

Integrated SPDT Switch and LNA with Bypass Mode

5.0 - 6.0 GHz

Rev. V4

Features

- 802.11a,n,ac Applications
- 0.9 dB Tx Insertion Loss
- 19 dB Rx Isolation
- 12 dB Rx Gain
- 2.2 dB Noise Figure
- 10 mA Current
- -40 dB EVM @ 23 dBm Input (802.11ac 80 MHz / 256 QAM)
- Lead Free 2 mm 12-lead STQFN package
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MAMF-010614 is a multi-function MMIC which includes a SPDT switch and LNA with bypass mode for the Rx path. This part would typically be used on the front end of WLAN 802.11a,n,ac modules where small size is critical.

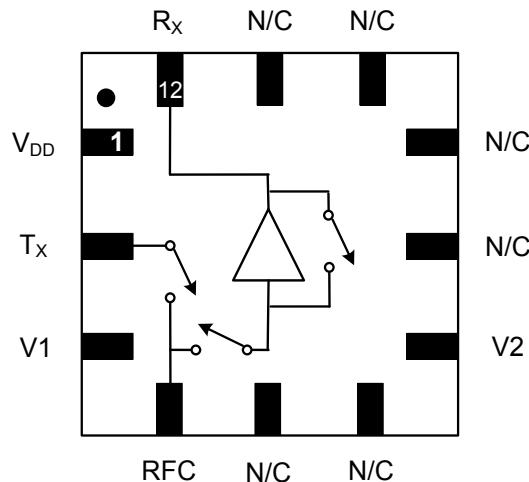
The MAMF-010614 delivers high isolation between Tx and Rx paths, low Tx insertion loss and a high gain, low noise Rx path.

Ordering Information^{1,2}

Part Number	Package
MAMF-010614-TR3000	3000 piece reel
MAMF-010614-001SMB	Sample Board

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

Functional Schematic

Pin Configuration³

Pin No.	Function	Description
1	V _{DD}	Drain Voltage Supply
2	T _X	T _X Port
3	V1	Control 1
4	RFC	RF Common
5	N/C	No Connection
6	N/C	No Connection
7	V2	Control 2
8	N/C	No Connection
9	N/C	No Connection
10	N/C	No Connection
11	N/C	No Connection
12	R _X	R _X Port
13	Paddle ⁴	Ground

3. M/A-COM Technology Solutions recommends connecting unused package pins to ground.

4. 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: Freq. = 5.25 - 5.825 GHz, V_{DD} = 3 V, V_C = 0/2.8 V, T_A = 25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Isolation	RFC to T _X RFC to R _X	dB	—	19 19	—
T _X Insertion Loss	RFC to T _X	dB	—	0.9	1.2
T _X Input / Output Return Loss	RFC to T _X	dB	—	12	—
T _X Input P0.1dB	T _X Path On	dBm	—	31	—
T _X EVM	P _{IN} = +23 dBm, 802.11AC 80 MHz / 256 QAM	dB	—	-42	—
R _X Gain	RFC to R _X , Gain Mode	dB	10	12	—
R _X Insertion Loss	RFC to R _X , Bypass Mode	dB	—	6	7.5
R _X Input / Output Return Loss	RFC to R _X , Gain Mode	dB	—	10	—
R _X Noise Figure	Gain Mode	dB	—	2.2	—
R _X Input IP3	Gain Mode	dBm	—	10	—
R _X Input P0.1dB	Bypass Mode	dBm	—	10	—
R _X Input P1dB	Gain Mode	dBm	-5	-3	—
R _X EVM	P _{IN} = -15 dBm. Gain Mode	dB	—	-46	—
Quiescent Current	No RF, Gain Mode, V _{DD} = 3 V	mA	—	10	12
Leakage Current	All States except High Gain	µA	—	10	—

Absolute Maximum Ratings^{5,6}

Parameter	Absolute Maximum
Input Power	0 dBm
R _X Gain Mode	20 dBm
R _X Bypass Mode	35 dBm CW
T _X , 5 V _C , RFC - T _X	33 dBm CW
T _X , 3.3 V _C , RFC - T _X	
V _{DD}	+5 volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

Truth Table^{7,8}

Control V1	Control V2	RFC-R _X	RFC-T _X
Low	Low	Bypass Mode	Off
Hi	Low	Gain Mode	Off
Low	Hi	Off	On

7. Differential voltage, V (state Low) - V (state Hi), must be +2.7 V minimum and must not exceed +5 V.

8. Low = 0 ± 0.3 V, Hi = +2.7 V to +5 V.

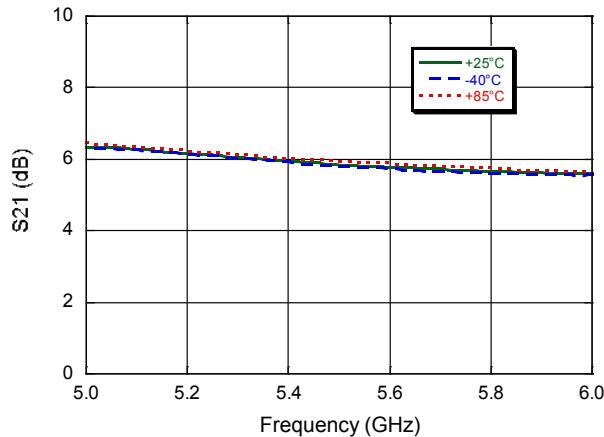
- Exceeding any one or combination of these limits may cause permanent damage to this device.
- M/A-COM Technology Solutions does not recommend sustained operation near these survivability limits.

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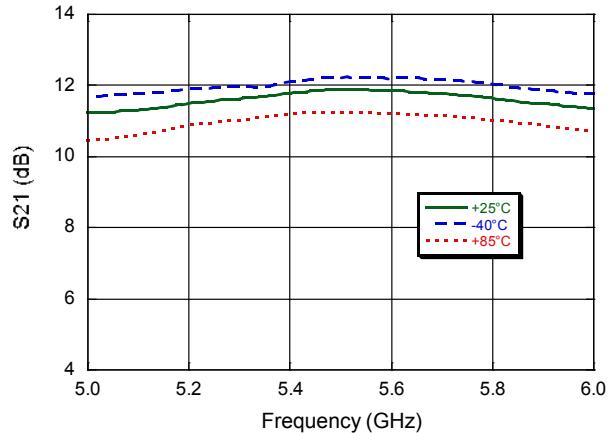
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Typical Performance Curves:

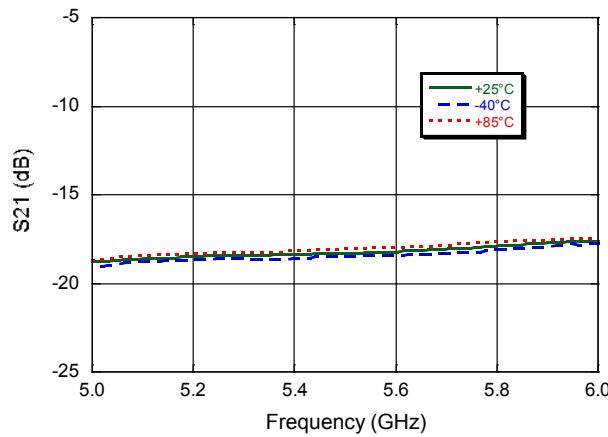
R_x Insertion Loss, Bypass Mode



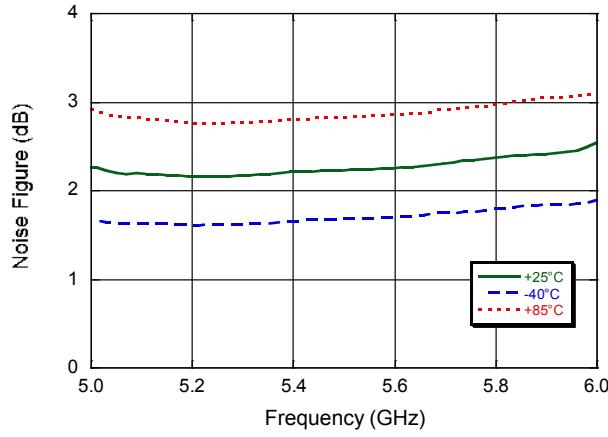
R_x Gain, Gain Mode



RFC - R_x Isolation (T_x On)

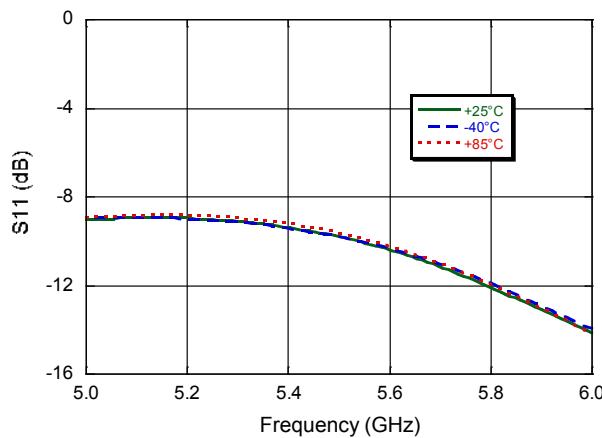
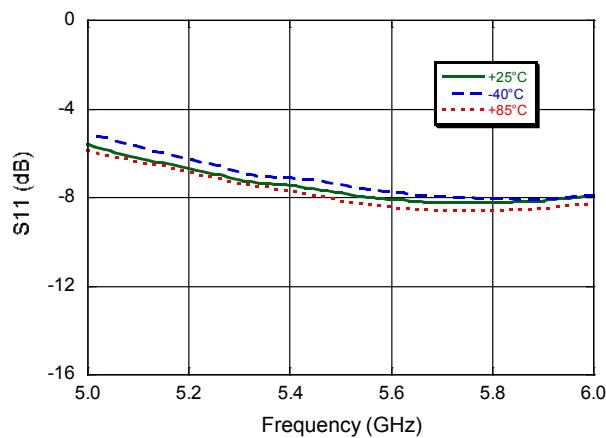
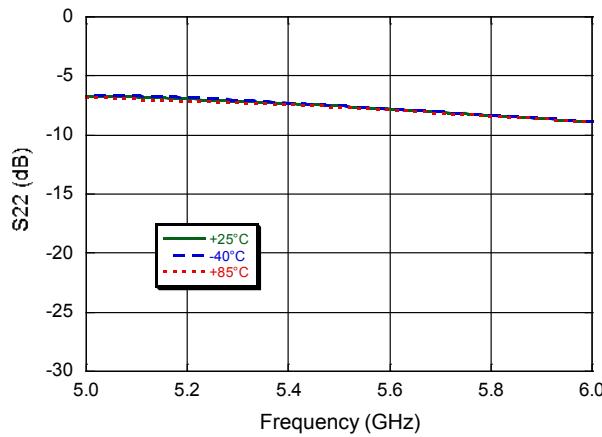
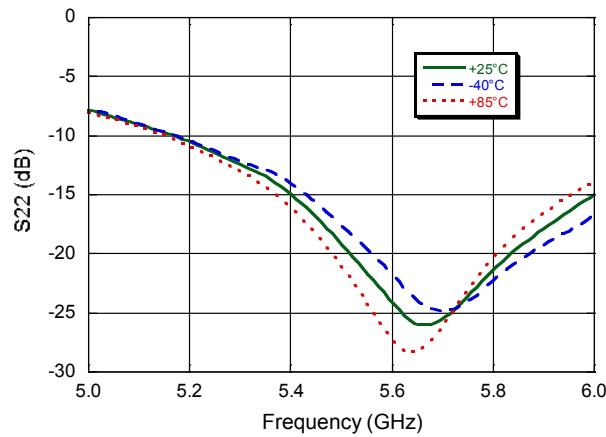


R_x Noise Figure, Gain Mode



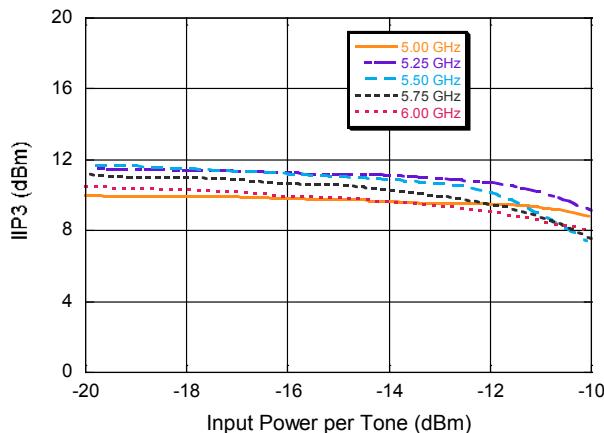
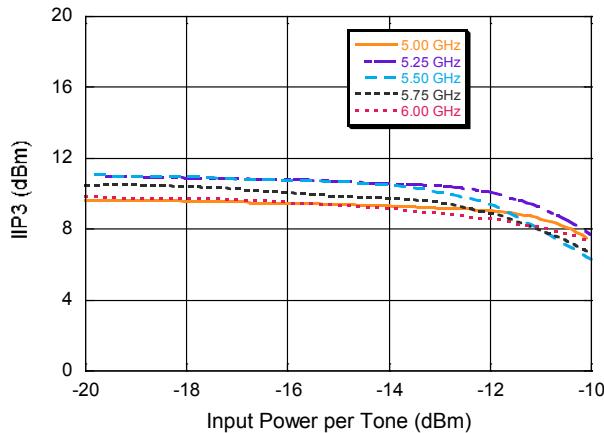
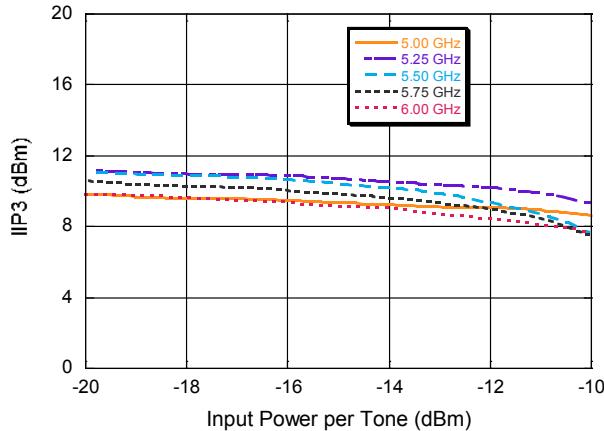
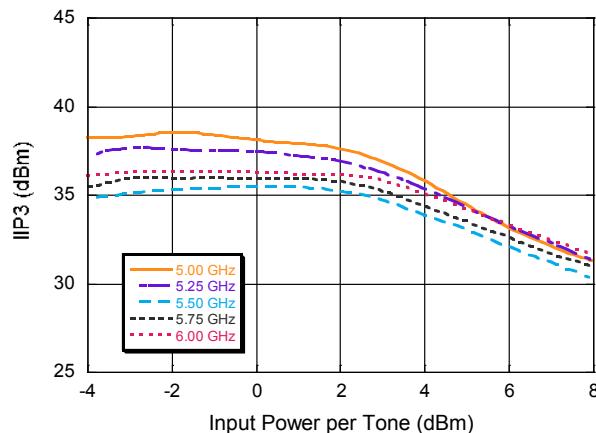
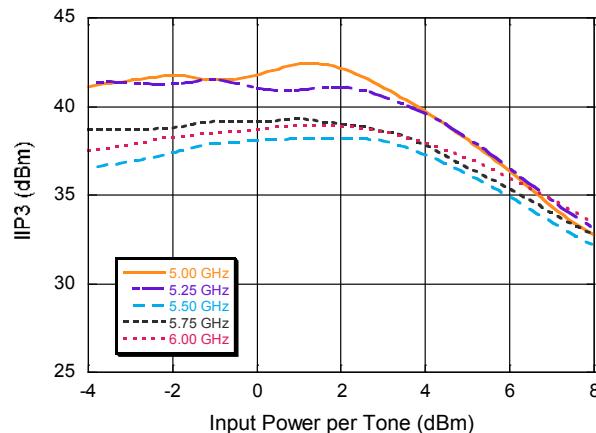
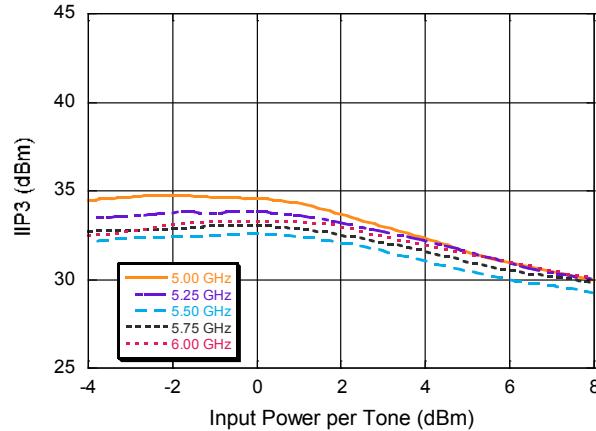
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Typical Performance Curves:***R_x Input Return Loss, Bypass Mode******R_x Input Return Loss, Gain Mode******R_x Output Return Loss, Bypass Mode******R_x Output Return Loss, Gain Mode***

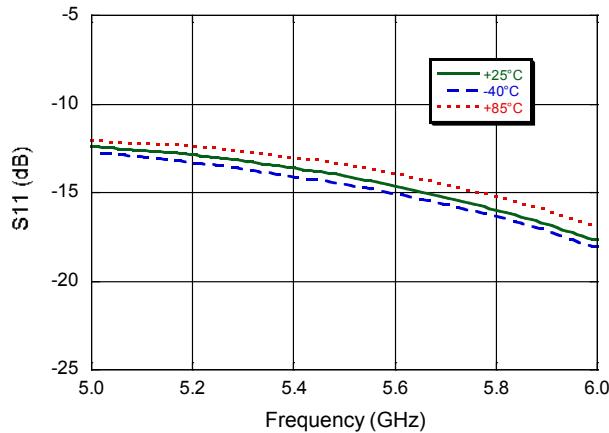
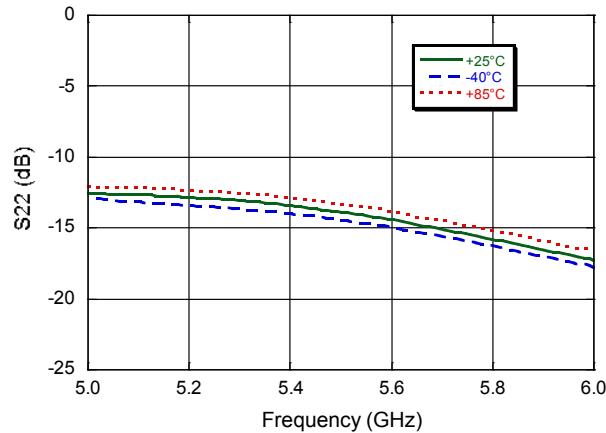
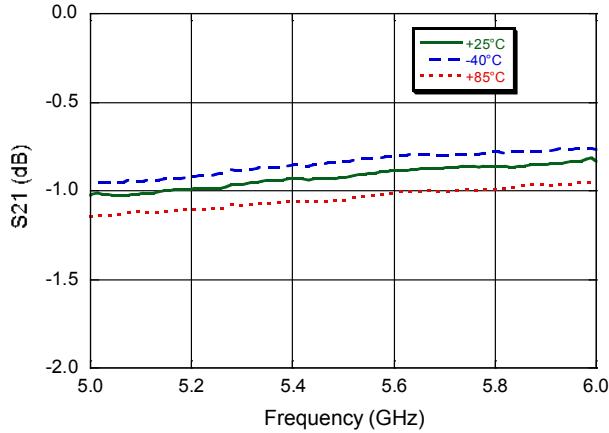
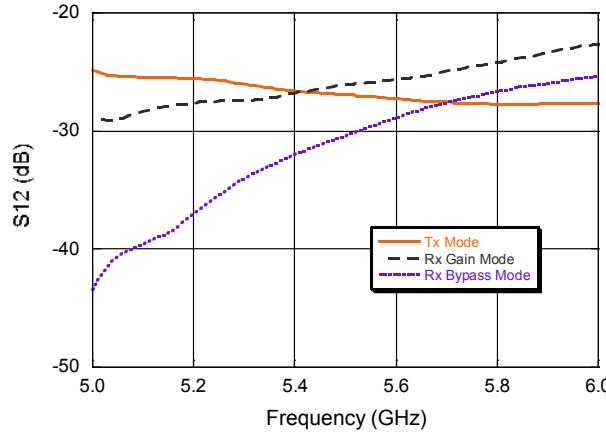
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Typical Performance Curves:
R_x Input IP3, Gain Mode @ +25°C***R_x Input IP3, Gain Mode @ -40°C******R_x Input IP3, Gain Mode @ +85°C******R_x Input IP3, Bypass Mode @ +25°C******R_x Input IP3, Bypass Mode @ -40°C******R_x Input IP3, Bypass Mode @ +85°C***

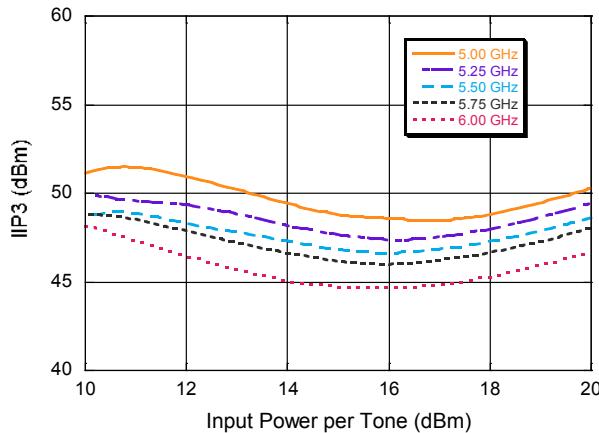
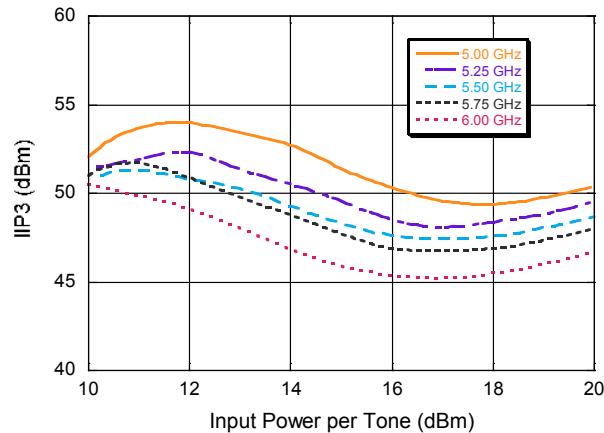
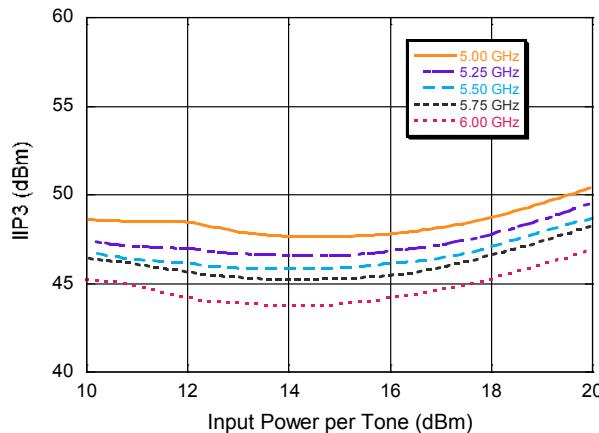
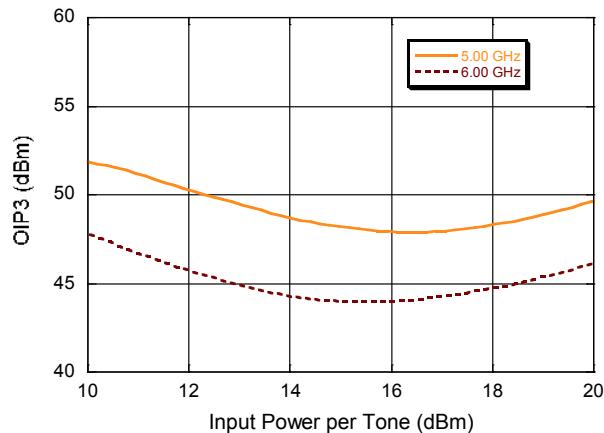
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Typical Performance Curves:
T_x Input Return Loss***T_x Output Return Loss******T_x Insertion Loss******T_x - R_x Isolation***

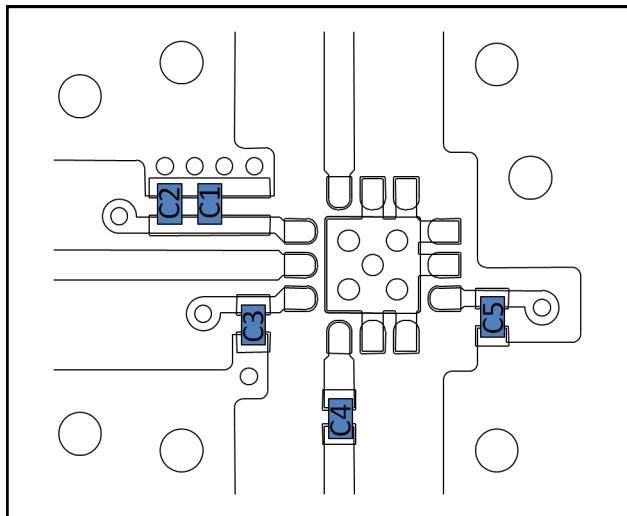
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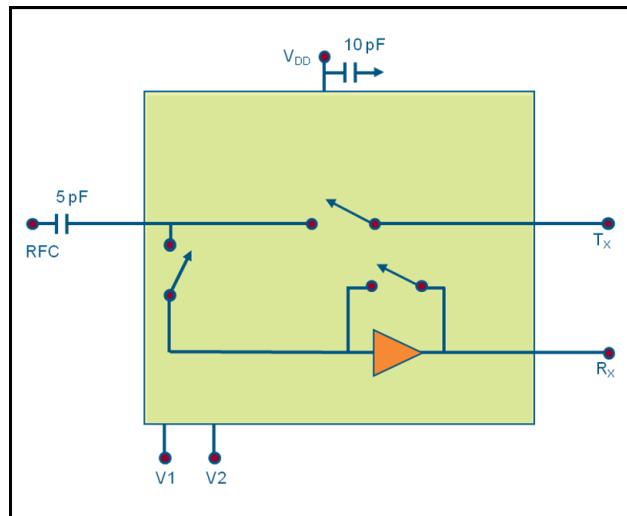
Typical Performance Curves:
T_x Input IP3 @ +25°C***T_x Input IP3 @ -40°C******T_x Input IP3 @ +85°C******T_x Output IP3 @ +25°C***

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Recommended Sample Board⁹


9. Place C1 and C2 as shown.

Functional Schematic

Parts List

Component	Value	Case Size
C1	10 pF	0201
C2, C3, C5	0.1 μ F	0201
C4	5 pF	0201

Handling Procedures

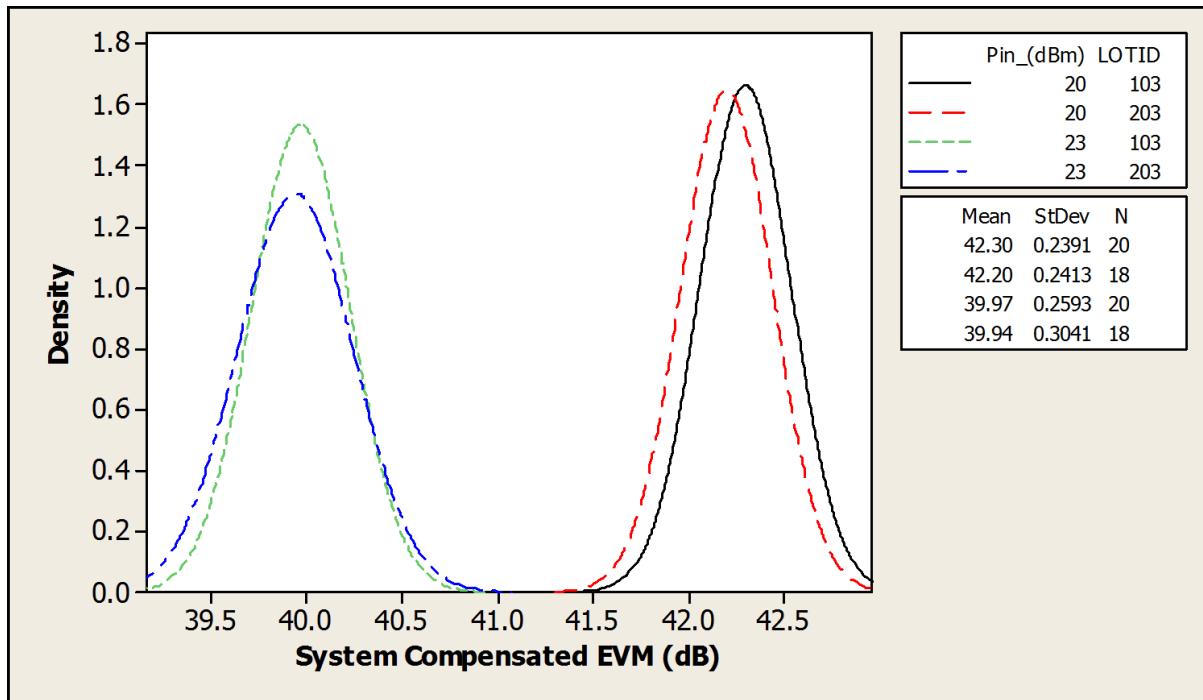
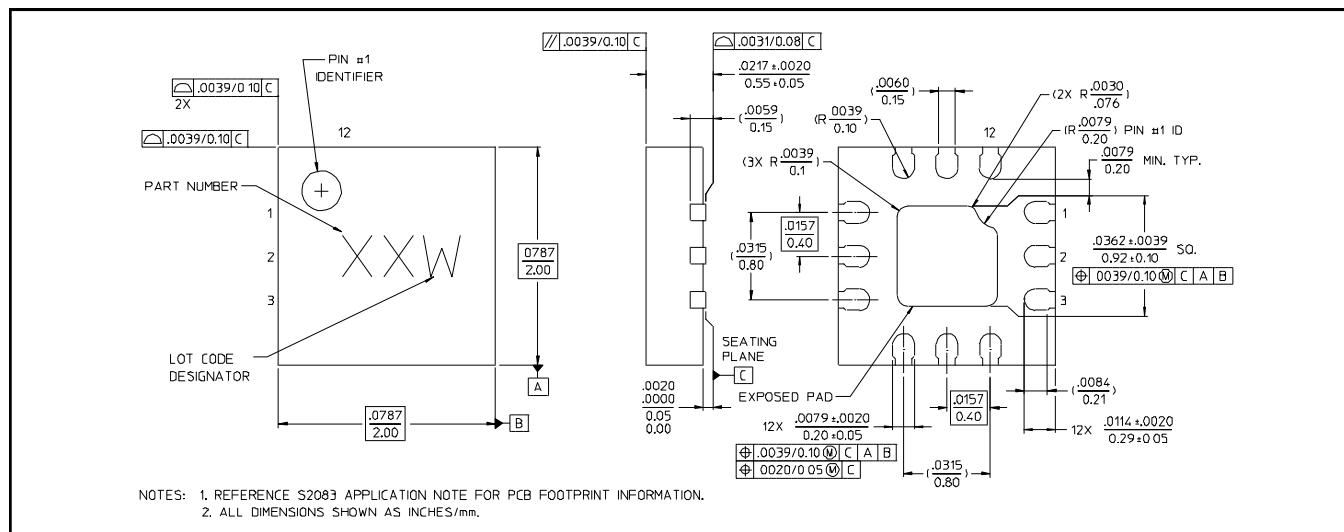
Please observe the following precautions to avoid damage:

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.

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System Compensated EVM, 802.11AC 80 MHz / 256 QAM

Lead-Free 2 mm STQFN-12LD-0.4mm Pitch[†]

[†]Reference Application Note S2083 for lead-free solder reflow recommendations.

Meets JEDEC moisture sensitivity level 1 requirements.

Plating is Ni/Pd/Au over Copper.

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