

Specifications for the LVHV cable for D0 Run 2B silicon upgrade

Overview

This is a request for quotation for 1000 feet of halogen free multi-conductor cable with a shield. Details are provided in here that are not strictly necessary, but may help engineering staff pick the most proper cable for this application.

The Twisted Pair Cable Bundle has three cables in the bundle. First is the Twisted Pairs cable. This cable has been designed, purchased, and is being built now. There is a clock cable and that cable has been designed, purchased, and is being built now. The third cable is the Low Voltage / High Voltage (LVHV) cable and this document is the specification for this cable.

The Low Voltage / High Voltage Cable will be approximately 3 meters long and the production detector will need 48 cables. To have adequate spares and for test fixtures, we should build 100 cables, or purchase 300 meters of cable (or 1000 feet).

Speed is an issue in this cable purchase. The use of materials to bring down the production / delivery time will be important in this cable, within the specifications stated below.

Cable Details

The LVHV cable is made of two twisted pairs surrounded by a shield & drain wire that is then surrounded by an outer jacket. This is shown below in Figure 1.

The foil shield needs to be wrapped such that the drain wire is in good contact with the foil. One method of this is shown below in Figure 2.

For reference only, the final cable assembly will be as shown in Figure 3. One side will be stripped back several inches and soldered to solder pads on the junction card. The other side will be terminated with a Molex "C-Grid" connector. The shield wire will be covered with heat shrink and terminated to a ring lug connector. At both ends, where the cable goes from stripped to not stripped, a small piece of heat shrink will be applied to provide strain relief in the transition (and because it will look better).

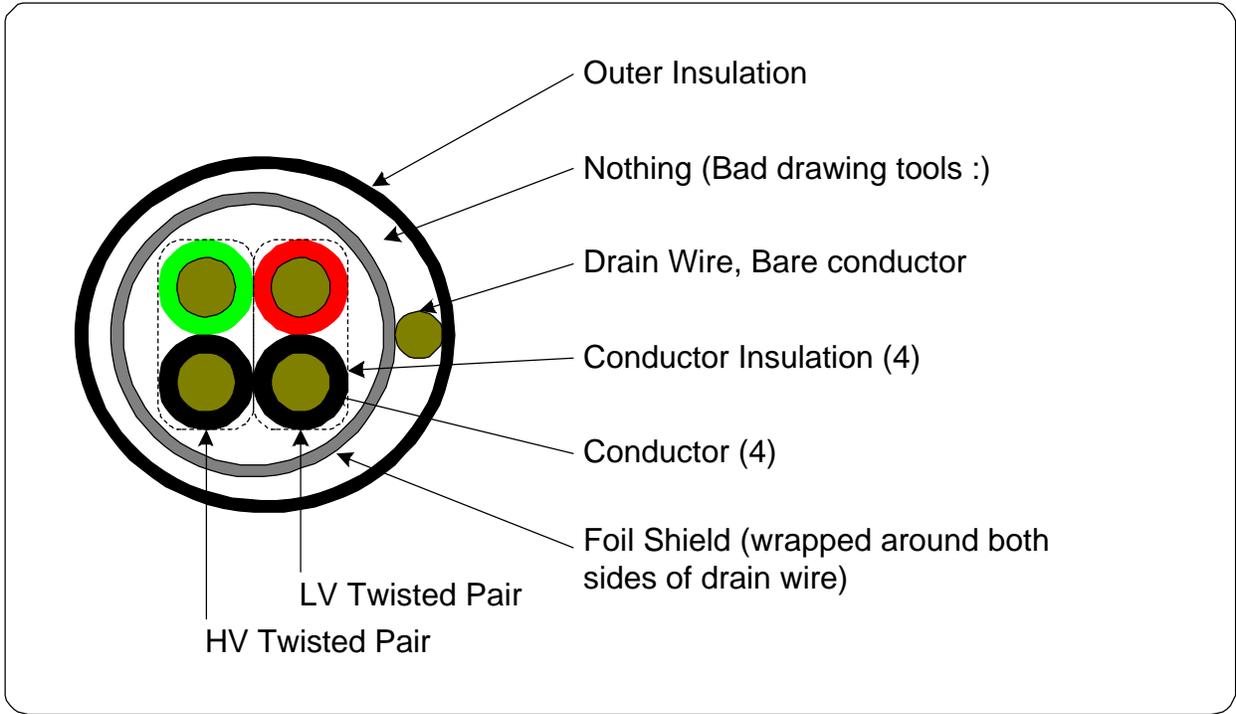


Figure 1: Cable Construction Diagram

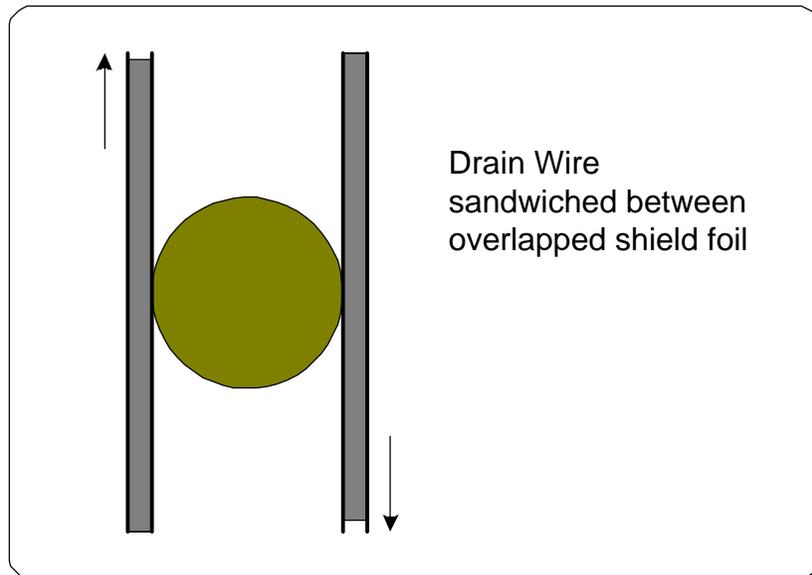


Figure 2: Shield Foil Detail

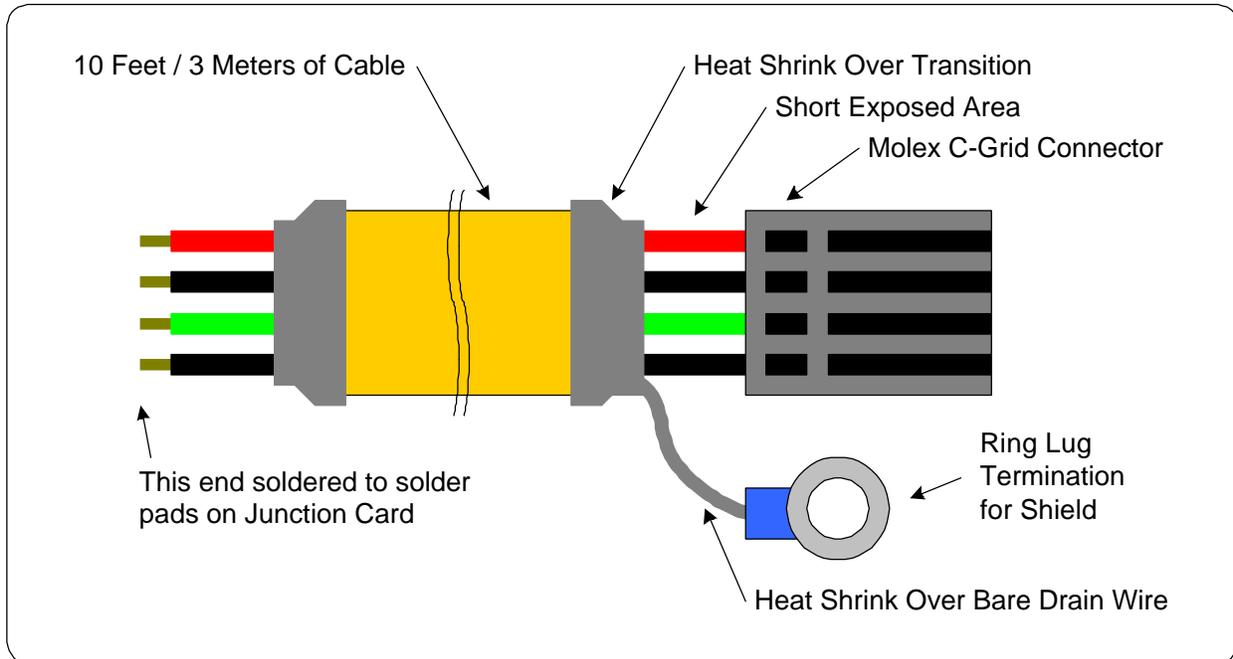


Figure 3: Final Cable Assembly Details for LVHV Cable

Delivery Timetable

This cable is desired ASAP. There is not time for a multi-month lead time on this cable. Please add to the quotation the expected lead time.

Specifications

1. Wire Gauge
 - 4 main signal conductors are 22 Gauge
 - Shield Drain wire is 24 Gauge or 22 Gauge, bare wire
2. Conductor Materials
 - Main signal conductors need to be a material compatible with soldering on one side and crimping to a gold plated contact on the other. The compatibility includes oxidation and material migration.
 - The shield wire needs to be crimped to a tin/lead contact on one side.
3. Type of Insulation
 - Type does not matter so long as it fits the size / voltage rating / halogen free requirements
4. Temperature Range
 - Operating temperature for this cable is at -15°C . The cable needs to be rated to at least -20°C .
5. Cable Layout
 - The cable can be round or flat and does not need any form of filler materials.
6. Dimensions
 - Individual Conductors: 0.064 Inch / 1.63mm
 - Outer Insulator Diameter: Does not matter
7. Flame Retardant
 - There is no strict requirement here.
 - The use of flame-retardant materials is desired if the halogen free requirement is still met.
 - If multiple insulation materials are available, the one that is least flammable is preferable over the most flammable.
8. Halogen Free
 - The cables must be halogen free. This includes the inner conductors and the outer insulation.
9. Voltage Rating
 - Only one of the conductors needs to be rated at 1000V. This would be the green conductor of the green / black twisted pair.
 - All other conductors need to be rated to 100V.
 - All conductors can be rated to 1000V if necessary.
10. Shield
 - Foil Shield with a 22 or 24 Gauge drain wire.
 - Drain wire must be in contact with the shield the length of the cable.