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MM1-1886HCH-2

GaAs MMIC mmWave Double Balanced Mixer

PRE-RELEASE

DEVICE OVERVIEW

General Description

The MM1-1886HCH-2 is a compact, passive double-balanced MMIC mixer engineered for wideband performance. It features excellent 8.5 dB conversion loss, superior isolations, and spurious performance across a broad 18 to 86 GHz RF/LO bandwidth. Low LO drive requirement allows operation at as low as +13 dBm inputs. The MM1-1886H is available as a wire bondable chip or a connectorized package.

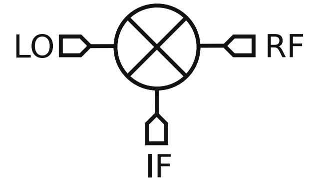
Features

- RF/LO Bandwidth, 18 to 86 GHz
- IF Bandwidth, DC to 20 GHz
- Low LO Drive Requirement, +13 dBm Minimum
- LO to RF Isolation, 50 dB Typical
- RoHS Compliant

Applications

- Test and Measurement Equipment
- Fixed RF up converters
- Electronic warfare equipment

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MM1-1886HCH-2	GaAs MMIC mmWave Double Balanced Mixer	CH	REACH RoHS	Pre-release	EAR99

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Revision History

Revision Code	Revision Date	Comment
G0	2026-02-02	Pre-Release

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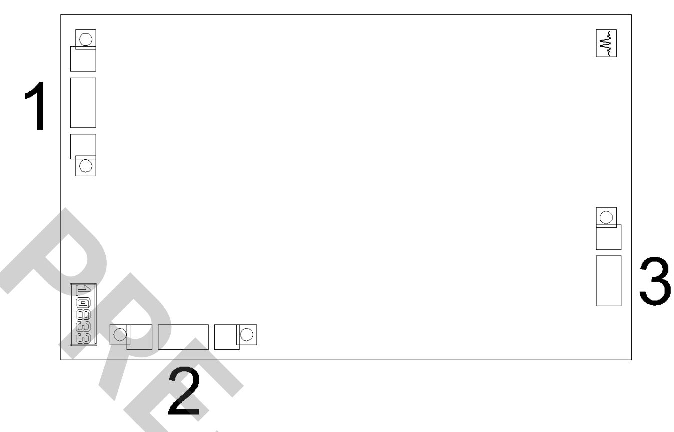
Port Configuration and Functions

Port Diagram



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Port Functions

Configuration A

Port	Function	Description	DC Equivalent Circuit
GND	Ground	CH package ground path is provided through the substrate and ground bond pads.	
Port 1	LO	Port 1 is DC open	
Port 2	IF	Port 2 is diode connected	
Port 3	RF	Port 3 is DC open	

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Configuration B

Port	Function	Description	DC Equivalent Circuit
GND	Ground	CH package ground path is provided through the substrate and ground bond pads.	
Port 1	RF	Port 1 is DC open for the M package.	
Port 2	IF	Port 2 is diode connected for the M package.	
Port 3	LO	Port 3 is DC open for the M package.	

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
Power Handling, at any Port	27	dBm

Package Information

Parameter	Details	Rating
Dimensions	-	2.28x1.38mm

Recommended Operating Conditions

Parameter	Min	Nominal	Max	Unit
LO Input Power	13	16	-	dBm

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Electrical Specifications

The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data shown is for the connectorized M package mixer used in the forward direction with a +16 dBm sine wave input. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C.

Parameter	Port Configuration	Test Conditions	Min	Typ	Max	Unit
RF Frequency Range	-	-	18	-	86	GHz
LO Frequency Range	-	-	18	-	86	GHz
IF Frequency Range	-	-	0	-	20	GHz
Conversion Loss	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	8.5	-	dB
Conversion Loss	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	10	-	dB
Input IP3	A	LO/RF=18-67 GHz IF=DC-20 GHz LO drive level=16 dBm	-	18.5	-	dBm
Input IP3	B	LO/RF=18-67 GHz IF=DC-20 GHz LO drive level=16 dBm	-	21.5	-	dBm
Input P1dB	-	LO/RF=18-86 GHz IF=DC-20 GHz LO drive level=16 dBm	-	7.5	-	dBm
LO-RF Isolation	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	50	-	dB
LO-RF Isolation	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	50	-	dB
LO-IF Isolation	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	35	-	dB
LO-IF Isolation	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	56	-	dB
RF-IF Isolation	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	55	-	dB
RF-IF Isolation	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	33	-	dB
Noise Figure [1]	A	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	8.5	-	dB
Noise Figure [2]	B	LO/RF=18-86 GHz IF=91 MHz LO drive level=16 dBm	-	10	-	dB

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[1][2] Mixer Noise Figure typically measures within 0.5 dB of conversion loss for IF frequencies greater than 5 MHz.

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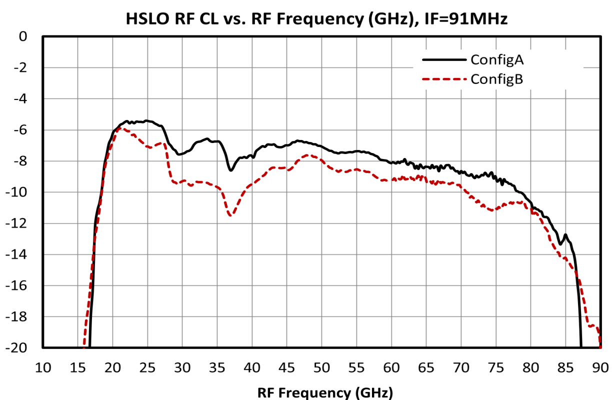
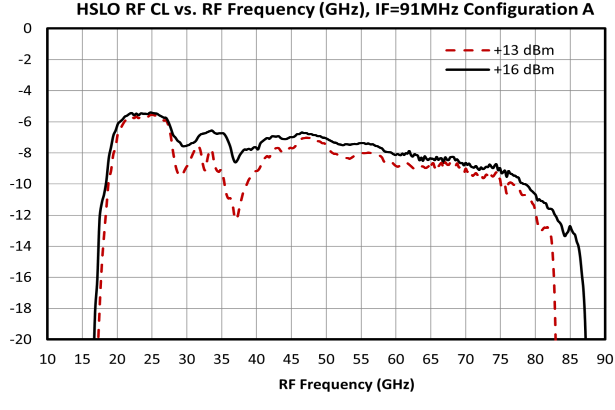
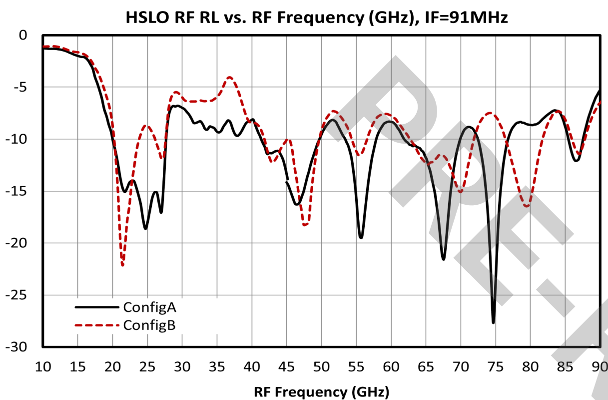
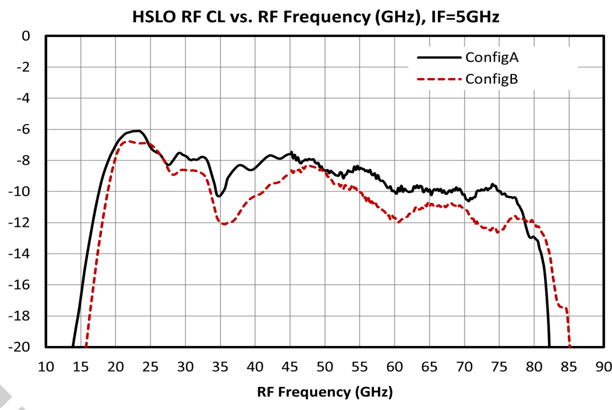
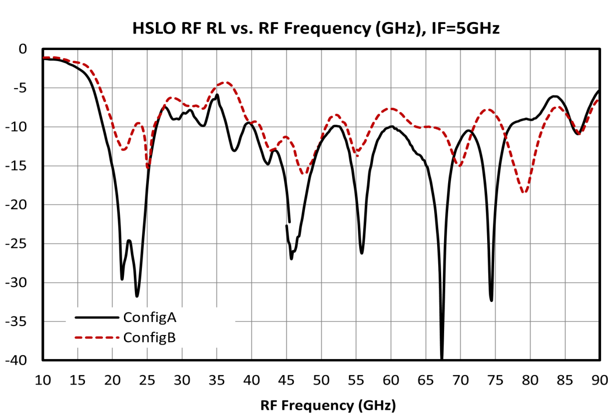
Typical Performance Plots

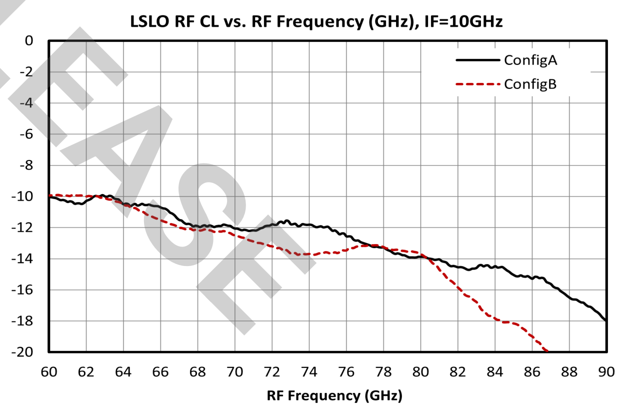


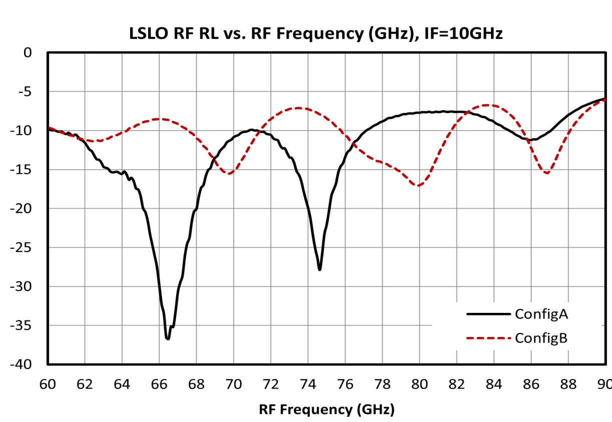


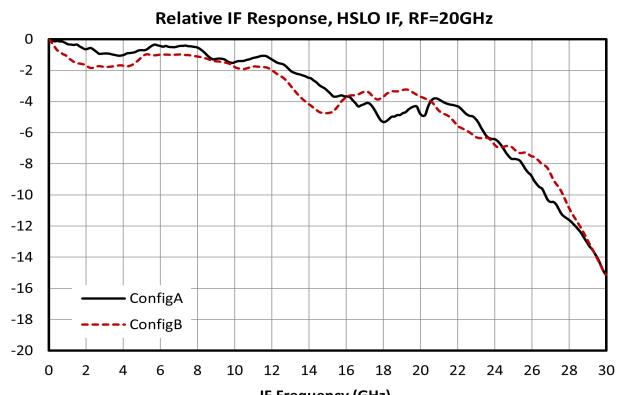












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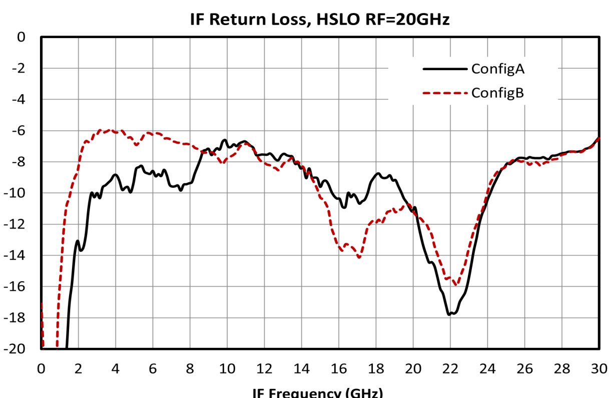

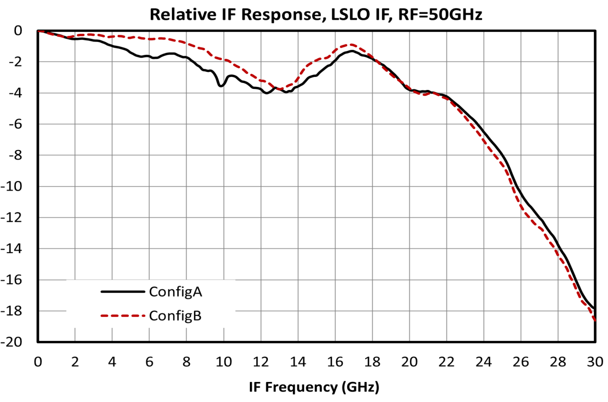

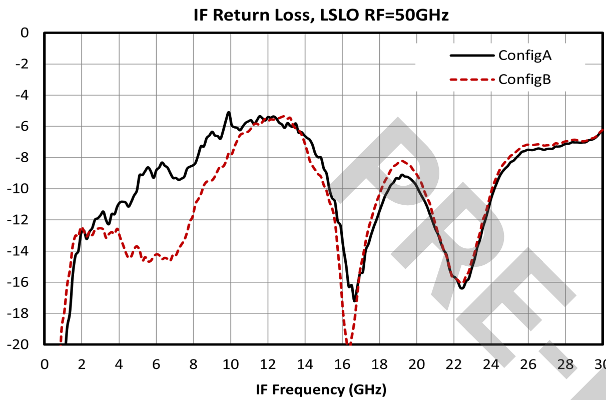

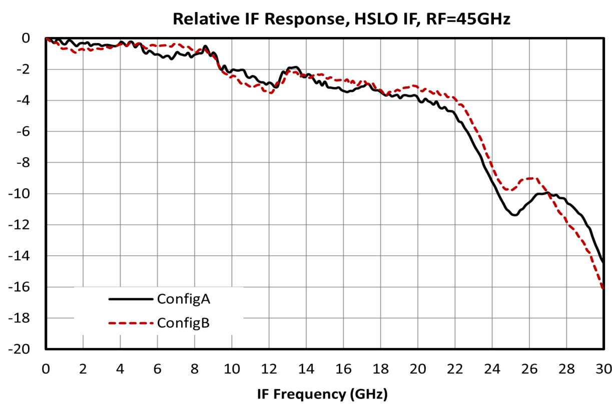

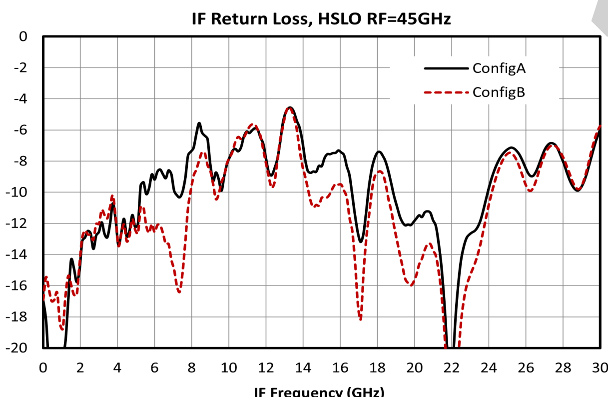

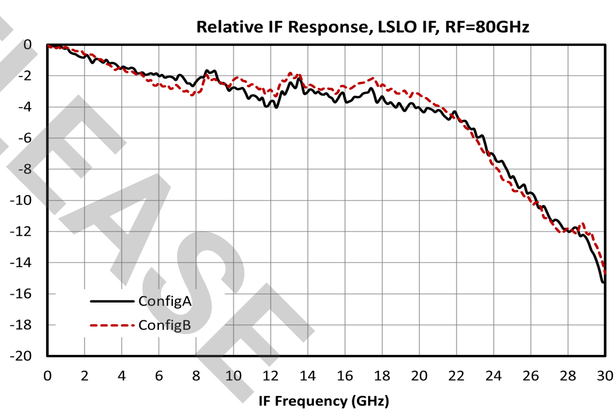

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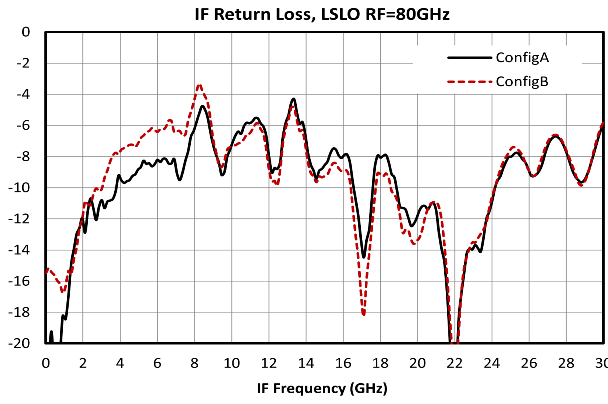

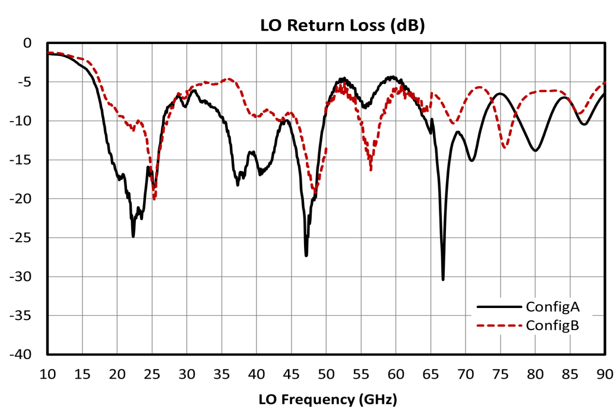

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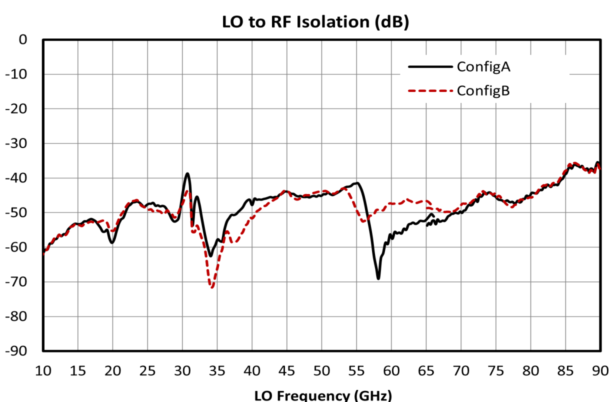

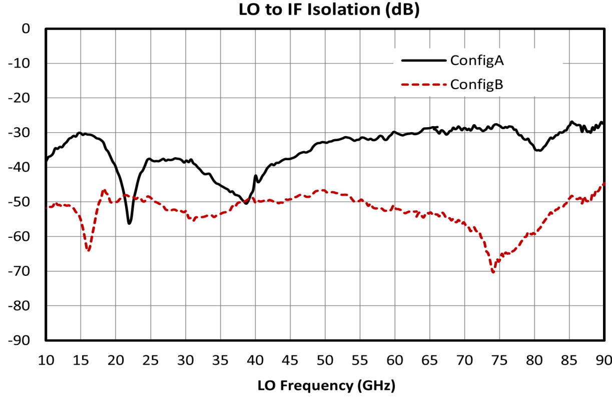

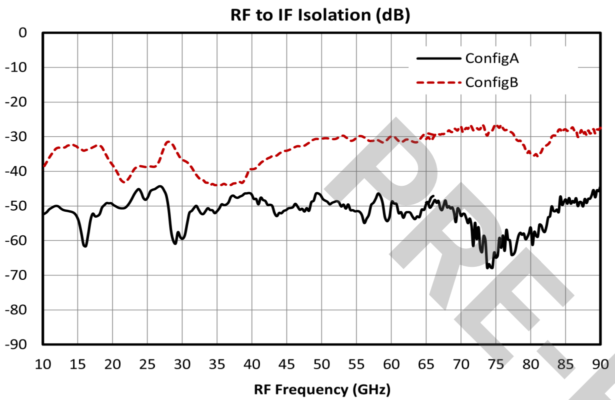

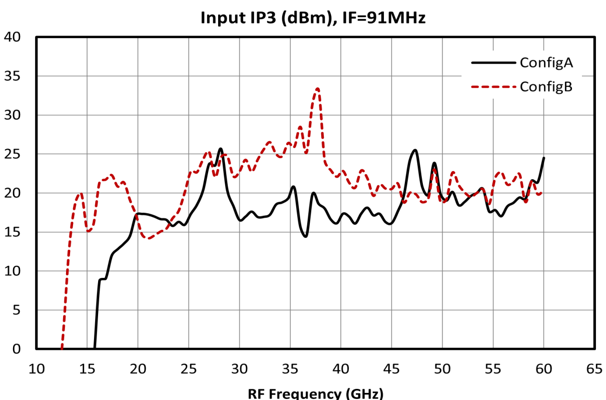

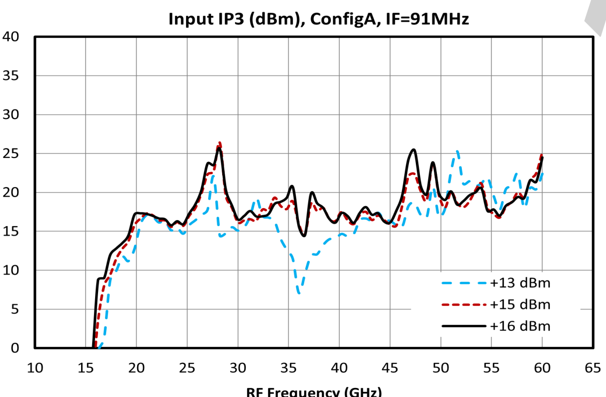

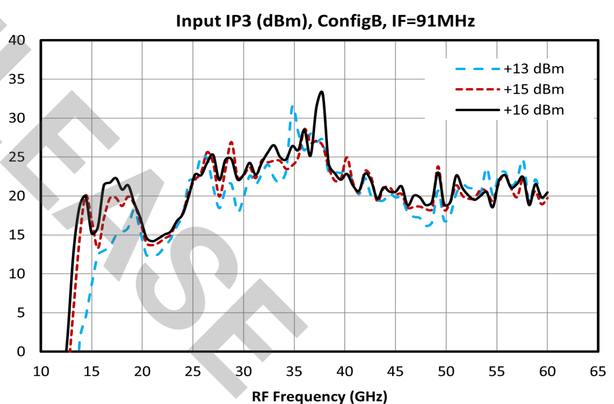

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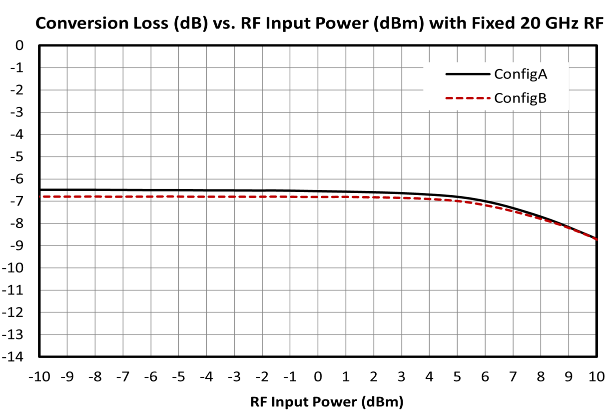

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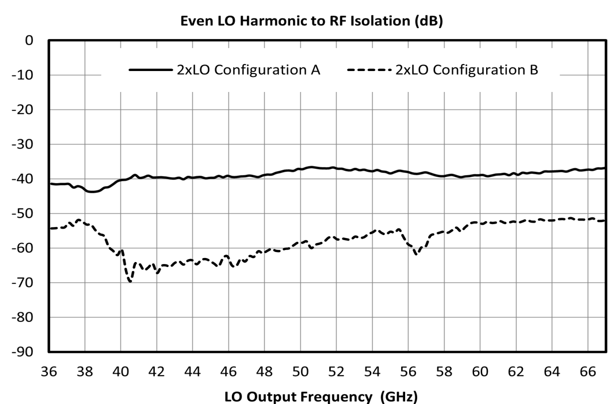
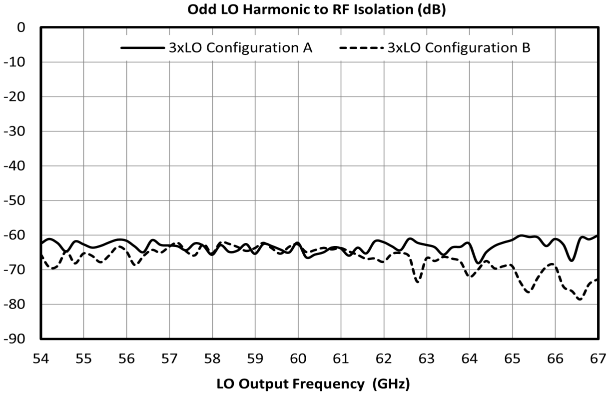
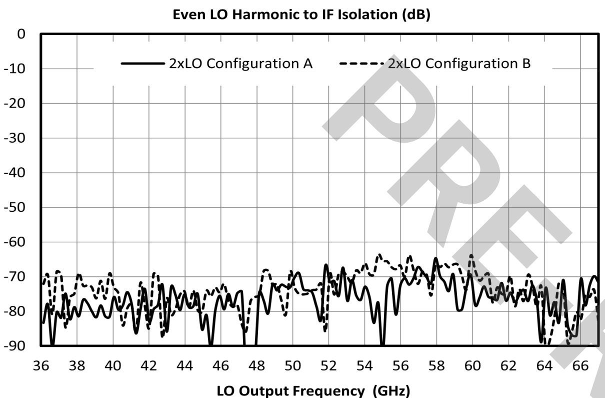
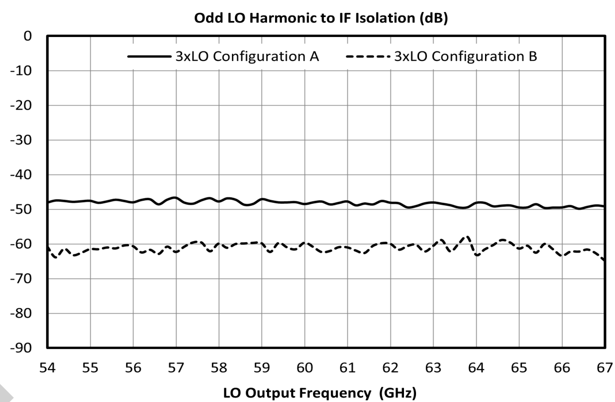
GaAs MMIC mmWave Double Balanced Mixer

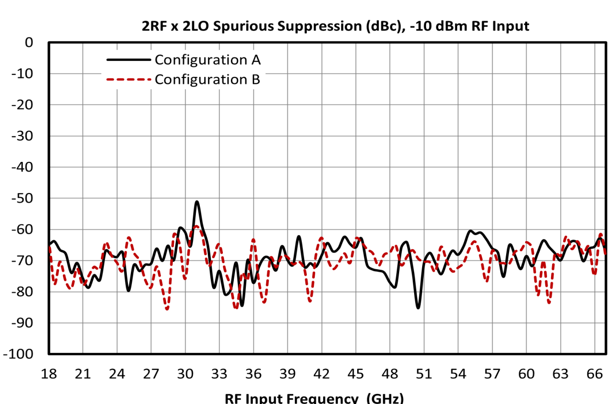
Typical Performance Plots: LO Harmonic Isolation

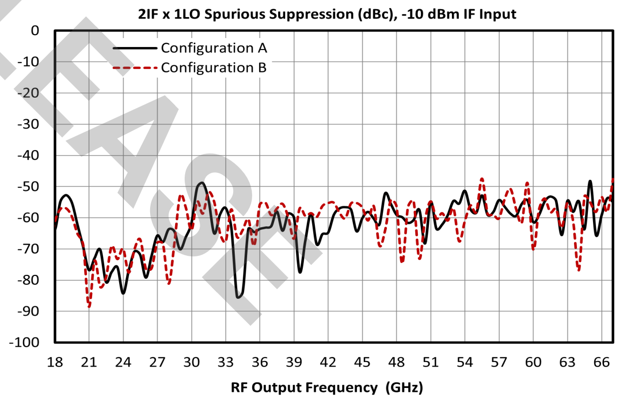












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Spur Table

Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies (+mLO+nRF) within the 18 to 67 GHz RF/LO bands, which create a 91 MHz IF spurious output. The mixer is swept across the full 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 70 dBc for the Configuration A for a -10 dBm input, so a -20 dBm RF input creates a spur that is (2-1) x (-10 dB) dB lower, or 80 dBc.

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

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xRF	43 (23)	Reference	46 (33)	12 (13)	50 (31)	N/A
2xRF	68 (65)	65 (79)	70 (74)	63 (81)	78 (80)	63 (79)
3xRF	76 (75)	84 (88)	101 (100)	92 (94)	102 (98)	80 (88)
4xRF	92 (87)	115 (114)	110 (112)	112 (111)	113 (110)	113 (110)
5xRF	N/A	125 (121)	122 (123)	122 (120)	122 (120)	121 (121)

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Upconversion Spurious Suppression

Spurious data is taken by mixing a 91 MHz IF with LO frequencies (+mLO+nIF), which creates an RF within the 18 to 67 GHz RF band. The mixer is swept across the full 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 68 dBc for the Configuration A for a -10 dBm input, so a -20 dBm IF input creates a spur that is (2-1) x (-10 dB) dB lower, or 78 dBc.

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

-10 dBm IF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xIF	43 (23)	Reference	47 (34)	11 (11)	49 (30)	N/A
2xIF	77 (80)	68 (66)	65 (73)	70 (72)	72 (67)	75 (72)
3xIF	92 (90)	85 (86)	89 (87)	75 (77)	91 (89)	86 (86)
4xIF	99 (99)	101 (99)	97 (96)	96 (93)	101 (97)	98 (96)
5xIF	110 (110)	110 (108)	107 (105)	106 (106)	108 (108)	109 (107)

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Die Mounting Recommendations

Mounting and Bonding Recommendations

Marki MMICs should be attached directly to a ground plane with conductive epoxy. The ground plane electrical impedance should be as low as practically possible. This will prevent resonances and permit the best possible electrical performance. Datasheet performance is only guaranteed in an environment with a low electrical impedance ground.

Mounting - To epoxy the chip, apply a minimum amount of conductive epoxy to the mounting surface so that a thin epoxy fillet is observed around the perimeter of the chip. Cure epoxy according to manufacturer instructions.

Wire Bonding - Ball or wedge bond with 0.025 mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. All bonds should be as short as possible <0.31 mm (12 mils).

Circuit Considerations – 50 Ω transmission lines should be used for all high frequency connections in and out of the chip. Wirebonds should be kept as short as possible, with multiple wirebonds recommended for higher frequency connections to reduce parasitic inductance. In circumstances where the chip more than .001” thinner than the substrate, a heat spreading spacer tab is optional to further reduce bondwire length and parasitic inductance.

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Handling Precautions

General Handling

Chips should be handled with care using tweezers or a vacuum collet. Users should take precautions to protect chips from direct human contact that can deposit contaminants, like perspiration and skin oils on any of the chip's surfaces.

Static Sensitivity

GaAs MMIC devices are sensitive to ESD and should be handled, assembled, tested, and transported only in static protected environments.

Cleaning and Storage: Do not attempt to clean the chip with a liquid cleaning system or expose the bare chips to liquid. Once the ESD sensitive bags the chips are stored in are opened, chips should be stored in a dry nitrogen atmosphere.

Bonding Diagram

Orientation Marker

1

2

3

Multiple Wirebonds for Reduced Inductance

Minimum Space Gap/ Wirebond Length

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Mechanical Data

Outline Drawing

Download : Outline 2D Drawing

Function	Configuration A Port Number	Configuration B Port Number
LO	1	3
IF	2	2
RF	3	1

PROJECTION INCH [MM]

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVALS
A	Initial Release	3/16/26	AT

.005 [.13] min clearance

.090 [2.28]

.004 [.09]

.014 [.35]

.054 [1.38]

.042 [1.07]

.007 [.18]

.004 [.09]

.004 [.10]

.019 [.49]

.004 [.09]

1

2

3

RF Signal Pad
.004[.10] x .008[.20]
3 PL
.007 [.176] pitch between
.004 [.10] sqaure GND pads

.004[.10] x .004[.10]
Ground Pad,
5 PL

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Notes:

1. CH substrate is .004 in Thick GaAs.
2. I/O traces 4.2 microns and ground plane 5 microns finish
3. Tolerance for X, Y dimensions is ±0.002 in.
Tolerance for metalization is ±0.0001 in.

MATERIAL: 210-10833-R70

FINISH:

NOTES:

DRAWN BY	DATE
OG	01/28/2026
SP	02/09/2026
AJN	02/09/2026

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Outline
Bare Die G31 MMIC Mixer

SIZE A | CAGE CODE 0UC32 | DWG. NO. MM1-1886HCH-2

SHEET 1 OF 1

DO NOT SCALE DRAWING

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