FAIRCHILD
SEMICONDUCTOR®

June 2004

RMWW12001

12–24 GHz Doubler MMIC

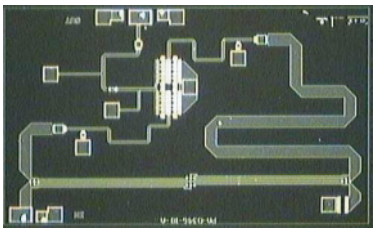
General Description

Fairchild Semiconductor's RMWW12001 is a 12 to 24 GHz Doubler designed for use in point to point and point to multi-point radios, and various communications applications. In conjunction with other Fairchild Semiconductor's amplifiers, multipliers and mixers it forms part of a complete 23 and 26 GHz transmit/receive chipset. The RMWW12001 utilizes our 0.25 µm power PHEMT process and is sufficiently versatile to serve in a variety of multiplier applications.

Features

- 4 mil substrate
- Conversion loss 10 dB (typ.)
- No DC bias required
- Chip size 1.5mm x 2.5mm

Device



Absolute Ratings

Symbol	Parameter	Ratings	Units
P_{IN}	RF Input Power (from 50Ω source)	+22	dBm
T_C	Operating Baseplate Temperature	-30 to +85	°C
T_{STG}	Storage Temperature Range	-55 to +125	°C

Electrical Characteristics (At 25°C), 50Ω system, Pin = +18dBm

Parameter	Min	Typ	Max	Units
Input Frequency Range	8.5		12	GHz
Output Frequency Range	17		24	GHz
Input Drive Power	+16	+18		dBm
Conversion Loss		10	12.5	dB
Conversion Loss Variation vs. Frequency		2		dB
Fundamental Rejection		-20		dBc
3rd Harmonic Rejection		-25		dBc
4th Harmonic Rejection		-25		dBc
5th Harmonic Rejection		-35		dBc
Input Return Loss (Pin = +18dBm)		12		dB

Application Information

CAUTION: THIS IS AN ESD SENSITIVE DEVICE.

Chip carrier material should be selected to have GaAs compatible thermal coefficient of expansion and high thermal conductivity such as copper molybdenum or copper tungsten. The chip carrier should be machined, finished flat, plated with gold over nickel and should be capable of withstanding 325°C for 15 minutes.

Die attachment should utilize Gold/Tin (80/20) eutectic alloy solder and should avoid hydrogen environment for PHEMT devices. Note that the backside of the chip is gold plated and is used as RF ground.

These GaAs devices should be handled with care and stored in dry nitrogen environment to prevent contamination of bonding surfaces. These are ESD sensitive devices and should be handled with appropriate precaution including the use of wrist grounding straps. All die attach and wire/ribbon bond equipment must be well grounded to prevent static discharges through the device.

Recommended wire bonding uses 3 mils wide and 0.5 mil thick gold ribbon with lengths as short as practical allowing for appropriate stress relief. The RF input and output bonds should be typically 0.012” long corresponding to a typical 2 mil gap between the chip and the substrate material.

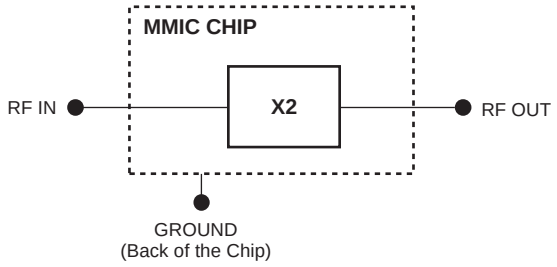
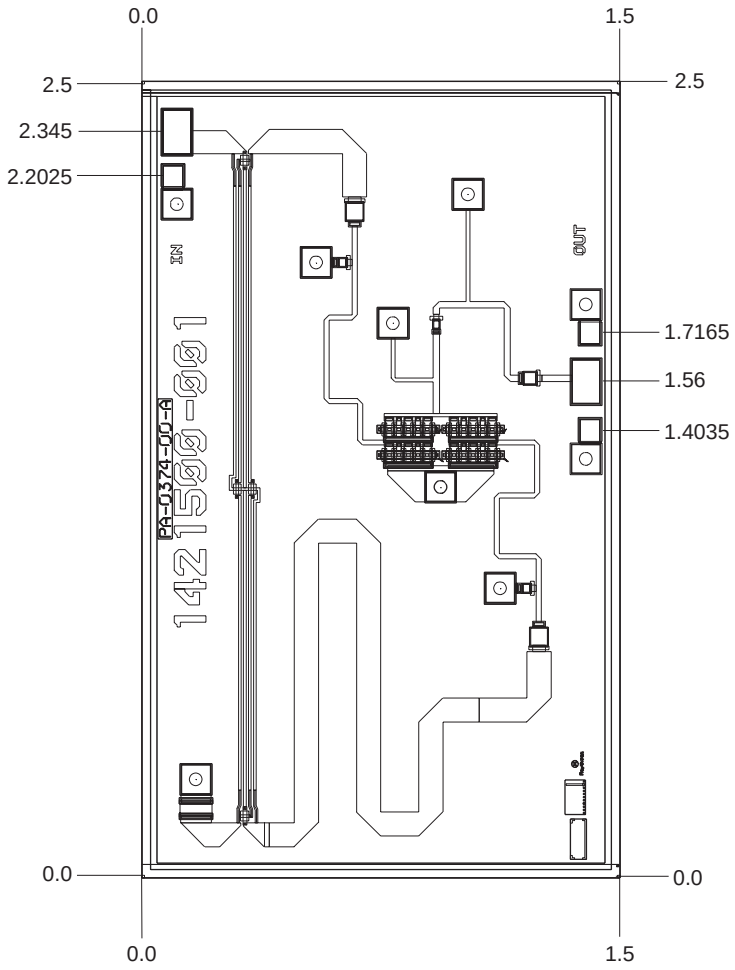
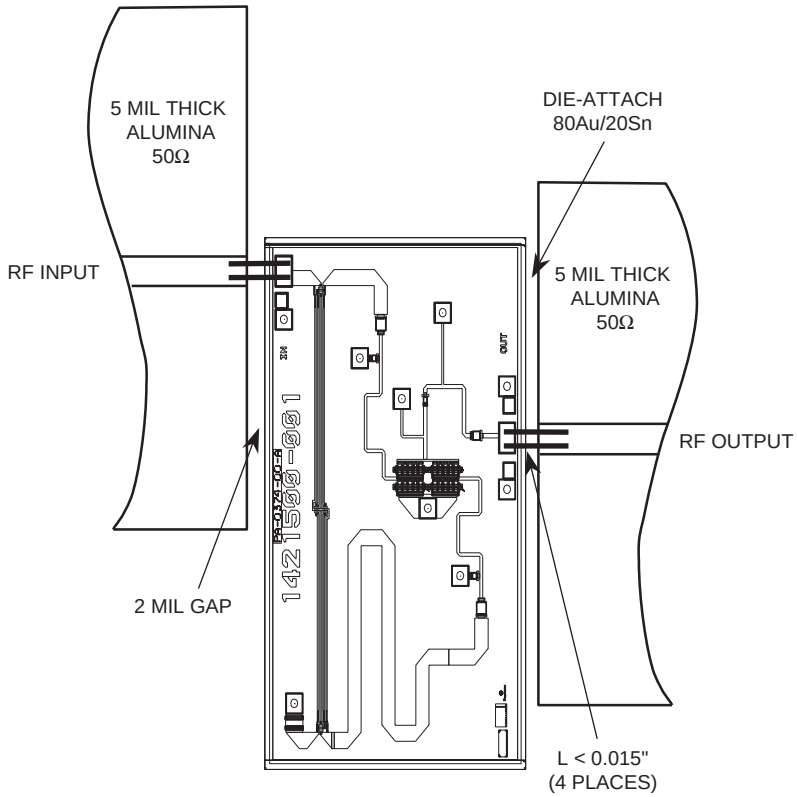


Figure 1. Functional Block Diagram



Dimensions in mm

Figure 2. Chip Layout and Bond Pad Locations
(Chip Size is 1.5mm x 2.5mm x 100µm. Back of chip is RF Ground)



Note:
Use 0.003" by 0.0005" Gold Ribbon for bonding. RF input and output bonds should be less than 0.015" long with stress relief.

Figure 3. Recommended Assembly Diagram

Recommended Procedure for Operation

The following sequence of steps must be followed to properly test the amplifier:

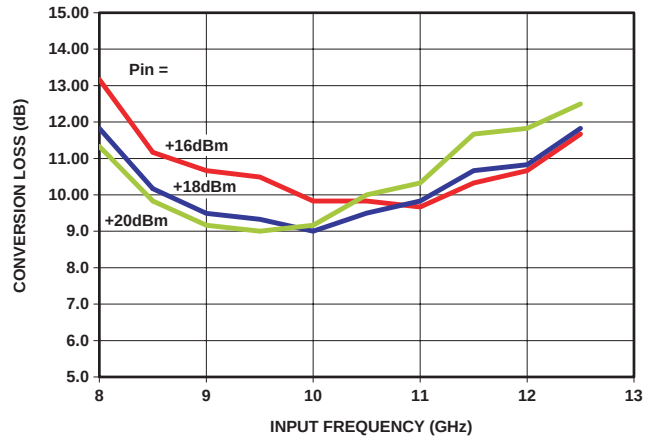
Step 1: The RMWW12001 does not require DC bias. Apply RF input signal at the appropriate frequency band and input drive level.

Step 2: Follow turn-off sequence of:

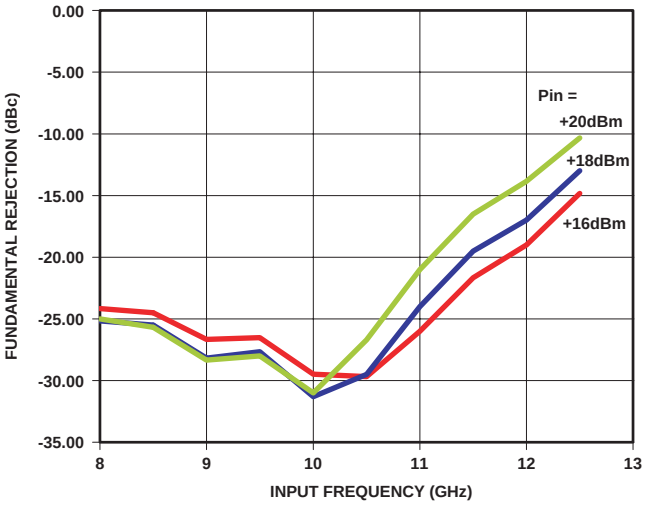
(i) Turn off RF input power,

Typical Characteristics

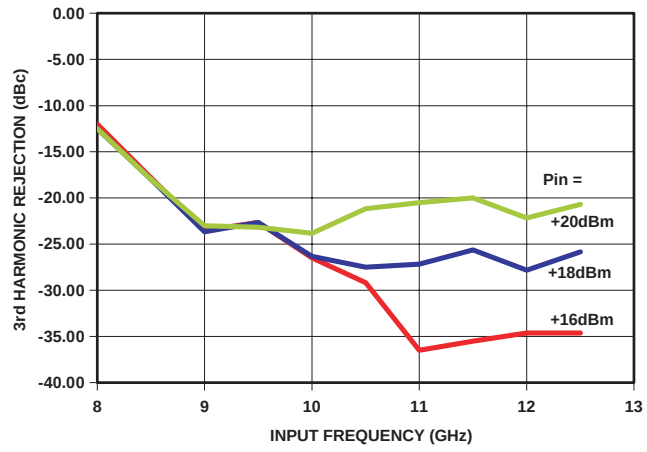
Typical Performance, Chip Bonded into 50Ω Test Fixture



Typical Performance, Chip Bonded into 50Ω Test Fixture

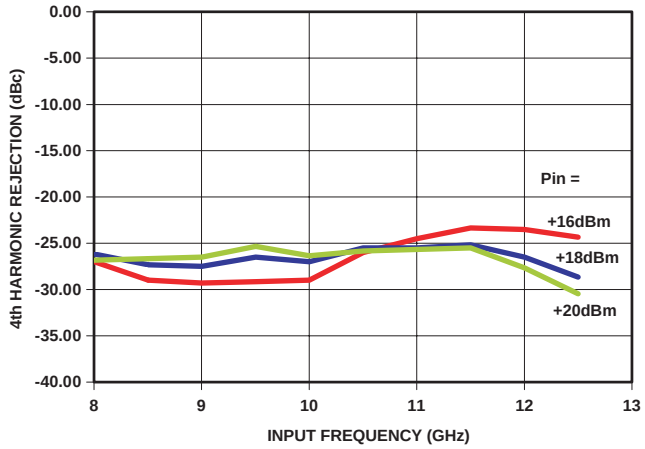


Typical Performance, Chip Bonded into 50Ω Test Fixture

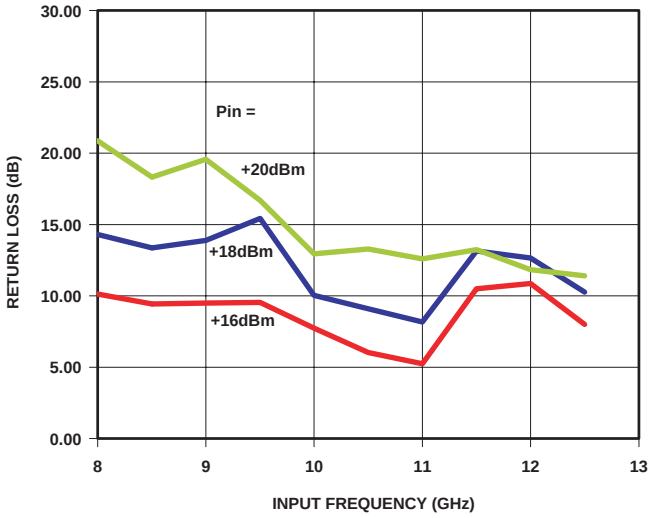


Typical Characteristics (Continued)

Typical Performance, Chip Bonded into 50Ω Test Fixture



Typical Performance, Chip Bonded into 50Ω Test Fixture



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CROSSVOLT™	GlobalOptoisolator™	MicroPak™	QS™	SyncFET™
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EcoSPARK™	HiSeC™	MSX™	Quiet Series™	TINYOPTO™
E²CMOS™	I²C™	MSXPro™	RapidConfigure™	TruTranslation™
EnSigna™	*i-Lo*™	OCX™	RapidConnect™	UHC™
FACT™	ImpliedDisconnect™	OCXPro™	µSerDes™	UltraFET®
FACT Quiet Series™		OPTOLOGIC®	SILENT SWITCHER®	VCX™
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