

EMI Best Practices

- **PCB Design Guidelines**

- Minimize ground loop areas
- Route differential pairs close together
- Use 100ohm coupled differential pairs
- Minimize impedance discontinuities
- Minimize skew within the pair
- Keep stubs as short as possible
- Minimize the number of vias
- Solid ground and power planes
- Sufficient decoupling capacitors on chip power supplies
- Keep digital and analog lines separate

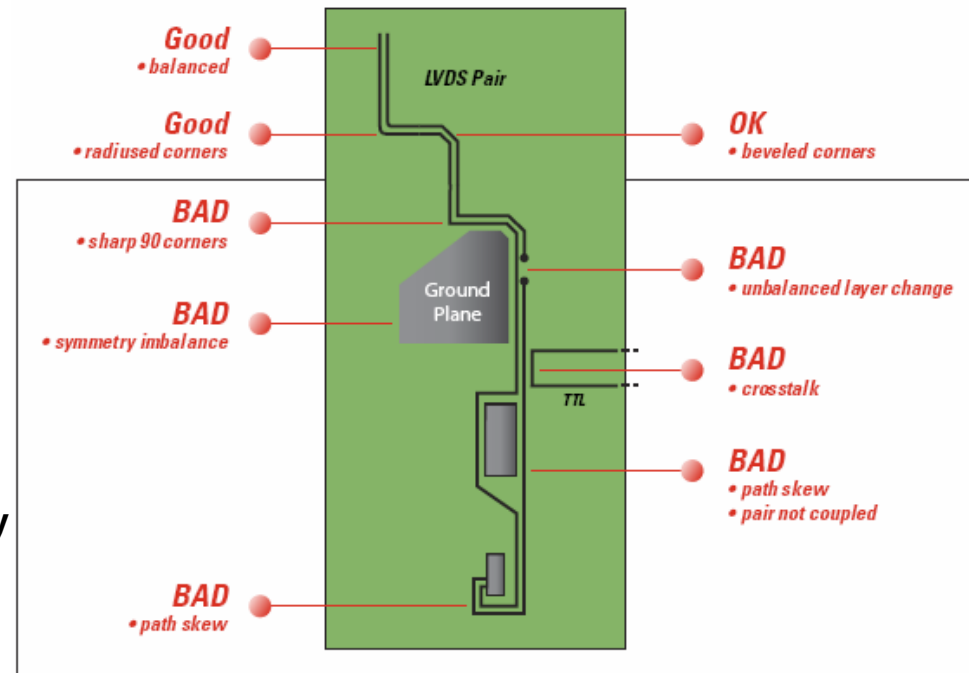
- **Signal Integrity**

- Reduce crosstalk noise and jitter
- Minimize Power/Ground bounce (noise)
- Controlled edge rate of 2ns for single-ended signals to minimize signal reflections
- Optimize Host to Serializer signal drive strength (low drive) to avoid over/undershoot and extremely fast edge rates; maintain only clock fast edge for low jitter

PCB Guidelines

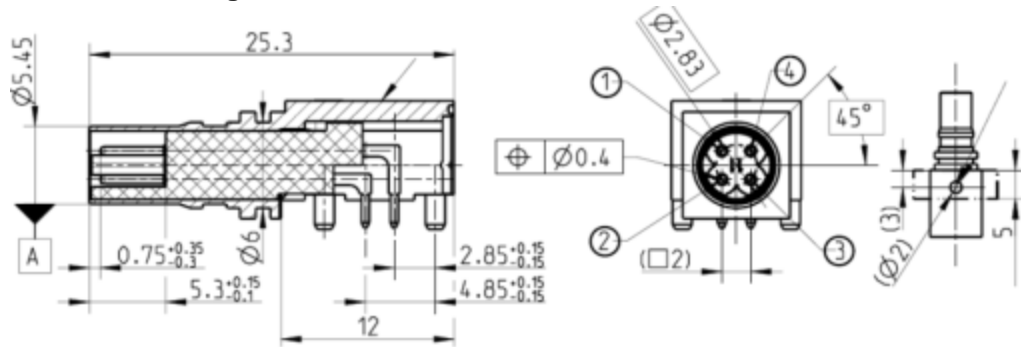
- ✓ Use at least a four-layer board with dedicated power and ground planes
- ✓ Use surface-mount components to minimize parasitics
- ✓ Separate a single-ended signal from a differential signal by at least three times the differential spacing
- ✓ Separate adjacent differential pairs by three times the intra-pair trace spacing
- ✓ If vias are required for high-speed data lines, be sure to place vias to ground next to the signal via for a constant return path for the signal
- ✓ Route all differential traces as 100Ω differential impedance transmission lines
- ✓ Route all single-ended signals as 50Ω impedance lines
- ✓ Route all power signals as wide as reasonably possible to minimize inductance

- ✓ Use connectors and cables that are designed for high-speed differential data
- ✓ Follow the typical connection diagrams found in the datasheet for power-supply filtering recommendations

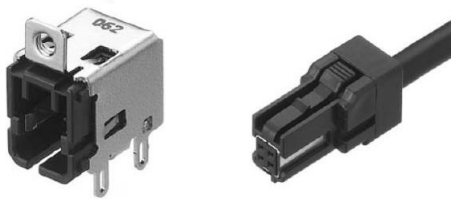


Examples of Connectors

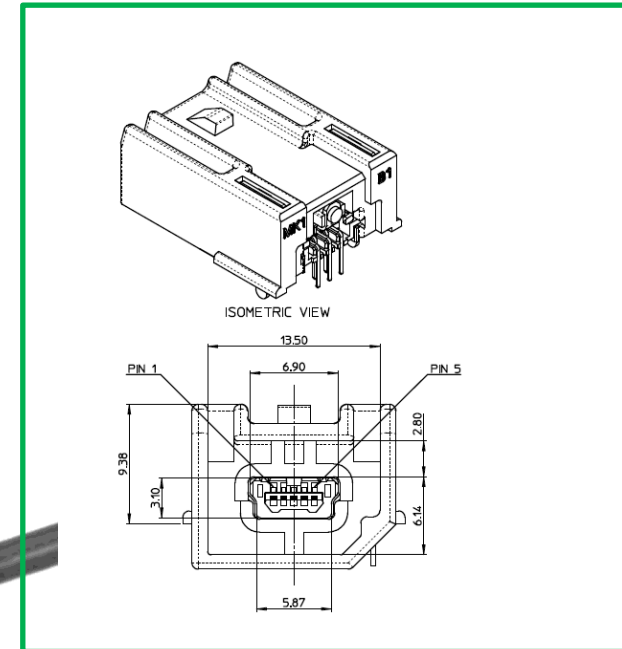
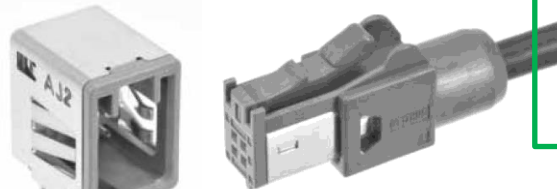
Rosenberger HSD®



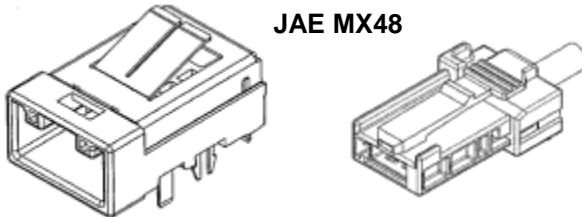
Honda TAK-A4



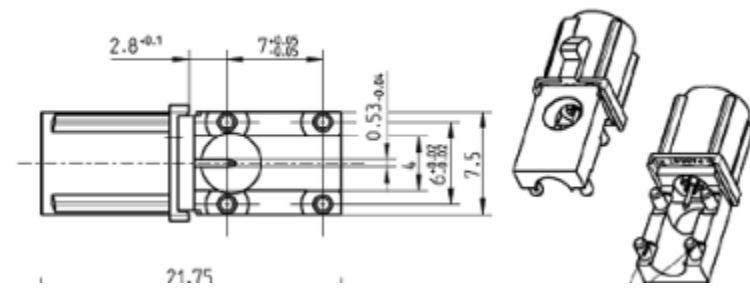
Hirose GT17



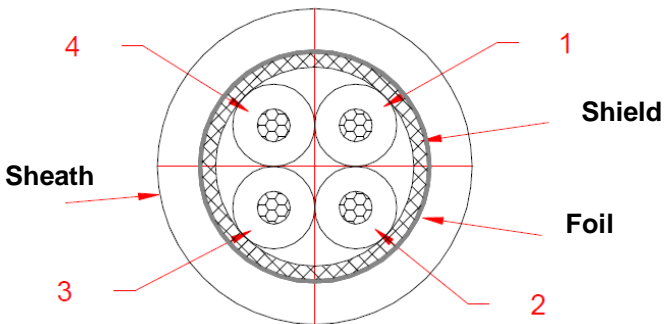
JAE MX48



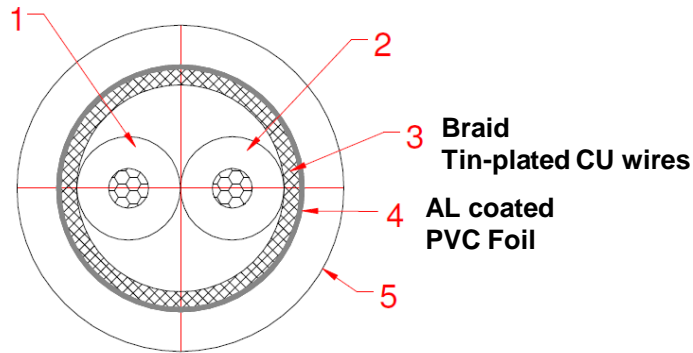
FAKRA (SMB-A)



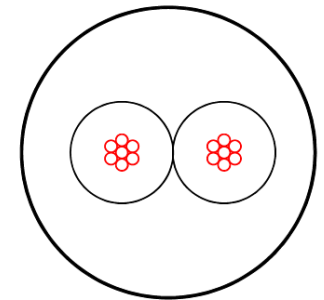
Cable Types



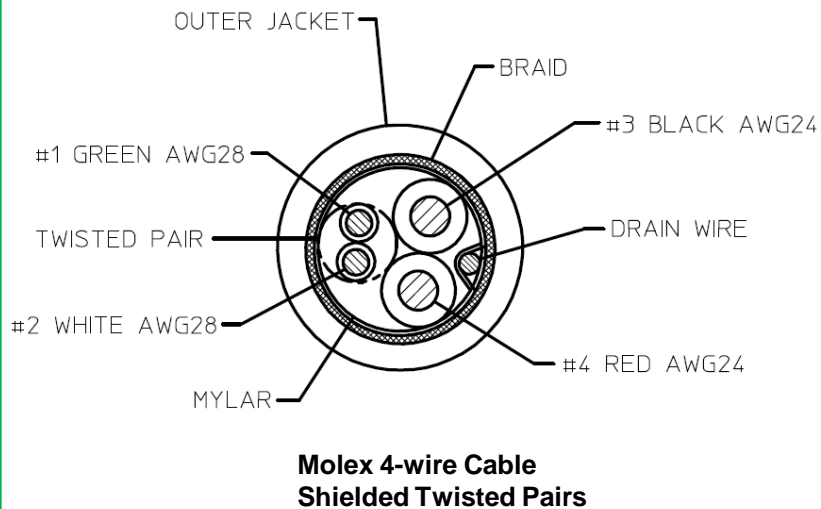
**Leoni DACAR538
Star-Quad Cable**



**Leoni DACAR 522 STP
FL9YCBY 2x0.14
Shielded Twisted Pair**



**K&S FlexRay UTP
FLR09YS-YW
Unshielded Twisted Pair**



**Molex 4-wire Cable
Shielded Twisted Pairs**



**Leoni DACAR302
Coax**