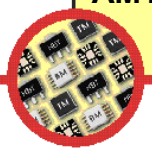
GaAs MMIC Power Amplifier



DESCRIPTION

AMCOM's AM143440WM-BM/EM/FM-R is part of the GaAs HiFET MMIC power amplifier series. This high efficiency MMIC is a 2-stage GaAs pHEMT power amplifier biased at 10 to 14V. The input and inter-stage matching networks cover 1.4 to 3.4GHz. This MMIC requires output external matching to your band of interest between 1.4GHz to 3.4 GHz to provide maximum bandwidth flexibility. As an example, one of the available evaluation boards has over 20dB gain, 8 watts (39dBm) saturated output power over the 1.5 to 1.8GHz band at 12V. The other evaluation board at 2.0 to 3.0GHz achieved 19dB gain and 39dBm output power at 12V.

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 the 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 these devices directly on a metal heat sink. The AM143440WM-FM-R is the AM143440WM-BM-R mounted on a gold plated copper carrier. The EM package has the same footprint as the FM 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 1.4 to 3.4GHz
- High output power, P1dB = 39dBm
- High gain > 20dB
- Input matched from 1.4GHz to 3.4GHz
- High efficiency > 40%

APPLICATIONS

- PCS Base Station
- GPS Applications
- MMDS
- WLAN Repeaters
- 14V Applications

TYPICAL PERFORMANCE*

a) TEST BOARD FOR 1.5 to 1.8GHz

Performance at V_{dd} = +12V, V_{gs}=-0.9V, I_{dq} = 1300mA, T_a = 25°C**

Parameters	Minimum	Typical	Maximum
Frequency		1.5 – 1.8GHz	
Small Signal Gain	18dB	20.5dB	
Gain Ripple		± 1.5dB	± 2.0dB
P1dB	36.5dBm	38.5dBm	
Psat		39.0dBm	
IP3		44dBm	
Efficiency @ P1dB		35%	
Input Return Loss	15dB	20dB	
Output Return Loss	3dB	5dB	
Thermal Resistance		5°C/W	

*Specifications subject to change without notice.

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

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Typical Performance at V_{dd} = 10V, 12V & 14V, I_{dq} = 1300mA, T_a = 25°C

Parameters	V_{dd} = +10V	V_{dd} = +12V	V_{dd} = +14V
Frequency	1.5 – 1.8GHz	1.5 – 1.8GHz	1.5 – 1.8GHz
Small Signal Gain	21dB	20.5dB	20dB
Gain Ripple	± 1.2dB	± 1.2dB	± 1.2dB
P1dB	37.5dBm	38.5dBm	39.0dBm
Psat	38.0dBm	39.0dBm	39.5dBm
IP3	44dBm	44dBm	44dBm
Efficiency @ P1dB	35%	35%	30%
Input Return Loss	20dB	20dB	20dB
Output Return Loss	5dB	5dB	5dB
Thermal Resistance	5°C/W	5°C/W	5°C/W

b) TEST BOARD FOR 2.0 to 3.0 GHz

Performance at V_{dd} = +12V, V_{gs}=-0.9V**, I_{dq} = 1300mA, T_a = 25°C

Parameters	Minimum	Typical	Maximum
Frequency		2.0 – 3.0GHz	
Small Signal Gain	17dB	20dB	
Gain Ripple		± 1.5dB	± 3.0dB
P1dB	37.0dBm	38.5dBm	
Psat		39.0dBm	
IP3		43dBm	
Efficiency @ P1dB		30%	
Input Return Loss	10dB	12dB	
Output Return Loss	7dB	10dB	
Thermal Resistance		5°C/W	

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

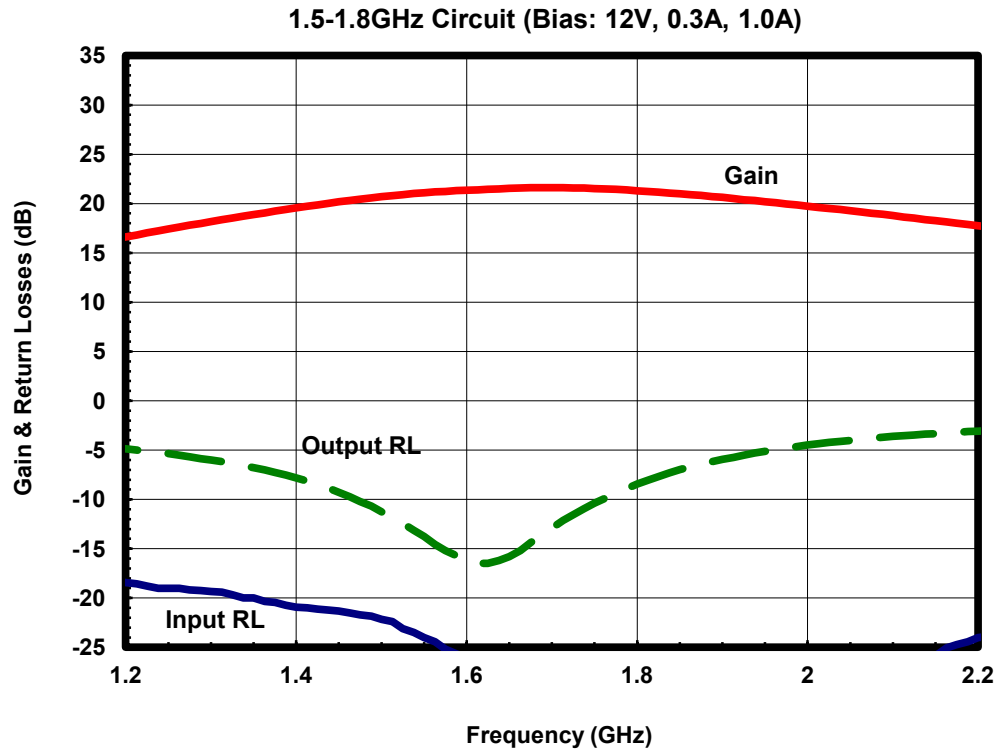
Typical Performance at V_{dd} = 10V, 12V & 14V, I_{dq} = 1300mA, T_a = 25°C

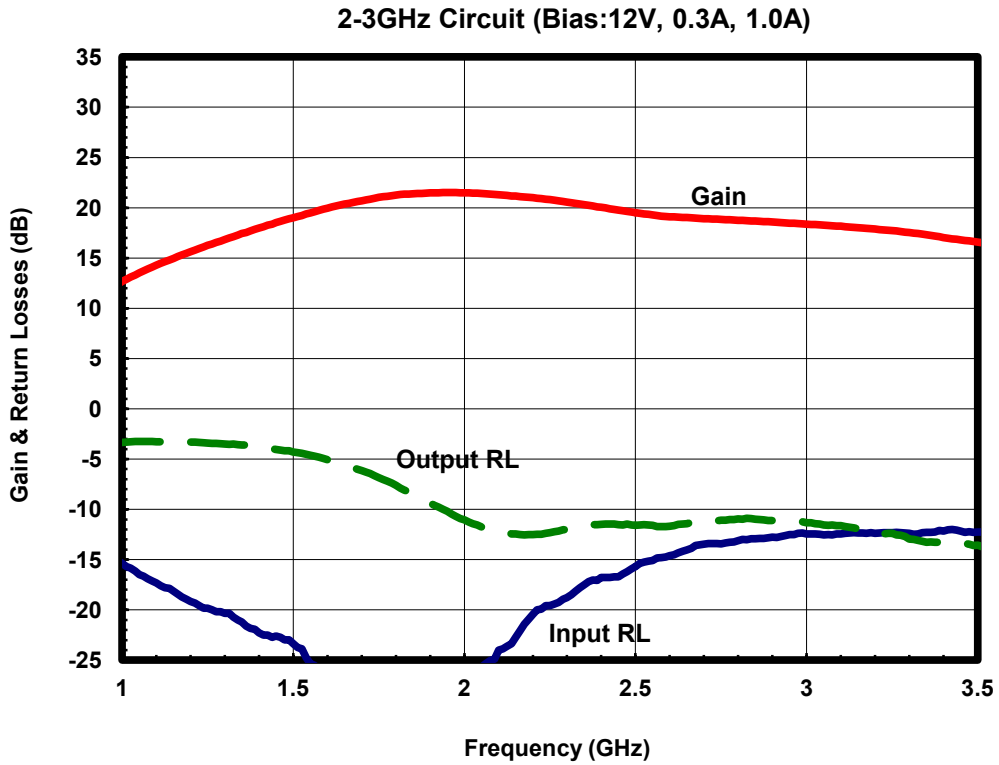
Parameters	V_{dd} = +10V	V_{dd} = +12V	V_{dd} = +14V
Frequency	2.0 – 3.0GHz	2.0 – 3.0GHz	2.0 – 3.0GHz
Small Signal Gain	21dB	20dB	19dB
Gain Ripple	± 1.5dB	± 1.5dB	± 1.5dB
P1dB	37.0dBm	38.5dBm	39.0dBm
Psat	37.5dBm	39.0dBm	39.5dBm
IP3	43dBm	43dBm	43dBm
Efficiency @ P1dB	30%	30%	30%
Input Return Loss	15dB	15dB	15dB
Output Return Loss	10dB	10dB	10dB
Thermal Resistance	5°C/W	5°C/W	5°C/W

ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Rating
Drain source voltage	V_{dd}	14V
Gate source voltage	V_{gs}	-3V
Drain source current	I_{dd}	1.5A
Continuous dissipation at room temperature	P_t	25W
Channel temperature	T_{ch}	175°C
Storage temperature	T_{sto}	-55°C to +135°C

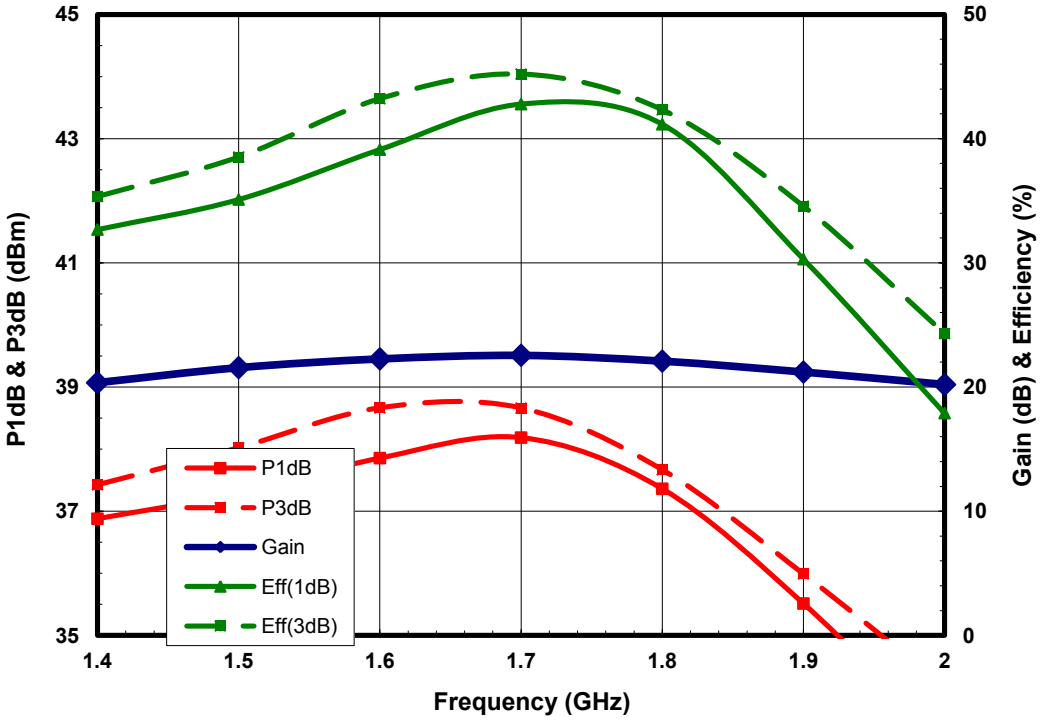
SMALL SIGNAL DATA



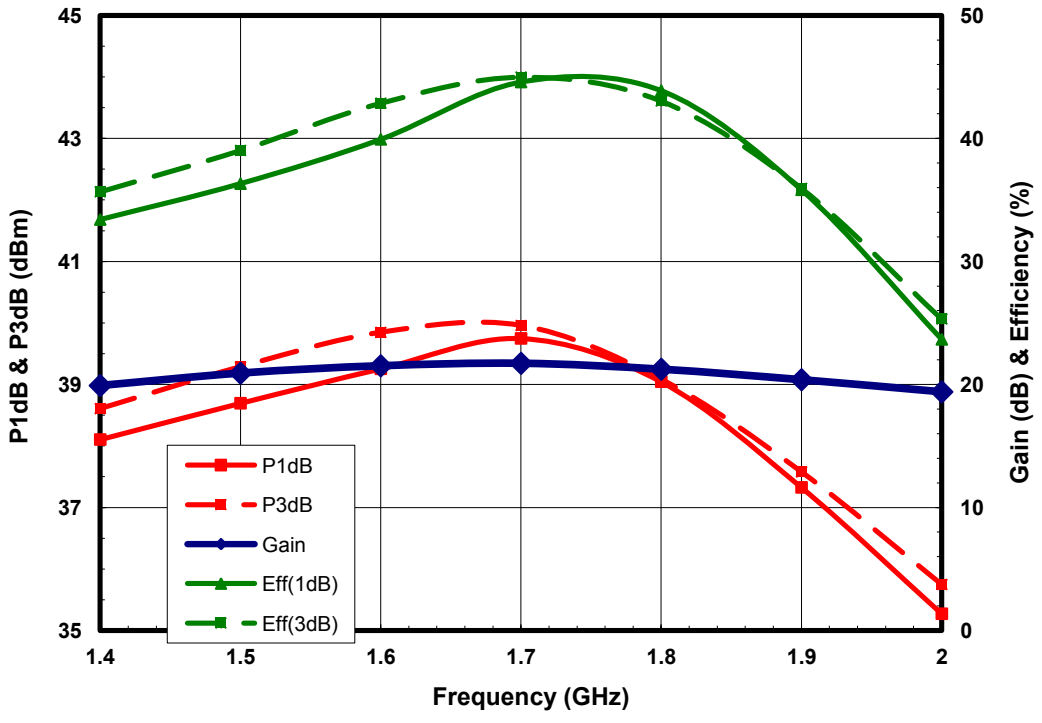


POWER DATA of 1.5 to 1.8GHz TEST BOARD

V_{dd}=+10V, I_{dd1}=0.3A, I_{dd2}=1.0A

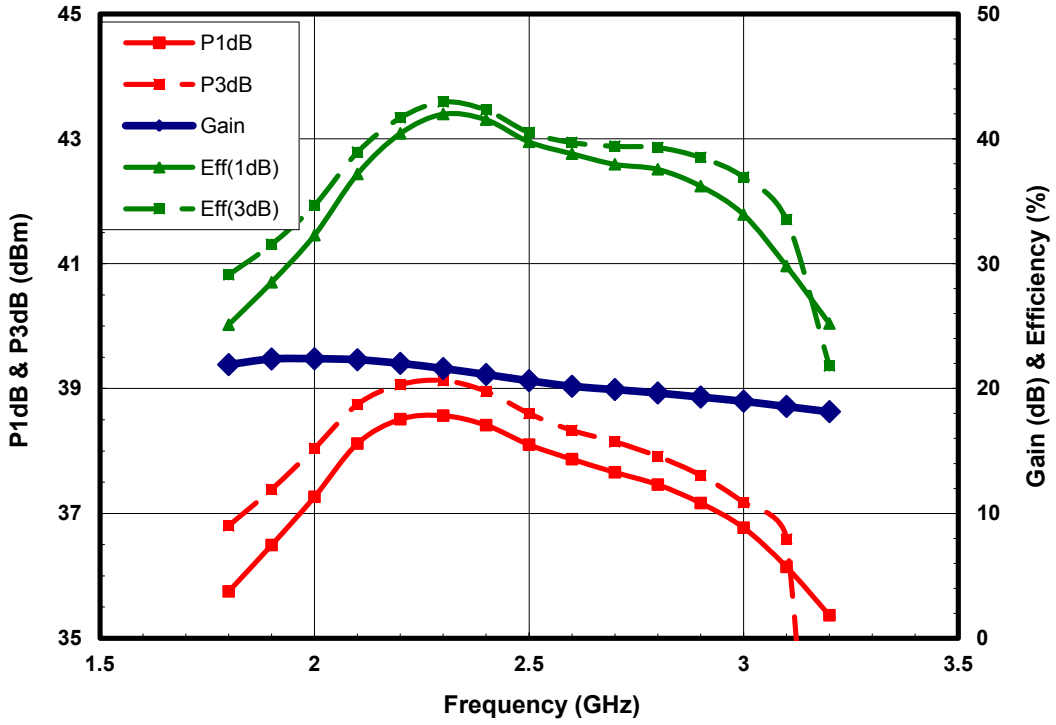


V_{dd}=+12V, I_{dd1}=0.3A, I_{dd2}=1.0A

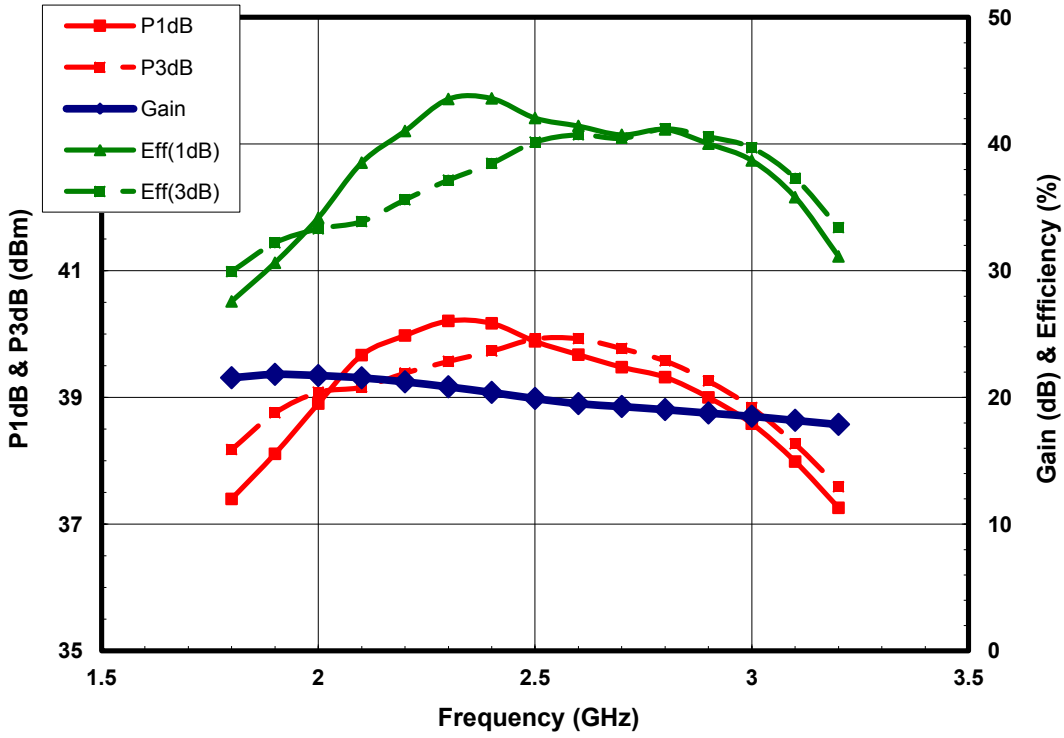


POWER DATA of 2.0 to 3.0GHz TEST BOARD

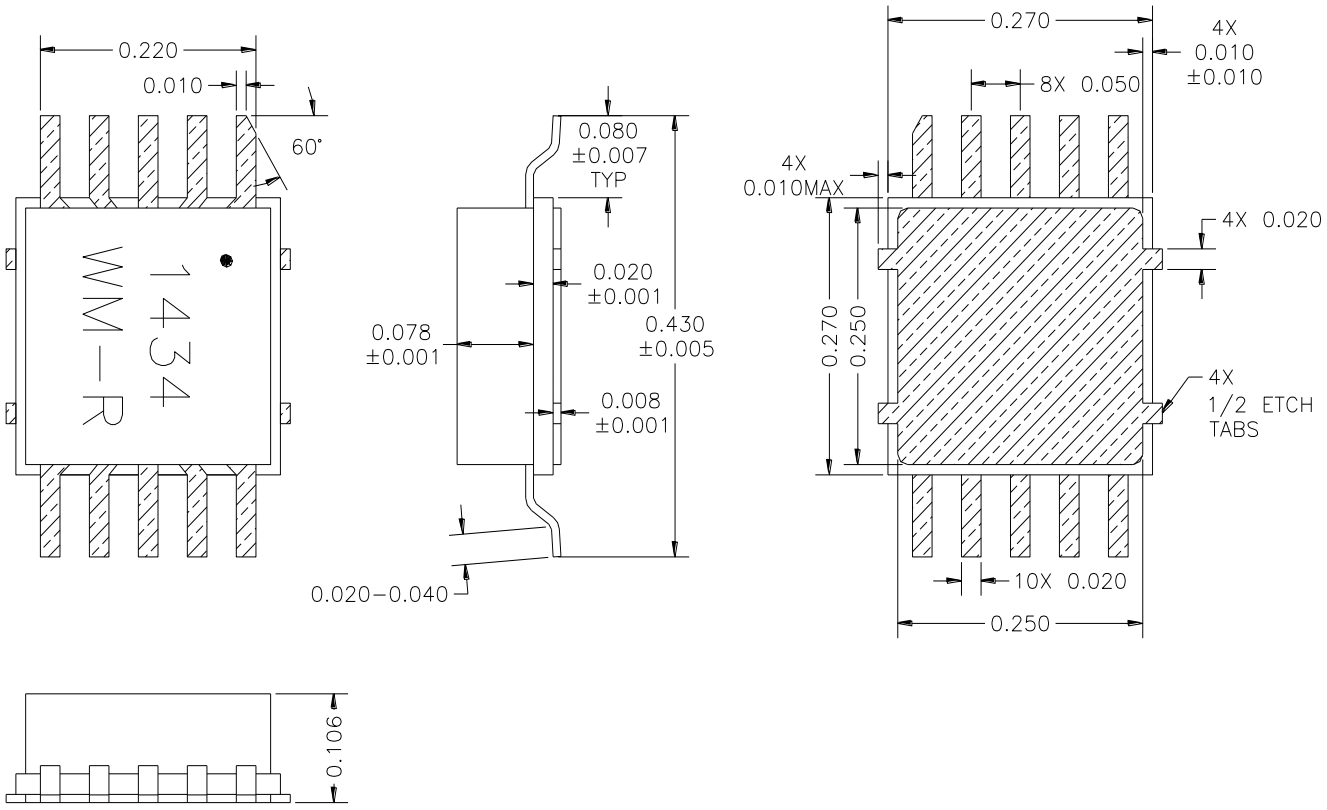
V_{dd}=+10V, I_{dd1}=0.3A, I_{dd2}=1.0A



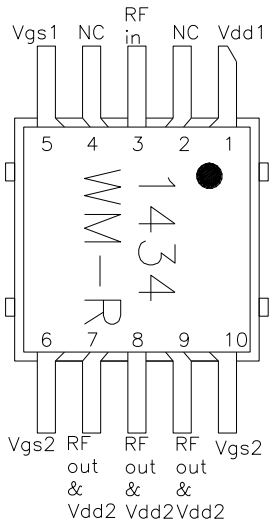
V_{dd}=+12V, I_{dd1}=0.3A, I_{dd2}=1.0A



PACKAGE OUTLINE (BM)



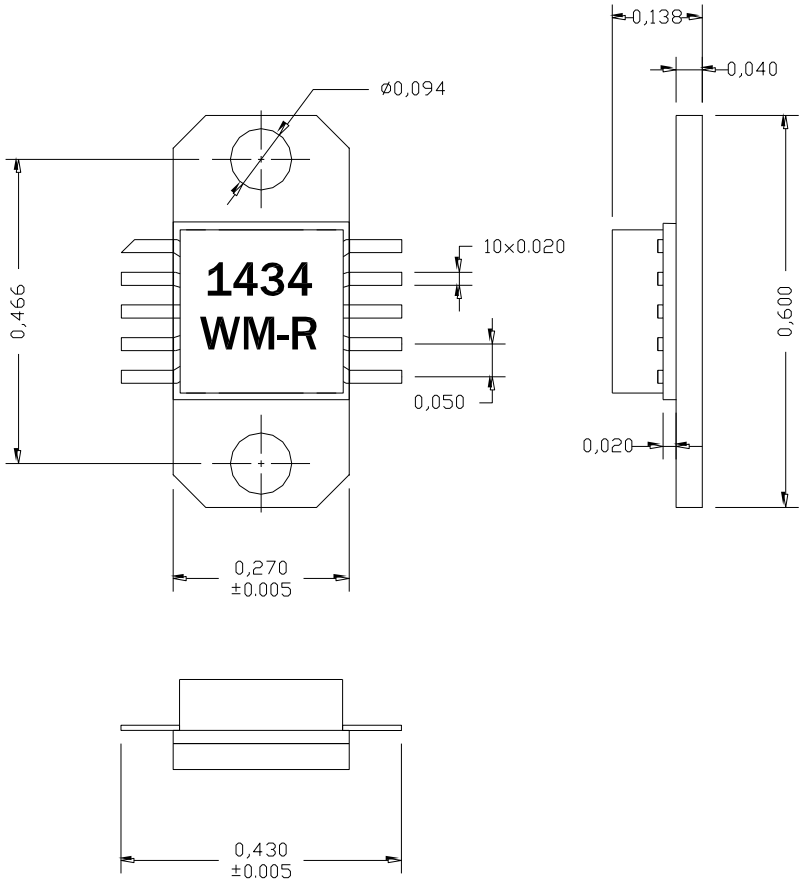
PIN LAYOUT



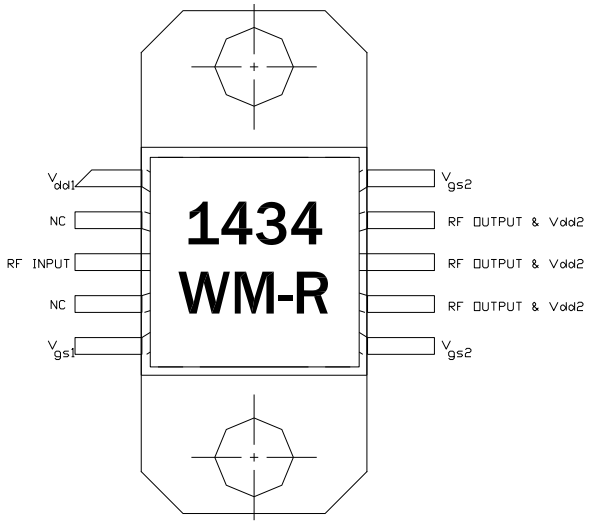
Pin No.	Function	Bias*
1	Vdd1	+12V
2	NC	
3	RF in	
4	NC	
5	Vgs1	-0.9V
6	Vgs2	-0.9V
7	RF out & Vdd2	+12V
8	RF out & Vdd2	+12V
9	RF out & Vdd2	+12V
10	Vgs2	-0.9V

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

PACKAGE OUTLINE (EM)*



PIN LAYOUT

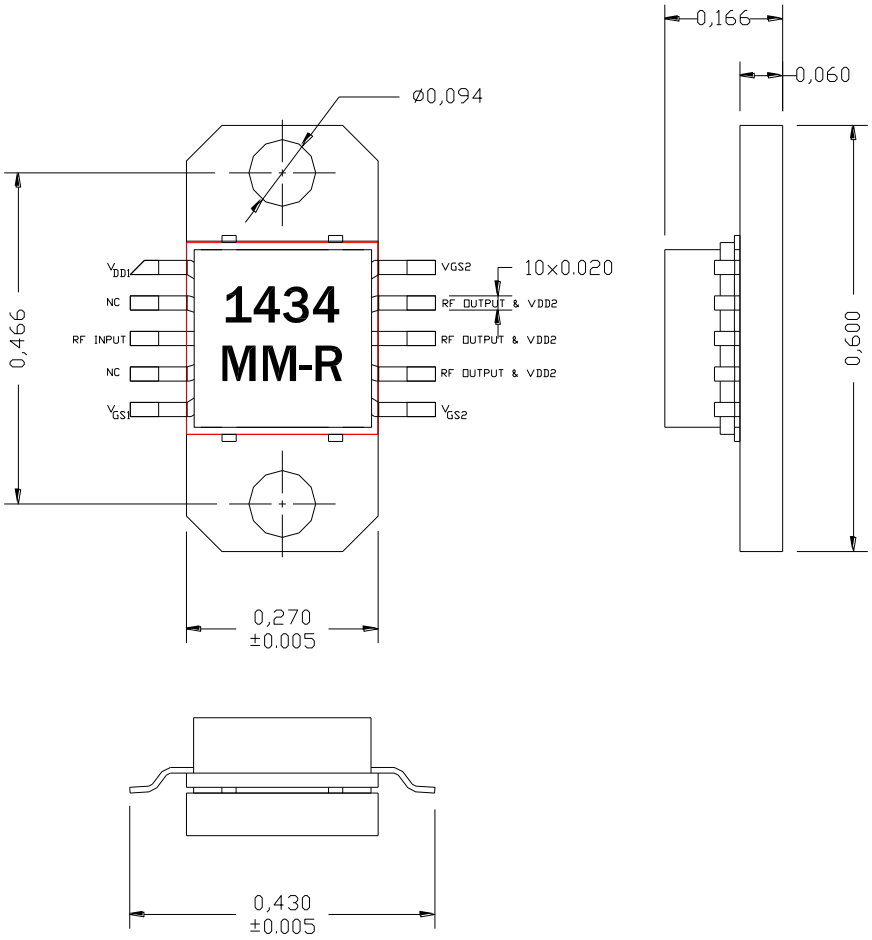


Pin No.	Function	Bias**
1	Vdd1	+12V
2	NC	
3	RF in	
4	NC	
5	Vgs1	-0.9V
6	Vgs2	-0.9V
7	RF out & Vdd2	+12V
8	RF out & Vdd2	+12V
9	RF out & Vdd2	+12V
10	Vgs2	-0.9V

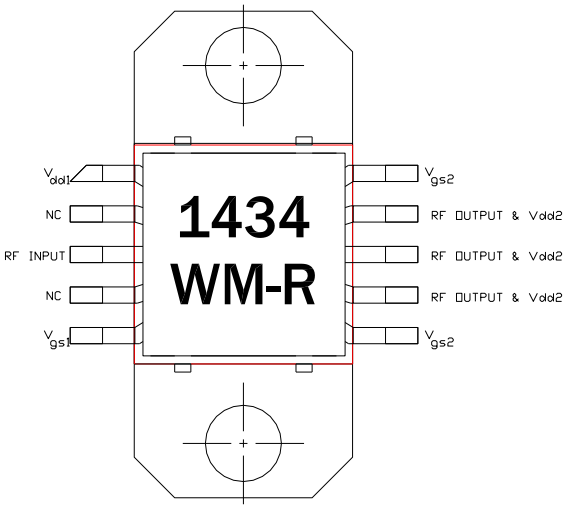
* EM version flange is made of CuW

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

PACKAGE OUTLINE (FM)*



PIN LAYOUT

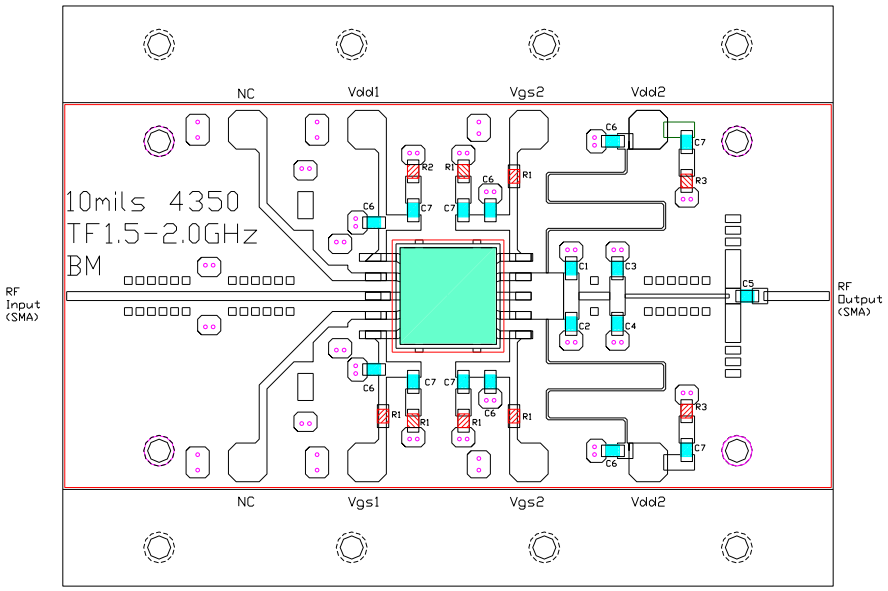


Pin No.	Function	Bias**
1	Vdd1	+12V
2	NC	
3	RF in	
4	NC	
5	Vgs1	-0.9V
6	Vgs2	-0.9V
7	RF out & Vdd2	+12V
8	RF out & Vdd2	+12V
9	RF out & Vdd2	+12V
10	Vgs2	-0.9V

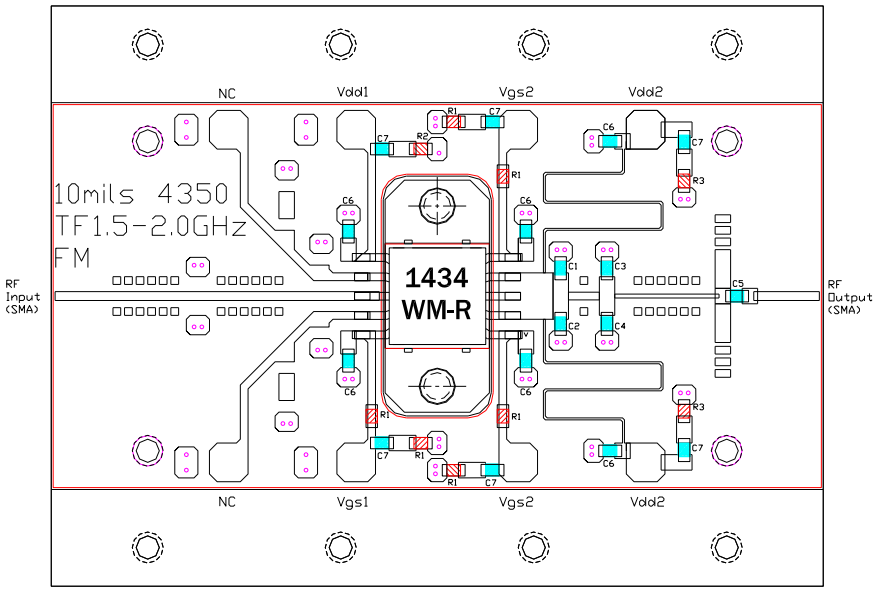
* FM version flange is made of Copper

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

1.5 to 1.8GHz TEST CIRCUITS



Notes:
1- 10mils Rogers 4350 Material epoxied to TF
2- Ckt is for un-matched MMICs at 1.5-2.0GHz
3- C1=0.6pF, C2=0.7pF, C3=1.3pF, C4=1.8pF
C5=3.9pF, C6=20pF, C7=1000pF,
R1=50ohms, R2=10ohms, R3=50hms
4- All Caps & Resistors are 0603 size
5- External 1 μF dipped tantalum capacitor should be attached to Vd and Vg to decouple external bias leads.



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C5=3.9pF, C6=20pF, C7=1000pF,
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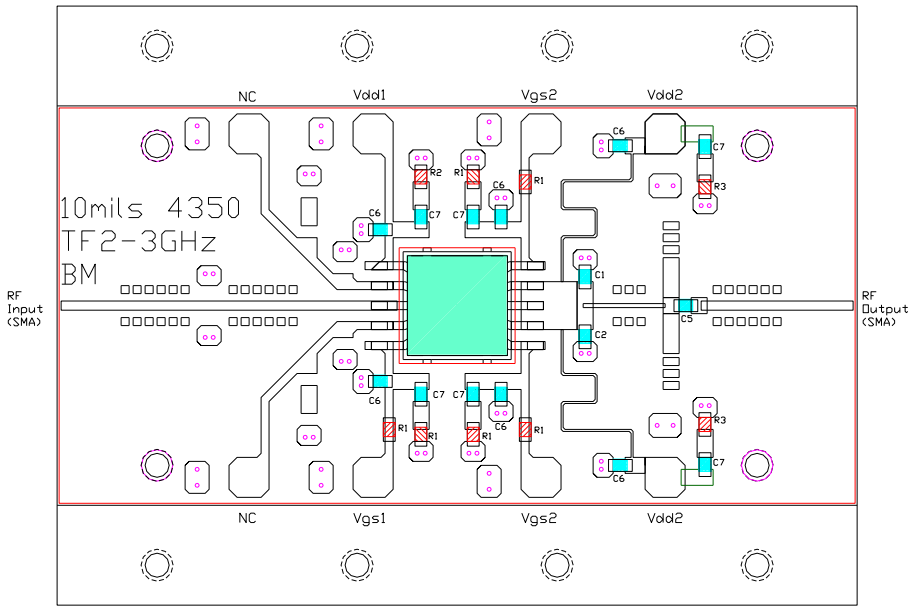
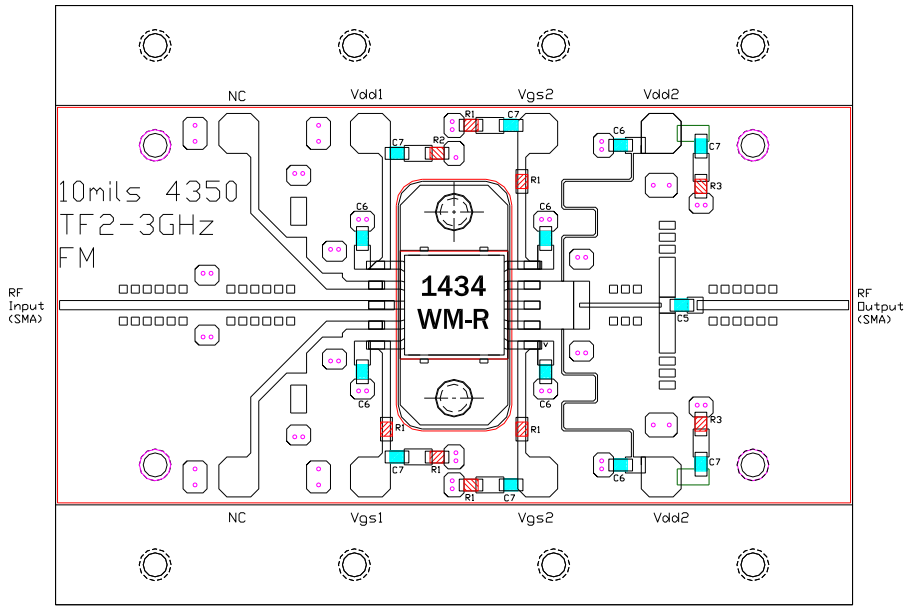
2.0 to 3.0GHz TEST CIRCUITS



Notes:
1– 10mils Rogers 4350 Material epoxied to TF
2– Ckt is for un–matched MMICs at 2.0–3.0GHz
3– C1=1.2pF, C2=1.1pF, C5=3.0pF, C6=20pF, C7=1000pF,

R1=50ohms, R2=10ohms, R3=50ohms
4– All Caps & Resistors are 0603 size
5– External 1 μF dipped tantalum capacitor should be attached to Vd and Vg to decouple external bias leads.



Notes:
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2– Ckt is for un–matched MMICs at 2.0–3.0GHz
3– C1=1.2pF, C2=1.1pF, C5=3.0pF, C6=20pF, C7=1000pF,

R1=50ohms, R2=10ohms, R3=50ohms
4– All Caps & Resistors are 0603 size
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