LVDS Driver

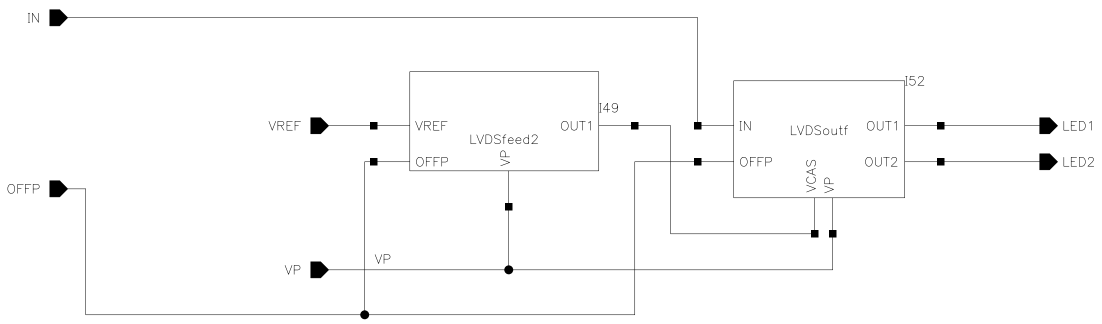
Implemented in ABCD2T/NT (SCT Readout chip)

Francis ANGHINOLFI

1. Specification

A "LVDS" type of output line driver has been developed for the serial data drive (40Mbits/sec). The main features are :
. Differential output drive, 3.5mA typ. across 100 ohms resistor.
. Output voltage level controlled at 1.23V +/- 30mV.
. Compatible with commercial TIA/EIA 644 compliant LVDS Receivers.

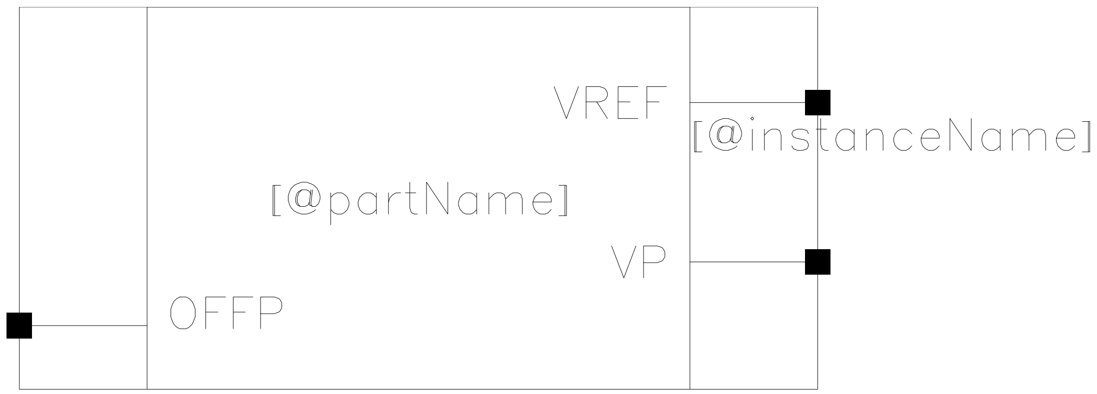
2. Description



Pin name	Function
IN	CMOS level input
LED1	LVDS output
LED2	Complementary LVDS output
VP	Current reference for the output drive
VREF	Voltage Reference input
OFFP	Power OFF mode. When OFFP is set, the line driver is switched off and the power is reduced from 64mW to less than 4mW.

The driver is made of an output buffer (LVDSout) which drives a constant current in either direction between the two outputs. The output DC level is controlled by a feedback element (LVDSfeed) referenced to an internal bandgap voltage reference generator.

2. Vref Bandgap reference



Pin name	Function
VP	Current reference for the output drive
VREF	Voltage Reference output
OFFP	Power OFF mode. When OFFP is set, the line driver is switched off and the power is reduced from 64mW to less than 4mW.

A Band-gap voltage reference VREF is built up inside the chip. It is set at 1.267 Volts (simulation value, 25oC, 4V power supply, typ parameters). From simulation, the variations with parameters are:
Temperature dependence : +120uV/oC
Power supply dependence : +20mV/V
Process dependence : +/- 35mV (process corner parameters, Temp = 25oC)

4. Simulations

Simulations have been performed with the new DMILL corner parameters (DMILL 4.3 design kit).

It shows a full functionality of the present schema for all the corners of the parameters, within temperature and voltage range, at 50MHz clock period and 50pF load.

The following table shows the characteristics at the outputs with different parameters.

Parametric	DC Level @ outputs	Differential Swing @ outputs
ff 0 deg. C 4.3V	1.258V	347mV
tt 25 deg. C 4V	1.267V	360mV
ss 0 deg. C 3.7V	1.259V	372mV
iss 0 deg. C 4.3V	1.206V	330mV

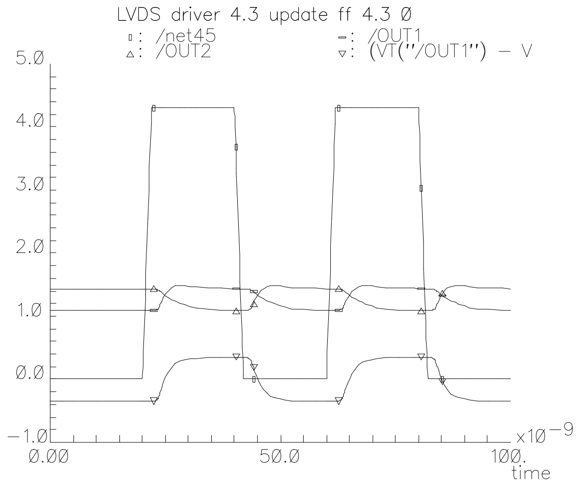


Fig. 1 : LVDS Driver outputs. "ff" parameters, 0 deg,. C, 4.3V. 50pF load. Top trace is the signal input. Middle traces are the two output signals. Bottom trace is the differential signal across 100 ohms.

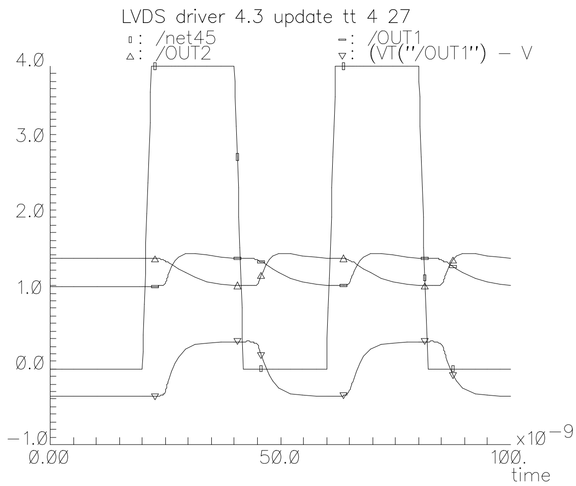


Fig. 2 : LVDS Driver outputs. "tt" parameters, 27 deg,. C, 4V. 50pF load. Top trace is the signal input. Middle traces are the two output signals. Bottom trace is the differential signal across 100 ohms.

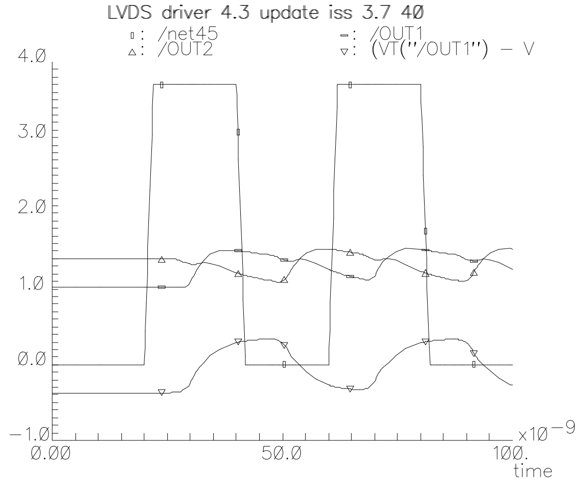


Fig. 3 : LVDS Driver outputs. "iss" parameters, 40 deg,. C, 3.7V. 50pF load. Top trace is the signal input. Middle traces are the two output signals. Bottom trace is the differential signal across 100 ohms.