

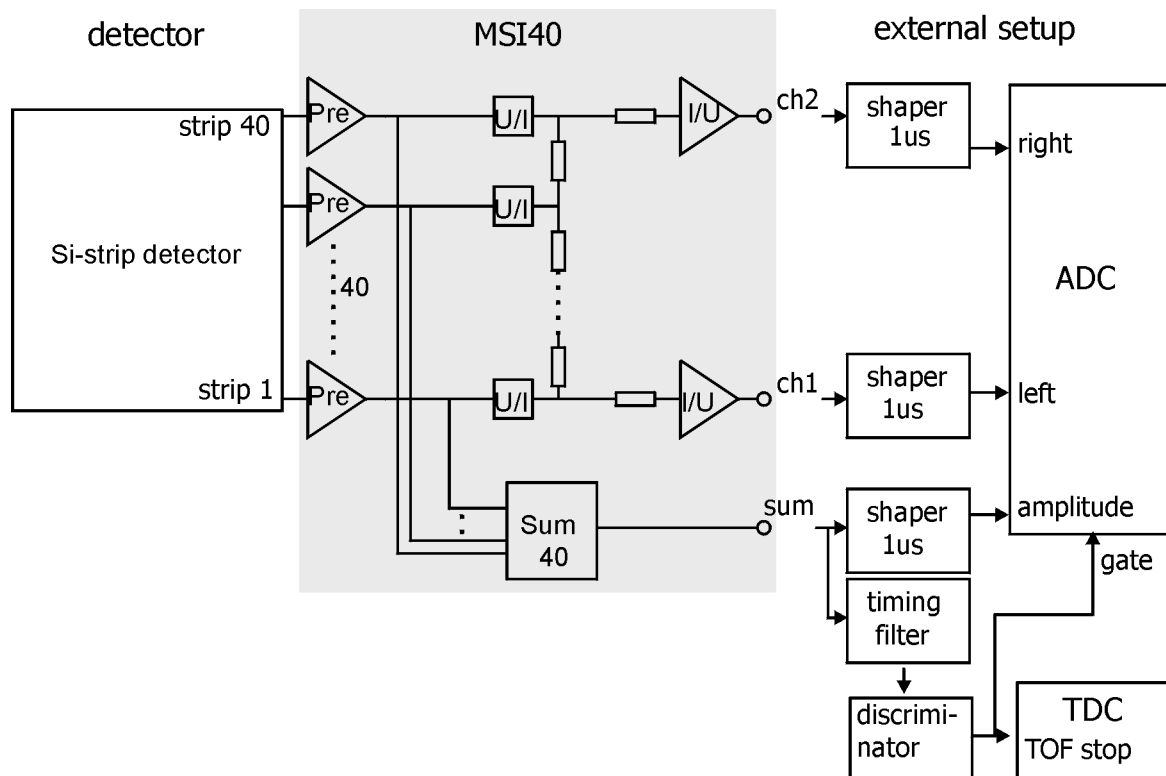
The mesytec MSI40 is a 40 channel preamplifier array. The sensitivity (20MeV to 20GeV) is adapted for high energetic heavy ion detection.

The preamplifier outputs are multiplexed on a resistor chain, providing two charge division signals to calculate the center of gravity of an event. In addition all 40 preamplifier outputs are summed up to provide an output for amplitude (disposed charge) and timing measurement.

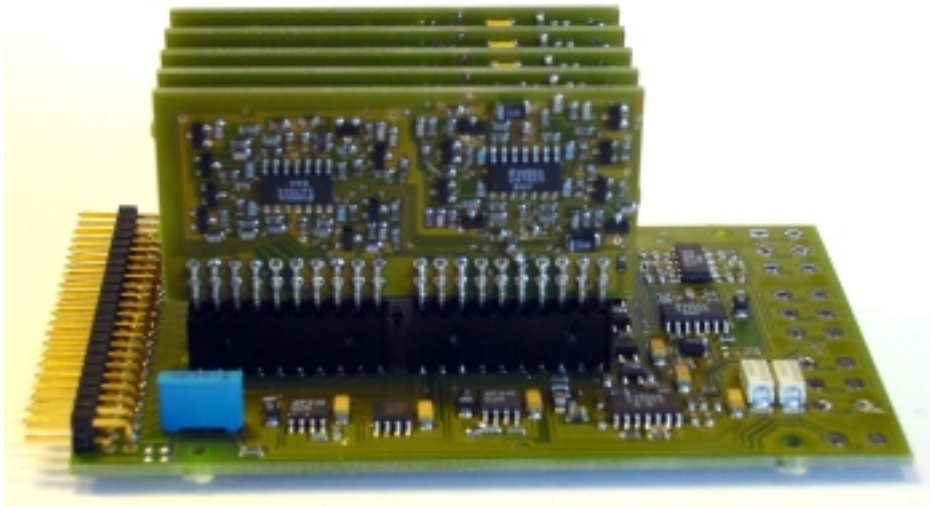
Features:

- 40 high range preamplifiers (20MeV to 2GeV)
- Two output signals for position calculation
- Sum output for total charge and timing
- All outputs can be terminated with 50 Ω

Schematics:

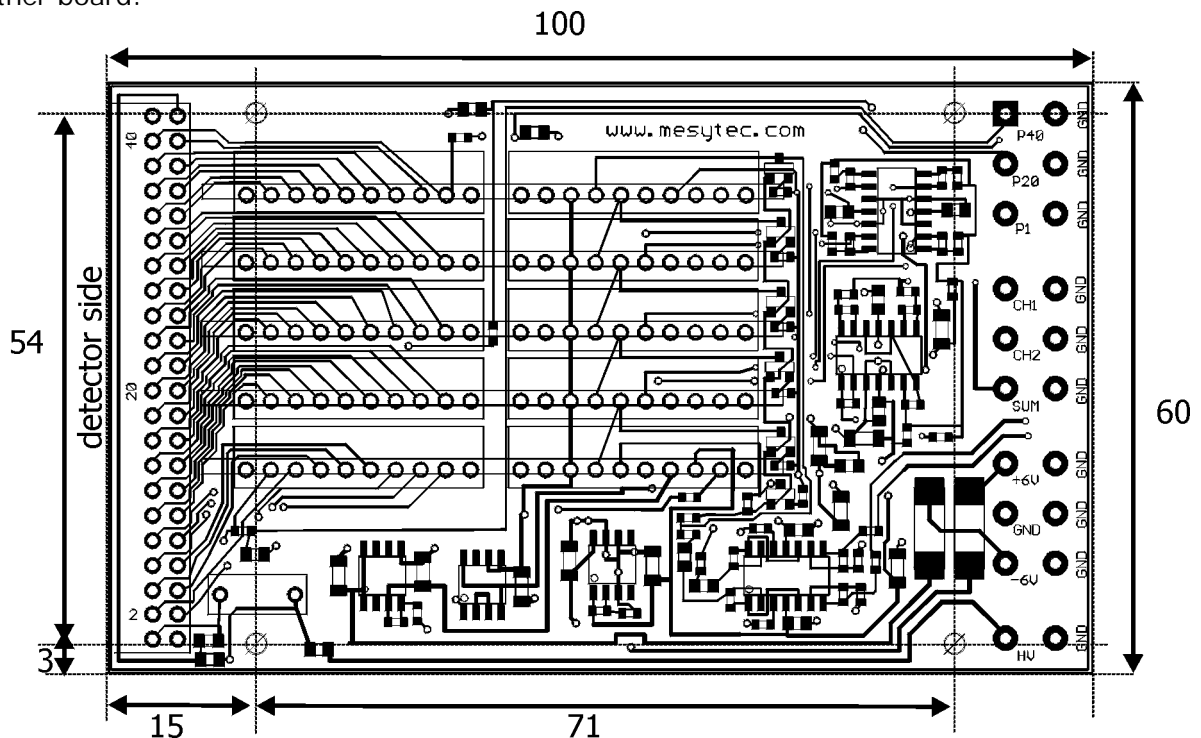


Module, overview



Mechanical Data

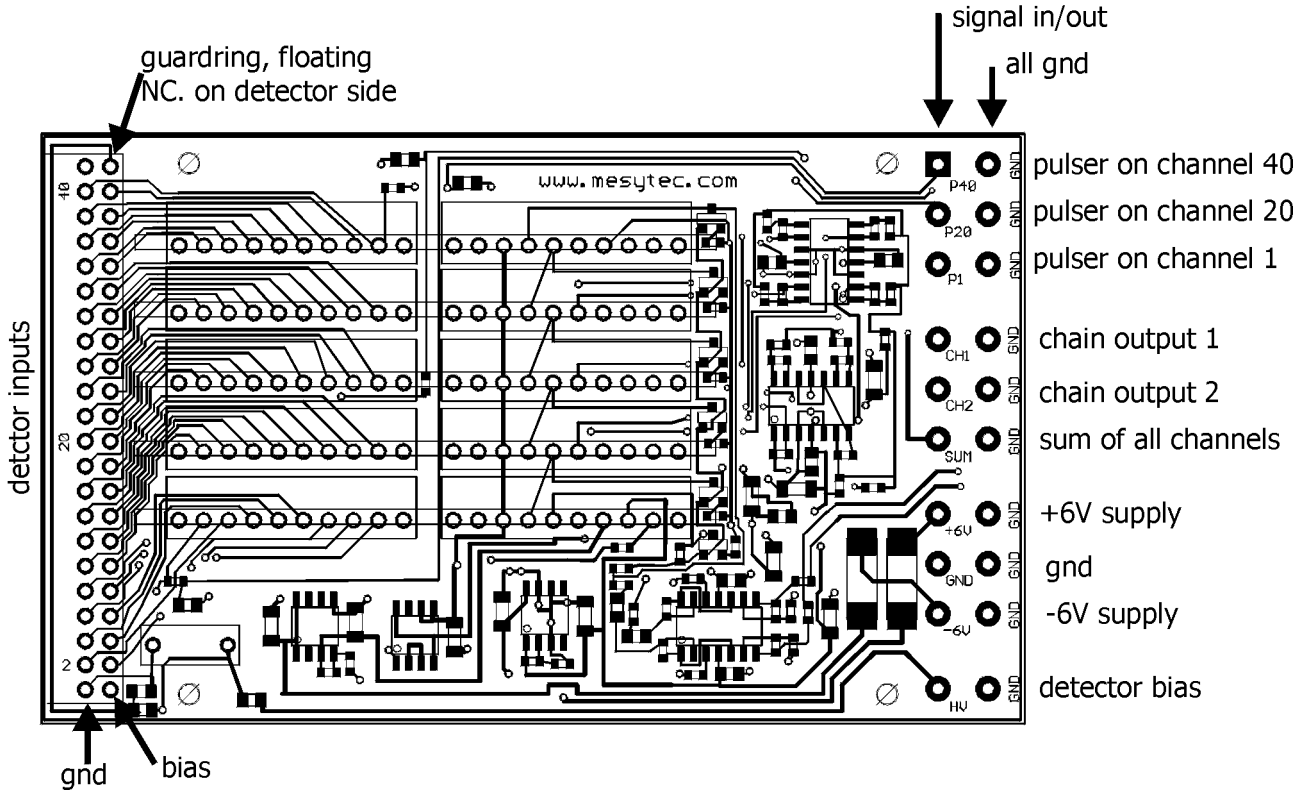
Mother board:



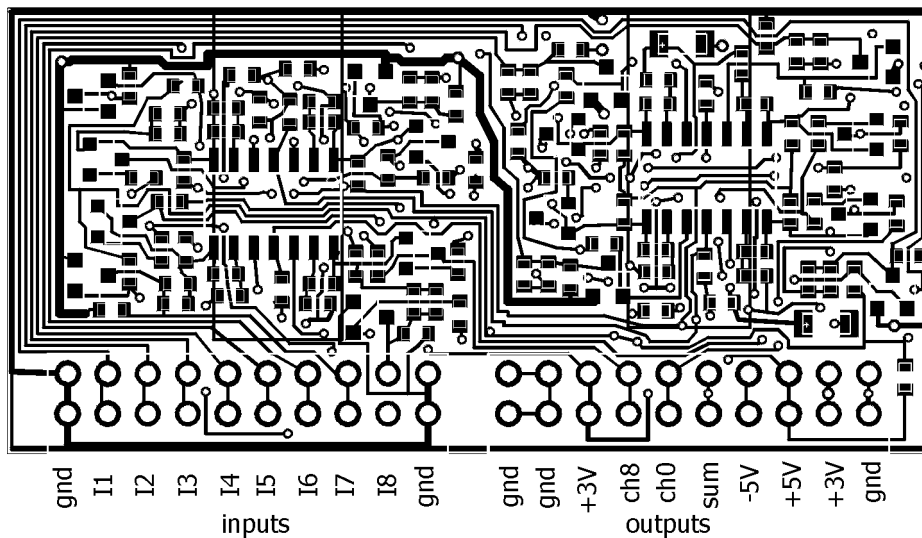
total size with preamp modules plugged in: $100 \times 60 \times 41 \text{ mm}^3$

Connections on motherboard and preamplifier modules

Motherboard of MSI40



8 fold preamplifier module



Technical Data:

Input stage

- Input connectors: 44 pin connector, including bias and analog ground
- 40 Charge sensitive preamplifiers, range: $1 \cdot 10^{-13}$ C to $4.5 \cdot 10^{-11}$ C.
- p-side readout (negative input charge).

Bias

- Bias for n-side (positive), filtered by R-C (470k Ω , 10nF)
- Maximum bias voltage $U_{\text{bias}} = +200\text{V}$
- Can be operated with 20 μA bias current

Sum output:

- 1.5V @ 1GeV
- Risetime typ. 30ns, decay time: 10 μs
- Typical noise with 1us shaper, open inputs: 200keV FWHM
- Can be terminated with 50 Ω
- Suggested shaping time for shaper: 1us FWHM

Position outputs (ch1, ch2)

- positive tail pulse, rise time 500ns, decay time 10 μs
- Output voltage for 1GeV: ch1+ch2 = 2.2V = 100%,
- Variation with position, both outputs: 30% to 70% (for 1GeV: 0.5V to 1.5V)
- Suggested shaping time for shaper: 1us FWHM
- Typical noise for ch1+ch2, shaper with 1us, no detector connected: 200keV FWHM
- All position outputs can be terminated with 50 Ω

Pulser inputs: (P1, P20, P40)

- Charge injection: 1V = 100MeV (internal coupling capacitor is 4.7pF)
- Detector-channel 1 = "P1", channel20 = "P20" or channel 40 = "P40"
- All pulser inputs are terminated with 50 Ω

Power consumption: 1W

- Supply range: $\pm 5.5\text{V}$ to $\pm 6.5\text{V}$
- +6V, 90mA
- -6V, -80mA

How to calculate the position:

- gain and offset calibration, (pulser on P20)
L = (ch1+offset1) calibrate offset with two defined pulser amplitudes
R = (ch2 + offset2)*gain calibrate offset, determine gain to equalize both channels
- position calculation, range: -1 to +1
X = (ch1-ch2)/(ch1+ch2)*(detector_width/2)

Hints for experiment setup:

- Do not connect input ground or the detector to any other ground.
- Connect the "output" grounds, this is power supply, ch1,ch2, sum, pulser inputs and bias to the same ground level.