Active Doubler 2.5 - 6.0 / 5.0 - 12.0 GHz

Features

- Octave Bandwidth Operation
- +16 dBm Output Power
- -35 dBc Fundamental Leakage
- +5 V, 125 mA Bias
- Lead-Free 4 mm 24-lead QFN Package
- 100% RF, DC and Output Power Testing
- RoHS* Compliant and 260°C Reflow Compatible

Description

The XX1002-QH is a 2.5 - 6.0 / 5.0 - 12.0 GHz QFN active doubler that delivers +16 dBm of output power. The device combines an active doubler with an output buffer amplifier that delivers constant power over a range of input powers. The device has excellent rejection of the fundamental and harmonic products and requires a single positive bias supply.

This device uses MACOM's GaAs HBT device technology to ensure high reliability and uniformity. The device comes in a low-cost 4 mm QFN surface mount plastic package offering excellent RF and thermal properties and is RoHS compliant.

This device is specifically designed for point-to-point radio applications and is well suited for other telecom applications such as SATCOM and VSAT.

Ordering Information¹

Part Number	Package
XX1002-QH-0G0T	tape and reel
XX1002-QH-EV1	evaluation module

1. Reference Application Note M513 for reel size information.

Functional Block Diagram



Pin Configuration²

Pin No.	Function	Pin No.	Function
3	RF In	22	V _{CC}
16	RF Out	25	Paddle ³

2. MACOM recommends connecting unused package pins to ground.

3. The exposed paddle centered on the package bottom must be connected to RF and DC ground.

* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

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Rev. V2

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Electrical Specifications: Input Freq. = 2.5 - 6.0 GHz, T_A = 25°C

Parameter	Units	Min.	Тур.	Max.
Output Frequency Range	GHz	5	-	12
Input Return Loss	dB	-	-15	-
Output Return Loss	dB	-	-7	-
Saturated Output Power	dBm	+13	+16	-
RF Input Power	dBm	-3	-	+3
Fundamental Leakage	dBc	-	-35	-
Third Harmonic Leakage	dBc	-	-30	-
Fourth Harmonic Leakage	dBc	-	-20	-
Bias Voltage	VDC	-	+5.0	+5.5
Supply Current (Quiescent)	mA	-	102	140

Absolute Maximum Ratings^{4,5}

Parameter	Absolute Max.
Supply Voltage	+6 V
Supply Current	200 mA
Input Power	+10 dBm
Storage Temperature	-65°C to +165°C
Operating Temperature	-55°C to +85°C
Junction Temperature ^{6,7}	+150°C

- 4. Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.
- 6. Operating at nominal conditions with $T_{\rm J}$ \leq +150°C will ensure MTTF > 1 x 10 6 hours.
- 7. Junction Temperature $(T_J) = T_C + \Theta_{JC} * (V * I)$ Typical CW thermal resistance $(\Theta_{JC}) = 77^{\circ}C/W$

Biasing

The device is operated by biasing VCC = 5 V which will draw typically 102 mA quiescent / 125 mA under RF drive. The device requires by-passing as shown in the recommended layout with C1 = 1 nF and C2 = 1 μ F.

PCB Layout



Parts List

Component	Value	Package
C1	1 nF	0402
C2	1 µF	0805

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MACOM

Typical Performance Curves



(3xFin) Harmonic Suppression





Fundamental Suppression





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Active Doubler 2.5 - 6.0 / 5.0 - 12.0 GHz

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Typical Performance Curves



(2xFin) Output Power







Fundamental Rejection





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Active Doubler 2.5 - 6.0 / 5.0 - 12.0 GHz



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MTTF





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Lead-Free Package Dimensions/Layout



[†] Reference Application Note S2083 for lead-free solder reflow recommendations. Meets JEDEC moisture sensitivity level 3 requirements. Plating is 100% matte tin over copper.

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 0 (200 V HBM) devices.

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