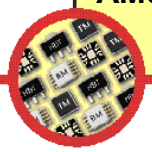
GaAs MMIC Power Amplifier



DESCRIPTION

AMCOM's AM011037WM-BM/EM/FM-R is part of the GaAs pHEMT MMIC power amplifier series. This high efficiency MMIC is a 2-stage GaAs pHEMT power amplifier biased at +8V. The input and inter-stage matching networks cover 0.1 to 1GHz. This MMIC requires output external matching to your band of interest between 0.1GHz to 1GHz to provide maximum bandwidth flexibility. As an example, one of the available evaluation boards has over 30dB gain, 6 watts (38dBm) saturated output power over the 0.2 to 0.3GHz band. This MMIC is in a ceramic package with both RF and DC leads at the lower level of the package to facilitate low-cost SMT assembly to PC board. When mounting directly to PCB, please see application note AN700 for instructions. Because of high DC power dissipation, we strongly recommend to mount this device directly on a metal heat sink. The AM011037WM-FM-R is the AM011037WM-BM-R mounted on a gold plated copper flange carrier. The EM package has the same footprint as the FM package with straight leads and a Copper/Tungsten flange instead of the Copper flange. There are two screw holes on the flange to facilitate screwing on to a metal heat sink. This MMIC is RoHS compliant.

FEATURES

- Frequency applications from 0.1 to 1GHz
- High output power, P1dB = 37dBm
- High gain > 30dB
- Input matched from 0.1GHz to 1GHz
- High efficiency > 40%

APPLICATIONS

- Cellular & PCS Base Station
- 0.1 to 1GHz Applications
- Radio Service
- Broadcasting

TYPICAL PERFORMANCE*

a) TEST BOARD FOR 0.2 to 0.3 GHz

Performance at V_{dd} = +8V, , V_{gs}=-0.66V, I_{dq} = 1.4A, T_a = 25°C**

Parameters	Minimum	Typical	Maximum
Frequency		0.2 – 0.3GHz	
Small Signal Gain	29dB	31dB	
Gain Ripple		± 1.0dB	± 2.0dB
P1dB	36.0dBm	37.0dBm	
Psat		37.5dBm	
IP3		46dBm	
Efficiency @ P1dB		40%	
Input Return Loss	8dB	10dB	
Output Return Loss	10dB	12dB	
Thermal Resistance		5°C/W	

*Specifications subject to change without notice.

** V_{gs} may vary from lot to lot. Adjust V_{gs} to get I_{dq} recommended value

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b) TEST BOARD FOR 0.8 to 1.0GHz

Performance at V_{dd} = +8V, V_{gs}=-0.66V**, I_{dq} = 1.4A, T_a = 25°C

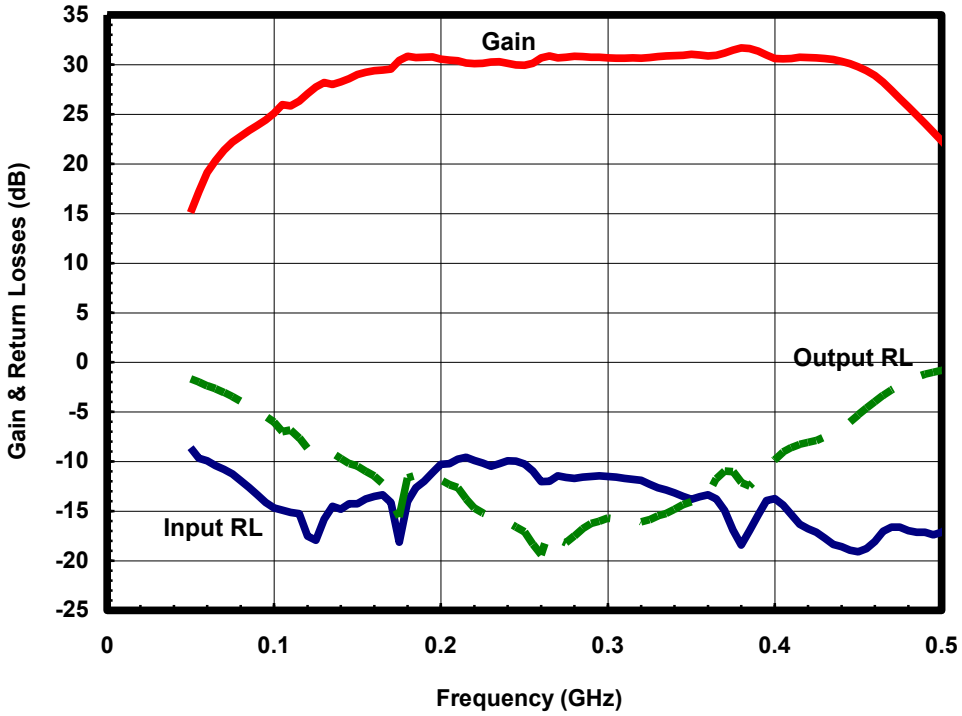
Parameters	Minimum	Typical	Maximum
Frequency		0.8 – 1.0GHz	
Small Signal Gain	28dB	30dB	
Gain Ripple		± 1.0dB	± 2.0dB
P1dB	36.0dBm	37.0dBm	
Psat		37.5dBm	
IP3		46dBm	
Efficiency @ P1dB		35%	
Input Return Loss	7dB	10dB	
Output Return Loss	5dB	8dB	
Thermal Resistance		5°C/W	

** V_{gs} may vary from lot to lot

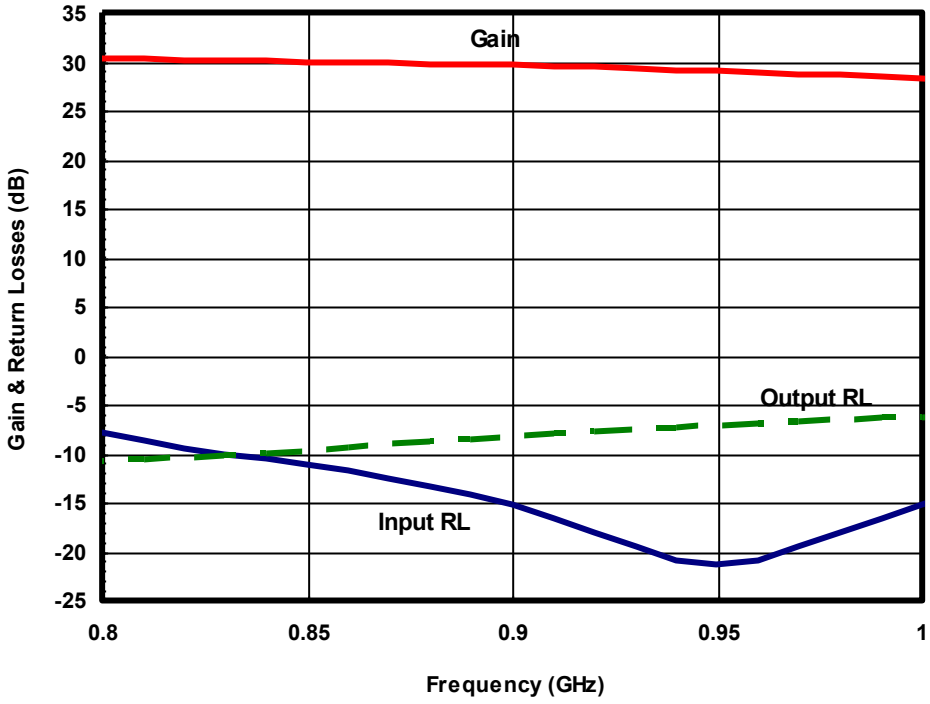
ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Rating
Drain source voltage	V_{dd}	10V
Gate source voltage	V_{gs}	-3V
Drain source current	I_{dd}	1.5A
Continuous dissipation at room temperature	P_t	15W
Channel temperature	T_{ch}	175°C
Storage temperature	T_{sto}	-55°C to +135°C

SMALL SIGNAL DATA

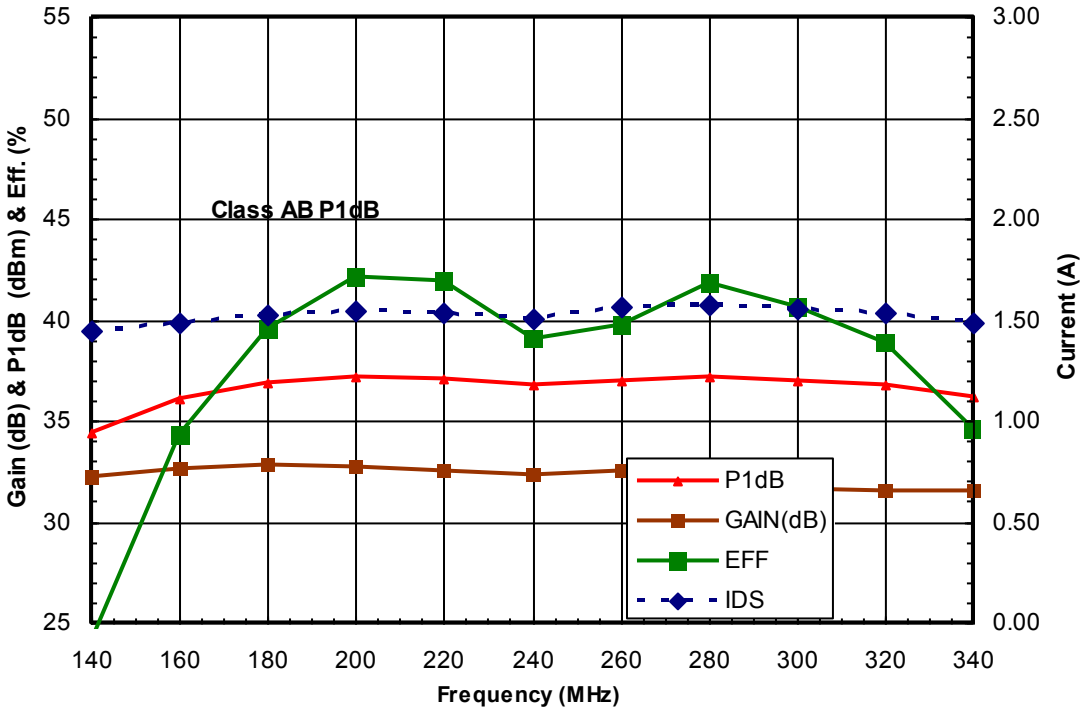


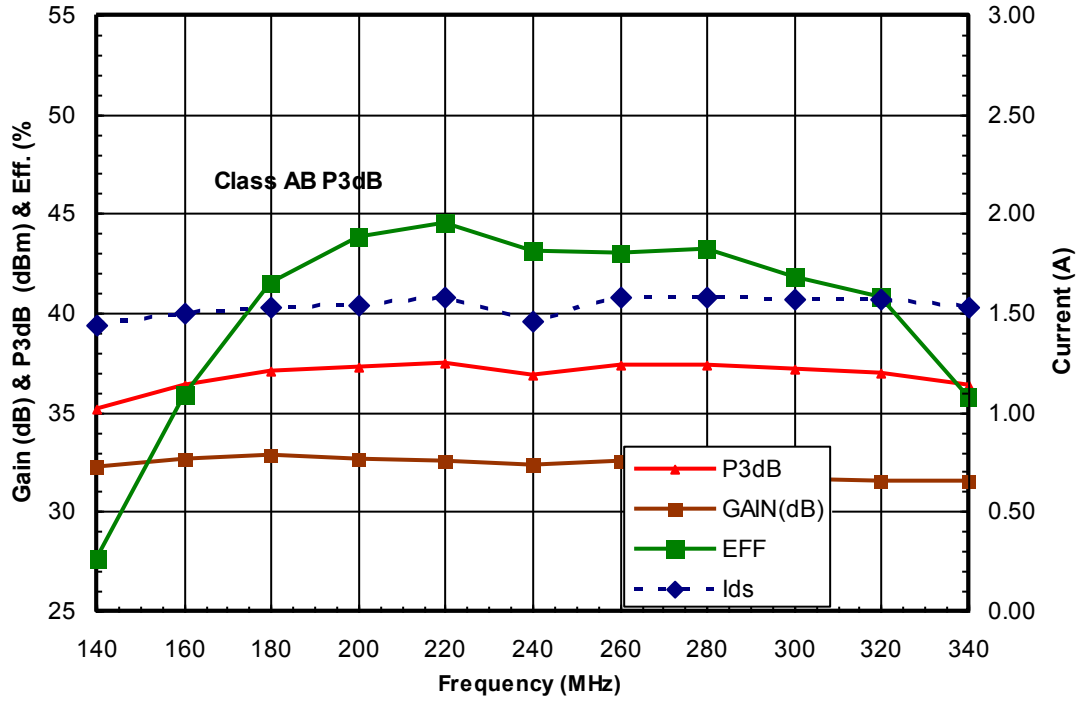
Gain & Return Losses for 0.2 to 0.3GHz Matching Circuit



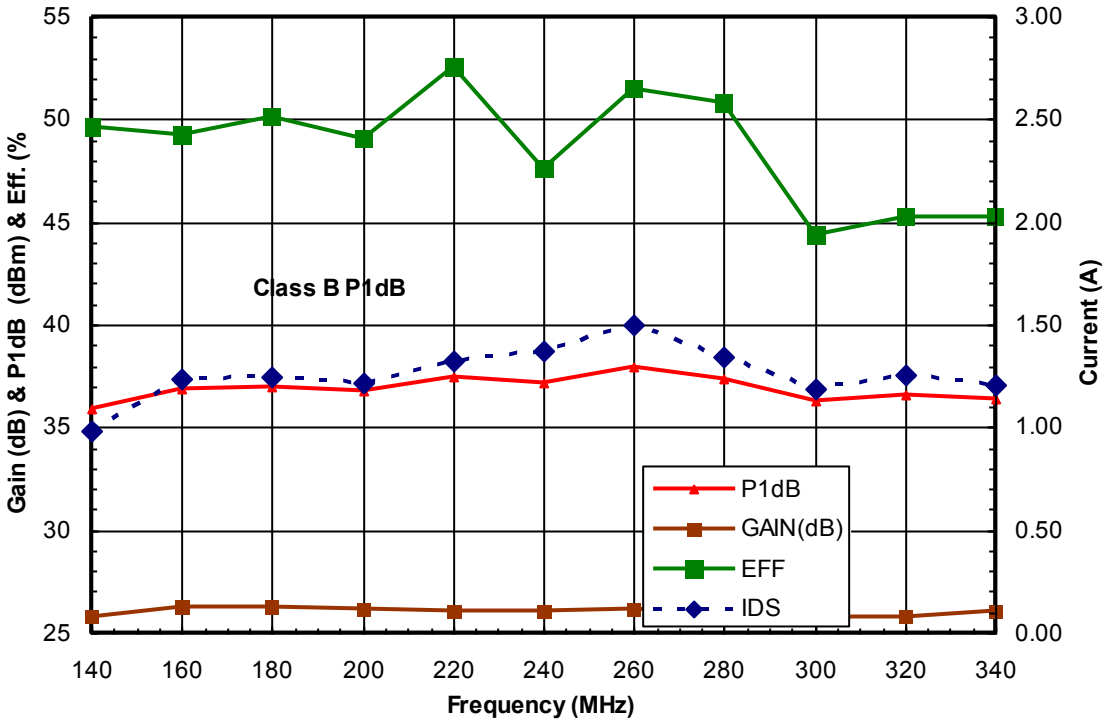
Gain & Return Losses for 0.8 to 1.0GHz Matching Circuit

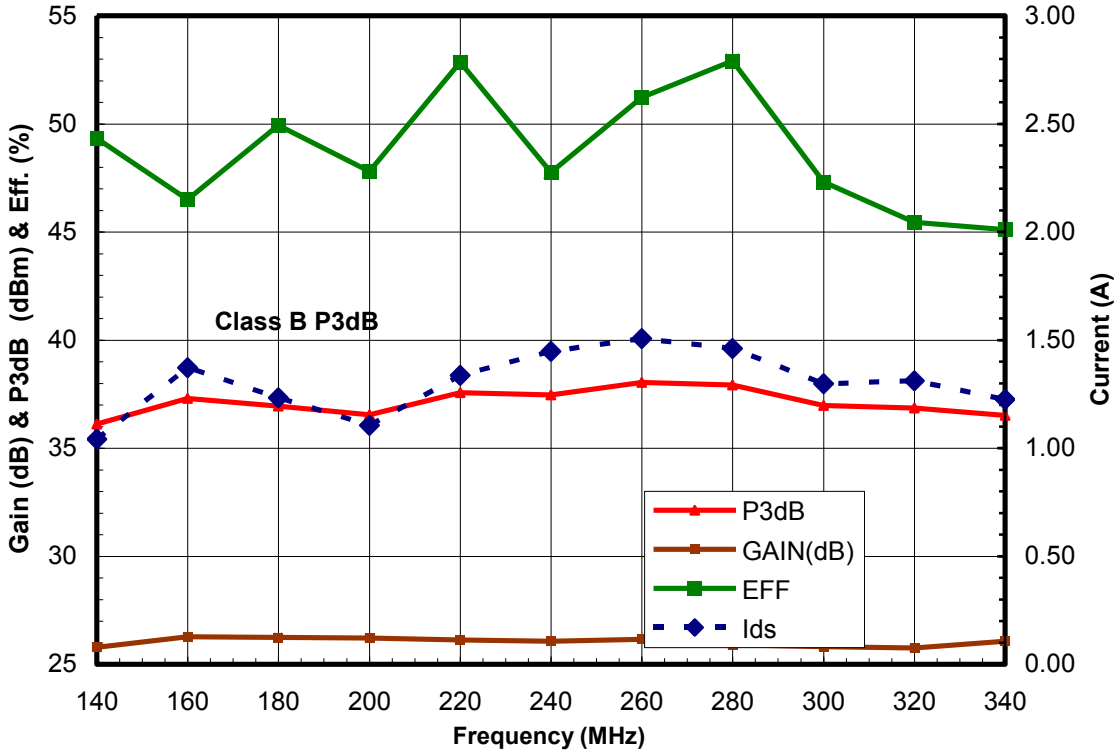
POWER DATA of 0.2 to 0.3GHz TEST BOARD



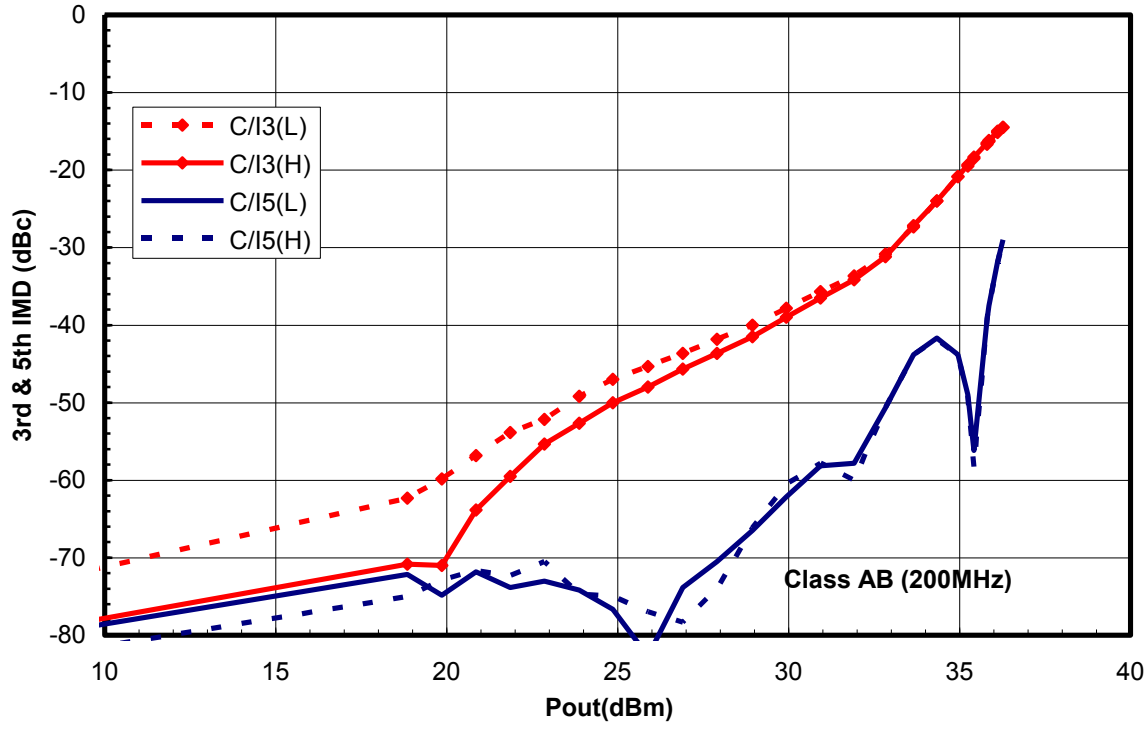


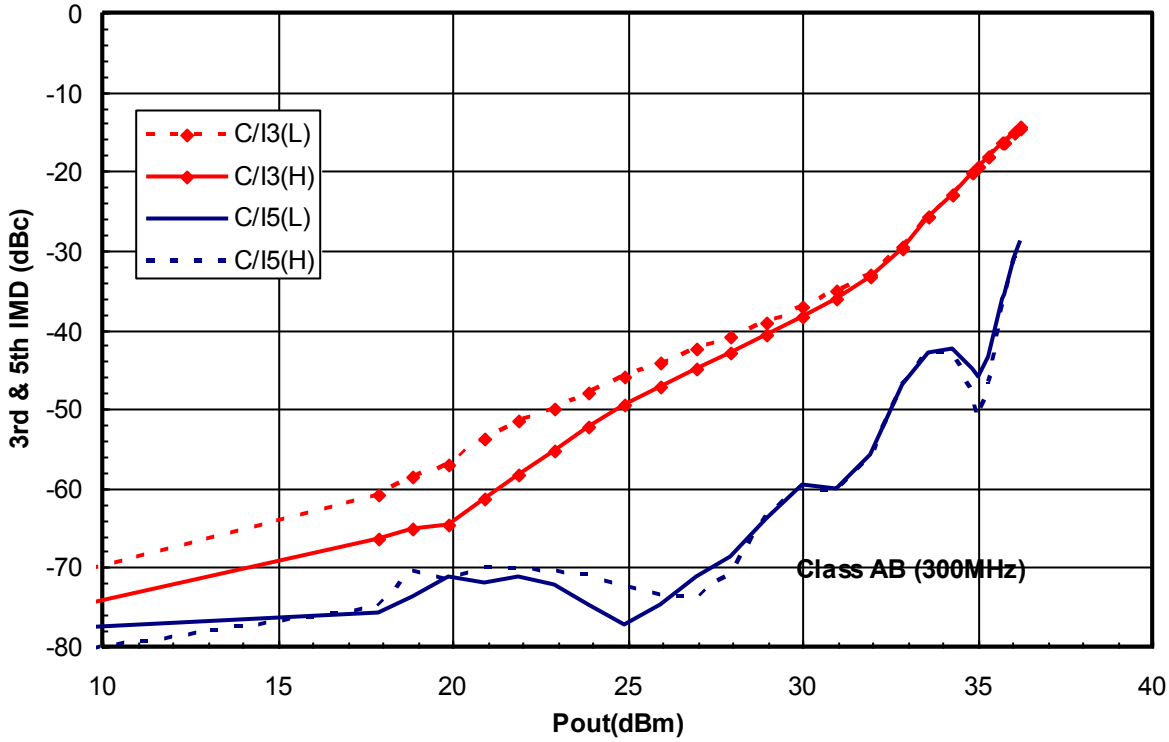
Class AB Power (V_{dd}=+8V, V_{gs}=-0.66V, I_{ds1}=0.1A, I_{ds2}=0.8A)



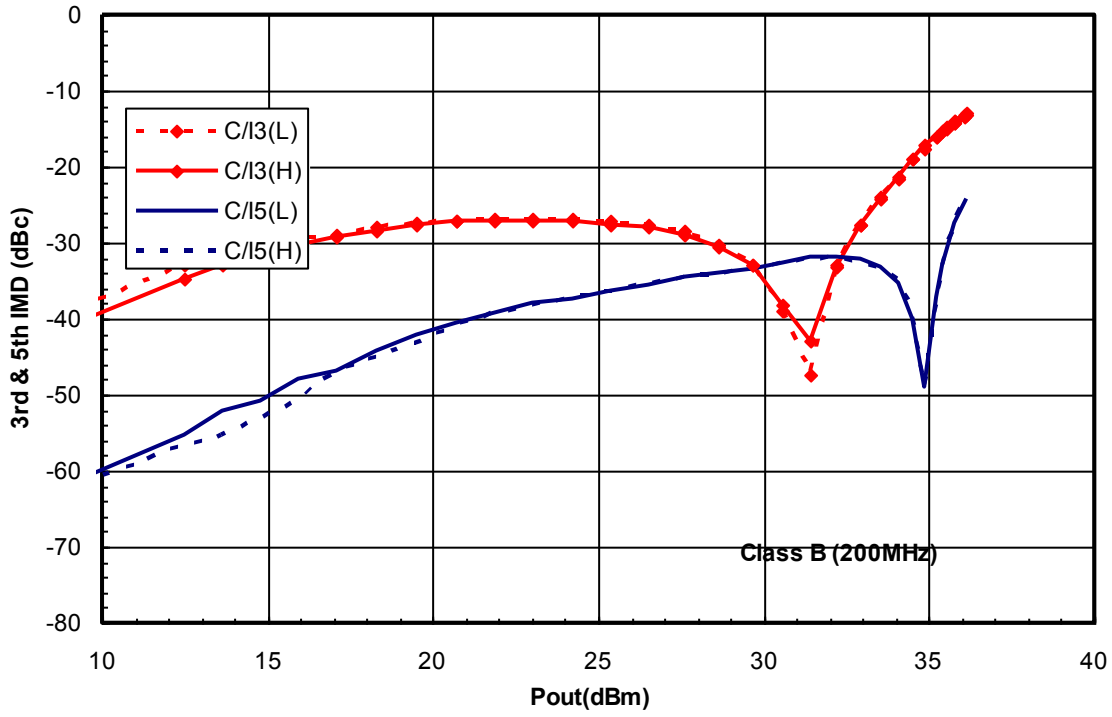


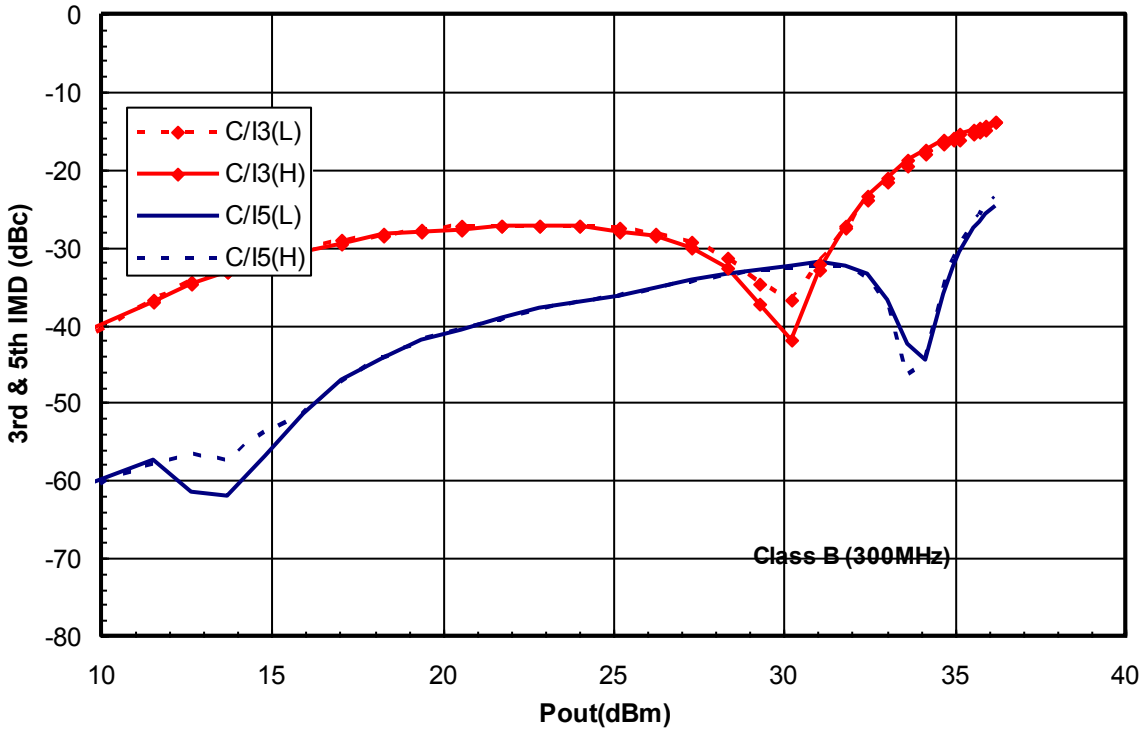
Class B Power (V_{dd}=+8V, V_{gs1}=-0.93V ,V_{gs2}=-1.55V, I_{ds1}=0.1A, I_{ds2}=0.04A)



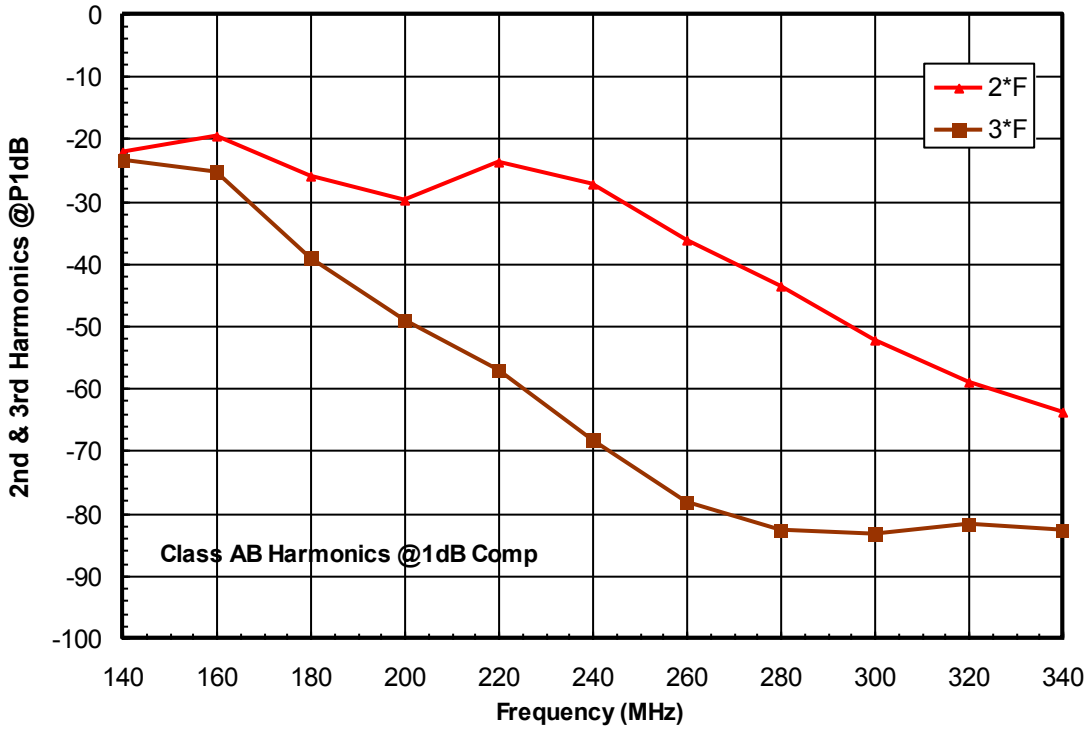


Class AB 3rd & 5th Order IMD at 200 & 300MHz

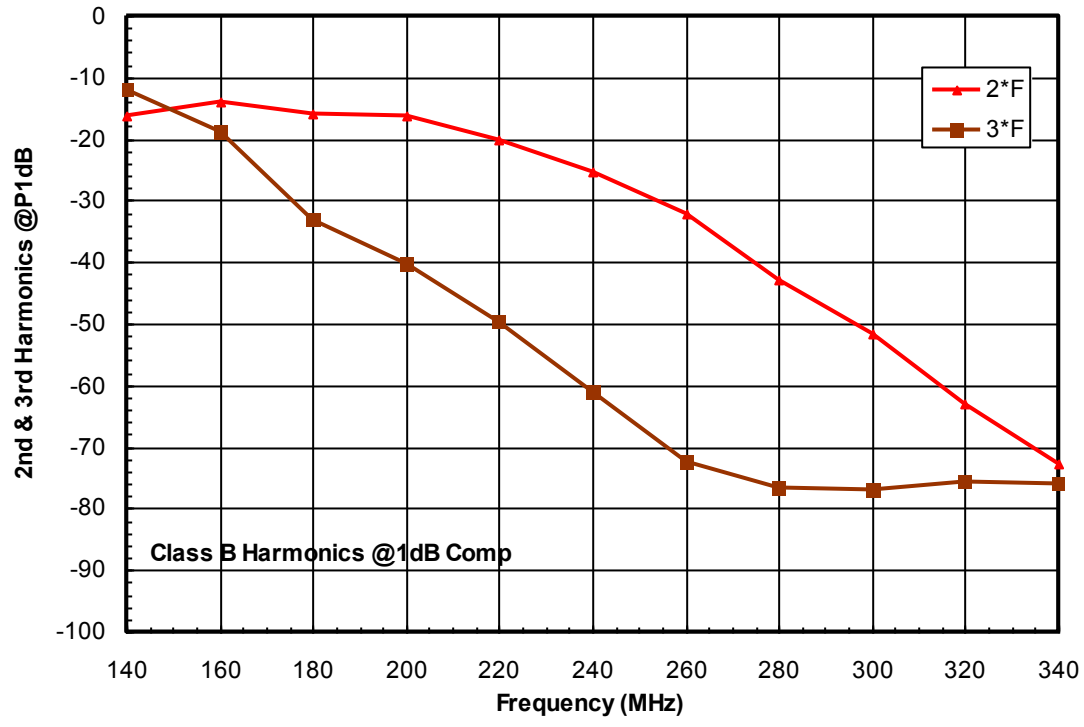




Class B 3rd & 5th Order IMD at 200 & 300MHz

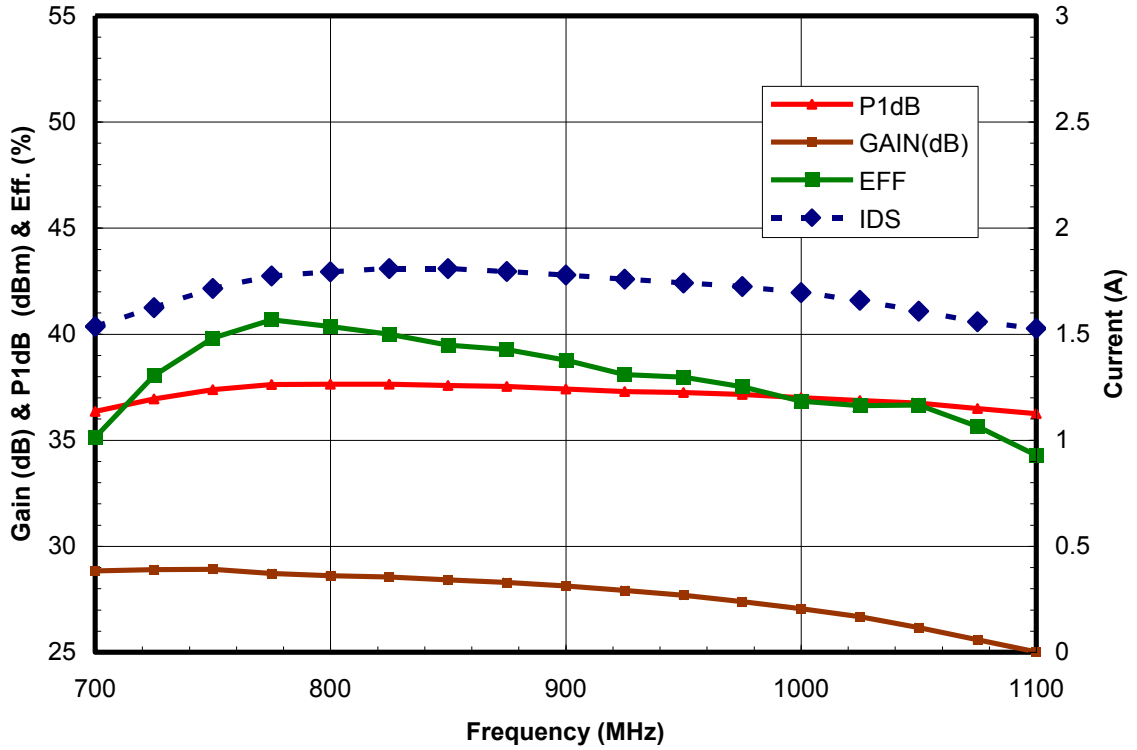


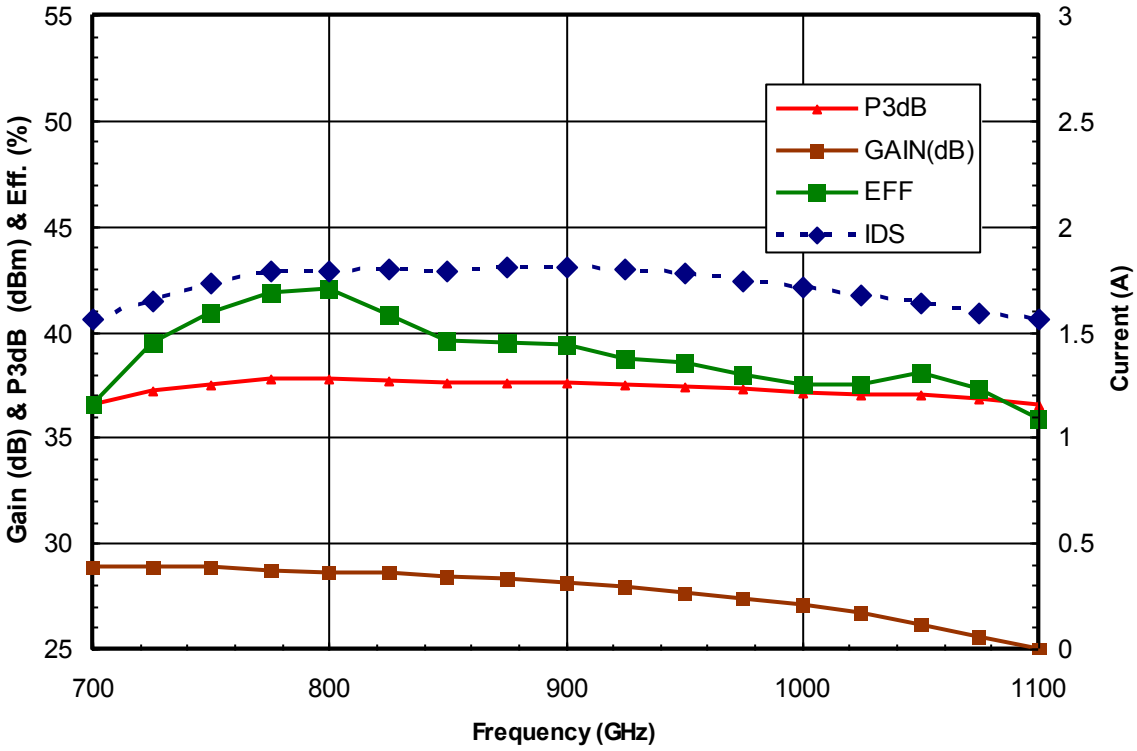
Class AB 2nd & 3rd Harmonics at P1dB



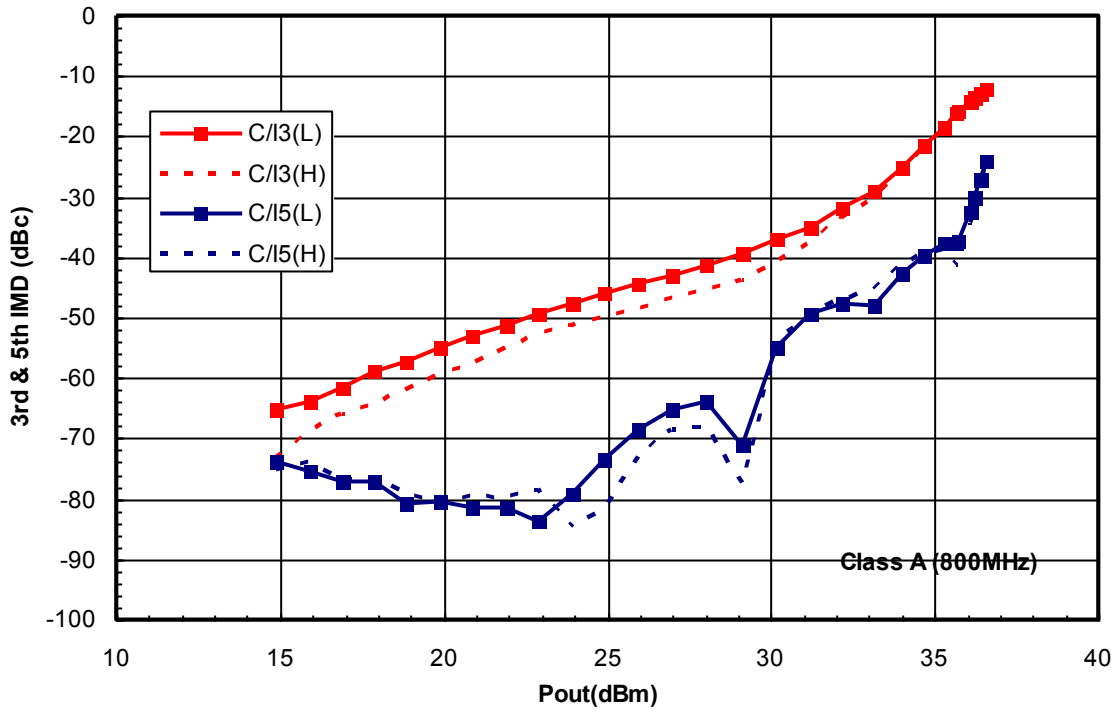
Class B 2nd & 3rd Harmonics at P1dB

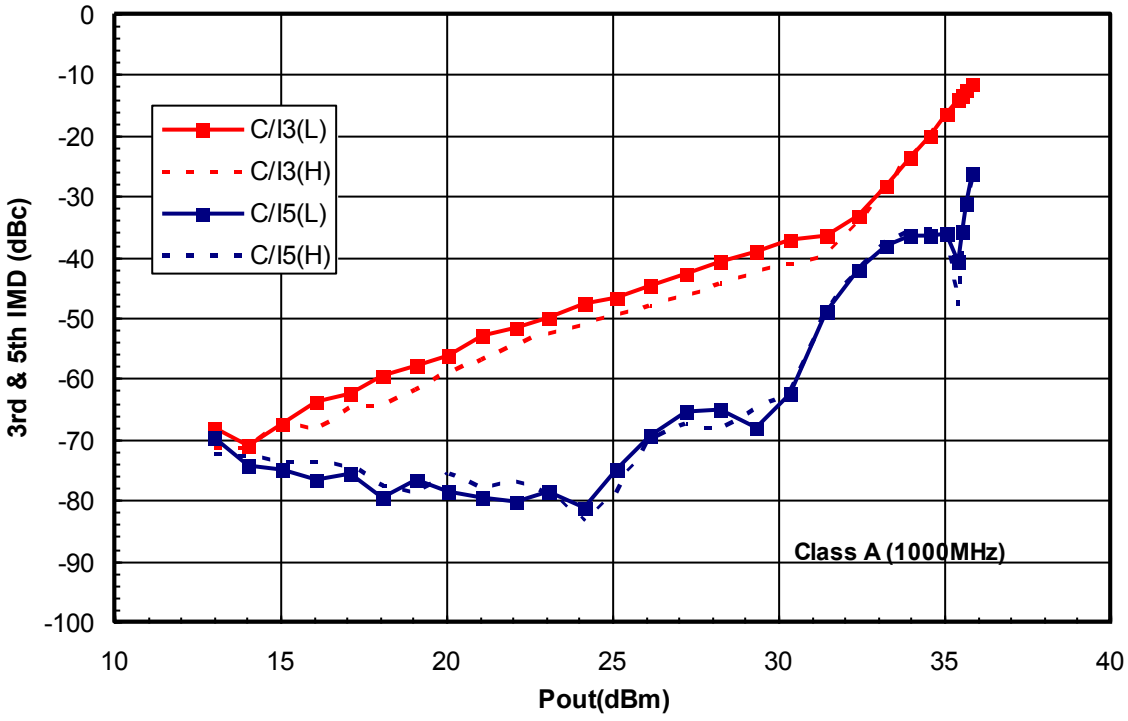
POWER DATA of 0.8 to 1.0GHz TEST BOARD



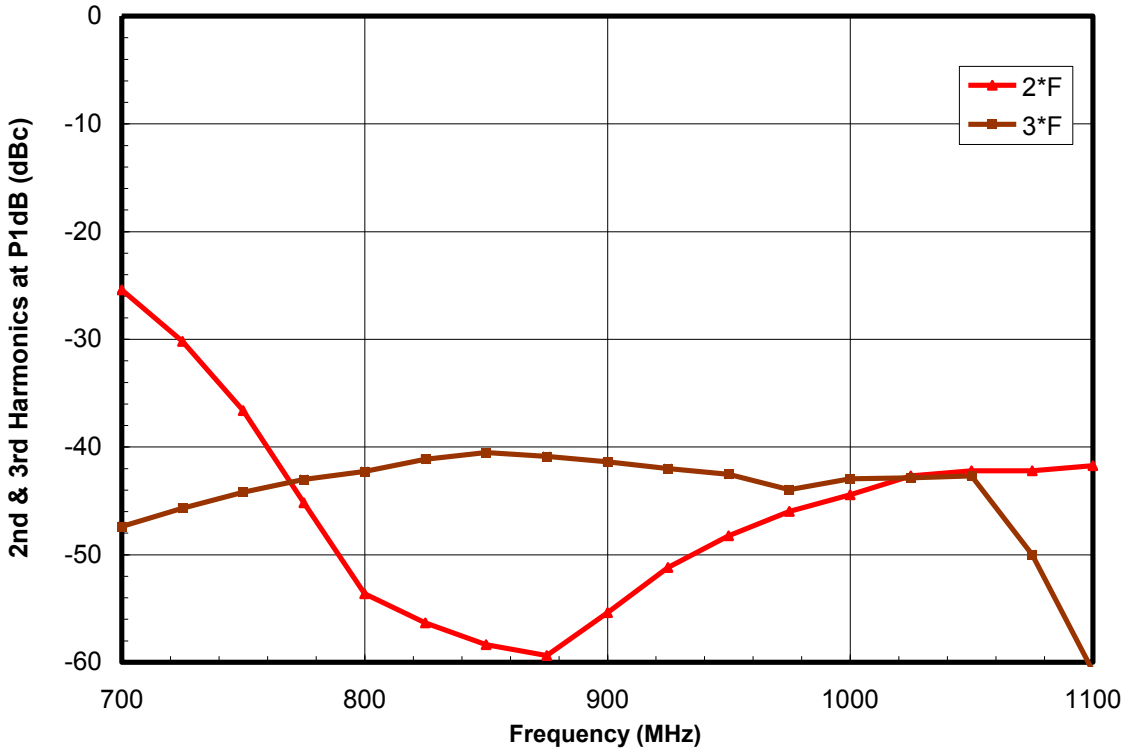


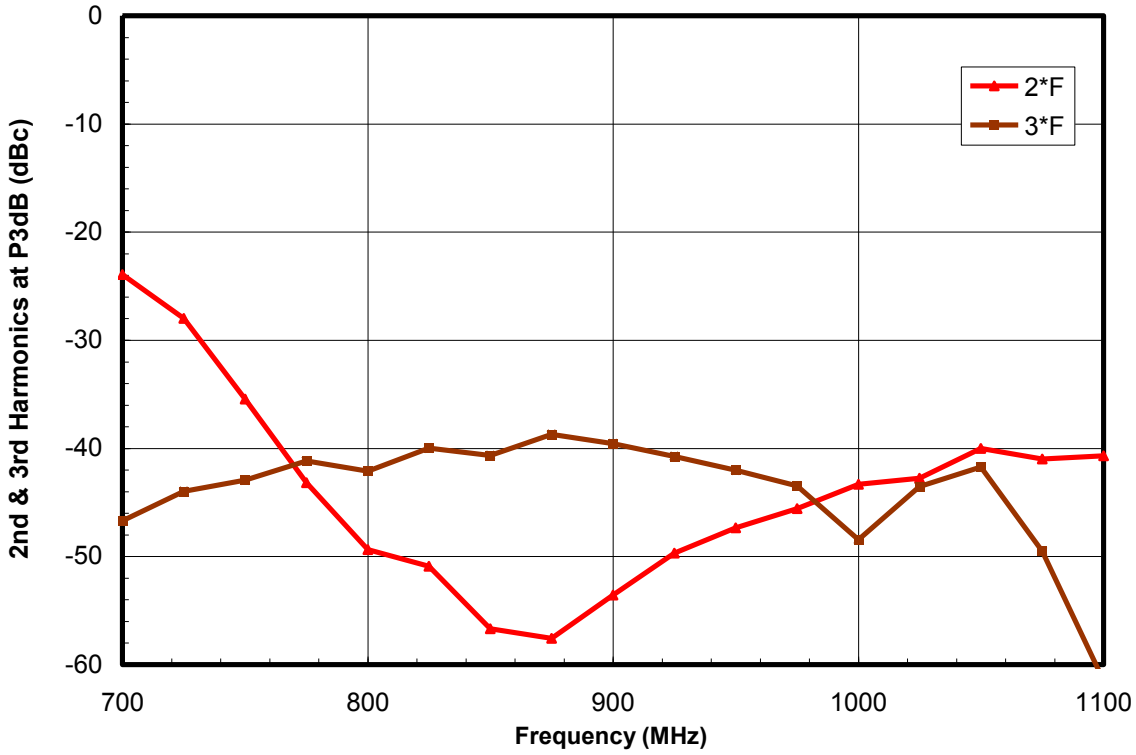
Class A Power (V_{dd}=+8V, V_{gs1}=-0.66V ,V_{gs2}=-0.66V, I_{ds1}=0.15A, I_{ds2}=1.2A)





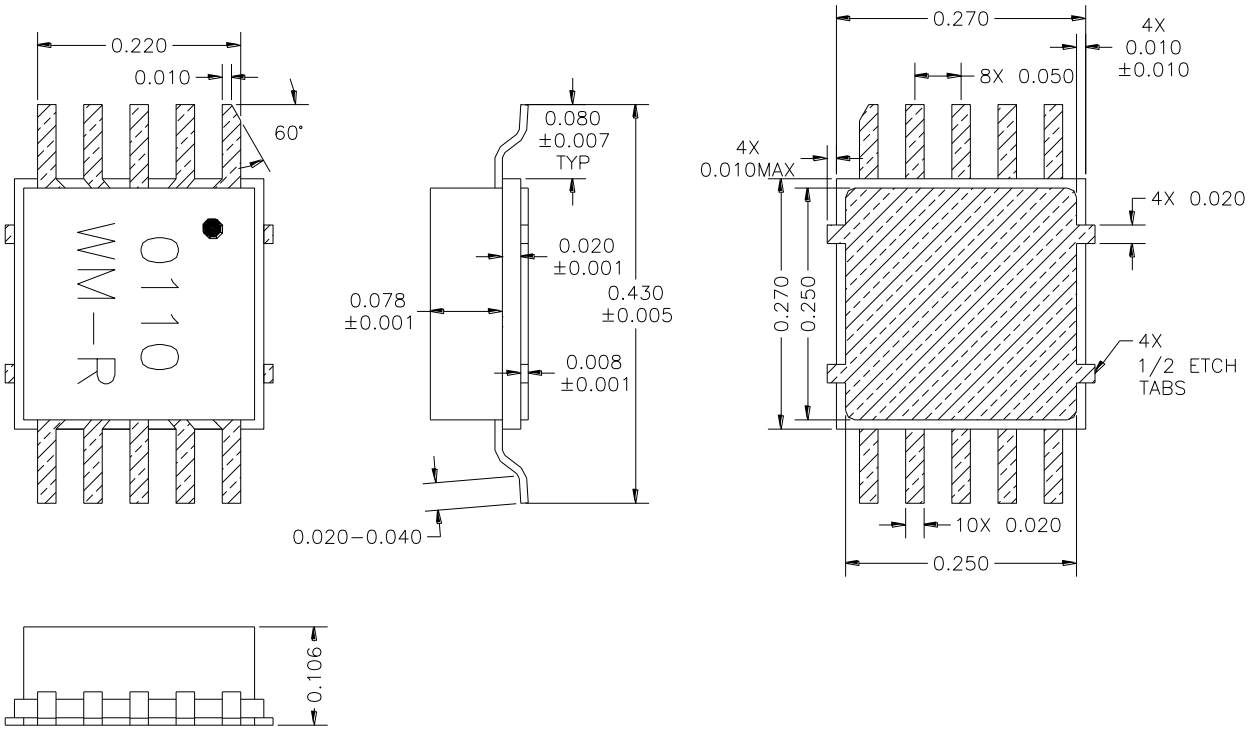
2nd & 3rd Order IMD (V_{dd}=+8V, V_{gs1}=-0.66V ,V_{gs2}=-0.66V, I_{ds1}=0.15A, I_{ds2}=1.2A)



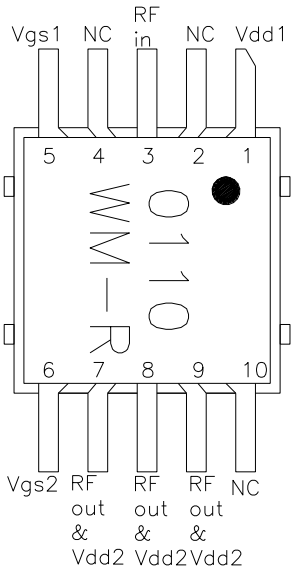


2nd & 3rd Harmonics (V_{dd}=+8V, V_{gs1}=-0.66V ,V_{gs2}=-0.66V, I_{ds1}=0.15A, I_{ds2}=1.2A)

PACKAGE OUTLINE (BM)



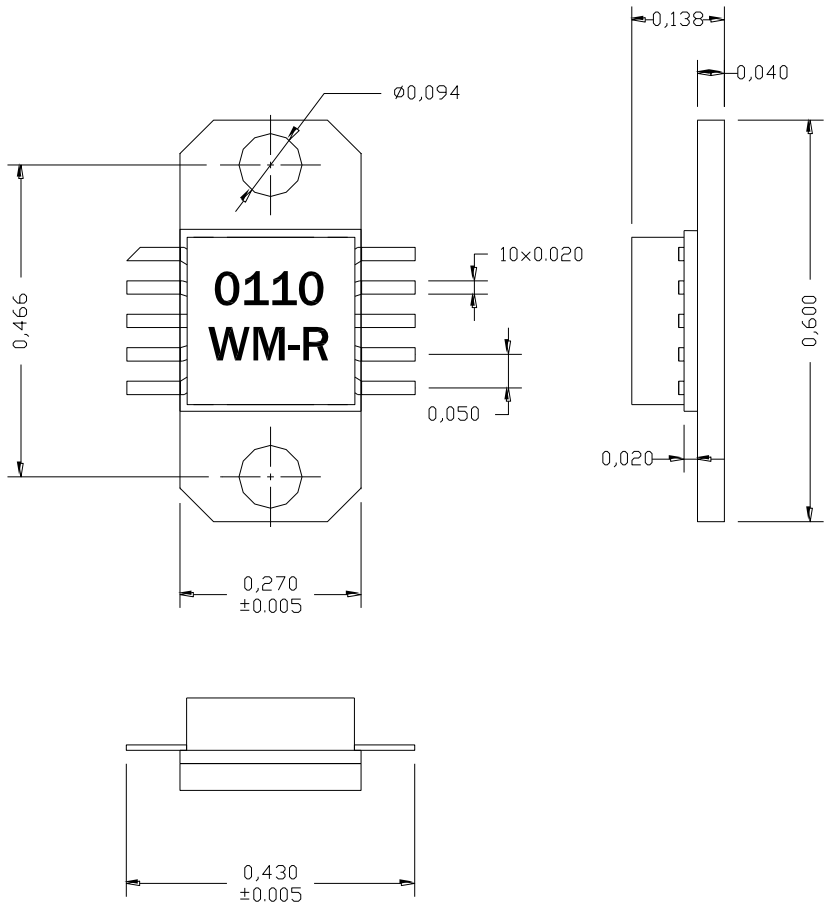
PIN LAYOUT



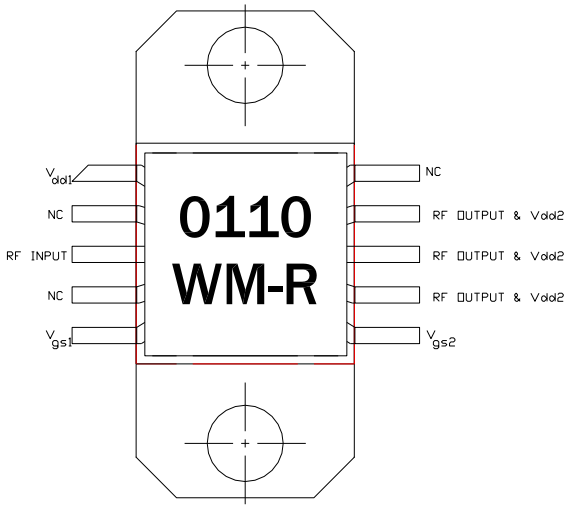
Pin No.	Function	Bias*
1	Vdd1	+8V
2	NC	
3	RF in	
4	NC	
5	Vgs1	-0.93V
6	Vgs2	-0.93V
7	RF out & Vdd2	+8V
8	RF out & Vdd2	+8V
9	RF out & Vdd2	+8V
10	NC	

* V_{gs1}, V_{gs2} may vary from lot to lot

PACKAGE OUTLINE (EM)*



PIN LAYOUT

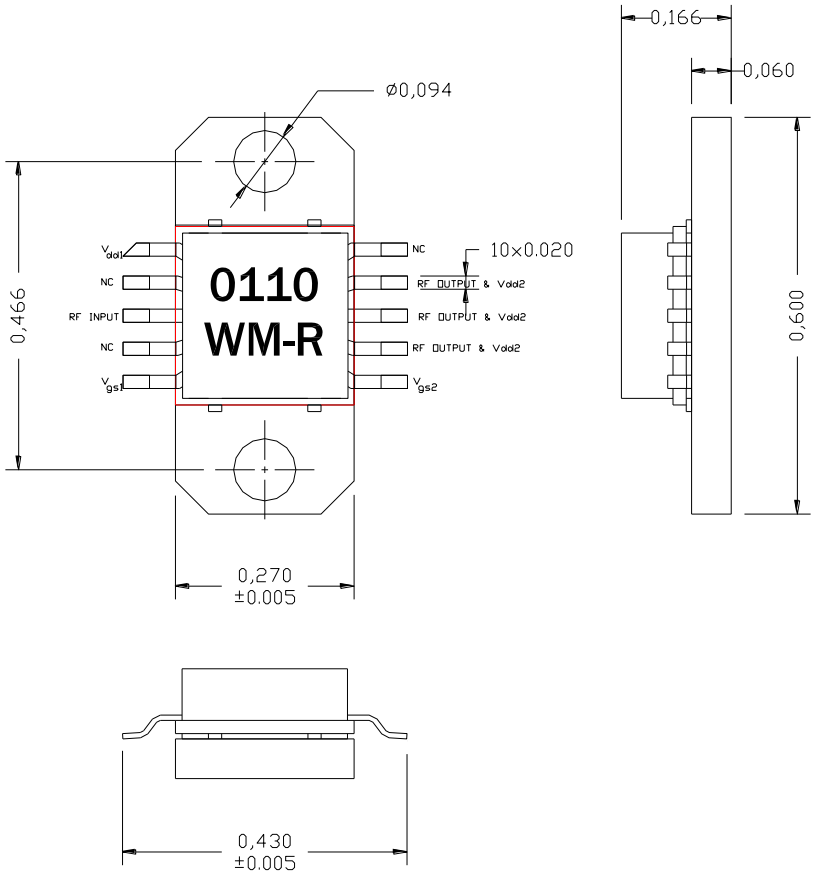


Pin No.	Function	Bias**
1	Vdd1	+8V
2	NC	
3	RF in	
4	NC	
5	Vgs1	-0.93V
6	Vgs2	-0.93V
7	RF out & Vdd2	+8V
8	RF out & Vdd2	+8V
9	RF out & Vdd2	+8V
10	NC	

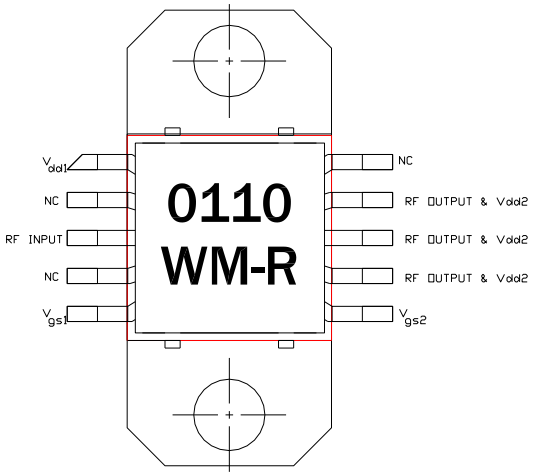
* EM version flange is made of CuW

** V_{gs1} & V_{gs2} may vary from lot to lot

PACKAGE OUTLINE (FM)*



PIN LAYOUT



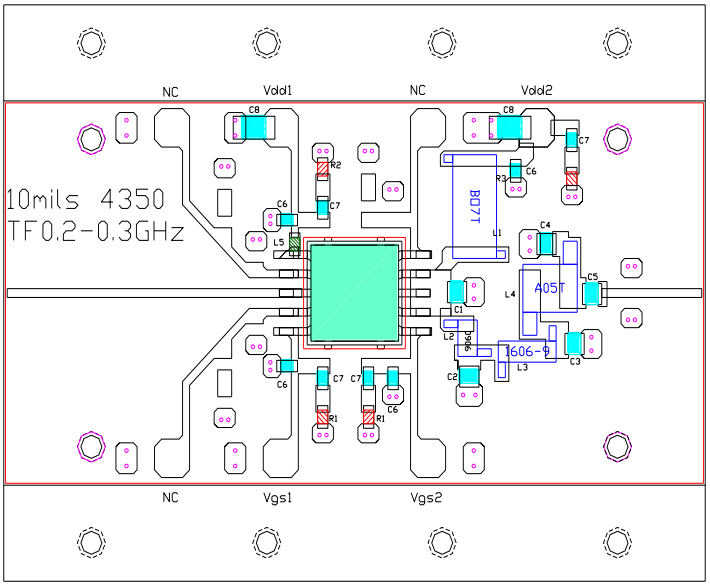
Pin No.	Function	Bias**
1	Vdd1	+8V
2	NC	
3	RF in	
4	NC	
5	Vgs1	-0.93V
6	Vgs2	-0.93V
7	RF out & Vdd2	+8V
8	RF out & Vdd2	+8V
9	RF out & Vdd2	+8V
10	NC	

* FM version flange is made of Copper

** V_{gs1} & V_{gs2} may vary from lot to lot

0.2 to 0.3GHz BM TEST CIRCUIT

RF Input (SMA)

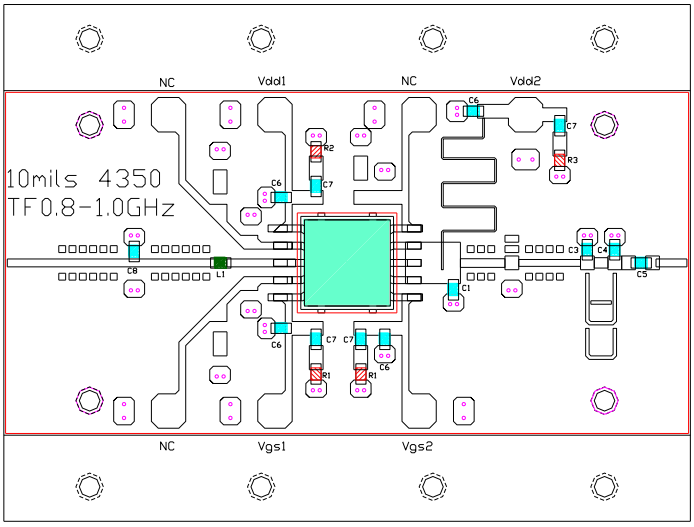


RF Output (SMA)

Notes:
1- 10mils Rogers 4350 Material epoxied to TF
2- Ckt is for un-matched MMICs at 0.2 to 0.3GHz
3- C1=30pF, C2=51pF, C3=27pF, C4=10pF
C5=100pF, C6=20pF, C7=1000pF, C8=10uF
R1=50ohms, R2=10ohms, R3=5 ohms,
L1=22nH (B07T), L2=3.85nH (0906-4),
L3=9.85nH (1606-9), L4=18.5nH (A05T), L5=100nH
4- C1, C2, C3, C4 & C5 are ATC 100A size
5- All other Caps & Resistors are 0603 size
6- External 1µF dipped tantalum capacitors should be attached to Vd and Vg to decouple external bias leads

0.8 to 1.0GHz BM TEST CIRCUIT

RF Input (SMA)



RF Output (SMA)

Notes:
1- 10mils Rogers 4350 Material epoxied to TF
2- Ckt is for un-matched MMICs at 0.8 to 1.0GHz
3- C1=10pF, C3=3.3pF, C4=2pF, C5=51pF,
C6=20pF, C7=1000pF, C8=4.7pF, L1=2.7nH
R1=50ohms, R2=10ohms, R3=5 ohms
4- C1, C2, C3, C4 & C5 are ATC 600S series
5- All other Caps & Resistors are 0603 size
6- External 1µF dipped tantalum capacitors should be attached to Vd and Vg to decouple external bias leads