

## JUMPER FAILURE MODE

The symptoms of this failure mode are:

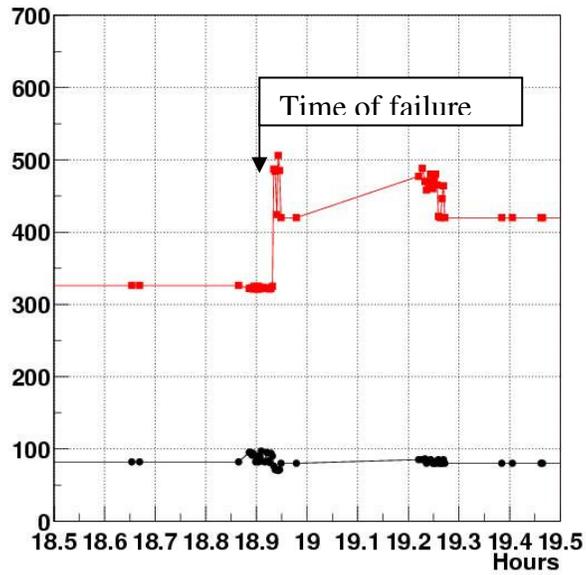
1. The ladder still Initialize even if with some corrupted bits once in a while
2. The PHI side chips are still working perfectly
3. The Z side chips read-out their
  - a. CHIP-ID (as programmed on the bitstream)
  - b. CAP-ID (the pipeline cell identifier)
  - c. The first channel and the data associated with it but no other channels (Independently if the chips are set in read-all or sparse mode)
4. At the time of failure there is a step UP in the AVDD current consumption
5. The AVDD current consumption is NOT stable versus time but it depend strongly on the BE state of the chips

The same symptoms have been induced on the bench by removing the DVDD connection from the PHI to the Z side.

Here is an example of the data readout by a ladder affected by this failure mode. These data are taken with the chips in read-all mode and DPS ON. The CHIP-IDs are green, the channel numbers are blue and the data are black

```
      83140002 01000200 03000400 05000603 07000800 09040a00 0b010c04
0d000e00 0f001000 11011200 13001400 15001600 17001800 19011a03 1b001c00
1d001e00 1f002001 21002200 23002400 25002600 27062800 29042a00 2b002c01
2d002e00 2f003003 31033200 33083400 35023600 37013800 39003a00 3b003c00
3d003e00 3f034000 41004200 43004405 45034604 47024801 49004a04 4b004c02
4d004e00 4f015000 51005204 53035407 55005603 57005802 59005a00 5b005c03
5d005e00 5f006000 61046200 63006400 65046604 67006800 69076a00 6b016c03
6d026e00 6f037007 71007200 73007400 75017604 77007800 79007a01 7b067c07
7d007e01 7f008214 00010100 02000300 04090504 06000700 08050907 0a010b03
0c010d06 0e040f00 10011100 12031300 14041500 16031700 18001900 1a071b08
1c041d00 1e001f00 20002106 22022307 24042500 26032700 28012904 2a002b00
2c002d00 2e022f08 30003100 32033301 34003501 36003700 38043900 3a003b00
3c043d00 3e003f04 40004102 42044300 44004503 46004701 48004900 4a034b06
4c034d04 4e044f02 50005101 52005302 54015500 56075700 58005900 5a025b03
5c075d00 5e005f03 60006100 62026302 64006506 66026700 68016904 6a006b00
6c006d00 6e036f03 70067100 72027304 74077500 76007704 78047903 7a007b00
7c077d00 7e007f04 a1140000 a0140001
```

In Figure 1 the currents drawn on both AVDD and DVDD power lines for one of the devices that recently broke is plotted versus time around the instant of failure. The current is measured by the Power Supply Ammeter with intervals of 7-10 seconds (the reading is zero-suppressed so the same value does NOT show up 2 times in a row).



**Figure 1. SB5W5L0:** BLACK is the DVDD current in mA and RED is the AVDD current in mA plotted vs time in Hours between 18:30 and 19:30 on May 8th.

This failure mode is up to now present only on the SVXII ladders. Everything seems to be consistent with fusing the DVDD connection at the jumper (either the VIA or the wire-bonds) but all measurements done on the bench so far show that there are not normal operating conditions when enough energy is dissipated in order to “blow” the line.

Even if the PHI side of the ladders affected by these symptoms is still fully functional the Z side is lost forever.