

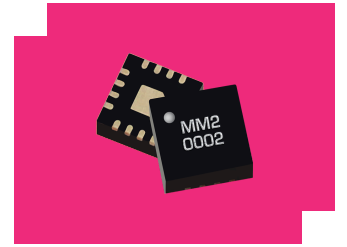
# MM2-0843HPSM-2

## GaAs MMIC Triple Balanced Mixer

### DEVICE OVERVIEW

#### General Description

The MM2-0843HPSM-2 is a passive GaAs MMIC triple-balanced mixer designed with broadband operation from 8 to 43 GHz. It delivers low conversion loss, high linearity, and excellent port-to-port isolation. The device supports a wide LO input power range of +15 to +21 dBm (nominal +18 dBm), providing flexibility across system implementations. Packaged in a 3 x 3 mm QFN, the MM2-0843HPSM-2 enables compact, repeatable implementations in space-constrained RF assemblies. Evaluation boards are available.



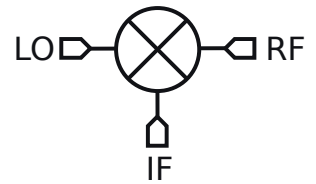
#### Features

- Broadband operation from 8 to 43 GHz
- Low Conversion Loss, 7 dB Typical
- High Input IP3, +24 dBm Typical
- High LO to RF Isolation, 40 dB Typical
- Small 3x3mm QFN Style Package

#### Applications

- Electronic Warfare
- Test and Measurement Equipment
- Radar and satellite communications

#### Functional Block Diagram



#### Part Ordering Options

| Part Number    | Description                       | Package | Green Status  | Product Lifecycle | Export Classification |
|----------------|-----------------------------------|---------|---------------|-------------------|-----------------------|
| MM2-0843HPSM-2 | GaAs MMIC Triple Balanced Mixer   | PSM     | REACH<br>RoHS | Released          | EAR99                 |
| MM2-0843HPSM-1 | GaAs MMIC Triple Balanced Mixer   | PSM     | REACH<br>RoHS | Released          | EAR99                 |
| EVB-MM2-0843HP | Evaluation Board, GaAs MMIC Mixer | EVB     | RoHS<br>REACH | Released          | EAR99                 |

## Table Of Contents

- **Device Overview**
  - General Description
  - Features
  - Applications
  - Functional Block Diagram
- **Port Configuration and Functions**
  - Port Diagram
  - Port Functions
- **Revision History**
- **Specifications**
  - Absolute Maximum Ratings
  - Package Information
  - Recommended Operating Conditions
  - Electrical Specifications
  - Typical Performance
  - Spur Tables
- **Mechanical Data**
  - Outline Drawing
- **Footprint Image**
- **Evaluation Board**
  - Evaluation Board Outline Drawing

## Revision History

| Revision Code | Revision Date | Comment         |
|---------------|---------------|-----------------|
| -             | 2026-05-28    | Initial Release |

## Port Configuration and Functions

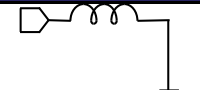
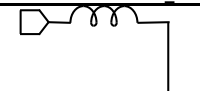
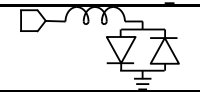
### Port Diagram

A top-down x-ray view of the package is shown below.

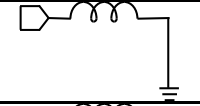
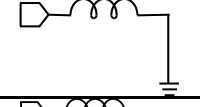



## Port Functions

### Configuration A

| Port   | Function | Description  | DC Equivalent Circuit   |
|--------|----------|--|---|
| Pin 10 | RF       | Pin 10 is DC short and AC matched to 50 $\Omega$ from 8 to 43 GHz. Blocking capacitor is optional. |  |
| Pin 3  | LO       | Pin 3 is DC short and AC matched to 50 $\Omega$ from 8 to 43 GHz. Blocking capacitor is optional.  |  |
| Pin 6  | IF       | Pin 6 is DC coupled to the diodes. Blocking capacitor is optional.                                 |  |

**Configuration B**

| Port   | Function | Description  | DC Equivalent Circuit   |
|--------|----------|--|---|
| Pin 10 | LO       | Pin 10 is DC short and AC matched to 50 $\Omega$ from 8 to 43 GHz. Blocking capacitor is optional. |  |
| Pin 3  | RF       | Pin 3 is DC short and AC matched to 50 $\Omega$ from 8 to 43 GHz. Blocking capacitor is optional.  |  |
| Pin 6  | IF       | Pin 6 is DC coupled to the diodes. Blocking capacitor is optional.                                 |  |

## Specifications

### Absolute Maximum Ratings

| Parameter                     | Maximum Rating | Unit |
|-------------------------------|----------------|------|
| Maximum Operating Temperature | 100            | °C   |
| Maximum Storage Temperature   | 125            | °C   |
| Minimum Operating Temperature | -55            | °C   |
| Minimum Storage Temperature   | -65            | °C   |
| Pin 10 DC Current             | 21             | mA   |
| Pin 3 DC Current              | 24             | mA   |
| Pin 6 DC Current              | 15             | mA   |

### Package Information

| Parameter                  | Details            | Rating       |
|----------------------------|--------------------|--------------|
| ESD                        | 250 to < 500 Volts | HBM Class 1A |
| Dimensions                 | -                  | 3 x 3 mm     |
| Moisture Sensitivity Level | -                  | MSL 1        |

### Recommended Operating Conditions

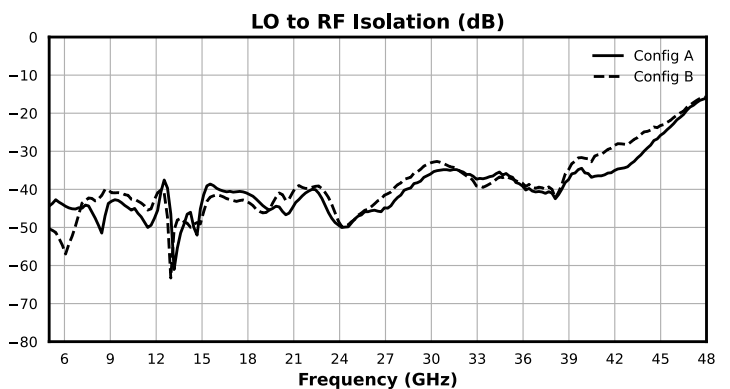
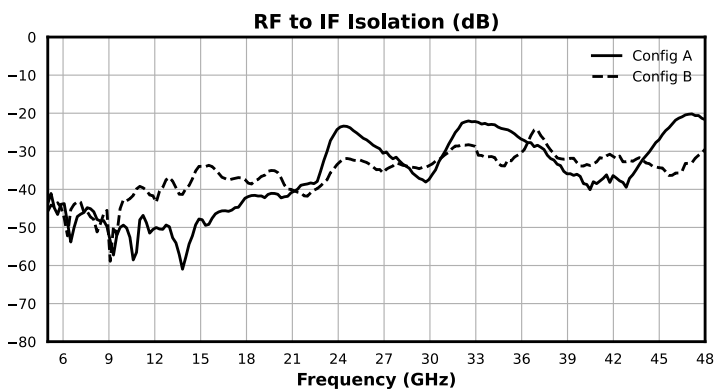
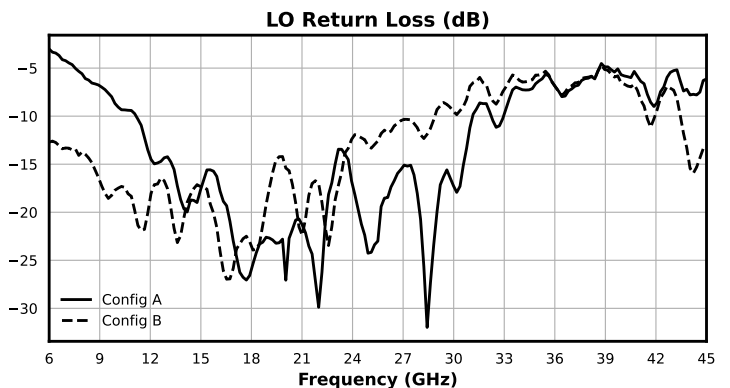
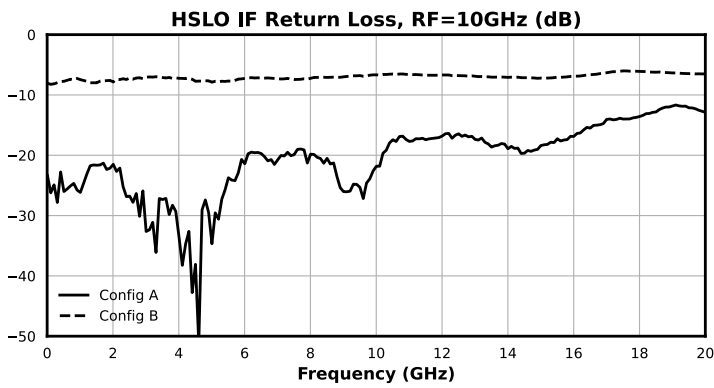
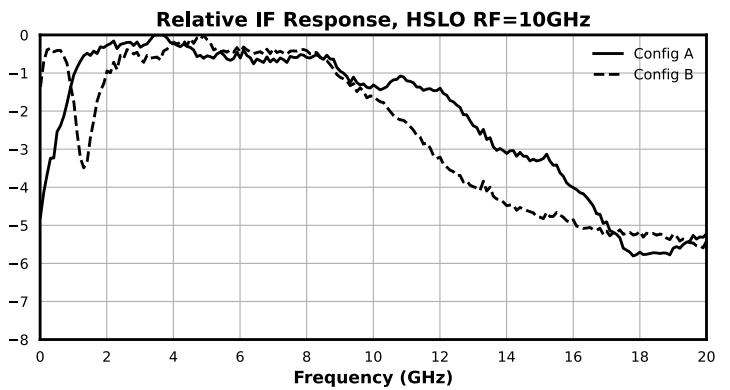
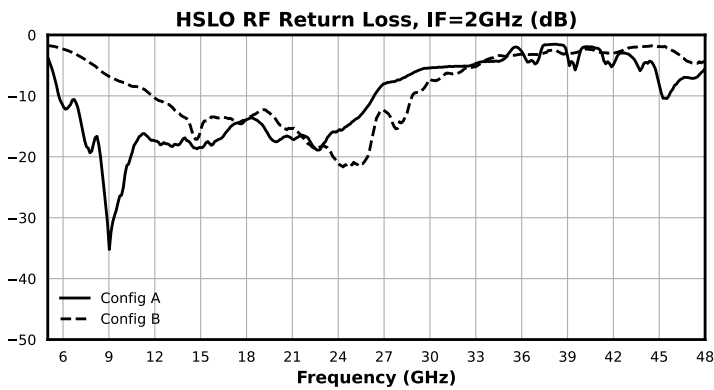
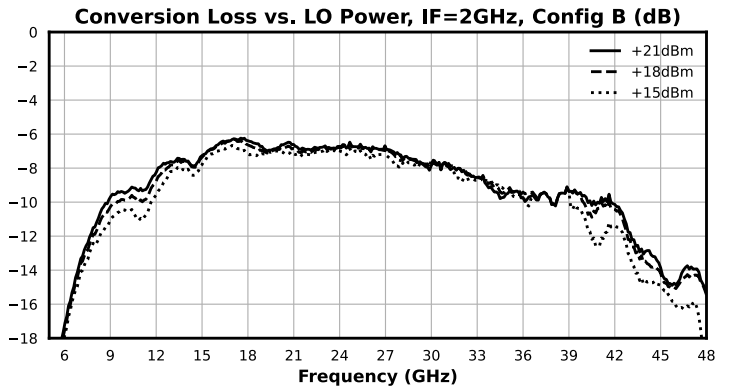
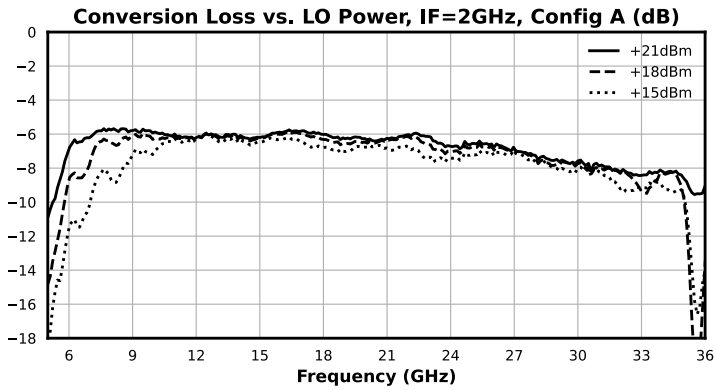
| Parameter      | Min | Nominal | Max | Unit |
|----------------|-----|---------|-----|------|
| LO Input Power | 15  | 18      | 21  | dBm  |

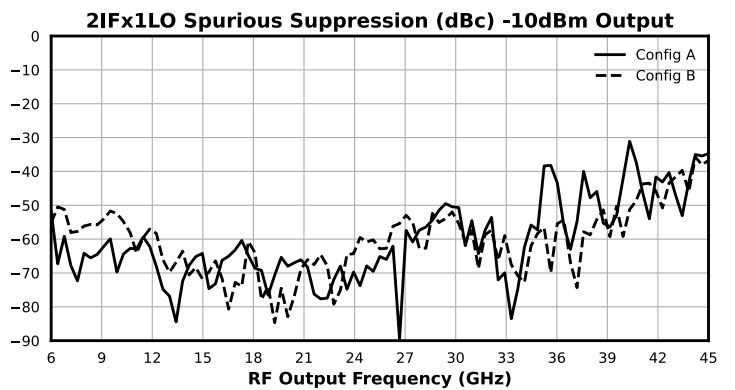
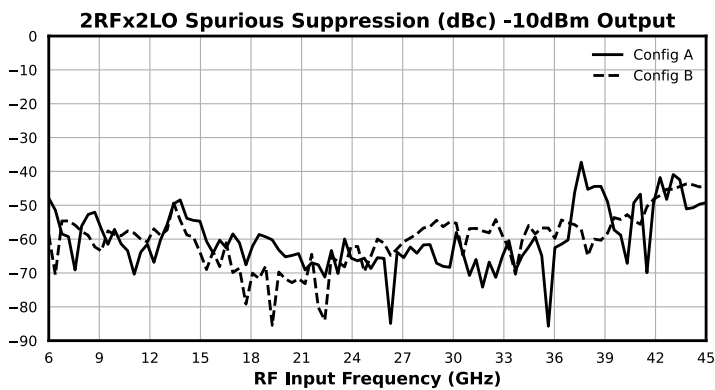
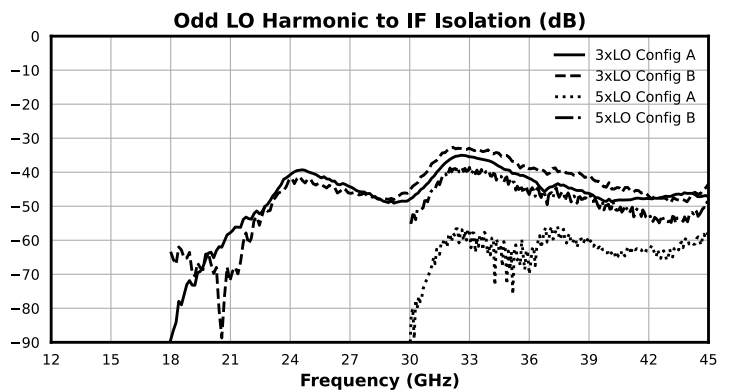
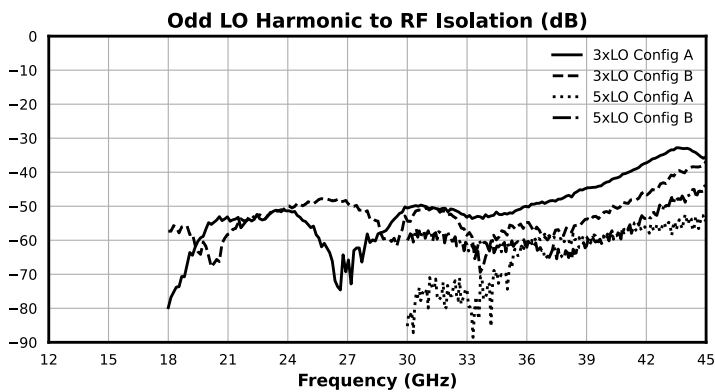
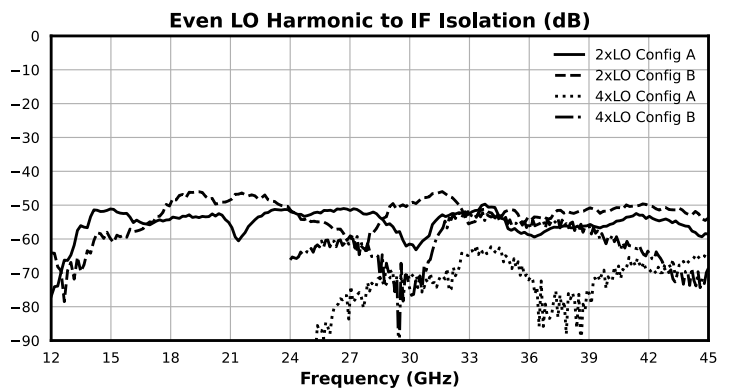
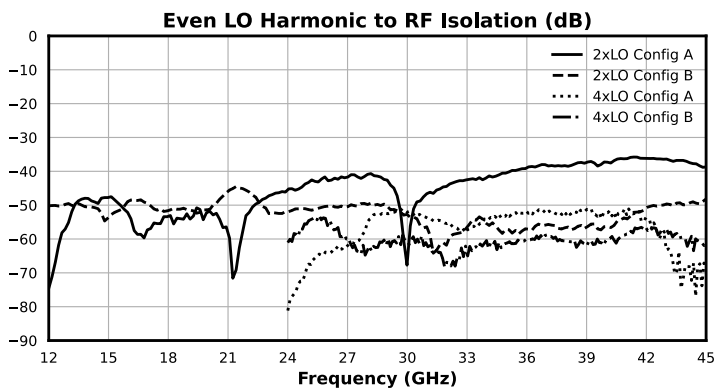
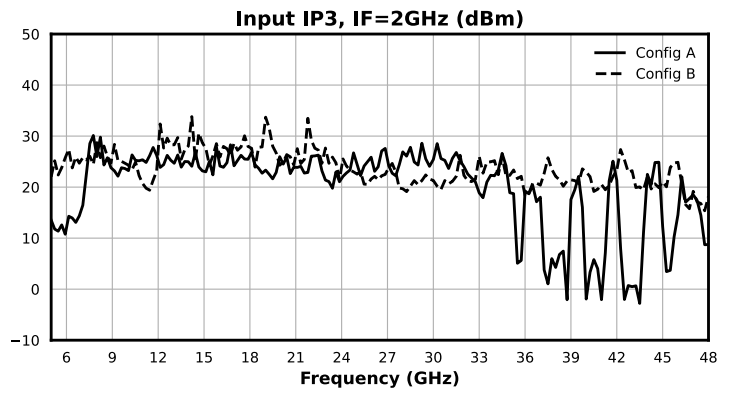
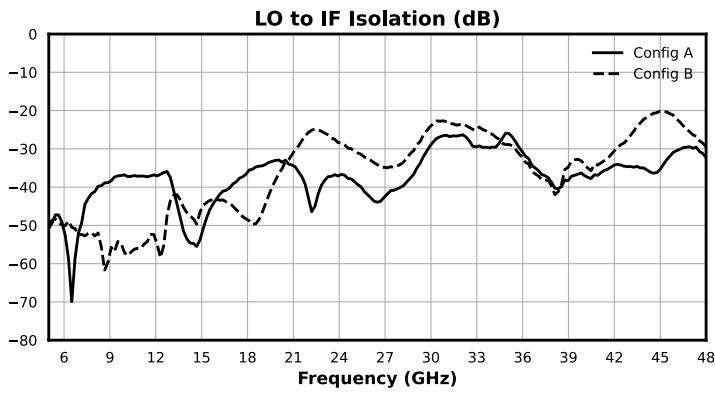
### Electrical Specifications

Specifications guaranteed from -55 to +100°C, measured in a 50Ω system. Specifications are shown for Configurations A (B). RF testing is performed on a sample basis to verify conformance to datasheet guaranteed specifications. Consult factory for more information.

| Parameter          | Port Configuration | Test Conditions   | Min | Typ  | Max | Unit |
|--------------------|--------------------|---|-----|------|-----|------|
| Conversion Loss    | A                  | RF=8-43GHz<br>LO=10-45GHz<br>IF=2GHz<br>LO Drive Level=+18dBm | -   | 7    | -   | dB   |
| Input IP3          | A                  | RF=8-43GHz<br>LO=10-45GHz<br>IF=2GHz<br>LO Drive Level=+18dBm | -   | 24   | -   | dBm  |
| Input P1dB         | A                  | RF=8GHz<br>LO=10GHz<br>IF=2GHz<br>LO Drive Level=+18dBm       | -   | 12.5 | -   | dBm  |
| Conversion Loss    | B                  | RF=8-43GHz<br>LO=10-45GHz<br>IF=2GHz<br>LO Drive Level=+18dBm | -   | 8    | -   | dB   |
| Input IP3          | B                  | RF=8-43GHz<br>LO=10-45GHz<br>IF=2GHz<br>LO Drive Level=+18dBm | -   | 25   | -   | dBm  |
| Input P1dB         | B                  | RF=8GHz<br>LO=10GHz<br>IF=2GHz<br>LO Drive Level=+18dBm       | -   | 15.5 | -   | dBm  |
| RF-IF Isolation    | -                  | -   | -   | 35   | -   | dB   |
| LO-RF Isolation    | -                  | -   | -   | 40   | -   | dB   |
| LO-IF Isolation    | -                  | -   | -   | 35   | -   | dB   |
| RF Frequency Range | -                  | -   | 8   | -    | 43  | GHz  |
| LO Frequency Range | -                  | -   | 6   | -    | 45  | GHz  |
| IF Frequency Range | -                  | -   | 1   | -    | 14  | GHz  |

**Typical Performance**





**Spur Table**

**Downconversion Spurious Suppression**

Spurious data was taken by selecting RF and LO frequencies ( $\pm mLO \pm nRF$ ) within the band of 10 to 20 GHz for RO/LF, which create a 2 GHz IF spurious output. The mixer is swept across the spurious band and the mean is calculated. The numbers shown in the table below are for a -10 dBm RF input. Spurious suppression is scaled for different RF power levels by (n-1), where "n" is the RF spur order. For example, the 2RFx2LO spur is 62 dBc for the A configuration for a -10 dBm input, so a -20 dBm RF input creates a spur that is (2-1) x (-10 dB) dB lower, or 72dBc.

Typical Downconversion Spurious Suppression (dBc): Configuration A (Configuration B), Sine Wave LO

| -10 dBm RF Input | 0xLO        | 1xLO        | 2xLO        | 3xLO        | 4xLO        | 5xLO        |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1xRF             | -32 (-32)   | Reference   | -43 (-32)   | -22 (-20)   | -37 (-33)   | -39 (-22)   |
| 2xRF             | -71 (-76)   | -59 (-69)   | -72 (-72)   | -67 (-69)   | -75 (-77)   | -75 (-79)   |
| 3xRF             | -89 (-84)   | -81 (-87)   | -93 (-93)   | -89 (-90)   | -95 (-91)   | -89 (-90)   |
| 4xRF             | -96 (-95)   | -98 (-100)  | -106 (-102) | -104 (-104) | -106 (-104) | -102 (-97)  |
| 5xRF             | -105 (-107) | -109 (-112) | -113 (-111) | -117 (-112) | -116 (-112) | -115 (-113) |

**Upconversion Spurious Suppression**

Spurious data is taken by mixing a 2 GHz IF with LO frequencies ( $\pm mLO \pm nIF$ ), which creates an RF within the 10 to 20 GHz RF band. The mixer is swept across the spurious output band and the mean is calculated. The numbers shown in the table below are for a -10 dBm IF input. Spurious suppression is scaled for different IF input power levels by (n-1), where “n” is the IF spur order. For example, the 2IFx1LO spur is typically 73 dBc for the A configuration for a -10 dBm input, so a -20 dBm IF input creates a spur that is (2-1) x (-10 dB) dB lower, or 83 dBc.

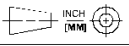
**Typical Upconversion Spurious Suppression (dBc): Configuration A (Configuration B), Sine Wave LO**

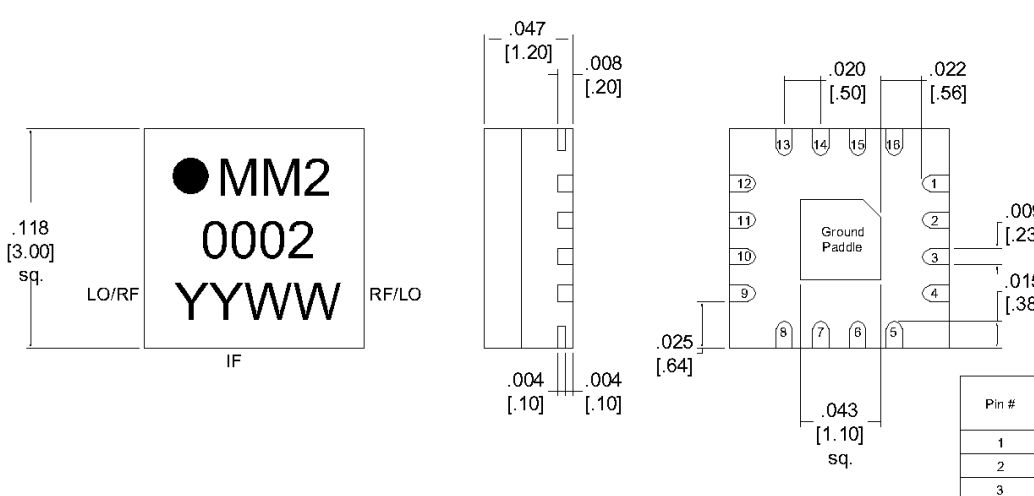
| -10 dBm IF Input | 0xLO        | 1xLO        | 2xLO        | 3xLO        | 4xLO        | 5xLO        |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1xIF             | -31 (-32)   | Reference   | -41 (-33)   | -24 (-19)   | -37 (-34)   | -34 (-22)   |
| 2xIF             | -85 (-85)   | -83 (-79)   | -83 (-85)   | -85 (-82)   | -85 (-73)   | -86 (-84)   |
| 3xIF             | -93 (-88)   | -93 (-91)   | -93 (-94)   | -95 (-94)   | -97 (-93)   | -93 (-92)   |
| 4xIF             | -105 (-103) | -105 (-103) | -104 (-99)  | -104 (-101) | -105 (-99)  | -101 (-103) |
| 5xIF             | -112 (-111) | -105 (-105) | -115 (-111) | -117 (-114) | -116 (-112) | -114 (-112) |

**Mechanical Data**

**Outline Drawing**

Download : [Outline 2D Drawing](#) | [Outline 3D Drawing](#) | [Outline 3D STP](#)

| PROJECTION   |              | REVISIONS |                 |         |           |
|--|--------------|-----------|-----------------|---------|-----------|
|  | INCH<br>[MM] | REV.      | DESCRIPTION     | DATE    | APPROVALS |
|  |              | A         | Initial Release | 2/25/26 | AT        |


Top View Dimensions: .118 [3.00] sq. LO/RF, IF, RF/LO, .047 [1.20], .008 [.20], .020 [.50], .022 [.56], .009 [.23], .015 [.38], .025 [.64], .043 [1.10] sq.

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

**Notes (unless otherwise specified):**

- Substrate material is LCP.
- I/O Leads and Die Paddle is (from base to finish):  
 Ni: 0.5 - 2.0µm  
 Pd: 0.08 - 0.15µm  
 Au: 0.003µm Min.
- All unconnected pins should be connected to PCB RF ground.

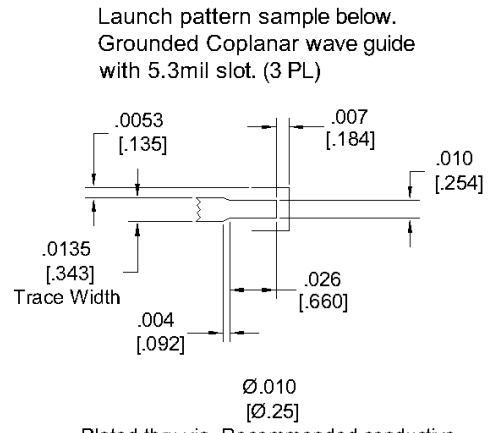
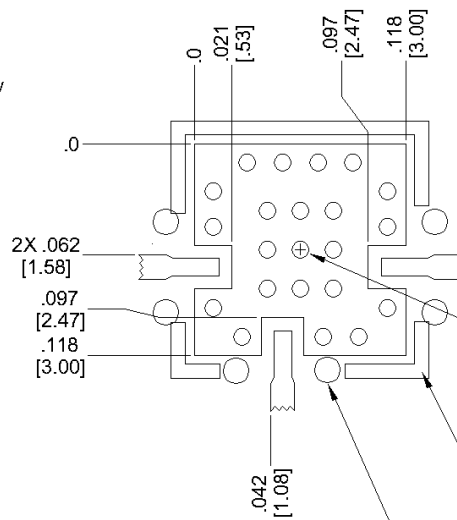
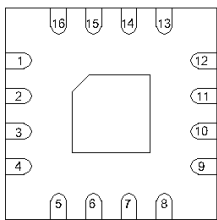
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|-----------|--|---------|--|--|--|
| Note 1    |  | Note 2  |  | DRAWN BY: LCG<br>DATE: 2/20/26<br>CHECKED BY: AJN<br>DATE: 2/23/26<br>APPROVED BY: AD<br>DATE: 2/24/26 |  |

|   |                         |
|---|-------------------------|
|  |                         |
| <b>Outline Plastic 3mm QFN Mixer Package</b>  |                         |
| SIZE: <b>A</b>  | CAGE CODE: <b>0UC32</b> |
| DWG. NO: <b>MM2-0843HPSM-2</b>  |                         |
| SHEET 1 OF 1  |                         |

Proprietary: This document was originated by and is the property of Marki Microwave. Unauthorized disclosure is prohibited. **DO NOT SCALE DRAWING**

Footprint Image

3mm QFN Sample Drawing X-Ray view



Plated thru via. Recommended conductive or non-conductive fill. Vias can be added or reduced at PCB designer's discretion.

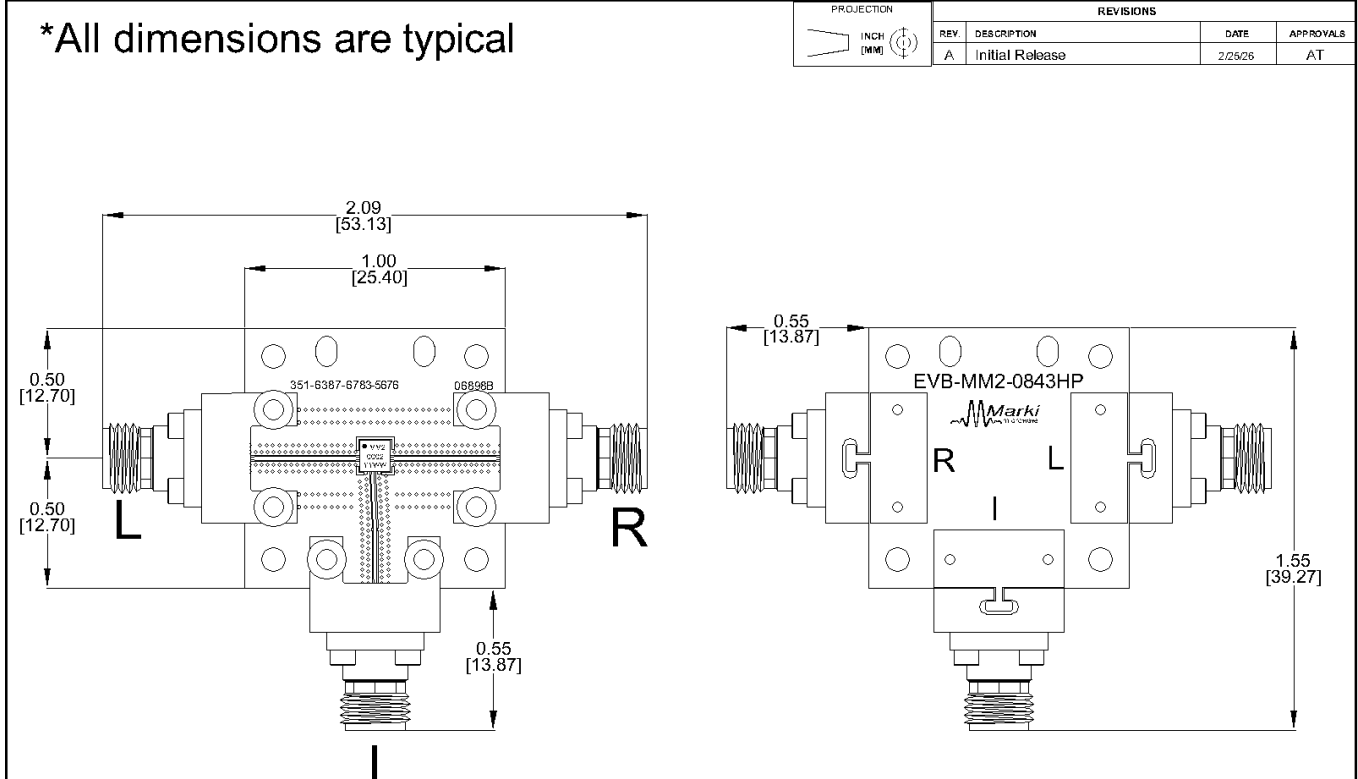
Recommended to have solder mask around the perimeter of the QFN border for better reflow alignment. Thickness of solder mask is left to PCB designer's discretion.

Recommended to have the ground plane flooded. Ground plane are left to PCB designer's discretion.

The landing pattern is to be used on Material Rogers 4003 008" Thick, 1/2 Oz Cu both sides.

**Evaluation Board - Outline Drawing**

**\*All dimensions are typical**



| PROJECTION |      | REVISIONS |                 |         |           |
|------------|------|-----------|-----------------|---------|-----------|
| INCH       | (MM) | REV.      | DESCRIPTION     | DATE    | APPROVALS |
| A          |      | A         | Initial Release | 2/29/26 | AT        |

| Port | Connector Type |
|------|----------------|
| LO   | 2.92mm Female  |
| RF   | 2.92mm Female  |
| IF   | 2.92mm Female  |

Note: Eval Connectors are not removeable.

**Note: RoHS Compliant Assembly**

| NOTES:  |      | Marki microwave |         | www.markimicrowave.com                            |           |
|---|------|-----------------|---------|---|-----------|
| <small>J1, L55 OF E.W. 82 8P25 113<br/>           2 INCHES DIA. 1 INCH DIA<br/>           TOL. 0.0025 INCH<br/>           10.12.92: XX4 .02 199.23<br/>           XXX4 .010 #</small> |      | DRAWN BY        | DATE    | <b>Outline</b><br><b>3mm QFN Mixer Eval Board</b> |           |
| MATERIAL:   | LCG  | 2/20/08         |         |   |           |
| FINISH:   | AJ/N | 2/23/26         |         |   |           |
| DO NOT SCALE DRAWING  |      | AD              | 2/24/26 | SIZE  | CAGE CODE |
|   |      |                 |         | A   | 0UC32     |
|   |      |                 |         | DWG. NO.  |           |
|   |      |                 |         | EVB-MM2-0843HP                                    |           |
|   |      |                 |         | SHEET 1 OF 1                                      |           |

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