

TDMX011037

Double-Balanced Mixer
18 - 46 GHz

Product Specification

Rev. -

Features

- Low Conversion Loss: 6.5 dB
- High Linearity: 20 dBm IIP3
- Wide IF Bandwidth: dc to 20 GHz
- High Isolation
- Die Size: 1.15 × 0.97 × 0.10 mm
- RoHS Compliant

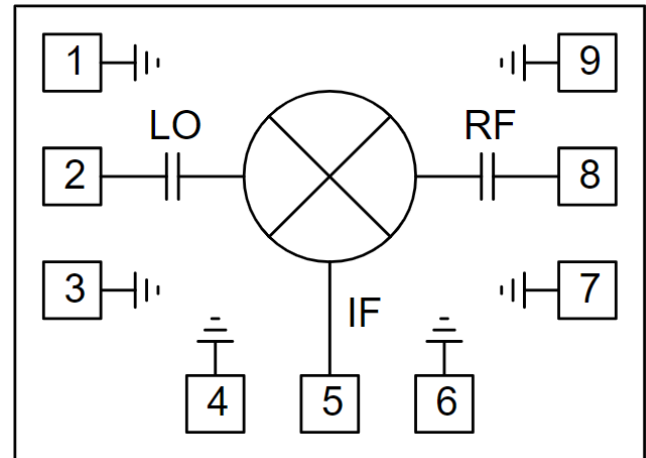
Description

TDMX011037 is a double-balanced passive diode mixer MMIC qualified for use in space environments. The mixer offers low conversion loss, high linearity and a wide IF bandwidth. The double-balanced circuit configuration provides excellent port isolation while internal 50-ohm matching simplifies its application.

This mixer is well suited for high reliability space applications including;

- Ku/Ka band orbital transmit/receive modules
- Satellite microwave communications

Functional Schematic



Bond-pad Configuration

Pad No.	Function	Pad No.	Function
1	GND ²	6	GND ²
2	LO	7	GND ²
3	GND ²	8	RF
4	GND ²	9	GND ²
5	IF	10	GND ³

2. These pads are internally connected to ground, and they can be left unconnected.
3. The backside of the die must be connected to RF, dc and thermal ground.

Double-Balanced Mixer 18 - 46 GHz

Product Specification

Rev. -

Electrical Specifications⁴: $F_{IF} = 1\text{GHz}$, $P_{LO} = +15\text{ dBm}$, $T_A = 25^\circ\text{C}$, $Z_0 = 50\ \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
LO and RF Frequency	—	GHz	18	—	46
IF Frequency	—	GHz	0	—	20
LO Power	—	dBm	—	15	—
Conversion Loss	18 - 24 GHz	dB	—	6.5	12
	24 - 40 GHz			6.5	10
	40 - 46 GHz			6.5	11
Input P1dB	—	dBm	—	12	—
Input IP3	$P_{RF} = -10\text{ dBm/ tone}$, $\Delta f = 1\text{ MHz}$	dBm	—	20	—
Input IP2	$P_{RF} = -10\text{ dBm/ tone}$, $\Delta f = 1\text{ MHz}$	dBm	—	50	—
LO-to-RF Isolation	—	dB	—	35	—
LO-to-IF Isolation	18 - 24 GHz	dB	25	37	—
	24 - 40 GHz		27	45	
	40 - 46 GHz		23	44	
RF-to-IF Isolation	18 - 24 GHz	dB	—	10	—
	24 - 40 GHz		8	24	
	40 - 46 GHz		13	27	
RF Return Loss	RF = 40 GHz	dB	—	5	—
IF Return Loss	IF = 1 GHz	dB	—	15	—

4. All specifications refer to down-conversion operation, unless otherwise noted.

Absolute Maximum Ratings^{5,6}

Parameter	Absolute Maximum
LO Power	23 dBm
RF or IF Power	20 dBm
Junction Temperature ⁷	+150°C
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C

5. Exceeding any one or combination of these limits may cause permanent damage to this device.

6. Teledyne does not recommend sustained operation near these survivability limits.

7. Operating at nominal conditions with $T_J \leq +150^\circ\text{C}$ will ensure $\text{MTTF} > 1 \times 10^6$ hours.

Handling Procedures

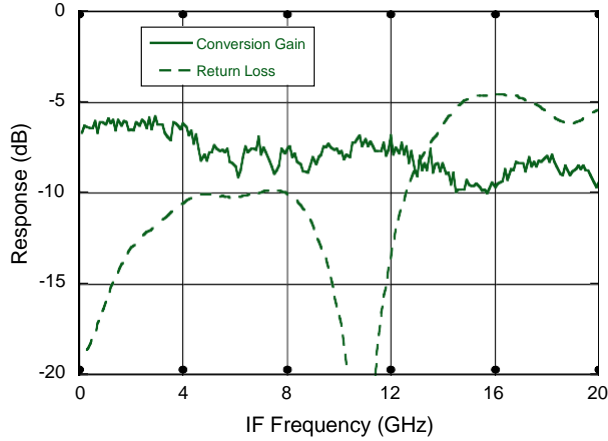
Please observe the following precautions to avoid damage:

Static Sensitivity

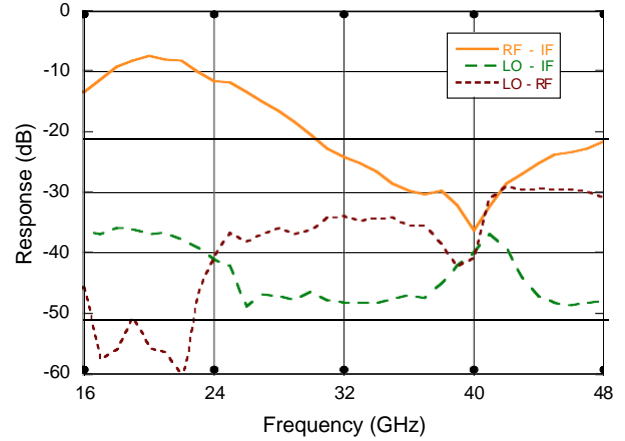
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1B devices.

Typical Performance Curves, $P_{LO} = +15$ dBm, $T_A = 25^\circ\text{C}$

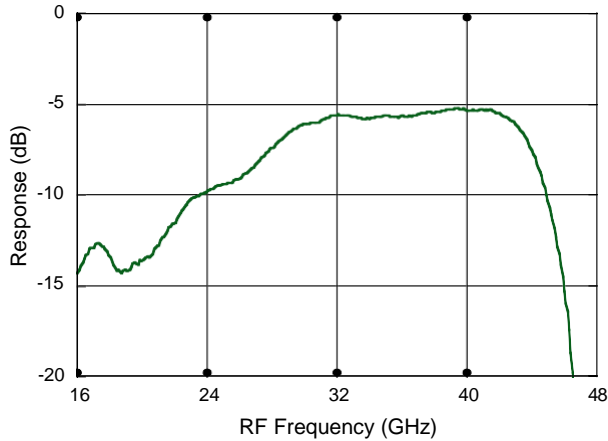
IF Bandwidth & Return Loss



Isolation



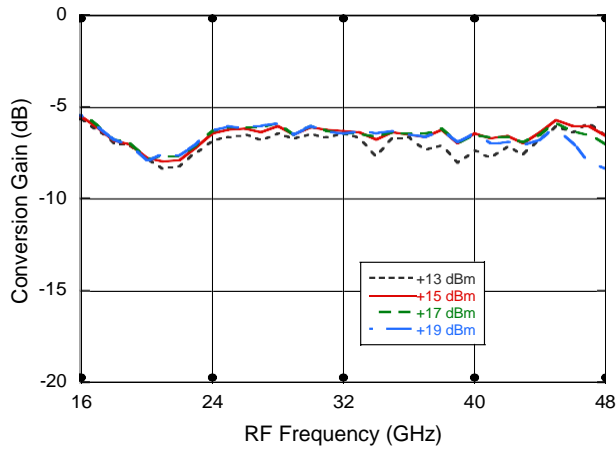
RF Return Loss



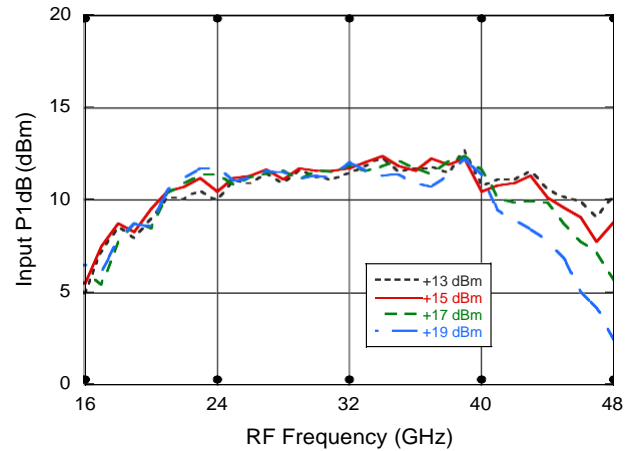
All performance curves refer to down-conversion operation, unless otherwise noted.
Two-tone input power = -10 dBm each tone, 1 MHz spacing.

Typical Performance Curves vs. LO Power, $T_A = 25^\circ\text{C}$

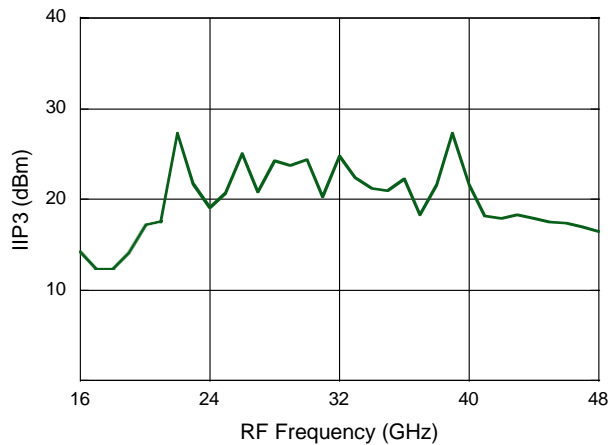
Conversion Gain



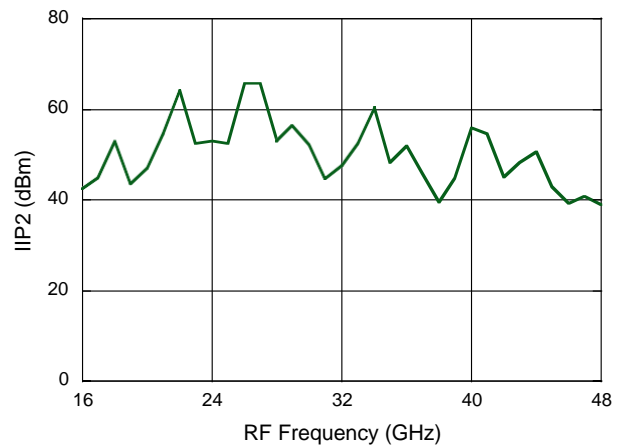
Input P1dB



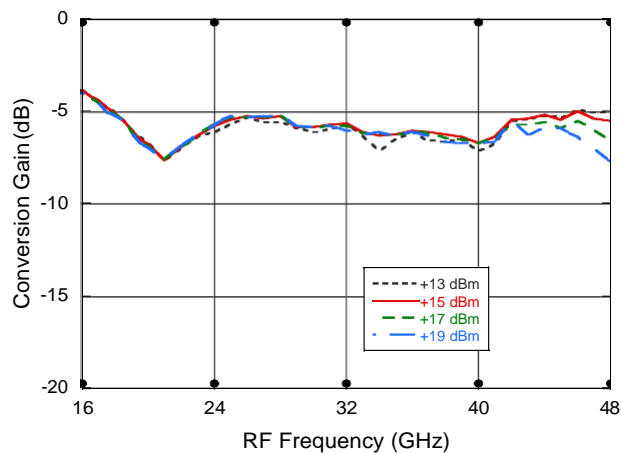
Input IP3 at $P_{LO} = +15\text{ dBm}$



Input IP2 at $P_{LO} = +15\text{ dBm}$



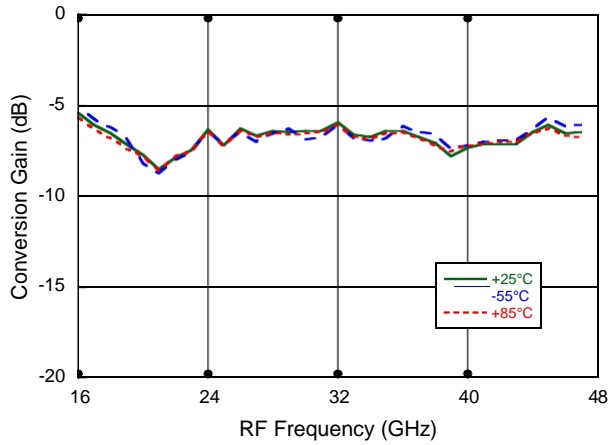
Up Conversion Gain



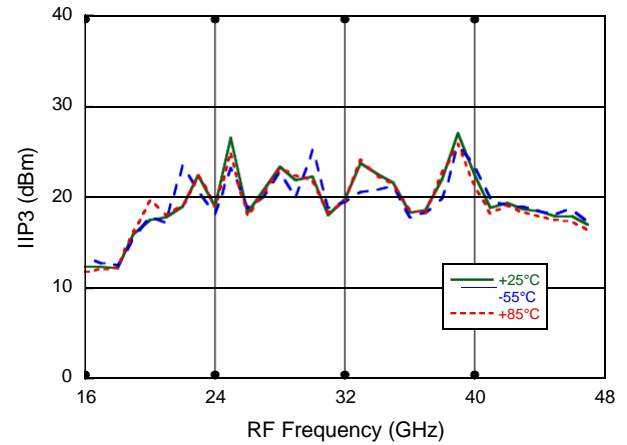
All performance curves refer to down-conversion operation, unless otherwise noted.
Two-tone input power = -10 dBm each tone, 1 MHz spacing.

Typical Performance Curves vs. Temperature, $P_{LO} = +15$ dBm

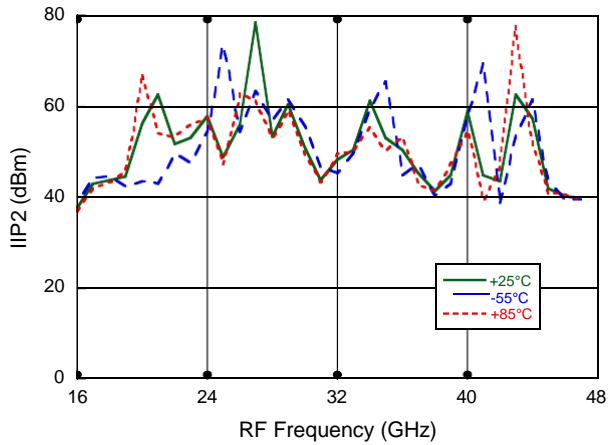
Conversion Gain



Input IP3



Input IP2



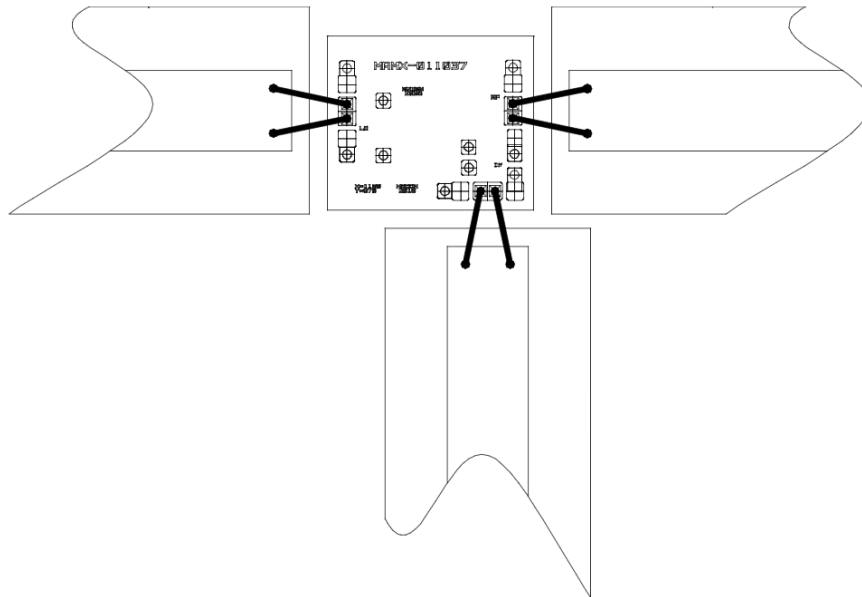
All performance curves refer to down-conversion operation, unless otherwise noted.
 Two-tone input power = -10 dBm each tone, 1 MHz spacing.

MxN Spurious Rejection @ IF Port (dBc IF)

RF = 24 GHz @ -10 dBm
 LO = 25 GHz @ +15 dBm

MxRF	NxLO				
	0	1	2	3	4
0	x	14	24	x	x
1	4	0	22	x	x
2	75	61	67	66	x
3	x	86	66	71	75
4	x	x	88	99	95

Assembly Guideline



Notes:

Attach bare die to PCB or carrier using conductive epoxy. Bond die signal pads to PCB 50 Ω traces using 1.0 mil gold wire. Two bond wires are recommended on each signal pad for optimal performance. There is no need to bond the die GND pads.

Ordering Information

Part Number	Package
TDMX011037-98	EM (Sample Die) Vacuum Release Gel Pack
TDMX011037-99	FM (Flight) with Method 2010 Visual Inspection Vacuum Release Gel Pack

Document Revision History

Revision	Date	Comments/Changes
Rev -	3/4/2020	Initial Revision Product Specification

Contact Information:

Teledyne e2v HiRel Electronics~ <http://www.tdehirel.com> ~ email: tdemarketing@teledyne.com

Trademarks are the property of their respective owners.

Advance Information: The product is in a formative or design stage. The data sheet contains design target specifications for product development. Specifications and features may change in any manner without notice.

Product Specification: The data sheet contains preliminary data. Additional data may be added at a later date. Teledyne e2v HiRel reserves the right to change specifications at any time without notice in order to supply the best possible product.

Product Specification: The data sheet contains final data. In the event Teledyne e2v HiRel decides to change the specifications, Teledyne e2v will notify customers of the intended changes by issuing a CNF (Customer Notification Form).

The information in this datasheet is believed to be reliable. However, Teledyne e2v HiRel Electronics assumes no liability for the use of this information. Use shall be entirely at the user's own risk. No patent rights or licenses to any circuits described in this data sheet are implied or granted to any third party.

Teledyne e2v's products are not designed or intended for use in devices or systems intended for surgical implant, or in other applications intended to support or sustain life, or in any application in which the failure of the Teledyne e2v product could create a situation in which personal injury or death might occur. Teledyne e2v HiRel Electronics assumes no liability for damages, including consequential or incidental damages, arising out of the use of its products in such applications.