XX1007-QT

Doubler
13.5-17.0/27.0-34.0 GHz

Features
- Integrated Gain, Doubler and Driver Stages
- Single Positive Supply, +5V
- Integrated Bypassing Capacitor
- +20.0 dBm Output Saturated Power
- 35.0 dBc Fundamental Suppression
- On-Chip ESD Protection
- 100% RF, DC and Output Power Testing
- Lead-Free 3 mm 16-Lead QFN Package
- RoHS* Compliant and 260°C Reflow Compatible

Description
M/A-COM Tech’s 13.5-17.0 / 27.0-34.0 GHz GaAs MMIC doubler integrates a gain stage, passive doubler and driver amplifier onto a single device. The XX1007-QT has a self-biased architecture requiring a single positive supply (+5V) only and integrated on-chip bypassing and DC blocking capacitors eliminating the need for any external components. This device uses M/A-COM Tech’s GaAs PHEMT device model technology, and is based upon electron beam lithography to ensure high repeatability and uniformity. The XX1007-QT has integrated ESD structures for protection and comes in a low cost 3x3mm QFN package. The device is well suited for Millimeter wave Point-to-Point Radio, LMDS, SATCOM and VSAT applications.

Ordering Information
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX1007-QT-0G00</td>
<td>bulk quantity</td>
</tr>
<tr>
<td>XX1007-QT-0G0T</td>
<td>tape and reel</td>
</tr>
<tr>
<td>XX1007-QT-EV1</td>
<td>evaluation board</td>
</tr>
</tbody>
</table>

Functional Block Diagram

Pin Configuration

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Function</th>
<th>Pin No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>RF In</td>
<td>1,2,4,5,6,7,8,9</td>
<td>NC</td>
</tr>
<tr>
<td>10</td>
<td>RF Out</td>
<td>11,12,14,15,16</td>
<td>NC</td>
</tr>
<tr>
<td>13</td>
<td>Vd</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage (Vd)</td>
<td>+6.0 VDC</td>
</tr>
<tr>
<td>Supply Current (Id)</td>
<td>300 mA</td>
</tr>
<tr>
<td>Gate Bias Voltage (Vg)</td>
<td>+0.3 VDC</td>
</tr>
<tr>
<td>Input Power (RF Pin)</td>
<td>10 dBm</td>
</tr>
<tr>
<td>Storage Temperature (Tstg)</td>
<td>-65 to +165 °C</td>
</tr>
<tr>
<td>Operating Temperature (Ta)</td>
<td>-55 to MTTF Table¹</td>
</tr>
<tr>
<td>Channel Temperature (Tch)</td>
<td>MTTF Table¹</td>
</tr>
</tbody>
</table>

(1) Channel temperature directly affects a device's MTTF. It is recommended to keep channel temperature as low as possible to maximize lifetime.
## Electrical Specifications: 13.5-17 GHz (fin) (Ambient Temperature T = 25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Frequency Range (fout)</td>
<td>GHz</td>
<td>27.0</td>
<td>-</td>
<td>34.0</td>
</tr>
<tr>
<td>Input Return Loss (S11)</td>
<td>dB</td>
<td>-</td>
<td>-8.0</td>
<td>-</td>
</tr>
<tr>
<td>Output Return Loss (S22)</td>
<td>dB</td>
<td>-</td>
<td>-10.0</td>
<td>-</td>
</tr>
<tr>
<td>Fundamental Suppression</td>
<td>dBc</td>
<td>-28.0</td>
<td>-35.0</td>
<td>-</td>
</tr>
<tr>
<td>RF Input Power (RF Pin)</td>
<td>dBm</td>
<td>-</td>
<td>8.0</td>
<td>-</td>
</tr>
<tr>
<td>Output Power at 8.0 dBm Pin (Pout)</td>
<td>dBm</td>
<td>+16.0</td>
<td>+20.0</td>
<td>-</td>
</tr>
<tr>
<td>Drain Bias Voltage (Vd)</td>
<td>VDC</td>
<td>-</td>
<td>+5.0</td>
<td>+5.5</td>
</tr>
<tr>
<td>Supply Current (Id1,2,3) (Vd=5.0V Typical)</td>
<td>mA</td>
<td>-</td>
<td>200</td>
<td>240</td>
</tr>
</tbody>
</table>
Typical Performance Curves

XX1007-QT: Pout at Fin and 2X Fin, Pin = 10 dBm, Vd = 5V

XX1007-QT: Pout at Fin and 2X Fin, Pin = 5 dBm, Vd = 5V

XX1007-QT: Pout at Fin and 2X Fin, Pin = 0 dBm, Vd = 5V

XX1007-QT: Pout at Fin and 2X Fin, Pin = 3 dBm, Vd = 5V

XX1007-QT: Pout vs Pin, Vd = 5V, Input Frequency = 14.5 GHz

XX1007-QT: Pout vs Pin, Input Frequency = 14.5 GHz
XX1007-QT

Doubler
13.5-17.0/27.0-34.0 GHz

Typical Performance Curves

XX1007-QT: Idd Vs Pin, Input Frequency = 14.5 GHz

XX1007-QT: Idd Vs Input Frequency, Vd = 5V

XX1007-QT: Input Return Loss (S11)

XX1007-QT: Input Return Loss (S22)

M/A-COM Technology Solutions Inc. (MACOM) and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice. Visit www.macom.com for additional data sheets and product information.
Doubler
13.5-17.0/27.0-34.0 GHz

Evaluation Board Layout

Handling Procedures
Please observe the following precautions to avoid damage:

Static Sensitivity
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these class 2 devices.

MTTF Tables (TBD)
These numbers were calculated based on accelerated life test information and thermal model analysis received from the fabricating foundry.

<table>
<thead>
<tr>
<th>Backplate Temperature</th>
<th>Channel Temperature</th>
<th>Rth</th>
<th>MTTF Hours</th>
<th>FITs</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 deg Celsius</td>
<td>192 deg Celsius</td>
<td>126 C/W</td>
<td>3.4 E+06</td>
<td>2.9 E+02</td>
</tr>
</tbody>
</table>

Bias Conditions: Vd=5.0V, Id=200mA
Lead-Free Package Dimensions/Layout

QT (3x3 mm)

Pin 1 Dot By marking

- A2
- A3
- 0.0191
- 3.9991
- 1.996
- 0.2999

TOP VIEW

RECOMMENDED SOLDER PAD PITCH AND DIMENSIONS

- A
- A3
- A2
- b
- K
- D
- E
- e
- D2
- E2
- L

Note:
1. ALL DIMENSIONS ARE IN mm.

MIN TYP MAX
A 0.80 0.90 1.00
A3 0.20 REF
A2 0.00 0.65 1.00
b 0.20 0.25 0.30
K 0.20 — —
D 3.00 BSC
E 3.00 BSC
e 0.50
D2 1.50 1.65 1.60
E2 1.50 1.65 1.60
L 0.16 0.26 0.36

1. VIEWS ARE NOT TO SCALE: USE DIMENSIONS AND TABLE.
## Doubler

| 13.5-17.0/27.0-34.0 GHz |

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 estopells 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.