

High Dynamic Range Amplifier 250 - 3800 MHz

**MAAMSS0070
V4**

Features

- Ideal for high linearity applications over a wide dynamic range
- Low Noise Figure
- High IP_3
- Single +5 V Supply Voltage
- Lead-Free SOT-89 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Re-flow Compatible

Description

M/A-COM's MAAMSS0070 broadband gain stage is a GaAs MMIC amplifier in a lead-free SOT-89 surface mount plastic package. It can be operated from a single 5 volt supply.

The MAAMSS0070 broadband design provides low noise figure and high IP_3 from 250 to 3800 MHz.

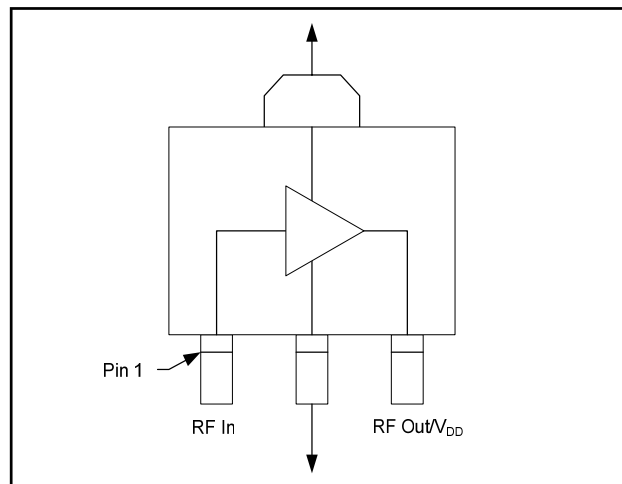
M/A-COM fabricates the MAAMSS0070 using a MESFET process to realize low noise and high dynamic range.

Ordering Information ¹

Part Number	Package
MAAMSS0070	Bulk Packaging
MAAMSS0070TR-1000	1000 piece reel
MAAMSS0070TR-3000	3000 piece reel
MAAM-000070-001SMB	2140 MHz Configuration
MAAM-000070-002SMB	900 MHz Configuration
MAAM-000070-003SMB	1900 MHz Configuration
MAAM-000070-004SMB	2400 MHz Configuration
MAAM-000070-005SMB	3500 MHz Configuration

1. Reference Application Note M513 for reel size information.

Functional Block Diagram



Pin Configuration

Pin No.	Pin Name	Description
1	RF In	RF Input
2	GND	Ground
3	RF Out/V _{DD}	RF Output & Voltage Bias

Maximum Operating Conditions ²

Parameter	Maximum Operating Conditions
Junction Temperature ³	150°C
RF Input Power	+10 dBm
Operating Temperature	-40°C to +85°C

2. Operating at or within these conditions will ensure MTTF > 1 x 10⁶ hours.

3. Typical thermal resistance (θ_{jc}) = 70°C/W.

Absolute Maximum Ratings ^{4,5}

Parameter	Absolute Maximum
RF Output Power	23 dBm
Voltage	6 volts
Storage Temperature	-65°C to +150°C
Junction Temperature	200°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.

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

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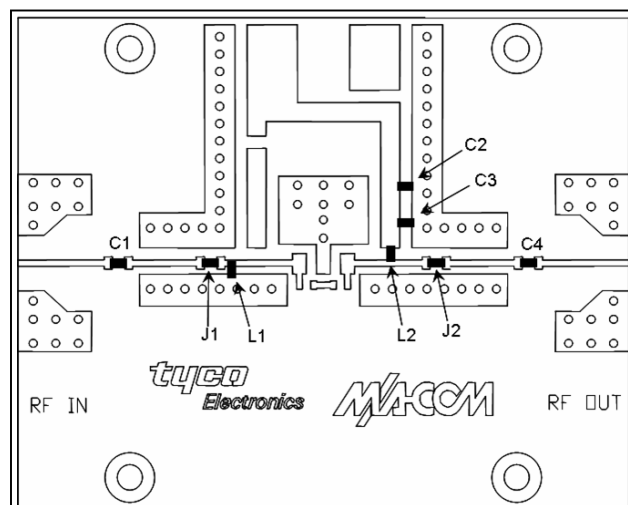
Electrical Specifications: $T_A = +25^\circ\text{C}$, $V_{CC} = +5\text{ V}$, $Z_0 = 50\ \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	900 MHz	dB	12.2	13.2	14.2
	1900 MHz	dB	11.7	12.7	13.7
	2140 MHz	dB	11.0	12.0	13.0
	2400 MHz	dB	10.7	11.7	12.7
	3500 MHz	dB	9.8	10.8	11.8
Output IP3	(+5 dBm / tone, 1 MHz spacing)				
	900 MHz	dBm	38.0	42.0	—
	1900 MHz	dBm	36.0	40.0	—
	2140 MHz	dBm	37.0	41.0	—
	2400 MHz	dBm	36.0	40.0	—
	3500 MHz	dBm	37.5	41.5	—
Noise Figure	900 MHz	dB	—	3.2	3.9
	1900 MHz	dB	—	3.2	3.9
	2140 MHz	dB	—	3.3	4.0
	2400 MHz	dB	—	3.4	4.1
	3500 MHz	dB	—	3.4	4.1
Current	-	mA	120	150	180

Typical Performance: $T_A = +25^\circ\text{C}$, $V_{CC} = +5\text{ V}$, $Z_0 = 50\ \Omega$

Parameter	Test Conditions	Units	900 MHz	1900 MHz	2140 MHz	2400 MHz	3500 MHz
Input Return Loss		dB	18.2	16.0	17.5	14.6	15.0
Output Return Loss		dB	10.5	10.0	12.0	10.3	8.0
Output P1dB		dB	21.5	21.0	22.0	21.0	21.8

2140 MHz PCB Layout



Parts List

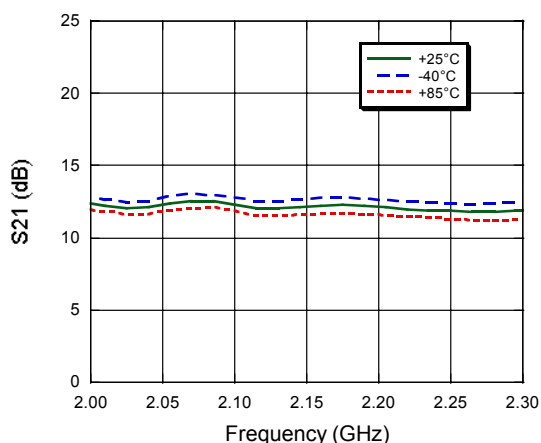
Part	Value	Case Style	Manufacturer
C1,C3	1000 pF	0402	Murata
C2	0.1 μF	0402	Murata
C4	100 pF	0402	Murata
L1	2.2 nH	0402	Coilcraft
L2	12 nH	0402	Toko
J1,J2	Jumper	0402	-

**High Dynamic Range Amplifier
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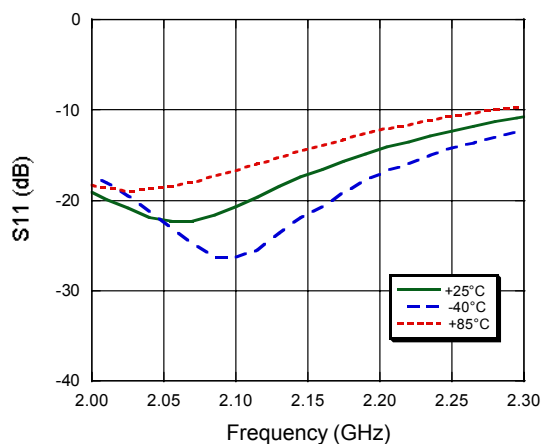
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Typical Performance Curves, 2140 MHz Configuration

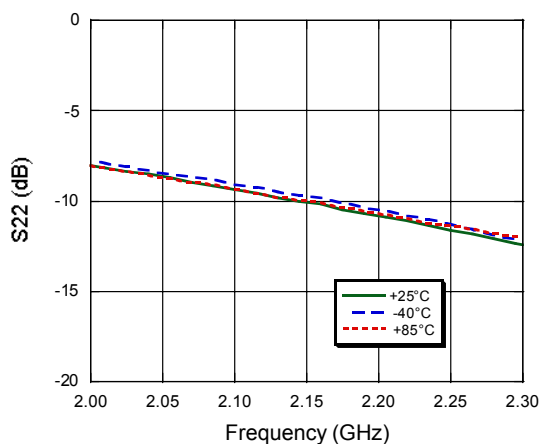
Gain



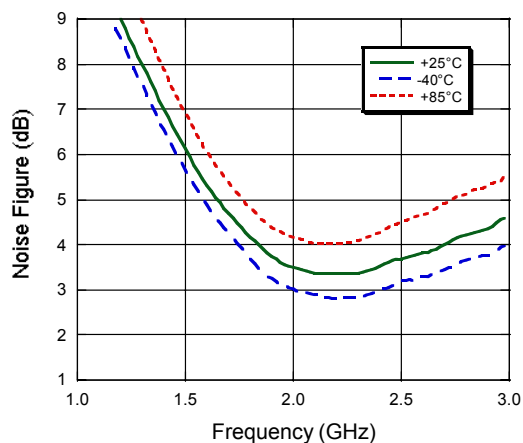
Input Return Loss



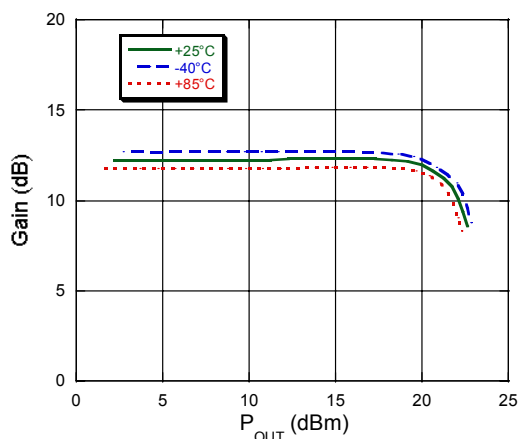
Output Return Loss



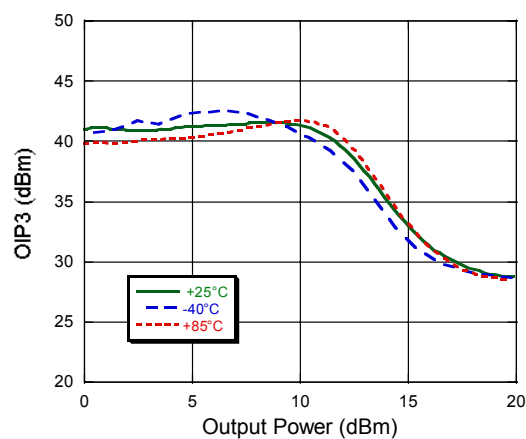
Noise Figure



P_{1dB} vs. P_{OUT} @ 2140 MHz



Output IP3

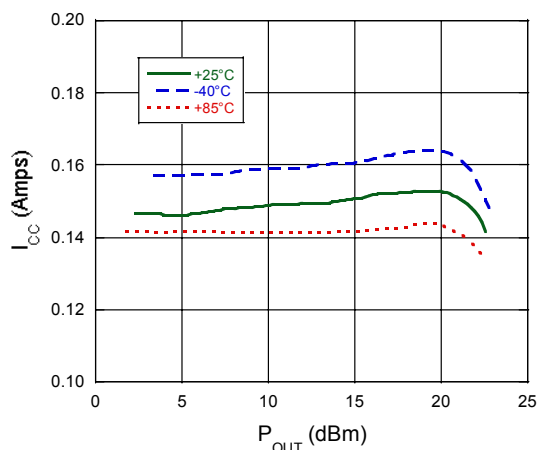


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Typical Performance Curves, 2140 MHz Configuration

I_{CC} vs. P_{OUT} @ 2140 MHz



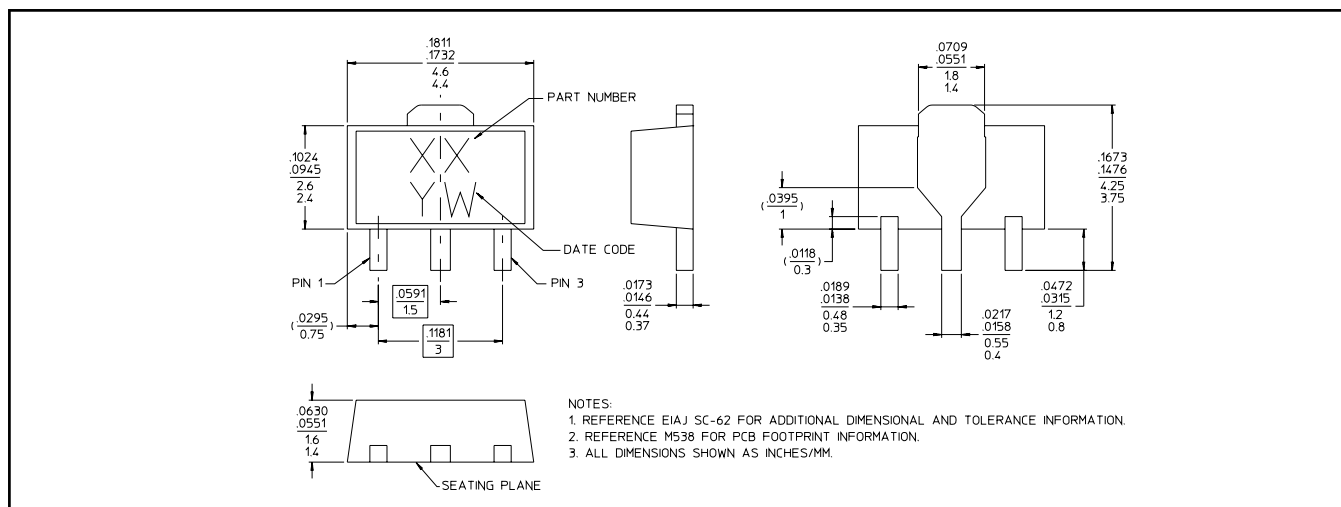
Handling Procedures

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.

Lead-Free SOT-89 Plastic Package†

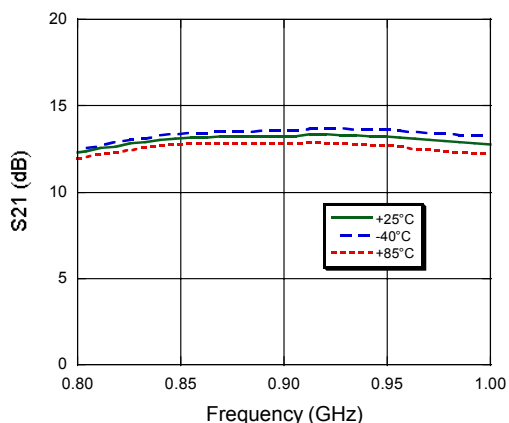


† Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

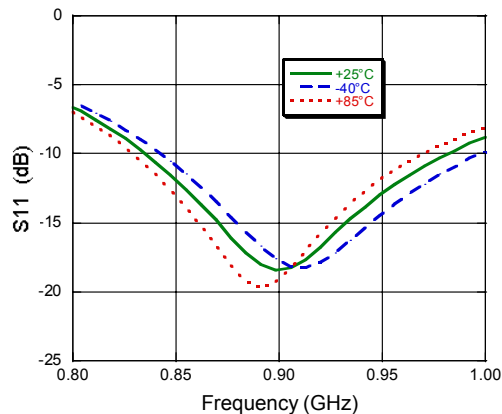
Applications Section

Typical Performance Curves, 900 MHz Configuration

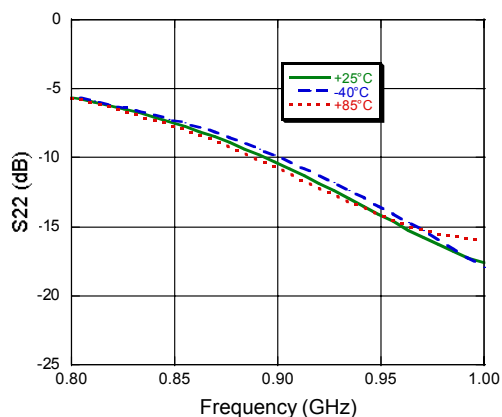
Gain



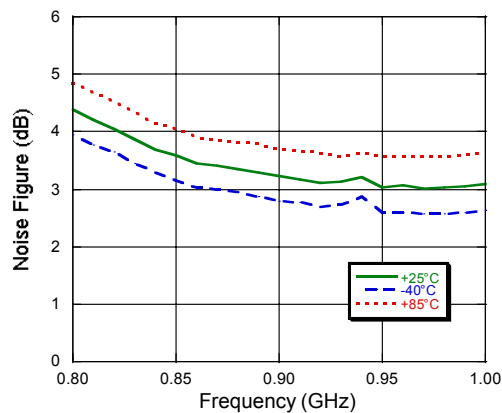
Input Return Loss



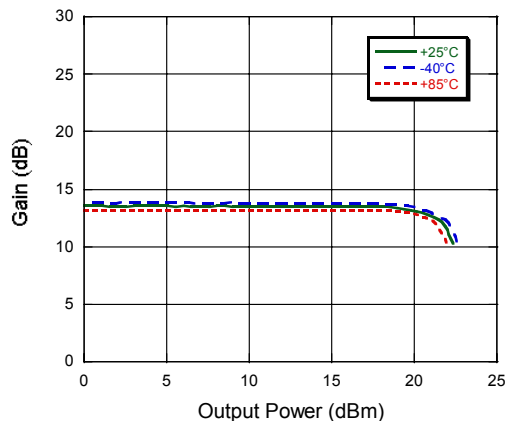
Output Return Loss



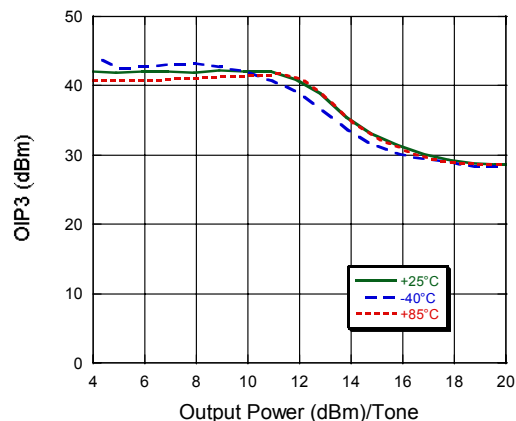
Noise Figure



P1dB



Output IP3

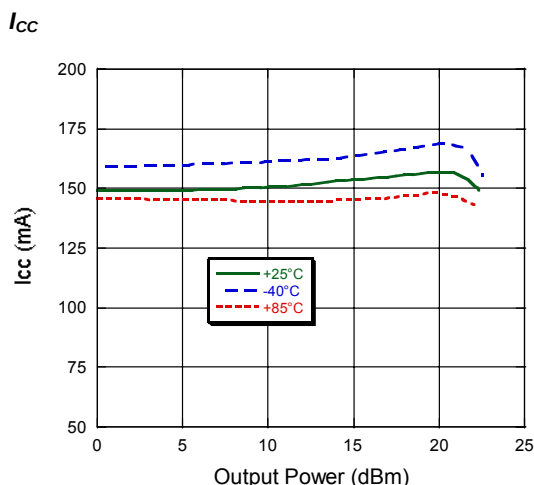


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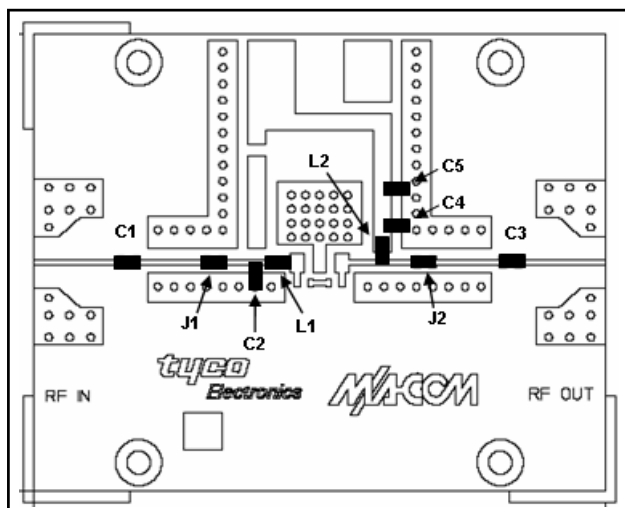
Typical Performance Curves, 900 MHz Configuration



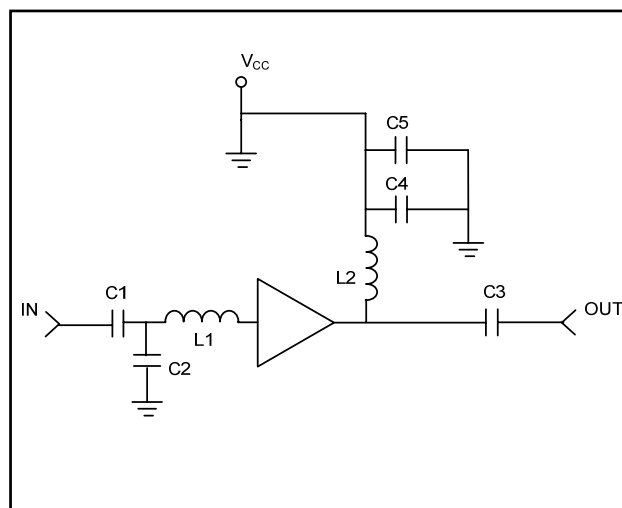
Parts List

Part	Value	Case Style	Manufacturer
C1, C3	1000 pF	0402	Murata
C2	1.8 pF	0402	Murata
C4	15 pF	0402	Murata
C5	0.1 μ F	0402	Murata
L1	8.2 nH	0402	Coilcraft
L2	100 nH	0603	Coilcraft
J1, J2	Jumper	0402	-

900 MHz PCB Layout



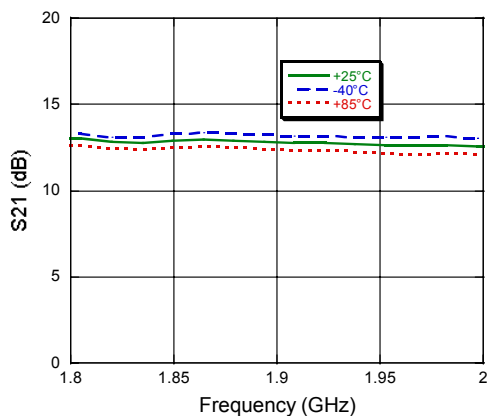
900 MHz Schematic



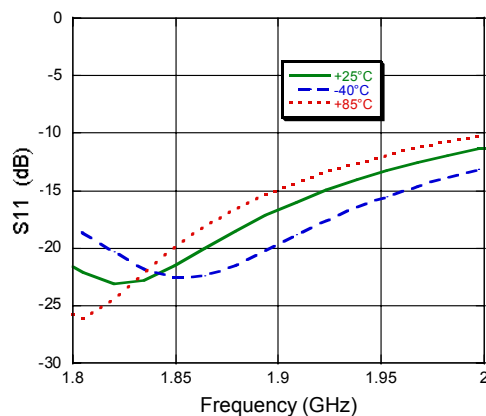
Applications Section

Typical Performance Curves, 1900 MHz Configuration

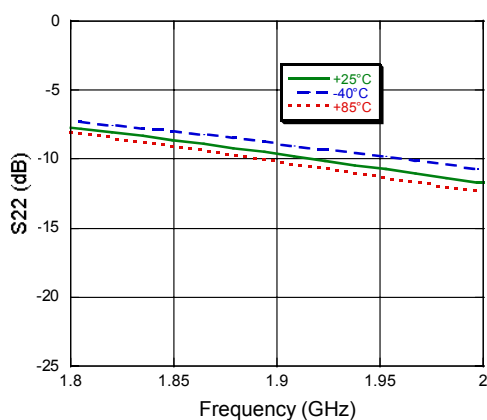
Gain



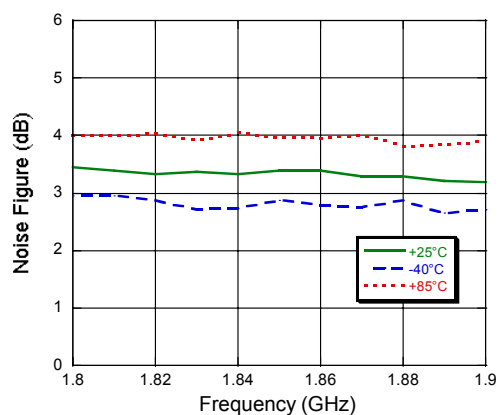
Input Return Loss



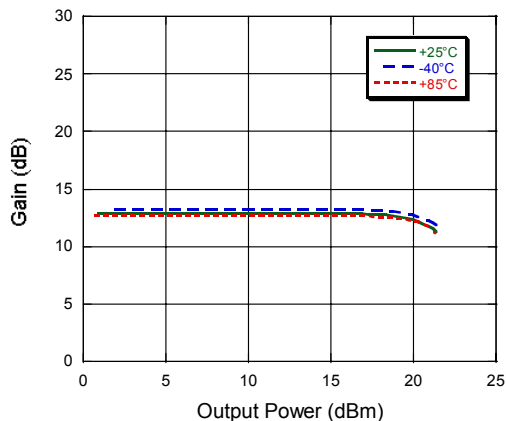
Output Return Loss



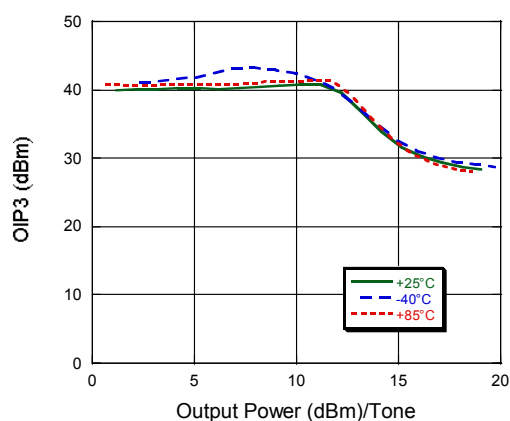
Noise Figure



P1dB



Output IP3



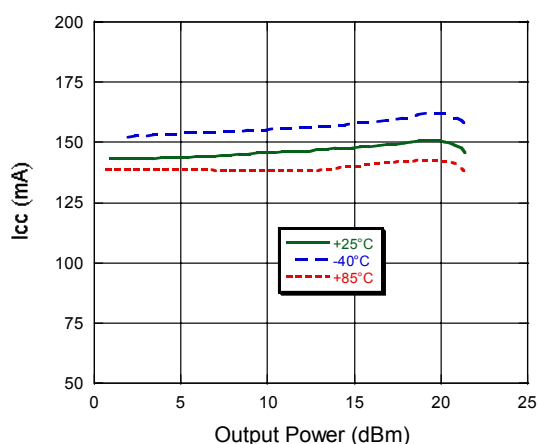
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Typical Performance Curves, 1900 MHz Configuration

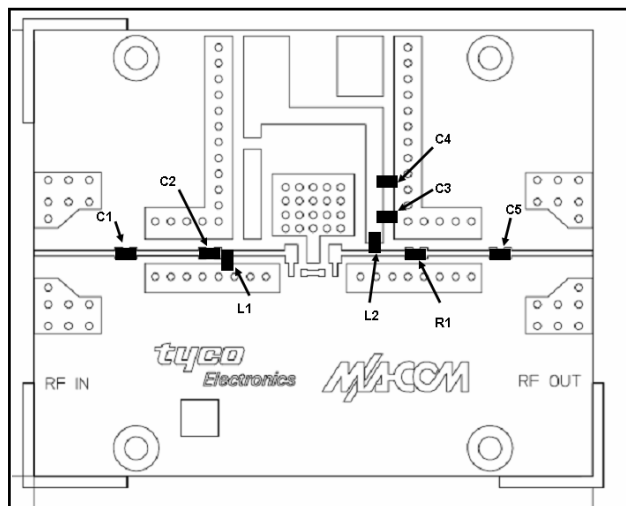
I_{CC}



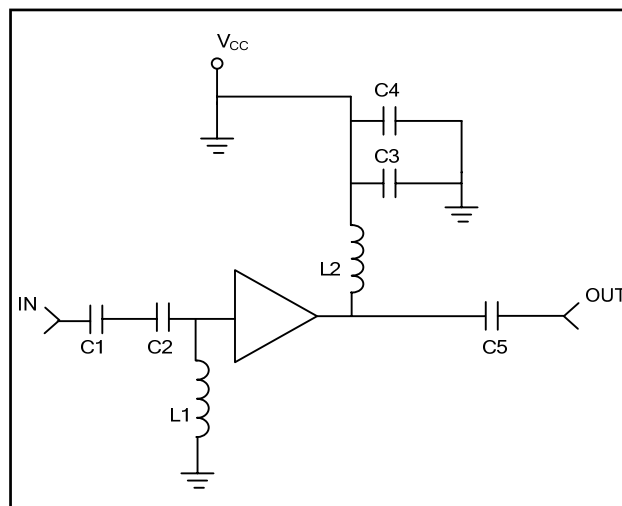
Parts List

Part	Value	Case Style	Manufacturer
C1, C3	1000 pF	0402	Murata
C2	2 pF	0402	Murata
C4	0.1 pF	0402	Murata
C5	100 pF	0402	Murata
L1	2 nH	0402	Coilcraft
L2	12 nH	0603	Toko
R1	0 0HM	0402	Panasonic

1900 MHz PCB Layout



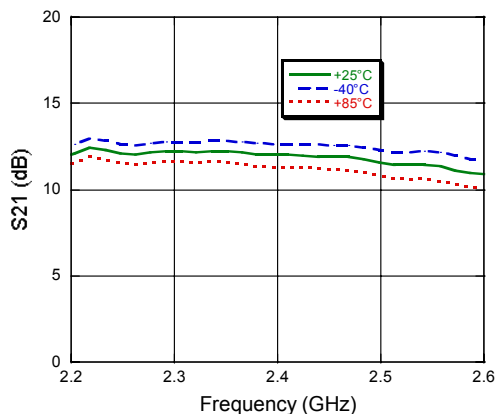
1900 MHz Schematic



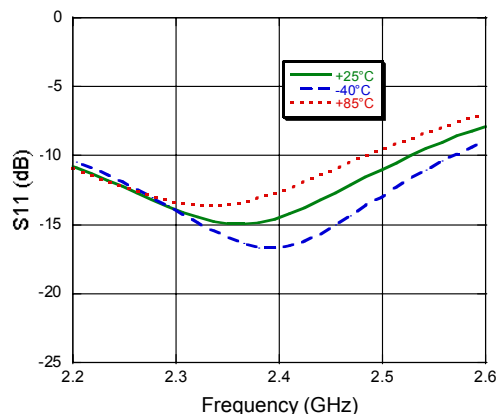
Applications Section

Typical Performance Curves, 2400 MHz Configuration

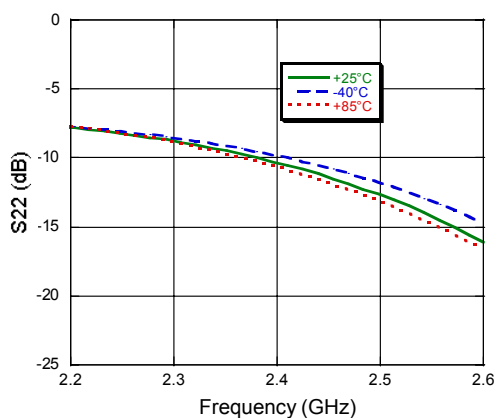
Gain



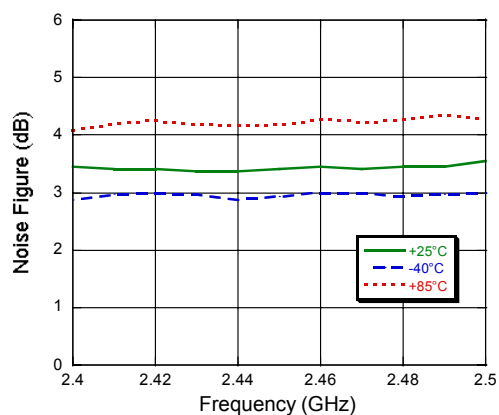
Input Return Loss



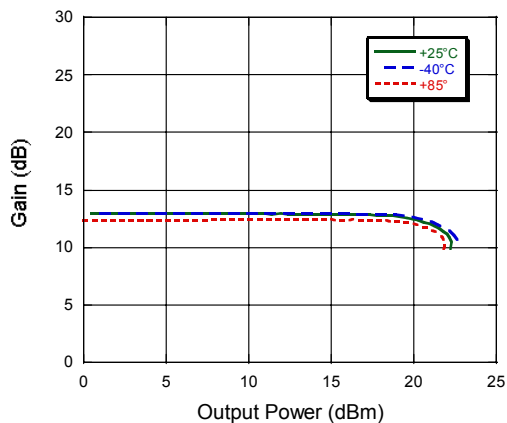
Output Return Loss



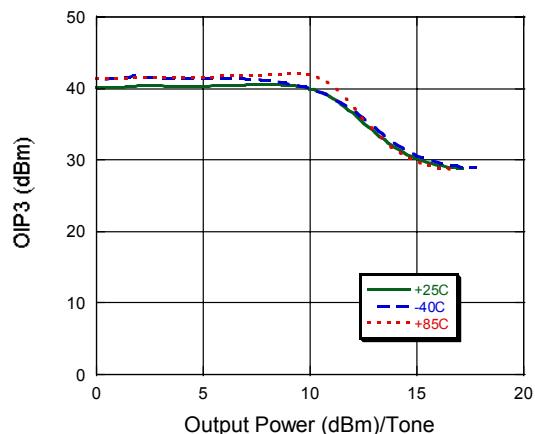
Noise Figure



P1dB

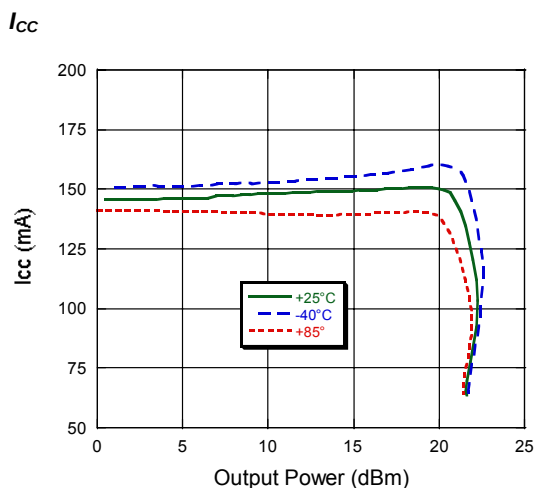


Output IP3



Applications Section

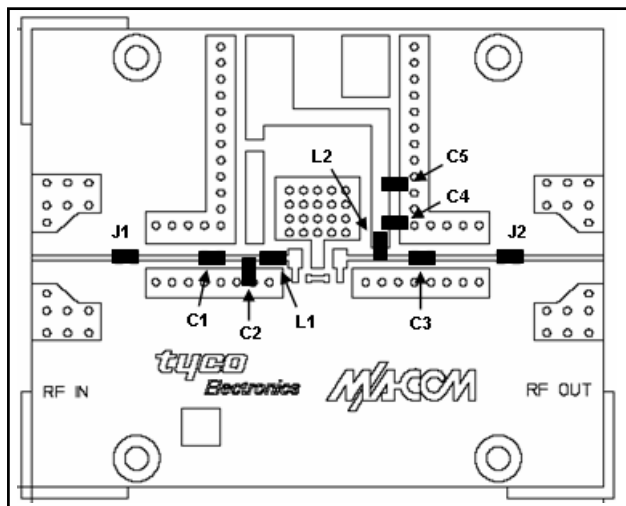
Typical Performance Curves, 2400 MHz Configuration



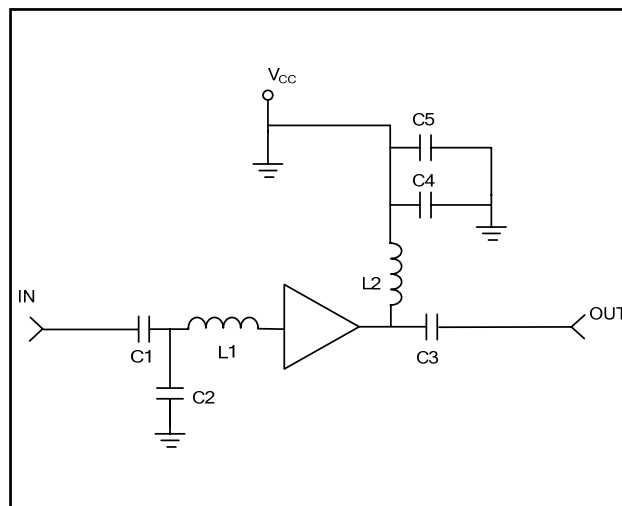
Parts List

Part	Value	Case Style	Manufacturer
C1, C3	39 pF	0402	Murata
C2	1.8 pF	0402	Murata
C4	1000 pF	0402	Murata
C5	0.1 μ F	0402	Murata
L1	3.3 nH	0402	Coilcraft
L2	12 nH	0402	Coilcraft
J1, J2	Jumper	0402	-

2400 MHz PCB Layout



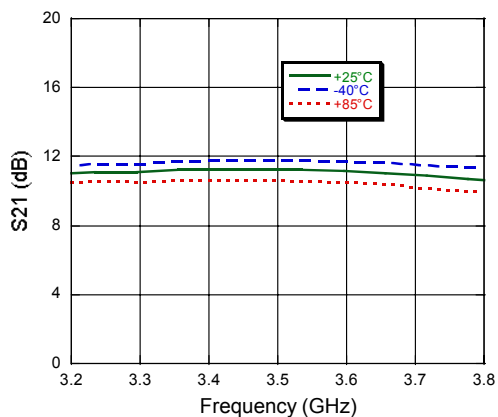
2400 MHz Schematic



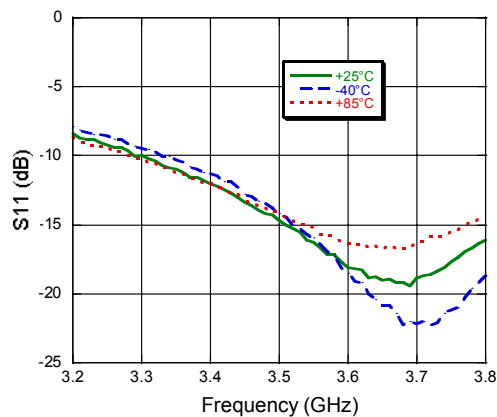
Applications Section

Typical Performance Curves, 3500 MHz Configuration

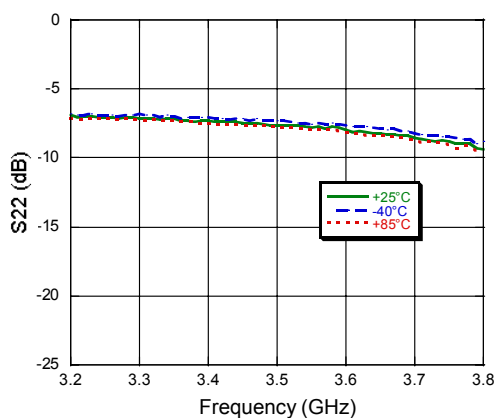
Gain



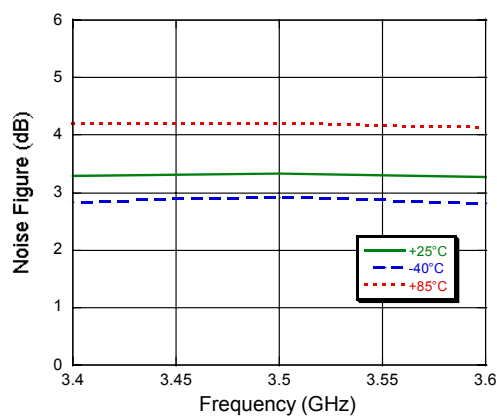
Input Return Loss



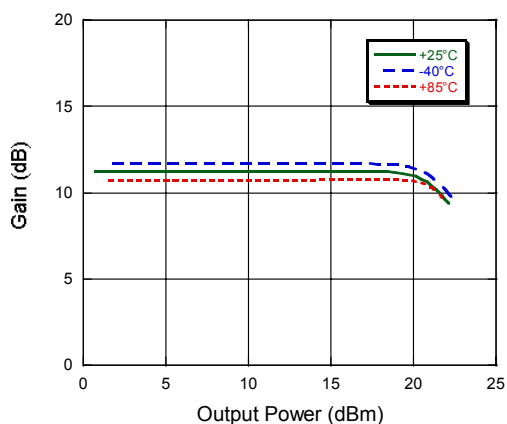
Output Return Loss



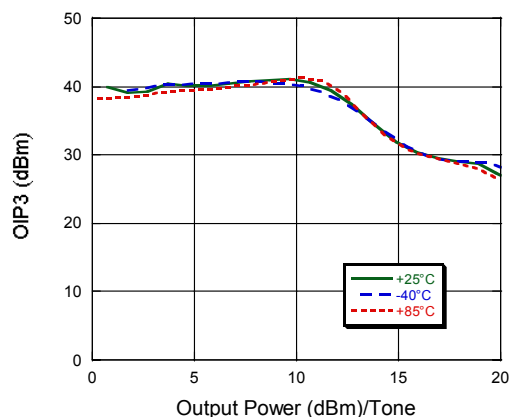
Noise Figure



P1dB



Output IP3

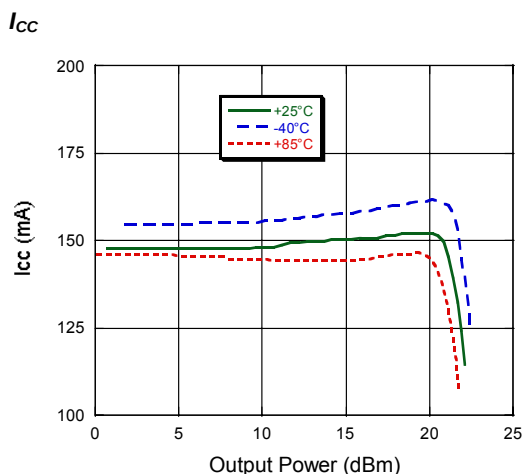


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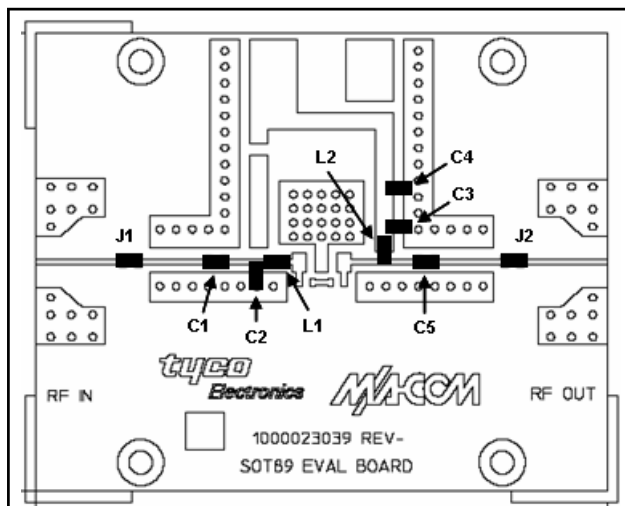
Typical Performance Curves, 3500 MHz Configuration



Parts List

Part	Value	Case Style	Manufacturer
C1, C5	39 pF	0402	Murata
C2	1.2 pF	0402	Murata
C3	1000 pF	0402	Murata
C4	0.10 μ F	0402	Murata
L1	1 nH	0402	Coilcraft
L2	12 nH	0402	Coilcraft
J1, J2	Jumper	0402	-

3500 MHz PCB Layout



3500 MHz Schematic

