ANALISI DI UN FILTRO CROSSOVER

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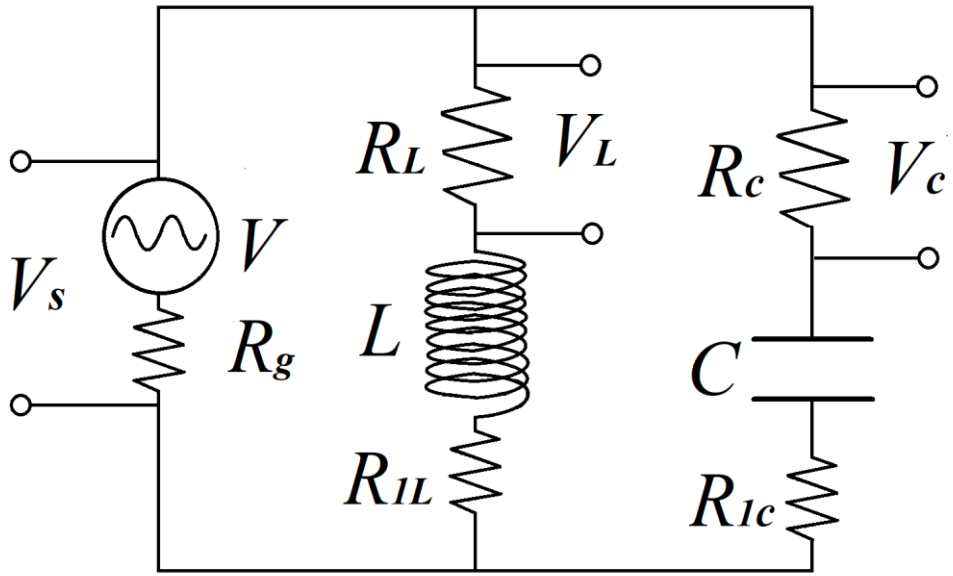
A.A. 2021/2022

APPARATO SPERIMENTALE



Schema del circuito realizzato sulla scheda NI ELVIS II

Function generator

- $R_G \approx 50\ \Omega$
- V : *tensione sinuisoidale con ampiezza* $5V$

Ramo Woofer

- $L = (48.9\ \pm 0.5)\ mH$
- $R_{1L} = (127.14 \pm 0.16)\ \Omega$
- $R_L = (997.9\ \pm 0.5)\ \Omega$

Ramo tweeter

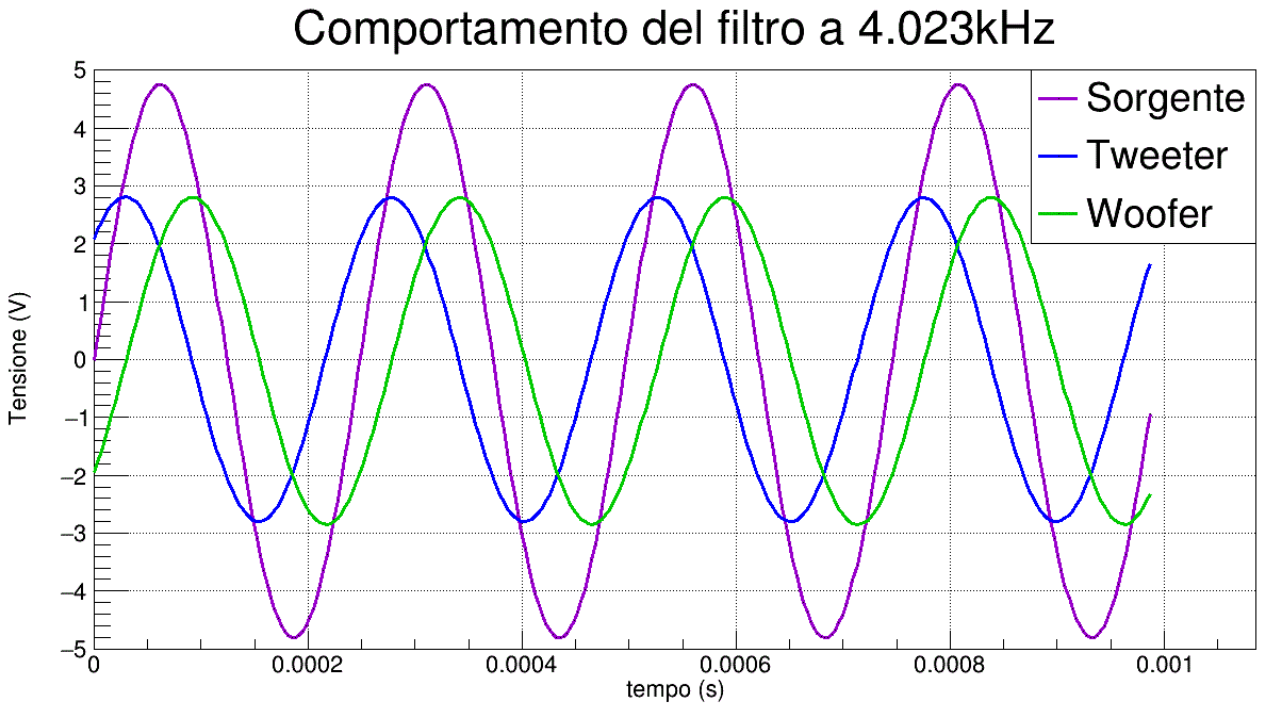
- $C = (32.0\ \pm 0.3)\ nF$
- $R_{1C} = (999.9\ \pm\ 0.5)\ \Omega$
- $R_C = (150.10\ \pm\ 0.17)\ \Omega$

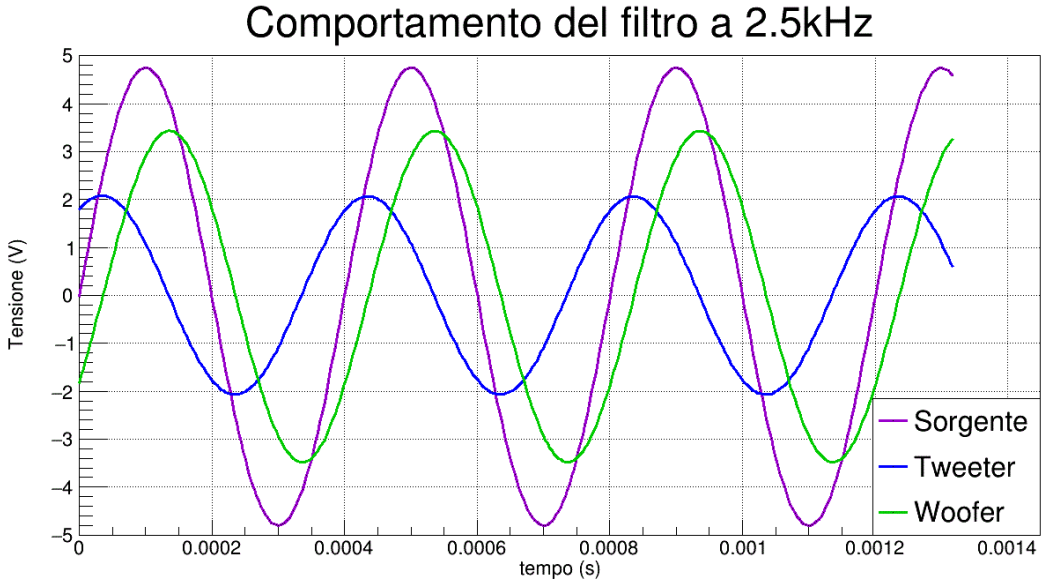
Analisi preliminare

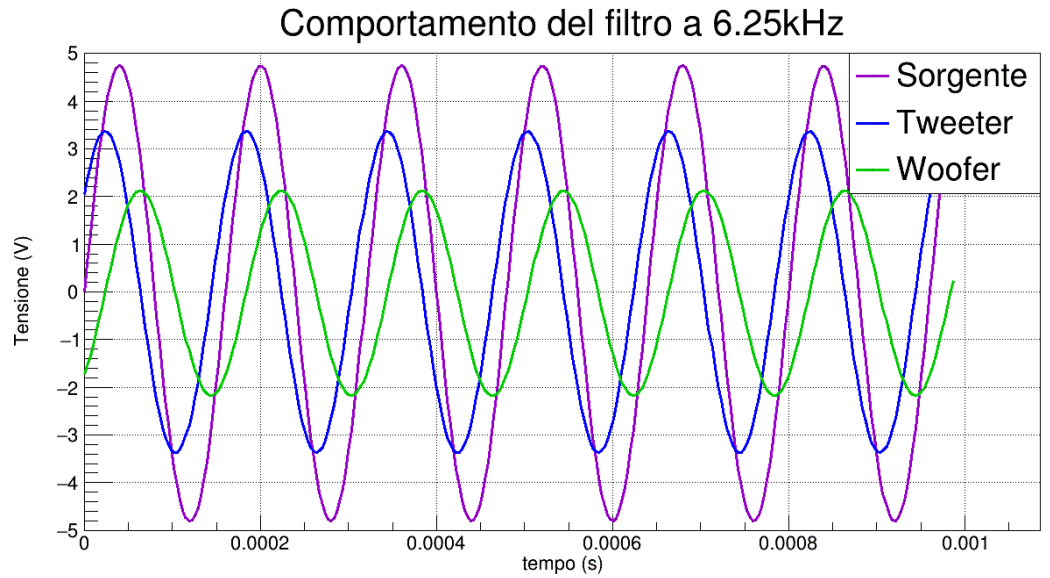
Crossover atteso: $\nu_a = (4020 \pm 50) Hz$

Frequenza di campionamento

- $f = 300\ kHz$





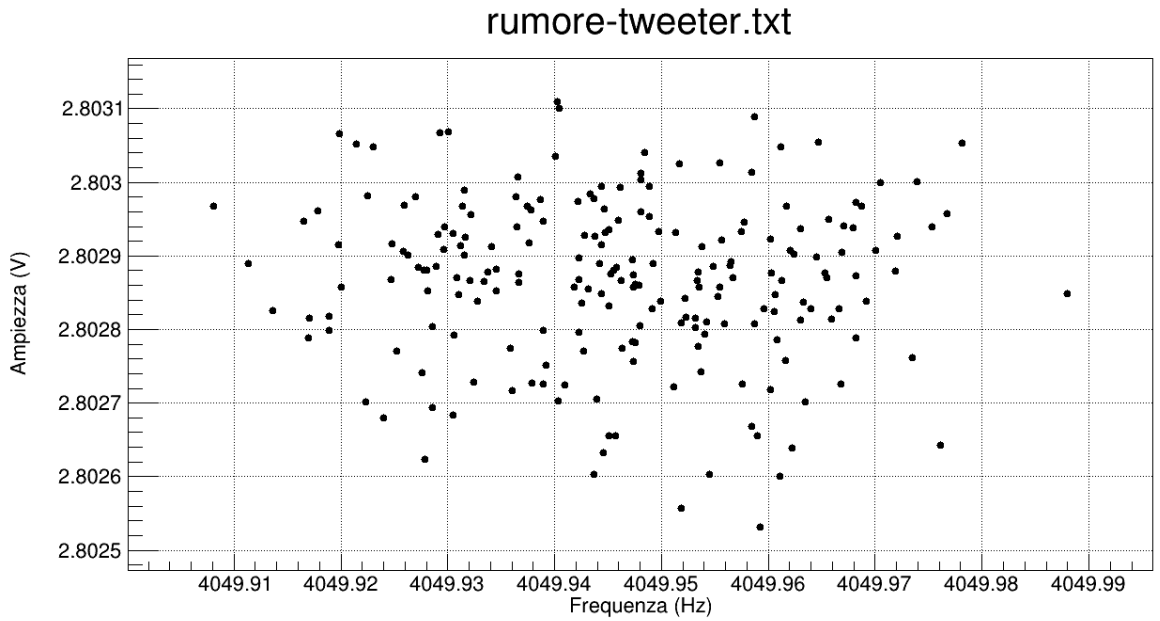


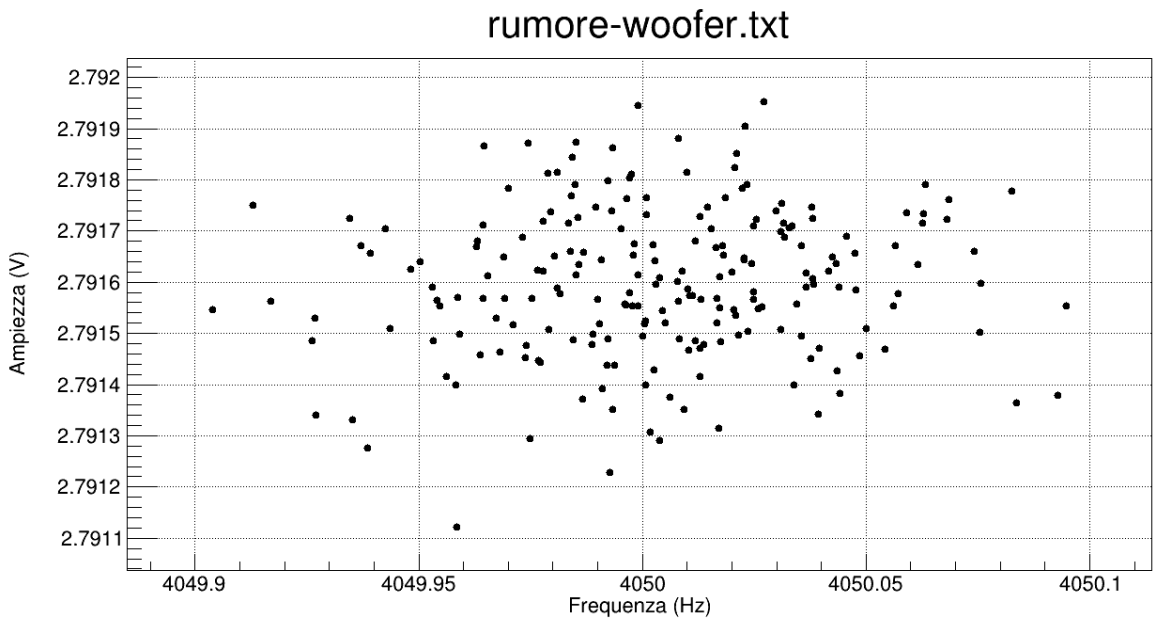
ANALISI TENSIONE: RANGE RISTRETTO

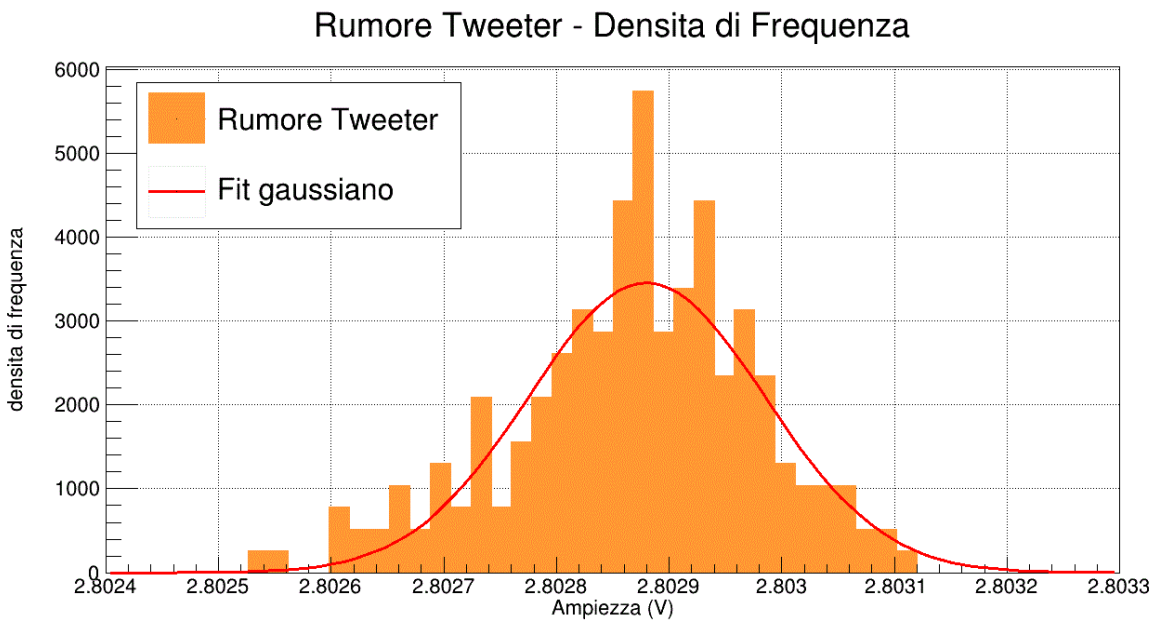
Rumore preso sia sul woofer che sul tweeter:

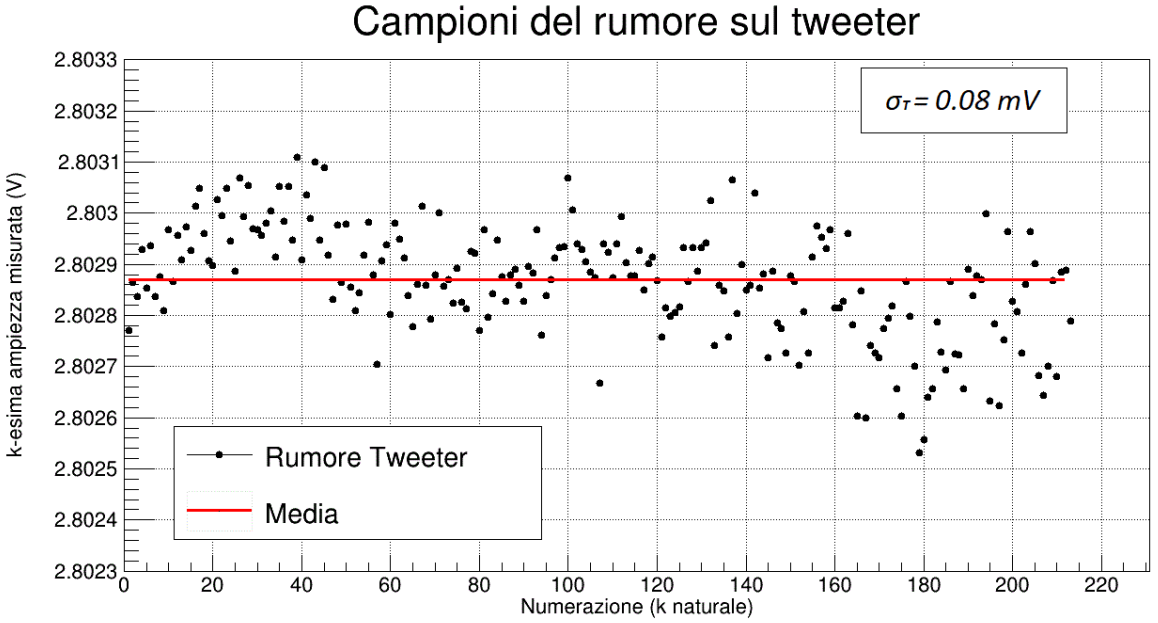
- Abbiamo alimentato il circuito con una frequenza costante vicino a quella di crossover e analizzato con labview l'ampiezza in funzione della frequenza.

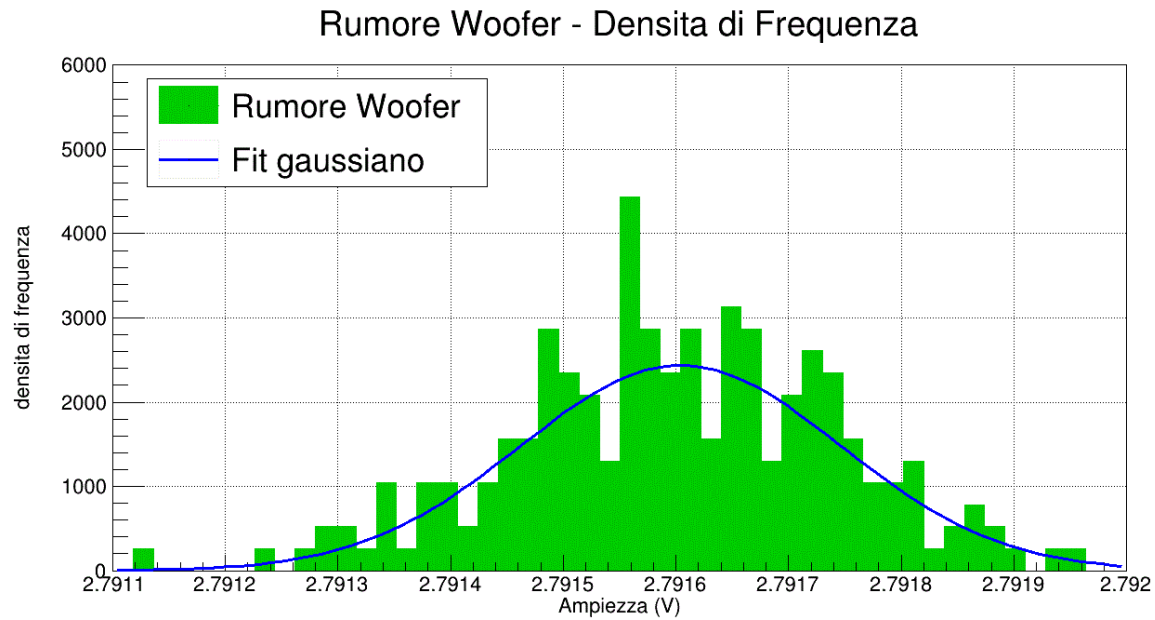
Le oscillazioni sulla frequenza sono state trascurate.

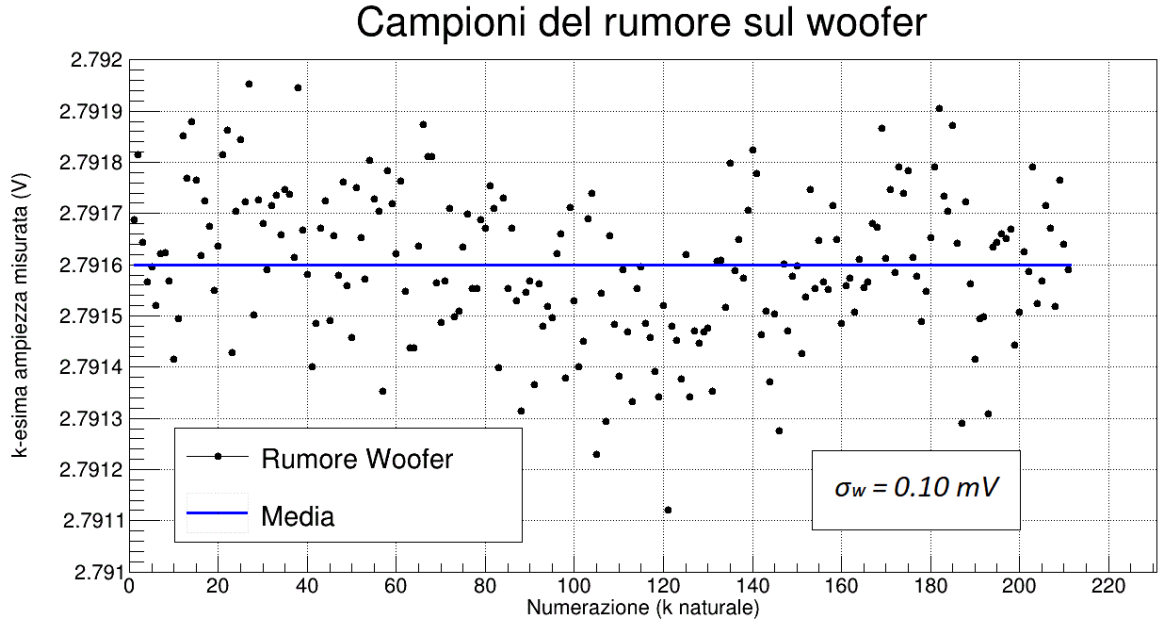





Rumore Tweeter - Densita di Frequenza
Rumore Tweeter
Fit gaussiano
densita di frequenza
Ampiezza (V)
0
1000
2000
3000
4000
5000
6000
2.8024
2.8025
2.8026
2.8027
2.8028
2.8029
2.803
2.8031
2.8032
2.8033


Campioni del rumore sul tweeter
$\sigma_T = 0.08$ mV
Rumore Tweeter
Media
k-esima ampiezza misurata (V)
Numerazione (k naturale)
2.8023
2.8024
2.8025
2.8026
2.8027
2.8028
2.8029
2.803
2.8031
2.8032
2.8033
0
20
40
60
80
100
120
140
160
180
200
220


Rumore Woofer - Densita di Frequenza
Rumore Woofer
Fit gaussiano
densita di frequenza
Ampiezza (V)
0
1000
2000
3000
4000
5000
6000
2.7911
2.7912
2.7913
2.7914
2.7915
2.7916
2.7917
2.7918
2.7919
2.792


Campioni del rumore sul woofer
$\sigma_W = 0.10$ mV
Rumore Woofer
Media
k-esima ampiezza misurata (V)
Numerazione (k naturale)
2.791
2.7911
2.7912
2.7913
2.7914
2.7915
2.7916
2.7917
2.7918
2.7919
2.792
0
20
40
60
80
100
120
140
160
180
200
220

Fit parabolici su woofer e tweeter

Errori usati nelle misure di ampiezza

- Tweeter $\delta V_T = 2\sigma_T = 0.16\, mV$
- Woofer $\delta V_W = 2\sigma_W = 0.2\, mV$

$\widetilde{\chi_T}^2 = 1.166$ $\quad R_T{}^2 = 0.999996$

$\widetilde{\chi_W}^2 = 0.4581$ $\quad R_W{}^2 = 0.999981$