

Features

- Broadband High Gain Operation
- Optimized Performance for WiMax Applications
- Excellent EVM Performance: 1.5% @ 18 dBm
- High Efficiency
- Lead-Free 4x4 mm PQFN-12LD Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

M/A-COM's MAAMSS0072 RF driver amplifier is a two-stage GaAs MMIC which exhibits exceptional linearity performance as well as high gain in a lead-free 4x4 mm PQFN surface mount plastic package. The device is biased with a single +5 volt supply and consumes 200 mA typically.

The MAAMSS0072 is fabricated using a high linearity HBT process to realize low current and high power functionality. The process features full passivation for increased performance and reliability.

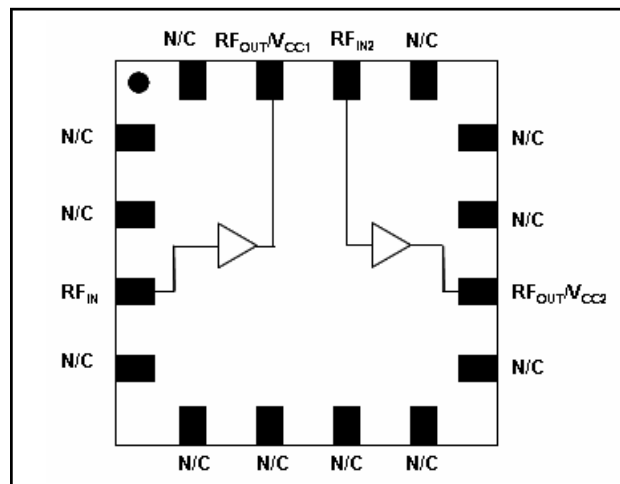
The MAAMSS0072 can be externally tuned for operation anywhere within the 250 to 4000 MHz frequency band.

Ordering Information ^{1,2}

Part Number	Package
MAAMSS0072TR-3000	3000 piece reel
MAAM-000072-001SMB	Sample Board, 3500 MHz Tuning
MAAM-000072-002SMB	Sample Board, 2500 MHz Tuning

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

Functional Block Diagram



Pin Configuration

Pin No.	Pin Name	Description
1	N/C	No Connection
2	N/C	No Connection
3	RF _{IN}	RF Input
4	N/C	No Connection
5	N/C	No Connection
6	N/C	No Connection
7	N/C	No Connection
8	N/C	No Connection
9	N/C	No Connection
10	RF _{OUT} / V _{CC2}	RF Output, 2nd Stage Supply
11	N/C	No Connection
12	N/C	No Connection
13	N/C	No Connection
14	RF _{IN2}	2nd Stage RF Input
15	RF _{OUT} / V _{CC1}	RF Output, 1st Stage Supply
16	N/C	No Connection
17	Paddle ³	RF and DC Ground

3. 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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RF Driver Amplifier
250 - 4000 MHz

M/A-COM Products
Rev. V3

RF 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	2500 MHz	dB	26.5	28.5	30.5
	3500 MHz	dB	21.0	23.0	25.0
OIP3	17 dBm / Tone, 1 MHz Tone Spacing 2500 MHz	dBm	37.5	40.5	—
	3500 MHz	dBm	36.0	39.0	—
Noise Figure	2500 MHz	dB	—	—	—
	3500 MHz	dB	—	4.2	—

RF Electrical Specifications : $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = +5\text{ V}$, $Z_0 = 50\ \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Gain	2500 MHz	dB	24.5	28.5	32.5
	3500 MHz	dB	19.0	23.0	27.0
OIP3	17 dBm / Tone, 1 MHz Tone Spacing 2500 MHz	dBm	32.5	40.5	—
	3500 MHz	dBm	31.0	39.0	—
Noise Figure	2500 MHz	dB	—	—	—
	3500 MHz	dB	—	4.2	—

DC Electrical Specifications: $V_{CC} = +5\text{ V}$, $Z_0 = 50\ \Omega$, RF Drive = +20 dBm

Parameter	Temperature	Units	Min.	Typ.	Max.
Current	-40°C	mA	240	290	340
Current	$+25^\circ\text{C}$	mA	185	235	285
Current	$+85^\circ\text{C}$	mA	130	180	230

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

Parameter	Test Conditions	Units	2500 MHz	3500 MHz
Input Return Loss		dB	19	15
Output Return Loss		dB	13	15
Output P1dB		dBm	28	27
EVM	+18 dBm channel power 54 Mbps OFDM (includes 1% system level)	% rms	1.0	1.5
Quiescent Current	+5 V	mA	200	200

Absolute Maximum Ratings ^{4,5}

Parameter	Absolute Maximum
RF Output Power	+28.5 dBm
Voltage	6 volts
Operating Temperature	-40°C to $+85^\circ\text{C}$
Storage Temperature	-65°C to $+150^\circ\text{C}$

- 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.

Maximum Operating Conditions ⁶

Parameter	Maximum Operating Conditions
Junction Temperature ⁷	160°C
RF Output Power	28.5 dBm
Operating Temperature	-40°C to $+85^\circ\text{C}$

- Operating at or within these conditions will ensure MTTF > 1 x 10⁶ hours.
- Typical thermal resistance (θ_{jc}) = 65°C/W.

2

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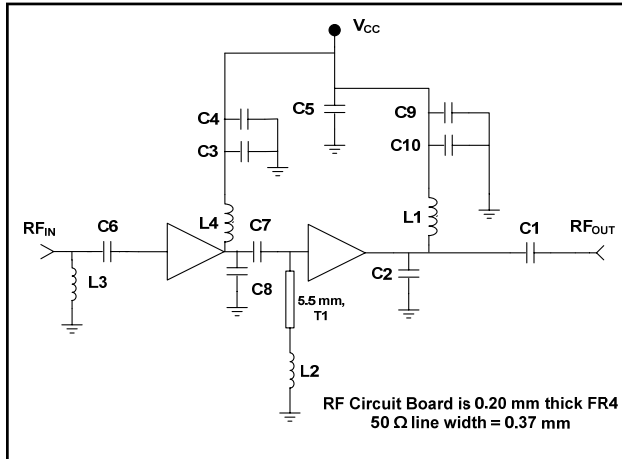
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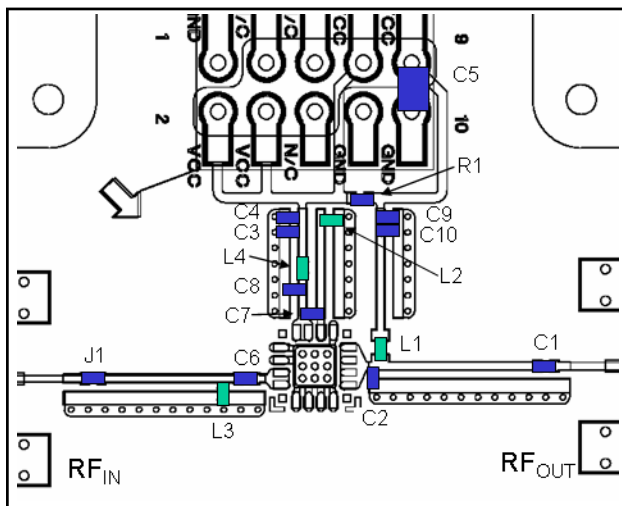
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3300 - 3800 MHz Schematic



3300 - 3800 MHz PCB Layout



External Parts List

Component	Value	Case Size	Manufacturer
C1, C3, C9	1000 pF	0402	Murata
C2	0.5 pF	0402	Murata
C4, C10	0.1 μF	0402	Murata
C5	10 μF	1206	Kemet
C6	1.2 pF	0402	Murata
C7	2.7 pF	0402	Murata
C8	1 pF	0402	Murata
L1	8.2 nH	0402	Coilcraft
L2, L3	1 nH	0402	Toko
L4	1.8 nH	0402	Toko
R1	0	0402	-
J1	Jumper	-	-
T1	50 Ω, 120° @ 3500 MHz		

Handling Procedures

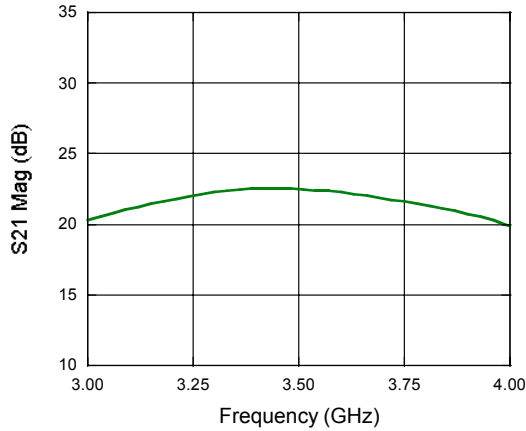
Please observe the following precautions to avoid damage:

Static Sensitivity

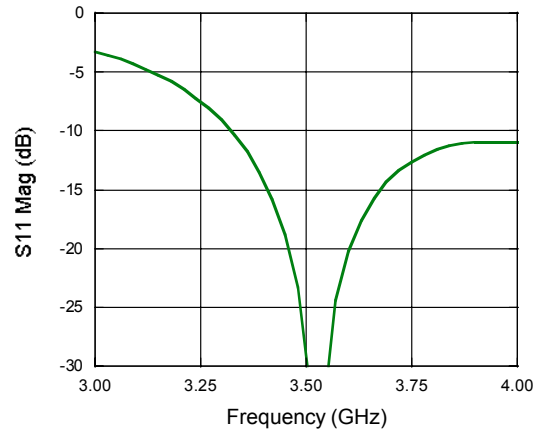
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Typical Performance Curves: @ +25°C, 3300 - 3800 MHz Configuration

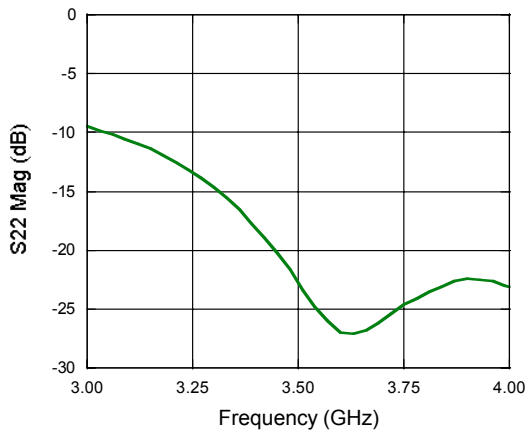
Gain



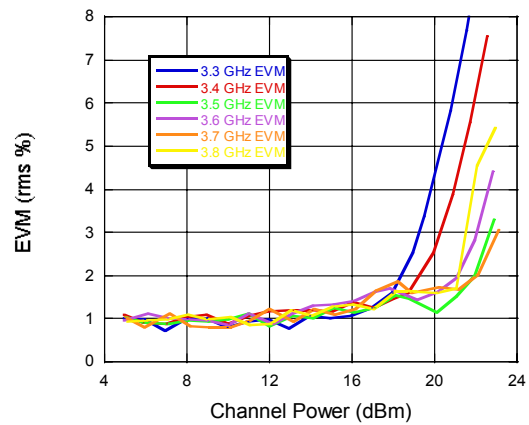
Input Return Loss



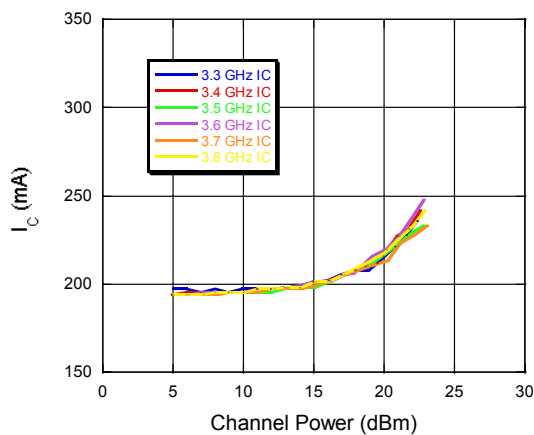
Output Return Loss



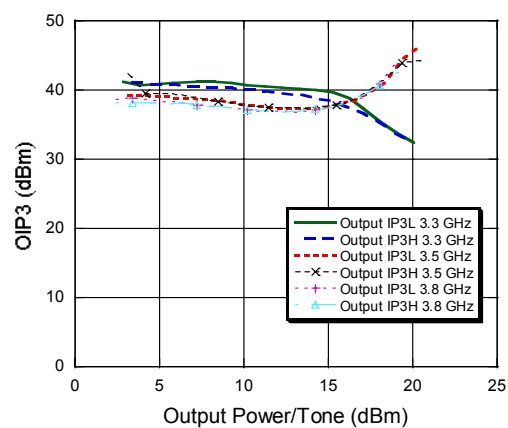
EVM



Current



Output IP3



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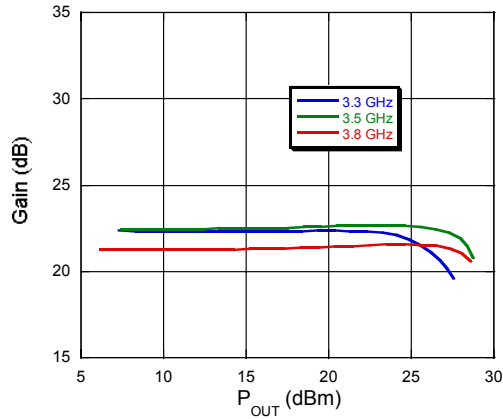
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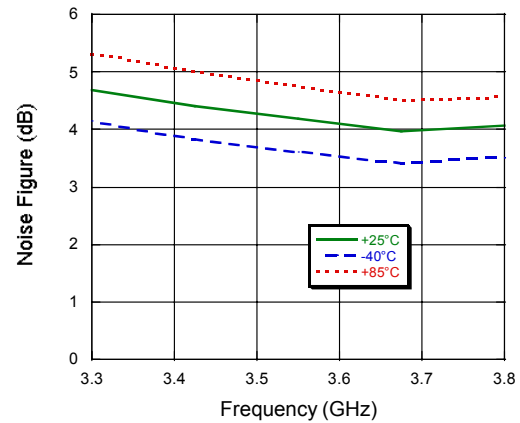
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Typical Performance Curves: @ +25°C, 3300 - 3800 MHz Configuration

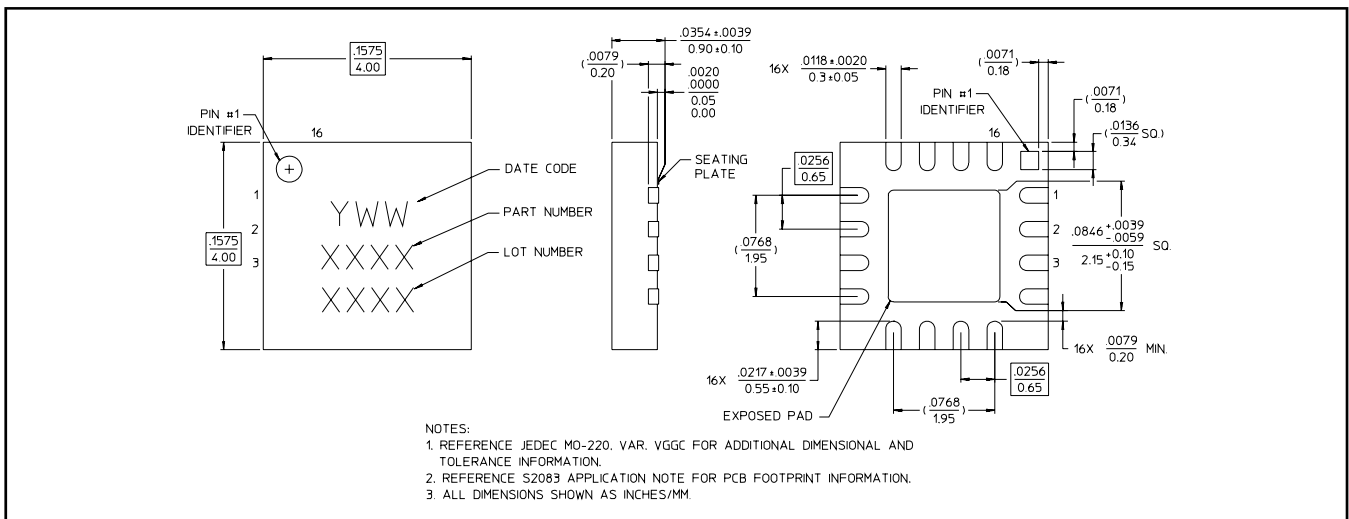
P1dB



Noise



Lead-Free 4 mm 16-Lead PQFN†



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

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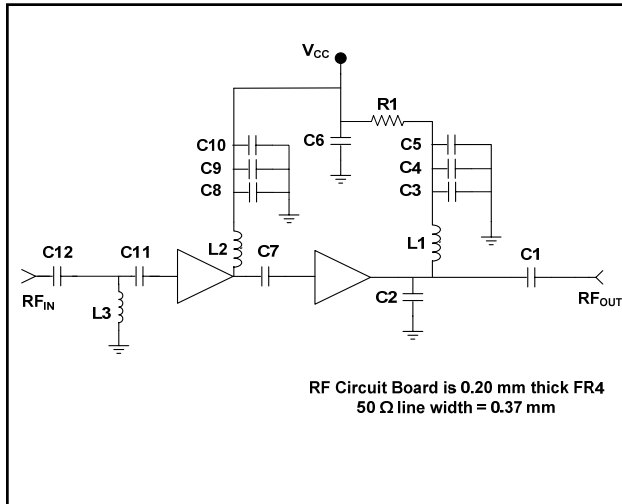
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Applications Section

Typical Performance Curves, 2300 - 2700 MHz Configuration

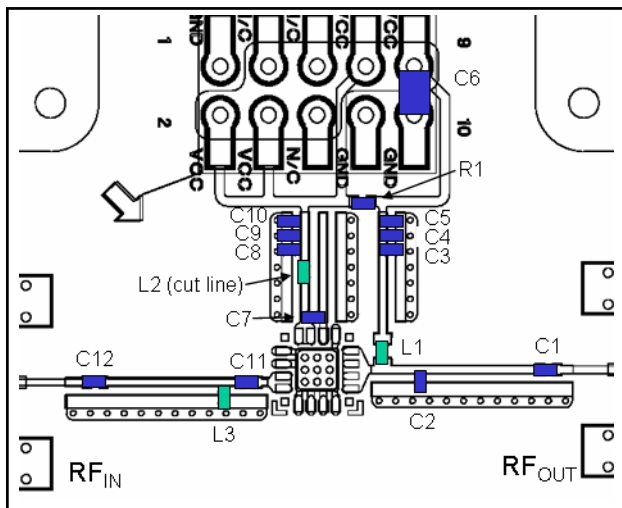
2300 - 2700 MHz Schematic



Parts List

Part	Value	Case Style	Manufacturer
C1, C12	100 pF	0402	Murata
C2	1 pF	0402	Murata
C3, C8	1000 pF	0402	Murata
C4, C5, C9, C10	0.1 μF	0402	Murata
C6	3.3 μF	1206	Kemet
C7	1.5 pF	0402	Murata
C11	2.2 pF	0402	Murata
L1	10 nH	0402	Coilcraft
L2	1.5 nH	0402	Coilcraft
L3	1.8 nH	0402	Coilcraft
R1	0 Ω	0402	Panasonic

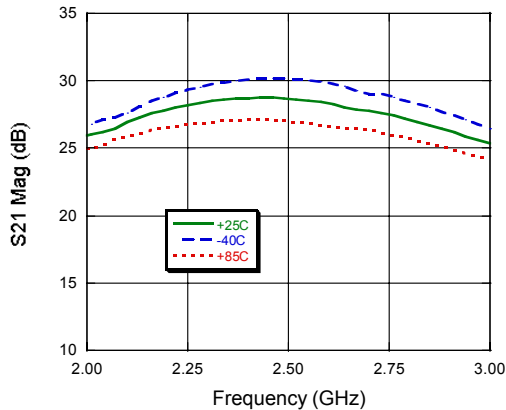
2300 - 2700 MHz PCB Layout



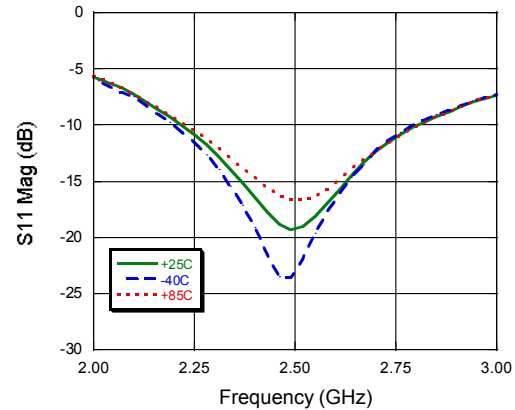
Applications Section

Typical Performance Curves, 2300 - 2700 MHz Configuration

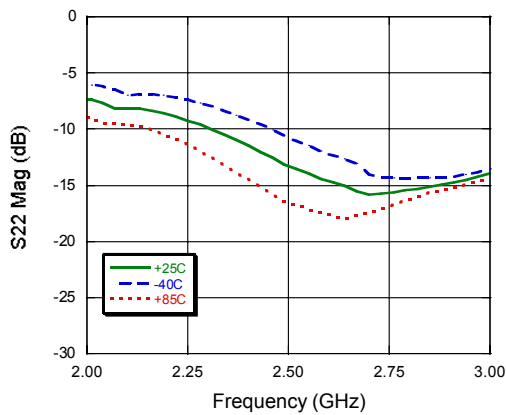
Gain



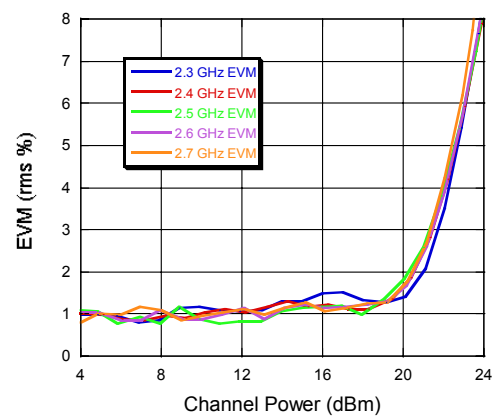
Input Return Loss



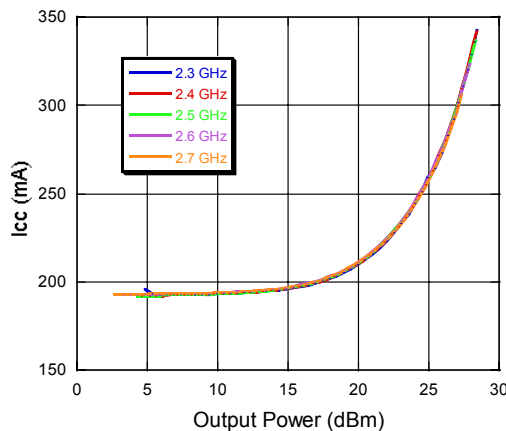
Output Return Loss



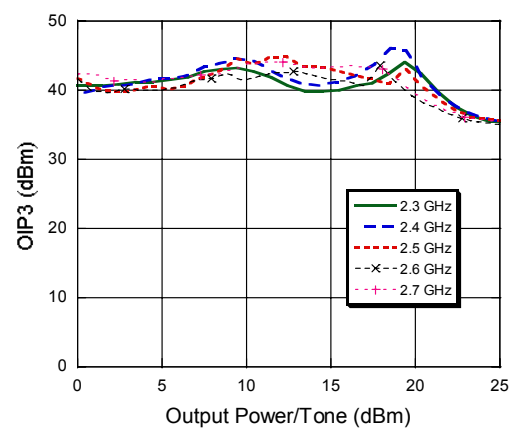
EVM



Current



Output IP3



7

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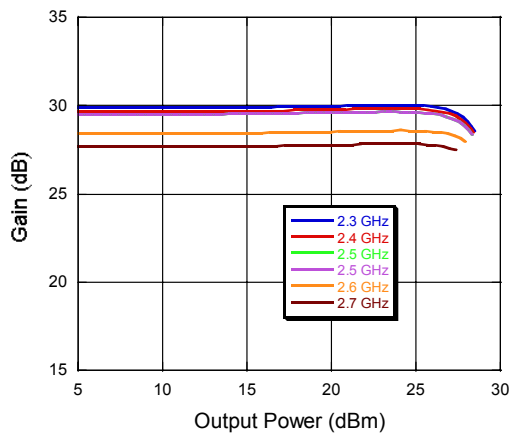
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Applications Section

Typical Performance Curves, 2300 - 2700 MHz Configuration

P1dB



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