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# MM1-0115HPSM

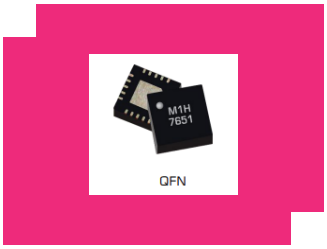
## GaAs MMIC Double Balanced Mixer



## DEVICE OVERVIEW

### General Description

The MM1-0115HPSM is a GaAs MMIC double balanced mixer that features excellent conversion loss, superior isolations and spurious performance across a broad bandwidth. MM1-0115HPSM works well as both an up and down converter through Ku band. The MM1-0115HPSM is recommend for moderate power applications that demand high linearity. The MM1-0115HPSM is available in a 4x4 mm QFN package. Evaluation boards are also available.



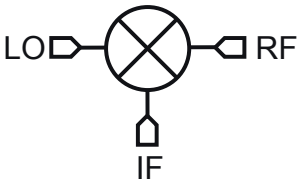

### Features

- Parameter Typical
- RF/LO response 1GHz - 15GHz
- IF response DC – 2.5 GHz
- Conversion Loss 8.0dB
- LO to RF Isolation 52dB

### Applications

- SATCOM
- Radar
- Test and Measurement Equipment
- Electronic Warfare

### Functional Block Diagram



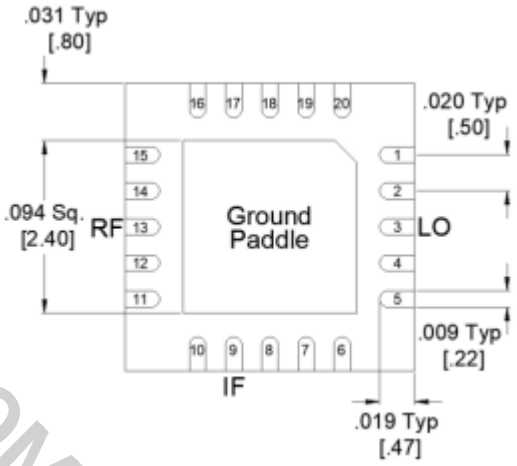

### Part Ordering Options

| Part Number | Description | Package | Green Status | Product Lifecycle | Export Classification | Recommended Replacement |
|---|---|---|---|---|---|---|
| MM1-0115HPSM | GaAs MMIC Double Balanced Mixer | QFN | Consult Factory | Not Recommended for New Design | - | - |

## Table Of Contents

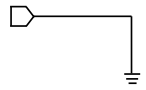
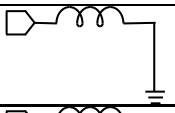
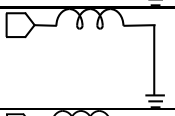
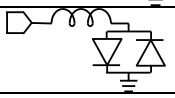
## Port Configuration and Functions

### Port Diagram






## Port Functions

| Port | Function | Description | Equivalent Circuit for Package |
|---|---|---|---|
| Paddle | Ground | SM package ground path is provided through the ground paddle |  |
| Pin 13 | RF | Pin 13 is DC short and AC matched to 50 Ohms from 1 to 15 GHz. Blocking capacitor is optional. |  |
| Pin 3 | LO | Pin 3 is DC short and AC matched to 50 Ohms from 1 to 15 GHz. Blocking capacitor is optional. |  |
| Pin 9 | IF | Pin 9 is DC coupled to the diodes. Blocking capacitor is optional. |  |

## Specifications

### Absolute Maximum Ratings

| Parameter | Maximum Rating | Unit |
|---|---|---|
| DC Current | 30 | mA |
| DC Current | 30 | mA |
| DC Current | 30 | mA |
| Maximum Operating Temperature | 100 | °C |
| Maximum Storage Temperature | 125 | °C |
| Minimum Operating Temperature | -55 | °C |
| Minimum Storage Temperature | -65 | °C |
| RF Power Handling | 33 | dBm |
| RF Power Handling | 33 | dBm |
| RF Power Handling | 33 | dBm |

### Package Information

| Parameter | Details | Rating |
|---|---|---|
| Dimensions | - | 4 x 4 mm |
| Moisture Sensitivity Level | - | MSL 1 |

### Recommended Operating Conditions

| Parameter | Min | Nominal | Max | Unit |
|---|---|---|---|---|
| LO Input Power | 13 | 17 | 21 | dBm |
| Ambient Temperature | -55 | 25 | 100 | °C |

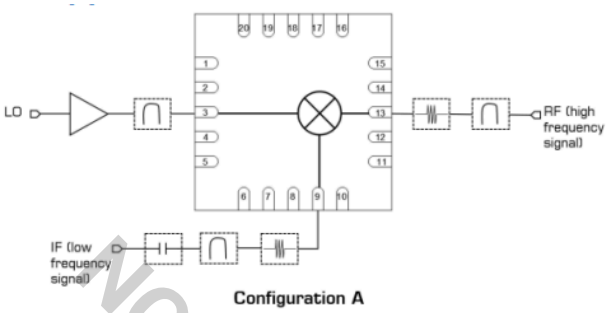
## Sequencing Requirements

There is no requirement to apply power to the ports in a specific order. However, it is recommended to provide a 50Ω termination to each port before applying power. This is a passive diode mixer that requires no DC bias.

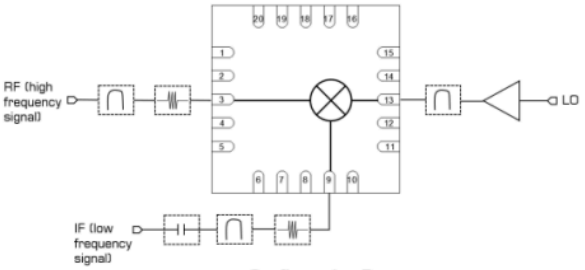
## Electrical Specifications

| Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Conversion Loss | RF/LO = 1 - 15GHz, IF = 0.2-2.5GHz, LO = +17dBm, TA = 25°C, Config A | - | 9 | - | dB |
| Conversion Loss | RF/LO = 1-15GHz, IF = DC-0.2GHz, LO = +17dBm, TA = 25°C, Config A | - | 8 | 14 | dB |
| Input 1dB Gain Compression Point | Config A | - | 10 | - | dBm |
| Input IP3 | RF/LO = 1 - 15GHz, IF = DC - 0.2GHz, LO = +17dBm, TA = 25°C, Config A | - | 21 | - | dBm |
| Isolation, LO to IF | IF/LO = 1-15GHz, TA = 25°C, Config A | - | 23 | - | dB |
| Isolation, LO to RF | RF/LO = 1 - 15GHz, TA = 25°C, Config A | - | 52 | - | dB |
| Isolation, RF to IF | RF/IF = 1 - 15GHz, TA = 25°C, Config A | - | 34 | - | dB |
| Noise Figure | RF/LO = 1 - 15GHz, IF = DC-0.2GHz | - | 8 | - | dB |

## Application Circuit




Configuration A




Configuration B

## Application Circuit Description

IF Port – Used as input on an upconversion, output on downconversion, or LO port in a band shifting application. Signals should be connected by 50 ohm microstrip or coplanar traces to well matched broadband 50 ohm sources and loads. Blocking capacitor is recommended if DC voltage is present on the line.

RF Port – Used as input on a downconversion, output on upconversion, or output in a band shifting application. Signals should be connected by 50 ohm microstrip or coplanar traces to well matched broadband 50 ohm sources and loads.

Filtering and Matching- Filtering is generally desired for spurious and image removal on the output port of the mixer. Reflective filters can cause out of band signals to reflect back into the mixer and cause conversion loss ripple, erroneous spurs, and other undesired behaviors. To eliminate these problems it is recommend that the filters be placed as close to the output port as possible. If undesired behavior is still observed, a diplexer with one port terminated or a 1-3 dB attenuator may reduce this problem.

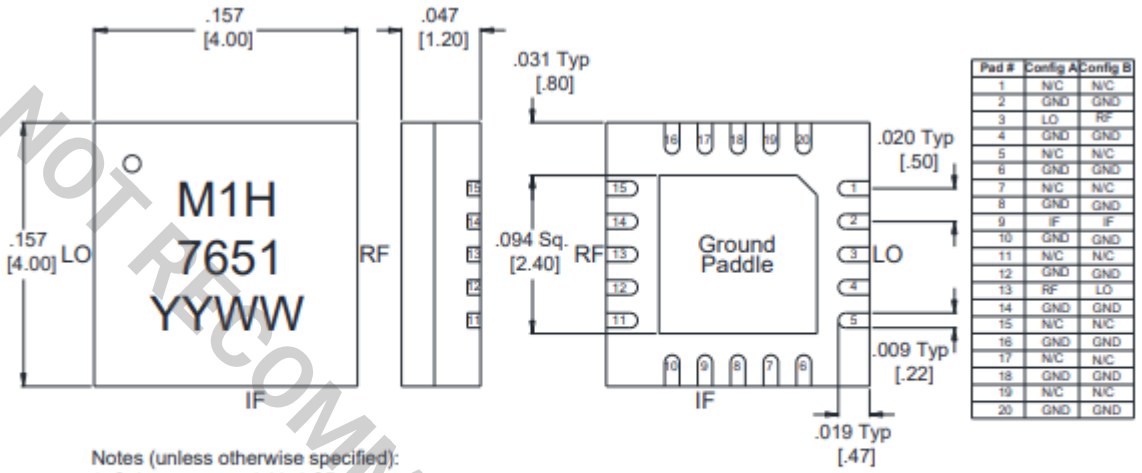
RF Ground – The ground paddle of the QFN should be connected to a low noise RF ground with very low electrical resistance for high frequency operation.

LO Port – The noise floor of the LO input signal should be less than the value of the noise floor plus isolation of the mixer, or a filter is recommended to prevent reduction in dynamic range. An LO amplifier is required if the LO power is below the recommended drive level. It is important to use an amplifier with a broadband 50 ohm match such that it does not reflect spurious signals back into the mixer or other system circuitry.

## Mechanical Data

### Outline Drawing

Download : Outline 2D Drawing

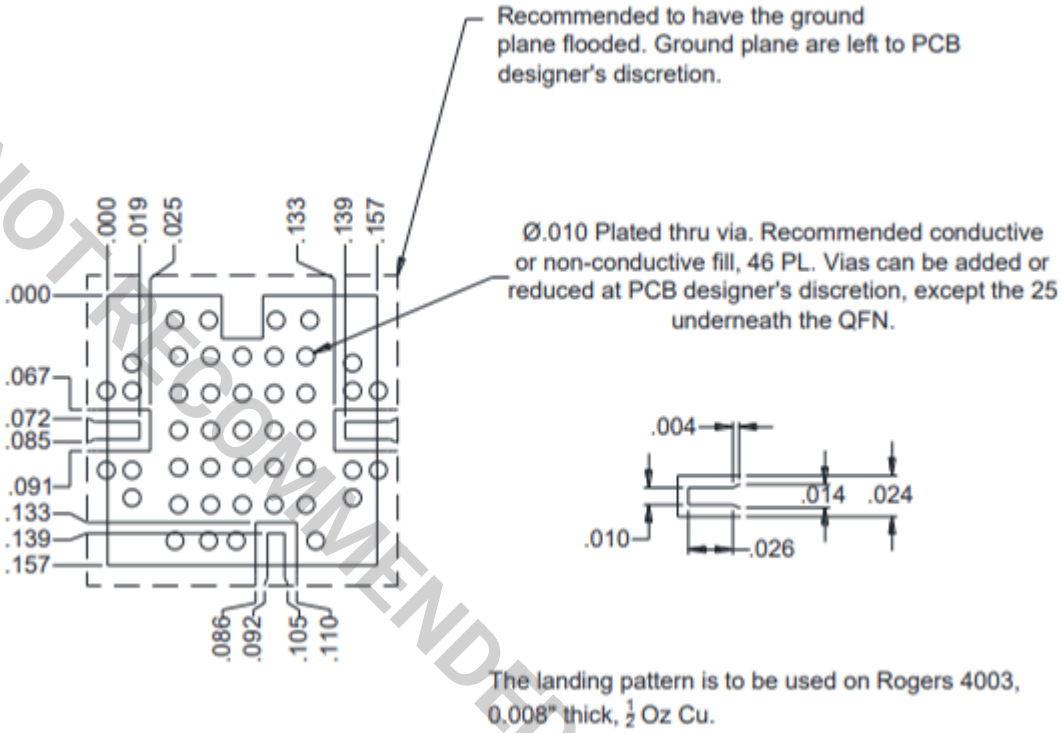



| Pad # | Config A | Config B |
|---|---|---|
| 1 | N/C | N/C |
| 2 | GND | GND |
| 3 | LO | RF |
| 4 | GND | GND |
| 5 | N/C | N/C |
| 6 | GND | GND |
| 7 | N/C | N/C |
| 8 | GND | GND |
| 9 | IF | IF |
| 10 | GND | GND |
| 11 | N/C | N/C |
| 12 | GND | GND |
| 13 | RF | LO |
| 14 | GND | GND |
| 15 | N/C | N/C |
| 16 | GND | GND |
| 17 | N/C | N/C |
| 18 | GND | GND |
| 19 | N/C | N/C |
| 20 | GND | GND |

Notes (unless otherwise specified):
1. Substrate material is LCP.
2. I/O Leads and QFN Paddle are:
   0.008 - 0.05 microns Gold, over
   0.08 - 0.15 microns Palladium, over
   0.5 - 2.0 microns Nickel
3. Ground all unconnected pins to PCB RF ground.

## Footprint Image

Download : Footprint Drawing



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