Silicon Double Balanced HMIC Mixer
850 - 1050 MHz

Features
- +35 dBm Typical Input IP3
- 8.3 dB Typical Conversion Loss
- +15 to +19 dBm LO Drive
- Fully Balanced Passive Mixer
- NO External Matching Required
- Low Cost Miniature Plastic MLP Package
- RoHS* Compliant with 260 °C. Reflow Capability
- 100% MATTE Tin Plating

Description and Applications
MA4EXP950H1-1277T is a silicon monolithic 850-1050 MHz, high barrier, double balanced mixer in a low cost, miniature surface mount FQFP-N 3mm Square, 16 lead plastic package. The die uses M/A-COM’s unique HMIC silicon/glass process to realize low loss passive elements while retaining the advantages of high barrier silicon schottky barrier diodes to produce a compact device.

These mixers are well suited for GSM and CDMA cellular basestation infrastructure applications where small size and high performance is required. Typical applications include frequency conversion, modulation, and demodulation in wireless receivers and transmitters.

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Maximum 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>Incident LO Power</td>
<td>+20 dBm C.W.</td>
</tr>
<tr>
<td>Incident RF Power</td>
<td>+20 dBm C.W.</td>
</tr>
<tr>
<td>Soldering Temperature</td>
<td>+260 °C</td>
</tr>
</tbody>
</table>

1. Exceeding these limits may cause permanent damage.
2. Please refer to application note M538 for surface mounting instructions.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA4EXP950H1-1277T</td>
<td>Tape and Reel</td>
</tr>
<tr>
<td>MAMX-090950-000SMB</td>
<td>Sample Test Boards</td>
</tr>
</tbody>
</table>

Mixer Schematic

Silicon Double Balanced HMIC Mixer
850 - 1050 MHz

Electrical Specifications $T_A = 25 \, ^\circ C$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency Range</th>
<th>Test Conditions</th>
<th>Units</th>
<th>Min.</th>
<th>Avg.</th>
<th>Max.</th>
</tr>
</thead>
</table>
| Conversion Loss    | 850 MHz
850-1050 MHz       | LO Drive = +19 dBm
RF = -10 dBm, IF = 60 MHz | dB     | -     | 8.1   | 8.3   | 9.5   |
|                    |                          |                                                      |       |       |       |       |
| L - R Isolation    | 850 MHz
850-1050 MHz       | LO Drive = +17 dBm
RF Level = -10 dBm | dB     | -     | 58.0  | -     | -     |
|                    |                          |                                                      |       |       |       |       |
| L - I Isolation    | 850 MHz
850-1050 MHz       | LO Drive = +17 dBm
RF Level = -10 dBm | dB     | -     | 49.0  | -     | -     |
|                    |                          |                                                      |       |       |       |       |
| R - I Isolation    | 850 MHz
850-1050 MHz       | LO Drive = +17 dBm
RF Level = -10 dBm | dB     | -     | 30.0  | -     | -     |
|                    |                          |                                                      |       |       |       |       |
| RF VSWR            | 850 MHz
850-1050 MHz       | LO Drive = +17 dBm
RF Level = -10 dBm | Ratio   | -     | 1.50:1| 2.20:1| -     |
|                    |                          |                                                      |       |       |       |       |
| IF VSWR            | DC - 500 MHz             | LO Drive = +17 dBm
RF Level = -10 dBm | Ratio   | -     | 1.70:1| -     | -     |
|                    |                          |                                                      |       |       |       |       |
| LO VSWR            | 850 MHz
850-1050 MHz       | LO Drive = +17 dBm
RF Level = -10 dBm | Ratio   | -     | 2.1:1 | 1.7:1 | -     |
|                    |                          |                                                      |       |       |       |       |
| Input IP3          | 850 MHz
850-1050 MHz       | LO Drive = +19 dBm
RF = -10 dBm, IF = 60 MHz | dBm    | -     | 32.0  | 33.0  | -     |
|                    |                          |                                                      |       |       |       |       |
| Input 1 dB Compression | 850 MHz
850-1050 MHz       | LO Drive = +17 dBm
IF = 60 MHz          | dBm    | -     | 12.1  | 12.7  | -     |
|                    |                          |                                                      |       |       |       |       |
| IF1 dB Bandwidth   | DC-200 MHz               | LO = 850 MHz @ +17 dBm                            | MHz   | 0     | -     | 200   |
Typical Performance Curves (LO Drive = +17 dBm, RF = -10 dBm, IF = 60 MHz)

**Conversion Loss**

![Conversion Loss Graph](image)

**Isolation**

![Isolation Graph](image)

**RF VSWR**

![RF VSWR Graph](image)

**IF VSWR**

![IF VSWR Graph](image)

**Input IP3 and 1 dB Compression Point**

![Input IP3 and 1 dB Compression Graph](image)
MA4EXP950H1-1277T Outline - 3mm FQFP-N 16 Lead Saw Singulated

NOTES
1. REFERENCE JEDEC MO-220, VAR VBB-1 FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION
2. REFERENCE S2883 APPLICATION NOTE FOR PCB FOOTPRINT INFORMATION
3. ALL DIMENSIONS SHOWN AS INCHES/ MM
Silicon Double Balanced HMIC Mixer
850 - 1050 MHz

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppels or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.