MH101

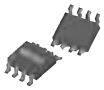
High Dynamic Range MMIC Mixer

The Communications Edge™

Advanced Product Information

Product Features

- +30 dBm Input IP3
- No External Matching Elements Required
- RF 1900-2200 MHz
- LO 1700-2150 MHz
- IF 50-200 MHz
- +17 dBm Drive Level
- Low Cost SOIC-8 Package
- No External Bias Required



Actual Size

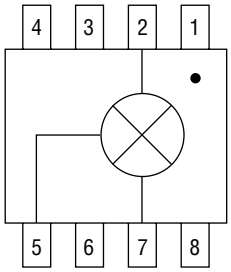
Product Description

The MH101 is a passive GaAs MESFET mixer that provides high dynamic range performance in a low cost SOIC-8 package. WJ's MH101 uses patented techniques to realize greater than +30 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.
RF	7
LO	2
IF	5
Ground	1,3,4,6,8

Specifications

Parameter	Units	Minimum	Typical	Maximum	Condition
Frequency Range:					
RF	MHz	1900		2200	
LO	MHz	1700		2150	
IF	MHz	50		200	
SSB Conversion Loss	dB		9.0	10.5	
Noise Figure	dB		9.5		
Input IP3	dBm		+30		
Input P1dB	dBm		+16		
Isolation:					
L-R	dB		28		
L-I	dB		37		
R-I	dB		18		
Return Loss:					
RF Port	dB		15		
LO Port	dB		12		
IF Port	dB		20		
LO Drive Level	dBm		+17		

Data was taken using the application board in a 50 Ω system, with a low side LO at +17 dBm in a downconvertering applicaion at 25°C.
Input IP3 was measured with two tones with an input power of +5 dBm/tone separated by 1 MHz.

Absolute Maximum Ratings[1]

Parameter	Rating
Operating Case Temperature	-40 to +85°C
Storage Temperature	-65 to +100°C
Maximum Input LO Power[2]	+21 dBm

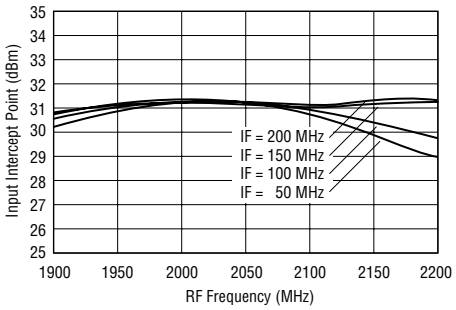
1. Operation of this device above any of these parameters may cause permanent damage.
2. Total sum of LO port and RF port power should not to exceed +23 dBm.

Ordering Information

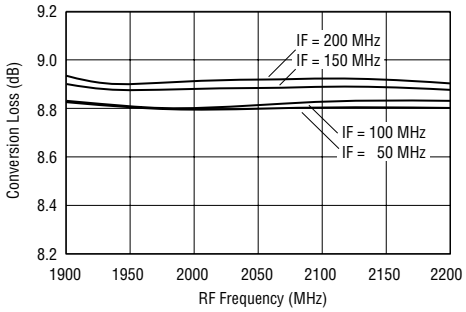
Part No.	Description
MH101	High Dynamic Range MMIC Mixer (Available in tape and reel)
MH101-PCB	Fully Assembled Application Circuit

Performance Charts

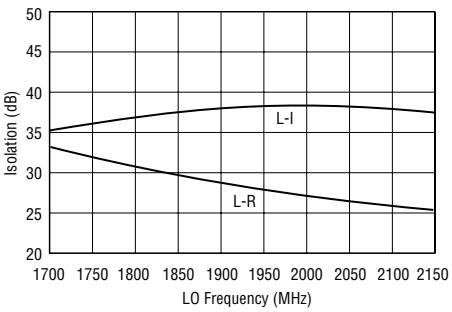
Input IP3 vs RF Frequency



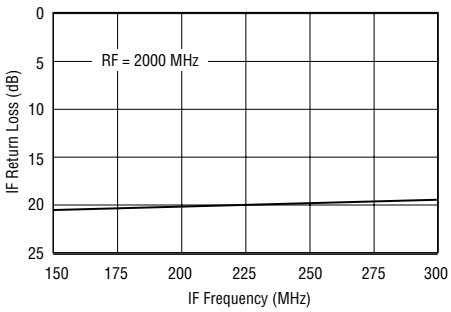
Conversion Loss vs RF Frequency



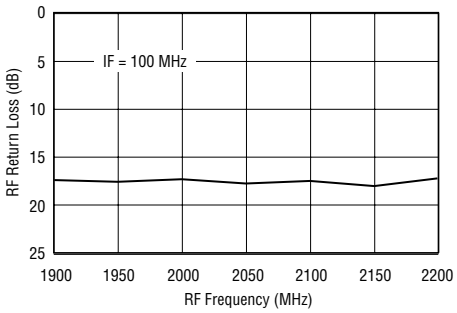
Isolation vs LO Frequency



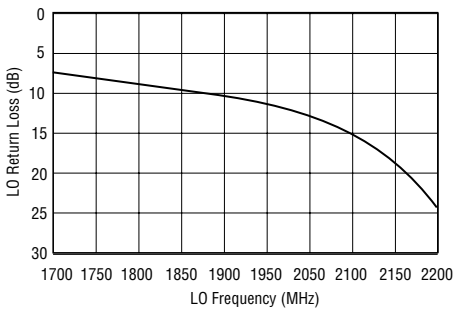
IF Return Loss vs IF Frequency



RF Return Loss vs RF Frequency

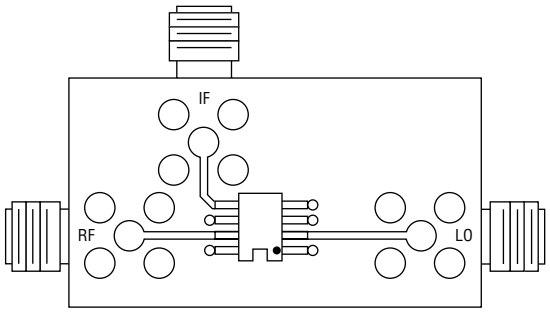


LO Return Loss vs LO Frequency



Data was taken using the application board in a 50 Ω system, with a low side LO at +17 dBm in a downconvertering applicaion at 25°C.
Input IP3 was measured with two tones with an input power of +5 dBm/tone separated by 1 MHz.

Application Circuit

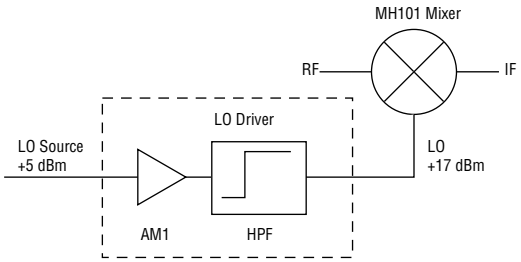


LO Driver for MH101 Applications

Summary:
Various times it may be difficult to apply a +17 dBm required LO signal to drive WJ Communications' MH101 mixer. This application note offers a suggested LO driver curcuit so that only +5 dBm of power is required from an external LO source to drive any of WJ's new MMIC mixers: the MH1, MH101, or MH102. (Two LO driver circuits can also be cascaded together if only -8 dBm is available from an LO source.)

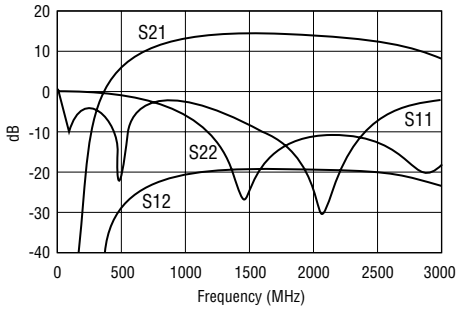
The LO driver using WJ's AM1 amplifier is suitable for any LO signal in the frequency band of 1450-2200 MHz. Only a single supply is needed to power the driver with 4.5 V at 75 mA. In addition, an integrated high pass filter is suggested, but not required, in the application circuit to reject and limit IF noise that might be incident into the LO port of the mixer. The filter provides excellent rejection at IF frequencies up to 450 MHz.

Suggested System Configuration

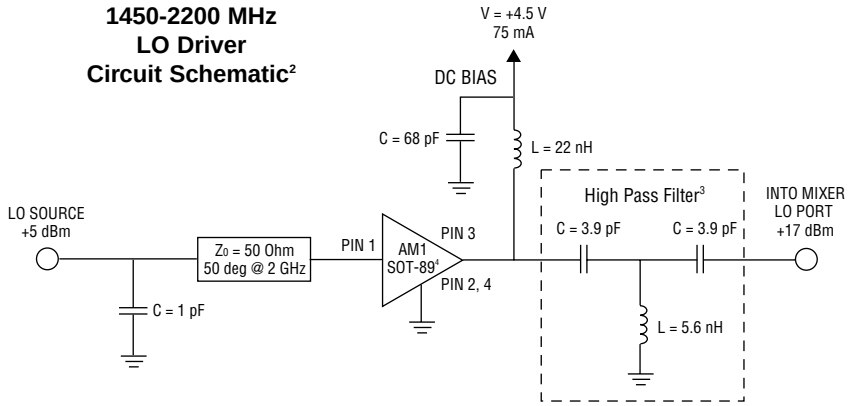


Typical Specification Parameters[1]	
Frequency (MHz)	1450-2200
RF Input Power (dBm)	+5
Min RF Output Power (dBm)	+17
S21 - Small Signal Gain (dB)	13
S11 - Input Return Loss (dB)	-12
S22 - Output Return Loss (dB)	-15
Maximum RF Input Power (dBm)	+7
200 MHz rejection (dBc)	40
Bias	+4.5 V at 75 mA

Small-signal S-parameters vs Frequency

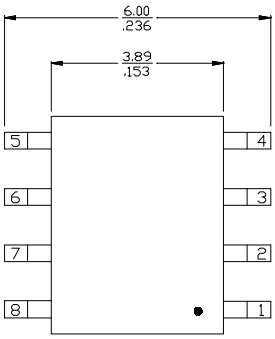


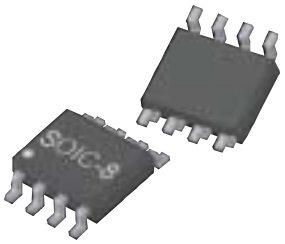
1450-2200 MHz LO Driver Circuit Schematic[2]



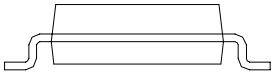
1. All specification parameters were tested at 25°C.
2. All components are 0603 size. All components are standard 5% tolerance parts. Toko LL1608-FH chip inductors and AVX capacitors were used in the design.
3. The optional high pass filter can be substituted with a series 68 pF DC blocking capacitor if not used.
4. Please refer to the AM1 datasheet for specifications and mounting information pertaining to the AM1.

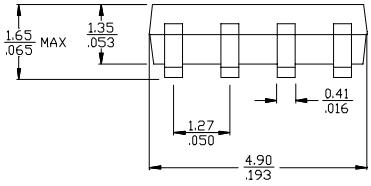
Outline Drawing



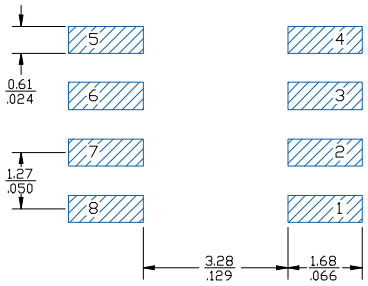


mm
inch



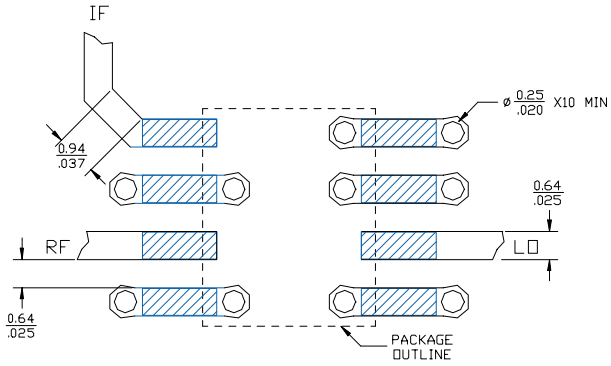


Land Pattern



FUNCTION	PIN NO.
GROUND	1
LO	2
GROUND	3-4
IF	5
GROUND	6
RF	7
GROUND	8

Mounting Configuration



Notes:
1. Ground vias are critical for thermal and RF grounding considerations.
2. A minimun of 10 ground vias are required for 14 mil and 28 mil FR4 board.
3. If your PCB design rules allow, 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.
4. Trace width depends on PC board.

This document contains information on a new product.
Specifications and information are subject to change without notice.

Caution! ESD sensitive device.