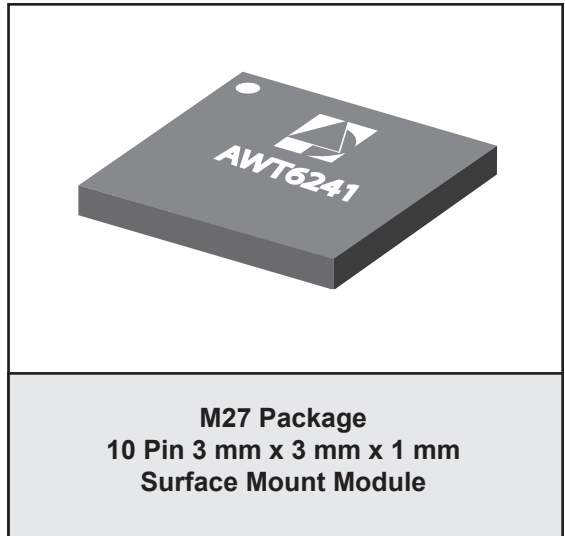


FEATURES

- InGaP HBT Technology
- High Efficiency:
 42 % @ $P_{OUT} = +28.5$ dBm
 26 % @ $P_{OUT} = +17$ dBm (without DC/DC Converter)
- Low Quiescent Current: 8 mA (in low power mode)
- Low Leakage Current in Shutdown Mode: $<1 \mu A$
- Internal Voltage Regulator Eliminates the need for External Reference Voltage (V_{REF})
- HSPA Compliant (no backoff)
- One mode control input
- Optimized for a 50Ω System
- Low Profile Miniature Surface Mount Package: 1 mm
- RoHS Compliant Package, 250 °C MSL-3



APPLICATIONS

- WCDMA / HSPA IMT/UMTS-Band Wireless Handsets and Data Devices

PRODUCT DESCRIPTION

The AWT6241 HELP3™ PA is a next generation product for UMTS handsets. This PA incorporates ANADIGICS' HELP3™ technology to provide low power consumption without the need for an external voltage regulator or DC/DC Converter. The AWT6241 is manufactured on

an advanced InGaP HBT MMIC technology offering state-of-the-art reliability, temperature stability, and ruggedness. There are two operating modes for optimum efficiency at high and medium/low power output levels with a single mode input. A shutdown mode with low leakage current increases handset talk and standby-time. The self-contained 3 mm x 3 mm x 1 mm surface mount package incorporates matching networks optimized for output power, efficiency, and linearity in a 50Ω system.

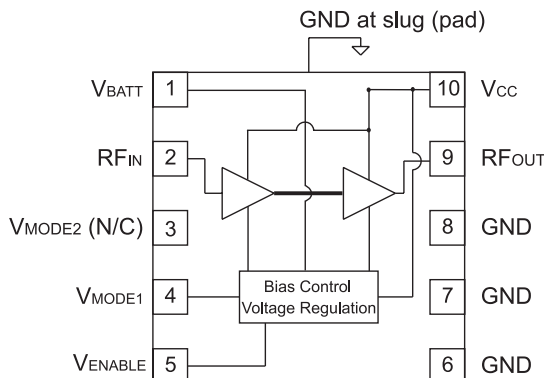


Figure 1: Block Diagram

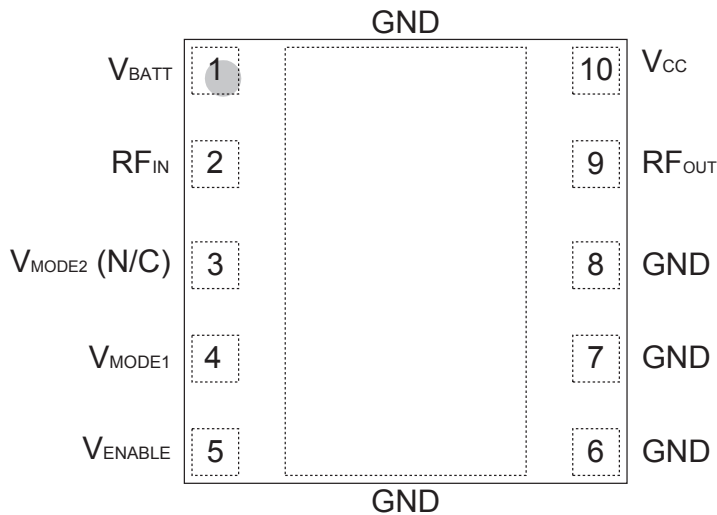


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

| PIN | NAME | DESCRIPTION |
|-----|-------------------|------------------------|
| 1 | V_{BATT} | Battery Voltage |
| 2 | RF_{IN} | RF Input |
| 3 | V_{MODE2} (N/C) | No Connection |
| 4 | V_{MODE1} | Mode Control Voltage 1 |
| 5 | V_{ENABLE} | PA Enable Voltage |
| 6 | GND | Ground |
| 7 | GND | Ground |
| 8 | GND | Ground |
| 9 | RF_{OUT} | RF Output |
| 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 |
| Battery Voltage (V_{BATT}) | 0 | +6 | V |
| Control Voltages (V_{MODE1} , V_{ENABLE}) | 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 | +3.4 | +4.2 | V | $P_{OUT} \leq +28.5$ dBm |
| Enable Voltage (V_{ENABLE}) | +2.15 0 | +2.4 - | +3.1 +0.5 | V | PA "on" PA "shut down" |
| Mode Control Voltage (V_{MODE1}) | +2.15 0 | +2.4 - | +3.1 +0.5 | V | Low Bias Mode High Bias Mode |
| RF Output Power (P_{OUT}) R99 WCDMA, HPM HSPA (MPR=0), HPM R99 WCDMA, LPM HSPA (MPR=0), LPM | 28 ⁽¹⁾ 27 ⁽¹⁾ 16.5 ⁽¹⁾ 15.5 ⁽¹⁾ | 28.5 27.5 17 16 | 28.5 27.5 17 16 | dBm | 3GPP TS 34.121-1, Rel 7 Table C.11.1.3 |
| 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_C = +25 °C, V_{CC} = +3.4 V, V_{BATT} = +3.4 V, V_{ENABLE} = +2.4 V, 50 Ω system)

| PARAMETER | MIN | TYP | MAX | UNIT | COMMENTS | |
|--|--------------|--------------|--------------|--------|--|--------------------|
| | | | | | P _{OUT} | V _{MODE1} |
| Gain | 25.0 12.0 | 27.5 14.0 | 30.0 16.5 | dB | +28.5 dBm +17 dBm | 0 V 2.4 V |
| ACLR1 at 5 MHz offset ⁽¹⁾ | - - | -41 -42 | -38 -37.5 | dBc | +28.5 dBm +17 dBm | 0 V 2.4 V |
| ACLR2 at 10 MHz offset | - - | -55 -55 | -48 -48 | dBc | +28.5 dBm +17 dBm | 0 V 2.4 V |
| Power-Added Efficiency ⁽¹⁾ (without DC/DC Converter) | 39 23 | 42 26 | - - | % | +28.5 dBm +17 dBm | 0 V 2.4 V |
| Quiescent Current (I _q) Low Bias Mode | - | 8 | 13 | mA | V _{MODE1} = +2.4 V | |
| Mode Control Current | - | 0.3 | 0.8 | mA | through V _{MODE} pin, V _{MODE1} = +2.4 V | |
| Enable Current | - | 0.3 | 0.8 | mA | through V _{ENABLE} pin, V _{EN} = +2.4 V | |
| BATT Current | - | 3.0 | 5 | mA | through V _{BATT} pin, V _{MODE1} = +2.4 V | |
| Leakage Current | - | <1 | 5 | μA | V _{BATT} = +4.3 V, V _{CC} = +4.3 V, V _{ENABLE} = 0 V, V _{MODE1} = 0 V | |
| Noise in Receive Band ⁽²⁾ | - | -137 | -135 | dBm/Hz | P _{OUT} ≤ +28.5 dBm, V _{MODE} = 0 V | |
| | - | -143 | -138 | dBm/Hz | P _{OUT} ≤ 17 dBm, V _{MODE} = +2.4 V | |
| Harmonics 2fo 3fo, 4fo | - - | -42 -52 | -35 -35 | dBc | P _{OUT} ≤ +28.5 dBm | |
| Input Impedance | - | - | 2:1 | VSWR | | |
| Spurious Output Level (all spurious outputs) | - | - | -70 | dBc | P _{OUT} ≤ +28.5 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 full operating range | |

Notes:

(1) ACLR and Efficiency measured at 1950 MHz.

(2) Noise measured at 2110 to 2170 MHz.

3. P_{OUT} ≤ +28.5 dBm; In-band load VSWR < 5:1; Out-of-band load VSWR < 10:1; Applies over all operating conditions.

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 the V_{ENABLE} and V_{MODE1} 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 V_{MODE1} . The Bias Control table lists the recommended modes of operation for various applications. V_{MODE2} is not necessary for this PA.

Two operating modes are available to optimize current consumption. High Bias/High Power operating mode is for P_{OUT} levels ≥ 16 dBm. At around 16 dBm output power, the PA should be “Mode Switched” to Medium/Low power mode for lowest quiescent current consumption.

Table 5: Bias Control

| APPLICATION | P_{OUT} LEVELS | BIAS MODE | V_{ENABLE} | V_{MODE1} | V_{CC} | V_{BATT} |
|---|------------------|-----------|--------------|-------------|-------------|--------------|
| UMTS - med/low power (Low Bias Mode) | $\leq +17$ dBm | Low | +2.4 V | +2.4 V | 3.2 - 4.2 V | ≥ 3.2 V |
| UMTS - high power (High Bias Mode) | $> +16$ dBm | High | +2.4 V | 0 V | 3.2 - 4.2 V | ≥ 3.2 V |
| Optional lower V_{CC} in low power mode | $\leq +7$ dBm | Low | +2.4 V | +2.4 V | 1.5 V | ≥ 3.2 V |
| Shutdown | - | Shutdown | 0 V | 0 V | 3.2 - 4.2 V | ≥ 3.2 V |

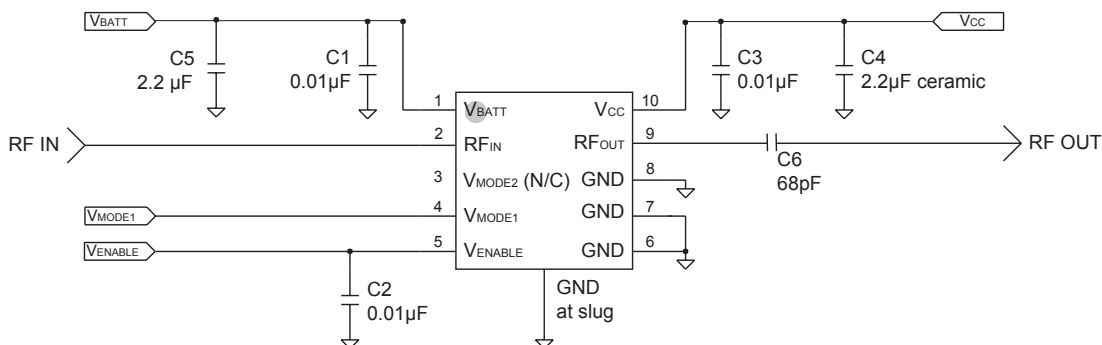
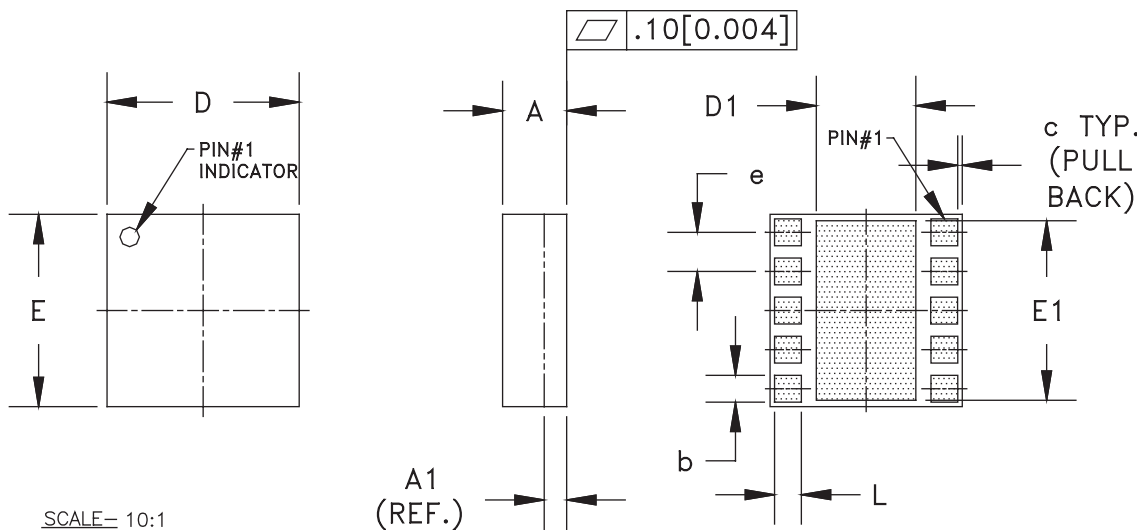


Figure 3: Application Circuit Schematic

PACKAGE OUTLINE



| SYMBOL | 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

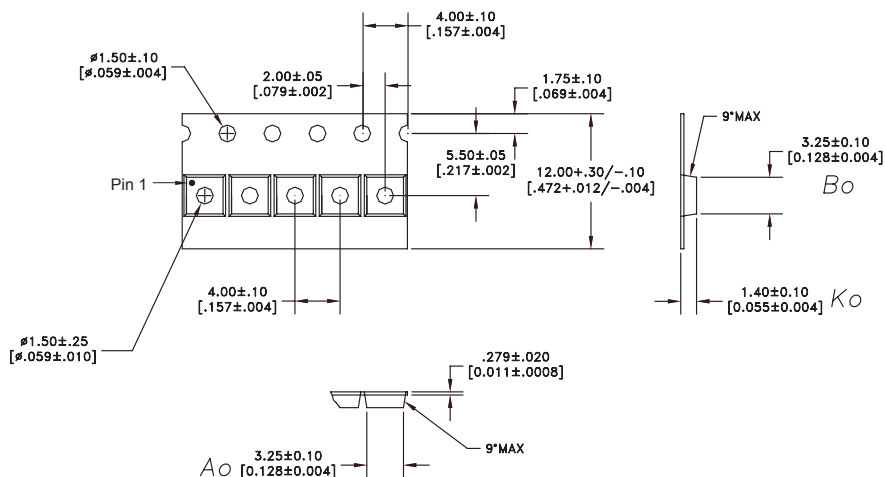


NOTES:

1. ANADIGICS LOGO SIZE: NONE
2. PART NUMBER: B241R
3. WAFER LOT NUMBER: LLLL = FOUR DIGIT LOT NUMBER
NN = THREE DIGIT WAFER NUMBER
4. PIN 1 INDICATOR: LASER DOT
5. B.O.M. #: 092
6. COUNTRY CODE: CC = TH -for- THAILAND, TW -for- TAIWAN,
PH -for- PHILIPPINES, CH -for- CHINA,
ID -for- INDONESIA, HK -for- HONG KONG
7. TYPE : ARIAL
SIZE : 1.5-POINT
COLOR : LASER

Figure 5: Branding Specification - M27 Package

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 |
|---------------|-------------------|---|-------------------------------------|
| AWT6241RM27Q7 | -20 °C to +90 °C | RoHS Compliant 10 Pin 3 mm x 3 mm x 1 mm Surface Mount Module | Tape and Reel, 2500 pieces per Reel |
| AWT6241RM27P9 | -20 °C to +90 °C | RoHS Compliant 10 Pin 3 mm x 3 mm x 1 mm Surface Mount Module | Partial Tape and Reel |

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