



## AWT6310R

Dual-band CDMA/PCS

3.4 V/28 dBm Linear Power Amplifier Module

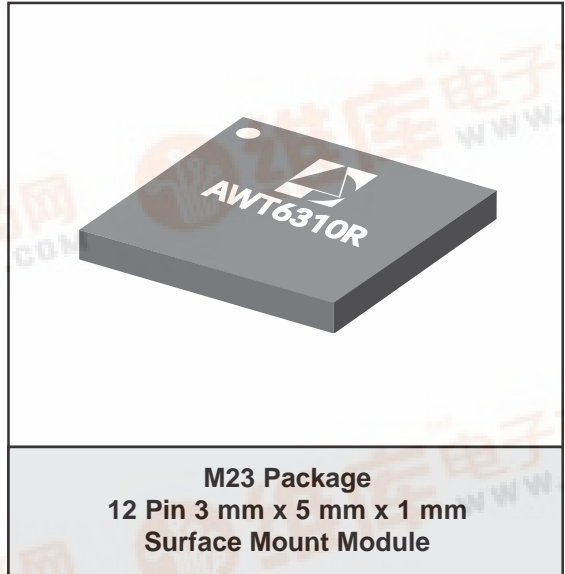
PRELIMINARY DATA SHEET - Rev 1.1

### FEATURES

- Single Mode Operation:  $P_{OUT} \leq +28$  dBm
- High Efficiency: 54 % AMPS, 39 % CDMA
- Low Quiescent Current: 50 mA
- 25 % Package Size Reduction
- Common  $V_{MODE}$  Control Line
- Simplified  $V_{CC}$  Bus PCB routing
- Reduced External Component Count
- Low Profile Surface Mount Package: 1.1 mm
- RoHS Compliant Package, 250 °C MSL-3

### APPLICATIONS

- Dual-band Cellular/PCS CDMA Wireless Handsets



### PRODUCT DESCRIPTION

The AWT6310R meets the increasing demands for higher levels of integration in dual-band CDMA/PCS 1X handsets, while reducing board area requirements by 25 %. The package pinout was chosen to enable handset manufacturers to easily route  $V_{CC}$  to both power amplifiers and simplify control with a common  $V_{MODE}$  pin. 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 3 mm x 5 mm x 1 mm surface mount package incorporates matching networks optimized for output power, efficiency and linearity in a 50  $\Omega$  system.

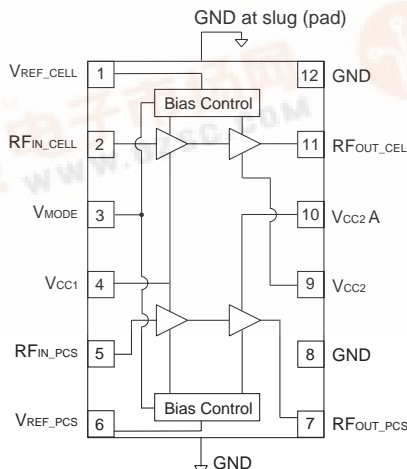


Figure 1: Block Diagram



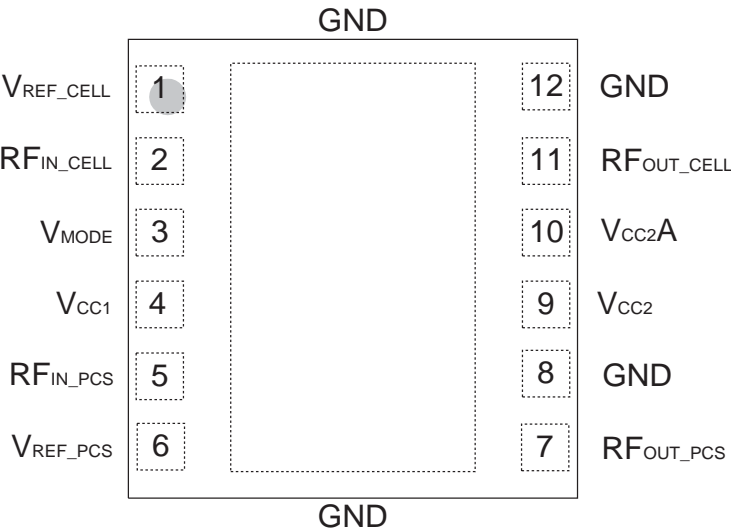


Figure 2: Pinout

Table 1: Pin Description

PIN	NAME	DESCRIPTION
1	$V_{REF\_CELL}$	Reference Voltage for Cell Band
2	$RF_{IN\_CELL}$	RF Input for Cell Band
3	$V_{MODE}$	Mode Control Voltage
4	$V_{CC1}$	Supply Voltage
5	$RF_{IN\_PCS}$	RF Input for PCS Band
6	$V_{REF\_PCS}$	Reference Voltage for PCS Band
7	$RF_{OUT\_PCS}$	RF Output for PCS Band
8	GND	Ground
9	$V_{CC2}$	Supply Voltage
10	$V_{CC2A}$	Supply Voltage
11	$RF_{OUT\_CELL}$	RF Output for Cell Band
12	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 1850	-	849 1910	MHz	Cellular PCS
Supply Voltage ( $V_{CC}$ )	+3.2	+3.4	+4.2	V	
Reference Voltage ( $V_{REF}$ )	+2.75 0	+2.85 -	+3.1 +0.5	V	PA "on" PA "shut down"
Mode Control Voltage ( $V_{MODE}$ )	+2.5 0	+2.85 -	+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  $V_{CC} = +3.2$  V,  $P_{OUT}$  is derated by 0.5 dB.

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**Table 4: Electrical Specifications - AMPS Operation**  
( $T_C = +25\text{ }^{\circ}\text{C}$ ,  $V_{CC} = +3.4\text{ V}$ ,  $V_{REF} = +2.85\text{ V}$ ,  $V_{MODE} = 2.85\text{ V}$ ,  $P_{OUT} = +31\text{ dBm}$ ,  $50\text{ }\Omega$  system)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Gain	24	26	29	dB	
Gain Variation	-	0.4	1.0	dB	
Power-Added Efficiency <sup>(1)</sup>	50	54	-	%	
Quiescent Current (Icq)	-	50	70	mA	Low Bias
Reference Current	-	1.5	3	mA	through VREF pin
Leakage Current	-	<1	5	$\mu\text{A}$	$V_{CC} = +4.2\text{ V}$ , $V_{REF} = 0\text{ V}$ , $V_{MODE} = 0\text{ V}$
Noise in Receive Band	-	-134	-132	dBm/Hz	869 MHz to 894 MHz
Harmonics 2fo 3fo, 4fo	- - -	-46 -50	-30 -30	dBc	
Input Impedance	-	-	2:1	VSWR	
Spurious Output Level (all spurious outputs)	-	-	-65	dBc	$P_{OUT} \leq +31\text{ dBm}$ 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	10:1	-	-	VSWR	Applies over all operating conditions

Notes:

(1) PAE limit applies at 824 MHz.

**Table 5: Electrical Specifications - Cellular 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 24	27.0 26.5 25.5	29 29 28	dB	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = +2.85 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	- - -	-50 -51 -50	-47 -47 -47	dBc	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = +2.85 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	- - -	-62 -60 -66	-57 -56 -57	dBc	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = +2.85 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Power-Added Efficiency <sup>(1)</sup>	37 37 8	39 40 9	- - -	%	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = +2.85 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Quiescent Current (I <sub>cq</sub> )	-	50	70	mA	V <sub>MODE</sub> = +2.85 V, Low Bias
Reference Current	-	1.5	3	mA	through V <sub>REF</sub> pin
Mode Control Current	-	0.6	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	-	-133	-131	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 conditions
Load mismatch stress with no permanent degradation or failure	10:1	-	-	VSWR	Applies over all operating conditions

Notes:

(1) PAE and ACP limit applies at 836.5 MHz.

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**Table 6: PCS 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	25 24 23	26.5 26.0 25.0	29 28 28	dB	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = +2.85 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Adjacent Channel Power at ±1.25 MHz offset Primary Channel BW - 1.23 MHz Adjacent Channel BW = 30 kHz	- - -	-50 -51 -53	-47 -47 -47	dBc	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = +2.85 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Adjacent Channel Power at ±2.25 MHz offset Primary Channel BW - 1.23 MHz Adjacent Channel BW = 30 kHz	- - -	-61 -60 -67	-57 -56 -57	dBc	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = +2.85 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Power-Added Efficiency	37 37 8	39 40 9	- - -	%	P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = 0 V P <sub>OUT</sub> = +28 dBm, V <sub>MODE</sub> = +2.85 V P <sub>OUT</sub> = +16 dBm, V <sub>MODE</sub> = +2.85 V
Quiescent Current (I <sub>cq</sub> )	-	48	62	mA	V <sub>MODE</sub> = +2.85 V
Reference Current	-	2.3	4	mA	through V <sub>REF</sub> pin, PA "on"
Mode Control Current	-	0.6	1.0	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, V <sub>MODE</sub> = 0 V
Noise in Receive Band	-	-133	-131	dBm/Hz	1930 MHz to 1990 MHz
Harmonics 2fo 3fo, 4fo	- - -	-46 -55	-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	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

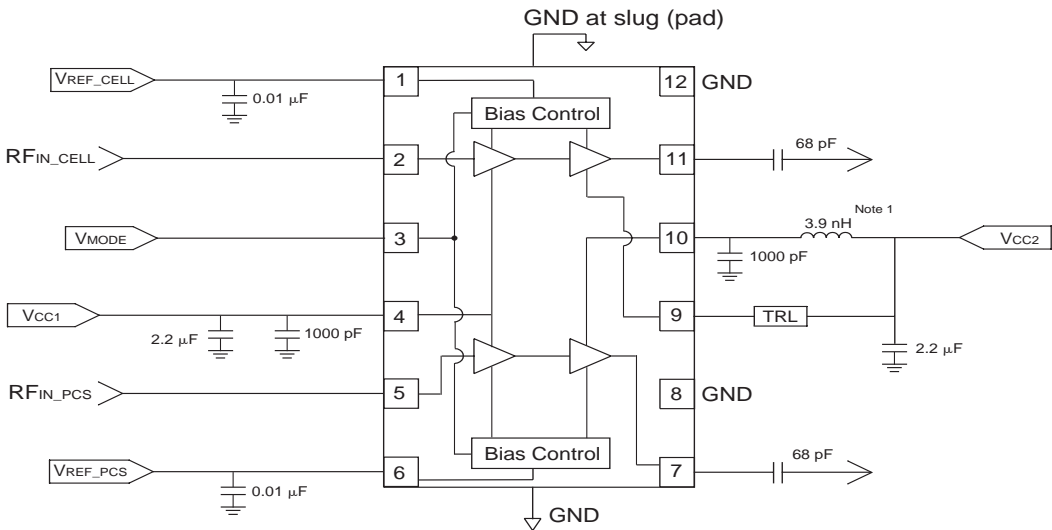
The power amplifier may be placed in a shutdown mode by applying a logic low levels (see Operating Ranges table) to both the  $V_{REF}$  and  $V_{MODE}$  voltages.

## 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 7: Bias Control

APPLICATION	$P_{OUT}$ LEVELS	BIAS MODE	$V_{REF}$	$V_{MODE}$
AMPS	(all)	Low	+2.85 V	+2.85 V
CDMA - low power	$\leq 28$ 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



Note:  
1. 3.9 nH Inductor should be rated for  $> 1$  Amp.

Figure 3: Application Circuit

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PACKAGE OUTLINE

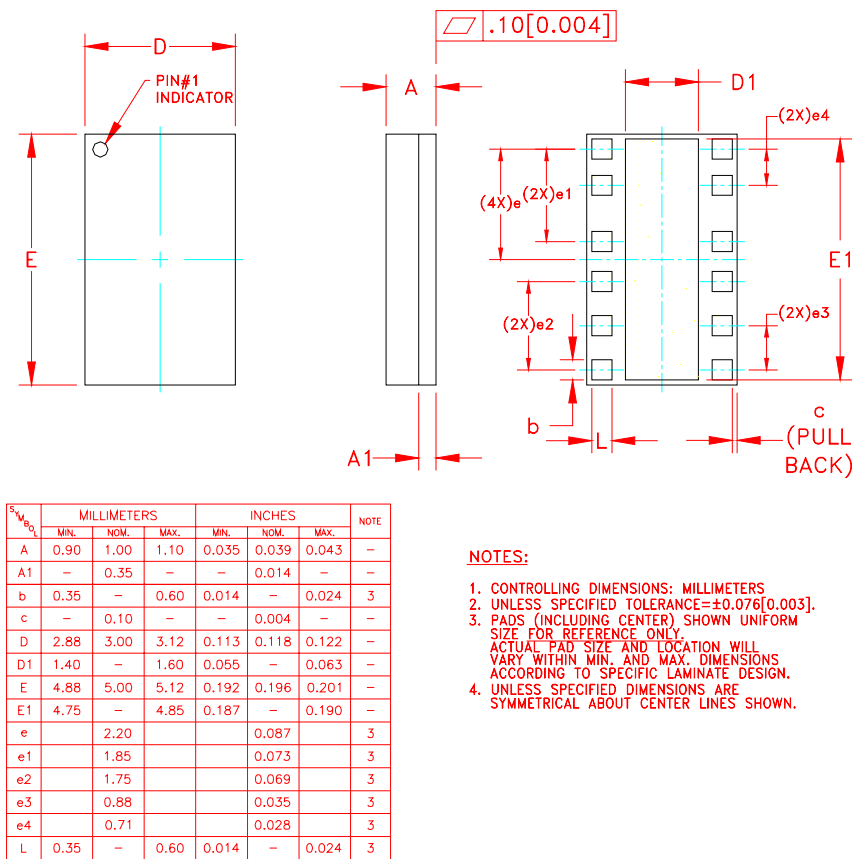


Figure 4: Package Outline - 12 Pin 3 mm x 5 mm x 1 mm Surface Mount Module

TOP BRAND



NOTES:

- |                             |  |
|-----------------------------|--|
| 1. ANADIGICS LOGO SIZE:     | NONE   |
| 2. PART NUMBER:             | FOUR DIGIT NUMERICAL   |
| 3. WAFER LOT NUMBER:        | LLLLL = LOT NUMBER<br>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<br>CC = PH-for-PHILIPPINES, CH-for-CHINA |
| 7. YEAR & WORK WEEK         | YY = YEAR, WW = WORK WEAK  |
| 8. TYPE:<br>SIZE:<br>COLOR: | ARIAL<br>1.5-POINT<br>LASER  |

Figure 5: Branding Specification



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**ORDERING INFORMATION**

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
AWT6310RM23Q7	-30 °C to +85 °C	RoHS Compliant 12 Pin 3 mm x 5 mm x 1 mm Surface Mount Module	Tape and Reel, 2500 pieces per Reel



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