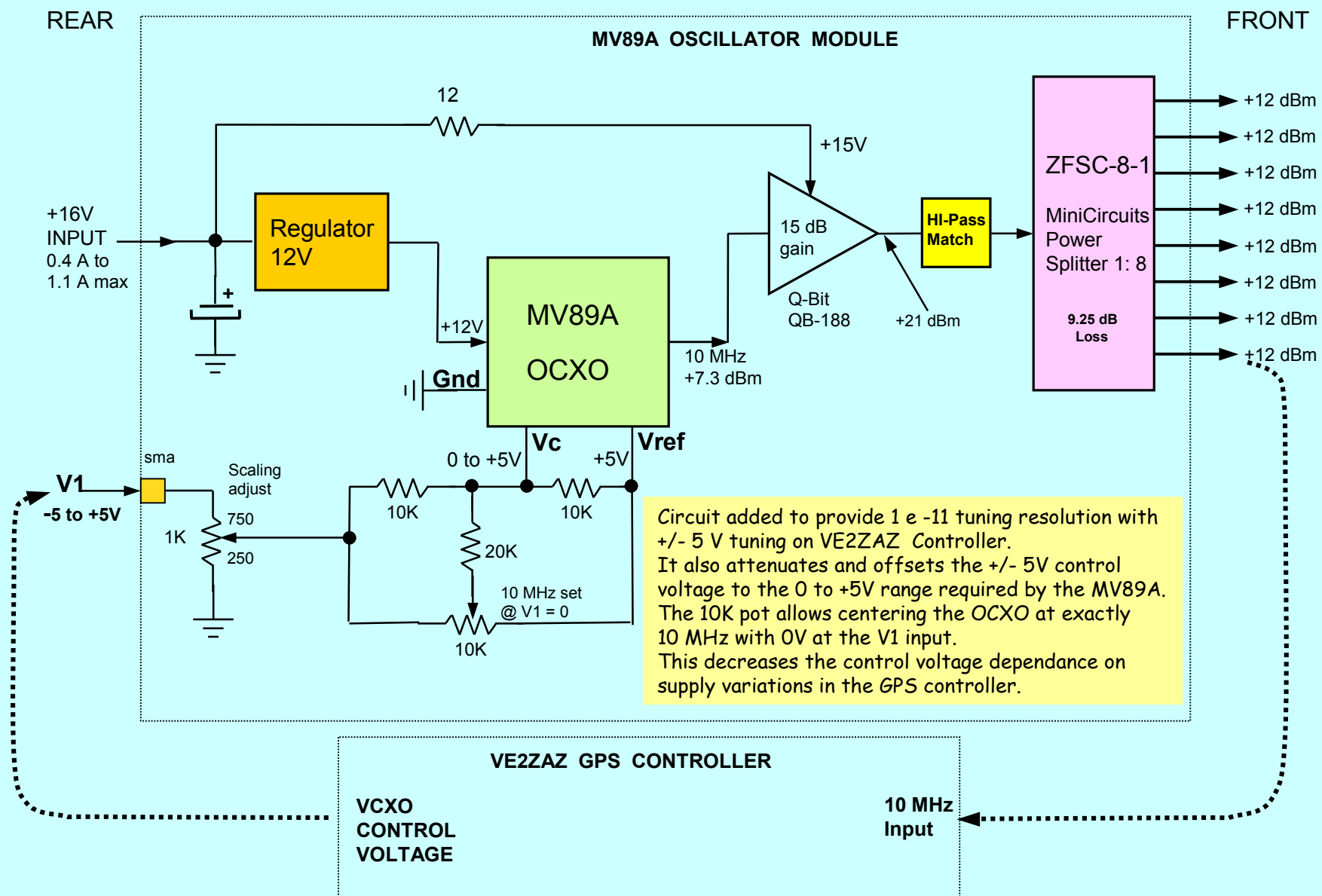


# **OCXO AND CLOCK DISTRIBUTION SYSTEM**

**As used with VE2ZAZ Controller**

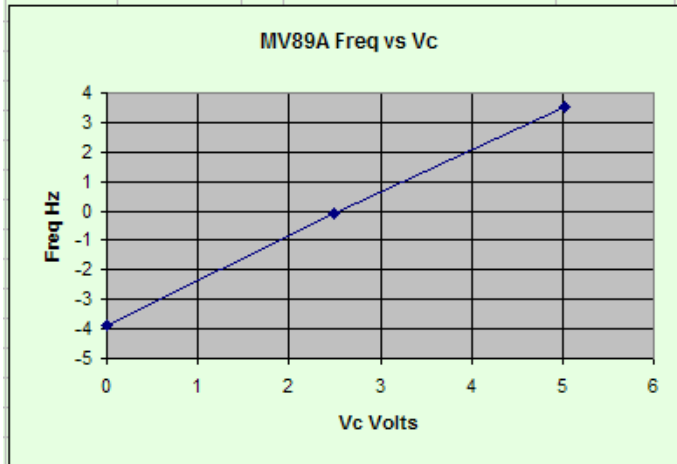
**Jacques Audet VE2AZX  
June 2011  
Rev. June 2014**

## BLOCK DIAGRAM

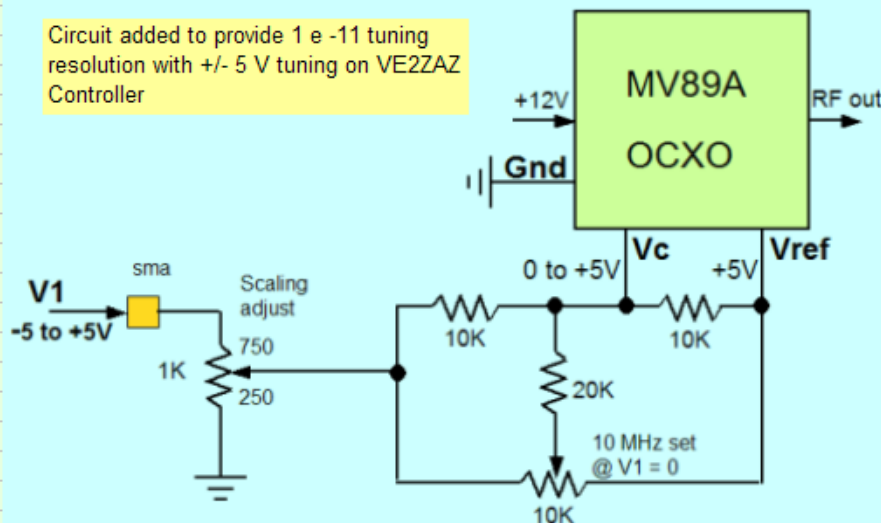


## MV89A MEASUREMENTS

Vc	Freq * 200	Freq (Hz) ref. @ 10 MHz	OEXO alone SLOPE Hz / V	mV into 1K	Zin at Vc in
0	-1769.3	-3.8465	1.471	42.70	Vc to GND 57173
2.484	-1021.2	-0.106			
5.02	-292.4	3.538		43.40	Vc to +5V ref 57433
			OEXO Average Zin	57303	



Circuit added to provide  $1 \text{ e-}11$  tuning resolution with +/- 5 V tuning on VE2ZAZ Controller



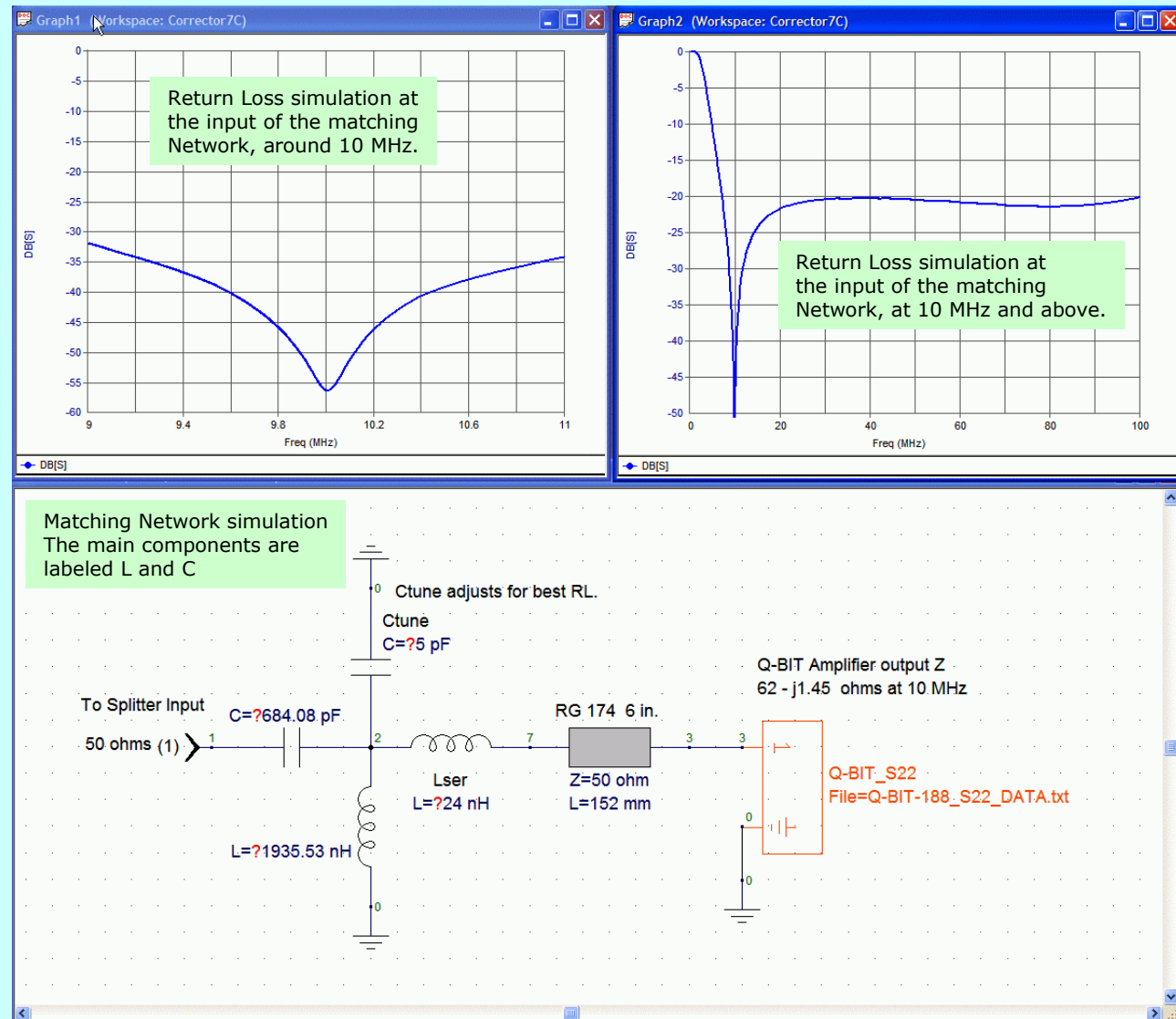
With V1 = 0 The 10K pot gives:  
 $V_c \text{ min / max} = 2.115 / 3.021 \text{ V}$   
 $\Delta V = 0.906 \text{ V}$  or 1.333 Hz frequency adjustment range.

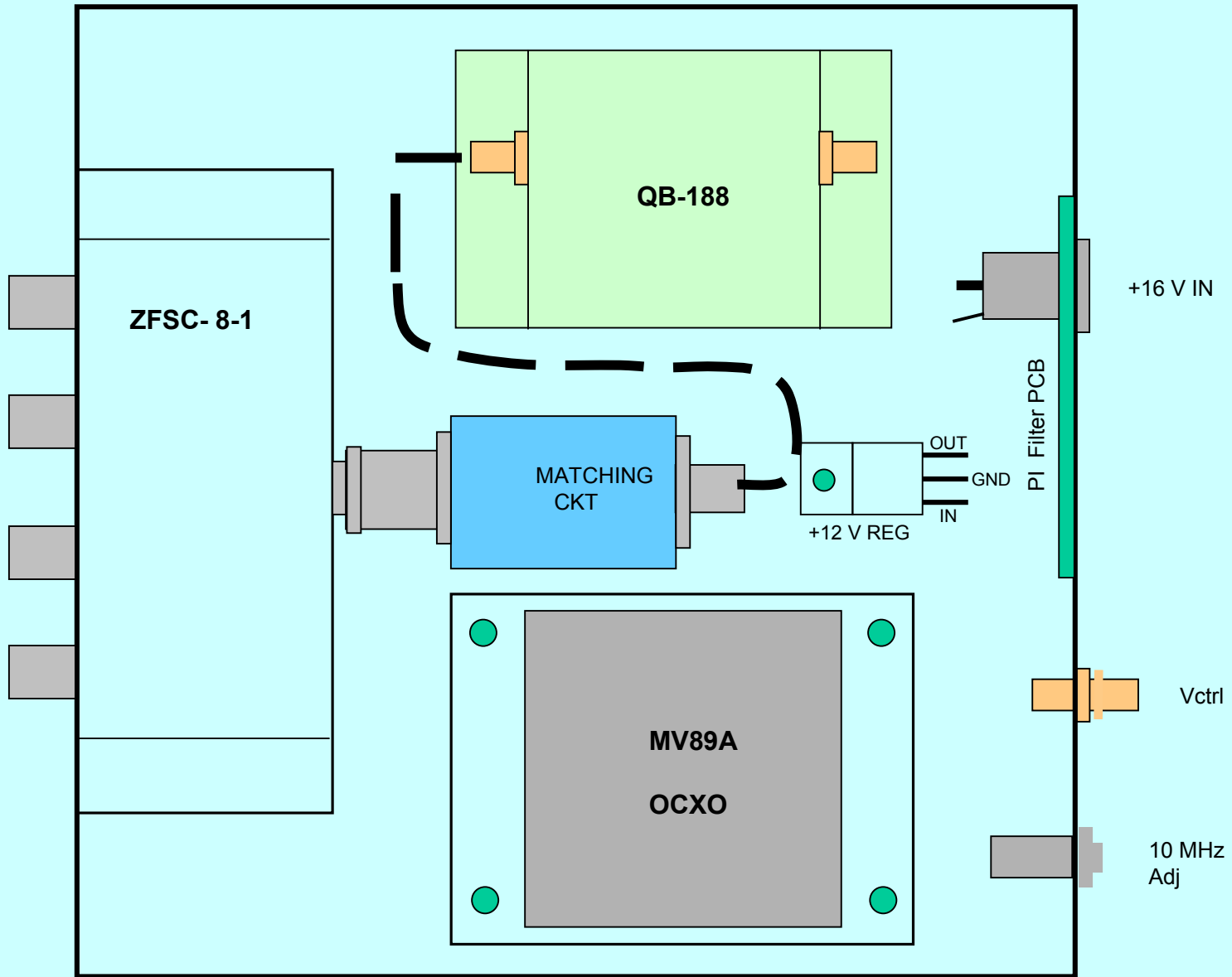
With 10K pot at middle and with V1 min / max = -4.5 / +4.5 V, we get:  
 $V_c \text{ min / max} = 2.054 / 3.074 \text{ V}$   
 $\Delta V = 1.02 \text{ V}$  or 1.5 Hz frequency adjustment range.  
 VE2ZAZ's controller has 14 bits resolution or 16384 levels. Then the corresponding freq resolution =  $1.5 \text{ Hz} / 16384 = 91.5 \text{ uHz}$ .  
 At 10 MHz, this is  $9.15 \text{ e-}12$  resolution, or approx.  $1 \text{ e-}11$  resolution.

## HI PASS MATCHING CIRCUIT AT THE SPLITTER INPUT

The matching circuit transforms the Q-Bit amplifier output  $Z$  ( $62 - j1.45$  ohms, measured) to a value very close to 50 ohms at 10 MHz. This MAXIMIZES the port to port isolation of the 1 : 8 splitter.

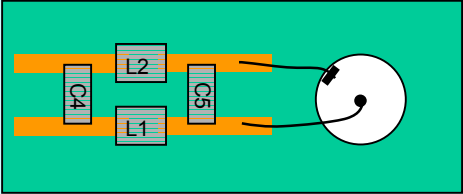
A high pass matching circuit is used to prevent degradation of the return loss at frequencies above 10 MHz. This also MAXIMIZES the port to port isolation at the 10 MHz harmonics.



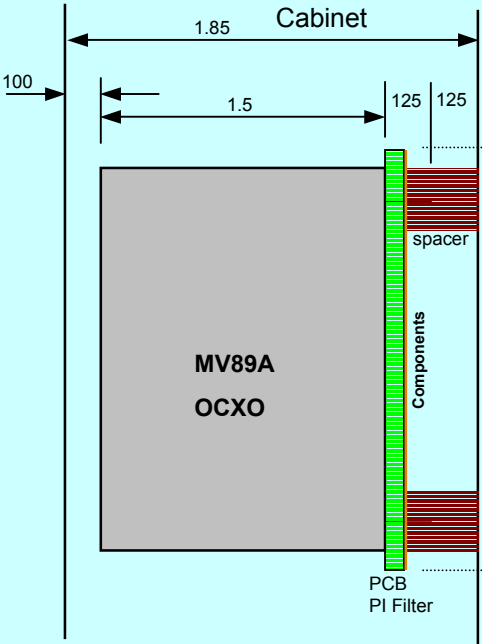


Cabinet: Hammond 1455T1601

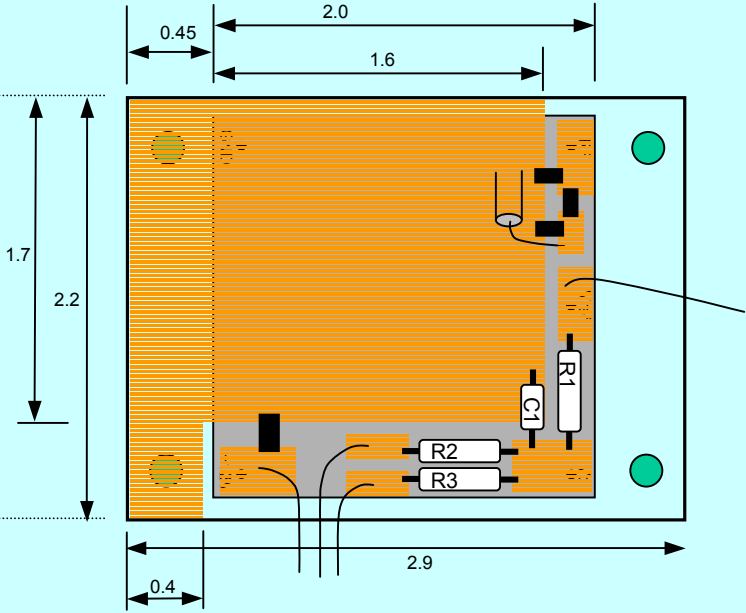
PI Filter PCB

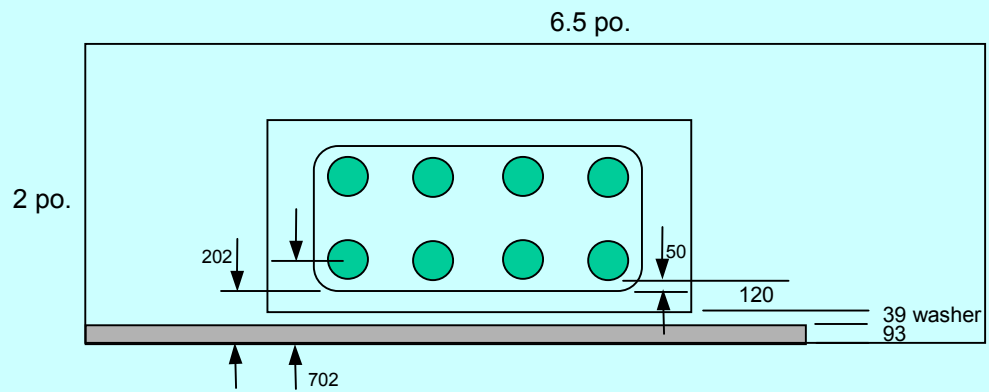
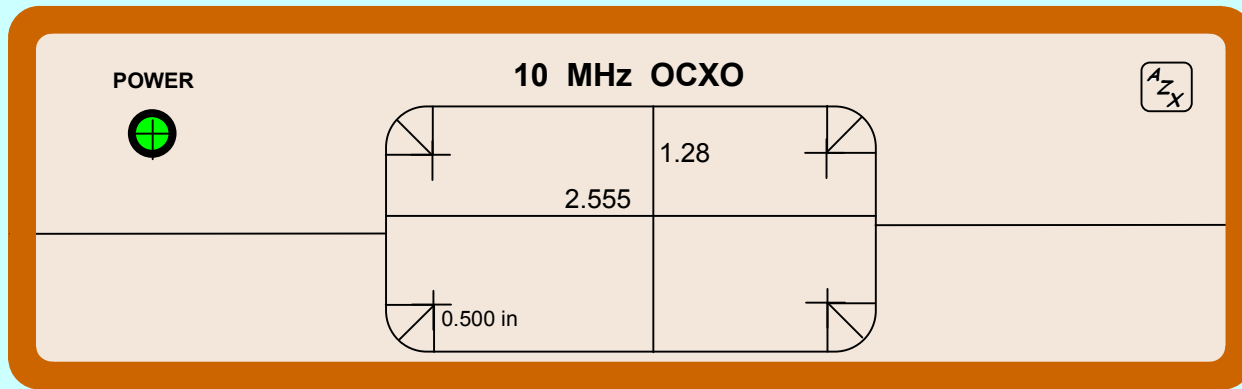


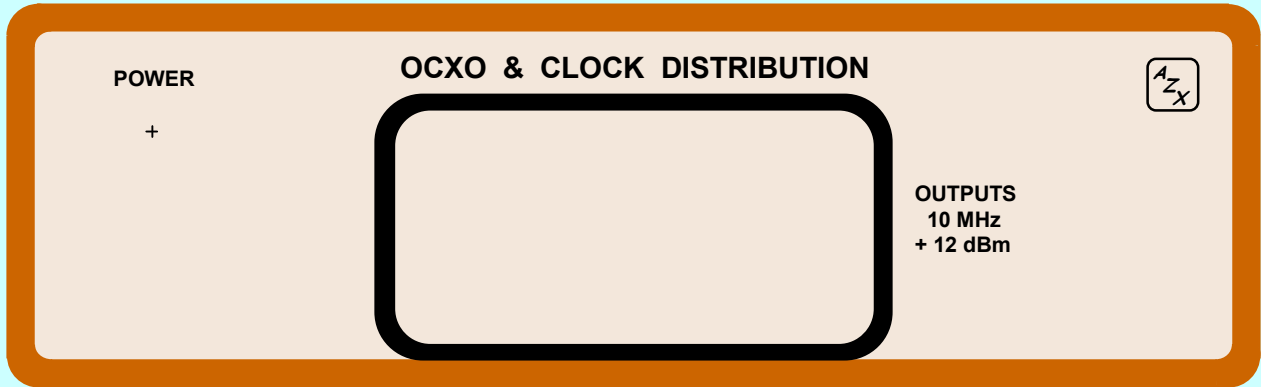
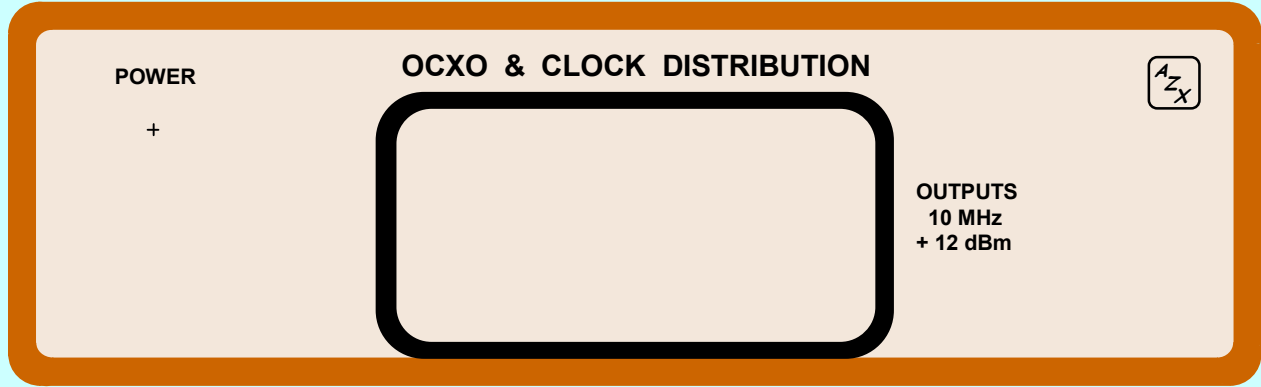
SIDE VIEW



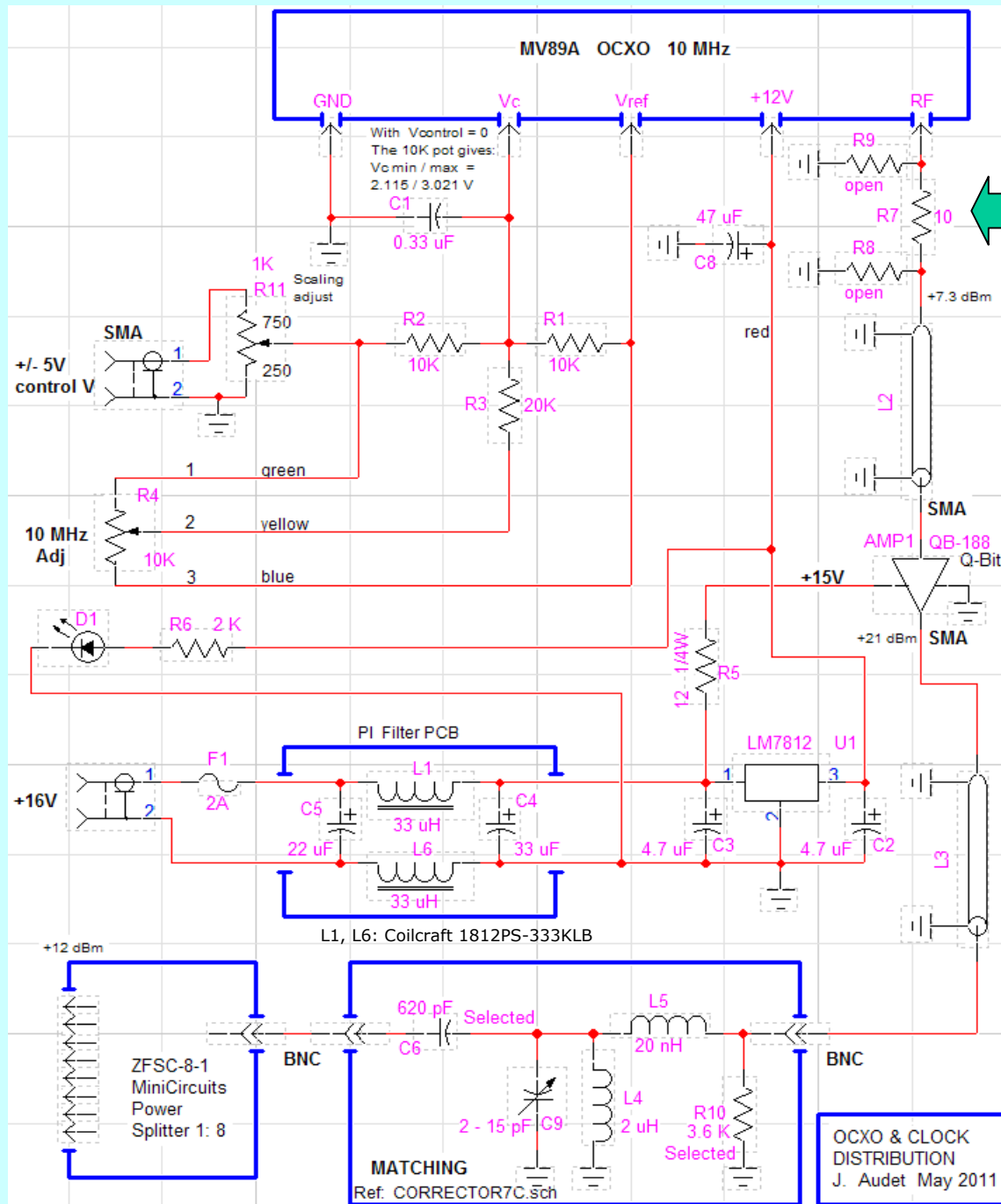
TOP VIEW







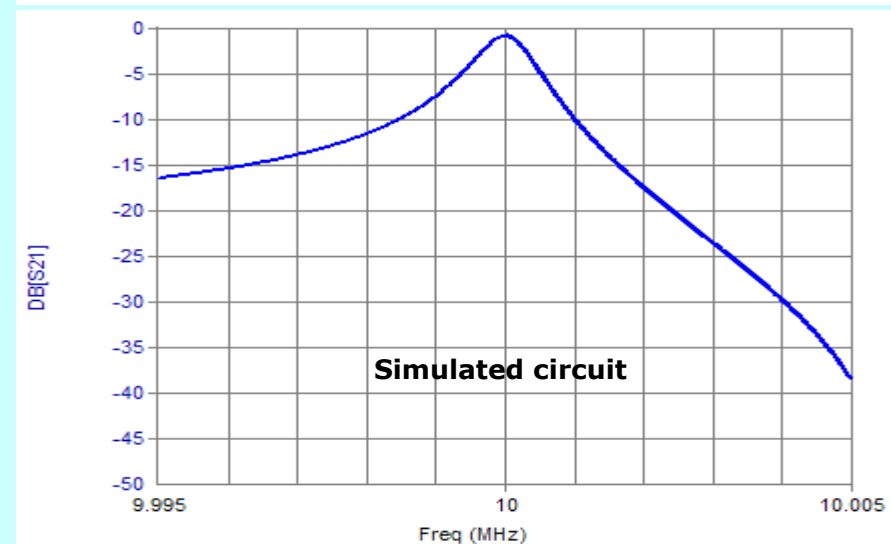
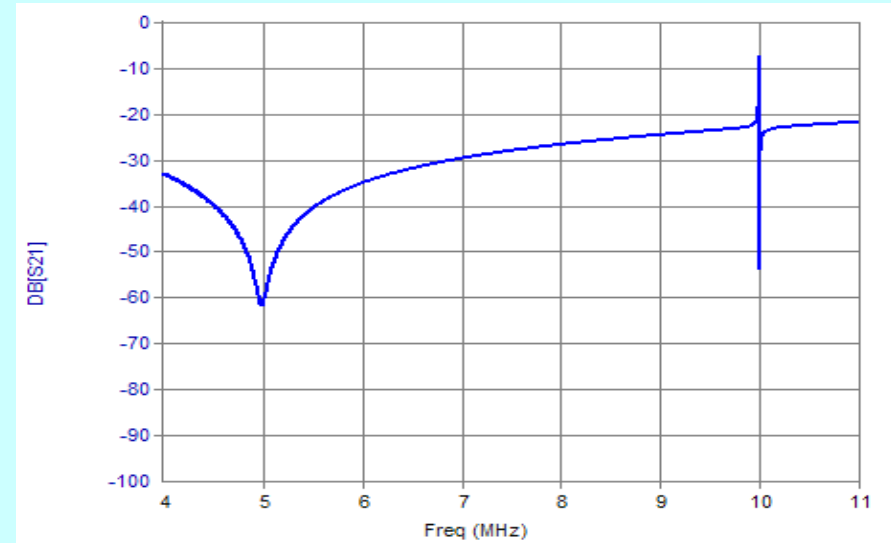
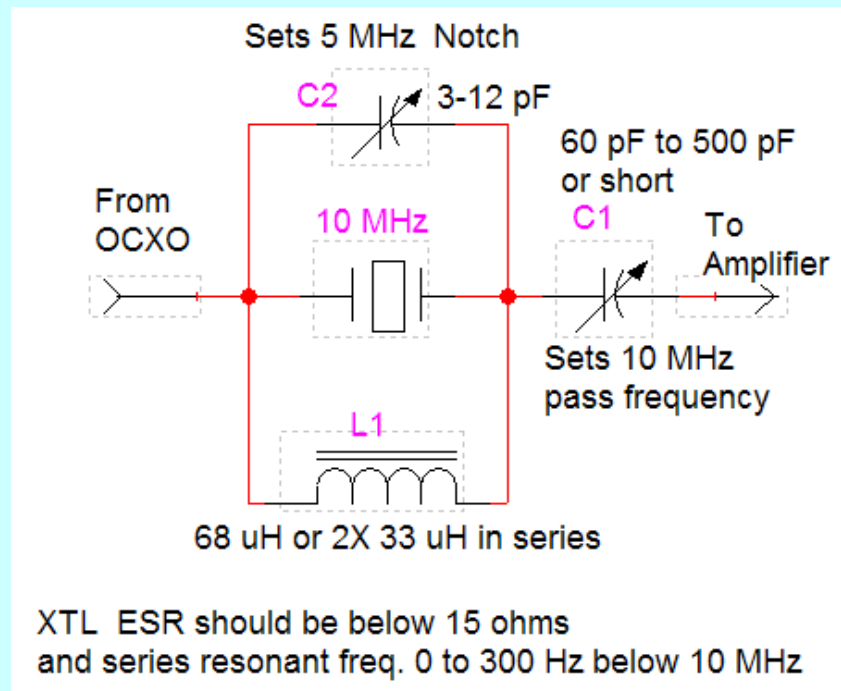




**Remove R7 to R9  
 And insert 5 MHz  
 Notch Filter here**

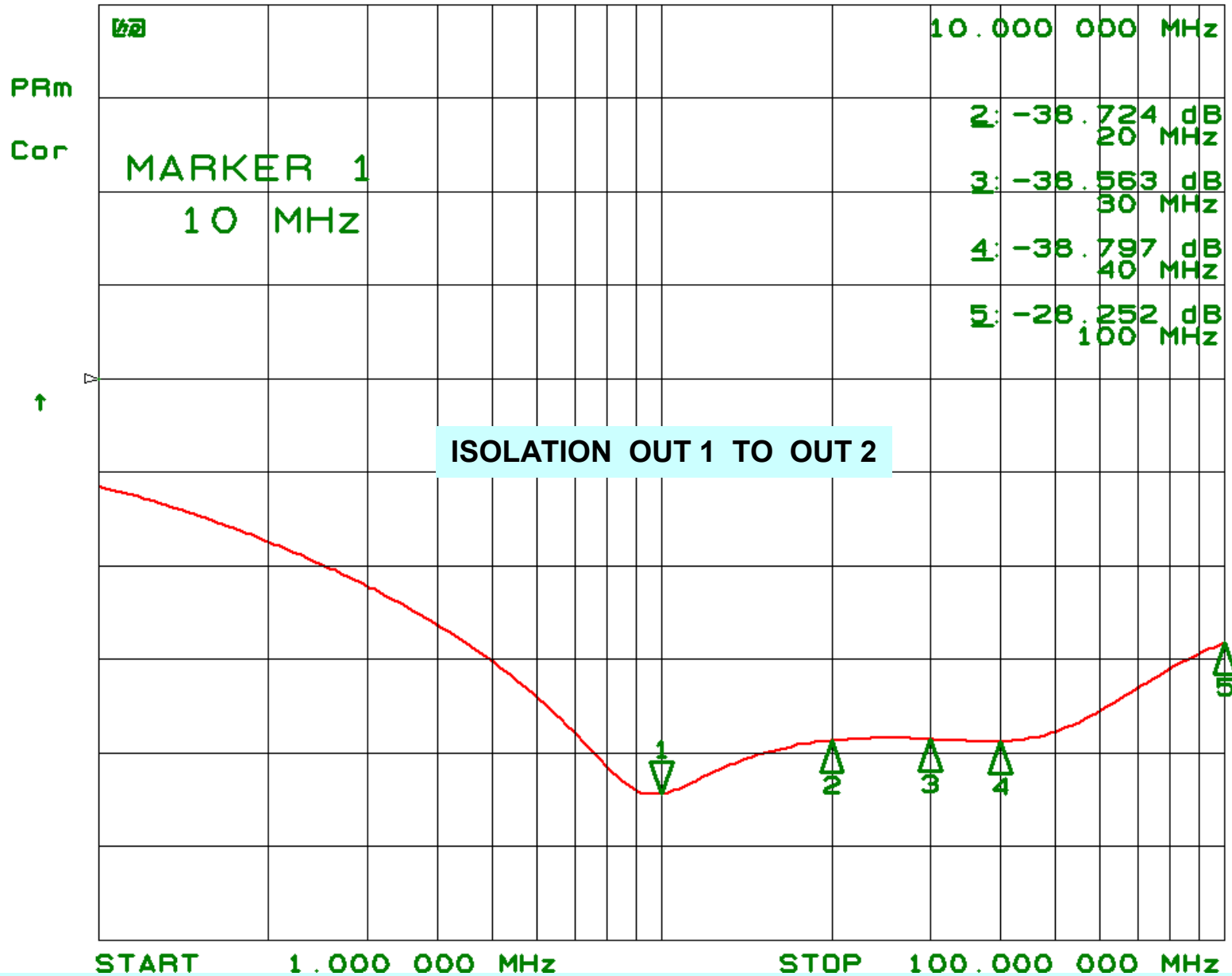
## 5 MHz Notch Filter

The 5 MHz output was – 45 dB down on my OCXO. See slide 16  
This notch filter adds more than 50 dB rejection at 5 MHz



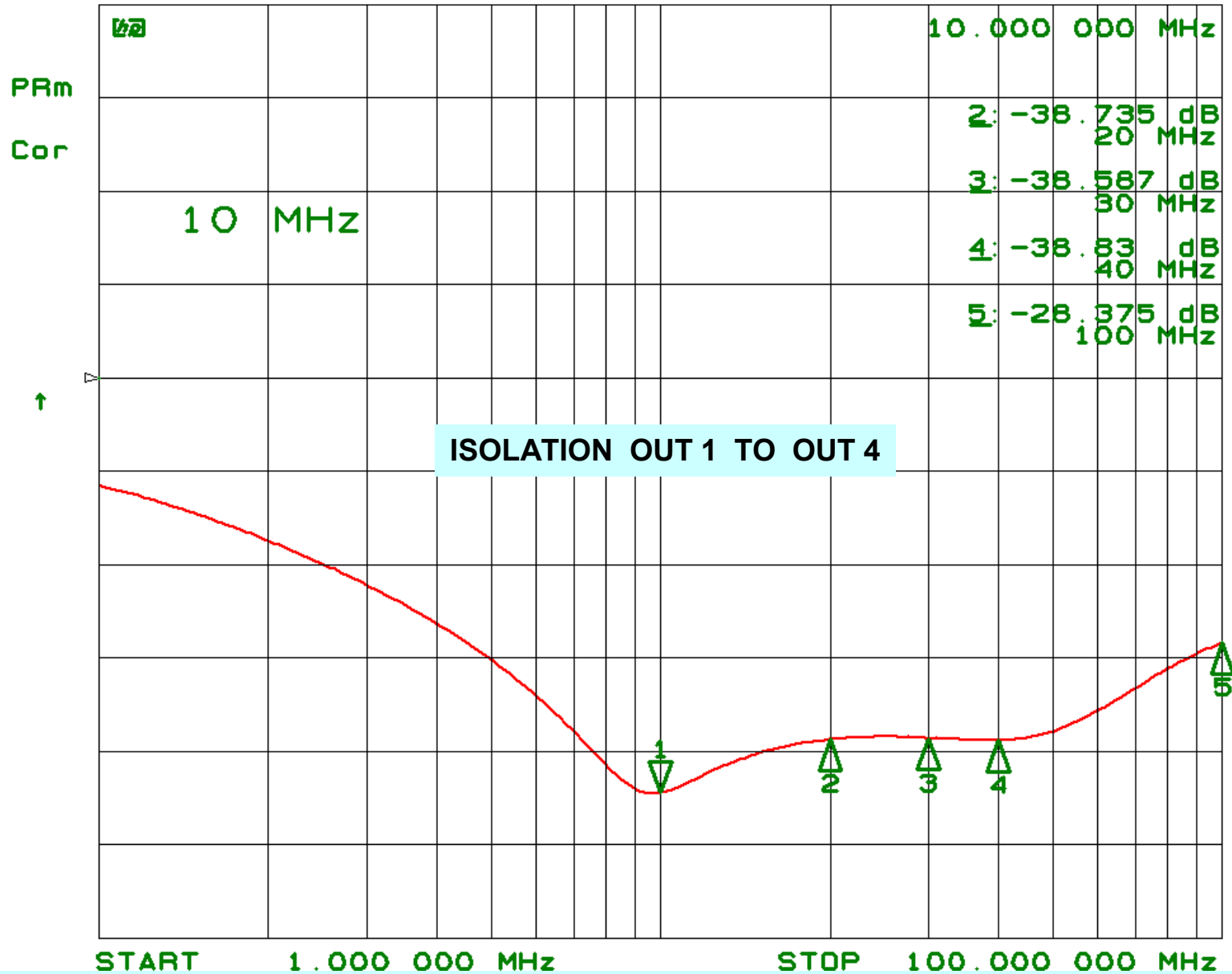
5 Jun 2011 14:44:33

CH1 S<sub>21</sub> log MAG 10 dB/ REF 0 dB 1: -44.396 dB



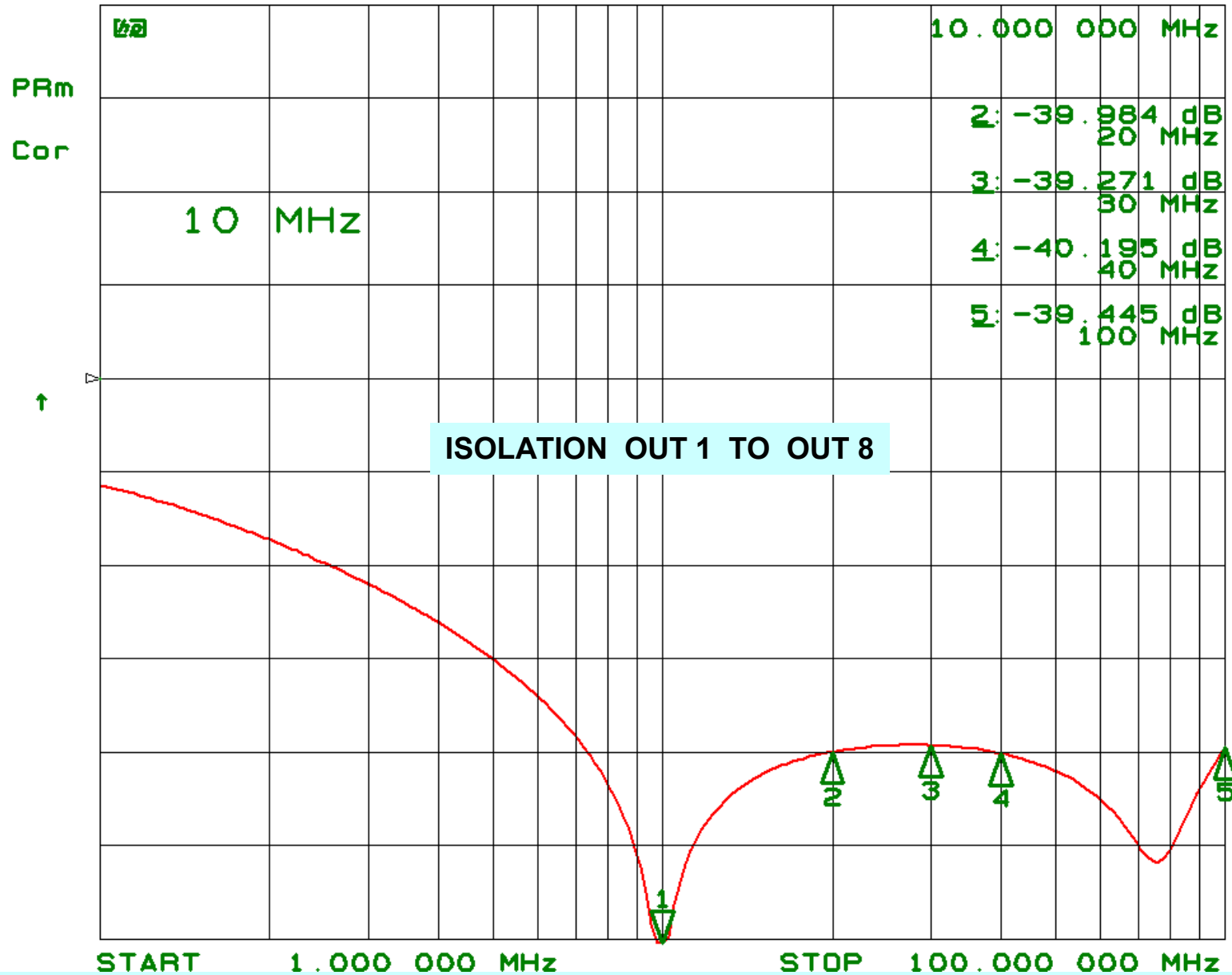
6 Jun 2011 14:47:00

CH1 S<sub>21</sub> log MAG 10 dB/ REF 0 dB 1: -44.446 dB



6 Jun 2011 14:47:14

CH1 S<sub>21</sub> log MAG 10 dB/ REF 0 dB 1: -62.374 dB



5 Jun 2011 09:57:02

CH1 S<sub>11</sub> log MAG 10 dB/ REF 0 dB L: -60.983 dB

10.000 000 MHz

PRM

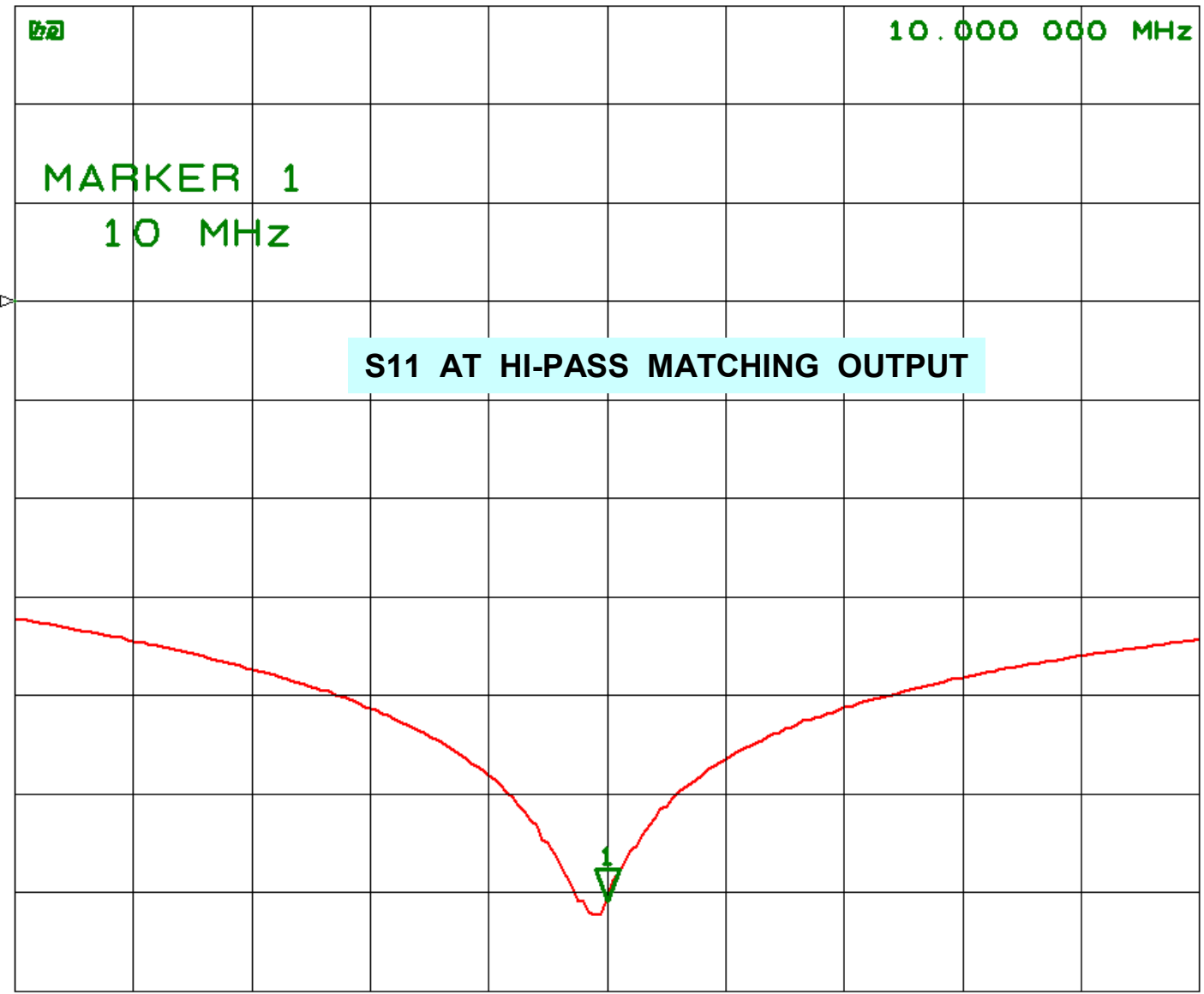
C?

MARKER 1  
10 MHz

S<sub>11</sub> AT HI-PASS MATCHING OUTPUT

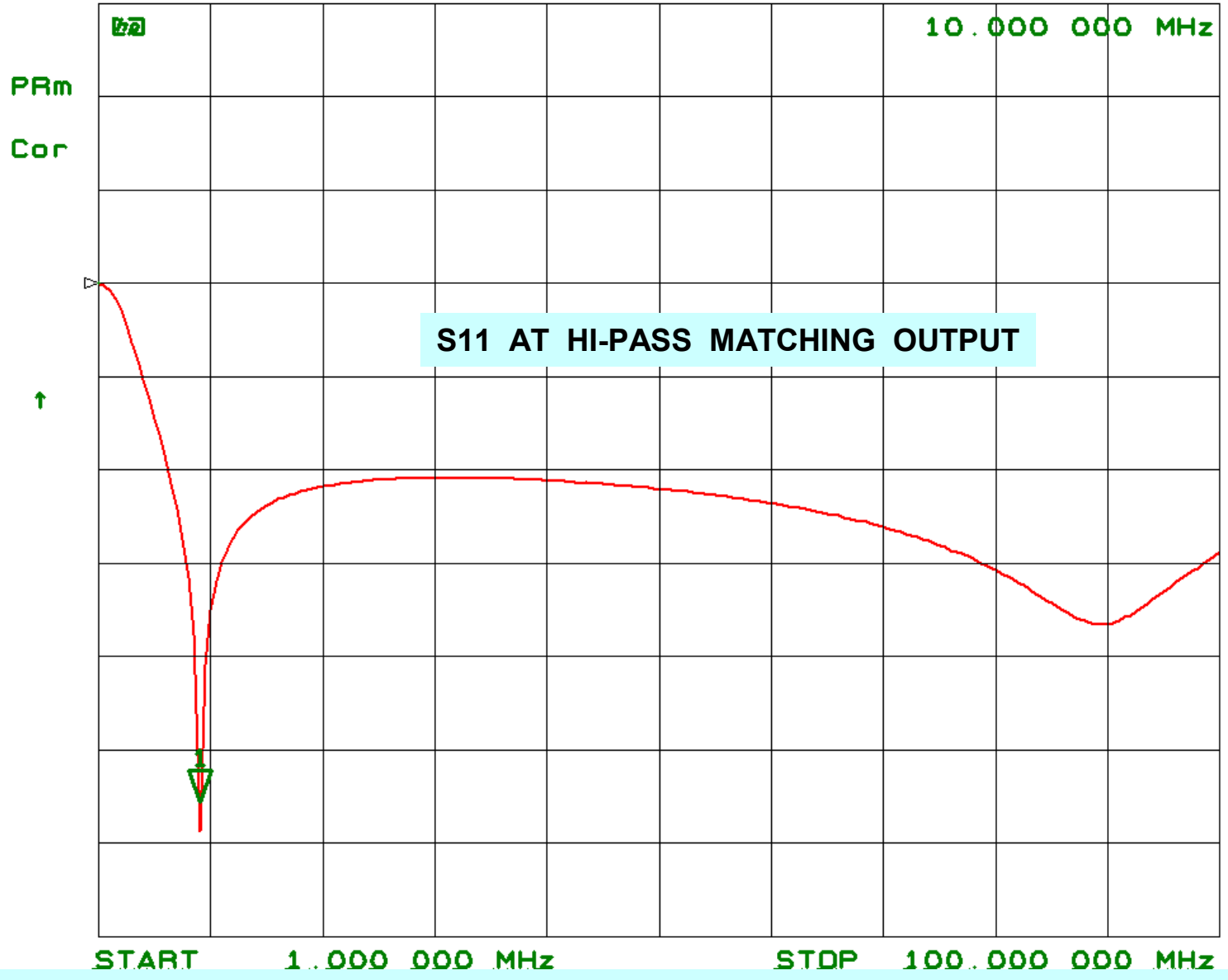
↑

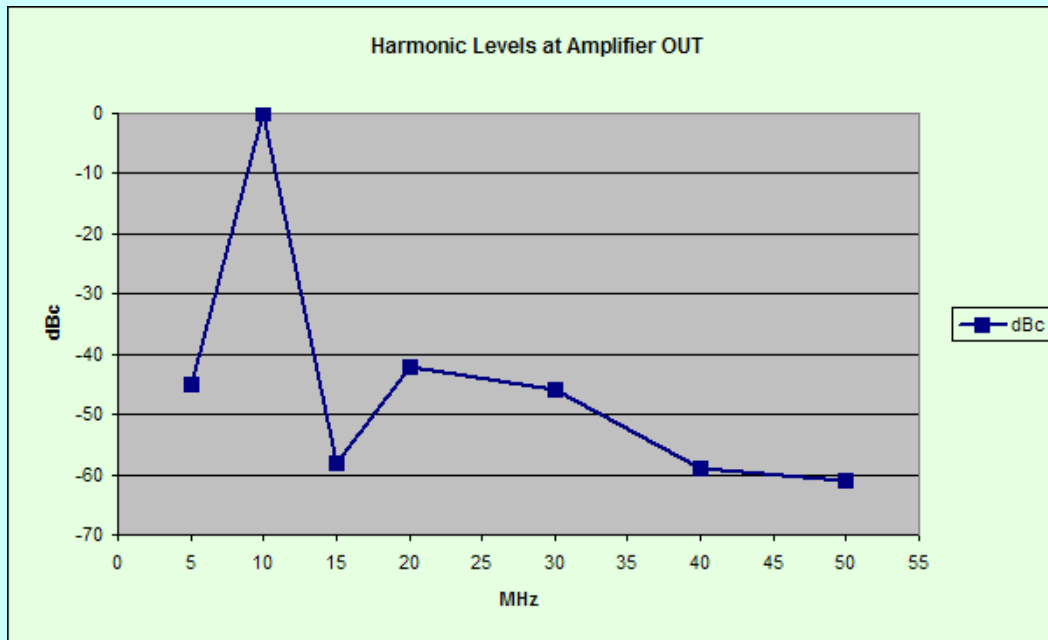
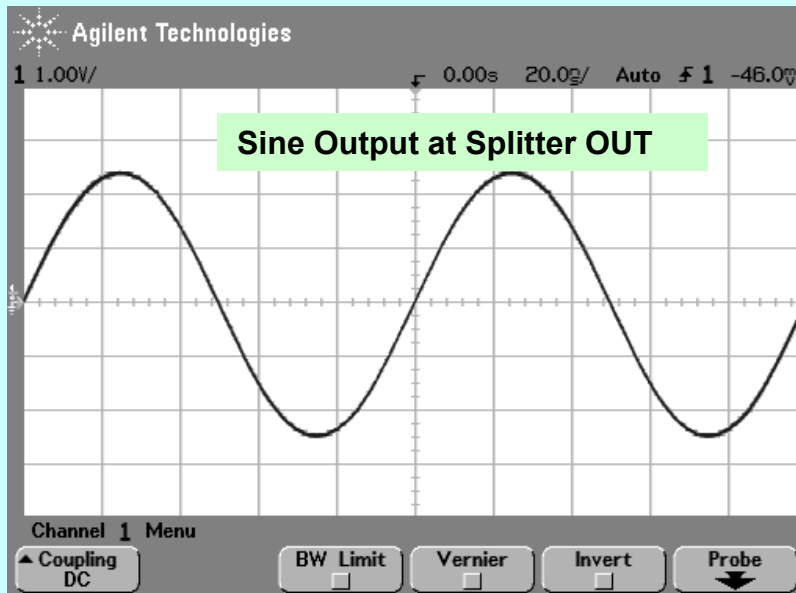
START 9.000 000 MHz STOP 11.000 000 MHz



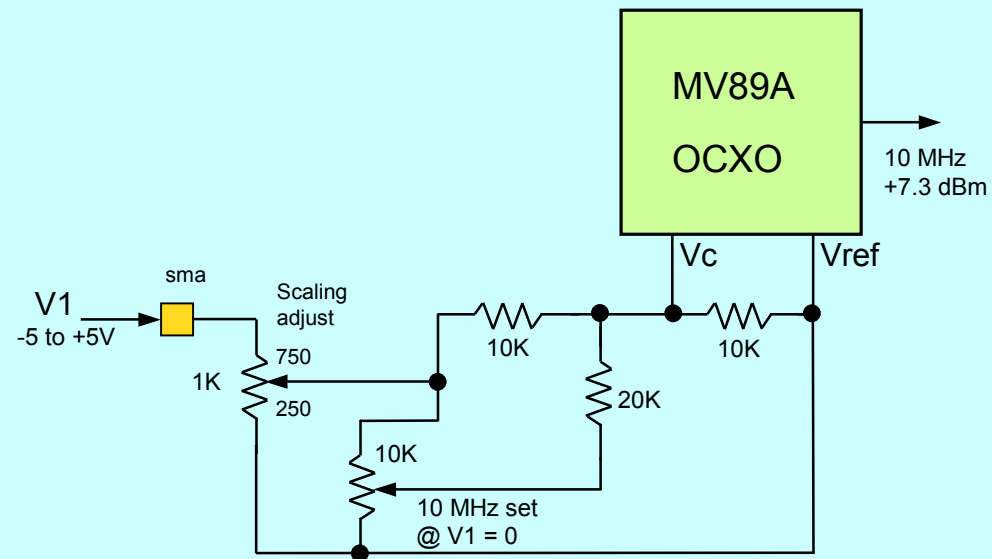
5 Jun 2011 09:56:18

CH1 S<sub>11</sub> log MAG 10 dB/ REF 0 dB 1: -55.53 dB

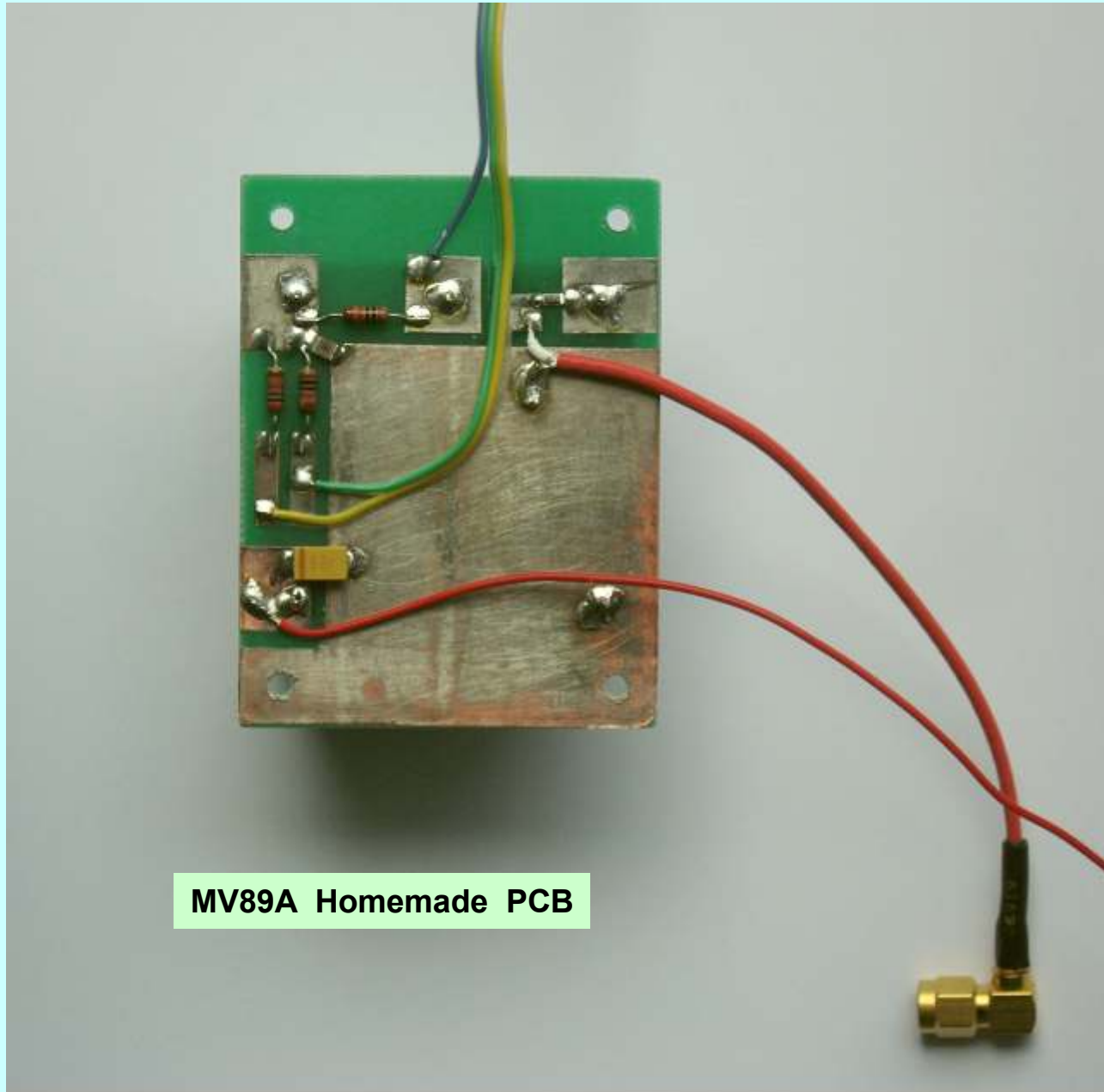




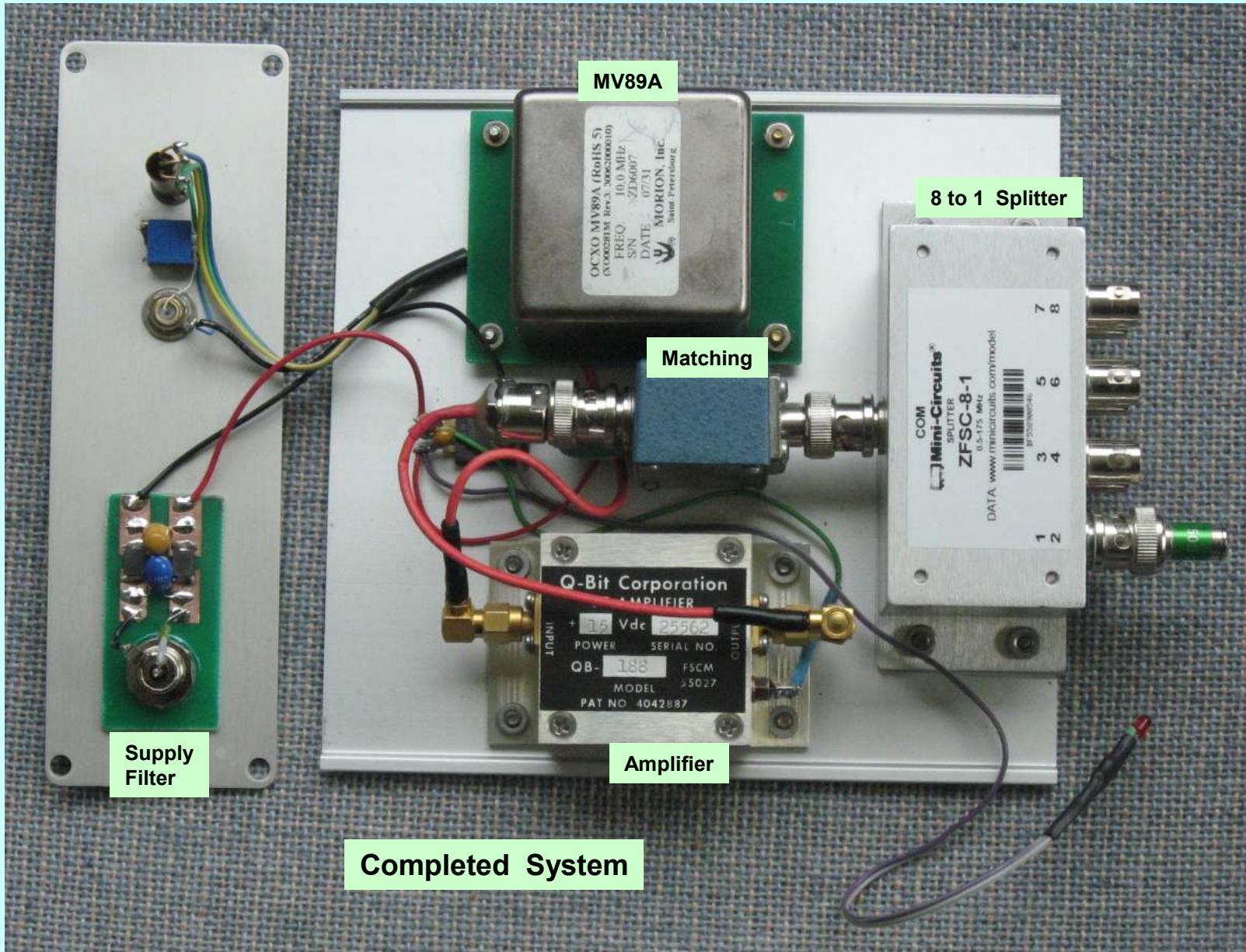




**Scaling and Frequency Adjust Circuit**



**MV89A Homemade PCB**



MV89A

8 to 1 Splitter

Matching

Supply Filter

Amplifier

Completed System

OCXO MV89A (RoHS 5)  
OC00281M Rev.3 300620000100  
FREQ 10.0 MHz  
S/N ZD6007  
DATE 07/31  
MORION, Inc.  
Saint Petersburg

COM Mini-Circuits  
SPLITTER  
ZFSC-8-1  
0.5-175 MHz  
DATA: www.minicircuits.com/model  
1 2 3 4 5 6 7 8

Q-Bit Corporation  
AMPLIFIER  
+ 15 Vdc 25562  
POWER SERIAL NO.  
QB- 188 FSCM  
MODEL 55027  
PAT NO 4042887



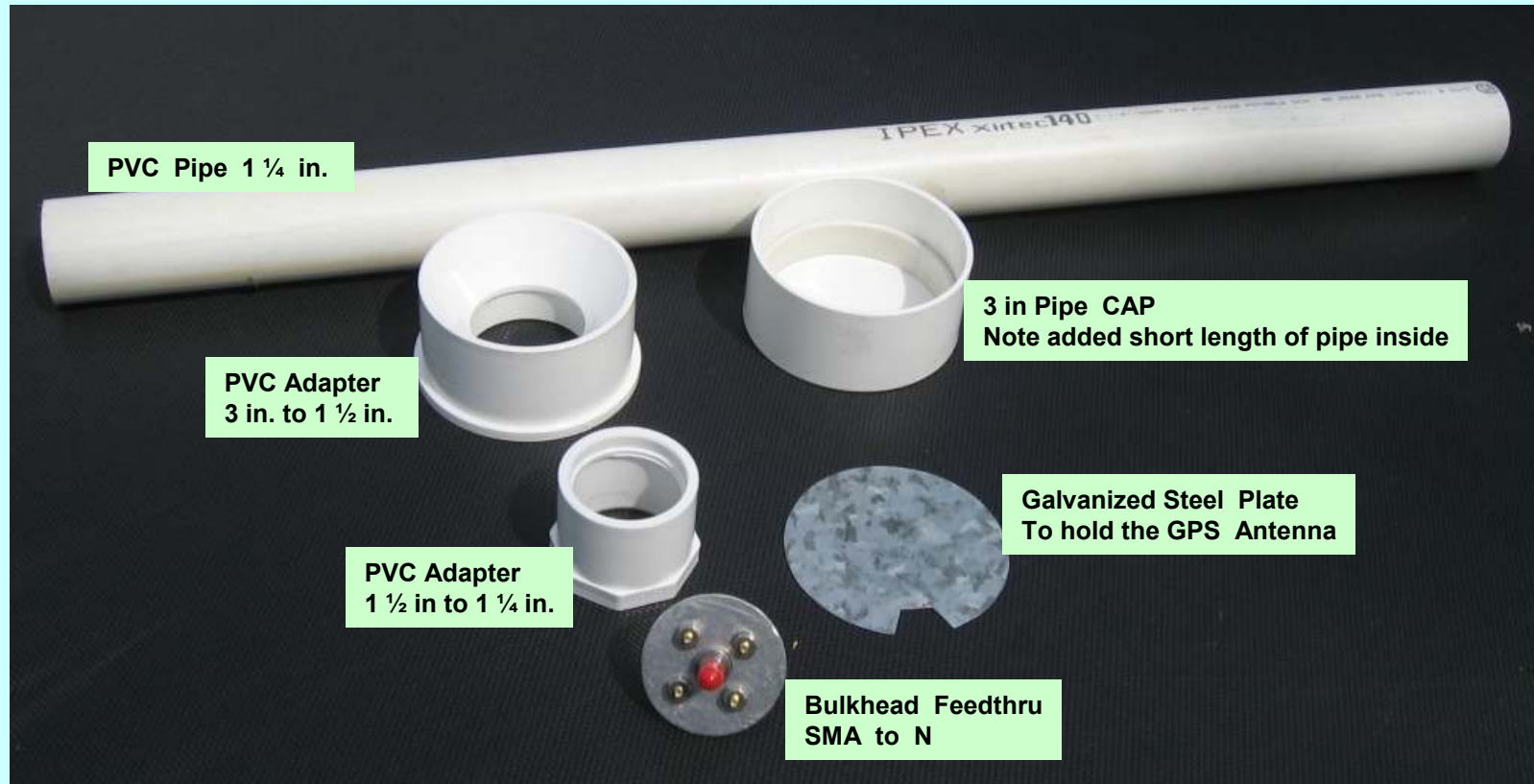
As Used with VE2ZAZ Controller



### Rear View

Without Controller, Vc IN is shorted

## OUTDOOR GPS ANTENNA





**Bulkhead Feedthru  
SMA to N Mounted on  
PVC Adapter  
1 ½ in to 1 ¼ in.**



**PVC Adapter 3 in. to 1 ½ in.  
and SMA to N  
Bulkhead Feedthru**



**GPS Antenna with a short length Of RG-174  
Mounts on top of PVC Adapter 3 in. to 1 ½ in.**



**Completed Antenna  
attached to the Roof Side**