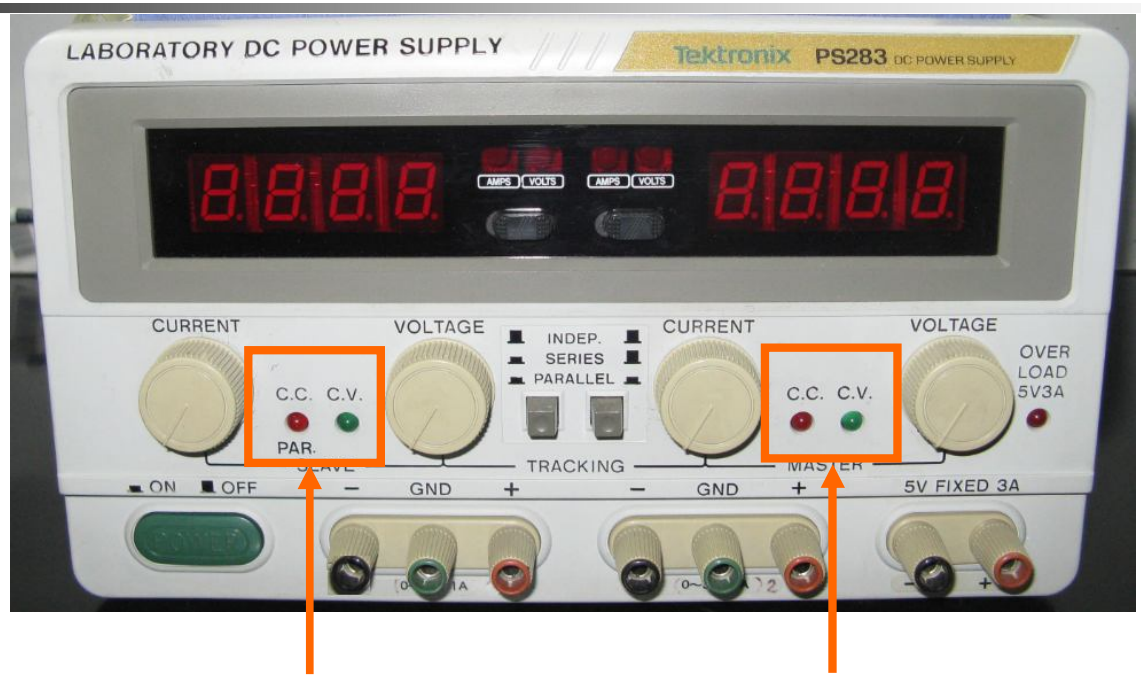
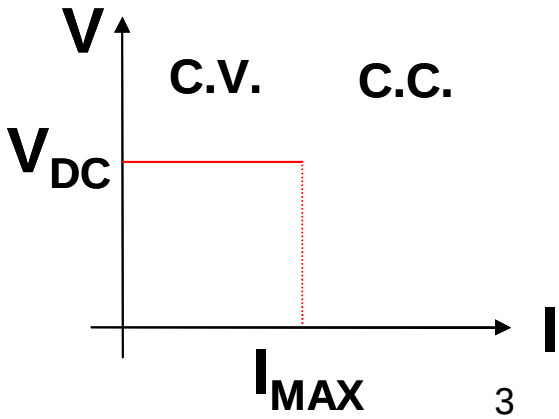
Alimentatore
Tektronix PS283

Generatore di Tensione

Regolazione Tensione e Limite di Corrente



Spie che indicano i due regimi (Attenzione a C.C.!!!)



I_{MAX} : Limite di corrente (1A)

DEVO SEMPRE
Limitare la Corrente

Tasti
AMPS e VOLTS

Tasti TRACKING

Tasti TRACKING: Serie

collegamento interno fra il + dello SLAVE e il - del MASTER

Tasti TRACKING: Serie

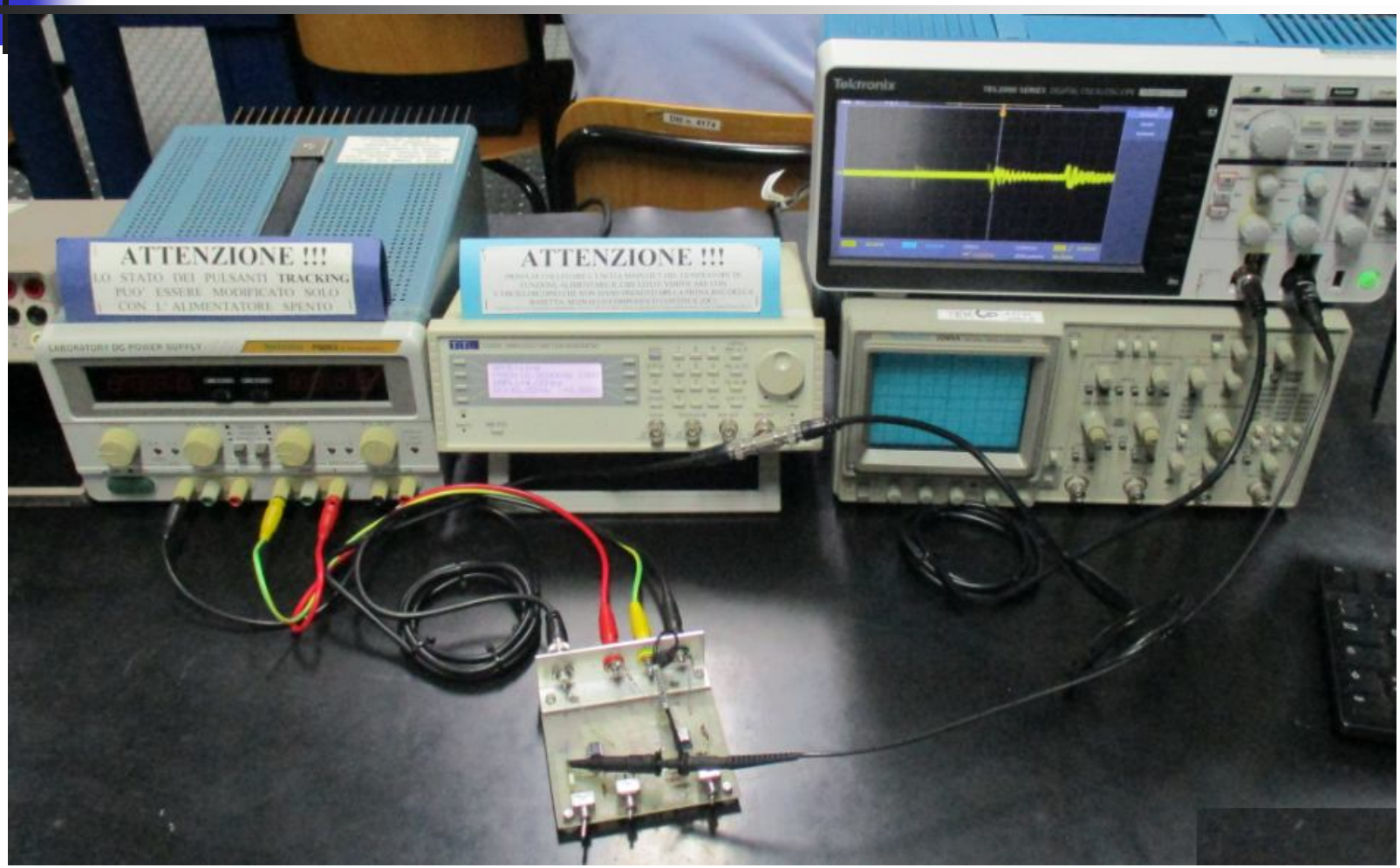
collegamento interno fra il + dello SLAVE e il - del MASTER

0-30V (variabili)

Impostare 15V
e spegnere l'Alimentatore

Collegamento OP-AMP

e accendere Generatore di Funzioni ed Oscilloscopio

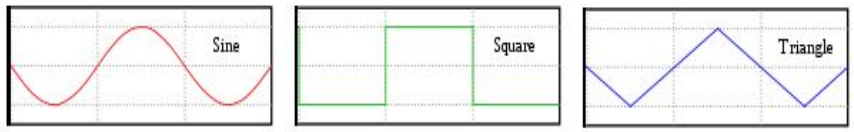


Generatore di Funzioni
T T i - TG2000

Genera i segnali di tensione

Regolazioni principali

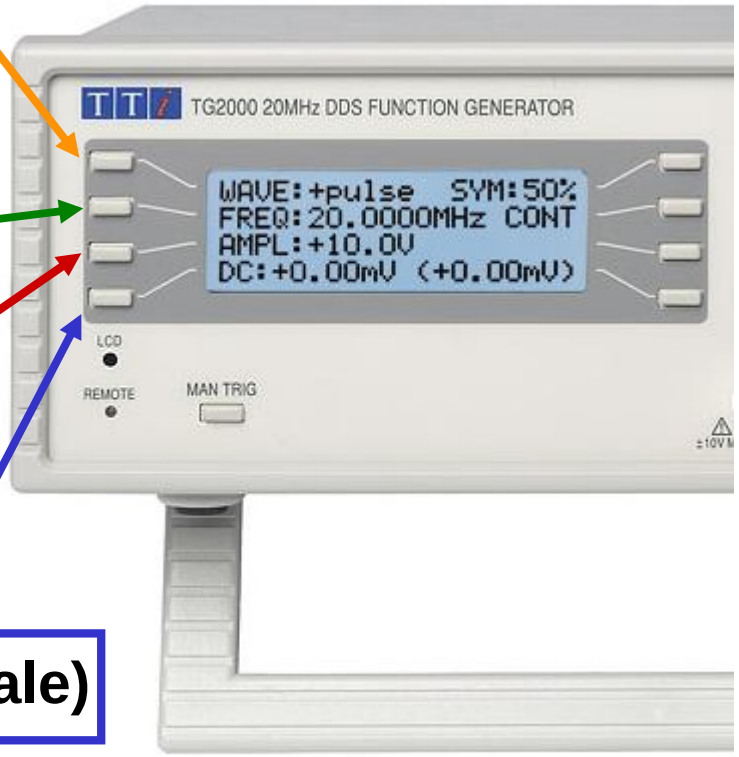
Forma d'onda del Segnale



Frequenza del Segnale

Ampiezza picco-picco del Segnale

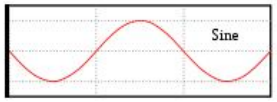
Offset (comp. continua del Segnale)



Forma d'onda del Segnale

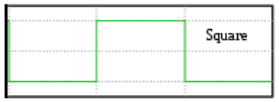
1 premi

Onda Sinusoidale
= sine



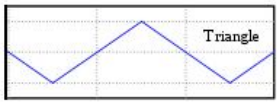
2

Onda Quadra
= square

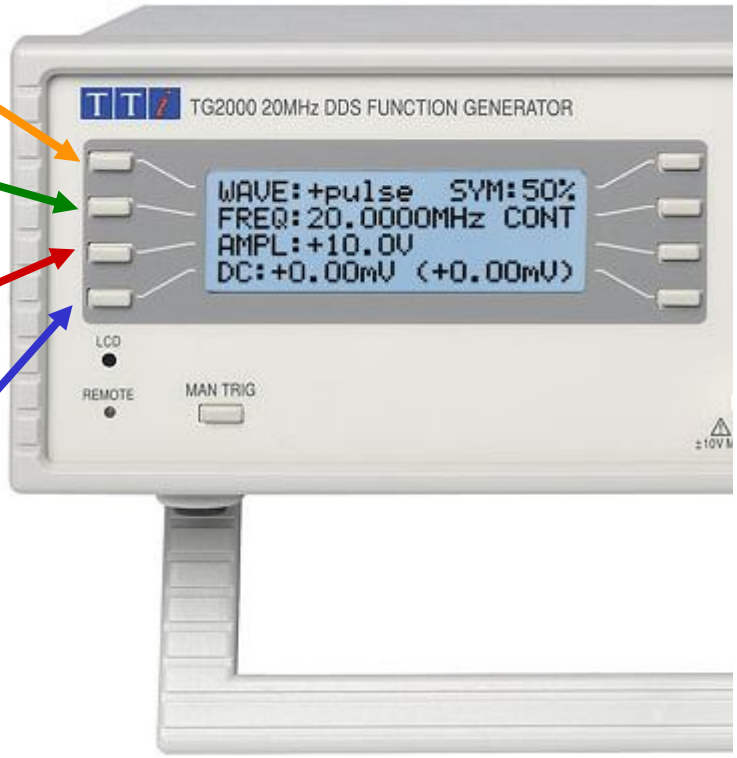


2

Onda Triangolare
= triangle

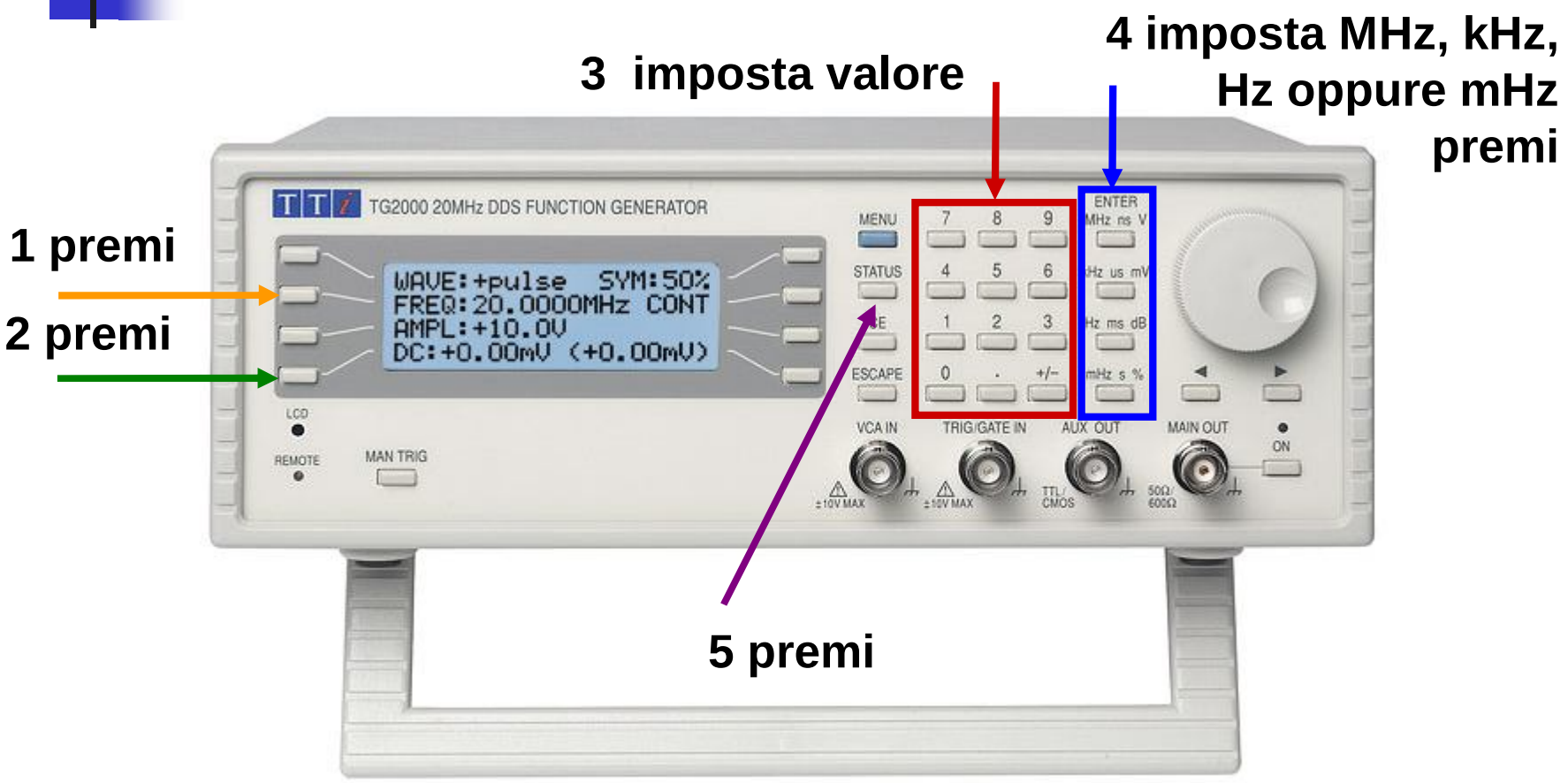


2

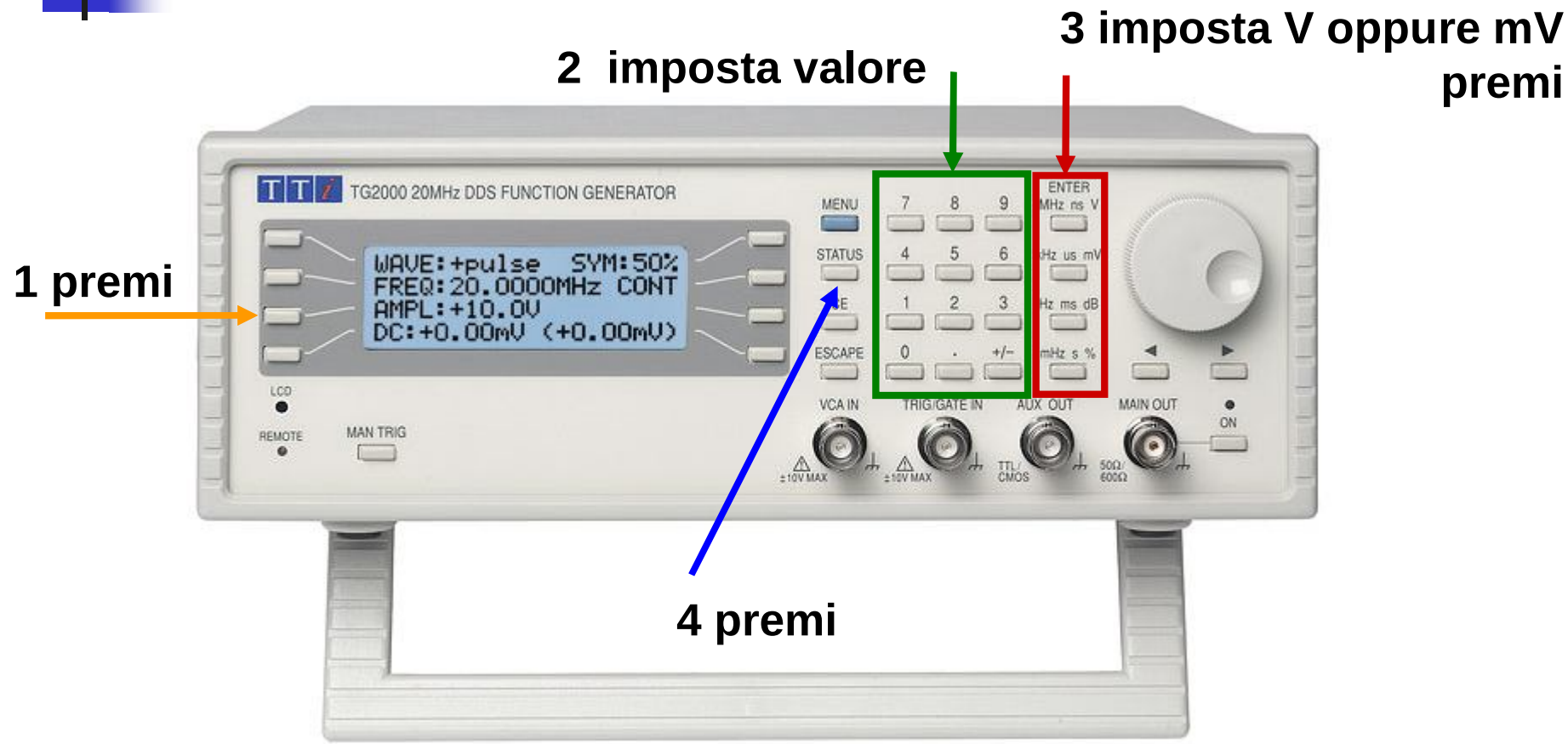


3 premi STATUS

Frequenza del Segnale 1kHz

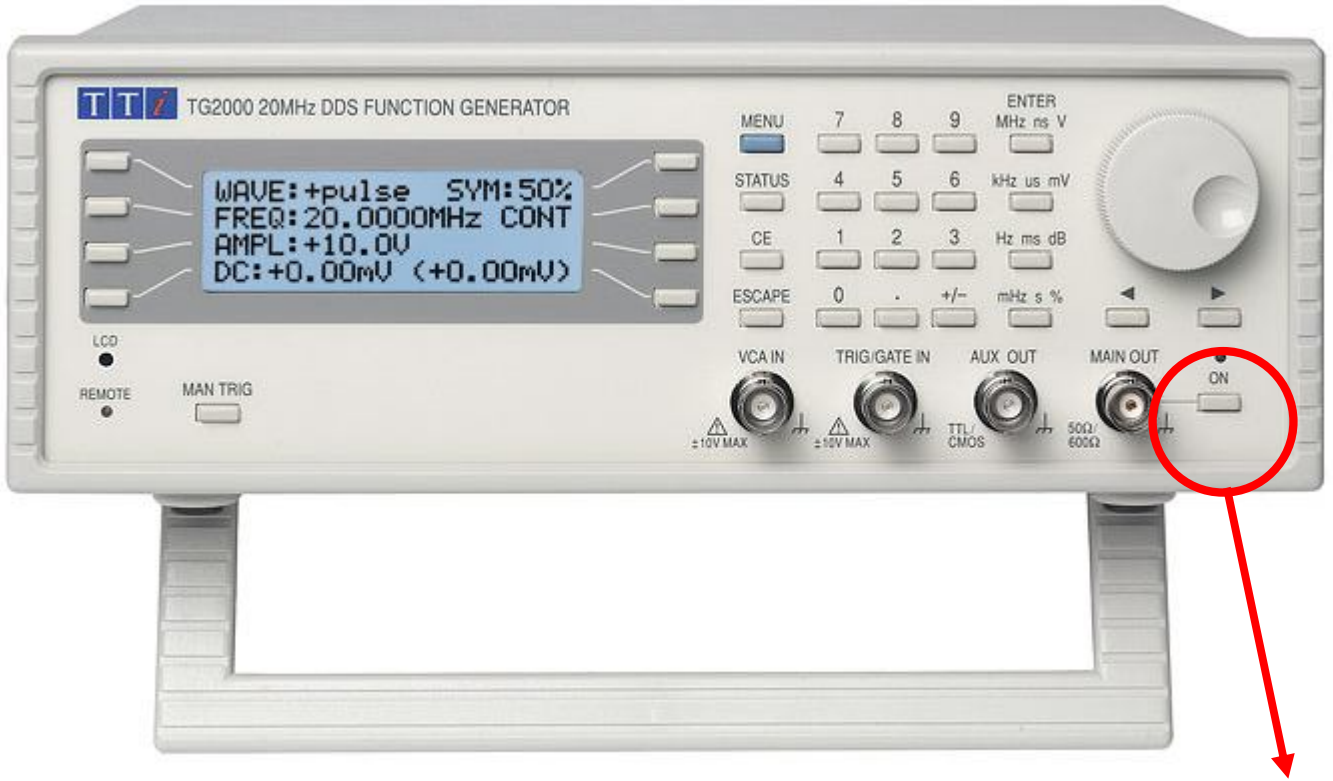


Ampiezza del Segnale 100mV



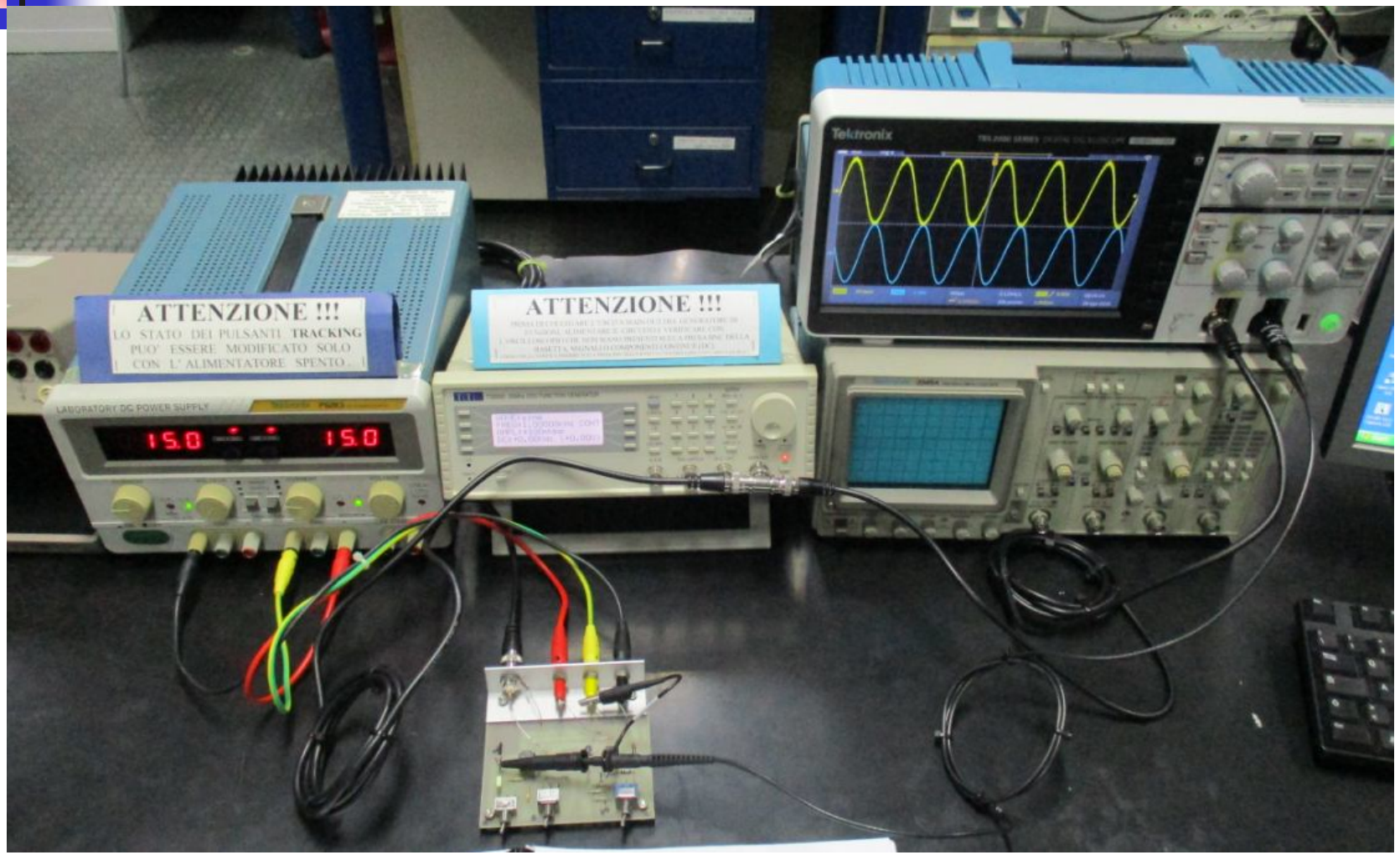
Accendere Alimentatore

Attenzione:

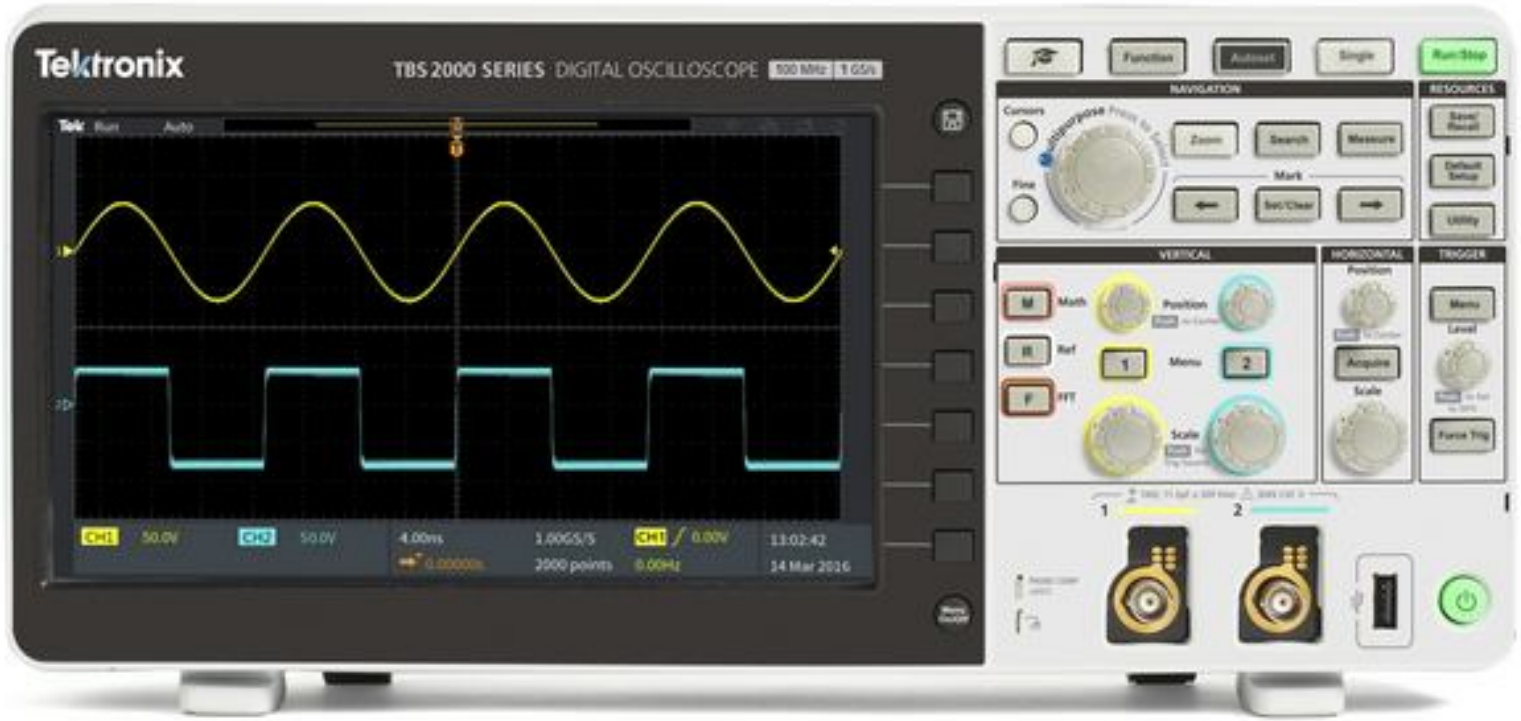


Dopo aver impostato il generatore ed aver effettuato gli opportuni controlli mettere su ON (si accende il LED rosso)

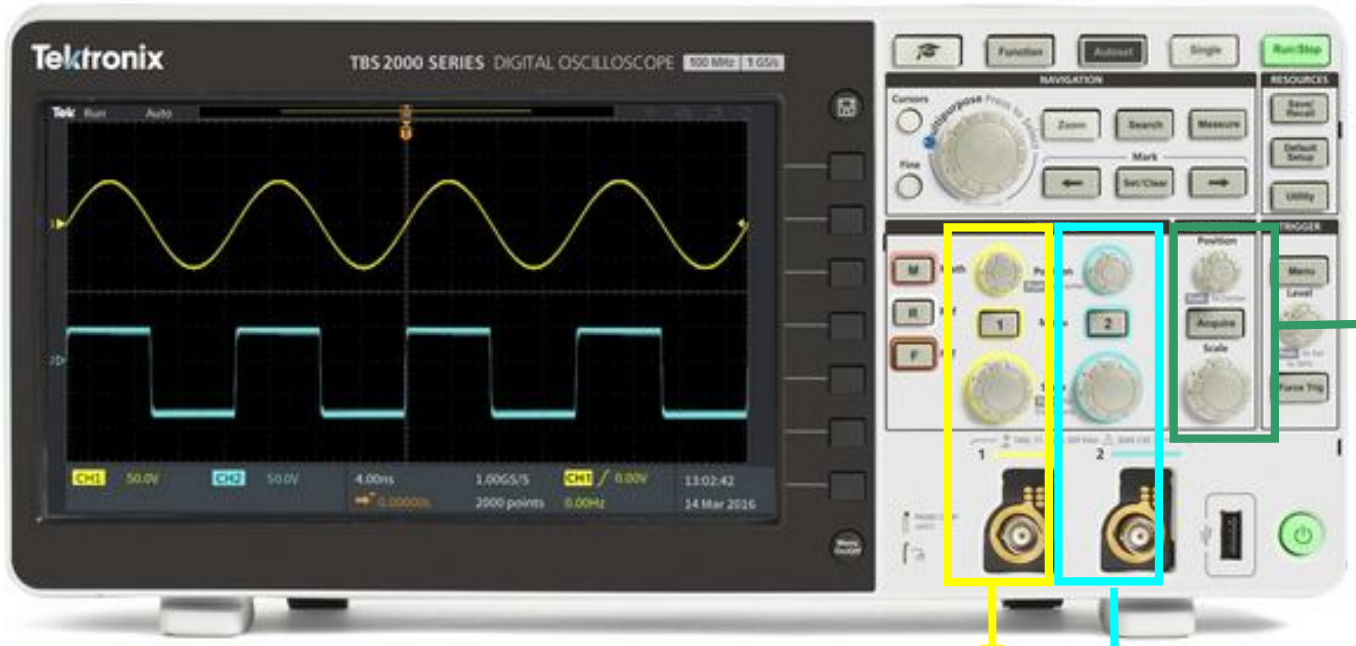
Collegamento OP-AMP



Oscilloscopio Digitale Tektronix TBS2102



Canali di Ingresso



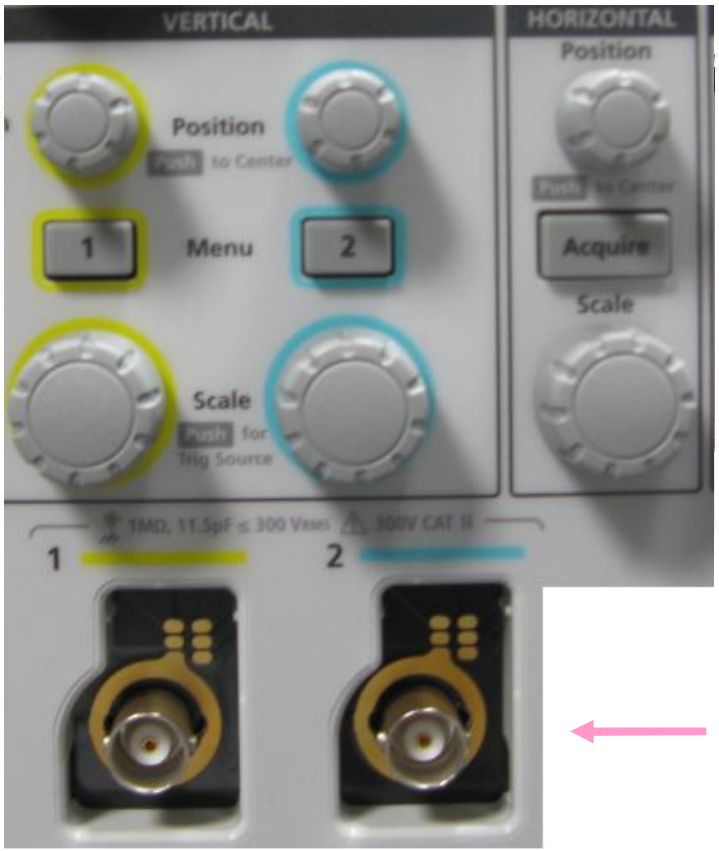
Scala orizzontale

Canale 1
traccia gialla

Canale 2
traccia azzurra

Scale verticali

Canali di Ingresso



Visualizzazione e posizione delle tracce

Visualizzazione canali

Controllo delle Scale di Visualizzazione

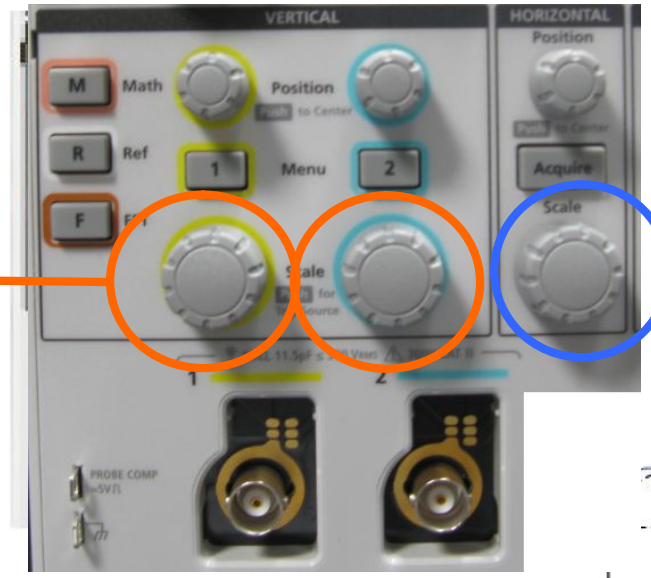
Ingressi BNC

CH1
traccia gialla

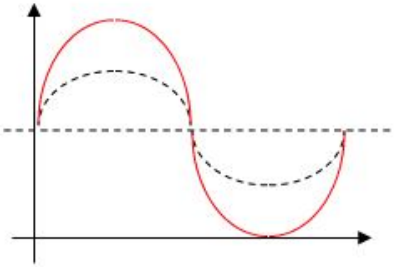
CH2
traccia azzurra

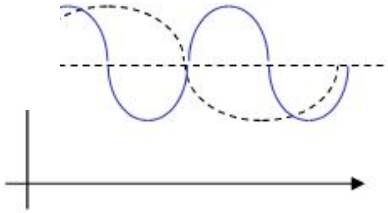
Controllo della Scala di Visualizzazione

Scala Verticale
Volt/div
(Una per canale)



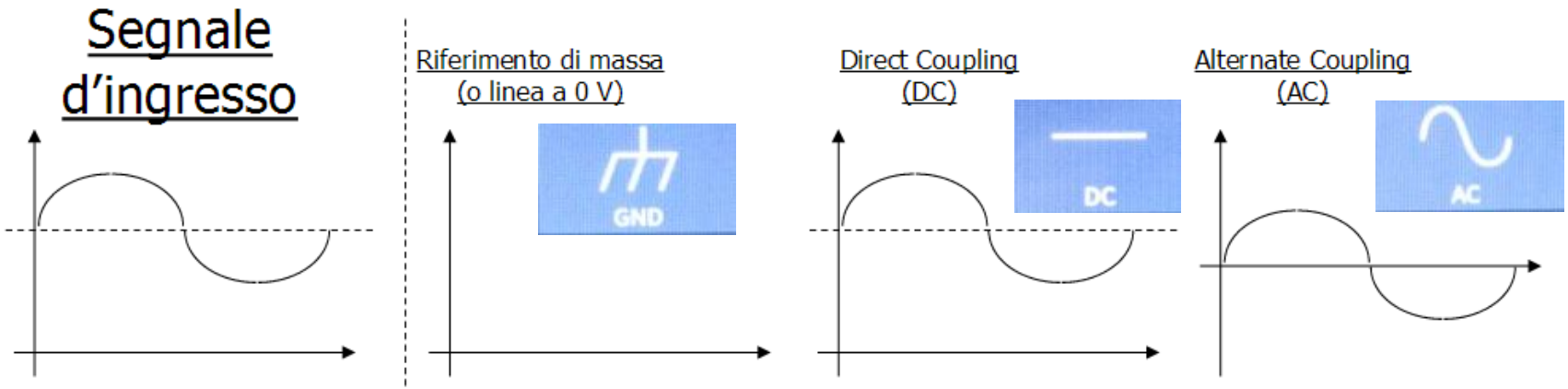
Scala Orizzon.
(Comune)

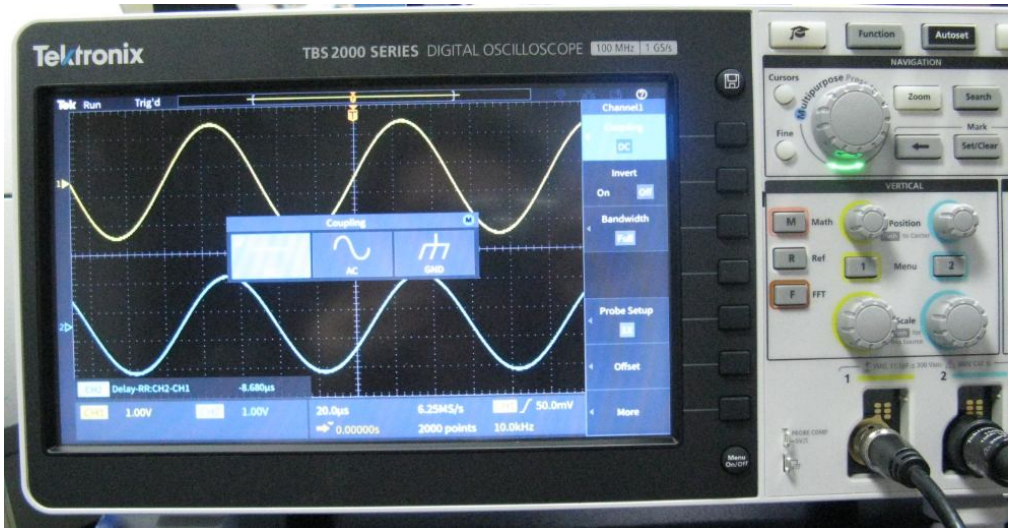




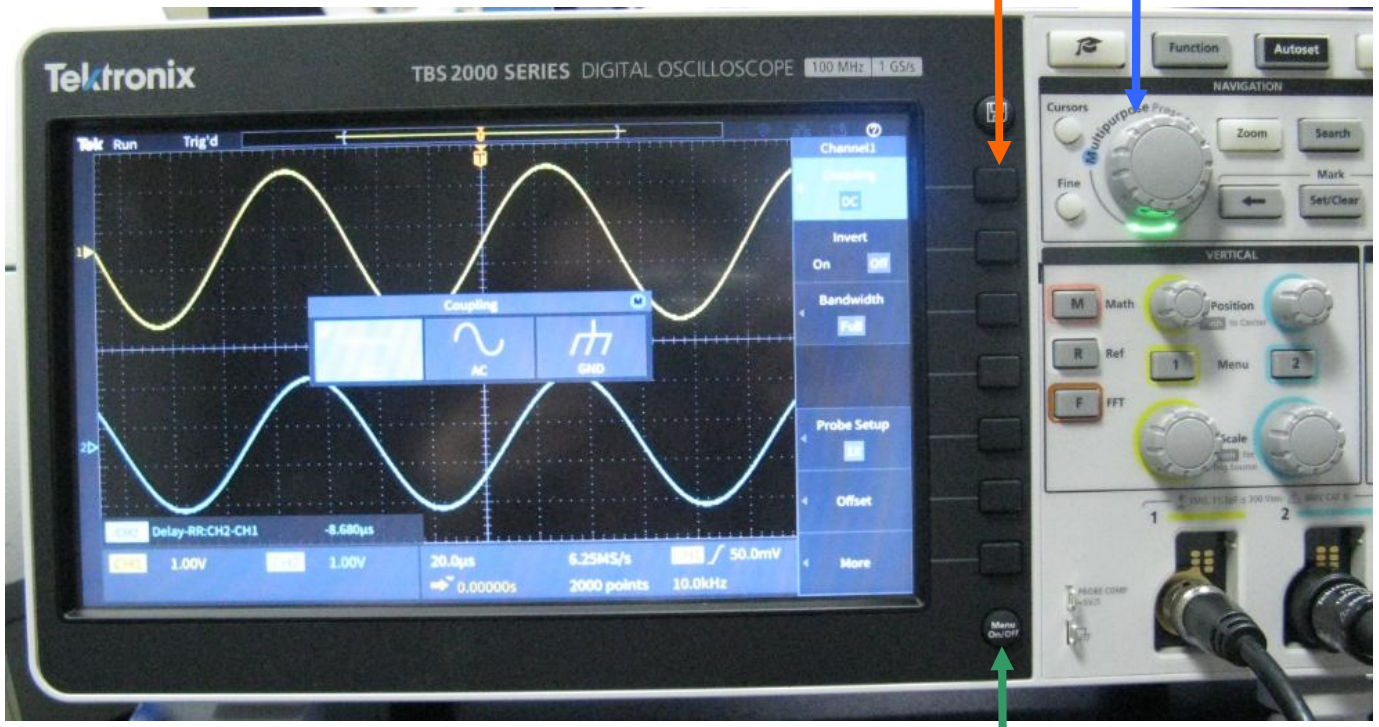
Anche in questo caso il segnale **NON** viene alterato!!!
E' solo la visualizzazione che cambia!!!

Accoppiamento in ingresso Coupling: (Configurare CH1  e CH2 )





Accoppiamento in ingresso Coupling:
(Configurare CH1 premi  … e poi CH2 premi )



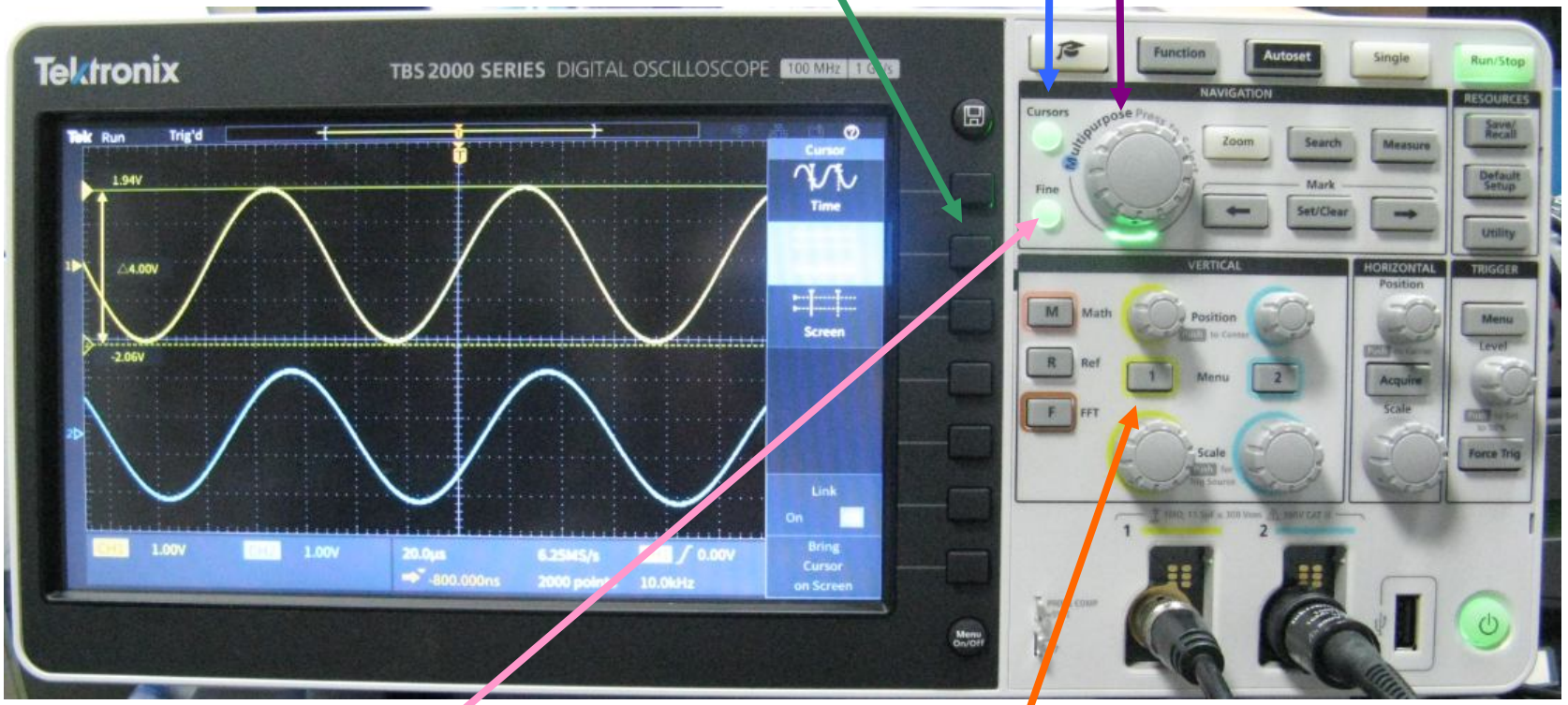
Misura di tensione picco-picco

(Misurare CH1  … e poi CH2 

3 seleziona

2 premi

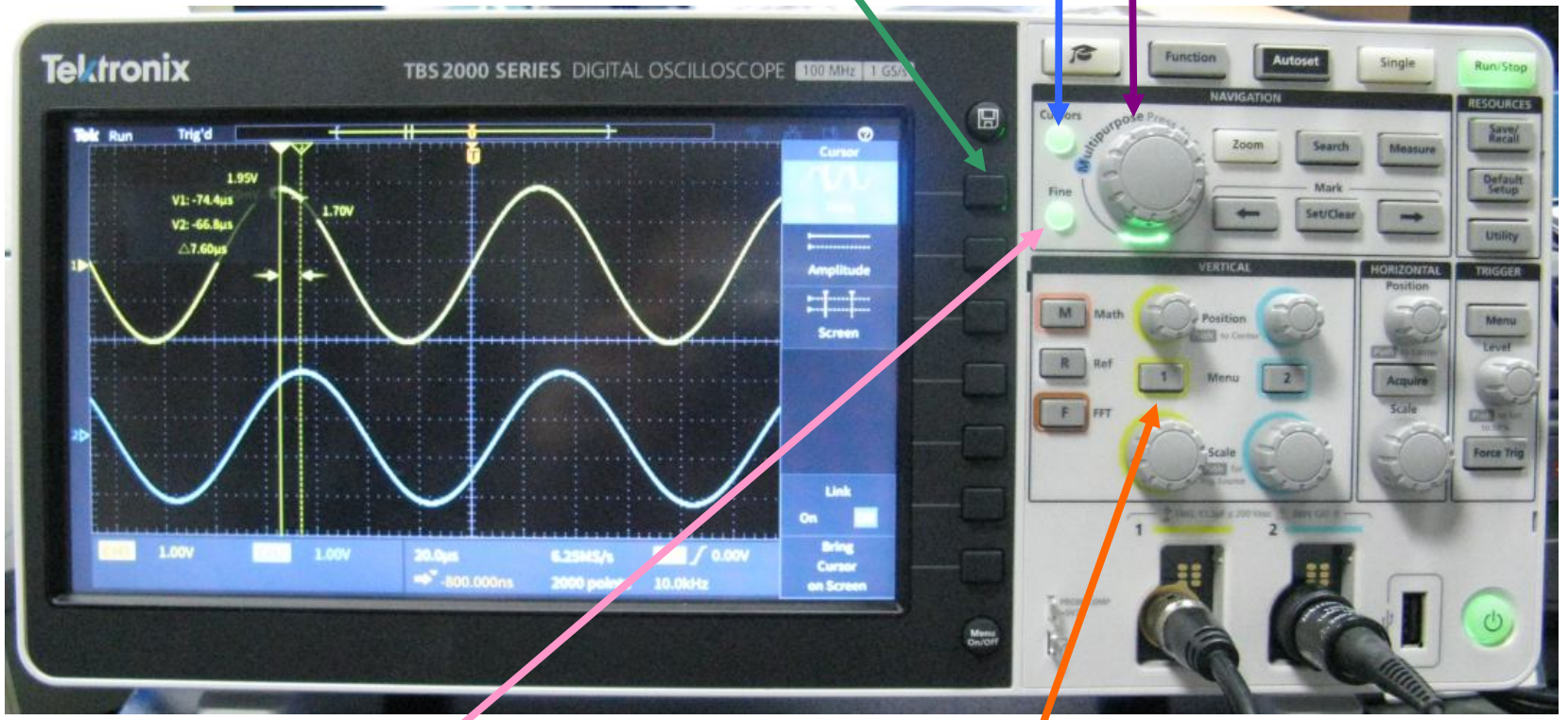
4 ruota, seleziona e …



1 premi

5 regolazione Fine movimento barra 1 e premi per passare alla barra 2

Misura del Δt
(Misurare CH2 – CH1)



Sonda Oscilloscopio 10.1

Coccodrillo di Massa

Punta Sonda

Connettore BNC

CONTROLLARE eventuale ATTENUAZIONE
INPUT = Cavo BNC = CH1 = 1X
OUTPUT = Sonda Oscilloscopio = CH2 = 10X

3 ruota e seleziona 1X

4 premi

2 premi

5 premi

1 premi

ruota e seleziona 10X

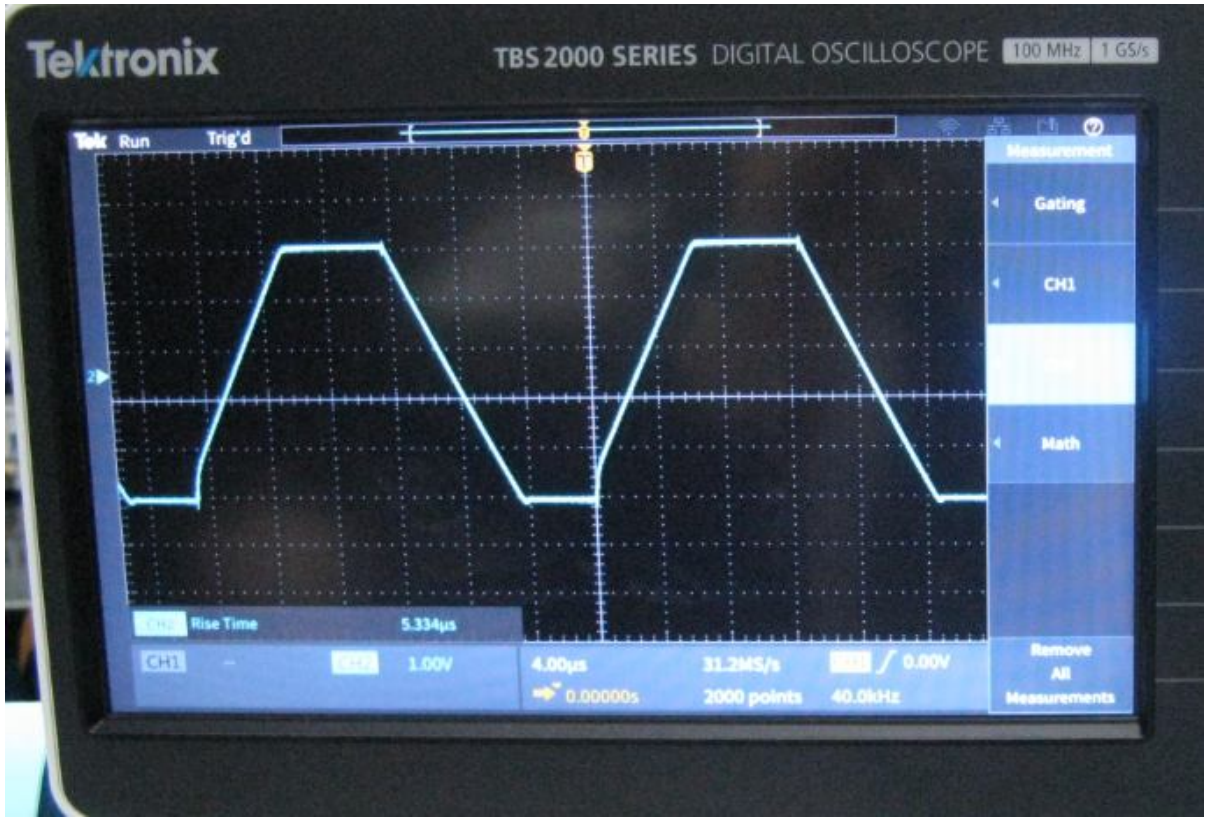
Misura del Tempo di Salita
Rise Time (Configurare CH2)

2 ruota e seleziona **3 premi** **1 premi**

4 esci **dal Menu (premi 1 volta)**

Misura del Tempo di Salita
Rise Time

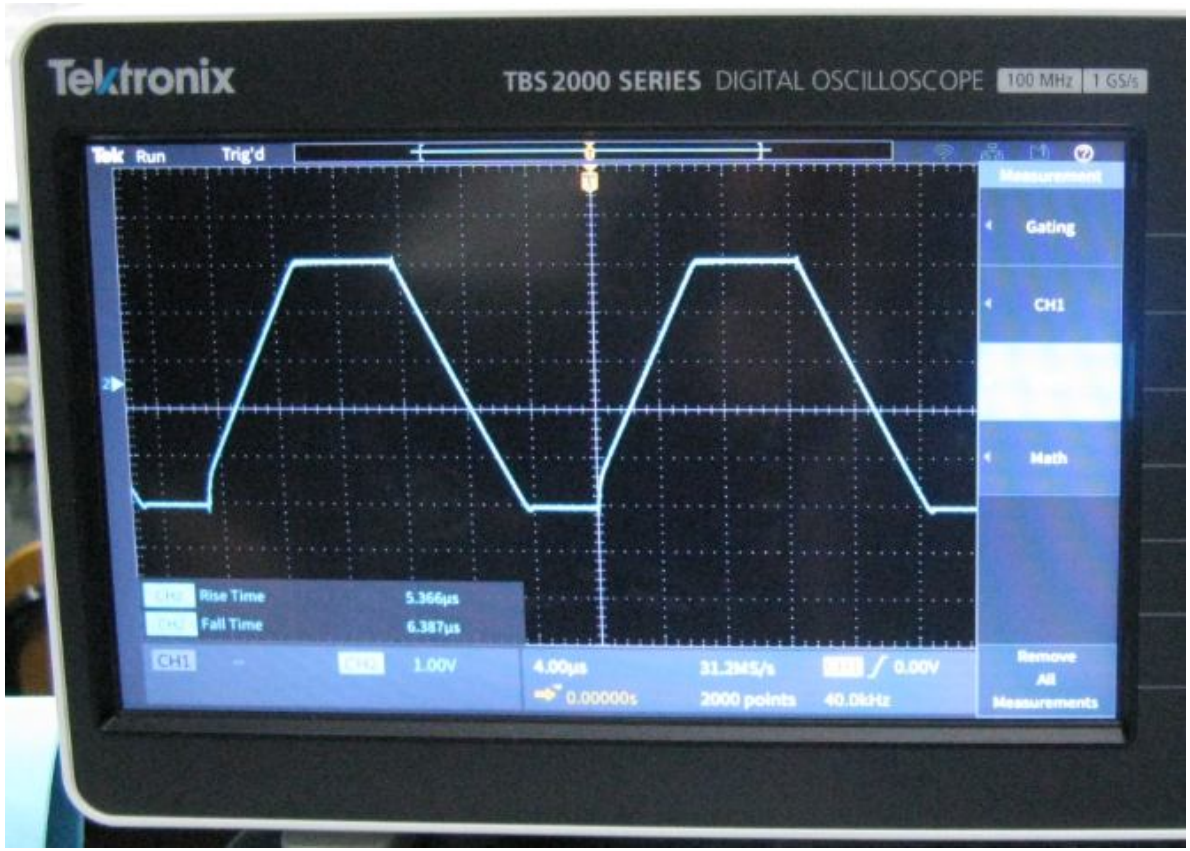
Visualizzazione del Rise Time



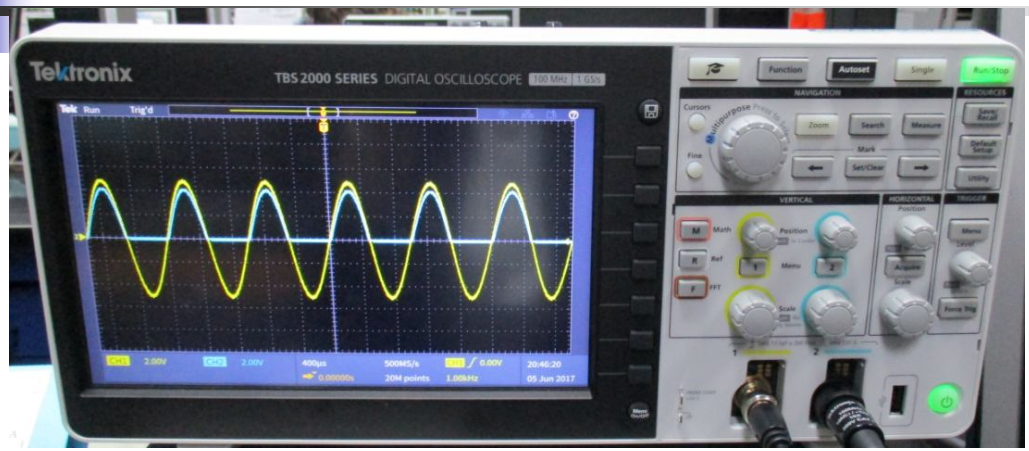
Misura del Tempo di Discesa
Fall Time (Configurare CH2 )

Misura del Tempo di Discesa
Fall Time

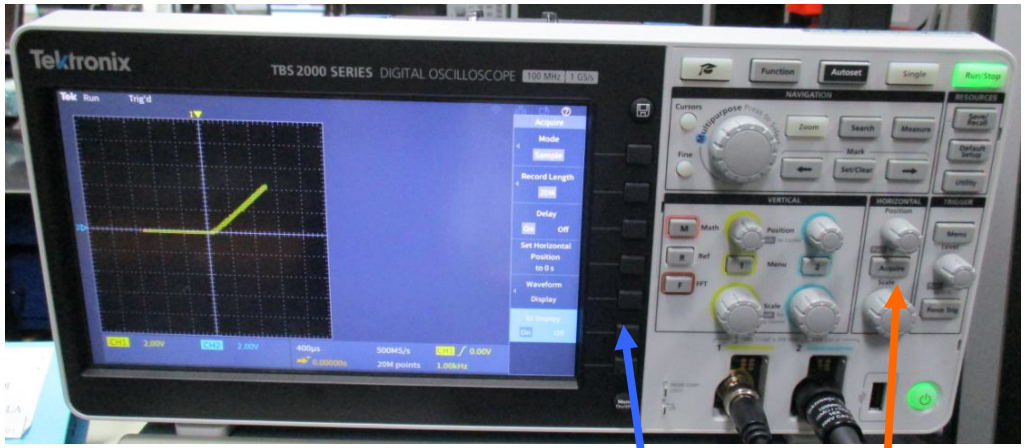
Visualizzazione del Fall Time



Configurazione X / Y



VISUALIZZAZIONE NORMALE
Raddrizzatore a semplice semionda



VISUALIZZAZIONE X / Y
ingresso / uscita

2 premi **1 premi**

Corto Circuito Virtuale «Reale»

Effetto del guadagno ad anello aperto sul Corto Circuito Virtuale: misura dell'ampiezza della tensione V^- al variare della frequenza
($V^+ = 0$ V)

OpAmp μA741
Diagramma del Modulo di $A_a(j\omega)$

Vedi anche grafico a pag. 81 in basso sulle dispense

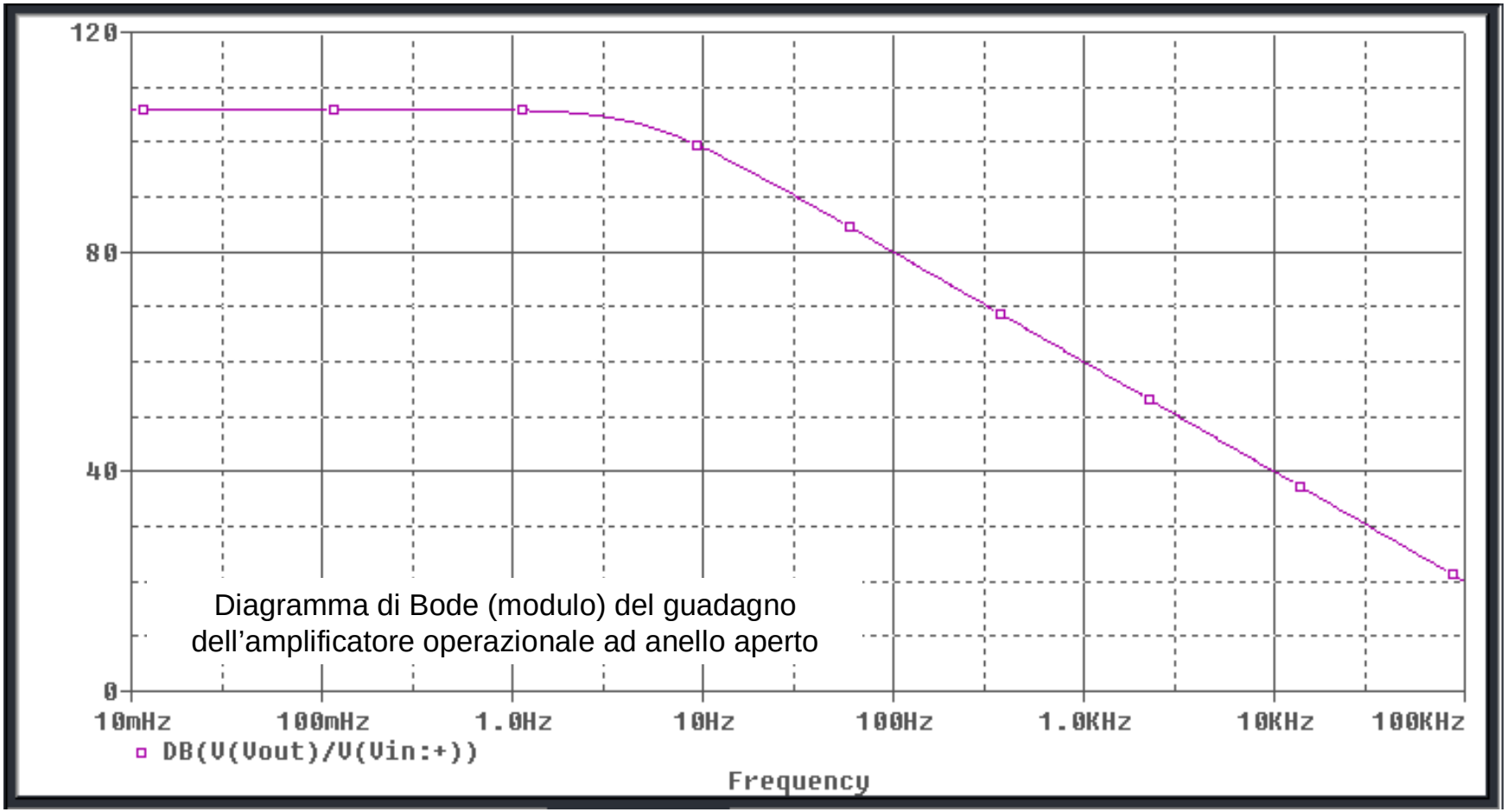
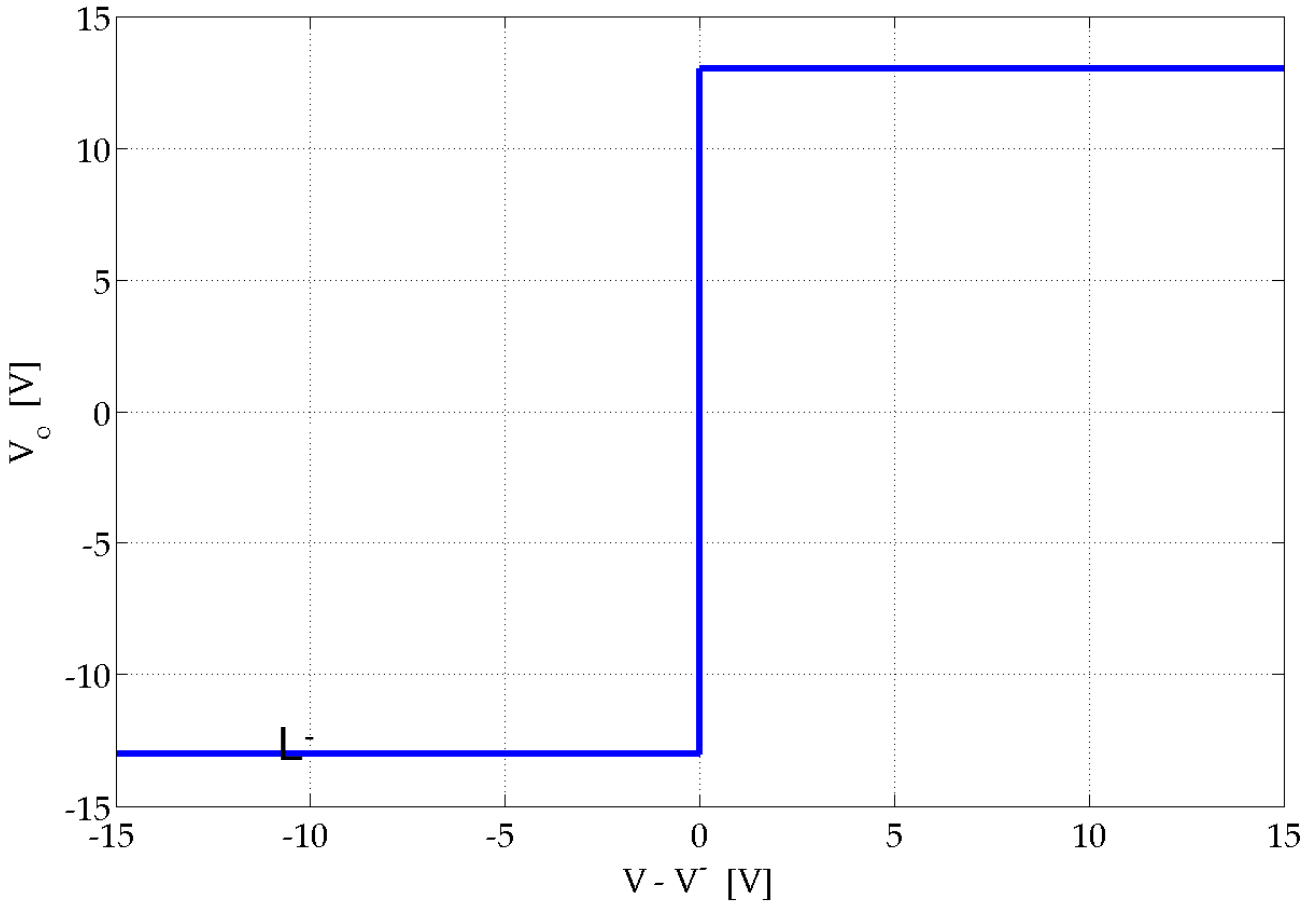


Diagramma di Bode (modulo) del guadagno dell'amplificatore operazionale ad anello aperto

Se l'OpAmp Satura, vale il Corto Circuito Virtuale?

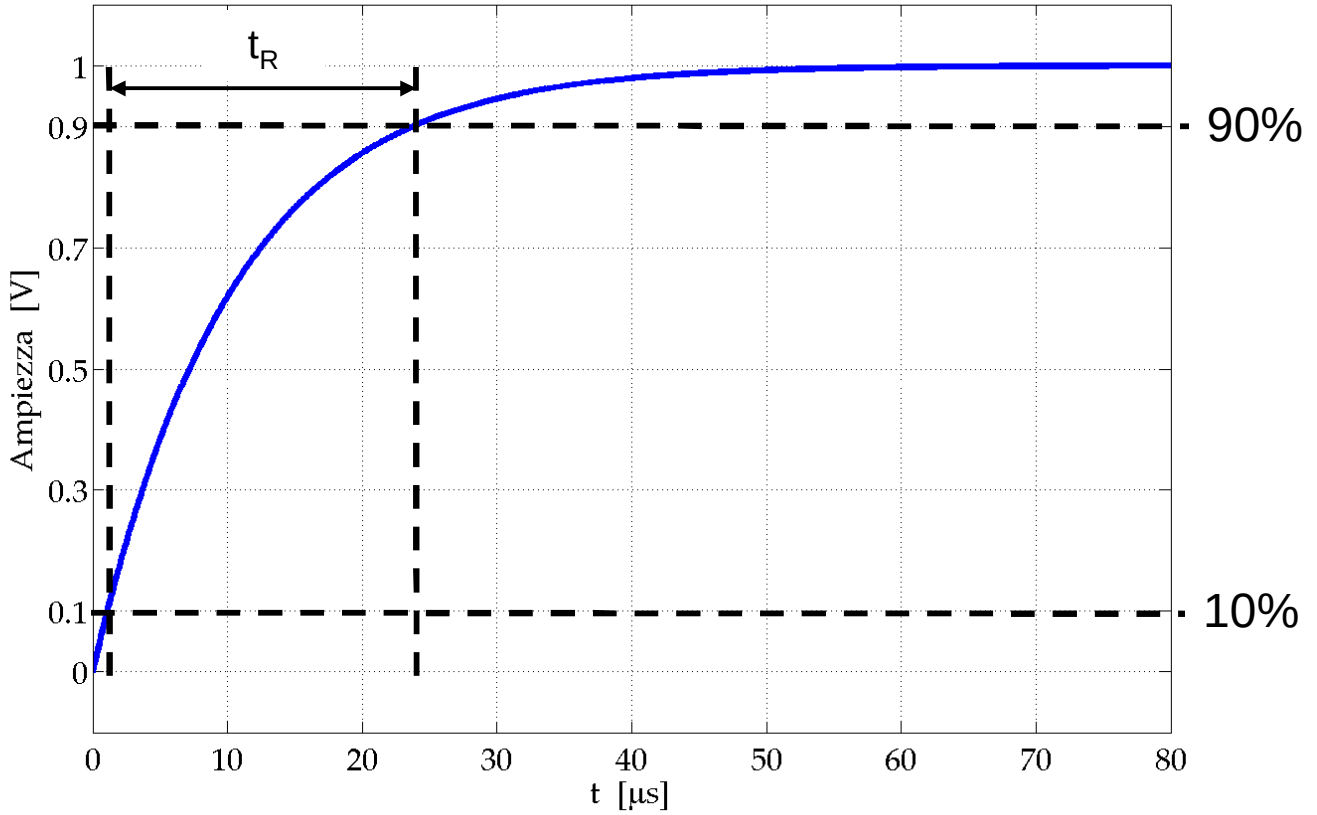
NO! Perché? … Pensate al valore di A_a…



$$A_a = \frac{V_o}{V^+ - V^-}$$

Amplificatore Invertente
Risposta al Gradino

t_R: Rise Time (Tempo di Salita) → $f_c = 0.35 / t_R$



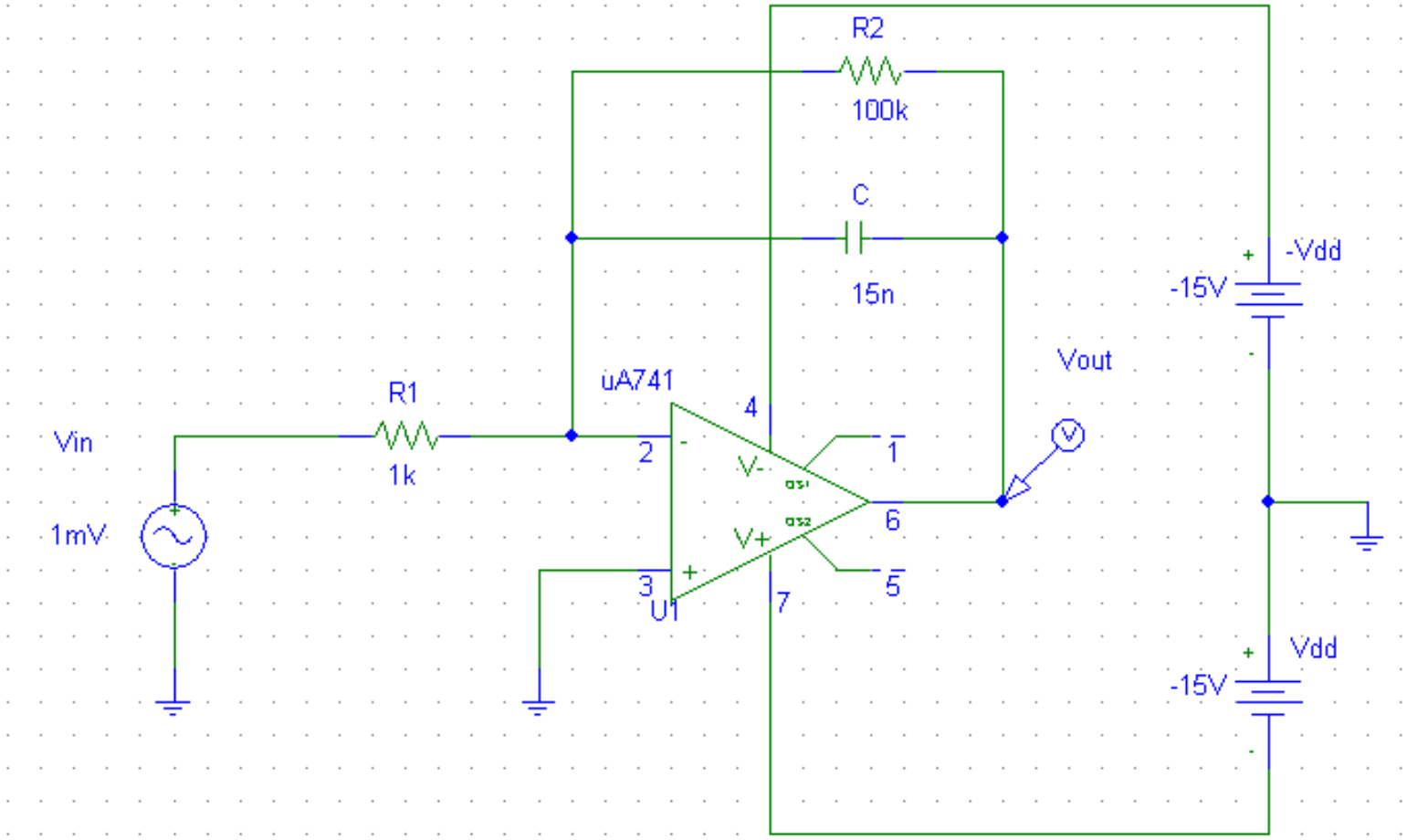
Misura del Tempo di Salita

Rise Time (Configurare CH2 )

2 ruota e seleziona 3 premi 1 premi

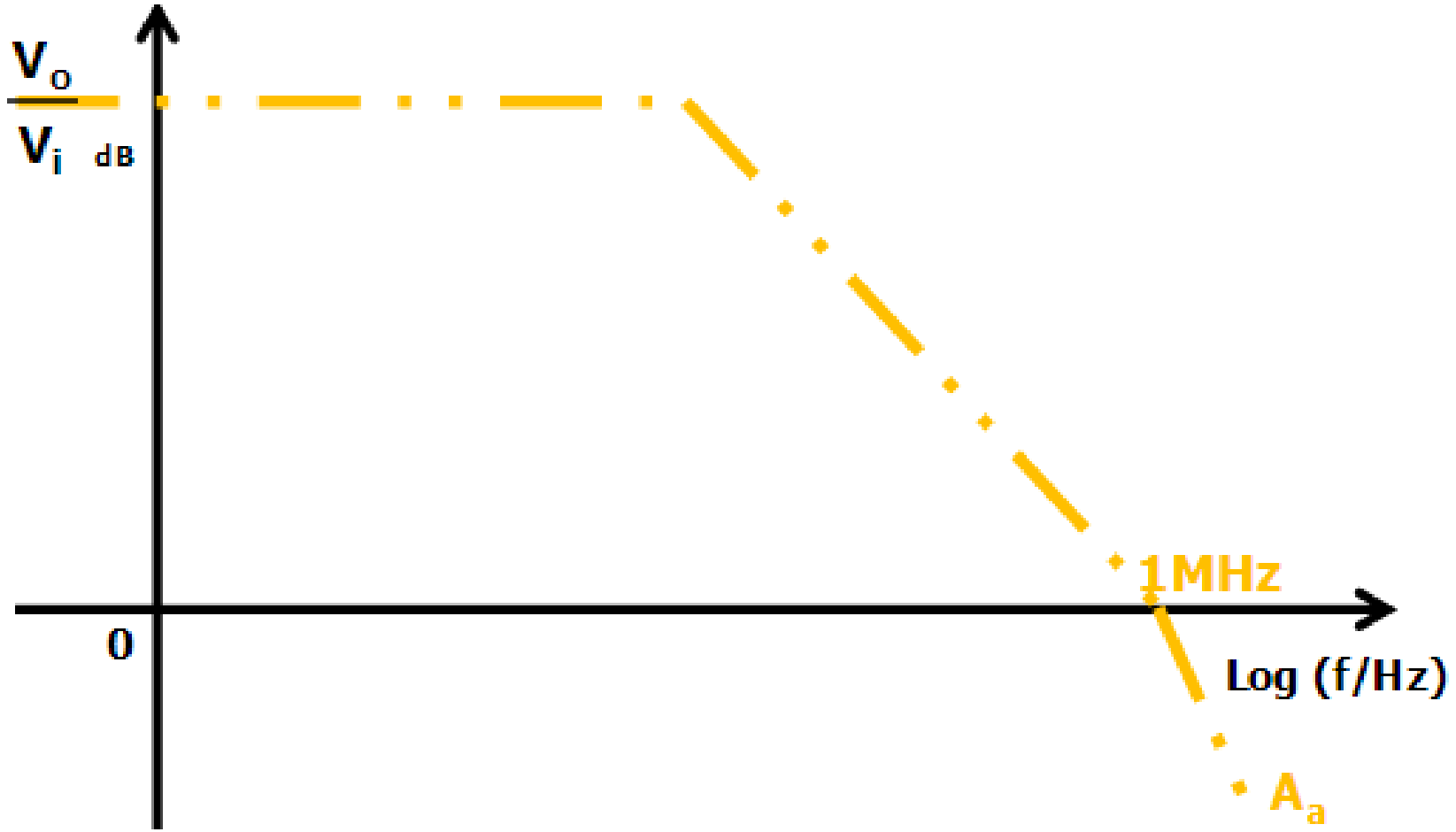
4 esci dal Menu (premi 1 volta)

Integratore di Miller Approssimato

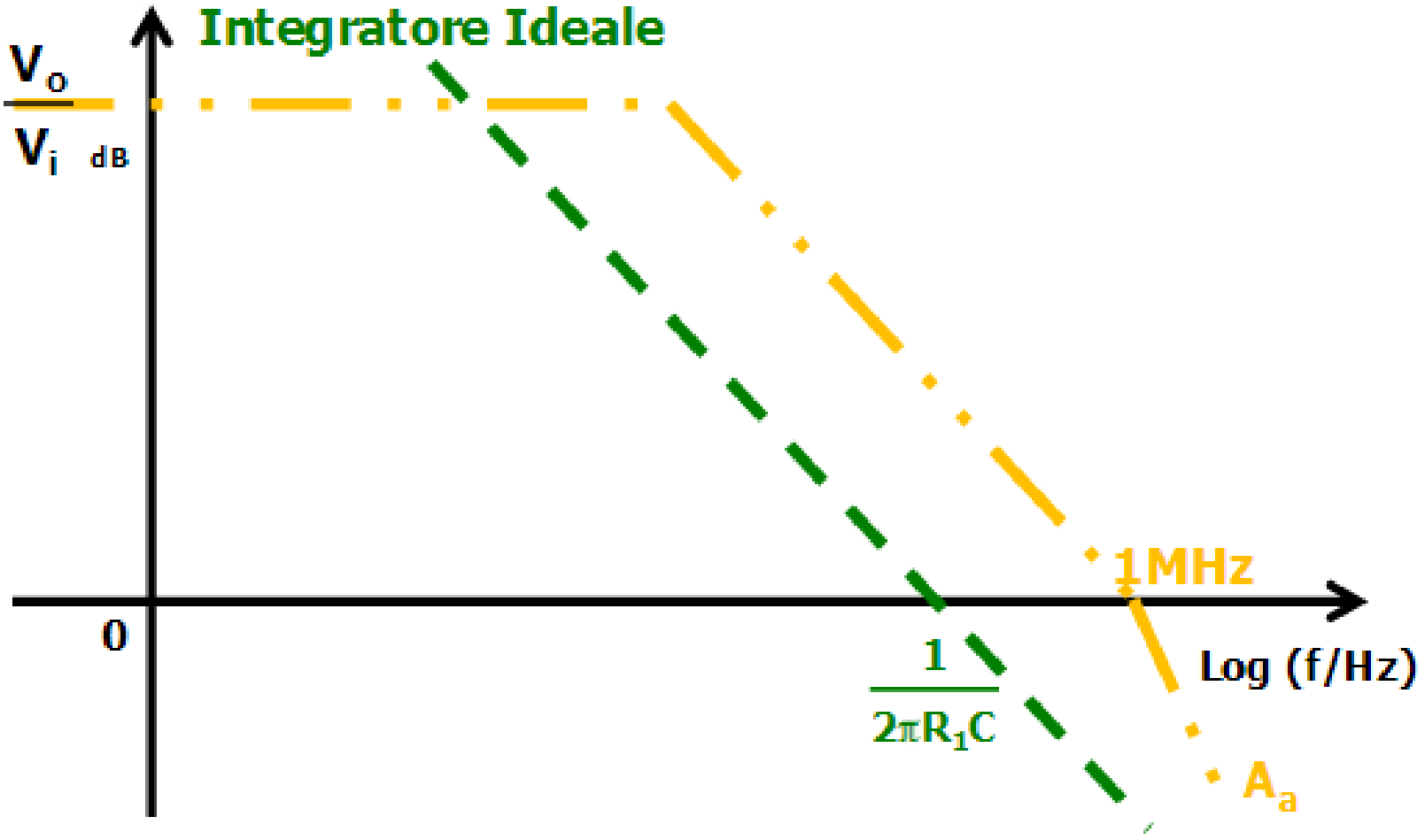


Stima Diagramma di Bode del Modulo

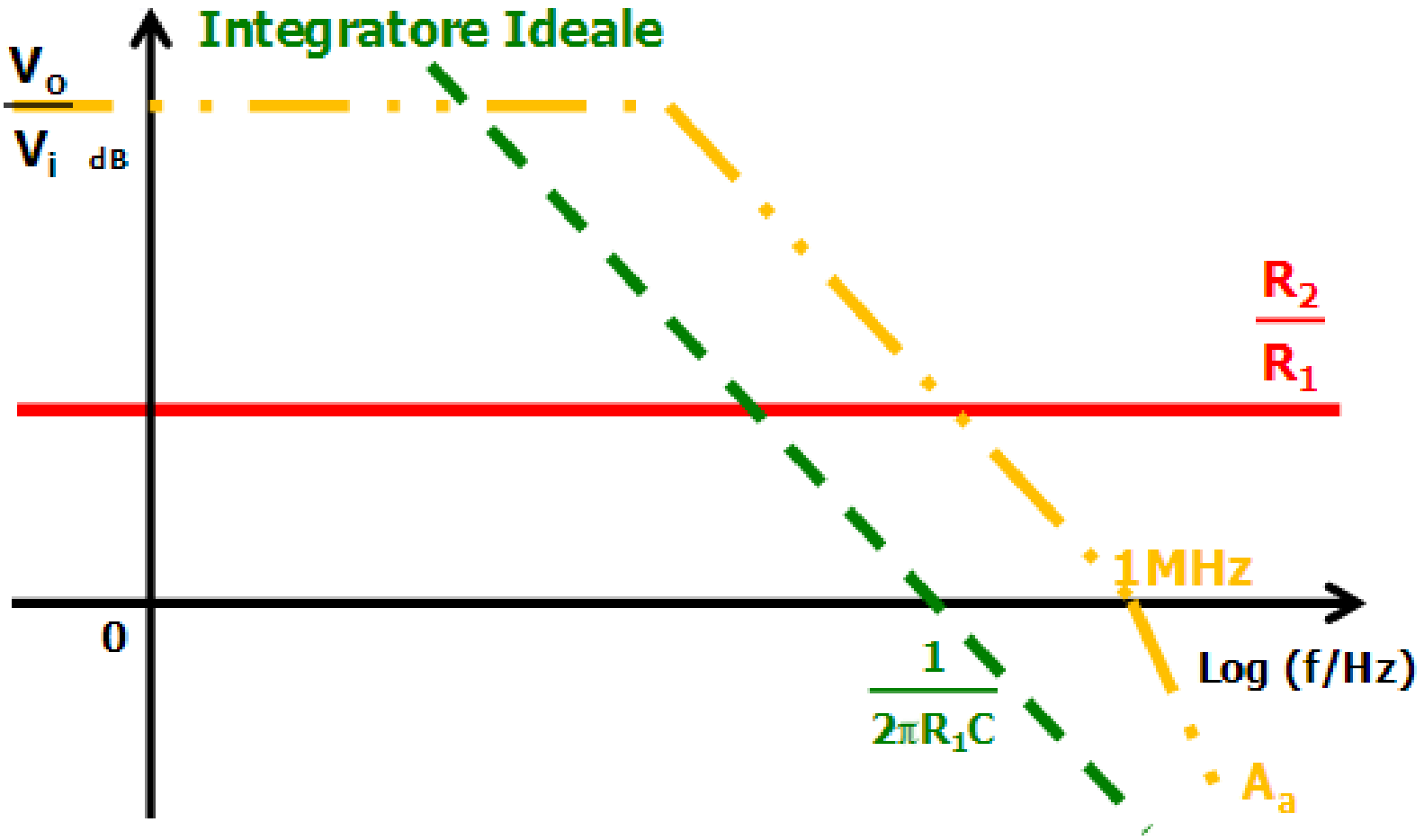
Stima Diagramma di Bode del Modulo



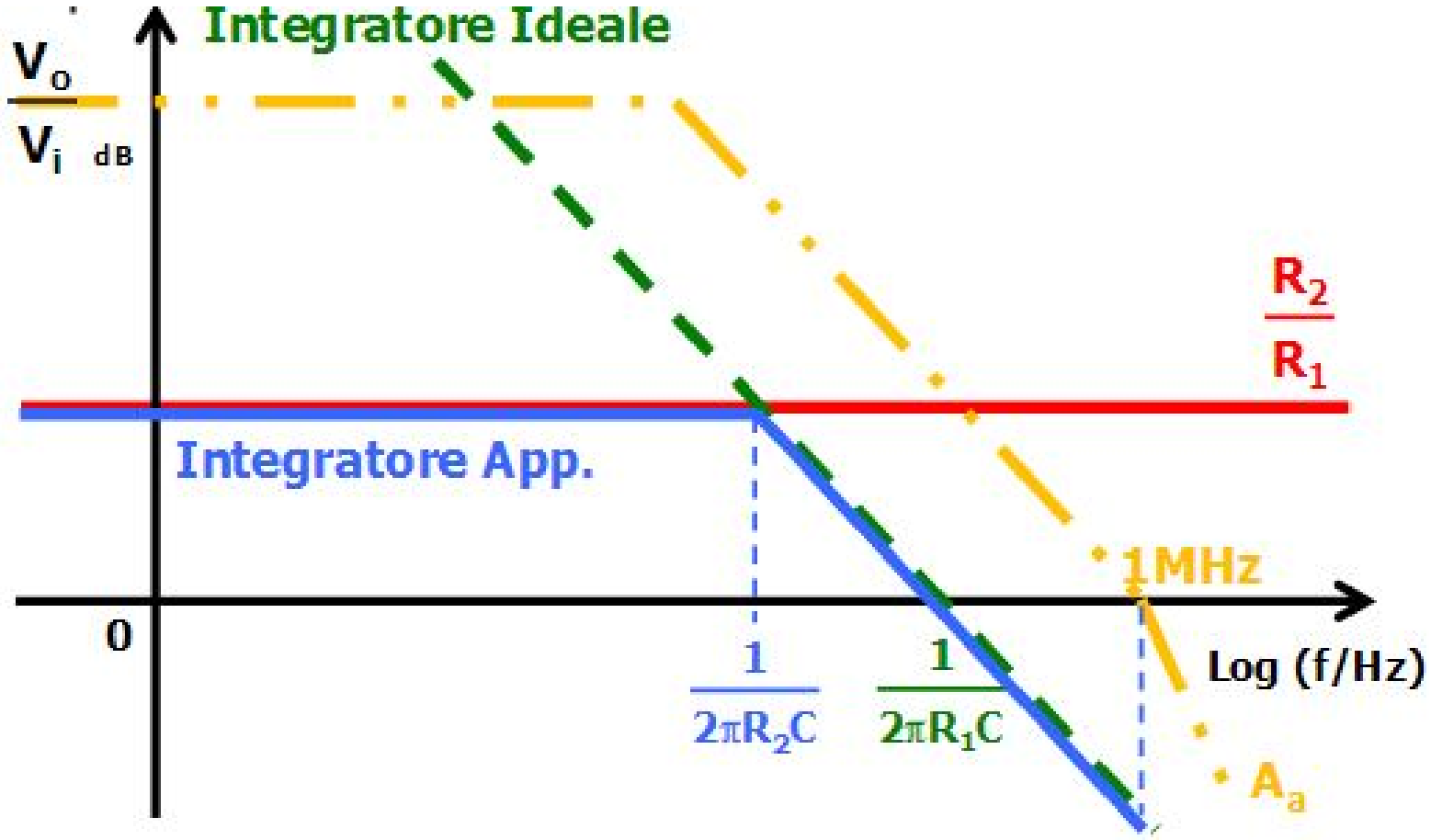
Stima Diagramma di Bode del Modulo



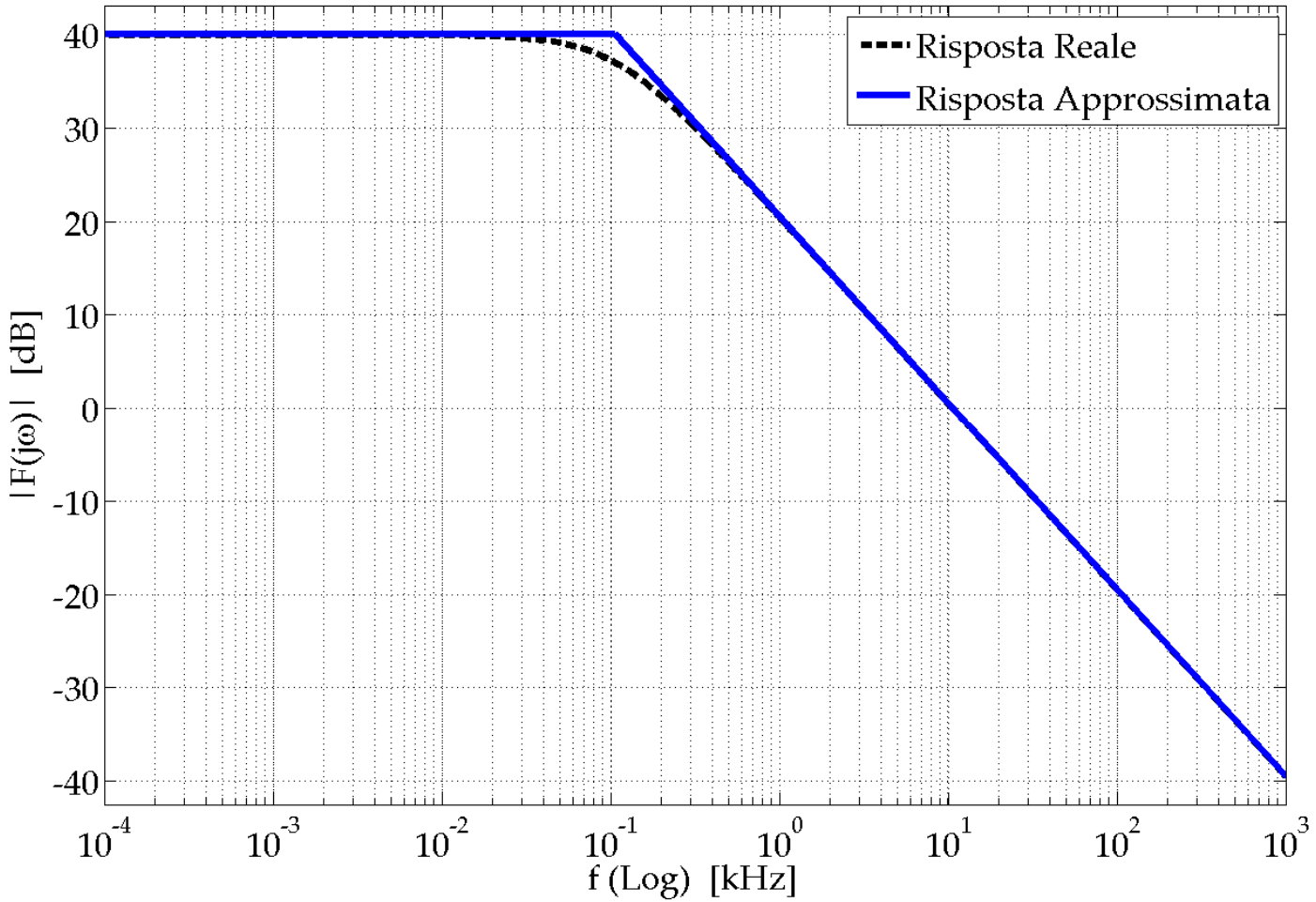
Stima Diagramma di Bode del Modulo



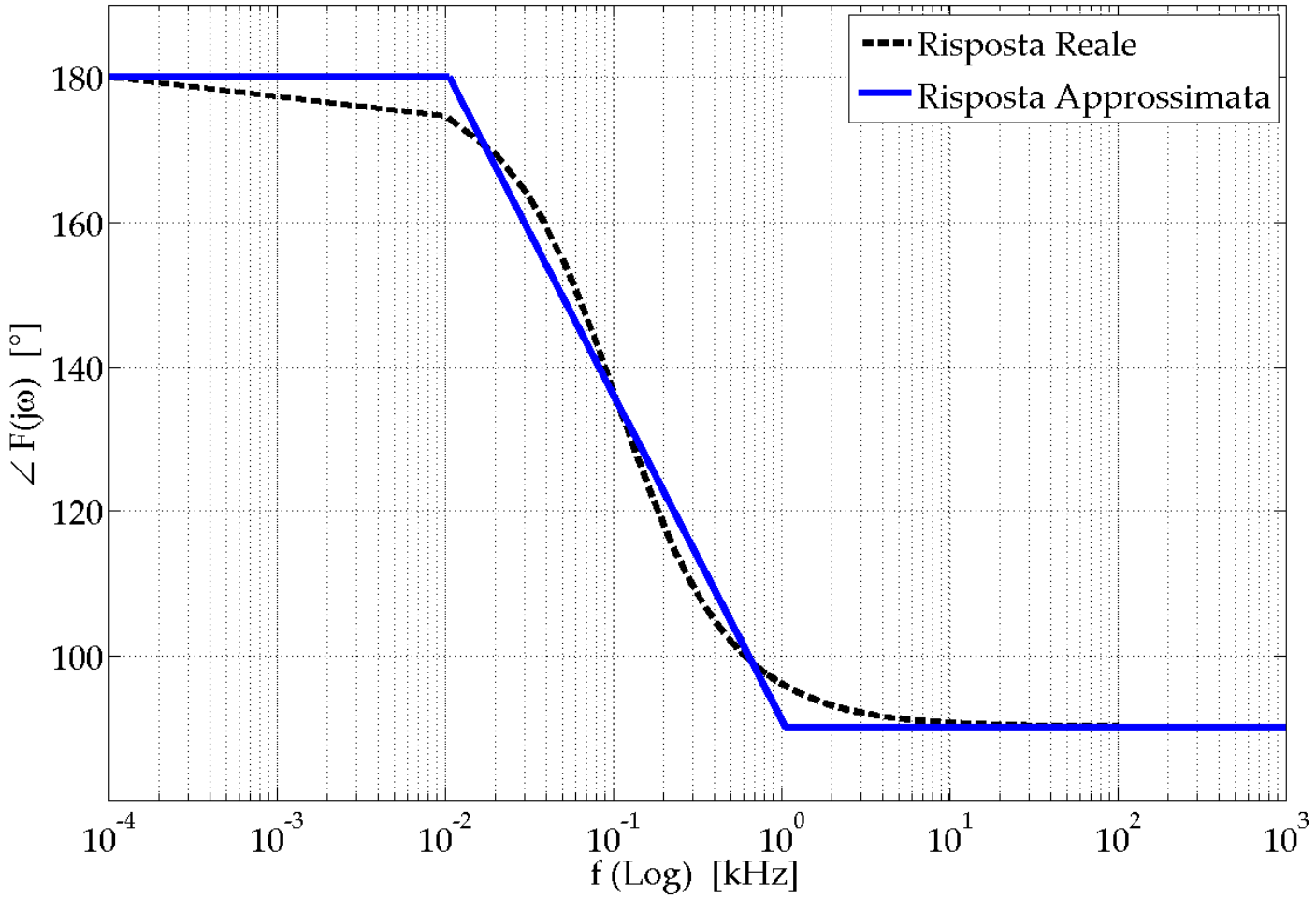
Stima Diagramma di Bode del Modulo



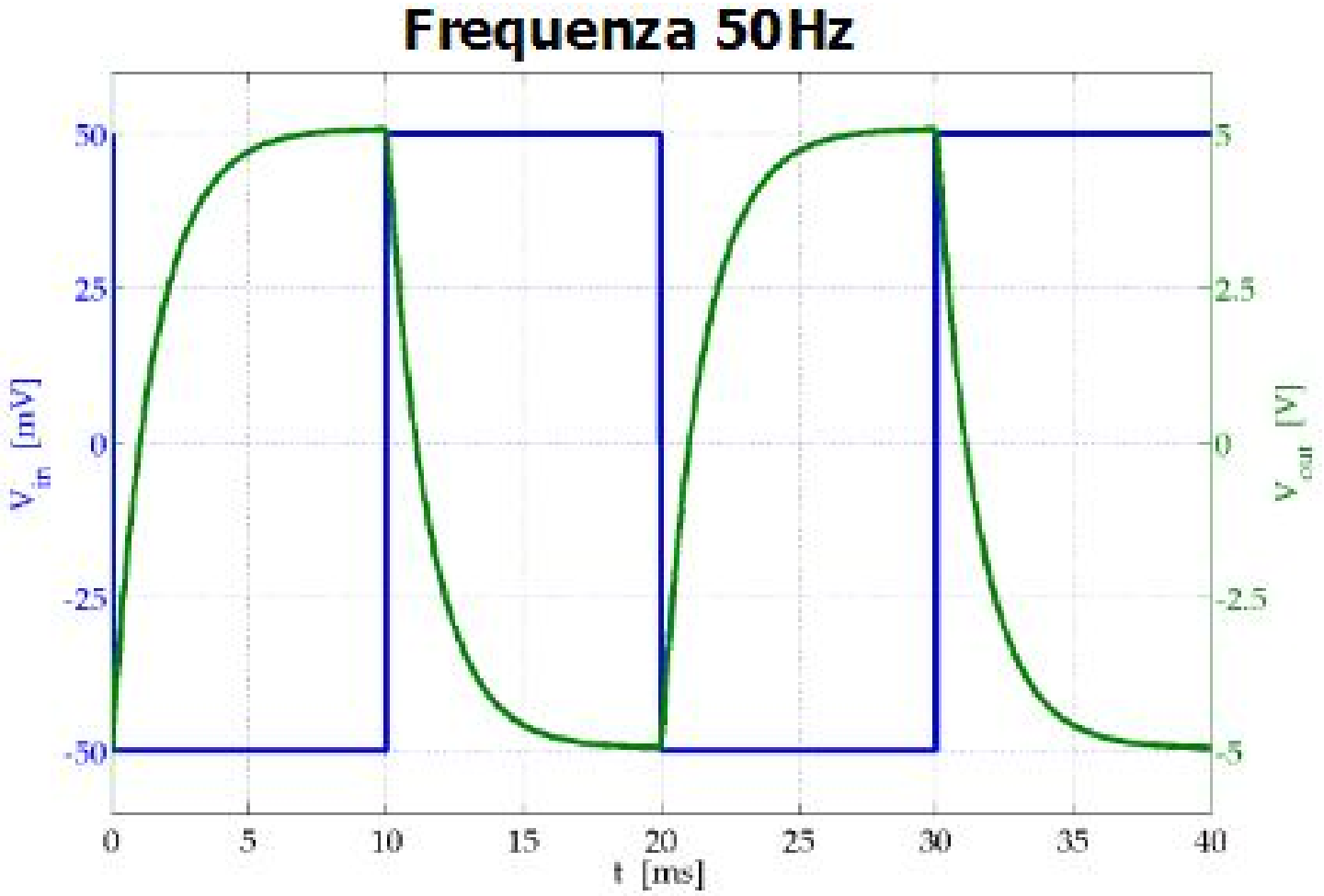
Integratore di Miller
Diagramma di Bode - Modulo



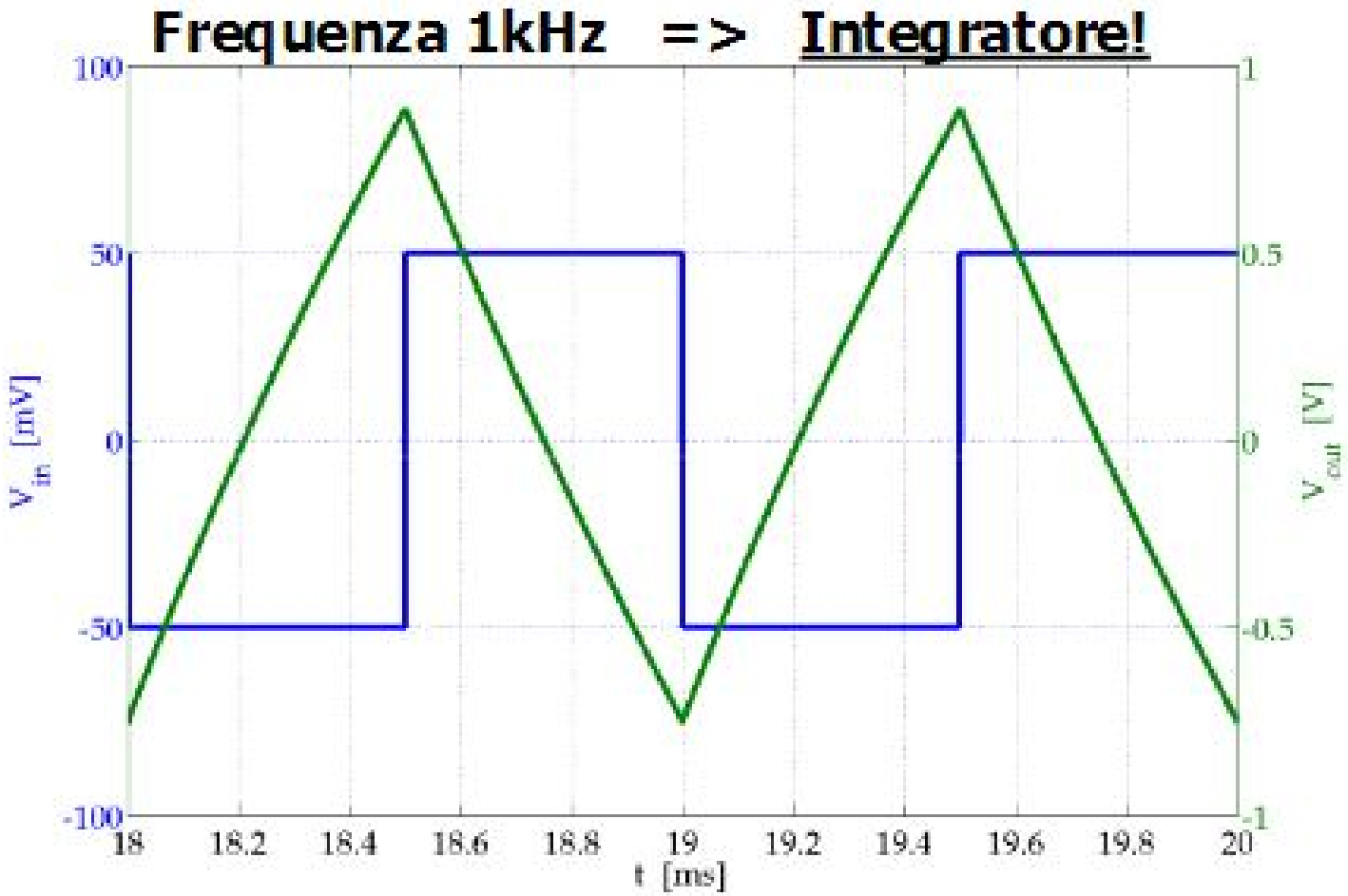
Integratore di Miller
Diagramma di Bode - Fase



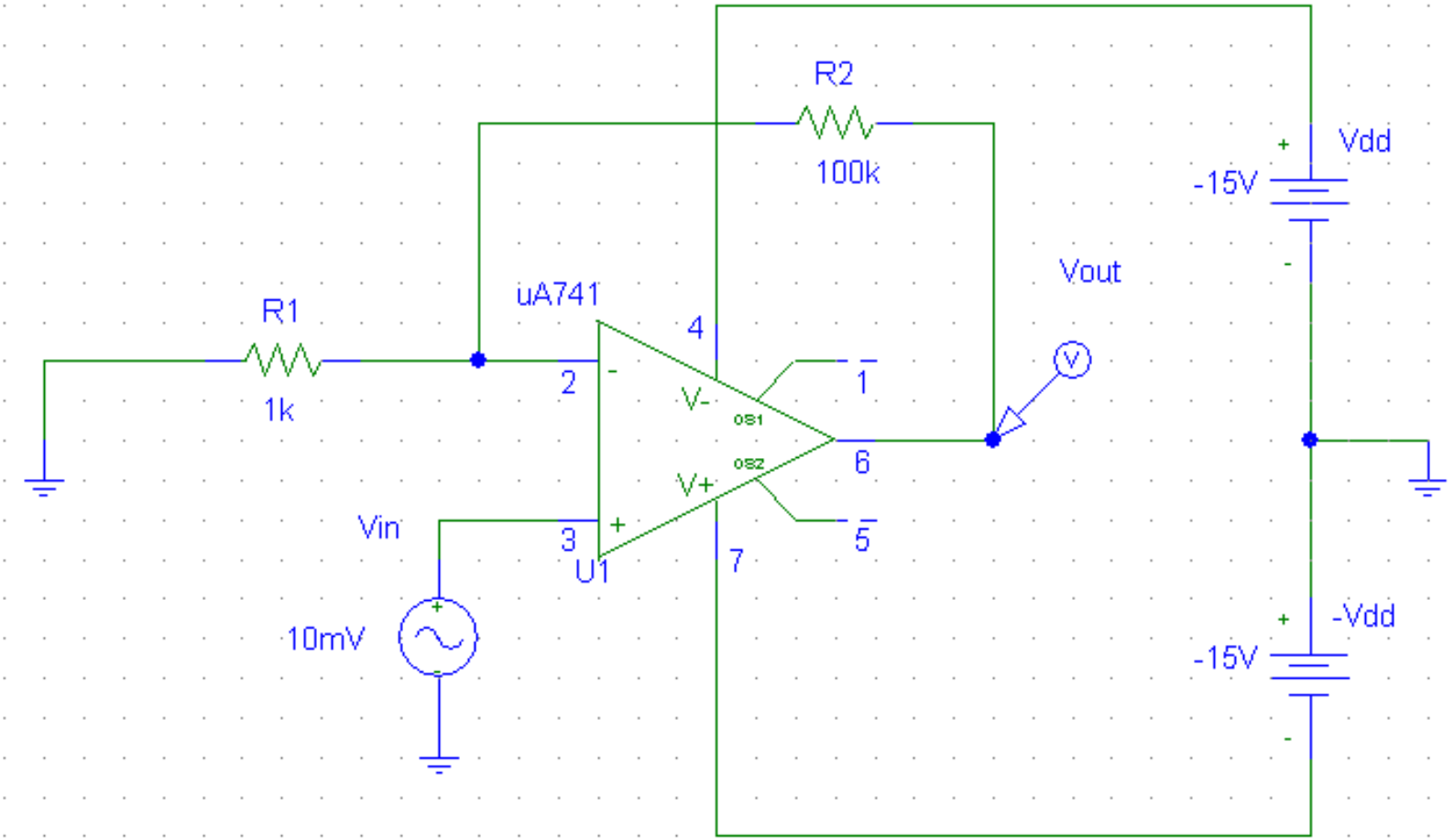
Integratore di Miller
Risposta all'Onda Quadra (1)



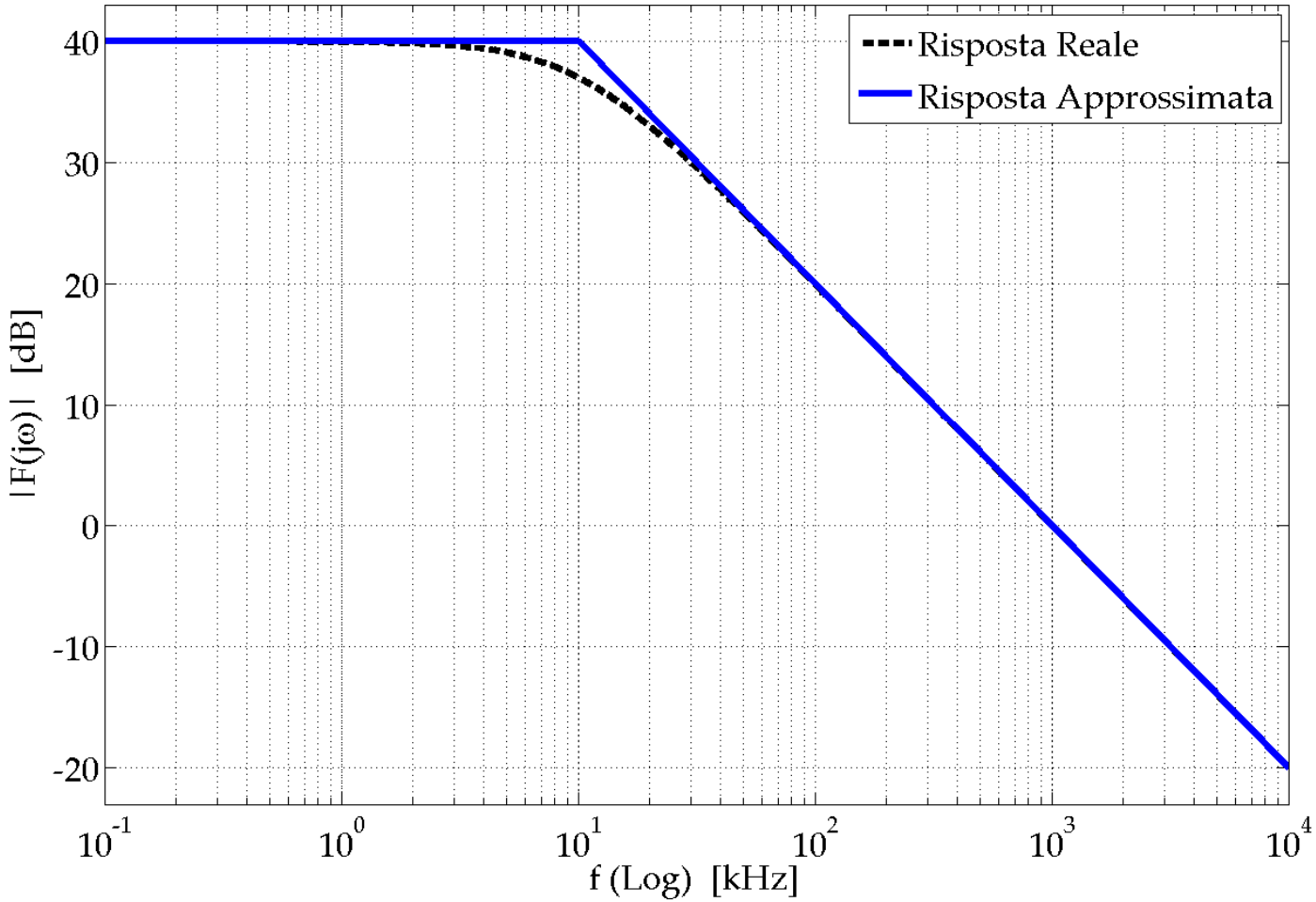
Integratore di Miller
Risposta all'Onda Quadra (2)



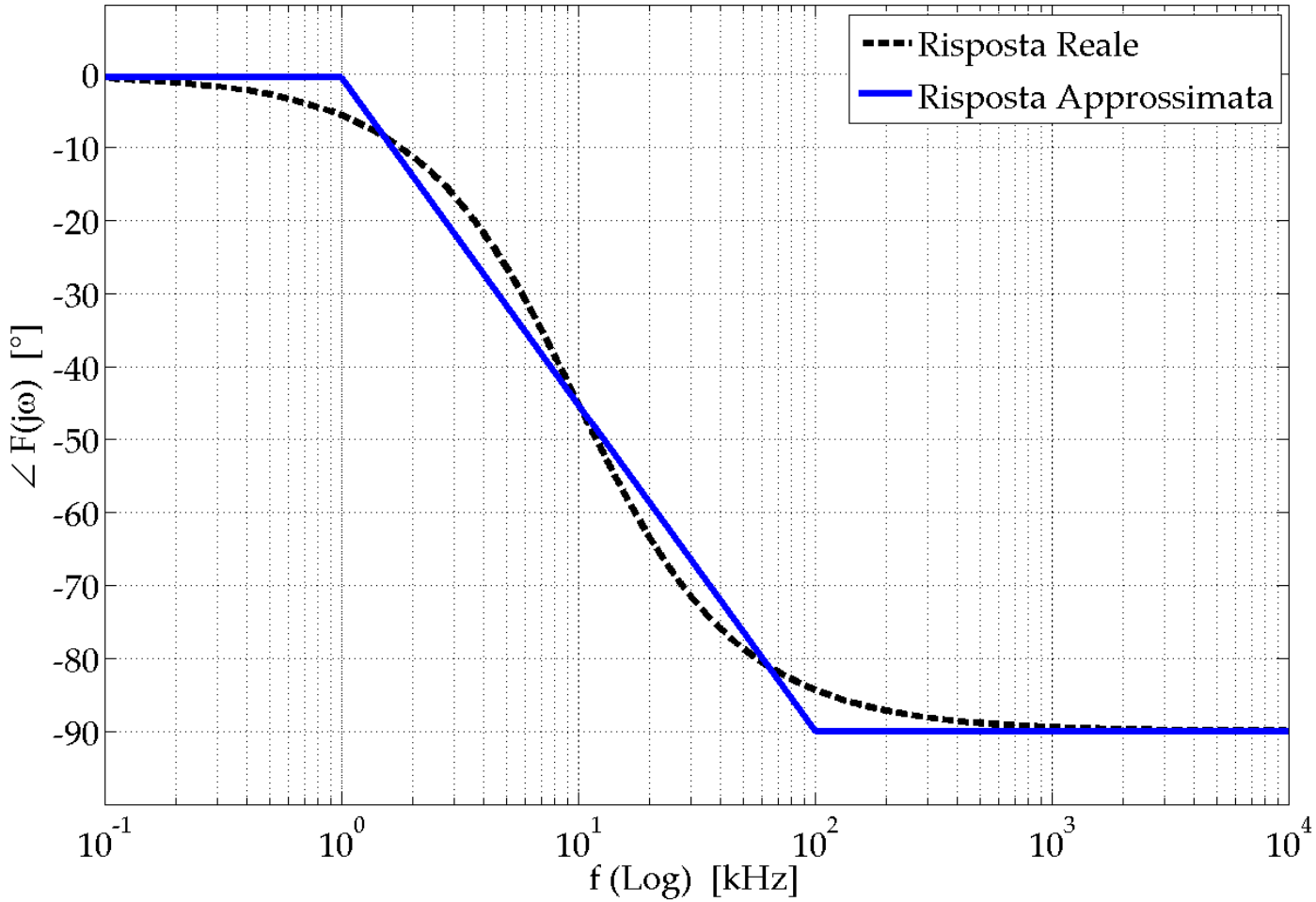
Configurazione Non Invertente



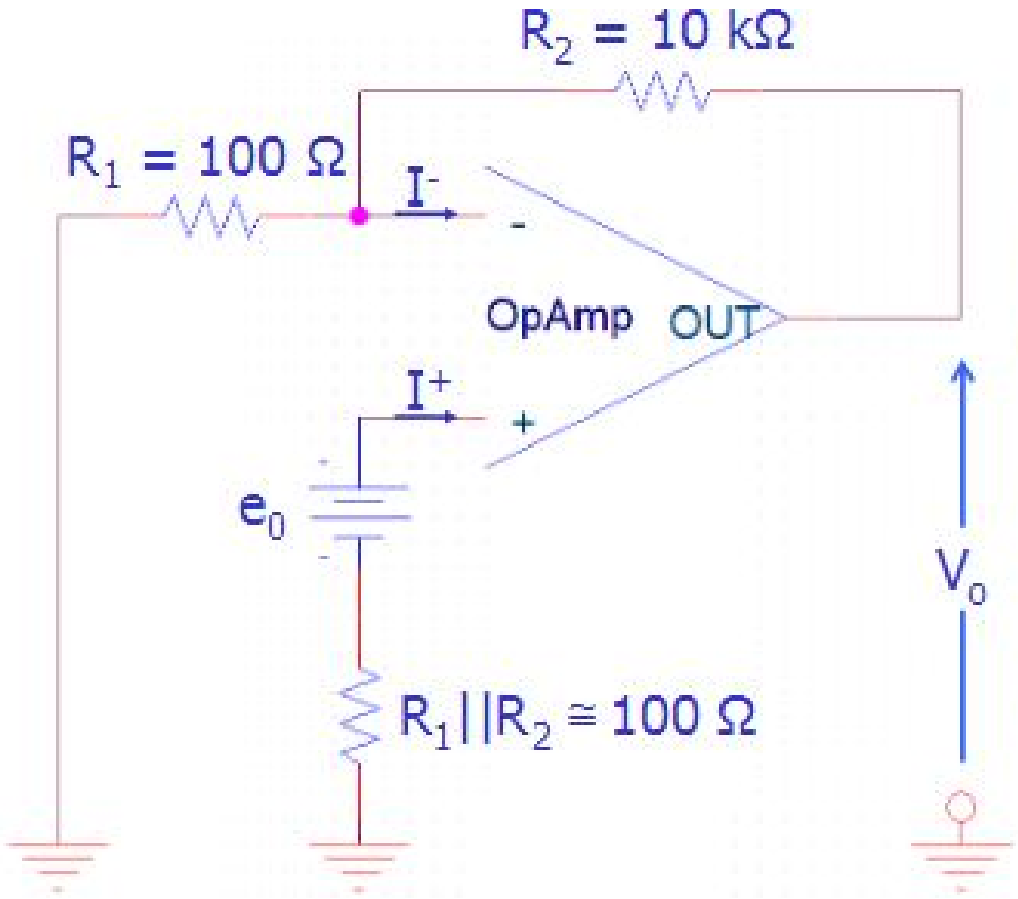
Configurazione Non Invertente
Diagramma di Bode - Modulo



Configurazione Non Invertente
Diagramma di Bode - Fase



Effetto della Tensione e delle Correnti di Offset

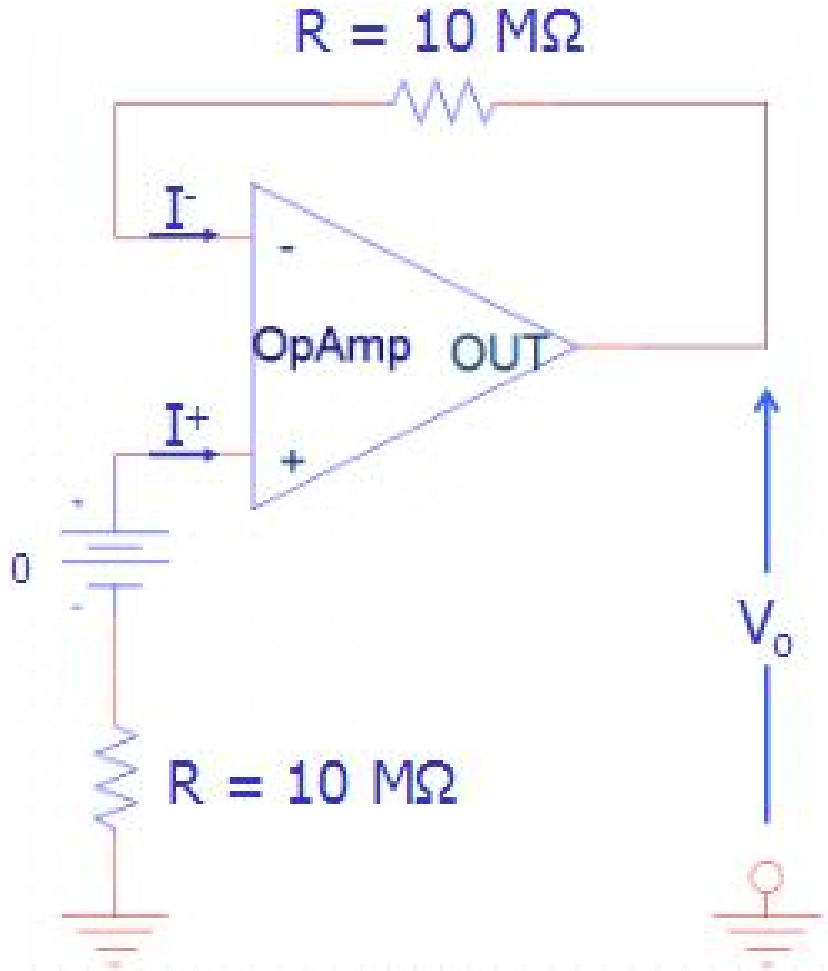


A causa degli offset di tensione e corrente, **in assenza di segnale applicato**, si osserva una tensione di uscita V_o pari a:

$$V_o = e_0 \left(1 + R_2 / R_1 \right) + R_2 \left(I^- - I^+ \right) \Rightarrow$$

$$V_o \approx e_0 \left(1 + R_2 / R_1 \right)$$

Effetto della Tensione e delle Correnti di Offset

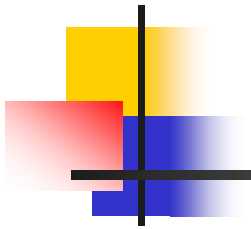


A causa degli offset di tensione e corrente, **in assenza di segnale applicato**, si osserva una tensione di uscita V_o pari a:

$V_o = e_0 + R (I^- - I^+) \Rightarrow$

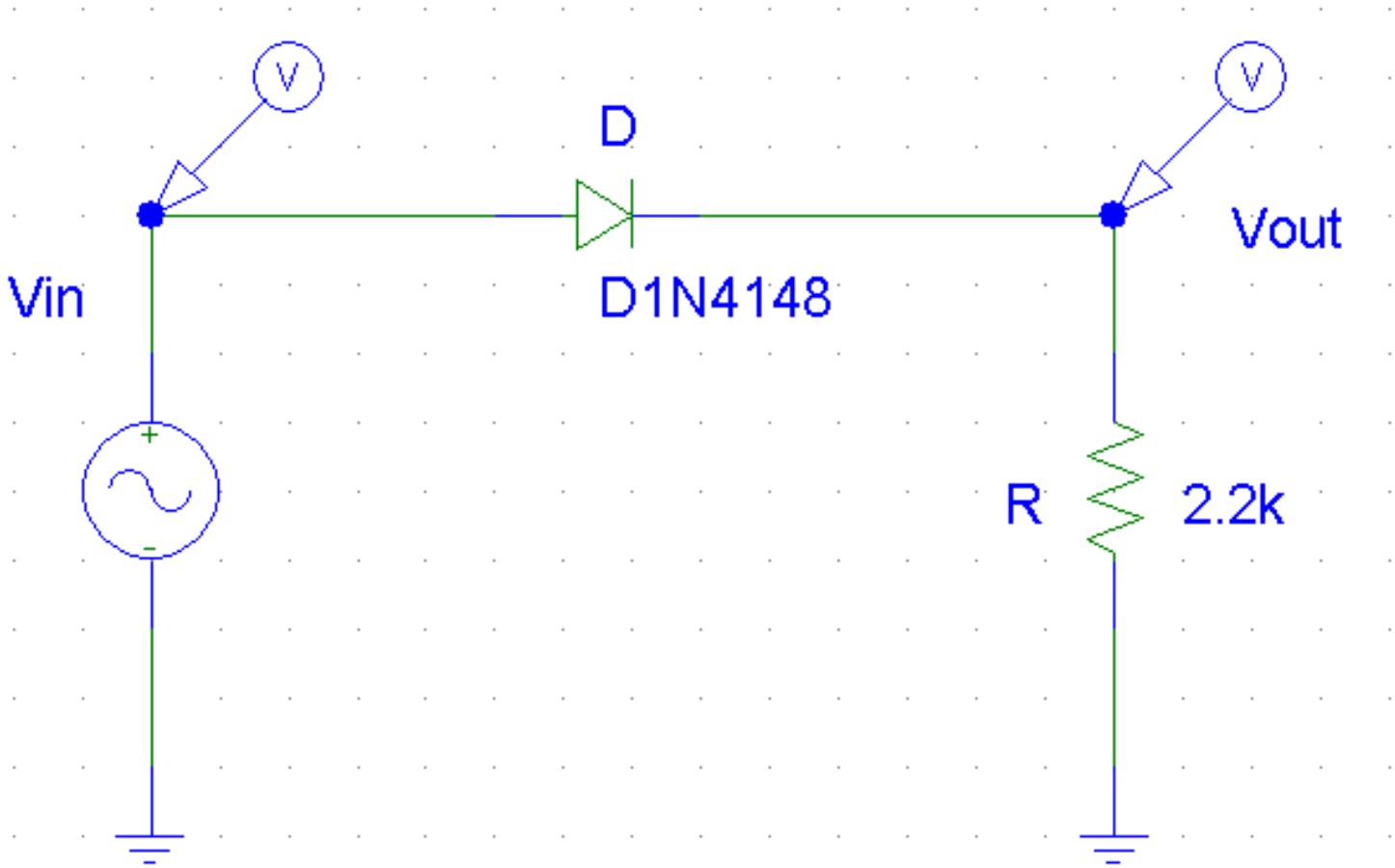
$V_o \approx R (I^- - I^+)$

Elettronica I
- Seconda Esercitazione -



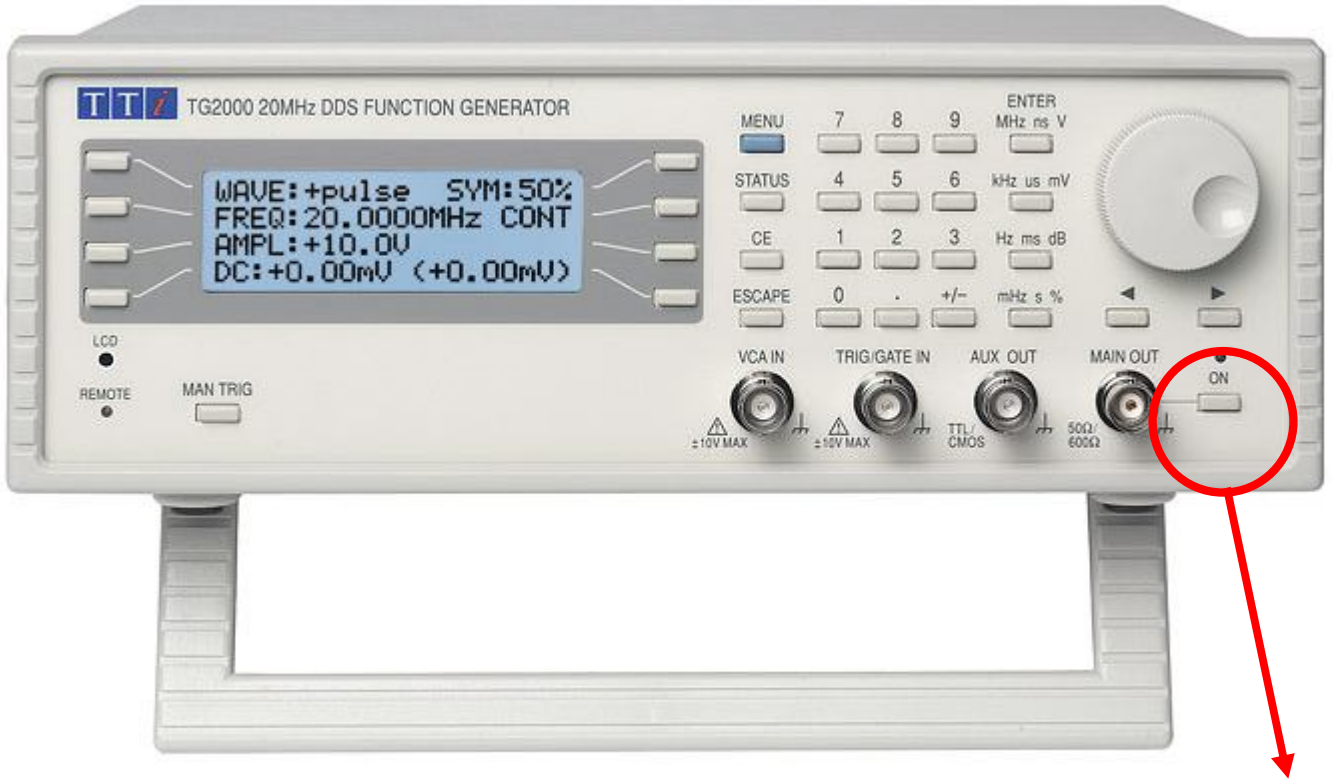
CIRCUITI CON DIODI

Raddrizzatore a Singola Semionda (uscita 1)



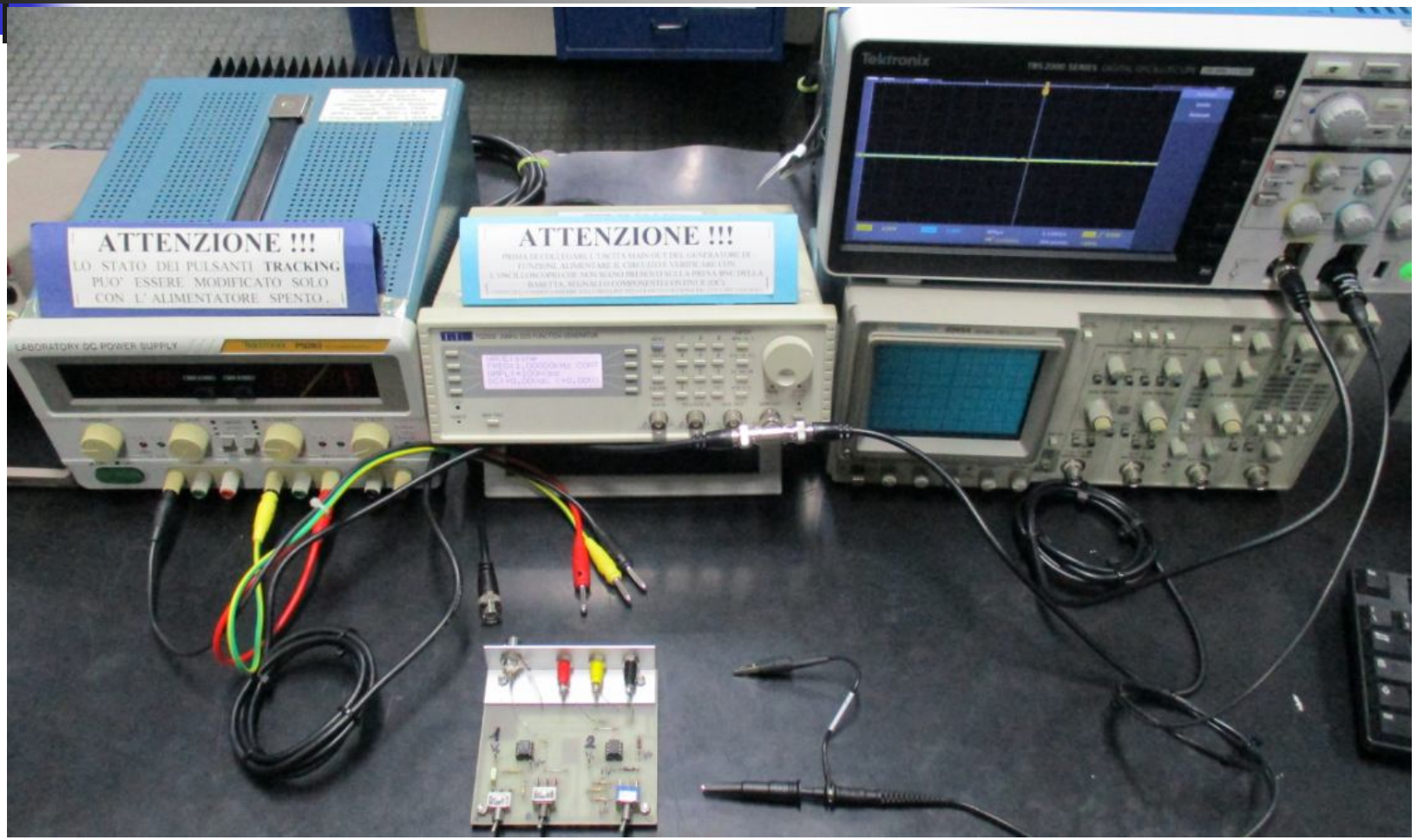
Spegnere l'Alimentatore Tektronix PS283

Attenzione:

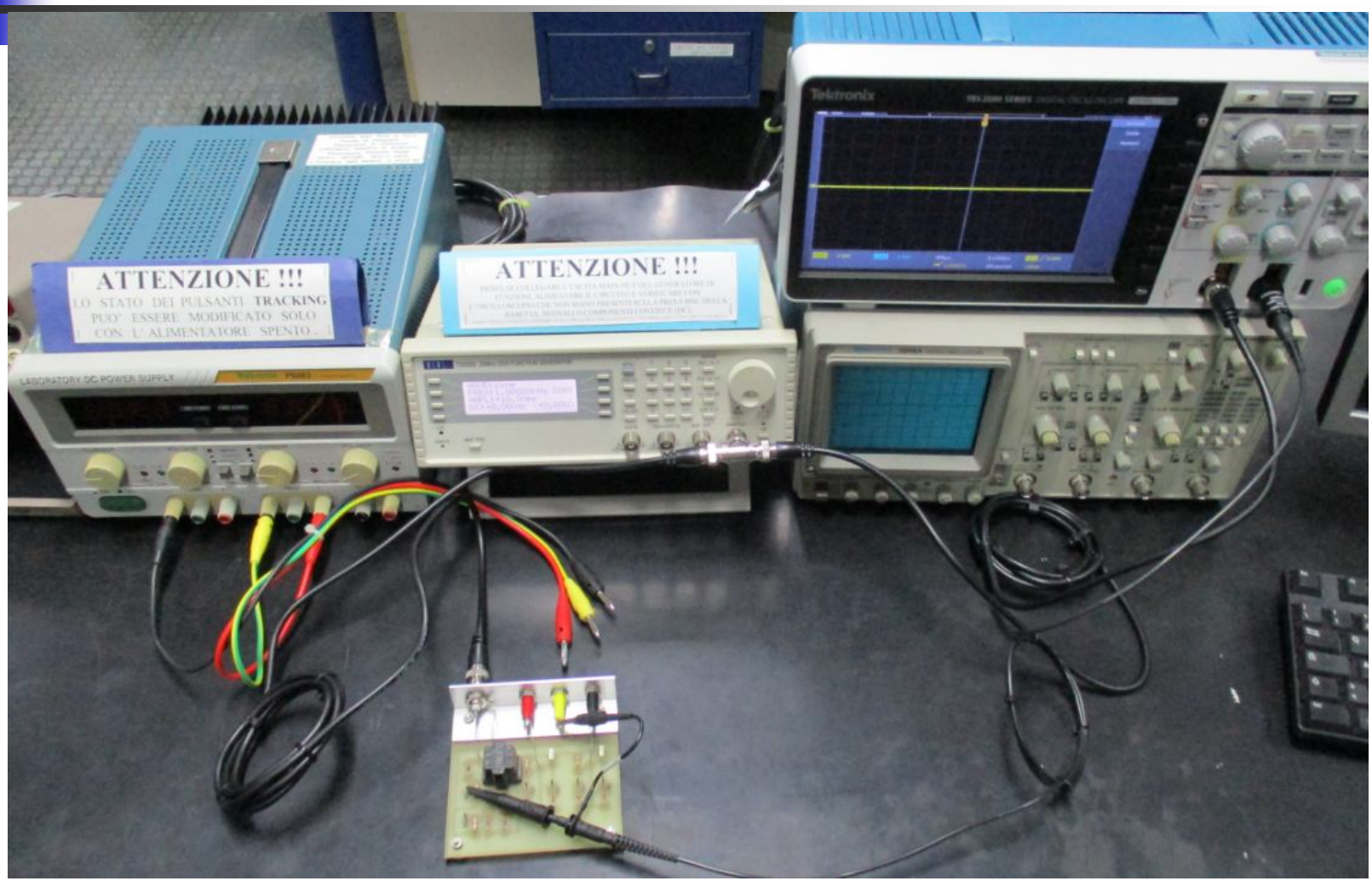


Mettere su OFF (si spegne il LED rosso)

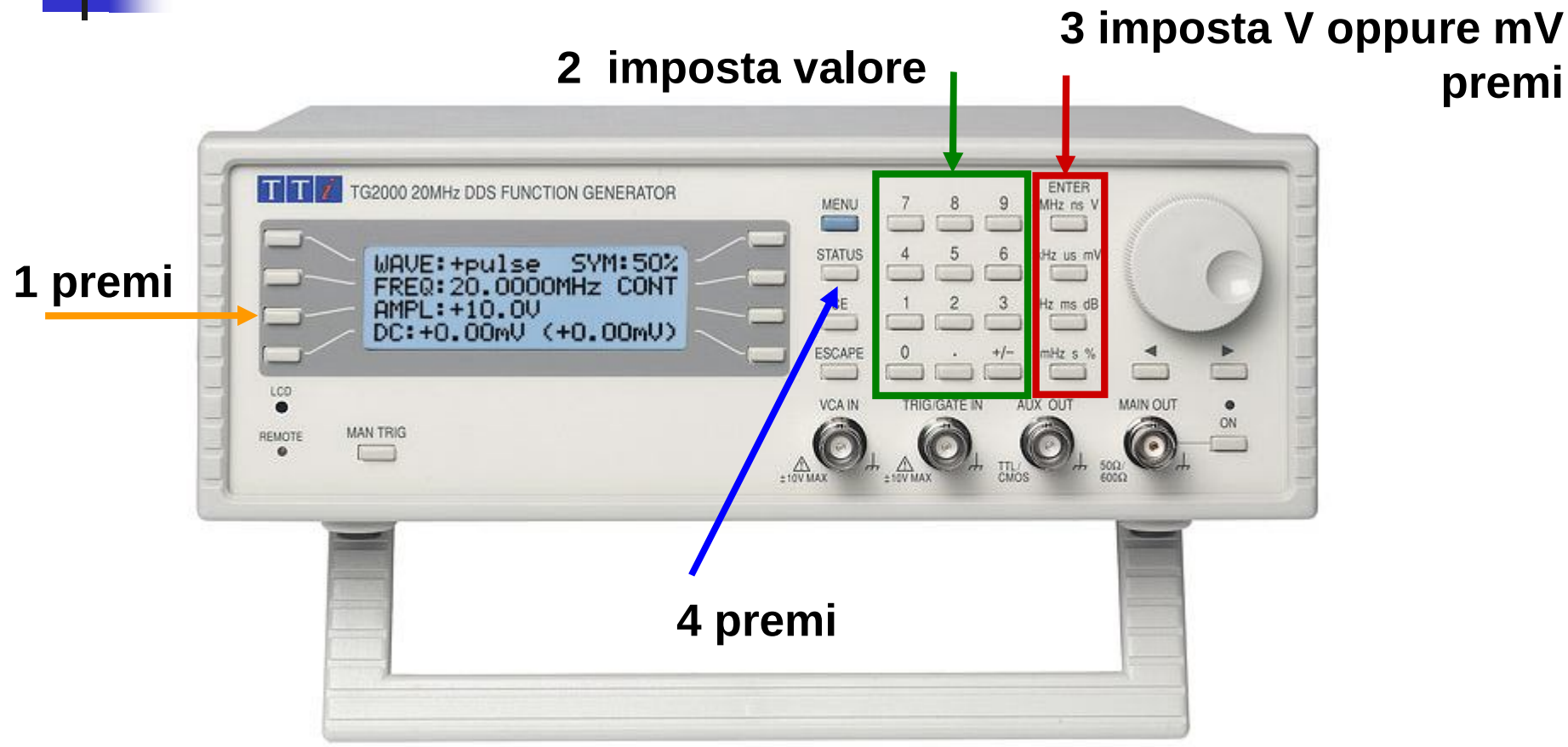
Staccare i cavi dalla basetta OP-AMP



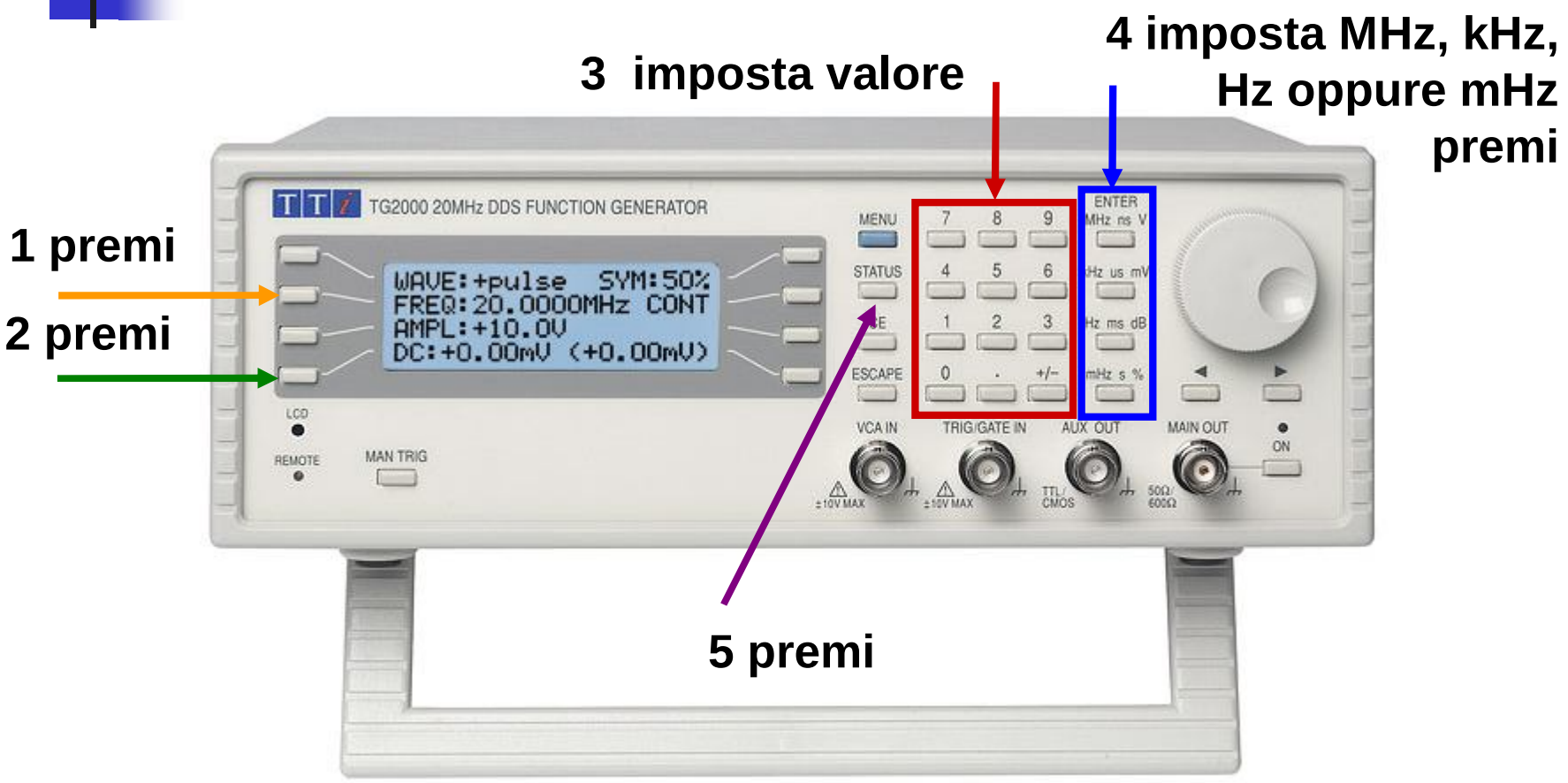
Dispense pagina 35 - Collegamento Raddrizzatore a semplice semionda



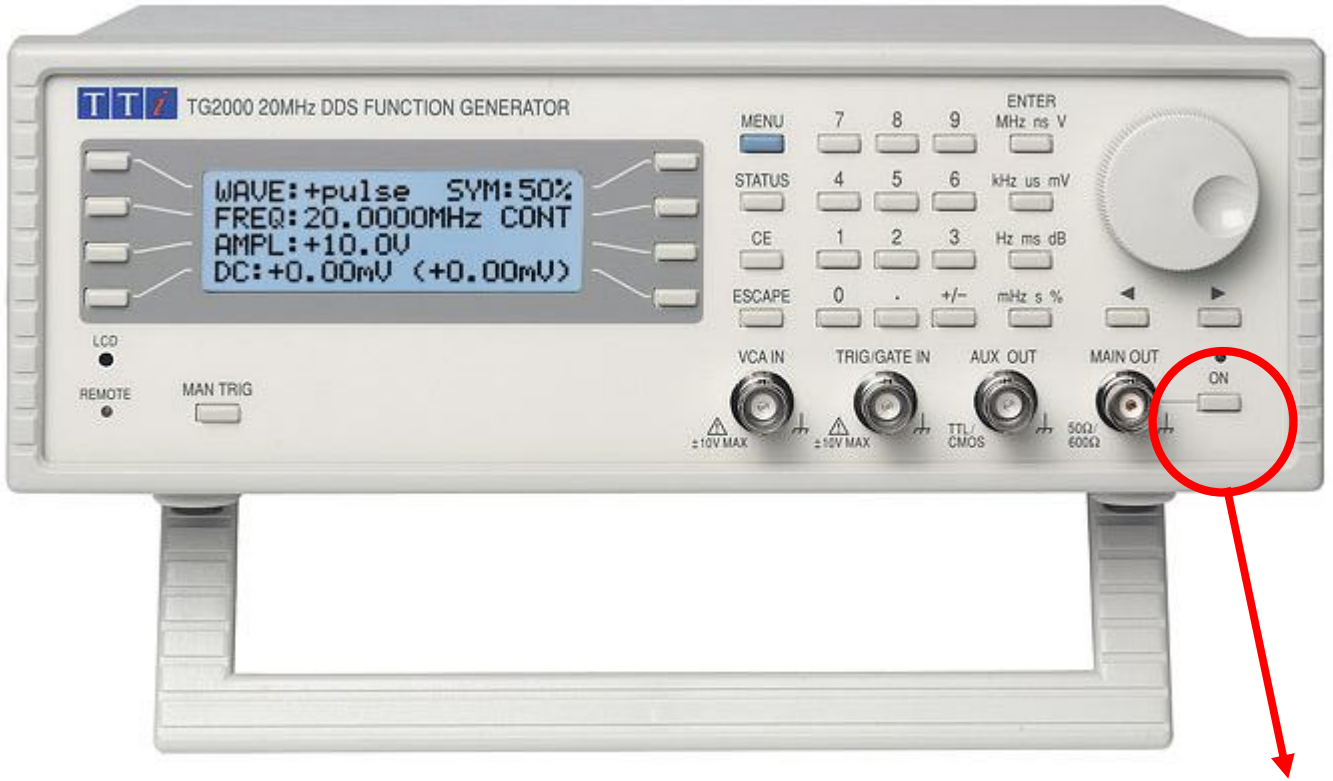
Ampiezza del Segnale 10V



Frequenza del Segnale 1 kHz

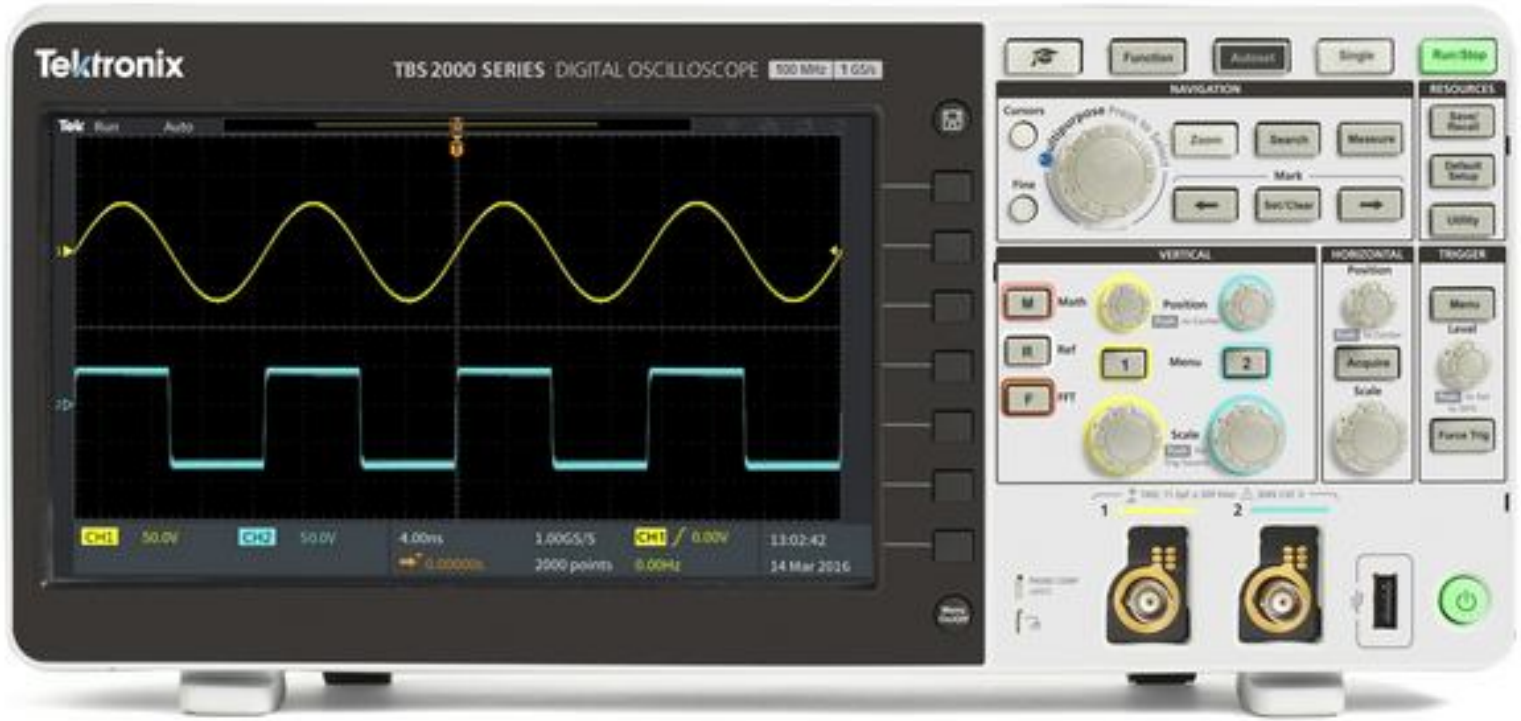


Attenzione:

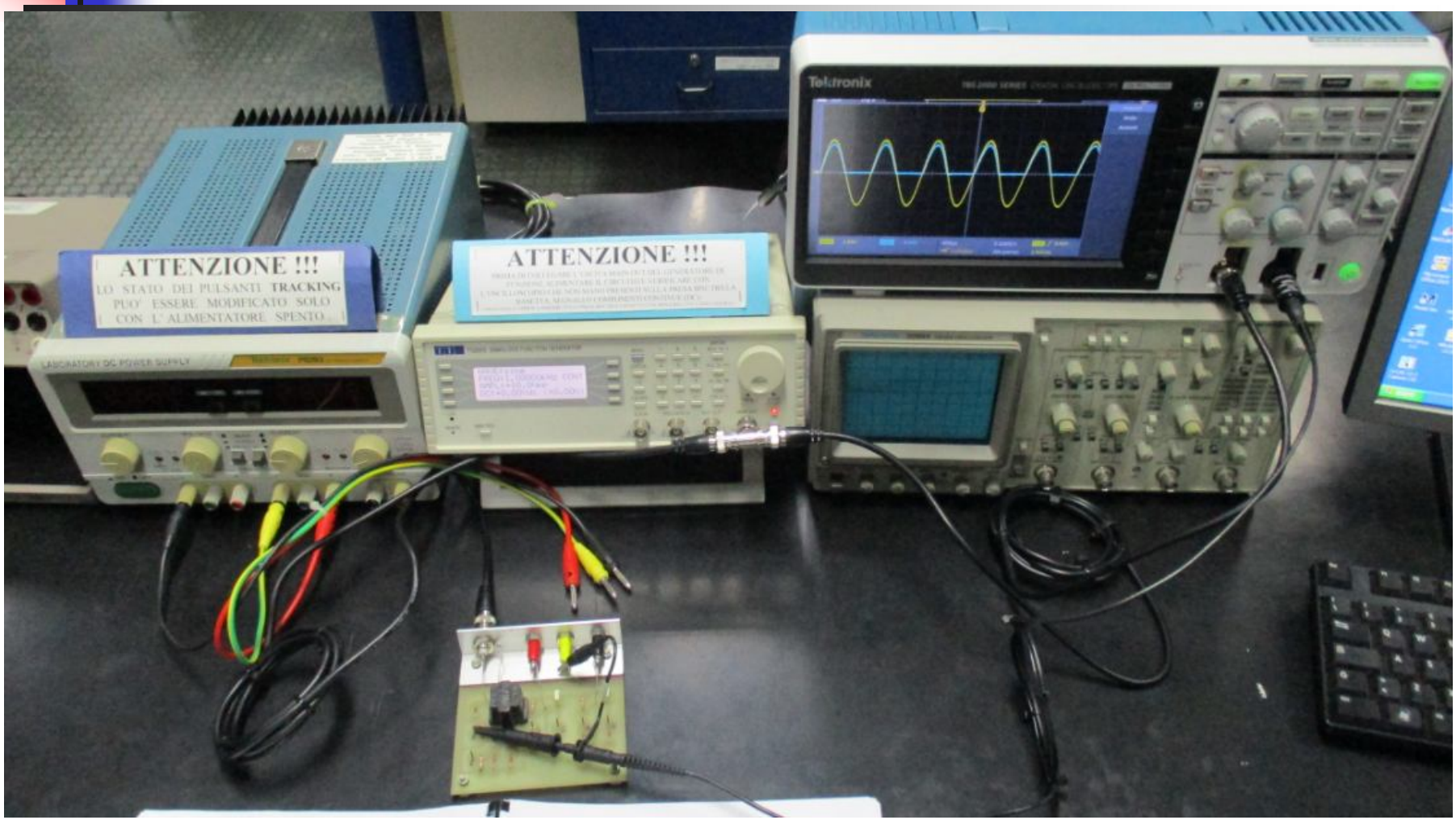


Dopo aver impostato il generatore ed aver effettuato gli opportuni controlli mettere su ON (si accende il LED rosso)

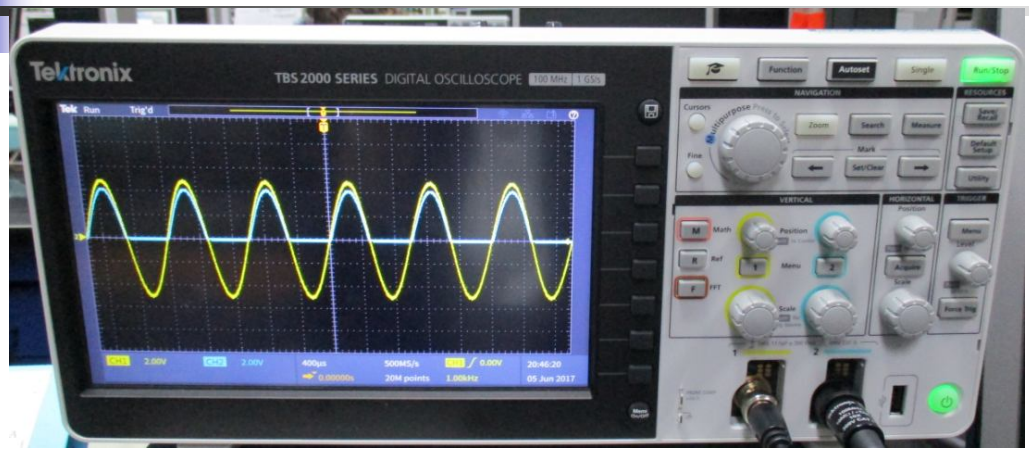
Oscilloscopio Digitale Tektronix TBS2102



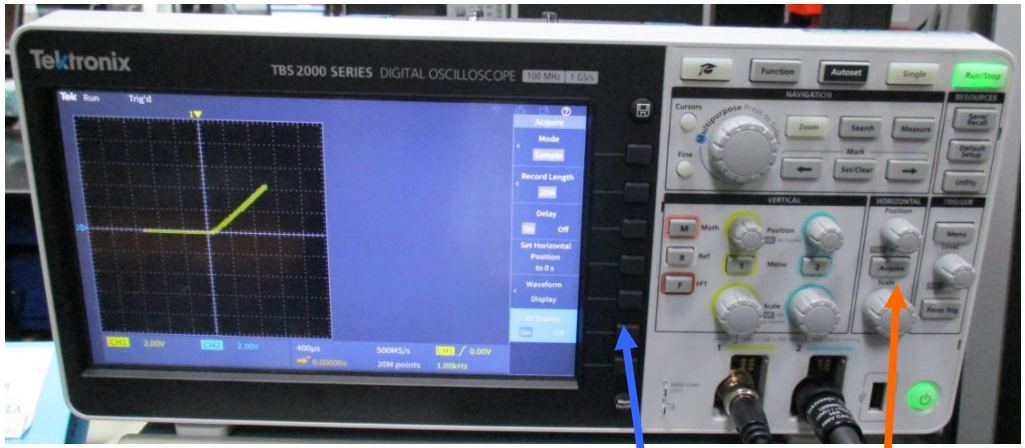
Strumenti accesi - Collegamento Raddrizzatore a semplice semionda



Configurazione X / Y



VISUALIZZAZIONE NORMALE
Raddrizzatore a semplice semionda

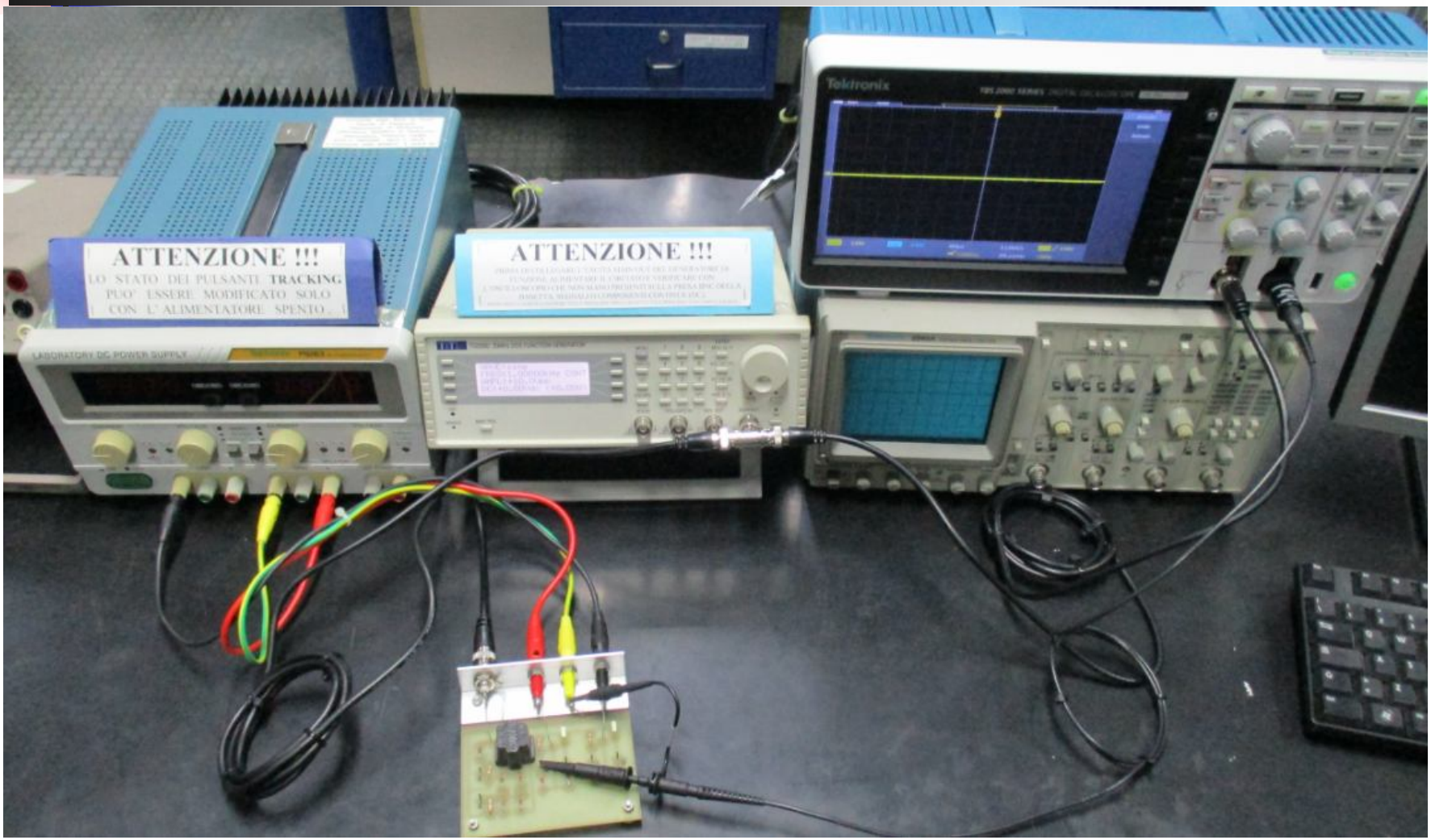


VISUALIZZAZIONE X / Y
ingresso / uscita

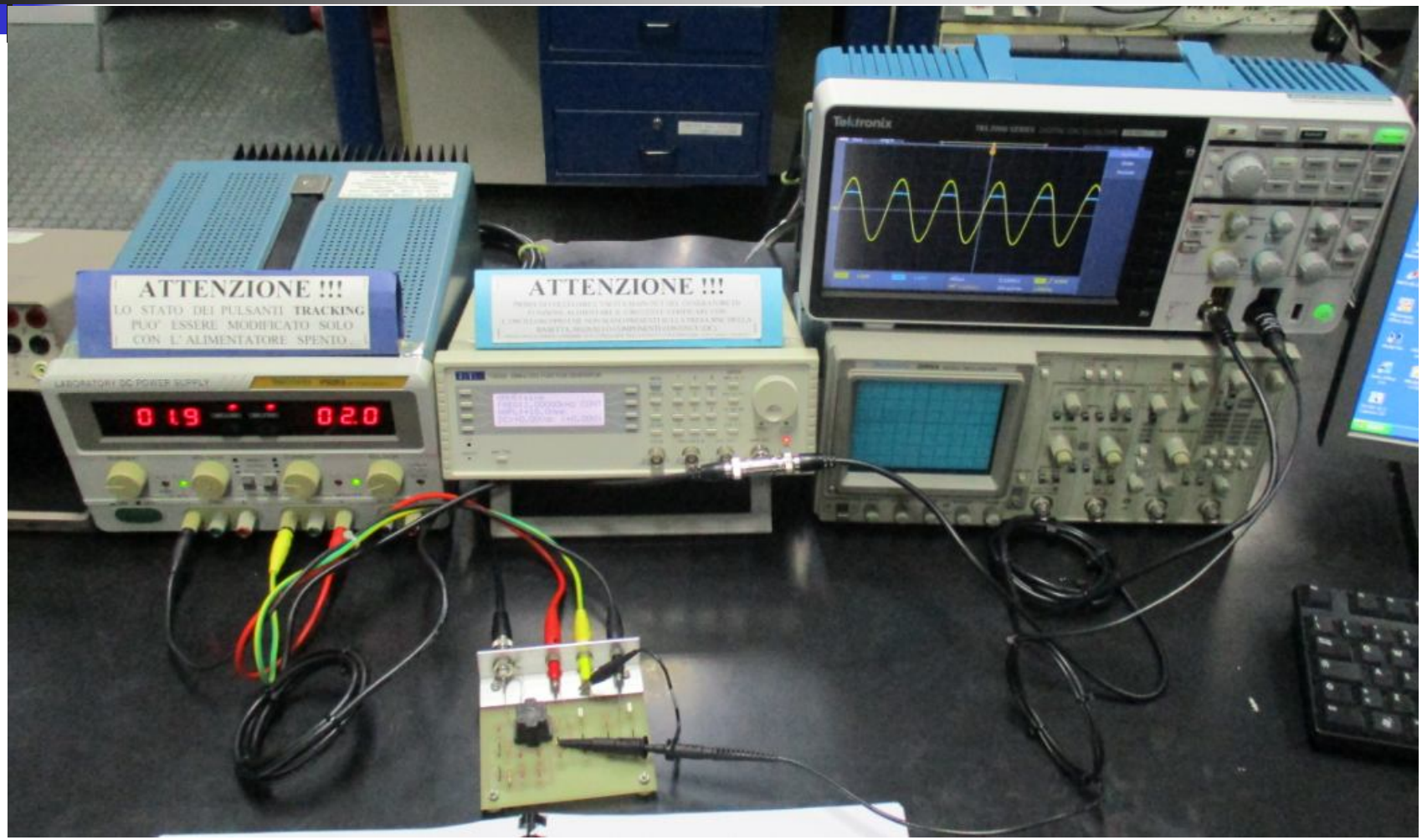
2 premi **1 premi**

Alimentatore
Collegamento serie a 2V

Dispense pagina 37 - Collegamento Circuito di cimatura (clipping)

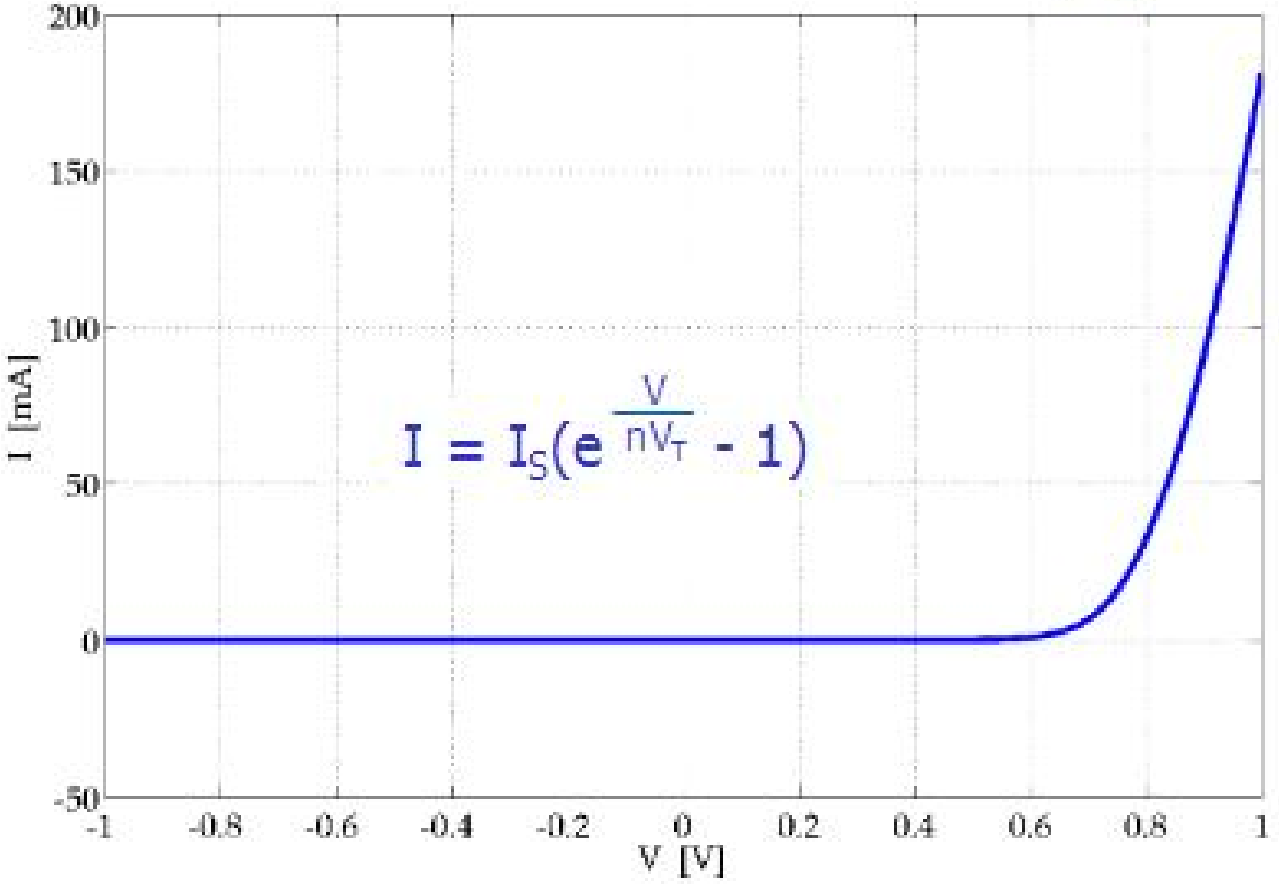


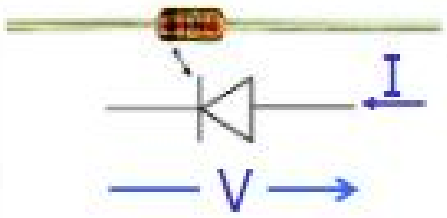
Strumenti accesi - Collegamento Circuito di cimatura (clipping)



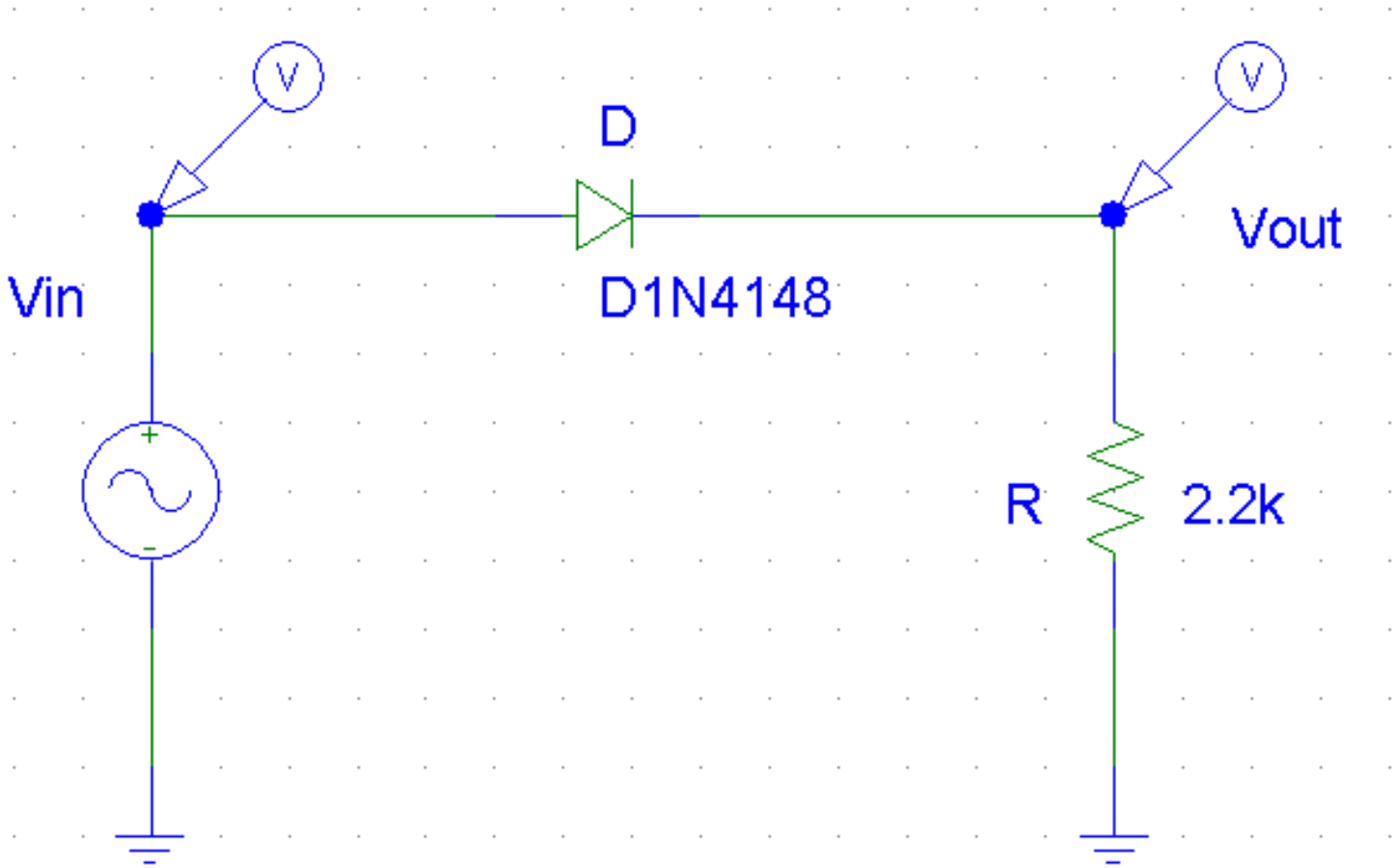
Caratteristica I(V) del Diodo 1N4148

Datasheet del diodo a pag. 70

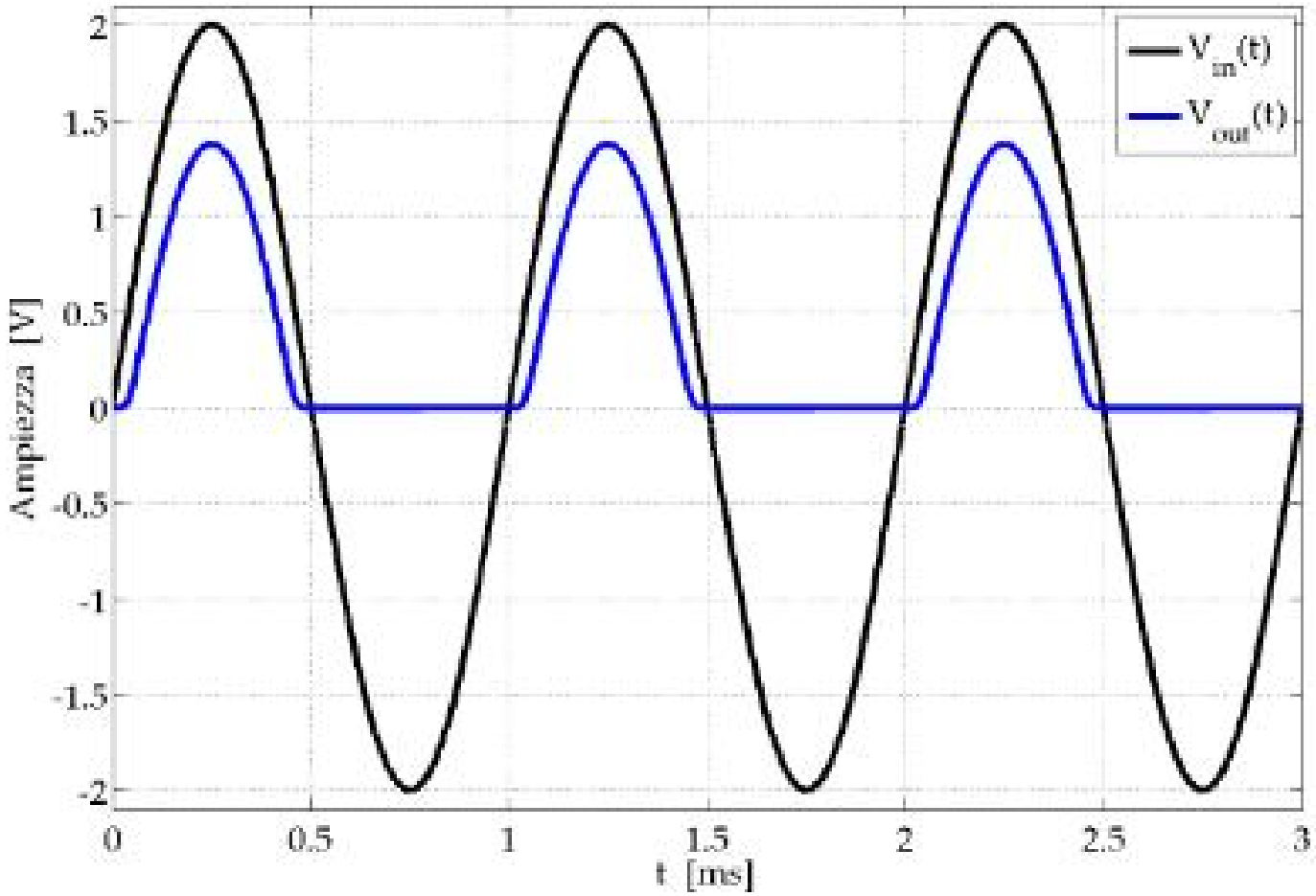




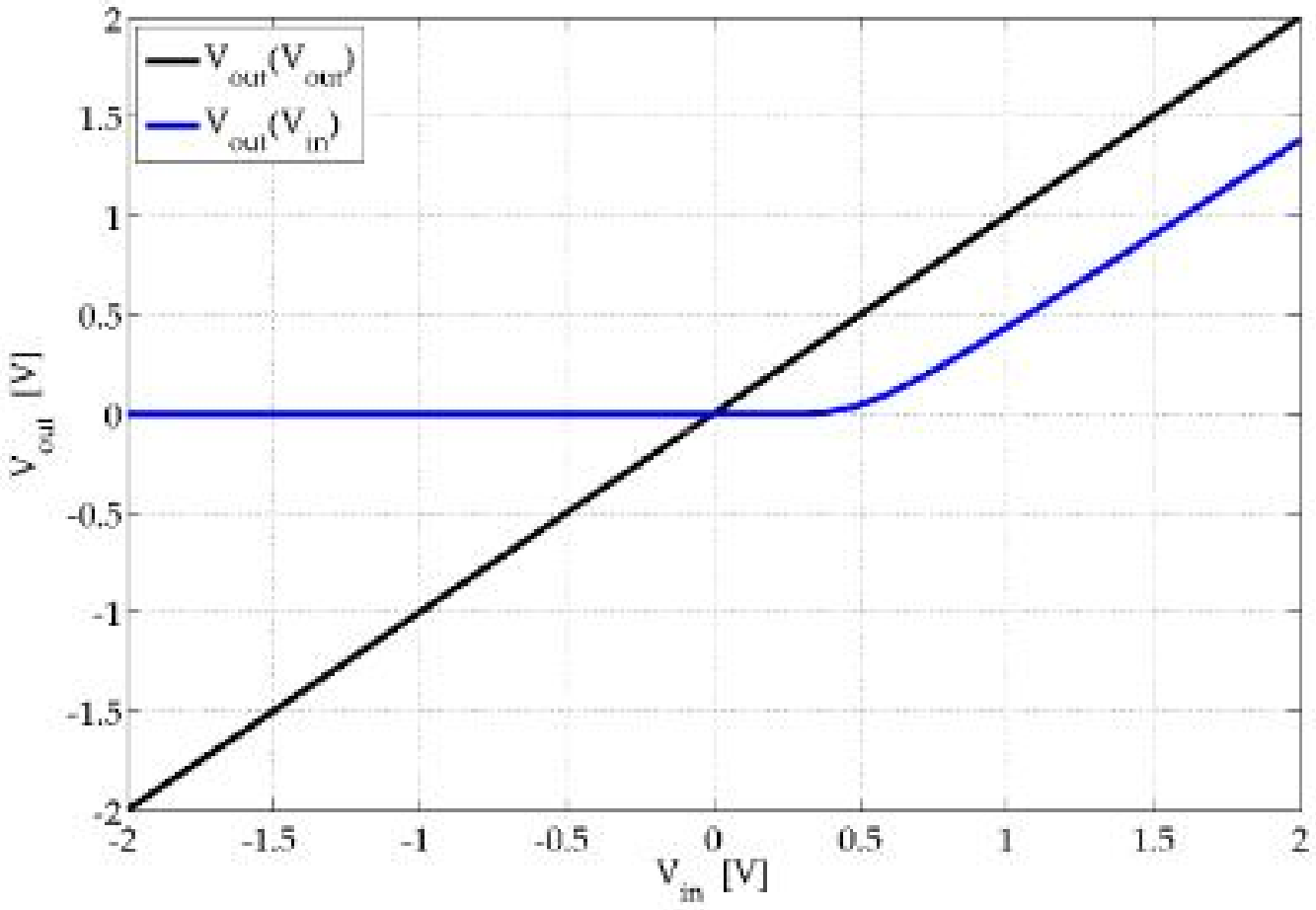
Raddrizzatore a Singola Semionda (uscita 1)



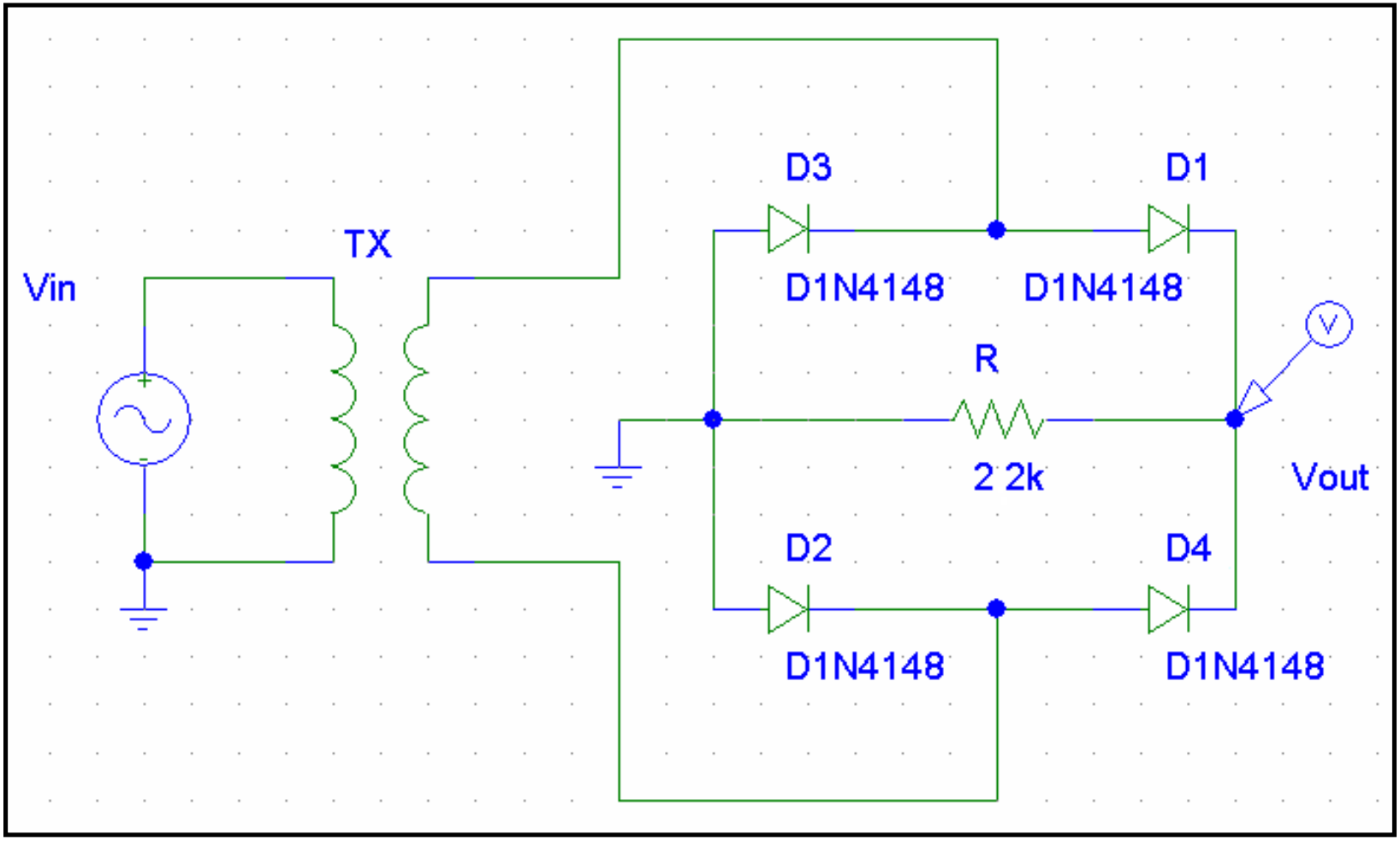
Raddrizzatore a Singola Semionda (uscita 1)



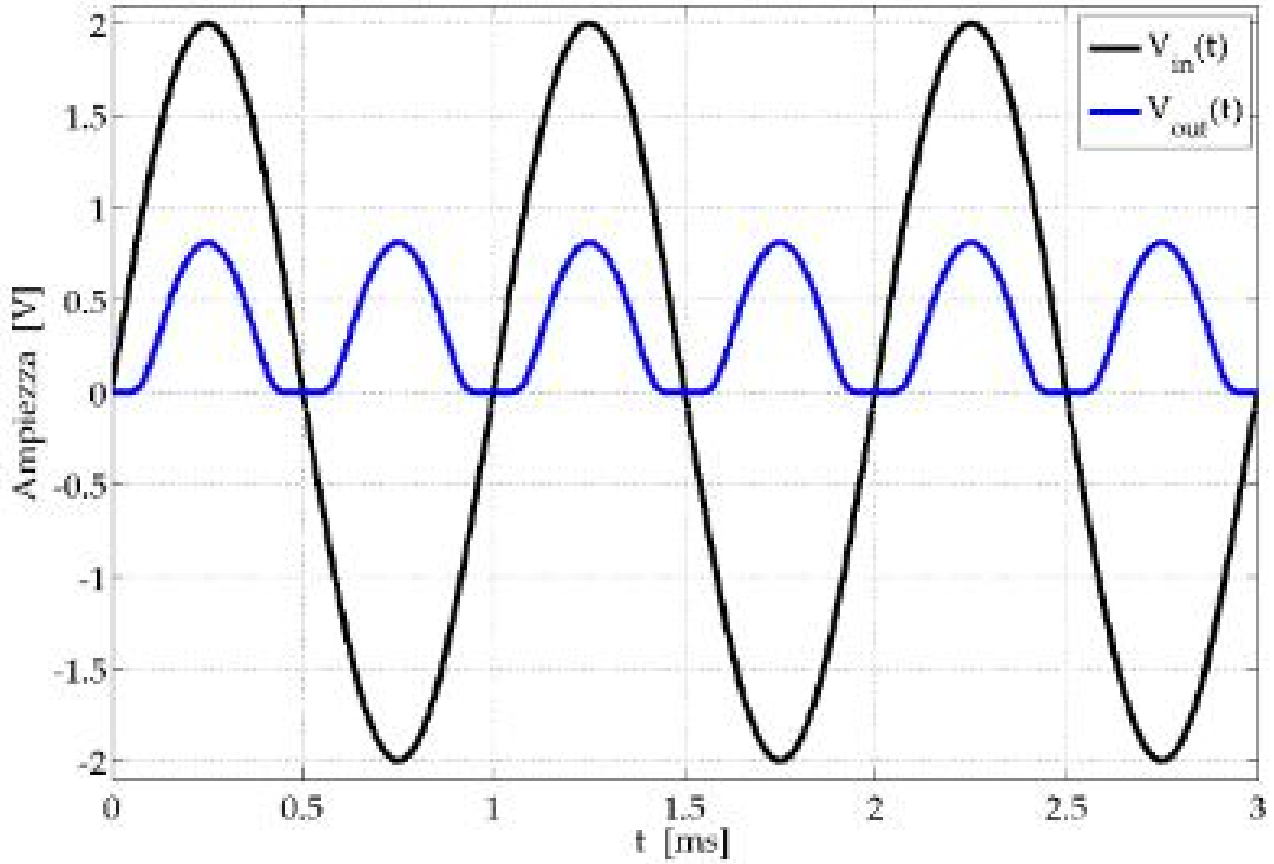
Caratteristica V_{out} (V_{in})



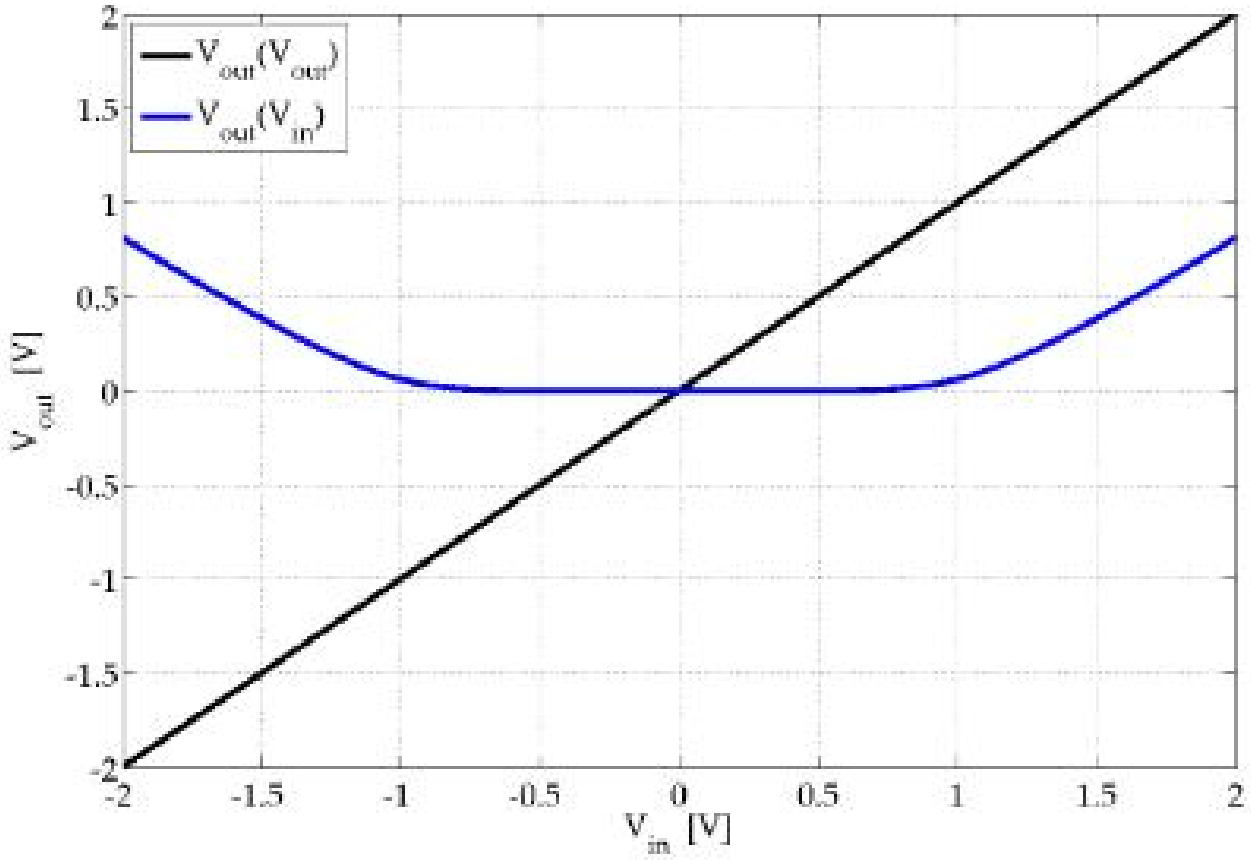
Raddrizzatore a Ponte di Diodi (uscita 2)



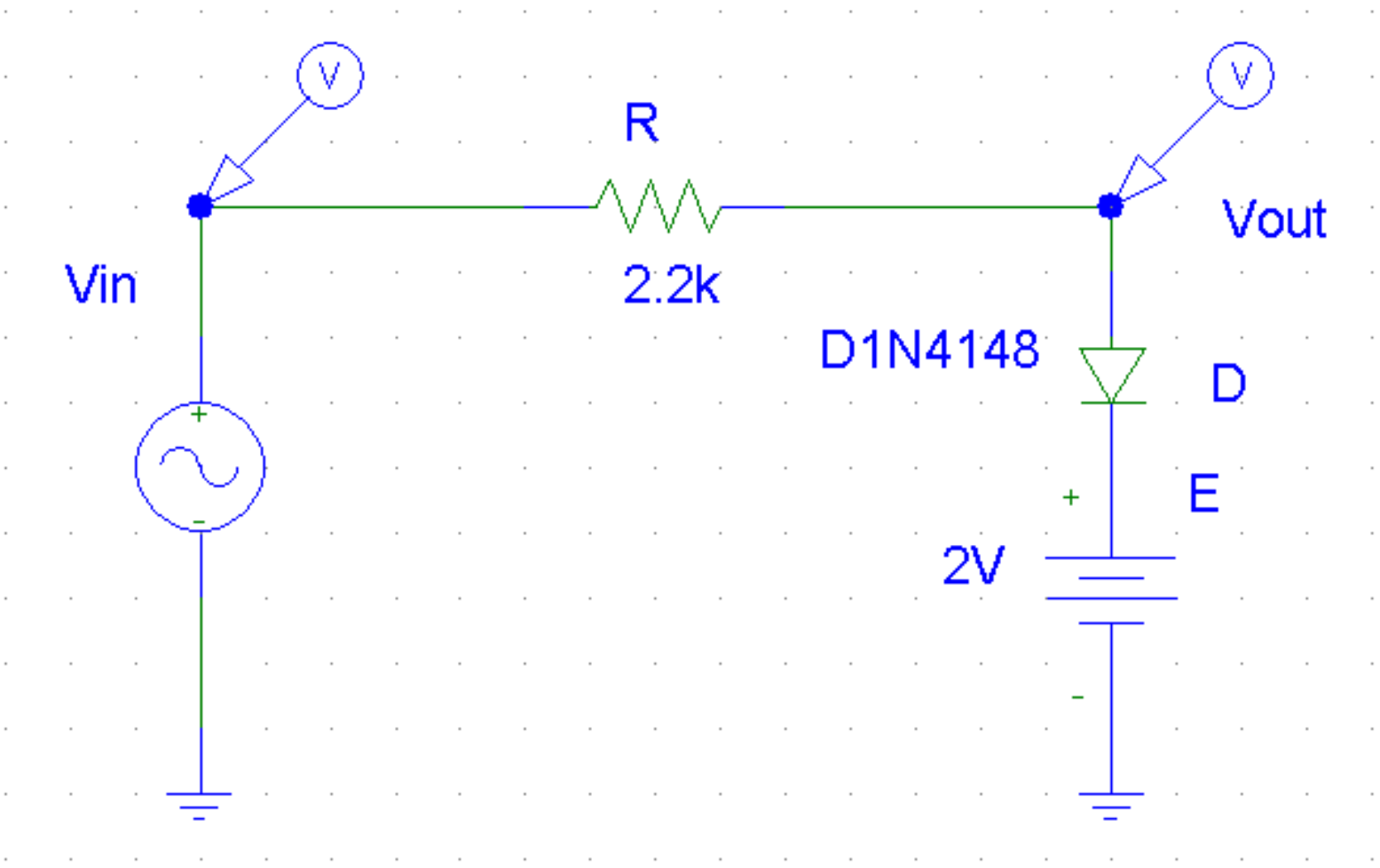
Raddrizzatore a Ponte di Diodi (uscita 2)



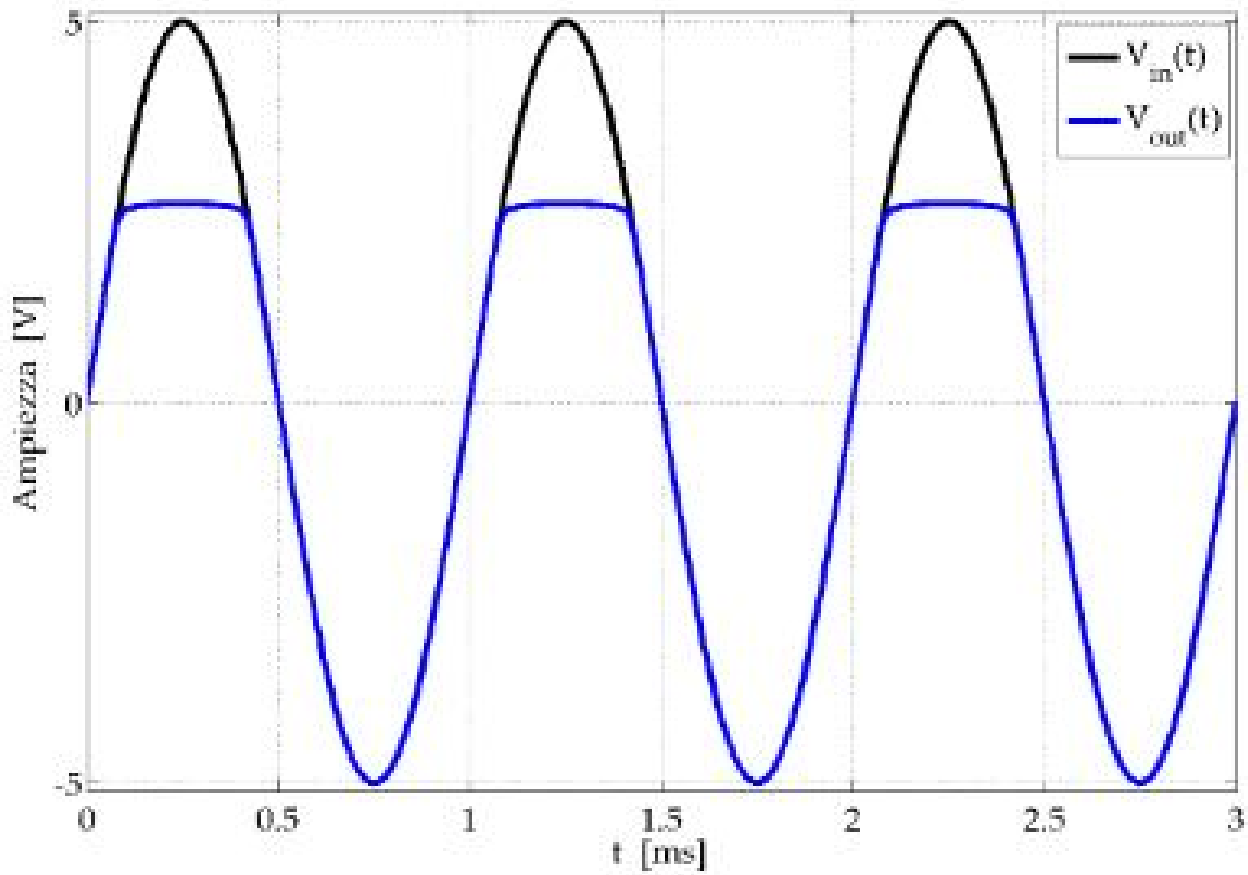
Caratteristica V_{out} (V_{in})



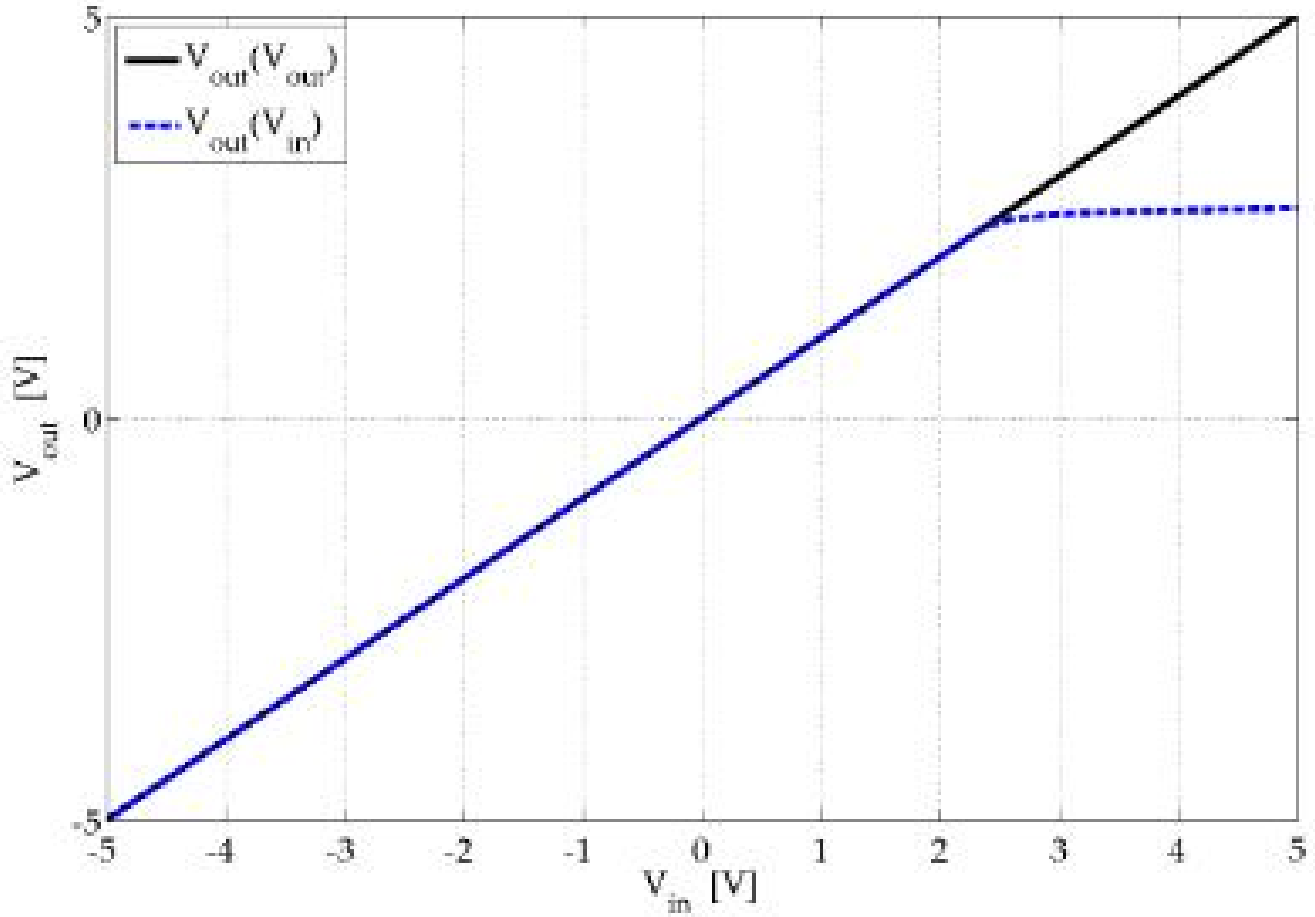
Limitatore al Valore Superiore
Clipping (uscita 3)



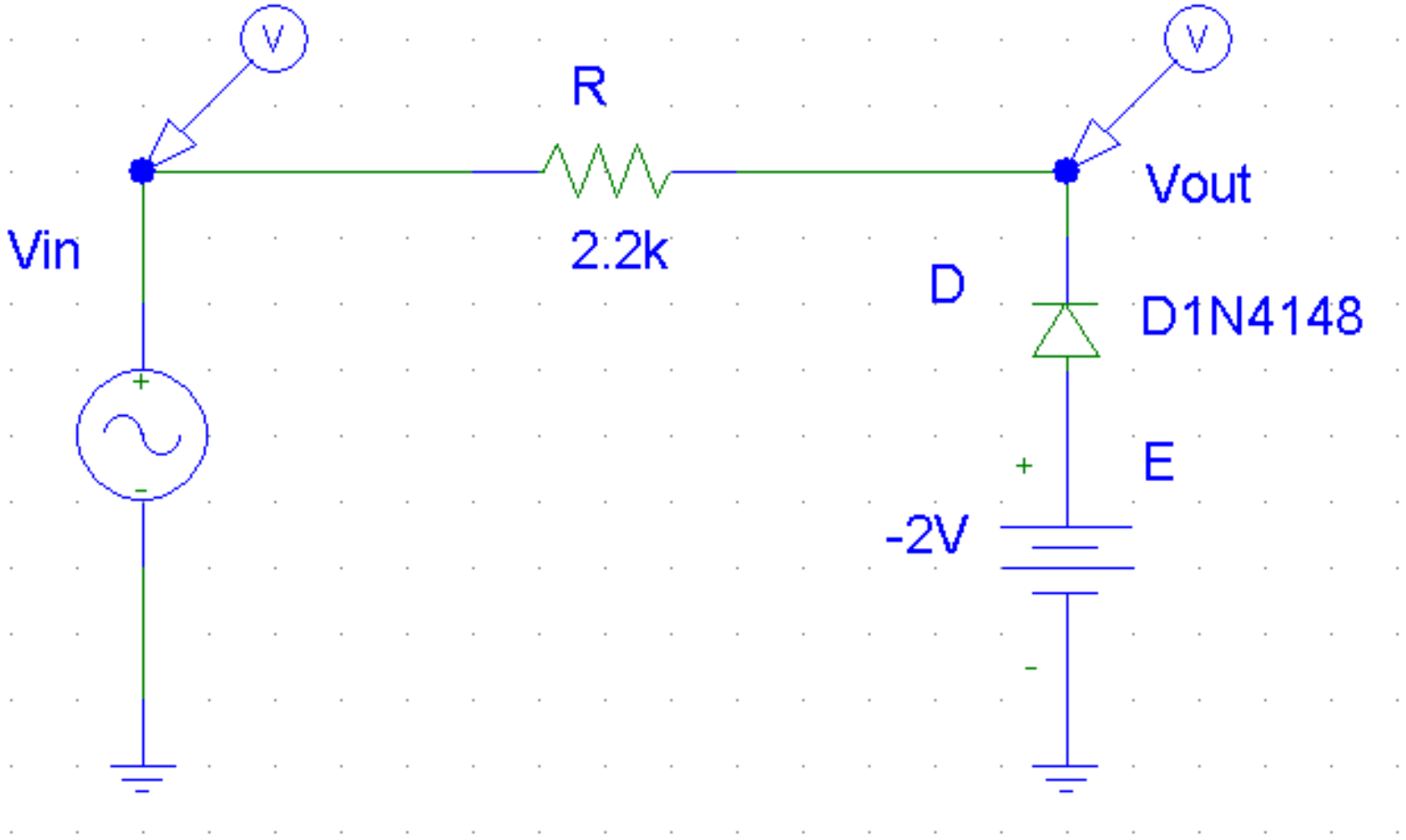
Limitatore al Valore Superiore
Clipping (uscita 3)



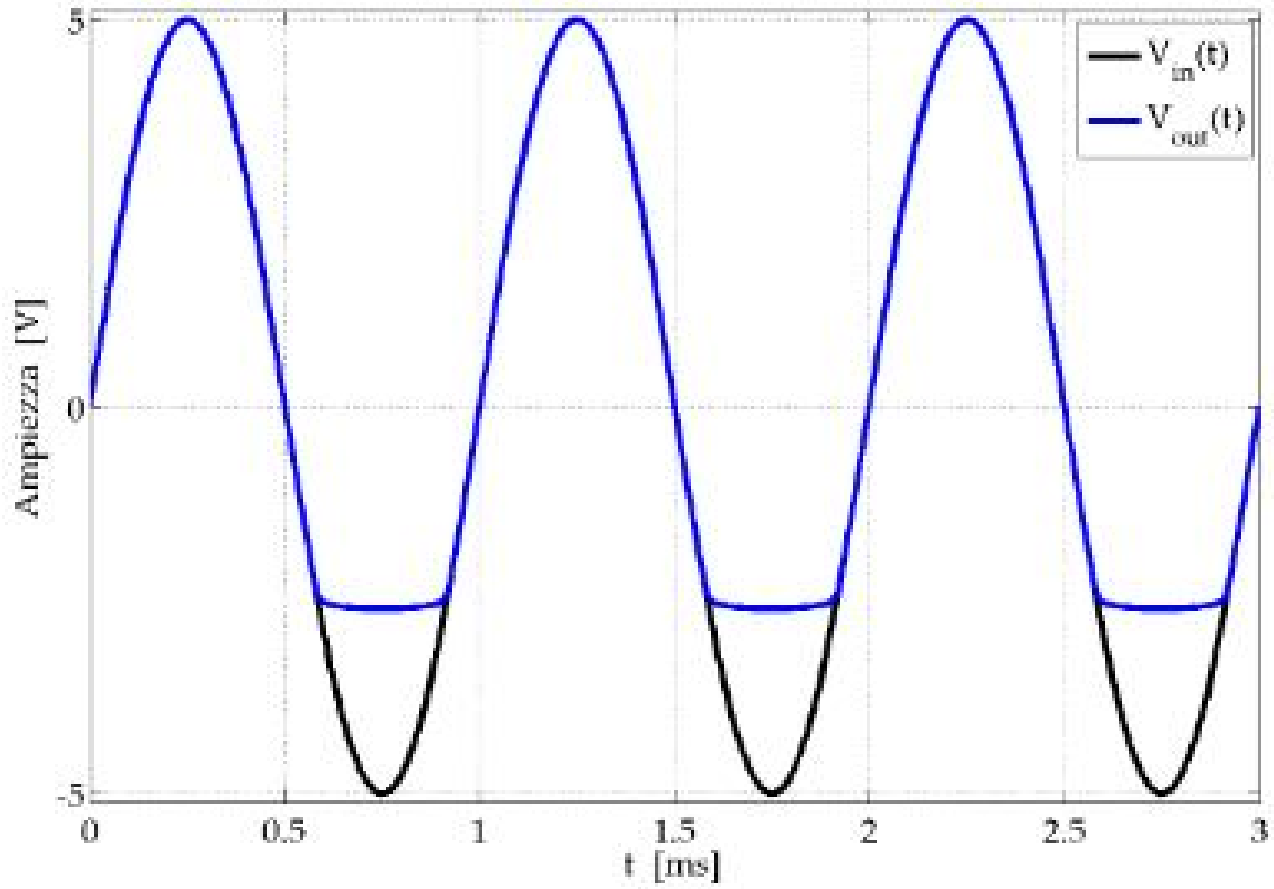
Caratteristica V_{out} (V_{in})



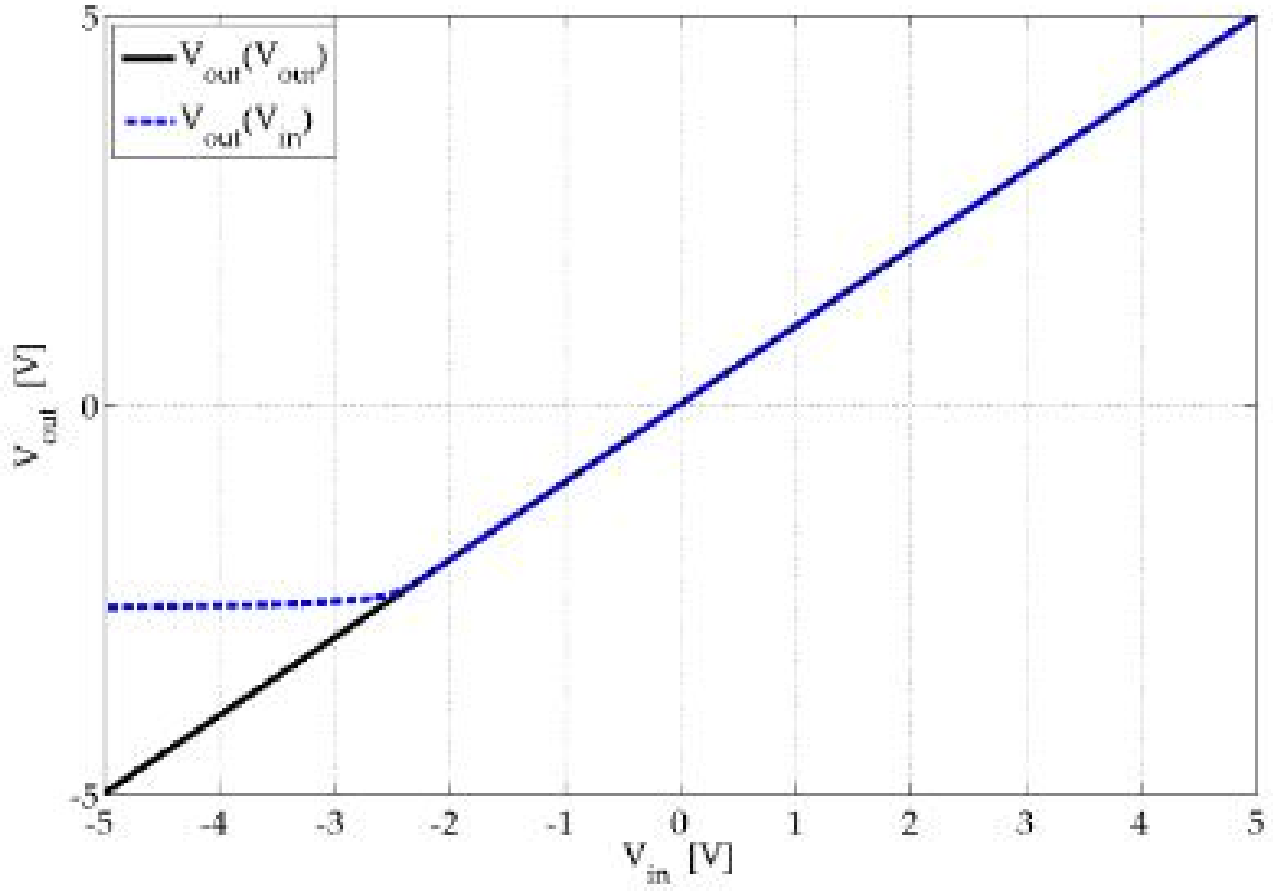
Limitatore al Valore Inferiore
Clipping (uscita 4)



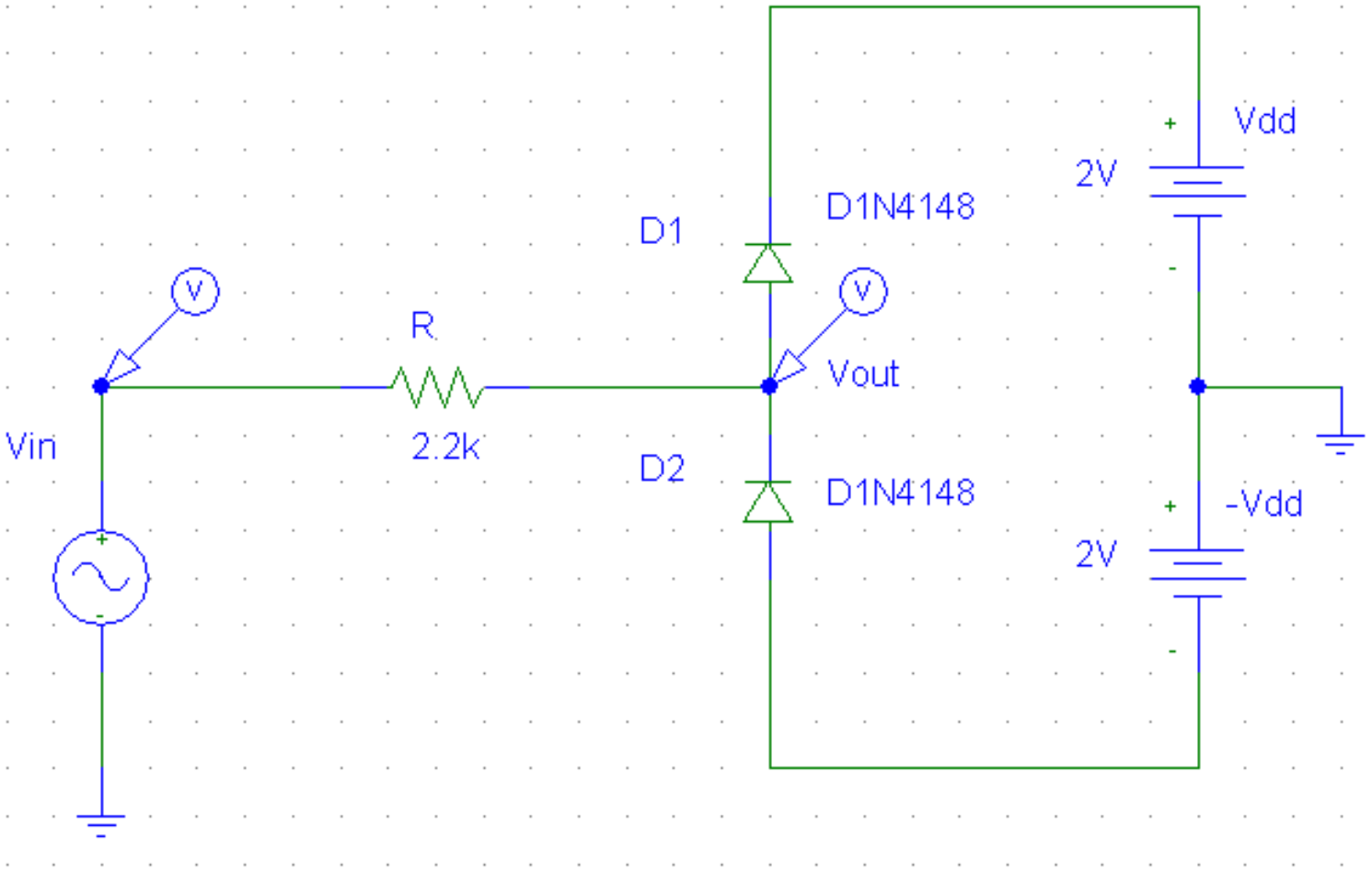
Limitatore al Valore Inferiore
Clipping (uscita 4)



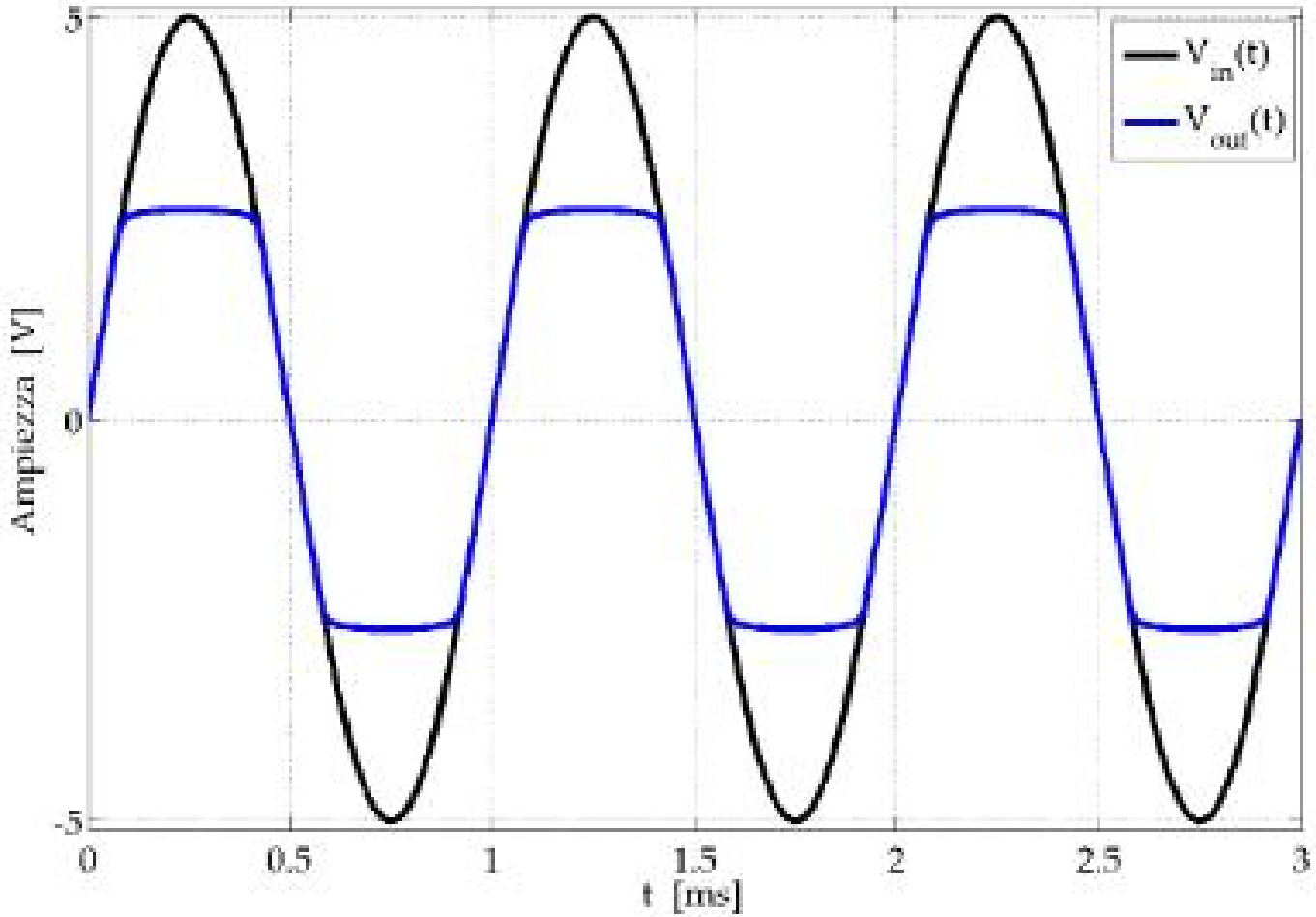
Caratteristica V_{out} (V_{in})



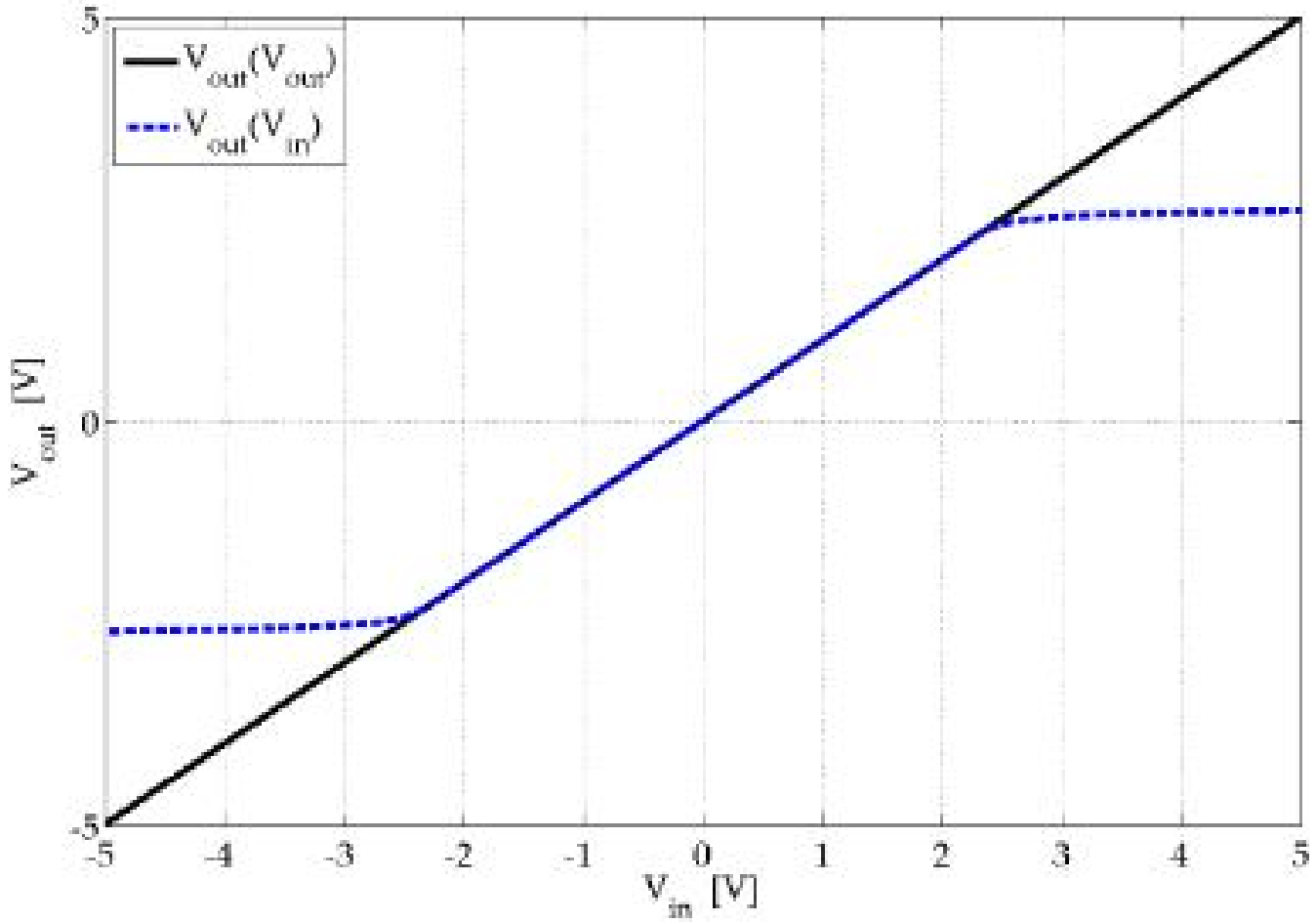
Limitatore Max/Min
Clipping



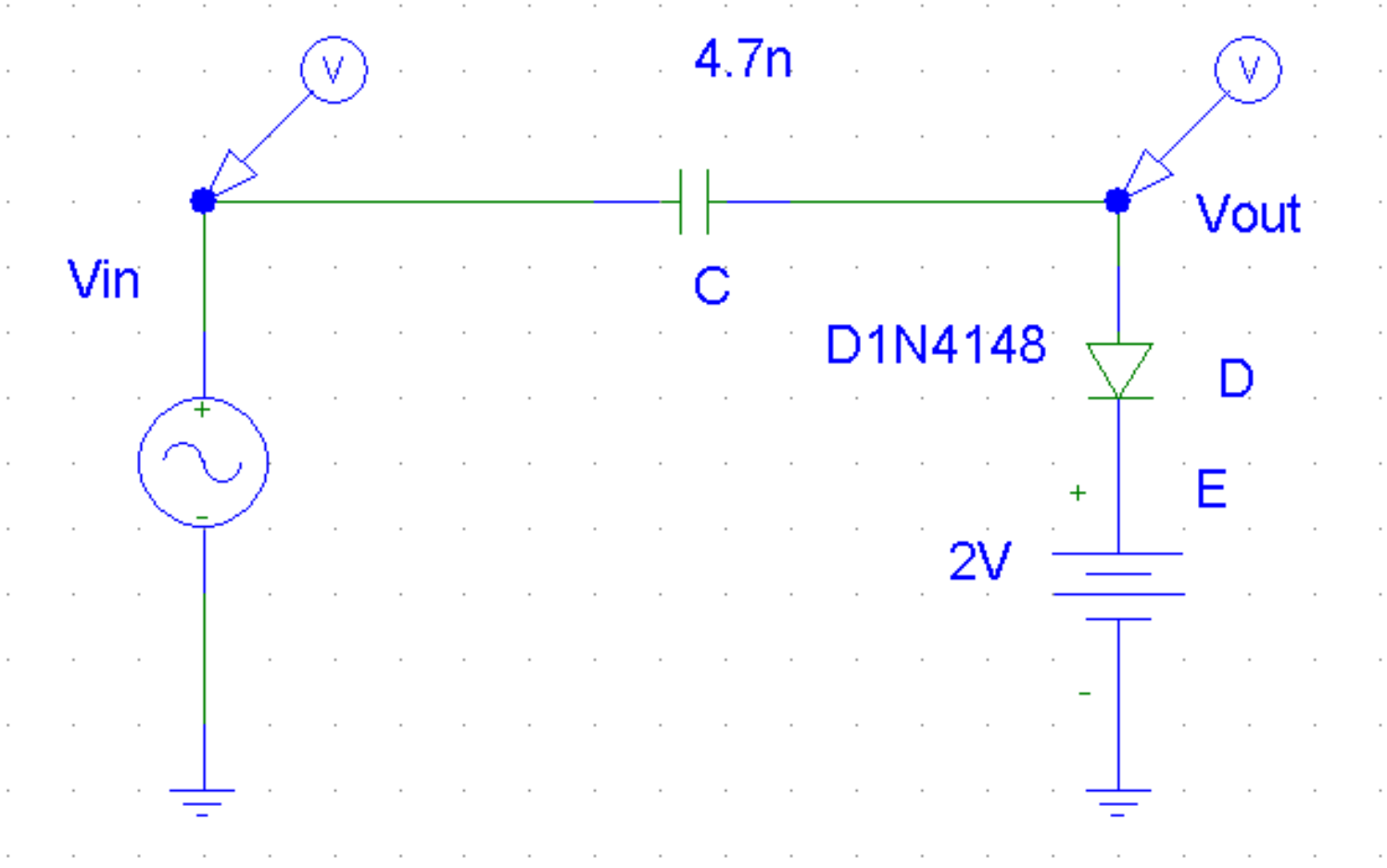
Limitatore Max/Min
Clipping



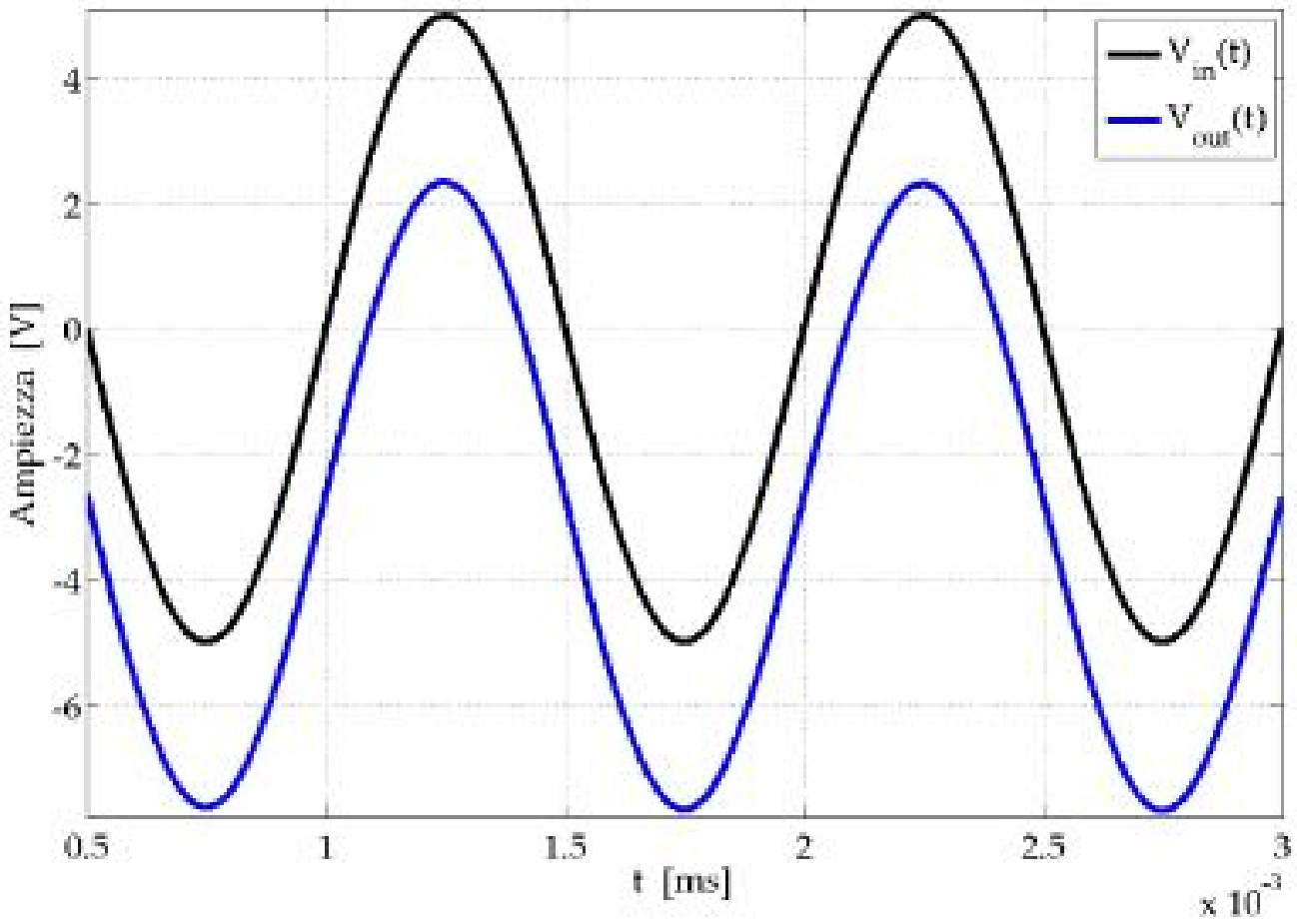
Caratteristica V_{out} (V_{in})



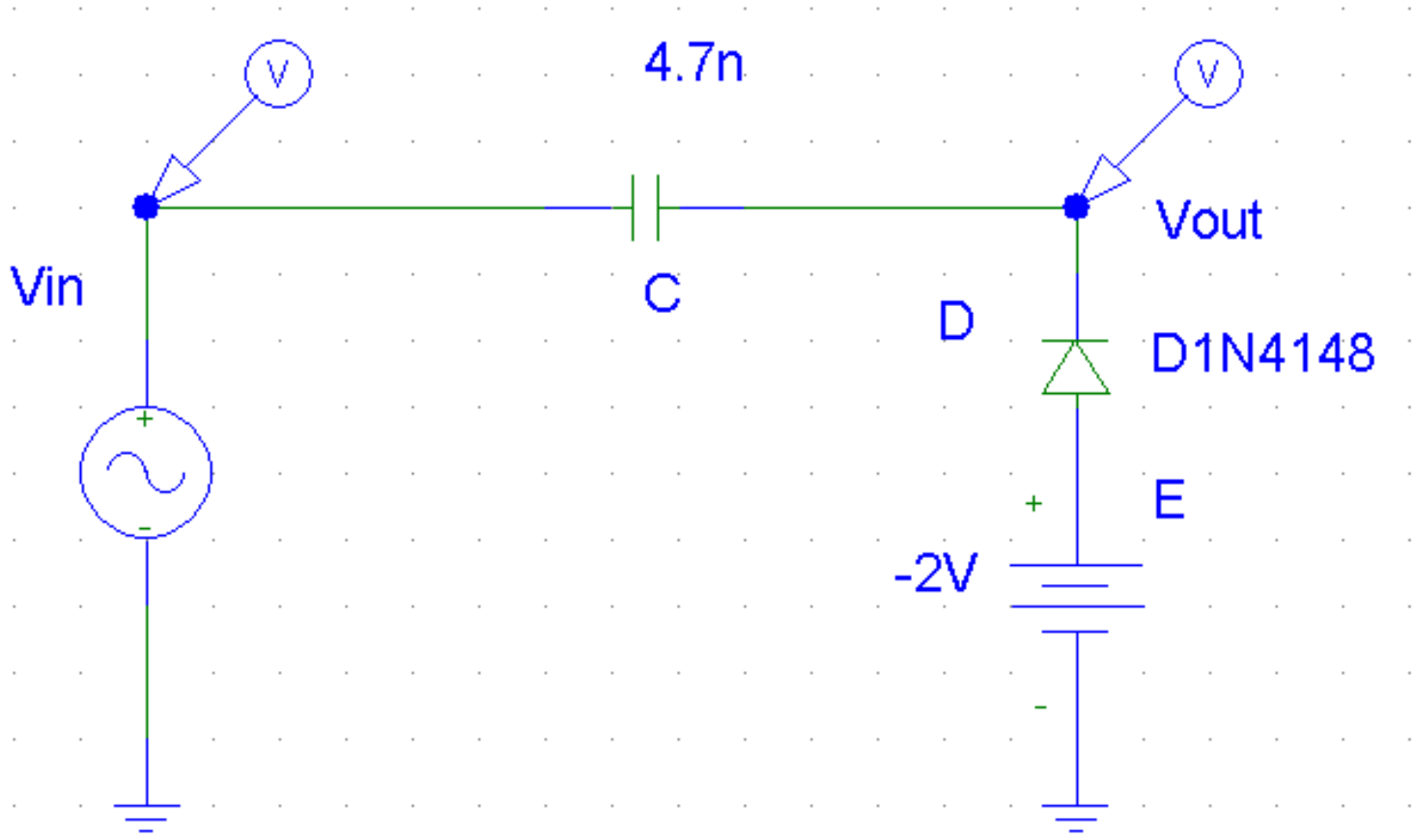
Aggancio del Massimo
Clamping (uscita 5)



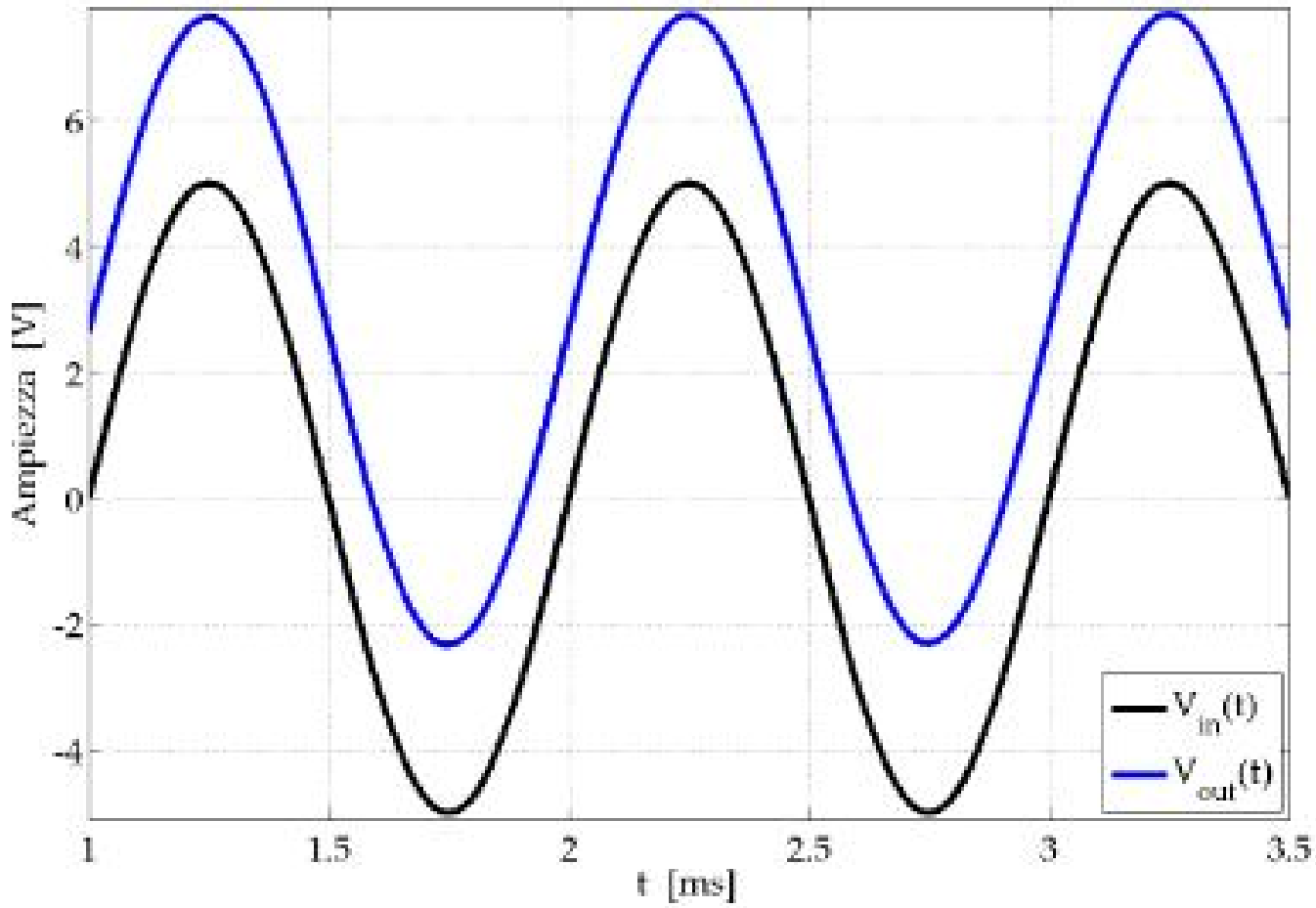
Aggancio del Massimo
Clamping (uscita 5)



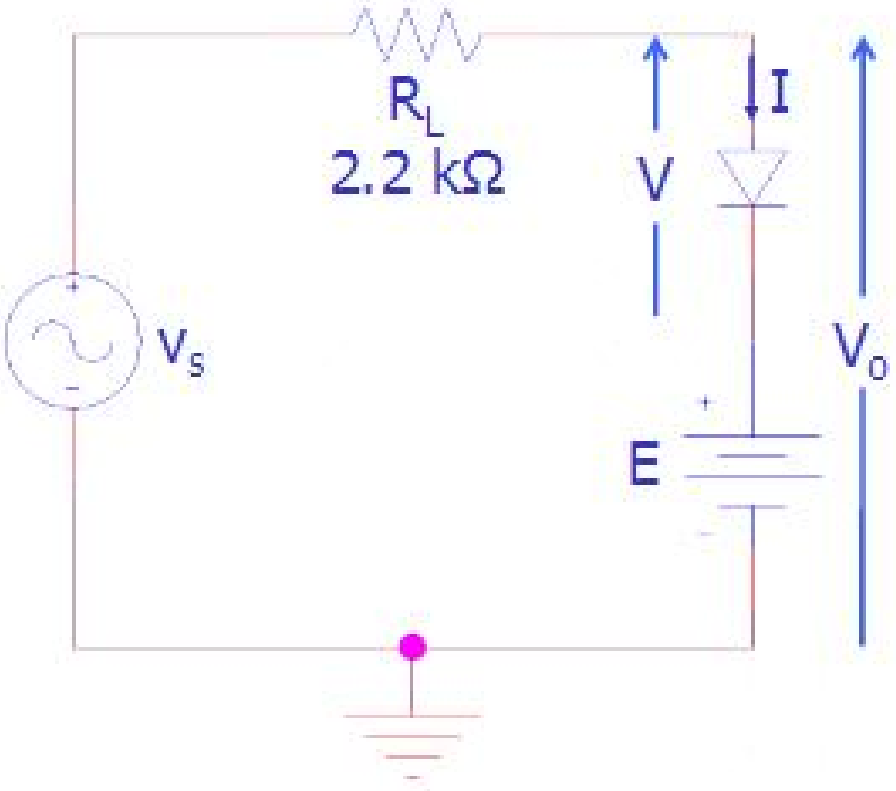
Aggancio del Minimo
Clamping (uscita 6)

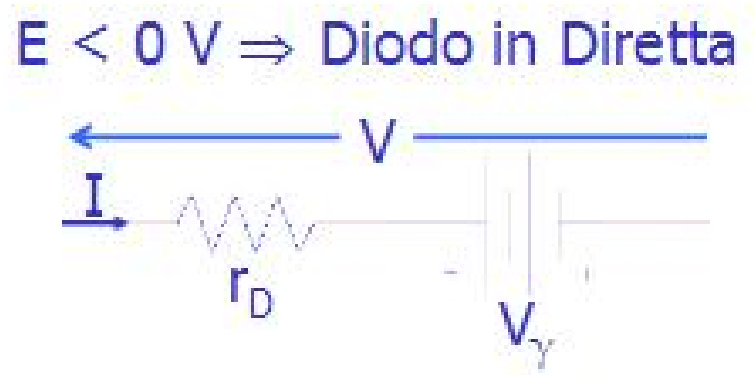


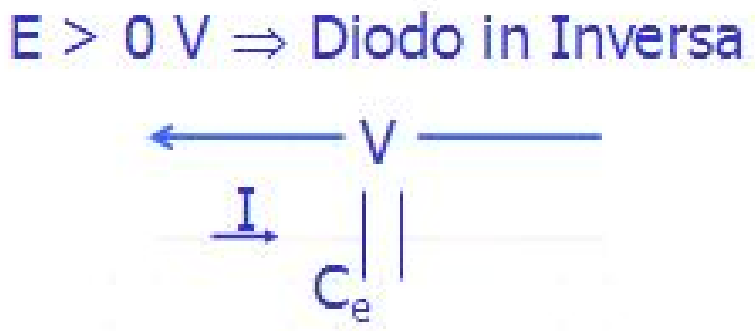
Aggancio del Minimo
Clamping (uscita 6)



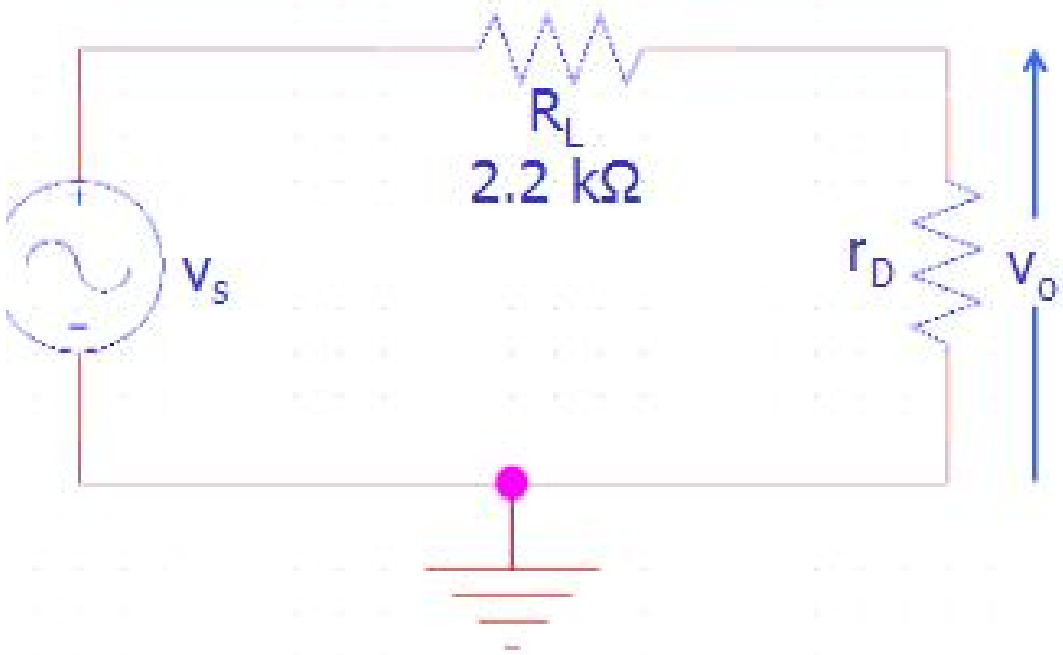
Polarizzazione e Parametri di Piccolo Segnale

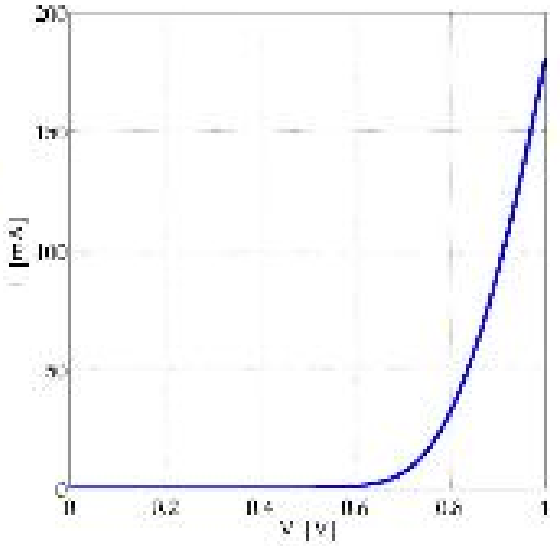






Polarizzazione Diretta (E < 0V)

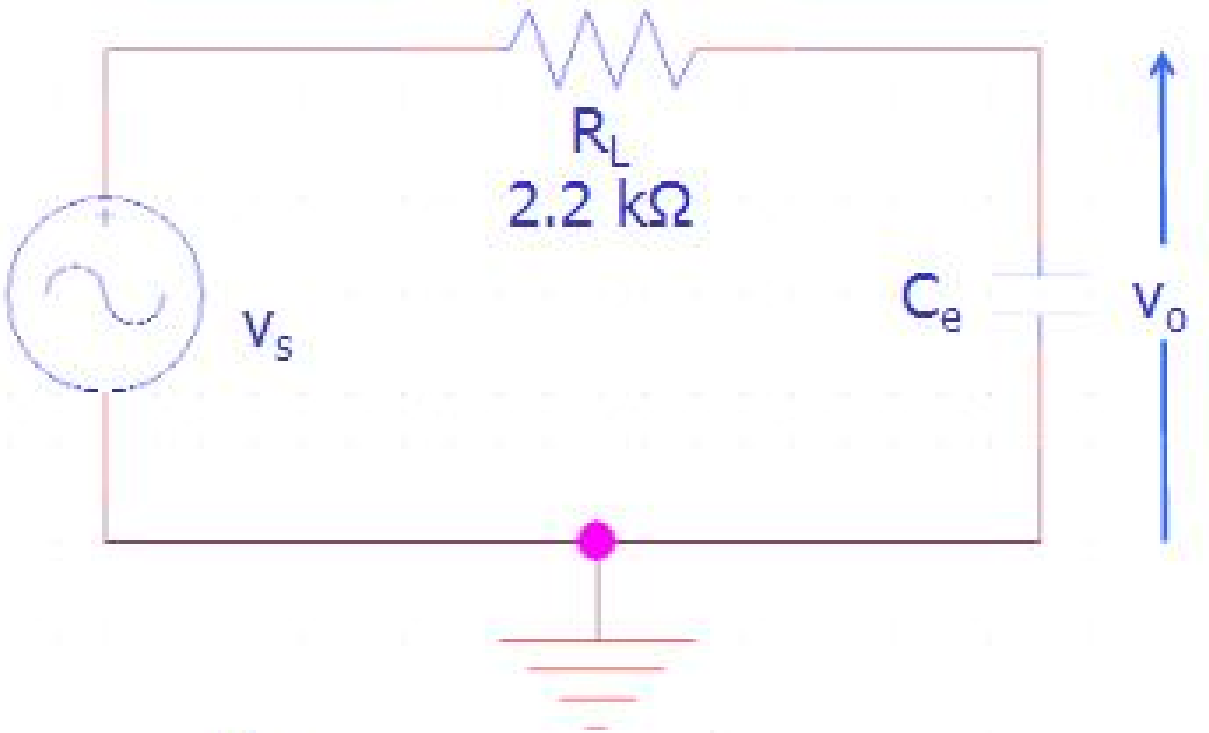




$$r_D = \left[\frac{dI}{dV}\right]^{-1} = \frac{nV_T}{I}$$

$$v_o = v_s \frac{r_D}{r_D + R_L}$$

Polarizzazione Inversa (E > 0V)



$$C_e = \frac{C_0}{\left[1 + \frac{E}{V_C}\right]^{1/2}}$$

$$v_o = v_s \frac{1}{1 + j\omega C_e R_L}$$

Polarizzazione Inversa (E > 0V)