

Fast Preamplifier Electronics for Hamamatsu CCD Image Sensor S11071

DZA-S11071

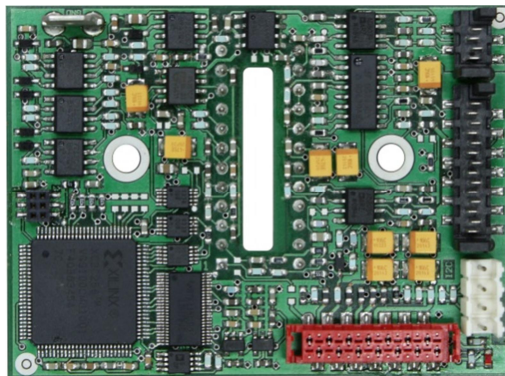
>PRELIMINARY<

Product ID: 0106236.10
Document: ds_dza-s11071_090e.docx

tec5^{five}
Technology for Spectroscopy

In der Au 27
61440 Oberursel / Germany

Phone: +49 (0) 6171 / 9758 – 0
Fax: +49 (0) 6171 / 9758 – 50
E-Mail: sales@tec5.com
Internet: www.tec5.com



Short Description

- § Fast preamplifier electronics for Hamamatsu High UV Sensitivity CCD Image Sensor S11071
- § Pixel frequency up to 1 MPixel per second
- § For 16 bit readout
- § Sensor chip socket for direct insertion on the PCB
- § Device input: sensor chip
- § Device output:
tec5 16 bit Front End Electronics with sensor interface type 'Sensor_U2' (FEE-1M / CCD-8)
- § PCB dimensions: 66 mm x 49 mm

General

The preamplifier electronics DZA-S11071 serves as an interfacing component between the Hamamatsu CCD Image Sensor and the Front End Electronics board of a tec5 operation electronics. Typically, the CCD array is plugged into the DIL-24 socket on the soldering side of the PCB.

The preamplifier has to be supplied by six DC operating voltages applied to the power connector. These external voltages are basically required for operation of the CCD sensor. The tec5 DZA-S7030-4-P board with tec5 ADAP-PWR1 board and CAB-MM 14 cable may be used to provide the required operating voltages from a single 12 V_{DC} input.

The interface to the Front End Electronics complies to the tec5 specification 'Sensor_U2' (MICS-14 pin header connector for PDA control signals, MICS-4 connector for differential video signal) for direct interconnection to the FEE-1M.

For attaching external I²C devices to the electronics, an I²C bus interface connector is integrated.

Based on the CLK and START input signals from the FEE, the preamplifier board generates all signals required to read out the sensor chip. The analog video signal from the sensor array is primed and processed

for differential analog signal output. A synchronous A/D TRIGGER signal is provided to indicate the best sampling instant (rising slope of A/D TRIGGER signal). At the end of the readout sequence the electronics produces an /EOS signal pulse.

Readout Modes

- § Standard mode "line binning" (summing the vertical pixels), reading the array like a linear array
- § Imaging mode or customized binning optional. Please contact tec5 for details.

Technical Data

Diode array:	Hamamatsu S11071
Number pixels:	1044 or 2068(h) x 22 or 70(v)
Master clock frequency f _m :	max. 8 MHz (from FEE)
Pixel clock rate:	max. 1 MHz (f _m / 8)
Readout time:	1.1 or 2.1 ms (@ f _m = 8 MHz)
Minimal integration time:	approx. 1.2 or 2.2 ms
Intensity resolution:	16 bits

Analog Output:

Output range:	0 ... 3 V (differential)
Maximum load:	600 Ohm / 1 nF

Digital Input Control Signals (HCT level):

START:	Initiates a readout cycle for the CCD (active high, minimum length: one CLK period).
CLK:	Master clock for CCD readout (frequency f _m), has to be applied continuously. Used to derive all internal clocking and the output pixel rate.

Digital output signals (HCT level):

/EOS:	EndOfScan pulse output (active low, duration: minimum one CLK pulse) to signal the end of the array readout.
A/D TRIGGER:	Pulse chain, signaling the sampling instant for the video signal for each pixel during readout (active high, duration: one CLOCK pulse). The video signal level is held throughout the duration of the pulse.

I²C Interface:

The DZA-S11071 is equipped with an I²C interface addressing the on-board components EEPROM, temperature sensor(s) and 4-Bit output port for remote configuration control. Additional I²C devices can be connected via the I²C connector.

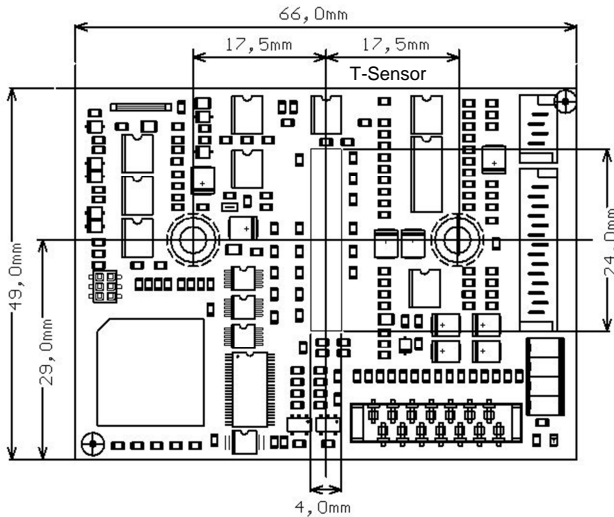
Current consumption:

+5V	from FEE-1M:	typically < 20 mA
-5V	external power:	typically < 50 mA
-8V	external power:	typically < 50 mA
+6V	external power:	typically < 50 mA
-12V	external power:	typically < 30 mA
+12V	external power:	typically < 30 mA
+15V	external power:	typically < 10 mA

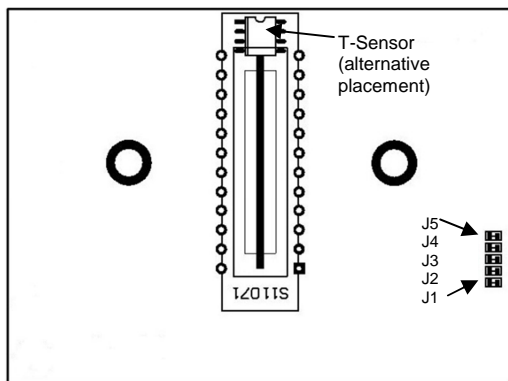
Environmental conditions (without sensor):

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-S11071, component side



PCB DZA-S11071, sensor side

Mechanical Interfaces

Board dimensions:	66 mm x 49 mm
Connector CCD array:	2x12 pin sockets on soldering side of the board
Mounting of board:	2 holes symmetric to sensor

Electronic Interface

Type:	tec5 specification ,Sensor_U2'
Video Out:	MICS-4
Digital Control:	MICS-14
External Power:	Würth type WR-MM (690 357 291 476) (14 pin low profile)
I ² C:	AMP Quick type 0828

Pin Assignment Digital Control Connector:

Pin	Designation	Pin	Designation
1	Sensor Trigger (A/D TRIGGER)	2	Sensor StartScan (START)
3	DI2 (not used)	4	Sensor Master Clock (CLK)
5	DI4 (not used)	6	Sensor EndOfScan (EOS)
7	0V – Digital Ground	8	-5V – Supply (not used)
9	0V – Digital Ground	10	+5V – Supply
11	DO3 (not used)	12	DO4 (not used)
13	I2C-SDA currently unused	14	I2C-SCL currently unused

Pin Assignment Video Out Connector:

Pin	Designation	Pin	Designation
1	0V – Digital Ground	2	Video Out (non inverted)
3	Video Out (inverted)	4	0V – Digital Ground

Pin Assignment I²C Connector:

Pin	Designation	Pin	Designation
1	I2C-SDA	2	0V – Digital Ground
3	I2C-SCL	4	+5V – Supply

Pin Assignment Standard External Power Connector:

Pin	Designation	Pin	Designation
1	+24V (not used)	2	+20V (not used)
3	+15V –	4	+12V –
5	+6V –	6	- 5V –
7	- 8V –	8	- 12V –
9	Uvar – (not used)	10	Digi I/O – (PowerOk)
11	0V – Digital Ground	12	0V – Digital Ground
13	0V – Digital Ground	14	0V – Digital Ground



Configuration Solder Gaps

J1: h-size (open=1044), J2: v-size (open=22), J3: binning mode (open=line binning active), J4: reserved, J5: remote config. (open=J1..J3 valid, closed= remote I²C)

System Operational Specifications

DZA-S11071 with tec5 16 bit Operating Electronics incl. FEE-1M /CCD-8 and S11071 sensor:

Single pixel dark readout noise:	< 11 counts rms*
Linearity error:	< 5% of FS*
Dynamic range at Full Scale:	approx. 450*
System sensitivity:	approx. 3 e ⁻ / count*

* Measurement conditions: f_m = 8 MHz, 16 bit A/D conversion, ambient temperature 25 °C

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.