

LVPECL to HCSL Level Translation

APPLICATION NOTE

Interfacing Between LVPECL and HCSL

Certain applications require HCSL signaling. Because LVPECL and HCSL common-mode voltages are different, applications that require HCSL inputs must use AC coupling to translate the LVPECL output to HCSL levels.

LVPECL output drivers are terminated through 50Ω to a common mode reference voltage, normally 2v below the power supply voltage. HCSL, on the other hand is referenced from GND and is centered at 0.35 volts. The differences in common mode voltage is shown in Figure 1.

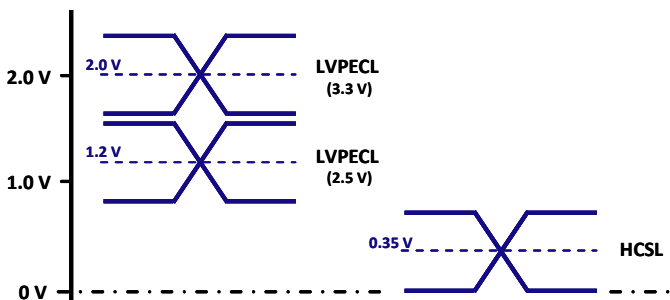


Figure 1

Due to the positive voltage offset, LVPECL signals must be shifted down in order to interface with HCSL compliant inputs.

AC Coupling and Termination

The LVPECL common mode output voltage can be shifted to the appropriate HCSL levels by AC coupling the output signal and terminating into a Thevenin equivalent resistor divider network as shown in Figure 2.

Thevenin resistor values can be calculated for any VDD by solving for two conditions at the receiver: (1) the resulting parallel resistor combination must equal 50Ω and (2) the DC termination voltage must equal 0.35V, the HCSL mid-level voltage.

$$R1 \parallel R2 = 50\Omega \quad (1)$$

$$0.35V = VDD \left(\frac{R2}{R1 + R2} \right) \quad (2)$$

Solving for R1 and R2 for VDD=3.3V results in Thevenin equivalent resistor values of 471.43 and 55.93 ohms, respectively. 470Ω and 56Ω commercially available 5% tolerance resistors are commonly used since both are every close to the calculated R1 and R2 values.

Because LVPECL requires pull down resistors to bias the internal emitter-follower outputs, 150Ω resistors are used to terminate the outputs to ground. This provides proper biasing of the LVPECL output stage, while the 470Ω and 56Ω resistor network biases the HCSL receiver input stage.

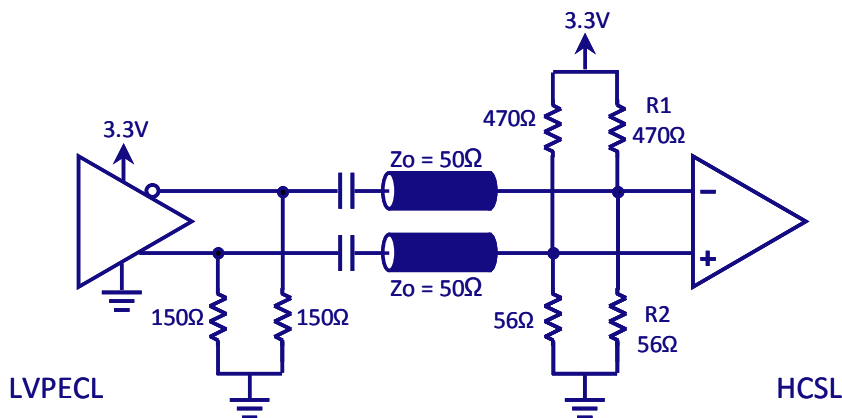


Figure 2

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