Heavy Ion Effects of low voltage LVDS line driver/receiver from National Instruments

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Backgrounds

- No export licence on this LVDS from National Semiconductor
- The 5V version was known to be SEL sensitive before it was modified by the manufacturer
- The 3.3V versions become of interest for us to investigate

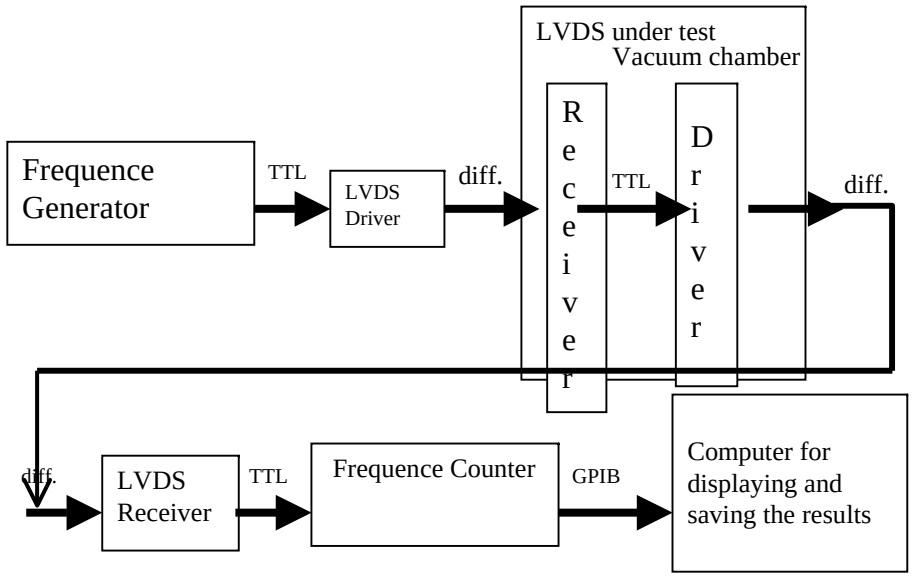
Test samples

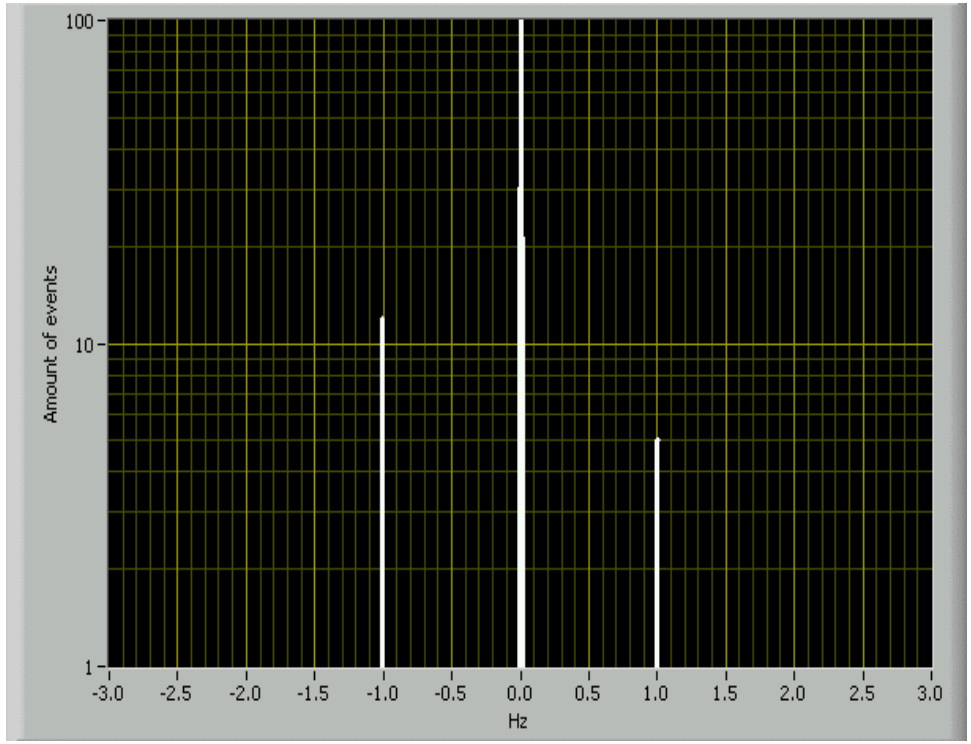
Part Type:	Driver DS90LV31B	Receiver DS90LV32B
Manufacturer:	**National Semiconductor**	**National Semiconductor**
Date Code	**0343A**	**0343A**
Quality:	**QML 5962-9865101QFA**	**QML 5962-9865201QFA**
Bias Condition	**3,3 Volt**	**3,3 Volt**
Package	**FP-16**	**FP-16**
Serialization	**S/N 1, S/N 2**	**S/N 3, S/N 4**

Heavy ions used in the present investigation at CYClotrone at Louvain la Neuve

Element	Energy MeV	Range µm	LET value MeV·cm^2/mg
84Kr17+	**316**	**43**	**34.0**
84Kr25+	**756**	**92**	**32.4**
132Xe26+	**459**	**43**	**55.9**

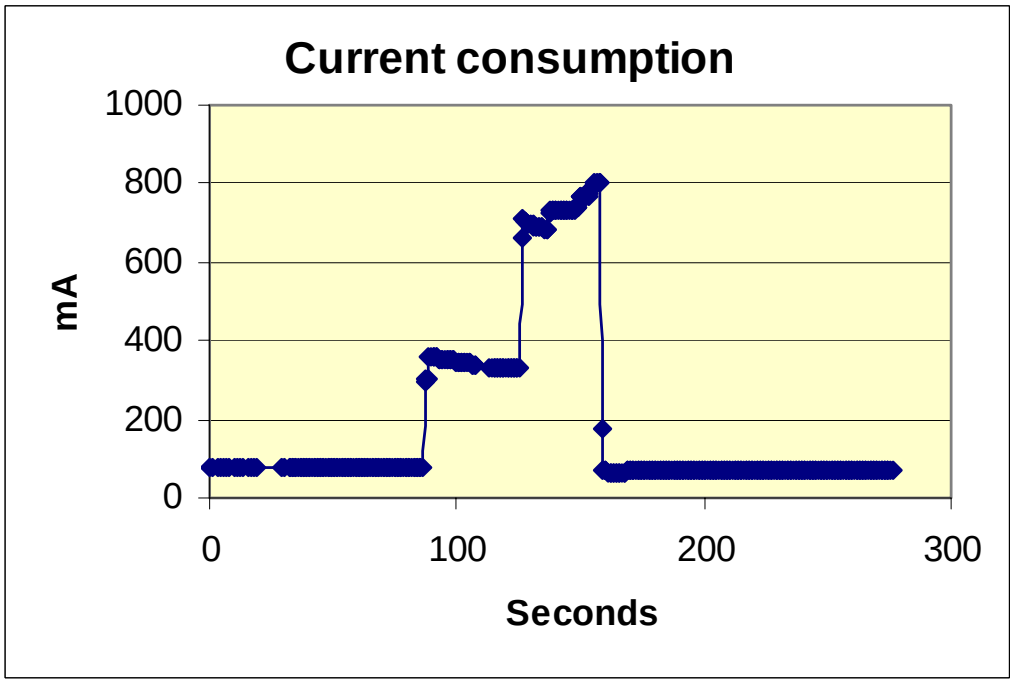
Test Techniques





SET measured with a feeding-and-counting technique developed by M.Wiktorson et al.

Partial SEL



Current as a function of test time.

First LU leave the device at about 350 mA, second LU initially at 700 mA.

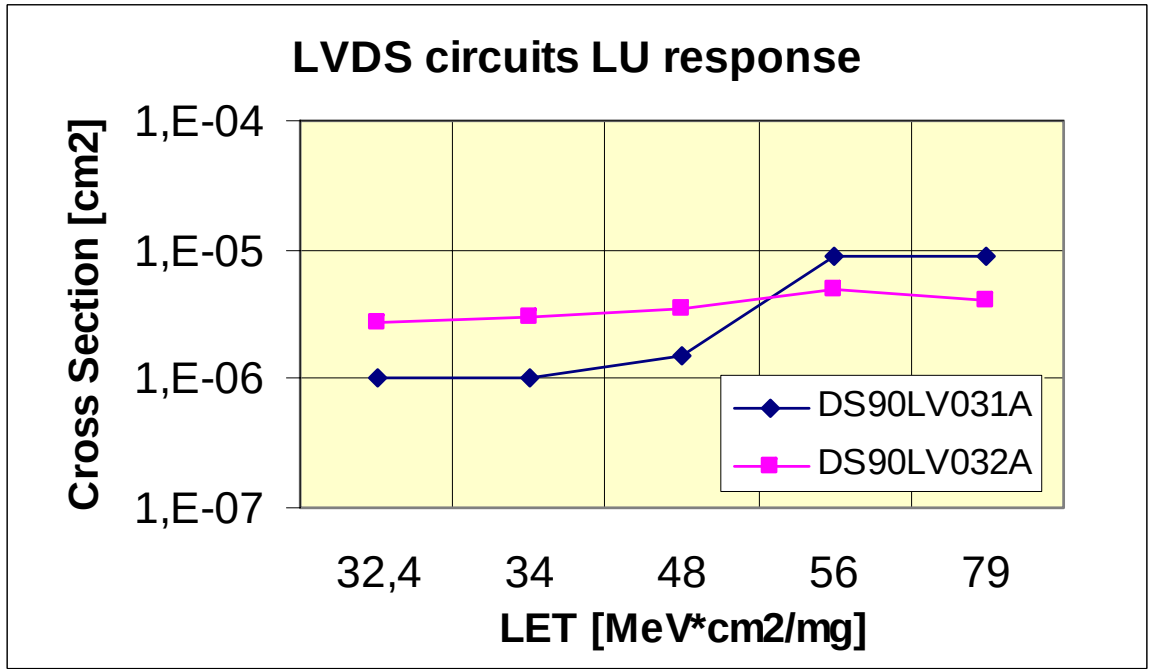
The LU-protection unit was set to shut down the DUT at 800mA.

For each SEL, the current increase was about 350mA

After the current was shut down by LU-protection unit, the component operated as normal

Both the Driver and the Receiver showed the same behavior and sensitivity for SEL

SEL Cross Section vs LET



No clear threshold value was recorded

Fluence of 1E6 ➔ Few SEL's

Conclusions

- Both the LVDS Driver & Receiver are Single Event Latch-up (SEL) sensitive. This has been known before on the 5V supply versions. After the 5V versions was modified it is no longer LU sensitive. Now the 5V versions “only” show indications of SET’s.

- During the LU mode both the Driver and the Receiver does NOT operate, the data transferring is out of order.

- With a LU-protection the 3.3V versions are useable, since after a shut down a 100% functionality was found.