



MH203A

High Linearity Cellular-Band MMIC Mixer

The Communications Edge™

Product Information

Product Features

- +34 dBm IIP3
- RF: 800 – 960 MHz
- LO: 1000 – 1310 MHz
- IF: 200 – 350 MHz
- +17 dBm Drive Level
- Lead-free/Green SOIC8 package
- No External Bias Required

Applications

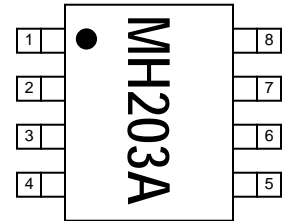
- 2.5G and 3G GSM/CDMA/wCDMA Mobile Infrastructure

Product Description

The MH203A is a passive GaAs MESFET mixer that provides high dynamic range performance in a low-cost lead-free/green/RoHS-compliant SOIC-8 package. WJ's MH203A uses patented techniques to realize +34 dBm Input IP3 at an LO drive level of +17 dBm and can be used for upconverting or downconverting high-side LO applications. This single monolithic integrated circuit does not require any external baluns or bias elements.

Typical applications include frequency up/down conversion, modulation and demodulation for receivers and transmitters used in 2.5G and 3G GSM/CDMA/wCDMA mobile infrastructure in the cellular frequency band.

Functional Diagram



Function	Pin No.
LO	2
IF & RF*	7
GND	1, 3, 4, 6, 8
N/C or GND	5

* External components (inductors & capacitors) are required to diplex the signal

Specifications ⁽¹⁾

Parameters	Units	Min	Typ	Max	Comments
RF Frequency Range	MHz		800 – 960		
LO Frequency Range	MHz		1000 – 1310		
IF Frequency Range	MHz		200 – 350		
SSB Conversion Loss	dB		7.3	8.5	
Noise Figure	dB		7.8	9.0	See note 2
Input IP3	dBm	+28	+31.5		RF=900-960MHz, IF>300MHz, See note 3
Input IP3	dBm	+30	+34		All other RF/IF combinations, See note 3
Input P1dB	dBm		+17.5		
2*LO – RF Isolation	dB		35		Referenced to the LO level at the RF port
LO – RF Isolation	dB	25	30		
LO – IF Isolation	dB	50	60		
RF – IF Isolation	dB		25		
Return Loss: RF Port	dB	10	20		See note 4
Return Loss: IF Port	dB	10	23		See note 4
Return Loss: LO Port	dB	10	15		LO=1064-1089MHz, See note 5
LO Drive Level	dBm		+17		

Test conditions unless otherwise noted:

1. Performance is with the use of an application specific circuit (shown on page 4) with a high-side LO at +17 dBm in a downconverting application at 25° C.
2. Assumes LO injection noise is filtered at the thermal noise floor, -174 dBm/Hz, at the RF, IF, and Image frequencies.
3. IIP3 is measured with $\Delta f = 1$ MHz with $RF_{in} = 0$ dBm / tone.
4. The return loss is measured after the diplexer which splits the RF and IF signals from the mixer. Details of the 6-element diplexing circuit are shown on page 4.
5. The minimum LO port return loss is 9 dB for LO=1000-1064MHz and LO=1089-1310MHz.

Absolute Maximum Rating

Parameter	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-65 to +100 °C
LO Power	+21 dBm
Input IF / RF Power	+20 dBm

Operation of this device above any of these parameters may cause permanent damage.

Ordering Information

Part No.	Description
MH203A*	High Dynamic Range Cellular-band MMIC Mixer (lead-tin SOIC-8 package)
MH203A-G	High Dynamic Range Cellular-band MMIC Mixer (lead-free/green/RoHS-compliant SOIC-8 package)
MH203A-PCB	Fully-Assembled Mixer Application Board

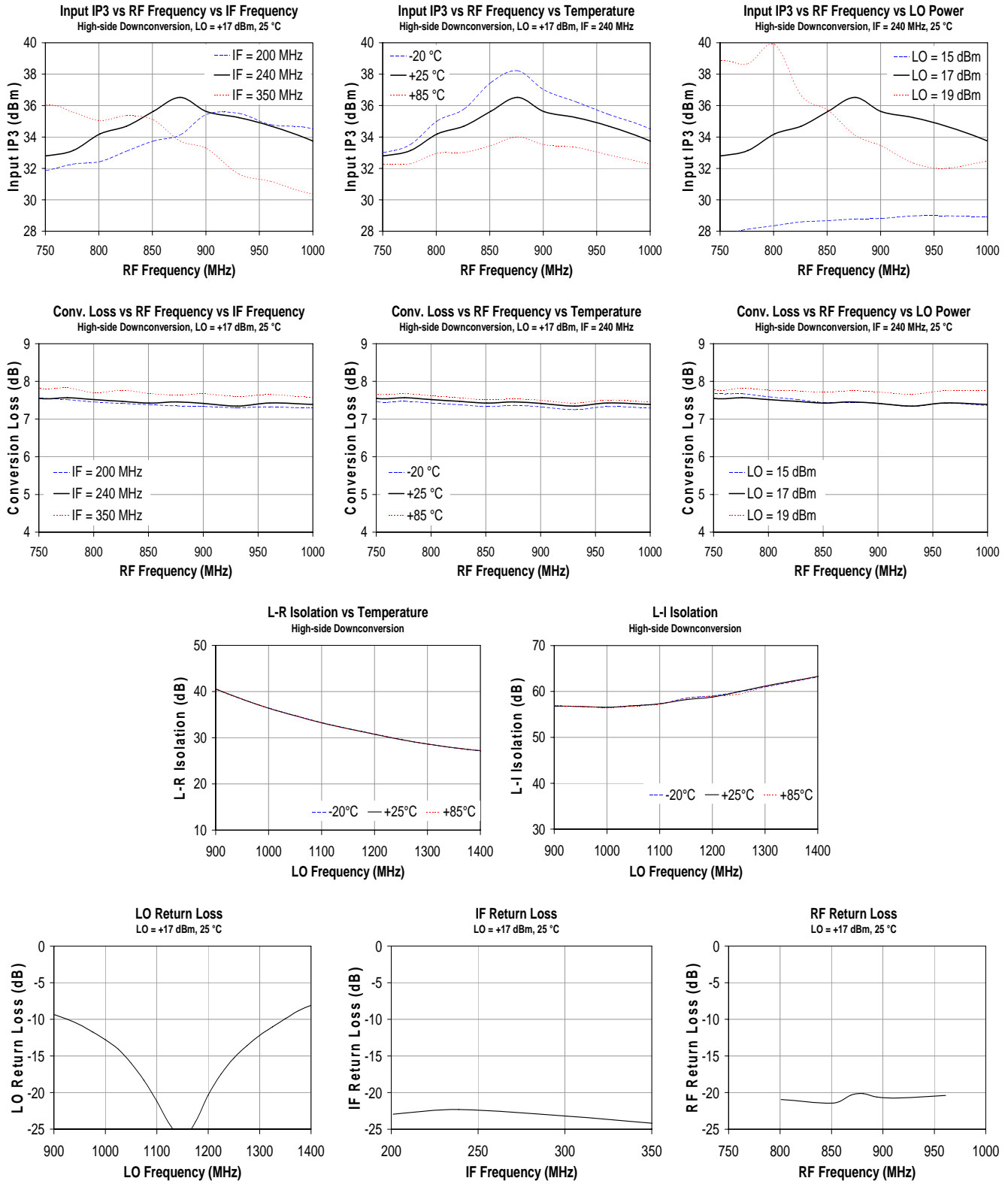
* This package is being phased out in favor of the green package type which is backward compatible for existing designs.

Specifications and information are subject to change without notice



Typical Downconversion Performance Plots

Performance using the MH203A with the 6-element diplexer shown on page 4

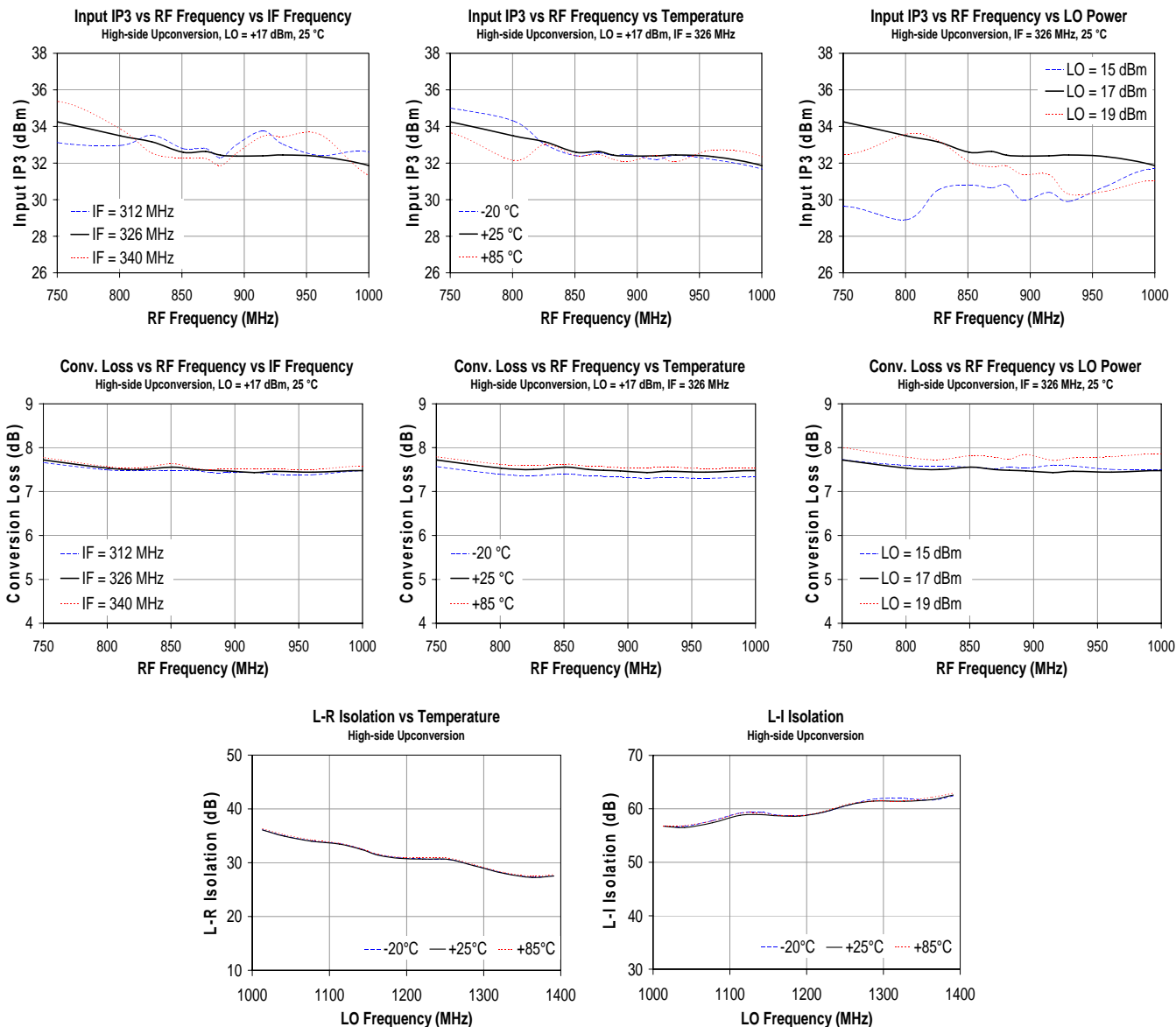


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Typical Upconversion Performance Plots

Performance using the MH203A with the 6-element diplexer shown on page 4





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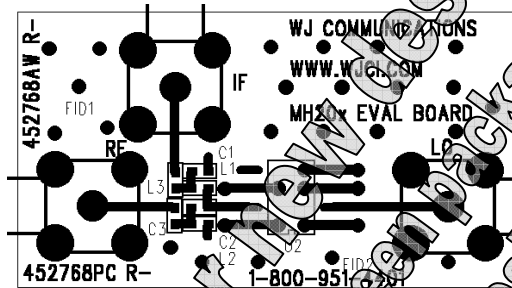
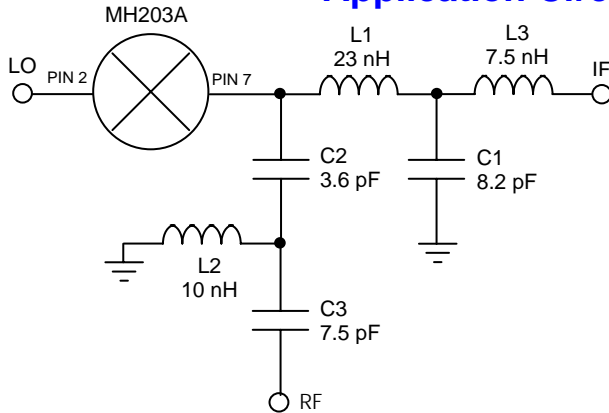
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Product Information

MH203A (Tin-Lead SOIC-8 Package) Mechanical Information

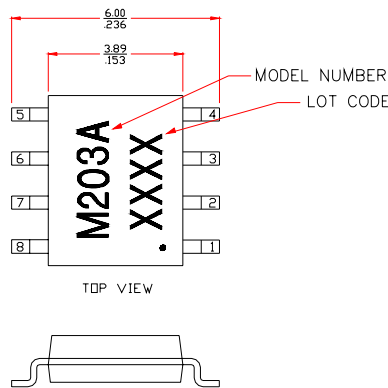
This package may contain lead-bearing materials. The plating material on the leads is SnPb.

Application Circuit (MH203A-PCB)



Circuit Board Material: .017" FR-4, 4 Layers, .062" max thickness
 All passive components are 0402 size
 All other pins on mixer are grounded.

Outline Drawing



Product Marking

The component will be marked with an "M203A" designator followed by an alphanumeric lot code on the top surface of the package.

Tape and reel specifications for this part are located on the website in the "Application Notes" section.

ESD / MSL Information



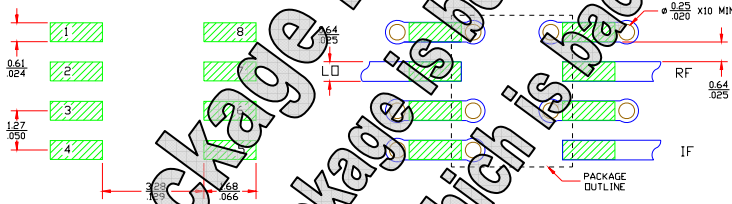
Caution! ESD sensitive device.

ESD Classification: Class 1B
 Value: Passes $\geq 500V$ to $<1000V$
 Test: Human Body Model (HBM)
 Standard: JEDEC Standard JESD22-A114

ESD Classification: Class III
 Value: Passes $\geq 500V$ to $<1000V$
 Test: Charged Device Model (CDM)
 Standard: JEDEC Standard JESD22-C101

MSL Rating: Level 3 at $+235^\circ C$ convection reflow
 Standard: JEDEC Standard J-STD-020B

Mounting Configuration and System



1. Ground vias are required for RF grounding considerations.
2. A minimum of two ground vias are required for 14 mil and 28 mil FR4 board.
3. Trace width depends on PCB board.

Functional Pin Layout

Pin	Function
1	Ground
2	LO Port
3	Ground
4	Ground
5	No Connect / Ground
6	Ground
7	RF / IF Port*
8	Ground

* External components (inductors & capacitors) are required to diplex the signal

Specifications and information are subject to change without notice



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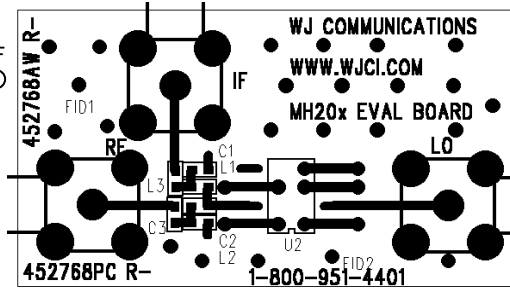
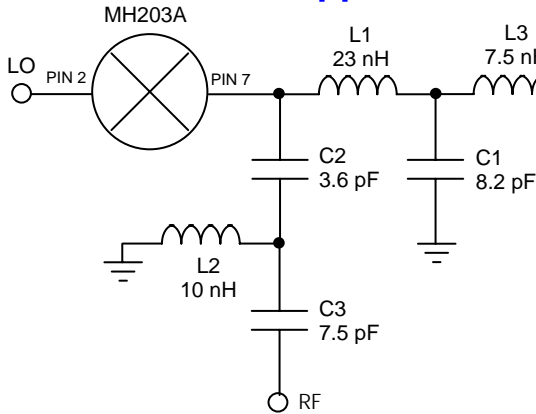
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Product Information

MH203A-G (Lead-Free/Green SOIC-8 Package) Mechanical Information

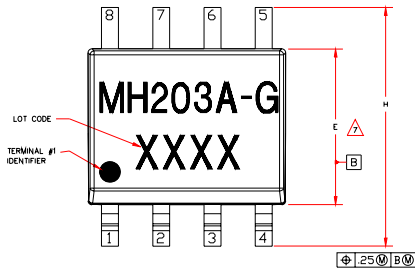
This package is lead-free/green/RoHS-compliant. The plating material on the leads is NiPdAu. It is compatible with both lead-free (maximum 260°C reflow temperature) and lead (maximum 245°C reflow temperature) soldering processes.

Application Circuit (MH203A-PCB)

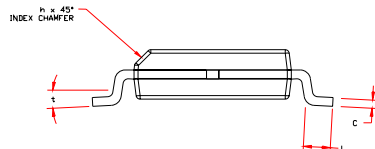
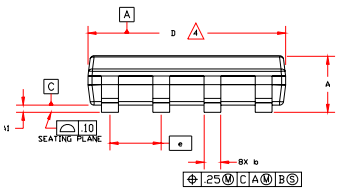


Circuit Board Material: .014" FR-4, 4 layers, .062" total thickness
All passive components are 0402 size.
All other pins on mixer are grounded.

Outline Drawing



- NOTES:
- EXCEPT WHERE NOTED, THIS PART OUTLINE CONFORMS TO JEDEC STANDARD MS-012, ISSUE C FOR SMALL OUTLINE (SMD) PERIPHERAL TERMINALS 3.75mm BODY WIDTH (PLASTIC).
 - DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.4M-1994.
 - ALL DIMENSIONS ARE IN MILLIMETERS. ANGLES ARE IN DEGREES.
 - DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS, WHICH SHALL NOT EXCEED .15mm(.006") PER SIDE.
 - DEVIATION FROM JEDEC MS-012 STANDARD:
 - LENGTH OF TERMINAL FOR SOLDERING TO A SUBSTRATE.
 - DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS, WHICH SHALL NOT EXCEED .25mm(.010") PER SIDE.



SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.30	1.40	.051	.055
A1	.10	.25	.004	.010
b	.016			
C	.20			
D	4.80	5.00	.189	.197
E	3.90	4.00	.150	.157
e	1.27 BSC .050 BSC			
H	5.80	6.20	.228	.244
h	.25	.50	.01	.02
L	.40	1.27	.016	.050
t	0	8"	0	8"

Product Marking

The component will be marked with an "MH203A-G" designator followed by an alphanumeric lot code on the top surface of the package.

Tape and reel specifications for this part are located on the website in the "Application Notes" section.

ESD / MSL Information



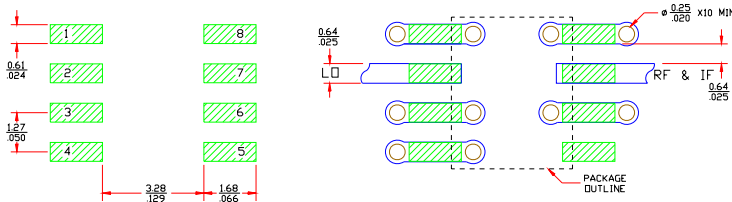
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ESD Classification: Class 1B
 Value: Passes $\geq 500V$ to $<1000V$
 Test: Human Body Model (HBM)
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ESD Classification: Class III
 Value: Passes $\geq 500V$ to $<1000V$
 Test: Charged Device Model (CDM)
 Standard: JEDEC Standard JESD22-C101

MSL Rating: Level 2 at $+260^\circ C$ convection reflow
 Standard: JEDEC Standard J-STD-020B

Land Pattern / Mounting Configuration



- Notes: 1. Ground vias are critical for RF grounding considerations.
 2. A minimum of 10 ground vias are required for 14 mil and 28 mil FR4 board.
 3. Trace width depends on PCB board.

Functional Pin Layout

Pin	Function
1	Ground
2	LO Port
3	Ground
4	Ground
5	No Connect / Ground
6	Ground
7	RF / IF Port*
8	Ground

* External components (inductors & capacitors) are required to diplex the signal

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