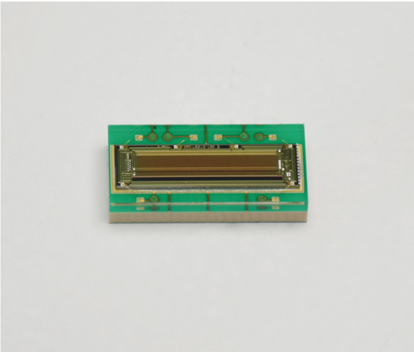
深圳东裕光大电子有限公司
广州市东裕光电科技有限公司

产品规格书
SPECIFICATION

客户名称 CUSTOMER	
产品名称 PRODUCTION	COMS 线性图像传感器 CMOS Linear image Sensor
产品型号 MODEL	S10227-10(DYWH)
版本号 VERSION NO	A1.0

地址(Add)：深圳市光明区凤凰街道光明大道 481 号乐府广场 1B 栋 1609-1611 室
厂址(Add)：广东省广州市番禺区石基镇海涌路 3 号 10 号厂房 2 楼
电话(Tel)：18038161512
传真(Fax)：020-39966833
网址(Net)：www.tonyuled.cn www.tonyuled.com

客户确认 CUSTOMER CONFIRMATION	审 核 CHECKED BY	编 制 PREPARED BY
	周毅兴	陈少龙



S10227-10(DYWH)

Small, resin-sealed CMOS image sensor

The S10227-10(DYWH) is a resin-sealed CMOS linear image sensor to offer compact size and high cost-performance compared to our previous product (S9227 series).

Features

- **Compact and high cost-performance**
  Surface mount type package: 4.4 × 9.1 × 1.6^t mm
- **Pixel pitch: 12.5 µm**
  Pixel height: 250 µm
- **512 pixels**
- **Single 5 V power supply operation**
- **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**

Applications

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

Structure

Parameter	Specification	Unit
Number of pixels	512	-
Pixel pitch	12.5	µm
Pixel height	250	µm
Photosensitive area length	6.4	mm
Package	Glass epoxy	-
Seal material	Silicone resin	-

Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Supply voltage	Vdd	Ta=25 °C	-0.3 to +6	V
Clock pulse voltage	V(CLK)	Ta=25 °C	-0.3 to +6	V
Start pulse voltage	V(ST)	Ta=25 °C	-0.3 to +6	V
Operating temperature	Topr	No dew condensation*1	-40 to +85	°C
Storage temperature	Tstg	No dew condensation*1	-40 to +85	°C
Reflow soldering conditions	Tsol	JEDEC MSL 2a	Peak temperature: 260°C, 3 times (See P.8)	-

*1: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

Recommended terminal voltage

Parameter		Symbol	Min.	Typ.	Max.	Unit
Supply voltage		Vdd	4.75	5	5.25	V
Clock pulse voltage	High level	V(CLK)	Vdd - 0.25	Vdd	Vdd + 0.25	V
	Low level		-	0	-	V
Start pulse voltage	High level	V(ST)	Vdd - 0.25	Vdd	Vdd + 0.25	V
	Low level		-	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)	50 k	-	5 M	Hz
Data rate	DR	-	f(CLK)	-	Hz
Current consumption*2	Ic	20	26	32	mA
Conversion efficiency	CE	-	1.6	-	μV/e$^-$

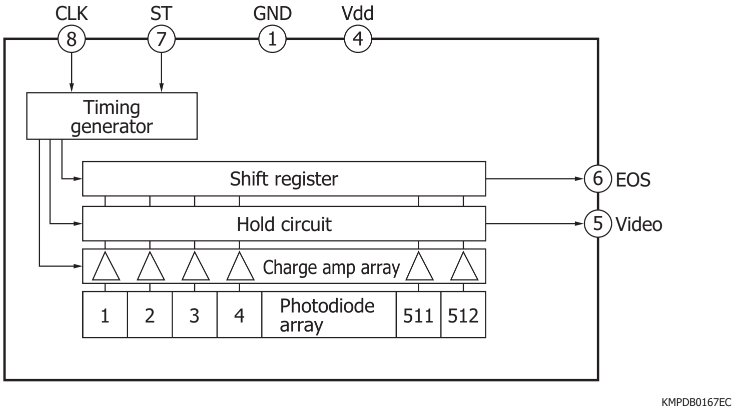
*2: f(CLK)=5 MHz

Electrical and optical characteristics [Ta=25 °C, Vdd=5 V, V(CLK)=V(ST)=5 V, f(CLK)=5 MHz]

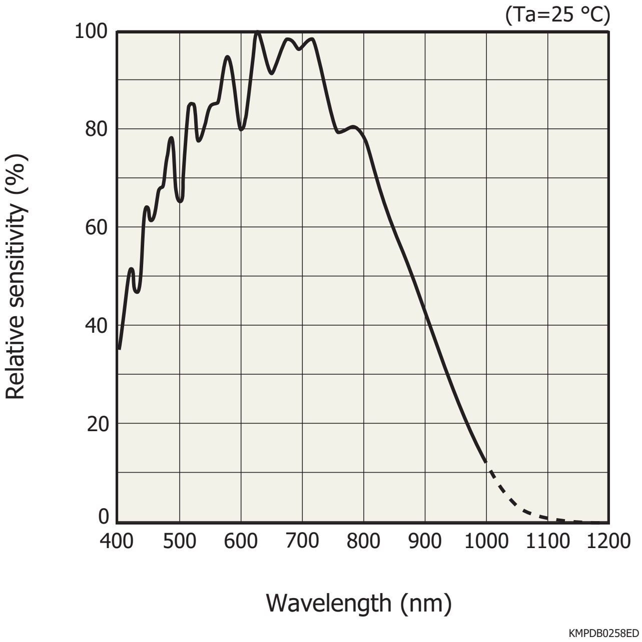
Parameter	Symbol	Min.	Typ.	Max.	Unit
Spectral response range	λ		400 to 1000		nm
Peak sensitivity wavelength	λp	-	700	-	nm
Dark output voltage*3	VD	-	1	10	mV
Saturation output voltage*4	Vsat	4	4.3	-	V
Readout noise	Nread	-	0.45	1	mV rms
Output offset voltage	Voffset	0.4	0.6	0.9	V
Photoresponse nonuniformity*5 *6	PRNU	-	-	±8.5	%

*3: Integration time=10 ms
*4: Voltage difference from Voffset
*5: Photoresponse nonuniformity (PRNU) is the output nonuniformity that occurs when the entire photosensitive area is uniformly illuminated by light which is 50% of the saturation exposure level. PRNU is measured using 510 pixels excluding the pixels at both ends, and is defined as follows:
PRNU= ΔX/X × 100 (%)
X: average output of 510 pixels excluding the pixels at both ends, ΔX: difference between X and maximum or minimum output
*6: Measured with a tungsten lamp of 2856 K

Block diagram

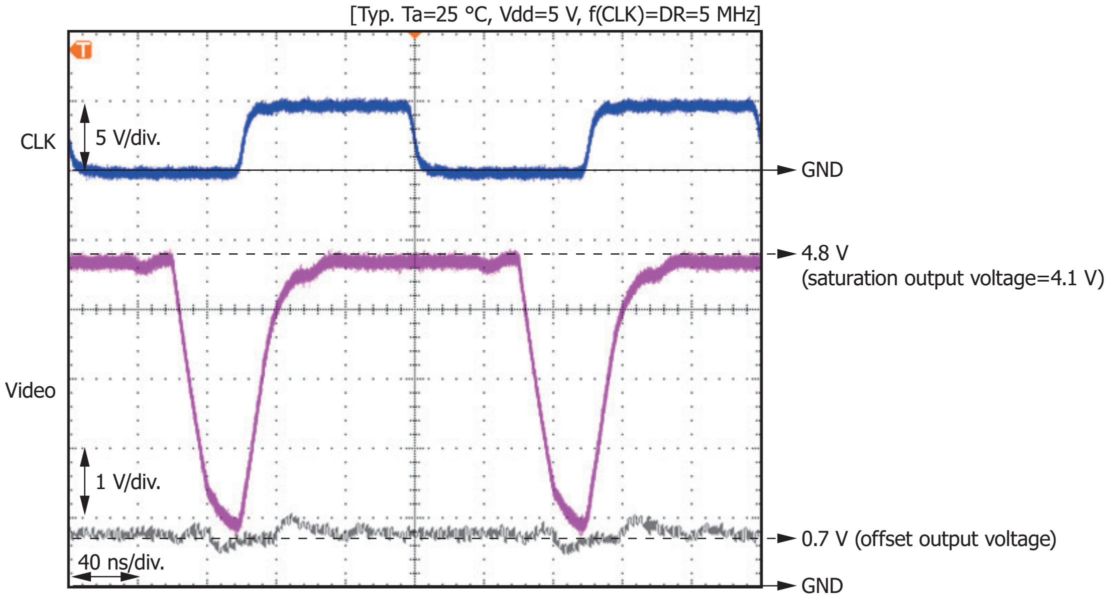


Spectral response (typical example)

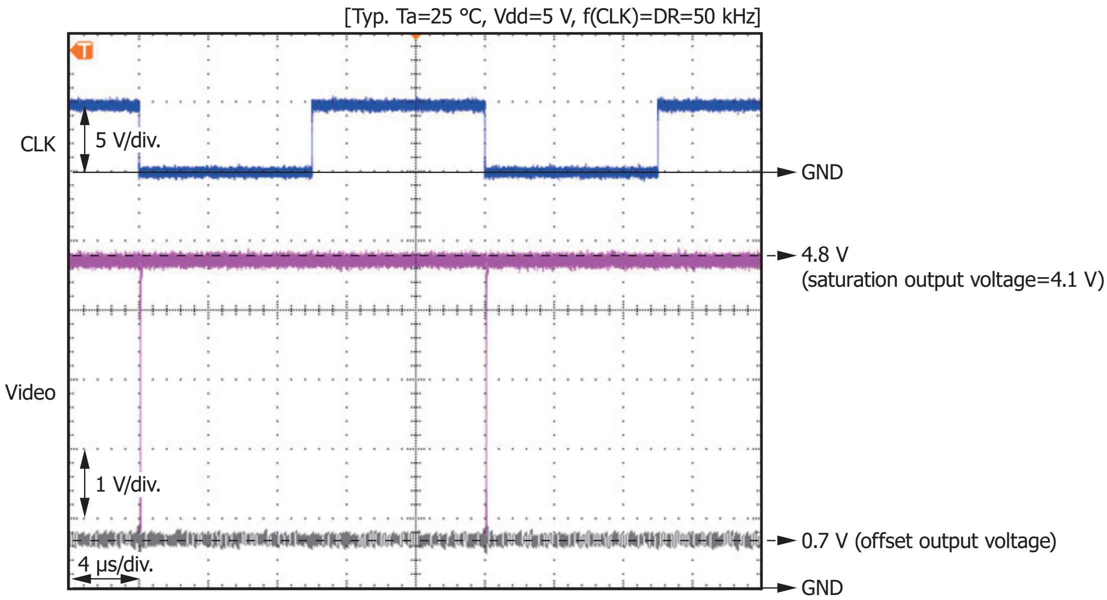


Output waveform of one element

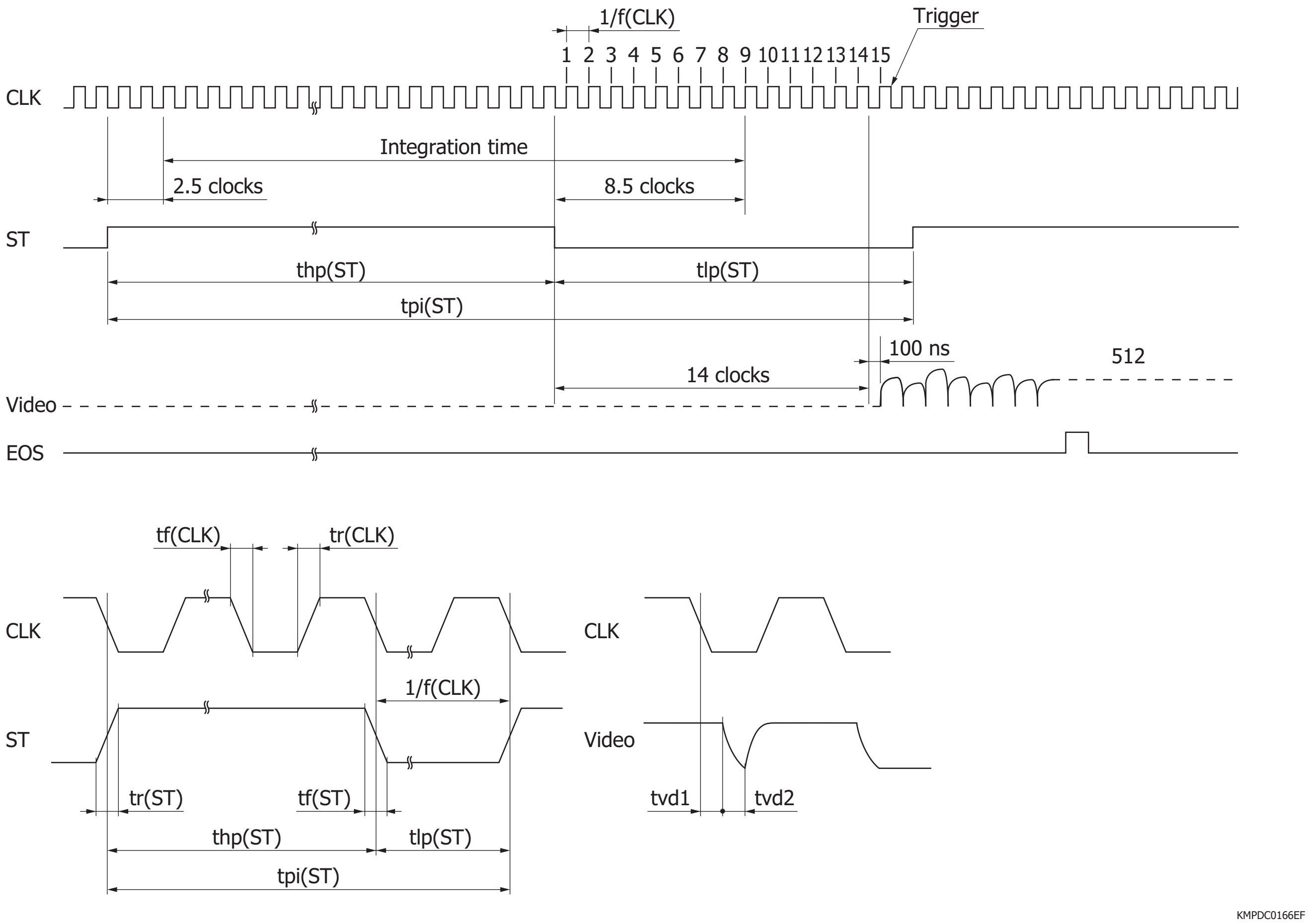
■ f(CLK)=DR=5 MHz



■ f(CLK)=DR=50 kHz



Timing chart

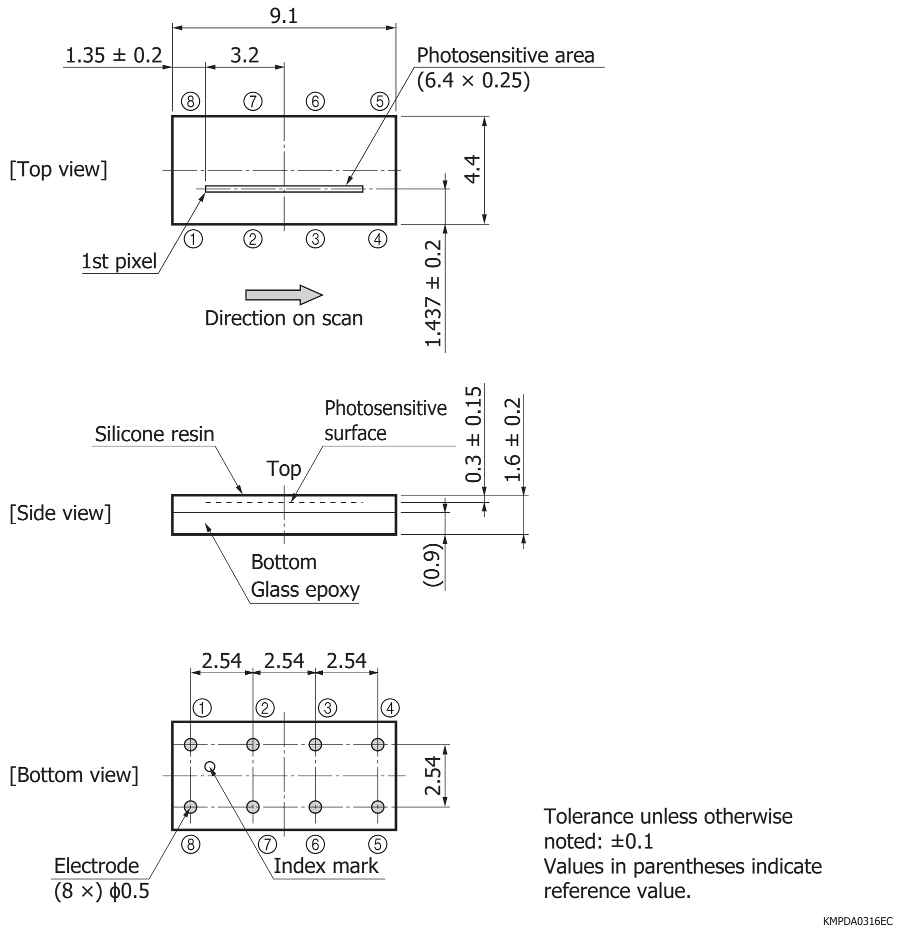


Parameter	Symbol	Min.	Typ.	Max.	Unit
Start pulse interval	tpi(ST)	530/f(CLK)	-	1100 m	s
Start pulse high period	thp(ST)	8/f(CLK)	-	1000 m	s
Start pulse low period	tlp(ST)	15/f(CLK)	-	100 m	s
Start pulse rise and fall times	tr(ST), tf(ST)	0	20	30	ns
Clock pulse duty	-	45	50	55	%
Clock pulse rise and fall times	tr(CLK), tf(CLK)	0	20	30	ns
Video delay time 1	tvd1	32	40	48	ns
Video delay time 2	tvd2	40	50	60	ns

Note: Dark output increases if the start pulse period or the start pulse high period is lengthened.
The internal timing 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.
The output from 1st pixel appears 14 clocks plus 100 ns after the falling edge of ST pulse.
The EOS pulse is output 39 ns after the falling edge of CLK pulse.
The output voltage after reading the last pixel (512 pixels) is indefinite.

Start pulse setting example (for setting the start pulse period to a minimum and the integration time to a maximum)
Start pulse high period=515/f(CLK), Start pulse low period=15/f(CLK)

Dimensional outline (unit: mm)

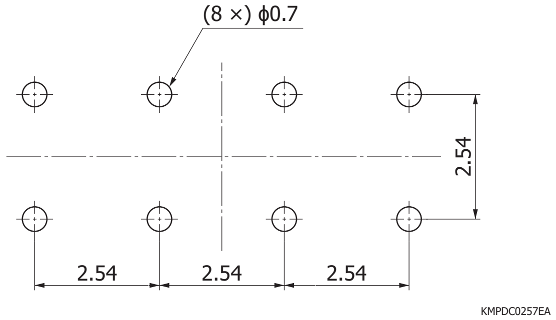


Pin connections

Pin no.	Symbol	I/O	Discription
1	GND	-	Ground
2	NC	-	No connection
3	NC	-	No connection
4	Vdd	I	Power supply voltage
5	Video	O	Video signal output*7
6	EOS	O	End of scan
7	ST	I	Start pulse
8	CLK	I	Clock pulse

*7: Connect a buffer amplifier for impedance conversion to the video output terminal so as to minimize the current flow. As the buffer amplifier, use a high input impedance operational amplifier with JFET or CMOS input.

Recommended land pattern (unit: mm)



Appearance inspection standards

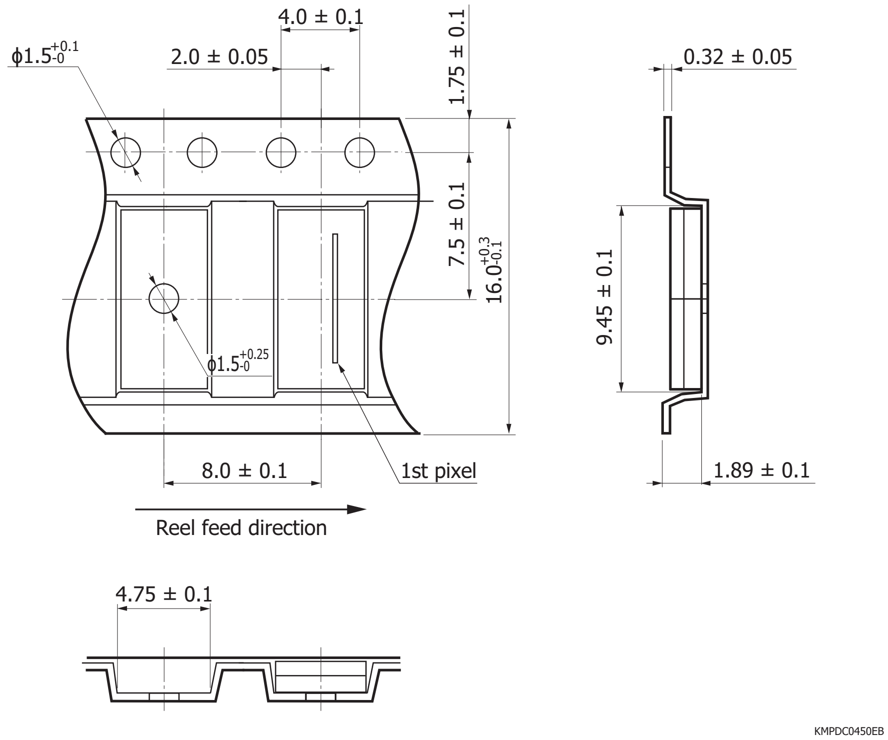
Parameter	Test criterion	Inspection method
Foreign matter on photosensitive area	10 μm max.	Automated camera

Standard packing specifications

■ Reel (conforms to JEITA ET-7200)

Dimensions	Hub diameter	Tape width	Material	Electrostatic characteristic
330 mm	100 mm	16 mm	PPE	Conductive

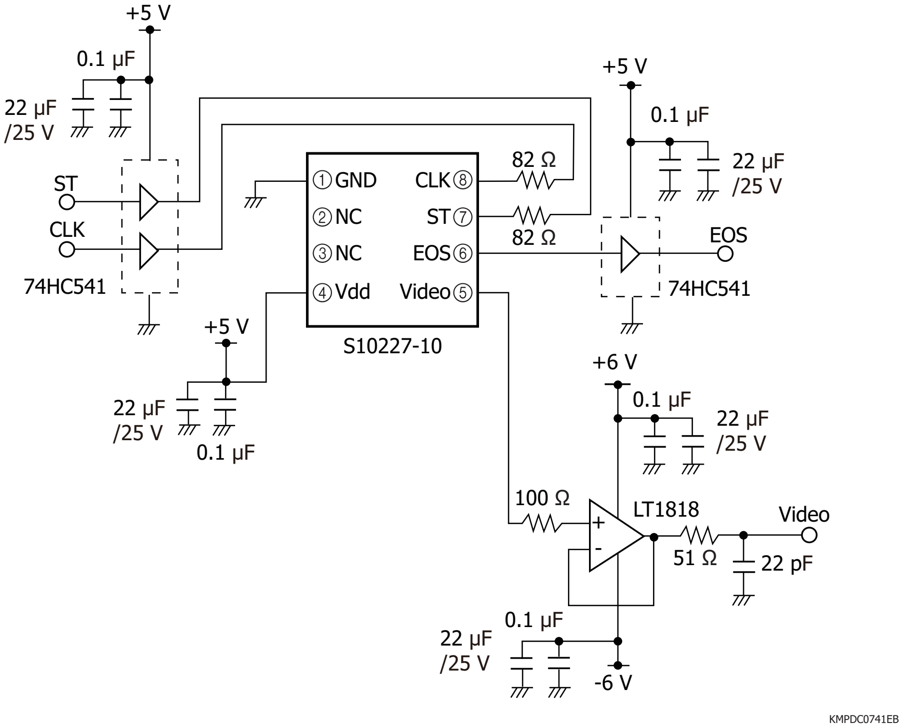
■ Embossed tape (unit: mm, material: polycarbonate resin, conductive)



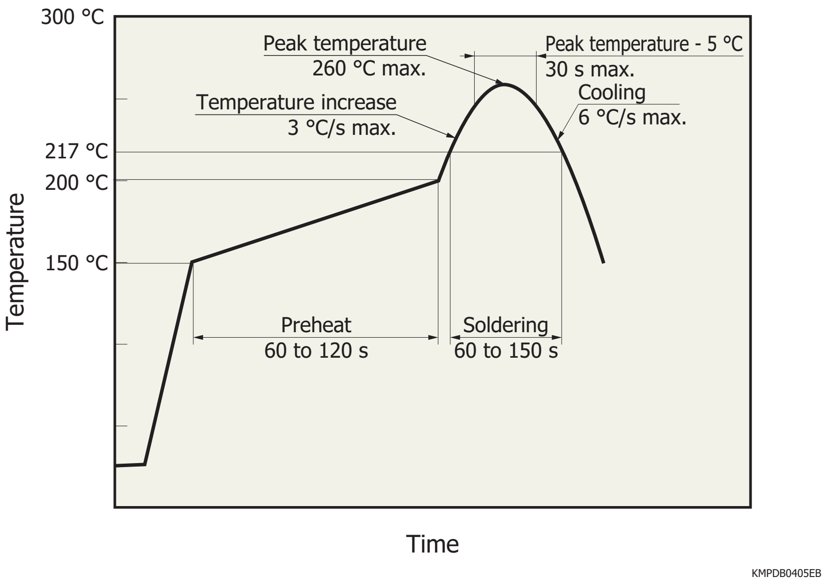
■ Packing quantity
2000 pcs/reel

■ Packing type
Reel and desiccant in moisture-proof packing (vaccum-sealed)

Application circuit example



Recommended reflow soldering conditions (typical example)



- This product supports lead-free soldering. After unpacking, store it in an environment at a temperature of 30 °C or less and a humidity of 60% or less, and perform soldering within 4 weeks.
- The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. Before actual reflow soldering, check for any problems by tesitng out the reflow soldering methods in advance.
- When three or more months have passed or if the packing bag has not been stored in an environment described above, perform baking. For the baking method, see the related information "Resin sealed type CMOS linear image sensor / Precautions."

Precautions

(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.

· Protect this device from surge voltages which might be caused by peripheral equipment.

(2) Package handling

· The photosensitive area of this device is sealed and protected by transparent resin. When compared to a glass faceplate, the surface of transparent resin may be less uniform and is more likely to be scratched. Be very careful when handling this device and also when designing the optical systems.

· Dust or grime on the light input window might cause nonuniform sensitivity. To remove dust or grime, blow it off with compressed air.

(3) Surface protective tape

· Protective tape is affixed to the surface of this product to protect the photosensitive area. After assembling the product, remove the tape before use.

(4) Operating and storage environments

· Handle the device within the temperature range specified in the absolute maximum ratings. Operating or storing the device at an excessively high temperature and humidity may cause variations in performance characteristics and must be avoided.

(5) UV exposure

· This product is not designed to prevent deterioration of characteristics caused by UV exposure, so do not expose it to UV light.

Related information

■ Precautions

· Disclaimer

· Image sensors

· Resin-sealed CMOS linear image sensors

Information described in this material is current as of May 2020.
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.