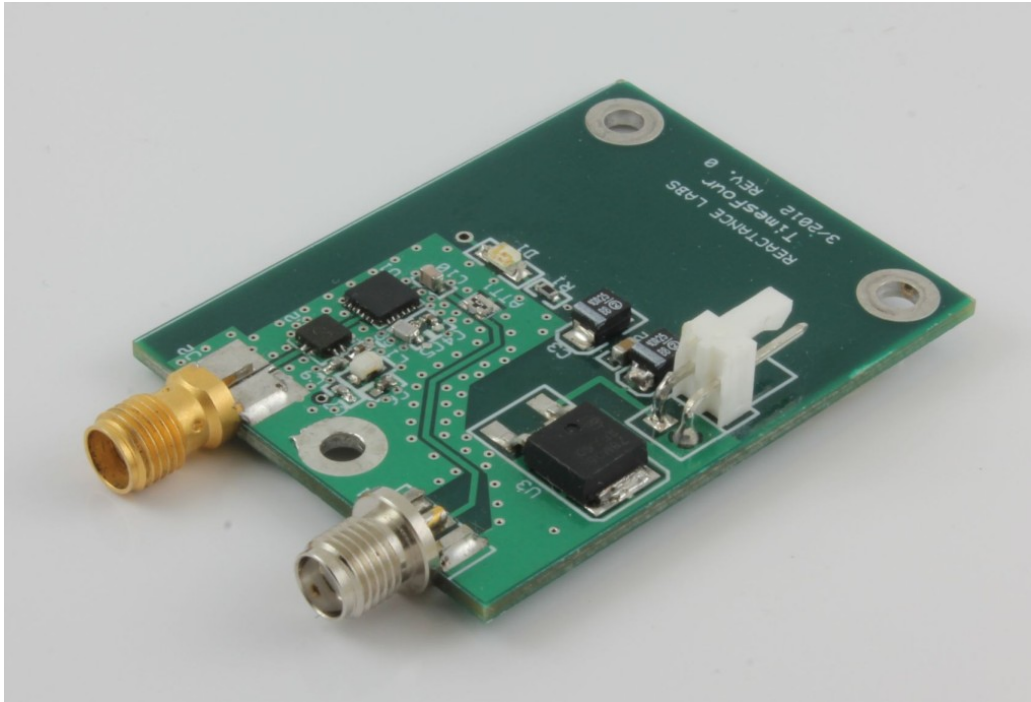




TimesFour



User's Manual

Version 1.0

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1 Overview

1.1 Introduction

The TimesFour multiplier was designed to complement the Reactance Labs OpenSynth line of frequency synthesizers for the purpose of generating X band (8-12 GHz) signals for use in local oscillators, beacons, etc. With a matching footprint, the TimesFour the combination of the two boards makes for a very compact signal source. A TimesFour can be used with any signal source in the 2-3 GHz range of appropriate power (see specifications).

1.2 Specifications

DC input voltage: +12V (can be used down to ~7.5V)

DC current typical: 200 mA

RF IN: 2- 3.25 GHz at -8 to +10 dBm

RF Output:

8 GHz: +12.5 dBm

9 GHz: +16 dBm

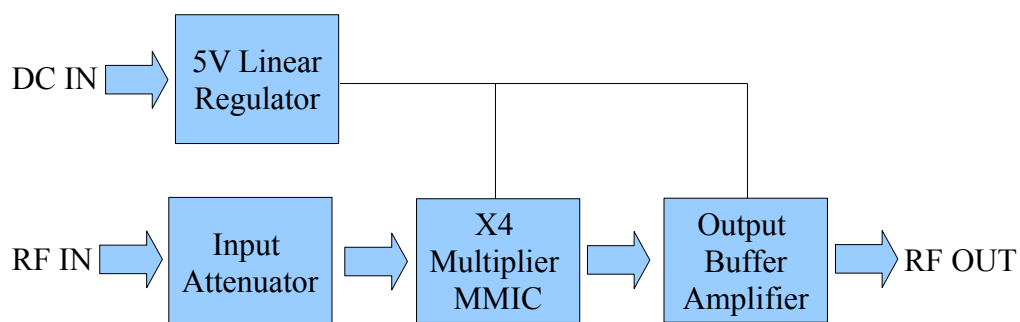
10 GHz: +18 dBm

11 GHz: +17 dBm

12 GHz: +14 dBm

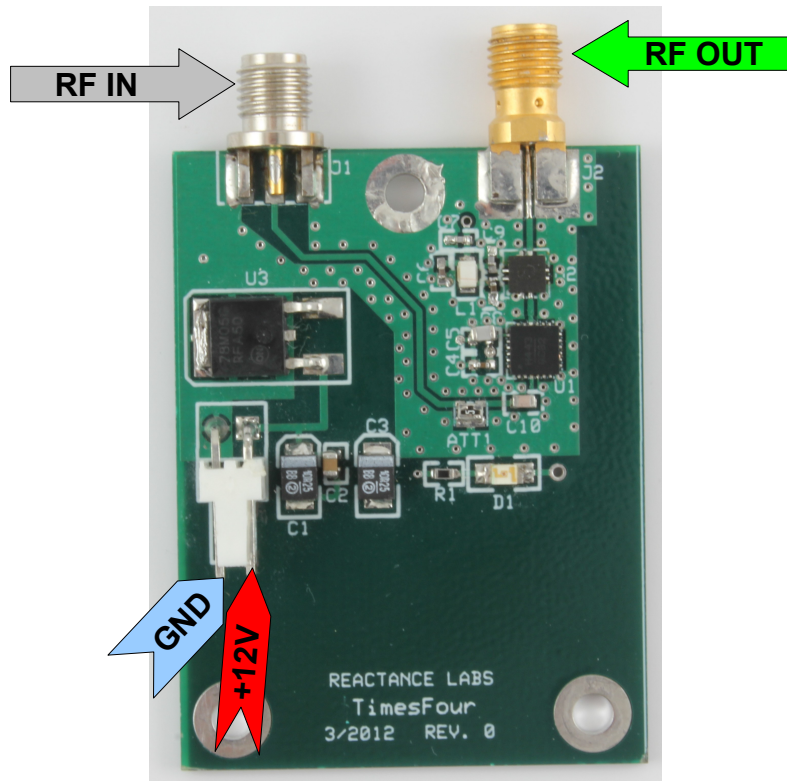
13 GHz: +10 dBm

1.3 Block Diagram



2 Usage

2.1 Electrical Interfaces



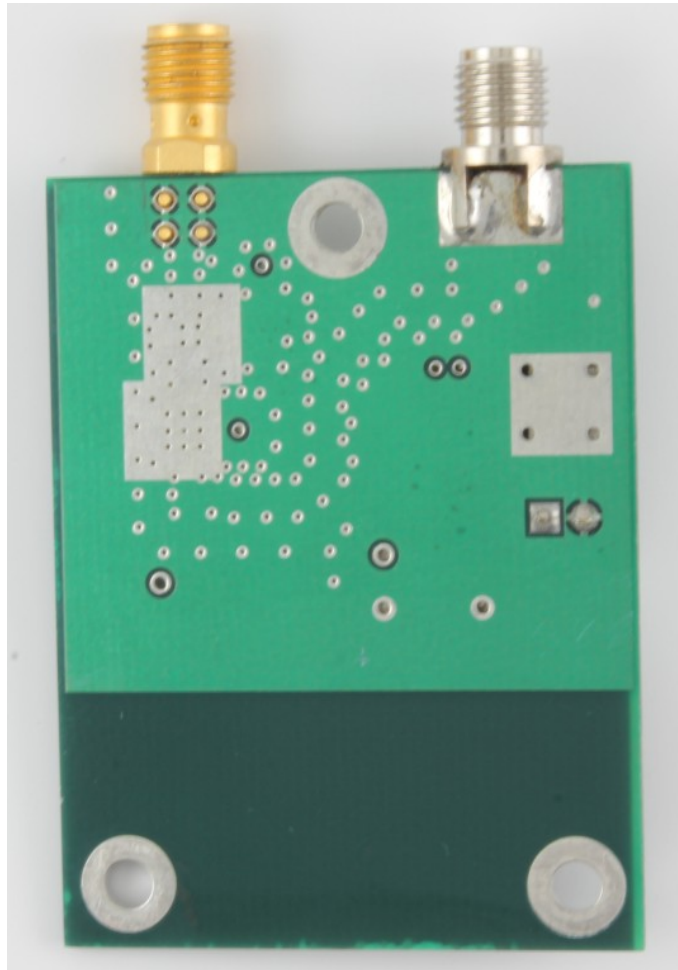
Photograph 1: Electrical Interfaces

Make sure that the DC supply is capable of supplying 200 mA at 12V. It is possible to run the TimesFour from as low as 7.5V and as high as 35V (operating much more than 12V-14V will cause substantially more power to be dissipated in the regulator and could result in overheating and failure, so is not recommended to operate beyond 12-14V for long)

It is important not to exceed +10 dBm on the input connector to avoid overloading and damaging the multiplier MMIC.

Ensure that whenever an input and DC are present, a decent 50 ohm termination is connected to the output connector. A full reflection (nothing connected, or a short) may displease the output buffer.

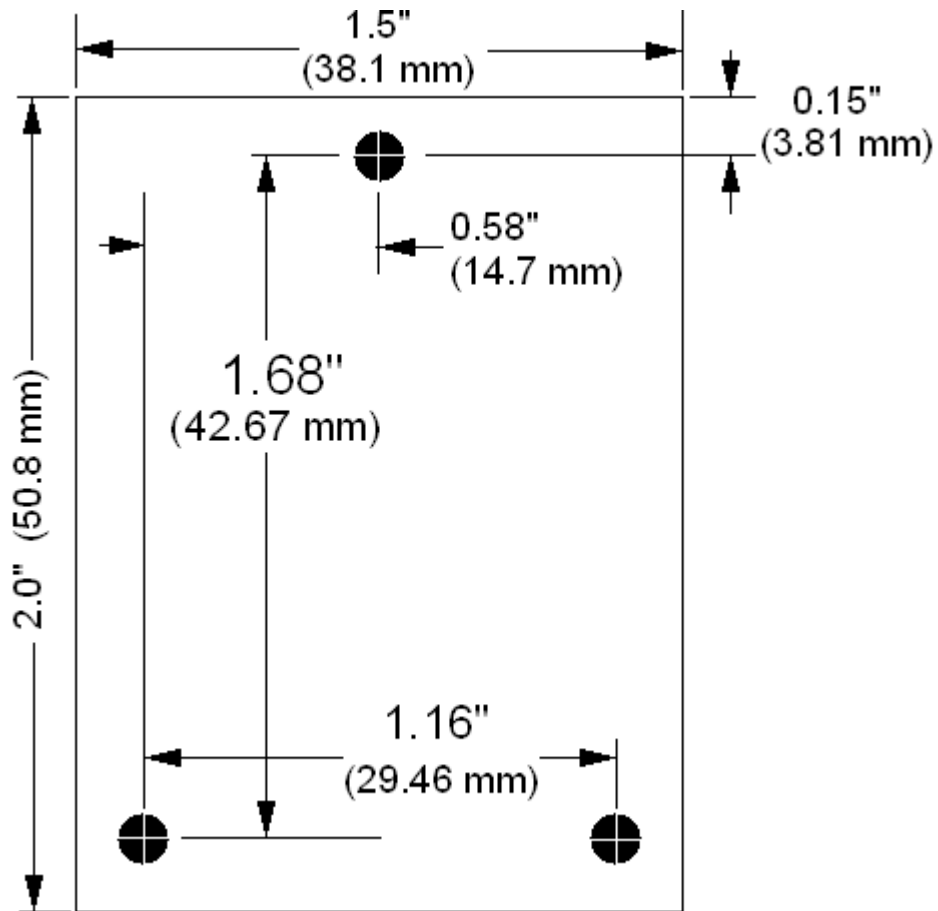
2.2 Thermal Considerations



Photograph 2: Back Side of PCB

The TimesFour dissipates 2.4 watts with no load. It is important to dissipate the heat generated with an appropriate heat sink. The exposed square silver areas on the back of the PCB seen in Photograph 2 need a good thermal path to the heatsink. **It is critically important that the connections on the back side of the board be electrically insulated and that the vias are not shorted together.** It is recommended that a thermally conductive, electrically insulating layer be placed between the bottom of the board and a heatsink. Note on the back of the board that the pins sticking through are not flush with the bottom of the board. These must not be shorted to ground!

2.3 Mechanical Interfaces

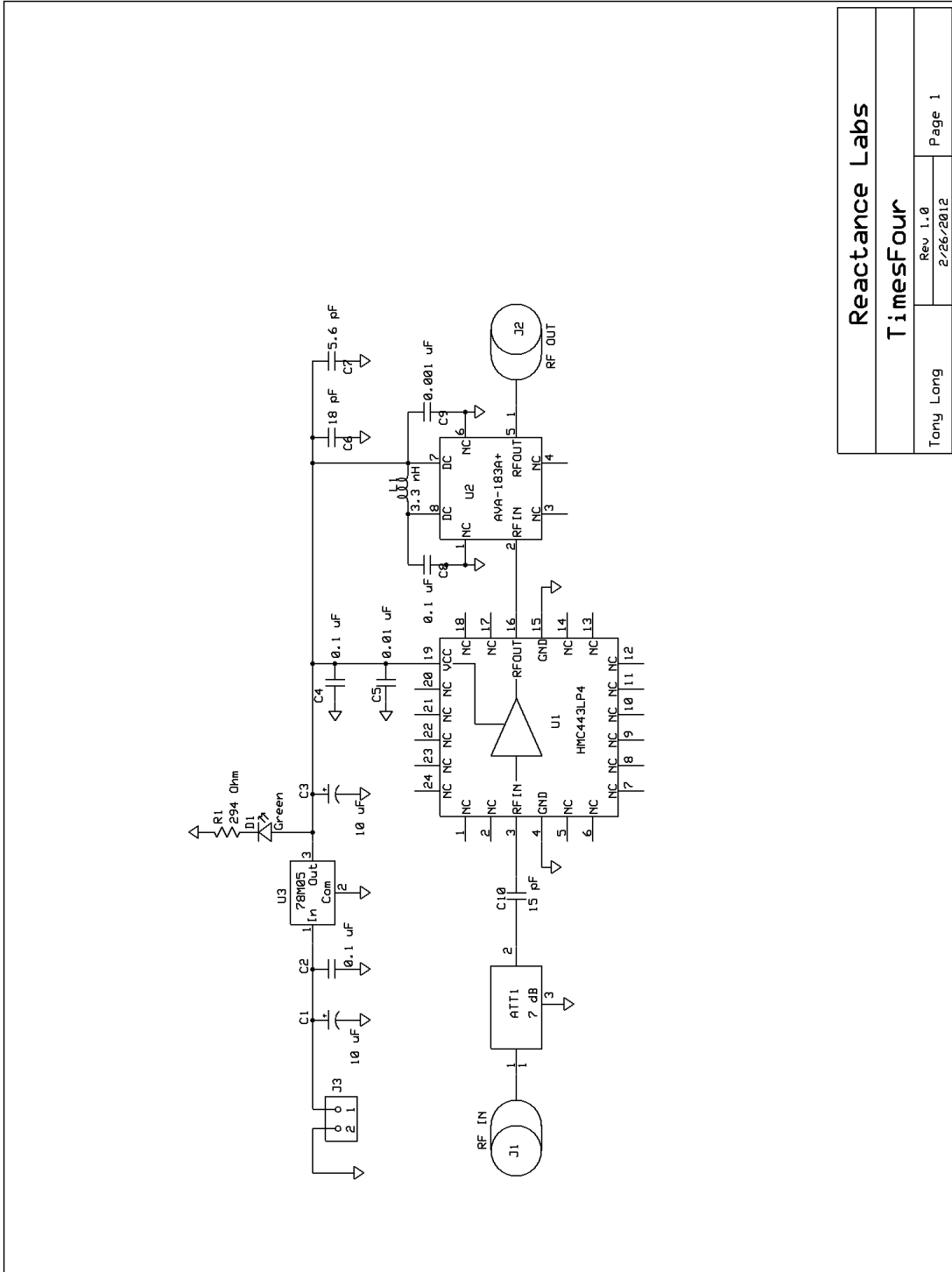


Drawing 1: Fastener Locations and Dimensions

Use caution when torquing connectors to the input and output. If using more than finger force, support the body of the connector with a pair of needle nosed pliers, or in the case of the output connector with a small wrench.

3.0 Documentation

3.1 Schematic Diagram



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3.2 *Bill of Materials*

Digikey:

ATT1	7 dB	PAT127CT-ND
C1	10 uF	718-1760-1-ND
C2	0.1 uF	445-1316-1-ND
C3	10 uF	718-1760-1-ND
C4	0.1 uF	445-1316-1-ND
C5	0.01 uF	445-1311-1-ND
C6	18 pF	490-1281-2-ND
C7	5.6 pF	445-4883-1-ND
C8	0.1 uF	490-1318-1-ND
C9	0.001 uF	490-3244-1-ND
C10	15 pF	712-1318-1-ND
D1	Green	160-1169-1-ND
J1	RF IN	CONSMA003.062-ND
J2	RF OUT	J797-ND
J3	DC IN	WM4300-ND
L1	3.3 nH	535-10487-1-ND
R1	294 Ohm	P294HCT-ND
U3	78M05	MC78M05CDTRKGOSCT-ND

Hittite:

U1 HMC443LP4 HMC443LP4

Mini-Circuits

U2 AVA-183A+ AVA-183A+