JLab Discriminator Status

Benjamin Raydo

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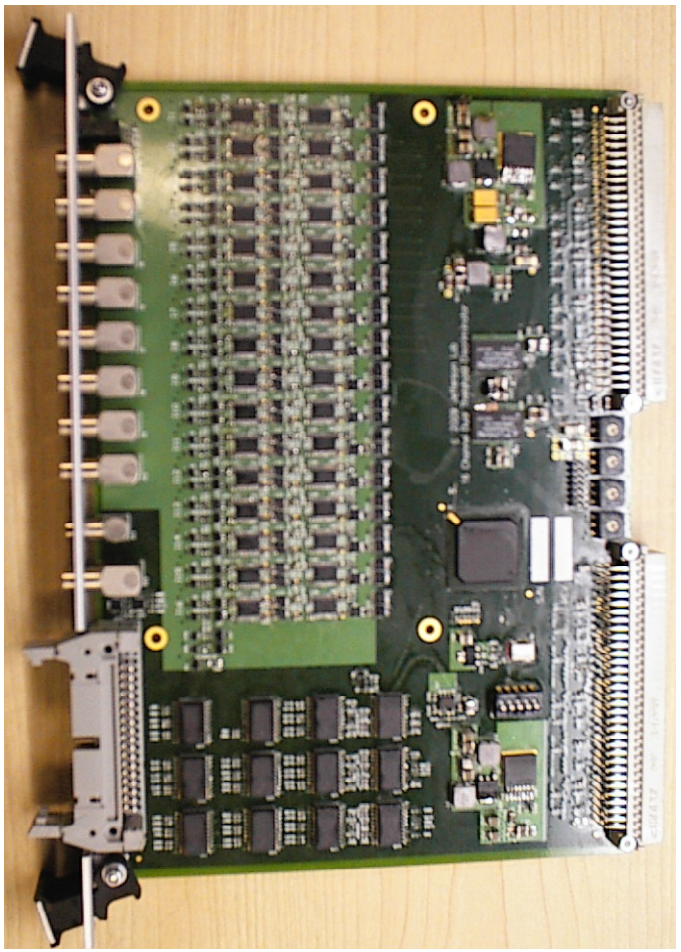
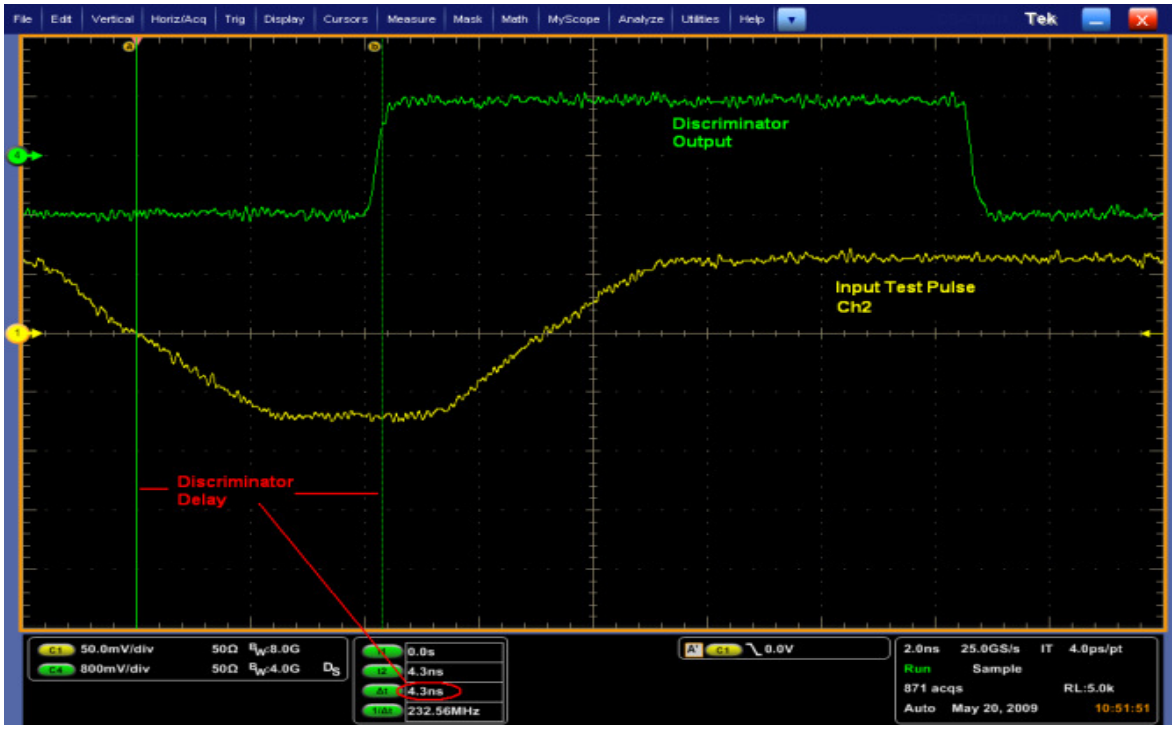
Discriminator Prototype



- 16 Channel Discriminator working prototype
- Dual-threshold (0 to -1V, 1mV steps)
- Non-updating mode
- Scalers are kept for both thresholds
- Standard VME interface (A32/A24, D64 support)

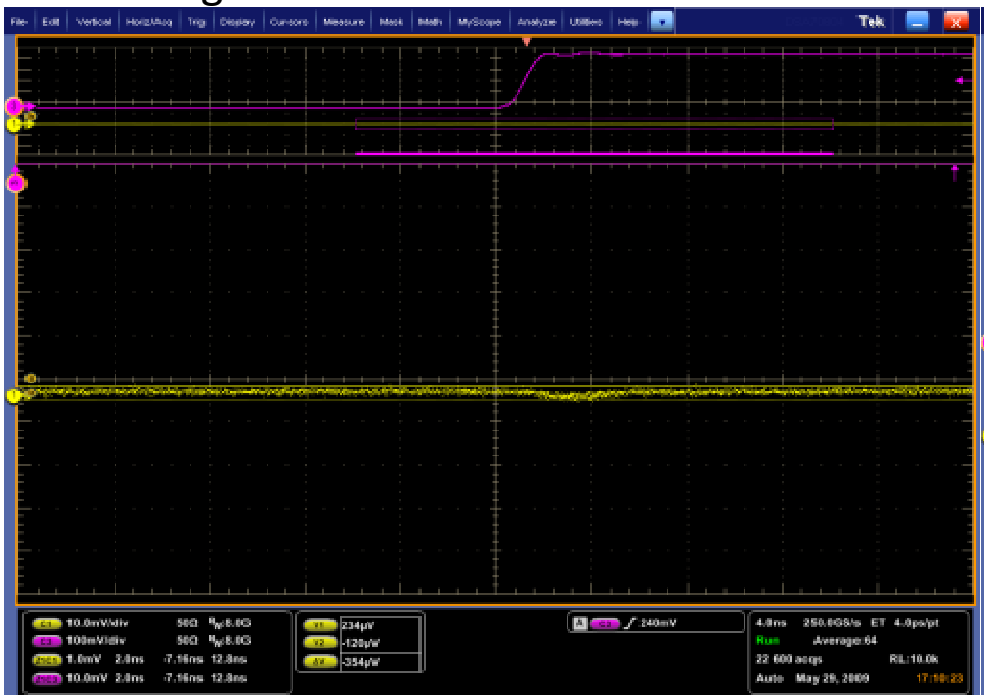
Input-to-Output Delay



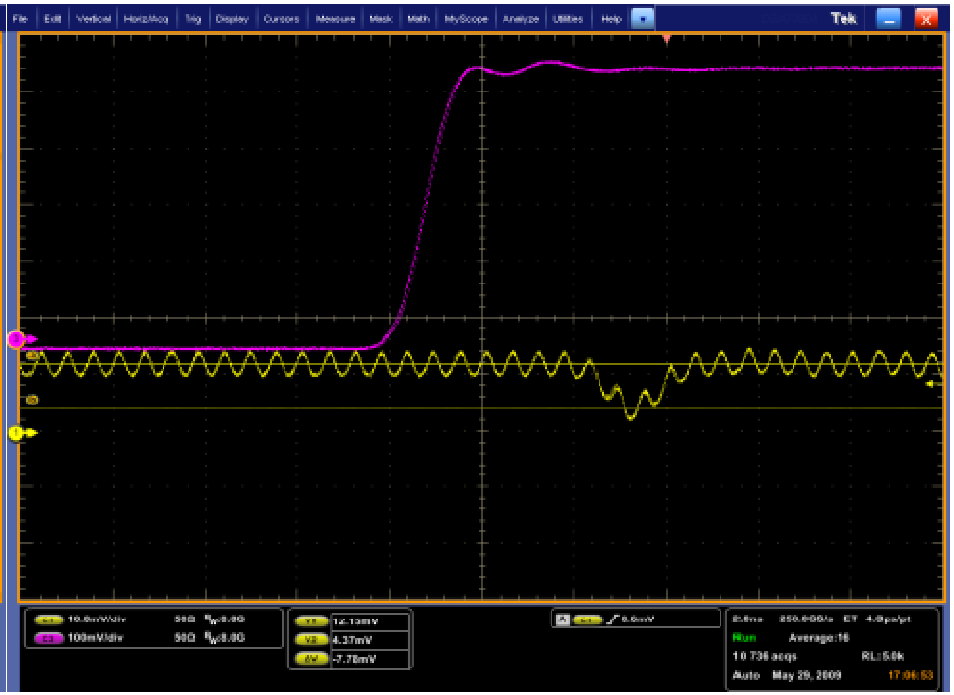
Fast response time ~4.3ns

Channel-to-Channel Isolation

JLab Design:



CAEN V895:

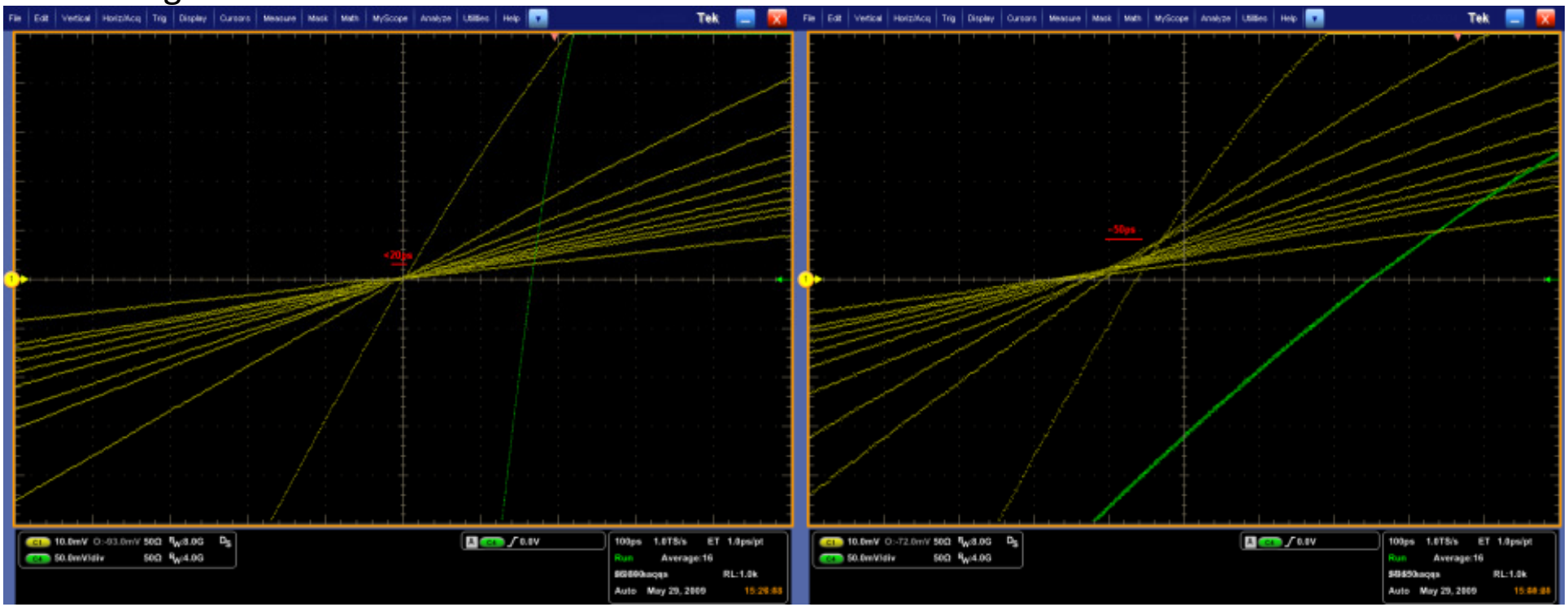


- 1V/ns, 500mV step used on adjacent test channel. Victim channel shown in yellow.
- Note scales: JLab 1mV/div, V895 10mV/div
- JLab design provides very high channel isolation (design uses shielded Lemo connectors)

Slew Rate Dispersion

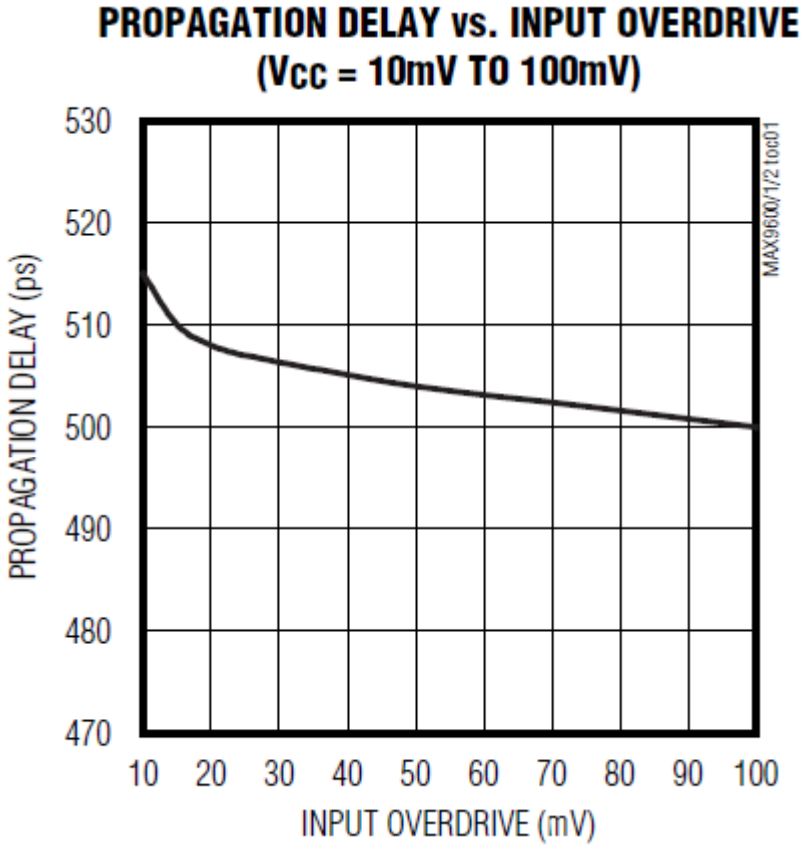
JLab Design:

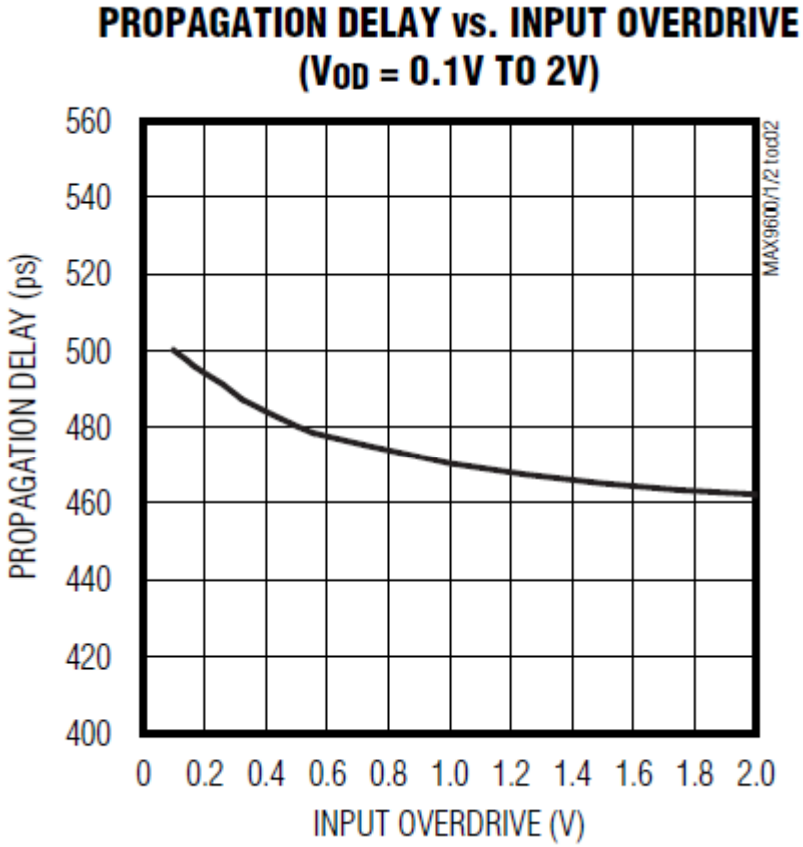
CAEN V895:



- Slew rates varied from 20mV/ns to 250mV/ns, 100mV overdrive pulse
- Green trace shown is the discriminator output used as scope trigger
- Ideally the yellow traces would intersect at the same point
- Measured dispersion: JLab ~20ps, V895 ~50ps

Overdrive Dispersion

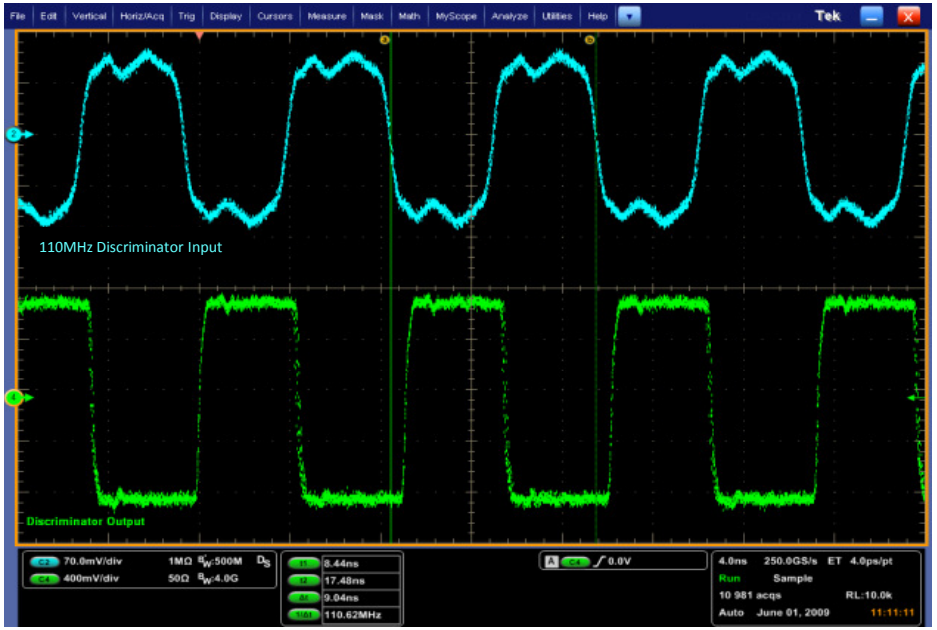




- Overdrive dispersion has not been measured – will be done with new test jig
- Overdrive dispersion graphs taken from comparator datasheet (2V/ns rise time signal)

Maximum Rate

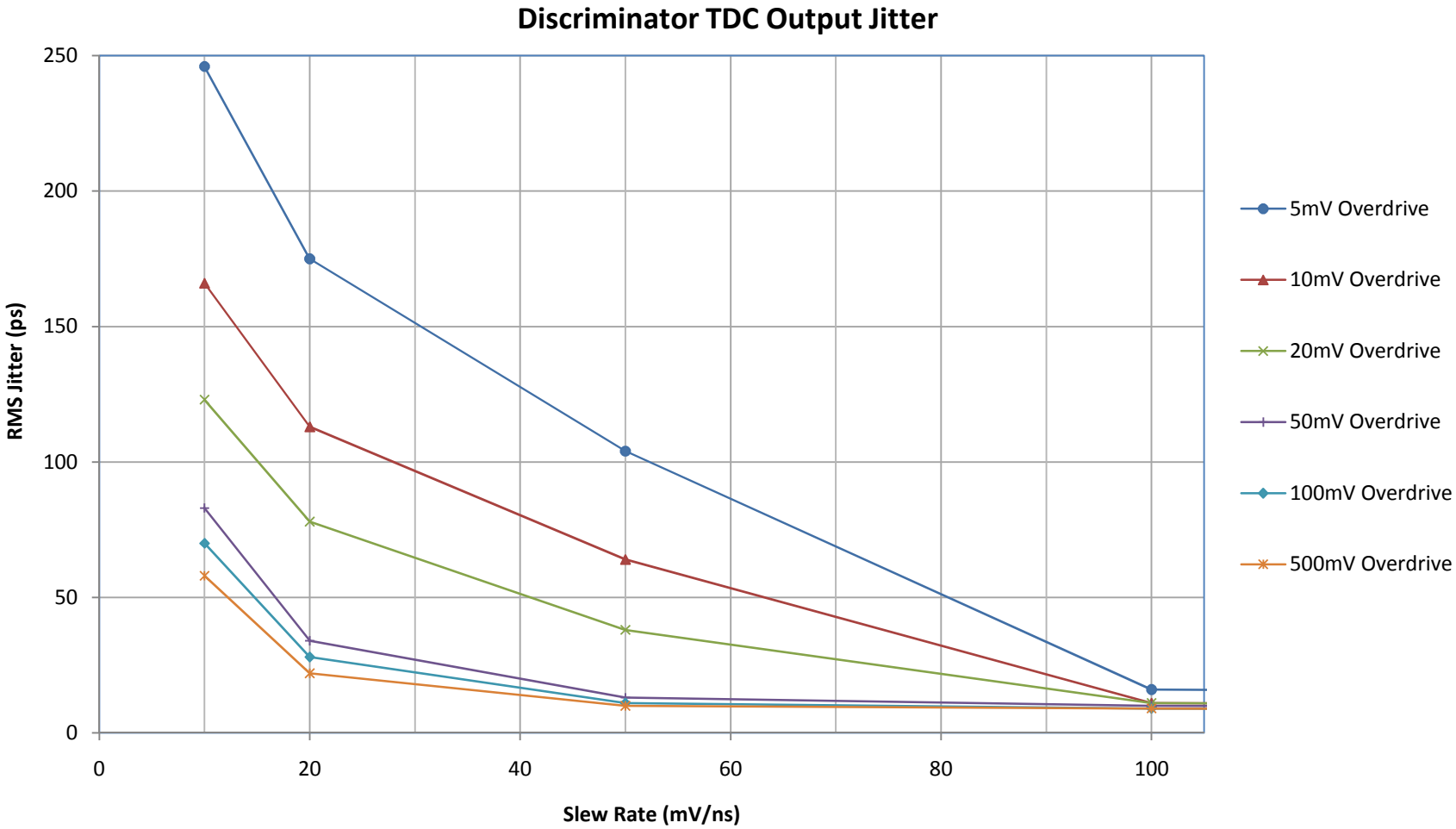
110MHz rate w/4ns output pulse width:



80MHz rate w/8ns output pulse width:

- Pulse width effects double pulse resolution (discriminator operates in non-updating mode)
- TDCs will require minimum input pulse width (F1 – 4ns?)

Jitter Performance



- Greater overdrive and/or slew rate improves jitter performance
- 1MHz variable slew rate/amplitude square wave used for test

Next Steps

- Revision of the prototype is almost complete (several changes for cleanup & optimization, main discriminator characteristics will not change)

- Small order of 5 boards for Hall B, 2 for Hall D will be underway this month. Will confirm schedule once build package is received by assembler.

- Pedro Toledo from University of Chile has arrived for a 6 month period. He will be responsible for building an automated test rig that will verify functionality and critical performance characteristics of production boards.