

AC termination

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AC, or RC, termination comprises a resistor, R , and a capacitor, C , that connect to the load end of the transmission line (**Figure 1**).

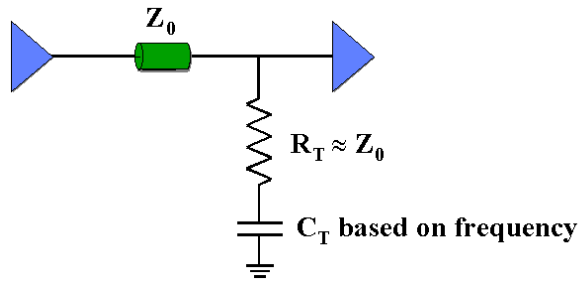


Figure 1. AC termination

The value of R_T must match the Z_0 of the line to eliminate reflection. Choosing the capacitor value is intricate, because a small value results in a smaller RC time constant, and the resulting RC circuit acts as an edge generator, causing overshoot and undershoot. On the other hand, a large capacitor value increases power consumption. As a rule, the RC time constant must be greater than twice the loaded propagation delay of the line. Power dissipation in the termination components is a function of the frequency, duty cycle, and bit pattern of the previous data. These factors

affect the charging and discharging of the termination capacitor and hence affect power dissipation. The advantages of ac termination are that the termination capacitor blocks dc and hence saves considerable power and that an appropriate choice of the capacitor value results in the waveform at the load end that's nearly an ideal square wave with minimal overshoot or undershoot.

One disadvantage of ac termination is that the data on the line may exhibit time jitter, depending on the previous data pattern. For example, a long string of like bits causes the line and capacitor to charge to the maximum level of the driver's output voltage. Then, a subsequent data bit of the opposite polarity takes longer than normal to cross the receiver threshold because the voltage at the receiver starts from a greater potential. The timing budget must include this increased time to guarantee system operation.

When using ac termination, note that the standard RS-422 interface protocol does not recommend ac termination, because the drivers' typical 100V source impedance can introduce output jitter. Also, current-mode drivers do not use ac termination.

(Reference: Termination techniques for high speed buses by Karthik Ethirajan and John Nemece)