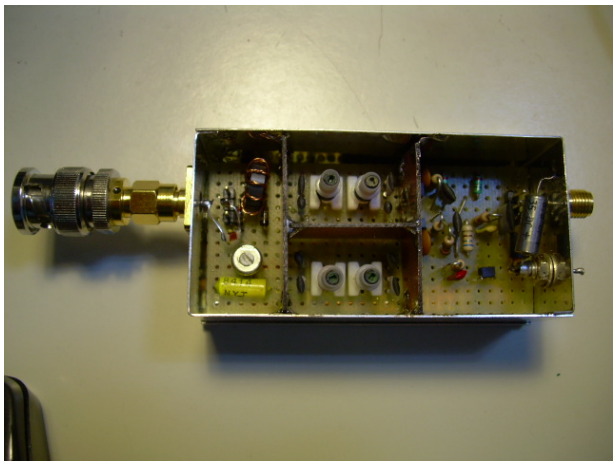
10 to 100 MHz Multiplier

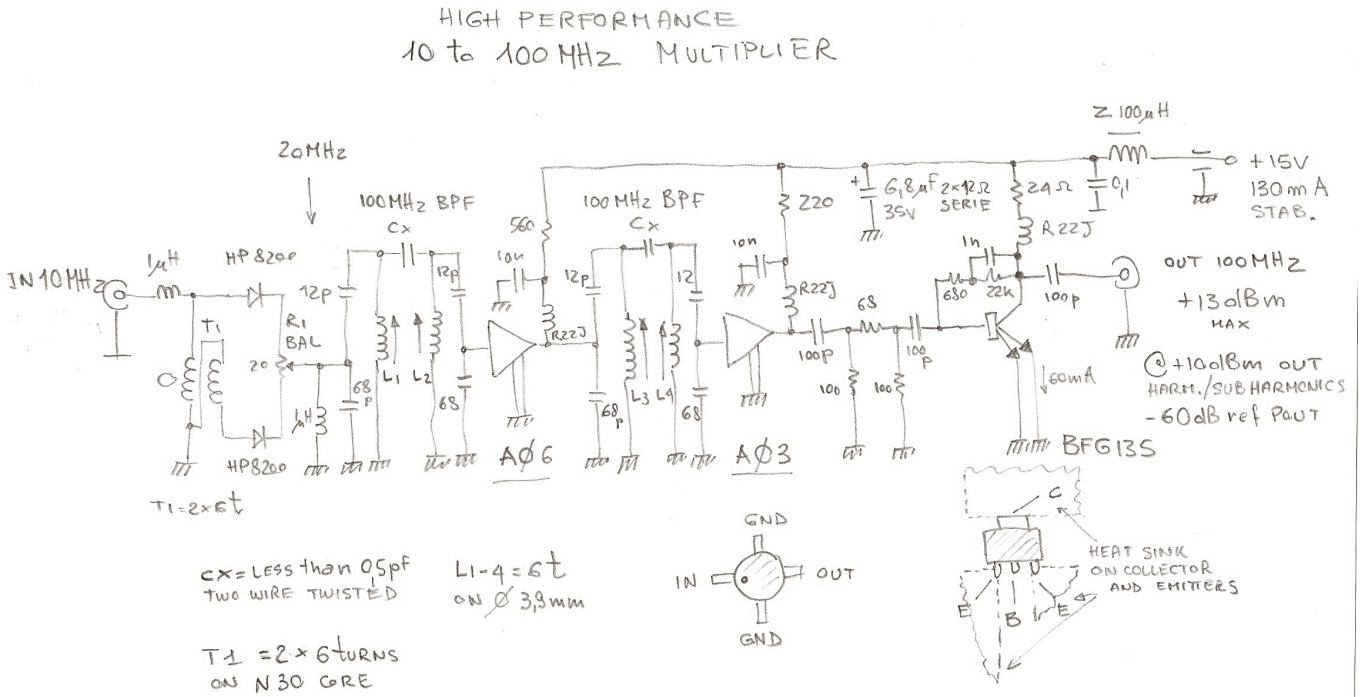
This frequency multiplier from 10 to 100MHz has the characteristic of being simple to build and have high performance as low harmonic content.



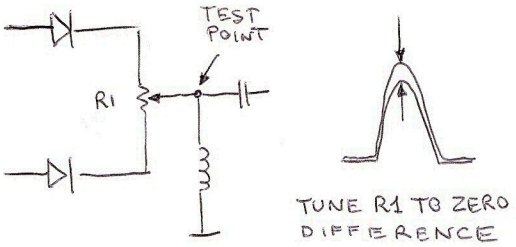
INPUT ---> OUTPUT: in 10MHz +5dBm out 100MHz +10dBm.
Signal to harmonics and sub-harmonics ratio more than 60 dB.

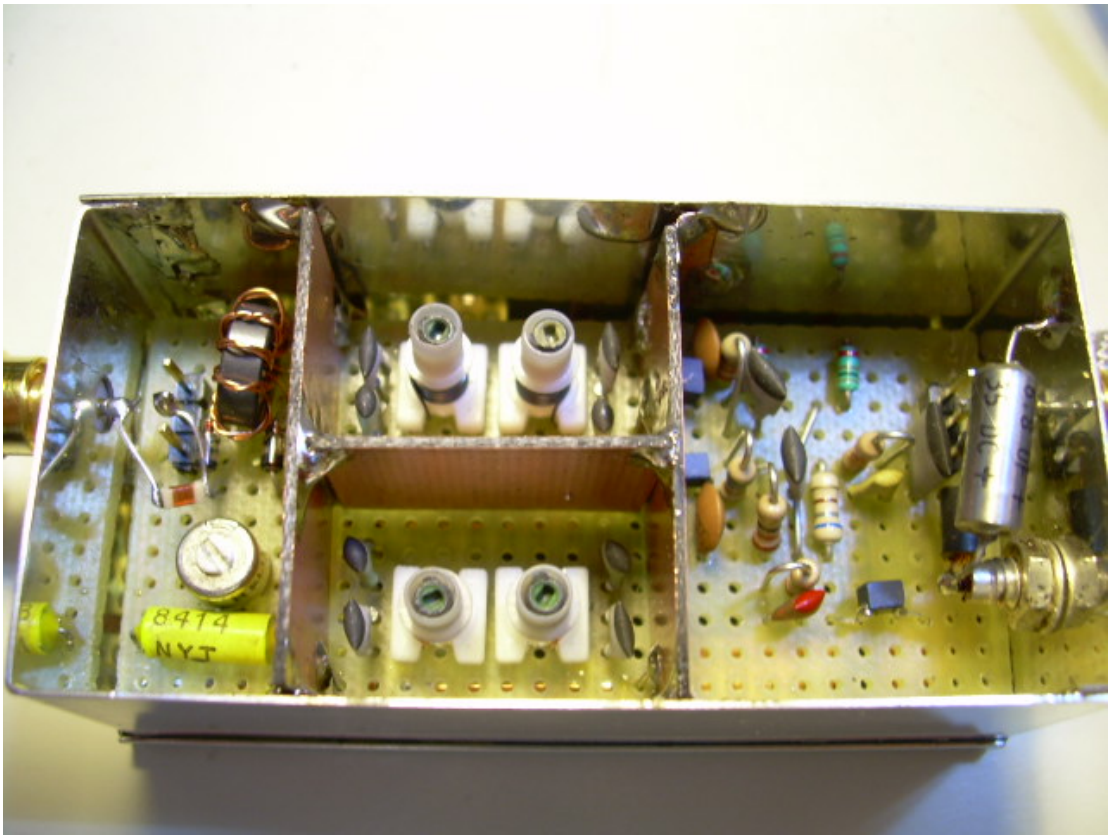
The input circuit is a passive diode doubler followed by amplifiers and two 100-MHz band-pass filters that select the fifth harmonic of the duplicated input signal.

Schematic:

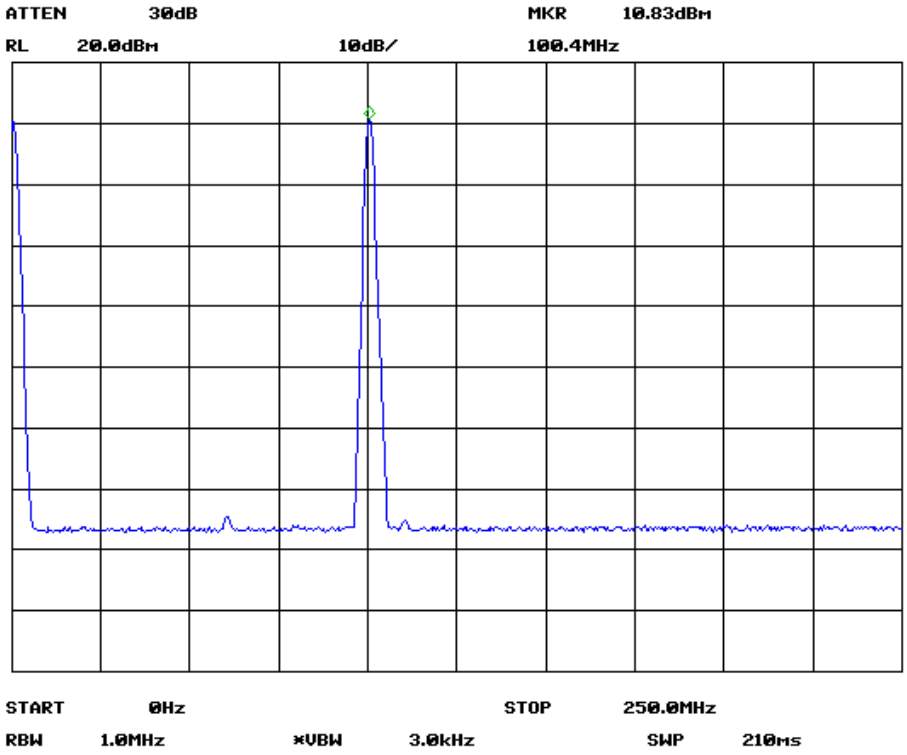


R1 is used to balance the doubler and have fewer harmonics of the fundamental at 10 MHz. This adjustment improves by 5 dB the fundamental's rejection and will be improved from 25 to 30 dB. These harmonics, especially at 90 and 110 MHz, would be difficult to remove from the 100 MHz filters. To calibrate R1 simply measure the signal at 20MHz output of the duplicator with an oscilloscope. Appropriately setting the time base and trigger level, you will see the positive and negative half-wave superimposed on different levels. Set R1 to have overcome the coincident upper peak for the two half-waves.

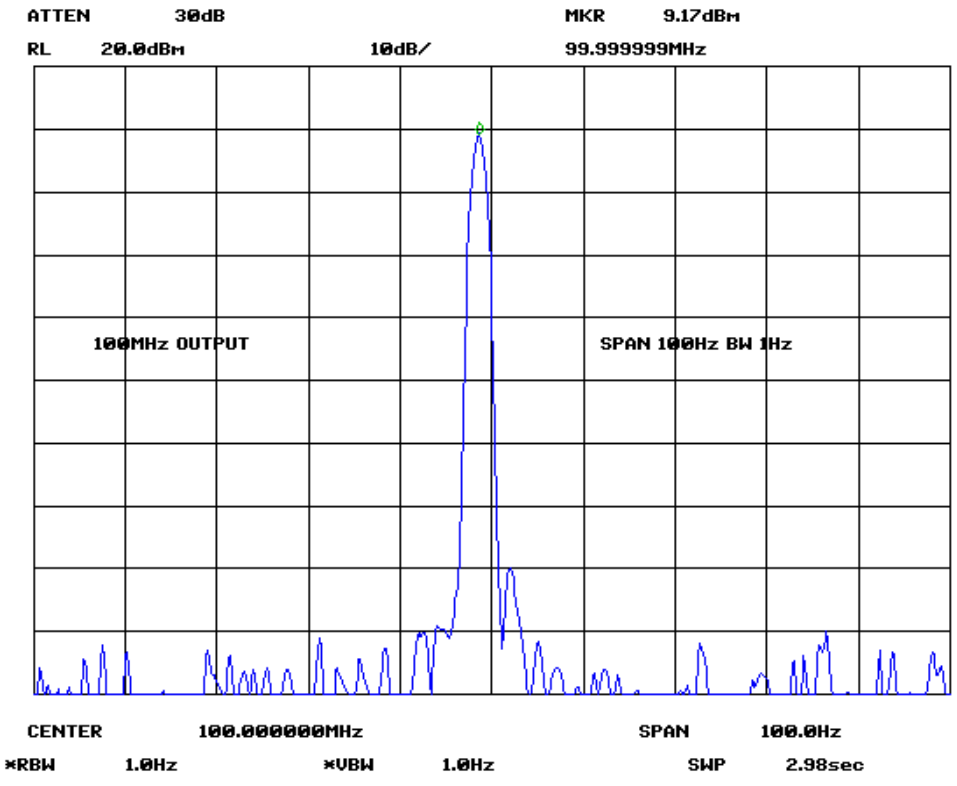




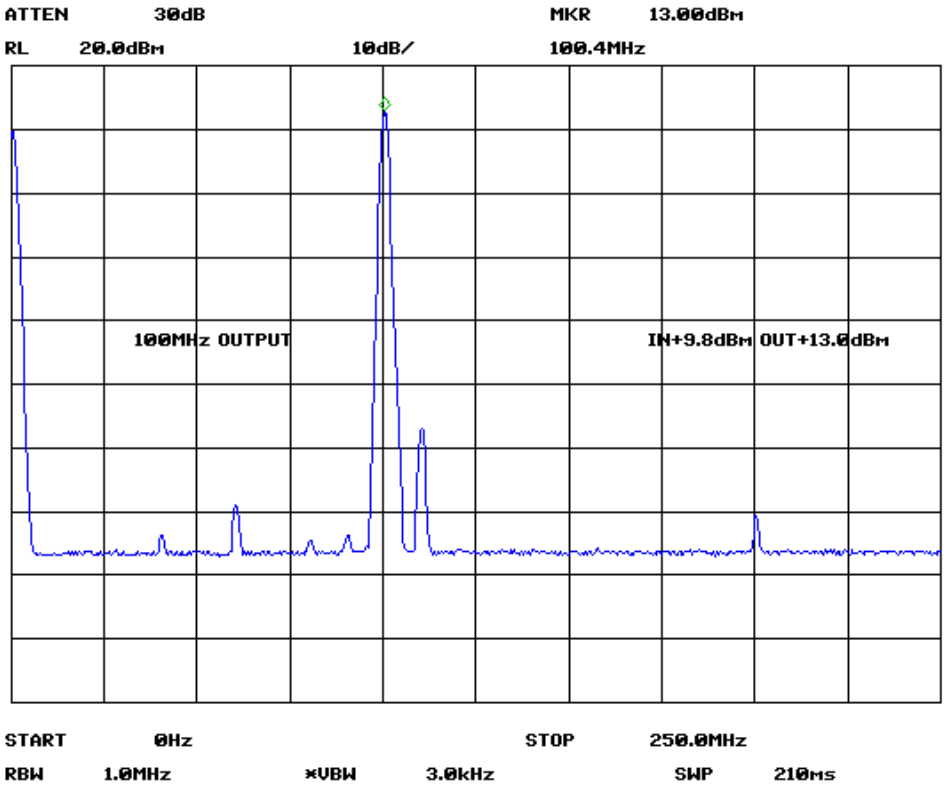
Output signal spectrum (Po=+10dBm) from zero to 250MHz:

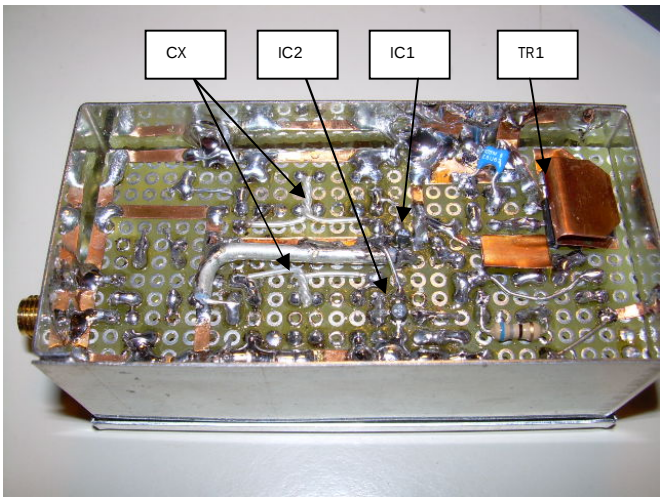


Output signal (Po=+10dBm) span 10Hz per division and BW 1Hz:



Output signal spectrum (Po=+13dBm) from zero to 250MHz:





View of the PCB. This preliminary version is very compact and I recommend using a larger box and board.

Writer: Luciano P.S. Paramithiotti