

User Guide

*SIB064-2152 / AMP320
64 Channel Multianode Photomultiplier Amplifier System
Hamamatsu H14220A MAPMT Series*



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Product Overview

- Mounting PCB / 64 Channel Transimpedance Preamplifier for Hamamatsu H14220A MAPMT
- Two 32 Channel Amplifier Boxes
- 32 Outputs available on SMB Connectors on each Amplifier Box
- Separate Timing Amplifier Chain for MAPMT Last Dynode Output
- Simple Power Supply and Connectivity



The SIB064-2152 preamplifier board provides the mechanical and electrical connectivity between the Hamamatsu H14220A 64 channel MAPMT and external data acquisition electronics. The MAPMT is inserted into four connectors on the bottom side of the SIB064-2152 MAPMT PCB. The board provides transimpedance gain to each of the 64 MAPMT anode signals while a timing amplifier provides gain to the last dynode output. Two top-side mounted high density flat cable connectors are used to connect the MAPMT PCB to the rear panels of two AMP320 shielded enclosures that each include 32 amplifiers. The outputs from the 64 individual amplifier chains are available on two 32 channel sets of SMB connectors located on the front panels of the AMP320s. Each AMP320 also has a timing amplifier chain for the MAPMT last dynode signal. A separate power cable to the circular DIN connector on the AMP320 rear panels provides power to the entire system.



Complete System

SIB064-2152 / AMP320 64 Channel MAPMT Preamp System

Included

- SIB064-2152 MAPMT Mounting / Preamp PCB for Hamamatsu H14220A MAPMT
- Two AMP320 32 Channel Amplifier Boxes
- Two MAPMT PCB-to-AMP320 Interface Cables, 1 Meter
- Two Power Supply Units
- User Manual



SIB064-2152
Hamamatsu H14220A
Mounting / Preamplifier PCB



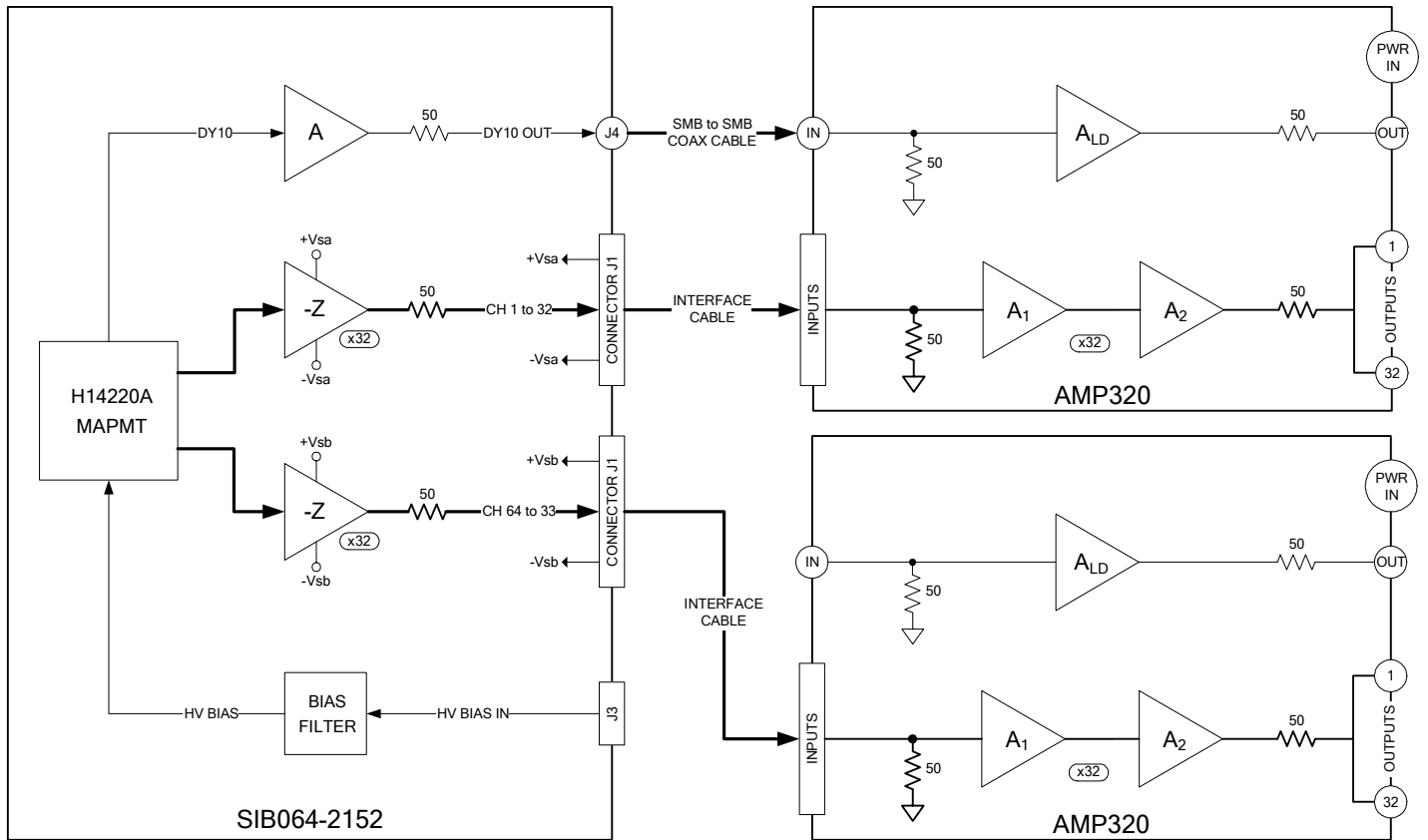
AMP320
32 Channel Amplifier Box
(x2)



MAPMT PCB to AMP320
Interface Cable
(x2)



Power Supply
(x2)



Functional Block Diagram

SIB064-2152 / AMP320 64 Channel MAPMT Preamp System

Specifications

(T_A = +25C, unless otherwise noted)

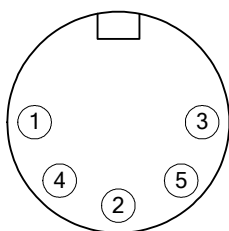
Description	Sym	Min	Typ	Max	Units	Notes
PREAMPLIFIER CIRCUITS						
Quantity	P1 – P64		64			Two AMP320 units are required for 64 channels
PMT ANODE SIGNAL PATH						
Total Transimpedance			53.5		KΩ	SIB064-2152 and AMP320 combined signal path
SIB064-2152 Transresistance	Z		2.21		KΩ	Input stage only
SIB064-2152 Net Transresistance			1.11		KΩ	From 50 ohm divider through interface cable to AMP320
Linear Input Range		-25		+5	uA	
Maximum Input		-250		+250	uA	
Input Current Noise				7.7	pA/√Hz	
Total Input RMS Noise				100	nA	DC to 200 MHz
AMP320 First Stage Gain	A ₁		9.9			
AMP320 Second Stage Gain	A ₂		9.9			
AMP320 Net Gain			48.6			From 50 ohm output to external 50 ohm load
Output DC Bias		+30		+90	mV	Into 50 Ω load, non-adjustable
Output Range		-0.3		+1.5	V	Into 50 Ω load
Output Impedance			50		Ω	
Output Slew Rate		800			V/usec	
TIMING SIGNAL PATH						
Total Gain			123			SIB064-2152 and AMP320 combined signal path
SIB064-2152 Gain	A		49.7			
SIB064-2152 Net Gain			24.9			From 50 ohm divider through interface cable to AMP320
Linear Input Range		-2.4		+12	mV	
Maximum Input		-100		+100	mV	
DC Input Impedance		100			KΩ	
AMP320 Gain	A _{LD}		9.9			
AMP320 Net Gain			4.95			From 50 ohm output to external 50 ohm load
Output DC Bias		+30	0	+90	mV	Into 50 Ω load, non-adjustable
Output Range		-0.3		+1.5	V	Into 50 Ω load
Output Impedance			50		Ω	
Output Slew Rate		800			V/usec	
POWER						
Positive Supply Voltage	+V _s		+5		V	
Negative Supply Voltage	-V _s		-5		V	
Positive Supply Current	+I _s		250		mA	For each AMP320 unit
Negative Supply Current	-I _s		250		mA	For each AMP320 unit

Setup

The Hamamatsu H14220A MAPMT is mounted to the SIB064-2152 MAPMT board and positioned to detect incoming light from a scintillator crystal or optical assembly. Two AMP320 amplifier boxes are connected to the MAPMT board using the two flat interface cables. The interface cables connect to the rear of the AMP320 enclosures and carry the 64 MAPMT signals as well as the power to the preamplifiers on the SIB064-2152. Power to the system is applied to the rear-mounted circular DIN connectors on the AMP320s using the included power supply units. The 64 preamplifier outputs are available on the 32 SMB connectors located on the front of each AMP320 enclosure. For MAPMTs that utilize pins instead of a bias cable, the SIB064-2152 includes a connector to apply the bias. Additionally, if the last dynode signal from the MAPMT is used, it can be connected from the SMB connector on the MAPMT mounting PCB to one of the AMP320 timing inputs located on the rear of the enclosure.

Power Supply

Power to the amplifiers in the system, consisting of +/- 5V, is provided by the power supply units. No other power supply other than the ones provided should be used with the system.



FRONT VIEW OF
CABLE CONNECTOR

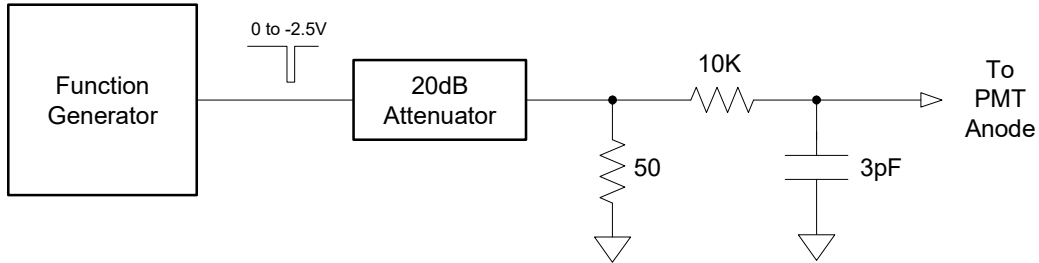
PIN NUM	SIGNAL NAME	FUNCTION
1	GROUND	Power supply ground
2	GROUND	Power supply ground
3	+5V	+5V power to preamplifiers
4	-5V	-5V power to preamplifiers
5	+12V	-12V unused

Flat Interface Cables

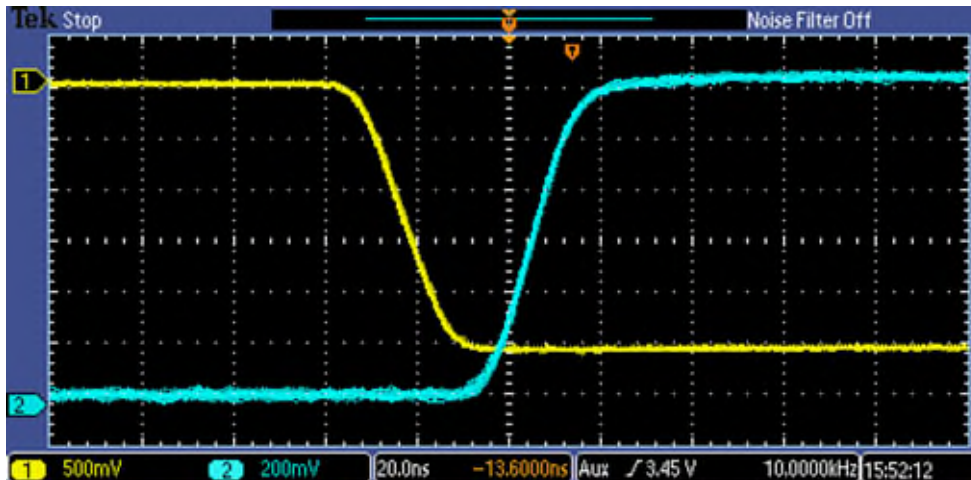
The preamplifier system uses two 40 position flat interface cables to connect the MAPMT preamplifier PCB to the AMP320s. These high density cables provide very good shielding and high speed response but are not intended for repetitive insertions and removals. Great care should be taken when plugging in these cables.

Typical Preamp Step Response

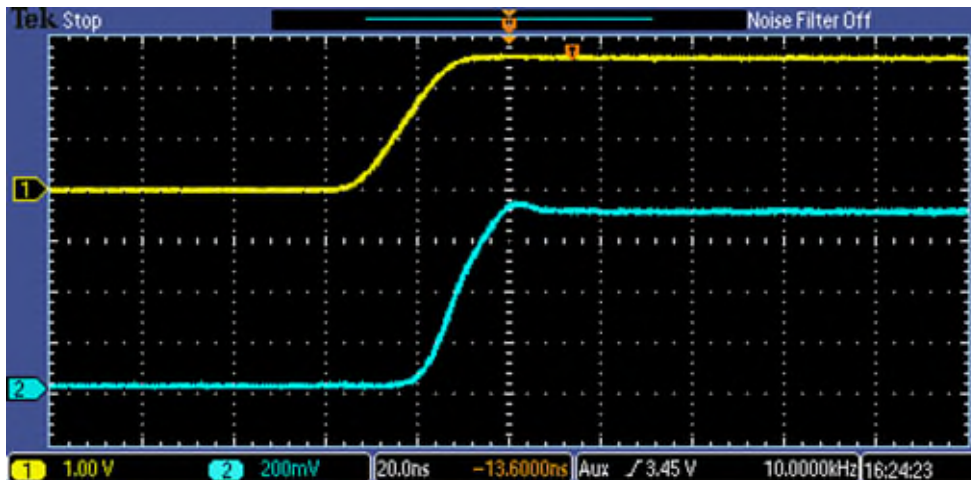
The first two figures below show the anode test circuit and typical anode amplifier response to a 0 to 25uA negative current pulse. The third figure shows the step response of the last dynode timing preamplifier on the SIB064-2152 to a 0 to 25mV positive voltage pulse.



MAPMT Anode Test Circuit



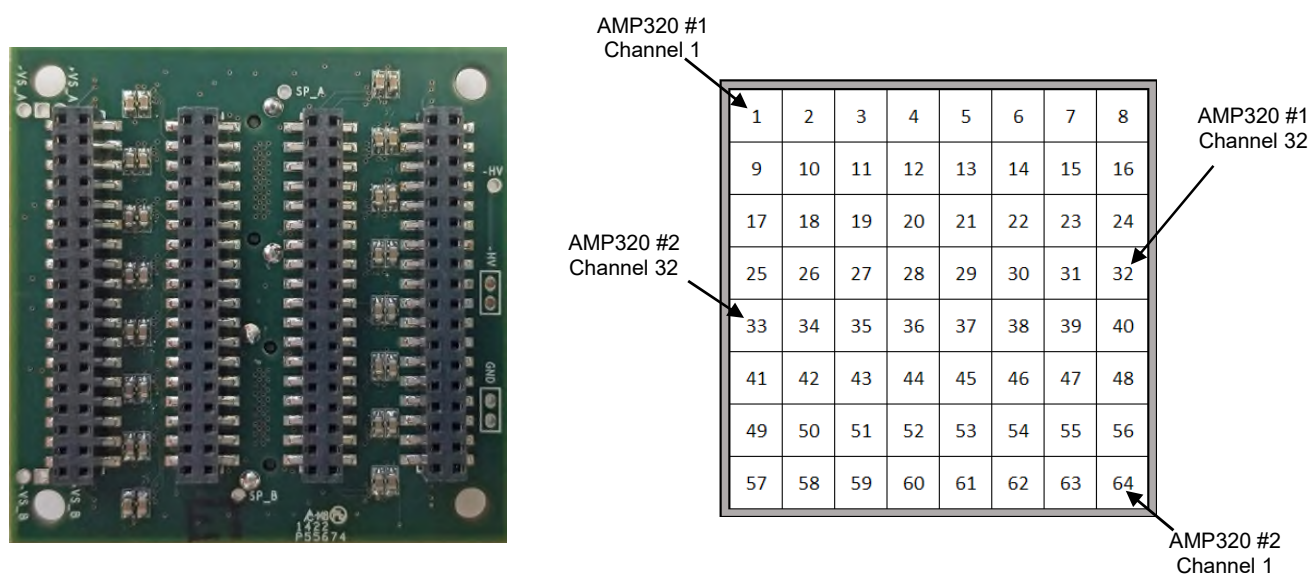
Step Response of Anode Amplifier Chain



Step Response of Last Dynode Amplifier Chain

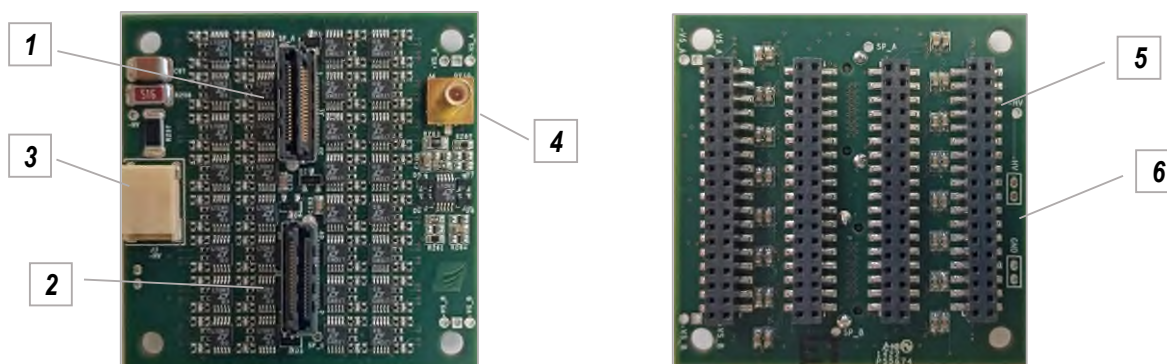
MAPMT to Output Channel Mapping

The first set of 32 anode signals (1 to 32) from the H14220A MAPMT are mapped to the first AMP320 amplifier channels 1 through 32 as shown in the figure below. The second set of 32 anode signals (33 to 64) from the H14220A MAPMT are mapped to the second AMP320 amplifier channels 33 through 64 in a mirrored sequence. The figure shows the channels as viewed from the rear (connector side) of the MAPMT PCB. The second set of AMP320 signals can be easily unmirrored by simply connecting the 32 SMB outputs in reverse order to the external data acquisition electronics.



MAPMT Anode to Output Channel Mapping

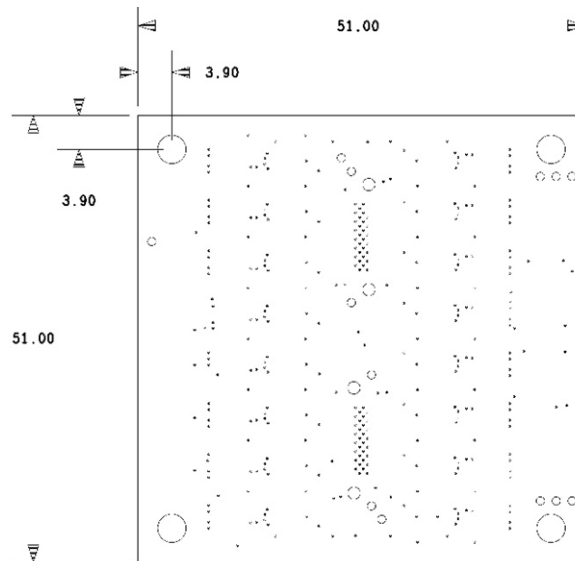
SIB064-2152 Top and Bottom Views



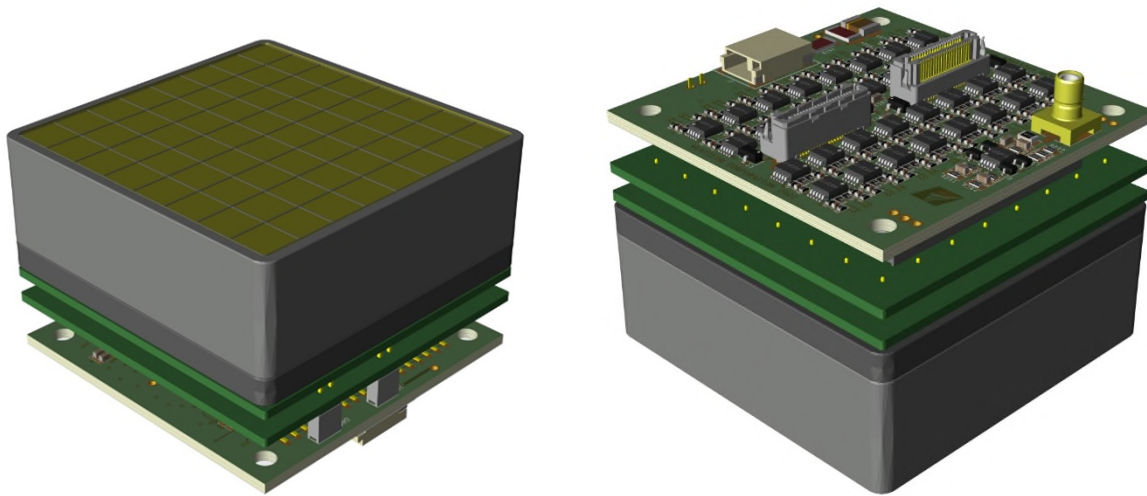
Top and Bottom Views

- | | |
|---|---|
| 1. Interface Cable Connector (Ch. 1-32) | 2. Interface Cable Connector (Ch. 33-64) |
| 3. High Voltage Bias Connector | 4. Last Dynode SMB Output Connector |
| 5. MAPMT Connectors (x4) | 6. Optional Connectors for MAPMT Bias Input |

SIB064-2152 Mechanical Information



SIB064-2152 Printed Circuit Board Dimensions



SIB064-2152 3D Views



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