

E-pHEMT MMIC

AE414 (Preliminary)

RFHIC

Product Features

- Small size (3X3 mm)
- Higher Gain
- Higher linearity
- DFN SMD Type package
- Higher productivity
- Lower manufacturing cost
- -60dBc CSO 135 Channels @ +30dBmV/ch
- -71dBc CTB 135 Channels @ +30dBmV/ch
- -71dBc XMD 135 Channels @ +30dBmV/ch
- Low Noise Figure

Application

- Low Noise Amplifier for CATV, Satellite
- Cable Modem
- FTTH (G-PON, GE-PON)
- Optical node



Description

AE414 is designed as low cost drive amplifiers for many applications including FTTH, CATV System. This MMIC is based on Gallium Arsenide Enhancement Mode pHEMT which shows low current draw and very low noise. The data in this spec sheet is valid only for 75 ohm application. 50 ohm data is in a separate spec sheet.

Specifications

PARAMETER		UNIT	MIN	TYP	MAX	Condition
Frequency		MHz	50 ~ 2200			
Gain		dB	18.5	20		
Input Return Loss		dB		-20		
Output Return Loss		dB		-10		
Output IP3		dBm	35	38		
1dB Compression Point		dBm	22	25		
Noise Figure		dB		2	2.5	
CSO	30 ~ 870MHz	dBc		-60	-55	135 channel, +30dBmV/ch
CTB		dBc		-71	-66	135 channel, +30dBmV/ch
XMOD		dBc		-71	-66	135 channel, +30dBmV/ch
DC Current		mA		140		Vdd = 8.0V

NOTE

1. Test conditions unless otherwise noted. 1000MHz, T=25℃, Vdd=8V, 75Ω system
2. OIP3 measured with 2 tones at an output power of +10dBm/tone separated by 1MHz

Absolute Minimum and Maximum Ratings

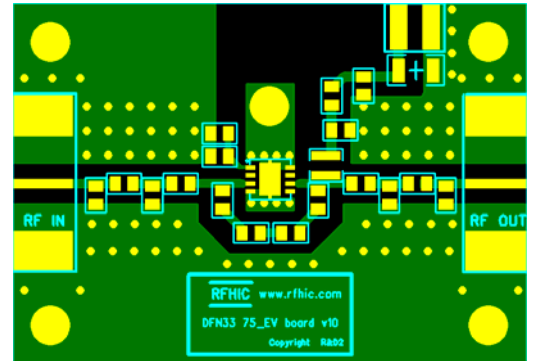
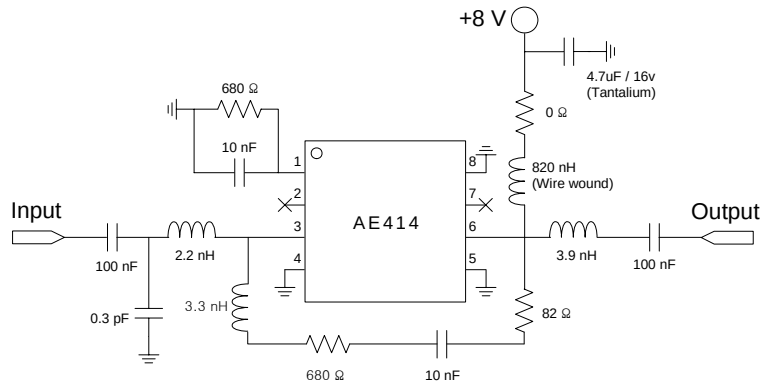
PARAMETER	UNIT	MIN	TYP	MAX
Device Voltage	VDC		+8	+8.5
Operating Temperature	℃	-40		+85
Storage Temperature	℃	-40		+150

AE414 (Preliminary)

E-pHEMT MMIC

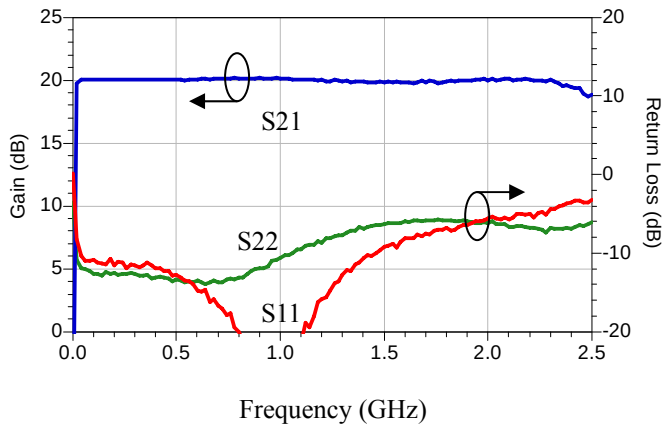
RFHIC

Application Circuit: 50~ 2200MHz, 8v, 75ohm System

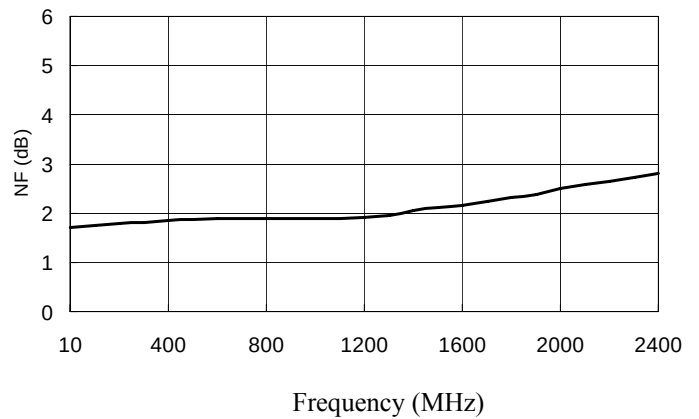


PCB material (FR4), PCB thickness (0.8t), Via hole ($\phi 0.4$)

S-Parameter



Noise Figure



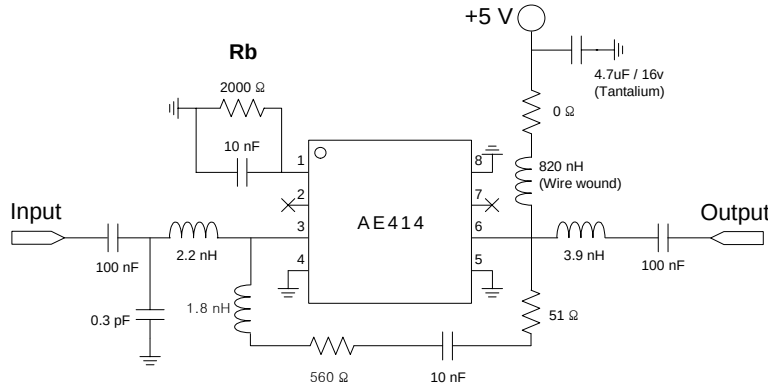
Multi-Tone Test 135CH_FLAT@Output Power +30dBmV

Level: +30dBmV Tilt: 135CH_FLAT									8V	680 ohm
FRQ	XMD(NCTA)	CTB_RAW	CTB_COR	N-FLR	CSU_RAW	CSU_COR	CSU_FRQ	CSL_RAW	CSL_COR	CSL_FRQ
55.25	73.2	75.2	79.6	76.5	76	80.4	56.06	72.4	74.6	53.99
77.25	74	75.6	80	76.5	72.6	74.8	77.99	76	80.4	75.89
109.25	74.2	74.8	79.2	76.3	75.9	80.2	110	71.5	73.1	107.99
211.25	73.4	74.9	79.3	76.1	75.5	79.8	212.49	69.9	71	209.99
331.25	73.5	73.5	77.8	74.9	71.4	73.9	332.5	67.1	68	329.99
445.25	72.5	74.5	78.8	76.1	69.3	70.3	446.5	66.1	66.6	443.99
547.25	71.9	73	77.3	73.9	65.6	66.3	548.5	64.5	65	545.99
637.25	72.3	73	77.3	74.4	64.1	64.5	638.49	65.7	66.3	635.98
745.25	71.9	72.9	77.2	74	61.8	62.1	746.49	68.3	69.7	743.98
859.25	71.5	71.4	75.7	72.1	60	60.3	860.49	70.3	74.6	858.49
Min	71.5	71.4	75.7	72.1	60	60.3	56.06	64.5	65	53.99
Max	74.2	75.6	80	76.5	76	80.4	860.49	76	80.4	858.49

AE414 E-pHEMT MMIC (Preliminary)

RFHIC

Application Circuit: 50~ 2200MHz, 5v, 75ohm System

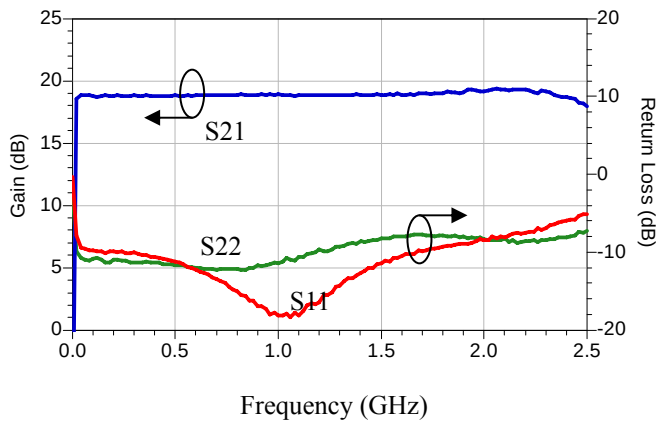


5v Application, Bias Resistor(Rb) 2 kohm

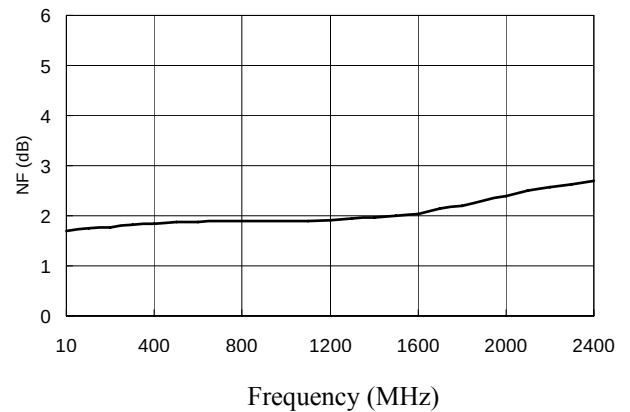
Parameter	Unit	Typical Data
Gain	dB	19
OIP3	dBm	33
P1dB	dBm	19
CSO	dBc	-53
CTB	dBc	-63
XMOD	dBc	-63
DC Current	mA	100

*Test condition: 1000MHz, 25℃

S-Parameter



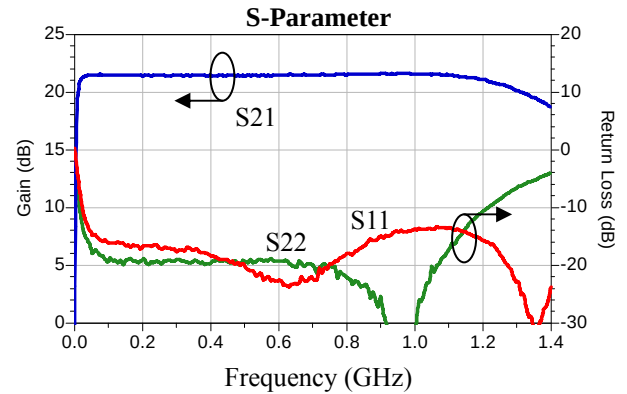
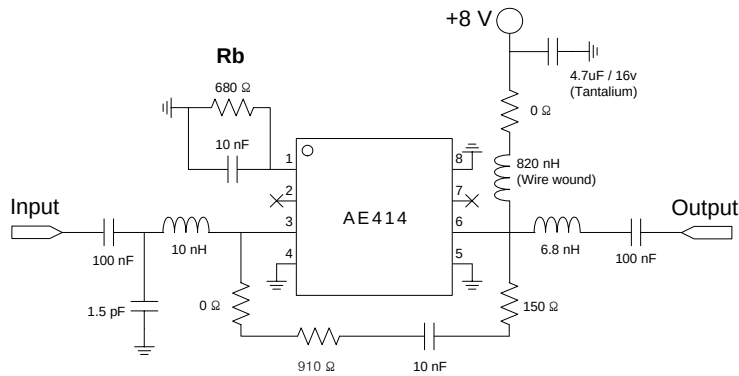
Noise Figure



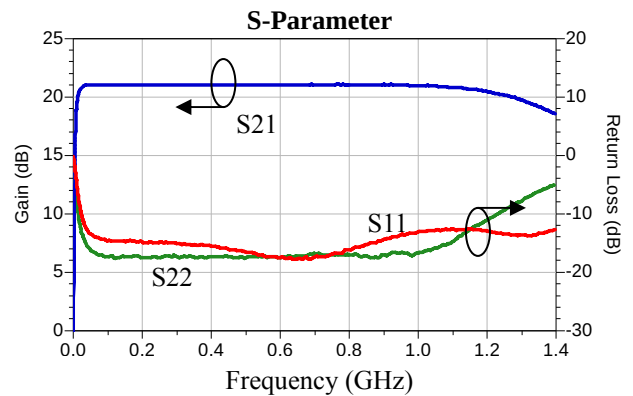
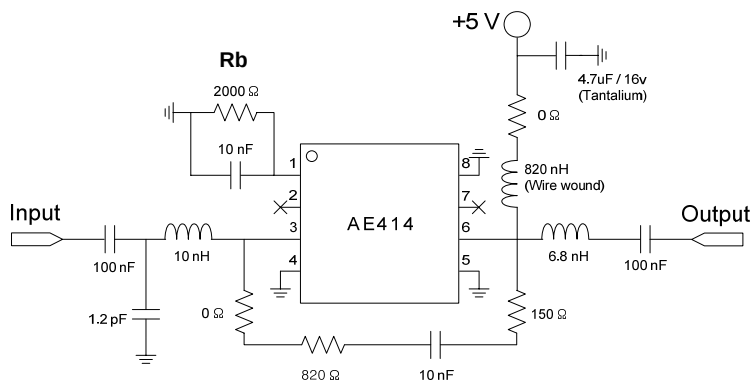
Multi-Tone Test 135CH_FLAT@Output Power +30dBmV

Level: +30dBmV Tilt: 135CH_FLAT									5V	2 kohm
FRQ	XMD(NCTA)	CTB_RAW	CTB_COR	N-FLR	CSU_RAW	CSU_COR	CSU_FRQ	CSL_RAW	CSL_COR	CSL_FRQ
55.25	71.1	74.3	78.6	76.5	74.6	79	55.99	56.1	56.1	53.99
77.25	70.9	74.8	79.1	76	55.4	55.4	78	76	80.3	76.15
109.25	72.2	74	78.4	76.2	72.4	74.9	110	55.8	55.8	108
211.25	71.9	73.4	76.4	76.2	67.4	68	212.5	56.2	56.2	209.99
331.25	71.5	70.8	73	74.8	63	63.3	332.5	57	57	329.98
445.25	70.5	70.1	71.3	75.9	61.2	61.3	446.49	58.4	58.4	443.99
547.25	69.8	68.8	70.4	73.8	60.3	60.5	548.49	59.8	59.9	545.98
637.25	68.8	67.4	68.4	74.3	59.3	59.4	638.5	61.8	62.1	635.99
745.25	67.8	67.2	68.1	74.1	58	58.1	746.49	65.6	66.3	743.99
859.25	66.3	66.6	67.9	72.4	57.4	57.5	860.49	68.4	70.6	858.49
Min	66.3	66.6	67.9	72.4	55.4	55.4	55.99	55.8	55.8	53.99
Max	72.2	74.8	79.1	76.5	74.6	79	860.49	76	80.3	858.49

Application Circuit: 50~ 1000MHz, 8v, 75ohm System



Application Circuit: 50~ 1000MHz, 5v, 75ohm System



Specifications

Parameter	Unit	Typical Data		Condition
Frequency	MHz	50~1000		
Supply Voltage	V	8	5	
Bias resistor	Ω	680	2 k	Rb
Gain	dB	21.4	21	
OIP3	dBm	39**	36***	
P1dB	dBm	25	20	
Noise Figure	dB	1.7	1.7	
CSO	dBc	-60	-53	135 channel, +30dBmV/ch
CTB	dBc	-71	-63	135 channel, +30dBmV/ch
XMOD	dBc	-71	-63	135 channel, +30dBmV/ch
DC Current	mA	140	100	

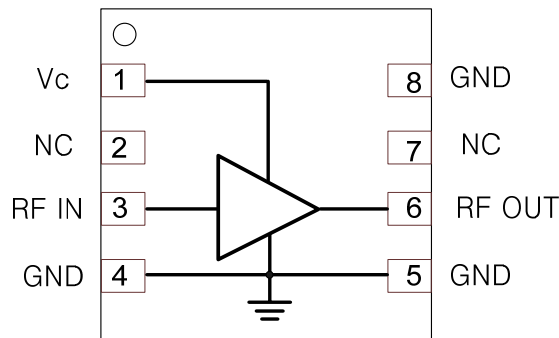
NOTE

*. Test conditions unless otherwise noted. 500MHz, T=25°C, 75 Ω system

**. OIP3 measured with 2 tones at an output power of +10dBm/tone separated by 1MHz

***. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz

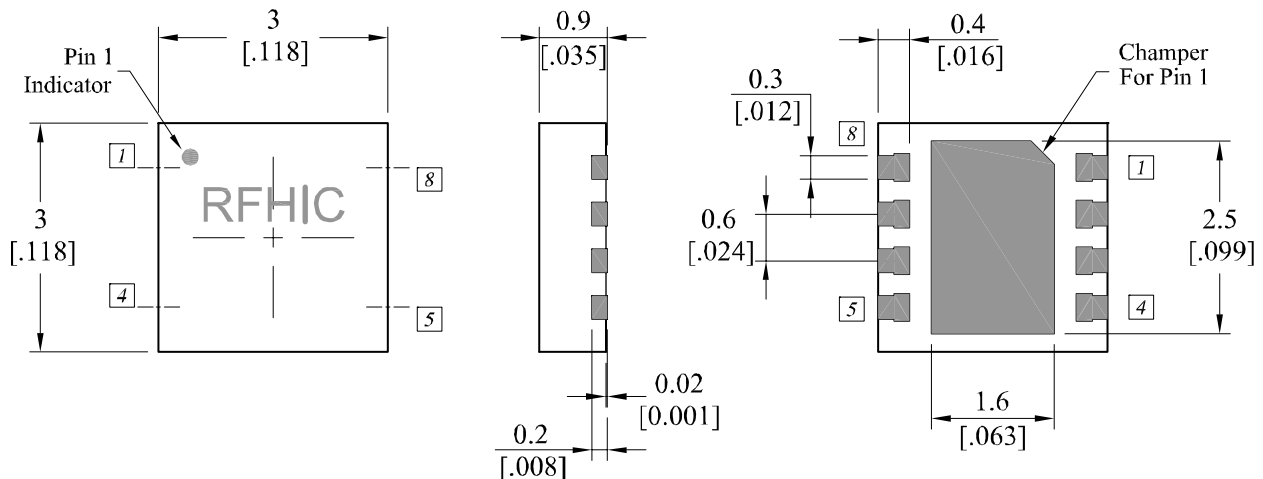
Block Diagram



PIN No	Description
1	Bias Control
2, 7	No Connection
3	RF Input
4, 5, 8	Ground
6	RF Output

<Marking: AF004B>

Package Dimensions (Type: DFN 3 x 3 -8L)



RFHIC Corporation (RFHIC) reserves the right to make changes to any products herein or to discontinue any product at any time without notice. RFHIC do not assume any liability for the suitability of its products for any particular purpose, and disclaims any and all liability, including without limitation consequential or incidental damages. The product specifications herein expressed have been carefully checked and are assumed to be reliable. However, RFHIC disclaims liability for inaccuracies and strongly recommends buyers to verify that the information they are using is current before placing purchase orders. RFHIC products are not intended for use in life support equipment or application where malfunction of the product can be expected to result in personal injury or death. Buyer uses or sells such products for any such unintended or unauthorized application, buyer shall indemnify, protect and hold RFHIC and its directors, officers, stockholders, employees, representatives and distributors harmless against any and all claims arising out of such use. RFHIC's liability under or arising out of damages, claims of whatsoever kind and nature which RFHIC products could cause shall be limited in amount to the net purchase price of the products sold to buyer by RFHIC.