

# **MINOS Near Detector Front End Electronics Minder Timing Module (MTM) Printed Circuit Board review**

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## **I. MTM**

### **A. General Description**

- Picture of module provided (mtm.jpg)
- Schematics Provided in PDF File (mtm\_schematics.pdf)
- Connector Types
  - (2) 96-pin DIN male backplane connectors, 3M 7296-50C2-TH
  - (1) Keyed single RJ45 connector, AMP 558310-1
  - (1) Stacked 2x8 RJ45 connector, AMP 569259-1
  - (2) Single RJ45 connectors, AMP 406017-1
  - (1) 10 pin header, 3M 2510-6003UB
- Connector pinouts available within schematics.

## I. MTM (Cont.)

### B. Mechanical Description

- No Special Subrack Requirements
- Board Size: 340 mm x 6U standard VME
- Board Thickness: 0.062” Standard, No Edge Milling
- Stiffeners: 2 horizontal, 1 vertical
- Warpage: Standard Acceptable
- Chamfers: Not Required, Not Specified
- Clearances: DRC 8 mill traces, 8 mil spacing
- Non-circuitry areas cross-hatched top & bottom
- ESD Protection: None (Not Available in Crate)
- Front Panel:
  - Painted, anodized aluminum with silkscreen
  - Ejector Handles with holdings screws
  - LEDs present with labeling
  - Connectors isolated from front panel
- Keying: Master Clock Interface connector keyed to prevent accidental connection to LVDS outputs.
- Test & Repair:
  - Standard Test stand, with Open Side Panel
  - Test points on PCB for GND and signal monitoring
  - Full Checkout & Support from FNAL/ANL

## I. MTM (Cont.)

### C. Electrical Description

- Power Pins and protection:
  - (3) VCC pins, (8) GND pins on J1
  - 2.6A Polyswitch resettable fuse, 0.75A average current draw from VCC.
  - 1N5908 transorb
- I/O Connector Types
  - Front panel keyed RJ45 connector: Master Clock Interface, used for receiving HOTLink serial transmissions; also contains bi-directional serial LVDS slow control interface. Red, 8 conductor shielded category 5 cable with snagless boots.
  - Front panel stacked 2 x 8 RJ45 connector: MINDER Timing Fanouts, used for LVDS clock and timing signal distribution to 16 MINDER modules.
  - (2) Front panel single RJ45 connectors: Auxiliary Timing Fanouts, used for other clock and timing signal distribution (such as Keeper module).
  - 10 pin header with keyed shroud for JTAG download of Altera PLDs
  - J1 Backplane: 96-pin DIN, TTL, Power, & Ground
  - J2 Backplane: 96-pin DIN, not used
- Power Distribution: Use Power Planes, Meets IPC Industry Standards
- Air Flow: Crate will have ~900 CFM, with “Z” Modules in Unused Slots