MAMF-010614

Integrated SPDT Switch and LNA with Bypass Mode
5.0 - 6.0 GHz

Rev. V3

Features

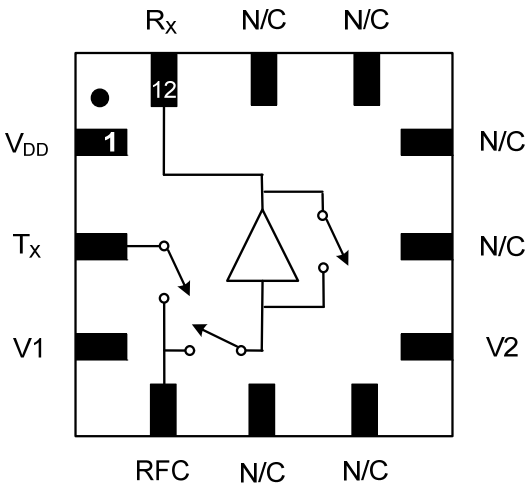
- 802.11a,n,ac Applications
- 0.9 dB T_X Insertion Loss
- 19 dB R_X Isolation
- 12 dB R_X Gain
- 2.2 dB Noise Figure
- 10 mA Current
- -40 dB EVM @ 23 dBm Input
  (802.11ac 80 MHz / 256 QAM)
- Lead Free 2 mm 12-lead STQFN package
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MAMF-010614 is a multi-function MMIC which includes a SPDT switch and LNA with bypass mode for the R_X 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 T_X and R_X paths, low T_X insertion loss and a high gain, low noise R_X path.

Functional Schematic



Pin Configuration[3]

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.

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.

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

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• **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
• **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

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 R_X Gain Mode R_X Bypass Mode T_X, 5 V_C, RFC - T_X T_X, 3.3 V_C, RFC - T_X	 0 dBm 20 dBm 35 dBm CW 33 dBm CW
V_{DD}	+5 volts
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

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

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.

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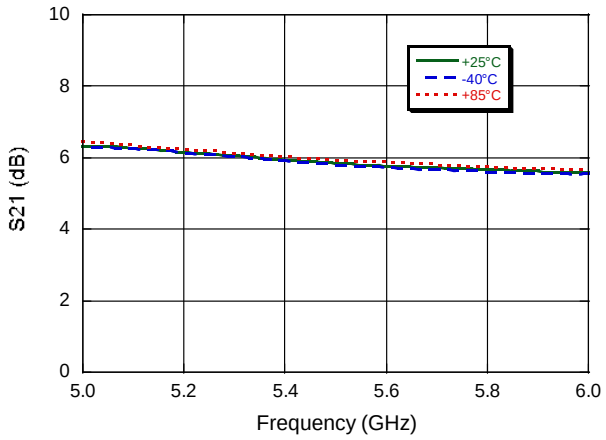
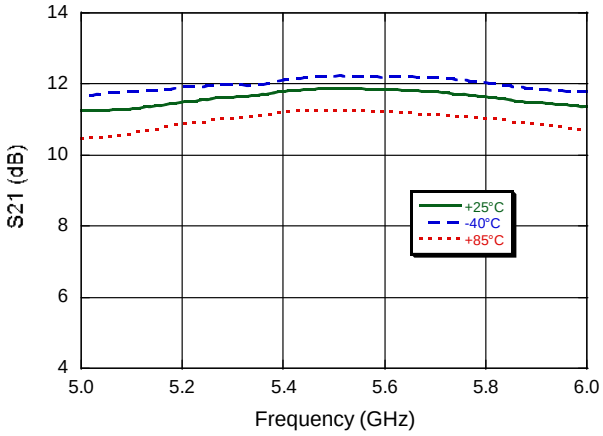
Typical Performance Curves:

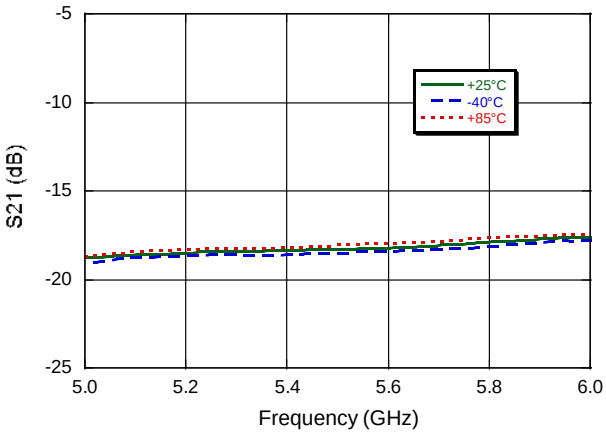
R_X Insertion Loss, Bypass Mode



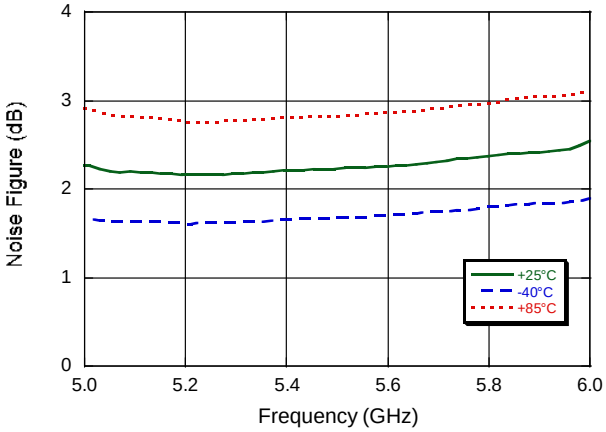
R_X Gain, Gain Mode



RFC - R_X Isolation (T_X On)



R_X Noise Figure, Gain Mode



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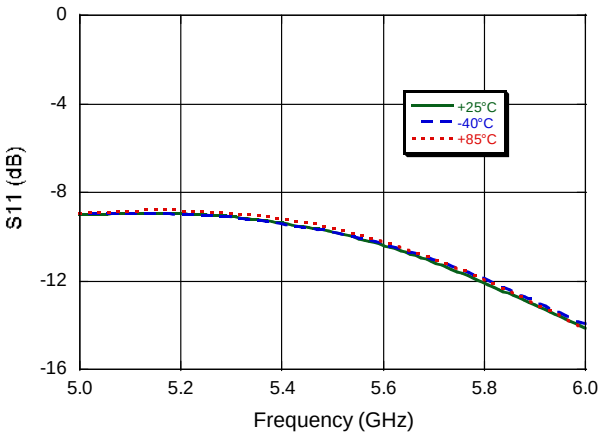
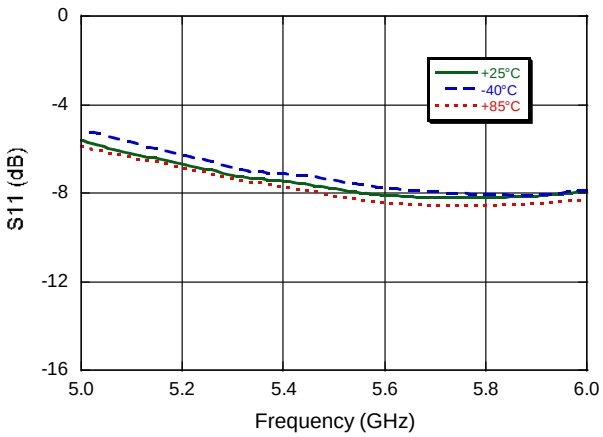
Typical Performance Curves:

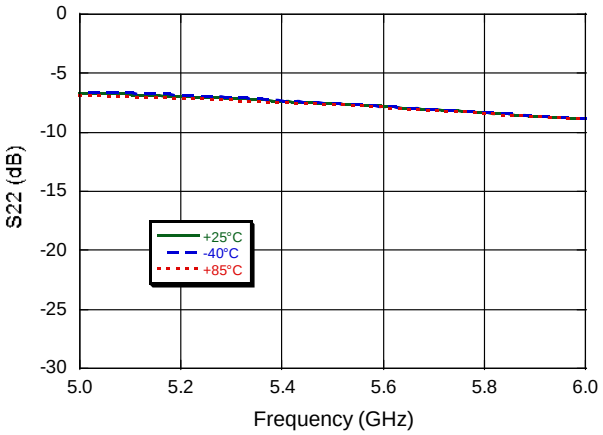
R_X Input Return Loss, Bypass Mode



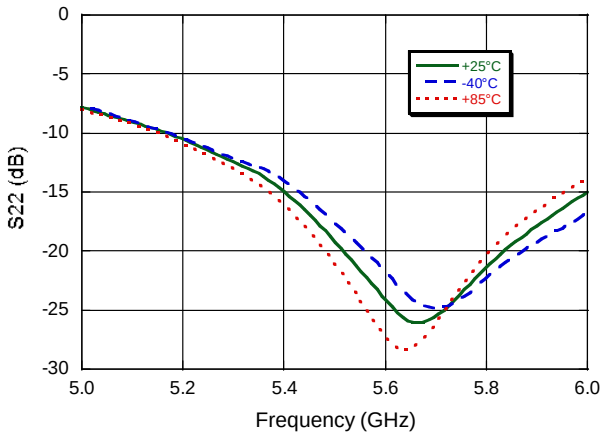
R_X Input Return Loss, Gain Mode



R_X Output Return Loss, Bypass Mode



R_X Output Return Loss, Gain Mode



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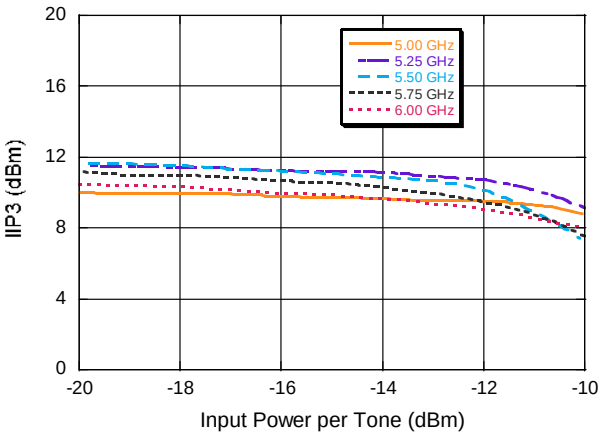
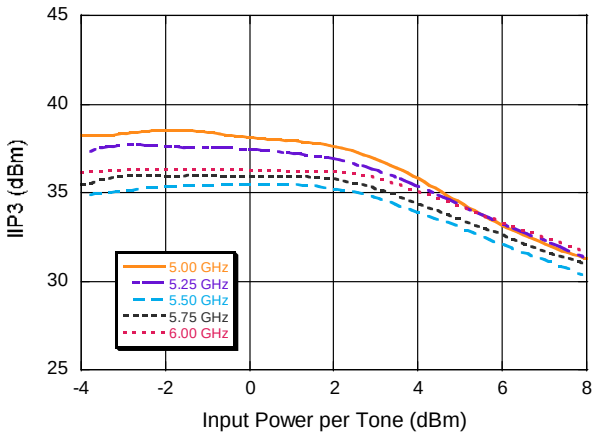
Typical Performance Curves:

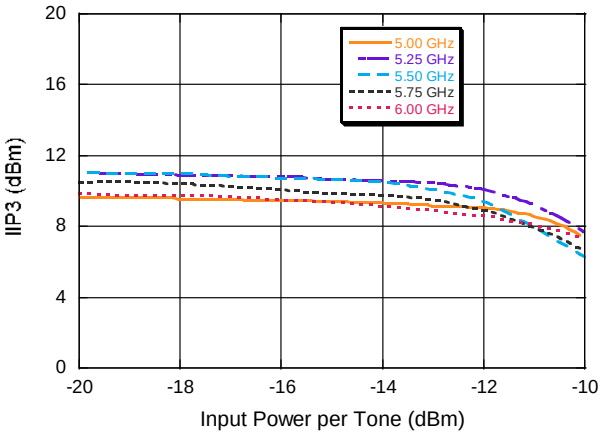
R_X Input IP3, Gain Mode @ +25°C



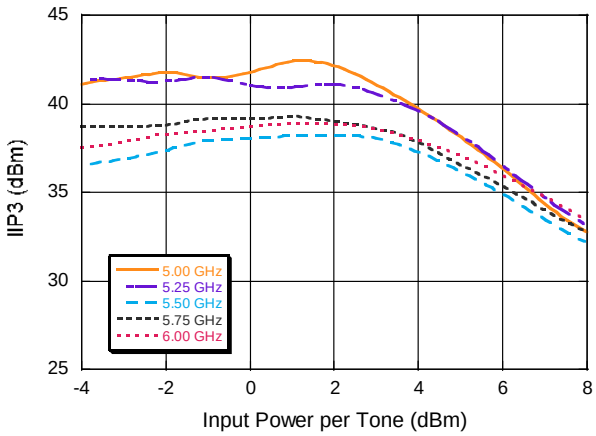
R_X Input IP3, Bypass Mode @ +25°C



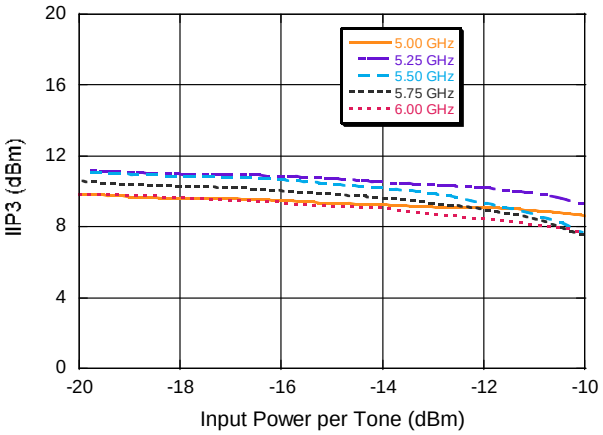
R_X Input IP3, Gain Mode @ -40°C



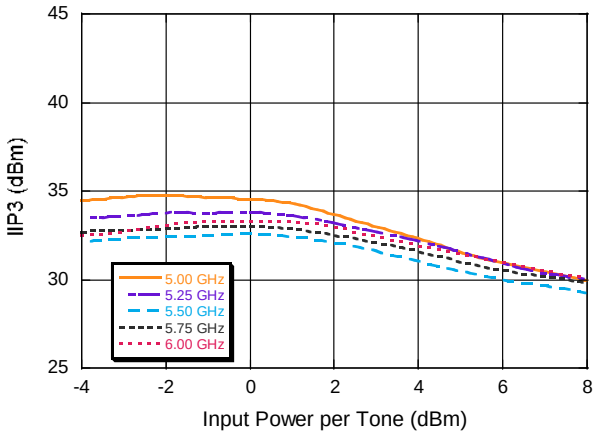
R_X Input IP3, Bypass Mode @ -40°C



R_X Input IP3, Gain Mode @ +85°C

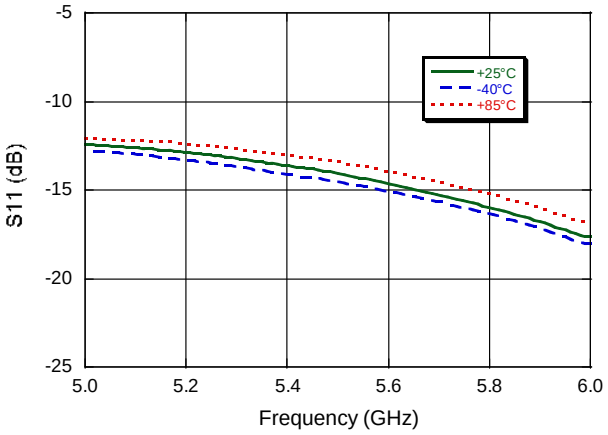


R_X Input IP3, Bypass Mode @ +85°C

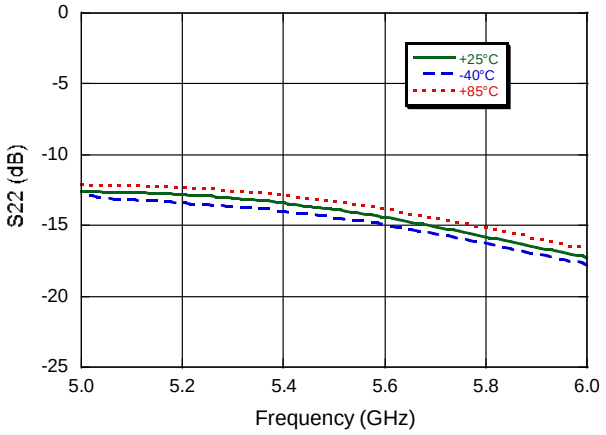


Typical Performance Curves:

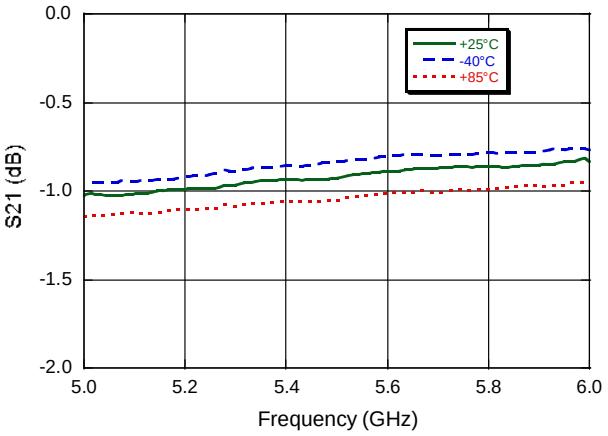
T_X Input Return Loss



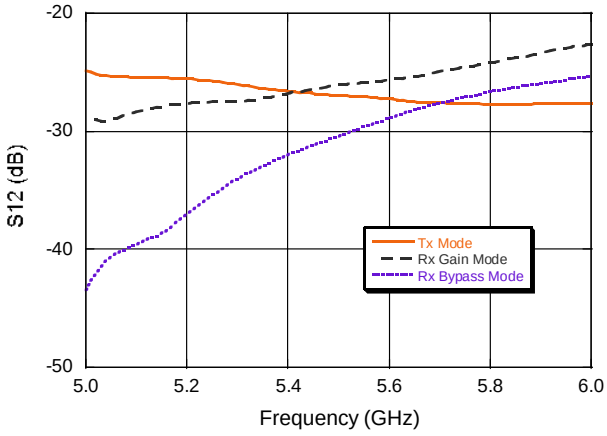
T_X Output Return Loss



T_X Insertion Loss



T_X - R_X Isolation



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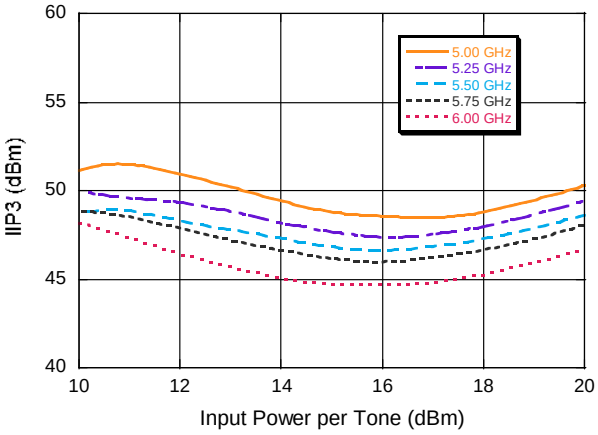
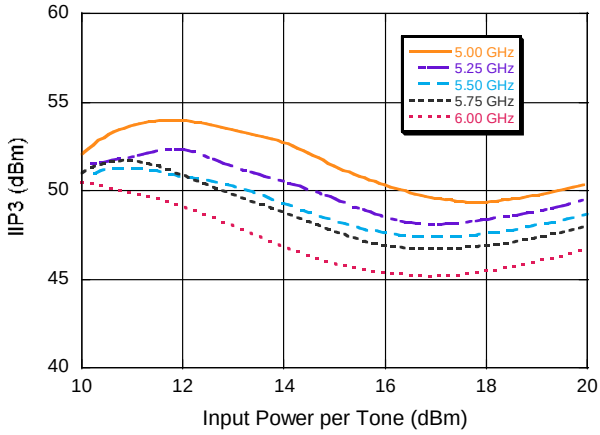
Typical Performance Curves:

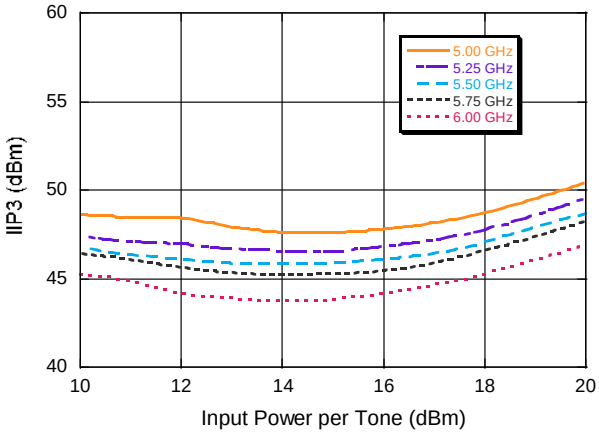
T_X Input IP3 @ +25°C



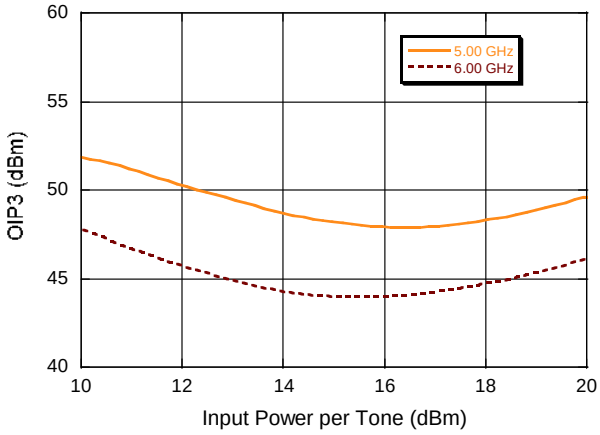
T_X Input IP3 @ -40°C



T_X Input IP3 @ +85°C



T_X Output IP3 @ +25°C



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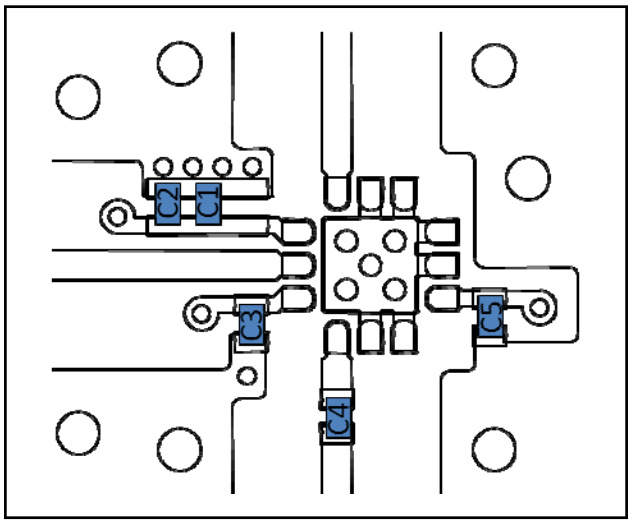
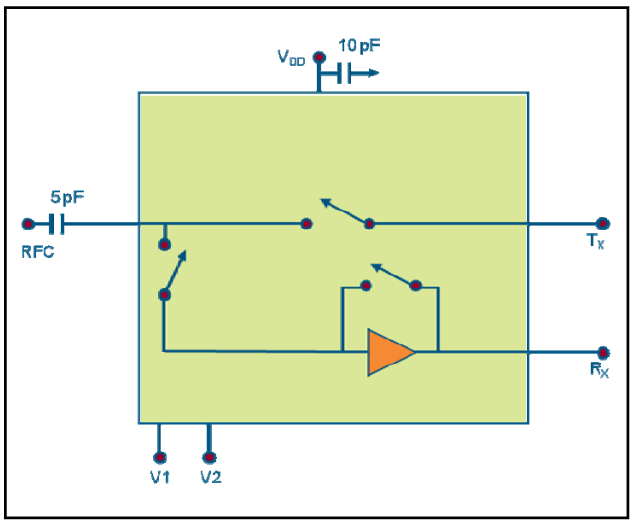
Recommended Sample Board[9]



Functional Schematic



9. Place C1 and C2 as shown.

Parts List

Component	Value	Case Size
C1	10 pF	0201
C2, C3, C5	0.1 µF	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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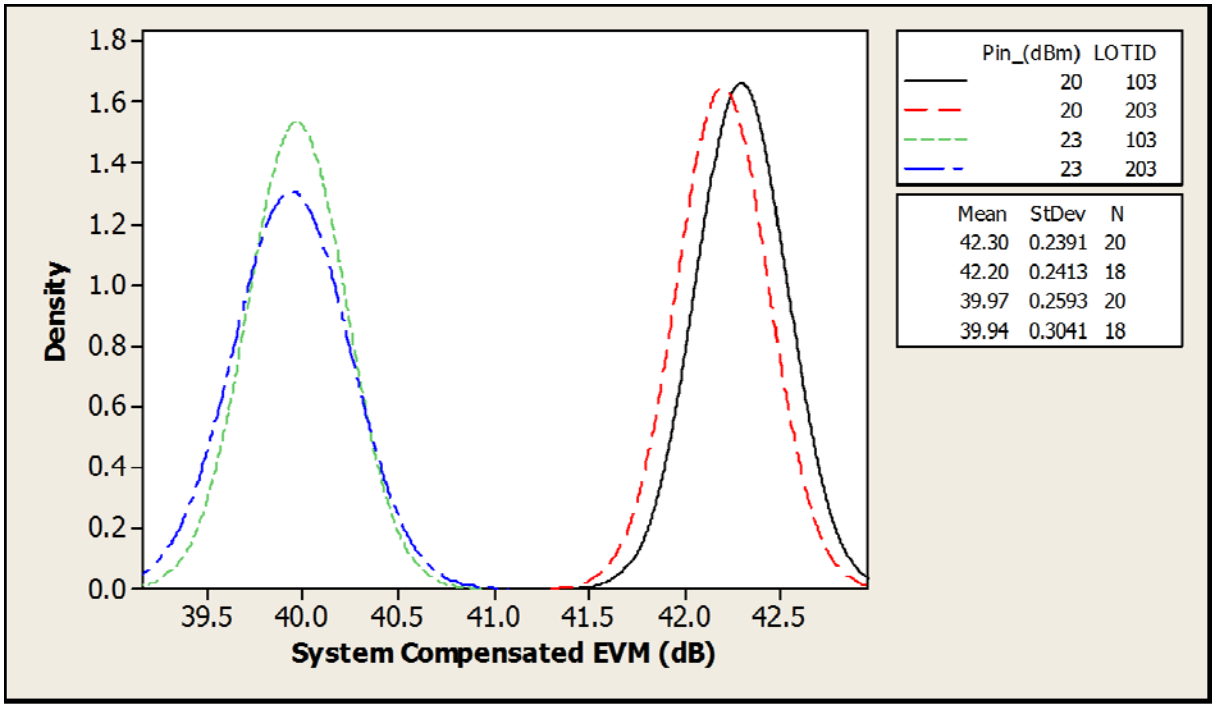
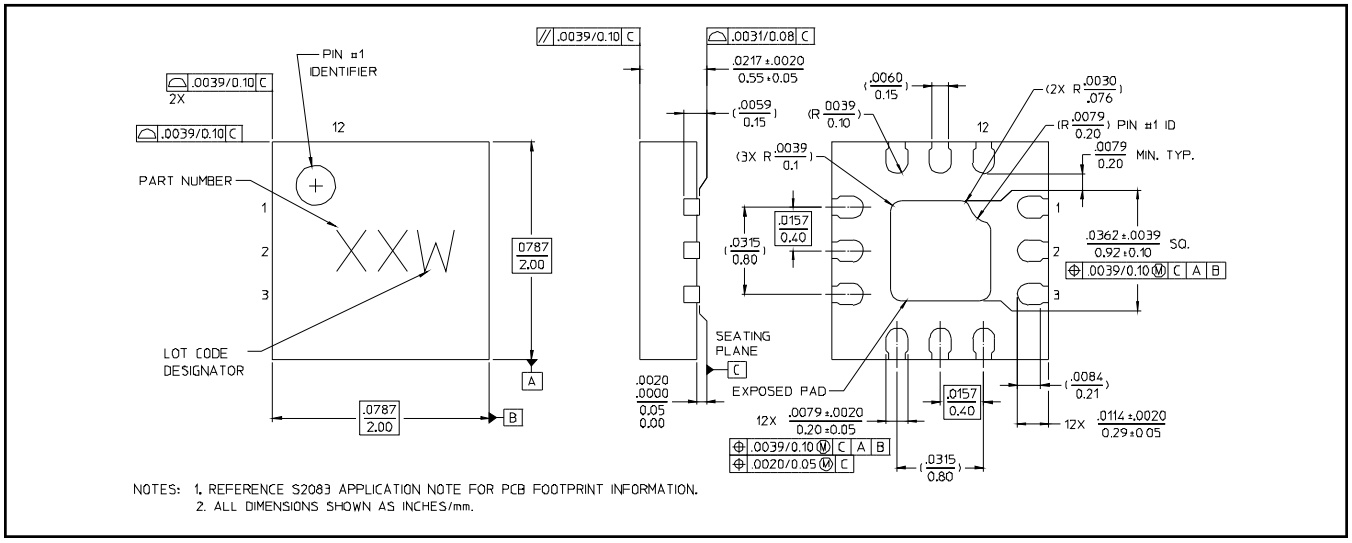
System Compensated EVM, 802.11AC 80 MHz / 256 QAM



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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