

RELEVANT PRODUCTS

- AWT6271
- AWT6272

GENERAL DESCRIPTION

The ANADIGICS 4 mm x 4 mm hetero-junction bipolar transistor (HBT) power amplifier modules designed for WCDMA Cellular handsets have an operating frequency band from 824 MHz to 849 MHz and operate from a single lithium-ion (Li-ion) battery. The amplifier

input and output are matched to provide optimum performance in a 50 Ω system; only minimal external components are required for proper RF bypassing.

Table 1: Module Pin Description

PIN	NAME	DESCRIPTION	NOTES
1	V _{REF}	Reference Voltage	+2.75 to +2.95 V for PA "on" 0 to +0.5 V for PA "shut down"
2	V _{MODE}	Mode Control Voltage	+2.5 to +3.1 V for Low Bias Mode 0 to +0.5 V for High Bias Mode
4	RF _{IN}	RF Input	Use 50 Ω transmission line
5	V _{CC}	Supply Voltage	+3.2 to +4.2 V
6	V _{CC}	Supply Voltage	+3.2 to +4.2 V
8	RF _{OUT}	RF Output	Use 50 Ω transmission line
3, 7, 9, 10	GND	Ground	

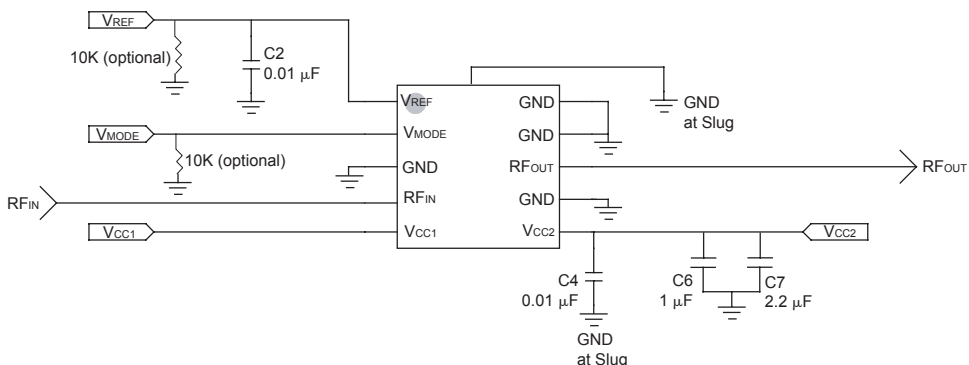


Figure 1: Application Schematic

EVALUATION BOARD

The evaluation board, shown in Figure 2, was designed on ROGERS (R04033) material with 8 mils

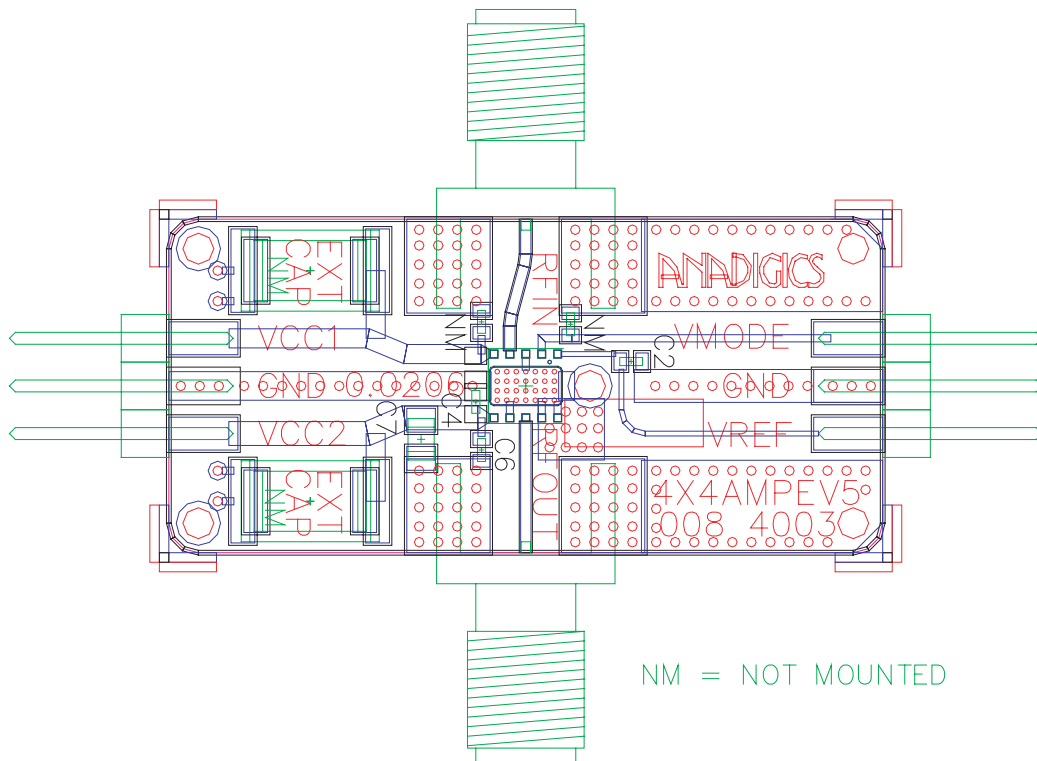


Figure 2: Evaluation Board Layout

Notes:

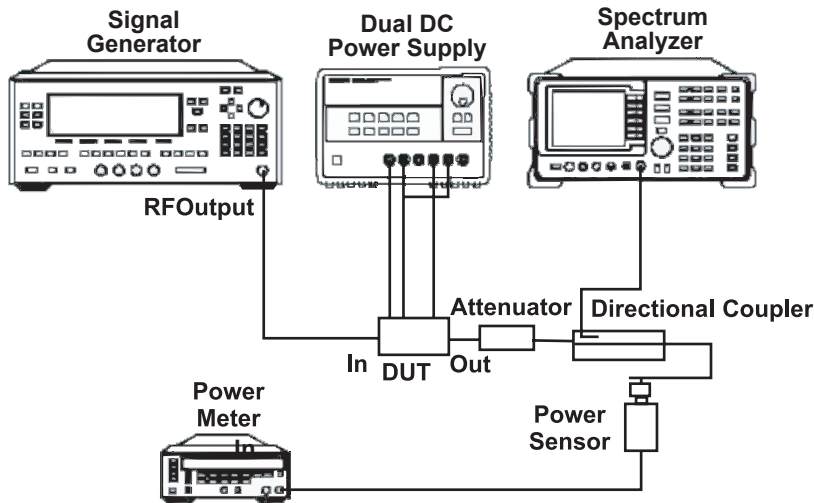
1. Copper trace width is 20.6 mils.
2. Relative dielectric constant is 3.38 at 1 GHz.
3. Dielectric thickness is 8.0 mils.

Table 2: Evaluation Board Parts List

DESCRIPTION	VALUE	FUNCTION
C2	0.01 μ F	Bypass
C4	0.01 μ F	Bypass
C6	1 μ F	Bypass
C7	2.2 μ F	Bypass

Notes:

1. Capacitors should be of a ceramic type.
2. If any DC signal is present at the input of this amplifier – the blocking capacitor should be used, placed in series to RF input trace. It is recommended to use a ceramic (0603 10pF) capacitor.



Test Setup Notes:

1. Figure 3 shows minimum equipment required for proper power amplifier operation.
2. Depending upon the power sensor, 10 to 20 dB attenuator is sufficient to prevent overloading of the power meter or the spectrum analyzer.

Test Equipment

The following test equipment is recommended for testing of WCDMA Cellular evaluation boards.

- One RF WCDMA⁽¹⁾ signal generator capable of delivering at least +5 dBm of output power at the operating frequency band (Agilent E4432B).
- One RF power meter capable of measuring up to +30 dBm at the operating frequency band (Agilent E4419B).
- One RF power sensor capable of measuring RF power in the range from -50 dBm to +30 dBm at the operating frequency band (Agilent E9301H).
- One RF spectrum analyzer capable of measuring ACP in operating frequency band and covering up to the 3-rd harmonic of the highest frequency in band (Rohde & Schwarz FSP).
- One DC power supply capable of delivering 1.5 A at +4 V and 500 mA at +3 V (Agilent 6624A)
- One SMA 10 dB attenuator capable of handling 2 watts.

Notes:

(1) WCDMA: 3GPP 32-03-00, uplink, DPCCH + DPDCH and HSDPA

Test Setup

1. Set DC power supply to +3.4 V (for V_{CC1} and V_{CC2}), to +2.85 V (for V_{REF}), and to 0 V (for V_{MODE}).
2. Set power meter measured frequency to 836 MHz and its calibration factor to correspond to the set frequency.
3. Set power meter offset value equal to the total loss of the attenuator, directional coupler, and connecting cables.
4. Set spectrum analyzer center frequency to 836 MHz and enable WCDMA(3GPP) measuring personality.
5. Select and enable WCDMA digital signal on the signal generator.
6. Set signal generator frequency to 836 MHz and output power to -10 dBm.
7. Ensure DC power supply is disabled and RF output of a signal generator is OFF.
8. Connect evaluation board to the test setup as shown.
9. Turn on DC power supply and measure the idle current.
10. Switch RF output of a signal generator to ON.
11. Increase amplitude of a signal generator to the desired output power level (according to the corresponding data sheet).
12. Measure and record ACP, Gain (as a difference

WCDMA Cellular 4 mm x 4 mm Power Amplifier Modules

between Input and Output power levels) and total current consumption.

Test sequence (Recommended PA turn-on and turn-off sequences):

Turn-on sequence:

1. Connect DUT according to the setup shown on Figure 3. **Do not** turn on DC power supply before connecting DUT to RF input and output cables (make sure that RF output of a signal generator is OFF before connecting RF cables to DUT).
2. Turn on V_{CC} first and then turn on V_{REF} and V_{MODE} .
3. Turn RF output of a signal generator ON and make measurements.

Turn-off sequence:

1. Turn RF output of a signal generator OFF. **Do not** disconnect DUT from RF input and output cables before turning off DC power supply.
2. Turn off V_{REF} and V_{MODE} , and then V_{CC} .
3. Disconnect DUT from the test setup.

Layout Considerations

A sufficient number of holes (QTY 12 - 0.2 mm diameter plated through hole) should be placed under the module in order to channel the heat properly. In addition, contact should be made between the PA slug located under the amplifier and the board. For hand assembly of the board, place sufficient bonding paste so that contact is made between the PA and ground. For large volume assembly, please refer to the solder profile recommendations application note. For RF_{IN} and RF_{OUT} , provide 50 Ω transmission lines.

Other Recommendations

In order to maximize performance both the Low and

High Bias Modes should be used. Operation in the High Bias Mode allows the PA to exceed the system performance requirements at output power levels from +16 dBm up to its maximum specified power. For an output power less than +16 dBm, the Low Bias Mode should be used to minimize quiescent current while maintaining system performance. A logic low (0 V) at the V_{MODE} pin places the PA in High Bias Mode, and a logic high (+2.8 V) at the V_{MODE} pin places the PA in Low Bias Mode.

Applying a logic low (0 V) to both the V_{REF} and V_{MODE} pins places the amplifier in shutdown (standby) mode.

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