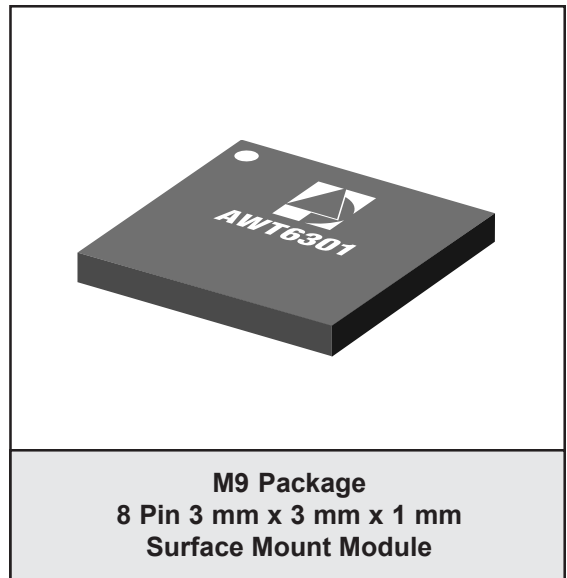


### FEATURES

- InGaP HBT Technology
- High Efficiency: 53 % AMPS, 39 % CDMA
- Low Quiescent Current: 60 mA
- Low Leakage Current in Shutdown Mode:  $<1 \mu\text{A}$
- $V_{\text{REF}} = +2.85 \text{ V}$  (+2.7 V Min Over Temp.)
- Optimized for a  $50 \Omega$  System
- Surface Mount Package
- CDMA 1XRTT, 1xEV-DO Compliant
- Pinout Enables Easy Phone Board Migration From 4 mm x 4 mm Package

### APPLICATIONS

- Single Mode CDMA Wireless Handsets
- Dual Mode AMPS/CDMA Wireless Handsets



### PRODUCT DESCRIPTION

The AWT6301 meets the increasing demands for higher efficiency and linearity in AMPS/CDMA 1X handsets, while reducing pcb area by 44%. The package pinout was chosen to enable handset manufacturers to switch from a 4mm x 4mm PA module with very few layout changes to the phone board. 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, serve to increase handset talk and standby time. The self contained 3mm x 3mm surface mount package incorporates matching networks optimized for output power, efficiency and linearity in a  $50 \Omega$  system.

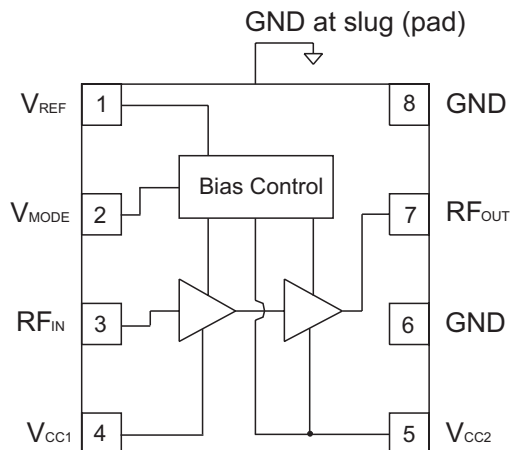


Figure 1: Block Diagram

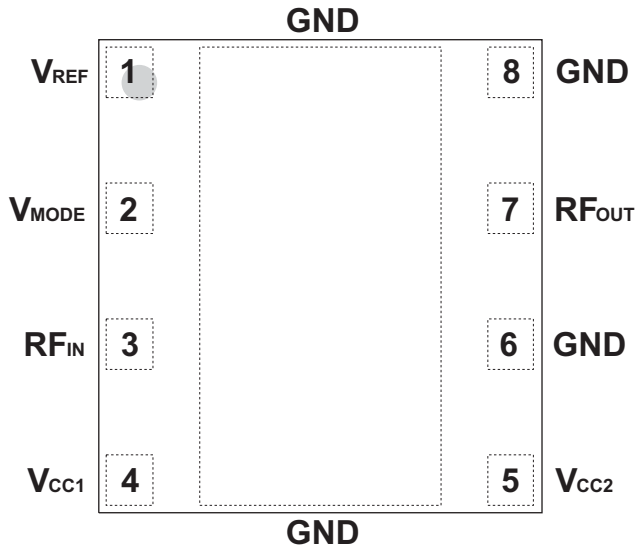


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

PIN	NAME	DESCRIPTION
1	V <sub>REF</sub>	Reference Voltage
2	V <sub>MODE</sub>	Mode Control
3	RF <sub>IN</sub>	RF Input
4	V <sub>CC1</sub>	Supply Voltage
5	V <sub>CC2</sub>	Supply Voltage
6	GND	Ground
7	RF <sub>OUT</sub>	RF Output
8	GND	Ground

## ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage ( $V_{CC}$ ) With RF Drive DC Only	0 0	+5 +8	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)	824	-	849	MHz	
Supply Voltage ( $V_{CC}$ )	+3.2	+3.4	+4.2	V	
Reference Voltage ( $V_{REF}$ )	+2.7 0	+2.85 -	+3.1 +0.5	V	PA "on" PA "shut down"
Mode Control Voltage ( $V_{MODE}$ )	+2.5 0	+2.8 -	+3.1 +0.5	V	Low Bias Mode High Bias Mode
RF Output Power ( $P_{OUT}$ )	30.5 <sup>(1)</sup> 27.5 <sup>(1)</sup>	31.0 28.0	- -	dBm	AMPS CDMA
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  $T_C = +85$  °C and  $V_{CC} = +3.2$  V,  $P_{OUT}$  is derated by 0.5 dB.

**Table 4: Electrical Specifications - AMPS Operation**  
**(T<sub>c</sub> = +25 °C, V<sub>CC</sub> = +3.4 V, V<sub>REF</sub> = +2.85 V, V<sub>MODE</sub> = 0 V, P<sub>OUT</sub> = +31 dBm, 50 Ω system)**

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Gain	24	26.5	30	dB	
Gain Variation	-	0.3	1.0	dB	
Power-Added Efficiency <sup>(1)</sup>	50	53	-	%	
Quiescent Current (I <sub>q</sub> )	-	120	145	mA	V <sub>MODE</sub> = 0 V, High Bias
Reference Current	-	5.0	8	mA	through V <sub>REF</sub> pin
Leakage Current	-	<1	5	μA	V <sub>CC</sub> = +4.2 V, V <sub>REF</sub> = 0 V, V <sub>MODE</sub> = 0 V
Noise in Receive Band	-	-134	-132	dBm/Hz	869 MHz to 894 MHz
Harmonics 2fo 3fo, 4fo	- - -	-35 -50	-30 -30	dBc	
Input Impedance	-	-	2:1	VSWR	
Spurious Output Level (all spurious outputs)	-	-	-65	dBc	P <sub>OUT</sub> ≤ +31 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	10:1	-	-	VSWR	Applies over all operating ranges

Notes:

(1) PAE limit applies at 824 MHz.

**Table 5: Electrical Specifications - CDMA Operation**  
**(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	25 24	27.5 26.2	30 28	dB	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Adjacent Channel Power at ± 885 kHz offset <sup>(1)</sup> Primary Channel BW = 1.23 MHz Adjacent Channel BW = 30 kHz	- -	-49.5 -56	-47 -47	dBc	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Adjacent Channel Power at ± 1.98 MHz offset <sup>(1)</sup> Primary Channel BW = 1.23 MHz Adjacent Channel BW = 30 kHz	- -	-59.5 -65	-57 -57	dBc	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Power-Added Efficiency <sup>(1)</sup>	37 8	39 8.8	- -	%	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Quiescent Current (I <sub>q</sub> )	-	62	70	mA	V <sub>MODE</sub> = +2.85 V, Low Bias
Reference Current	-	5	8	mA	through V <sub>REF</sub> pin
Mode Control Current	-	0.35	1.0	mA	through V <sub>MODE</sub> pin
Leakage Current	-	<1	5	μA	V <sub>CC</sub> = +4.2 V, V <sub>REF</sub> = 0 V, V <sub>MODE</sub> = 0 V
Noise in Receive Band	-	-135	-133	dBm/Hz	869 MHz to 894 MHz
Harmonics 2fo 3fo, 4fo	- - -	-35 -50	-30 -30	dBc	
Input Impedance	-	-	2:1	VSWR	
Spurious Output Level (all spurious outputs)	-	-	-65	dBc	P <sub>OUT</sub> ≤ +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	10:1	-	-	VSWR	Applies over all operating ranges

Notes:

(1) PAE and ACP limit applies at 824 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 a logic low levels (see Operating Ranges table) to both the  $V_{REF}$  and  $V_{MODE}$  voltages.

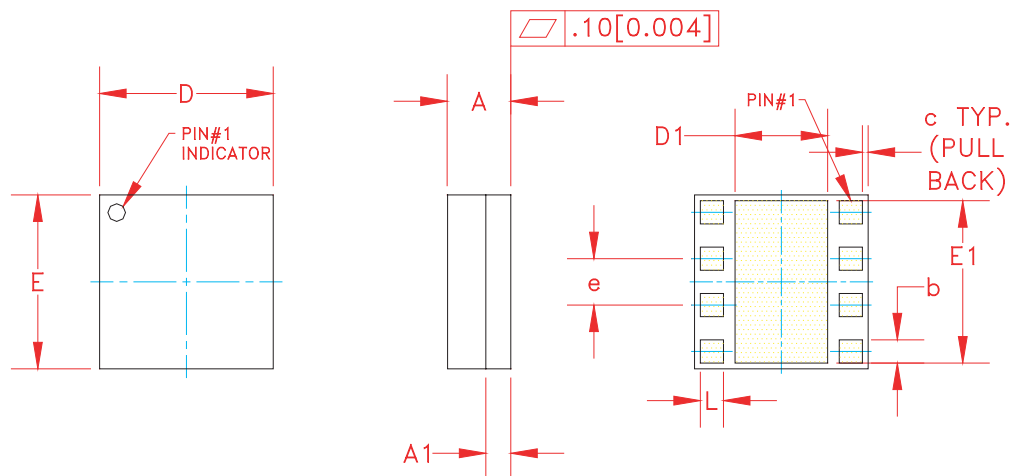
**Bias Modes**

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 6: Bias Control

APPLICATION	$P_{OUT}$ LEVELS	BIAS MODE	$V_{REF}$	$V_{MODE}$
AMPS	(all)	High	+2.85 V	0 V
CDMA - low power	$\leq +16$ dBm	Low	+2.85 V	+2.85 V
CDMA - high power	$> +16$ dBm	High	+2.85 V	0 V
Shutdown	-	Shutdown	0 V	0 V

## PACKAGE OUTLINE



Symbol	MILLIMETERS			INCHES			NOTE
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
A	1.07	1.17	1.27	0.042	0.046	0.05	—
A1	—	0.51	—	—	0.020	—	—
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 3: M9 Package Outline - 8 Pin 3 mm x 3 mm x 1 mm Surface Mount Module

## TOP BRAND

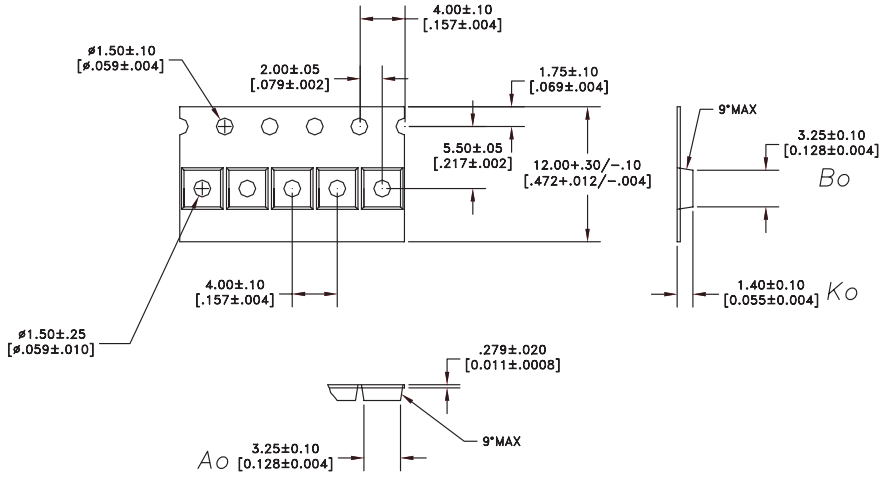


## NOTES:

1. ANADIGICS LOGO SIZE: NONE
2. PART NUMBER: FOUR DIGIT NUMERICAL
3. WAFER LOT NUMBER: LLLLL = 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 4: Branding Specification

COMPONENT PACKAGING



NOTES:

- MATERIAL: 3000 (CARBON FILLED POLYCARBONATE)  
100% RECYCLABLE.

DIMENSIONS ARE IN MILLIMETERS [INCHES]

DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994

Figure 5: Tape & Reel Packaging

Table 7: 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"



NOTES

**AWT6301**

**NOTES**

NOTES

**ORDERING INFORMATION**

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
AWT6301M9Q7	-30 °C to +85 °C	8 Pin 3 mm x 3 mm x 1 mm Surface Mount Module 235 °C MSL-4	Tape and Reel, 2500 pieces per Reel

**ANADIGICS, Inc.**

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Warren, New Jersey 07059, U.S.A.

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Fax: +1 (908) 668-5132

URL: <http://www.anadigics.com>

E-mail: [Mktg@anadigics.com](mailto:Mktg@anadigics.com)

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