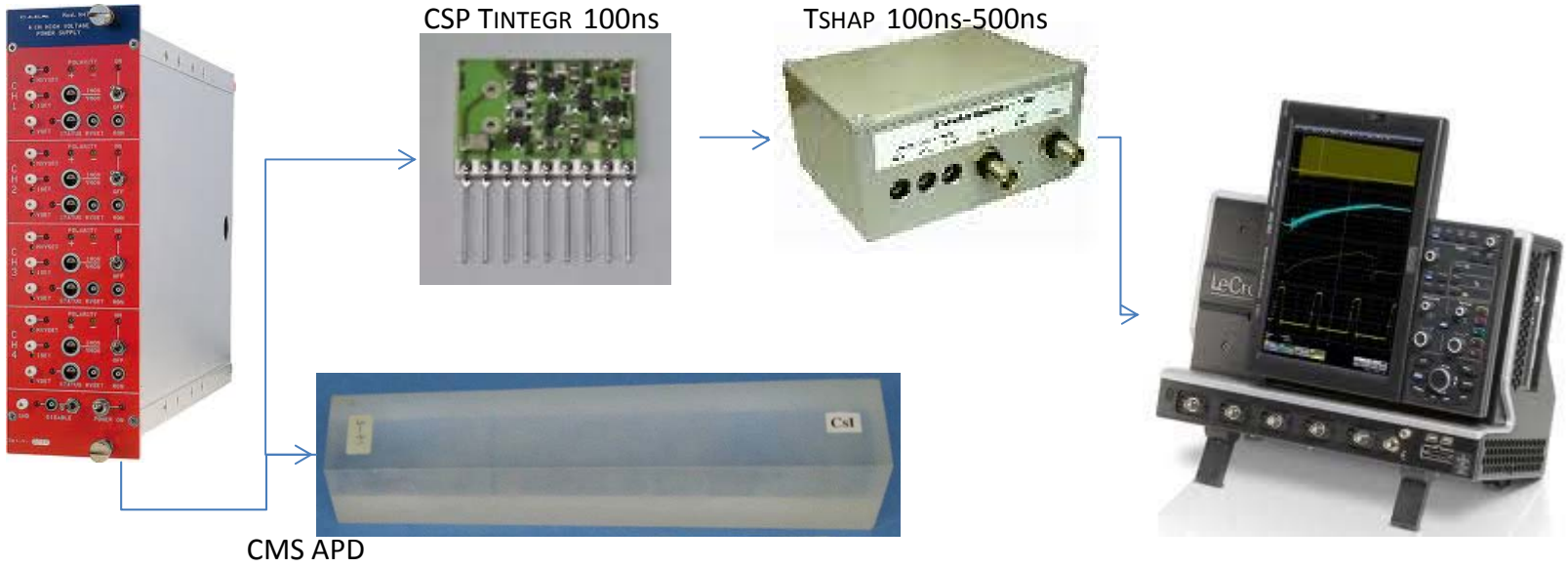
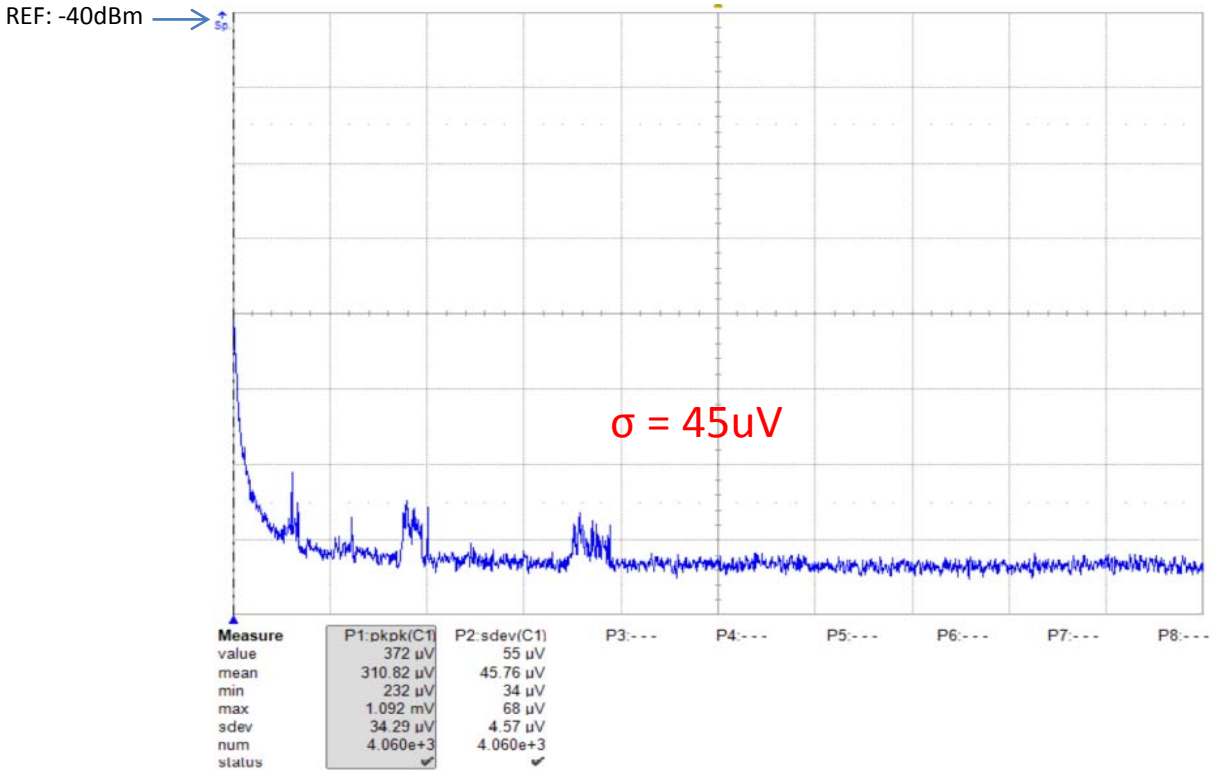
CSP HAMAMATSU H4083 (TIA configuration) CREMAT CR200 noise analysis

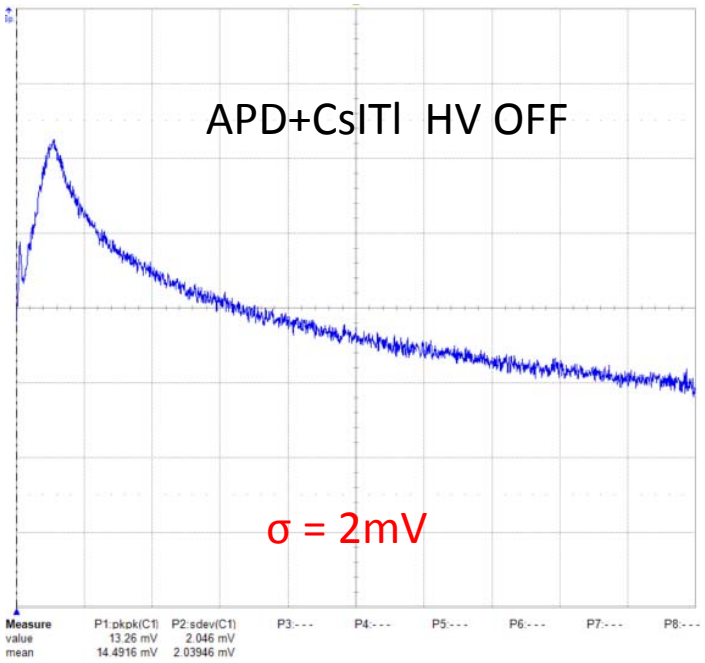
L.Recchia
(presented by V. Bocci)

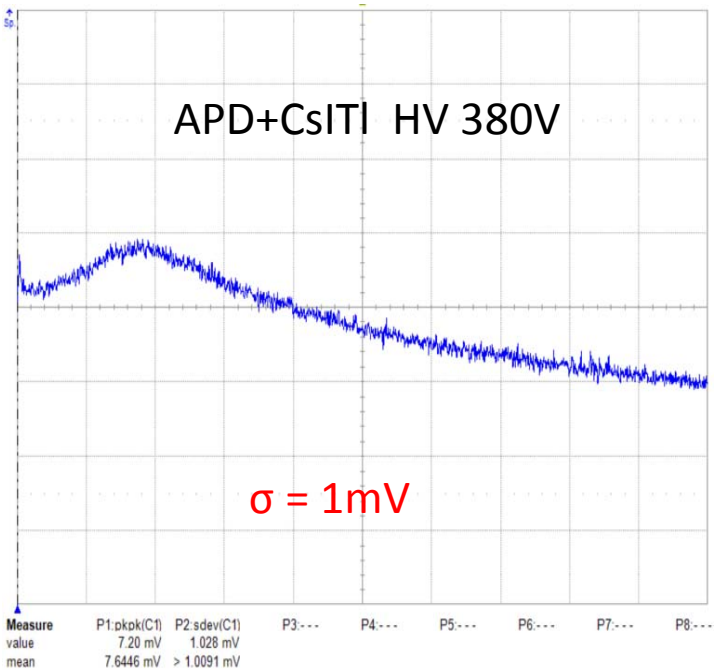


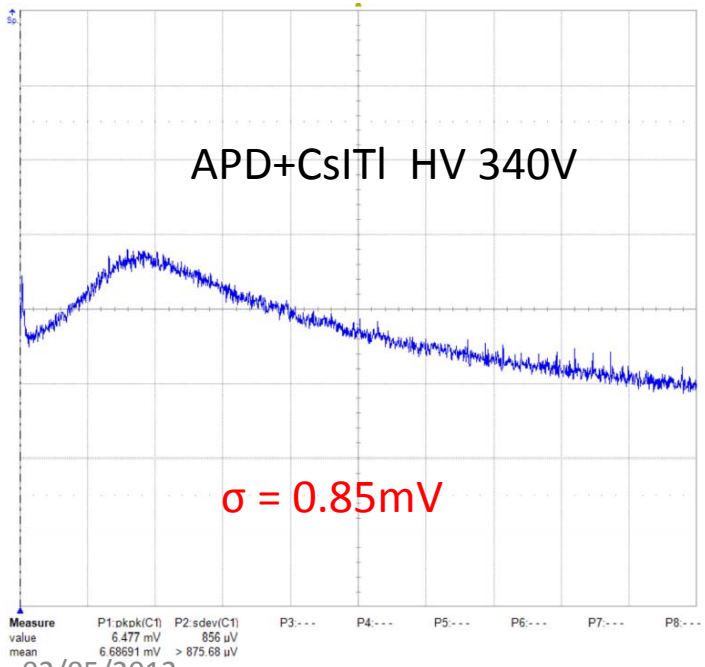
Noise spectrum
LeCroy HRO 64 Zi Scope



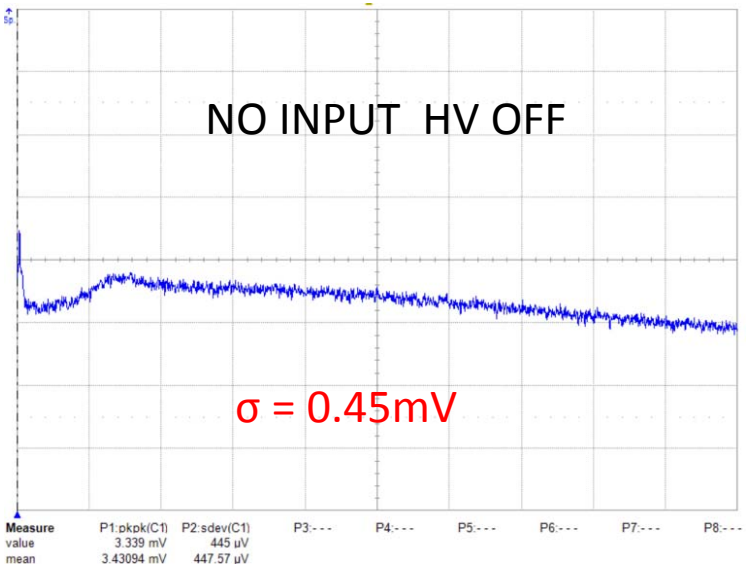
SETUP: BWL 20MHz, 50Ohm, Ref=-40dBm, 10dB/div, 5MHz, 500KHz/div

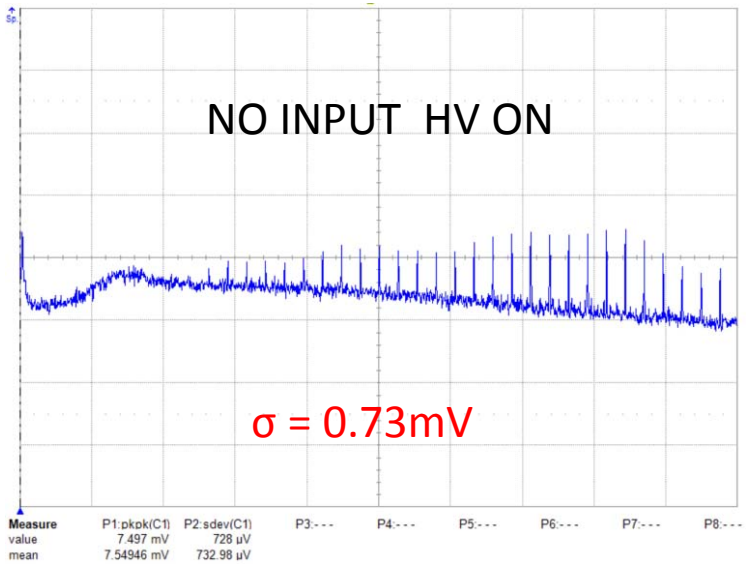


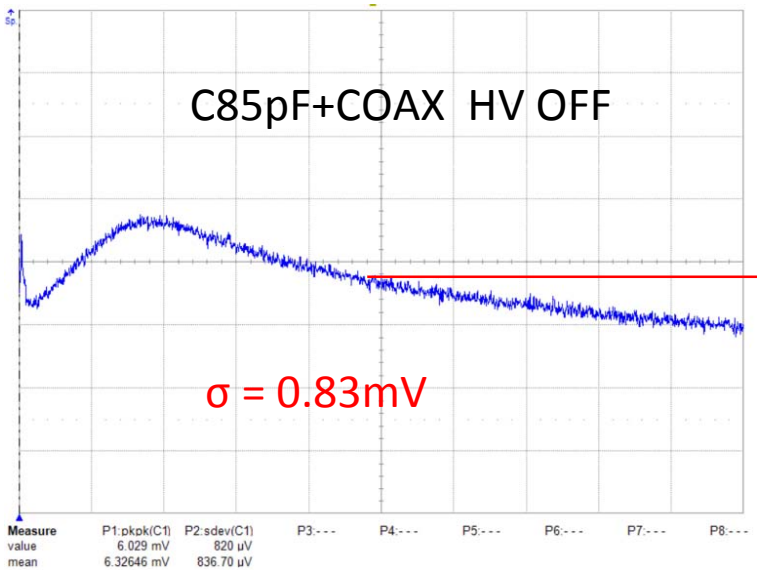


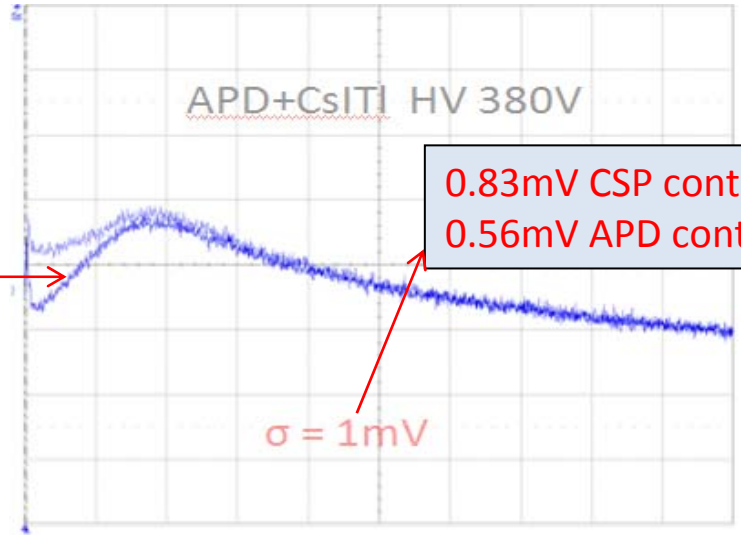


Noise spectrum H4083 single ended output



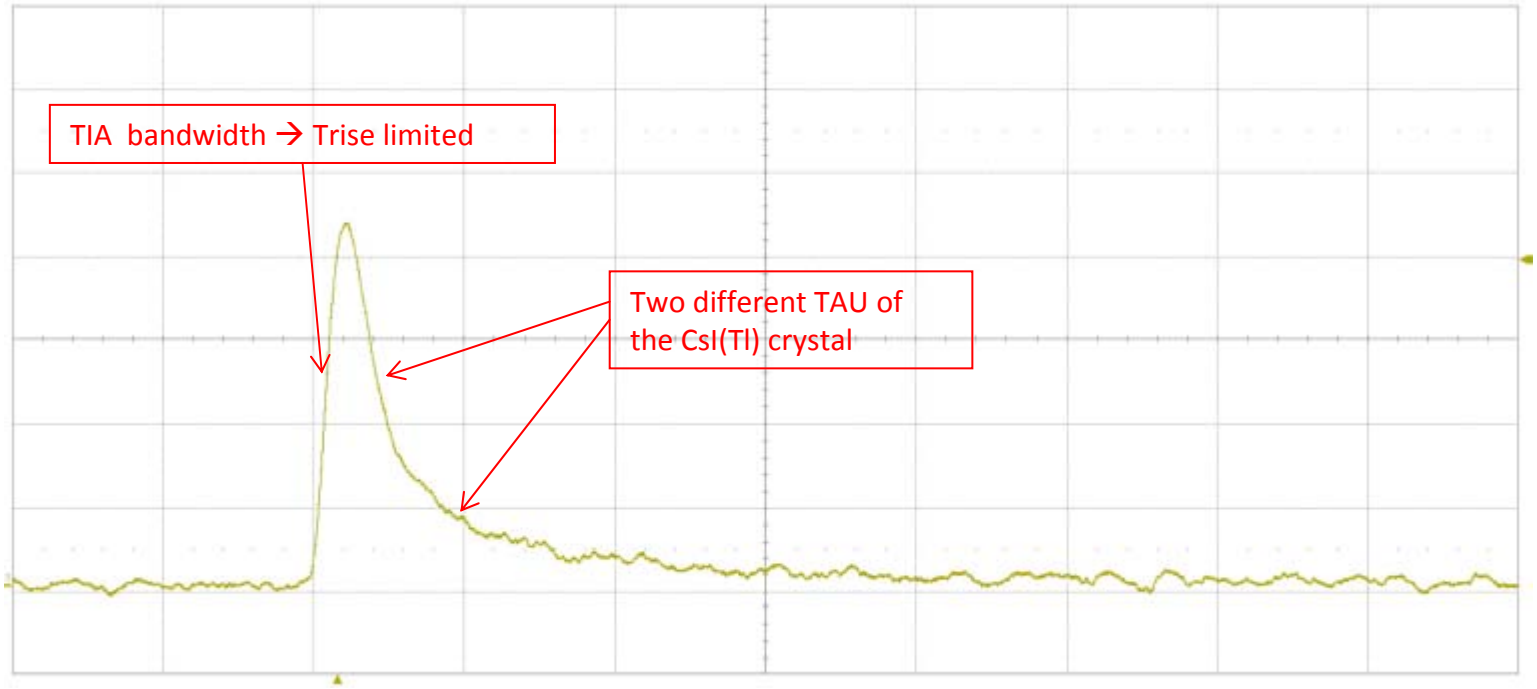






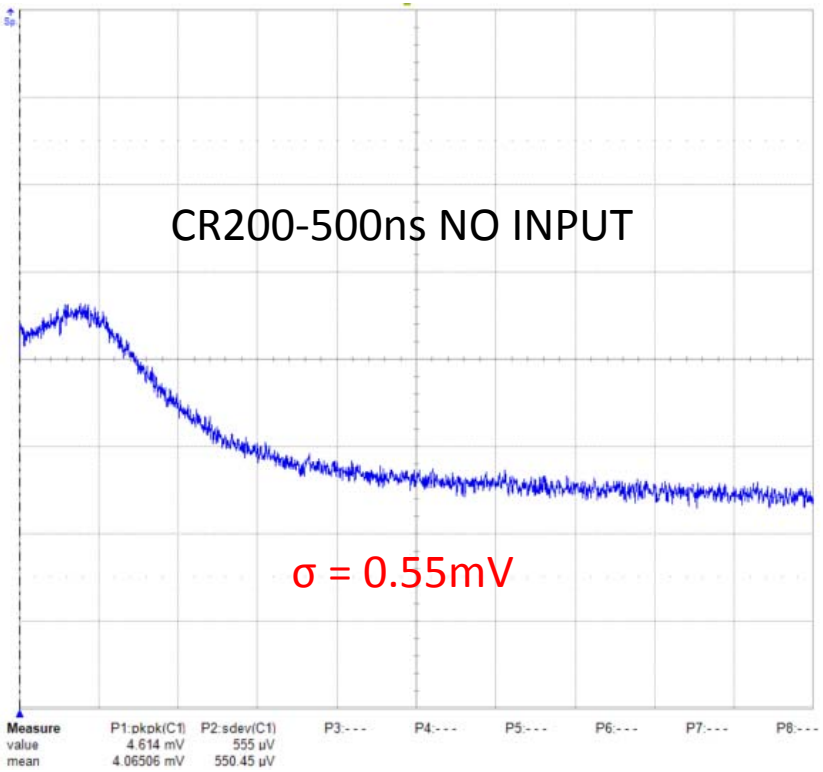
0.83mV CSP contribution
0.56mV APD contribution

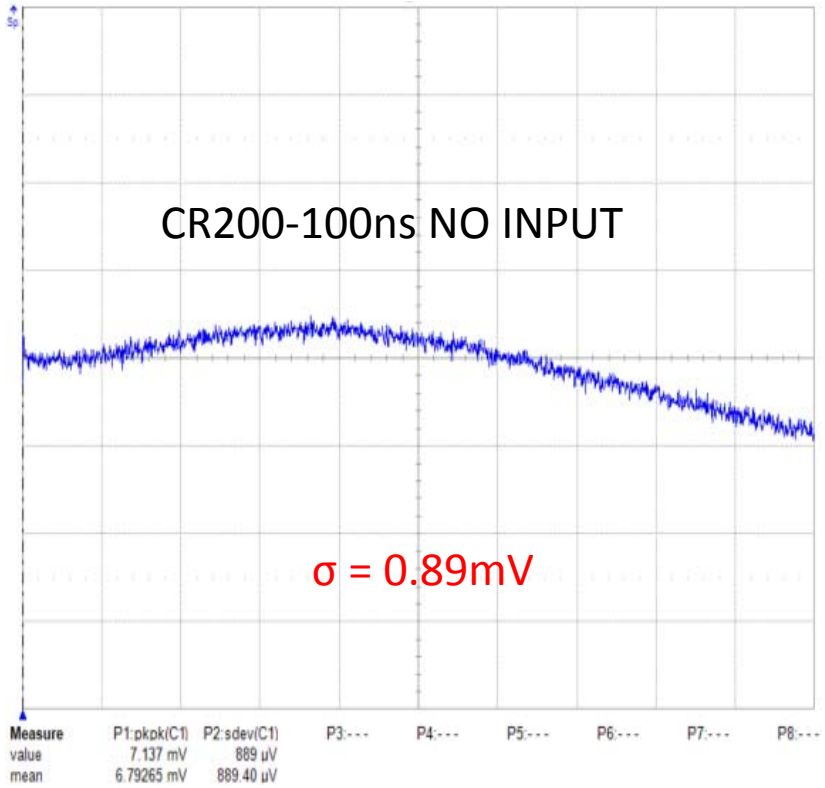
Typical response from Cosmic (CsI(Tl)+APD@ 380V+H4083@1MV/I)



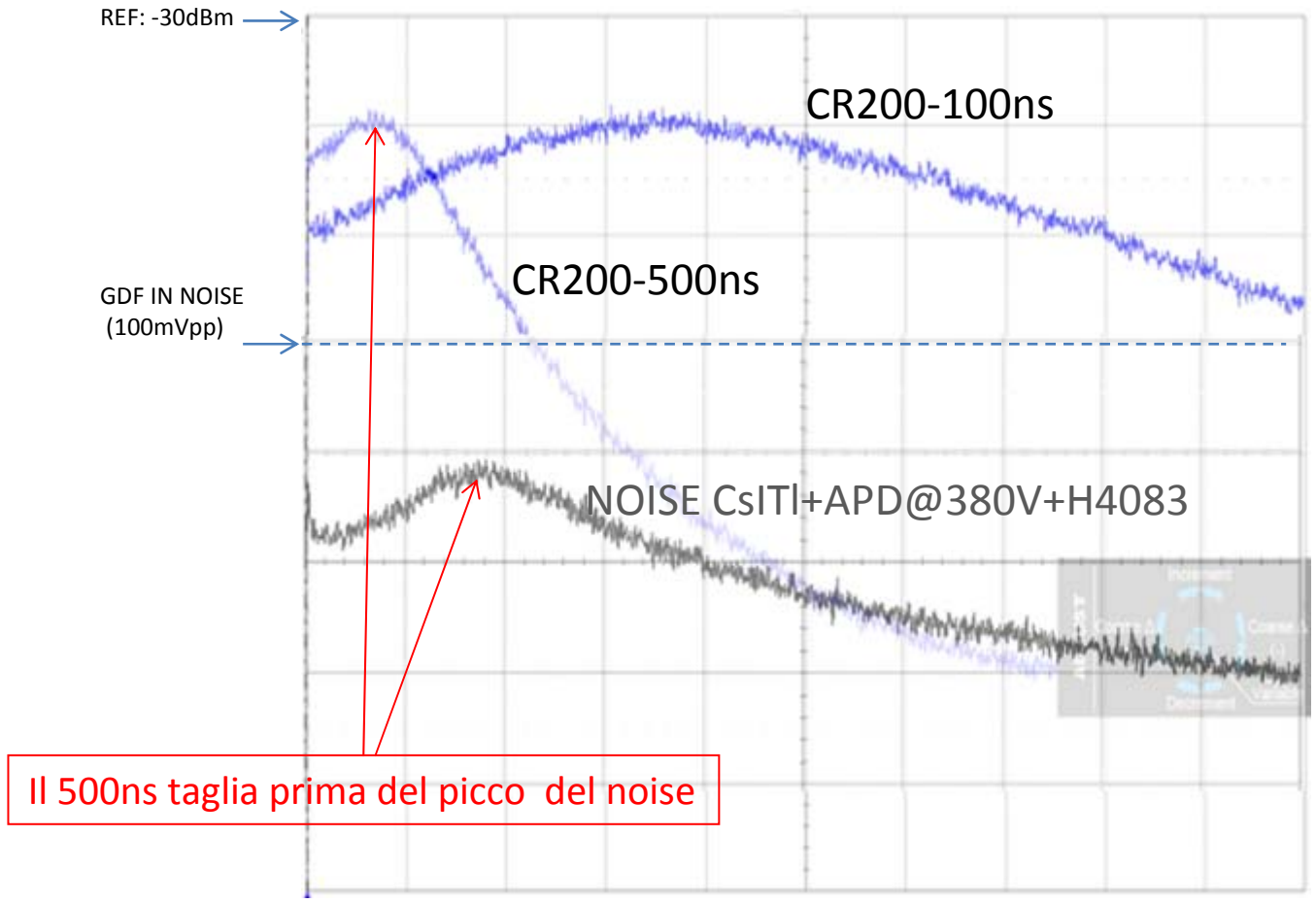
SETUP: 2us/div, 20mV/div, 50Ohm, BWL 20M

SHAPER BOX CR160 noise spectrum

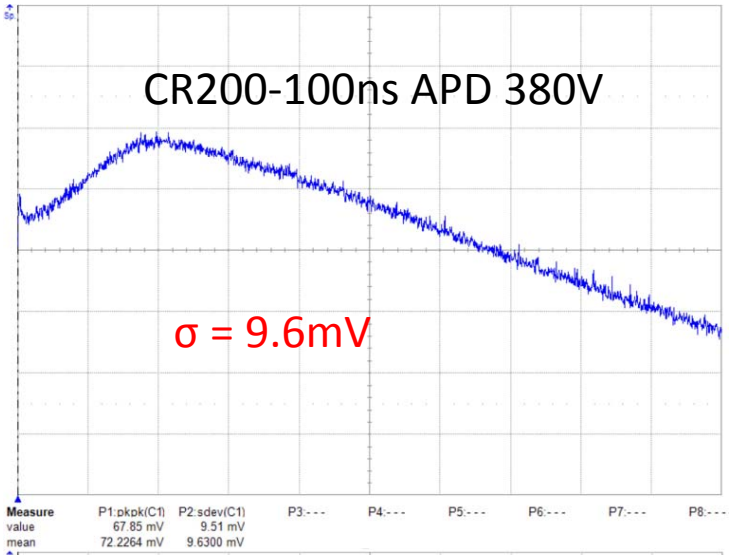


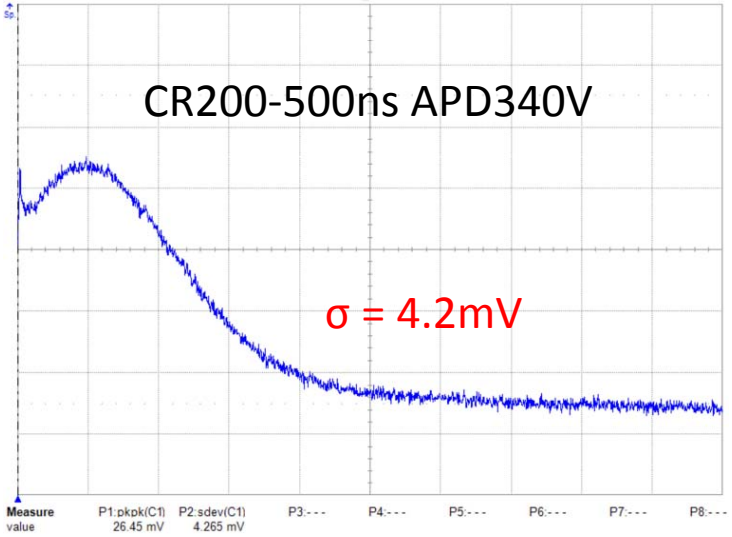


Frequency response SHAPER 0-5MHz



Noise output from the chain





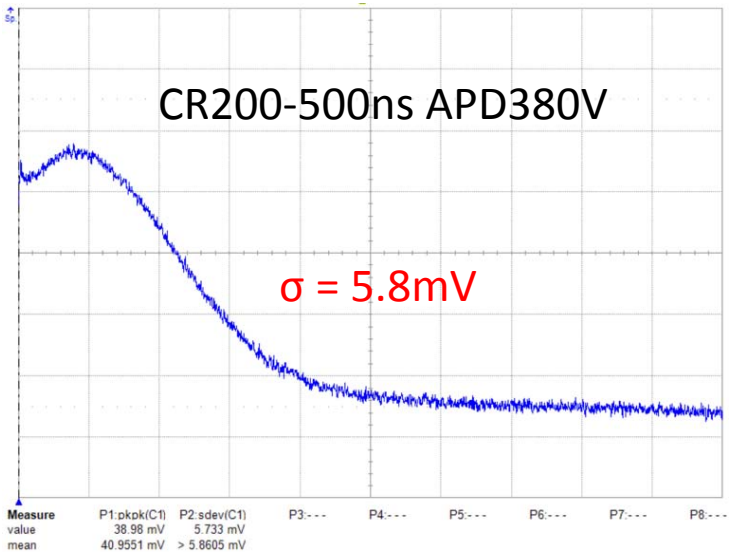


TABELLA MISURE

OGGETTO	CONFIGURAZIONE	NOISE Vrms 20MHz
LeCroy HRO 64 Zi	BWL 20MHz, 1mV/div	0.045m
H4083	APD HV OFF	2m
H4083	APD HV 340	0.85m
H4083	APD HV380	1m
H4083	NO INPUT-HV OFF	0.45m
H4083	C 85pF HV OFF	0.83m
CR200-100	NO INPUT BOX CR160	0.89m
CR200-500	NO INPUT	0.55m
H4083+CR200-100	APD HV380	9.63m
H4083+CR200-500	APD HV380	5.86m

CONCLUSIONI

- Il CSP H4083 with an integration time of 100 ns it is pratically a **transimpedance** amplifier (TIA) and follow the CsI(Tl) signal with two costant time coming from the crystal and a $Trise_{100\%}$ of about 400ns from the H4083.
- The Noise TIA + APD@340V IS EQUIVALENT from the noise TIA + Ceq .
- At 380V the noise from APD comes out . From 340V to 380V the noise increase 1.2 times but the signal increase of 2.5 time , than the S/N at 380 V is better
- The HV CAEN noise is evident with empty input CSP but negligible in normal condition. The noise almost does not change when the HV is disabled, disappear swithing off the HV or detouching the HV cable .
- The CR200-500 shaper in this case is better not only for a lower specific noise but also because the H4083 specific noise is better filtered respect to CR200-100 shaper.

APD GAIN – VOLTAGE by A. Rossi