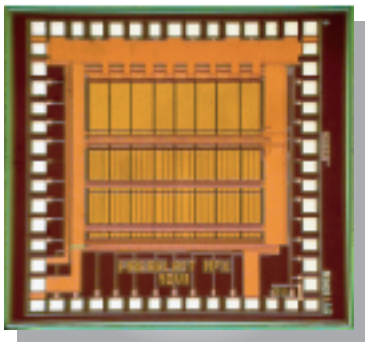
MPX-08™

Charge-Integrating Chip



Advanced Readout System

A micropower charge-integrating readout system optimized for pulse analysis for use with photomultiplier tubes and similar detectors.

Applications

The MPX-08™ integrated circuit is an eight-channel, charge-integrating analog data acquisition system, suitable for measuring charges in the range from several fC to over 10 pC. It has been developed primarily for use with photomultiplier tubes and similar devices in applications involving discrete charge pulse events. The signal range is typically from <1 photoelectron up to >50 photoelectrons, assuming a nominal PMT gain of 10^6. The MPX-08™ should also be considered for applications involving gas proportional detectors. It is also suitable for detectors operating in current mode, or anywhere where a micropower multichannel gated electrometer or picoammeter is called for. The MPX-08™ is particularly well suited to minimize power in large pulse-mode detector systems involving multi-level triggering and a sparse hit pattern, such as a scintillating fiber tracker for high energy charged particles

Standard Features

- Complete analog front end for 8 detector channels
- Quiescent power dissipation 3.63 mW (454 W/channel)
- Power level adjustable to application requirements
- Selection of four gains, independently on each channel
- Analog output is total integrated charge since lastreset; resets externally timed
- Two discriminators per channel (LLD and ULD)
- Direct output from each LLD
- Internal latching of charge values and ULD bits reduce deadtime; can reduce power in multi level triggering applications
- Uses external A/D converter for maximum flexibility in application
- External logic controls trigger and readout patterns
- 0.35 m CMOS process

Availability

The MPX-08™ can be supplied as individual chips, bare or in CQFP-64 packages. A readout system board with data acquisition software is also available. Custom versions of the MPX-08 with more channels, modified gain, or new capabilities may be developed. Inquiries into these possibilities are welcome. (nova@novarad.com)

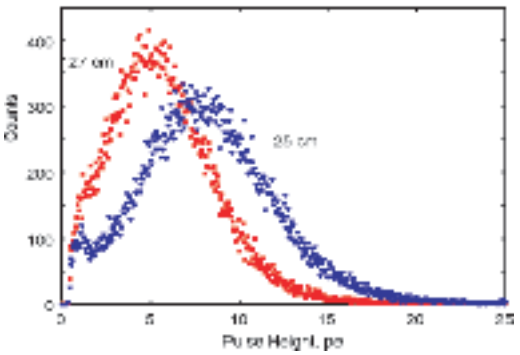
NOVA R&D, Inc.

NOVA R&D, Inc. 1525 Third Street, Suite C, Riverside, CA 92507-3429 - Tel: (909) 781-7332 - Fax: (909) 781-0178 - nova@novarad.com - www.novarad.com

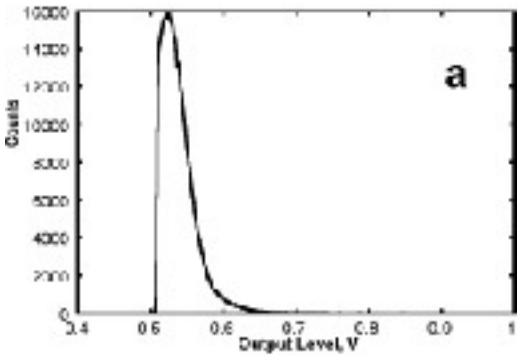
MPX-08™ Specifications

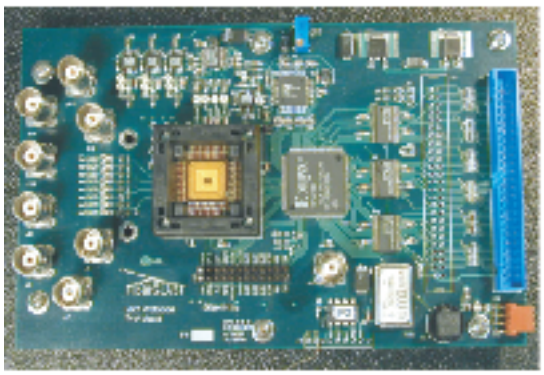
Number of Channels:	8
Input Amplifer Feedback Capacitance:	Selectable 4.3pF, 4.9pF, 5.3pF, or 5.8 pF
Signal Range:	7.1pC, 8.1pC, 8.7pC, and 9.6 pC
Input Amplifier Risetime:	< 100 ns
Cross-Talk (with MAPMT/bias assembly connected):	< 0.4 %
Discriminator Sensitivity:	< 1 mV
Discriminator Prop. Delay @ 10 mV thr., 35 mV Pulse:	200 ns
Discriminator Prop. Delay @ 10 mV thr., 14 mV Pulse:	< 600 ns
Nonlinearity (input to track/hold output):	< 0.5%
Input leakage current:	< 2 pA
Die size:	2.1 x 2.1 mm^2
Pad Pitch:	140 μm, 56 pads

Reference: "Design and performance of a low power integrated circuit readout system for multianode photomultiplier tubes," SPIE Symp. Proc. 4141, 253 (2000). A data sheet can be made available by request. (nova@novarad.com)

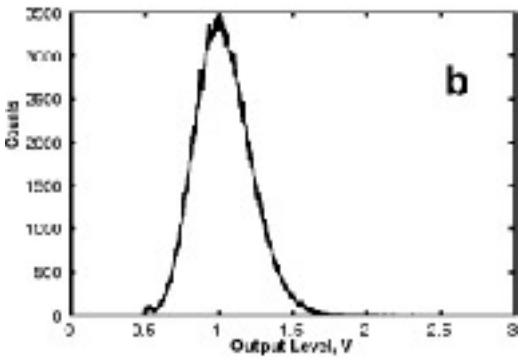


◄ Pulse height spectrum from scintillating fiber and multianode photomultiplier tube (MAPMT) with Sr^{90} source placed at two different distances from a Hamamatsu R5900-00-M64 MAPMT.





◄ The MPX-08™ readout system board. The ASIC is in the test socket just left of center.



► a) Single-photoelectron pulse height spectrum.
b) ~10-photoelectron pulse height spectrum

NOVA R&D Inc. specializes in the development of innovative radiation detector technologies, with a focus on the design and production of advanced mixed-signal, multi-channel ASICs (Application Specific Integrated Circuits), system electronics and software to read out state-of-the-art detectors. The company offers a line of standard products and custom solutions for detector readout in research, medical, industrial, and security applications.

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