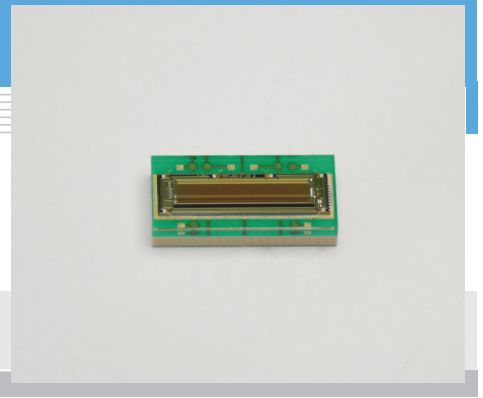# CMOS linear image sensor
S10227

Small plastic package CMOS image sensor

Features

- Compact and high cost-performance
  Surface mount package: 4.4 × 9.1 × 1.6 ^{t} mm
- Pixel pitch: 12.5 µm
  Pixel height: 250 µm
- Number of pixels: 512 ch
- Single 5 V power supply operation available
- Video data rate: 5 MHz max.
- Simultaneous charge integration
- Shutter function
- High sensitivity, low dark current, low noise
- Built-in timing generator allows operation with only
  Start and Clock pulse inputs
- Spectral response range: 400 to 1000 nm

Note: Consult with the nearest sales office if an evaluation
      board is needed.

Applications

- Barcode readers
- Displacement meters
- Refractometers
- Interferometers
- Miniature spectrometers

■ Absolute maximum ratings (Ta=25 °C)

Parameter	Symbol	Value	Unit
Supply voltage	Vdd	-0.3 to +6	V
Clock pulse voltage	V(clk)	-0.3 to +6	V
Start pulse voltage	V(st)	-0.3 to +6	V
Operating temperature*1	Topr	-25 to +85	°C
Storage temperature*1	Tstg	-25 to +85	°C

*1: No condensation

■ Dimensions

Parameter	Value	Unit
Number of pixels	512	-
Pixel pitch	12.5	µm
Pixel height	250	µm
Active area length	6.4	mm

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■ Recommended terminal voltage

Parameter		Symbol	Min.	Typ.	Max.	Unit
Supply voltage		Vdd	4.75	5	5.25	V
Clock pulse voltage	High	V(clk)	Vdd - 0.25	Vdd	Vdd + 0.25	V
	Low		-	0	-	V
Start pulse voltage	High	V(st)	Vdd - 0.25	Vdd	Vdd + 0.25	V
	Low		-	0	-	V

■ Electrical characteristics [Ta=25 °C, Vdd=5 V, V(clk)=V(st)=5 V]

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock pulse frequency	f(clk)	0.1	-	5	MHz
Video data rate	VR	-	f(clk)	-	MHz
Power consumption	P	-	150	-	mW
Conversion efficiency	CE	-	(1.6)	-	$\mu V/e^-$

■ Electrical and optical characteristics [Ta=25 °C, Vdd=5 V, V(clk)=V(st)=5 V]

Parameter	Symbol	Min.	Typ.	Max.	Unit
Spectral response range	λ		400 to 1000		nm
Peak sensitivity wavelength	λp	-	700	-	nm
Dark output voltage[2]	Vd	-	0.5	5	mV
Saturation output voltage	Vsat	-	4.2	-	V
Readout noise	Nr	-	0.4	-	mV rms
Offset output voltage	Vo		0.6	-	V
Photo response non-uniformity[3][4]	PRNU	-	-	±8.5	%

[2]: Storage time Ts=10 ms

[3]: Uniformity is defined under the condition that all pixels in the device are uniformly illuminated by light which is 50% of the
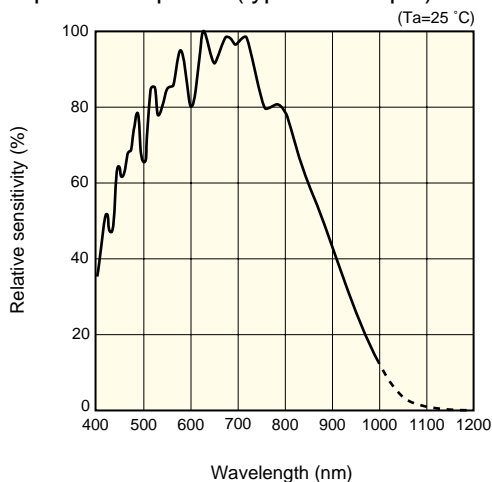saturation exposure level and using 510 pixels excluding both ends pixels as follows:
PRNU= $\Delta X/X \times 100$ (%)
X: Average output of 510 pixels excluding the pixels at both ends
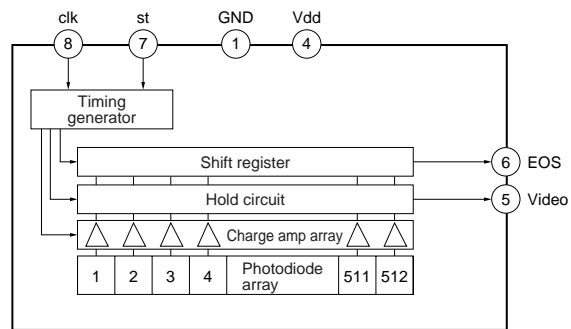ΔX: Difference between X and maximum or minimum output

[4]: Measured with a tungsten lamp of 2856 K
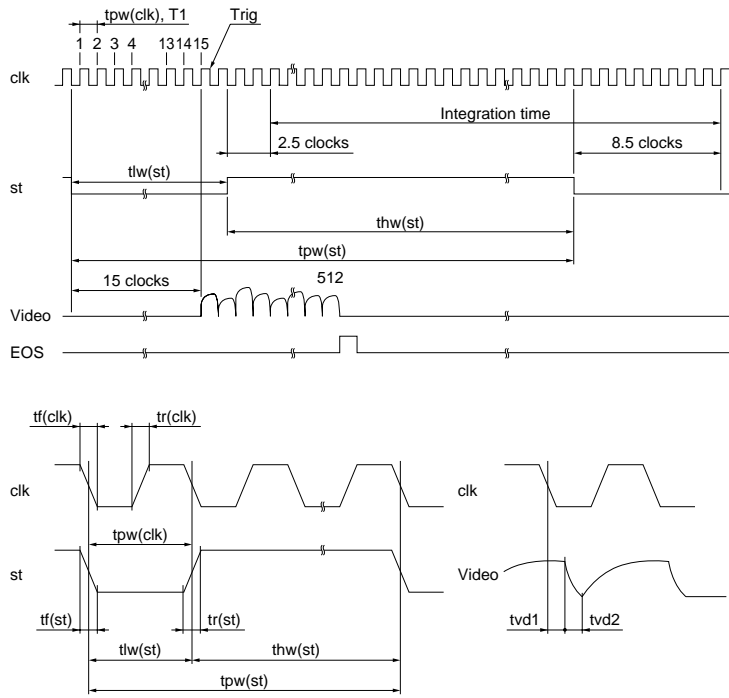
■ Spectral response (typical example)

KMPDB0258EC

### ■ Block diagram

KMPDC0167EA

■ Timing chart

KMPDC0166EB

Parameter	Symbol	Min.	Typ.	Max.	Unit
Start pulse width	tpw(st)	T1 × 530	-	-	ns
Start pulse high width	thw(st)	T1 × 8	-	-	ns
Start pulse low width	tlw(st)	T1 × 15	-	-	ns
Start pulse rise and fall time	tr(st), tf(st)	0	20	30	ns
Clock pulse width	tpw(clk), T1	200	-	-	ns
Clock pulse rise and fall time	tr(clk), tf(clk)	0	20	30	ns
Video delay time 1	tvd1	-	30	-	ns
Video delay time 2	tvd2	-	40	-	ns

Note: The internal circuit starts operating at the rise of clk pulse immediately after st pulse sets to low.
The integration time equals the high period of st pulse plus 6 clk cycles.

■ Dimensional outlines (unit: mm)
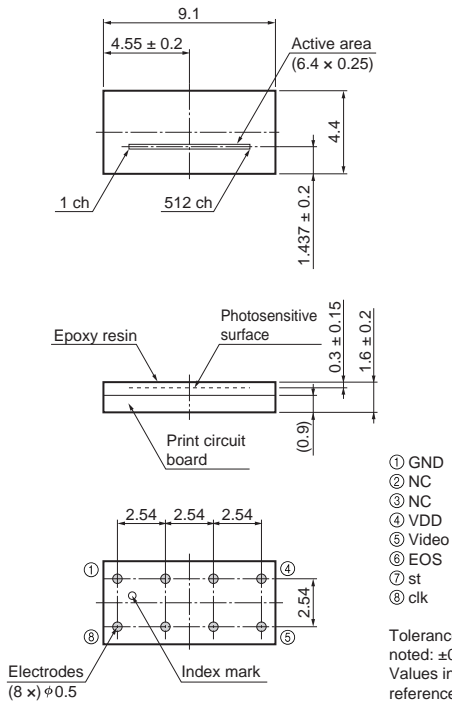
① GND
② NC
③ NC
④ VDD
⑤ Video
⑥ EOS
⑦ st
⑧ clk

Tolerance unless otherwise noted: ±0.1
Values in parentheses indicate reference value.

KMPDA0213EB

3

■ Pin connection

Pin no.	Name	Description	Input/output
①	GND	Ground	Input
②	NC		-
③	NC		-
④	Vdd	Power supply voltage	Input
⑤	Video	Video signal output	Output
⑥	EOS	End of scan (Shift register end-of-scan signal pulse generated after reading signals from all pixels)	Output
⑦	st	Start pulse (Pulse for initializing the internally generated pulses that set the timing to start reading pixel signals)	Input
⑧	clk	Clock pulse (Pulse for synchronizing the internally generated pulses that control sensor operation frequency)	Input

■ Recommended land pattern

(8 ×) φ0.7

2.54

2.54   2.54   2.54

KMPDC0257EA
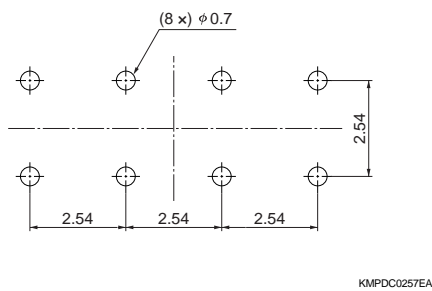
■ Temperature profile of reflow soldering

KMPDB0261EA
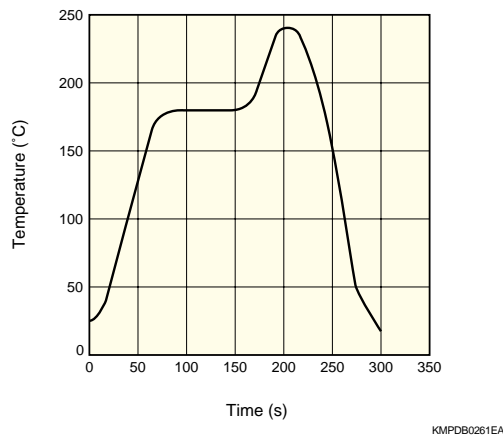
■ Precautions for use

(1) Electrostatic countermeasures
- · This device has a built-in protection circuit as a safeguard against static electrical charges. However, to prevent destroying the device with electrostatic charges, take countermeasures such as grounding yourself, the workbench and tools to prevent static discharges.
- · Protect this device from surge voltages which might be caused by peripheral equipment.

(2) Package handling
- · The package surface is easily scratched, so handle this device carefully.
- · Dust or grime on the light input window might cause non-uniform sensitivity. To remove dust or grime, blow it off with compressed air.

(3) Reflow soldering
- · To prevent damaging this device during reflow soldering, perform soldering within 24 hours after opening the moisture-proof packing.
- · The extent of damage that might occur during reflow soldering depends on the PC board size and reflow oven conditions. Check the device for any damage before reflow soldering.

(4) Surface protective tape
- · Protective tape is affixed to the surface of this product to protect the active area. After assembling the product, remove the tape before use.