Test of the Modified Preamplifier

Injecting capacitor 10pF, Detector capacitor 330 pF.

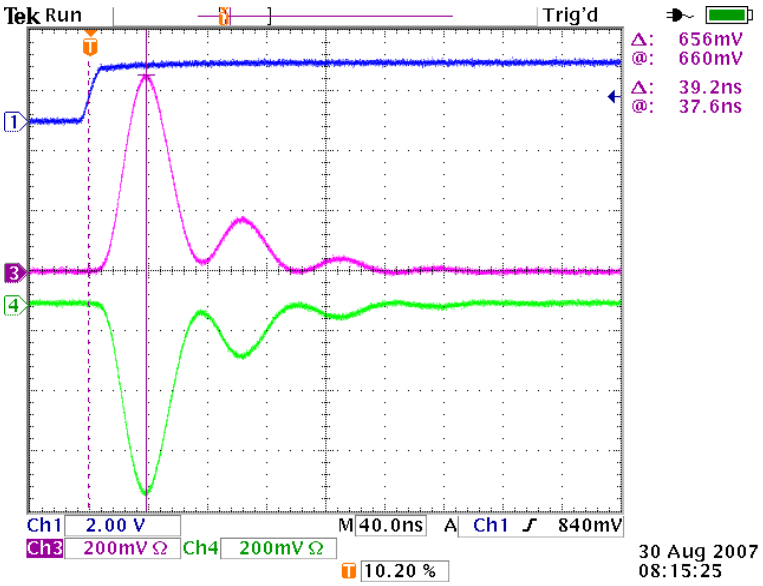

Fig. 1: Response to step 100mV front 10ns. Pretty much highest non-saturated signal. Injected charge 1pC.

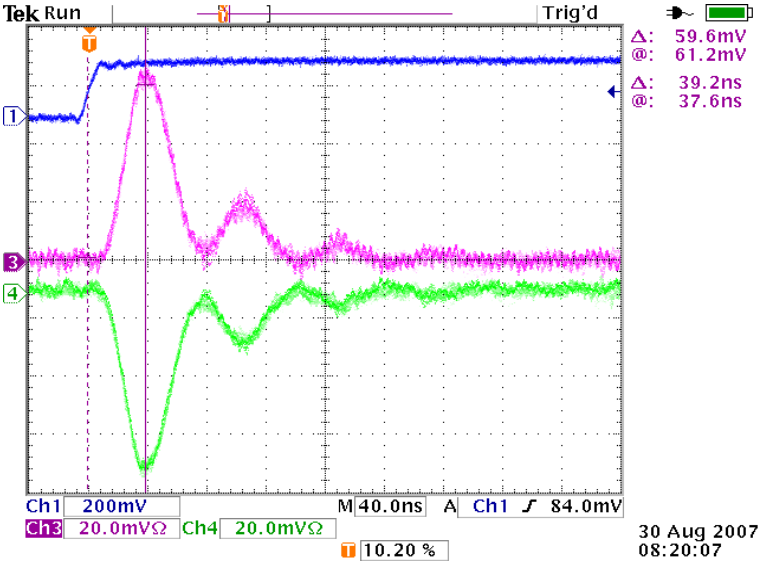

Fig. 2: Response to step 10mV, 10ns. Injected charge 100 fC.

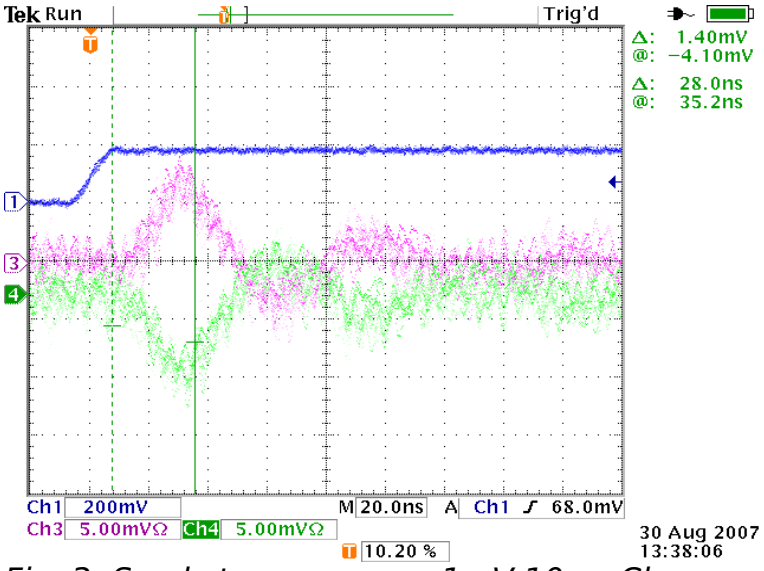

Fig. 3: Smal step response, 1mV 10ns. Charge 10 fC. Note parasitic oscillations at 25MHz, 5mV.

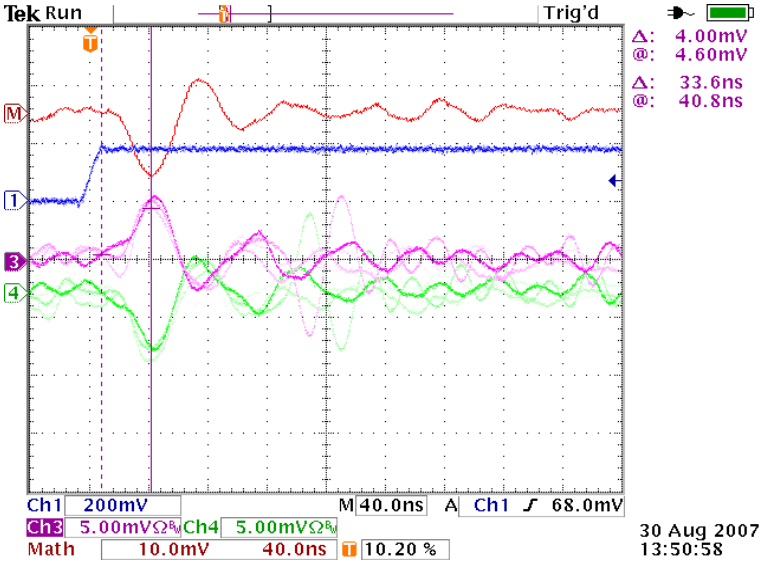

Fig. 4: Small step response, 1mV 10ns. Bandwidth limited to 20MHz.

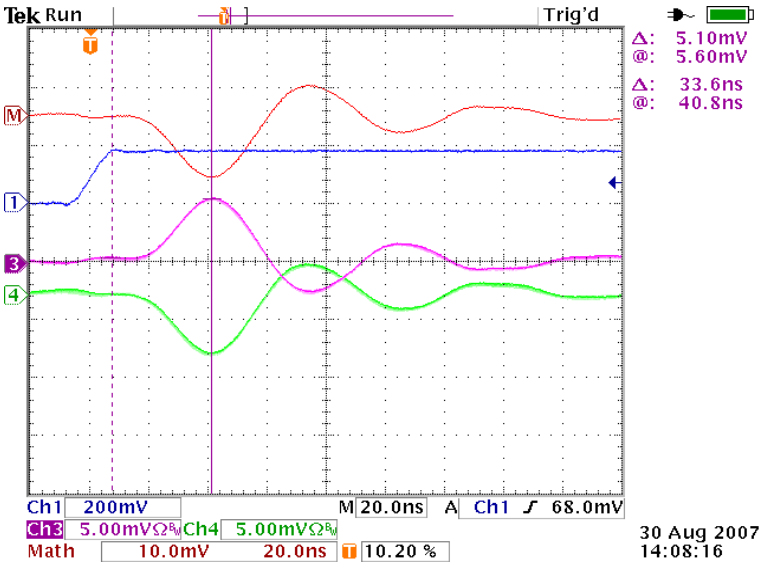

Fig. 5: Small step response, 1mV 10ns.
Bandwidth 20MHz, averaging 16 samples.
Injected charge 10fC.

The signal to noise at this picture is 10:1. Comparing with fig. 1 we can conclude that linear range spans from 1 fC to 1000 fC. Above 1000 fC the amplitude.

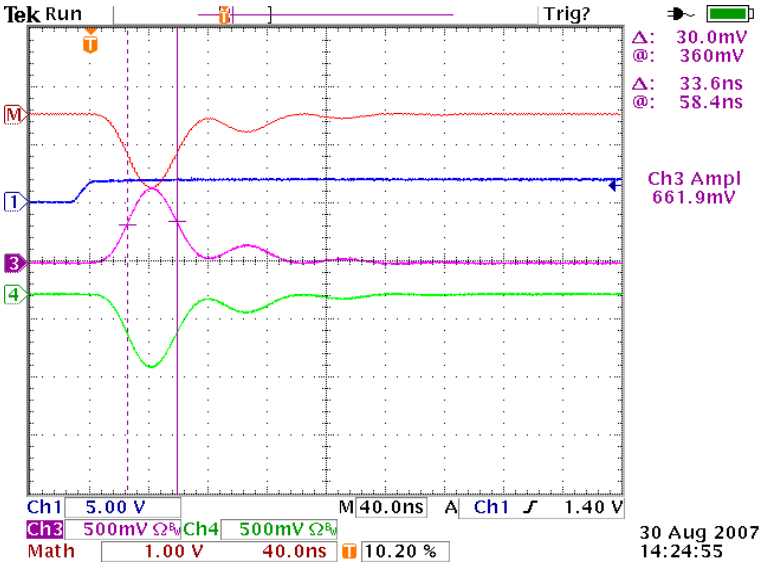

Fig. 6: Input: step 1pC, Output 0.66V 33ns

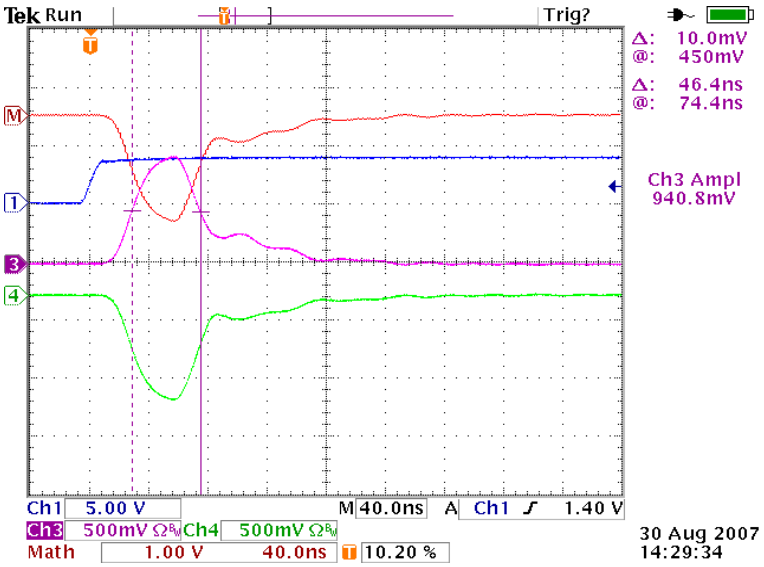

Fig. 7: Input: step 2pC, output: 0.94V, 46.4ns.

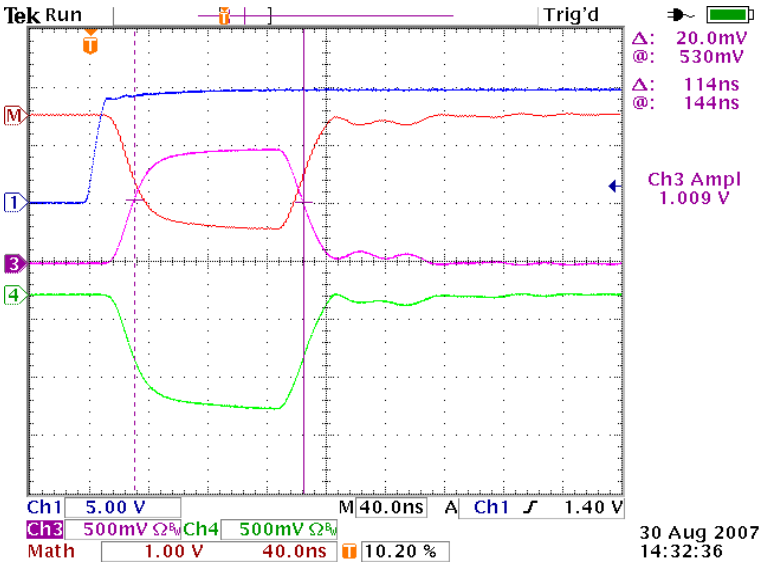

Fig. 8: Input: step 5pC, output: 1.01V, 114ns.

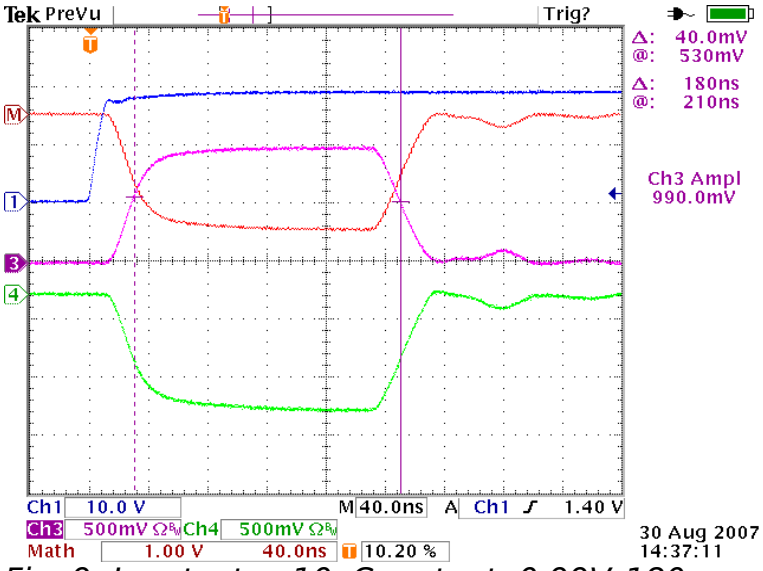

Fig. 9: Input: step 10pC, output: 0.99V, 180ns.

Summary

Minimum detectable signal is 1 fC see fig.5.
Maximum linear signal 1pC, see fig. 1.
Above 1pC up to 5pC the amplitude saturates at 1.0V but output width begins to grow linearly.
The signal integral is proportional to the input charge in the range of input signals from 1fC to 5pC.
For signals from 5pC to 10pC the signal itegral drops 20% from full proportionality to input charge.
The dynamic range of 10000 is acheavable!