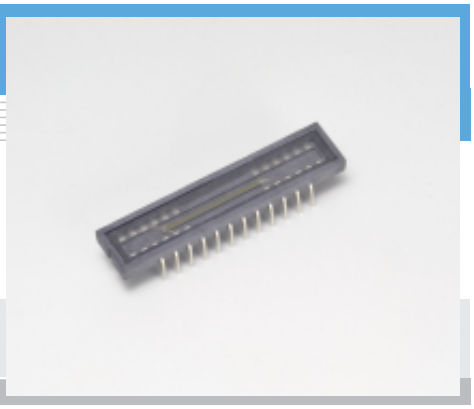
NEW

IMAGE SENSOR

CMOS linear image sensor
S10077



Digital output, built-in 8/10-bit AD converter, single power supply operation

S10077 is a CMOS linear image sensor designed for image input applications. The signal processing circuit has a charge amplifier with excellent input/output characteristics. The circuit also includes a 8-bit/10-bit AD converter.

Features

- Pixel pitch: 14 µm
  Pixel height: 50 µm
- Number of pixels: 1024 ch
- Single power supply operation: 3.3 to 5 V
- On-chip charge amplifier with excellent input/output characteristics
- Built-in timing generator allows operation with only start and clock pulse inputs
- Video data rate: 1 MHz Max.
- Spectral response range: 400 to 1000 nm
- Digital output
- 8-bit/10-bit switchable ADC
- Simultaneous charge integration and variable integration time function

Applications

- Analytical instrument
- Position detection
- Image reading

■ Absolute maximum ratings

Parameter	Symbol	Value	Unit
Supply voltage	Vdd	-0.3 to +6	V
AD mode selection voltage	Vsel	-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	-5 to +60	°C
Storage temperature	Tstg	-10 to +70	°C

*1: No condensation

■ Shape specifications

Parameter	Specification	Unit
Number of pixels	1024	-
Pixel pitch	14	µm
Pixel height	50	µm
Active area length	14.336	mm
Window material	TENPAX	-

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SOLID STATE DIVISION

■ Recommended terminal voltage

Parameter		Symbol	Min.	Typ.	Max.	Unit
Supply voltage		Vdd	3.3	5	5.25	V
AD mode selection voltage	10-bit	Vsel	Vdd - 0.25	Vdd	Vdd + 0.25	V
	8-bit		-	0	-	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	10-bit	f (CLK)	1	-	6	MHz
	8-bit		1	-	12	
Video data rate		VR	-	f (CLK)/12	-	kHz
Power consumption		P	-	70	-	mW

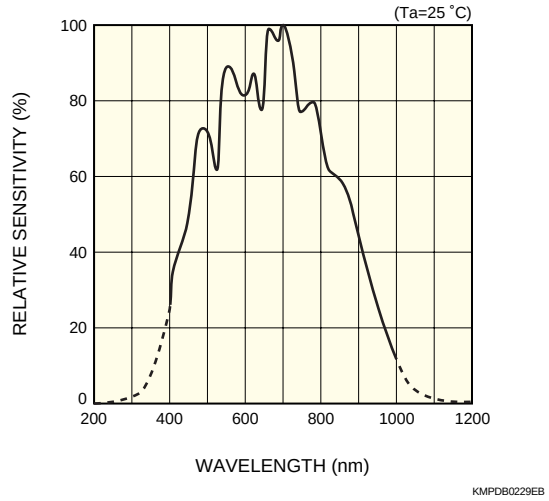
■ Electrical and optical characteristics [Ta=25 °C, Vdd=5 V, V (CLK)=V (ST)=5 V]

Parameter	Symbol	Min.	Typ.	Max.	Unit
Spectral response range	λ		400 to 1000		nm
Peak sensitivity wavelength	λp	-	700	-	nm
Photo sensitivity	RES	-	42	-	V/μJcm^2
Dark current	ID	-	0.7	-	fA
Saturation output voltage *2	Vsat	-	3.3	-	V
Readout noise	Nr	-	0.7	-	digit
Offset output voltage	Vo		0.3	-	V
Photo response non-uniformity *3 *4	PRNU	-	-	±10	%

*2: Relative voltage when Vo is taken as reference value

*3: Uniformity is defined under the condition that the device is uniformly illuminated by light which is 50 % of the saturation exposure level and using 1022 pixels excluding both ends pixels as follows:

■ Spectral response (typical example)



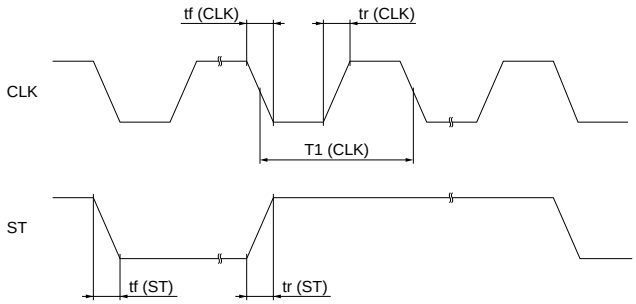
■ AD converter specifications (Ta=25 °C)

Parameter		Symbol	Specification	Unit
Digital output format		-	Serial output	-
Resolution *5	10-bit mode	RESO	10	bit
	8-bit mode		8	
Conversion voltage range *6		-	0 to 3.3	V

*5: Vsel=5 V (10-bit mode), 0 V (8-bit mode)

*6: Digital output is available from MSB as serial output.
10-bit mode: D9 to D0
8-bit mode: D7 to D0

■ Timing chart



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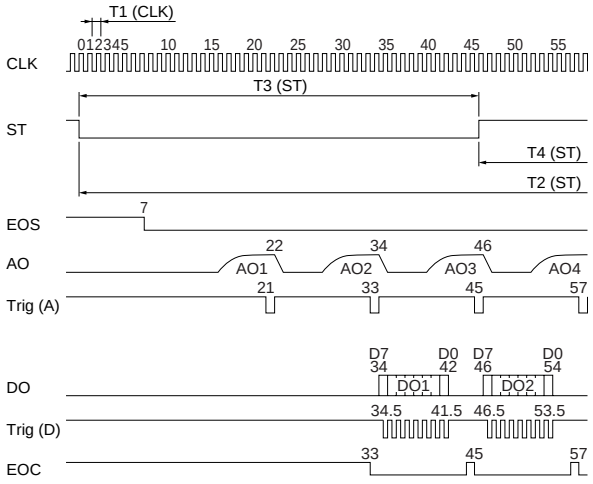
Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock pulse rise and fall time	tr (CLK), tf (CLK)	0	20	30	ns
Start pulse time cycle	T2 (ST)	12339	-	-	CLK
Start pulse low time	T3 (ST)	45	-	-	CLK
Start pulse high time *7	T4 (ST)	3600	-	-	CLK
Start pulse rise and fall time	tr (ST), tf (ST)	0	20	30	ns

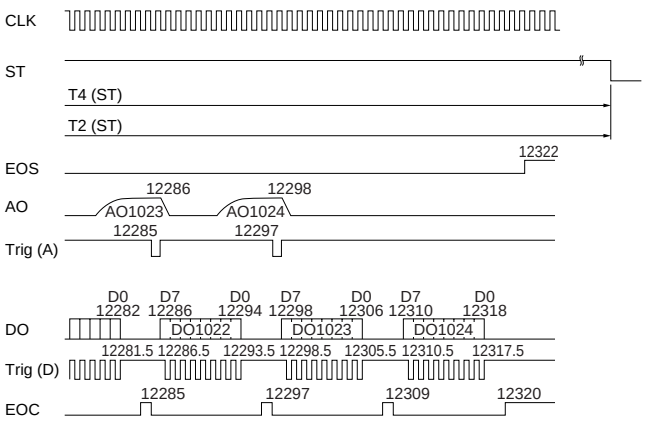
*7: Signal charge integration time equals the High period of start pulse + 7 CLK cycles.
The shift register operation starts at the rise of CLK pulse immediately after ST pulse sets to low.
Integration time can be changed by changing the High-to-Low ratio of ST pulses.

8-bit mode

● In the neighborhood of start pixel



● In the neighborhood of last pixel



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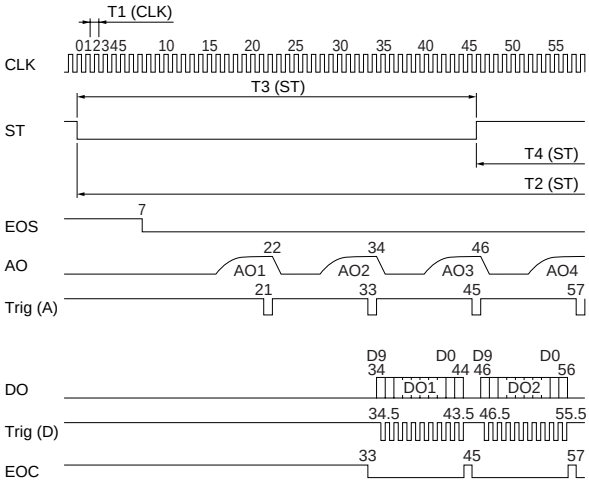
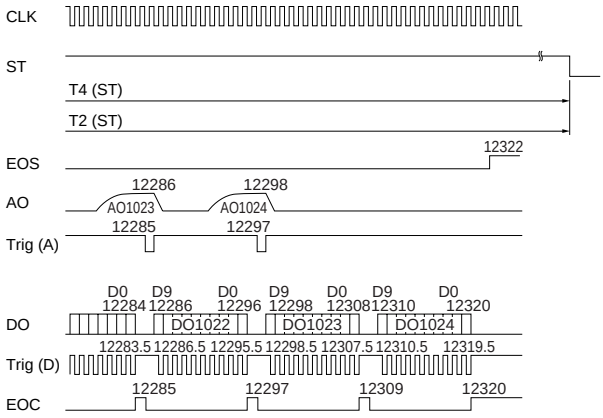
10-bit mode

● In the neighborhood of start pixel



● In the neighborhood of last pixel



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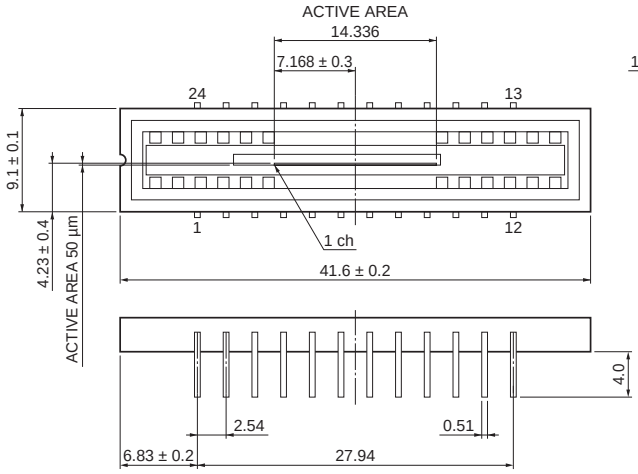
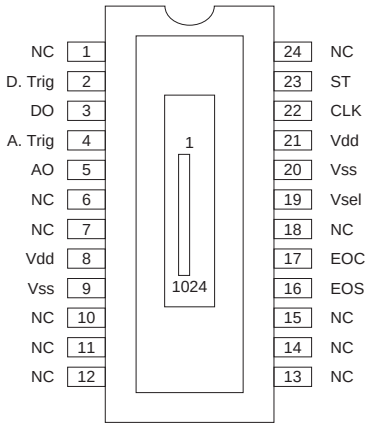
■ Dimensional outline (unit: mm, tolerance unless otherwise noted: ±0.1)



Package: LCP (Liquid Crystalline Polymer)

KMPDA0202EA

■ Pin connection



KMPDC0231EA

Pin No.	Symbol	Discription	Pin No.	Symbol	Discription
1	NC	No connection	13	NC	No connection
2	D. Trig	Trigger signal for digital output	14	NC	No connection
3	DO	Digital output	15	NC	No connection
4	A. Trig	Trigger signal for analog output	16	EOS	End of scan signal
5	AO	Analog output	17	EOC	Digital conversion end signal
6	NC	No connection	18	NC	No connection
7	NC	No connection	19	Vsel	AD mode selection voltage
8	Vdd	Supply voltage	20	Vss	GND
9	Vss	GND	21	Vdd	Supply voltage
10	NC	No connection	22	CLK	Clock signal
11	NC	No connection	23	ST	Start signal
12	NC	No connection	24	NC	No connection

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