## Background

KOA Speer Electronics offers several integrated passive solutions specifically targeted for terminating clock, address, and data bus signals in large scale systems. These systems are often built on a backplane foundation. The challenges of signal distribution, signal quality, and precision timing have become increasingly difficult in these systems. Clock and signal quality degradation occur as a result of parasitics that develop from the distribution of data and timing signals across a backplane.
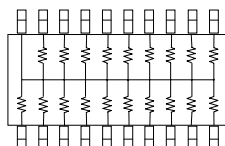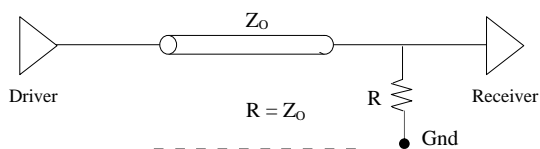
Termination Types

To minimize the effect of the parasitics associated with the signal distribution, clock, address, and data signals must be properly terminated. There are several termination techniques that can be employed to minimize signal skew, optimize edge transition, and eliminate signal reflections. Each technique has attributes that must be considered for a particular design. Following is a summary of the termination techniques commonly used in large scale digital systems today, and associated KOA Speer product solutions available.
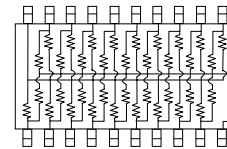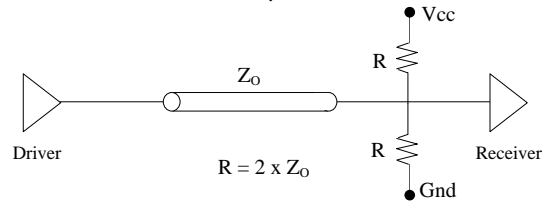
Series Termination (Product **RIA**)

R_D R Z_O

Driver $R = R_D = Z_O$ Receiver
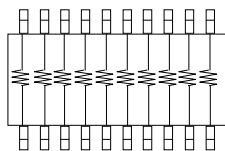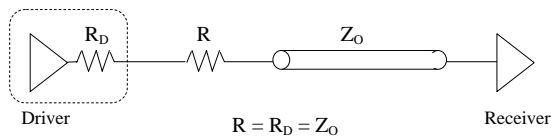
- Simple source termination
  - low power

Parallel Termination (Product **RBA**)

Z_O

Driver $R = Z_O$ R   Receiver

Gnd

Thevenin Termination (Product **RDA**)

Vcc

Z_O R

Driver $R = 2 \times Z_O$ R   Receiver

Gnd

- Low power load termination

AC Termination (Product **ACB**)

Z_O

Driver $R = 1.5 \times Z_O$ C   Receiver

R

Gnd
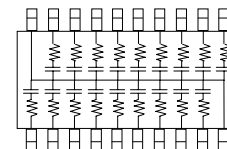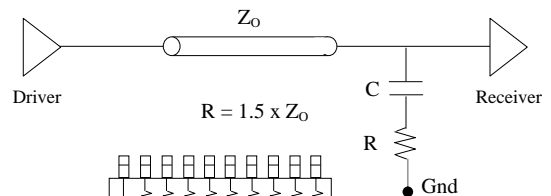
- Typical capacitor value 100pF ~ 200pF
- Reduces power consumption

Non-linear Termination (Product **DN5**)

Vcc

Z_O D

Driver   D   Receiver

Gnd
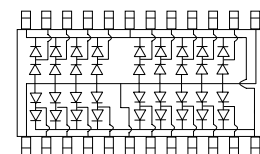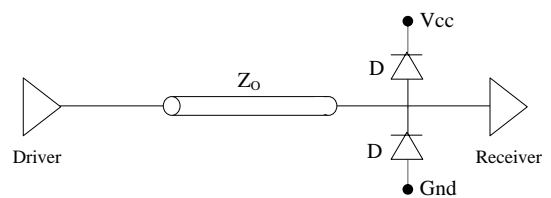
- Latches logic state, attenuates ringing / overshoot.
- Effective in suppressing short duration voltage transients for hot swap application.
- Effective termination in cases where bus impedance may change.