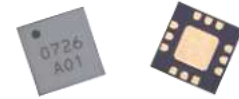


GaAs DOUBLE-BALANCED MIXER

MM1-0726HSM

The MM1-0726HSM is a passive GaAs double balanced MMIC mixer suitable for both up and down-conversion applications. As with all Marki Microwave mixers, it features excellent conversion loss, isolation and spurious performance across a broad bandwidth and in a small form factor. The MM1-0726HSM is available in a lead-free, RoHS compliant QFN surface mount package and is compatible with standard leaded and lead-free PCB reflow soldering processes. Owing to its passive balun circuitry, the mixer can be used in two different configurations: Configuration A for highest efficiency and Configuration B for highest linearity. Refer to page 2 for more information on the operating configurations.



Features

- Compact 3mm QFN SMT Style Package
- Broadband Performance
- Excellent Unit-to-Unit Repeatability
- RoHS Compliant

Electrical Specifications - Specifications guaranteed from -55 to +100°C, measured in a 50Ω system. Specifications are shown for Configurations A (B). See page 2 for port locations.

Parameter	LO (GHz)	RF (GHz)	IF (GHz)	Min	Typ	Max	Diode Option LO drive level (dBm)
Conversion Loss (dB)	7-26.5		DC-9		7.5 (11)	13 (19)	
Isolation (dB) LO-RF LO-IF RF-IF					See Plots		
Input 1 dB Compression (dBm)					+9 (+10)		H-Config. A: +17 to +23 (H-Config. B: +15 to +21)
Input Two-Tone Third Order Intercept Point (dBm)					+17 (+24)		H-Config. A: +17 to +23 (H-Config. B: +15 to +21)

Part Number Options

Model Number	Description
MM1-0726HSM-2 ¹	Surface Mount, H-Diode, I Port Configuration -2
EVAL-MM1-0726HSM	Connectorized Evaluation Fixture, H-Diode

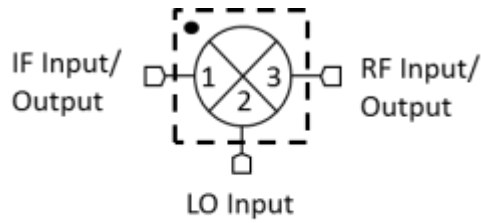
¹Note: For port locations and I/O designations, refer to the drawings on page 2 of this document.

GaAs DOUBLE-BALANCED MIXER

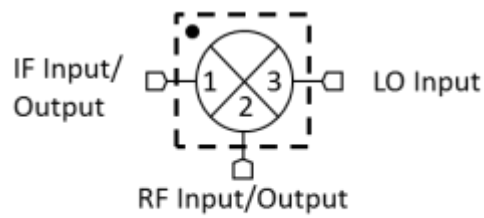
Page 4

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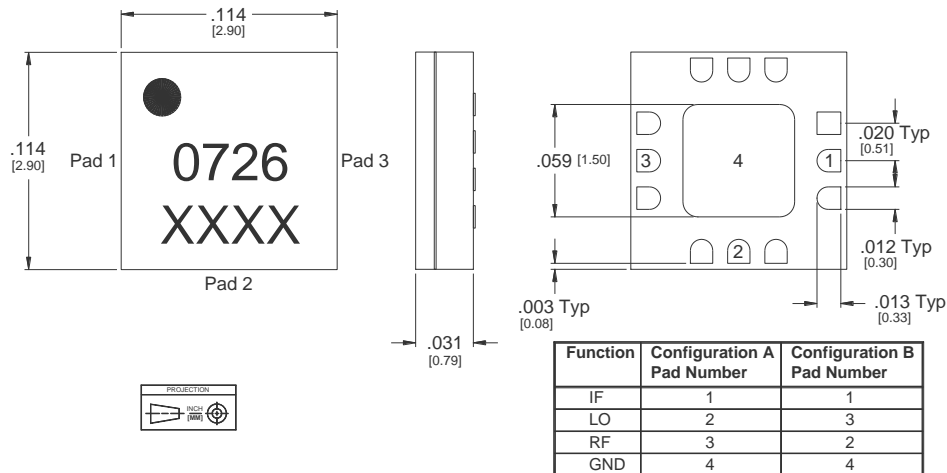
LO/RF 7 to 26.5 GHz
IF DC to 9 GHz



Configuration A



Configuration B

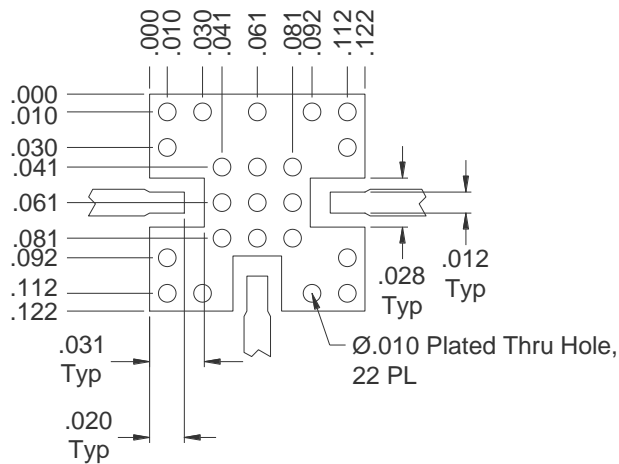


Outline Drawing – QFN package

Substrate material is Ceramic.

I/O Leads and Ground Paddle are 1.4±0.6 microns Au over 1.3 microns Ni.

All unconnected pins should be connected to PCB RF ground.



QFN-Package Surface-Mount Landing Pattern

[Click here for a DXF of the above layout.](#)

[Click here for leaded solder reflow.](#) [Click here for lead-free solder reflow.](#)

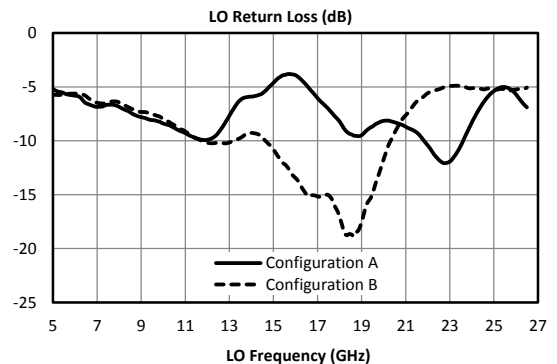
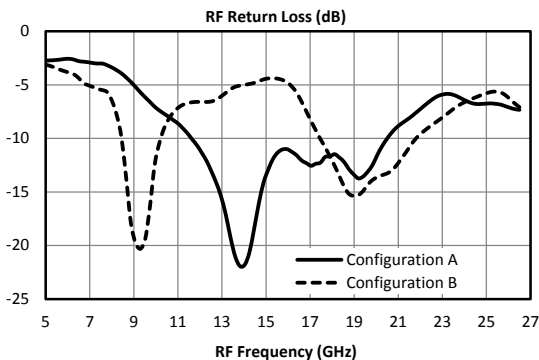
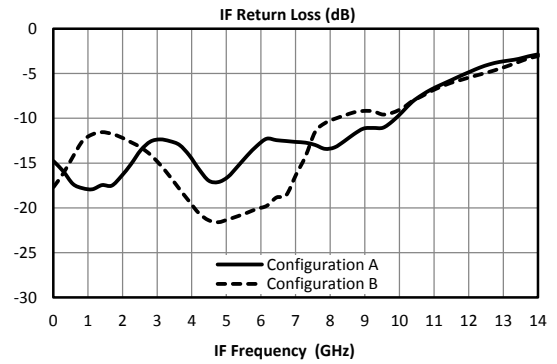
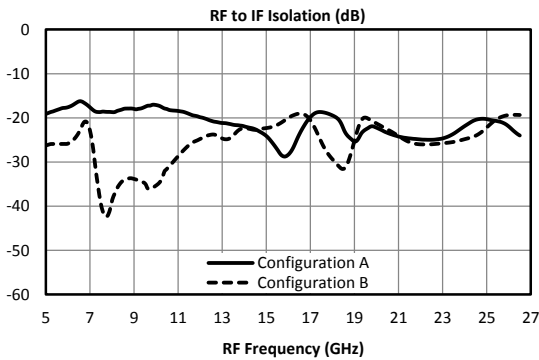
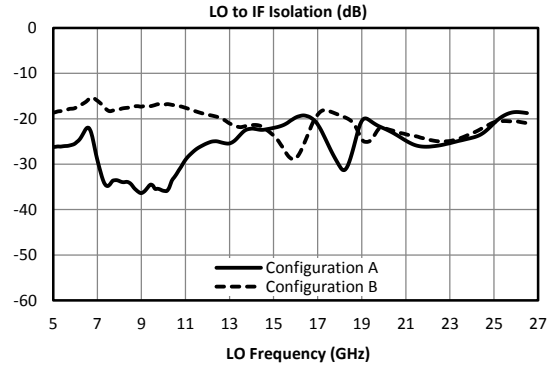
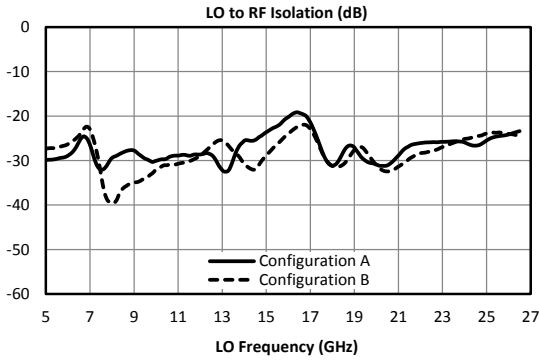
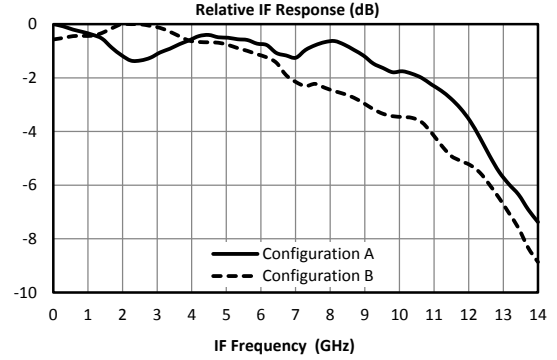
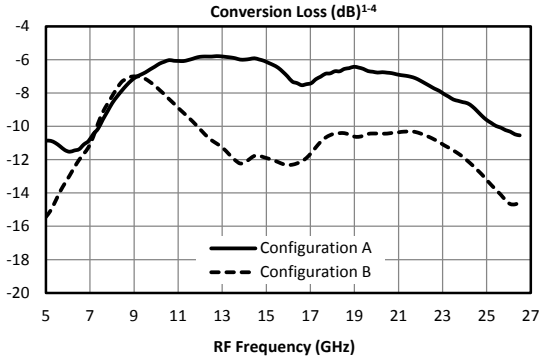
GaAs DOUBLE-BALANCED MIXER

Page 2

MM1-0726HSM

LO/RF 7 to 26.5 GHz
IF DC to 9 GHz

Typical Performance



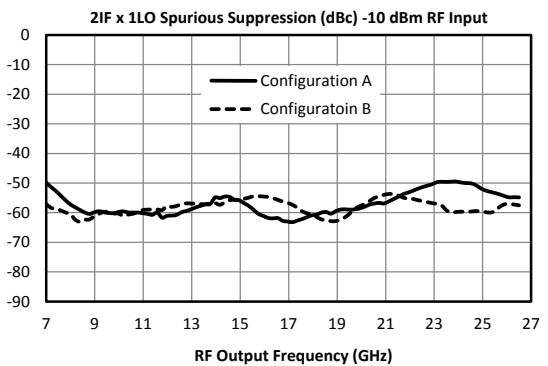
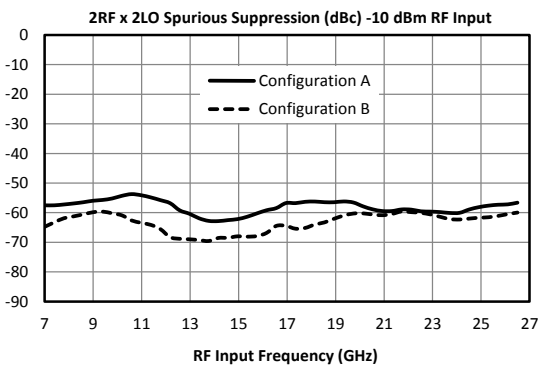
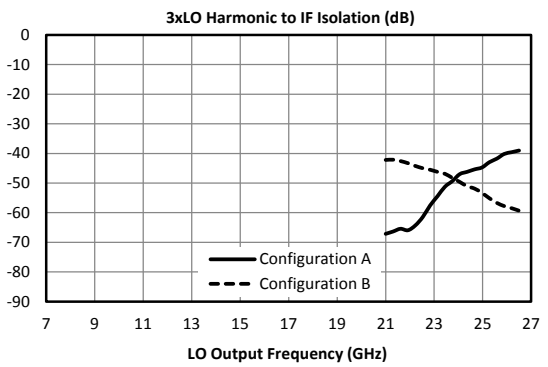
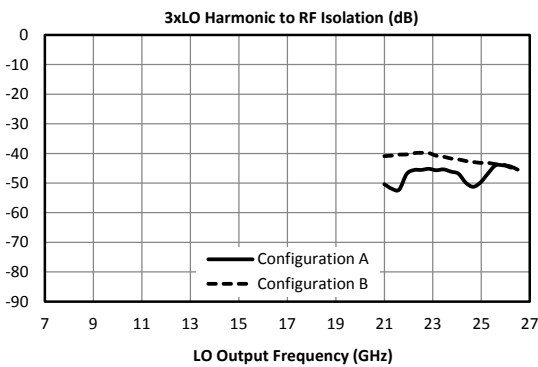
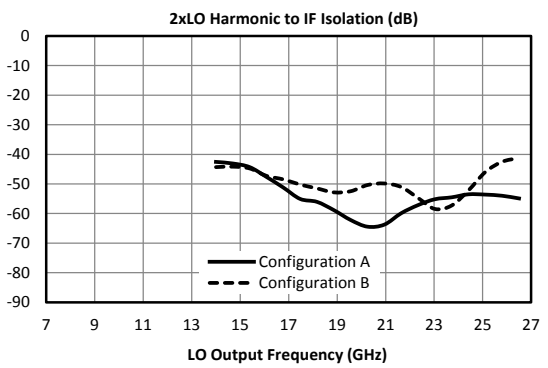
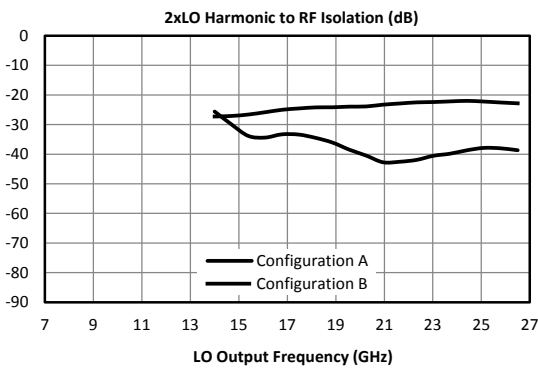
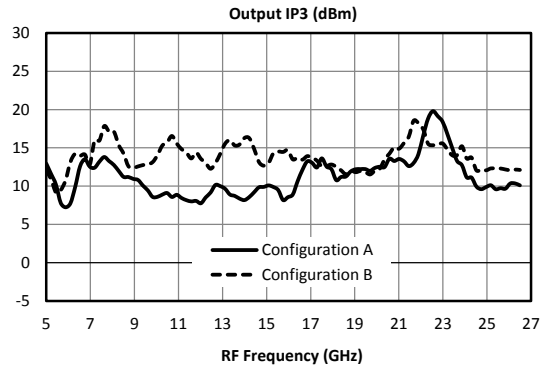
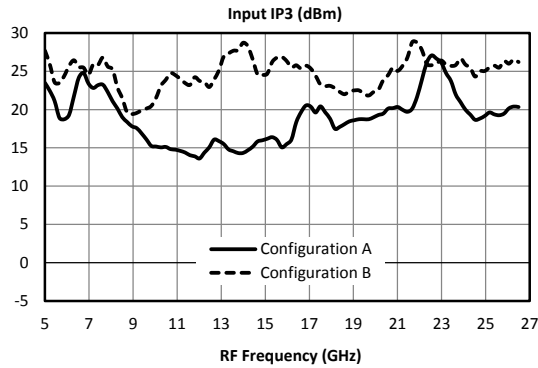
GaAs DOUBLE-BALANCED MIXER

Page 3

MM1-0726HSM

LO/RF 7 to 26.5 GHz
IF DC to 9 GHz

Typical Performance





GaAs DOUBLE-BALANCED MIXER

Page 5

MM1-0726HSM

LO/RF 7 to 26.5 GHz
IF DC to 9 GHz

Downconversion Spurious Suppression

Spurious data is taken by selecting RF and LO frequencies ($\pm mLO \pm nRF$) within the 7 to 26.5 GHz RF/LO bands, which create a 100 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 55 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 65 dBc.

Typical Downconversion Spurious Suppression (dBc): H Diode, A Configuration (B Configuration) ⁵

-10 dBm RF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xRF	15 (14)	Reference	15 (32)	10 (15)	20 (27)	22 (20)
2xRF	54 (67)	53 (48)	55 (59)	54 (50)	55 (66)	58 (50)
3xRF	82 (90)	63 (69)	68 (85)	72 (84)	70 (87)	69 (85)
4xRF	108 (108)	91 (103)	94 (108)	99 (107)	100 (113)	98 (111)
5xRF	123 (120)	125 (128)	106 (124)	110 (124)	114 (126)	117 (127)

Upconversion Spurious Suppression

Spurious data is taken by mixing a 100 MHz IF with LO frequencies ($\pm mLO \pm nIF$), which creates an RF within the 7 to 26.5 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 49 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 59 dBc.

Typical Upconversion Spurious Suppression (dBc): H Diode, A Configuration (B Configuration) ⁵

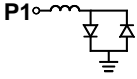


-10 dBm IF Input	0xLO	1xLO	2xLO	3xLO	4xLO	5xLO
1xIF	20 (25)	Reference	12 (29)	9 (10)	20 (31)	22 (20)
2xIF	55 (52)	49 (56)	50 (46)	45 (42)	47 (40)	49 (46)
3xIF	67 (77)	67 (75)	68 (78)	64 (67)	70 (69)	65 (69)
4xIF	95 (103)	90 (106)	92 (93)	90 (100)	96 (85)	92 (87)
5xIF	114 (121)	109 (122)	107 (117)	114 (124)	109 (108)	104 (102)

GaAs DOUBLE-BALANCED MIXER

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MM1-0726HSM

LO/RF 7 to 26.5 GHz
IF DC to 9 GHz

Port	Description	DC Interface Schematic
Port 1	Port 1 is DC coupled to the diodes. Blocking capacitor is optional.	
Port 2	Port 2 is DC short to ground and AC matched to 50 Ohms from 7 GHz to 26.5 GHz. Blocking capacitor is optional.	
Port 3	Port 3 is DC short to ground and AC matched to 50 Ohms from 7 GHz to 26.5 GHz. Blocking capacitor is optional.	

Absolute Maximum Ratings	
Parameter	Maximum Rating
Port 2 DC Current	1 Amp
Port 3 DC Current	1 Amp
Port 1 DC Current	50 mA
RF Power Handling (RF+LO)	+25 dBm at +25°C, derated linearly to +20 dBm at +100°C
Operating Temperature	-55°C to +100°C
Storage Temperature	-65°C to +125°C

DATA SHEET NOTES:

- Mixer Conversion Loss Plot IF frequency is 100 MHz.
- Mixer Noise Figure typically measures within 0.5 dB of conversion loss for IF frequencies greater than 5 MHz.
- Conversion Loss typically degrades less than 0.5 dB for LO drives 2 dB below the lowest and 3 dB above highest nominal LO drive levels.
- Conversion Loss typically degrades less than 0.5 dB at +100°C and improves less than 0.5 dB at -55°C.
- Unless otherwise specified, Configuration A data is taken with +20 dBm LO drive, and Configuration B is taken with +18 dBm drive
- Specifications are subject to change without notice. Contact Marki Microwave for the most recent specifications and data sheets.
- Catalog mixer circuits are continually improved. Configuration control requires custom mixer model numbers and specifications.

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