



# 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

### Specifications <sup>(1)</sup>

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  $\Delta f = 1$  MHz with  $RF_{in} = 0$  dBm / tone.

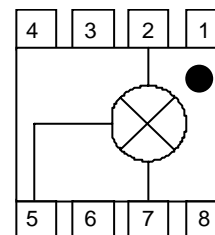
### Product Description

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

### 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



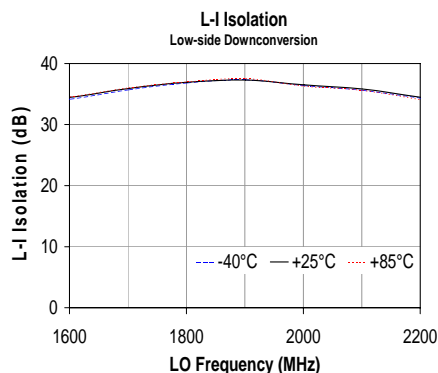
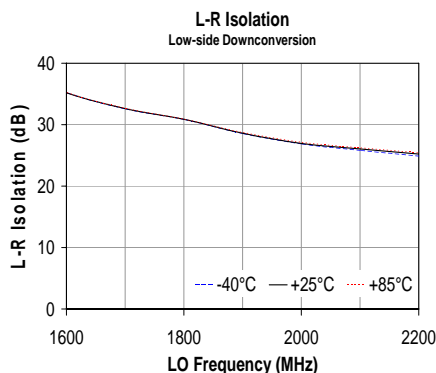
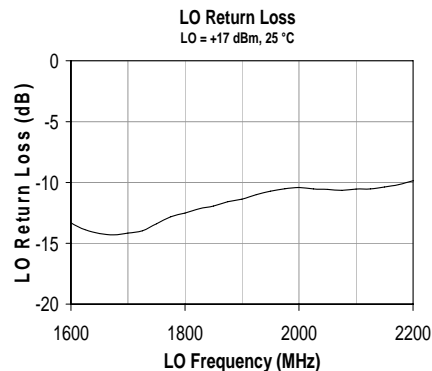
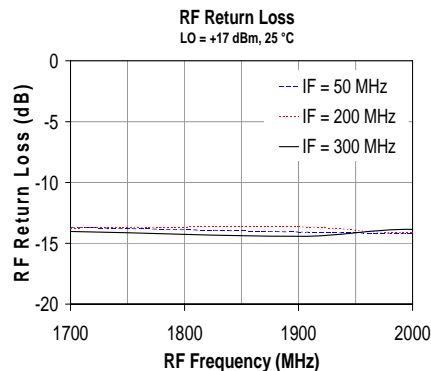
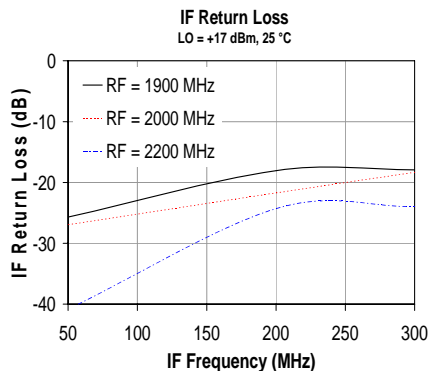
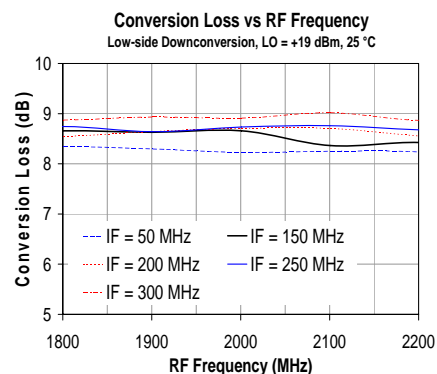
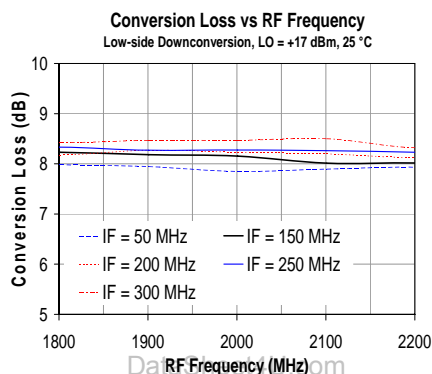
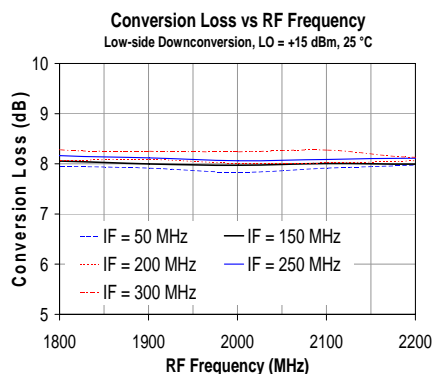
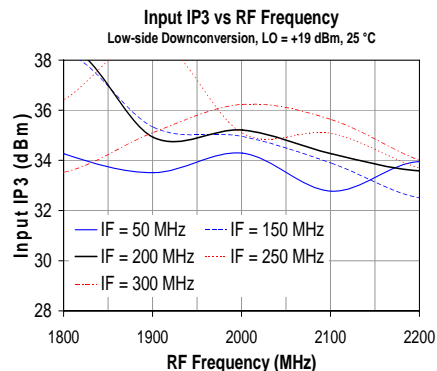
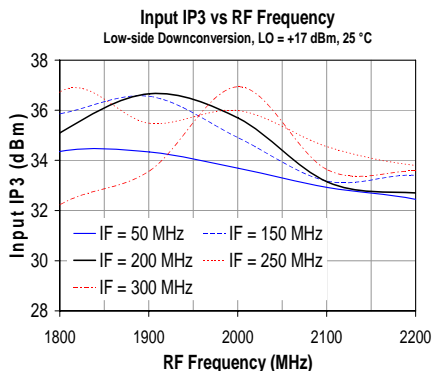
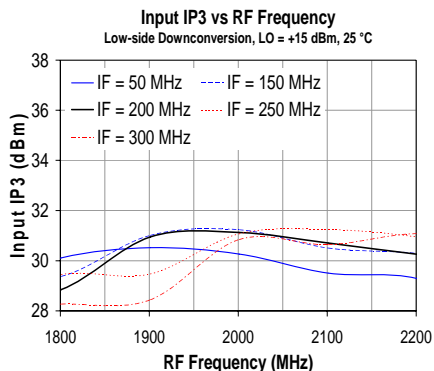
# MH103A

High Dynamic Range UMTS-Band MMIC Mixer

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Product Information

## Typical Performance Plots: Low-side Downconversion





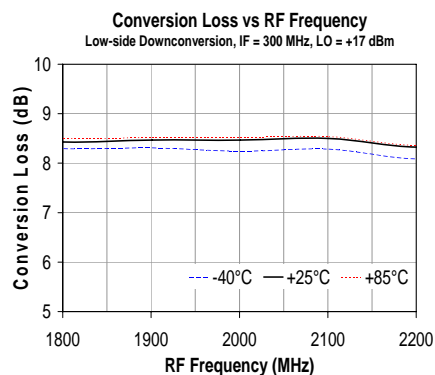
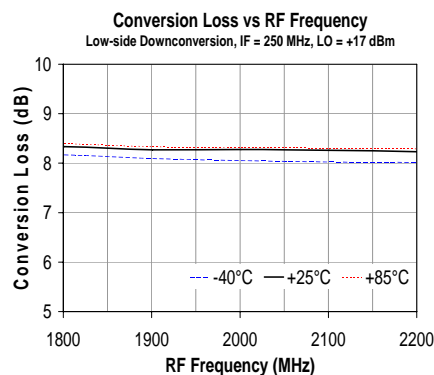
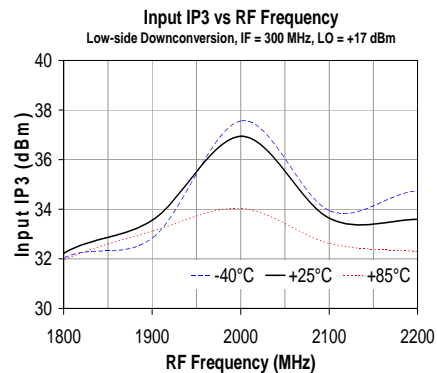
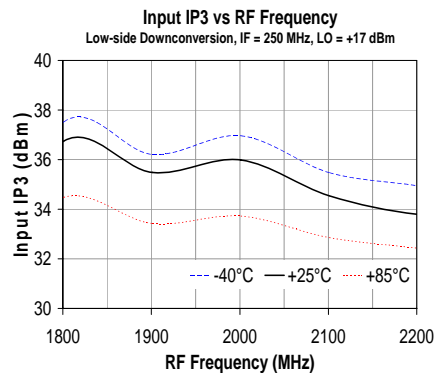
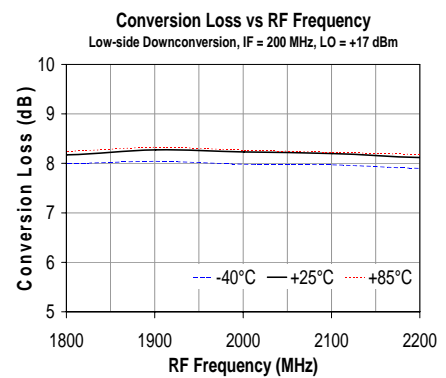
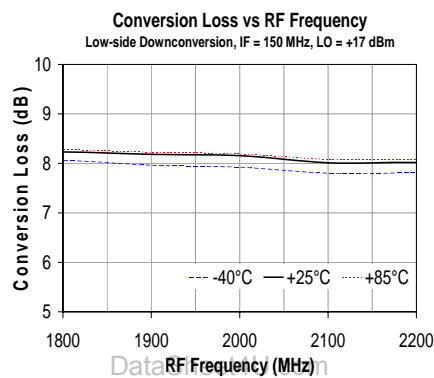
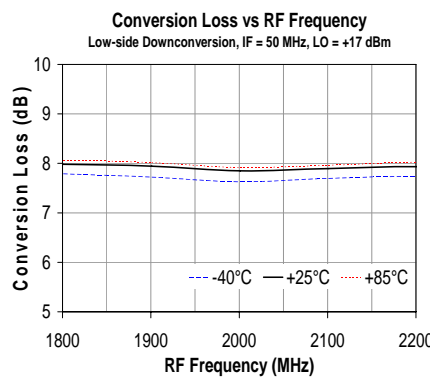
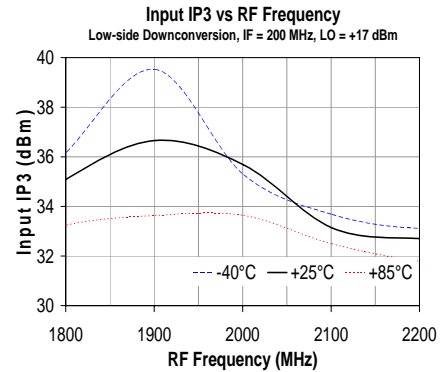
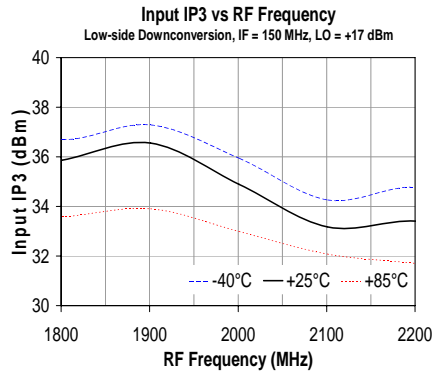
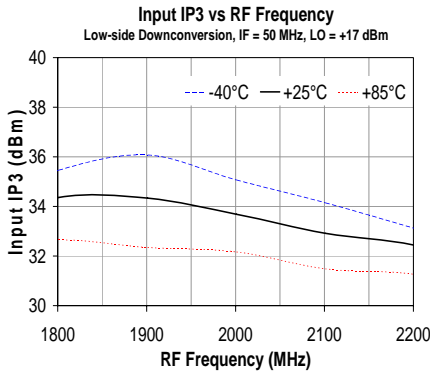
# MH103A

## High Dynamic Range UMTS-Band MMIC Mixer

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Product Information

### Typical Performance Plots over Temperature: Low-side Downconversion





# MH103A

High Dynamic Range UMTS-Band MMIC Mixer

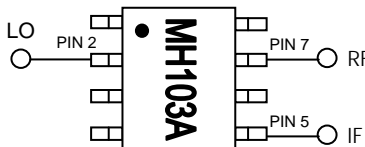
The Communications Edge™

Product Information

## MH103A (SOIC-8 Package) Mechanical Information

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

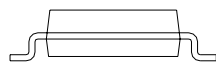
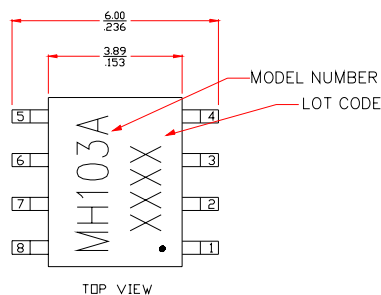
### Application Circuit (MH103A-PCB)



#### 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



mm  
inch

### Product Marking

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

The type and reference specifications for this part are located on the website in the "Application Notes" section.

### ESD / MSL Information



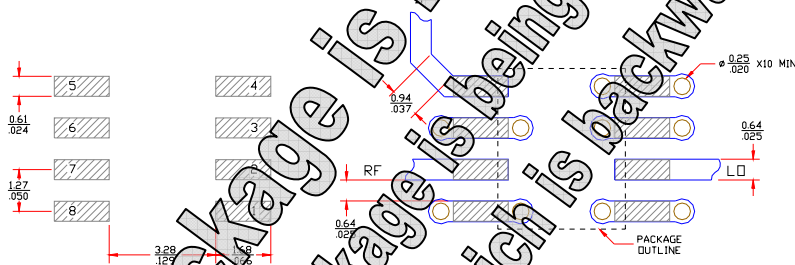
Caution! ESD sensitive device.

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

ESD Classification: Class III  
 Value: Passes  $\geq 500$  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



1. Ground vias are required for thermal and RF grounding considerations. A minimum of 4 vias are required for 14 mil and 28 mil FR4 board.
2. If your PCB is copper clad, ground vias should be placed under the land pattern for better RF and thermal performance. Otherwise ground vias should be placed as close to land pattern as possible.
3. Trace width depends on PCB board.

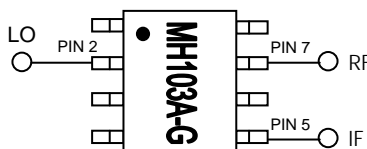
### Functional Pin Layout

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.

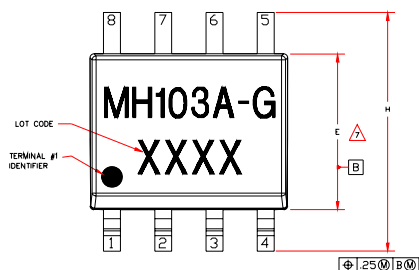
## Application Circuit (MH103A-PCB)



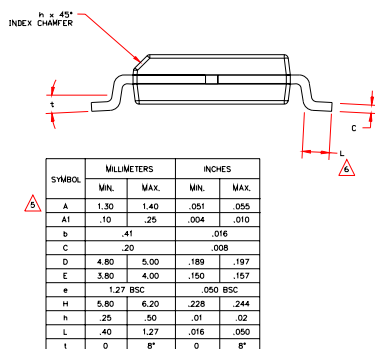
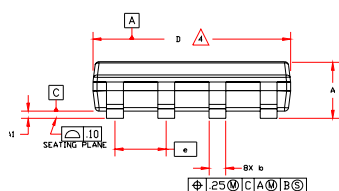
### Notes:

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

## 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(.006in) 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(.010in) PER SIDE.



## 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



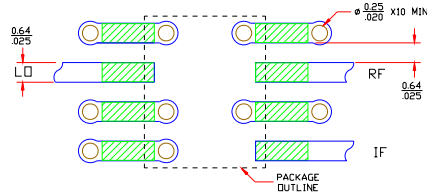
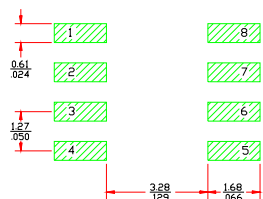
Caution! ESD sensitive device.

ESD Classification: Class 1B  
 Value: Passes  $\geq 500V$  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 2 at +260 °C convection reflow  
 Standard: JEDEC Standard J-STD-020B

## Land Pattern / Mounting Configuration



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

## Functional Pin Layout

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