATURE RANGE | PACKAGE DESCRIPTION                                                   | COMPONENT PACKAGING                 |
|---------------|-------------------|-----------------------------------------------------------------------|-------------------------------------|
| AWT6275RM20P8 | -20 °C to +90 °C  | RoHS Compliant 10 Pin<br>4 mm x 4 mm x 1.1 mm<br>Surface Mount Module | Tape and Reel, 2500 pieces per Reel |



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