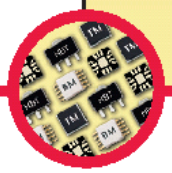
# GaAs MMIC Power Amplifier





## DESCRIPTION

AMCOM's AM003536WM-BM/EM/FM-R is an ultra-broadband GaAs MMIC power amplifier. It has 22 dB gain and 36dBm output power over the 0.01 to 3.5 GHz 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 the PC board. When mounting directly to the PCB, please see application note ANB700 for instructions. Because of high power dissipation, we strongly recommend to mount these devices directly on a metal heat sink. The AM003536WM-EM is a Copper Tungsten drop-in package with straight leads. The AM003536WM-FM-R is the AM003536WM-BM-R mounted on a gold-plated copper flange carrier. There are two screw holes on the flange to facilitate screwing on to a metal heat sink. Both parts are RoHS compliant.

## FEATURES

- Wide bandwidth from 10MHz to 3.5 GHz
- High output power, P1dB = 36dBm
- High gain, 22dB
- Input /Output matched to 50 Ohms

## APPLICATIONS

- Software Radio
- Instrumentation
- Gain block

## TYPICAL PERFORMANCE * (Bias Conditions**: $V_{dd}$ = +20V, $I_{dq1}$ = 125mA, $I_{dq2}$ = 550mA)

| Parameters | Minimum | Typical ** | Maximum |
|---|---|---|---|
| Frequency | 0.02 – 2.5GHz | 0.01 – 3.5GHz | - |
| Small Signal Gain | 19 dB | 22 dB | 26 dB |
| Gain Ripple | - | ± 1.5 dB | ± 3.0 dB |
| P1dB @ 1 GHz | 32.5 dBm | 34.0 dBm | - |
| Psat | 34.5 dBm | 36.0 dBm | - |
| Efficiency @ P1dB | - | 20 % | |
| IP3 @ 1GHz | - | 48 dBm | |
| Input Return Loss | 13 dB | 20dB | |
| Output Return Loss | 7 dB | 10dB | |
| Thermal Resistance | | 4.5 °C/W | |

* Specifications subject to change without notice.

** Gate biases corresponding to above currents are $V_{gs1}$=-1.2V, $I_{gs1}$ < 2mA, $V_{gs2}$=-0.8V, $I_{gs2}$ < 5mA and may vary from lot to lot. Gate currents could reach above limits only near power saturation

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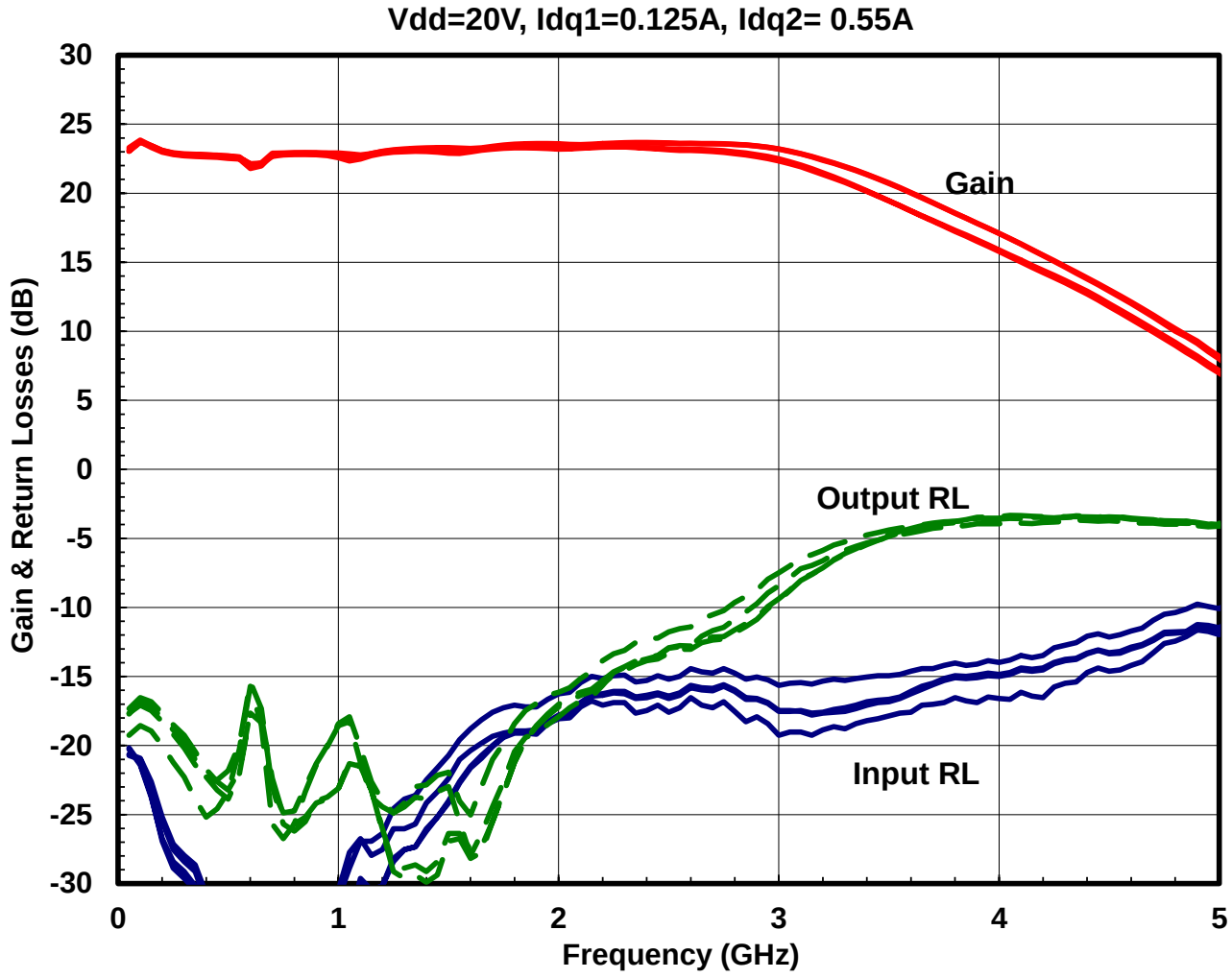
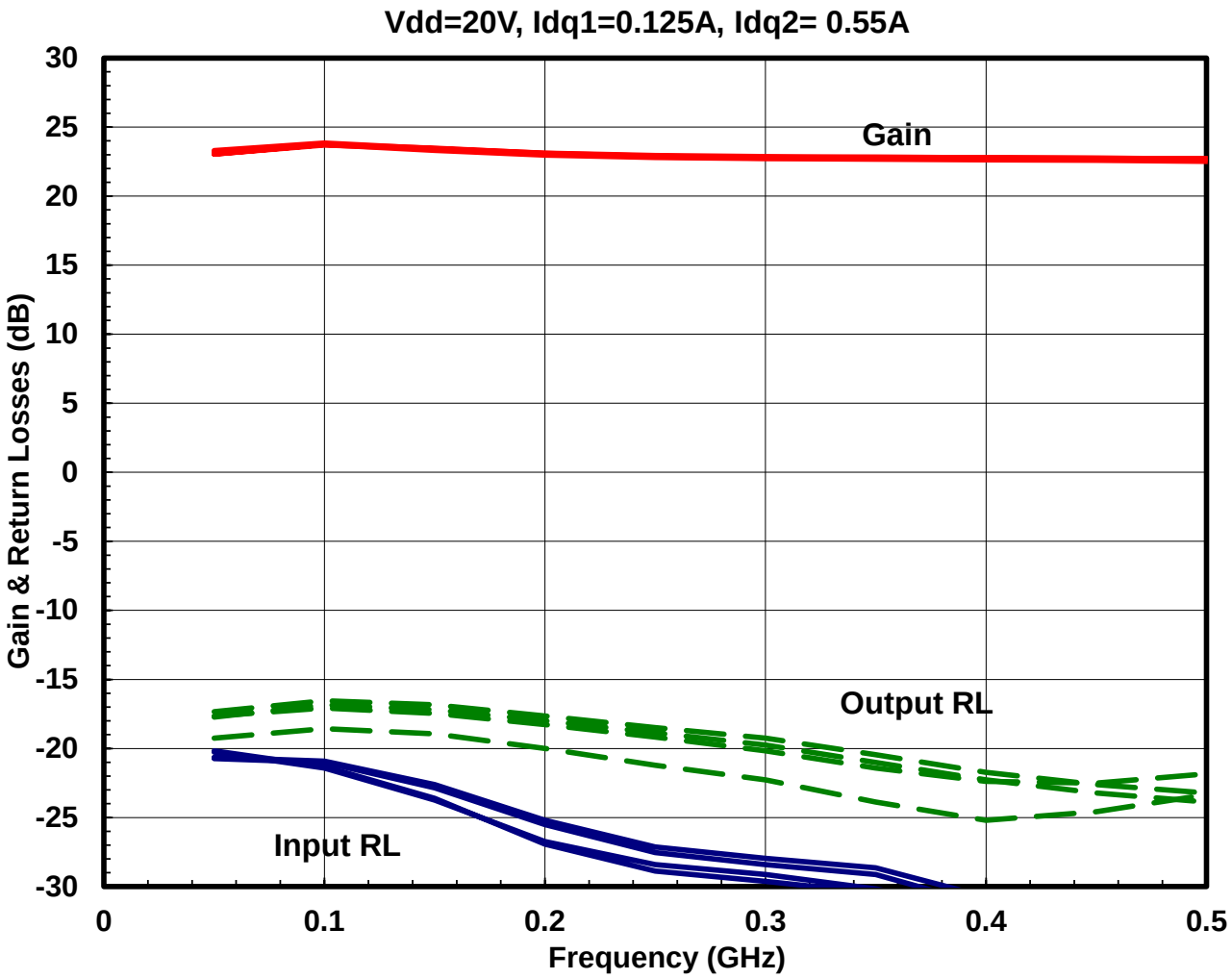
## ABSOLUTE MAXIMUM RATING

| Parameter | Symbol | Rating |
|---|---|---|
| Drain source voltage | $V_{dd}$ | 24 V |
| Gate source voltage | $V_{gs1}$ & $V_{gs2}$ | -3 V |
| Drain source current | $I_{dq1}$ | 150 mA |
| Drain source current | $I_{dq2}$ | 600 mA |
| Continuous dissipation at 25ºC | $P_t$ | 18 W |
| Channel temperature | $T_{ch}$ | 175 °C |
| Operating temperature | $T_{op}$ | -55°C to +85°C |
| Storage temperature | $T_{sto}$ | -55°C to +135°C |
| Input power | $P_{in}$ | 18dBm |

## SMALL SIGNAL DATA*

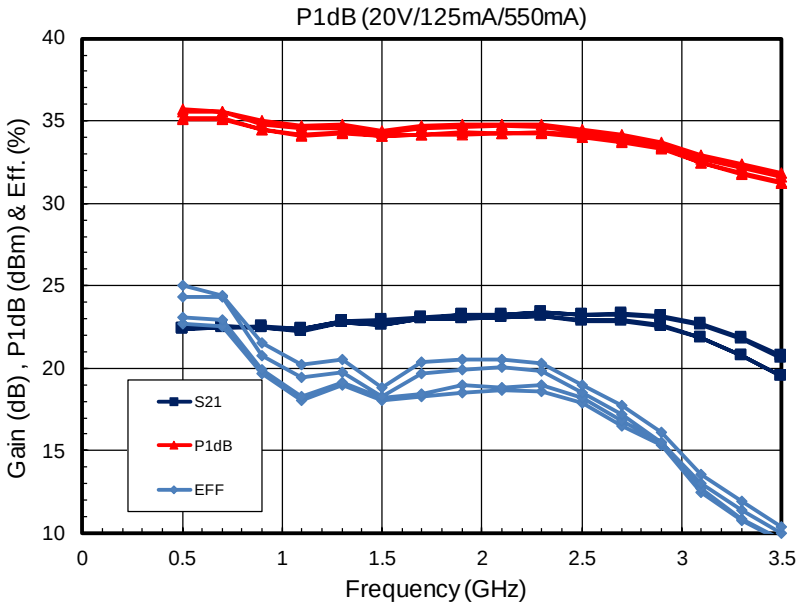


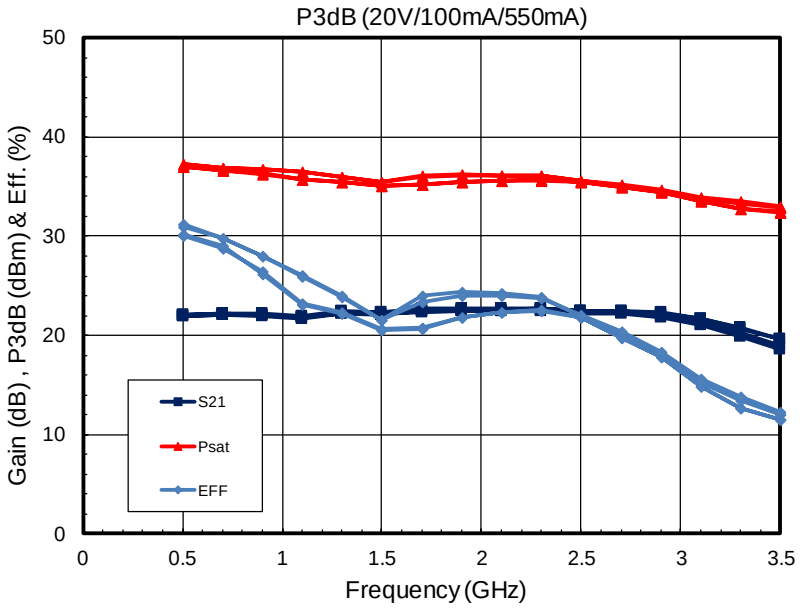
## EXTENDED LOW FREQUENCY SCALE




* S-Parameters measured using bias tee at the output. MMIC could be operated at lower than $V_{dd}$=+20V with almost same small signal parameters. $V_{gs1}$ & $V_{gs2}$ vary with $V_{dd}$ and may need slight adjustments

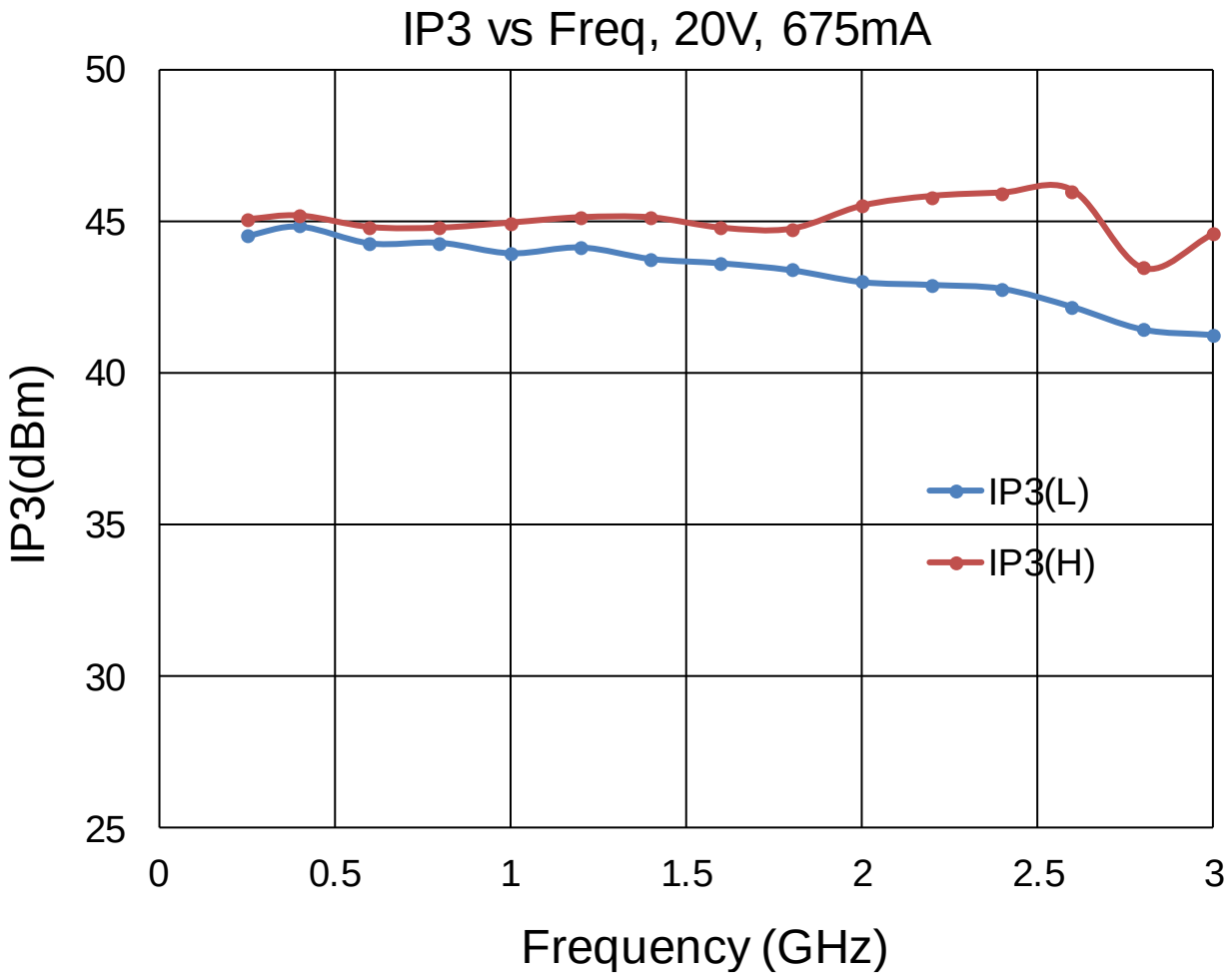
## POWER DATA*



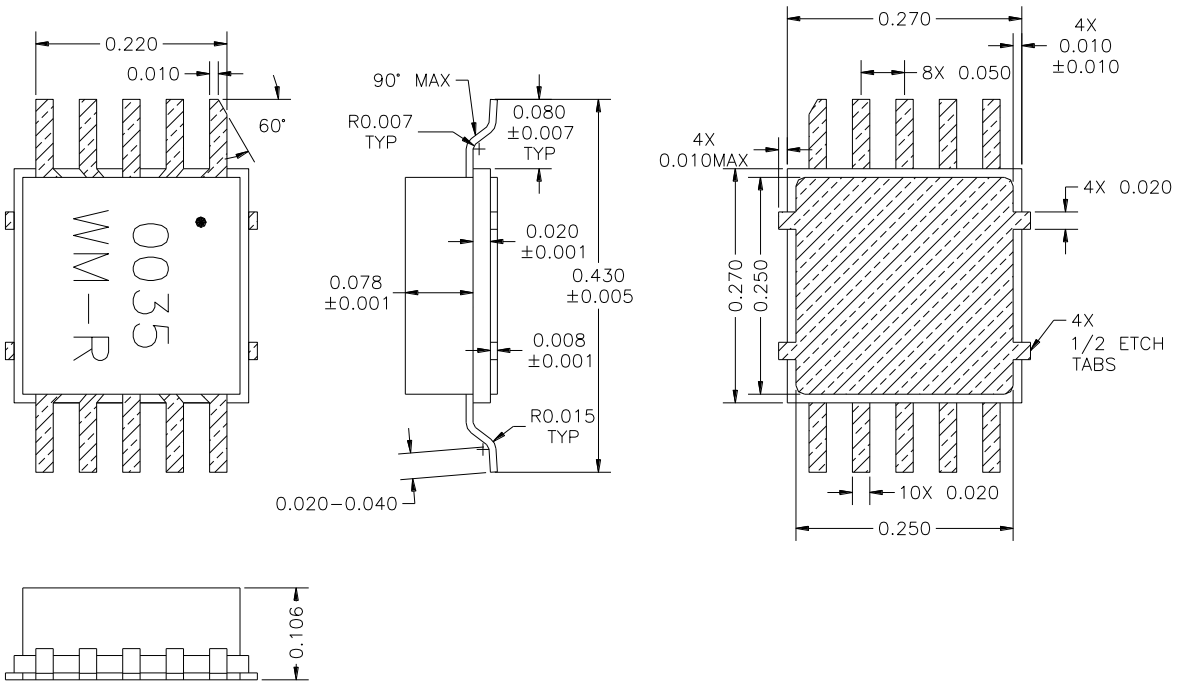




* Power measured using bias tee at the output. MMIC could be operated at lower than $V_{dd}$=+20V with reduced power output. $V_{gs1}$ & $V_{gs2}$ vary with $V_{dd}$ and may need slight adjustments

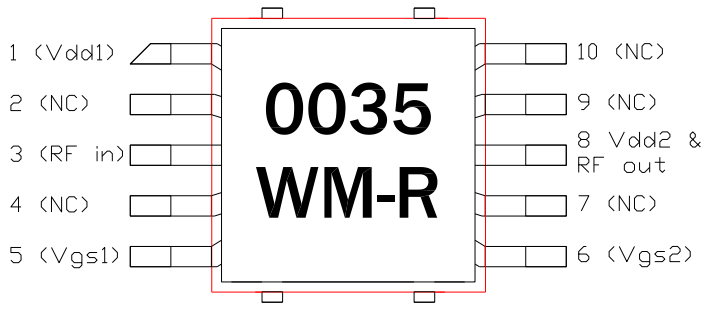
**THIRD ORDER INTERCEPT**



## PACKAGE OUTLINE (BM)



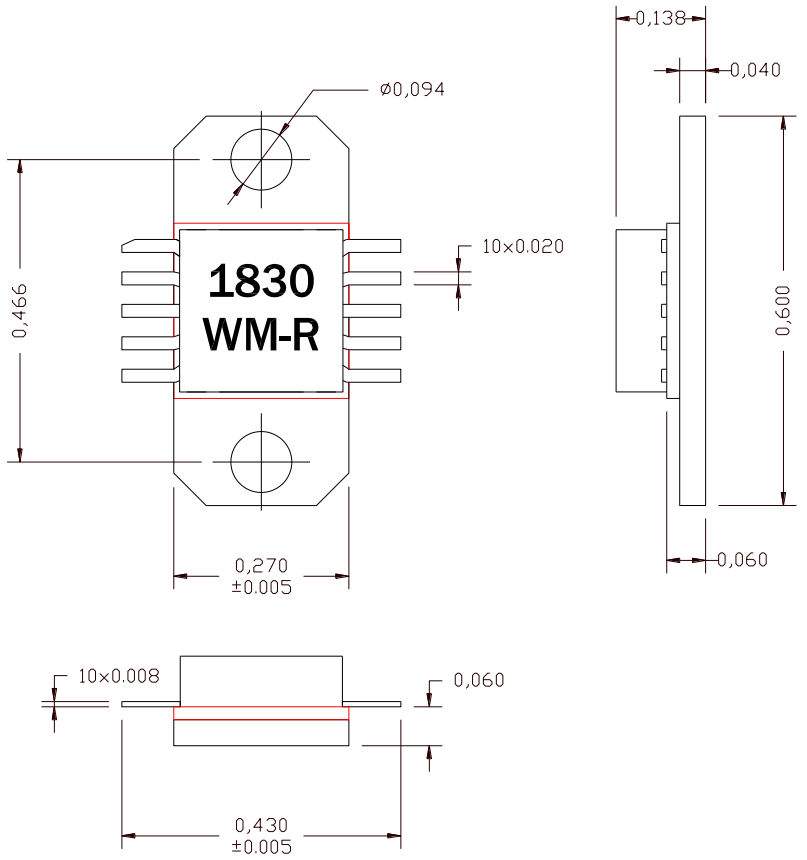

## PIN LAYOUT



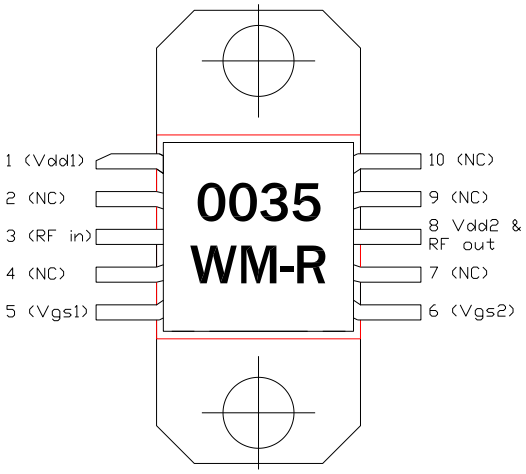

| Pin No. | Function | Bias* |
|---|---|---|
| 1 | Vdd1 | +20V |
| 2 | NC | |
| 3 | RF in | |
| 4 | NC | |
| 5 | Vgs1 | -1.2V |
| 6 | Vgs2 | -0.8V |
| 7 | NC | |
| 8 | RF out & Vdd2 | +20V |
| 9 | NC | |
| 10 | NC | |

* Gate biases are for reference only and may vary from lot to lot

## PACKAGE OUTLINE (EM)




## PIN LAYOUT

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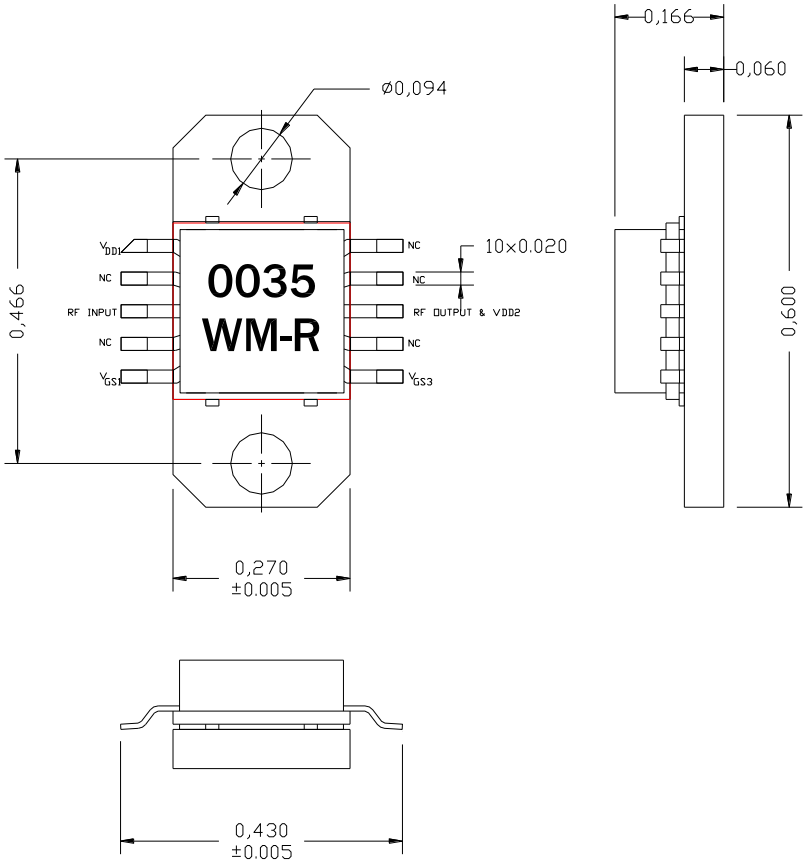
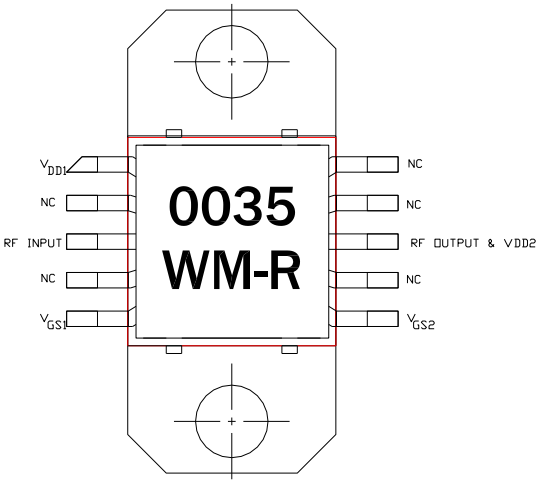
| 2 | NC | |
| 3 | RF in | |
| 4 | NC | |
| 5 | Vgs1 | -1.2V |
| 6 | Vgs2 | -0.8V |
| 7 | NC | |
| 8 | RF out & Vdd2 | +20V |
| 9 | NC | |
| 10 | NC | |

* Gate voltage may vary from lot to lot

## PACKAGE OUTLINE (FM)




## PIN LAYOUT

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| 2 | NC | |
| 3 | RF in | |
| 4 | NC | |
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| 6 | Vgs2 | -0.8V |
| 7 | NC | |
| 8 | RF out & Vdd2 | +20V |
| 9 | NC | |
| 10 | NC | |

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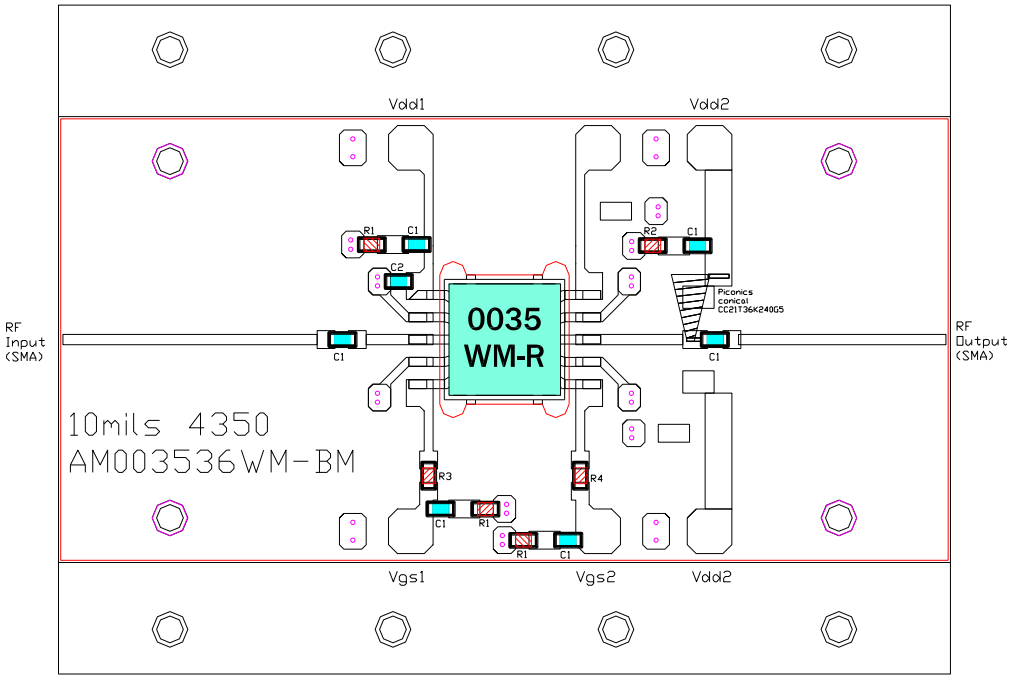
## TEST CIRCUIT for BM Package




Notes:
1- 10mils Rogers 4350 Material epoxied to TF
2- Ckt is for AM003536WM-BM, AM012535MM-BM & AM002535MM-BM
3- C1=1000pF, C2=20pF,
R1=50 Ohms, R2=10 ohms, R3=1000 Ohms, R4=500 Ohms
4- All Caps & Resistors are 0603 size

## Important Notes:

1- The +20V Bias to the output port could be provided via a bias tee or suitable chokes to be soldered on the board. Inductance of choke should be large enough to have high impedance at lowest frequency of operation (300nH is adequate).

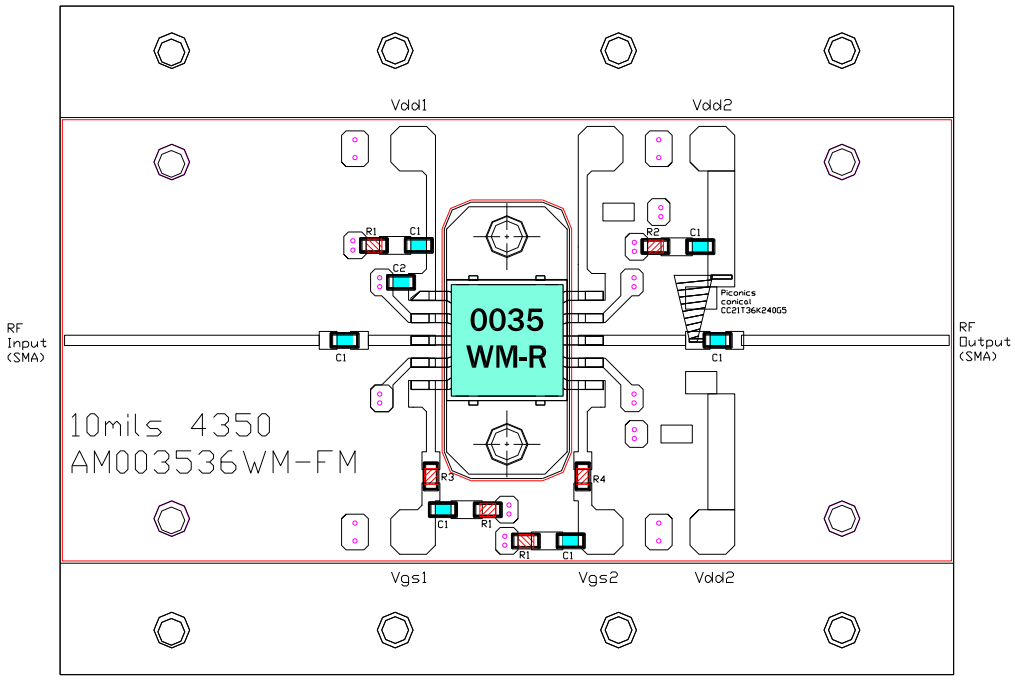
2- Recommended current biases are 125mA and 500mA for the first stage and second stage respectively. At $V_{dd1}$ & $V_{dd2}$ = +20V, $V_{gs1}$ & $V_{gs2}$ values are -1.2V and -0.80V respectively to obtain these desired currents. $V_{gs1}$ & $V_{gs2}$ could be adjusted to vary the currents going thru the first stage ($V_{dd1}$ pin) and the second stage ($V_{dd2}$ pin) respectively. Gate biases are for reference only.

3- Do not apply $V_{dd1}$ & $V_{dd2}$ without proper negative voltages on $V_{gs1}$ & $V_{gs2}$.

4- The currents flowing out of the $V_{gs1}$ & $V_{gs2}$ pins are less than 2mA & 5mA respectively at $P_{1dB}$.

5- DC blocking capacitors must be used at input and output.

## TEST CIRCUIT for EM & FM Package

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R1=50 Ohms, R2=10 ohms, R3=1000 Ohms, R4=500 Ohms
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