

# NMOS multichannel detector head



C5964 series

## UV to near infrared range (200 to 1000 nm), For multichannel spectrophotometry

The C5964 series is a family of multichannel detectors developed for spectrophotometry in the UV to near infrared range (up to 1000 nm). The C5964 series device incorporates a thermoelectrically-cooled NMOS linear image sensor (S5930/S5931/S8382/S8383 series), low noise driver/amplifier circuit and highly stable temperature control circuit. It also operates from simple external signal inputs. The image sensor is cooled to a preset temperature ( $T_s=0\text{ }^\circ\text{C}$ ) as soon as the power is turned on. Should the cooler fail and the device overheat, the built-in protection circuit automatically shut off the power. The housing is designed for compactness, yet offers good heat dissipation. Furthermore, mounting holes are provided on the front panel of the housing, permitting easy connection to a monochromator or other instruments

### Features

- Designed for use with a thermoelectrically-cooled NMOS linear image sensors (S5930 series, etc.)
- Built-in driver/amplifier and temperature control circuits
- Highly stable temperature control ensures a constant cooling temperature of  $T_s=0 \pm 0.05\text{ }^\circ\text{C}$  (at  $T_a=10\text{ to }30\text{ }^\circ\text{C}$ )
- Operates from simple signal inputs
- High sensitivity and wide dynamic range

### Applications

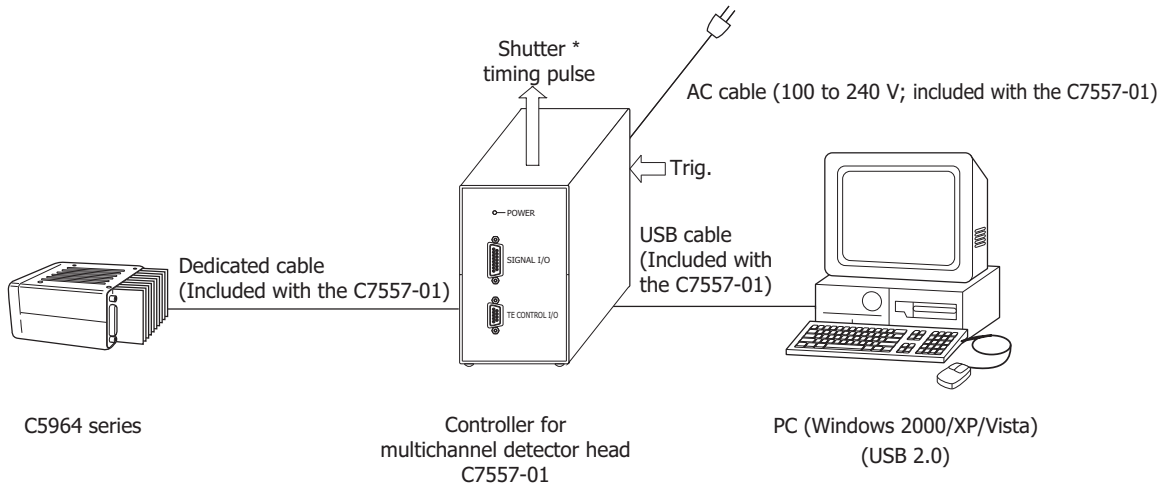
- Multichannel spectrophotometry
- Spectrophotometer, colorimeter
- Optical spectrum analyzer
- Time-resolved photometry

### Selection guide

The C5964 series consists of the following models depending on the NMOS linear image sensor used.

NMOS multichannel detector head	NMOS linear image sensor				Remark
	Type No.	Number of pixels	Pixel size [ $\mu\text{m}$ (H) $\times$ $\mu\text{m}$ (V)]	Effective active area [ $\text{mm}$ (H) $\times$ $\text{mm}$ (V)]	
C5964-0800	S5930-256S	256	50 $\times$ 2500	12.8 $\times$ 2.5	Standard type
C5964-0900	S5930-512S	512		25.6 $\times$ 2.5	
C5964-0910	S5931-512S	512	25 $\times$ 2500	12.8 $\times$ 2.5	
C5964-1010	S5931-1024S	1024		25.6 $\times$ 2.5	
C5964-0901	S8382-512S	512	50 $\times$ 2500	25.6 $\times$ 2.5	IR-enhanced type
C5964-1011	S8383-1024S	1024	25 $\times$ 2500	25.6 $\times$ 2.5	

**Connection example**



\* Shutter, etc. are not available.

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**Precaution for use**

When operating the C5964 series with the C7557-01, always be sure to attach the MOS adapter (supplied) to the C7557-01 main unit. If the the C5964 series is connected and the power is turned on without attaching the adapter, the power supply in the C7557-01 main unit may be damaged.

**Absolute maximum ratings**

Parameter	Symbol	Value	Unit
Supply voltage (for digital circuitry)	+V <sub>D</sub>	-0.5 to +7	V
Supply voltage (for analog circuitry)	±V <sub>A</sub>	±18	V
Digital input voltage	-	V <sub>D</sub>	V
Operating temperature	T <sub>opr</sub>	+10 to +30	°C
Storage temperature	T <sub>stg</sub>	0 to +50	°C

**Electrical characteristics (T<sub>a</sub>=25 °C, V<sub>D</sub>=+5 V, ±V<sub>A</sub>=±15 V, unless otherwise noted)**

Parameter		Symbol	Min.	Typ.	Max.	Unit	
Digital input	High level	V <sub>IH</sub>	+2.0	-	+V <sub>D</sub>	V	
	Low level	V <sub>IL</sub>	-0.5	-	+0.8	V	
Master clock (CLK) pulse frequency		f <sub>CLK</sub>	-	-	375	kHz	
Video signal readout frequency		f <sub>v</sub>	-	-	f <sub>CLK</sub> /6	Hz	
Master start (Start) pulse width		t <sub>st</sub>	1/f <sub>CLK</sub>	-	-	s	
Digital output	High level (I <sub>o</sub> =-6 mA)	V <sub>IH</sub>	+2.0	-	-	V	
	Low level (I <sub>o</sub> =+6 mA)	V <sub>IL</sub>	-	-	+0.8	V	
Power supply conditions	Rated voltage	Digital	+V <sub>D</sub>	+4.75	+5.0	+5.25	V
		Analog	±V <sub>A</sub>	±14.5	±15.0	±15.5	V
	Current consumption	+5 Vdc *1	-	-	-	+2.0	A
		+15 Vdc	-	-	-	+100	mA
		-15 Vdc	-	-	-100	mA	

\*1: Including the current consumption of the Peltier element incorporated in the NMOS linear image sensors (S5930 series, etc.)

**Electrical and optical characteristics (Ta=25 °C, Ts=0 °C, Vd=+5 V, ±VA=±15 V, unless otherwise noted)**

Parameter	Built in sensor	Symbol	Min.	Typ.	Max.	Unit
Spectral response range		$\lambda$	-	200 to 1000	-	nm
Peak sensitivity wavelength	S5930/S5931 series	$\lambda_p$	-	600	-	nm
	S8382/S8383 series		-	750	-	
Saturation output charge	S5930 series	Qsat	-	50	-	pC
	S5931 series		-	25	-	
	S8382 series		-	50	-	
	S8383 series		-	25	-	
Dark current	S5930 series	ID	-	0.009	0.03	pA/pixel
	S5931 series		-	0.004	0.01	
	S8382 series		-	0.009	0.03	
	S8383 series		-	0.004	0.01	
Photo response non-uniformity *2		PRNU	-	-	±3	%
Conversion gain	S5930 series	Gc	-	0.2	-	V/pC
	S5931 series		-	0.4	-	
	S8382 series		-	0.2	-	
	S8383 series		-	0.4	-	

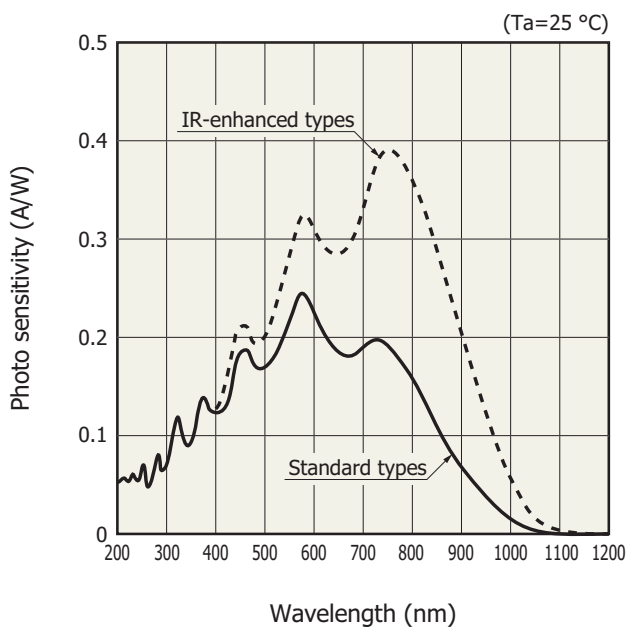
\*2: Use for "A" light source. 50 % of saturation, excluding first and last pixels.

**Temperature controller specifications (Ta=25 °C, Vd=+5 V, ±VA=±15 V, unless otherwise noted)**

Parameter *3	Symbol	Min.	Typ.	Max.	Unit
Cooling temperature	Ts	-1	0	+1	°C
Temperature control range	$\Delta T_s$	-0.05	-	+0.05	°C
Power dissipation of Peltier element	Pp	-	-	7	W
Cool down time to preset temperature	to	-	-	5	min
Setting temperature for overheat protection	To	+40	-	-	°C

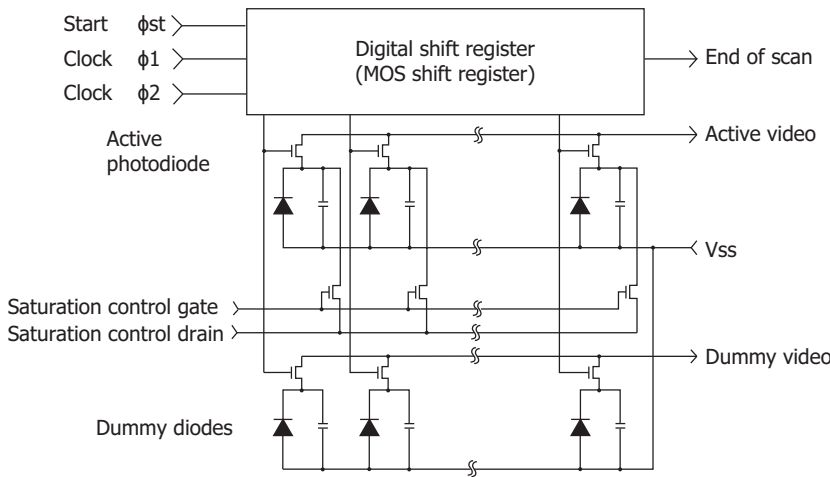
\*3: Other functions include error display, automatic power off, and detection of electrical opens and shorts by the thermosensor.

**Spectral response (Measurement example)**



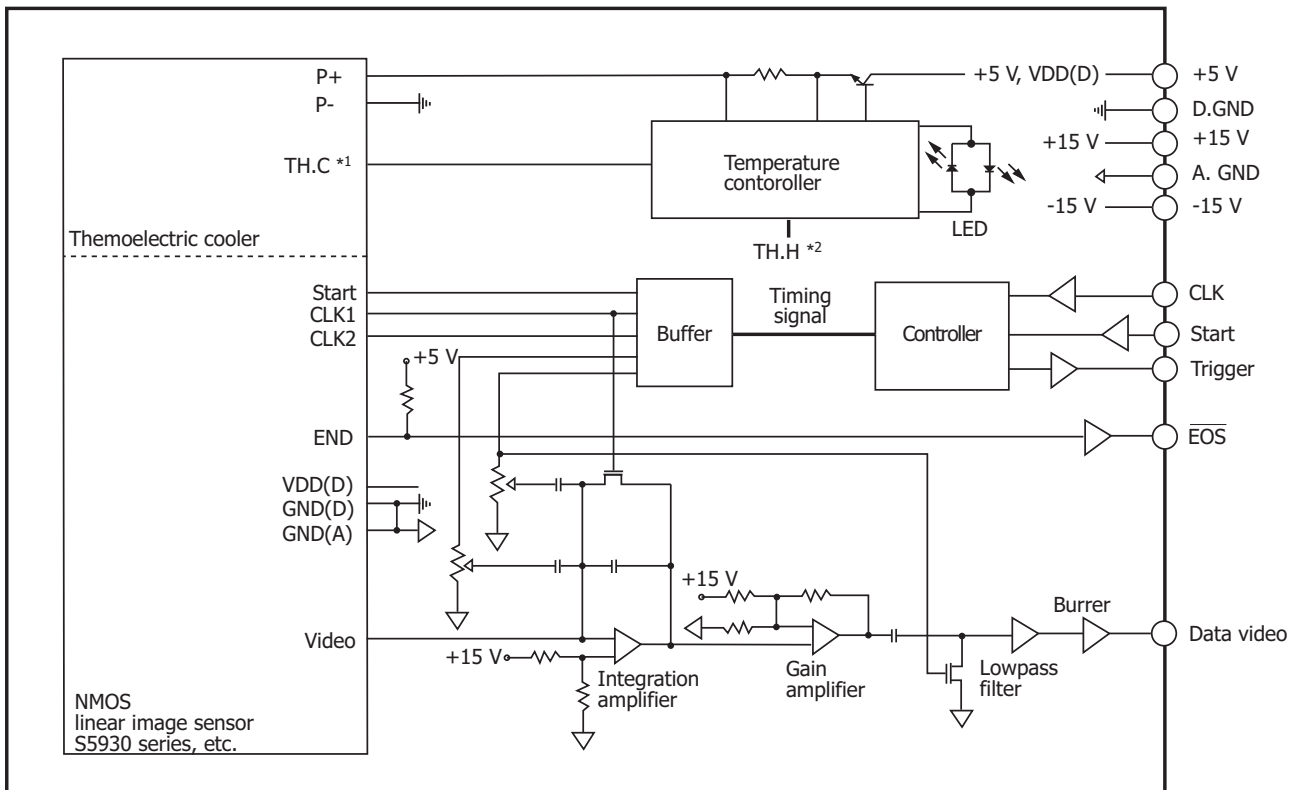
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Equivalent circuit (NMOS linear image sensor S5930/S5931/S8382/S8383 series)



KMPDC0020EA

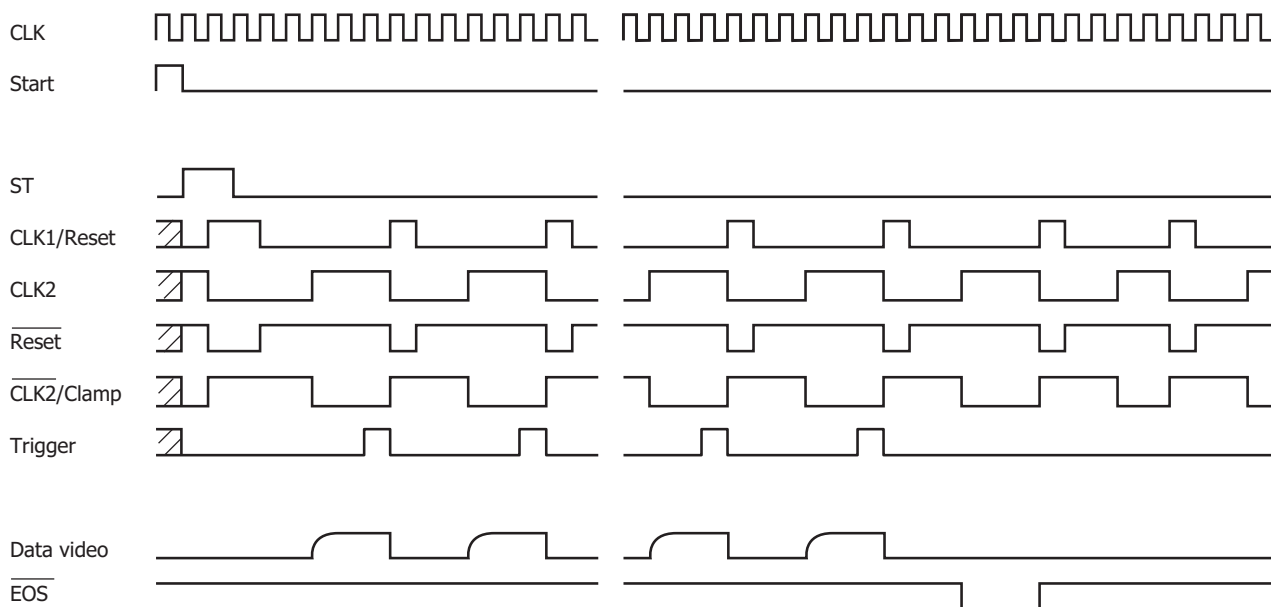
Block diagram (C5964 series)



\*1: Thermistor incorporated in the image sensor (for temperature monitoring of the image sensor)  
 \*2: Thermistor mounted on the heatsink fins (for temperature monitoring of the heat radiating side)

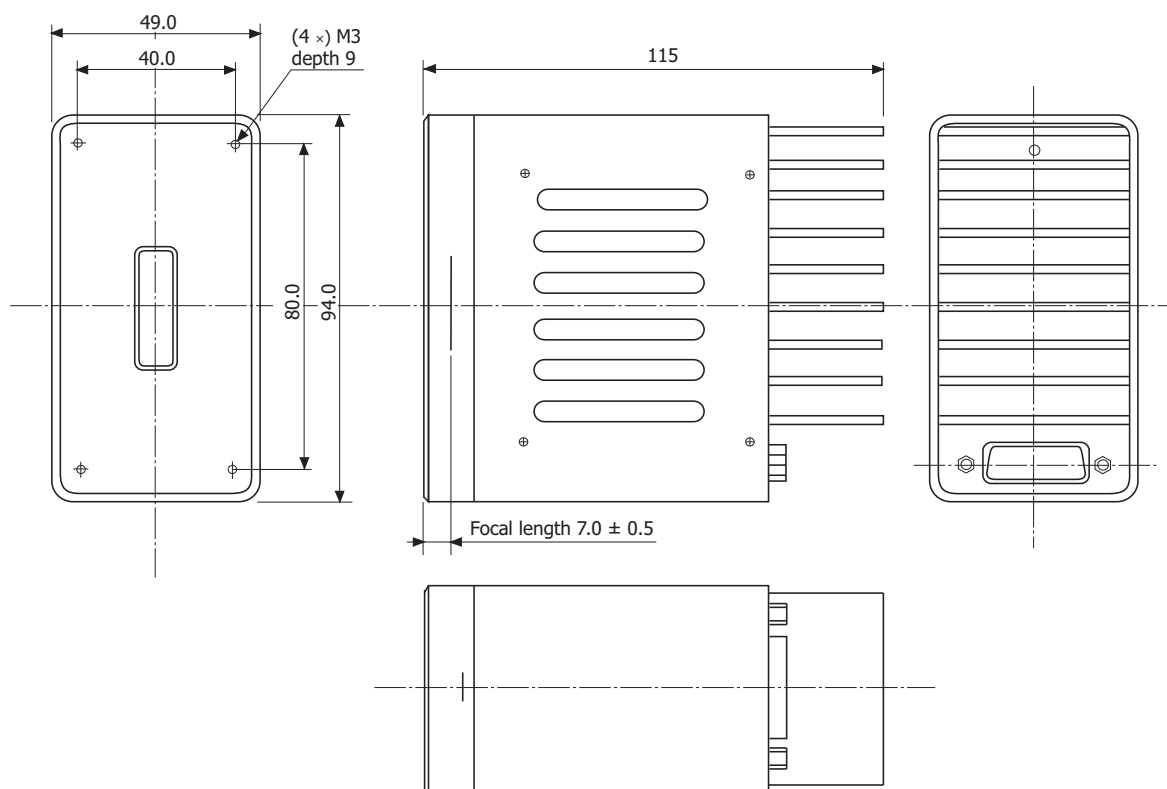
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**Timing chart**



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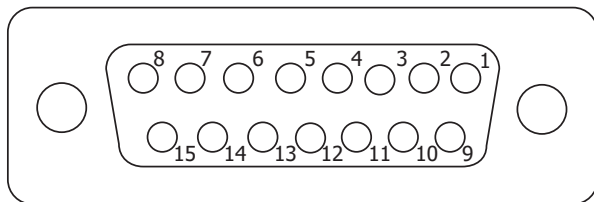
**Dimensional outline (unit: mm)**



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**Pin connection**

15-pin D-sub connector (socket type)



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Pin No.	Symbol	Description
1	NC	No connection
2	Data video	Analog video output signal. Positive polarity
3	VA1+(+15 V)	Power supply for analog circuitry
4	VA1-(-15 V)	Power supply for analog circuitry
5	VD(+5 V, P+)	Power supply for digital circuitry. For the thermoelectric cooler in the NMOS linear image sensor
6	Start	Digital input signal to initialize the circuit HCMOS compatible. Positive logic The start pulse interval determines the signal storage time of the sensor.
7	CLK	Digital input signal to specify the circuit operation HCMOS compatible. Operates at the rising edge
8	$\overline{\text{EOS}}$	Digital output signal to indicate the end of scan of the NMOS linear image sensor HCMOS compatible. Negative logic
9	A.GND	Analog ground
10	A.GND	Analog ground
11	NC	No connection
12	D.GND(P-)	Digital ground. Power supply return of the thermoelectric cooler mounted in the NMOS linear image sensor
13	D.GND	Digital ground
14	D.GND	Digital ground
15	Trigger	Digital output signal for A/D conversion HCMOS compatible. Positive logic

**Precautions for use**

The C5964 series is a precision device, so use sufficient caution when handling it.

- Never disassemble or modify the device as this may cause an operating failure.
  - Protect the device from shocks such as drops or impacts.
  - Avoid storing the device in high temperature and high humidity locations for long periods of time.
  - Never block the air vents provided on the top and side panels of this unit during operation. Blocking the air vents may cause overheating.
  - When connecting to other equipment, check that the electrical specifications are matched.
  - Never exceed the maximum ratings during operation.
- Observe the following precautions to obtain the fullest performance of device.
- Provide a proper shield to protect the device against external electromagnetic effects.  
Use of a shield cable is recommended.
  - Use a power supply with minimum ripple and noise.
  - Pay attention to prevent extraneous light from entering the device for accurate measurements.

Information described in this material is current as of July, 2014.

Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use.

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