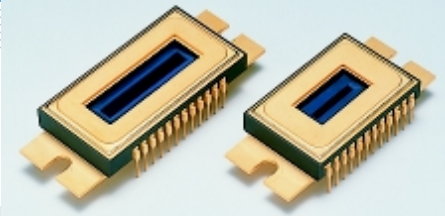


CCD area image sensor S9060/S9061 series

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 $24 \times 24 \mu\text{m}$ and are available in pixel formats of 512×256 (type No. suffix: -0908) and 1024×256 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: $24 \times 24 \mu\text{m}$
- 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		1044×256	1024×250	24.576×6.000
S9061-0908	One-stage TE-cooled	532×256	512×250	12.288×6.000
S9061-1008		1044×256	1024×250	24.576×6.000

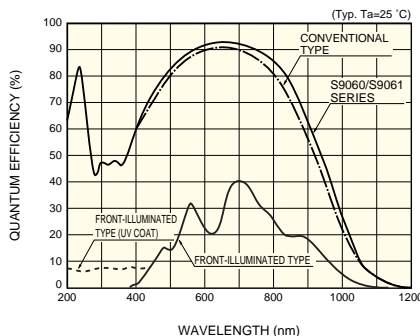
*1: Custom devices with a two-stage thermoelectric cooler are available on request.

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

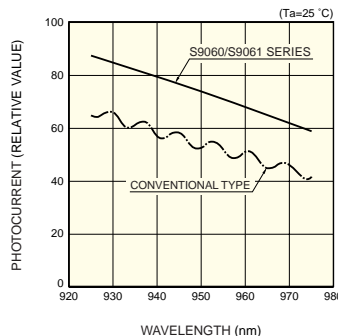
*2: Custom devices without window faceplate or with an AR (anti-reflection) coated sapphire window are available on request.

Spectral response (without window)



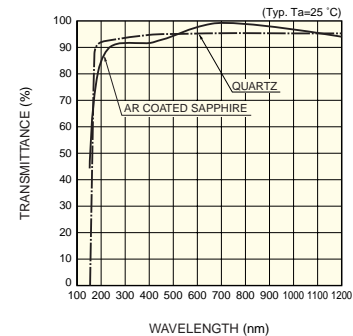
KMPDB0221EA

Etaloning characteristic



KMPDB0223EA

Window transmittance vs. wavelength



KMPDB0110EA

PRELIMINARY DATA
Aug. 2002

SOLID STATE DIVISION

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

Parameter		Symbol	Min.	Typ.	Max.	Unit
Saturation output voltage		Vsat	-	Fw × Sv	-	V
Full well capacity *3	Vertical	Fw	150,000	300,000	-	e ⁻
	Horizontal		300,000	600,000	-	
CCD node sensitivity *4		Sv	1.8	2.2	-	μV/e ⁻
Dark current *5 MPP mode (tentative data)	25 °C	DS	-	4,000	12,000	e ⁻ /pixel/s
	0 °C		-	200	600	
Readout noise *6		Nr	-	8	16	e ⁻ 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

*3: Large horizontal full well for line binning operation.

*4: V_{OD}=20 V, load resistance=22 kΩ

*5: Dark current nearly doubles for every 5 to 7 °C increase in temperature.

*6: -40 °C, operating frequency is 80 kHz

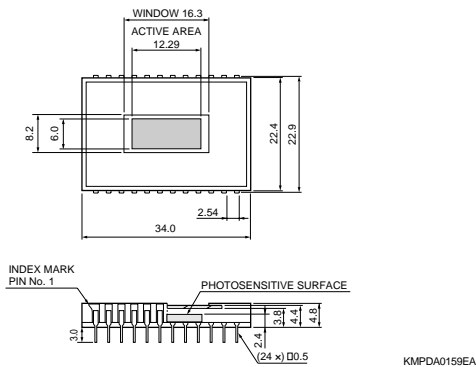
*7: Dynamic range (DR) = Full well/Readout noise

*8: Condition: half of the saturation output voltage.

$$\text{Photo response non-uniformity (PRNU) [\%]} = \frac{\text{Fixed pattern noise (peak to peak)}}{\text{Signal}} \times 100$$

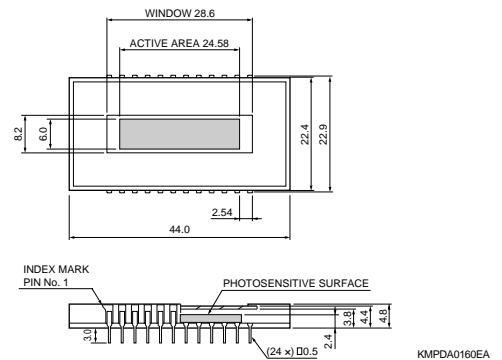
■ Dimensional outlines (unit: mm)

S9060-0908



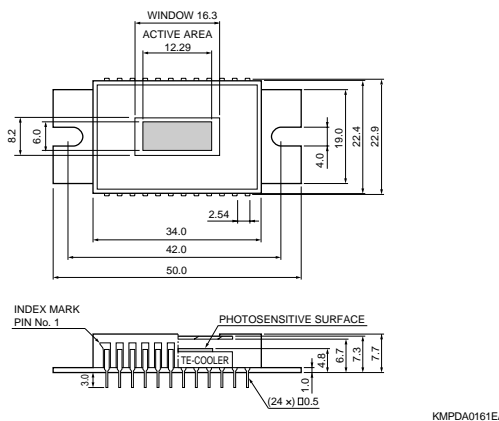
KMPDA0159EA

S9060-1008



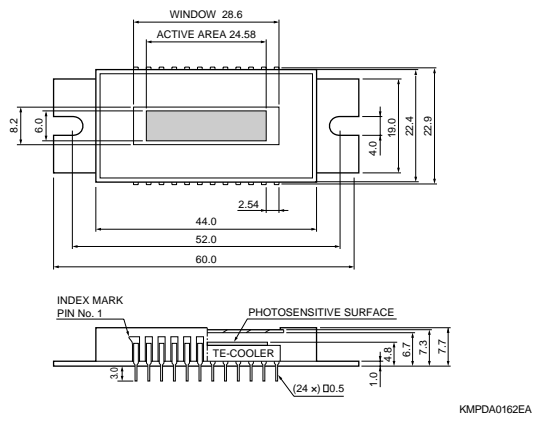
KMPDA0160EA

S9061-0908



KMPDA0161EA

S9061-1008



KMPDA0162EA