E-pHEMT MMIC AE314

Product Features

• 30 ~ 3000MHz
• GaAs E-pHEMT MMIC
• Higher linearity
• Low Noise Figure
• High Max input power
• SOT-89 SMD Type package
• Higher productivity
• Lower manufacturing cost
• Pb Free / RoHS Standard

Applications

• Cellular, GSM
• PCS, DCS, W-CDMA
• Wibro, WiMax, WiFi
• Tetra, CATV, Satellite system
• RFID, Femtocell
• Multi-metering

Package Type : SOT-89

Description

AE314 is a drive or pre-drive amplifier designed in a low cost SOT-89 package.
This MMIC is based on Gallium Arsenide Enhancement Mode pHEMT which shows low current and high IP3.
It is designed as driver devices for infrastructure equipment in the 30~3000MHz Wireless technologies such as Cellular, GSM, PCS, W-CDMA, Wibro, WiMax System.
The data in this spec sheet is valid only for 50 ohm application.

Electrical Specifications

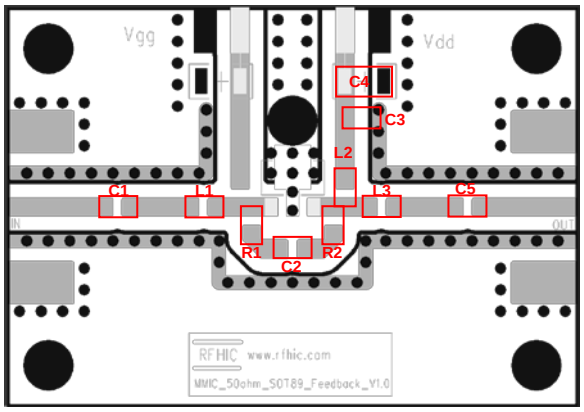
PARAMETER	UNIT	MIN	TYP	MAX	TYP	REMARK
Operating Frequency(fo)	MHz	30	-	3000	-	-
Small Signal Gain(S_{21})	dB	22	23	-	21	@ 900MHz
Input Return Loss(S_{11})	dB	-	-10	-	-10	-
Output Return Loss(S_{22})	dB	-	-10	-	-10	-
Output IP3(OIP3)	dBm	33	35	-	28	@ 900MHz
1dB Compression Point(P_1dB)	dBm	-	20	-	17	
Noise Figure(NF)	dB	-	2.8	-	2.7	-
DC Current	mA	-	100	-	50	3.3V Gate Rbias 9.1kohm
Supply Voltage	V	-	5	-	3.3	

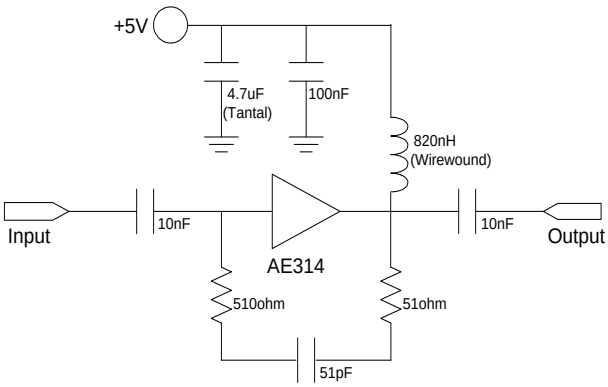
Note
1. Test conditions unless otherwise noted. Freq = At 900MHz, T=25℃, 50Ω system
2. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz

Absolute Maximum Ratings

PARAMETER	UNIT	MIN	TYP	MAX	REMARK
Device Voltage	V	-	5	10	-
Operating Case Temperature	℃	-40	-	85	-
Storage Temperature	℃	-40	-	150	-
ESD Human Body Model	-	-	Class 1A	-	-
Moisture Sensitivity Level	-	-	MSL1	-	-
Junction Temperature (Tj)	℃	-	-	180	@ quiescent current, No RF, Tc = 85℃
Thermal Resistance (Rth)	℃/W	-	60	-	

Application Circuit @ 30 ~ 2400MHz, 50ohm System(V_{DD} = 5V)





EVB BOM			
Description	**Reference Designator**	**Manufacturer**	**Manufacturer's P/N**
CAP, 51pF, 1608	C2	Murata	GRM1885C1H510JA01D
CAP, 10nF, 1608	L1, L3	Murata	GRM188R71H103KA01D
CAP, 100nF, 1608	C3	Murata	GRM188R71H104KA01D
CAP, 4.7uF, 3216-18	C4	AVX	TAJA475M016RNJ
IND, 820nH, ±10%, 2520, W/W	L2	Taiyo Yuden	LEM2520TR82K
RES, 0Ohm, 1608	C1, C5	ROHM	MCR03 EZPJ000
RES, 51Ohm, 1608	R2	ROHM	MCR03 EZPJ510
RES, 510Ohm, 1608	R1	ROHM	MCR03 EZPJ511

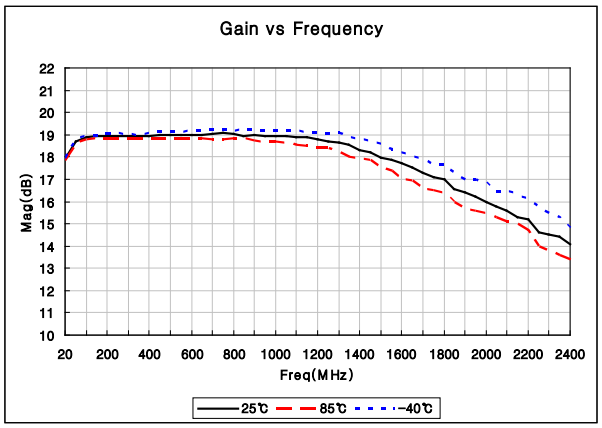
Typical Performance

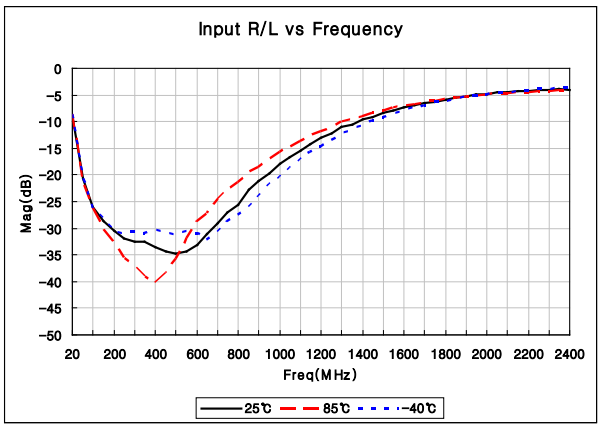
PARAMETER	UNIT	TYPICAL	REMARK
Operational Frequency Range	MHz	30 ~ 2400	-
Small Signal Gain(S21)	dB	19	@ 900MHz
Input Return Loss(S11)	dB	-10	-
Output Return Loss(S22)	dB	-10	-
Output IP3(OIP3)	dBm	35	@ 900MHz
1dB Compression Point(P_1dB)	dBm	20	
Noise Figure(NF)	dB	2.8	-
DC Current	mA	100	-
Supply Voltage	V	5	-

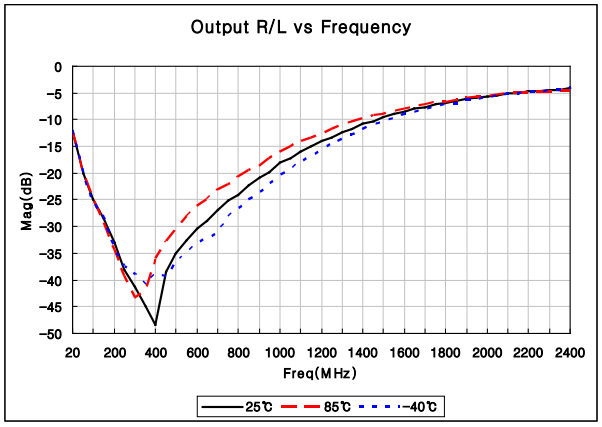
Note

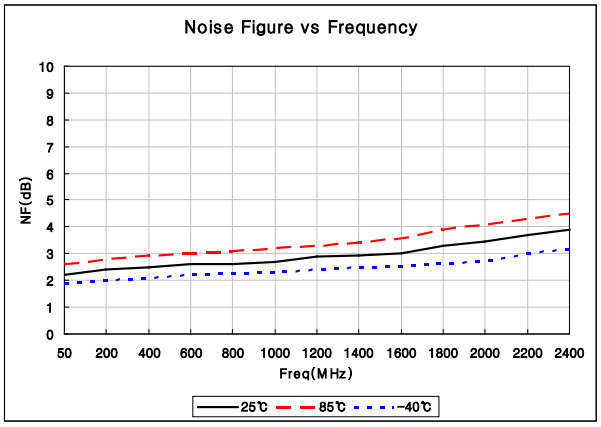
1. Test conditions unless otherwise noted. Freq = 30~2400MHz, Vdd=+5V, T=25℃, 50Ω system
2. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz

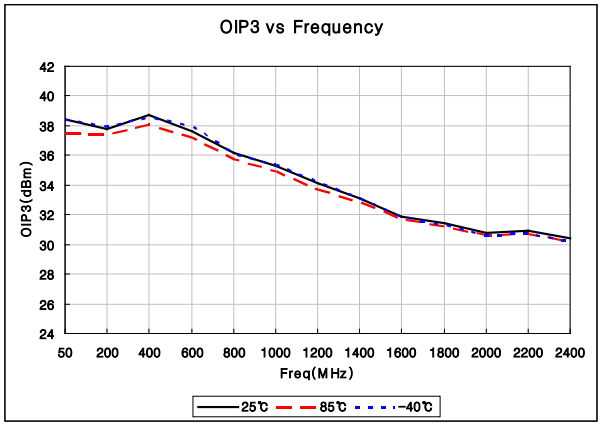
Typical Performance @ V_{DD} = 5V, I_{DS} = 100mA, 50ohm System

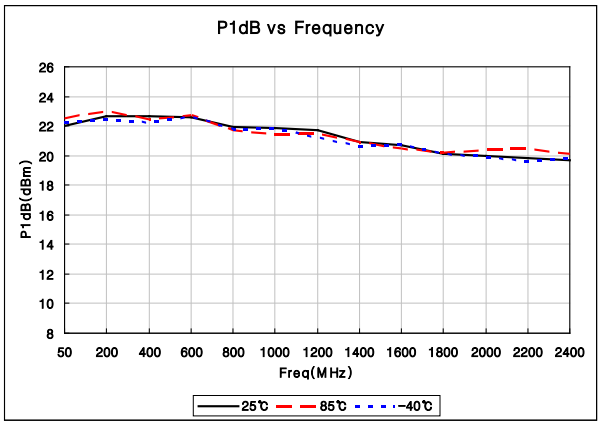




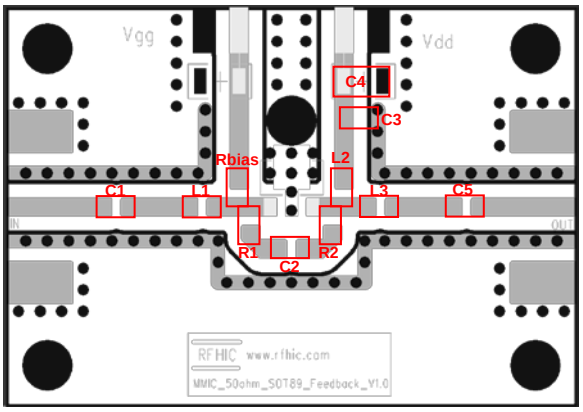


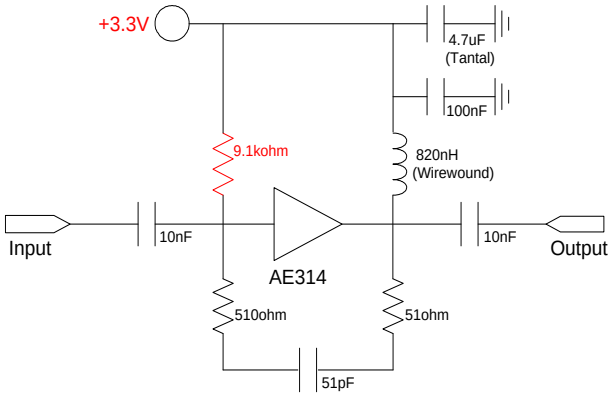






Application Circuit @ 30 ~ 2400MHz, 50ohm System(V_{DD} = 3.3V)





EVB BOM			
Description	**Reference Designator**	**Manufacturer**	**Manufacturer's P/N**
CAP, 51pF, 1608	C2	Murata	GRM1885C1H510JA01D
CAP, 10nF, 1608	L1, L3	Murata	GRM188R71H103KA01D
CAP, 100nF, 1608	C3	Murata	GRM188R71H104KA01D
CAP, 4.7uF, 3216-18	C4	AVX	TAJA475M016RNJ
IND, 820nH, ±10%, 2520, W/W	L2	Taiyo Yuden	LEM2520TR82K
RES, 0Ohm, 1608	C1, C5	ROHM	MCR03 EZPJ000
RES, 51Ohm, 1608	R2	ROHM	MCR03 EZPJ510
RES, 510Ohm, 1608	R1	ROHM	MCR03 EZPJ511
RES, 9.1KOhm, 1608	Rbias	ROHM	MCR03 EZPJ912

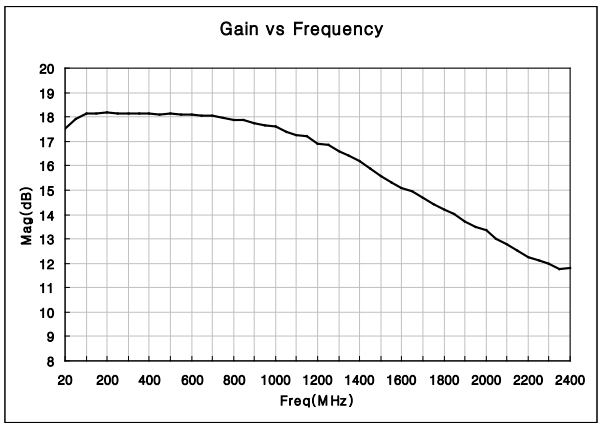
Typical Performance

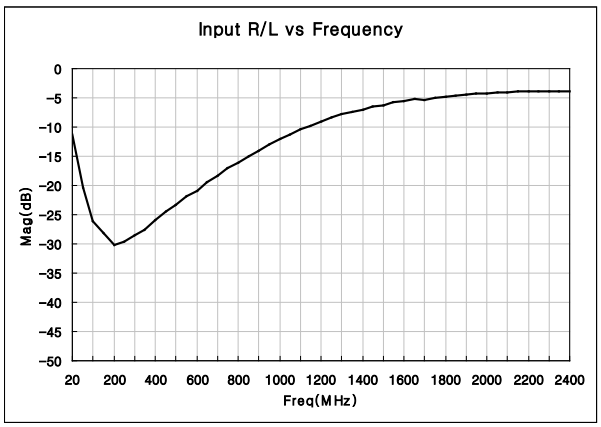
PARAMETER	UNIT	TYPICAL	REMARK
Operational Frequency Range	MHz	30 ~ 2400	-
Small Signal Gain(S21)	dB	17.5	@ 900MHz
Input Return Loss(S11)	dB	-10	-
Output Return Loss(S22)	dB	-10	-
Output IP3(OIP3)	dBm	28	@ 900MHz
1dB Compression Point(P_1dB)	dBm	17	
Noise Figure(NF)	dB	2.7	-
DC Current	mA	50	-
Supply Voltage	V	3.3	-

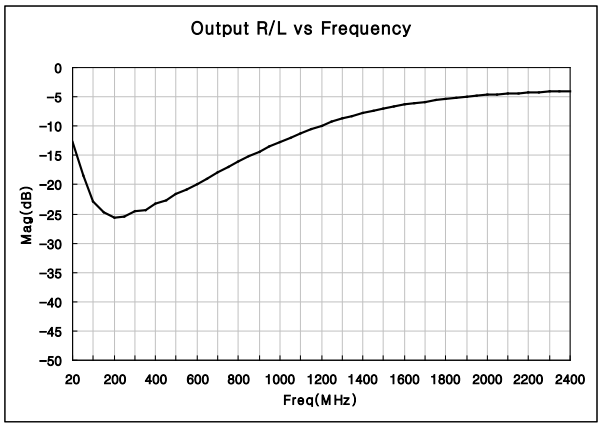
Note

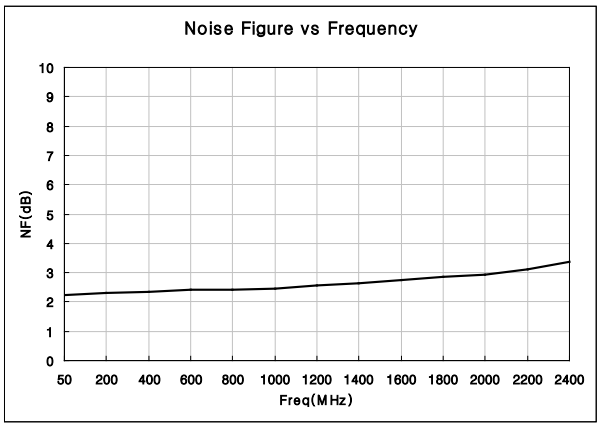
1. Test conditions unless otherwise noted. Freq=30~2400MHz, Vdd=+3.3V, T=25℃, 50Ω system
2. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz

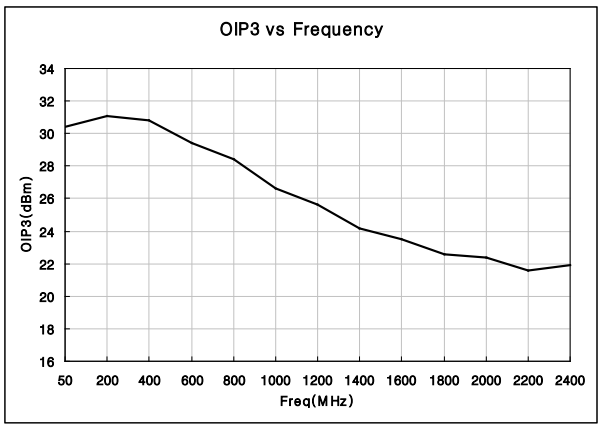
Typical Performance @ V_{DD}=3.3V, I_{DS}=50mA, T=25℃, 50ohm System

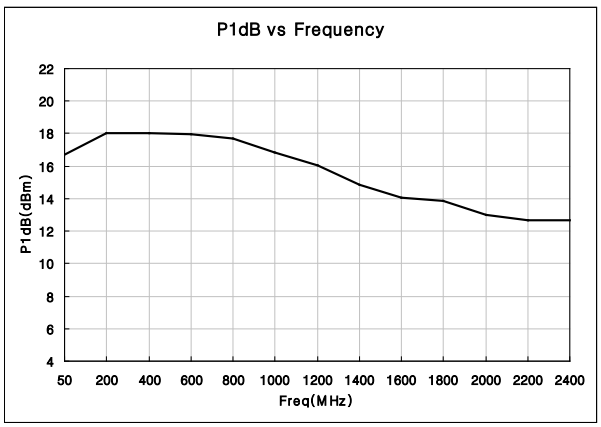




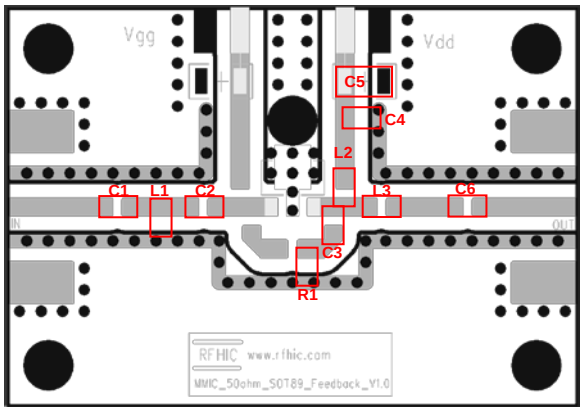


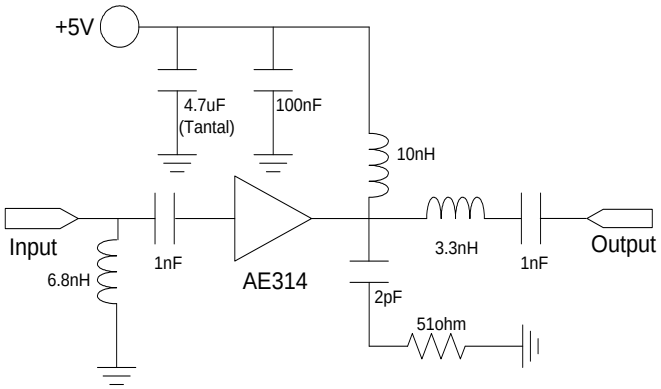






Application Circuit @ 800 ~ 1000MHz, 50ohm System





EVB BOM			
Description	**Reference Designator**	**Manufacturer**	**Manufacturer's P/N**
CAP, 2pF, 1608	C3	Murata	GRM1885C1H2R0CZ01D
CAP, 1nF, 1608	C2, C6	Murata	GRM188R71H103KA01D
CAP, 100nF, 1608	C4	Murata	GRM188R71H104KA01D
CAP, 4.7uF, 3216-18	C5	AVX	TAJA475M016RNJ
IND, 3.3nH, 1608	L3	Taiyo Yuden	HK16083N3S-T
IND, 6.8nH, 1608	L1	Taiyo Yuden	HK16086N8J-T
IND, 10nH, 1608	L2	Taiyo Yuden	HK160810NJ-T
RES, 0Ohm, 1608	C1	ROHM	MCR03 EZPJ000
RES, 51Ohm, 1608	R1	ROHM	MCR03 EZPJ510

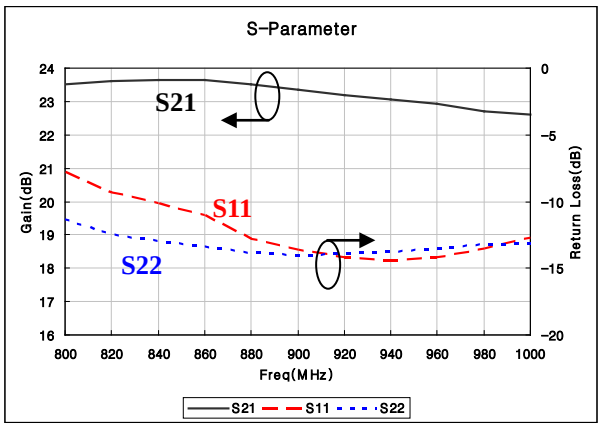
Typical Performance

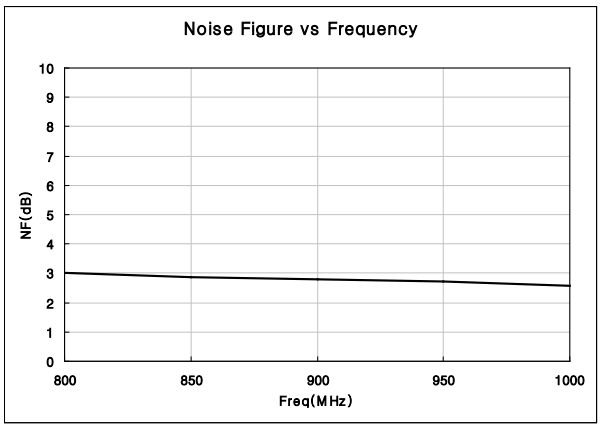
PARAMETER	UNIT	TYPICAL	REMARK
Operational Frequency Range	MHz	800 ~ 1000	-
Small Signal Gain(S21)	dB	23	@ 900MHz
Input Return Loss(S11)	dB	-10	-
Output Return Loss(S22)	dB	-10	-
Output IP3(OIP3)	dBm	35	@ 900MHz
1dB Compression Point(P_1dB)	dBm	20	
Noise Figure(NF)	dB	3	-
DC Current	mA	100	-
Supply Voltage	V	5	-

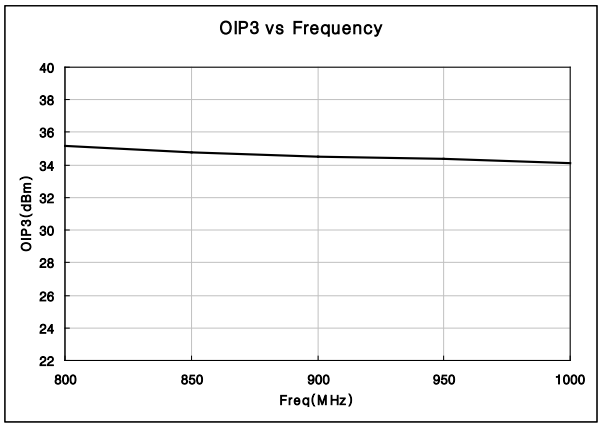
Note

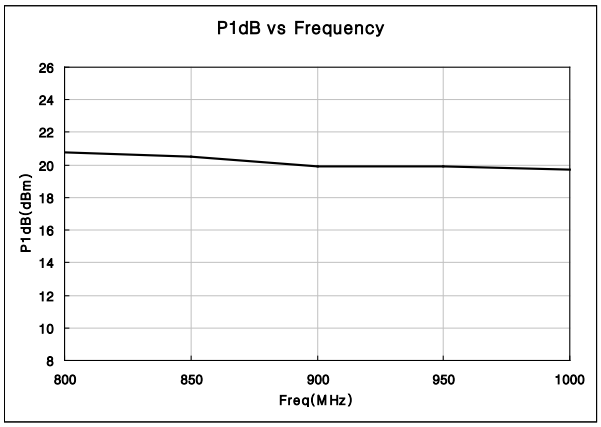
1. Test conditions unless otherwise noted. Freq = 800~1000MHz, Vdd=+5V, T=25℃, 50Ω system
2. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz

Typical Performance @ V_{DD} = 5V, I_{DS} = 100mA, T = 25℃, 50ohm System

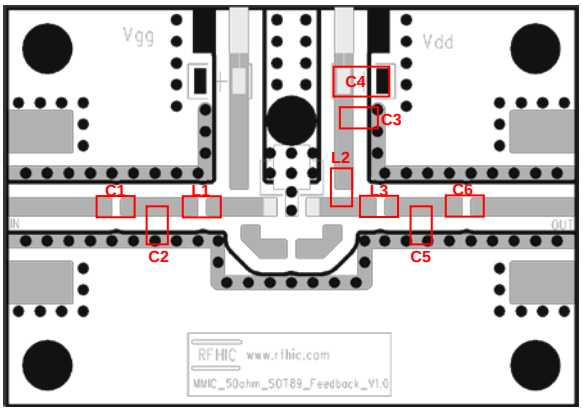


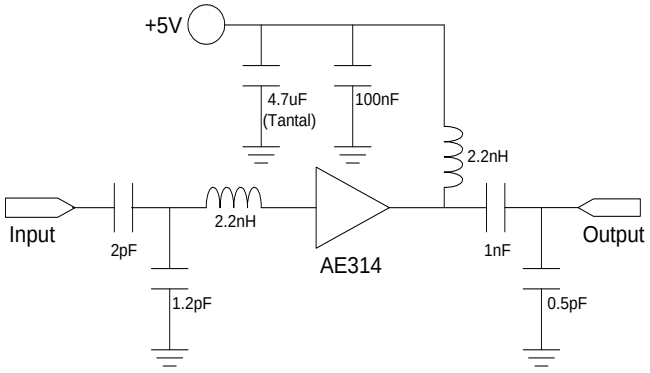






Application Circuit @ 1700 ~ 1900MHz, 50ohm System





EVB BOM			
Description	**Reference Designator**	**Manufacturer**	**Manufacturer's P/N**
CAP, 0.5pF, 1608	C5	Murata	GRM1885C1HR50CZ01D
CAP, 1.2pF, 1608	C2	Murata	GRM1885C1H1R2CZ01D
CAP, 2pF, 1608	C1	Murata	GRM1885C1H2R0CZ01D
CAP, 1nF, 1608	L3	Murata	GRM188R71H102KA01D
CAP, 100nF, 1608	C3	Murata	GRM188R71H104KA01D
CAP, 4.7uF, 3216-18	C4	AVX	TAJA475M016RNJ
IND, 2.2nH, 1608	L1, L2	Taiyo Yuden	HK16082N2S-T
RES, 0Ohm, 1608	C6	ROHM	MCR03 EZPJ000

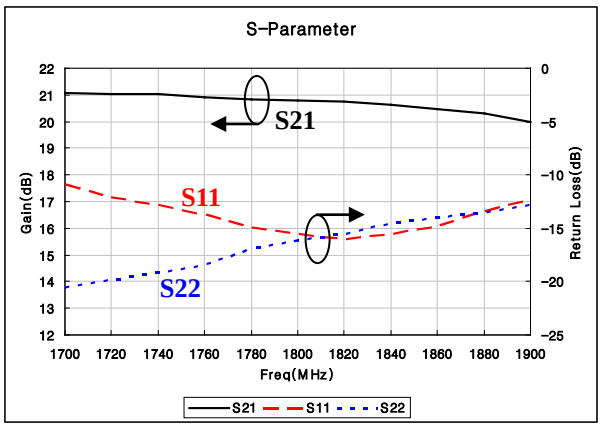
Typical Performance

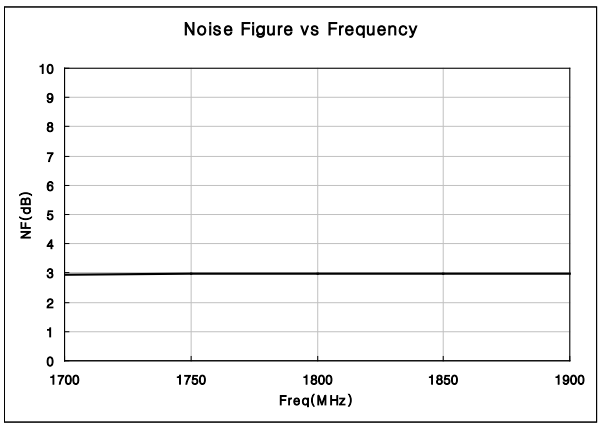
PARAMETER	UNIT	TYPICAL	REMARK
Operational Frequency Range	MHz	1700 ~ 1900	-
Small Signal Gain(S21)	dB	20.5	@ 1800MHz
Input Return Loss(S11)	dB	-10	-
Output Return Loss(S22)	dB	-10	-
Output IP3(OIP3)	dBm	31	@ 1800MHz
1dB Compression Point(P_1dB)	dBm	18	
Noise Figure(NF)	dB	3	-
DC Current	mA	100	-
Supply Voltage	V	5	-

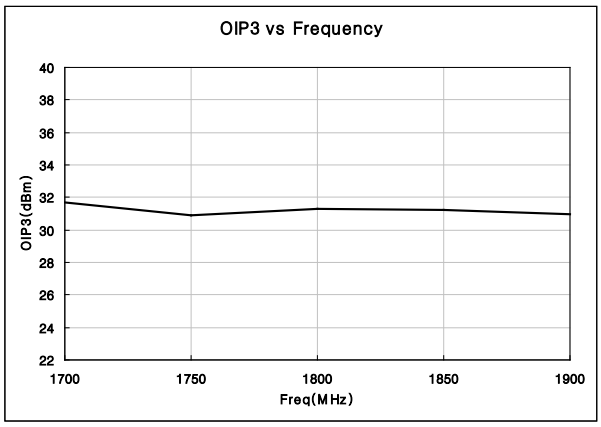
Note

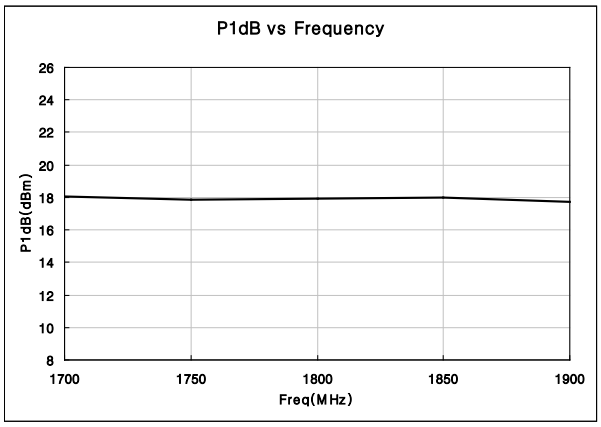
1. Test conditions unless otherwise noted. Freq=1700~1900MHz, Vdd=+5V, T=25℃, 50Ω system
2. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz

Typical Performance @ V_{DD} = 5V, I_{DS} = 100mA, T = 25℃, 50ohm System

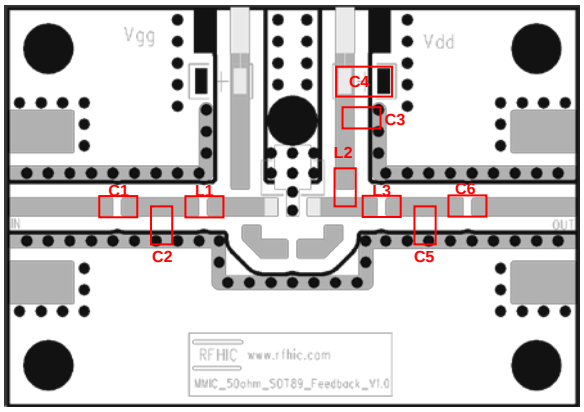


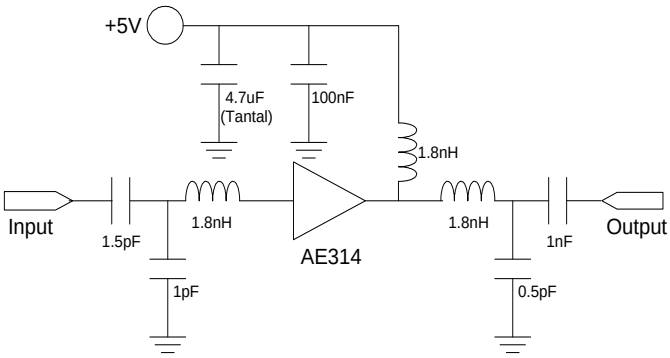






Application Circuit @ 1900 ~ 2200MHz, 50ohm System





EVB BOM			
Description	**Reference Designator**	**Manufacturer**	**Manufacturer's P/N**
CAP, 0.5pF, 1608	C5	Murata	GRM1885C1HR50CZ01D
CAP, 1pF, 1608	C2	Murata	GRM1885C1H1R0CZ01D
CAP, 1.5pF, 1608	C1	Murata	GRM1885C1H1R5CZ01D
CAP, 1nF, 1608	C6	Murata	GRM188R71H102KA01D
CAP, 100nF, 1608	C3	Murata	GRM188R71H104KA01D
CAP, 4.7uF, 3216-18	C4	AVX	TAJA475M016RNJ
IND, 1.8nH, 1608	L1, L2, L3	Taiyo Yuden	HK1608 1N8S-T

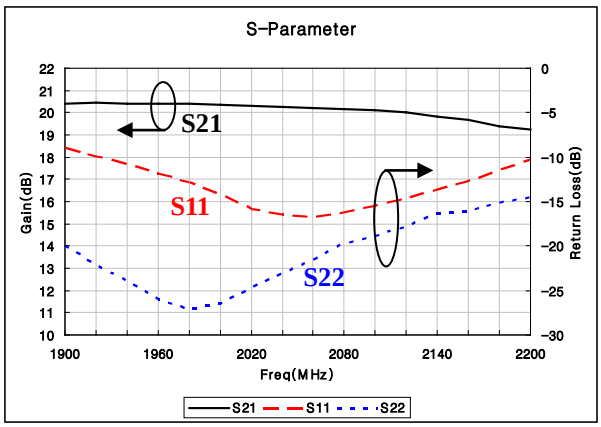
Typical Performance

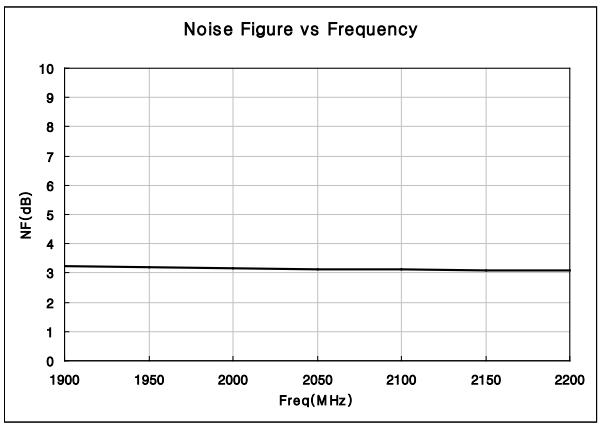
PARAMETER	UNIT	TYPICAL	REMARK
Operational Frequency Range	MHz	1900 ~ 2200	-
Small Signal Gain(S21)	dB	20	@ 2050MHz
Input Return Loss(S11)	dB	-10	-
Output Return Loss(S22)	dB	-10	-
Output IP3(OIP3)	dBm	30	@ 2050MHz
1dB Compression Point(P_1dB)	dBm	17	
Noise Figure(NF)	dB	2.8	-
DC Current	mA	100	-
Supply Voltage	V	5	-

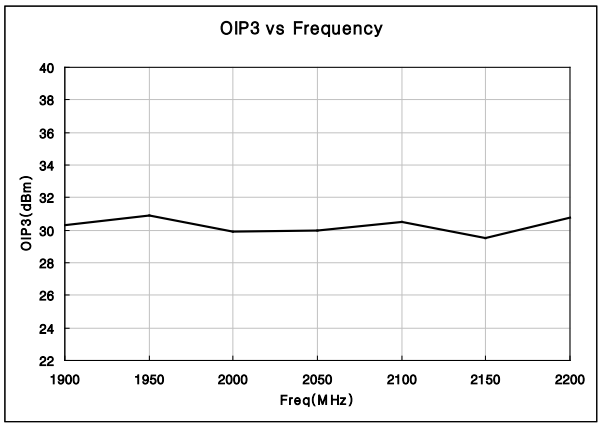
Note

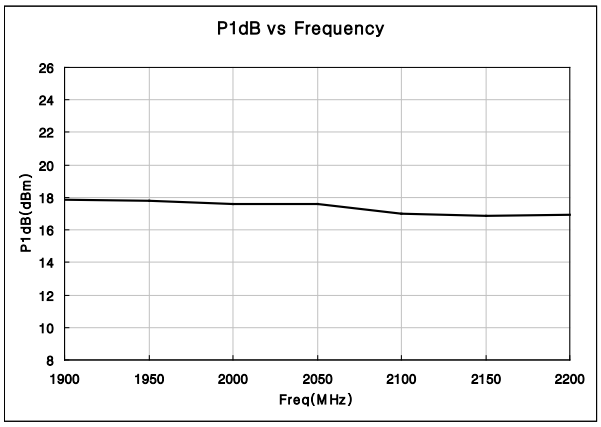
1. Test conditions unless otherwise noted. Freq = @ 1900~2200MHz, Vdd=+5V, T=25℃, 50Ω system
2. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz

Typical Performance @ V_{DD} = 5V, I_{DS} = 100mA, T = 25℃, 50ohm System



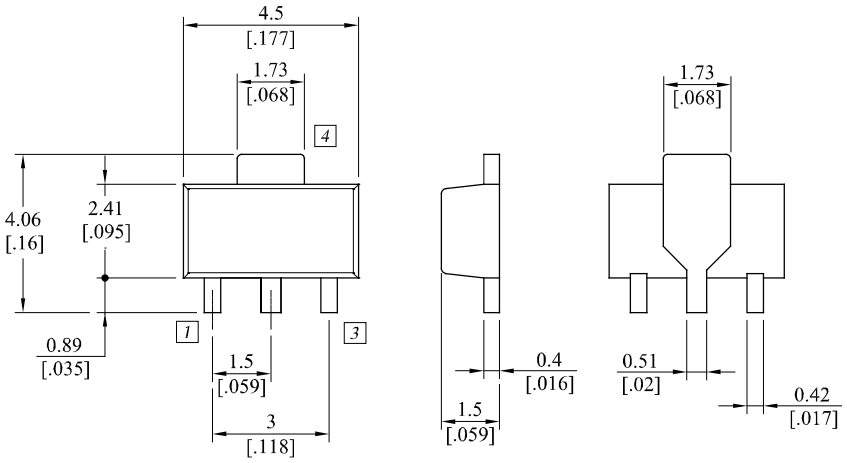






Package Dimensions (Type: SOT-89)

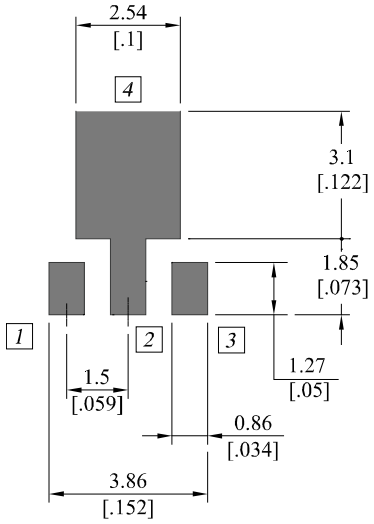
* Unit: mm[inch] | Tolerance ±0.2[.008]



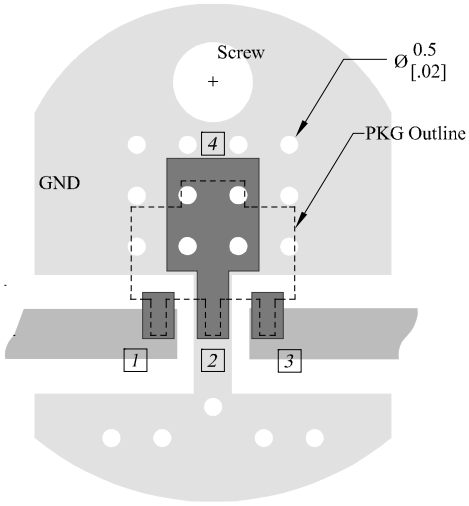
▲ Top View ▲ Side View ▲ Bottom View

Pin Description			
Pin No	**Function**	**Pin No**	**Function**
1	Input	4	GND
2	GND		-
3	Output / Bias		-

Recommended Pattern



Recommended Mounting Configuration



*** Mounting Configuration Notes**

1. Ground / thermal via holes are critical for the proper performance of this device.
2. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
3. Mounting screws can be added near the part to fasten the board to a heatsink. Ensure that the ground / thermal via hole region contacts the heatsink.
4. Do not put solder mask on the backside of the PCB in the region where the board contacts the heatsink.
5. RF trace width depends upon the PCB material and construction.
6. Use 1 oz. Copper minimum.

Revision History

Part Number	Release Date	Version	Modification	Data Sheet Status
AE314	2014.4.11	1.2	Revision : Absolute Maximum Ratings	-
AE314	2012.10.15	1.1	New datasheet format	-
AE314	2012.5.8	1.0	Initial Release.	-