

**High Power Linear Amplifier  
2.3 – 2.8 GHz**

**MAAPSS0103  
V3**

**Features**

- Ideal for WiMax, MESH Network, and Linear Applications
- P1dB: +32 dBm Typical
- Small Signal Gain: 34 dB Typical
- EVM: 2.5% at 26 dBm Linear (OFDM) P<sub>OUT</sub>
- Integrated Detector
- Lead-Free 4 mm 16 lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- RoHS\* Compliant and 260°C Reflow Compatible

**Description**

M/A-COM’s MAAPSS0103 RF power amplifier is a three stage GaAs MMIC which exhibits high gain and linearity performance in a lead-free 4 mm 16-lead PQFN surface mount plastic package. This product is designed for the 2.5 GHz IEEE 802.16 / WiMax band. The MAAPSS0103 also features an integrated power detector.

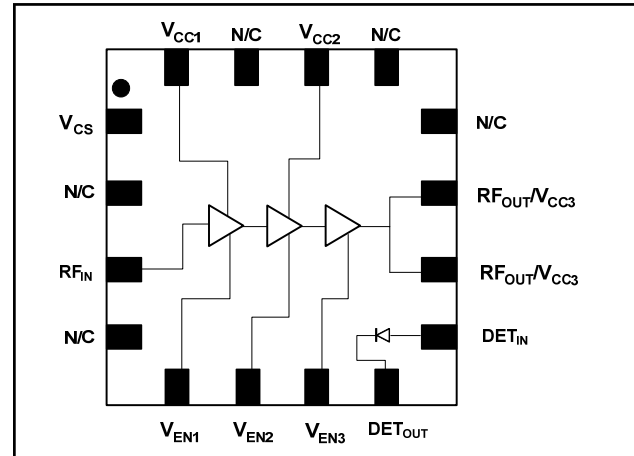
The MAAPSS0103 is fabricated using a high reliability GaAs HBT process to realize low current and high power functionality. The process features full passivation for increased performance and reliability.

**Ordering Information <sup>1</sup>**

Part Number	Package
MAAPSS0103TR-1000	1000 piece reel
MAAPSS0103TR-3000	3000 piece reel
MAAPSS0103SMB	Sample Test Board (Includes 5 Samples)

1. Reference Application Note M513 for reel size information.

**Block Diagram**



**Pin Configuration**

Pin No.	Pin Name	Description
1	V <sub>CS</sub>	Bias Supply Voltage
2	N/C	No Connect
3	RF <sub>IN</sub>	RF Input
4	N/C	No Connect
5	V <sub>EN1</sub>	Power Enable
6	V <sub>EN2</sub>	Power Enable
7	V <sub>EN3</sub>	Power Enable
8	DET <sub>OUT</sub>	Detector Output
9	DET <sub>IN</sub>	Detector Input
10	RF <sub>OUT</sub> /V <sub>CC3</sub>	RF Output, 3rd Stage Supply
11	RF <sub>OUT</sub> /V <sub>CC3</sub>	RF Output, 3rd Stage Supply
12	N/C	No Connect
13	N/C	No Connect
14	V <sub>CC2</sub>	2nd Stage Supply
15	N/C	No Connect
16	V <sub>CC1</sub>	1st Stage Supply
17	Paddle <sup>2</sup>	RF & DC Ground

2. The exposed pad centered on the package bottom must be connected to RF and DC ground.

\* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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**Electrical Specifications:  $T_A = +25\text{ }^\circ\text{C}$ ,  $V_{CC} = 5.0\text{ V}$ ,  $Z_0 = 50\text{ }\Omega$**

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	2.5 GHz	dB	31	34	—
Gain Flatness	2.3 - 2.8 GHz	dB	—	$\pm 1$	—
Input Return Loss	2.3 - 2.8 GHz	dB	—	10	—
Output Return Loss	2.3 - 2.8 GHz	dB	—	10	—
Output P1dB	2.5 GHz	dBm	—	32	—
EVM <sup>3</sup>	2.5 GHz, $P_{OUT} = 26\text{ dBm}$ OFDM, QAM-64, 54 Mbps	%	—	2.5	—
Enable Voltage	$V_{EN}$	V	—	2.8	—
Device / Supply Voltage	2.3 - 2.8 GHz	V	—	5	—
Quiescent Current Operating Current	2.5 GHz, No RF 2.5 GHz, $P_{OUT} = 26\text{ dBm}$	mA mA	— —	250 600	— 700
PAE	2.5 GHz, $P_{OUT} = 26\text{ dBm}$	%	—	14	—
Detector Output Range	2.5 GHz, $P_{OUT} = 14 - 28\text{ dBm}$ , OFDM	V	—	0.5 - 2.0	—
Thermal Resistance	@ $85^\circ\text{C}$ package paddle temperature	$^\circ\text{C/W}$	—	25	—

3. Includes system EVM of 0.8%.

**Absolute Maximum Ratings<sup>4,5</sup>**

Parameter	Absolute Maximum
Input Power	+ 5 dBm
Operating Supply Voltage	+6.0 Volts
Operating Control Voltage	+3.6 Volts
Operating Temperature	$-40^\circ\text{C}$ to $+85^\circ\text{C}$
Channel Temperature	$+150^\circ\text{C}$
Storage Temperature	$-40^\circ\text{C}$ to $+150^\circ\text{C}$

4. Exceeding any one or combination of these limits may cause permanent damage to this device.  
5. M/A-COM does not recommend sustained operation near these survivability limits.

**Handling Procedures**

Please observe the following precautions to avoid damage:

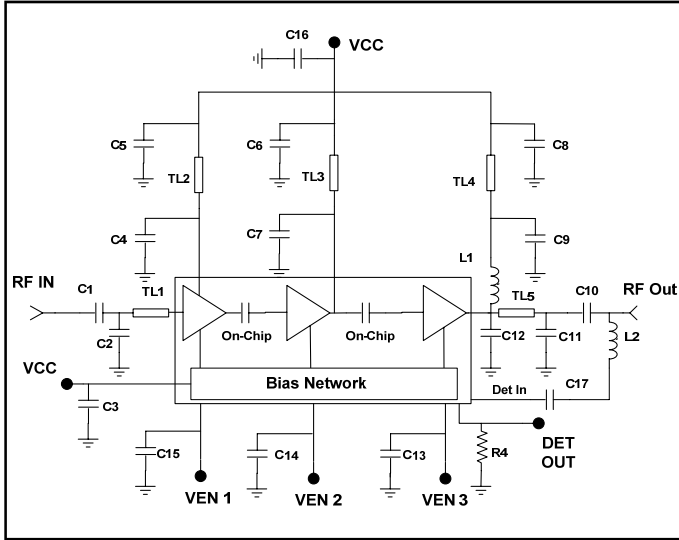
**Static Sensitivity**

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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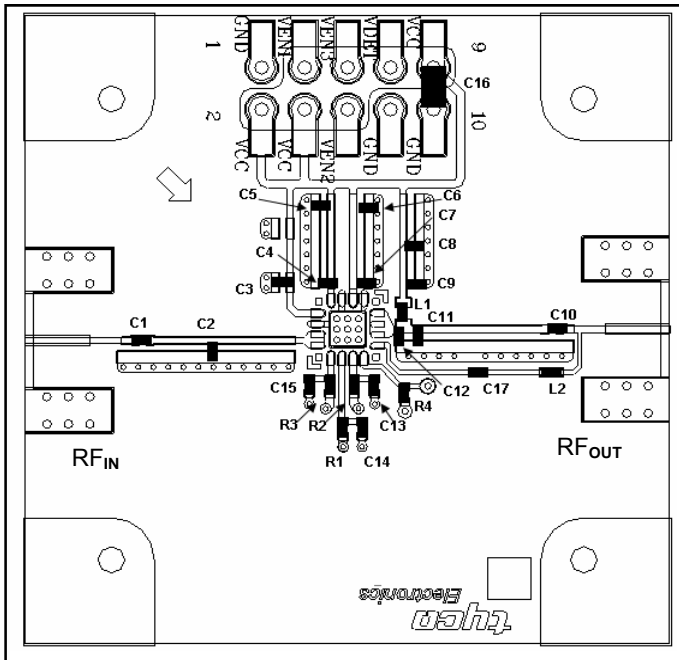
**Application Schematic**



**External Parts List**

Component	Value	Case Size	Manufacturer
C1, C5, C6, C10, C17	1000 pF	0402	Murata
C2	1.8 pF	0402	Murata
C3, C8, C13, C14, C15	0.1 $\mu$ F	0402	Murata
C4, C7, C9	8 pF	0402	Murata
C11	2 pF	0402	Murata
C12	2.2 pF	0402	Murata
C16	3.3 $\mu$ F	1206	Kemet
L1	3.6 nH	0402	Coilcraft
L2	15 nH	0402	Coilcraft
R1,R2,R3	0 $\Omega$	—	—
R4	100 k $\Omega$	—	—
TL1	5.5 mm (L), 0.37 mm (W)	—	—
TL2, TL3	4 mm (L), 0.37 mm (W)	—	—
TL4	1.7 mm (L), 0.37 mm (W)	—	—
TL5	0.3 mm (L), 0.37 mm (W)	—	—

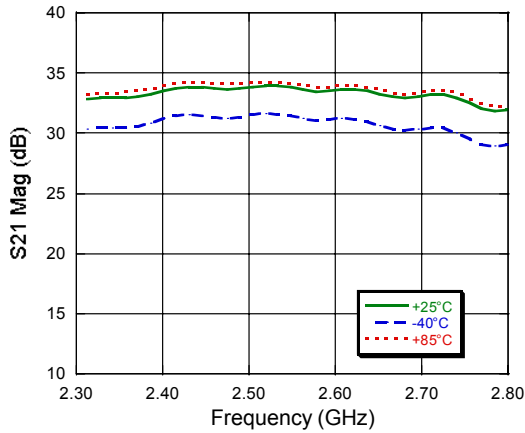
**Sample Board <sup>6</sup>**



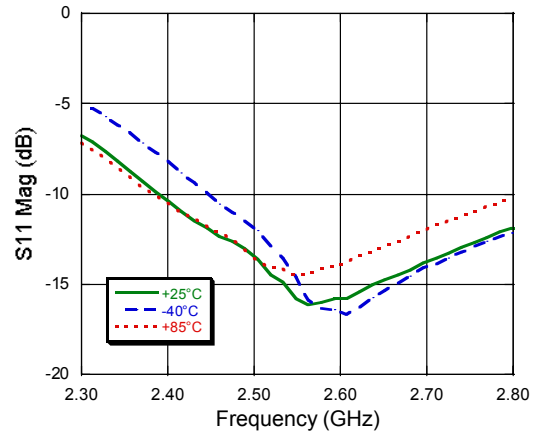
6. PCB Material FR4 - 50  $\Omega$  Line = 0.37 mm (W)

**Typical Performance Curves: over temp**

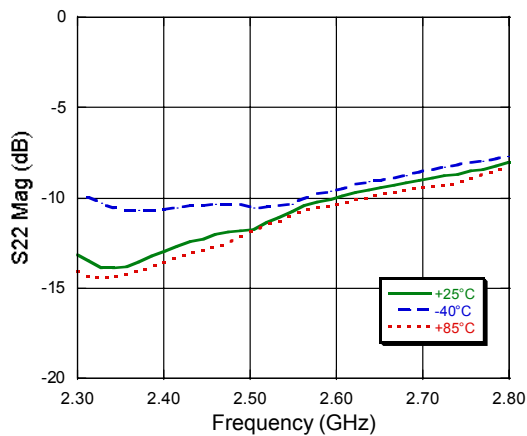
**Gain**



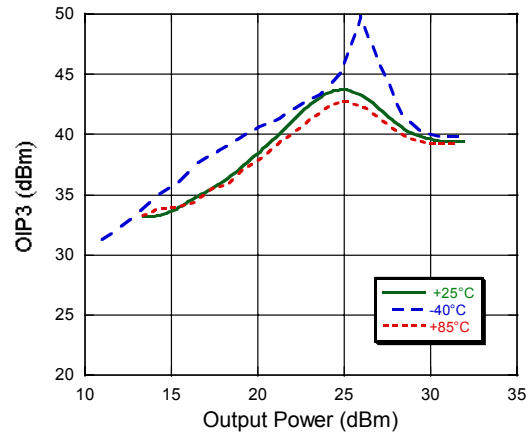
**S11**



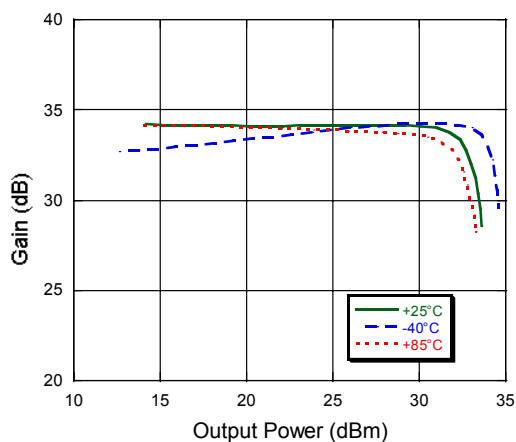
**S22**



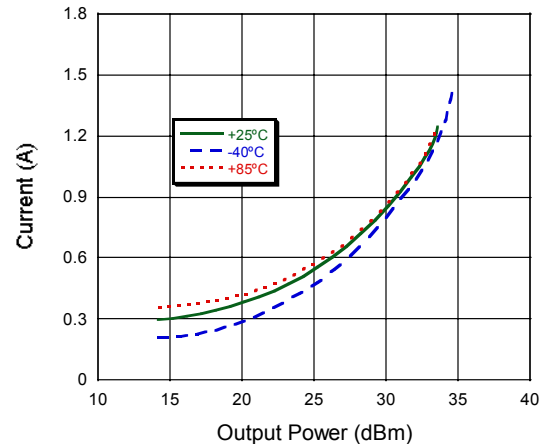
**OIP3**



**P1dB**



**Current**

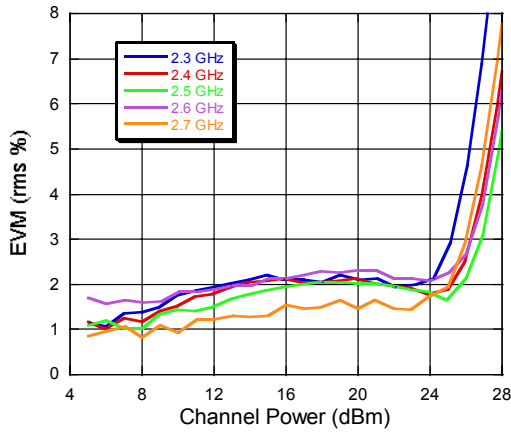


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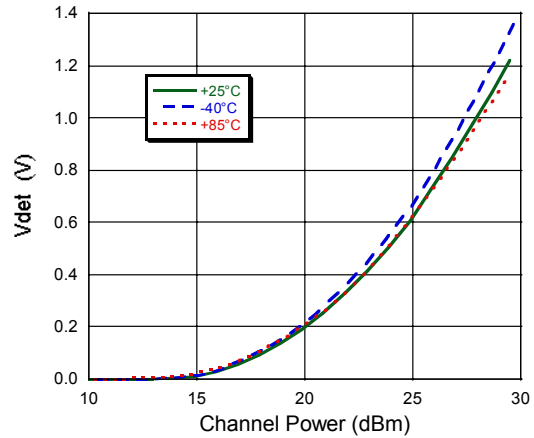
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**Typical Performance Curves: @ +25°C**

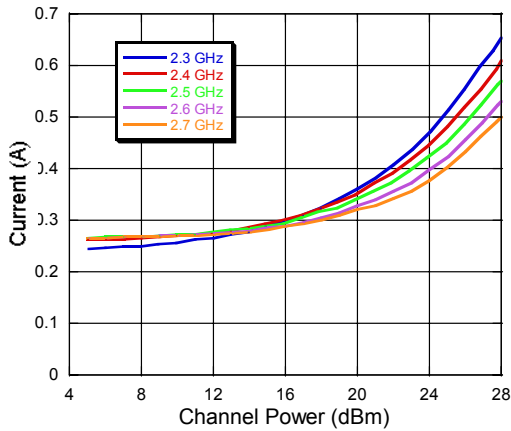
**EVM vs. Channel Power**



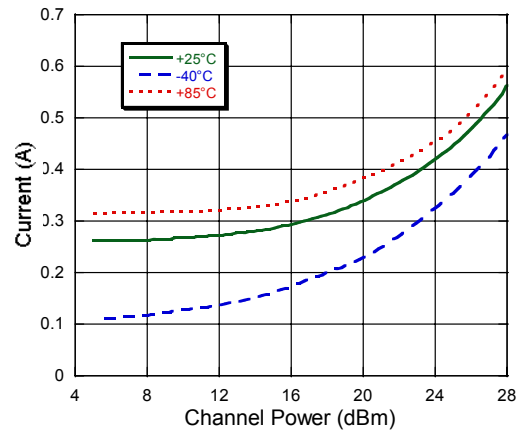
**V<sub>DET</sub> vs. Channel Power Over Temp @ 2.5 GHz**



**Current vs. Channel Power**



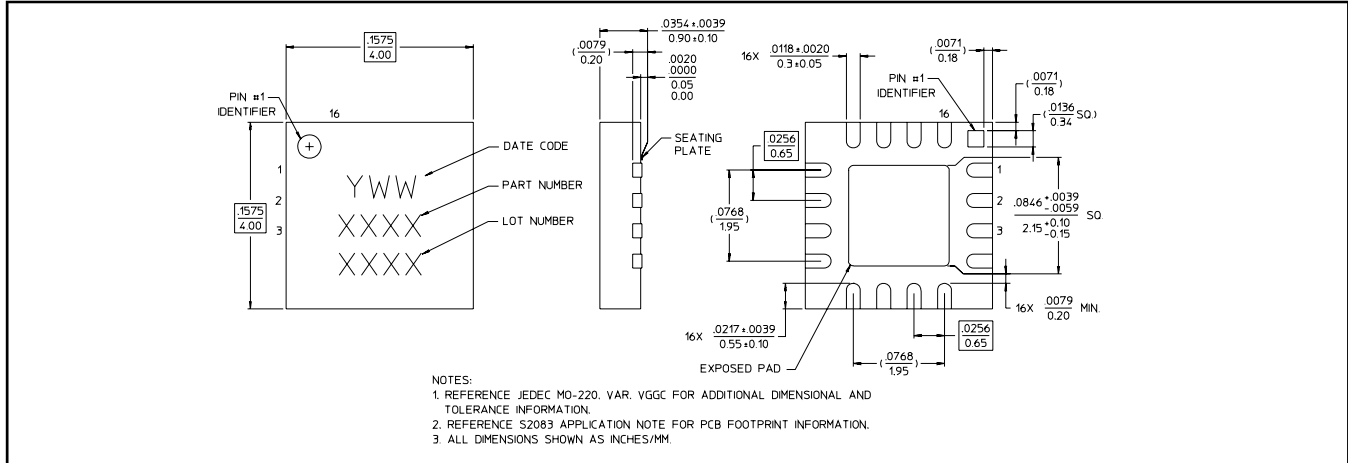
**Current vs. Channel Power Over Temp @ 2.5 GHz**



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**Lead-Free 4 mm 16-Lead PQFN†**



† Reference Application Note M538 for lead-free solder reflow recommendations.  
 Meets JEDEC moisture sensitivity level 1 requirements.