MAAPSS0075

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

Rev. V2

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_{OUT}
- 802.11g compliant to 19 dBm P_{OUT}
- 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

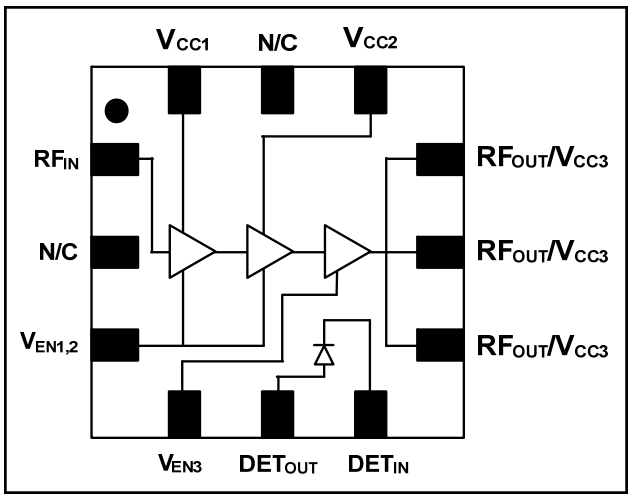
The MAAPSS0075 is a three stage power amplifier, designed for 2.4 GHz linear applications. This power amplifier is available in a lead free 3 mm 12-lead PQFN plastic package. The MAAPSS0075 also features an integrated power detector.

Ordering Information[1]

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_{IN}	RF Input
2	N/C	No Connect
3	$V_{EN1,2}$	Power Enable
4	V_{EN3}	Power Enable
5	DET_{OUT}	Detector Output
6	DET_{IN}	Detector Input
7	RF_{OUT} / V_{CC3}	RF Output, 3rd Stage Supply
8	RF_{OUT} / V_{CC3}	RF Output, 3rd Stage Supply
9	RF_{OUT} / V_{CC3}	RF Output, 3rd Stage Supply
10	V_{CC2}	2nd Stage Supply
11	N/C	No Connect
12	V_{CC1}	1st Stage Supply
Pad	Paddle[2]	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: F = 2.4 GHz, V_{CC} = 3.3 V, V_{EN} = 3.0 V, T_A = 25°C, Z_0 = 50 Ω

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

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	-40°C to +85°C
Channel Temperature	+150°C
Storage Temperature	-40°C to +150°C

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. 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_{CC} (3.3 V).
2. Apply V_{EN} (3.0 V).
3. Set Pin.
4. Turn off in reverse order with V_{CC} last.

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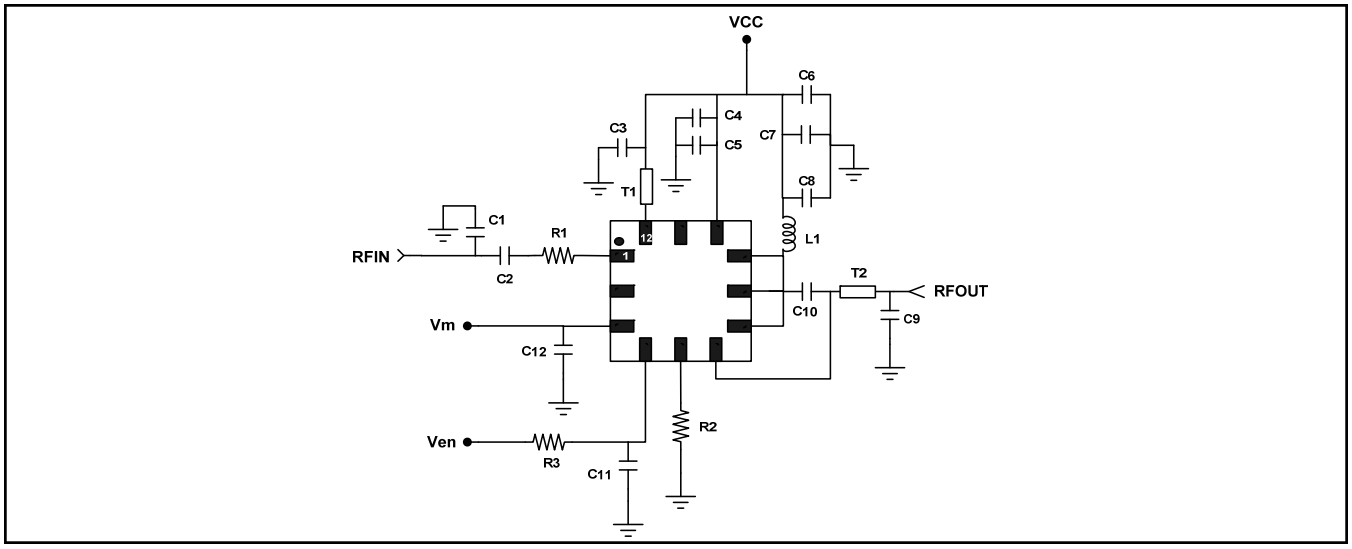
Evaluation Board Schematic

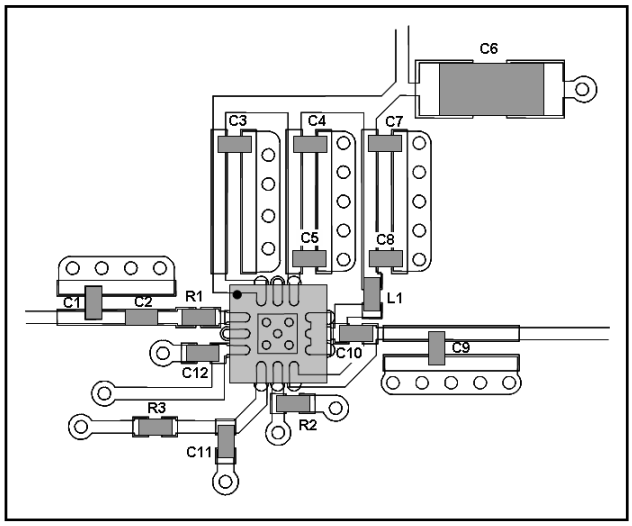


MAAPSS0075 External Parts List[5]

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

5. 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
* From package edge to center of component		

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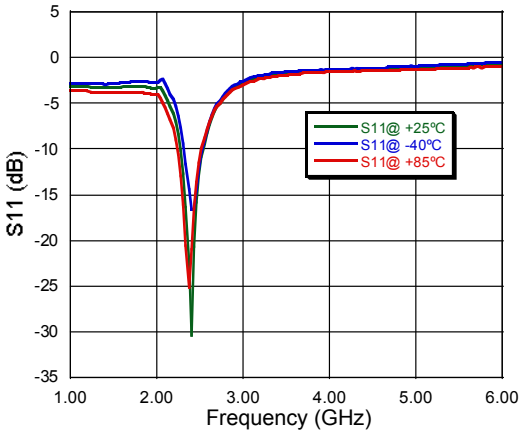
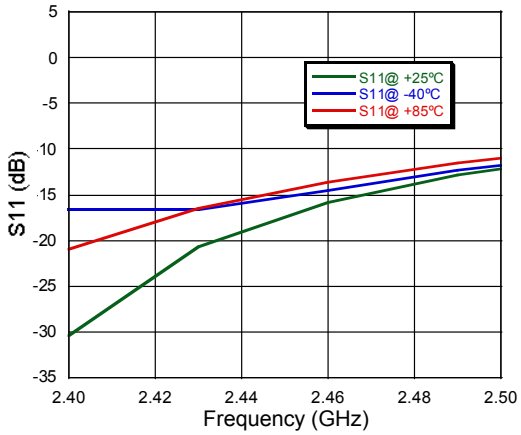
Typical Performance Curves: V_{CC} = 3.3 V, V_{EN} = 3.0 V, over Temperature

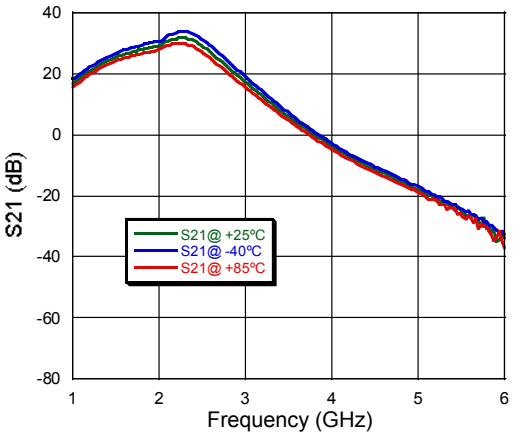
S11 vs. Frequency



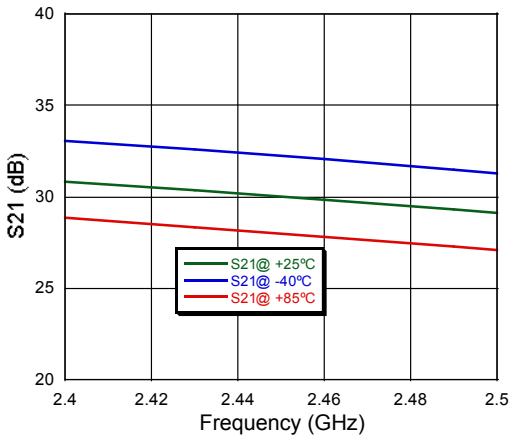
S11 vs. Frequency (2.4 GHz - 2.5 GHz)



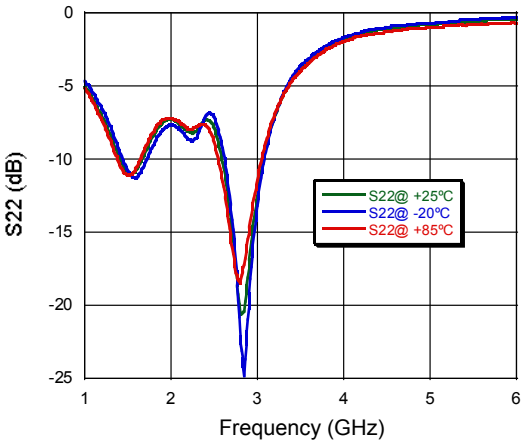
S21 vs. Frequency



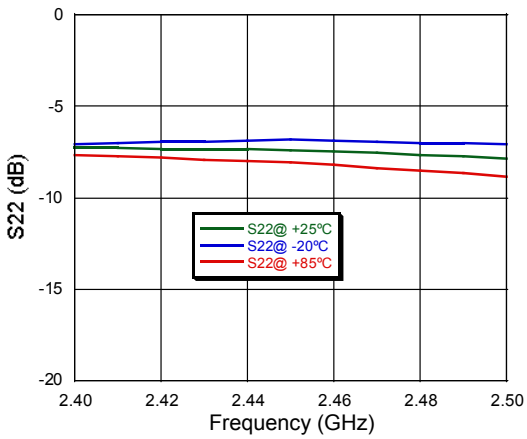
S21 vs. Frequency (2.4 GHz - 2.5 GHz)



S22 vs. Frequency



S22 vs. Frequency (2.4 GHz - 2.5 GHz)



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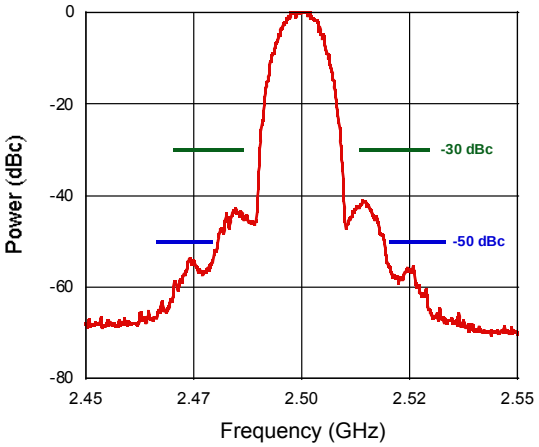
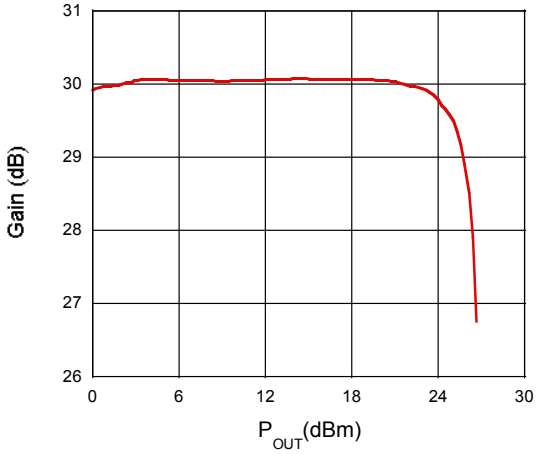
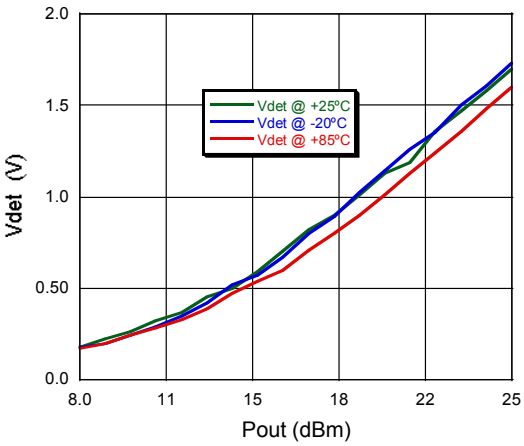
Spectral Mask for 802.11b, P_{OUT} = 23 dBm



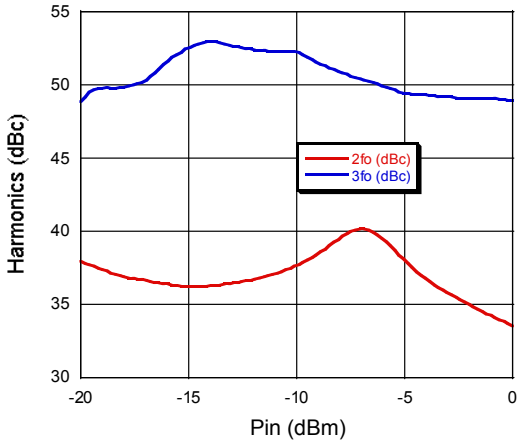
P1dB at 2.45 GHz



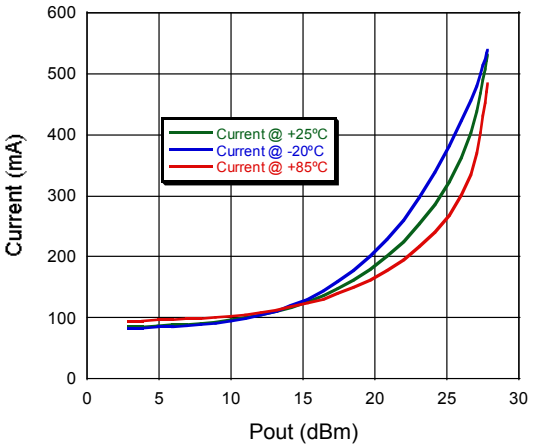
V_{DET} vs. P_{OUT} over Temperature at 2.45 GHz



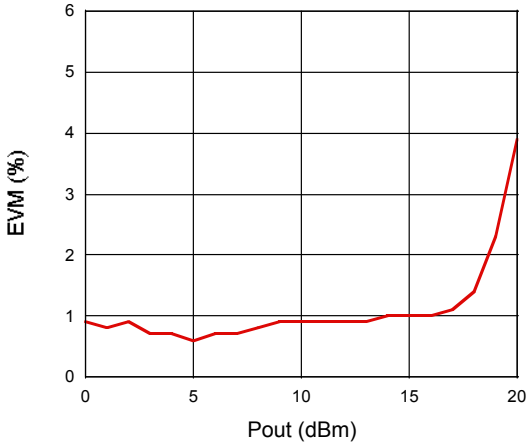
Harmonics vs. P_{IN} at 2.45 GHz



Current vs. POUT over Temperature at 2.45 GHz



EVM vs. P_{OUT} , OFDM, QAM-64, 54 Mbps



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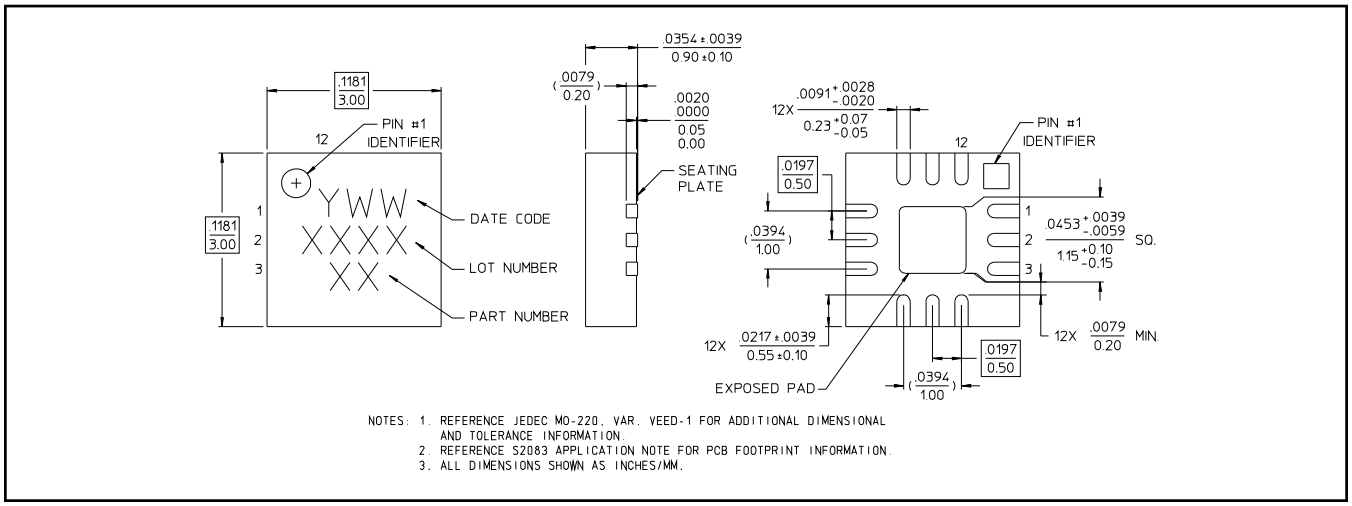
Lead-Free 3 mm 12-Lead PQFN†



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

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