

# Preamplifier Electronics for Hamamatsu N-MOS Linear Image Sensors S3901 ... S3904

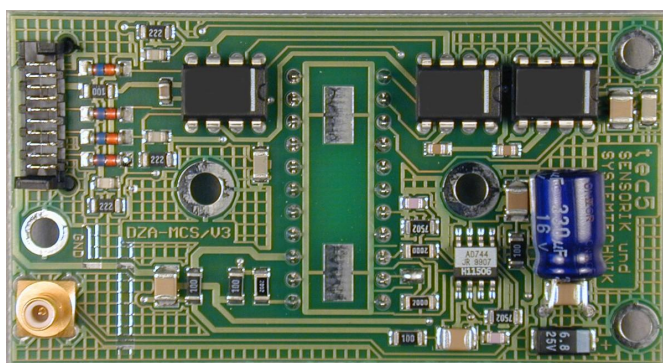
## DZA-S3901-4

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### Short Description

- § Preamplifier electronics for Hamamatsu N-MOS Linear Image Sensors types S3901 to S3904
- § Sensor chip socket for direct insertion on PCB
- § Device input: sensor chip
- § Device output:  
tec5 15 bit Front End Electronics (FEE-HS) or  
tec5 Electronic Sensor Multiplexer (MUX-4P /  
MUX-8A) with sensor interface ‚Sensor\_1A‘
- § PCB dimensions 74 mm x 40 mm

### General

The preamplifier electronics DZA-S3901-4 serves as an interfacing component between the Hamamatsu N-MOS Linear Image Sensors of series S3901 to S3904 and the Front End Electronics board of a tec5 operating electronics. In most applications, the photodiode array is plugged directly into the DIL-22 socket mounted to the soldering side of the PCB.

The interface for the Front End Electronics complies to tec5 specification ‚Sensor\_1A‘ (MICS-10 connector and a SMB flange socket with pin contact, video signal ‚single ended‘) and is therefore compatible to the interface of MMS Spectral Sensors defined by Carl Zeiss.

### DZA-S3901-4 for Carl Zeiss MCS Spectral Sensors

For use with MCS spectral sensors from Carl Zeiss, the electronics can be plugged directly onto the photodiode array integrated in the spectrometer and is fastened to the spectrometer housing by means of screws. Based on the MMS compatible sensor interface, the preamplifier electronics allows to run MCS modules with all operating electronics units which are compatible to the MMS series.

### Description of Operation

The electronics module converts the video current pulses originating from the diode array to voltage pulses. As input signal source, the 'active video' or the 'active minus dummy video' may be selected via solder gap BR2. The 'active minus dummy video' signal is the default factory setting.

The digital clock signals for controlling the array are converted from TTL or CMOS (HC) level to the levels required by the photodiode array. The module is factory preset for a diode array type S3904.

For different types of arrays, components R4, R12, C7 and C13 have to be replaced (see below)!

### Technical Data

Diode arrays:	Hamamatsu N-MOS Linear Image Sensors, type S3901*, S3902*, S3903* and S3904 or compatibles (* ) = R4, R12 and C7, C13 have to be changed!
Number of pixels:	128, 256, 512 or 1024
Substrate potential applied:	-5 V
Bias potential applied:	Ground
Clock pulses level to array:	±5 V
Pixel clock rate:	up to 200 kHz

#### Analog section:

Output range:	0...3 V
Sensitivity:	40 $\mu$ A/V
Slew rate:	>35 V/ $\mu$ s

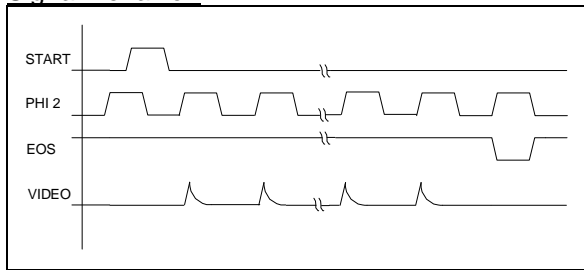
#### Digital control inputs (TTL/HC level):

START:	Initiates a read-out cycle at HIGH level of the signal START, triggered by a falling edge of the signal 'PHI2'.
PHI2:	Array master clock. If a read-out cycle has been initiated, one diode is read out at each rising edge of PHI2 until the end of the array is reached.

#### Digital control output (TTL/HC level):

/EOS:	EndOfScan, the signal /EOS is HIGH during the read-out cycle. After reading out the last photodiode /EOS is LOW for one HIGH period of the signal PHI2 to indicate the end of the array.
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### Signal Behavior:



For further details refer to Hamamatsu datasheet.

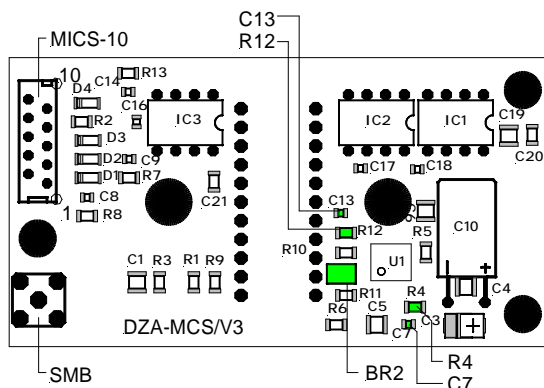
### Power consumption:

+5V: typically < 10 mA  
 -5V: typically < 10 mA

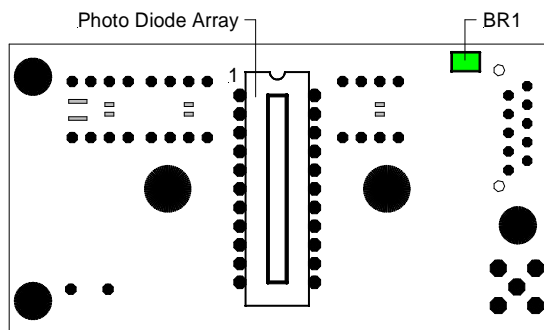
### Ambient Conditions:

Operating temperature range: 0 °C ... +65 °C  
 Storage temperature range: -40 °C ... +70 °C  
 Humidity (@25 °C, non condensing): 10 % ... 90 %

### Board Layout



PCB DZA-S3901-4, component side



PCB DZA-S3901-4, soldering / sensor side

### Mechanical Interfacing

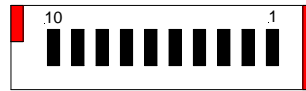
Board dimensions: 74 mm x 40 mm  
 Connector for PDA: DIL socket on soldering side of the board  
 Circuit board mounting: 2 mounting holes, arranged symmetrically w.r.t. the diode array

### Electronic Interfaces

Type: tec5 specification ,Sensor\_1A'  
 Video output: SMB flange socket  
 Digital control: MICS-10

### Pin Assignment MICS-10 Connector:

Pin	Description
1	Reserved (GND)
2	START – Start of Scan
3, 5, 7, 9	0V - Digital Ground
4	PHI2 - Array Clock
6	/EOS - End of Scan
8	-5V – Power Supply
10	+5V – Power Supply



### Solder Gaps

Solder gap BR1: closed  
 Solder gap BR2: open: 'active video'  
 closed: 'active minus dummy'  
 factory default settings: both gaps closed

### Component Values (S3901 ...S3904)

PDA Type	R4, R12	C7, C13
S3901	36 K	22 pF
S3902	150 K	4.7 pF
S3903	330 K	2.2 pF
S3904	75 K (default)	10 pF (default)

### System Data

System data, realized with tec5 15 bit Operating Electronics base on FEE-HS and a sensor type S3904-512Q:

Integration time (512 pixels): 3 ms  
 Clock frequency: 187.5 kHz  
 Intensity resolution: 15 bit  
 Ambient temperature: + 25 °C  
 Resulting single pixel dark noise: typ. 1.5 counts rms  
 Electronics thermal drift: < 0.5 counts/°C (excl. dark current)

### User Information

#### General

The information in this data sheet has been checked carefully. However, no responsibility is assumed for inaccuracies. tec5 reserves the right to make changes to any portion of this document without notice. Each product is tested carefully before being shipped. If, however, problems should occur while initial operation or during later operation, please first check your specific settings and correct installation (connectors).

#### Warranty

The warranty period for this product is 12 months. The warranty begins on the day of delivery. Within the warranty period, tec5 will repair free of charge any faulty functioning of the product resulting from faulty design or defective material. All other claims are excluded, in particular consequential damage.

#### Handling

The electronics is partly constructed in CMOS technology and is thus sensitive against electrostatic discharge. Take appropriate precautions whenever handling the component. Please switch off the power before connecting or disconnecting the product.