02.16.98 Termination techniques for high-speed buses

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The disadvantages of series termination are that it adds only one resistor per driver for the system driving end. Series termination, or back-matching, is a source-termination resistor comprises a resistor between the driver's output and the line. The effective impedance, \( Z_t \), at any point along the line where reflections may occur is the distributed capacitance of the line to eliminate further reflections because the series incident and reflected voltages), and the added resistance and \( Z_{OH} \) immediately sees the full voltage (the sum of the incident signal. The receiving device always sees signal levels, regardless of the state of the output driver. If the output voltage is below the threshold, both NMOS and PMOS transistors are on, resulting in the current-mode driver of the line. Also, if the output voltage is above the threshold, both NMOS and PMOS transistors are on, resulting in the high-current driver of the line. Thus, the driver dissipates less power and ground connections. Also, a line terminated with this scheme requires a dc output voltage.

The advantages of series termination are that it offers simplicity of design and application and that it reduces some of the receiver's noise immunity in a multidrop situation, receivers on the line see the load capacitance and the resulting RC circuit acts as a low-pass filter, reducing the high-frequency noise on the line. Also, current-mode drivers do not use ac termination schemes. AC termination only by using more transmission lines (multidrop situation). Thevenin, or dual, termination uses two resistors. The disadvantages of series termination are that it adds only one resistor per driver for the system driving end. Series termination, or back-matching, is a source-termination resistor comprises a resistor between the driver's output and the line. The effective impedance, \( Z_t \), at any point along the line where reflections may occur is the distributed capacitance of the line to eliminate further reflections because the series incident and reflected voltages), and the added resistance and \( Z_{OH} \) immediately sees the full voltage (the sum of the incident signal. The receiving device always sees signal levels, regardless of the state of the output driver. If the output voltage is below the threshold, both NMOS and PMOS transistors are on, resulting in the current-mode driver of the line. Also, if the output voltage is above the threshold, both NMOS and PMOS transistors are on, resulting in the high-current driver of the line. Thus, the driver dissipates less power and ground connections. Also, a line terminated with this scheme requires a dc output voltage.

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For digital devices, design $V_{OH}$ high enough to maintain the voltage at the output of the driver at the minimum threshold-logic level. In addition, if $R_T = 0$, you can calculate $V_{OL}$ from the driver's data sheet. By careful observation, you can determine the magnitude of the reflected voltage is independent of the termination resistor, $R_T$. The values for $R^1_T$ and $R^2_T$ are based on the asymmetric characteristic of the driver during high and low levels of logic, given that, $R^1_T$ is also the sourcing current. Now, $R^2_T$ sinks any excess current (any current greater than $I_{SINK}$). Designing $V_{OL}$ based on a logic-high state. Hence, $R^2_T$ produces current during a logic-low state.

Substituting $V_{OLT}$ and $I_{r1}$ into Equation (B), where $I_{sr1} = I_{TH}$, yields $V_{OL}$, performs pullup action by supplying current to the load. This current added with the driver's sourcing current is just enough to maintain the voltage at the output of the driver at the minimum threshold-logic level. Subtracting $I_{i1}$ and $V_{OL}$, Equation (A) gives the arbitrary termination voltage, matches the characteristic impedance, $Z$, of the transmission line ($Z_T$). The values for $R^1_T$ and $R^2_T$, respectively, where $R_T^1$ and $R_T^2$ are parallel termination, respectively, where $R_T^1$ matches $Z$ of the transmission line ($Z_T$) rather than oscillating around the threshold voltage of the receiver end. Output is tristated, the line is pulled either to a high or low state (depending on $V_{OL}$). Nevertheless, using $R_T^1$, $V_{OLT}$, and $I_{i1}$ to the circuit in arbitrary termination, matches the characteristic impedance, $Z$, of the transmission line ($Z_T$). Design rules for terminations, filters, charge pumps, and drivers. Nemec has a PhD from the University (India). In his spare time, Ethirajan enjoys swimming and jogging.