



## AWT6108R

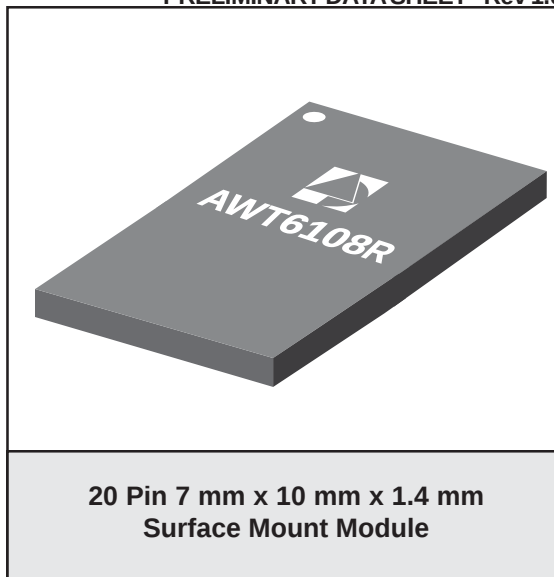
GSM850/GSM900/DCS/PCS  
Quad Band Power Amplifier Module  
With Integrated Power Control  
**PRELIMINARY DATA SHEET - Rev 1.0**

### FEATURES

- InGaP HBT Technology
- Integrated Power Control (CMOS)
- Quad Band Applications
- +35 dBm GSM Output Power at 3.5 V
- +33 dBm DCS/PCS Output Power at 3.5 V
- 55% GSM PAE
- 50% DCS/PCS PAE
- Small Footprint: 7 x 10 mm
- Low Profile: 1.4 mm
- Power Control Range: >50 dB
- GPRS Capable (Class 12)
- RoHS Compliant Package, 250 °C MSL-3

### APPLICATIONS

- GSM850/GSM900/DCS/PCS Handsets
- Dual/Tri/Quad Band PDA



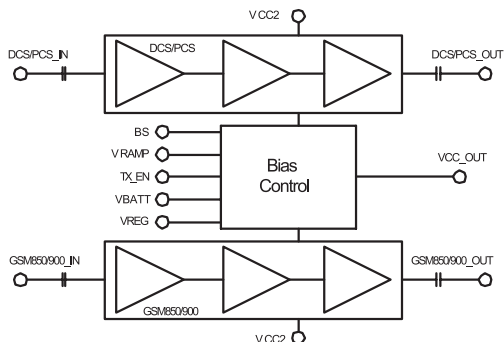
### PRODUCT DESCRIPTION

This quad band power amplifier module is designed to support dual, tri and quad band applications. The module includes an integrated power control scheme that facilitates fast and easy production calibration and reduces the number of external components required to complete a power control function.

The amplifier's power control range is typically 55dB, with the output power set by applying an analog voltage to  $V_{RAMP}$ . The logical control inputs,

TX\_EN and BS, are both 1.8 V and 3 V logic compliant. The TX\_EN is used to enable the amplifier typically with the TX burst. The BS is used to select which amplifier is enabled.

There are two amplifier chains, one to support GSM850/900 bands, the other for DCS/PCS bands. All of the RF ports for this device are internally matched to 50  $\Omega$ . Internal DC blocks are provided at the RF ports.



**Figure 1: Block Diagram**

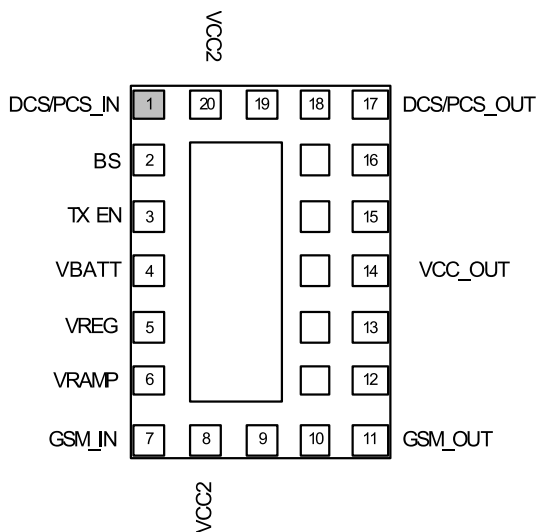


Figure 2: Pinout (X-Ray Top View)

Table 1: Pin Description

| PIN | NAME       | DESCRIPTION                                    | PIN | NAME        | DESCRIPTION                                                           |
|-----|------------|------------------------------------------------|-----|-------------|-----------------------------------------------------------------------|
| 1   | DCS/PCS_IN | DCS/PCS RF Input                               | 11  | GSM_OUT     | GSM850/900 RF Output                                                  |
| 2   | BS         | Band Select Logic Input                        | 12  | GND         | Ground                                                                |
| 3   | TX_EN      | TX Enable Logic Input                          | 13  | GND         | Ground                                                                |
| 4   | VBATT      | Battery Supply Connection                      | 14  | VCC_OUT     | Control Voltage Output Which Must be Connected to VCC2, No Decoupling |
| 5   | VREG       | Regulated Supply Connection                    | 15  | GND         | Ground                                                                |
| 6   | VRAMP      | Analog Signal Used to Control the Output Power | 16  | GND         | Ground                                                                |
| 7   | GSM_IN     | GSM850/900 RF Input                            | 17  | DCS/PCS_OUT | DCS/PCS RF Output                                                     |
| 8   | VCC2       | VCC Control Input for GSM850/900 Pre-Amplifier | 18  | GND         | Ground                                                                |
| 9   | GND        | Ground                                         | 19  | GND         | Ground                                                                |
| 10  | GND        | Ground                                         | 20  | VCC2        | VCC Control Input for DCS/PCS Pre-Amplifier                           |

## ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

| PARAMETER                         | MIN  | MAX | UNIT |
|-----------------------------------|------|-----|------|
| Supply Voltage ( $V_{BATT}$ )     | 0    | 7   | V    |
| RF Input Power ( $RF_{IN}$ )      | 0    | 11  | dBm  |
| Control Voltage ( $V_{RAMP}$ )    | -0.3 | 1.8 | V    |
| Storage Temperature ( $T_{STG}$ ) | -55  | 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: ESD Ratings

| PARAMETER                              | METHOD | RATING | UNIT |
|----------------------------------------|--------|--------|------|
| ESD Threshold Voltage (RF Ports)       | HBM    | >250   | V    |
| ESD Threshold Voltage (Control Inputs) | HBM    | >2.5   | kV   |

Although protection circuitry has been designed into this device, proper precautions should be taken to avoid exposure to electronic discharge (ESD) during handling and mounting. Human body model (HBM) employed is resistance = 1500  $\Omega$ , capacitance = 100 pF.

Table 4: Digital Inputs

| PARAMETER                    | MIN | TYP | MAX       | UNIT    |
|------------------------------|-----|-----|-----------|---------|
| Logic High Voltage ( $V_H$ ) | 1.2 | -   | $V_{REG}$ | V       |
| Logic Low Voltage ( $V_L$ )  | -   | -   | 0.5       | V       |
| Logic High Current ( $I_H$ ) | -   | -   | 30        | $\mu A$ |
| Logic Low Current ( $I_L$ )  | -   | -   | 30        | $\mu A$ |

Table 5: Operating Ranges

| PARAMETER                                             | MIN | TYP | MAX  | UNIT        | COMMENTS                                                                                 |
|-------------------------------------------------------|-----|-----|------|-------------|------------------------------------------------------------------------------------------|
| Case Temperature ( $T_c$ )                            | -20 | -   | 85   | $^{\circ}C$ |                                                                                          |
| Supply Voltage ( $V_{BATT}$ )                         | 3.0 | 3.5 | 5.5  | V           |                                                                                          |
| Regulated Voltage ( $V_{REG}$ )                       | 2.7 | 2.8 | 2.9  | V           |                                                                                          |
| Regulated Current ( $I_{REG}$ )                       |     |     |      |             |                                                                                          |
| TX_EN = HIGH                                          | -   | 6   | 8    | mA          |                                                                                          |
| TX_EN = LOW                                           | -   | 10  | 30   | $\mu A$     |                                                                                          |
| Control Voltage for Maximum Power ( $V_{RAMP\_MAX}$ ) | -   | -   | 1.6  | V           |                                                                                          |
| Control Voltage for Minimum Power ( $V_{RAMP\_MIN}$ ) | -   | 0.2 | 0.25 | V           |                                                                                          |
| Power Supply Leakage Current                          | -   | 1   | 10   | $\mu A$     | $V_{BATT} = 5.5 V$ , $V_{REG} = 0V$ ,<br>$V_{RAMP} = 0V$ , TX_EN = LOW,<br>No RF Applied |
| $V_{RAMP}$ Input Capacitance                          | -   | 3   | -    | pF          |                                                                                          |
| $V_{RAMP}$ Input Current                              | -   | -   | 10   | $\mu A$     | $V_{RAMP} = V_{RAMP\_MAX}$                                                               |
| Turn On/Off Time                                      | -   | 1   | 2    | $\mu s$     | $V_{RAMP} = 0.2V$ to $V_{RAMP\_MAX}$                                                     |
| Duty Cycle                                            | -   | -   | 50   | %           |                                                                                          |

The device may be operated safely over these conditions; however, parametric performance is guaranteed only over the conditions defined in the electrical specifications.

**Table 6: Electrical Characteristics for GSM850/900**  
**( $V_{BATT} = 3.5$  V,  $V_{REG} = 2.8$  V,  $P_{IN} = 2.0$  dBm, Pulse Width = 1154  $\mu$ s, Duty 25%,  
 $Z_{IN} = Z_{OUT} = 50\Omega$ ,  $T_C = 25$  °C,  $V_{RAMP} = 1.6$  V, BS = LOW, TX\_EN = HIGH)**

| PARAMETER                                   | MIN        | TYP        | MAX        | UNIT | COMMENTS                                                                                    |
|---------------------------------------------|------------|------------|------------|------|---------------------------------------------------------------------------------------------|
| Operating Frequency ( $F_O$ )               | 824<br>880 | -<br>-     | 849<br>915 | MHz  |                                                                                             |
| Input Power                                 | 0          | 2          | 5          | dBm  |                                                                                             |
| Output Power ( $P_{MAX}$ )                  | 34.5       | 35         | -          | dBm  | Freq = 824 to 915 MHz                                                                       |
| Degraded Output Power                       | 32.0       | 32.5       | -          | dBm  | $V_{BATT} = 3.0$ V, $T_C = 85$ °C,<br>$P_{IN} = 0$ dBm                                      |
| PAE @ $P_{MAX}$                             | 48         | 55         | -          | %    | Freq = 824 to 915 MHz                                                                       |
| Forward Isolation 1                         | -          | -37        | -30        | dBm  | TX_EN = LOW, $P_{IN} = 5$ dBm                                                               |
| Forward Isolation 2                         | -          | -25        | -10        | dBm  | TX_EN = HIGH, $V_{RAMP} = 0.2$ V,<br>$P_{IN} = 5$ dBm                                       |
| Cross Isolation<br>( $2F_O$ @ DCS/PCS port) | -          | -30        | -20        | dBm  | $V_{RAMP} = 0.2$ V to $V_{RAMP\_MAX}$                                                       |
| Harmonics<br>2fo<br>3fo                     | -<br>-     | -17<br>-30 | -5<br>-15  | dBm  | Over all output power levels                                                                |
| Stability                                   | -<br>-     | -<br>-     | -36<br>-30 | dBm  | VSWR = 8:1 all phases,<br>$P_{OUT} \leq 34.5$ dBm<br>$F_{OUT} < 1$ GHz<br>$F_{OUT} > 1$ GHz |
| Ruggedness                                  | -          | -          | 10:1       |      | All load phases, $P_{OUT} \leq 34.5$ dBm                                                    |
| RX Noise Power                              | -          | -86        | -83        | dBm  | $F_{TX} = 849$ MHz, RBW = 100 kHz,<br>$F_{RX} = 869$ to 894 MHz,<br>$P_{OUT} \leq 34.5$ dBm |
|                                             | -          | -81        | -77        | dBm  | $F_{TX} = 915$ MHz, RBW = 100 kHz,<br>$F_{RX} = 925$ to 935 MHz,<br>$P_{OUT} \leq 34.5$ dBm |
|                                             | -          | -86        | -83        | dBm  | $F_{TX} = 915$ MHz, RBW = 100 kHz,<br>$F_{RX} = 935$ to 960 MHz,<br>$P_{OUT} \leq 34.5$ dBm |
| Input VSWR                                  | -          | -          | 2.5:1      |      | Over all output power levels                                                                |

**Table 7: Electrical Characteristics for DCS/PCS**  
**( $V_{BATT} = 3.5\text{ V}$ ,  $V_{REG} = 2.8\text{ V}$ ,  $P_{IN} = 2.0\text{ dBm}$ , Pulse Width = 1154  $\mu\text{s}$ , Duty 25%,  
 $Z_{IN} = Z_{OUT} = 50\Omega$ ,  $T_C = 25\text{ }^\circ\text{C}$ ,  $V_{RAMP} = 1.6\text{ V}$ , BS = HIGH, TX\_EN = HIGH)**

| PARAMETER                     | MIN          | TYP        | MAX          | UNIT | COMMENTS                                                                                                                     |
|-------------------------------|--------------|------------|--------------|------|------------------------------------------------------------------------------------------------------------------------------|
| Operating Frequency ( $F_o$ ) | 1710<br>1850 | -<br>-     | 1785<br>1910 | MHz  |                                                                                                                              |
| Input Power                   | 0            | 2          | 5            | dBm  |                                                                                                                              |
| Output Power ( $P_{MAX}$ )    | 32           | 33         | -            | dBm  |                                                                                                                              |
| Degraded Output Power         | 29.5         | 30.5       | -            | dBm  | $V_{BATT} = 3.0\text{ V}$ , $T_C = 85\text{ }^\circ\text{C}$ ,<br>$P_{IN} = 0\text{ dBm}$                                    |
| PAE @ $P_{MAX}$               | 45           | 50         | -            | %    | Freq = 1710 to 1910 MHz                                                                                                      |
| Forward Isolation 1           | -            | -37        | -30          | dBm  | TX_EN = LOW, $P_{IN} = 5\text{ dBm}$                                                                                         |
| Forward Isolation 2           | -            | -17        | -10          | dBm  | TX_EN = HIGH, $V_{RAMP} = 0.2\text{ V}$ ,<br>$P_{IN} = 5\text{ dBm}$                                                         |
| Harmonics<br>2fo<br>3fo       | -<br>-       | -12<br>-30 | -5<br>-15    | dBm  | Over all output power levels                                                                                                 |
| Stability                     | -<br>-       | -<br>-     | -36<br>-30   | dBm  | VSWR = 8:1 all phases,<br>$P_{OUT} \leq 32\text{ dBm}$<br>$F_{OUT} < 1\text{GHz}$<br>$F_{OUT} > 1\text{GHz}$                 |
| Ruggedness                    | -            | -          | 10:1         |      | All load phases, $P_{OUT} \leq 32\text{ dBm}$                                                                                |
| RX Noise Power                | -            | -87        | -80          | dBm  | $F_{TX} = 1785\text{ MHz}$ ,<br>$F_{RX} = 1805\text{ to }1880\text{ MHz}$ ,<br>$P_{OUT} \leq 32.0\text{ dBm}$                |
|                               | -            | -87        | -80          | dBm  | $F_{TX} = 1910\text{ MHz}$ , RBW = 100 kHz,<br>$F_{RX} = 1930\text{ to }1990\text{ MHz}$ ,<br>$P_{OUT} \leq 32.0\text{ dBm}$ |
| Input VSWR                    | -            | -          | 2.5:1        |      | Over all output power levels                                                                                                 |

## PERFORMANCE DATA

Figure 3: GSM850/GSM900 Pout vs Vramp & Temperature  
(2 TX slots)

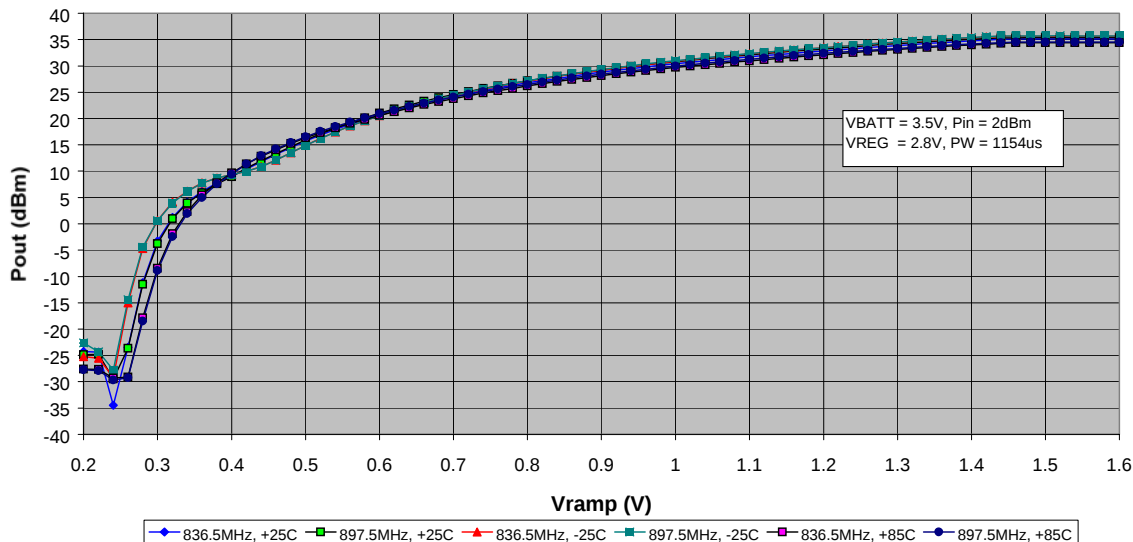
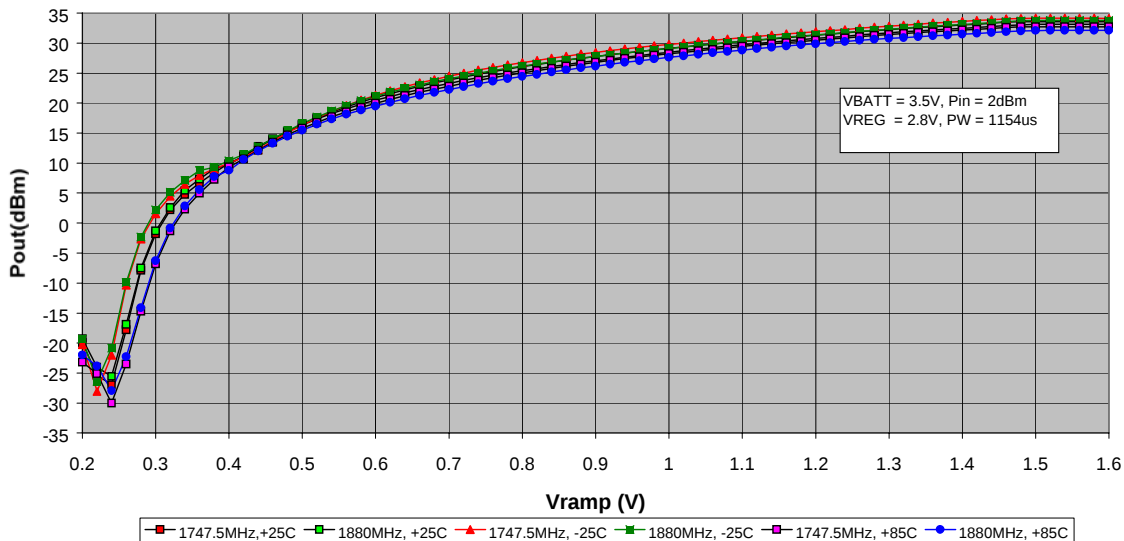
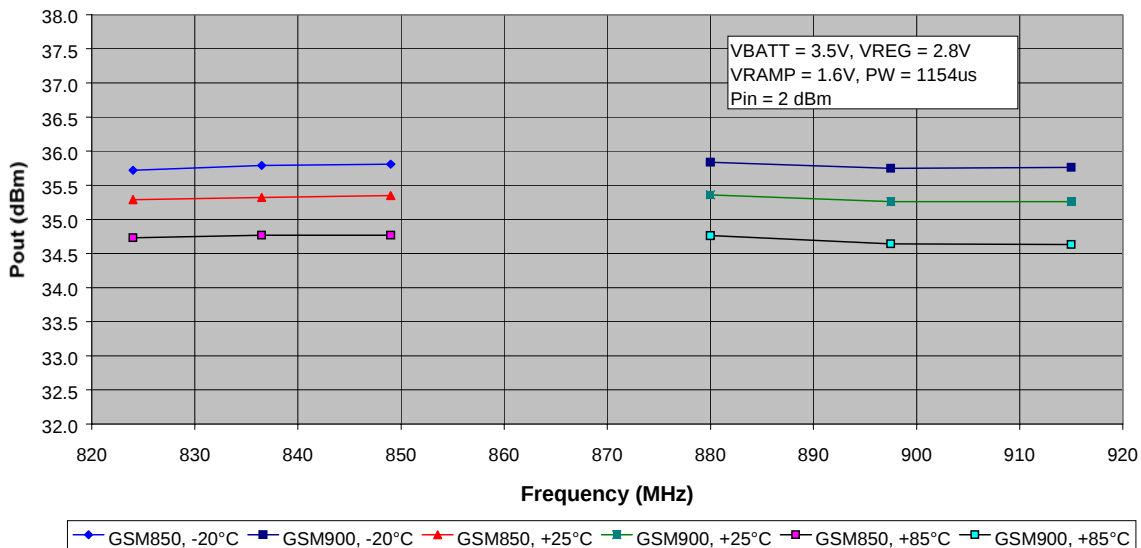


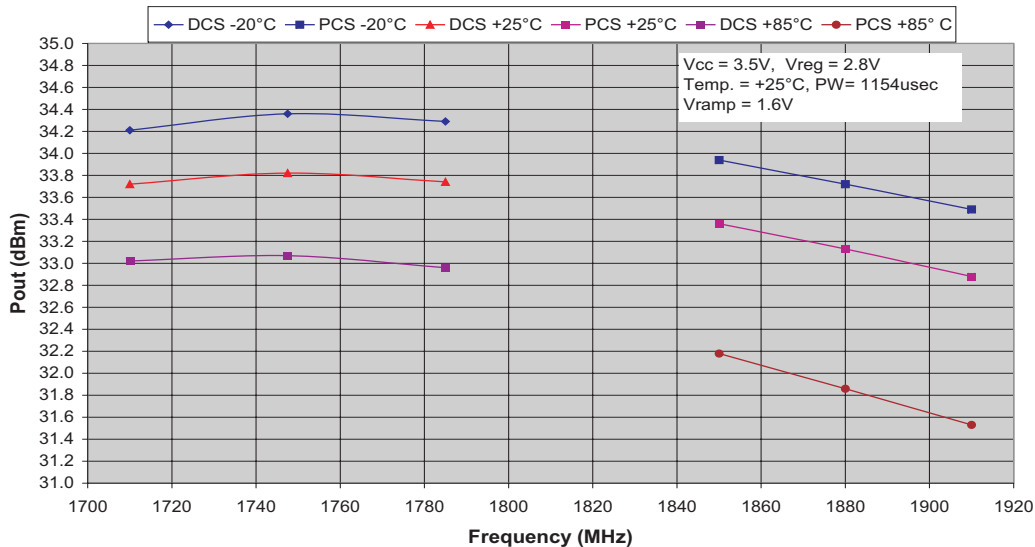
Figure 4: DCS/PCS Pout vs Vramp & Temperature  
(2 TX slots)



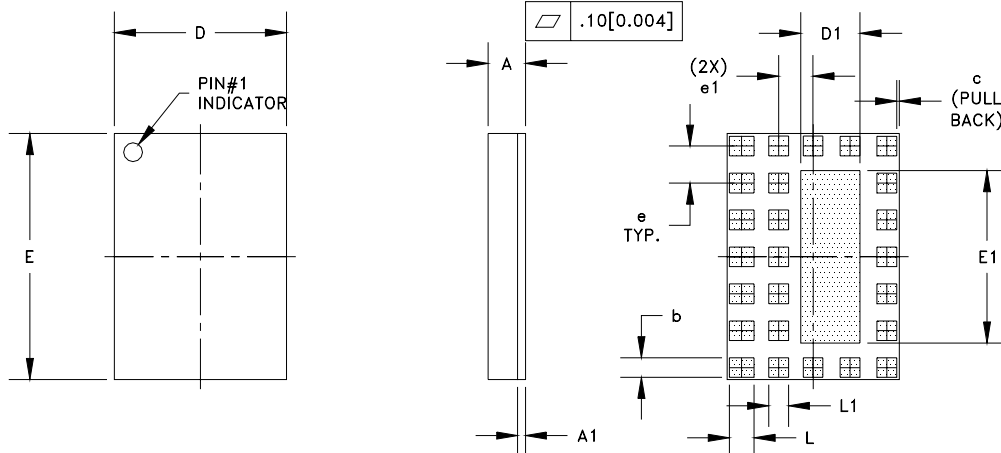
**Figure 5: GSM850/GSM900 P<sub>MAX</sub> vs. Temperature @ V<sub>ramp</sub>=V<sub>rampmax</sub> = 1.6V (2TX slots)**



**Figure 6: DCS/PCS P<sub>MAX</sub> vs. Temperature @ V<sub>RAMP</sub> = V<sub>RAMPMAX</sub> = 1.6 V ( 2 TX slots)**



## PACKAGE OUTLINE



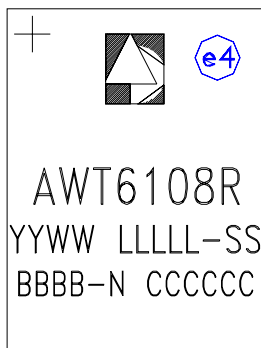
| S <sub>960L</sub> | MILLIMETERS |       |       | INCHES |       |      | NOTE |
|-------------------|-------------|-------|-------|--------|-------|------|------|
|                   | MIN.        | NOM.  | MAX.  | MIN.   | NOM.  | MAX. |      |
| A                 | 1.31        | 1.41  | 1.51  | —      | 0.055 | —    | —    |
| A1                | —           | 0.31  | —     | —      | 0.012 | —    | —    |
| b                 | —           | 0.80  | —     | —      | 0.031 | —    | 25X  |
| c                 | —           | 0.10  | —     | —      | 0.004 | —    | —    |
| D                 | 6.88        | 7.00  | 7.12  | —      | 0.276 | —    | —    |
| D1                | —           | 2.40  | —     | —      | 0.094 | —    | —    |
| E                 | 9.88        | 10.00 | 10.12 | —      | 0.394 | —    | —    |
| E1                | —           | 7.00  | —     | —      | 0.275 | —    | —    |
| e                 | —           | 1.50  | —     | —      | 0.059 | —    | TYP. |
| e1                | —           | 1.40  | —     | —      | 0.055 | —    | 2X   |
| L                 | —           | 1.00  | —     | —      | 0.039 | —    | 7X   |
| L1                | —           | 0.80  | —     | —      | 0.031 | —    | 18X  |

NOTES:

1. CONTROLLING DIMENSIONS: MILLIMETERS [INCHES].  
2. UNLESS SPECIFIED TOLERANCE= $\pm 0.076$ [0.003].

### Figure 7: Package Outline

TOP BRAND



NOTES:

- |                                                |                                                                                    |
|------------------------------------------------|------------------------------------------------------------------------------------|
| 1. ANADIGICS LOGO SIZE:                        | X=0.080±0.010    Y=0.095±0.010                                                     |
| 2. PART #                                      | AWT6108R                                                                           |
| 3. YEAR AND WORK WEEK:                         | YYWW: YY = YEAR, WW = WORK WEEK                                                    |
| 4. LOT - WAFER I.D.:                           | LLLLL = LOT#(USE U3 LOT#),SS = WAFER I.D.                                          |
| 5. PIN 1 INDICATOR:                            | LASER MARK                                                                         |
| 6. BOM #                                       | 5237-A                                                                             |
| 7. COUNTRY CODE:                               | CC = TH -for- THAILAND, TW -for- TAIWAN,<br>PH -for- PHILLIPPINES, CH -for- CHINA, |
| 8. TYPE : ELITE<br>SIZE : AS LARGE AS POSSIBLE | ID -for- INDONESIA, HK -for- HONG KONG                                             |

### Figure 8: Branding Specification



### Figure 9: Tape & Reel Packaging

### Table 8: Tape & Reel Dimensions

| PACKAGE TYPE    | TAPE WIDTH | POCKET PITCH | REEL CAPACITY | MAX REEL DIA |
|-----------------|------------|--------------|---------------|--------------|
| 7 X 10 x 1.4 mm | 16mm       | 12mm         | 2500          | 22"          |

NOTES

**ORDERING INFORMATION**

| ORDER NUMBER  | TEMPERATURE RANGE | PACKAGE DESCRIPTION                                                    | COMPONENT PACKAGING                 |
|---------------|-------------------|------------------------------------------------------------------------|-------------------------------------|
| AWT6108RM10P8 | -30 °C to +110 °C | RoHS Compliant 20 Pin<br>7 mm x 10 mm x 1.4 mm<br>Surface Mount Module | Tape and Reel, 2500 pieces per reel |

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