THE BIG DEAL
- Wide bandwidth 2200 to 7000 MHz
- High L-I Isolation, 46 dB typ. at 4 GHz
- Useable as Up & Down Converter
- Small Size 4 mm x 4mm x 1mm
- Aqueous washable
- Footprint Compatible with Hittite HMC129LC4

APPLICATIONS
- Satellite up and down converters
- Defense radar & communication
- VSAT

PRODUCT OVERVIEW
MDB-73H+ is an advanced wideband frequency mixer fabricated using InGap HBT technology with integrated LO and RF Baluns. It has repeatable performance making it suitable for volume production. It is packaged in tiny 4 mm x 4mm x 1mm MCLP™ Package having Tin Silver Nickel finish passing tin whisker test.

KEY FEATURES

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double Balanced</td>
<td>Results in excellent LO-RF (34-39 dB typical) &amp; LO-IF (33-55 dB typical) Isolations minimizing need for external filtering</td>
</tr>
<tr>
<td>Wide Bandwidth, 2.2 to 7 GHz</td>
<td>Useful in wideband systems or in several narrowband systems. Reducing inventory</td>
</tr>
<tr>
<td>Wide IF Bandwidth DC-1600 MHz</td>
<td>Usable in first (high IF<del>860 MHz)) and second down (low IF</del>70 MHz) converter applications. IF as low as DC enables use in phase detector applications.</td>
</tr>
<tr>
<td>Low Thermal Resistance</td>
<td>Extremely High Reliability improving overall system reliability</td>
</tr>
<tr>
<td>Tj=88°C typical at 85°C ground lead temperature &amp; LO=+15 dBm</td>
<td></td>
</tr>
<tr>
<td>4 mm x 4 mm, 24 lead MCLP Package</td>
<td>Low Inductance, repeatable transitions, excellent thermal contact to PCB</td>
</tr>
</tbody>
</table>

Notes:
a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.
b. The Hittite HMC129LC4 part number is used for identification and comparison purposes only.
## ELECTRICAL SPECIFICATIONS AT 25°C, UNLESS NOTED

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition (GHz)</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Frequency Range</td>
<td>-</td>
<td>2.2</td>
<td>-</td>
<td>7.0</td>
<td>GHz</td>
</tr>
<tr>
<td>LO Frequency Range</td>
<td>-</td>
<td>2.2</td>
<td>-</td>
<td>7.0</td>
<td>GHz</td>
</tr>
<tr>
<td>IF Frequency Range</td>
<td>-</td>
<td>DC</td>
<td>-</td>
<td>1.6</td>
<td>GHz</td>
</tr>
<tr>
<td>LO Power</td>
<td>-</td>
<td>-15</td>
<td>-</td>
<td>+15</td>
<td>dBm</td>
</tr>
<tr>
<td>Conversion Loss (at IF=0.03 GHz)</td>
<td>2.2</td>
<td>8.8</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>7.4</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>8.2</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>8.7</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>9.3</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>7.0</td>
<td>8.9</td>
<td>9.8</td>
<td>9.8</td>
<td>dB</td>
</tr>
<tr>
<td>LO-RF Isolation</td>
<td>2.2</td>
<td>38</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>34</td>
<td>39</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>39</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>7.0</td>
<td>34</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>LO-IF Isolation</td>
<td>2.2</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>42</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>35</td>
<td>46</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>39</td>
<td>55</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>46</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>7.0</td>
<td>33</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>RF-IF Isolation</td>
<td>2.2</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
<td>13</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>6.0</td>
<td>13</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>7.0</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>Input at 1dB Compression</td>
<td>2.2-7.0</td>
<td>-10</td>
<td>-</td>
<td>-</td>
<td>dBm</td>
</tr>
<tr>
<td>Noise Figure</td>
<td>-40°C to 85°C</td>
<td>2.2</td>
<td>8.9</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>-65°C to 150°C</td>
<td>4.0</td>
<td>9.0</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>Thermal Resistance (junction-to-ground lead)</td>
<td>105</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

Measured on Mini-Circuits Characterization test board TB-746+. See Characterization Test Circuit Figure 1

## MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-40°C to 85°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65°C to 150°C</td>
</tr>
<tr>
<td>RF Power</td>
<td>21 dBm</td>
</tr>
<tr>
<td>LO Power</td>
<td>21 dBm</td>
</tr>
<tr>
<td>IF Current</td>
<td>30 mA</td>
</tr>
</tbody>
</table>

2. Permanent damage may occur if any of these limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.
Double Balanced Mixer

Figure 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-746+). 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= 0 dBm, LO=+15 dBm, IF=30 MHz
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.
3. Noise Figure: LO=+15 dBm

Figure 1A. Block Diagram of Test Circuit used for characterization of Conversion Loss, Isolations (LO-RF, LO-IF, RF-IF) and Return Loss (LO, RF, IF)

Figure 1B. Block Diagram of Test Circuit used for characterization of Input IP3

Figure 1C. Block Diagram of Test Circuit used for characterization of Noise Figure.
**ADDITONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS**

CLICK HERE

<table>
<thead>
<tr>
<th>Performance Data</th>
<th>Data Table</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Swept Graphs</td>
</tr>
<tr>
<td></td>
<td>S-Parameter (S1P Files) Data Set (.zip file)</td>
</tr>
<tr>
<td>Case Style</td>
<td>DG1847 Plastic package, exposed paddle, lead finish: tin/silver/nickel</td>
</tr>
<tr>
<td>Tape &amp; Reel</td>
<td>F68 7&quot; reels with 20, 50, 100, 200, 500 or 1K devices</td>
</tr>
<tr>
<td>Standard quantities available on reel</td>
<td>13&quot; Reels with 2K, 3K, 4K devices</td>
</tr>
<tr>
<td>Suggested Layout for PCB Design</td>
<td>PL-413</td>
</tr>
<tr>
<td>Evaluation Board</td>
<td>TB-746+</td>
</tr>
<tr>
<td>Environmental Ratings</td>
<td>ENV08T1</td>
</tr>
</tbody>
</table>

**ESD RATING**

Human Body Model (HBM): Class 1B (500 to <1000V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M3 (200 to <400V) 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**

Start → Visual Inspection → Electrical Test → SAM Analysis

Visual Inspection → Reflow 3 cycles 260°C → Soak 85°C/85RH 168 hours → Bake at 125°C, 24 hours → Electrical Test → SAM Analysis → Finish

**NOTES**

A. 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.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. 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