

# Test rettificatori

Test set:

1. Trasformatore E-I  $V_{sec} = 15\text{ V}$
2. PSU di prova - SMD :- ) - composta da:
  - Resistori in serie secondario 2x 1.2 ohm
  - Raddrizzatore a ponte di Graetz con 1N4007 (diodo standard con  $C_j = 15\text{ pF}$ )
  - Condensatore di filtro Panasonic FC 2200uF
3. Carico resistivo 100 ohm - 50 ohm

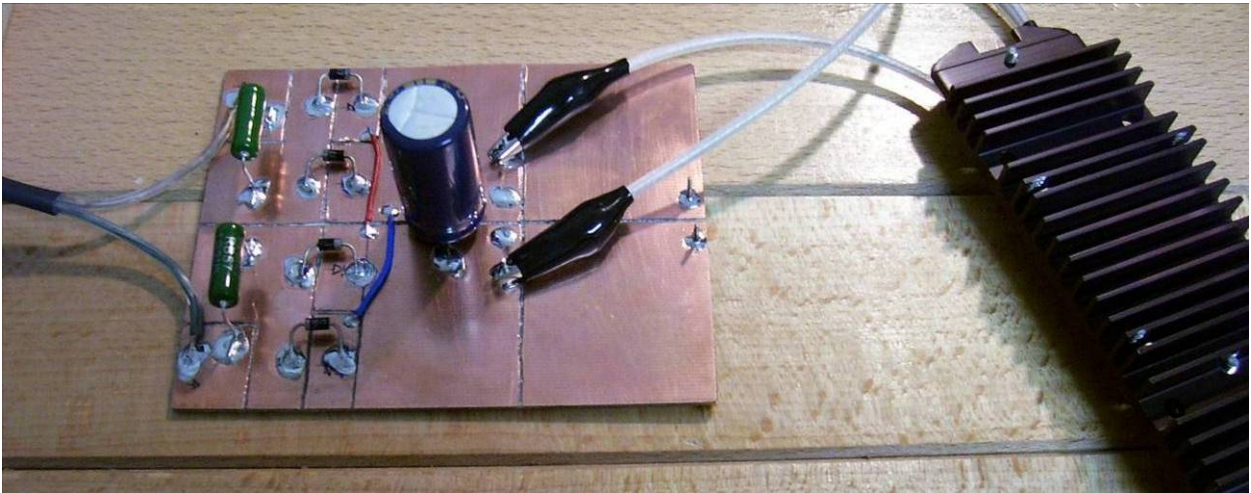


Fig. 1

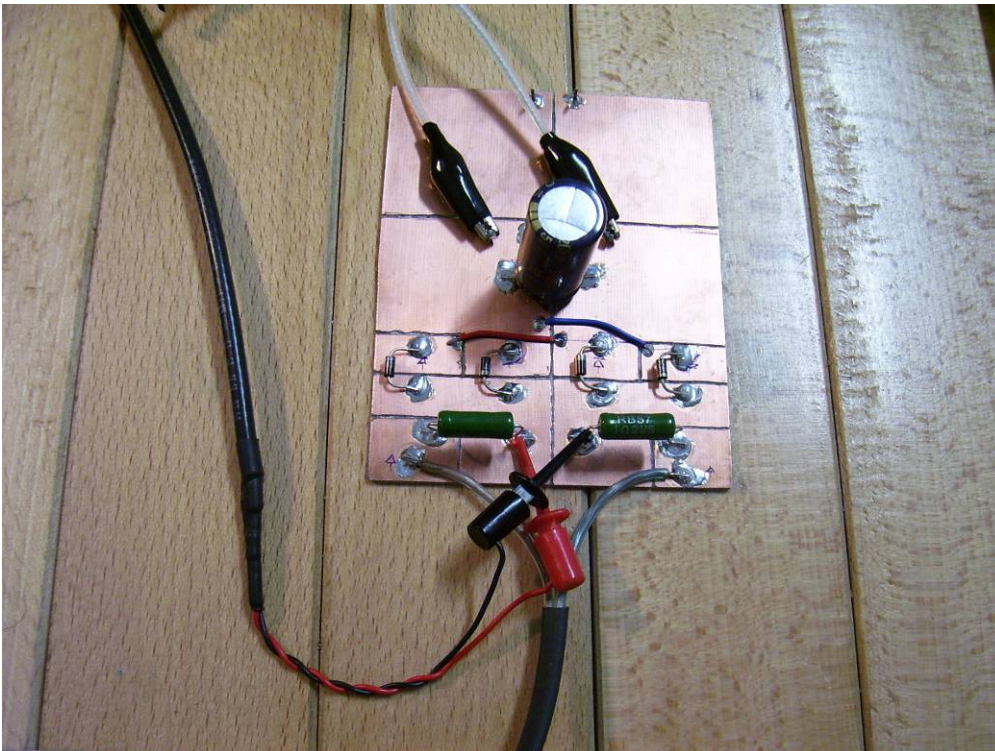


Fig. 2 - Test points

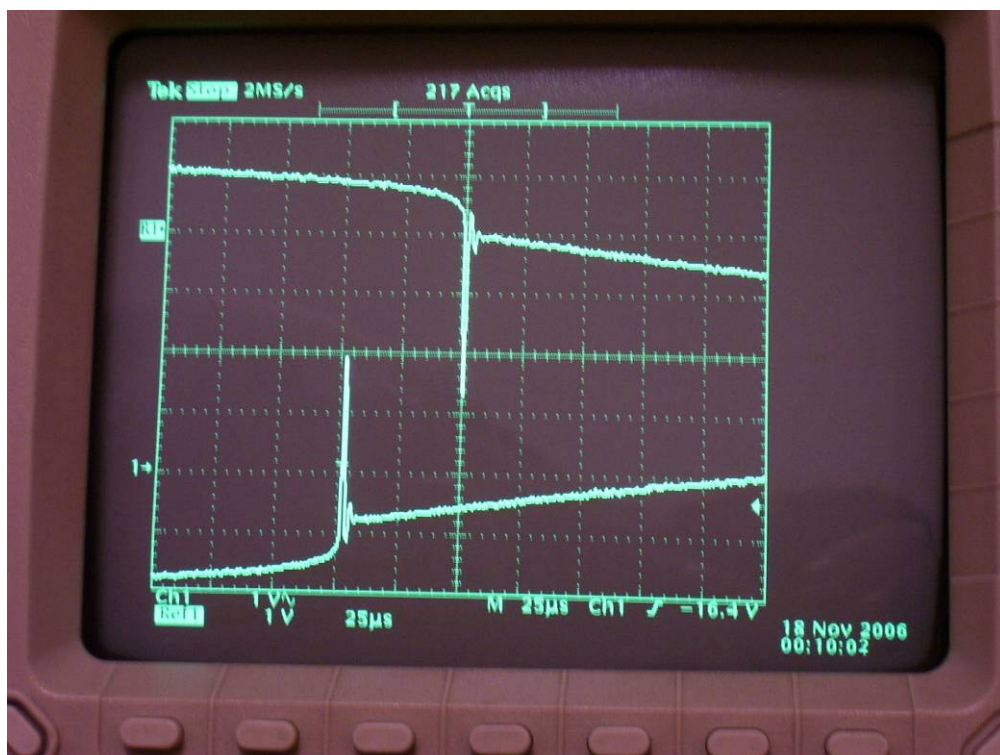


Fig. 3 - interdizione (in alto) e conduzione (in basso) dei diodi

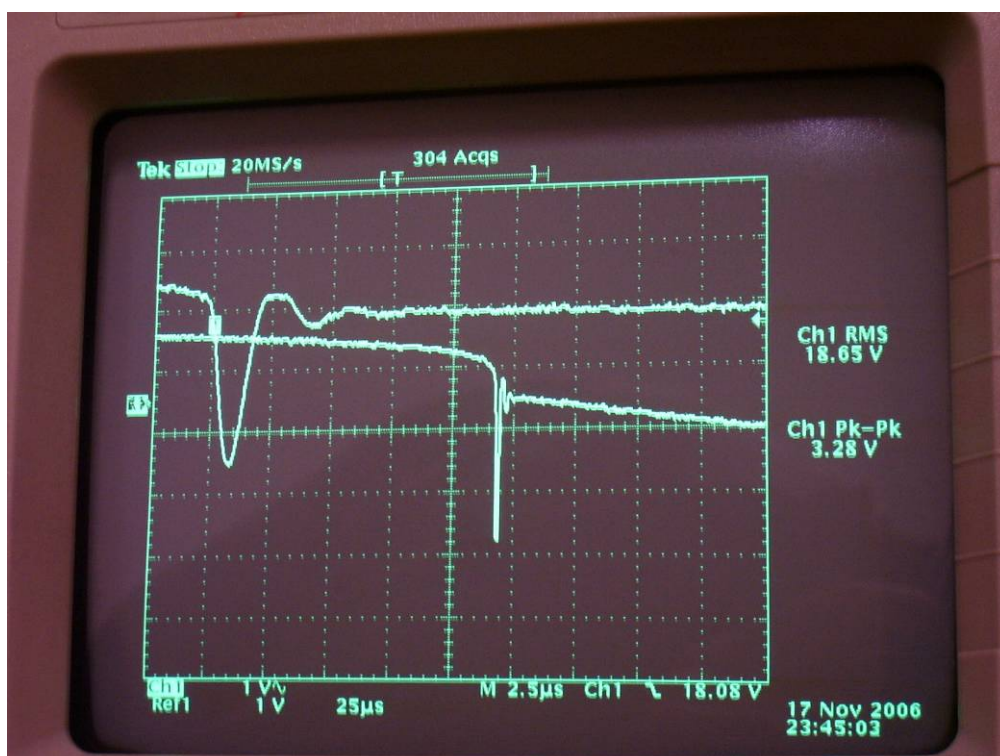


Fig. 4 - Interdizione diodi, asse X del tempo con divisione 25us (in basso) 2.5us (in alto)



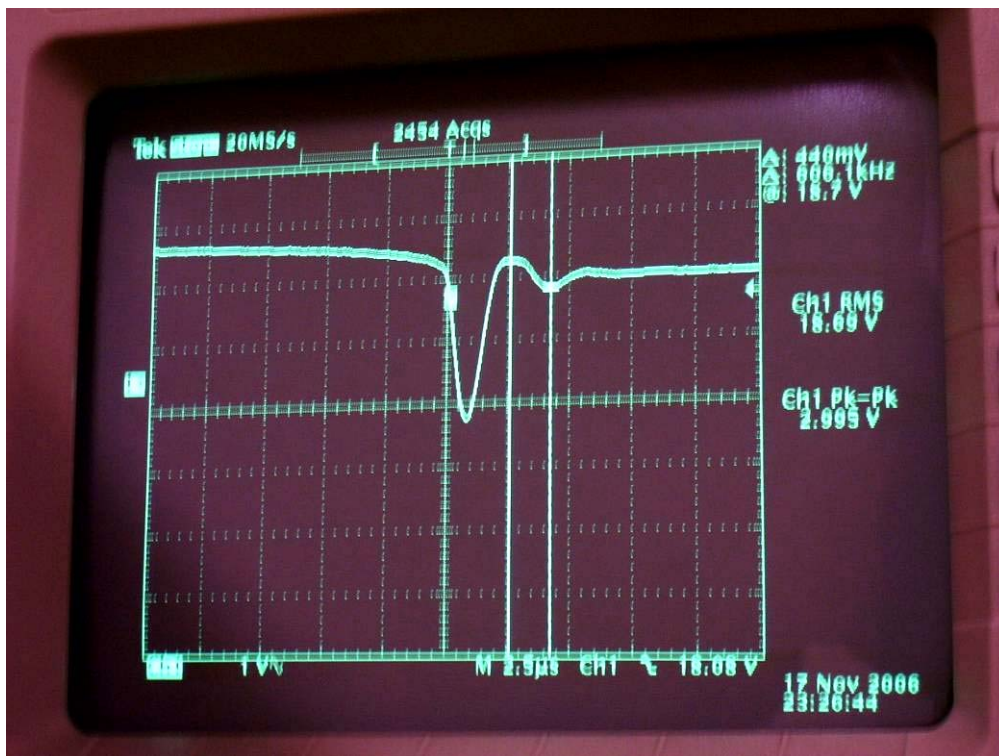


Fig. 5  
 Con assorbimento circa 200mA  
 Oscillazione con ampiezza 440mVpp e  $f=330\text{kHz}$

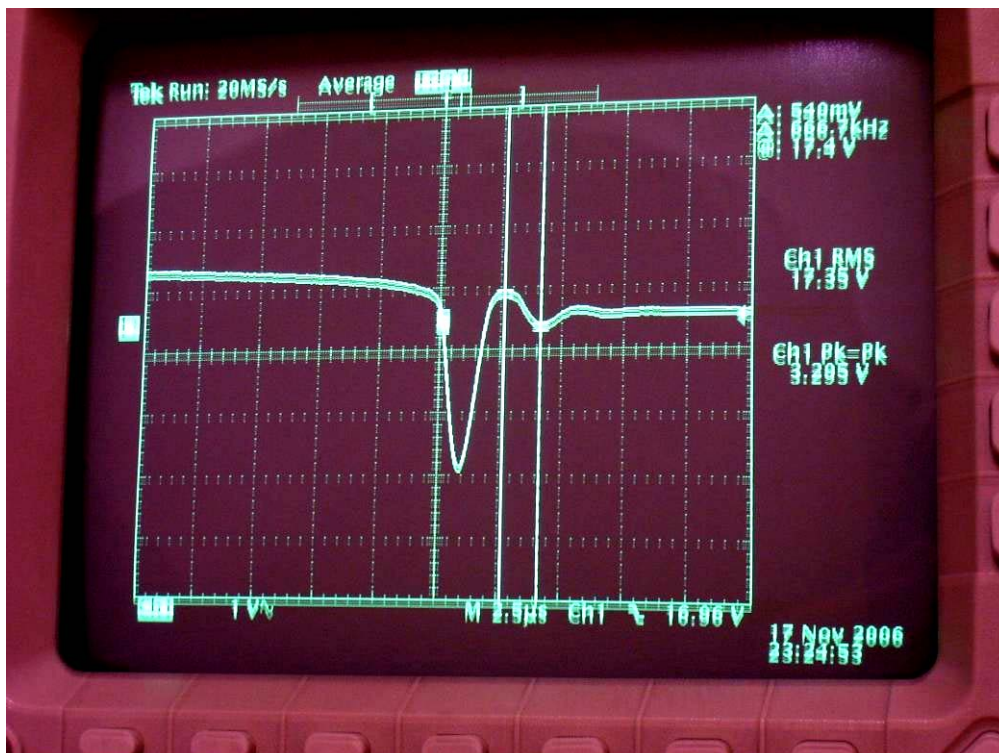


Fig. 6  
 Con assorbimento 400mA  
 Oscillazione con ampiezza 540mVpp e  $f=330\text{kHz}$

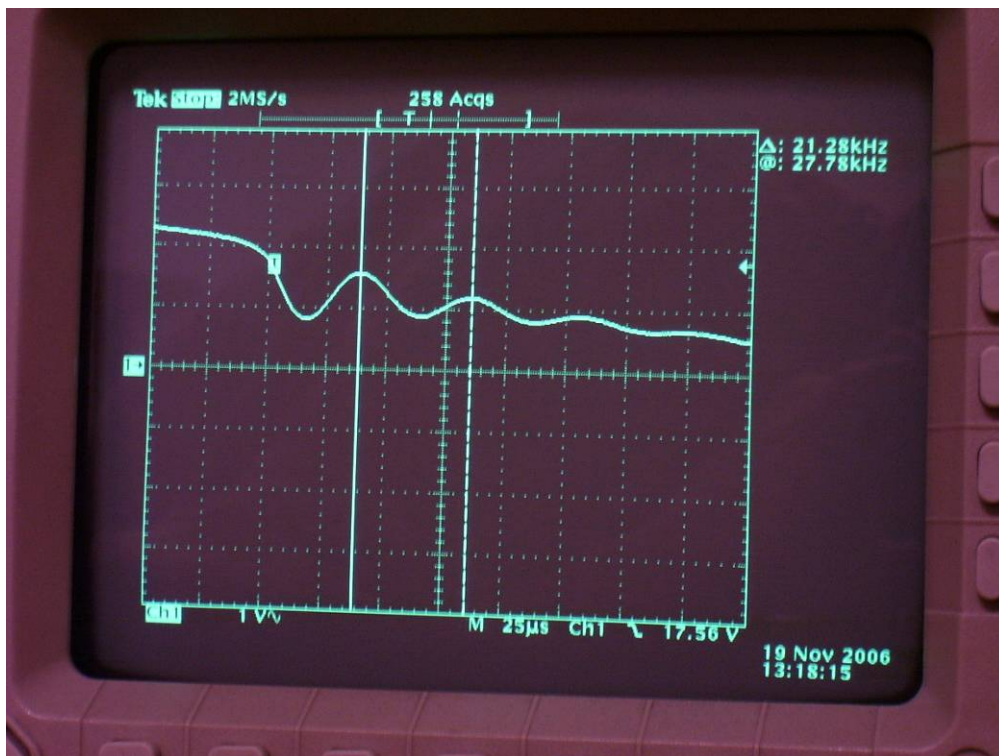


Fig. 7

Condensatore da 100 nF in parallelo al secondario ...una bella oscillazione a 21 kHz ad ogni commutazione dei diodi!

Con un condensatore da 100 nF in parallelo a ciascun diodo l'oscillazione rimane alla stessa frequenza e l'ampiezza aumenta leggermente.

**Tensione sul secondario alla commutazione** (in basso) vs. **Snubber in parallelo al sec.** (in alto)

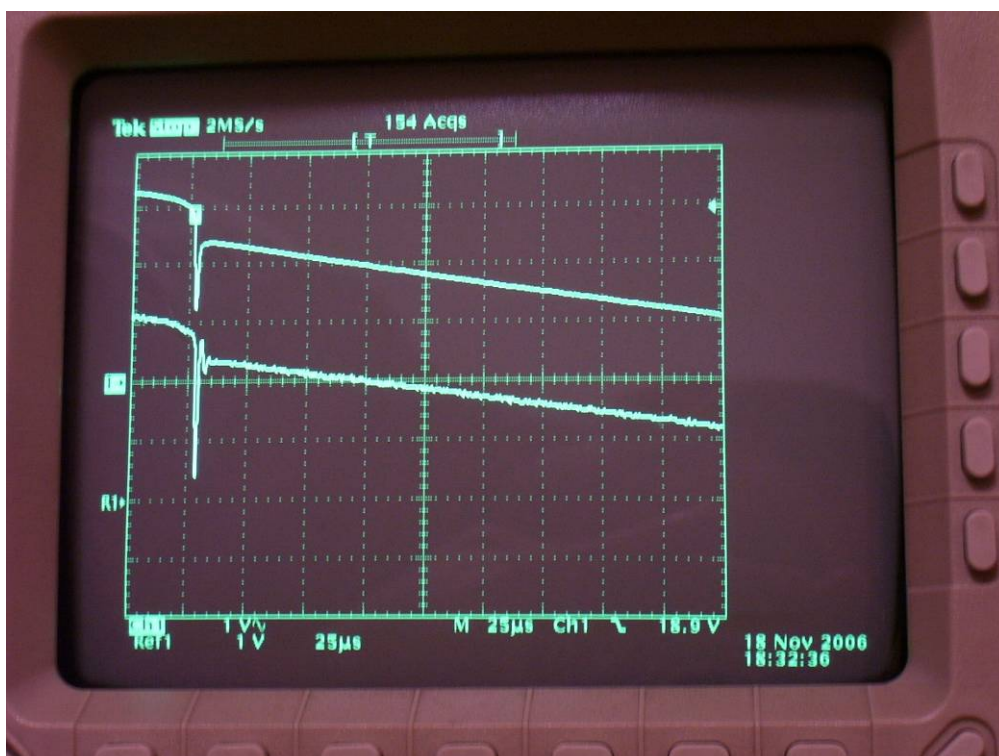


Fig. 8 - Snubber 22 nF + 1k ohm (quasi inutile, resistenza troppo elevata)



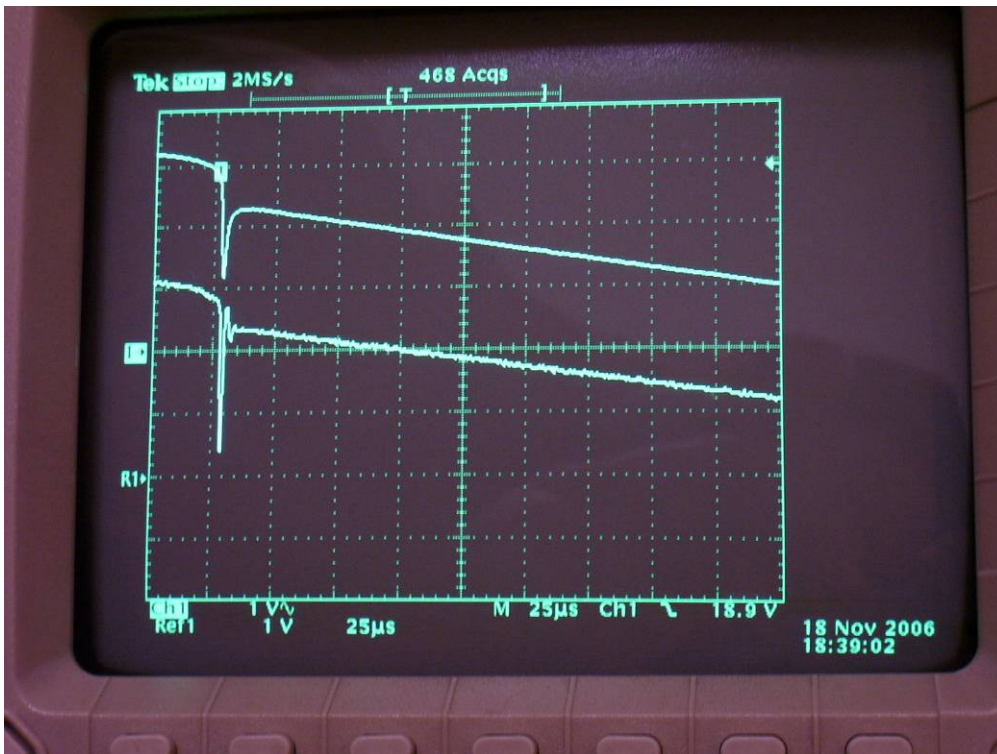


Fig. 9 - Snubber 22 nF + 560 ohm

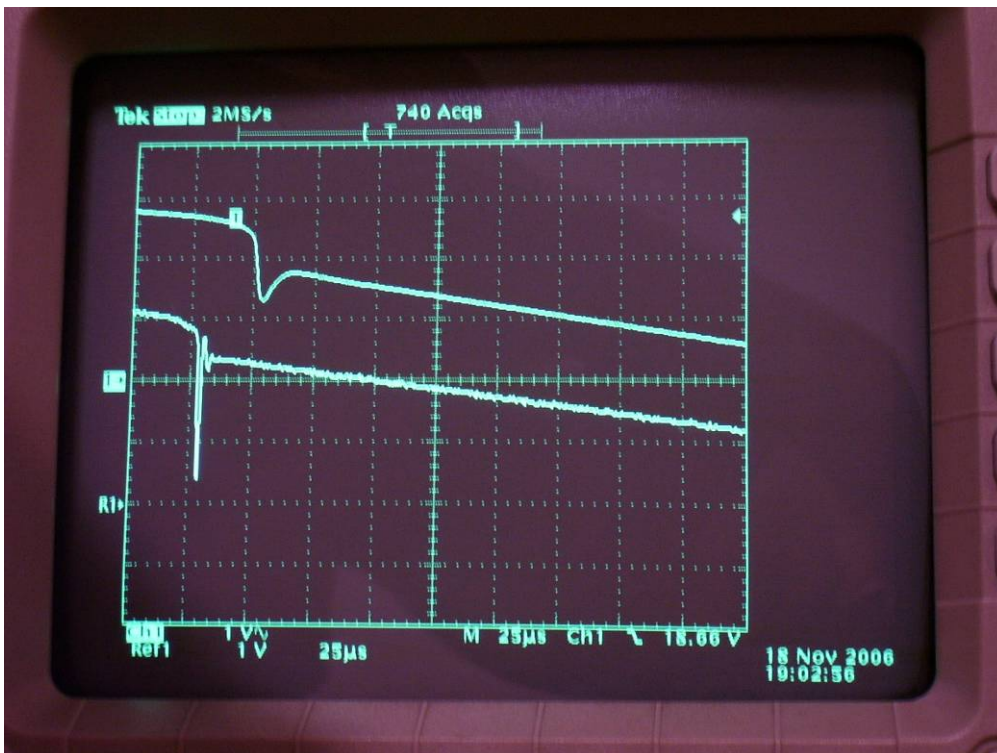


Fig. 10 - Snubber 22 nF + 220 ohm

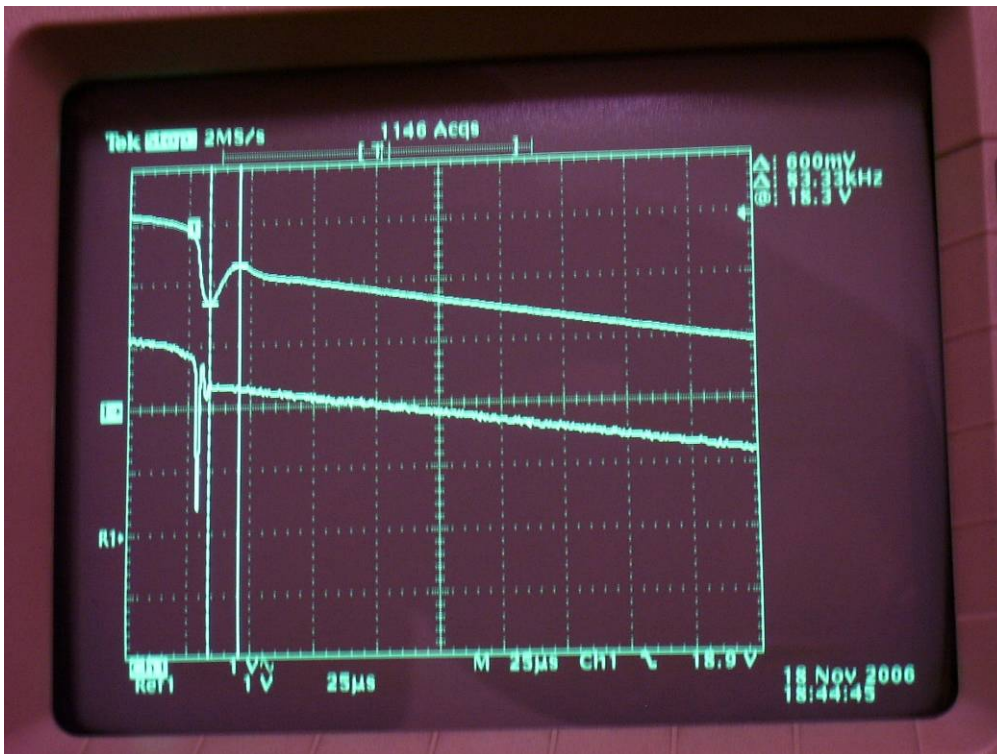


Fig. 11 - Snubber 22 nF + 100 ohm

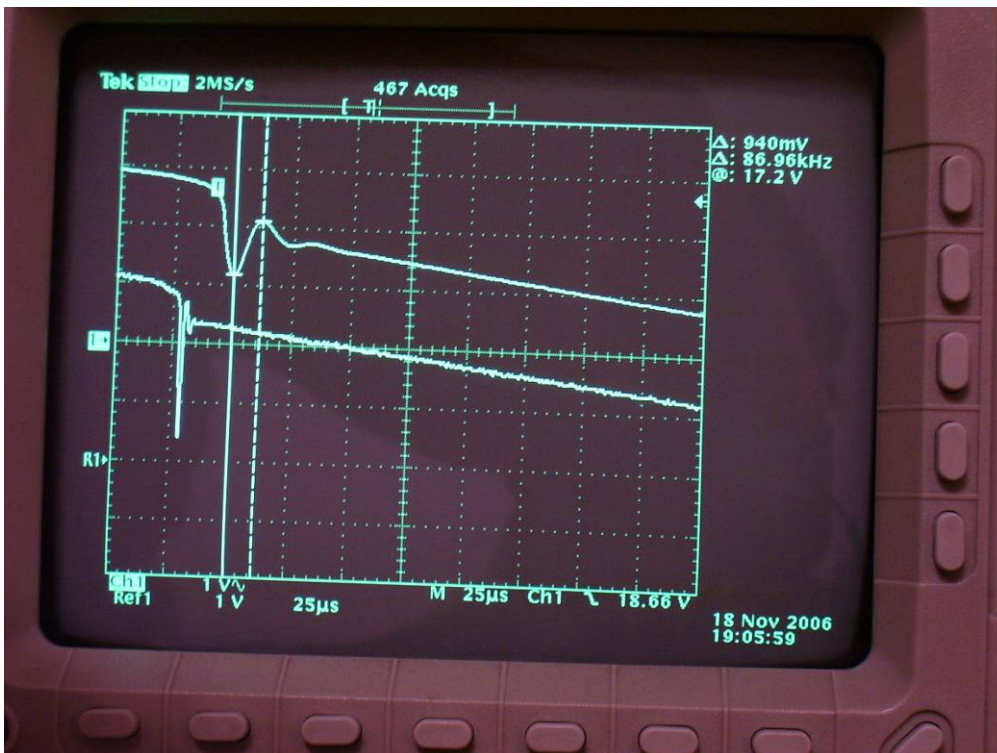


Fig. 12 - Snubber 22 nF + 56 ohm



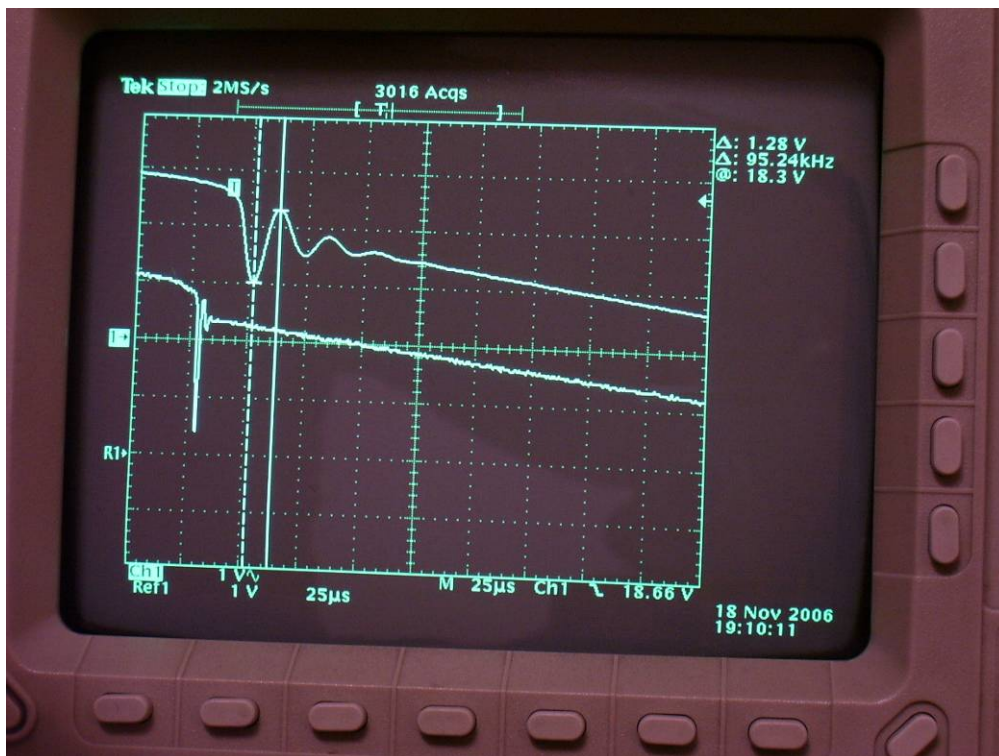


Fig. 13 - Snubber 22 nF + 10 ohm

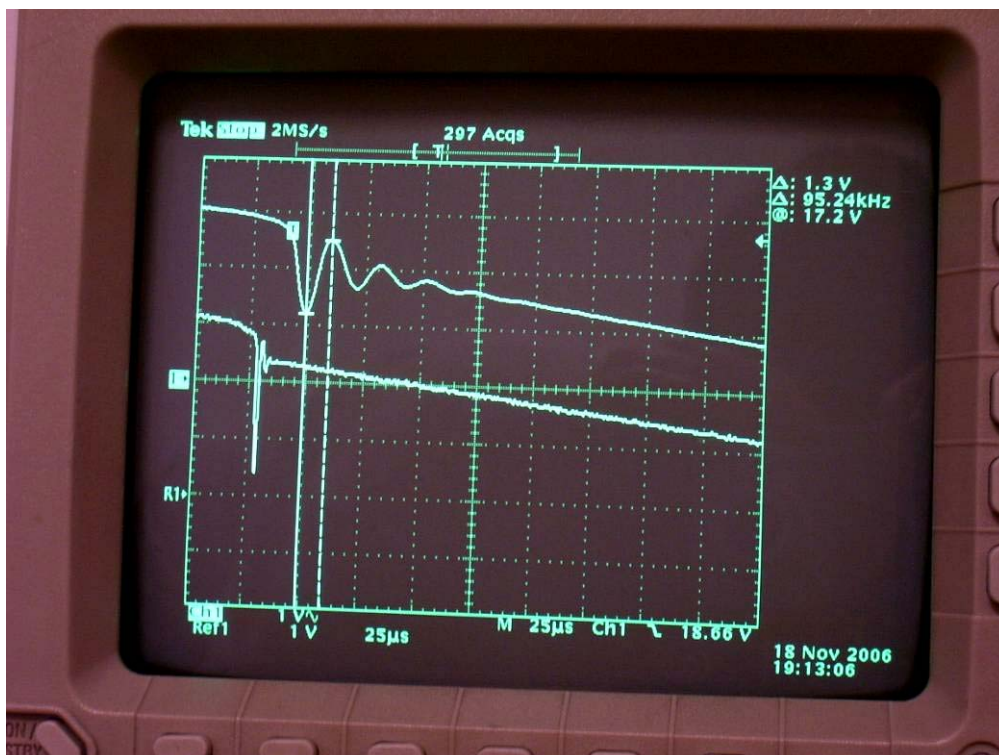


Fig. 14 - Snubber 22 nF + 2.2 ohm

Caduta di tensione sul resistore dello snubber:

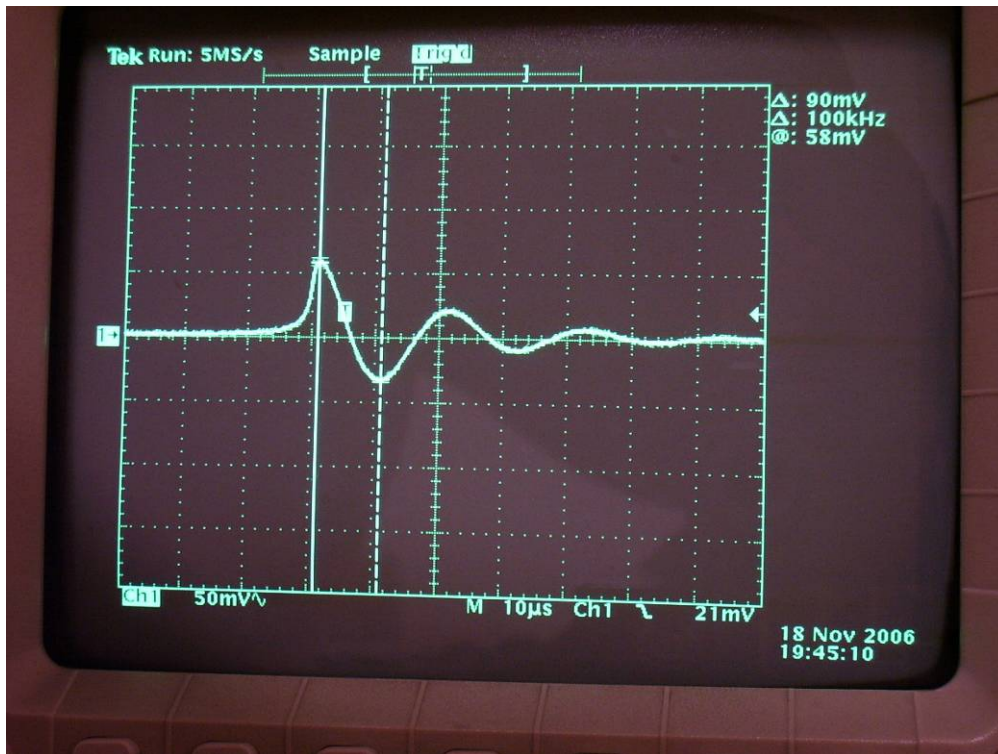


Fig. 15 - su 10 ohm in snubber con 22 nF (asse Y = 50mV)

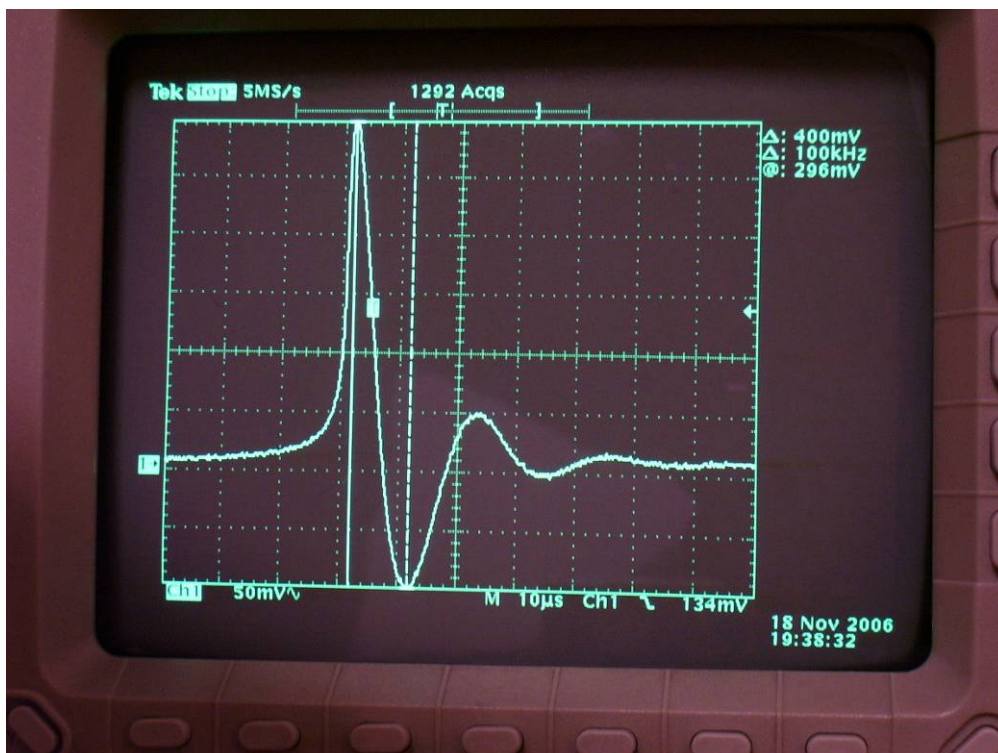


Fig. 16 - su 56 ohm in snubber con 22 nF (asse Y = 50mV)



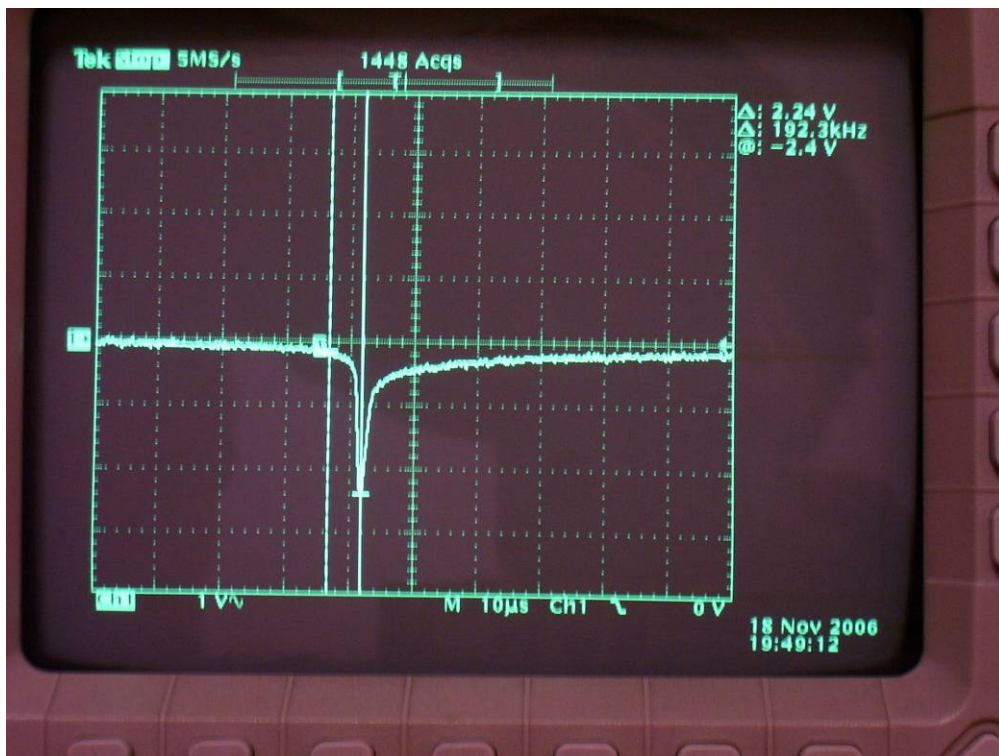


Fig. 17 - su 1k ohm in snubber con 22 nF (asse Y = 1V)

Risposta all'interdizione variando il valore del condensatore dello snubber:

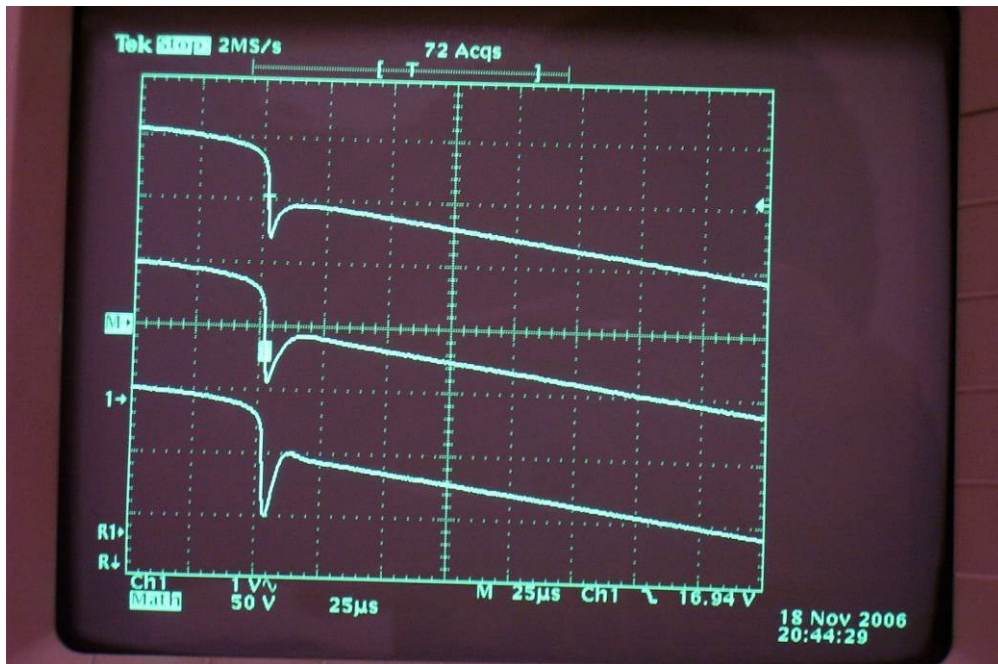


Fig. 18

Snubber 220 ohm + **condensatore**:

- 10nF (in basso)
- 22nF
- 100nF (in alto) (ottimale)
- con capacità maggiori, fino a 1uF, la curva varia di poco.

Risposta all'interdizione variando il valore del resistore dello snubber:

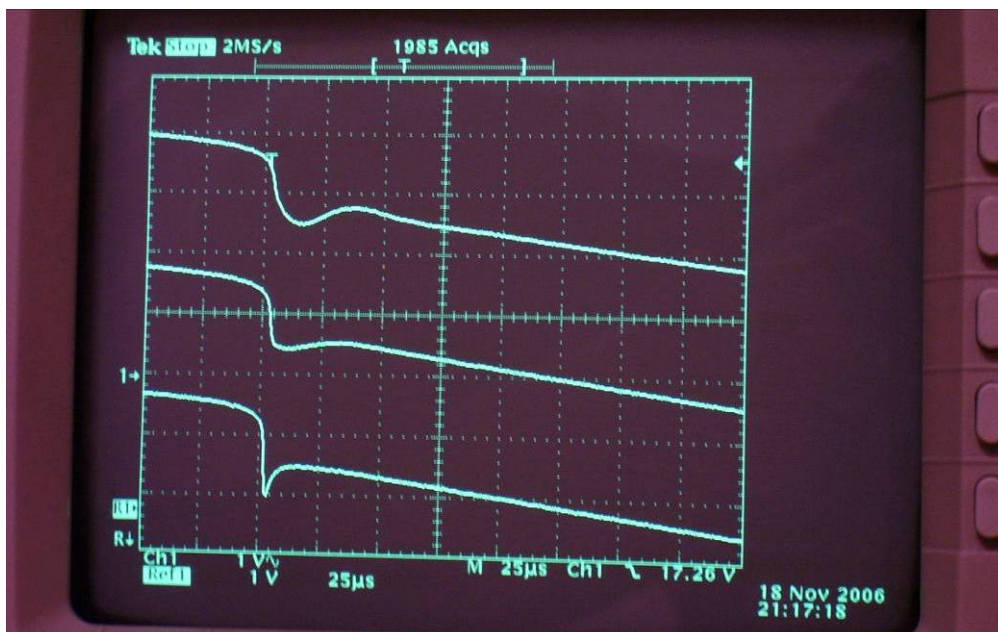


Fig. 19

Snubber 100 nF + **resistore**:

- 220 ohm (in basso)
- 100 ohm (ottimale)
- 56 ohm (in alto) (valore minimo, leggero principio di oscillazione a bassa frequenza)



Setup con uno snubber 100 nF + 100 ohm per ciascun diodo (quattro snubber in totale):

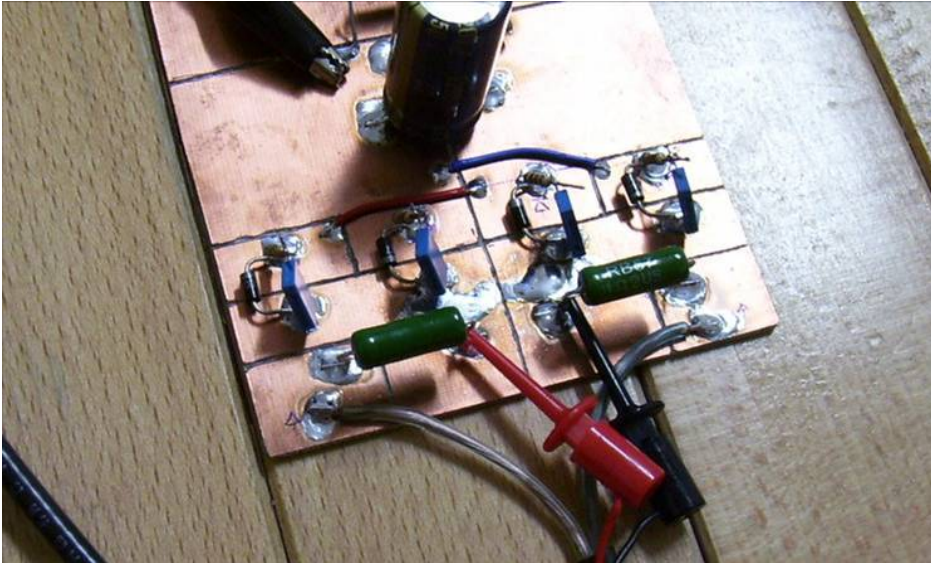


Fig. 20

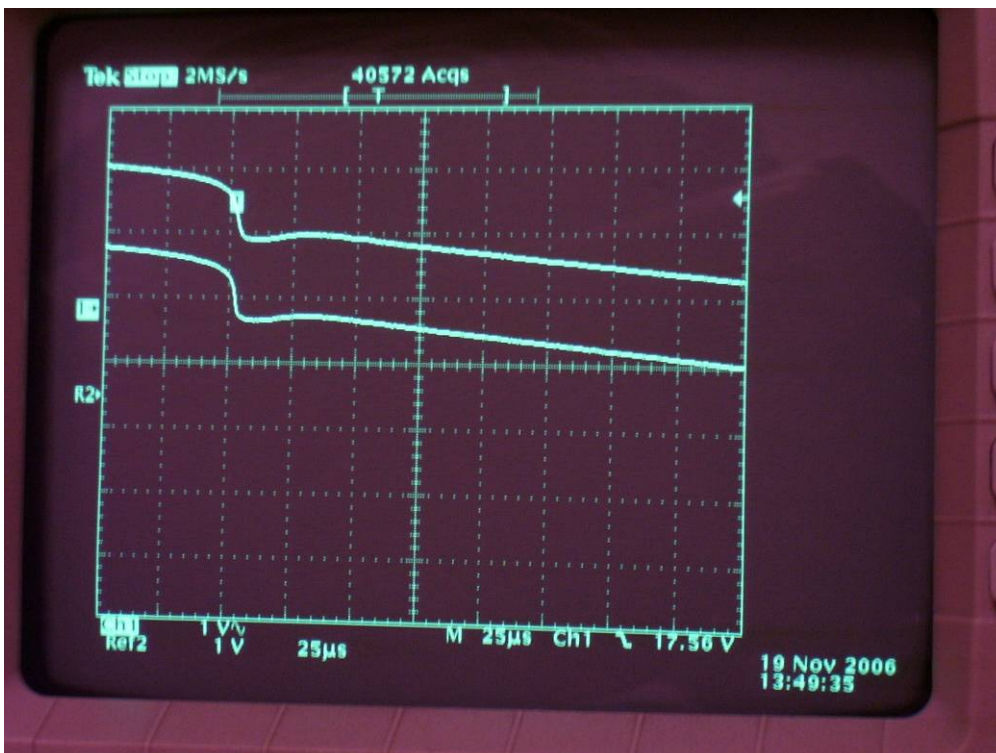


Fig. 21  
Confronto fra 4 snubber singoli e uno snubber lato secondario (curve praticamente identiche).

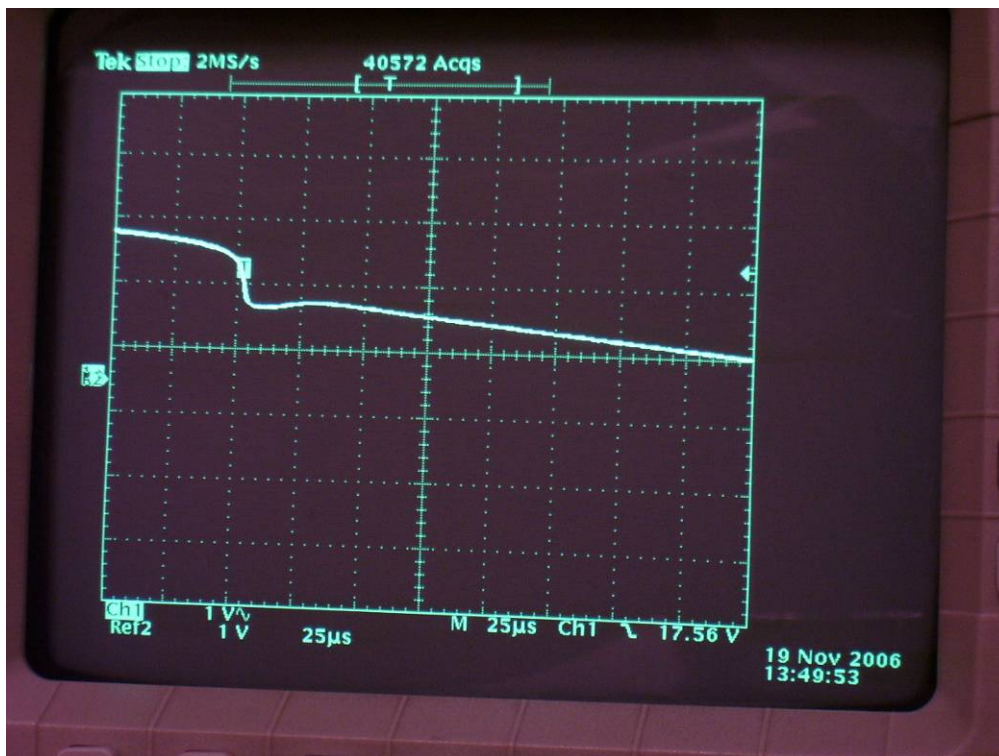


Fig. 22  
Le precedenti curve sovrapposte (identiche).



## Dual-snubber ...ovvero lo JamSnubber !!



Fig. 23

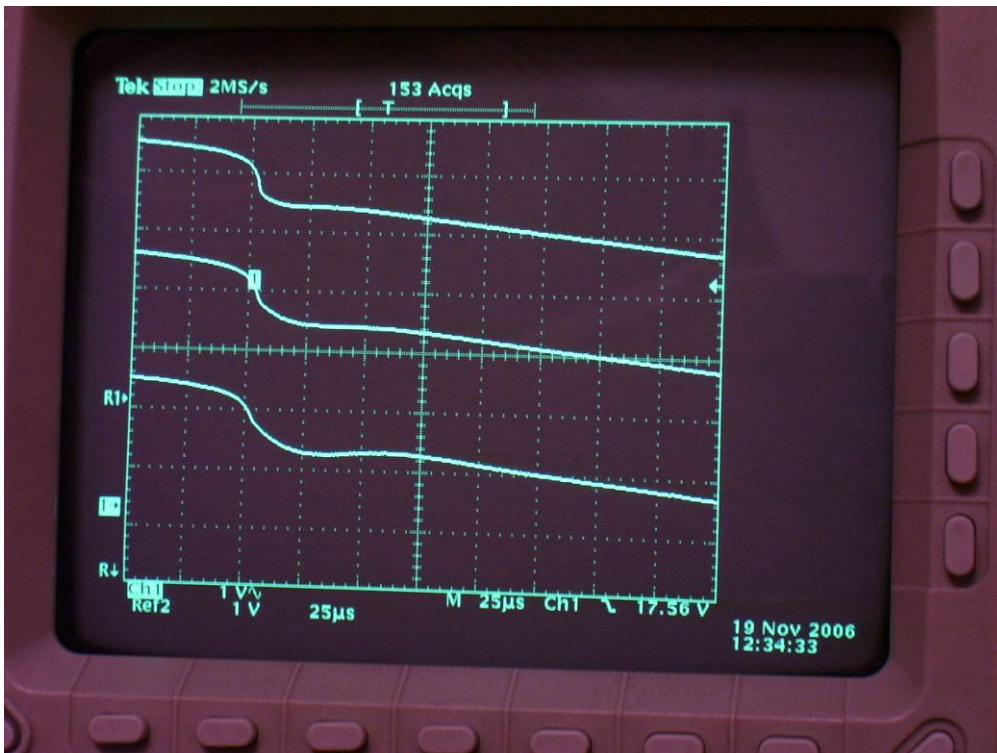


Fig. 24

Snubber 100 nF + 100 ohm \ snubber 220 nF + resistore:

- 56 ohm (in basso) (valore minimo, leggero principio di oscillazione)
- 100 ohm
- 220 ohm (in alto) (blando)

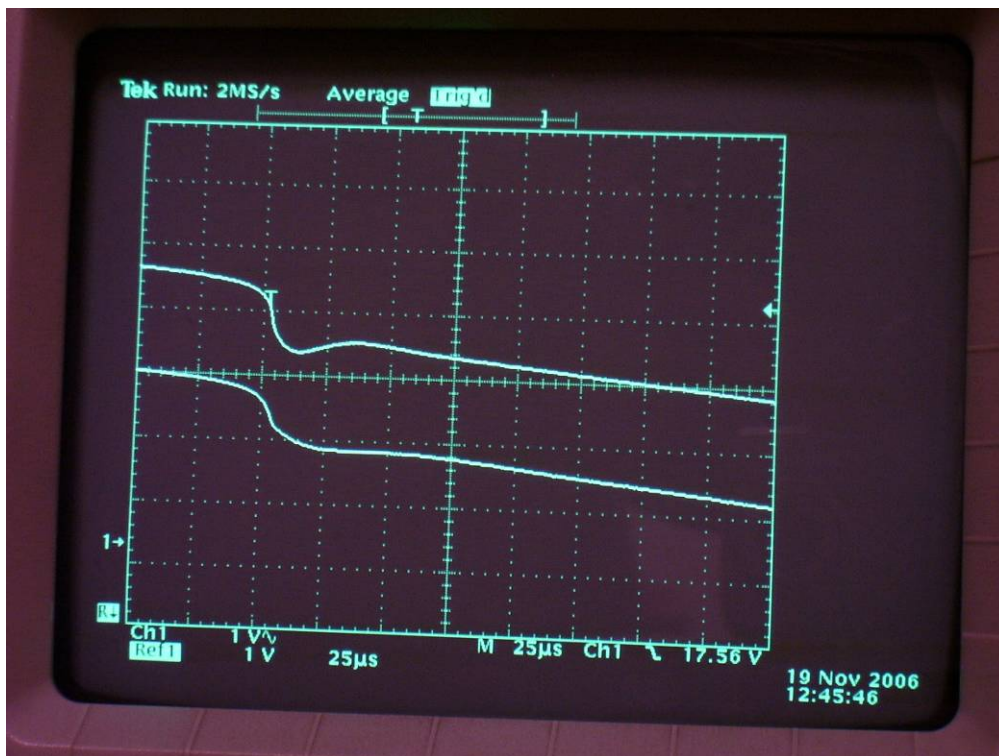


Fig. 25

Snubber  $100 \text{ nF} + 100 \text{ ohm}$  \\\ snubber  $22 \text{ nF} + 100 \text{ ohm}$  (in alto)  
 Snubber  $100 \text{ nF} + 100 \text{ ohm}$  \\\ snubber  $220 \text{ nF} + 100 \text{ ohm}$  (in basso)

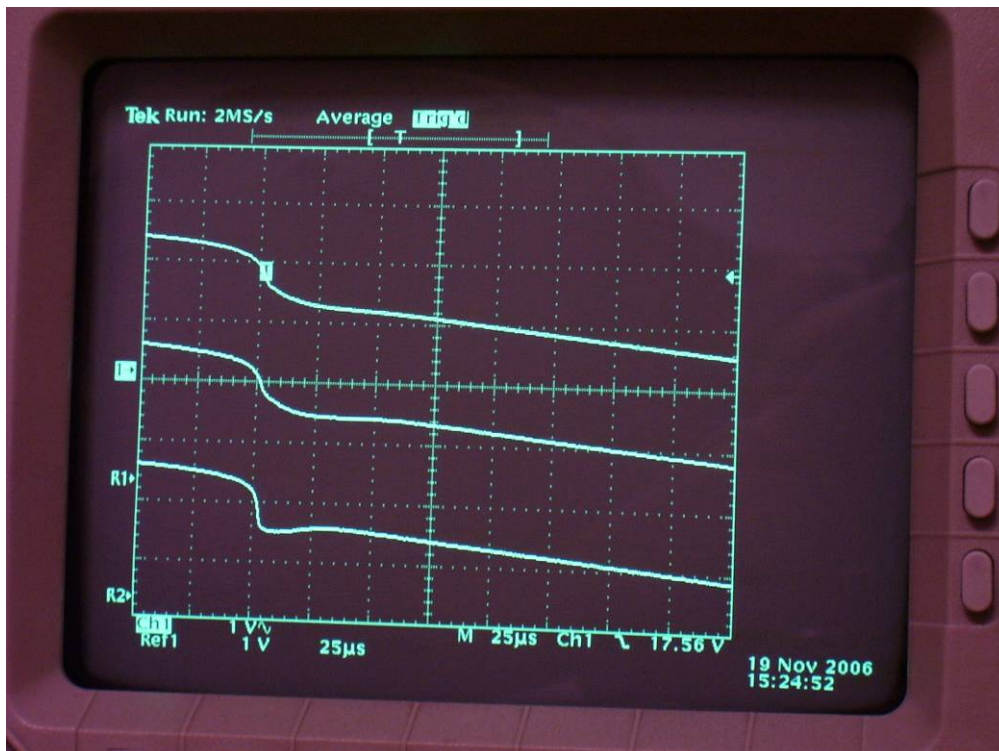


Fig. 26

Snubber  $100 \text{ nF} + 100 \text{ ohm}$  \\\ snubber  $100 \text{ ohm} + \text{condensatore}$ :

- $100 \text{ nF}$  (in basso)
- $220 \text{ nF}$
- $470 \text{ nF}$  (in alto)





Fig. 27

Snubber 100 nF + 100 ohm \\**snubber**:

- 470 nF + 68 ohm (in alto)
- 220 nF + 100 ohm (in basso)

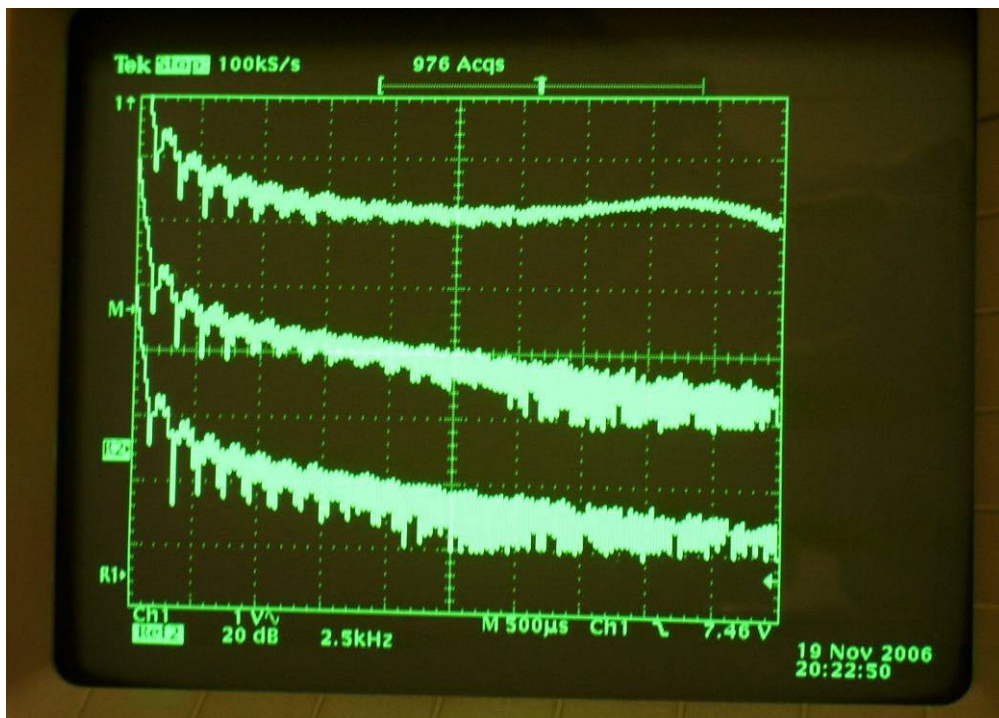


Fig. 28

**FFT** (DC - 25kHz , 2.5kHz div.)

- solo 100nF in parallelo al secondario (in alto) (nota andamento attorno a 20kHz)
- snubber 100 nF + 100 ohm \\**snubber** 220 nF + 68 ohm
- snubber 100 nF + 100 ohm \\**snubber** 1uF + 68 ohm

### JamSnubber con diversi diodi:

(asse Y = 100us/div.)

Ponte di Graetz con **1N5401** - diodo standard media potenza 3A con capacità di giunzione  $C_j=30\text{pF}$



Fig. 29

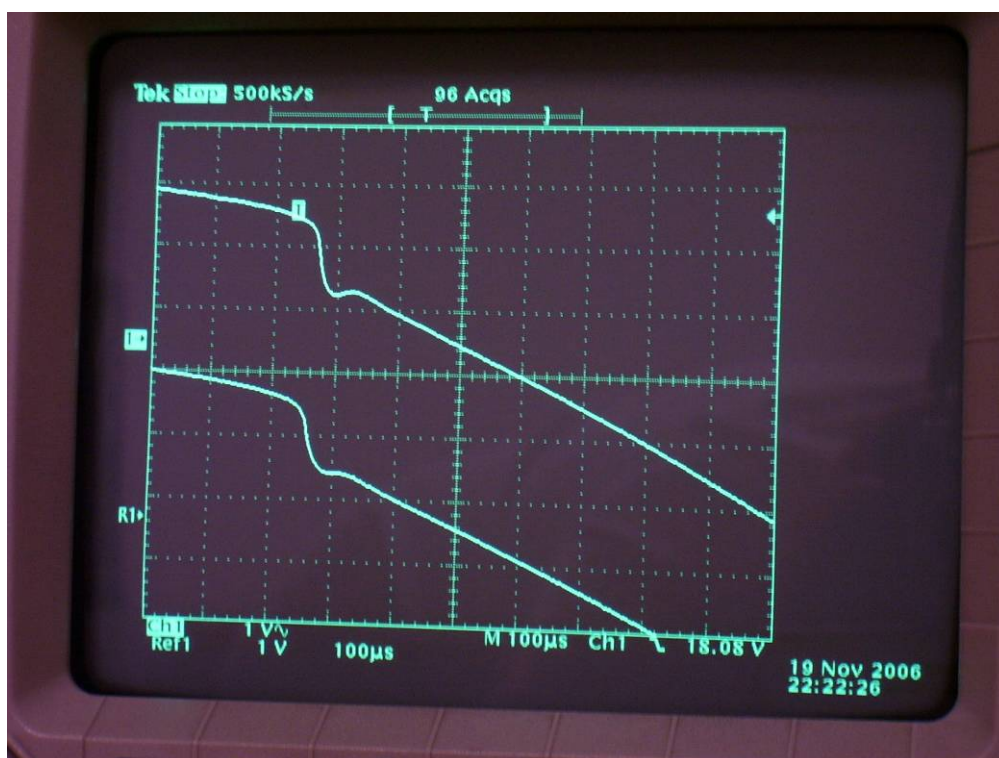


Fig. 30

- 1N5401 (in alto)
- 1N4007 (in basso)



Ponte di graetz con **SBVY27-100** - diodo ultra veloce 2A con tempo di recupero  $t_{rr}=25\text{ns}$  e capacità di giunzione  $C_j = 100\text{pF}$

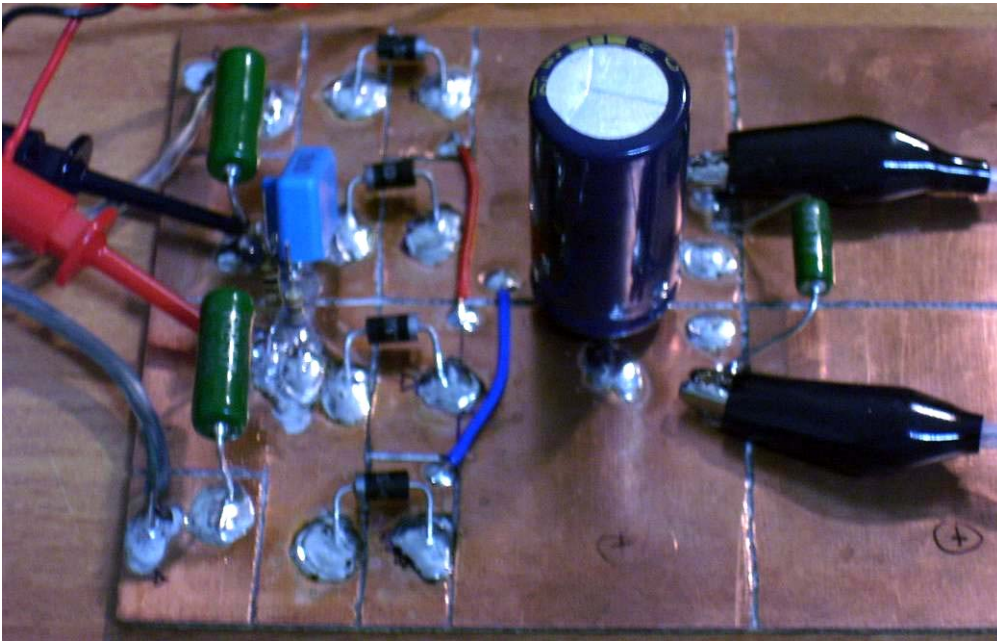


Fig. 31

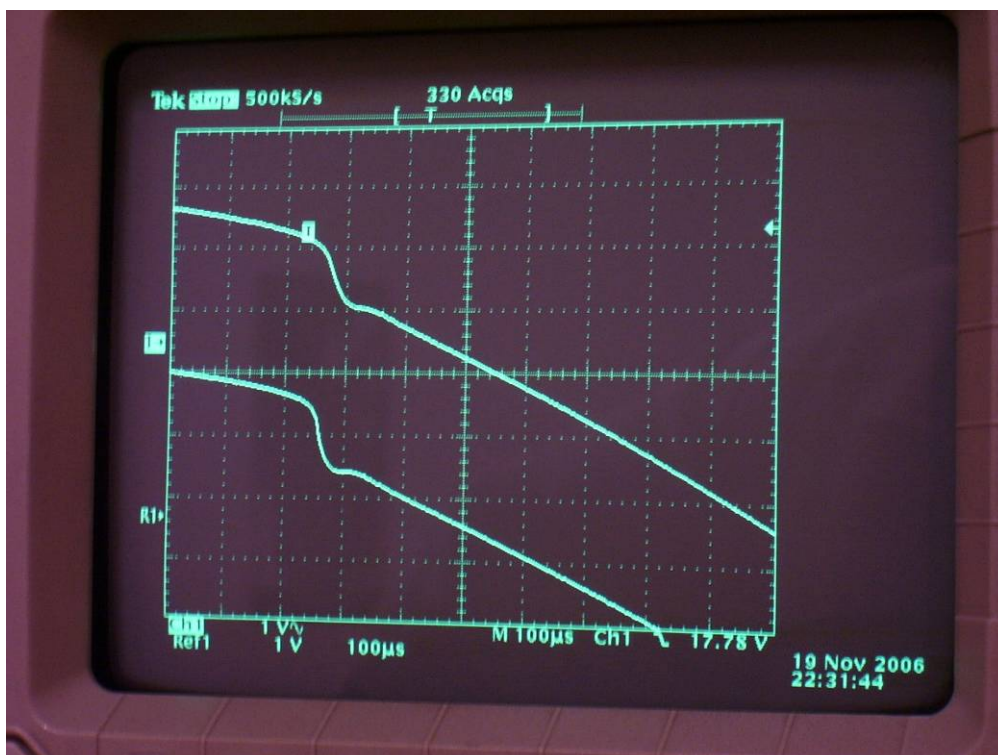


Fig. 32

- SBVY27-100 (in alto)
- 1N4007 (in basso)

Ponte di graetz con **uF4003** - diodo ultra veloce 1A con tempo di recupero  $t_{rr}=50\text{ns}$  e capacità di giunzione  $C_j=17\text{pF}$

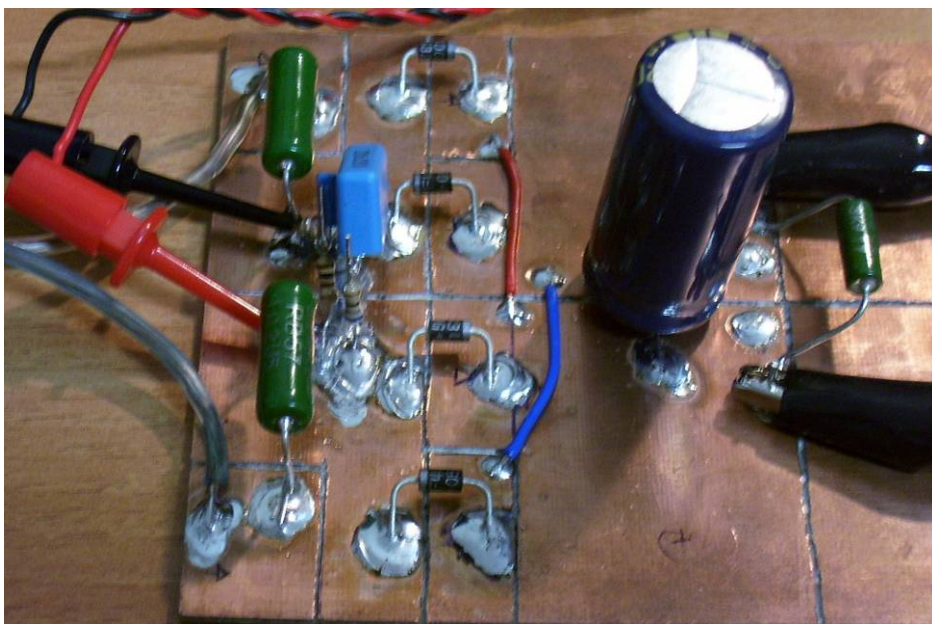


Fig. 33

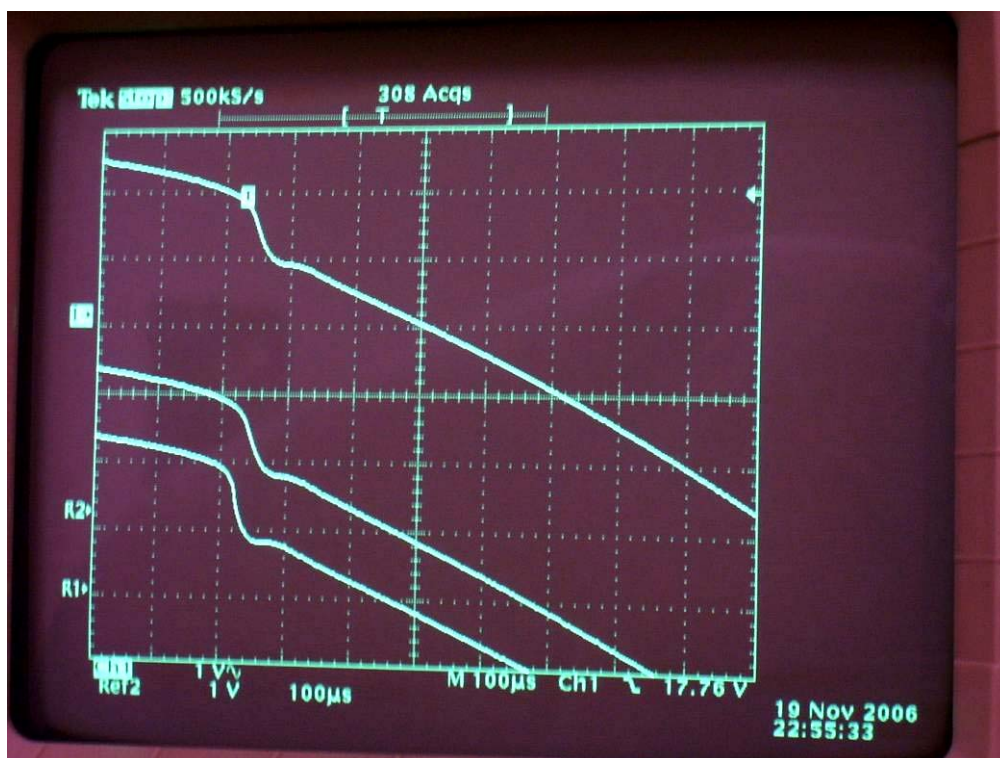


Fig. 34

- uF4003 (in alto)
- SBVY27-100 (al centro)
- 1N4007 (in basso)



Ponte di graetz con **MUR860** - diodo ultra veloce alta potenza 8A con tempo di recupero  $t_{rr}=60\text{ns}$  e capacità di giunzione  $C_j=25\text{pF}$

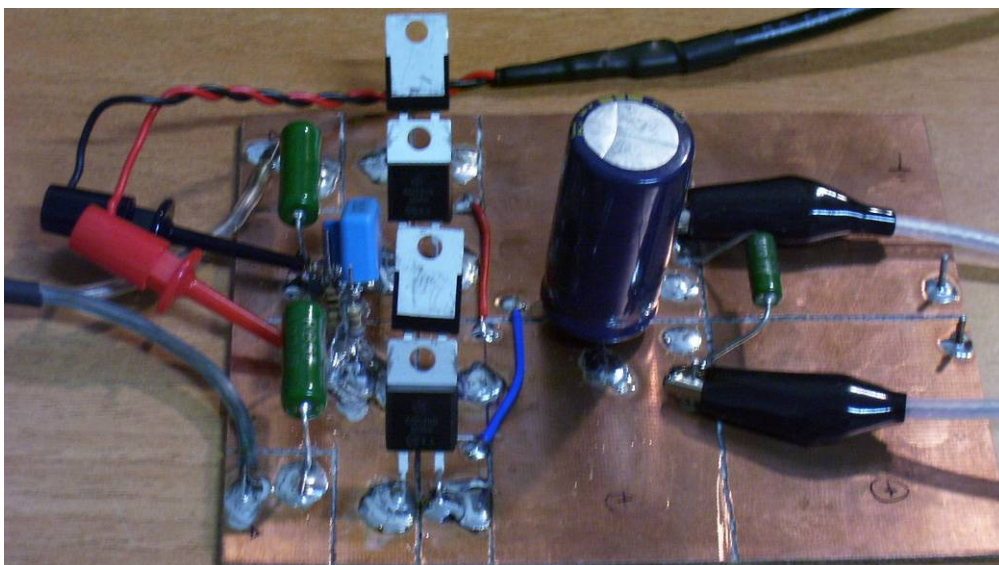


Fig. 35

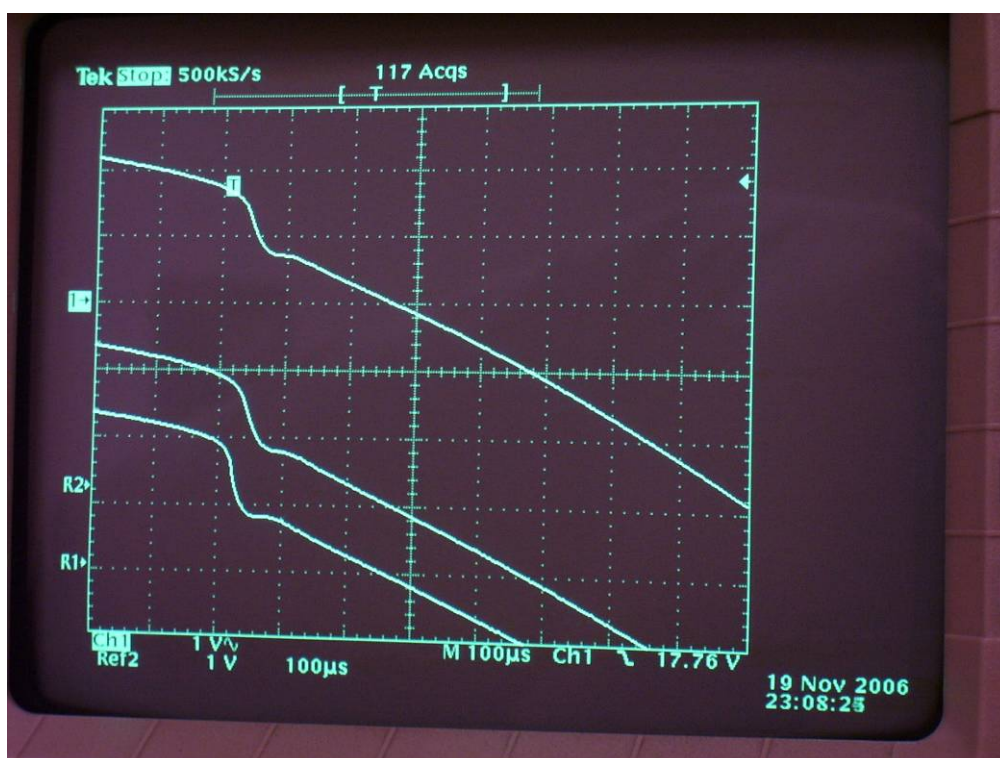


Fig. 36

- MUR860 (in alto)
- SBVY27-100 (al centro)
- 1N4007 (in basso)

### JamSnubber con diversi trasformatori:

(asse Y = 50us/div.)

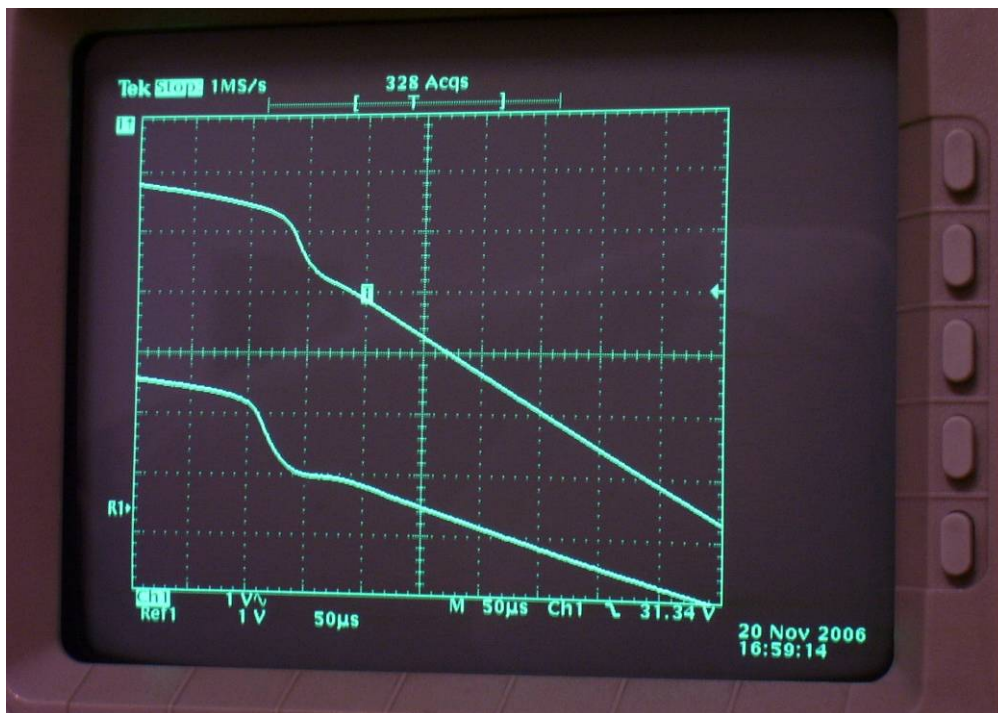


Fig. 37

- R-Core 30V (in alto)
- E-I 15V - Riferimento, usato nelle prove precedenti (in basso)

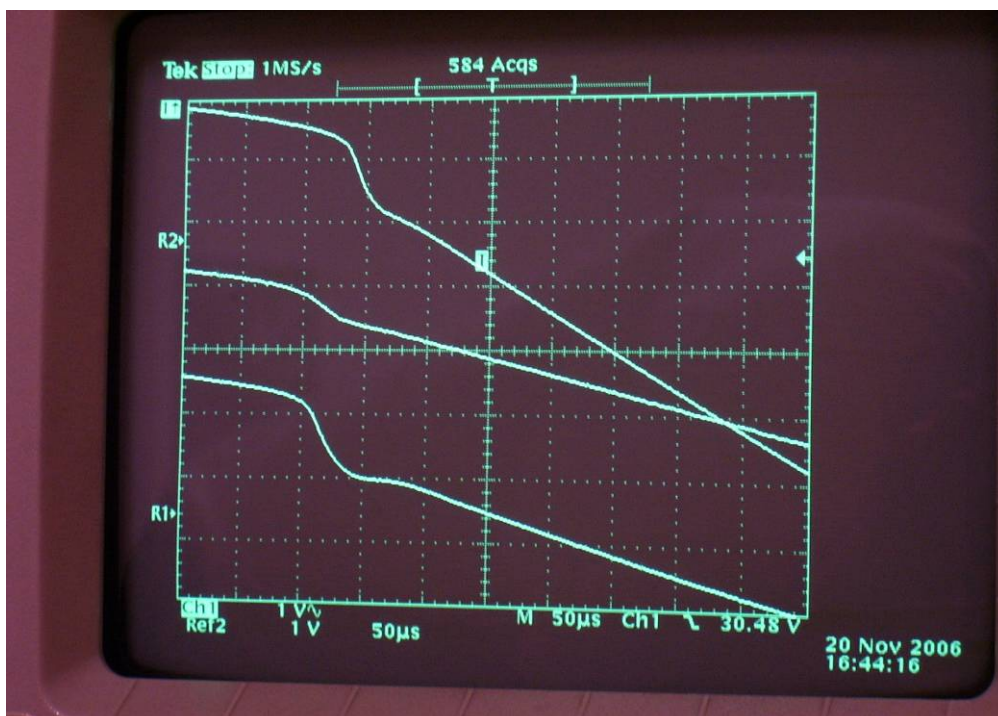


Fig. 38

- EI 30V - buona qualità (in alto)
- EI 12V - simile al riferimento (al centro)
- EI 15V - Riferimento (in basso)