

tec5 Operating Electronics for Spectral Sensors and Linear Image Arrays

Driver/Preamplifier DZA-S3901-4 Data Sheet

Board: DZA-MCS/V3 (06200.30)
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General

The Driver/Preamplifier electronics DZA-S3901-4 serves as an adaptation subassembly matching the Hamamatsu MOS Linear Image Sensors series S3901 - S3904 to the frontend electronics unit of a tec5 operating electronics.

In most applications, the photodiode array is plugged into the DIL-22 socket mounted to the soldering side of the printed circuit board.

The interface for the Frontend electronics complies to tec5 specification 'Sensor-1A' (MICS-10 connector and an 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 Driver / Preamplifier electronics allows to run MCS modules with all operating electronics units which are compatible to the MMS Series.

Features

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 Specifications

Diode arrays: Hamamatsu MOS Linear Image Sensors, series 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: ± 5 V

Analog output:
Output range: 0...3 V
Sensitivity: 40 μ A/V
Slew rate: >35 V/ μ s

Digital control inputs:

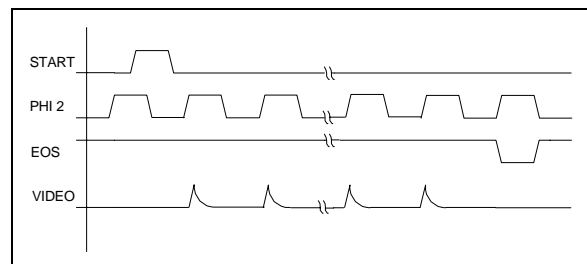
START: Initiates a read-out cycle at HIGH level of the signal START, triggered by a falling edge of the signal 'PHI2'

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:

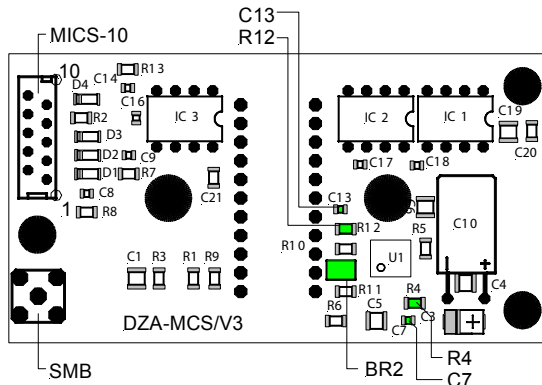
/EOS: EndOfScan, the signal /EOS is HIGH during the read-out cycle. After reading out the last photodiode /EOS is LOW for one HIGH period of the signal PHI2 to indicate the end of the array.

Timing diagram:

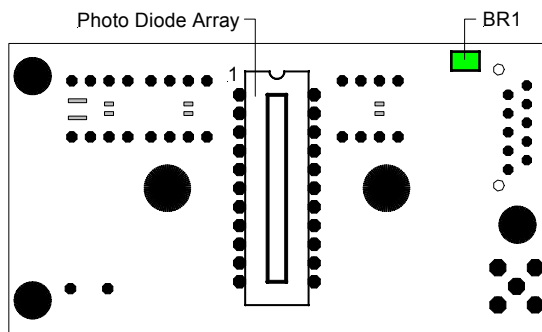


Further information concerning array timing can be found in the Hamamatsu data sheets.

Views of the circuit board:



Circuit board DZA-S3901-4, components side



Circuit board DZA-S3901-4, solder side

Mechanical Interfaces

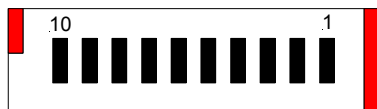
Circuit board dimensions: 74 x 40 [mm]
 Diode array connection: via socket, mounted on the circuit board, solder side
 Circuit board mounting: 2 fixing holes, arranged symmetrically w.r.t. the diode array

Interface Connections

Video output: SMB flange socket
 Array clocking: MICS-10

MICS-10 connector:

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



Solder Gaps

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

Components to change for S3901, S3902, S3903 and S3904

Array type	R4, R12	C7, C13
S3901	36 K	22p
S3902	150 K	4p7
S3903	330 K	2p2
S3904	75 K	10p

System Operational Specifications

Example data obtained using the tec5 15 bit PC/AT Operating Electronics and a Hamamatsu MOS Linear Image Sensor type S3904-512Q:

Min. integration time (512 pixels): 7 ms
 Clock rate: 64 kHz
 Intensity resolution: 15 bits
 Dark signal noise averaged for 20 scans: approx. 1.5 counts rms
 Temperature range: 0 °C to + 65 °C
 Electronics thermal drift: < 0.5 counts/°C (excluding dark current)
 Pixel noise: typ. ±1 count (20 scans averaged)



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