Revision of test pulse lines on ASDBLR EC wheel boards

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Input Protection on Test Pulse Lines

• The ASDBLR lacks input protection on the test pulse lines. End Cap Wheel boards that may be stored and tested separately from their DTMROC companion ASIC’s potentially have a risk of being damaged without on board protection of the test pulse lines (TP even and odd).

• A proposed simple diode fix of all test pulse lines has been tested and appears to work. By using a capacitor to couple between the DTMROC and ASDBLR boards the potential across the Test Pulse capacitors on each channel of the ASDBLR can be maintained at a level close to ground. The proposed revision appears to work and may eliminate the functional loss of channels with test pulse failures. Results from B wheel board #5 are shown.
ASDBLR ‘A’ and ‘B’ wheel board
Revised Test Pulse Inputs

Present Implementation on Boards

DTMROC
TST even,odd

2.4V Quiescent

ASDBLR
TST even,odd

Proposed (tested) implementation on Boards

DTMROC
TST even,odd

Cseries
680pF

2.4V Quiescent

ASDBLR
TST even,odd

D4
D2
D1

0 V Quiescent

First trial was without this 10pF cap to Agnd
Approximate Schematic of ASDBLR Test Pulse Odd (on chip)
THRESHOLD Ramp
Rate vs Threshold

Before
Bad TP cap

After
Test Pulse Scan 50% DAC values by Clock Bin (Normal working Channels)

Before Change

Odd Channels Strobed with Test Pulse Value = 9

Time bin #
Test Pulse Scan 50% DAC values by Clock Bin (Normal working Channels)

Just Diodes
Without 10pF cap

Odd Channels Strobed with Test Pulse Value = 9

Time bin #
Test Pulse Scan 50% eff DAC Values by Clock Bin (Normal working Channels)

Diodes and 10pF cap
Modified as shown in schematic

Odd Channels Strobed with Test Pulse Value = 9

Time bin #
Odd/Even TP  Before After
with 10pF caps on TP even/odd

- BEFORE Change
- After adding Diodes and coupling cap

Channel with Test Pulse Cap failure (after)
Note ramp limit was 160 here

Odd Test Pulse Strobed
Even Test Pulse Strobed

Channel with Test Pulse Cap failure (before)

(All locations on B wheel End cap board #5 revised)
Response of Shorted TP cap Channel to Test Pulse on Modified Board

50% Threshold point by time bin for three 75ns windows

Soft Ware Channel #7    Rod Readout chip # 8

Test Pulse Amplitude = 9
High Threshold Response

Compare with another ‘B’ wheel Board

- Modified B wheel
- Un Modified B wheel

Channel with Test Pulse Cap failure

Test Pulse Amplitude Value = 60