# ANADIGICS

FEATURES

- InGaP HBT Technology
- High Efficiency:
    - 43% @ P_{OUT} = +27.5 dBm
    - 21% @ P_{OUT} = +16 dBm
    - 15% @ P_{OUT} = +7 dBm
- Low Quiescent Current: 16 mA
- Low Leakage Current in Shutdown Mode:<1 mA
- V_{REF} = +2.85 V (+2.75 V min over temp)
- Optimized for a 50 Ω System
- Low Profile Miniature Surface Mount Package
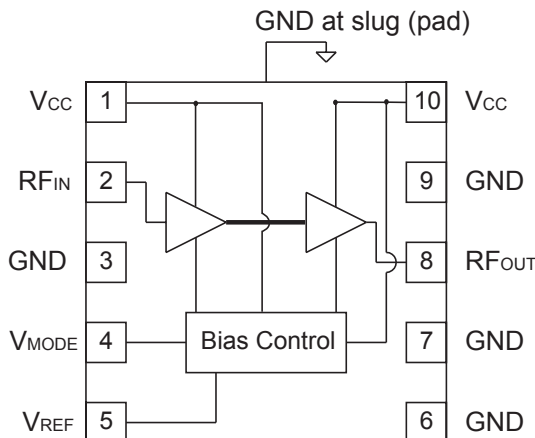- RoHS Compliant Package, 250 °C MSL-3
- HSPA Capable

APPLICATIONS

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

PRODUCT DESCRIPTION

The AWT6275 meets the increasing demands for higher output power in UMTS handsets. The PA module is optimized for V_{REF} = +2.85 V, a require-ment for compatibility with the Qualcomm® 6250 chipset. The device is manufactured on an ad-vanced 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

M20 Package
10 Pin 4 mm x 4 mm x 1 mm
Surface Mount Module
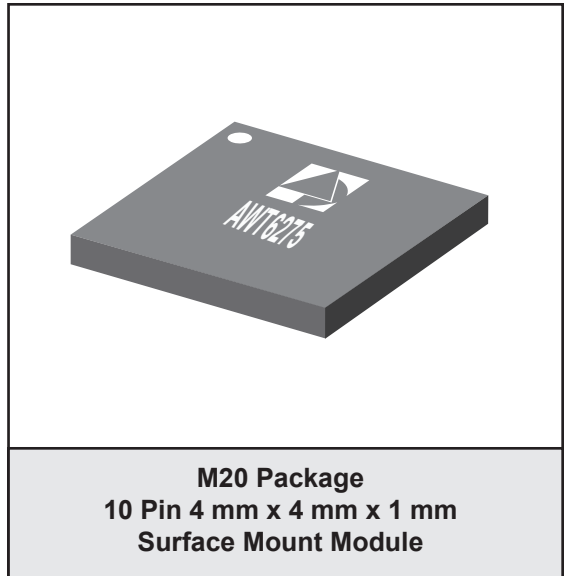
shutdown mode with low leakage current, increase handset talk and standby time. The self-contained 4 mm x 4 mm x 1 mm surface mount package incorporates matching networks optimized for output power, efficiency, and linearity in a 50 Ω system.
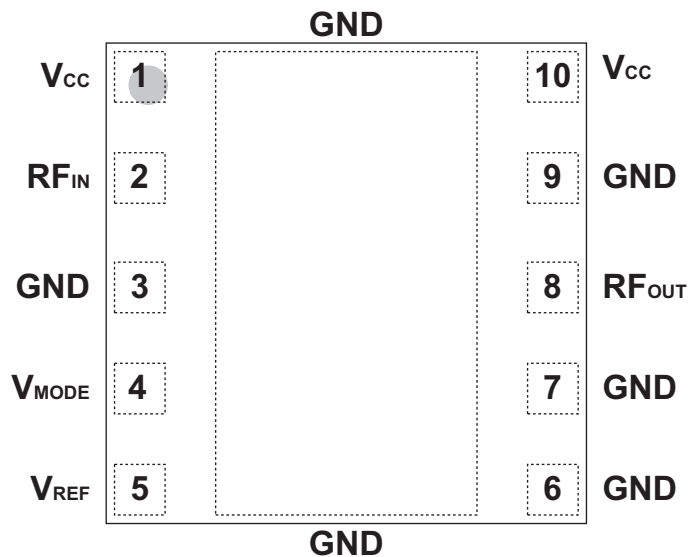
GND at slug (pad)

Figure 1: Block Diagram

GND

V_{CC}	1			10	V_{CC}
RF_{IN}	2			9	GND
GND	3			8	RF_{OUT}
V_{MODE}	4			7	GND
V_{REF}	5			6	GND

GND

Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

PIN	NAME	DESCRIPTION
1	V_{CC}	Supply Voltage
2	RF_{IN}	RF Input
3	GND	Ground
4	V_{MODE}	Mode Control Voltage
5	V_{REF}	Reference Voltage
6	GND	Ground
7	GND	Ground
8	RF_{OUT}	RF Output
9	GND	Ground
10	V_{CC}	Supply Voltage

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ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage (V_{CC})	0	+5	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

Table 3: Operating Ranges

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Operating Frequency (f)	1920	-	1980	MHz	
Supply Voltage (V_{CC})	+3.2 -	+3.4 +1.5	+4.2 -	V	$P_{OUT} \leq$ +27.5 dBm $P_{OUT} \leq$ 7 dBm
Reference Voltage (V_{REF})	+2.75 0	+2.85 -	+2.95 +0.5	V	PA "on" PA "shut down"
Mode Control Voltage (V_{MODE})	+2.3 0	+2.85 -	+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
	27[1]
	26[1]
	15.5[1]
	14.5[1]
		27.5
		26.5
		16
		15
			27.5
			26.5
			16
			15
				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_{REF} = +2.85 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Gain	24.5 13.5 12	26.5 15.5 14	29 17.5 16	dB	P_{OUT} = +27.5 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +2.85 V P_{OUT} = +7 dBm, V_{CC} = 1.5 V, V_{MODE} = +2.85 V
ACLR1 at 5 MHz offset [1]	- - -	-41 -43 -40	-38 -38 -38	dBc	P_{OUT} = +27.5 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +2.85 V P_{OUT} = +7 dBm, V_{CC} = 1.5 V, V_{MODE} = +2.85 V
ACLR2 at 10 MHz offset	- - -	-58 -52 -57	-48 -48 -48	dBc	P_{OUT} = +27.5 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +2.85 V P_{OUT} = +7 dBm, V_{CC} = 1.5 V, V_{MODE} = +2.85 V
Power-Added Efficiency [1]	39 18 12	43 21 15	- - -	%	P_{OUT} = +27.5 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +2.85 V P_{OUT} = +7 dBm, V_{CC} = 1.5 V, V_{MODE} = +2.85 V
Quiescent Current (Icq)	-	16	22	mA	V_{MODE} = +2.85 V, V_{CC} = 3.4 V
Reference Current	-	3.6	7	mA	through V_{REF} pin
Mode Control Current	-	0.3	1	mA	through V_{MODE} pin, V_{MODE} = +2.85 V
Leakage Current	-	<1	5	µA	V_{CC} = +4.2 V, V_{REF} = 0 V, V_{MODE} = 0 V
Noise in Receive Band	-	-141	-138	dBm/Hz	2110 MHz to 2170 MHz

Harmonics
  2fo
  3fo, 4fo
	-
	-
		-45
		-50
			-40
			-45
				dBc	$P_{OUT} \leq$ +27.5 dBm

Input Impedance	-	-	2:1	VSWR	
Spurious Output Level (all spurious outputs)	-	-	-70	dBc	$P_{OUT} \leq$ +27.5 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	10:1	-	-	VSWR	Applies over full operating range

Notes:
(1) ACLR and Efficiency measured at 1950 MHz.

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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_{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 V_{MODE}

voltage. The Bias Control table lists the recommended modes of operation for various applications.

Three operating modes are recommended to optimize current consumption. High Bias/High Power operating mode is for P_{OUT} levels $\geq$ 16 dBm. At ~ 16 dBm - 7 dBm, the PA should be "Mode Switched" to Low Bias Mode. For P_{OUT} levels < ~7 dBm, the V_{CC} can be switched to 1.5 V (Low Bias Mode is also used for P_{OUT} range).

Table 6: Bias Control

APPLICATION	P_{OUT} LEVELS	BIAS MODE	V_{REF}	V_{MODE}	V_{CC}
WCDMA - low power	$\leq$+7 dBm	Low	+2.85 V	+2.85 V	$\geq$ +1.5
WCDMA - med power	7 $\leq$ P_{OUT} $\leq$ +16 dBm	Low	+2.85 V	+2.85 V	+3.4
WCDMA - high power	>+16 dBm	High	+2.85 V	0 V	+3.4
Shutdown	-	Shutdown	0 V	0 V	-
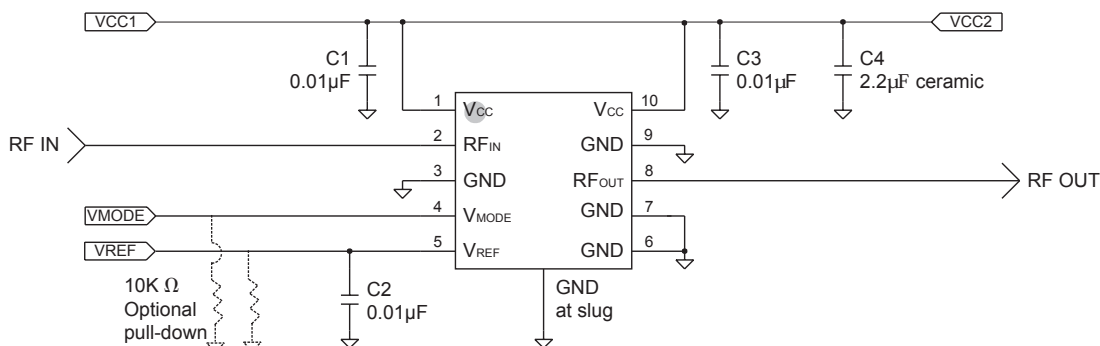
Figure 3: Application Circuit

PACKAGE OUTLINE
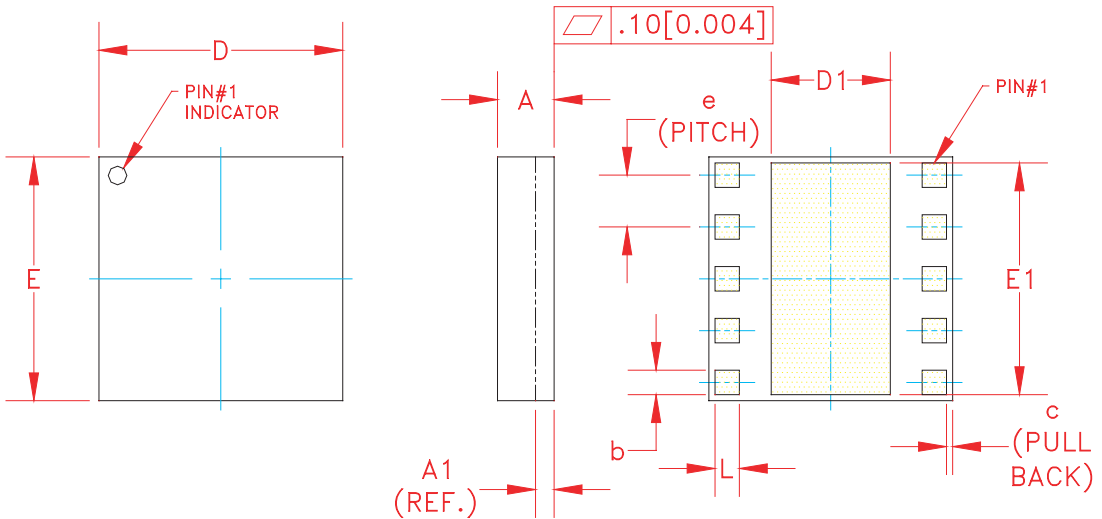
SYMBOL	MILLIMETERS			INCHES			NOTE
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
A	0.88	0.98	1.08	0.034	0.038	0.042	–
A1	0.32 (REF.)			0.0125 (REF.)			–
b	0.35	–	0.60	0.013	–	0.024	3
c	–	0.10	–	–	0.004	–	–
D	3.88	4.00	4.12	0.152	0.157	0.162	–
D1	1.90	–	2.25	0.075	–	0.088	–
E	3.88	4.00	4.12	0.152	0.157	0.162	–
E1	3.75	–	3.85	0.148	–	0.152	–
e		0.85			0.033		3
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.

Figure 4: Package Outline - 10 Pin 4 mm x 4 mm x 1 mm Surface Mount Module
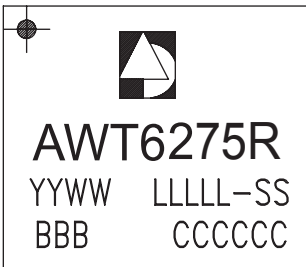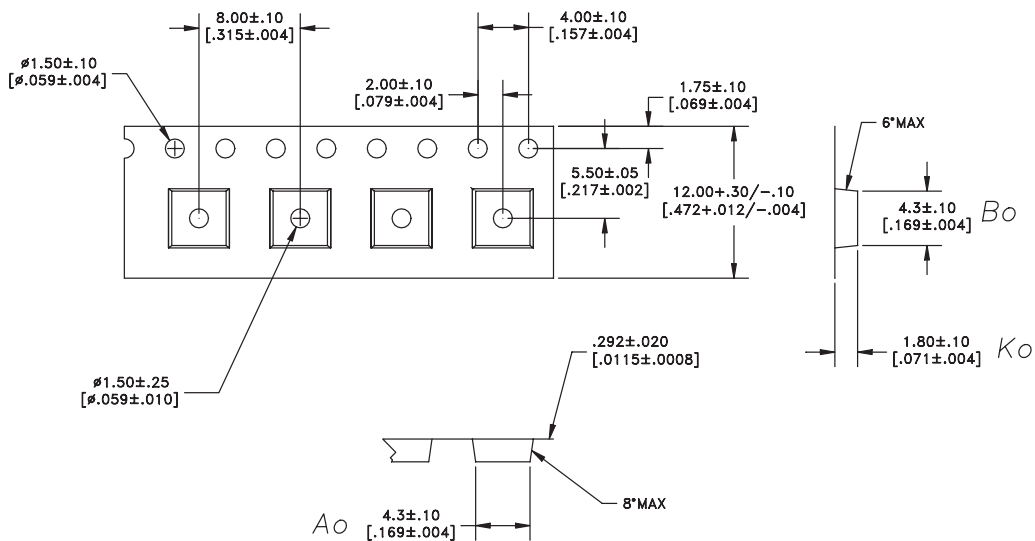

NOTES:

1. ANADIGICS LOGO SIZE: X=0.040±0.010   Y=0.048±0.010
2. PART #   AWT6275R
3. YEAR AND WORK WEEK: YYWW: YY = YEAR, WW = WORK WEEK
4. LOT – WAFER I.D.:   LLLLL – SS = WAFER/LOT I.D.
5. PIN 1 INDICATOR: MOLD NOTCH –or– INK DOT
6. BOM #   BBB
7. COUNTRY CODE: CCCCCC
8. TYPE : ELITE
   SIZE : AS LARGE AS POSSIBLE
   LASER MARKED

Figure 5: Branding Specification

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DIMENSIONS ARE IN MILLIMETERS [INCHES]
STANDARD TOLERANCES

Figure 6: Tape & Reel Packaging

Table 6: Tape & Reel Dimensions

PACKAGE TYPE	TAPE WIDTH	POCKET PITCH	REEL CAPACITY	MAX REEL DIA
4 mm x 4 mm x 1 mm	12 mm	8 mm	2500	13"

ORDERING INFORMATION

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
AWT6275RM20P8	-20 °C to +90 °C	RoHS Compliant 10 Pin 4 mm x 4 mm x 1 mm Surface Mount Module	Tape and Reel, 2500 pieces per Reel
AWT6275RM20P9	-20 °C to +90 °C	RoHS Compliant 10 Pin 4 mm x 4 mm x 1 mm Surface Mount Module	Partial Tape and Reel

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ANADIGICS, Inc.
141 Mount Bethel Road
Warren, New Jersey 07059, U.S.A.
Tel: +1 (908) 668-5000
Fax: +1 (908) 668-5132

URL: http://www.anadigics.com
E-mail: Mktg@anadigics.com

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