

Features

- Output Intercept Point of +40 dBm over a 20 dB Input Power Range
- Broadband Operation
- Excellent ACPR performance
- Lead-Free SOT-89 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

M/A-COM’s MAAMSS0048 RF driver amplifier is a GaAs MMIC which exhibits exceptional linearity performance over a dynamic range greater than 20 dB, as well as high gain in a lead-free miniature SOT-89 surface mount plastic package. The device runs off a single +5 volt supply and draws 160 mA typically.

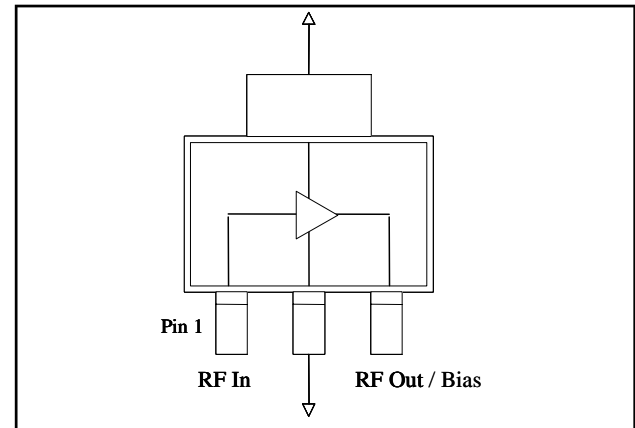
The MAAMSS0048 is fabricated using an HBT process to realize low current and high linearity. The process features full passivation for increased performance and reliability.

Ordering Information^{1,2}

Part Number	Package
MAAMSS0048	Bulk Packaging
MAAMSS0048TR-3000	3000 piece reel
MAAMSS0048SMB-01	Sample Board 900 MHz Tuning
MAAMSS0048SMB-02	Sample Board 1900 MHz Tuning
MAAMSS0048SMB-03	Sample Board 2140 MHz Tuning
MAAMSS0048SMB-05	Sample Board 3500 MHz Tuning

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

Functional Schematic



Pin Configuration

Pin No.	Function	Pin No.	Function
1	RF Input	3	RF Output/Bias
2	Ground		

Maximum Operating Conditions³

Parameter	Maximum Operating Conditions
Junction Temperature ⁴	160°C
RF Output Power	27 dBm
Operating Temperature	-40°C to +85°C

3. These operating conditions will ensure MTTF > 1 x 10⁶ hours.
4. Junction Temperature (T_J) = $T_A + \theta_{jc} * ((V * I) - (P_{OUT} - P_{IN}))$
Typical thermal resistance (θ_{jc}) = 65° C/W.
a) For $T_A = 25^\circ\text{C}$,
 $T_J = 74^\circ\text{C}$ @ 5 V, 175 mA, $P_{OUT} = 21$ dBm, $P_{IN} = 5$ dBm
b) For $T_A = 85^\circ\text{C}$,
 $T_J = 129^\circ\text{C}$ @ 5 V, 160 mA, $P_{OUT} = 21$ dBm, $P_{IN} = 6$ dBm

Absolute Maximum Ratings^{5,6}

Parameter	Absolute Maximum
RF Output Power	28 dBm
Voltage	6 volts
Storage Temperature	-65°C to +150°C
Junction Temperature	200°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. 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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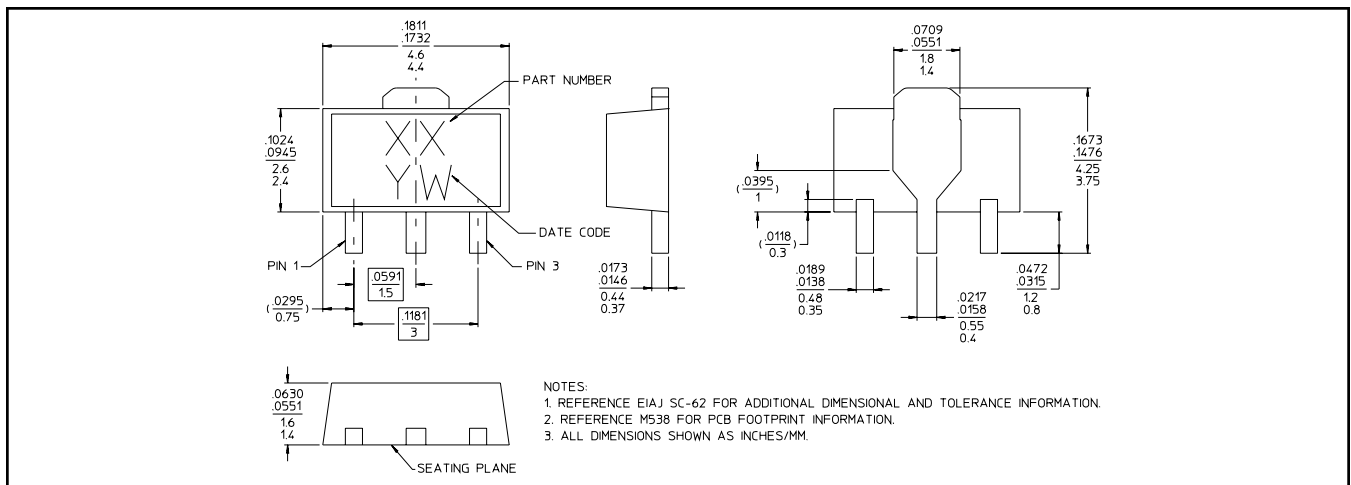
Electrical Specifications: $T_A = +25^\circ\text{C}$, $V_{CC} = +5\text{ V}$, $Z_0 = 50\ \Omega$

Parameter	Test Frequency	Units	Min.	Typ.	Max.
Gain	900 MHz	dB	19.5	21.0	22.5
	1900 MHz	dB	14.5	16.0	17.5
	2140 MHz	dB	14.0	15.5	17.0
	3500 MHz	dB	10.0	12.5	14.0
Output IP3 (+18 dBm / tone, 1 MHz spacing)	900 MHz	dBm	38.0	40.0	—
	1900 MHz	dBm	38.0	40.0	—
	2140 MHz	dBm	38.0	40.0	—
	3500 MHz	dBm	34.0	37.0	—
Noise Figure	900 MHz	dB	—	4.5	5.7
	1900 MHz	dB	—	3.3	4.5
	2140 MHz	dB	—	3.5	4.7
	3500 MHz	dB	—	3.2	5.0
Current @ +21 dBm Output	2140 MHz	mA	125	175	225

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

Parameter	Units	900 MHz	1900 MHz	2140 MHz	3500 MHz
Input Return Loss	dB	15	15	10	18
Output Return Loss	dB	15	10	12	20
Output P1dB	dB	27	27	27	27
Channel Power -45 dBc ACPR, IS-95 9 channels fwd -45 dBc ACPR, 3GPP WCDMA	dBm	20	19	—	—
	dBm	—	—	18	—
Quiescent Current	mA	160	160	160	160

Lead-Free SOT-89 Plastic Package[†]



[†] Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

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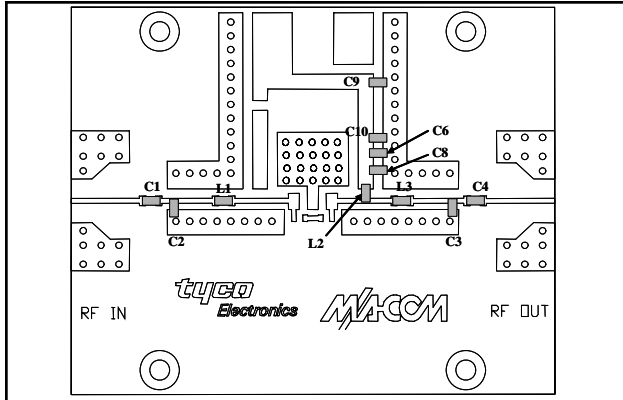
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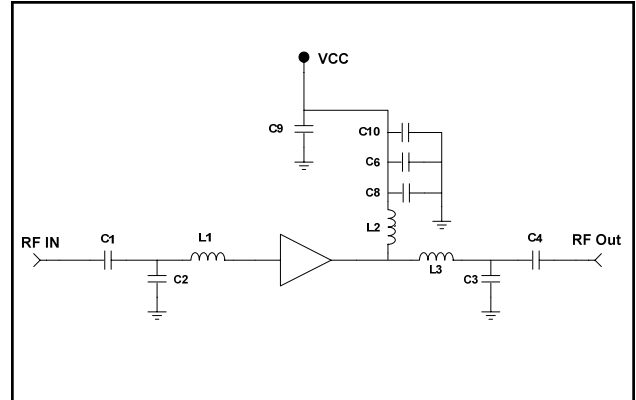
RF Driver Amplifier
250 - 4000 MHz

M/A-COM Products
Rev. V5

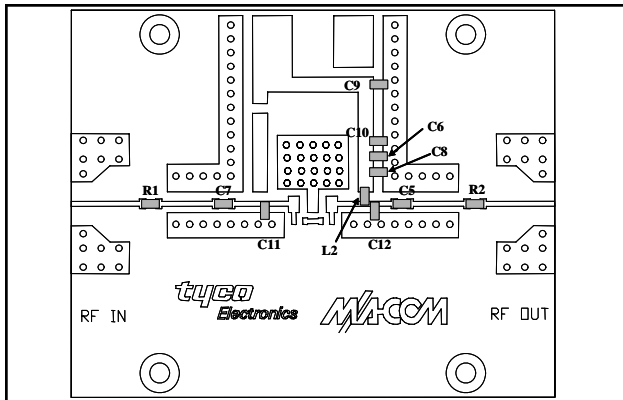
900 MHz PCB Layout



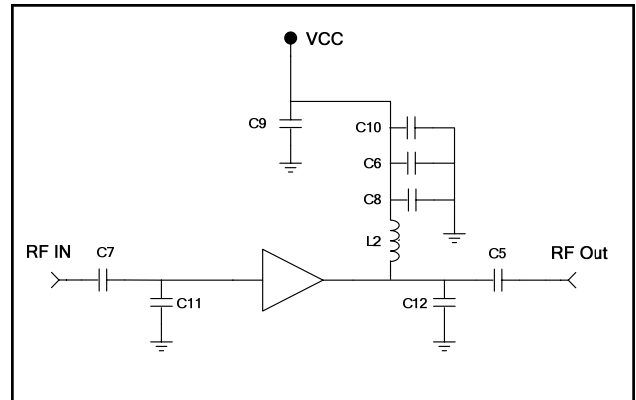
900 MHz Schematic



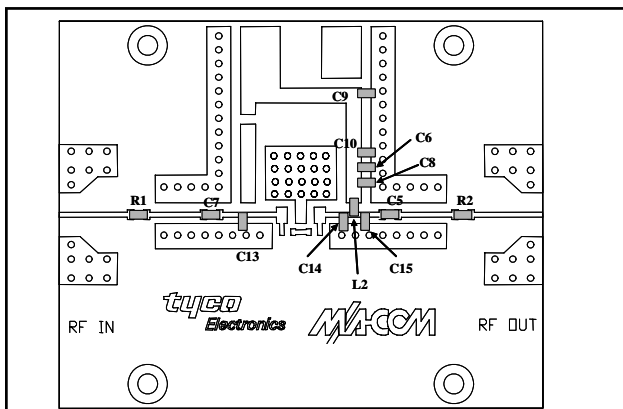
1900 MHz PCB Layout



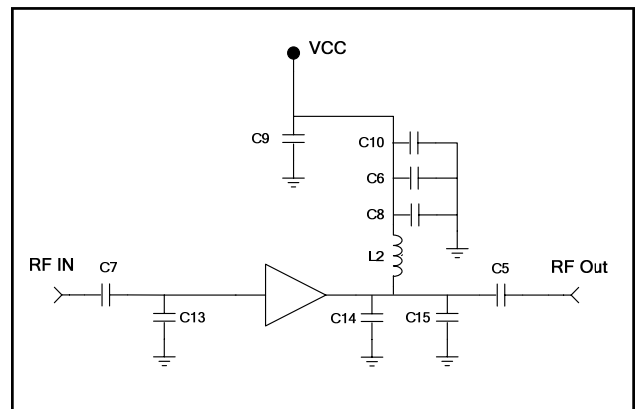
1900 MHz Schematic



2140 MHz PCB Layout



2140 MHz Schematic



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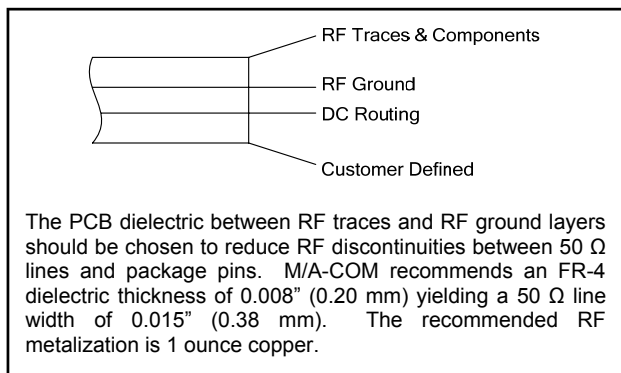
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Parts List

Part	Value	Used on Freq. Band	Case Style	Manufacturer	Purpose
C1, C4	1000 pF	300, 900	0402	Murata	DC Block
C6	1000 pF	All	0402	Murata	DC Block / Bypass
C2	6 pF	900	0402	Murata	Input Tuning
C3	4.7 pF	900	0402	Murata	Output Tuning
C5	39 pF	1900, 2140	0402	Murata	Output Tuning & DC Block
C7	12 pF	1900, 2141	0402	Murata	Input Tuning & DC Block
C8	15 pF	All	0402	Murata	Bypass
C16, C17	15 pF	300	0402	Murata	Input & Output Tuning
C9, C10	0.1 uF	All	0402	Murata	Bypass
C11	3 pF	1900	0402	Murata	Input Tuning
C12	2.7 pF	1900	0402	Murata	Output Tuning
C13	2 pF	2140	0402	Murata	Input Tuning
C14	2.2 pF	2140	0402	Murata	Output Tuning
C15	0.5 pF	2140	0402	Murata	Output Tuning
C18	1.5 pF	2400, 2700	0402	Murata	Output Tuning
C19	1.0 pF	3500	0402	Murata	Input Tuning
C20, C21	0.8 pF	2700, 3500, 3700	0603	Murata	Input Tuning
L1	3.3 nH	900	0402	Coilcraft	Input Tuning
L2	7.5 nH	900, 1900, 2140, 2400, 2700, 3500, 3700	0402	Coilcraft	Bias Injection
L3	1 nH	900	0402	Coilcraft	Output Tuning
L4	22 nH	300	0402	Coilcraft	Bias Injection
L5	33 nH	300	0402	Coilcraft	Input Tuning
L6	9 nH	300	0402	Coilcraft	Output Tuning
R1, R2	0 Ω	1900, 2140	0402	Panasonic	Jumper

Cross Section View



Handling Procedures

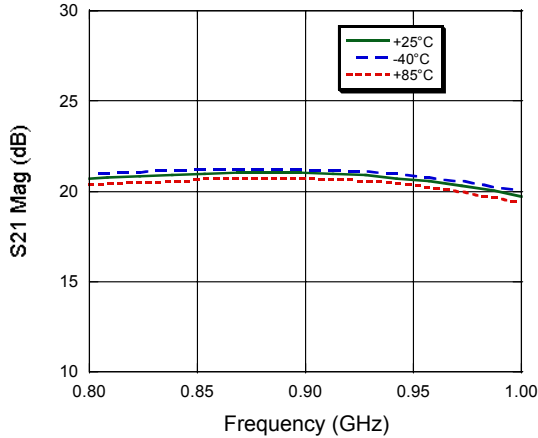
Please observe the following precautions to avoid damage:

Static Sensitivity

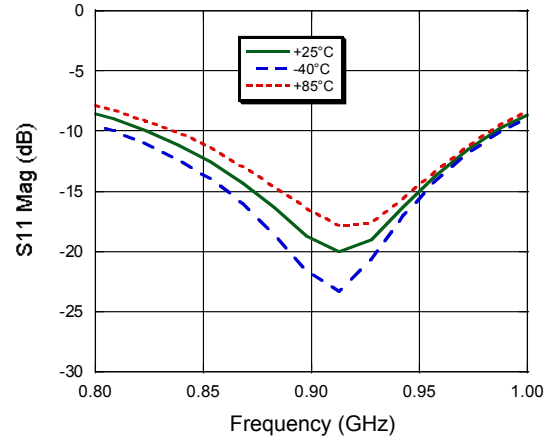
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these class zero devices.

Typical Performance Curves, 900 MHz Configuration

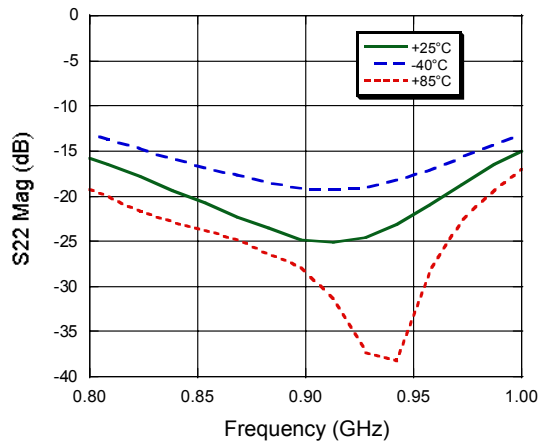
Gain



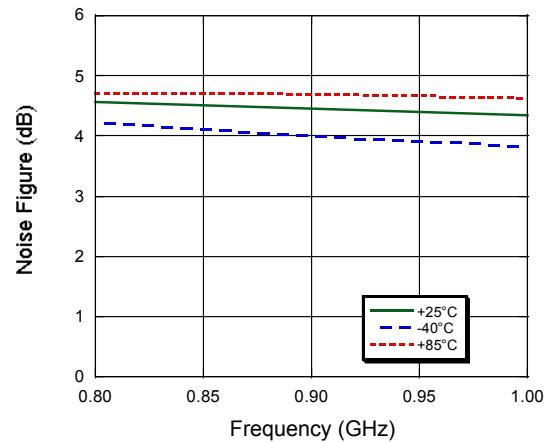
Input Return Loss



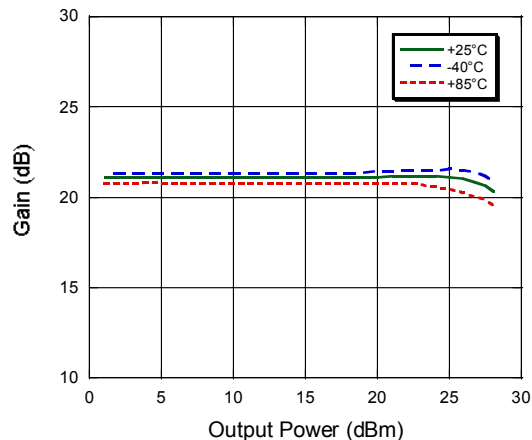
Output Return Loss



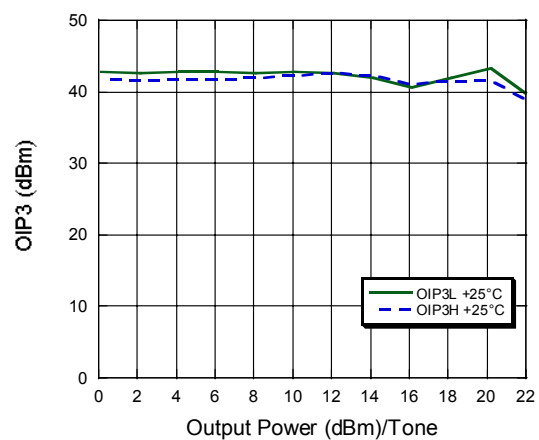
Noise Figure



P1dB



Output IP3



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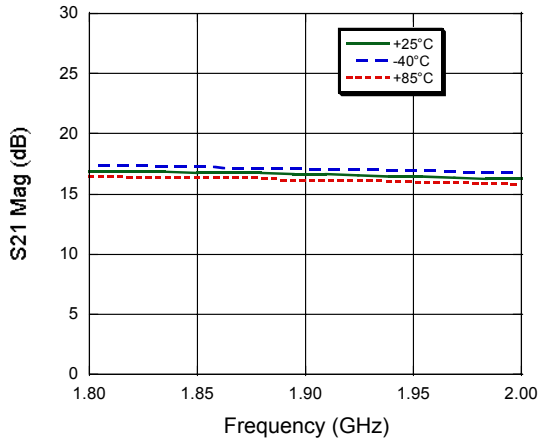
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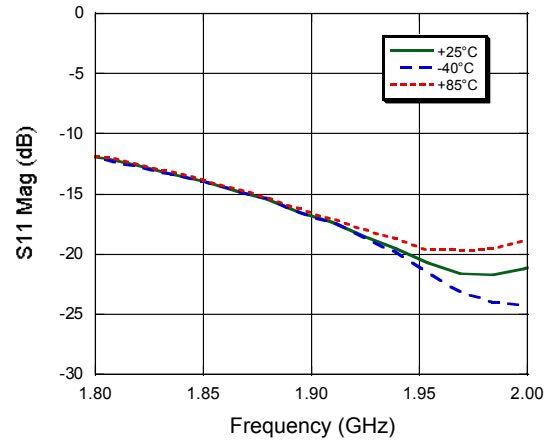
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Typical Performance Curves, 1900 MHz Configuration

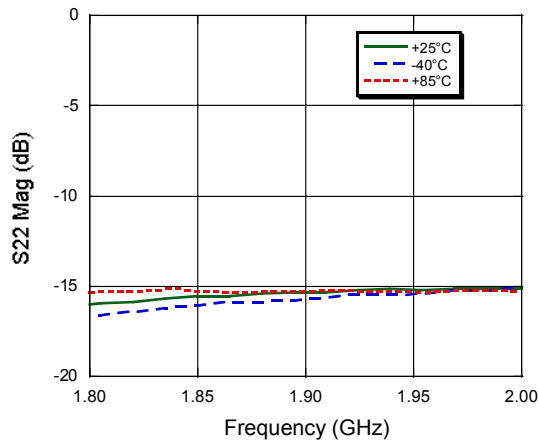
Gain



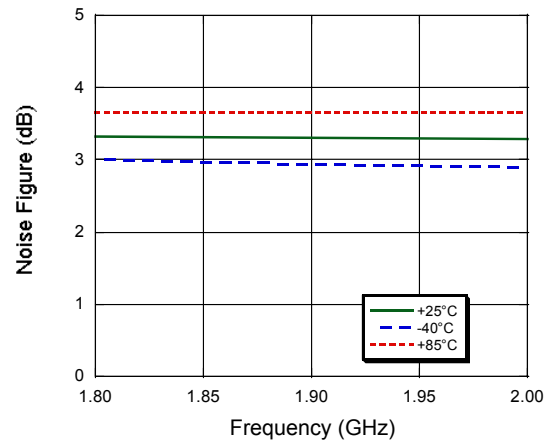
Input Return Loss



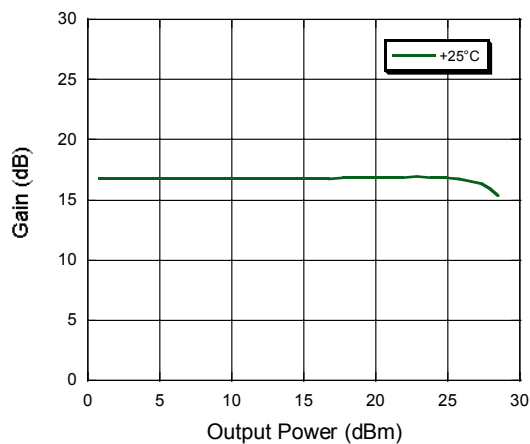
Output Return Loss



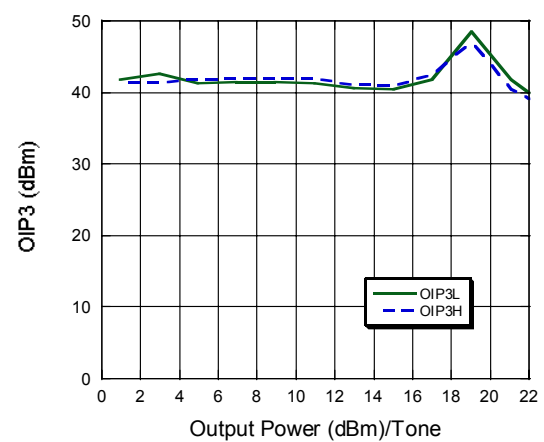
Noise Figure



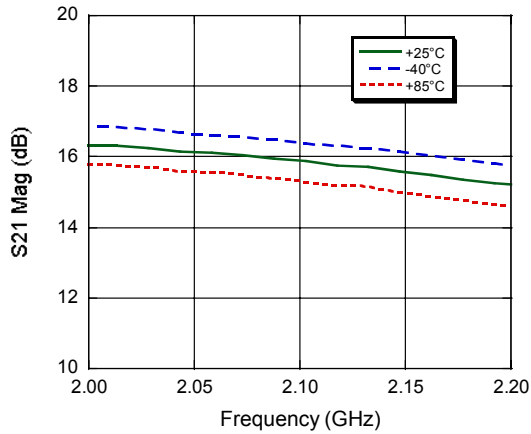
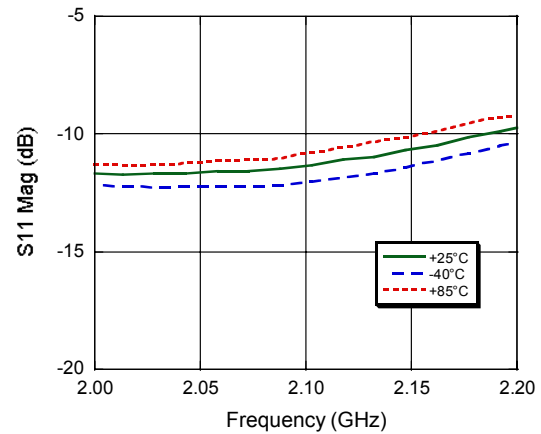
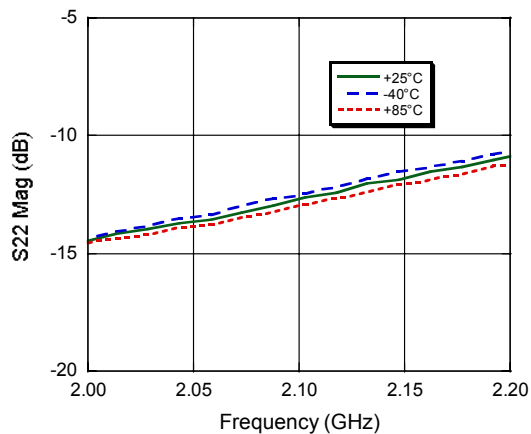
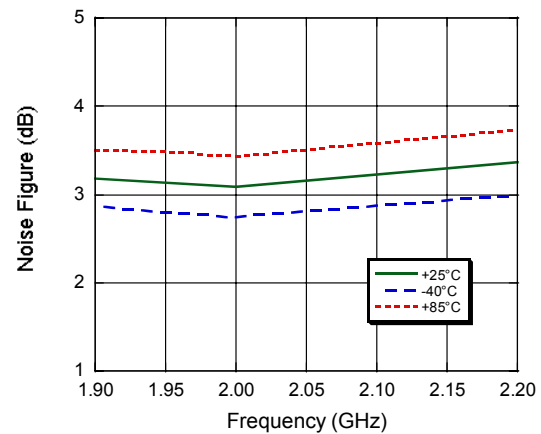
P1dB



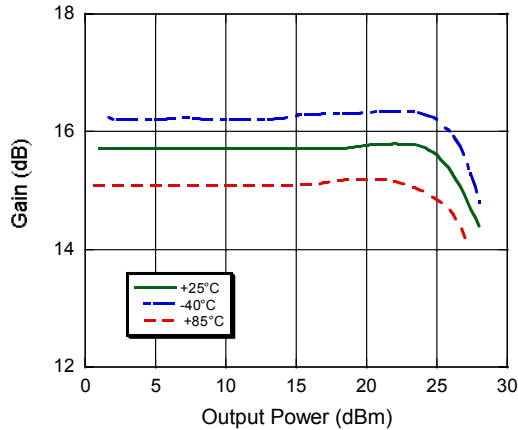
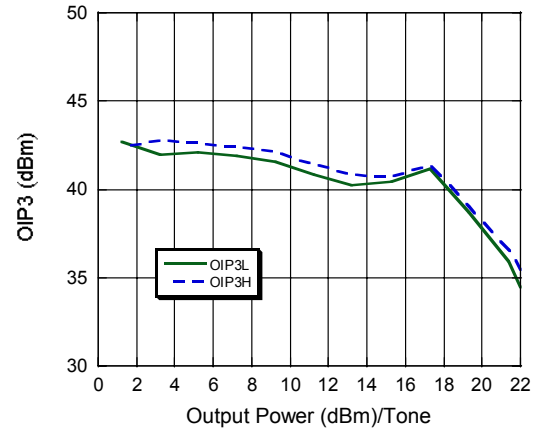
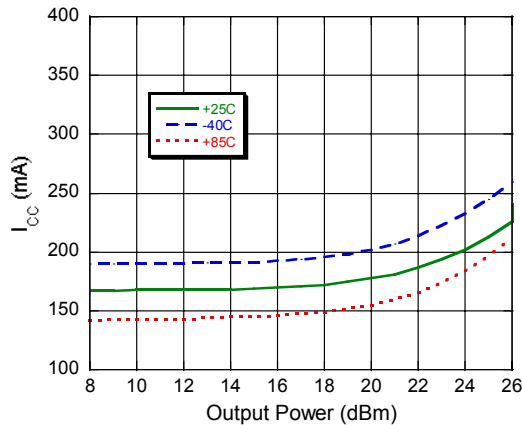
Output IP3



Typical Performance Curves, 2140 MHz Configuration

Gain

Input Return Loss

Output Return Loss

Noise Figure


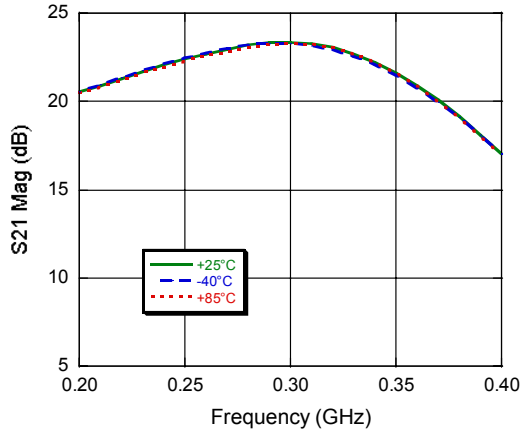
Typical Performance Curves, 2140 MHz Configuration

P1dB

Output IP3

Current


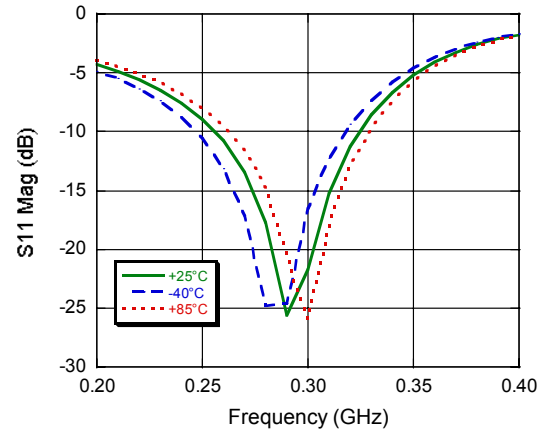
Applications Section

Typical Performance Curves, 300 MHz Configuration

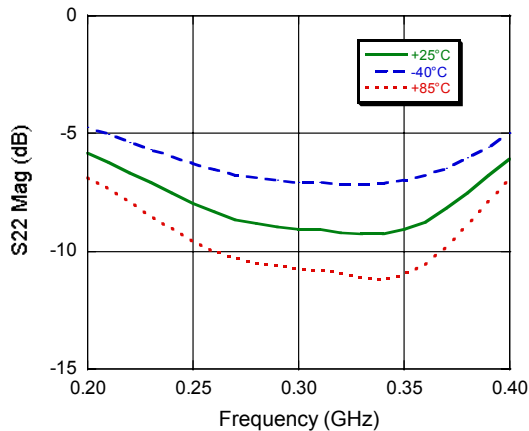
Gain



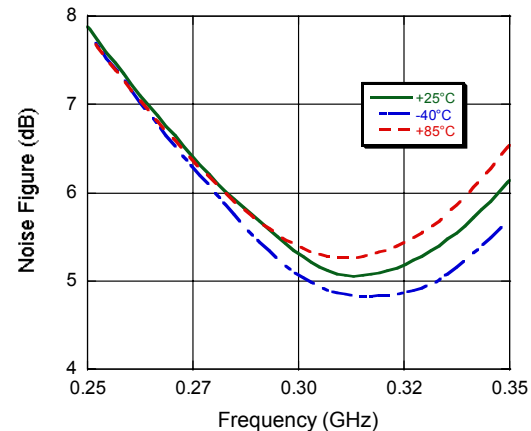
Input Return Loss



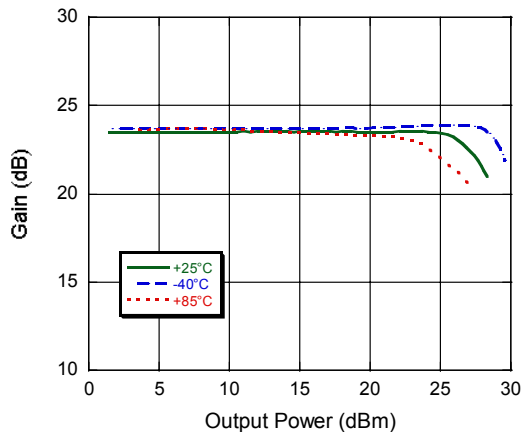
Output Return Loss



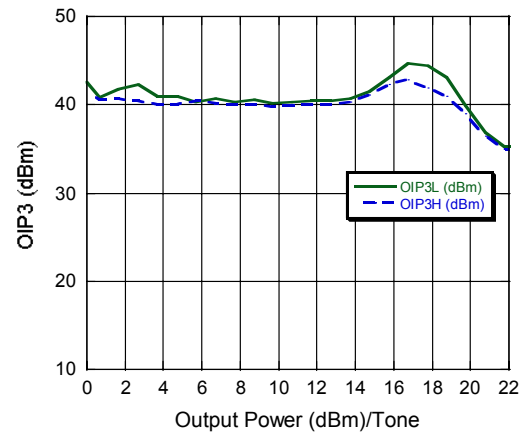
Noise Figure



P1dB



Output IP3



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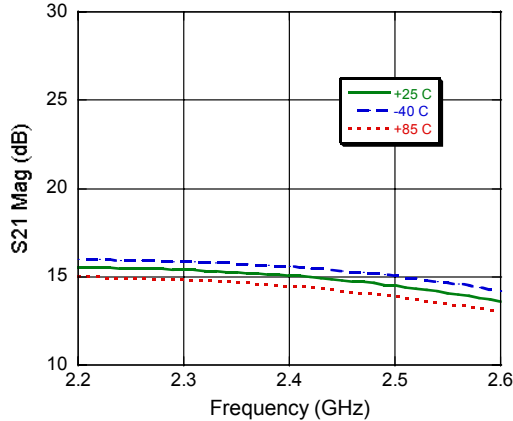
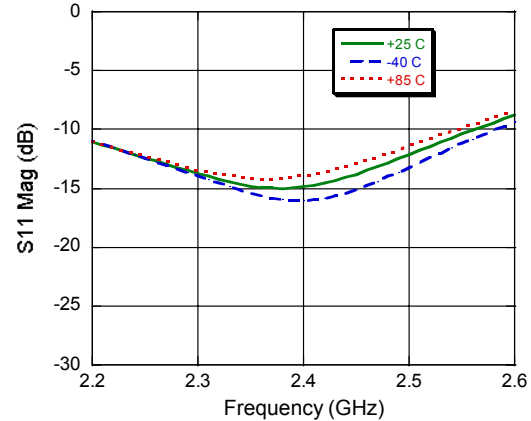
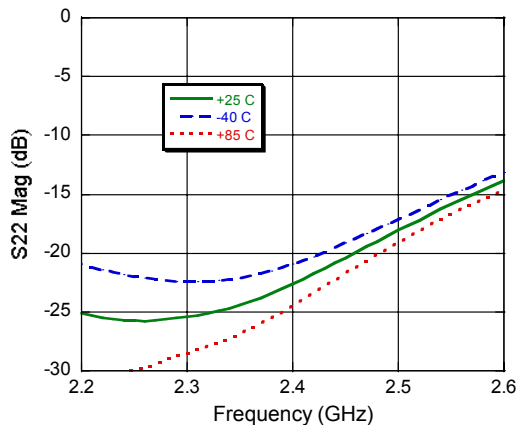
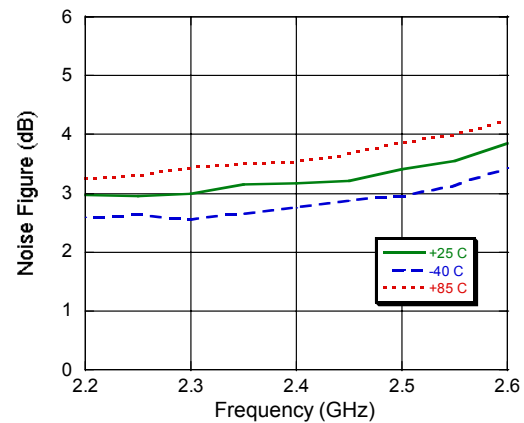
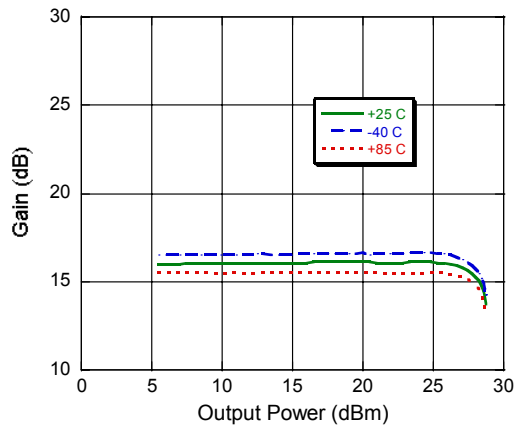
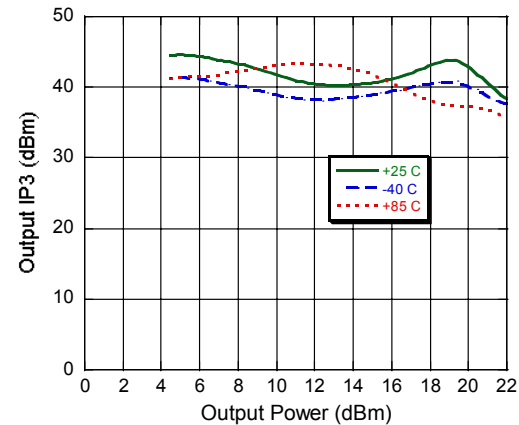
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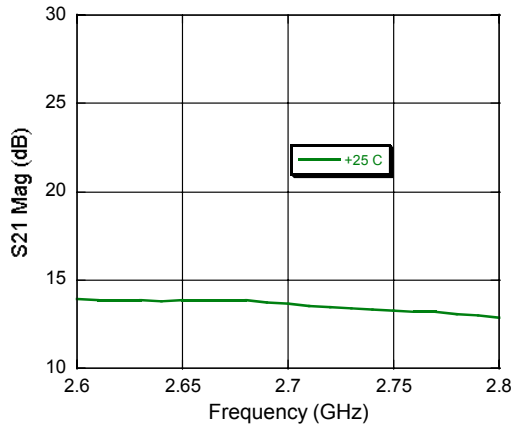
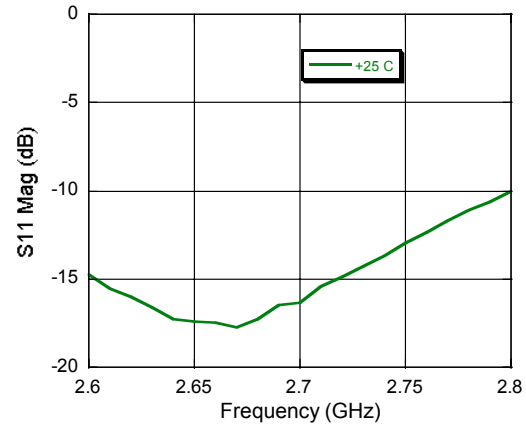
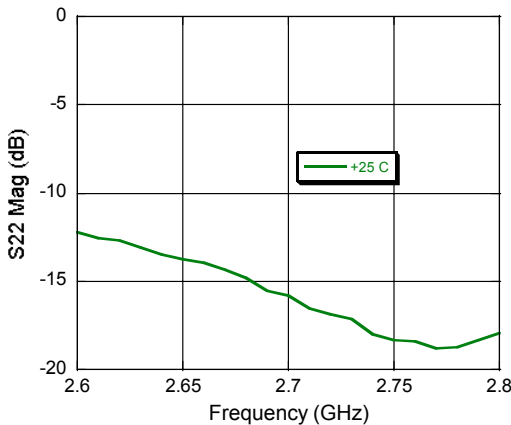
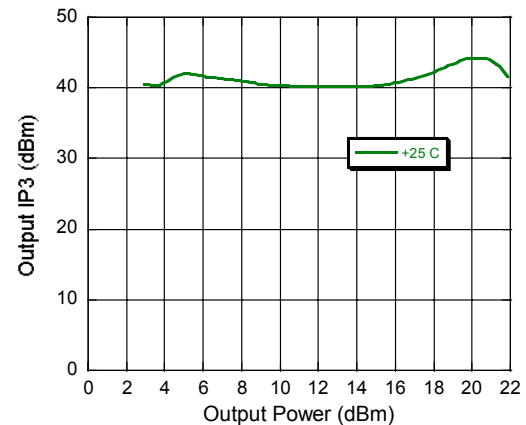
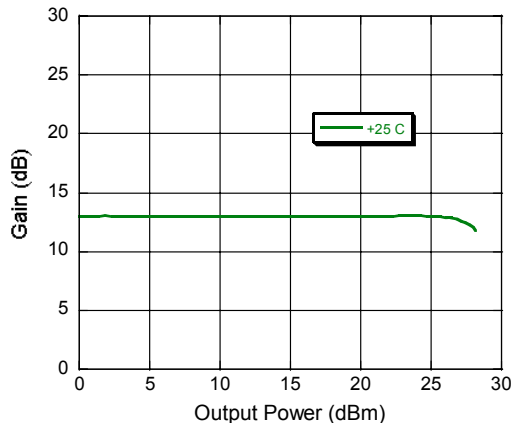
Applications Section

Typical Performance Curves, 2400 MHz Configuration

Gain

Input Return Loss

Output Return Loss

Noise Figure

P1dB

Output IP3


Applications Section

Typical Performance Curves, 2700 MHz Configuration

Gain

Input Return Loss

Output Return Loss

Output IP3

P1dB


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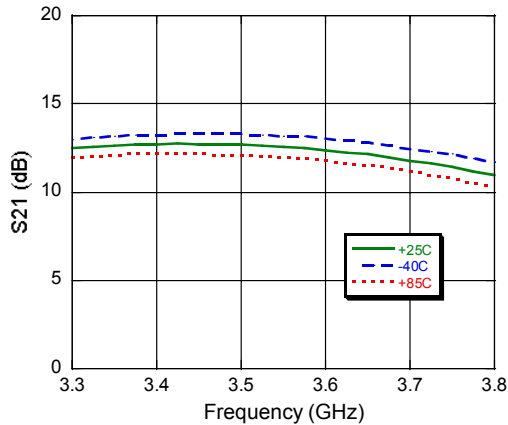
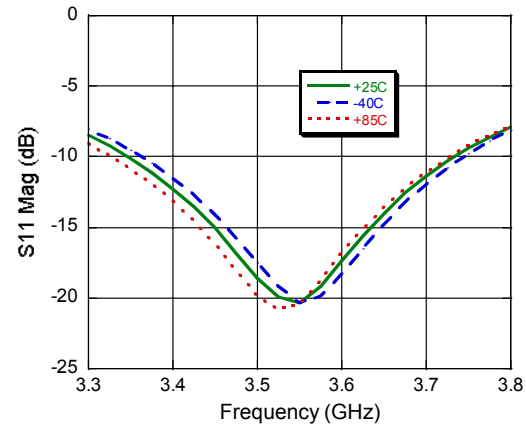
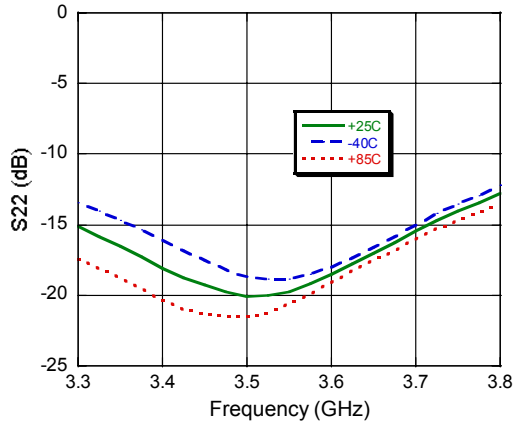
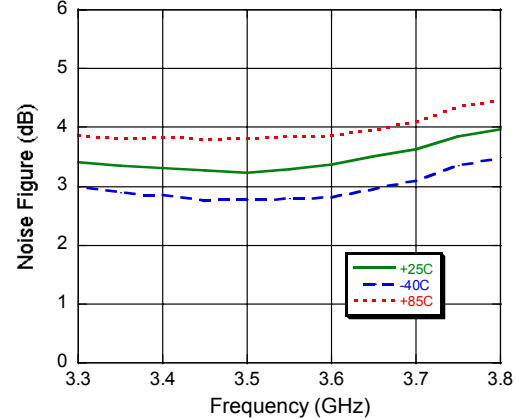
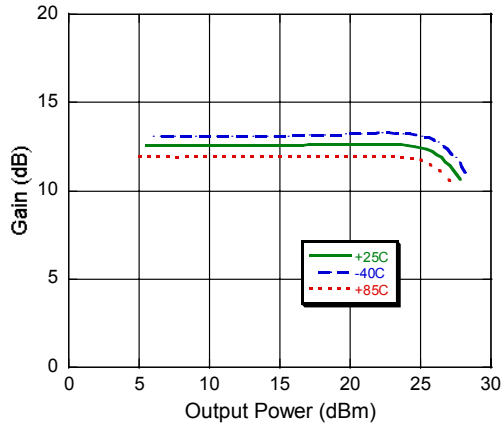
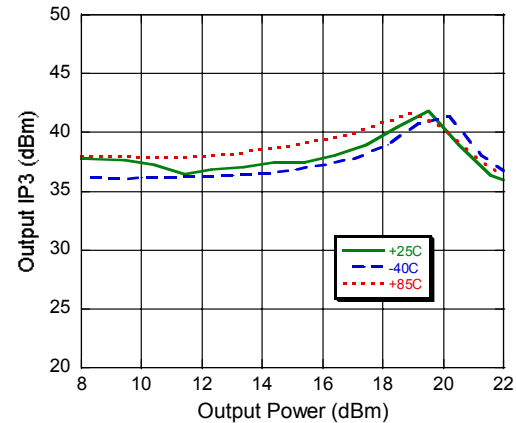
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Applications Section

Typical Performance Curves 3500 MHz Configuration

Gain

Input Return Loss

Output Return Loss

Noise Figure

P1dB

Output IP3


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• **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300

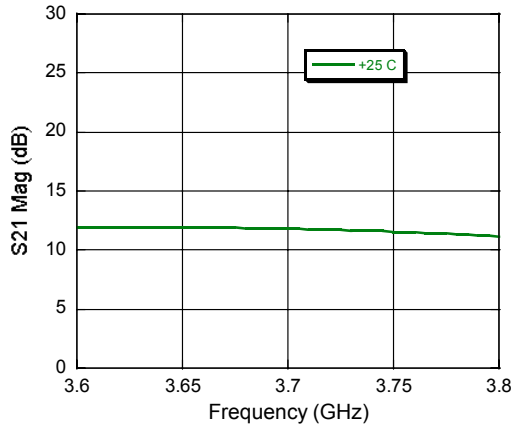
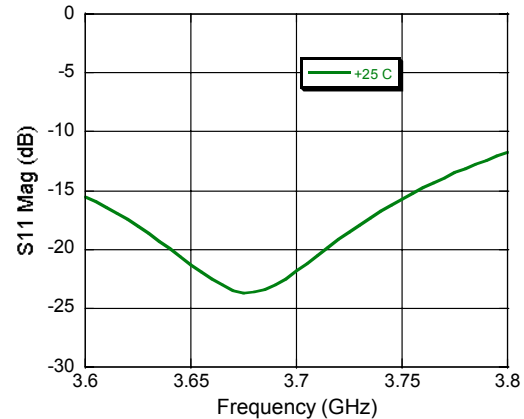
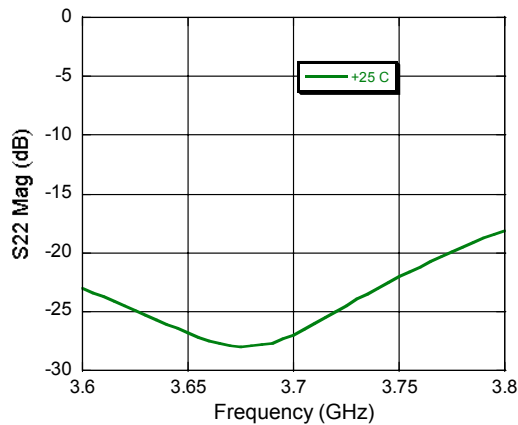
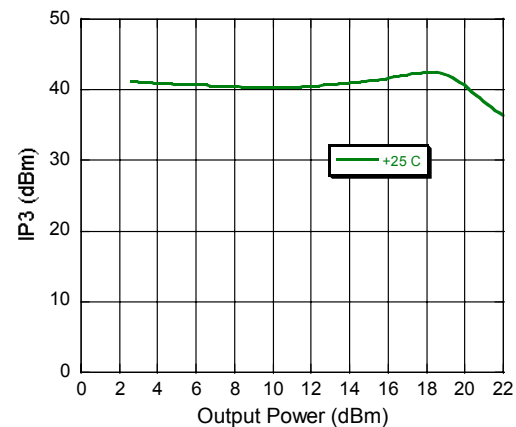
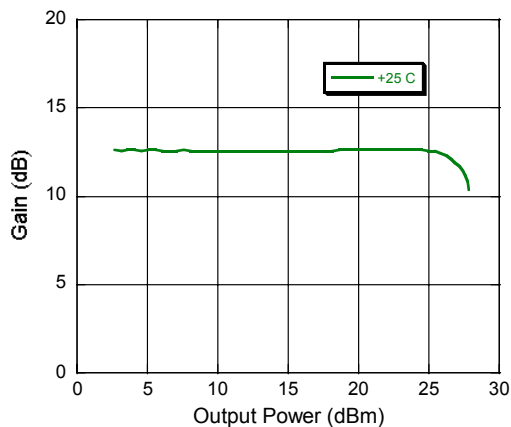
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Applications Section

Typical Performance Curves, 3700 MHz Configuration

Gain

Input Return Loss

Output Return Loss

Output IP3

P1dB


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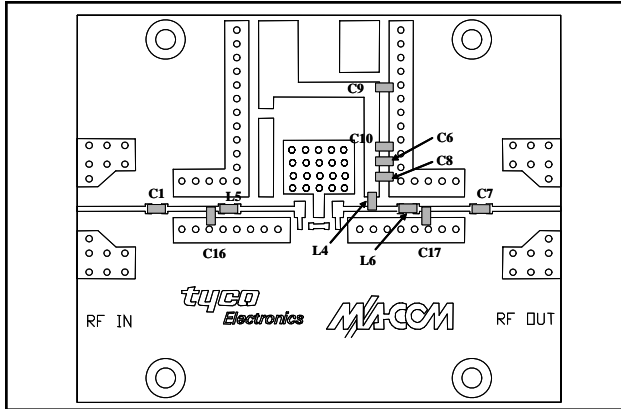
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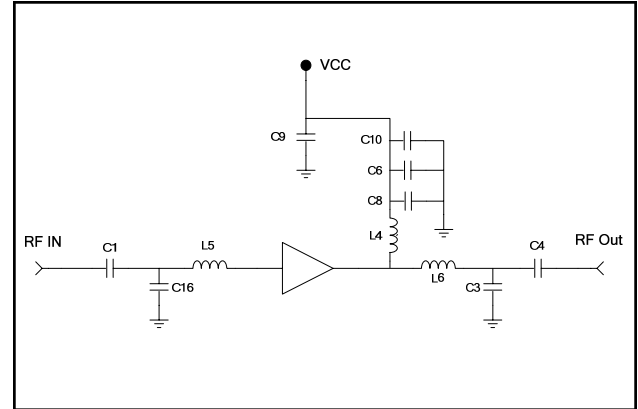
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Applications Section

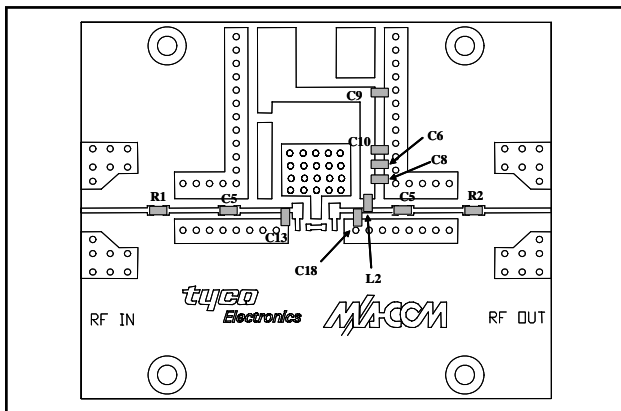
300 MHz PCB Layout



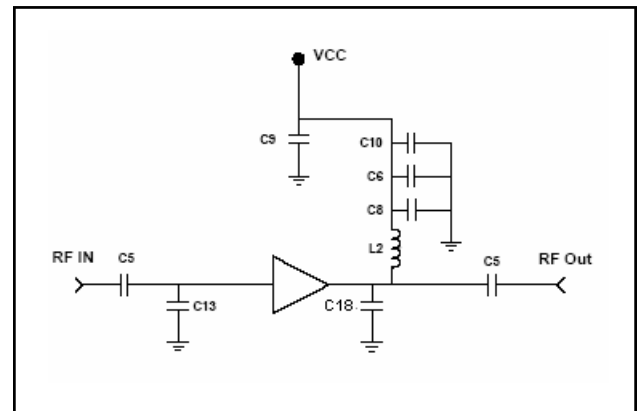
300 MHz Schematic



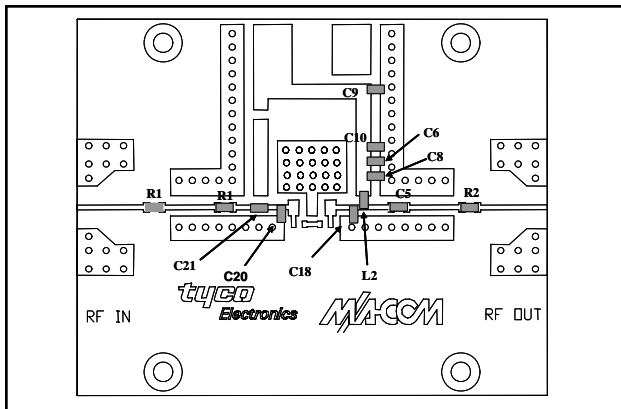
2400 MHz PCB Layout



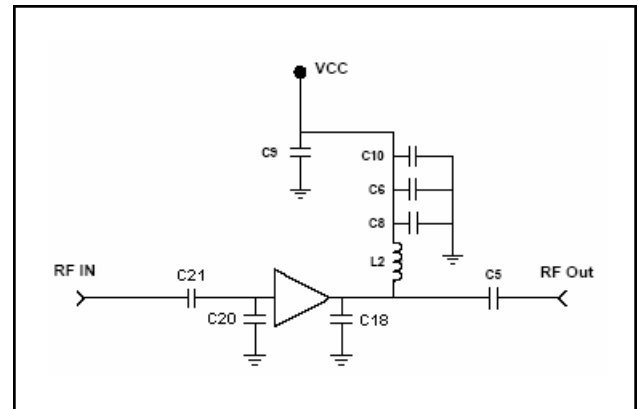
2400 MHz Schematic



2700 MHz PCB Layout



2700 MHz Schematic



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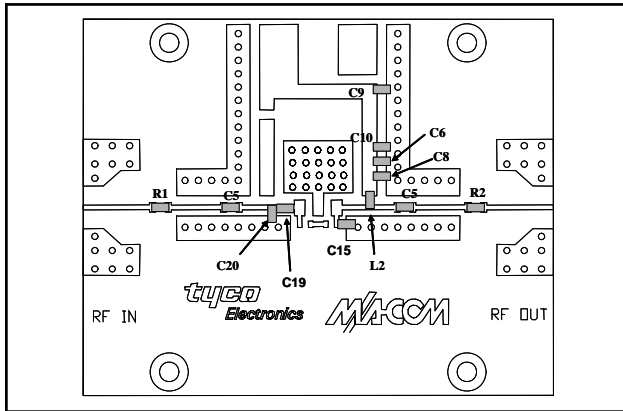
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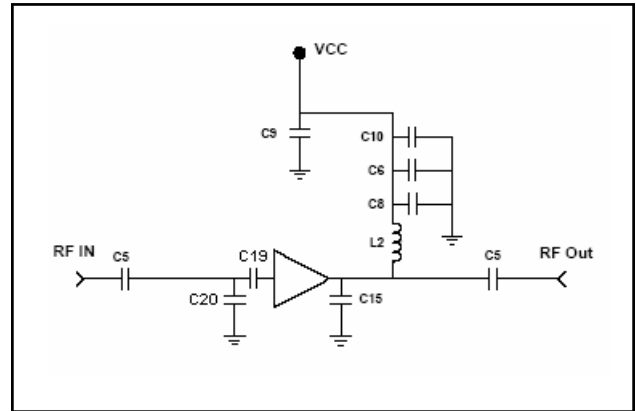
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Applications Section

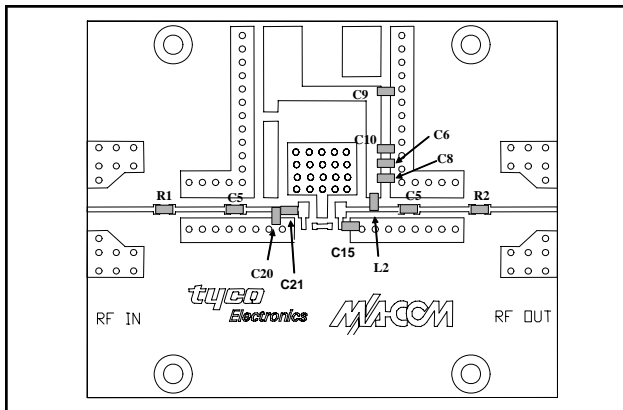
3500 MHz PCB Layout



3500 MHz Schematic



3700 MHz PCB Layout



3700 MHz Schematic

