E-pHEMT MMIC AE368

Product Features

- 50 ~ 3500MHz
- GaAs E-pHEMT MMIC
- 1W Medium Amplifier
- Higher linearity
- Low Noise Figure
- High Max input power
- SOIC-8 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 : SOIC-8

Description

AE368 is a drive or pre-drive amplifier designed in a low cost SOIC-8 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 50~3500MHz Wireless technologies such as Cellular, GSM, PCS, W-CDMA, Wibro, WiMax System.
The data in this spec sheet is valid only for 50ohm application.

Electrical Specifications

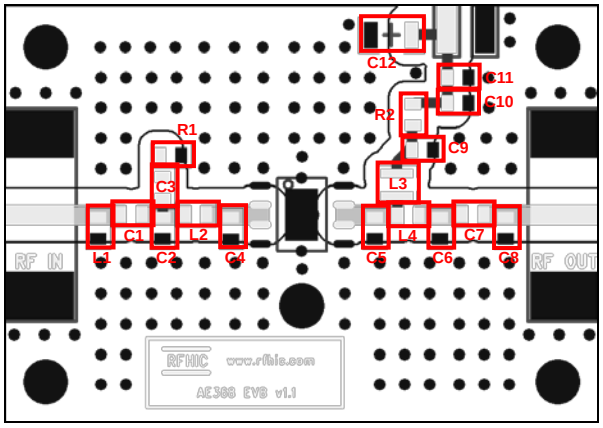
PARAMETER		UNIT	Test Frequency			REMARK
			1960MHz	2140MHz	2600MHz	
Small Signal Gain		dB	14.2	13.7	11.5	-
Input Return Loss		dB	-20	-18	-15	-
Output Return Loss		dB	-14	-20	-17	-
Output IP3*		dBm	46	48	48.5	-
1dB Compression Point		dBm	30.5	30.4	30.3	-
Noise Figure		dB	2.9	2.9	2.9	-
ACLR	WCDMA[2]	dBm	21.2	21.2	21.3	@ -50dBc ACLR
	LTE[3]		21.5	21.5	21	
Efficiency		%	52	54	52	@ P1dB
Supply Voltage/DC Current		V/mA	5/300			-

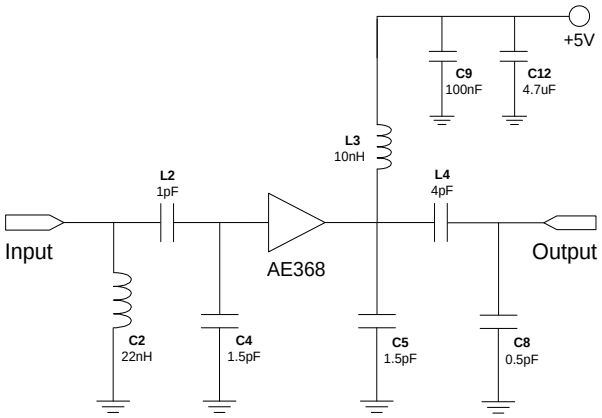
Note
1. OIP3 measured with 2 tones at an output power of +15dBm/tone separated by 1MHz
2. WCDMA 3G 1FA Test Model1 64DPCH, PAR = 10dB@0.01%
3. LTE FDD 10MHz ETM3.1 PAR=7.5dB@0.01%

Absolute Maximum Ratings

PARAMETER	UNIT	MIN	TYP	MAX	REMARK
Device Voltage	V	-	5	7	-
Operating Case Temperature	℃	-40	-	85	-
Storage Temperature	℃	-40	-	150	-
ESD Human Body Model	-	-	Class 1B	-	-
Moisture Sensitivity Level	-	-	MSL1	-	-
Junction Temperature (Tj)	℃	-	-	180	@ quiescent current, No RF, Tc = 85℃
Thermal Resistance (Rth)	℃/W	-	37.3	-	

Application Circuit @ 1930 ~ 1990MHz, 50ohm System





EVB BOM			
Description	**Reference Designator**	**Manufacturer**	**Manufacturer's P/N**
CAP, 0.5pF, 1608	C8	Murata	GRM1885C1HR50CZ01D
CAP, 1pF, 1608	L2	Murata	GRM1885C1H1R0CZ01D
CAP, 1.5pF, 1608	C4, C5	Murata	GRM1885C1H1R5CZ01D
CAP, 4pF, 1608	L4	Murata	GRM1885C1H4R0CZ01D
CAP, 100nF, 1608	C9	Murata	GRM188R71C104KA01D
CAP, 4.7uF, 3216-18	C12	AVX	TAJA475M016RNJ
IND, 22nH, 1608	C2	Taiyo Yuden	HK160822NJ
IND,10nH,±5%,2012,W/W	L3	WURTH ELEKTRONIK	74476010C
RES, 0Ohm, 1608	C1, R2, C7	ROHM	MCR03 EZPJ000
DNP	L1,R1,C3,C6,C10,C11	-	-

Typical Performance

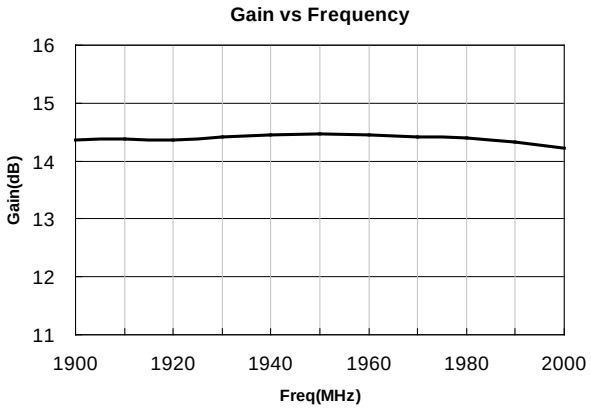
PARAMETER		UNIT	TYPICAL	Remark
Operational Frequency Range		MHz	1930 ~ 1990	-
Small Signal Gain(S21)		dB	14.2	@ 1960MHz
Input Return Loss(S11)		dB	-20	-
Output Return Loss(S22)		dB	-14	-
Output IP3(OIP3)		dBm	46	@ 1960MHz
1dB Compression Point(P_1dB) / Efficiency		dBm / %	30.5 / 52	
Noise Figure(NF)		dB	2.9	-
ACLR	**WCDMA[2]**	dBm	21.2	@ -50dBc ACLR
	LTE[3]		21.5	

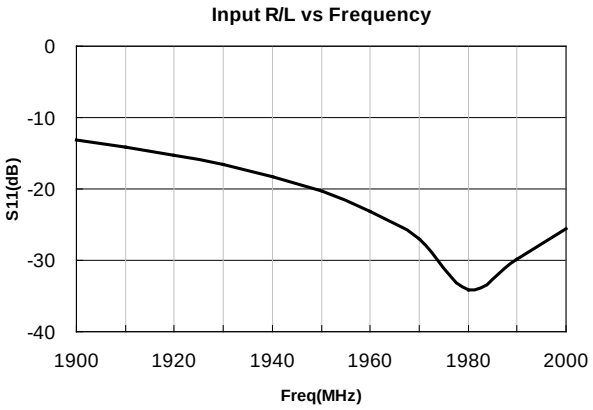
Note

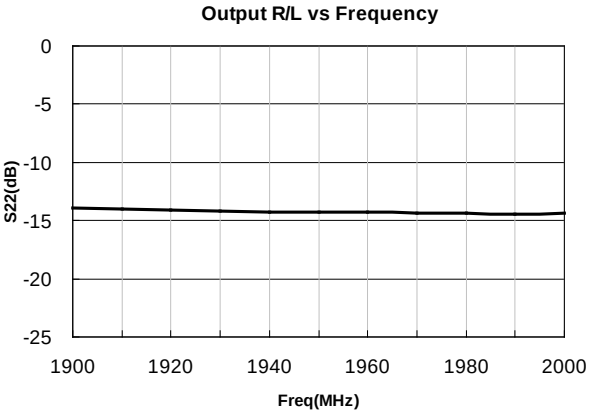
Test condition : Supply Voltage/DC Current = 5V/300mA, T = 25℃

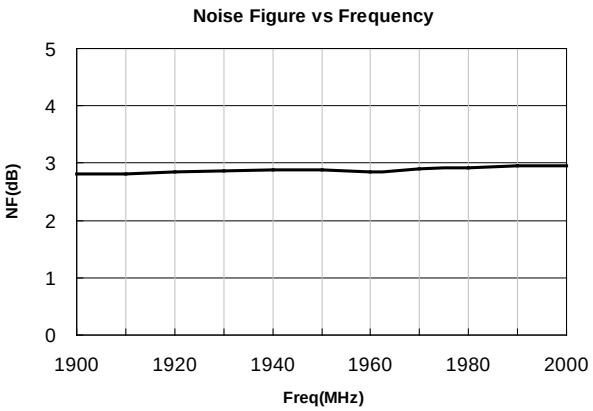
1. OIP3 measured with 2 tones at an output power of +15dBm/tone separated by 1MHz
2. WCDMA 3G 1FA Test Model1 64DPCH, PAR = 10dB@0.01%
3. LTE FDD 10MHz ETM3.1 PAR=7.5dB@0.01%

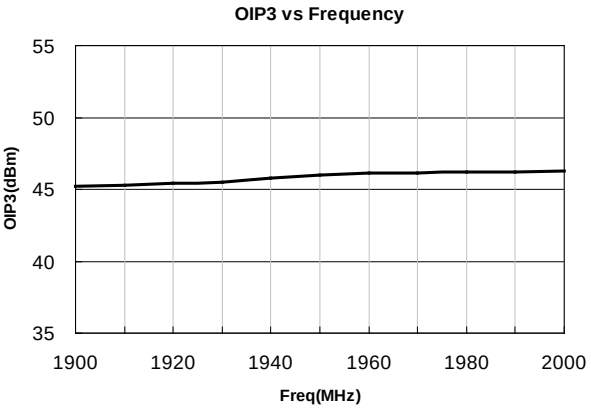
Typical Performance @ Voltage = 5V(300mA), T=25℃, 50ohm System

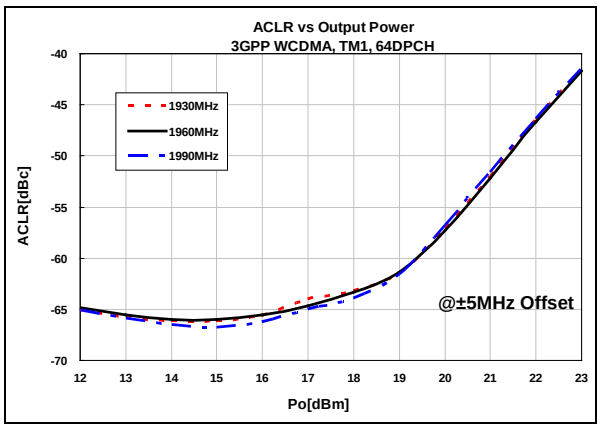


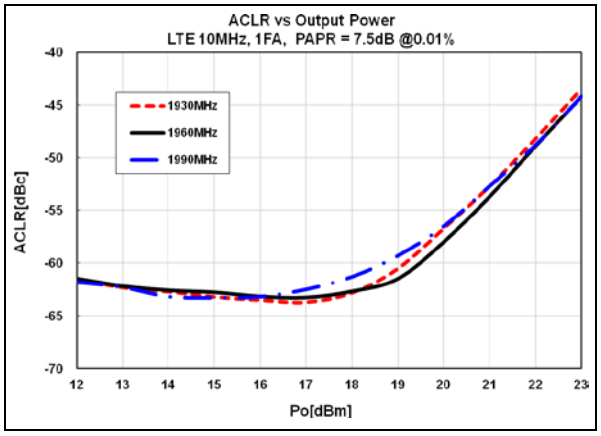


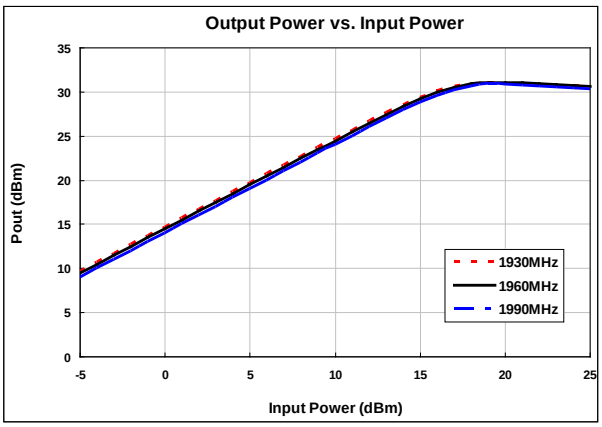


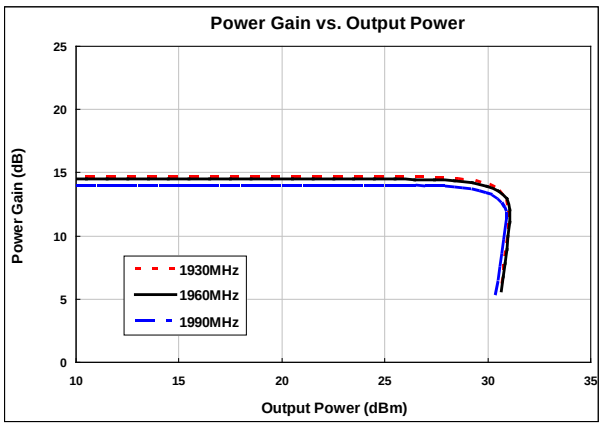


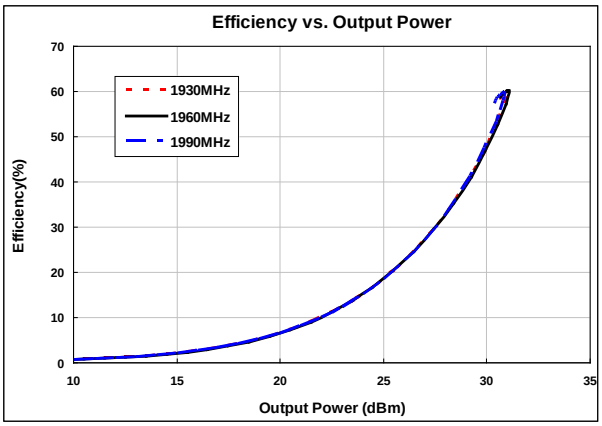


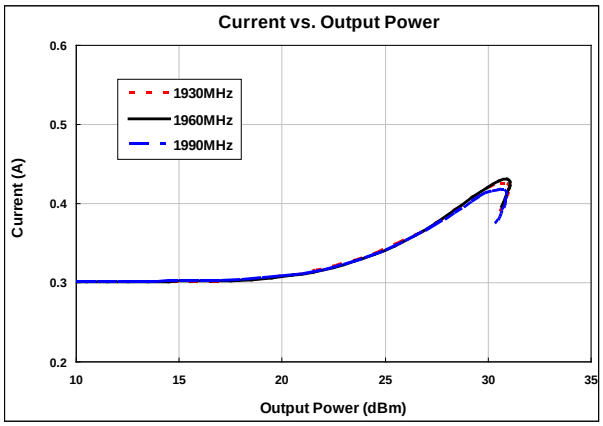

ACLR vs Output Power
3GPP WCDMA, TM1, 64DPCH
1930MHz
1960MHz
1990MHz
ACLR[dBc]
@±5MHz Offset
Po[dBm]


ACLR vs Output Power
LTE 10MHz, 1FA, PAPR = 7.5dB @0.01%
1930MHz
1960MHz
1990MHz
ACLR[dBc]
Po[dBm]

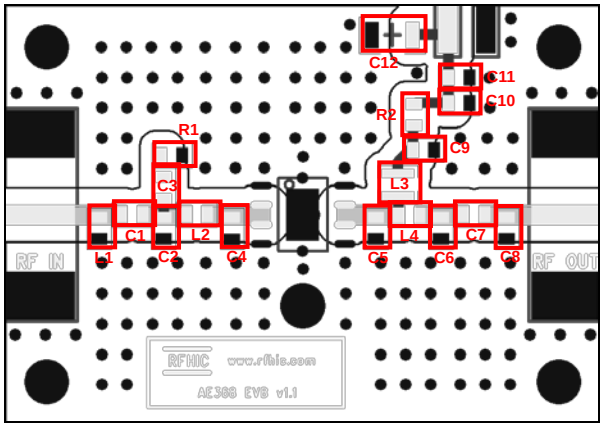

Output Power vs. Input Power
1930MHz
1960MHz
1990MHz
Pout (dBm)
Input Power (dBm)

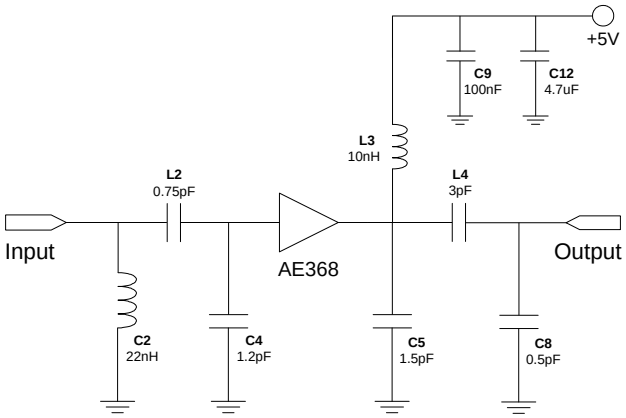

Power Gain vs. Output Power
1930MHz
1960MHz
1990MHz
Power Gain (dB)
Output Power (dBm)


Efficiency vs. Output Power
1930MHz
1960MHz
1990MHz
Efficiency(%)
Output Power (dBm)


Current vs. Output Power
1930MHz
1960MHz
1990MHz
Current (A)
Output Power (dBm)

Application Circuit @ 2110 ~ 2170MHz, 50ohm System





EVB BOM			
Description	**Reference Designator**	**Manufacturer**	**Manufacturer's P/N**
CAP, 0.5pF, 1608	C8	Murata	GRM1885C1HR50CZ01D
CAP, 0.75pF, 1608	L2	Murata	GRM1885C1HR75CZ01D
CAP, 1.2pF, 1608	C4	Murata	GRM1885C1H1R2CZ01D
CAP, 1.5pF, 1608	C5	Murata	GRM1885C1H1R5CZ01D
CAP, 3pF, 1608	L4	Murata	GRM1885C1H3R0CZ01D
CAP, 100nF, 1608	C9	Murata	GRM188R71C104KA01D
CAP, 4.7uF, 3216-18	C12	AVX	TAJA475M016RNJ
IND, 22nH, 1608	C2	Taiyo Yuden	HK160822NJ
IND, 10nH, ±5%, 2012, W/W	L3	WURTH ELEKTRONIK	74476010C
RES, 0Ohm, 1608	C1, R2, C7	ROHM	MCR03 EZPJ000
DNP	L1, R1, C3, C6, C10, C11	-	-

Typical Performance

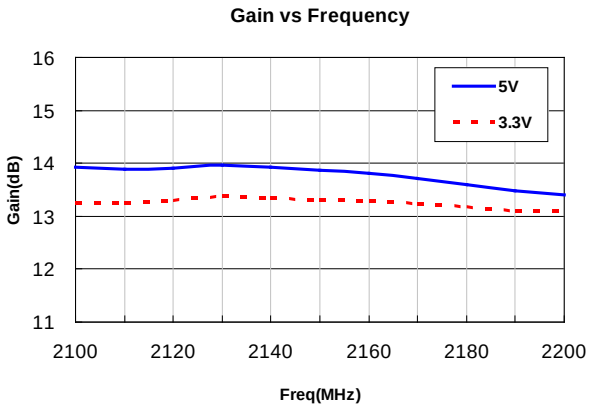
PARAMETER		UNIT	TYPICAL	REMARK
Operational Frequency Range		MHz	2110 ~ 2170	-
Small Signal Gain(S21)		dB	13.7	@ 2140MHz
Input Return Loss(S11)		dB	-18	-
Output Return Loss(S22)		dB	-20	-
Output IP3(OIP3)		dBm	48	@ 2140MHz
1dB Compression Point(P_1dB) / Efficiency		dBm / %	30.4 / 54	
Noise Figure(NF)		dB	2.9	-
ACLR	**WCDMA[2]**	dBm	21.2	@ -50dBc ACLR
	LTE[3]		21.5	

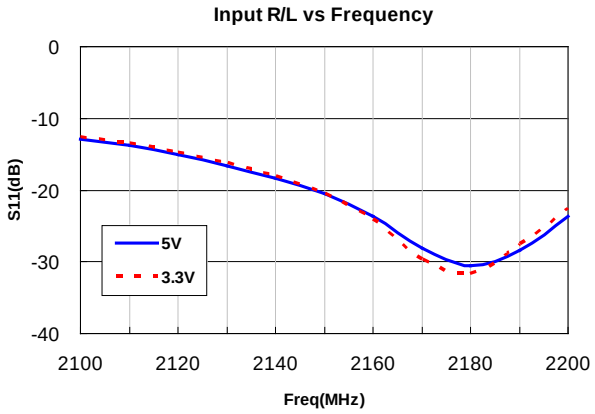
Note

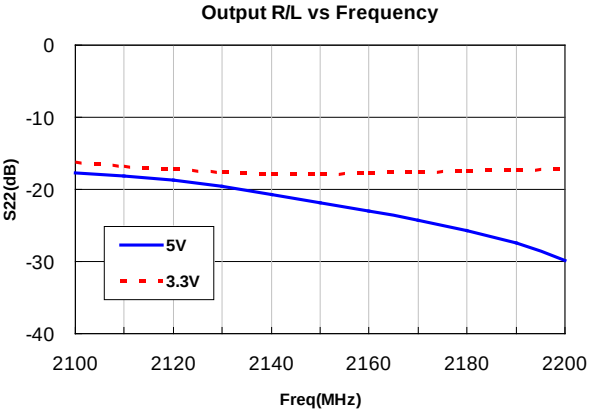
Test condition : Supply Voltage/DC Current = 5V/300mA, T = 25℃

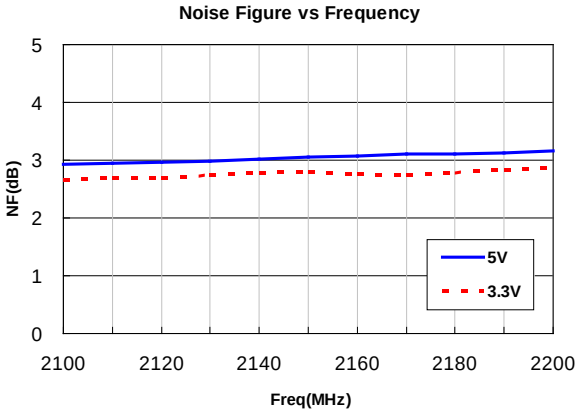
1. OIP3 measured with 2 tones at an output power of +15dBm/tone separated by 1MHz
2. WCDMA 3G 1FA Test Model1 64DPCH, PAR = 10dB@0.01%
3. LTE FDD 10MHz ETM3.1 PAR=7.5dB@0.01%

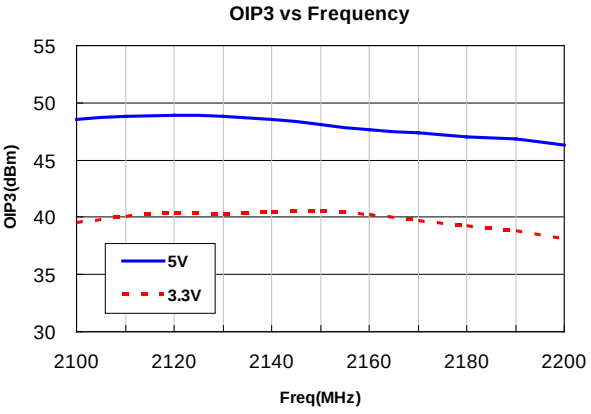
Typical Performance @ Voltage = 5V(300mA) & 3.3V(160mA), T=25℃, 50ohm System

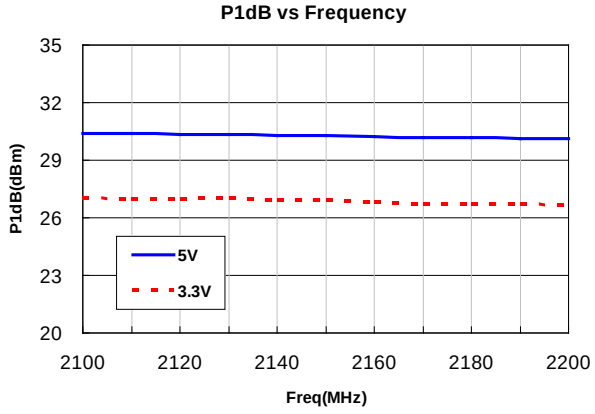


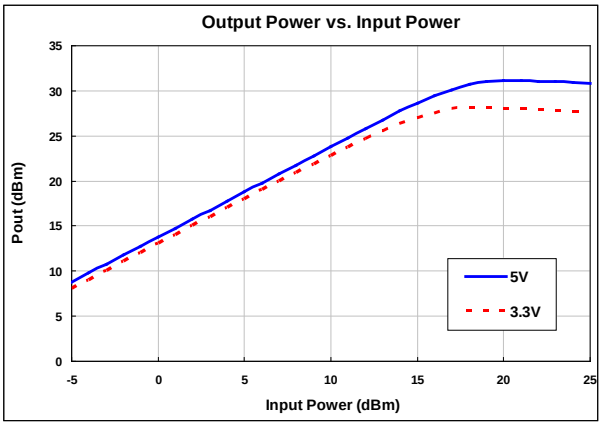


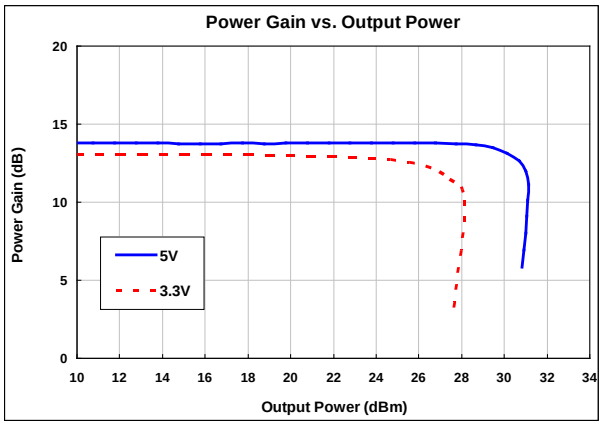


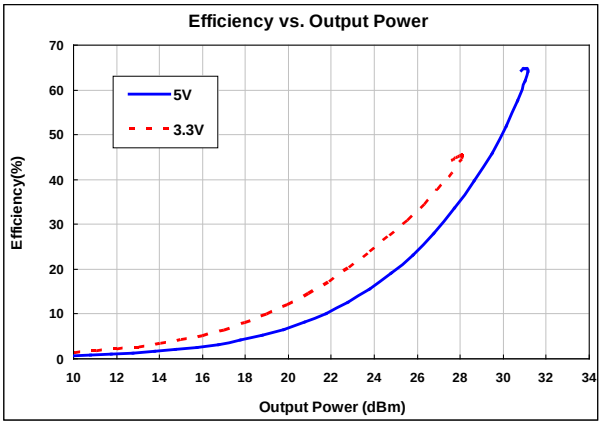


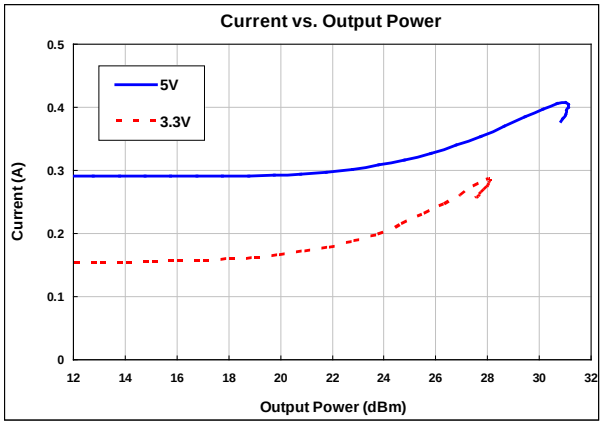




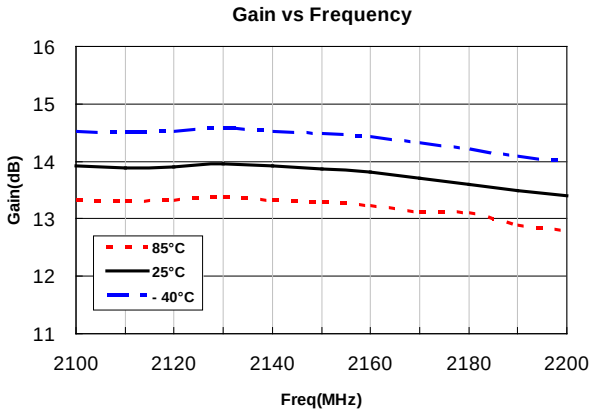

Output Power vs. Input Power
Pout (dBm)
Input Power (dBm)
5V
3.3V

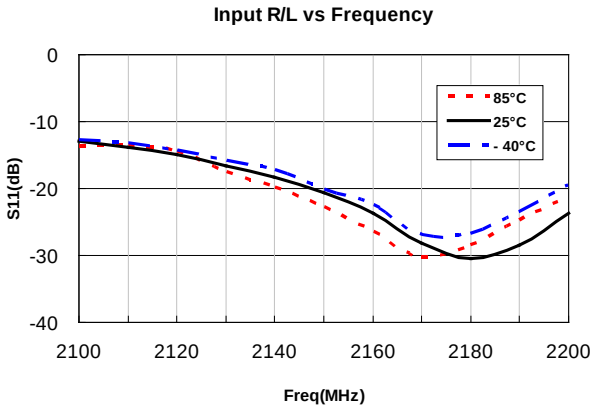

Power Gain vs. Output Power
Power Gain (dB)
Output Power (dBm)
5V
3.3V

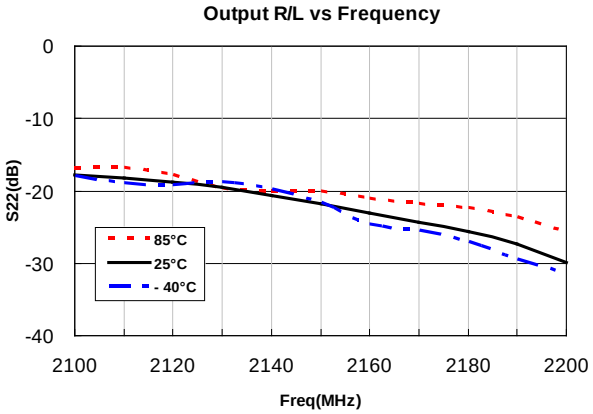

Efficiency vs. Output Power
Efficiency(%)
Output Power (dBm)
5V
3.3V

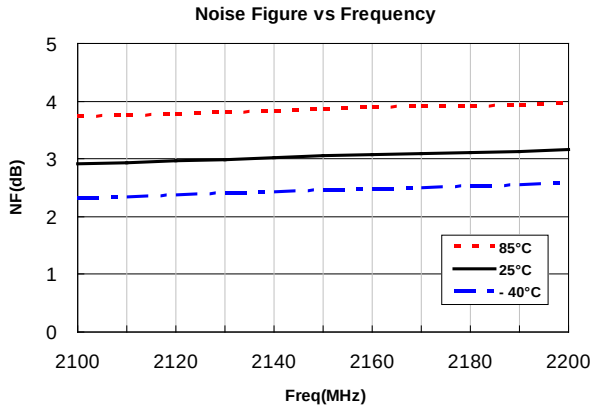

Current vs. Output Power
Current (A)
Output Power (dBm)
5V
3.3V

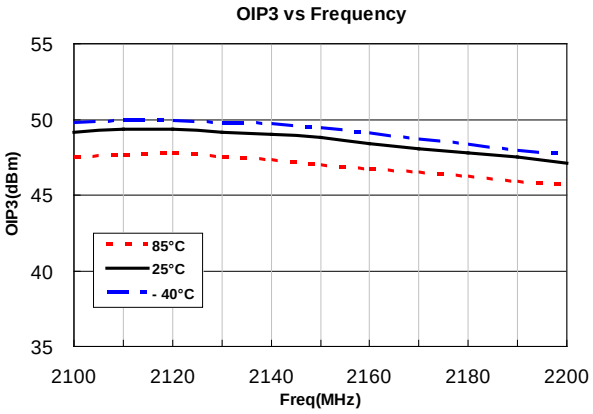
Typical Performance @ Voltage = 5V(300mA), 50ohm System

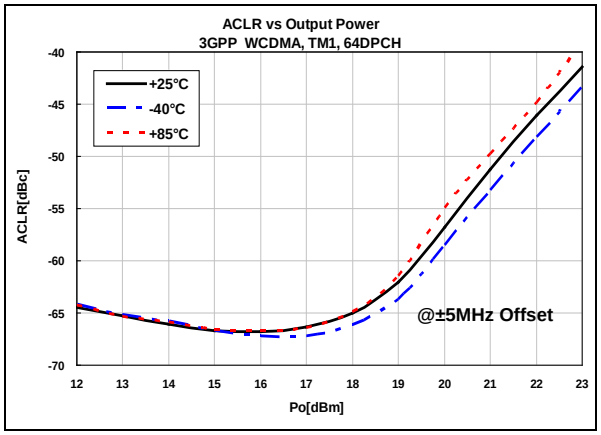


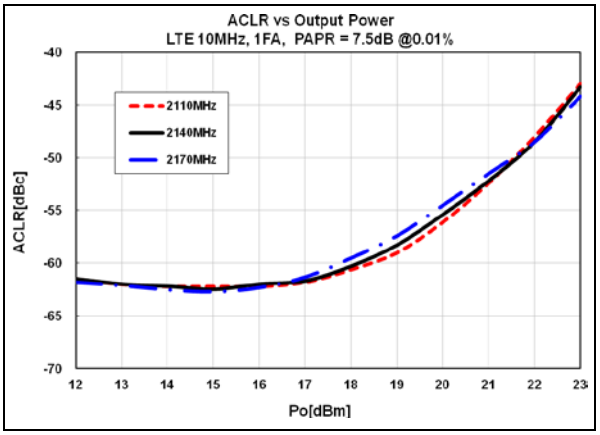


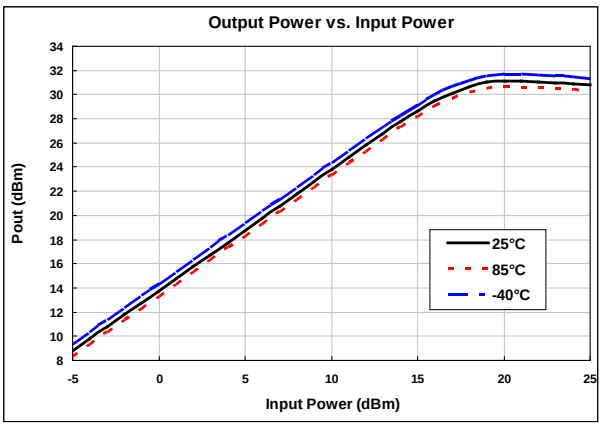


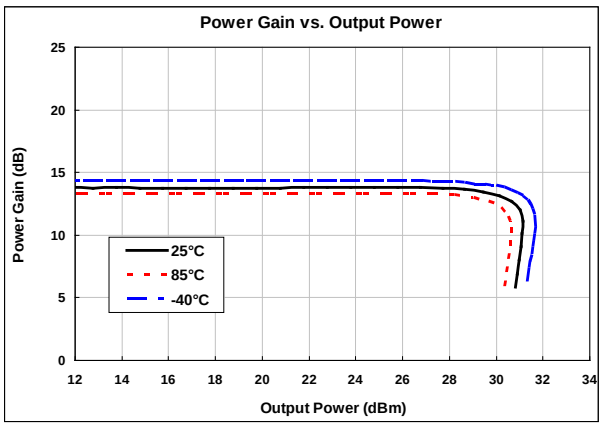


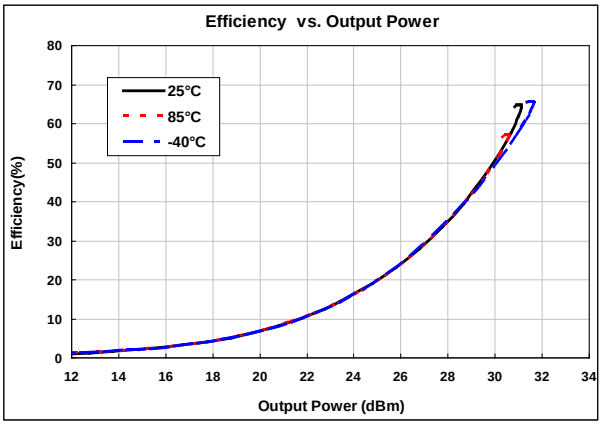


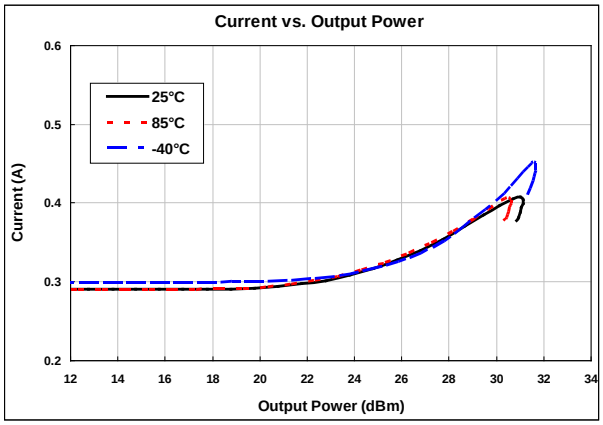

ACLR vs Output Power
3GPP WCDMA, TM1, 64DPCH
+25°C
-40°C
+85°C
@±5MHz Offset
ACLR[dBc]
Po[dBm]


ACLR vs Output Power
LTE 10MHz, 1FA, PAPR = 7.5dB @0.01%
2110MHz
2140MHz
2170MHz
ACLR[dBc]
Po[dBm]

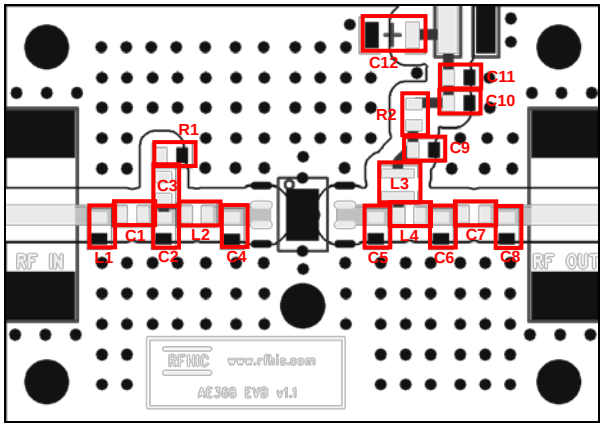

Output Power vs. Input Power
25°C
85°C
-40°C
Pout (dBm)
Input Power (dBm)

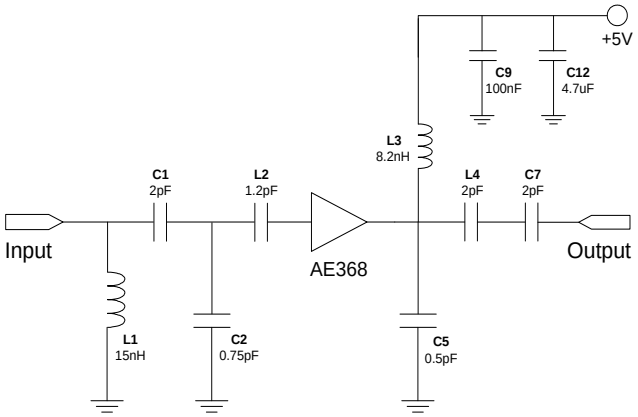

Power Gain vs. Output Power
25°C
85°C
-40°C
Power Gain (dB)
Output Power (dBm)


Efficiency vs. Output Power
25°C
85°C
-40°C
Efficiency(%)
Output Power (dBm)


Current vs. Output Power
25°C
85°C
-40°C
Current (A)
Output Power (dBm)

Application Circuit @ 2550 ~ 2650MHz, 50ohm System





EVB BOM			
Description	**Reference Designator**	**Manufacturer**	**Manufacturer's P/N**
CAP, 0.5pF, 1608	C5	Murata	GRM1885C1HR50CZ01D
CAP, 0.75pF, 1608	C2	Murata	GRM1885C1HR75CZ01D
CAP, 1.2pF, 1608	L2	Murata	GRM1885C1H1R2CZ01D
CAP, 2pF, 1608	C1, L4, C7	Murata	GRM1885C1H2R0CZ01D
CAP, 100nF, 1608	C9	Murata	GRM188R71C104KA01D
CAP, 4.7uF, 3216-18	C12	AVX	TAJA475M016RNJ
IND, 15nH, 1608	L1	Taiyo Yuden	HK160815NJ
IND, 8.2nH, ±5%, 2012,W/W	L3	WURTH ELEKTRONIK	744760082A
RES, 0Ohm, 1608	R2	ROHM	MCR03 EZPJ000
DNP	R1,C3,C4,C6,C8,C10,C11	-	-

Typical Performance

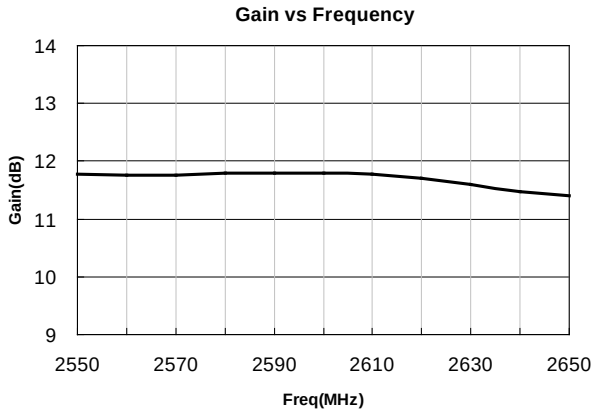
PARAMETER		UNIT	TYPICAL	REMARK
Operational Frequency Range		MHz	2550 ~ 2650	-
Small Signal Gain(S21)		dB	11.5	@ 2600MHz
Input Return Loss(S11)		dB	-15	-
Output Return Loss(S22)		dB	-17	-
Output IP3(OIP3)		dBm	48.5	@ 2600MHz
1dB Compression Point(P_1dB) / Efficiency		dBm / %	30.3 / 52	
Noise Figure(NF)		dB	2.9	-
ACLR	**WCDMA[2]**	dBm	21.3	@ -50dBc ACLR
	LTE[3]		21	

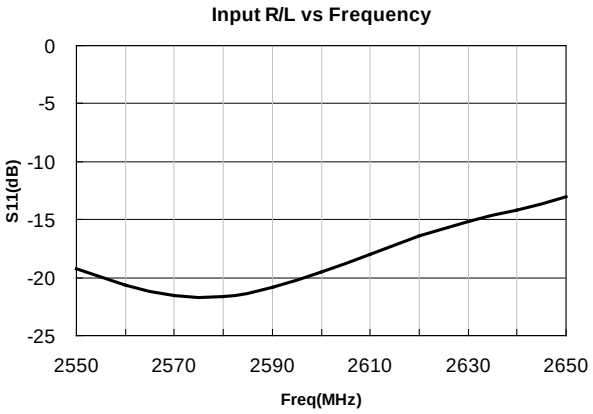
Note

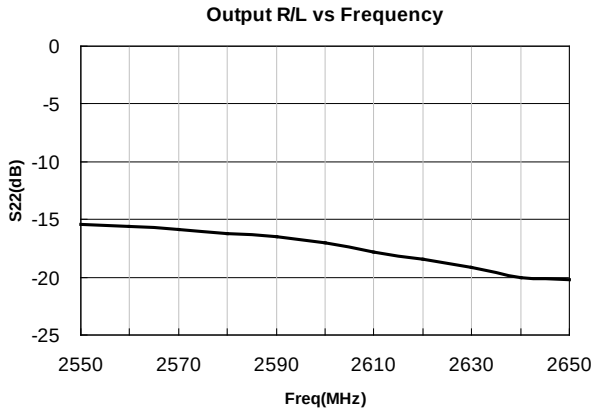
Test condition : Supply Voltage/DC Current = 5V/300mA, T = 25℃

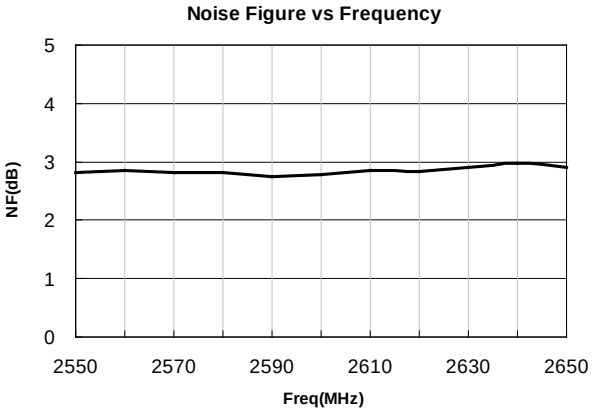
1. OIP3 measured with 2 tones at an output power of +15dBm/tone separated by 1MHz
2. WCDMA 3G 1FA Test Model1 64DPCH, PAR = 10dB@0.01%
3. LTE FDD 10MHz ETM3.1 PAR=7.5dB@0.01%

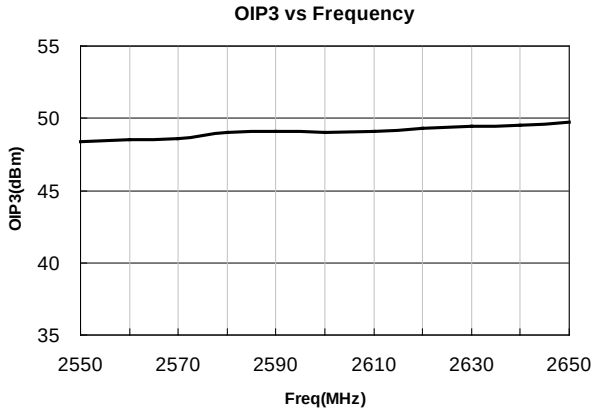
Typical Performance @ Voltage = 5V(300mA), T=25℃, 50ohm System

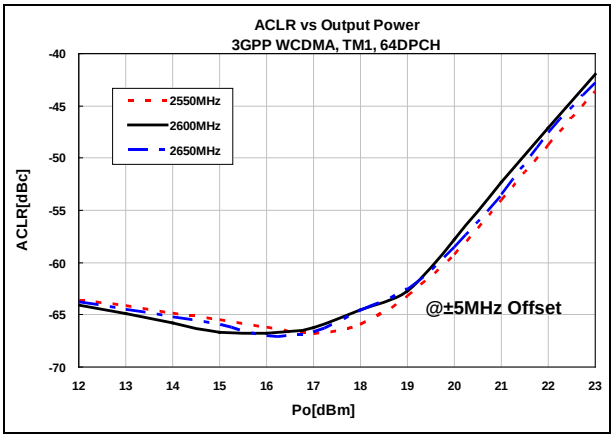


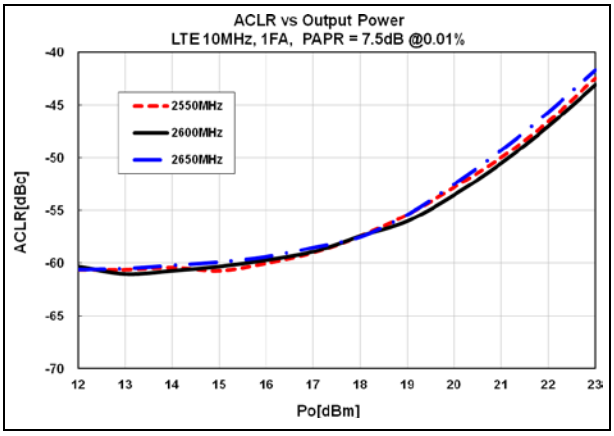


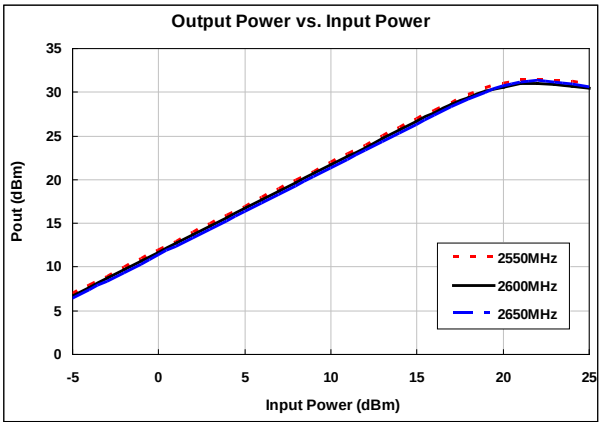


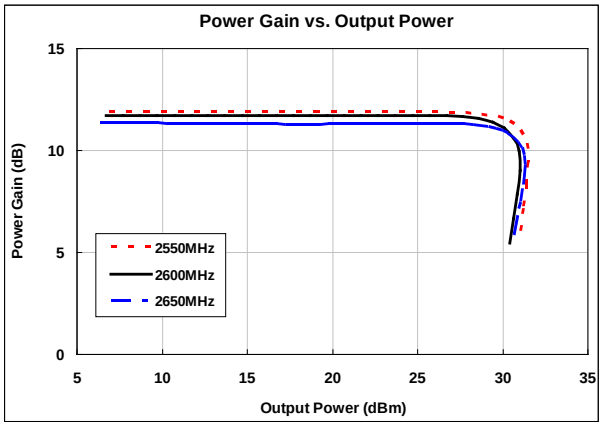


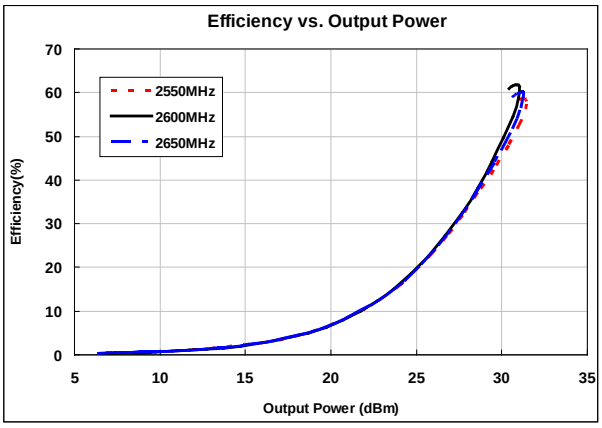


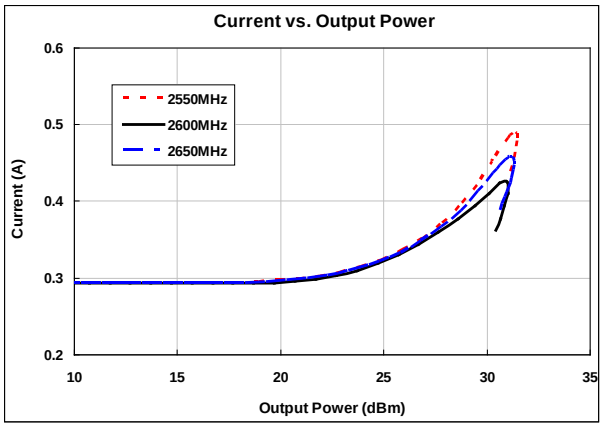

ACLR vs Output Power
3GPP WCDMA, TM1, 64DPCH
2550MHz
2600MHz
2650MHz
@±5MHz Offset
ACLR[dBc]
Po[dBm]


ACLR vs Output Power
LTE 10MHz, 1FA, PAPR = 7.5dB @0.01%
2550MHz
2600MHz
2650MHz
ACLR[dBc]
Po[dBm]


Output Power vs. Input Power
Pout (dBm)
2550MHz
2600MHz
2650MHz
Input Power (dBm)

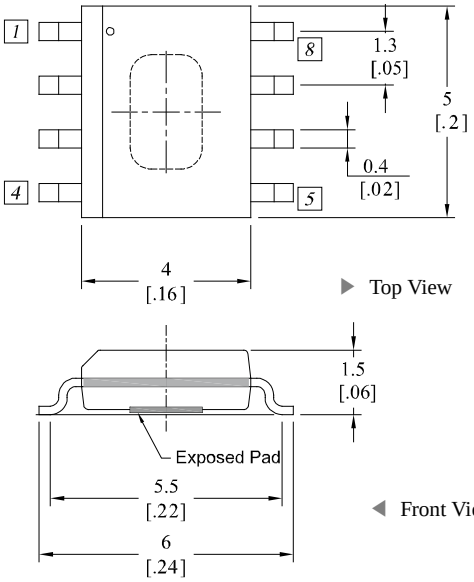

Power Gain vs. Output Power
Power Gain (dB)
2550MHz
2600MHz
2650MHz
Output Power (dBm)


Efficiency vs. Output Power
Efficiency(%)
2550MHz
2600MHz
2650MHz
Output Power (dBm)

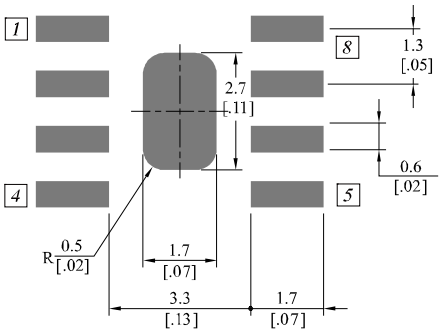

Current vs. Output Power
Current (A)
2550MHz
2600MHz
2650MHz
Output Power (dBm)

Package Dimensions (Type: SOIC-8)

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

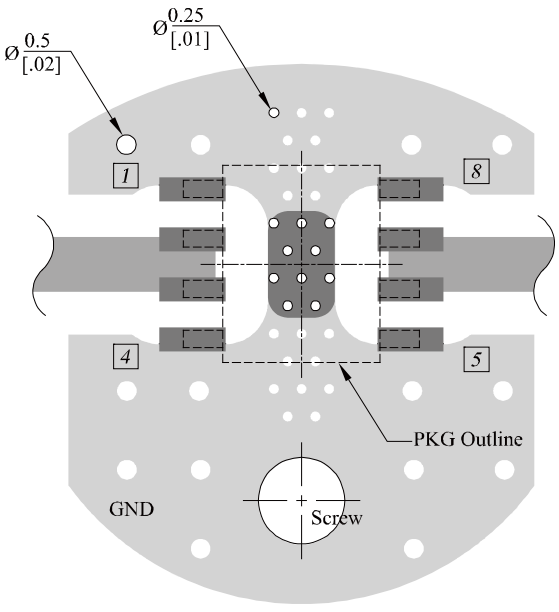


Recommended Pattern



Pin Description			
Pin No	**Function**	**Pin No**	**Function**
1	GND	5	GND
2	Input	6	Output / Bias
3	NC	7	Output / Bias
4	GND	8	GND

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
AE368	2014.4.11	1.3	Revision : Absolute Maximum Ratings	-
AE368	2013.11.28	1.2	ADDED : ACLR(LTE) Test Data	-
AE368	2012.10.10	1.1	New datasheet format	-
AE368	2012.3.29	1.0	Initial Release.	-