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

<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>1,2,5,6,7,8,9</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>
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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
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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)

For further information and support please visit:
https://www.macom.com/support

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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
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Lead-Free Package Dimensions/Layout

QT (3x3 mm)

Pin 1 Dot
By marking

A2
A3
0.0191

K
b
30 x 30
CHAMFER

A1
A1
A1
A1

BOTTOM VIEW

Note:
1. ALL DIMENSIONS ARE IN mm.

RECOMMENDED SOLDER PAD PITCH AND DIMENSIONS

A  0.80   0.90   1.00
A3  0.20   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   0.50   0.50
D2  1.50   1.65   1.50
E2  1.50   1.65   1.50
L   0.16   0.26   0.36

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