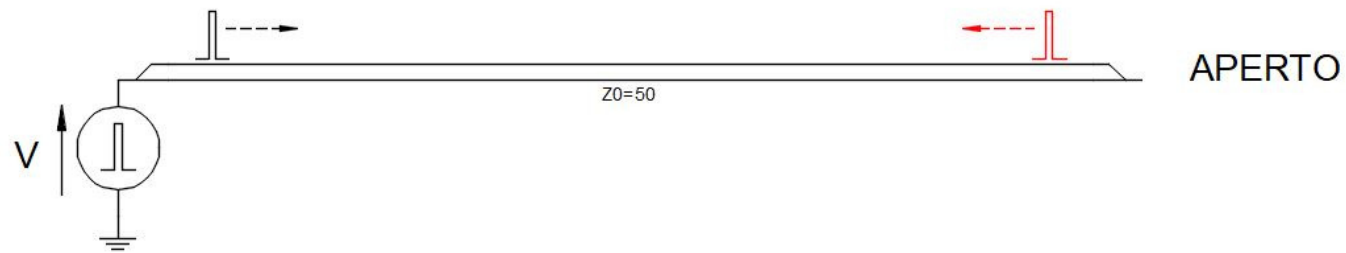


# TIME DOMAIN REFLECTOMETER

By iw2fnd Lucio

# PRINCIPLE OF TDR OPERATION



$$L = c \cdot VF \cdot \frac{t_v}{2}$$

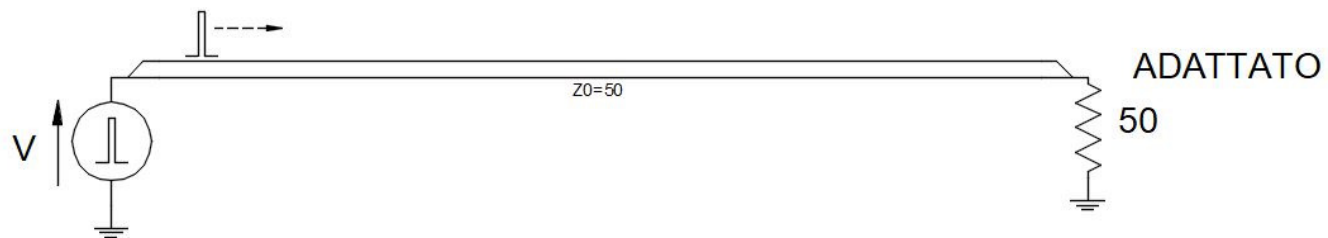
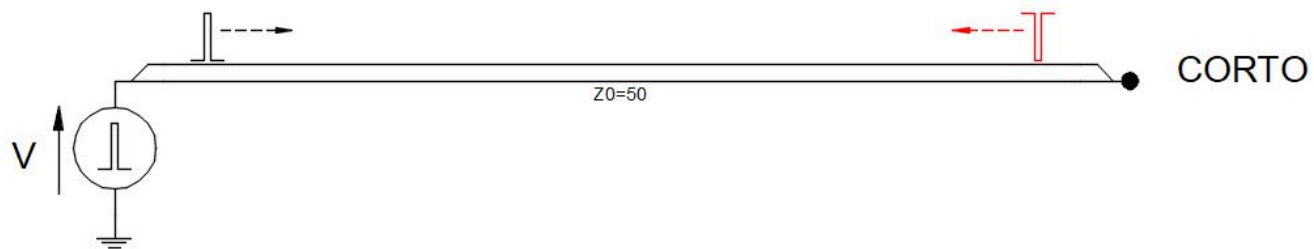
$$t_v = 200 \text{ ns}$$

$$VF = 0,66$$

$$c = 300 \cdot 10^6 \frac{\text{m}}{\text{s}}$$

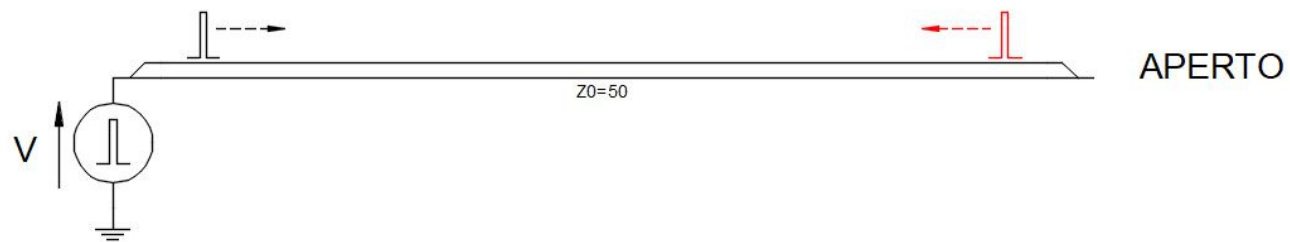
$$L = c \cdot VF \cdot \frac{t_v}{2} = 300 \cdot 10^6 \cdot 0,66 \cdot \frac{200^{-9}}{2} = 19,8 \text{ m}$$

# PRINCIPLE OF TDR OPERATION



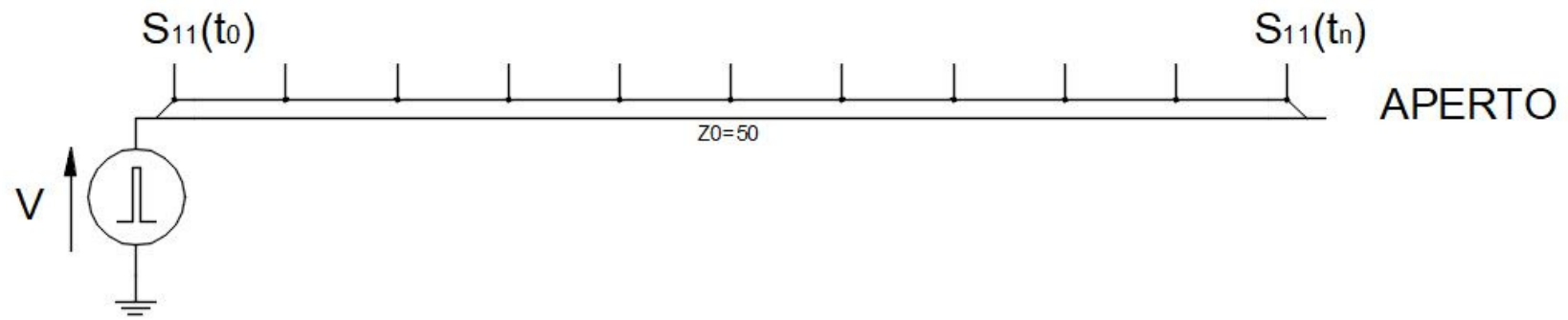
# PRINCIPLE OF TDR OPERATION

$$\rho = \left| \frac{V_R}{V_D} \right| = |S_{11}|$$



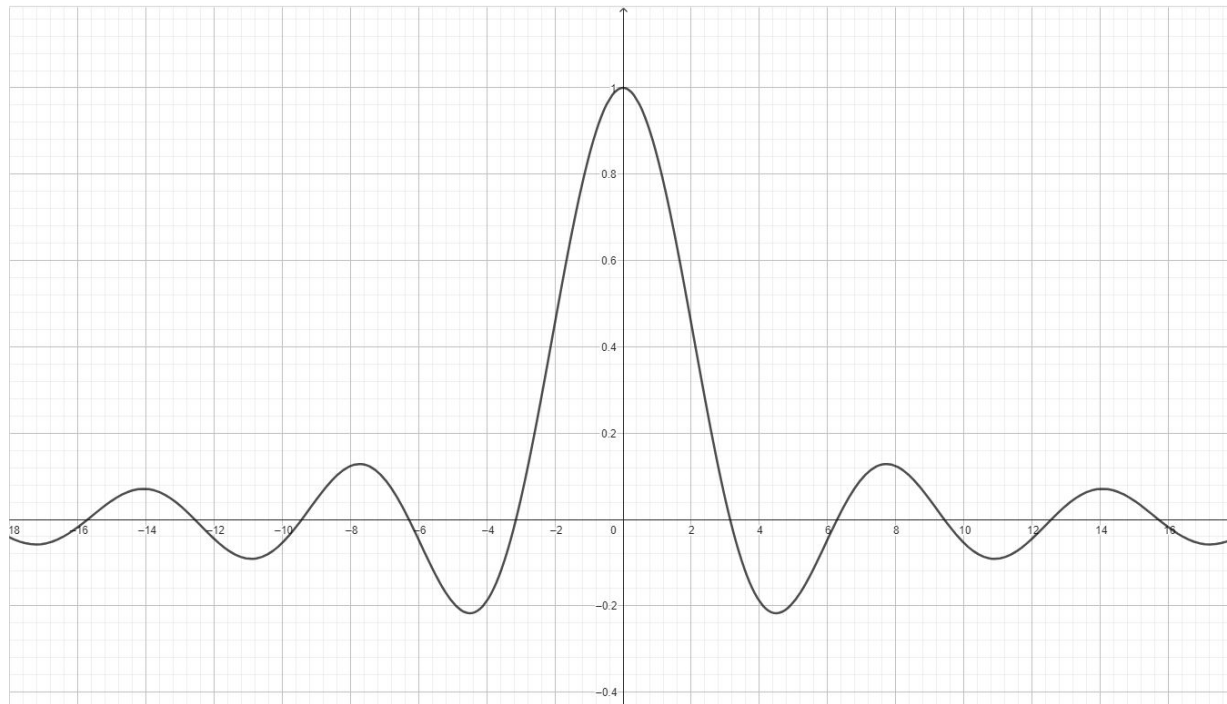
$$VSWR = \frac{1 + \rho}{1 - \rho}$$

# TDR WITH VNA



# TDR WITH VNA

$$\frac{\sin(x)}{x}$$



# TDR WITH NanoVNA

$$Span [MHz] = \frac{0,288 \cdot N^2 \cdot VF}{L [m]}$$

TDR NanoVNA start 10kHz VF 100%				
	201 punti		101 punti	
Span [MHz]	t [ns]	L [m]	t [ns]	L [m]
10	7820	1170	1950	293
20	3900	585	977	146
30	2600	390	651	97,6
40	1950	292	488	73,2
50	1560	234	390	58,5
60	1300	195	325	48,8
70	1110	167	279	41,8
80	976	146	244	36,6
90	868	138	217	32,5
100	781	117	195	29,2
150	520	78	130	19,5
200	390	58,5	97,6	14,6
300	260	39	65,1	9,75
400	195	29,2	48,8	7,31
500	156	23,4	39	5,85
1000	78,1	11,7	19,5	2,92
1500	52	7,8	13	1,95
2000	39	5,85	9,76	1,46
2500	31,2	4,68	7,81	1,17
3000	26	3,9	6,51	0,979