Mt. Chive

High Voltage Divider Board

Design Review

May 3, 2012

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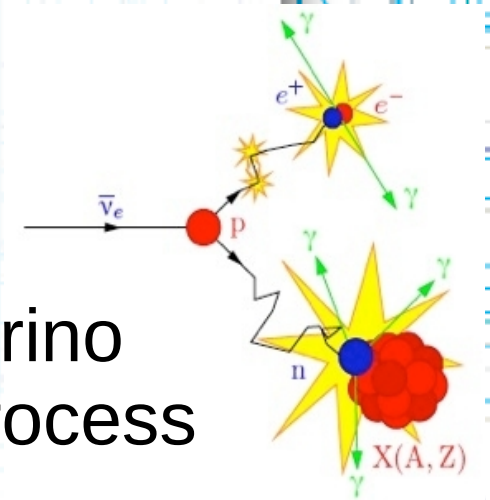
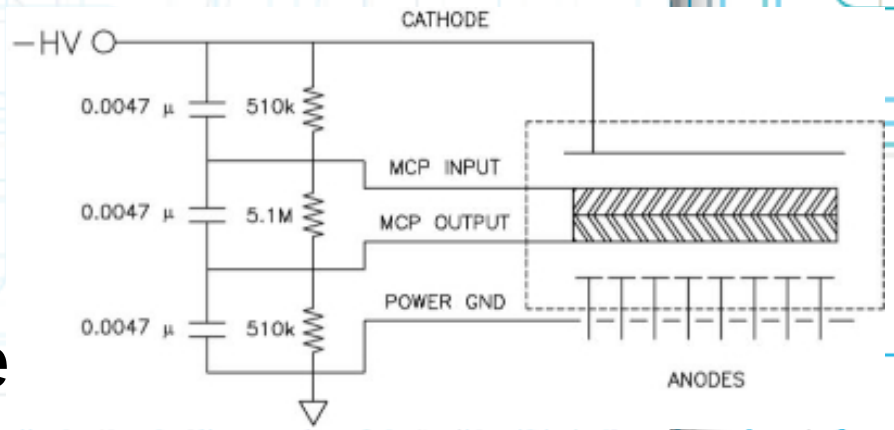
Overview / Motivation

- mini-Time Cube (mTC)
  - 2 liter doped plastic scintillator, neutrino detector via inverse-beta decay process



*Inverse beta decay schematic

- Utilizes micro channel plate (MCP) photomultiplier tubes (PMTs) to detect scintillation light
  - The PMTs require high voltages between their cathode and anode

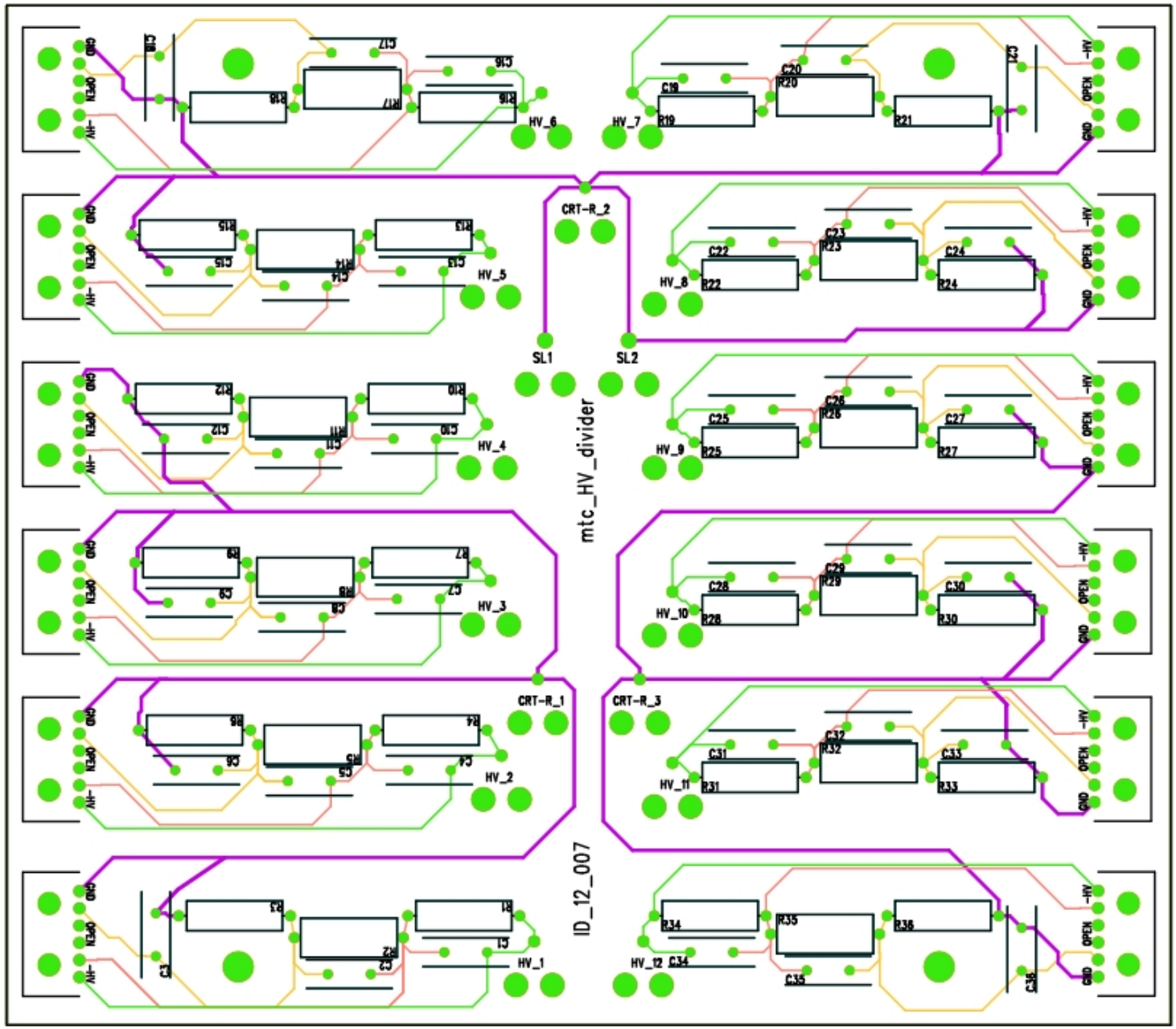


*Required divider circuit from Photonis data sheet

Specifications

- 24 channels of high voltage (~2.4kV)
  - Realized via two 12-channel PCBs
- Printed circuit board will divide high voltage; supplying 4 voltages to each PMT (Cathode, MCP-IN, MCP-OUT, Anode)
- Each channel will dissipate ~1W

Layout


mtc_HV_divider
ID_12_007
CRT-R_1
CRT-R_2
CRT-R_3
SL1
SL2
HV_1
HV_2
HV_3
HV_4
HV_5
HV_6
HV_7
HV_8
HV_9
HV_10
HV_11
HV_12
-HV
OPEN
GND

Problems / Solutions

- Test dividers with low voltage; to commence presently
- Using W-Ie-Ne-R (Mpod) high voltage supply
  - ✗ Software provided controls low voltage, **not** high voltage.
  - ✔ Additional software needs to be developed.
- Thermal Dissipation
  - ✗ 12W per HV board
  - ✔ Common issue for mTC electronics. Fans to circulate air, input and output already built into detector enclosure.

Thank You

Now check out the board