MH203A

High Linearity Cellular-Band MMIC Mixer *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

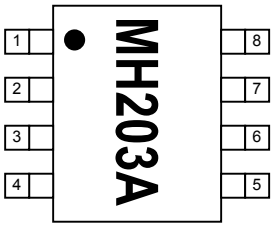
- 2.5G and 3G GSM/CDMA/ wCDMA Mobile Infrastructure

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 Δf = 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

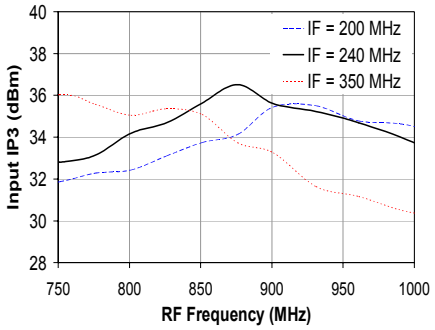
* This package is being phased out in favor of the green package type which is backward compatible for existing designs.

Specifications and information are subject to change without notice

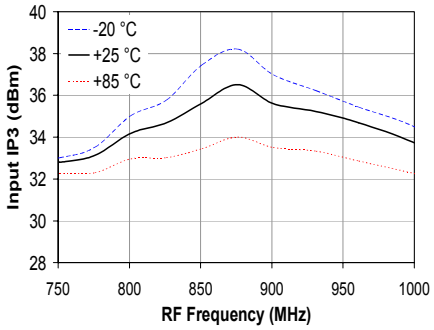
Typical Downconversion Performance Plots

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

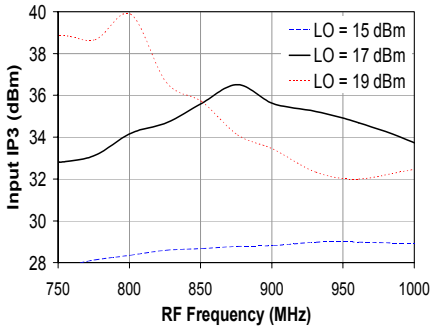
Input IP3 vs RF Frequency vs IF Frequency
High-side Downconversion, LO = +17 dBm, 25 °C



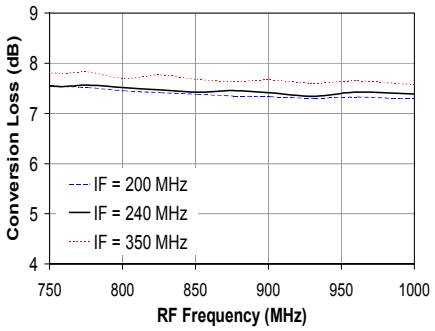
Input IP3 vs RF Frequency vs Temperature
High-side Downconversion, LO = +17 dBm, IF = 240 MHz



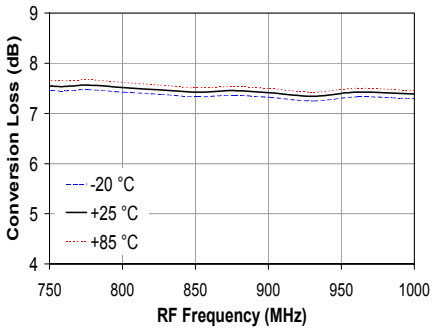
Input IP3 vs RF Frequency vs LO Power
High-side Downconversion, IF = 240 MHz, 25 °C



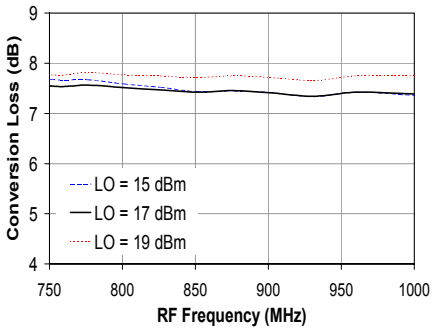
Conv. Loss vs RF Frequency vs IF Frequency
High-side Downconversion, LO = +17 dBm, 25 °C



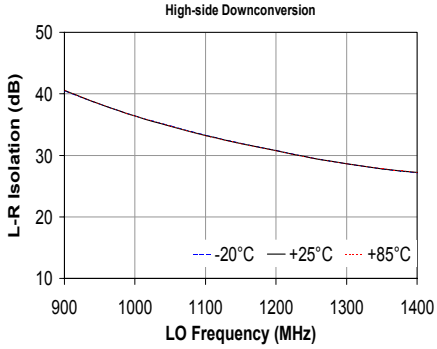
Conv. Loss vs RF Frequency vs Temperature
High-side Downconversion, LO = +17 dBm, IF = 240 MHz



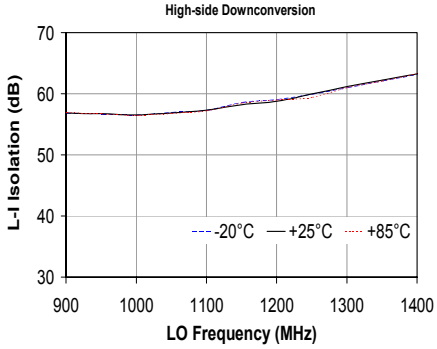
Conv. Loss vs RF Frequency vs LO Power
High-side Downconversion, IF = 240 MHz, 25 °C



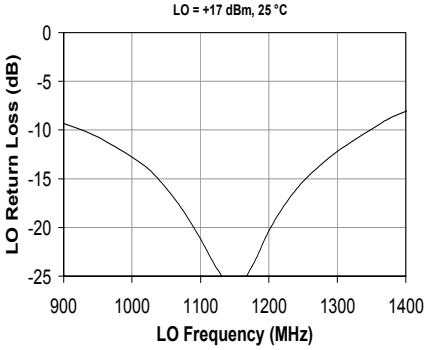
L-R Isolation vs Temperature
High-side Downconversion



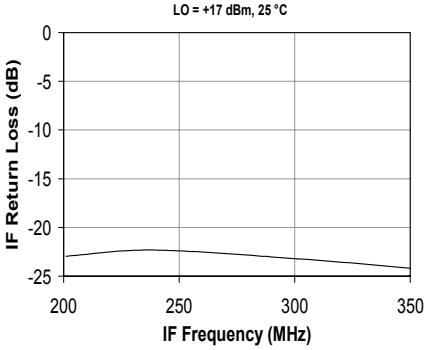
L-I Isolation
High-side Downconversion



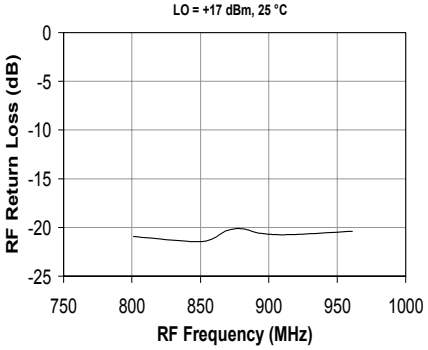
LO Return Loss
LO = +17 dBm, 25 °C



IF Return Loss
LO = +17 dBm, 25 °C



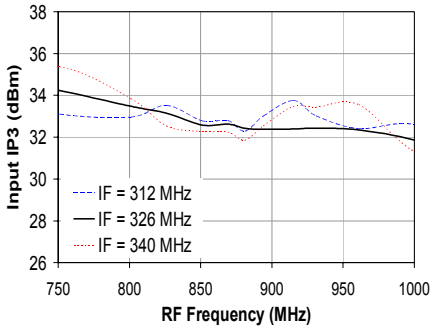
RF Return Loss
LO = +17 dBm, 25 °C



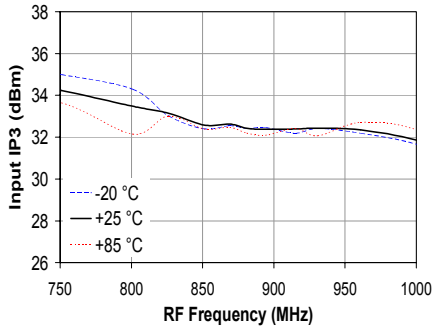
Typical Upconversion Performance Plots

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

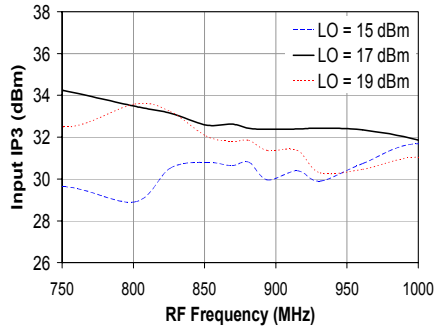
Input IP3 vs RF Frequency vs IF Frequency
High-side Upconversion, LO = +17 dBm, 25 °C



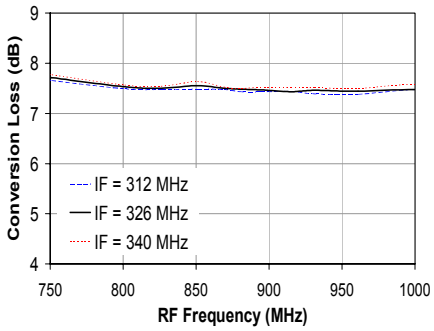
Input IP3 vs RF Frequency vs Temperature
High-side Upconversion, LO = +17 dBm, IF = 326 MHz



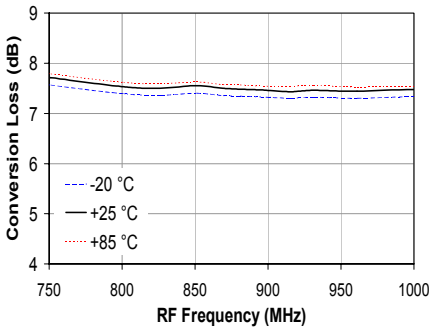
Input IP3 vs RF Frequency vs LO Power
High-side Upconversion, IF = 326 MHz, 25 °C



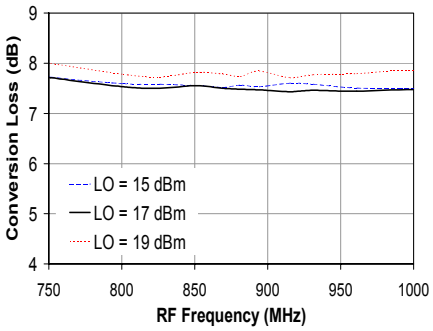
Conv. Loss vs RF Frequency vs IF Frequency
High-side Upconversion, LO = +17 dBm, 25 °C



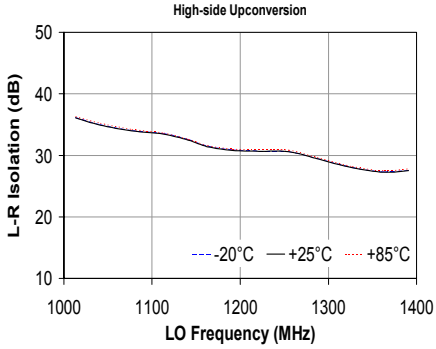
Conv. Loss vs RF Frequency vs Temperature
High-side Upconversion, LO = +17 dBm, IF = 326 MHz



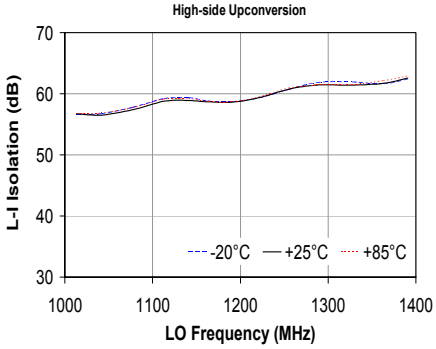
Conv. Loss vs RF Frequency vs LO Power
High-side Upconversion, IF = 326 MHz, 25 °C



L-R Isolation vs Temperature
High-side Upconversion



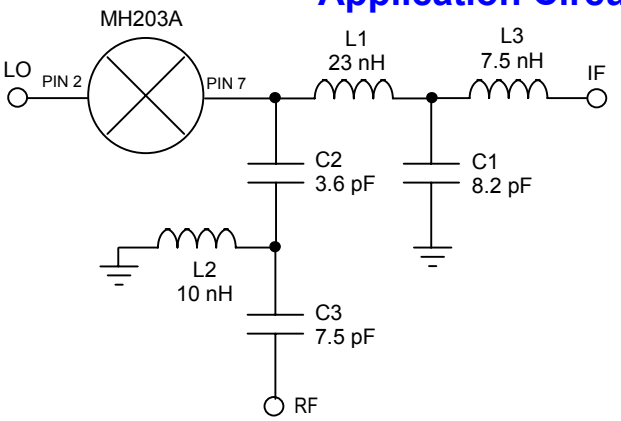
L-I Isolation
High-side Upconversion

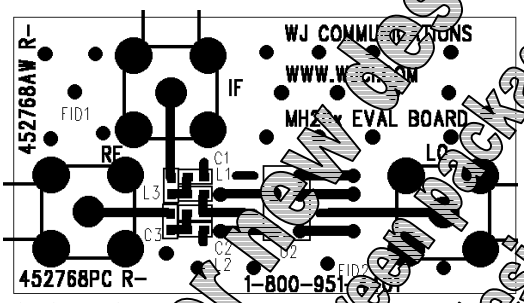


MH203A (Tin-Lead SOIC-8 Package) Mechanical Information

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

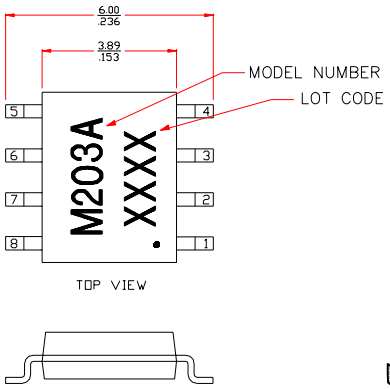
Application Circuit (MH203A-PCB)





Circuit Board Material: 6/4" FR-4, 4 layers, .062" total thickness
All passive components are 0402 size.
All other pins on mixer are grounded.

Outline Drawing

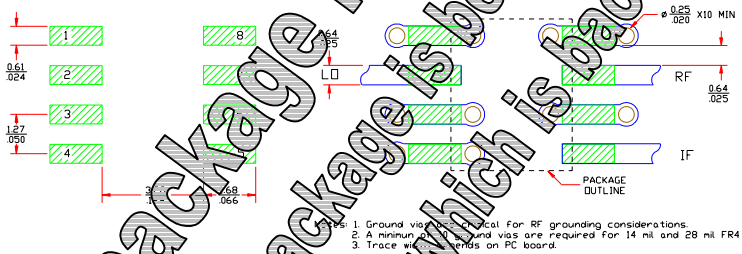


Product Marking

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.

Mounting Configuration / Land Pattern



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 widths depends on PC board.

ESD / MSL Information

Caution! ESD sensitive device.

ESD Classification:	Class 1B
Value:	Passes /500V to <1000 V
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114
ESD Classification:	Class III
Value:	Passes /500 V to <1000 V
Test:	Charged Device Model (CDM)
Standard:	JEDEC Standard JESD22-C101
MSL Rating:	Level 3 at +235 °C convection reflow
Standard:	JEDEC Standard J-STD-020B

Functional Pin Layout

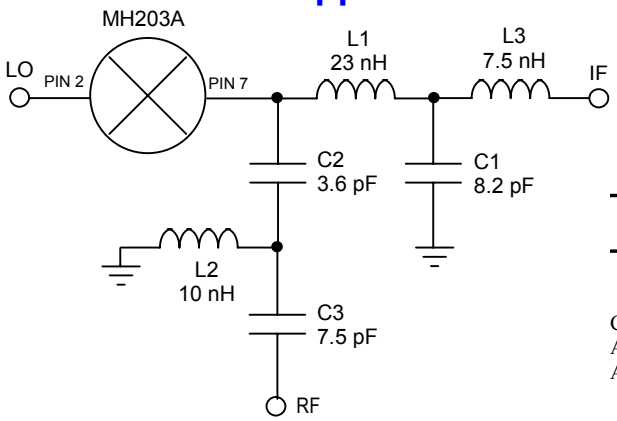
Pin	Function
1	Ground
2	LO Port
3	Ground
4	Ground
5	No Connect / Ground
6	Ground
7	RF / IF Port*
8	Ground

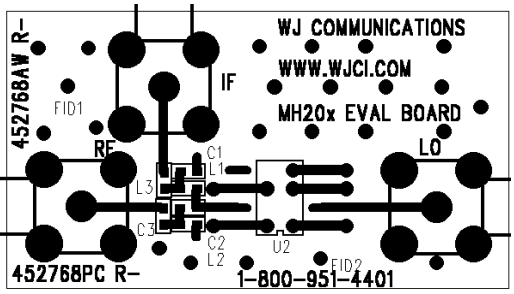
* External components (inductors & capacitors) are required to diplex the signal

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.

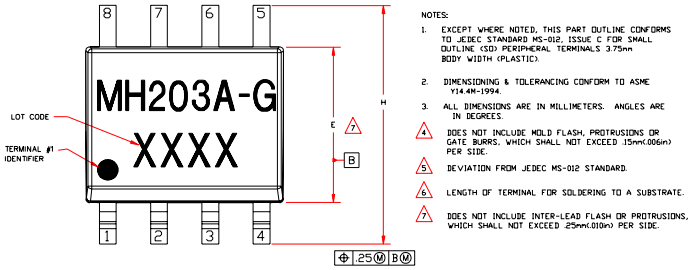
Application Circuit (MH203A-PCB)

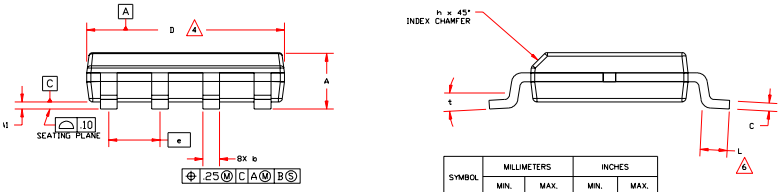




Circuit Board Material: .014" FR-4, 4 layers, .062" total thickness
All passive components are 0402 size.
All other pins on mixer are grounded.

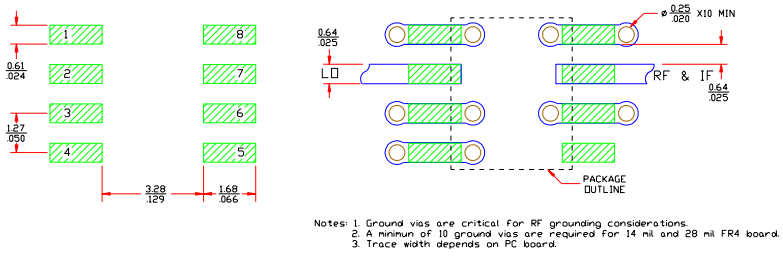
Outline Drawing





SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.30	1.40	.051	.055
A1	.10	.25	.004	.010
b	.41		.016	
C	.20		.008	
D	4.80	5.00	.189	.197
E	3.80	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°

Land Pattern / Mounting Configuration



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Test:	Charged Device Model (CDM)
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