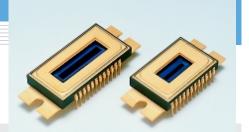
# CCD area image sensor S9060/S9061 series



# Improved etaloning (interference), high near IR sensitivity

S9060/S9061 series is a family of high sensitivity, back-thinned area image sensors with improved etaloning (interference) in the near IR region. This makes S9060/S9061 series ideal for high precision measurement in the near IR region.

S9060/S9061 series image sensors have a pixel size of 24  $\times$  24  $\mu$ m and are available in pixel formats of 512  $\times$  256 (type No. suffix: -0908) and 1024  $\times$  256 pixels (type No. suffix: -1008).

S9061 series has a one-stage thermoelectric cooler in the same package that cools the image sensor down to -10 °C when used at room temperatures. In addition, since both the CCD chip and the TE-cooler are sealed, no dry air is required, thus allowing easy handling. S9060/S9061 series has the same dimensions as S7030/S7031 series and they are pin compatible.

#### **Features**

- Improved etaloning (interference) type
- High near IR sensitivity
- Non-cooled type: S9060 series
   One-stage TE cooled type: S9061 series
- Pixel size: 24 x 24 µm
- Line/pixel binning operation
- High quantum efficiency: 90 % or more at peak
- Wide spectral response range
- Low noise readout
- Wide dynamic range
- Low dark current by MPP operation
- High UV sensitivity and good stability under UV exposure

### Applications

- Fluorescence spectroscopy, ICP
- Raman spectroscopy
- Industrial inspection
- Semiconductor inspection
- DNA sequencer
- Low-light-level detection
- Scientific measurement
- UV imaging
- Bio-photon observation

#### ■ Selection guide

Type No.	Cooling *1	Number of total pixels	Number of active pixels	Active area [mm (H) × mm (V)]
S9060-0908	Non cooled	532 × 256	512 × 250	12.288 × 6.000
S9060-1008	Non-cooled	1044 × 256	1024 × 250	24.576 × 6.000
S9061-0908	One store TE seeled	532 × 256	512 × 250	12.288 × 6.000
S9061-1008	One-stage TE-cooled	1044 × 256	1024 × 250	24.576 × 6.000

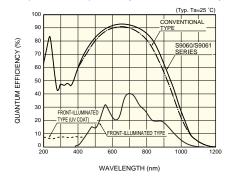
<sup>\*1:</sup> Custom devices with a two-stage thermoelectric cooler are available on request.

### ■ General rating

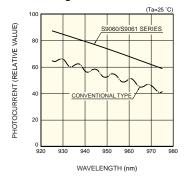
Parameter	Specification		
Vertical clock	2 phases		
Horizontal clock	2 phases		
Output circuit	One-stage MOSFET source follower		
Package	24 pin ceramic DIP		
Window material	Quartz glass *2		

<sup>\*2:</sup> Custom devices without window faceplate or with an AR (anti-reflection) coated sapphire window are available on request.

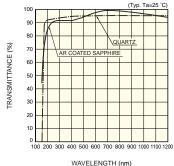
#### ■ Spectral response (without window)



#### Etaloning characteristic



#### ■ Window transmittance vs. wavelength



WAVELENGTH (nm)

SOLID STATE DIVISION

KMPDB0221EA

KMPDB0223EA

PRELIMINARY DATA Aug. 2002

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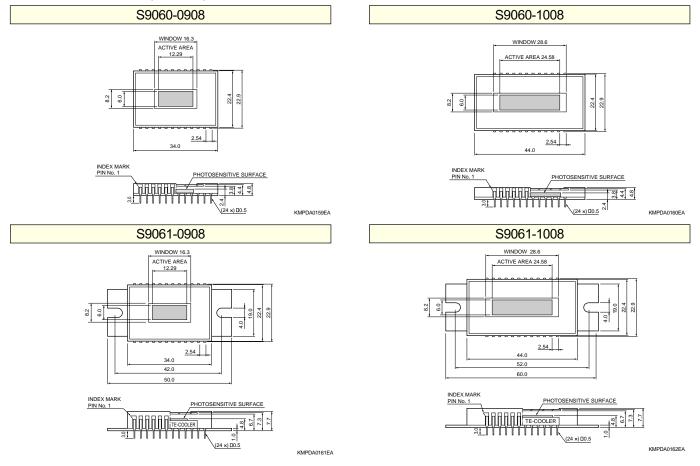
■ Electrical and optical characteristics (Ta=25 °C, unless otherwise noted)

Parameter		Symbol	Min.	Тур.	Max.	Unit
Saturation output voltage		Vsat	-	Fw × Sv	ı	V
Full well capacity *3	Vertical	Fw	150,000	300,000	ı	e ē
	Horizontal		300,000	600,000	ı	
CCD node sensitivity *4		Sv	1.8	2.2	ı	μV/e <sup>-</sup>
Dark current *5 MPP mode (tentative data)	25 °C	DS	-	4,000	12,000	e <sup>-</sup> /pixel/s
	0 °C		-	200	600	
Readout noise *6		Nr	-	8	16	e <sup>-</sup> rms
Dynamic range *7	Line binning	DR	18,750	75,000	•	-
	Area scanning		9,375	37,500	-	-
Photo response non-uniformity *8		PRNU	-	±3	±10	%
Spectral response range		λ	-	200 to 1100	-	nm

<sup>\*3:</sup> Large horizontal full well for line binning operation.

Fixed pattern noise (peak to peak) Photo response non-uniformity (PRNU) [%] = Signal

#### ■ Dimensional outlines (unit: mm)



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<sup>\*4:</sup> VoD=20 V, load resistance=22 kΩ

<sup>\*5:</sup> Dark current nearly doubles for every 5 to 7 °C increase in temperature.

<sup>\*6: -40 °</sup>C, operating frequency is 80 kHz

<sup>\*7:</sup> Dynamic range (DR) = Full well/Readout noise

<sup>\*8:</sup> Condition: half of the saturation output voltage.