



MAAPSS0075 V1

# Linear Power Amplifier 2.4 - 2.5 GHz, 802.11b/g

#### **Features**

- Ideal for 802.11b/g
- +26 dBm P1dB Typical at 3.3 V
- 29.5 dB Gain Typical
- 802.11b compliant to 23 dBm P<sub>OUT</sub>
- 802.11g compliant to 19 dBm P<sub>OUT</sub>
- Micro-Amp Shutdown
- Integrated Detector
- SiGe Process: Lowest Cost Solution
- Operates from 1.5 V to 4.0 V
- Lead-Free 3 mm 12-Lead PQFN Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS\* Compliant 260°C Reflow Compatible

#### **Description**

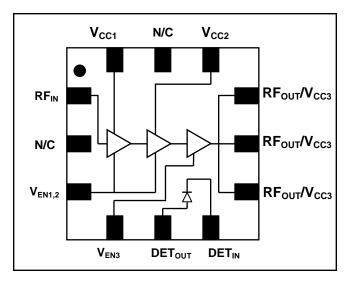
The MAAPSS0075 is a three stage power amplifier, designed for 2.4 GHz linear applications. This power amplifier is available in a lead free 3 mm 12-lead PQFN plastic package. The MAAPSS0075 also features an integrated power detector.

## Ordering Information<sup>1</sup>

Part Number	Package
MAAPSS0075TR	1000 piece reel
MAAPSS0075TR-3000	3000 piece reel
MAAPSS0075SMB	Sample Test Board (Includes 5 Samples)

1. Reference Application Note M513 for reel size information.

#### **Functional Schematic**



#### **Pin Configuration**

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

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

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

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### Electrical Specifications: F = 2.4 GHz, $V_{CC}$ = 3.3 V, $V_{EN}$ = 3.0 V, $T_A$ = 25°C, $Z_0$ = 50 $\Omega$

Parameter	Test Conditions	Units	Min.	Тур.	Max
Gain		dB	27.5	29.5	31.5
Input VSWR		:1		1.6	
Forward Isolation		dB		40	
P1dB		dBm		26	
Supply Voltage	V <sub>CC1</sub> , V <sub>CC2</sub> , V <sub>CC3</sub>	V		3.3	
Bias Voltage	V <sub>EN</sub>	V		3	
Current	Idle	mA		100	150
	P <sub>OUT</sub> = 19 dBm	mA		185	220
	P <sub>OUT</sub> = 23 dBm	mA		275	300
Off Current	V <sub>EN</sub> = 0 V	μA		3	20
Control Current	V <sub>EN</sub> Current	mA		3	
Harmonics	2fo	dBc		-37	
	3fo	dBc		-52	
Duty Cycle		%		100	
Linear Output Power	DSS source; compliance with 802.11b	dBm		23	
	EVM=3.5%, OFDM, QAM-64, 54 Mbps	dBm		19	
Detector Output	P <sub>OUT</sub> = 19 dBm	mV		780	
Detector Sensitivity	Up to P <sub>OUT</sub> = 19 dBm	mV/dB		70	
Stability	+1.8 V < $V_{CC}$ < +3.6 V, VSWR < 6.0:1, -20°C < $T_{C}$ < +85°C, RBW = 3 MHz max hold		All spurs < -60 dBc		
Ruggedness	+1.8V < V <sub>CC</sub> < +3.6 V, P <sub>OUT</sub> < +23 dBm, VSWR < 6:1		No per	manent o	lamage

## **Absolute Maximum Ratings** 3,4

Parameter	Absolute Maximum	
Input Power	+ 5 dBm	
Operating Supply Voltage	+4.0 Volts	
Operating Control Voltage	+3.0 Volts	
Operating Temperature	-20°C to +85°C	
Channel Temperature	+150°C	
Storage Temperature	-40°C to +150°C	

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

#### **Operating the MAAPSS0075**

The MAAPSS0075 is static sensitive. Please handle with care. To operate the device, follow these steps.

- 1. Apply V<sub>CC</sub> (3.3 V).
- 2. Apply V<sub>EN</sub> (3.0 V).
- 3. Set Pin.
- 4. Turn off in reverse order with  $V_{\text{CC}}$  last.

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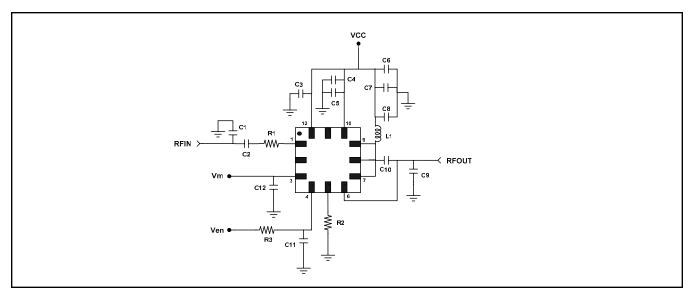
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#### **Evaluation Board Schematic**

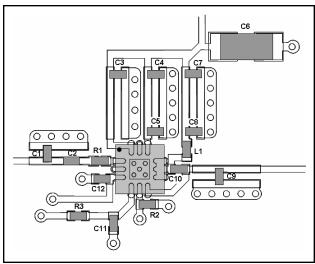


#### **MAAPSS0075 External Parts List**

Designator	Value	Footprint	Manufacturer
C1, C9	1.5 pF	0402	Murata
C2	1000 pF	0402	Murata
C3, C4, C7, C11, C12	0.1 uF	0402	Murata
C5, C8, C10	47 pF	0402	Murata
C6	10 uF	1206	AVX
L1	10 nH	0402	Coilcraft
R1	10 Ohm	0402	Panasonic
R2	100 Ohm	0402	Panasonic
R3	619 Ohm	0402	Panasonic

<sup>\*</sup> Equivalent components can be substituted.

### **Recommended PCB Configuration**



#### Transmission Line Dimensions, 0.20 mm thick FR4

Designator	Length (mil) *	Width (mil)
T1	190	15.0
T2	70	14.7
12	70	14.7

From package edge to center of component

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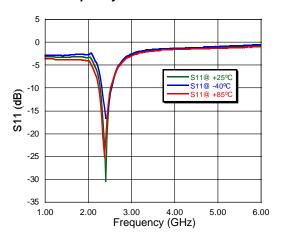


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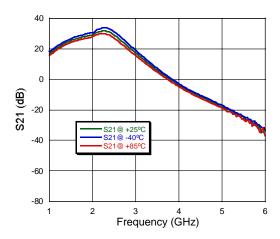
# Linear Power Amplifier 2.4 - 2.5 GHz, 802.11b/g

# Typical Performance Curves: $V_{CC} = 3.3 \text{ V}, V_{EN} = 3.0 \text{ V}, \text{ over Temperature}$

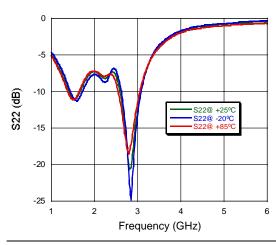
#### S11 vs. Frequency



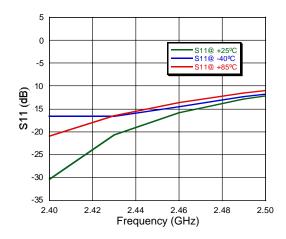
#### S21 vs. Frequency



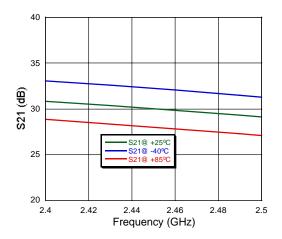
S22 vs. Frequency



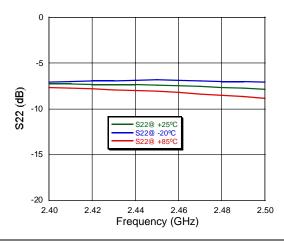
S11 vs. Frequency (2.4 GHz - 2.5 GHz)



S21 vs. Frequency (2.4 GHz - 2.5 GHz)



S22 vs. Frequency (2.4 GHz - 2.5 GHz)



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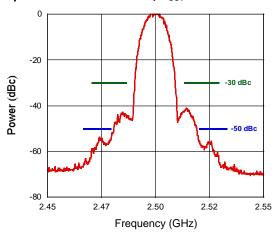


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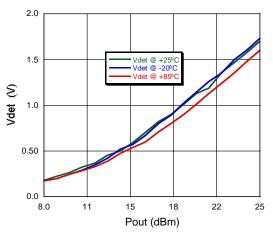
## **Linear Power Amplifier** 2.4 - 2.5 GHz, 802.11b/g

## Typical Performance Curves: $V_{CC} = 3.3 \text{ V}, V_{EN} = 3.0 \text{ V}$

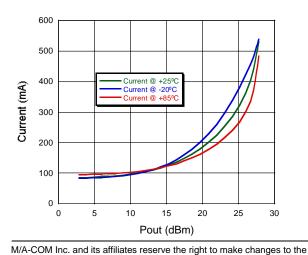
#### Spectral Mask for 802.11b, P<sub>OUT</sub> = 23 dBm



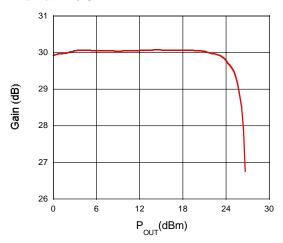
V<sub>DET</sub> vs. P<sub>OUT</sub> over Temperature at 2.45 GHz



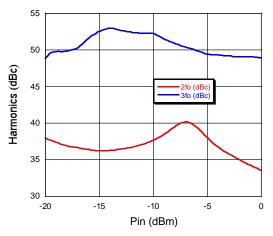
Current vs. POUT over Temperature at 2.45 GHz



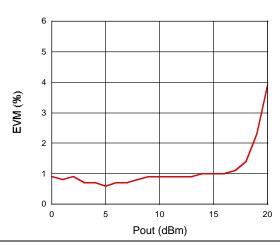
P1dB at 2.45 GHz



Harmonics vs. P<sub>IN</sub> at 2.45 GHz



EVM vs. P<sub>OUT</sub> , OFDM, QAM-64, 54 Mbps



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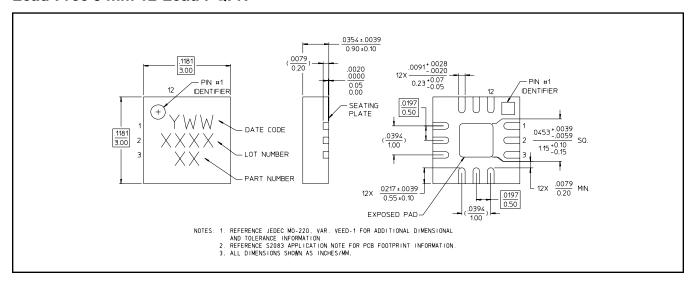




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### Lead-Free 3 mm 12-Lead PQFN<sup>†</sup>



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.

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