AWT6308R

HELP2™ PCS/CDMA 3.4V/28dBm Linear Power Amplifier Module

Data Sheet - Rev 2.3

FEATURES

- InGaP HBT Technology
- High Efficiency:
  40 % @ +28 dBm output
  19 % @ +16 dBm output
- Low Quiescent Current: 15 mA
- Low Leakage Current in Shutdown Mode: <1 μA
- Internal Voltage Regulation
- Optimized for a 50 Ω System
- Low Profile Miniature 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

APPLICATIONS

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

PRODUCT DESCRIPTION

The AWT6308R 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 AWT6308R 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 AWT6308R 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 AWT6308R 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 Ω system.

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

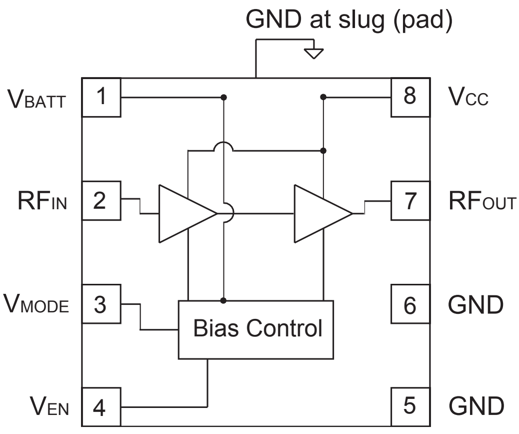


Figure 1: Block Diagram

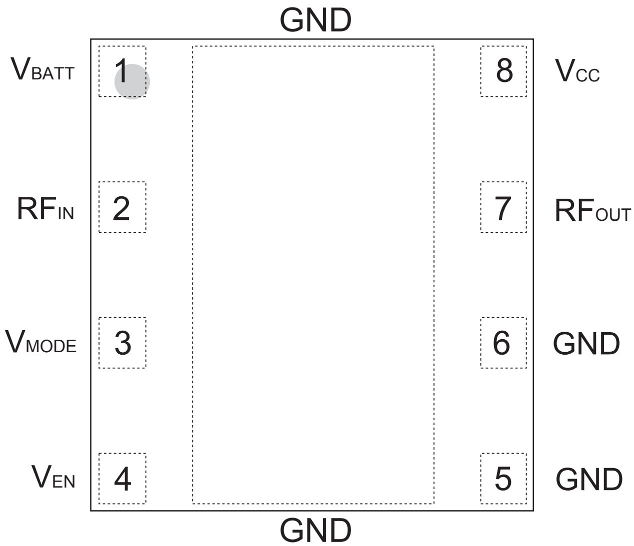


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

PIN	NAME	DESCRIPTION
1	V_{BATT}	Battery Voltage
2	RF_{IN}	RF Input
3	V_{MODE}	Mode Control Voltage
4	V_{EN}	PA Enable Voltage
5	GND	Ground
6	GND	Ground
7	RF_{OUT}	RF Output
8	V_{CC}	Supply Voltage

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)	1850	-	1915	MHz	
Supply Voltage (V_{CC} and V_{BATT})	+3.2	+3.4	+4.2	V	
Enable Voltage (V_{EN})	+2.2 0	+2.4 -	+3.1 +0.5	V	PA "on" PA "shut down"
Mode Control Voltage (V_{MODE})	+2.2 0	+2.4 -	+3.1 +0.5	V	Low Bias Mode High Bias Mode
RF Output Power (P_{OUT})	27.5 (1)	+28.0	-	dBm	
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_C = +25 °C, V_{BATT} = V_{CC} = +3.4 V, V_{EN} = +2.4 V, 50 Ω system, IS-95 uplink waveform)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Gain	24.5 14 14	27 16 16	29.5 18 18	dB	P_{OUT} = +28 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +2.4 V P_{OUT} = +18 dBm, V_{MODE} = +2.4 V, V_{CC} = +3.7 V
Adjacent Channel Power at ±1.25 MHz offset Primary Channel BW = 1.23 MHz Adjacent Channel BW = 30 kHz	- - -	-51 -58 -52	-46.5 -47 -47	dBc	P_{OUT} = +28 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +2.4 V P_{OUT} = +18 dBm, V_{MODE} = +2.4 V, V_{CC} = +3.7 V
Adjacent Channel Power at ±1.98 MHz offset Primary Channel BW =1.23 MHz Adjacent Channel BW = 30 kHz	- -	-56 -56	-53 -53	dBc	P_{OUT} = +28 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +2.4 V
Adjacent Channel Power at ±2.25 MHz offset Primary Channel BW = 1.23 MHz Adjacent Channel BW = 30 kHz	- -	-62 -62	-57 -57	dBc	P_{OUT} = +28 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +2.4 V
Power-Added Efficiency	36 16	40 19	- -	%	P_{OUT} = +28 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +2.4 V
Quiescent Current (Icq)	-	15	20	mA	through V_{CC} pin, V_{MODE} = +2.4 V
Enable Current	-	0.3	0.8	mA	through V_{EN} pin, PA "on"
Mode Control Current	-	0.3	0.8	mA	through V_{MODE} pin, V_{MODE} = +2.4 V
Battery Current	-	3	5	mA	through V_{BATT} pin, V_{MODE} = +2.4 V
Leakage Current	-	<1	5	µA	V_{CC} = +4.2 V, V_{EN} = 0 V, V_{MODE} = 0 V
Noise in Receive Band	-	-135	-133	dBm/Hz	1930 MHz to 1990 MHz
Harmonics 2fo 3fo, 4fo	- -	-43 -55	-30 -30	dBc	
Input Impedance	-	-	2:1	VSWR	
Spurious Output Level (all spurious outputs)	-	-	-65	dBc	P_{OUT} ≤ +28 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range

Notes:
1. ACPRs and Efficiency Limits at mid-band only.

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.

Table 5: Bias Control

APPLICATION	P_{OUT} LEVELS	LOGIC	V_{EN}	V_{MODE}
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

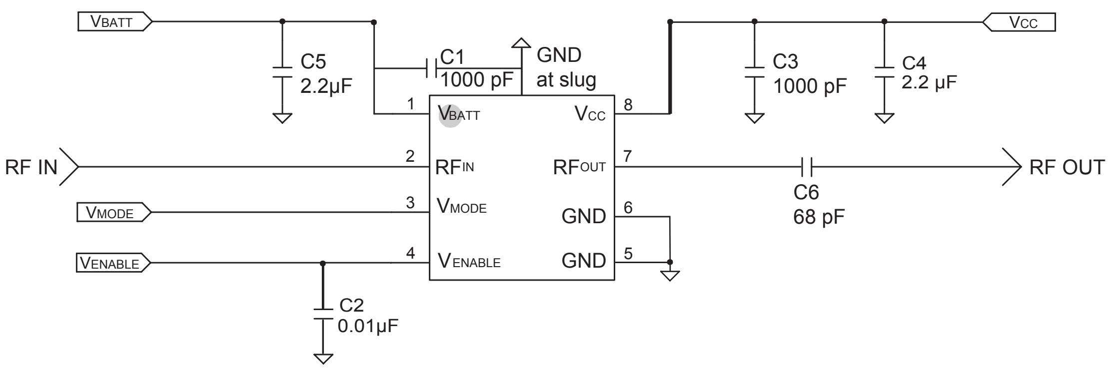
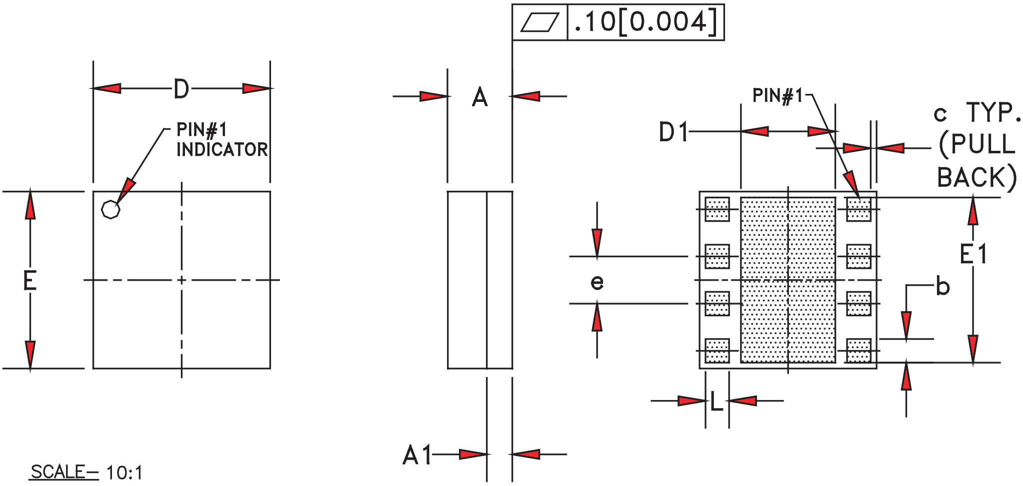


Figure 3: Application Circuit

PACKAGE OUTLINE



SYMBOL	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

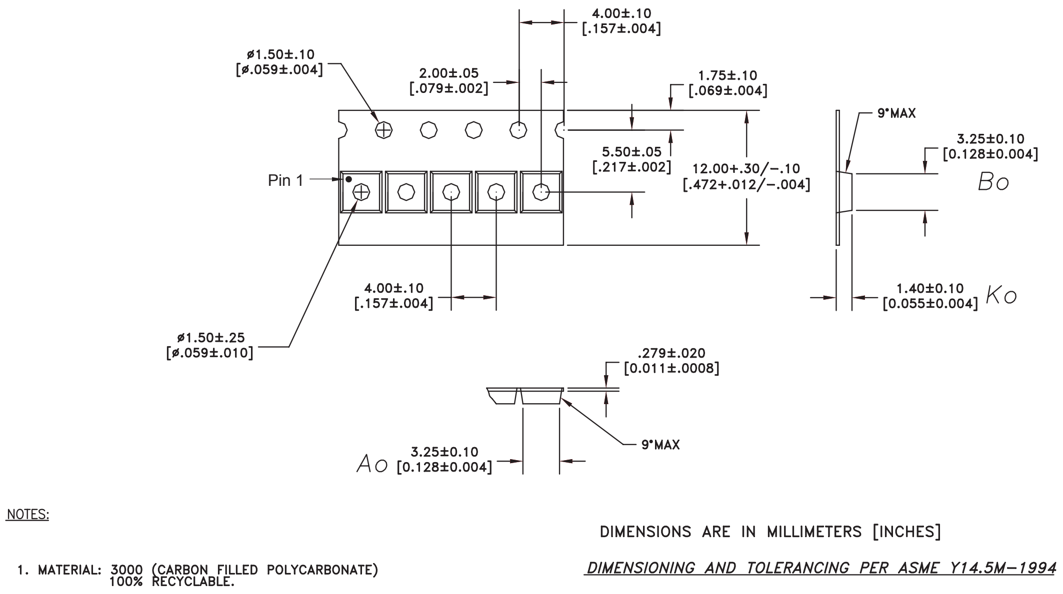


Figure 6: Tape & Reel Packaging

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
AWT6308RM9Q7	-30 °C to +85 °C	RoHS-Compliant 8 Pin 3 mm x 3 mm x 1 mm Surface Mount Module	Tape and Reel, 2500 pieces per Reel

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