

# MMIC Surface Mount Wideband Double Balanced Mixer-Amplifier

## MDA4-752H+

Level 0 (LO Power 0dBm) 2200-7500 MHz

### The Big Deal

- High L-I Isolation, 61 dB
- Low LO Power, 0 dBm
- Small Size, 4 x 4 x 1mm



CASE STYLE: DG1847

### Product Overview

MDA4-752H+ is a multi-chip module incorporating a mixer (InGaP HBT), LO amplifier (InGaP HBT) and IF amplifier (E-PHEMT) dice in as single package. It has flat conversion gain over a broad frequency range and with high IP3. In addition, the MDA4-752H+ has good input and output return loss over a broad frequency range without the need for external matching components. It is packaged in a tiny 4x4 mm MCLP package.

### Key Features

Feature	Advantages
Wide Bandwidth 2.2 to 7.5 GHz	Useful in wideband systems or in several narrowband systems, reducing inventory.
Wide IF Bandwidth 0.03 to 1.6 GHz	Usable in first (high IF-860 MHz) and second (low IF-70 MHz) down converter applications.
Conversion Gain, 4 to 9 dB	Incorporate low noise IF amplifier to enable positive conversion gain, minimizing the need for external amplifier circuits.
Low LO Power operation	Through the integration of a LO amplifier, the MDA4-752H+ can operate down to -3 dBm making this module very versatile as a receiver building block.
High LO-IF and RF-IF isolation 50 – 65 dB over 4 to 7.5 GHz	When used in suggested application circuit, provides outstanding isolation, minimizing the need for further filtering.
4 mm x 4 mm, 24 lead MCLP Package	Integrates Mixer, LO Amplifier and IF Amplifier into one package reducing PCB size. MCLP package has low inductance, repeatable transitions, and excellent thermal contact to PCB



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## MDA4-752H+

Level 0 (LO Power 0dBm) 2200-7500 MHz

### Product Features

- Wide bandwidth 2200 to 7500 MHz
- High L-I Isolation, 61 dB typ. at 4 GHz
- Operates with low LO power, 0 dBm
- Small Size 4 mm x 4mm x 1mm
- Aqueous washable

### Typical Applications

- Satellite down converters
- Defense radar & communication
- VSAT
- Aeronautical



CASE STYLE: DG1847

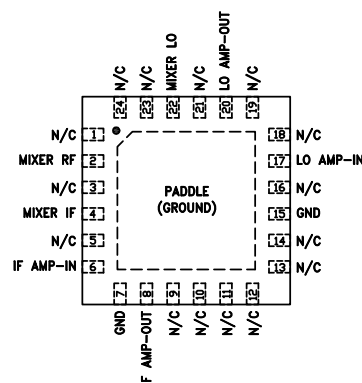
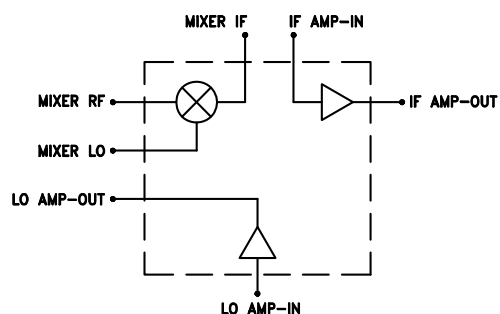
### +RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

### General Description

MDA4-752H+ is a multi-chip module incorporating a mixer (InGaP HBT), LO amplifier (InGaP HBT) and IF amplifier (E-PHEMT) dice in as single package. It has flat conversion gain over a broad frequency range and with high IP3. In addition, the MDA4-752H+ has good input and output return loss over a broad frequency range without the need for external matching components. It is packaged in a tiny 4x4 mm MCLP package.

### simplified schematic and bonding pad description



Function	Pad Number	Description
Mixer-RF	2	RF input to mixer
Mixer-LO	22	LO input to mixer
Mixer-IF	4	IF output from mixer
LO AMP-IN	17	LO Amplifier input
LO AMP-OUT	20	LO Amplifier output & DC-IN
IF AMP-IN	6	IF Amplifier input
IF AMP-OUT	8	IF Amplifier output & DC-IN
GND	7, Paddle	Connect to Ground
NC	1, 3,5,9-16,18,19,21,23,24	No connection, not used, ground externally

**Electrical Specifications<sup>1,2</sup> at 25°C, unless noted**

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
RF Frequency Range		2.2		7.5	GHz
LO Frequency Range		2.2		7.5	GHz
IF Frequency Range		0.03		1.6	GHz
LO Power			0		dBm
Conversion Gain (at IF=30 MHz)	2.2	—	7.6	—	dB
	3.0	—	9.7	—	
	4.0	8.1	9.1	10.4	
	5.0	—	7.6	—	
	6.0	—	7.3	—	
	7.5	—	4.2	—	
LO-RF Isolation	2.2	—	23	—	dB
	3.0	—	20	—	
	4.0	24	31	—	
	5.0	—	25	—	
	6.0	—	21	—	
	7.5	—	23	—	
LO-IF Isolation	2.2	—	19	—	dB
	3.0	—	35	—	
	4.0	53	61	—	
	5.0	—	64	—	
	6.0	—	59	—	
	7.5	—	60	—	
RF-IF Isolation	2.2		7		dB
	3.0		25		
	4.0		51		
	5.0		65		
	6.0		57		
	7.5		54		
Input at 1dB Compression	2-2 - 7.5		9		dBm
Input IP3	2.2		16		dBm
	3.0		15		
	4.0		15		
	5.0		16		
	6.0		16		
	7.5		19		
Noise Figure	2.3		8.6		dB
	3.0		9.6		
	4.0		9.9		
Thermal Resistance (junction-to-ground lead)			39		°C/W
DC Voltage			5		V
DC Current			141	169	mA

<sup>(1)</sup> Measured on Mini-Circuits Characterization test board TB-771+ as down converter. See Characterization Test Circuit Figure 1<sup>(2)</sup> Thermal Resistance= (Temperature rise of the device hot spot above ground lead ÷ Total power dissipation)**Absolute Maximum Ratings<sup>3</sup>**

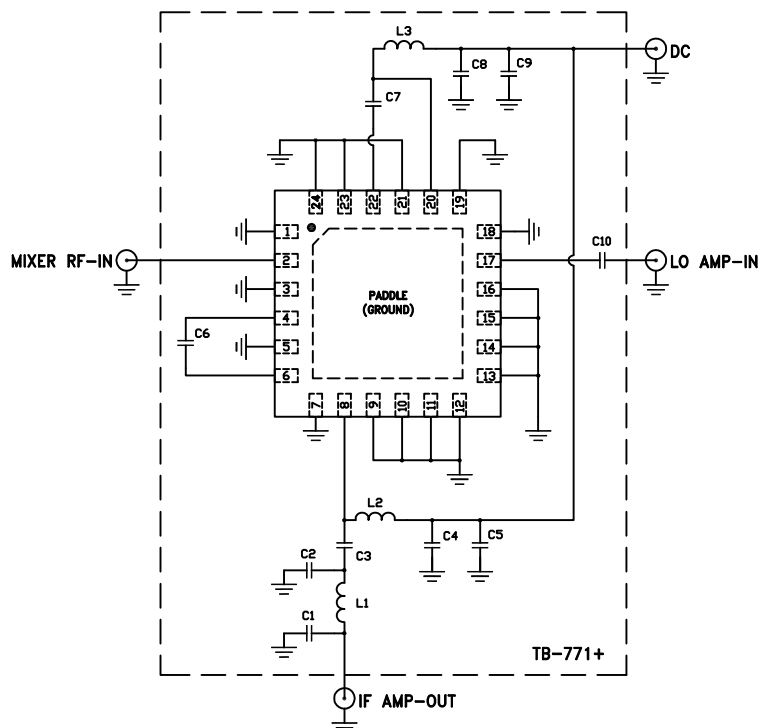
Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Mixer	RF-IN 21 dBm
	LO-IN 21 dBm
	IF Current 30 mA
IF Amplifier - IN	+23 dBm (5 minutes max.) +17 dBm (continuous)
LO Amplifier - IN	+24 dBm
Power Dissipation	
	LO Amplifier 0.725W
	IF Amplifier 0.47W
DC voltage	5.5V

3. Permanent damage may occur if any of these limits are exceeded.

Electrical maximum ratings are not intended for continuous normal operation.



## Characterization and Application Test Circuit



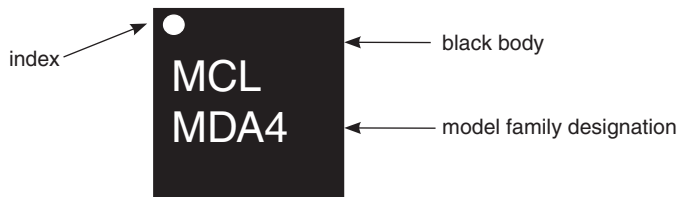
Component	Size	Value	Units
DUT		MDA4-752H+	—
L1	0402	4.7	nH
L2	0603	390	nH
L3	0402	36	nH
C1,C2	0402	3	pF
C3, C6	0402	.01	μF
C4,C7,C8,C10	0402	100	pF
C5,C9	0402	0.1	μF

Figure 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-771+). Conversion Loss, Isolations; L-R, L-I & R-I are measured using R&S ZVA 24 microwave network analyzer. Input IP3 is measured Agilent MXA N9020A spectrum Analyzer and PSG E8257D Signal Generators. NF is measured using Agilent's N8975A NF Analyzer

Conditions (Down Converter):

1. Conversion Loss, Isolations (L-R, L-I & R-I): RF= -10 dBm, LO=0 dBm, IF=30 MHz
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -10 dBm/tone at output.
3. Noise Figure: LO=0 dBm

## Product Marking



Additional Detailed Technical Information	
additional information is available on our dash board. To access this information <a href="#">click here</a>	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S1P Files) Data Set (.zip file)
Case Style	DG1847 Plastic package, exposed paddle, lead finish: matte-tin
Tape & Reel	F68
Standard quantities available on reel	7" reels with 10,20, 50, 100, 200, 500 or 1K devices
Suggested Layout for PCB Design	PL-433
Evaluation Board	TB-771+
Environmental Ratings	ENV08T1

## ESD Rating

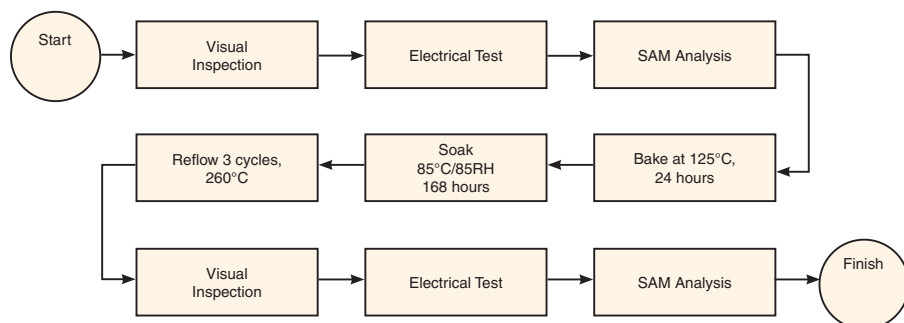
Human Body Model (HBM): Class 1A (250 to 500V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (Pass 25V) in accordance with ANSI/ESD STM5.2-1999

## MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

## MSL Test Flow Chart



## Additional Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)

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