Features

• 92 – 96GHz.
• 15 dB conversion loss.
• 13dBm LO drive.
• >20dB RF/ LO isolation.
• 20dB image rejection.

Applications

• Narrow or wide bandwidth millimeter-wave imaging.
• High resolution radar.
• Sensing.
• P2P communications; short haul/high capacity/low interference links.

Overview

W-ICM-C-9296 is a MMIC diode mixer with integrated quadrature coupler for single sideband (LO+IF / RF-LO) operation in both upconverter and downconverter modes, on a 20-mil thick gold-plated brass carrier. This carrier assembly provides a known good die attach to assist in customer handling of the die, and thermal management. The mixer carrier assembly includes 100pF DC decoupling capacitors, 17µm gold DC gold wire wedge bonds, and 50µm gold ribbon RF wedge bonds.

This MMIC contains the Arralis W-ICM-9296 Image Cancellation Mixer MMIC, which is fabricated using GaAs Shottky diode technology and is designed for output frequencies in the range from 92GHz to 96GHz using either fixed IF and varying LO (86GHz - 90GHz) or fixed LO and varying IF (2GHz – 6GHz) signals. The circuit typically supplies flat conversion loss at moderate levels of LO power and low dc consumption. All bond pads and the die underside are gold plated.

The MMIC die is compatible with precision die attach methods, as well as thermo-compression and thermosonic wire bonding, making it ideal for MCM and hybrid microcircuit applications. All data shown herein is measured with the chip in a 50Ohm environment and contacted with RF probes, with results calibrated to the probe tips.
Notes

The tests indicated have all been performed with 100pF de-coupling capacitors on Vc. All tests are carried out at 25°C.

### Measured Performance Data

*Test Conditions:* IF = Fixed, 5.4GHz, 4dBm, LO = 86.6GHz – 90.6GHz, Bias=0.5V, 4mA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>90</td>
<td>97</td>
<td>GHz</td>
<td></td>
</tr>
<tr>
<td>LO Frequency</td>
<td>86.6</td>
<td>90.6</td>
<td>GHz</td>
<td></td>
</tr>
<tr>
<td>LO Power</td>
<td>10</td>
<td>13</td>
<td>dBm</td>
<td></td>
</tr>
<tr>
<td>IF Frequency</td>
<td>2</td>
<td>5.4</td>
<td>6</td>
<td>GHz</td>
</tr>
<tr>
<td>Conversion Loss</td>
<td>15</td>
<td>18</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Image Rejection</td>
<td>18</td>
<td>22</td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>LO Leakage</td>
<td>23</td>
<td>dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vcx</td>
<td>0.5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Icx</td>
<td>2</td>
<td>mA</td>
<td></td>
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</table>

### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC Voltages</td>
<td>-10V to +2V dc</td>
</tr>
<tr>
<td>LO Power</td>
<td>25dBm</td>
</tr>
<tr>
<td>IF / RF Power</td>
<td>22dBm</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65°C to +150°C</td>
</tr>
<tr>
<td>Channel Temperature</td>
<td>+150°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>−40°C to +85°C</td>
</tr>
</tbody>
</table>

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features proprietary protection circuitry, damage may occur on devices subjected to ESD. Proper ESD precautions should be taken to avoid performance degradation or loss of functionality.
Measured Performance Data

Test Conditions: IF = Fixed, 5.4GHz, 4dBm, LO = 86.6GHz – 90.6GHz, Bias=0.5V, 4mA

Figure 1
Conversion Loss

Figure 2
Image Rejection

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Measured Performance Data

Test Conditions: IF = Fixed, 5.4GHz, 4dBm, LO = 86.6GHz – 90.6GHz, Bias=0.5V, 4mA

Figure 3
LO Leakage

LO Leakage (to LO input signal) (dBc)

RF Frequency (GHz)
Measured Performance Data

Test Conditions: LO = Fixed, 88.6GHz, 13dBm, IF = 2GHz – 6GHz, 4dBm, Bias=0.5V, 4mA

Figure 4
Conversion Loss

Conversion Loss (dB)

IF Frequency (GHz)

Figure 5
Image Rejection

Image Rejection (to wanted signal) (dBc)

IF Frequency (GHz)
Measured Performance Data

Test Conditions: - LO = Fixed, 88.6GHz, 13dBm, IF = 2GHz – 6GHz, 4dBm, Bias=0.5V, 4mA
**Bonding Diagram**

*Mixer Carrier Assembly TU-W1340310-Carrier*

**Notes:**

1) 0.0007 99.99% Au wire

2) Bond to be of minimal length and loop (as allowed by the available wire-bonder)
### Pad Descriptions

**Mixer MMIC TU-W1340310**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO</td>
<td>LO pad. This pad is AC coupled.</td>
</tr>
<tr>
<td>RF</td>
<td>RF pad. This pad is AC coupled.</td>
</tr>
<tr>
<td>IF</td>
<td>IF pad. This pad is AC coupled.</td>
</tr>
<tr>
<td>VC1</td>
<td>Diode bias pad 1.</td>
</tr>
<tr>
<td>VC2</td>
<td>Diode bias pad 2.</td>
</tr>
<tr>
<td>BOTTOM</td>
<td>The die backside must be connected to RF/DC ground.</td>
</tr>
</tbody>
</table>
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W band Datasheet

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