

Product Features

- 2.3 – 2.9 GHz
- 23 dB Gain
- EVM <2.5% @ 24 dBm Pout
- Internal Active Bias
- +5V Single Supply Voltage
- +33 dBm P1dB
- RoHS-compliant/Lead-free 5x5 mm QFN SMT package

Applications

- 802.16 WiMAX infrastructure
- WiBro infrastructure

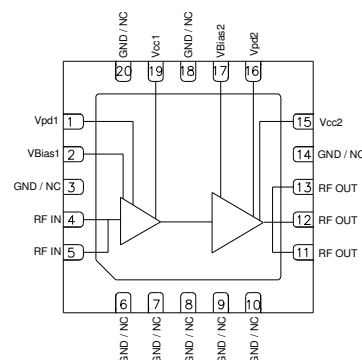
Product Description

The AH314 is a high dynamic range broadband driver amplifier in a surface mount package. The two-stage amplifier has 23 dB of gain, while being able to achieve high performance for 2.3–2.9 GHz WiMAX/WiBro applications delivering +24 dBm of linear output power.

AH314 uses a high reliability +5V InGaP/GaAs HBT process technology. The device incorporates proprietary bias circuitry to compensate for variations in linearity and current draw over temperature. The device does not require any negative bias voltage; an internal active bias allows the AH314 to operate directly off a commonly used single +5V supply. The RoHS-compliant/Lead-free/Green 5x5mm QFN package is surface mountable to allow for low manufacturing costs to the end user.

The AH314 is targeted for use in a configuration for the stage amplifier in 802.16 WiMAX or WiBro basestations where high linearity and medium power is required.

Functional Diagram



Specifications ⁽¹⁾

Parameter	Units	Min	Typ	Max
Operational Bandwidth	GHz	2.3		2.9
Output Channel Power	dBm		+24	
Power Gain	dB		23	
EVM ⁽²⁾	%		2.0	2.5
Efficiency	%		6.6	
Output P1dB	dBm		+33	
Noise Figure	dB		6.4	
Quiescent Current, Icq ⁽³⁾	mA		600	
Icc @ 26dBm	mA		700	
Device Voltage, Vcc	V		+5	

1. Test conditions unless otherwise noted: 25°C, +5V Vsupply, in 2.5-2.7GHz tuned application circuit shown in page 3.
2. Using an 802.16-2004 OFDMA, 64QAM-1/2, 1024-FFT, 20 symbols, 30 subchannels.
3. This corresponds to the quiescent current or operating current under small-signal conditions with bias resistor R1=68Ω off pin 1 and R2=150Ω off pin 16.

Typical Performance ⁽⁴⁾

Parameter	Units	Vcc=5V	Vcc=6V
Frequency	GHz	2.6	2.6
Output Channel Power	dBm	+25	+26
Power Gain	dB	23.1	22.9
S11 – Input R.L.	dB	-8.2	-8.6
S22 – Output R.L.	dB	-16.7	-26
Output P1dB	dBm	33	33
EVM	%	1.8	1.9
Efficiency	%	8.2	8.5
Noise Figure	dB	6.4	6.4
Quiescent Current	mA	600	650
Vpd, Vbias	V	+5	+5

4. Typical parameters reflect performance in a tuned application circuit at +25° C.

Absolute Maximum Rating

Parameter	Rating
Storage Temperature	-55 to +125 °C
Thermal Resistance, Rth	33 °C / W
Junction Temperature, Tj	150 °C
Collector Current, Icc (Icc1+Icc2)	1.6 A
RF Input Power into a 50Ω Load	19 dBm
Device Voltage	+8 V
Device Power	8 W

Operation of this device above any of these parameters may cause permanent damage.

Ordering Information

Part No.	Description
AH314	2.3-2.9 GHz WiMAX 2W Driver Amplifier
AH314-PCB	2.4-2.7 GHz Evaluation Board

Standard T/R size = 500 pieces on a 7" reel.

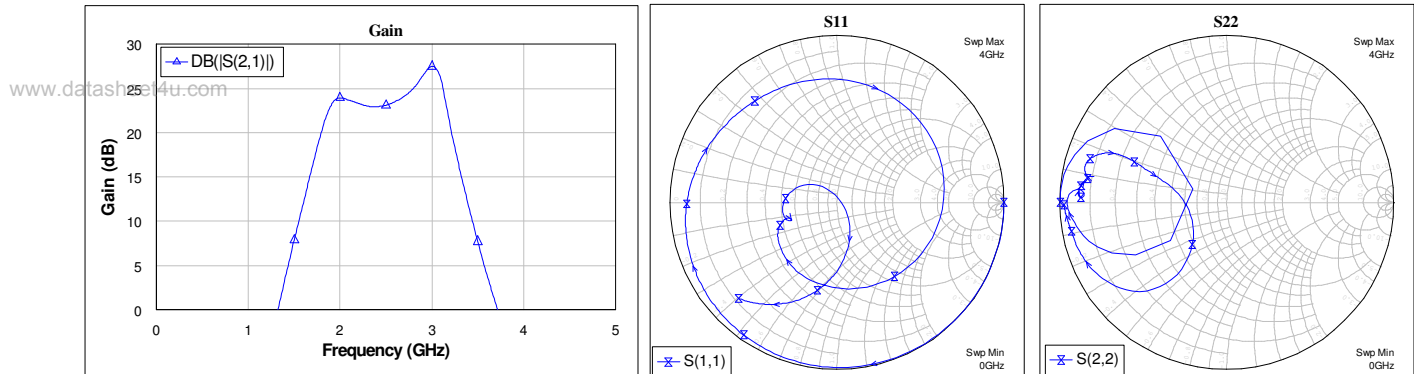


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2.3-2.9 GHz WiMAX 2W Driver Amplifier

Typical Device Data

S-Parameters ($V_{CC} = +5\text{ V}$, $I_{CC} = 600\text{ mA}$, $T = 25\text{ }^{\circ}\text{C}$, calibrated to device leads)



Notes:

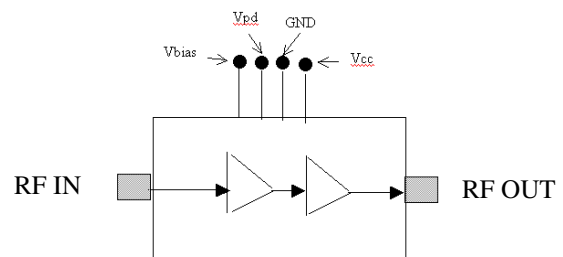
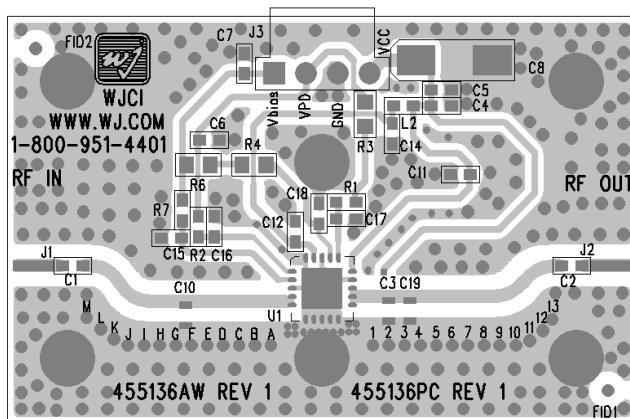
The gain for the unmatched device in 50ohm system is shown as the trace in blue color. The impedance plots are shown from 0 – 4000 MHz, with markers placed at 0.4GHz in 0.5GHz increments.

S-Parameters ($V_{CC} = +5\text{ V}$, $I_{CC} = 600\text{ mA}$, $T = 25\text{ }^{\circ}\text{C}$, unmatched 50 ohm system, calibrated to device leads)

Freq (MHz)	S11(dB)	S11(ang)	S21(dB)	S21(ang)	S12(dB)	S12(ang)	S22(dB)	S22(ang)
2200	-6.45	-120.54	23.31	-145.39	-48.04	60.39	-2.33	157.17
2250	-6.78	-130.36	23.13	-158.46	-47.97	52.65	-2.65	156.54
2300	-7.13	-138.36	22.99	-170.95	-48.01	45.37	-2.98	156.14
2350	-7.45	-144.94	22.95	-177.21	-48.10	38.67	-3.31	155.90
2400	-7.81	-150.37	22.95	-165.61	-48.27	31.91	-3.65	155.85
2450	-8.23	-154.71	23.00	-154.08	-48.56	24.85	-4.01	155.98
2500	-8.68	-158.06	23.09	-142.57	-48.96	17.33	-4.39	156.31
2550	-9.18	-160.55	23.28	-131.04	-49.41	8.81	-4.78	156.65
2600	-9.69	-161.94	23.51	-119.35	-49.99	-0.931	-5.19	157.1
2650	-10.16	-162.13	23.78	-107.23	-50.72	-12.17	-5.65	157.78
2700	-10.53	-161.30	24.11	-94.68	-51.59	-26.06	-6.17	158.54
2750	-10.73	-159.84	24.53	-81.54	-52.51	-43.81	-6.8	159.55
2800	-10.68	-158.59	25.03	-67.41	-53.25	-67.29	-7.77	161.17
2850	-10.36	-158.56	25.69	-52.45	-53.15	-96.50	-9.09	164.03
2900	-9.90	-161.62	26.43	-35.26	-51.90	-128.68	-11.10	172.59
2950	-9.64	-169.83	27.14	-14.38	-49.90	-160.49	-12.82	-160.65
3000	-10.22	175.73	27.49	-10.77	-48.05	168.76	-9.754	-129.23

Device S-parameters are available for download off of the website at: <http://www.wj.com>

Application Circuit PC Board Layout



PCB Material: 0.0147" Rogers Ultralam 2000, single layer, 1 oz Cu, $\epsilon_r = 2.45$

Microstrip line details: width = .042", spacing = .050"

The silkscreen markers 'A', 'B', 'C', etc. and '1', '2', '3', etc. are used as place markers for the input and output tuning.



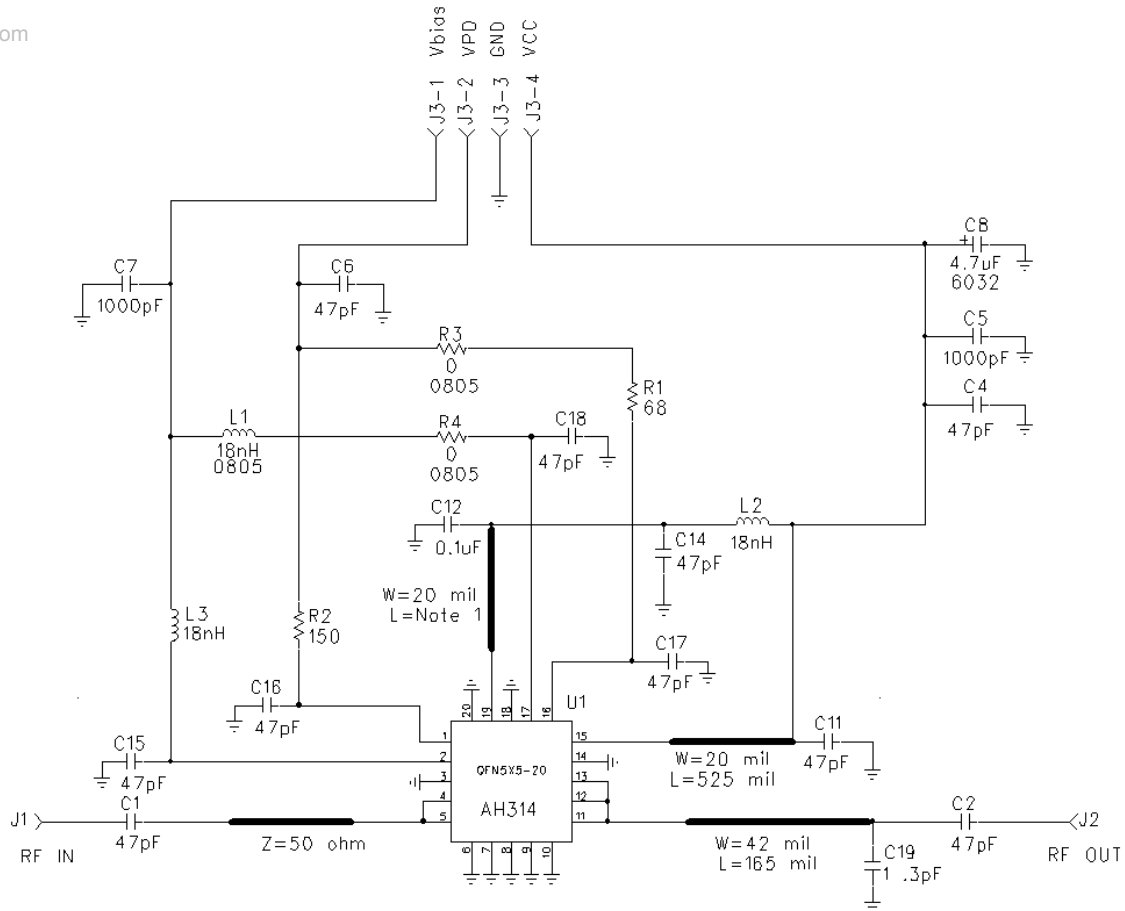
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2.3-2.9 GHz WiMAX 2W Driver Amplifier

Application Circuit Schematic (AH314-PCB) for 2.5-2.7 GHz.

(The Amplifier can be tuned across any 200MHz band over the 2.3-2.9 GHz BW.)

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Note 1: C12 to be placed as close as possible to the device.

Note 2: C11 = 47pF is critical. Do not replace C11 with other value.

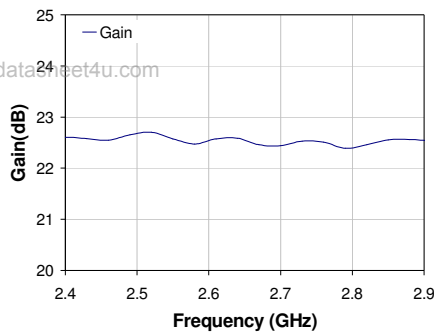


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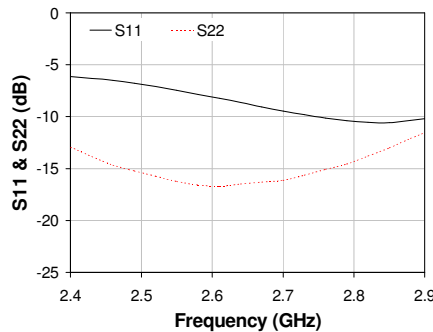
2.3-2.9 GHz WiMAX 2W Driver Amplifier

Typical Performance Plots for AH314-PCB, Vcc = 5V

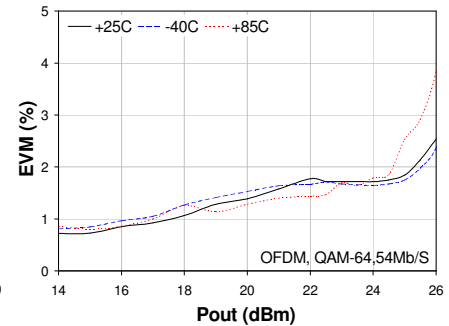
Gain



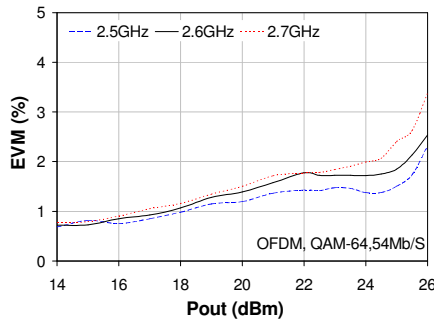
Return Loss



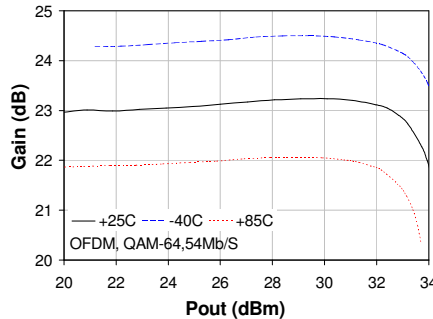
EVM vs Pout vs Temperature
(Freq = 2.6GHz, Vcc=5V)



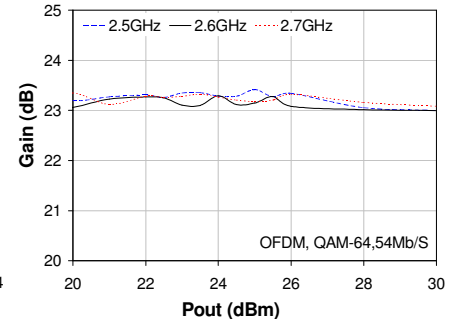
EVM vs Pout vs Frequency
(+25°C, Vcc=5V)



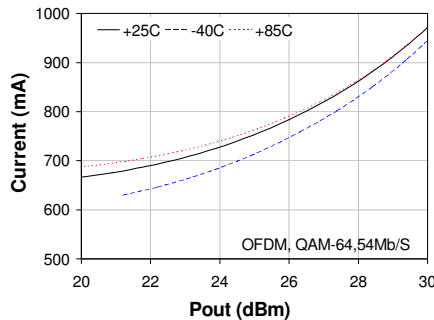
Gain vs Pout vs Temperature
(Freq = 2.6GHz, Vcc=5V)



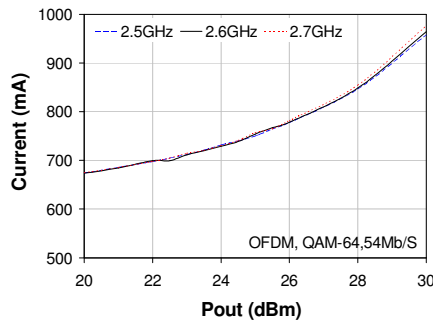
Gain vs Pout vs Frequency
(+25°C, Vcc=5V)



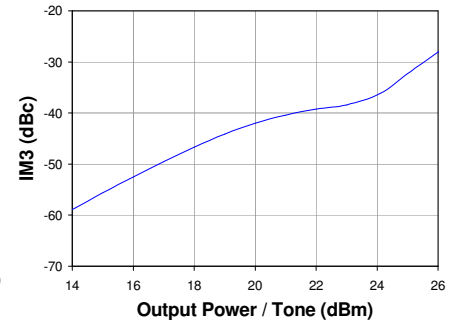
Current vs Pout vs Temperature
(Freq = 2.6GHz, Vcc=5V)



Current vs Pout vs Frequency
(+25°C, Vcc=5V)

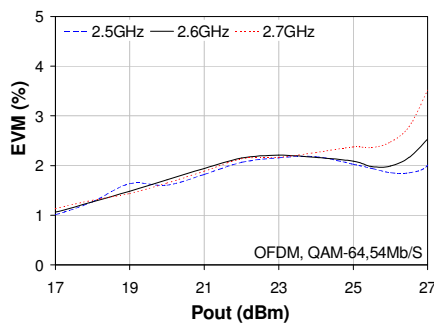


IM3 vs. Pout
(2.5GHz, 1MHz tone spacing, +25°C)

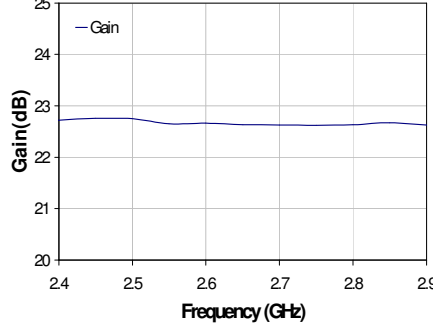


Typical Performance Plots for AH314-PCB, Vcc = 6V

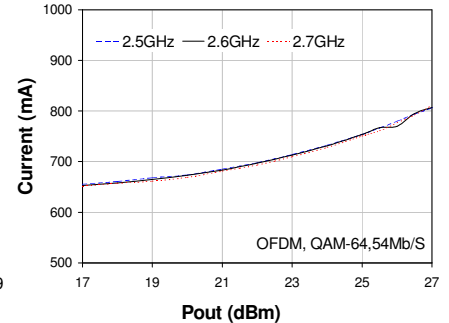
EVM vs Pout vs Frequency
(+25°C, Vcc=6V)



Gain



Current vs Pout vs Frequency
(+25°C, Vcc=6V)





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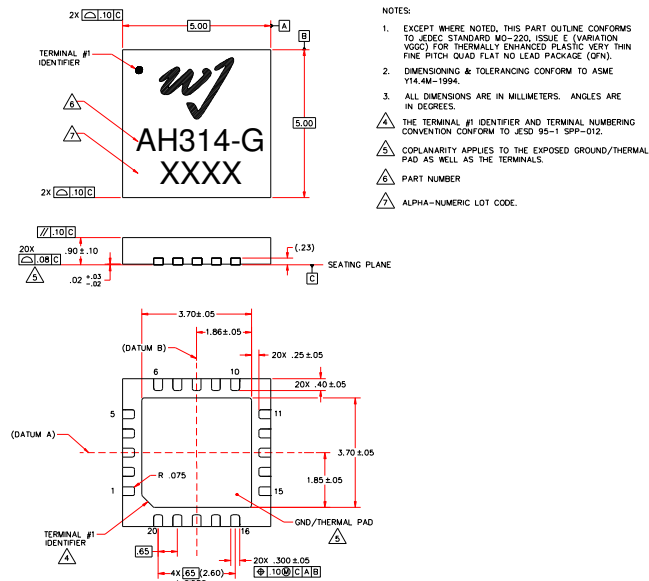
2.3-2.9 GHz WiMAX 2W Driver Amplifier

Mechanical Information

This package is lead-free/Green/RoHS-compliant. The plating material on the pins is annealed matte tin over copper. It is compatible with both lead-free (maximum 260 °C reflow temperature) and leaded (maximum 245 °C reflow temperature) soldering processes

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Outline Drawing



Product Marking

The component will be marked with an “AH314-G” designator with an alphanumeric lot code on the top surface of the package.

Tape and reel specifications for this part are located on the website in the “Application Notes” section.

ESD / MSL Information



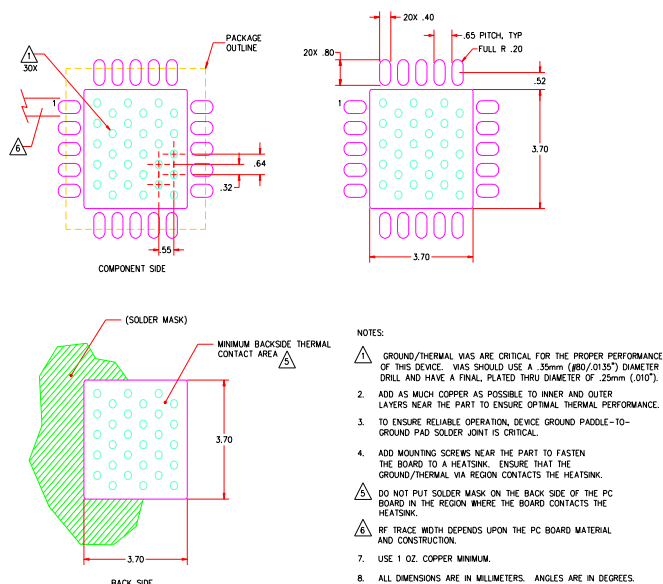
Caution! ESD sensitive device.

ESD Rating: TBD
Value: TBD
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

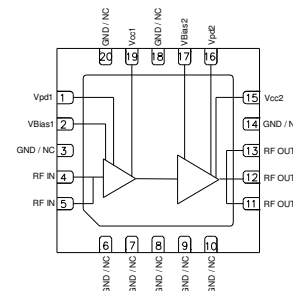
ESD Rating: TBD
Value: TBD
Test: Charged Device Model (CDM)
Standard: JEDEC Standard JESD22-C101

MSL Rating: Level 2 at +260 °C convection reflow
Standard: JEDEC Standard J-STD-020

Mounting Configuration / Land Pattern



Functional Pin Layout



Function	Pin No.
Vcc1	19
Vcc2	15
Vpd1	1
Vpd2	16
Input	4,5
Output	11,12,13
Vbias1	2
Vbias2	17
GND	Backside Paddle
N/C or GND	3,6,7,8,9,10,14,18,20