User Guide

SIB064-1902
64 Channel MAPMT Interface Board
Hamamatsu H12700 / H14220 / H10966 / H8500 Series MAPMT

Vertilon Corporation, 66 Tadmuck Road, Westford, MA 01886 / Tel: (978) 692-7070 / Fax: (978) 692-7010 / www.vertilon.com

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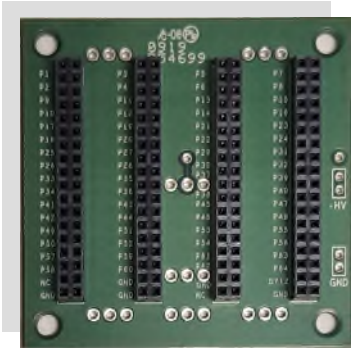
Product Overview

- Mounting board for Hamamatsu 2” Square 64 channel MAPMTs
- Compatible with Hamamatsu H12700, H14220, H10966, and H8500
- Includes anger logic for interface to data acquisition systems
- Outputs for last dynode signal from MAPMT
- Separate high voltage input for MAPMT cathode bias
- 100% compatible with Vertilon’s PhotoniQ multichannel DAQs
- Small size of 51 mm x 51 mm supports tiling multiple MAPMTs

(Coaxial cables not shown)



The SIB064-1902 multianode photomultiplier tube interface board provides the mechanical and electrical connectivity between Hamamatsu 64 anode 2” square MAPMTs, and external signal processing electronics such as Vertilon’s PhotoniQ multichannel data acquisition systems. Supported MAPMTs include the Hamamatsu H12700, H14220, H10966, and H8500. The MAPMT is mounted to the bottom side of the SIB064-1902 through 144 socket pins that connect the PMT’s 64 anode signals and last dynode output to the board. The anode signals are routed to an on-board resistive anger logic circuit that generates four anger signal outputs. These outputs connect using four hard-wired coaxial cables to Vertilon’s PhotoniQ IQSP418 or IQSP518 multichannel data acquisition system where the charge from each is separately integrated, digitized, and sent to a PC for display or further signal processing. For applications utilizing the last dynode output of the MAPMT, the SIB064-1902 includes two hard-wired coaxial cables that connect directly to this PMT signal which can be used to generate a trigger to the data acquisition system or other external electronics. When using an MAPMT with an integral high voltage cable, the negative high voltage bias to the MAPMT’s cathode is supplied directly through this cable which is compatible with the high voltage SHV output from the PhotoniQ. Alternatively, when using an MAPMT with no integral high voltage cable, four included optional socket pins can be added to the board for direct connection of the pins to the MAPMTs high voltage input. In this case, the high voltage bias is supplied through the SIB064-1902 on a specialized hard-wired SHV cable from the PhotoniQ. If required, this option can be ordered separately.

The functional block diagram for the SIB064-1902 is shown in Figure 1 on the following page.

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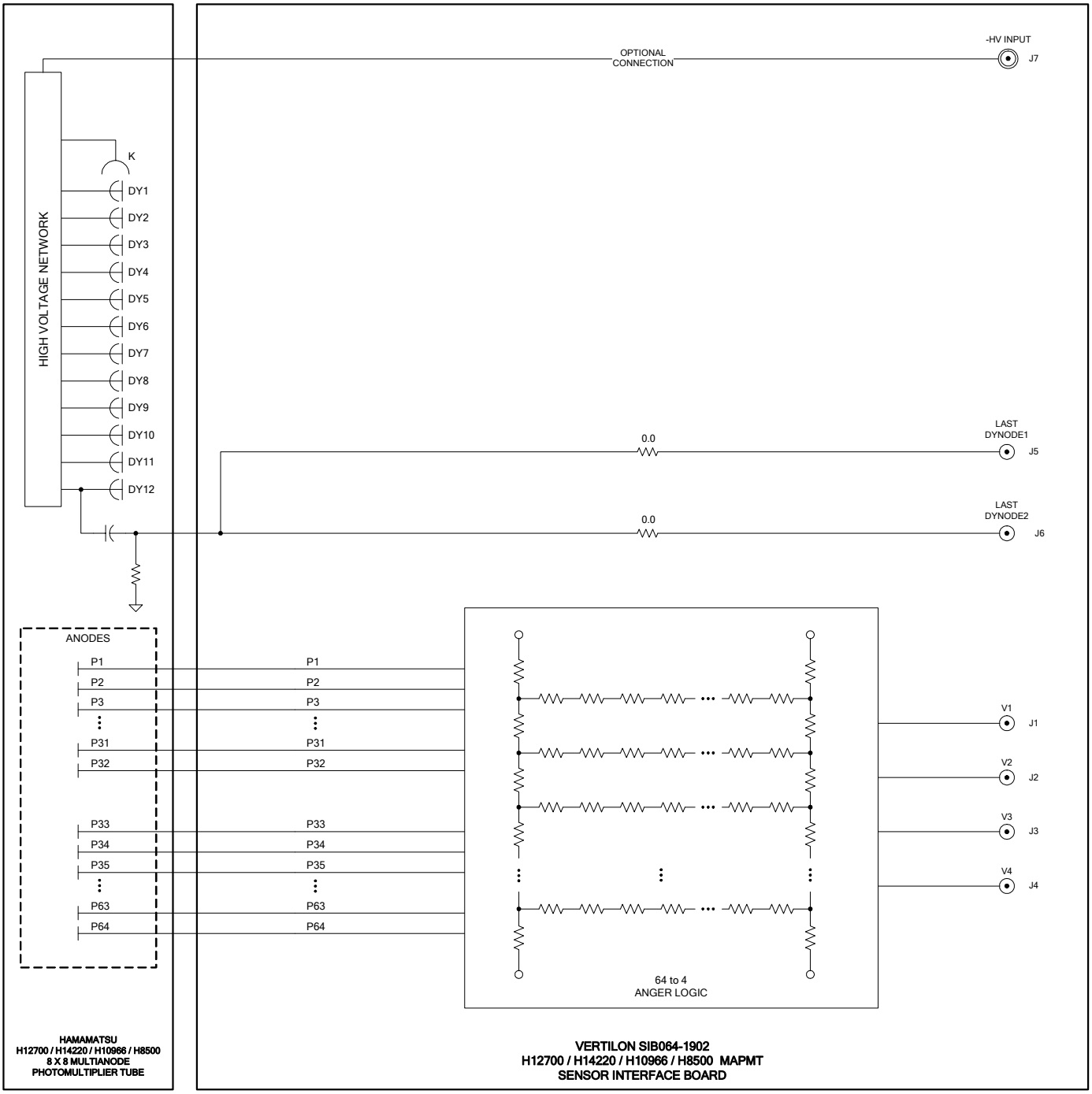

Figure 1: Functional Block Diagram

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Typical Setup

A typical setup using a SIB064-1902 is shown below. A Hamamatsu H12700A MAPMT is mounted to the SIB064-1902 and positioned to detect incoming light from a scintillator crystal or optical assembly. The four anger logic outputs from the SIB064-1902 connect to four inputs on a PhotoniQ IQSP418 or IQSP518 multichannel PMT data acquisition system. Digitized output data from the PhotoniQ is sent through a USB 2.0 connection to a PC for display, logging, or real-time processing. An additional connection between the last dynode output on the SIB064-1902 and a discriminator creates a trigger to the PhotoniQ. When using an H12700A, a high voltage bias of up to negative 1500 volts is sent directly to the PMT from an SHV connector located on the rear of the PhotoniQ. Alternatively, if an H12700B is used instead of an H12700A, bias to the PMT can be provided through the high voltage connector on the SIB064-1902. Note that the rear panel high voltage output is an optional configuration on the IQSP418 and IQSP518. An identical setup can be used for most other Hamamatsu 2" square, 64 channel MAPMTs.

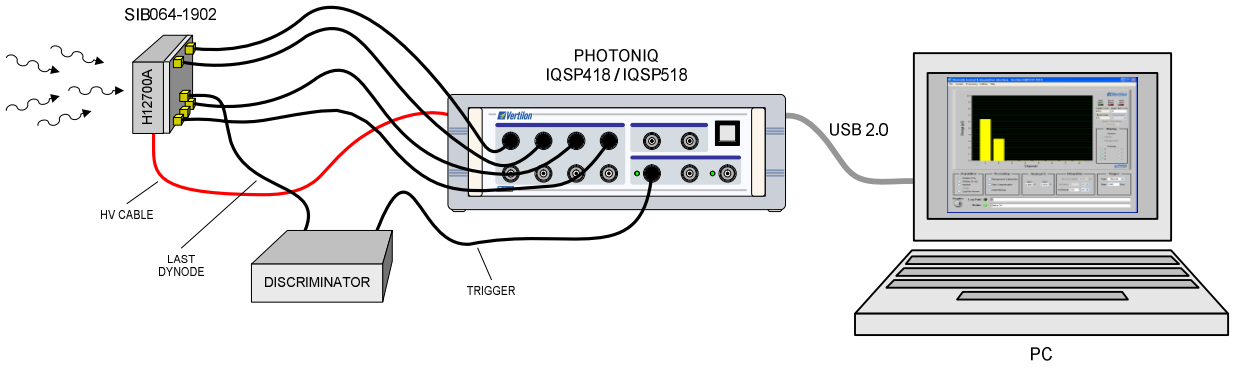

Figure 2: Typical Setup

High Voltage Interface

When using an MAPMT with integral high voltage cable, the cable from the PMT plugs directly into the SHV connector on the PhotoniQ. If the MAPMT does not include this cable, the included socket pins should be installed on the SIB064-1902 so that a direct connection can be made between the PMT's bias voltage pins and the sensor interface board. In this configuration, a hard-wired high voltage cable, which can be ordered separately, is used to supply the bias from the PhotoniQ to the SIB064-1902. In either configuration, control of the PMT bias is done through the PhotoniQ's graphical user interface.

Warning: The high voltage section of the SIB064-1902 contains signals at voltage levels that can exceed negative 1500 volts. Never touch a component or signal in this area.

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Photomultiplier Tube Anode Circuit

The 64 anode signals (P1 – P64) from the MAPMT are routed directly on the SIB064-1902 to the resistive anger logic circuit shown in the figure below. The four outputs labeled V1 to V4 are available on BNC connectors at the ends of the hard-wired coaxial cables. These signals connect directly to a charge integrating data acquisition system like a Vertilon PhotoniQ IQSP418 or IQSP518. The PhotoniQ utilizes DC-coupled high speed transimpedance amplifiers that maintain a DC bias voltage of +0.250 volts on each of its inputs. For this reason, it is important that all four outputs from the SIB064-1902 are directly connected to the PhotoniQ inputs — no additional interface circuitry is necessary.

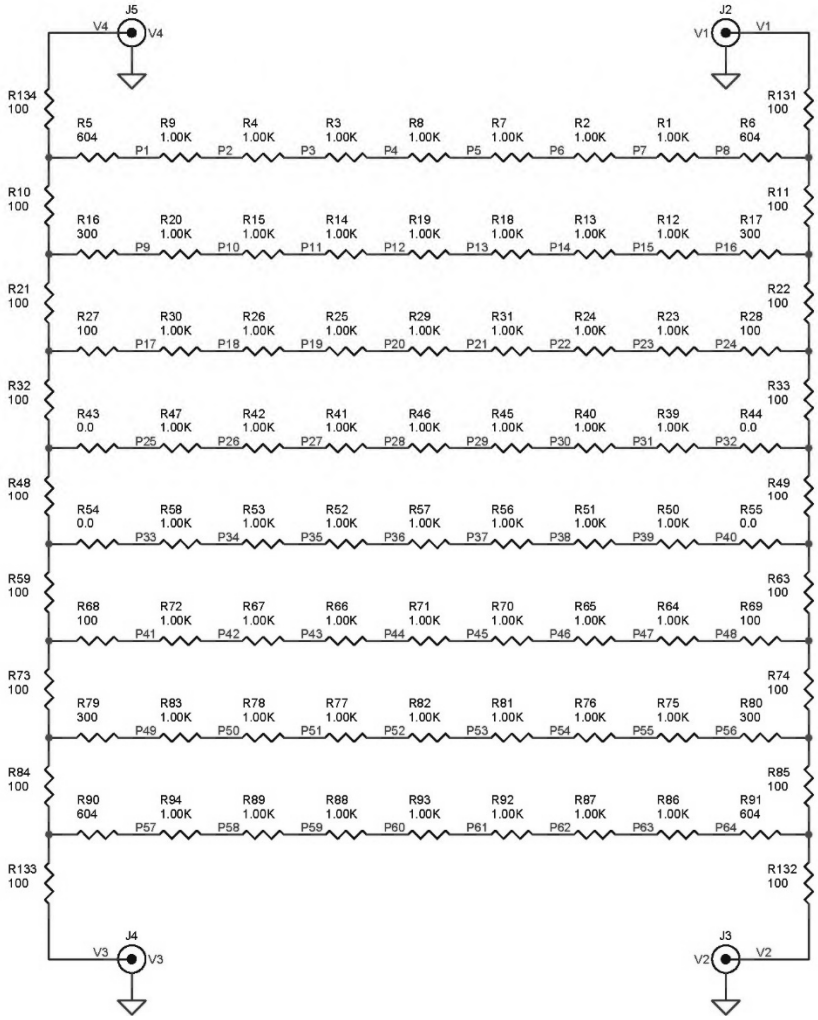

Figure 3: Resistive Anger Logic Circuit

Last Dynode Output

The MAPMT's last dynode output is directly available on a BNC connector on the end of a hard-wired coaxial cable from the SIB064-1902. This signal can be interfaced to external instrumentation to generate trigger signals to the PhotoniQ and other equipment.

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Top and Bottom Views

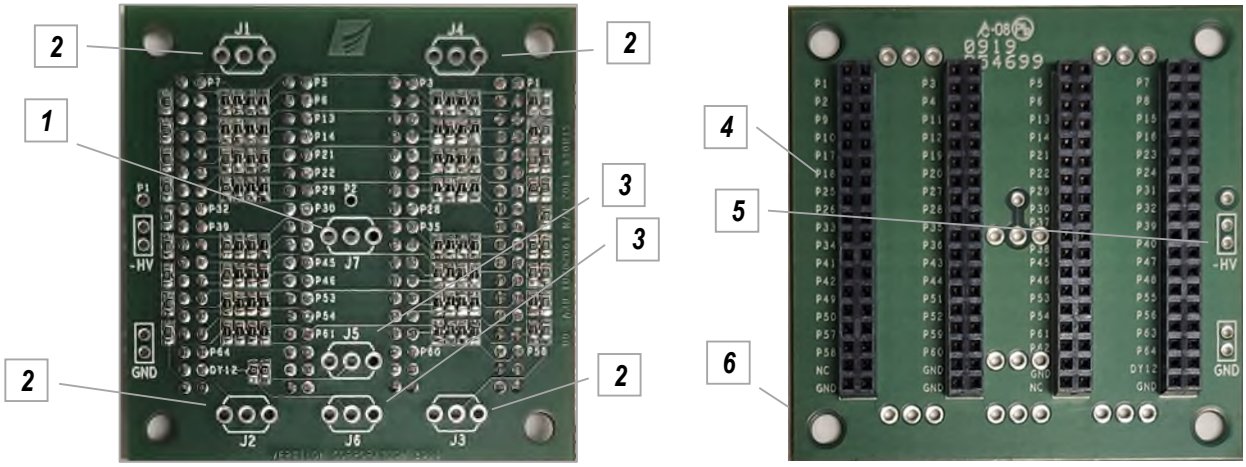

Figure 4: Top and Bottom Views

1. High Voltage Input (J7)
2. Anger Logic Outputs (J1 – J4)
3. Last Dynode Outputs (J5, J6)
4. MAPMT Anode & Dynode Connectors
5. MAPMT High Voltage Connector Location
6. Mounting Holes, 3.3 mm dia.

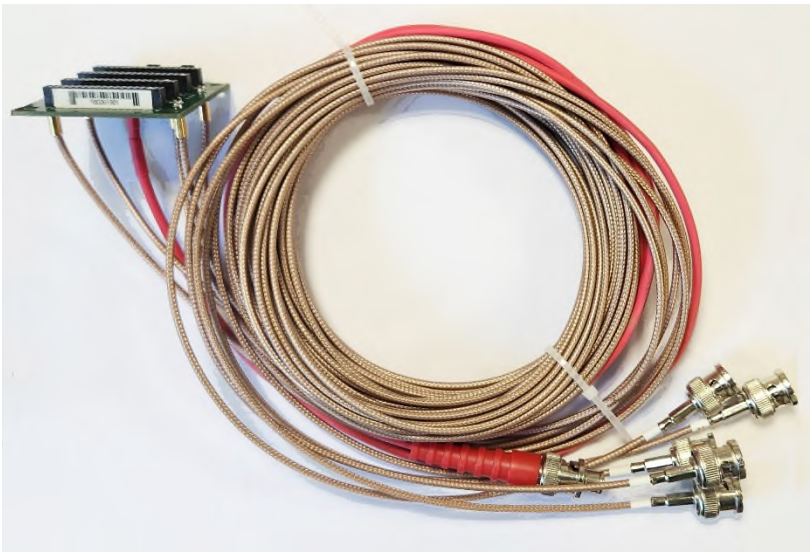

Figure 5: Complete Assembly with Hard-Wired Coaxial Cables

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Mechanical Information

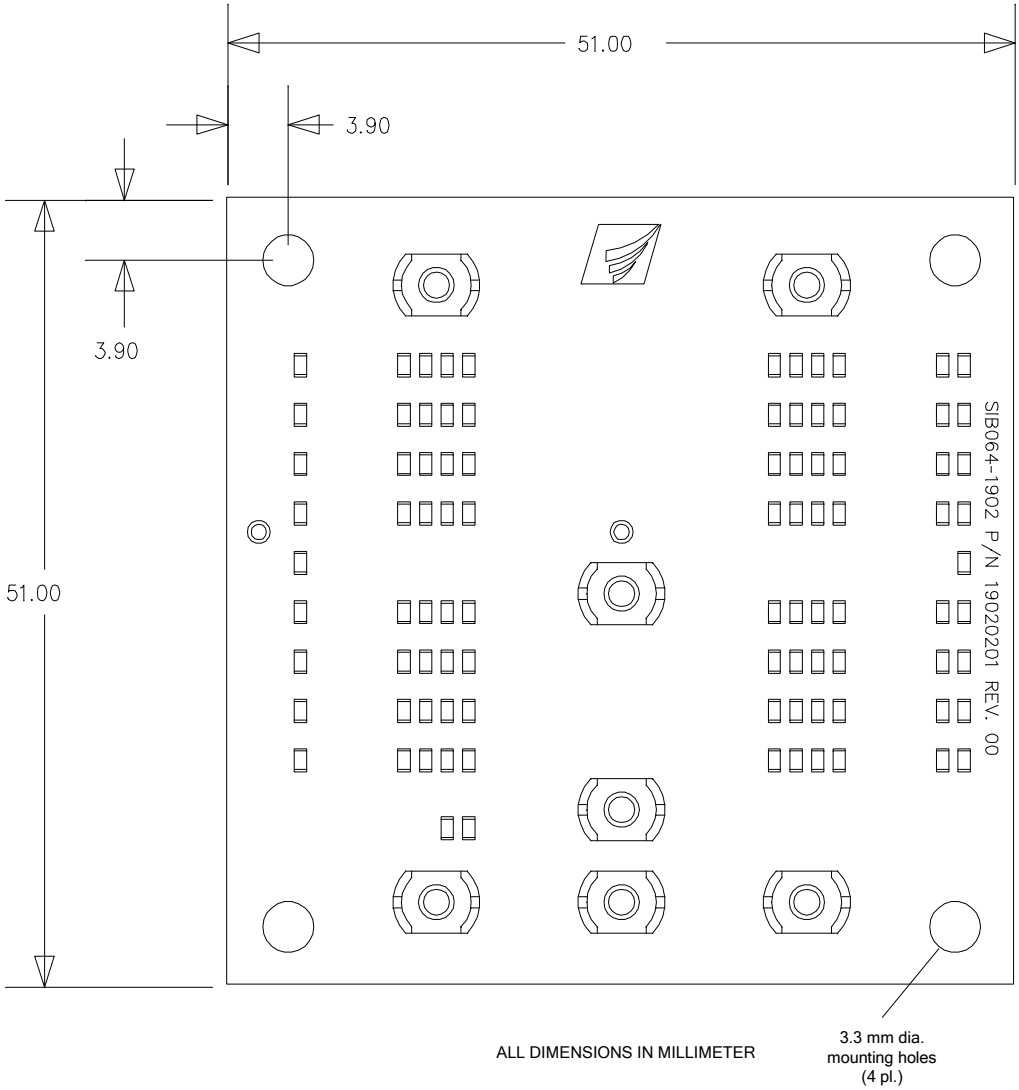

Figure 6: SIB064-1902 Printed Circuit Board Dimensions

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