MH103A

High Dynamic Range UMTS-Band MMIC Mixer

The Communications Edge ™

Product Information

Product Features

- +34 dBm IIP3
- RF: 1900 – 2200 MHz
- LO: 1600 – 2150 MHz
- IF: 50 – 300 MHz
- +17 dBm Drive Level
- Lead-free/Green SOIC8 package
- No External Bias Required

Applications

- Mobile Infrastructure

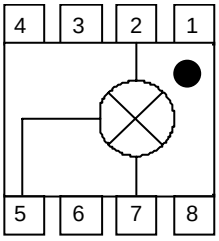
Product Description

The MH103A 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 MH103A uses patented techniques to realize +34 dBm Input IP3 at an LO drive level of +17 dBm.

This single monolithic integrated circuit does not require any external baluns, bias, matching, or decoupling elements. The on-chip diplexer affords good matching on the RF and IF ports.

Typical applications include frequency up/down conversion, modulation and demodulation for receivers and transmitters used in 3G UMTS systems.

Functional Diagram



Function	Pin No.
LO	2
IF	5
RF	7
GND	1, 3, 4, 6, 8

Specifications (1)

Parameter	Units	Min	Typ	Max	Comments
RF Frequency Range	MHz		1900 – 2200		
LO Frequency Range	MHz		1600 – 2150		
IF Frequency Range	MHz		50 – 300		
SSB Conversion Loss	dB		8.2	9.0	See note 1
Noise Figure	dB		8.7		See note 2
Input IP3	dBm	+28	+34		See note 1, 3
Input P1dB	dBm		+16		
LO – RF Isolation	dB	21	28		
LO – IF Isolation	dB	27	37		
RF – IF Isolation	dB	12	18		
Return Loss: RF Port	dB		15		
Return Loss: IF Port	dB		20		
Return Loss: LO Port	dB		12		
LO Drive Level	dBm		+17		

1. Test conditions unless otherwise noted: RF / IF = 1900 / 50, 1900 / 200, 2200 / 50, and 2200 / 300 MHz with a low-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.

Absolute Maximum Rating

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

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

Ordering Information

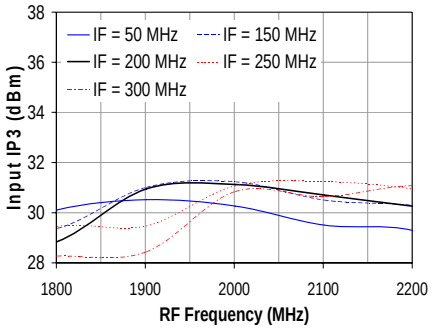
Part No.	Description
MH103A*	High Dynamic Range UMTS-band MMIC Mixer (lead-tin SOIC-8 package)
MH103A-G	High Dynamic Range UMTS-band MMIC Mixer (lead-free/green/RoHS-compliant SOIC-8 package)
MH103A-PCB	Fully-Assembled Mixer Application Board

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

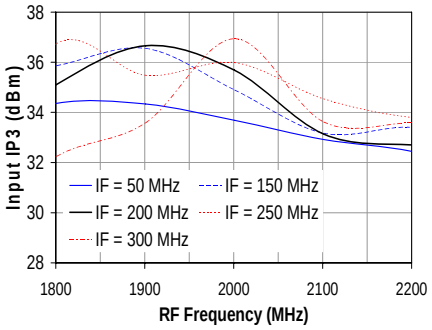
Specifications and information are subject to change without notice

Typical Performance Plots: Low-side Downconversion

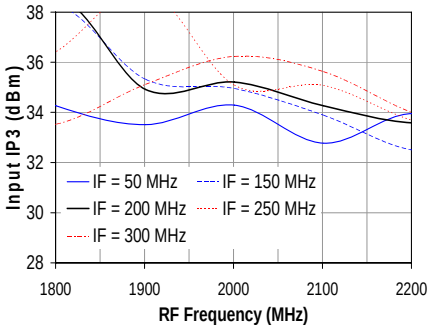
Input IP3 vs RF Frequency
Low-side Downconversion, LO = +15 dBm, 25 °C



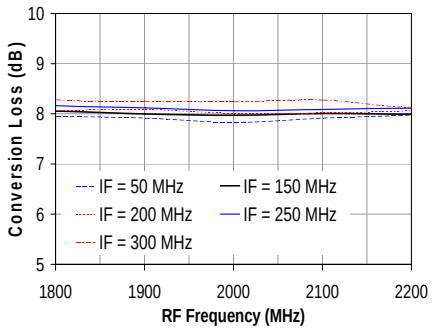
Input IP3 vs RF Frequency
Low-side Downconversion, LO = +17 dBm, 25 °C



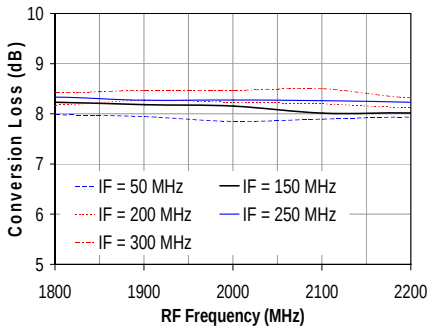
Input IP3 vs RF Frequency
Low-side Downconversion, LO = +19 dBm, 25 °C



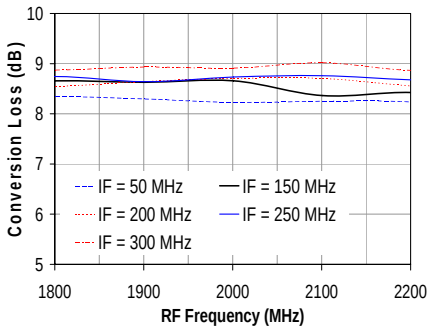
Conversion Loss vs RF Frequency
Low-side Downconversion, LO = +15 dBm, 25 °C



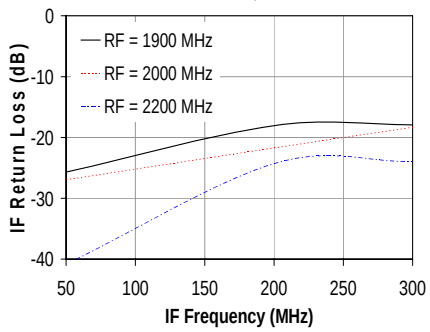
Conversion Loss vs RF Frequency
Low-side Downconversion, LO = +17 dBm, 25 °C



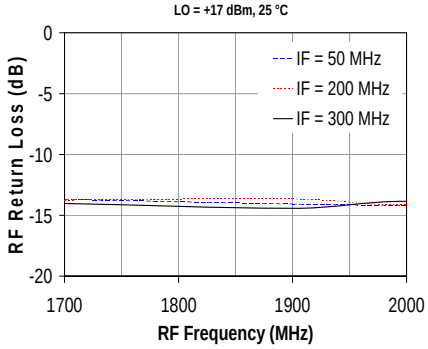
Conversion Loss vs RF Frequency
Low-side Downconversion, LO = +19 dBm, 25 °C



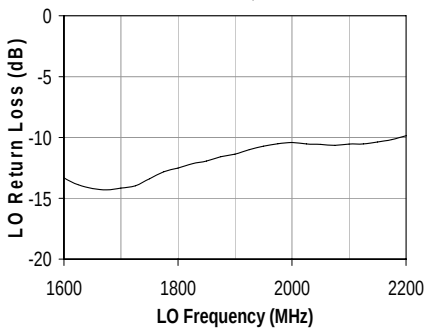
IF Return Loss
LO = +17 dBm, 25 °C



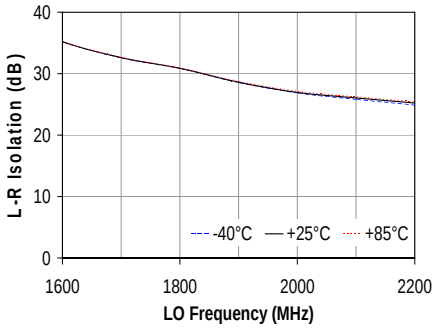
RF Return Loss
LO = +17 dBm, 25 °C



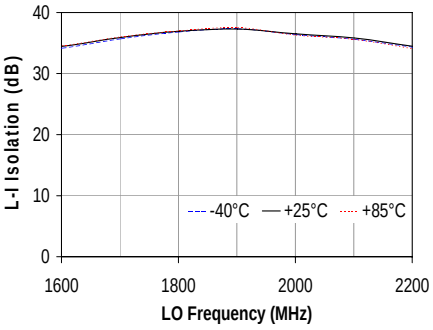
LO Return Loss
LO = +17 dBm, 25 °C



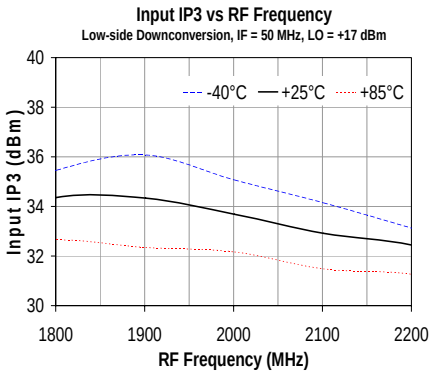
L-R Isolation
Low-side Downconversion

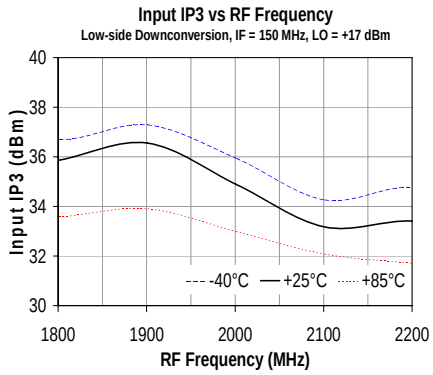


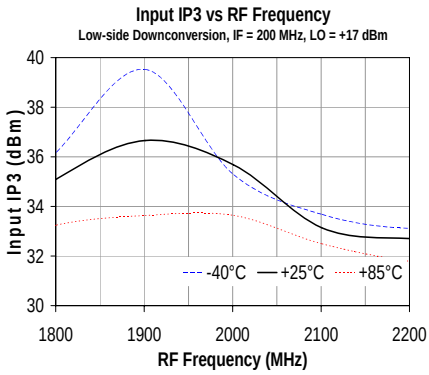
L-I Isolation
Low-side Downconversion

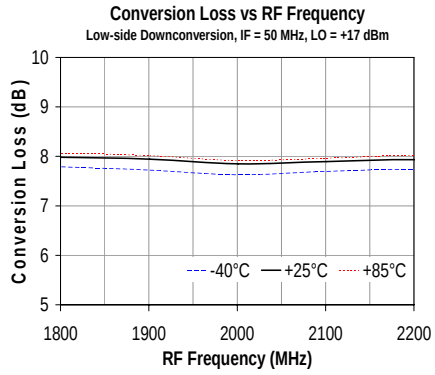


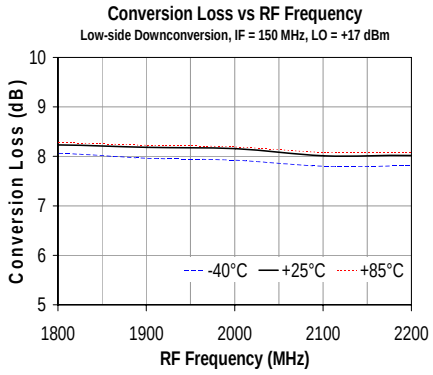
Typical Performance Plots over Temperature: Low-side Downconversion

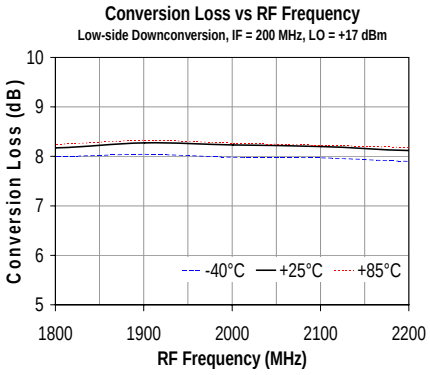


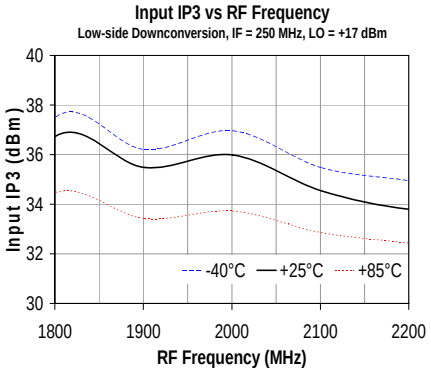


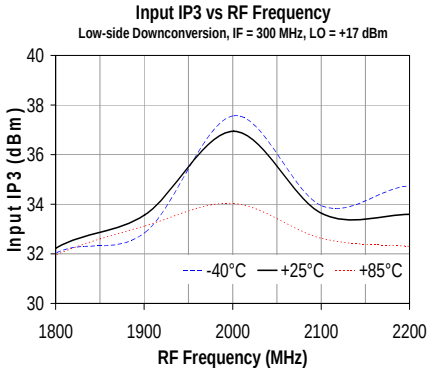


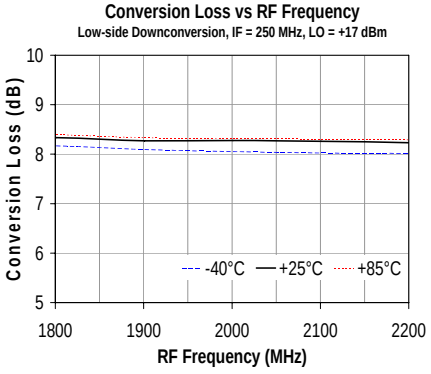


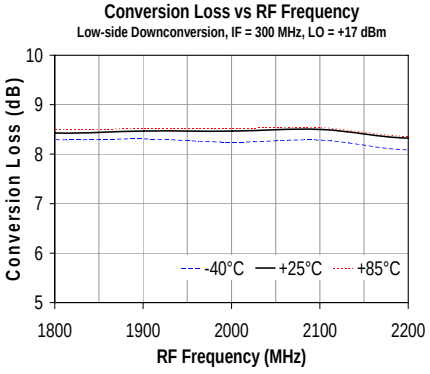








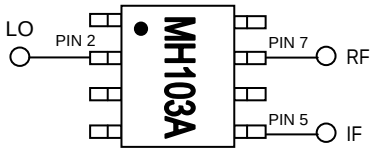




MH103A (SOIC-8 Package) Mechanical Information

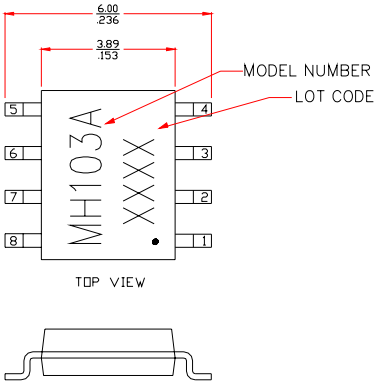
This package may contain lead-bearing materials. The plating material on the leads is SnPb.

Application Circuit (MH103A-PCB)



Notes:
1. All other pins on mixer are grounded.
2. Circuit board material: .014" FR-4, 4 layers, .062" total thickness
3. Blocking capacitors are required on the ports (pins 2, 5, 7) if any dc signal is present.

Outline Drawing



Product Marking

The component will be marked with an "MH103A" designator followed by an alphanumeric lot code on the top surface of the package.

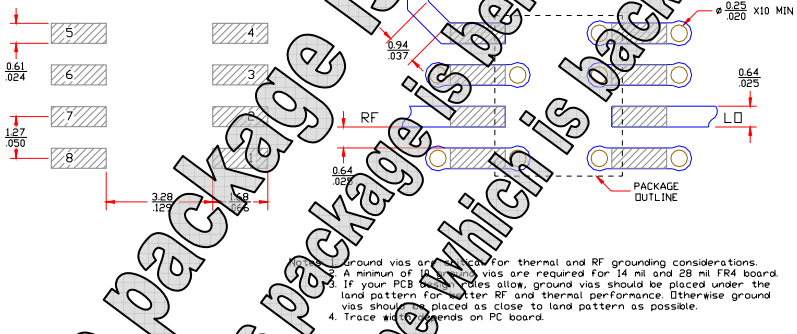
Tape and reel specifications for this part are located on the website in the "Application Notes" section.

ESD / MSL Information

Caution! ESD sensitive device.

ESD Classification:	Class 1B
Value:	Passes ≥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

Mounting Configuration / Land Pattern



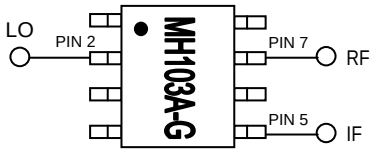
Functional Pin Layout

Pin	Function
1	Ground
2	LO Port
3	Ground
4	Ground
5	IF Port
6	Ground
7	RF Port
8	Ground

MH103A-G (Lead-Free Package) Mechanical Information

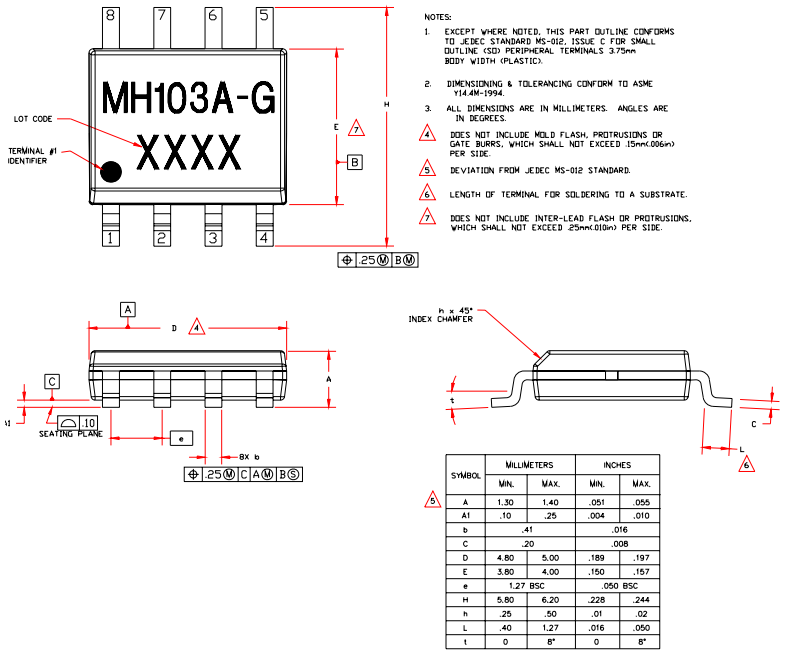
This package is lead-free/green/RoHS-compliant. The plating material on the leads is NiPdAu. It is compatible with both lead-free (maximum 260°C reflow temperature) and lead (maximum 245°C reflow temperature) soldering processes.

Application Circuit (MH103A-PCB)



Notes:
1. All other pins on mixer are grounded.
2. Circuit board material: .014" FR-4, 4 layers, .062" total thickness
3. Blocking capacitors are required on the ports (pins 2, 5, 7) if any dc signal is present.

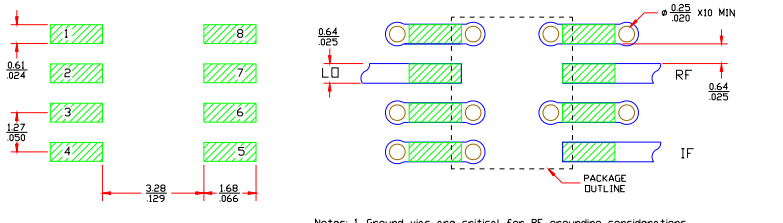
Outline Drawing



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

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



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

Product Marking

The component will be marked with an "MH103A-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

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 2 at +260 °C convection reflow
Standard:	JEDEC Standard J-STD-020B

Functional Pin Layout

Pin	Function
1	Ground
2	LO Port
3	Ground
4	Ground
5	IF Port
6	Ground
7	RF Port
8	Ground