



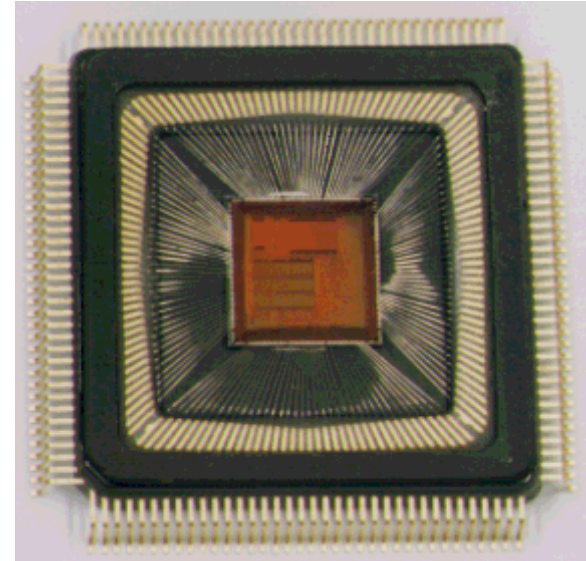
ATLAS

Production Readiness Review ATLAS Muon TDC (AMT)

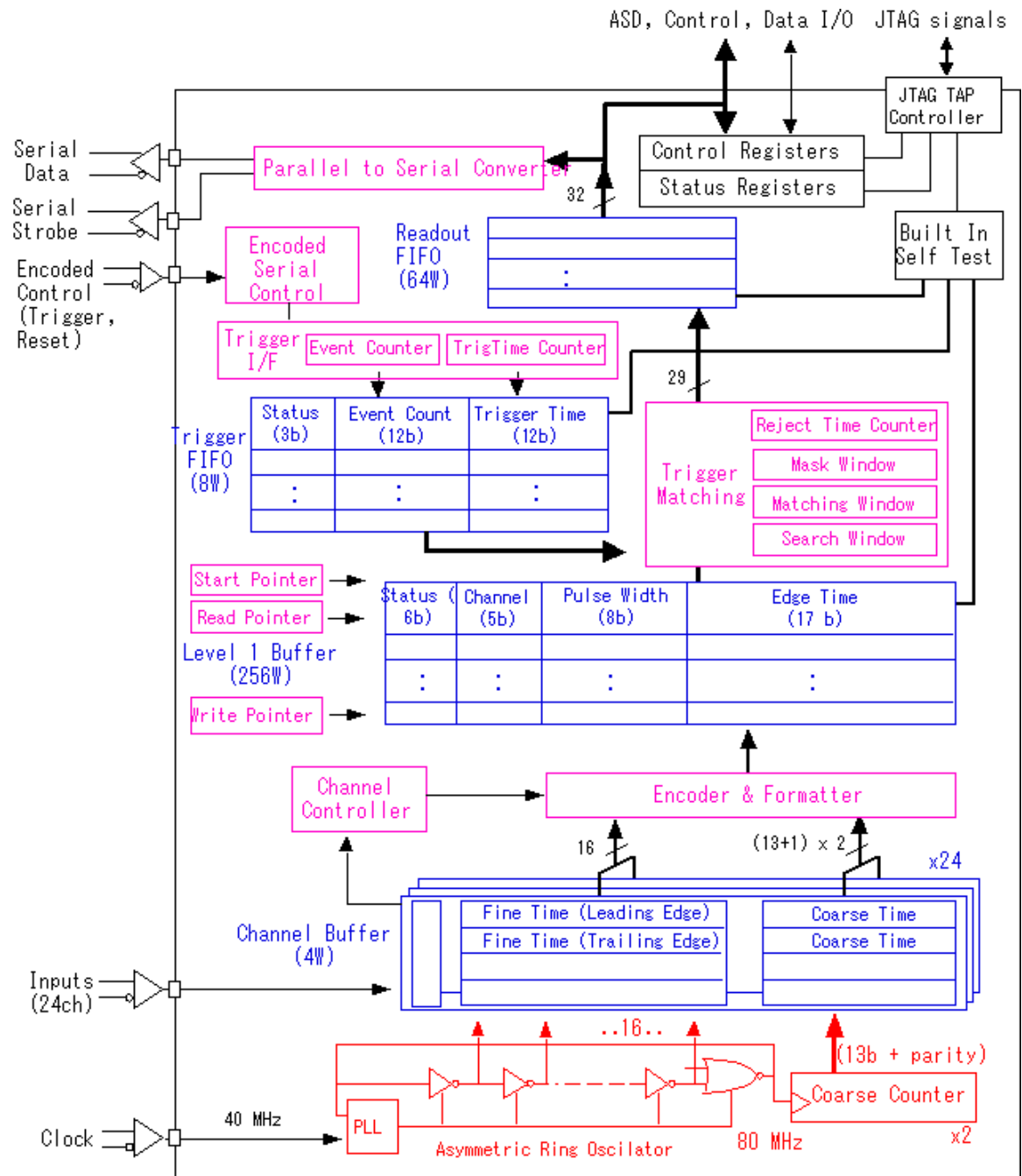
20 June 2002@CERN
Yasuo Arai (KEK)
yasuo.arai@kek.jp
<http://atlas.kek.jp/tdc/PRR/>

Description of Circuit

- Fine Time Measurement
:
- LVDS Receiver/Driver

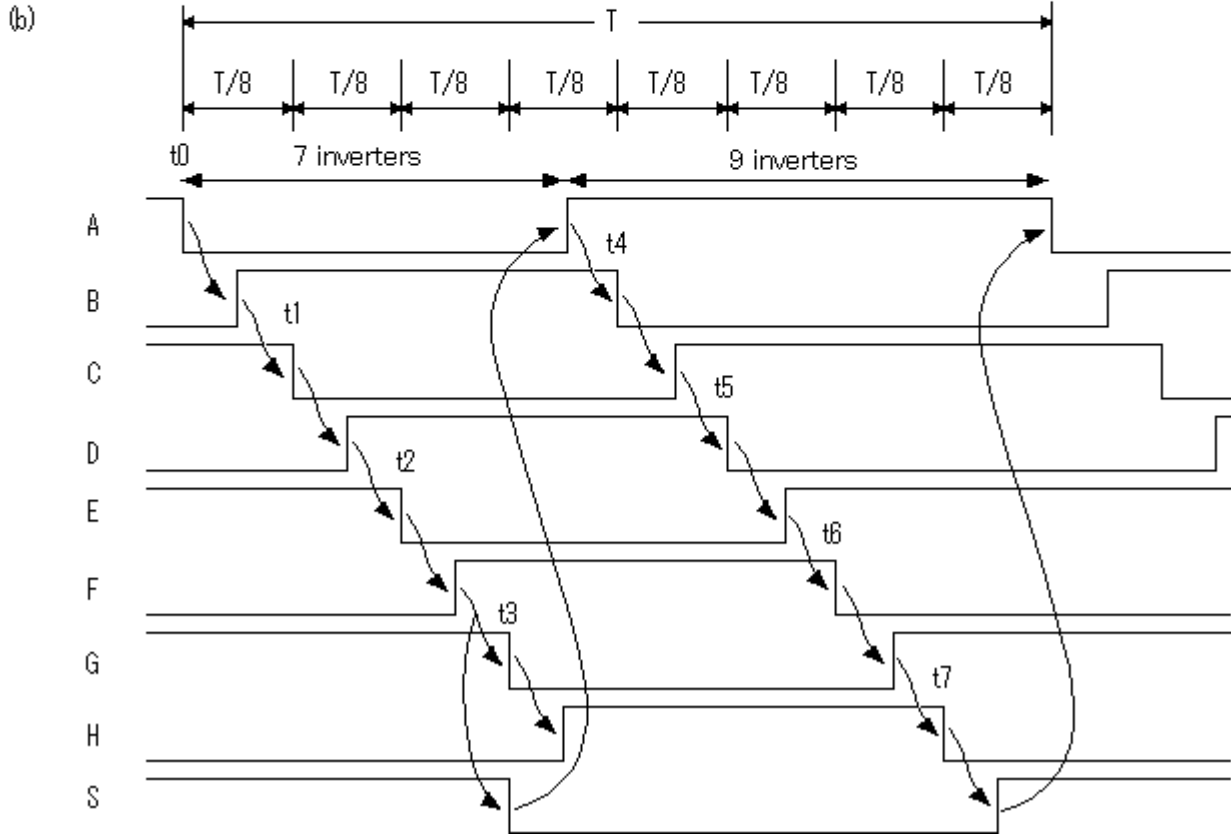
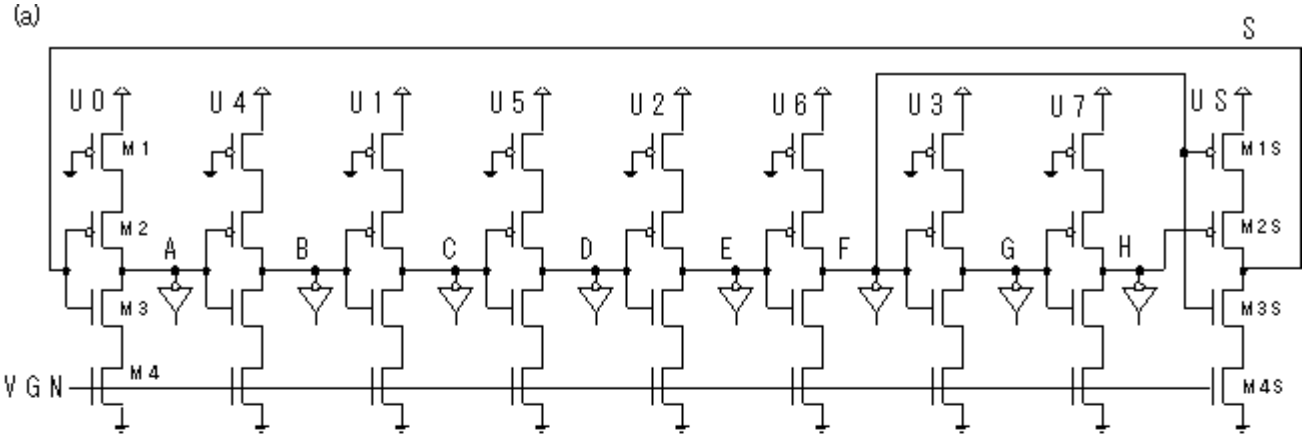


Block Diagram of the AMT-2



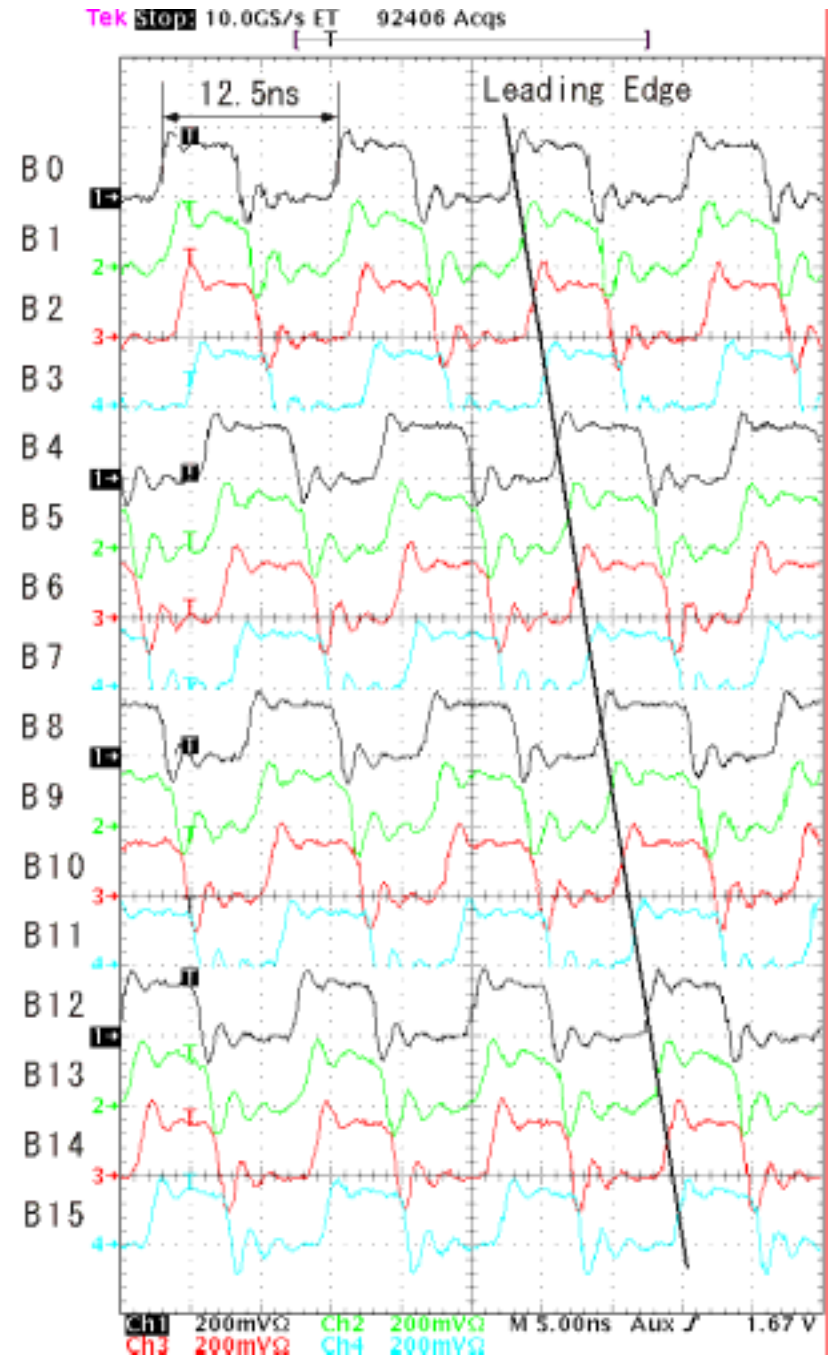
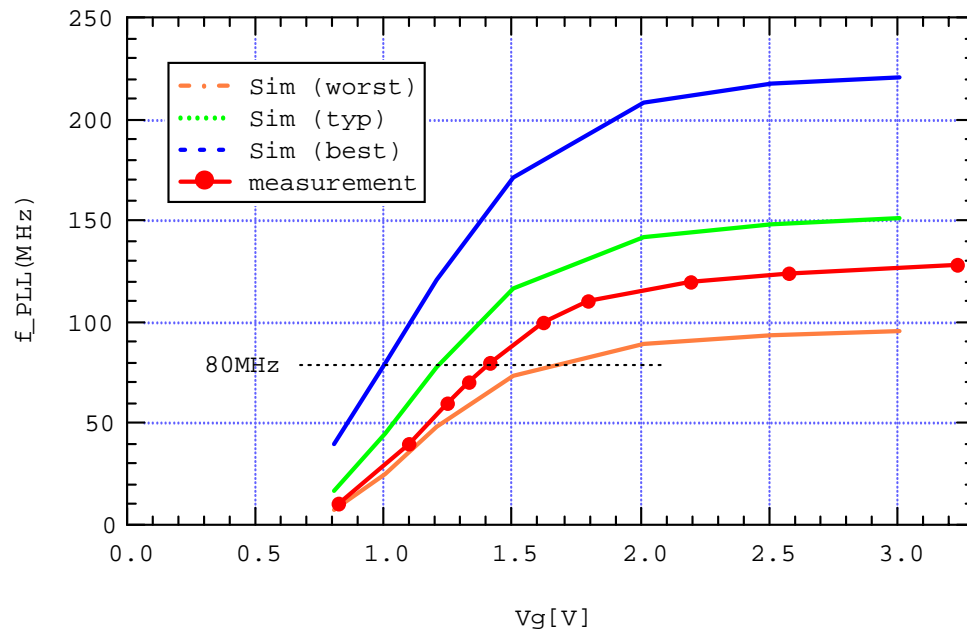
Asymmetric Ring Osc

(8 stage example)

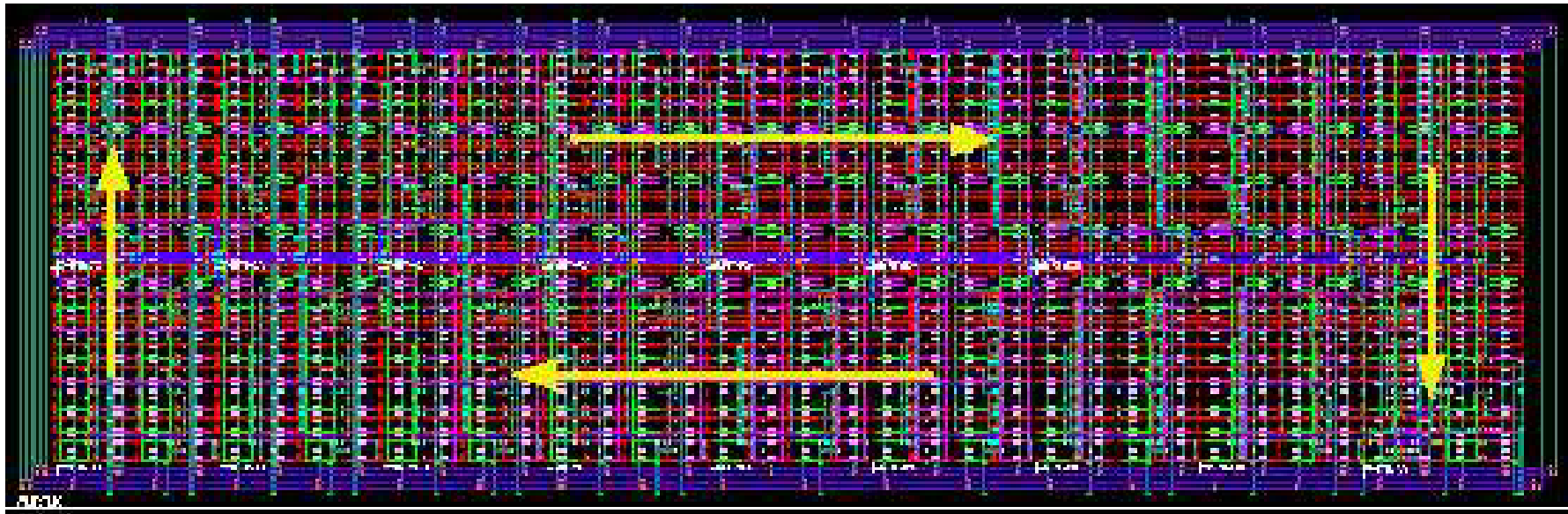


Tap Output Waveform (AMT-TEG)

PLL OSC vs. Vg



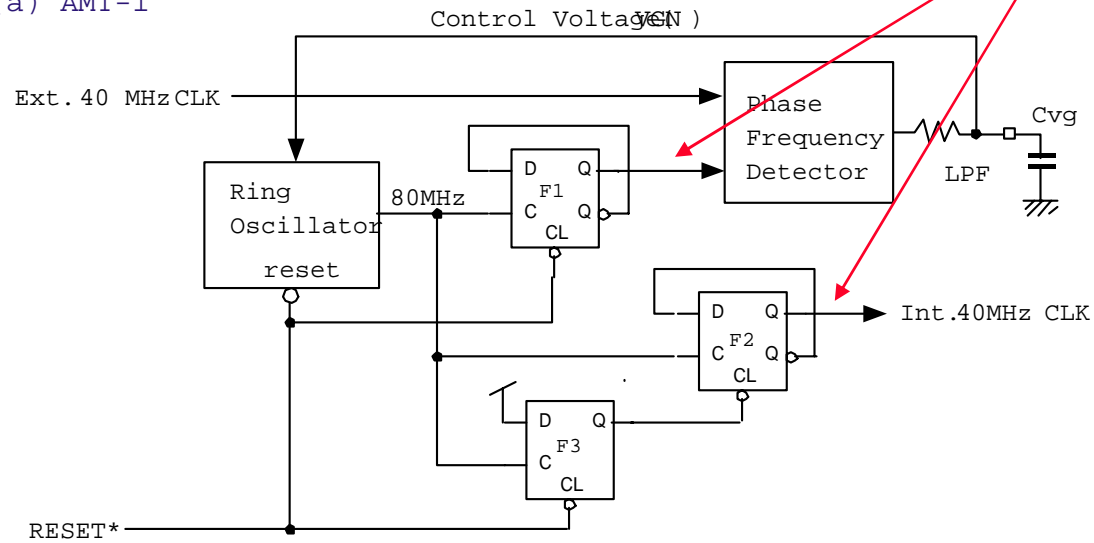
Layout of the Asym/ Ring OSC



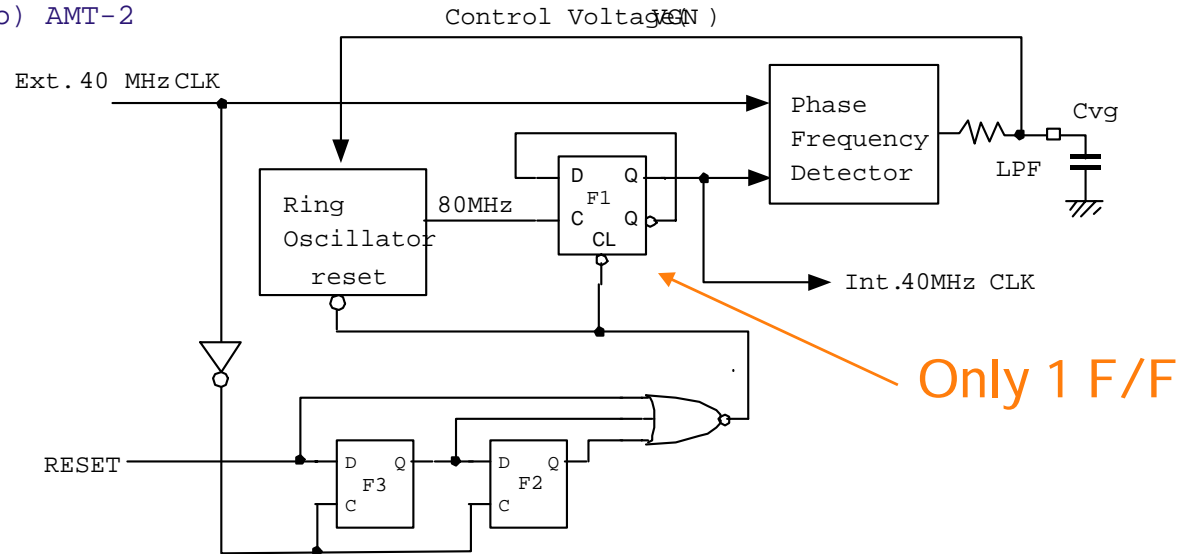
Half Cycle Phase shift

Can be Different Phase !

(a) AMT-1



(b) AMT-2

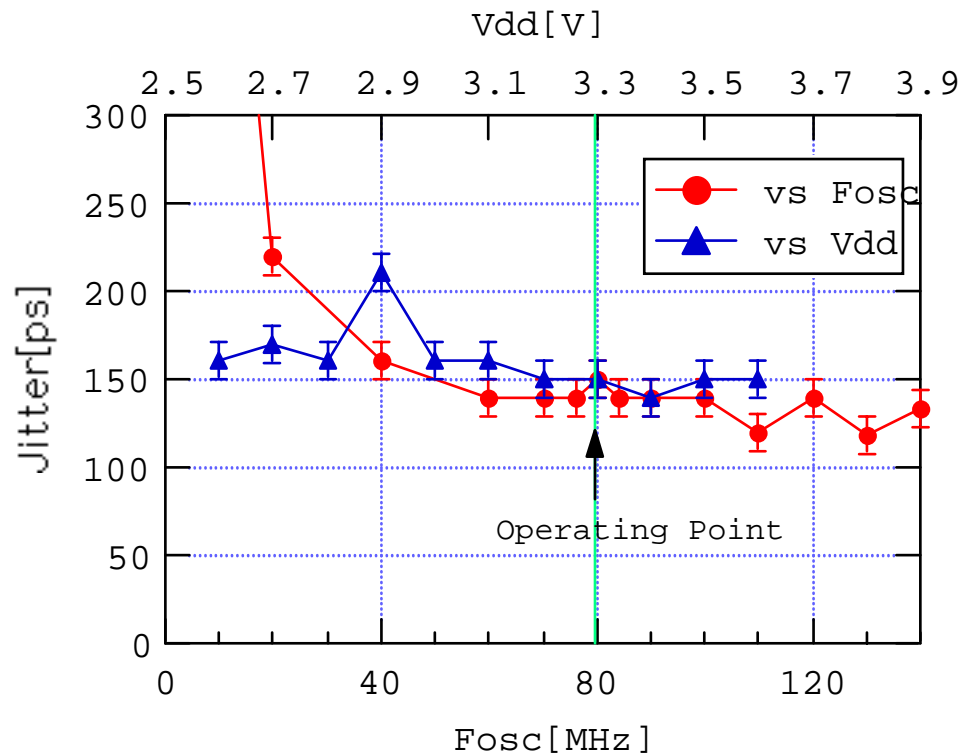
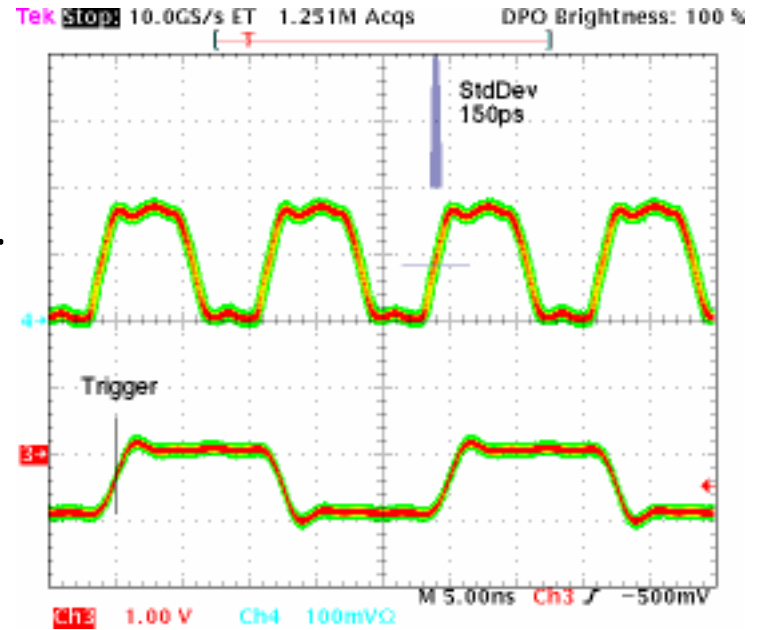


PLL Stability

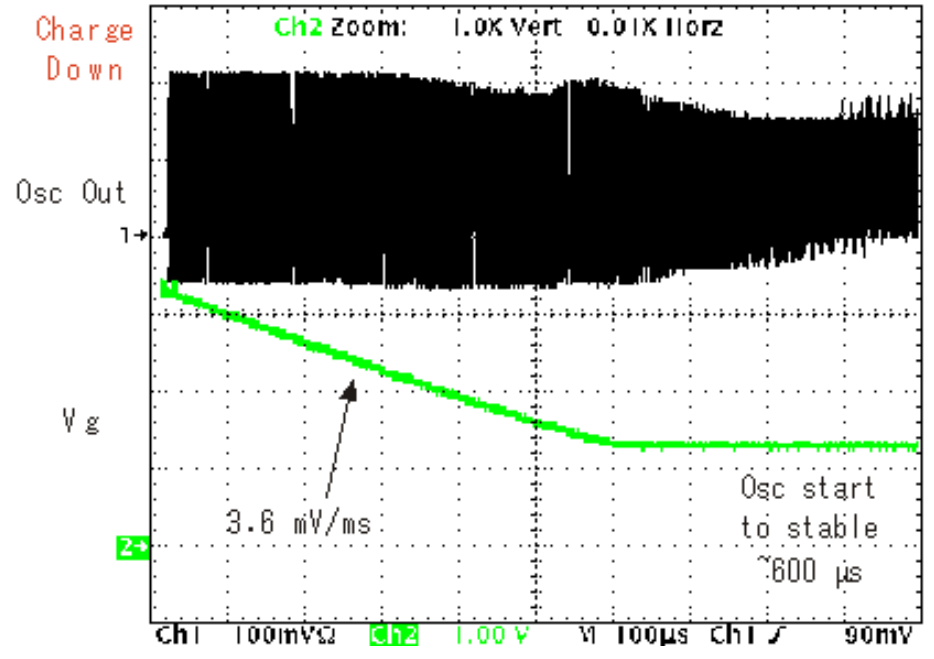
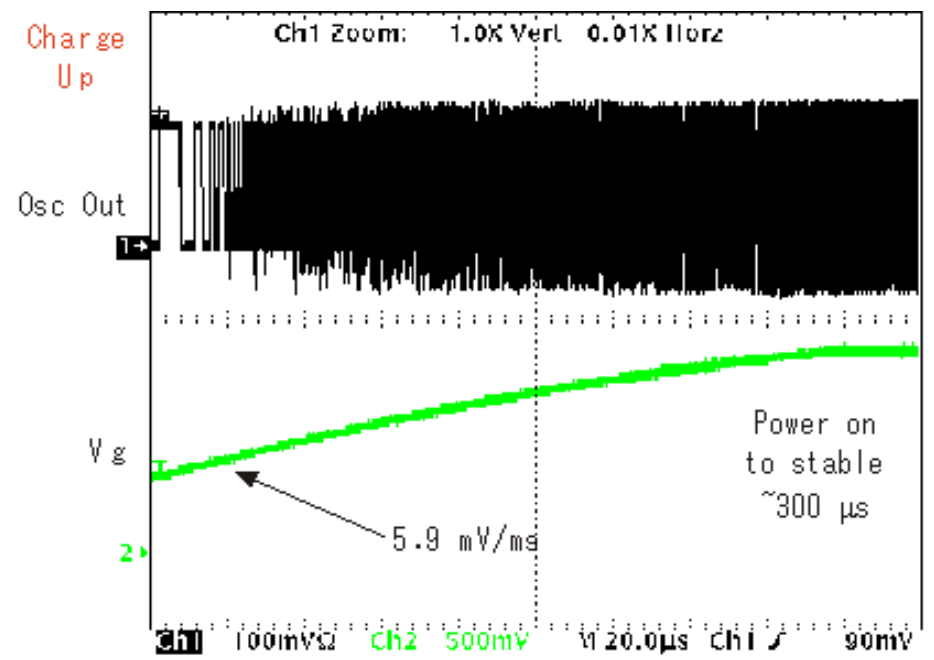
$\sigma = 150 \text{ ps @80MHz}$

PLL Osc.

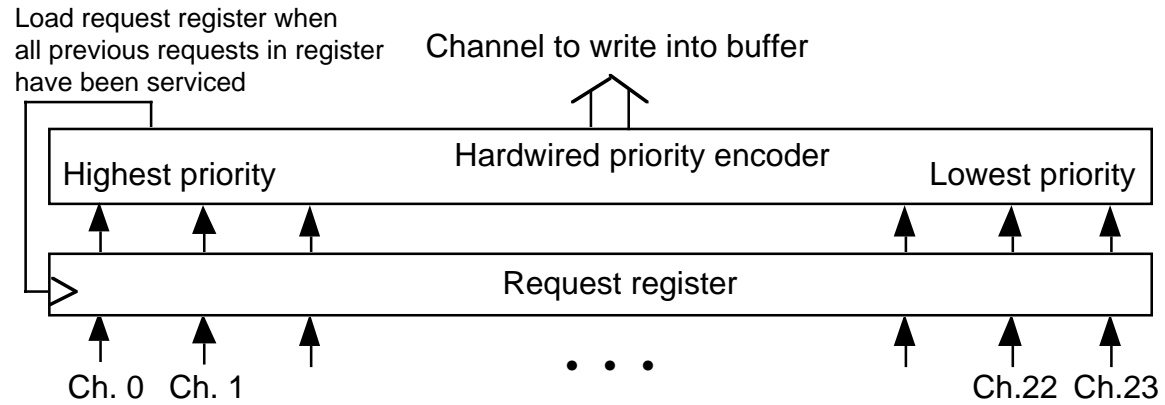
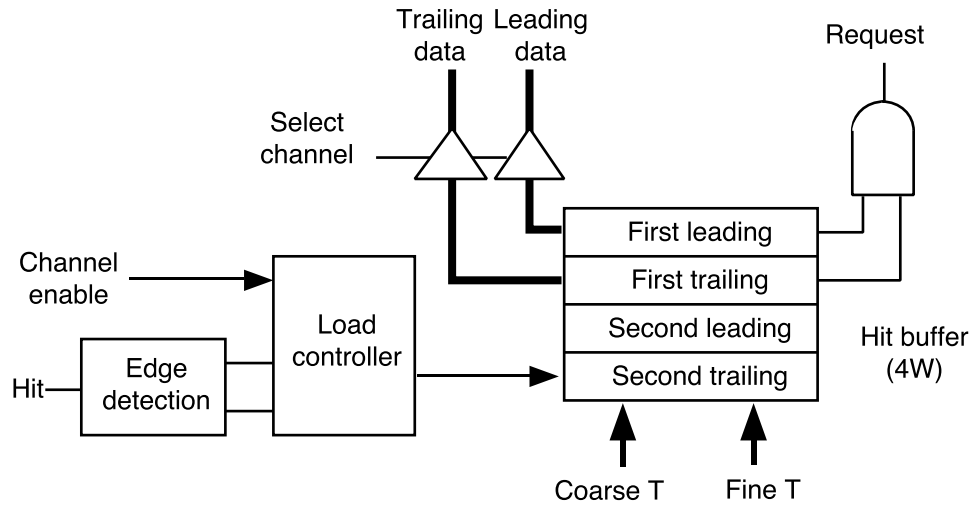
Ext. Clock



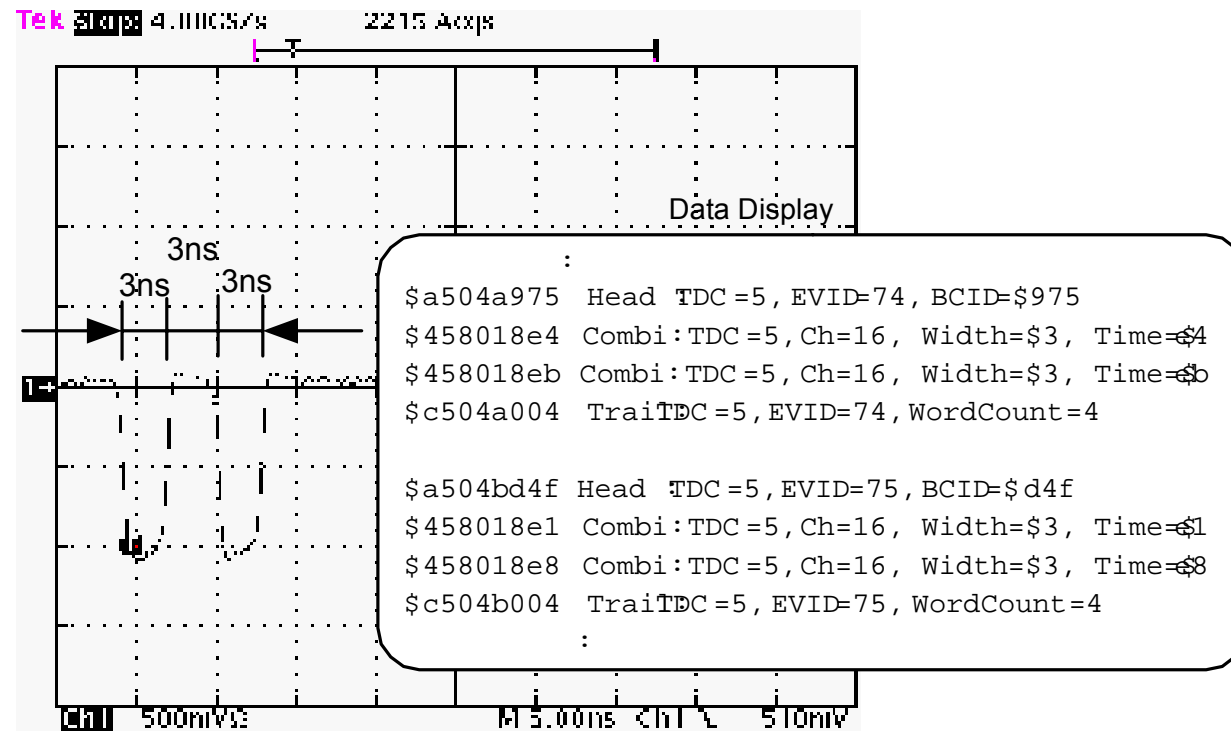
PLL Transition Characteristics (AMT-TEG)



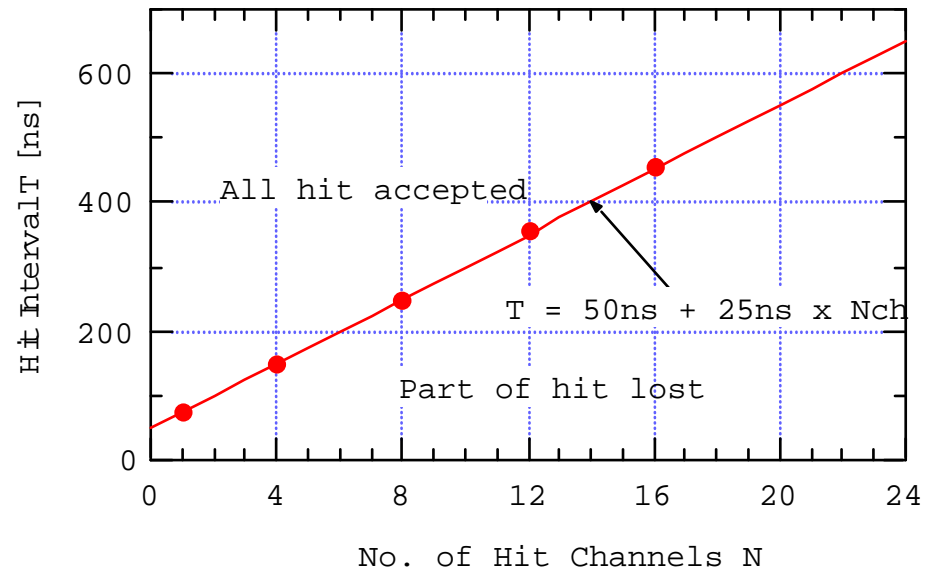
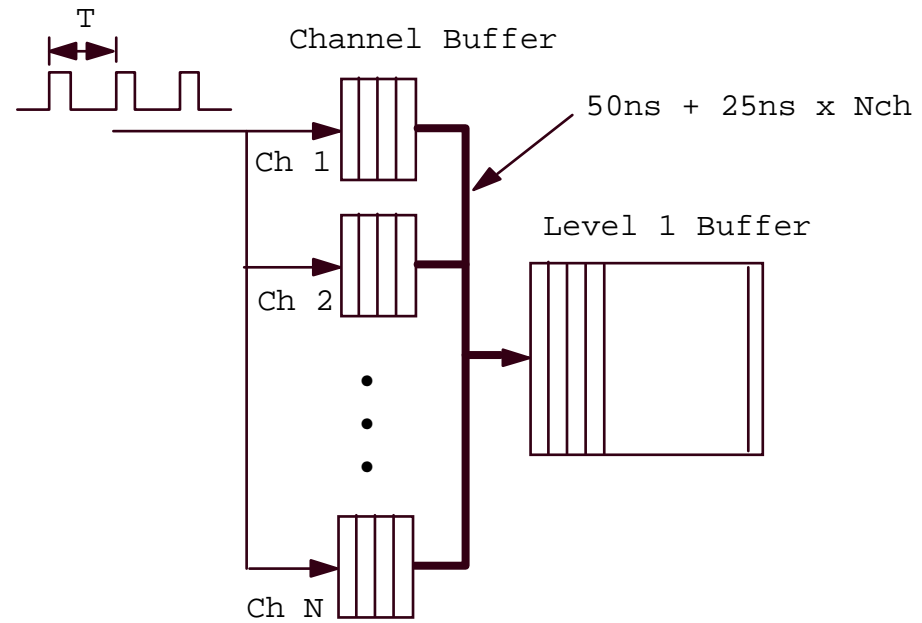
Channel Buffer



Short Pulses

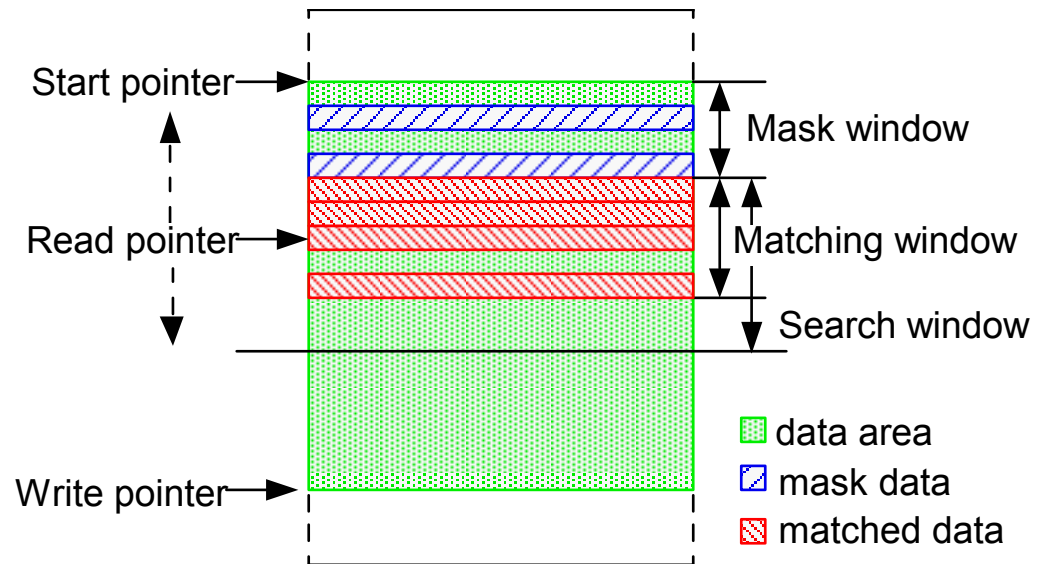
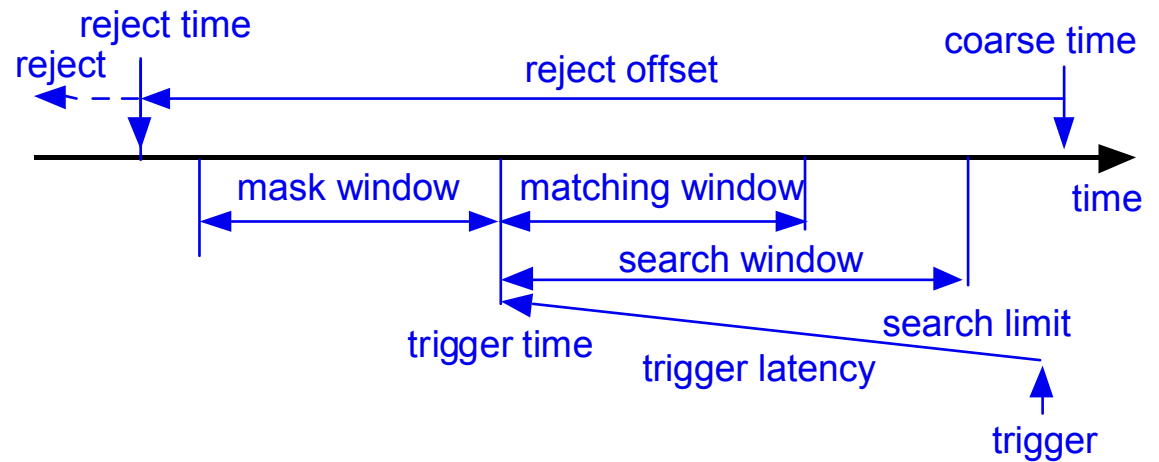


Data Transfer Speed between Chan Buf and L1 Buf

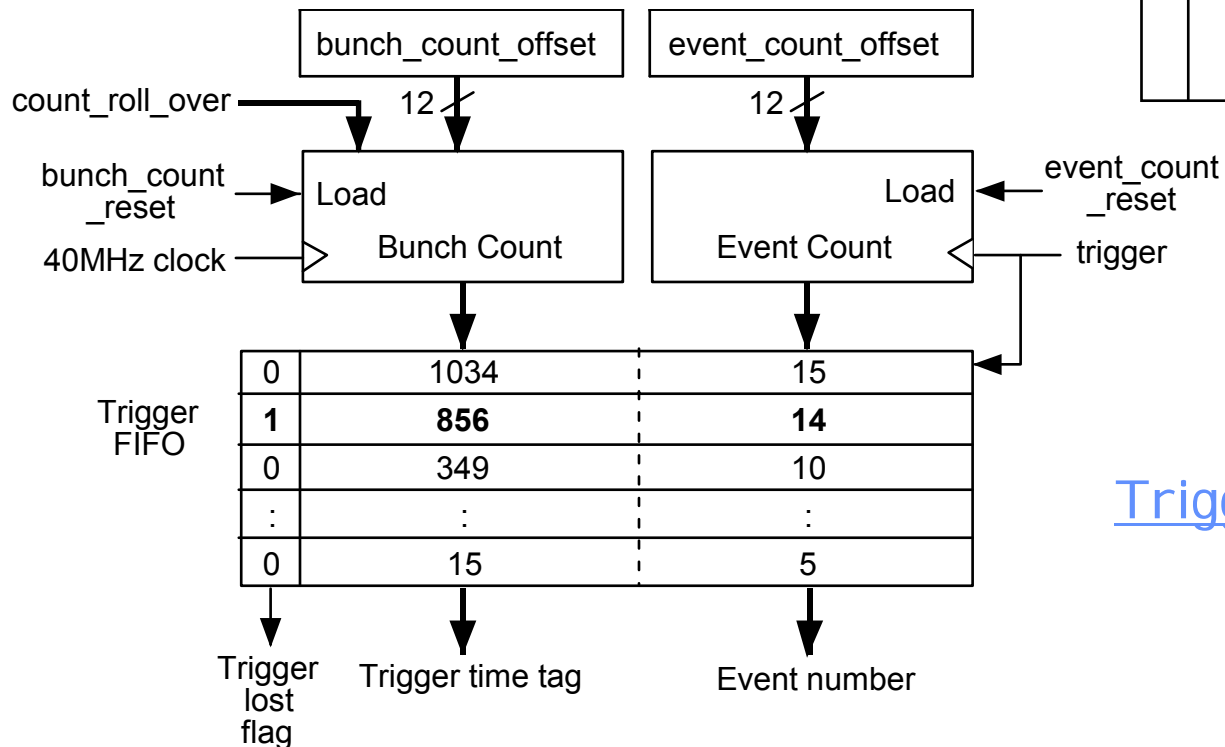
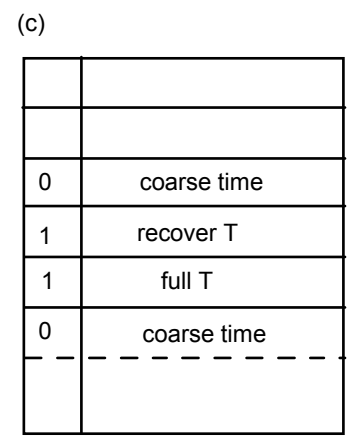
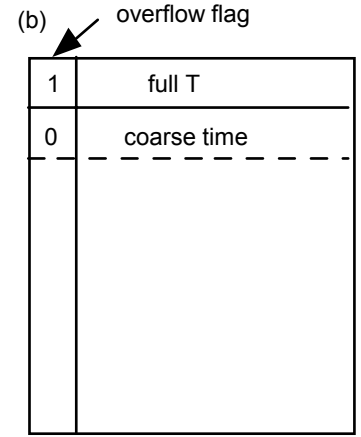
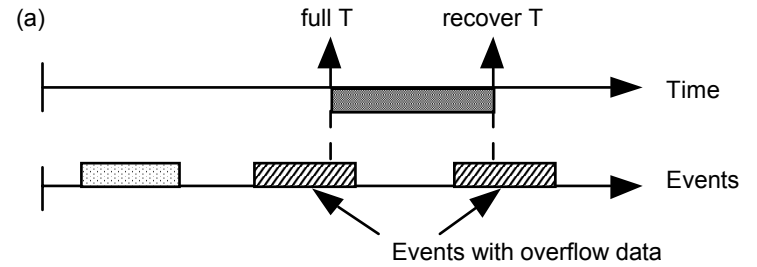


Trigger Matching

- Finds Hits in corresponding time window.
- Remove Old hits.

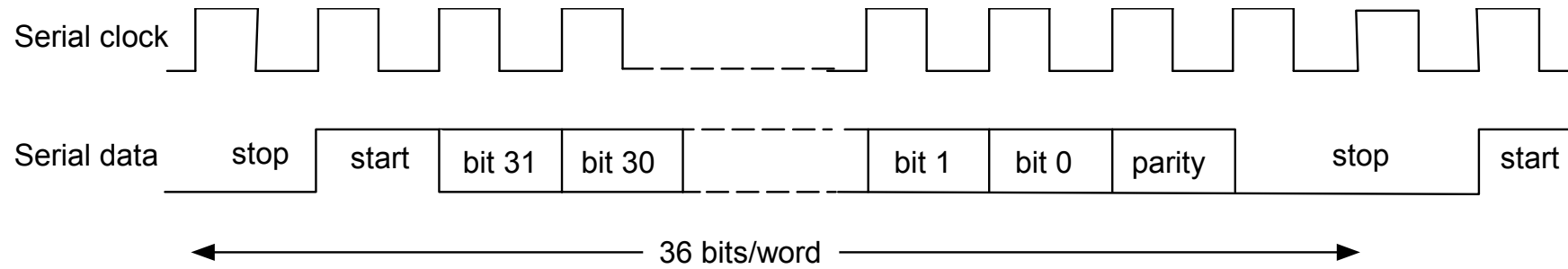


L1 Buffer Overflow

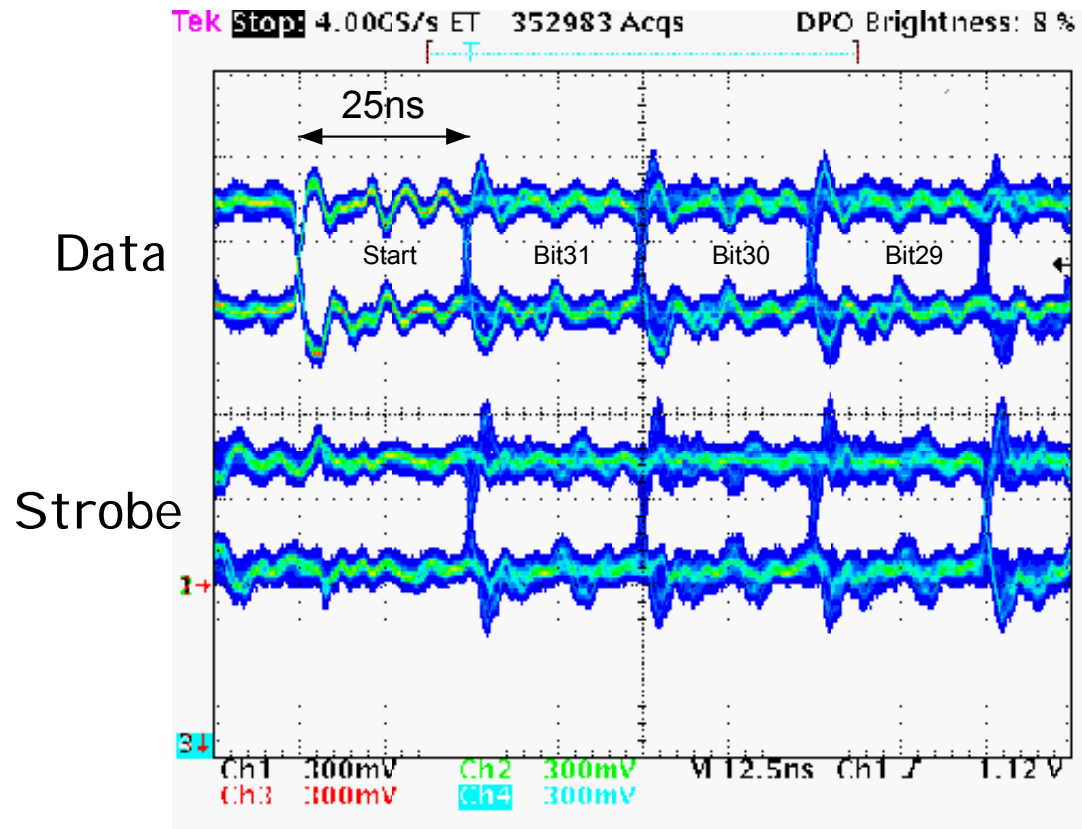


Trigger FIFO Overflow

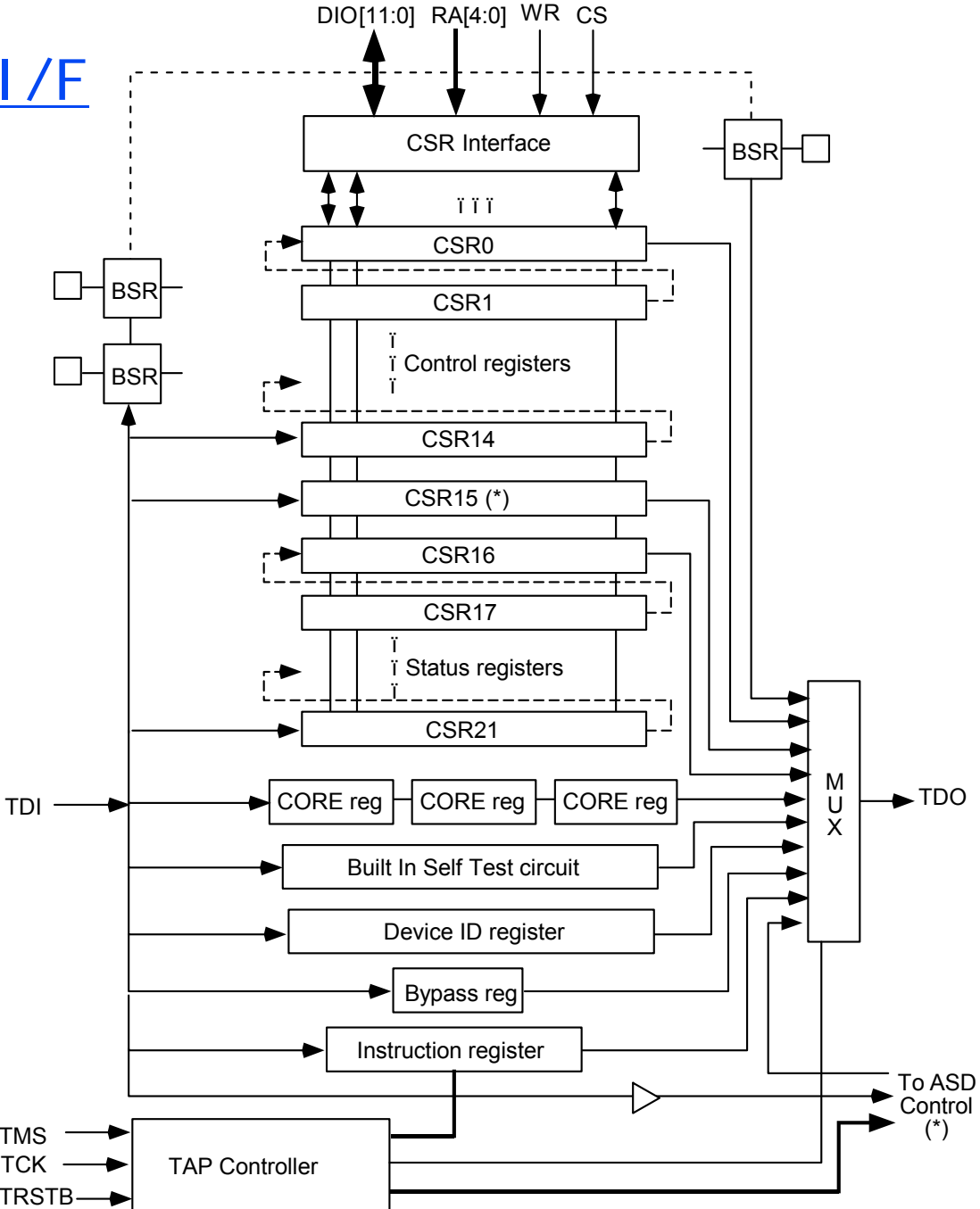
Serial Output



LVDS output waveform at 40 Mbps



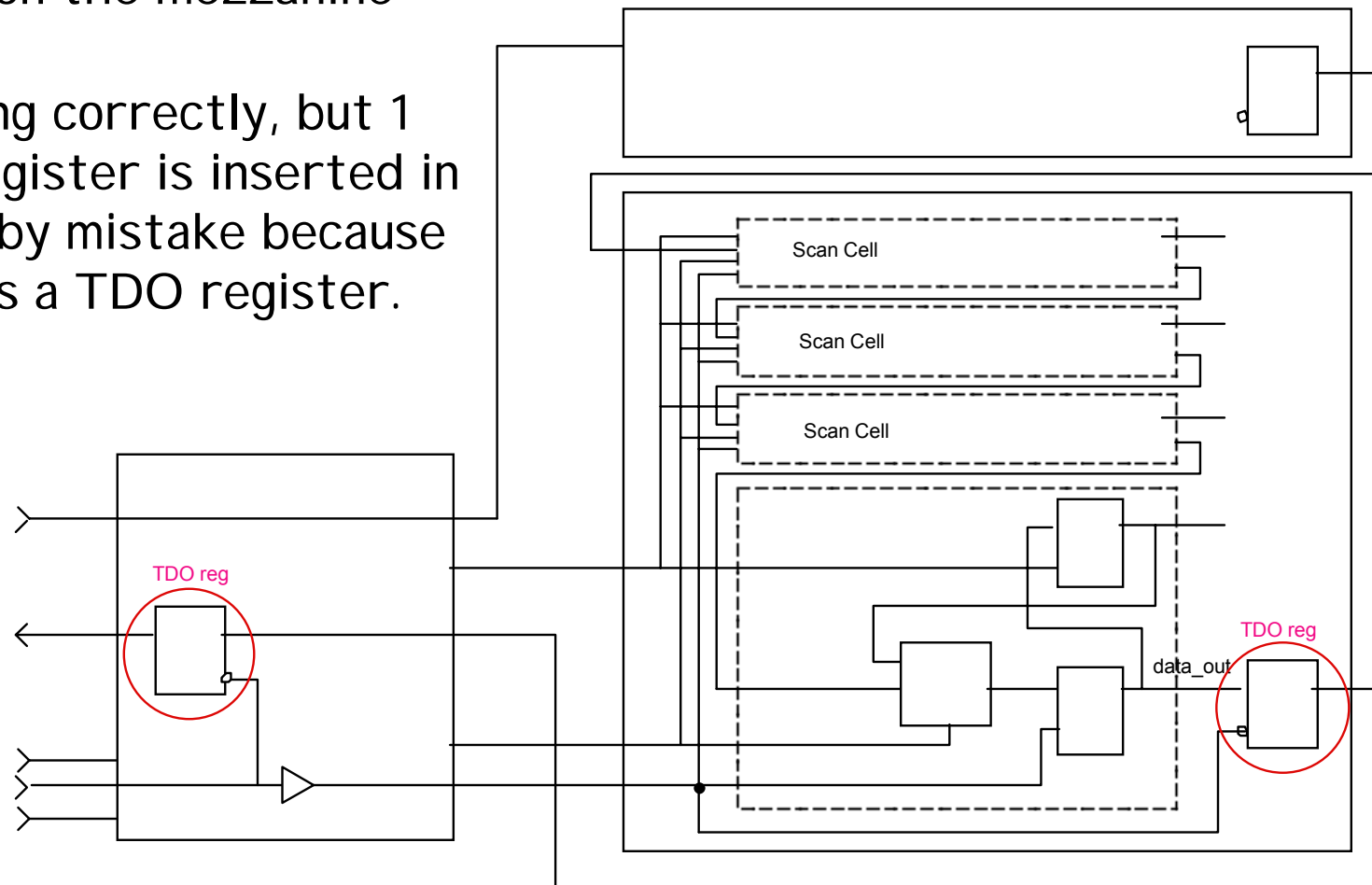
CSR Registers & JTAG I/F



(*) --- AMT-2 Only
Yasuo Arai(KEK)

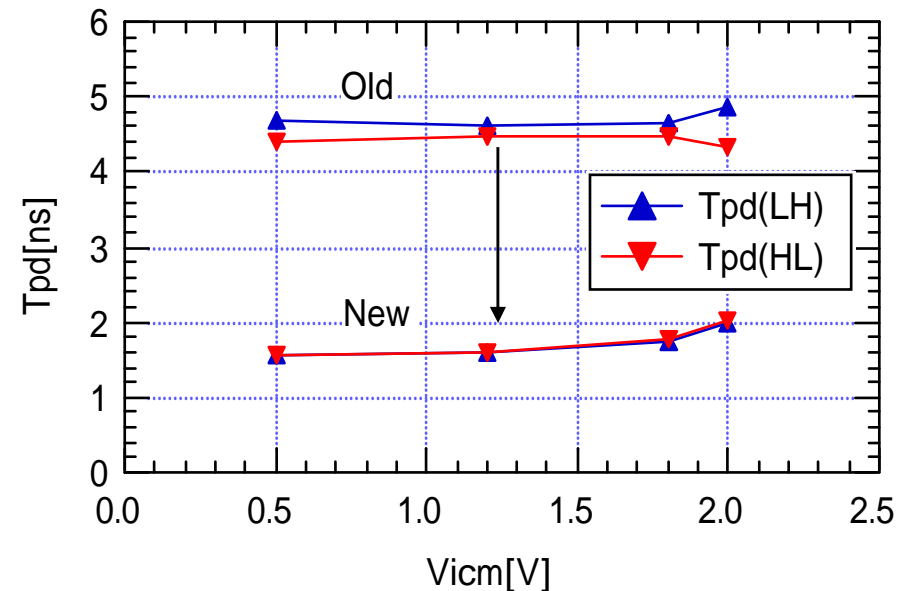
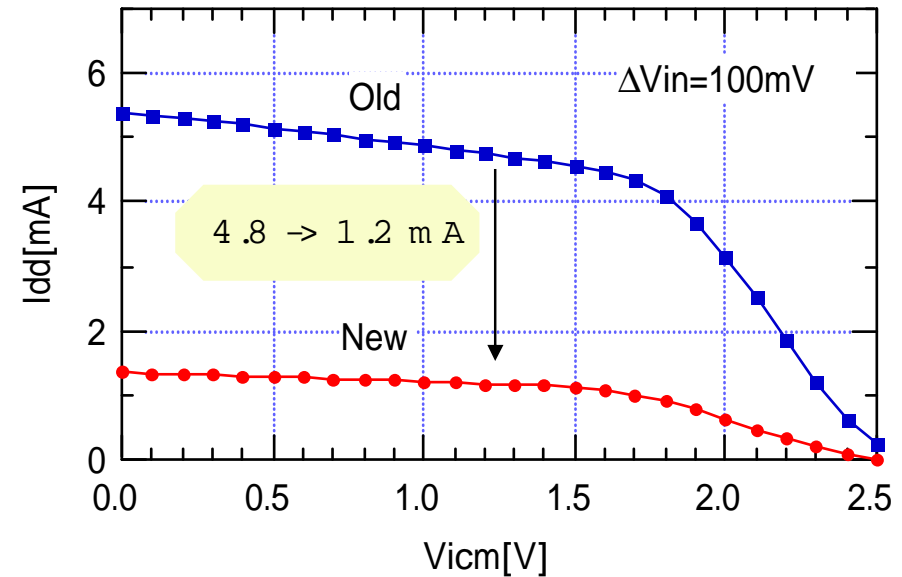
ASD Control

- Function to set ASD registers through AMT JTAG port is added to reduce power and components on the mezzanine board.
- It is working correctly, but 1 additional register is inserted in JTAG chain by mistake because both chip has a TDO register.



Low-Power LVDS Receiver

- 26 (30 in AMT-1) LVDS receivers are used in AMT-2.
- Previous design (Toshiba) uses large transistors in I/O buffer.
- Smaller input transistors are used in new design.
- Power Reduced :
15.5 mW -> 4 mW.
- Propagation Delay is also improved.



Power Consumption

- Power Consumption of the AMT-2 becomes **15 mW/ch** (total **360 mW**). (AMT-1 is 33mW/ch, total 800 mW)

