

## Using the V<sub>BB</sub> Reference on High Speed LVDS Repeaters

### Abstract

Fairchild's LVDS 2, 4, and 8-port repeaters are designed for high speed interconnects providing low Electromagnetic Interference (EMI) and low power dissipation at data rates up to 1.2Gb/s. The devices accept and generate LVDS levels with a typical output voltage of 330 mV. The devices are designed with a V<sub>BB</sub> output reference voltage for AC coupling on the inputs. This application brief will discuss when to use AC coupling in an interconnect design and illustrate how to use the V<sub>BB</sub> reference feature for optimizing the link.

### Output Reference Voltage (V<sub>BB</sub>)

The V<sub>BB</sub> reference is a design feature of Fairchild's LVDS repeaters which is simply a DC voltage reference used in applications employing AC coupling on the inputs. It is an internally generated DC voltage bias output that sources up to 275 μA of current. Test conditions used to characterize this feature were with V<sub>CC</sub> = 3.3V and an

I<sub>BB</sub> = 0 to -275 μA to guarantee minimum and maximum limits of 1.125V and 1.375V respectively. The V<sub>BB</sub> pin does not have to be used and can be left floating.

### When would the V<sub>BB</sub> Reference Voltage be used?

Application specific requirements will determine whether the V<sub>BB</sub> reference is needed. Typically when AC coupling is used to couple a transmitted differential signal to a receiver, the coupling capacitor blocks DC and thus the offset is no longer present at the receiver input. By connecting the V<sub>BB</sub> output reference voltage between a split termination, it effectively provides a common mode voltage point for the differential signals. Refer to Figure 1 for the V<sub>BB</sub> connection diagrams. The capacitor from V<sub>BB</sub> pin to ground is used to stabilize the common mode voltage point. The value of the capacitor will be dependent on the specific application environment.

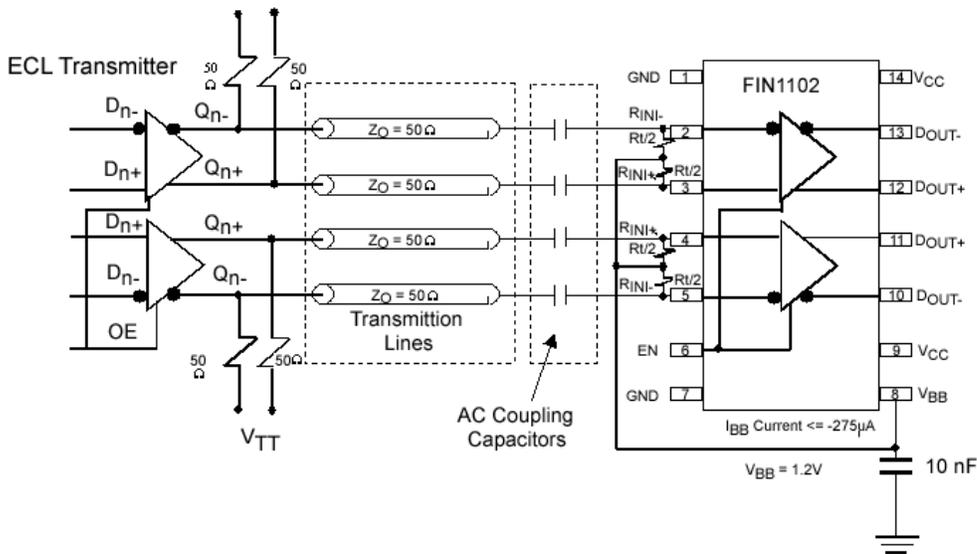


FIGURE 1. AC Coupling ECL to LVDS using the Output Reference Voltage (V<sub>BB</sub>)

## Why AC-couple a Signal?

There are several reasons a designer would consider AC-coupling a signal, some of which include the following:

1. For interchangeability between different logic families with different switching thresholds it may be necessary to change the DC bias level to be compatible with the switching thresholds of the receiving device.
2. To couple differential signals transmitted between equipment with no DC connection required between the chassis. This will allow easier reception of the signals by the receiver without concern of the common-mode voltage range.

AC coupling is typically used only with binary signals having an equal number of ones and zeros such as clocks with a 50% duty cycle. A signal with DC balance is referred to as a signal having an equal number of ones and zeros. Without a DC bias, the receiver will not respond since the internal circuitry has no DC operation point, effectively never allowing the input transistors to bias up.

## Summary

This application brief provides guidance for using the  $V_{BB}$  output reference feature on Fairchild's LVDS repeaters.  $V_{BB}$  can ease interchangeability and interfacing between different signaling standards.

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