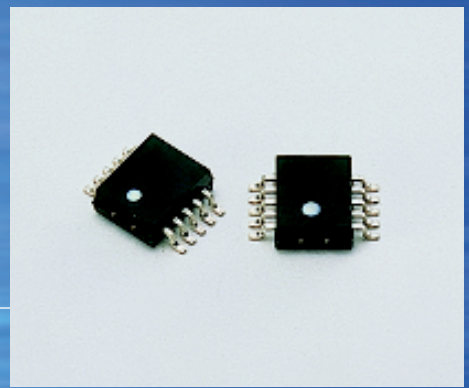


Photo IC for rangefinder S8040

Photo IC for far/near detection (with energy saving mode)



S8040 is a light modulation photo IC consisting of a dual photodiode and a control/processing circuit integrated on a single chip. When used with an infrared LED and light emitting/receiving lenses, S8040 detects the distance (near or far) to an object based on a prespecified distance by utilizing the triangular distance measurement method. S8040 can be operated in 2 modes: self-running mode and single trigger mode. Current consumption during standby (no distance detection) is held to 20 μA Max. Average current consumption is minimized by setting a longer measurement cycle.

Self-running mode: Operates with a measurement cycle proportional to the external capacitor value. (250 ms Typ. at 0.1 μF)

Single trigger mode: Detects the distance only when a trigger pulse is input to the TRIG terminal.

Features

- Detects distance (far/near) to object
- Energy saving operation
- Operation mode switching function
- Visible-cut plastic package impervious to background light
- Miniature plastic package

Applications

- Optical switch

■ Absolute maximum ratings (Ta=25 °C)

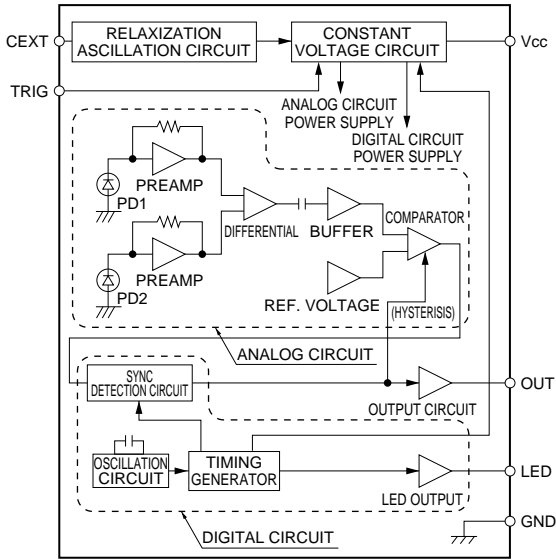
Parameter	Symbol	Value	Unit
Supply voltage	Vcc	-0.5 to +7.0	V
Output voltage	Vo	-0.5 to Vcc+0.5	V
Output current	Io	150	μA
External capacitor terminal voltage	VCEXT	-0.5 to Vcc+0.5	V
Trigger terminal voltage	VTRIG	-0.5 to Vcc+0.5	V
LED terminal voltage	VLED	-0.5 to Vcc+0.5	V
Power dissipation	P	250 *	mW
Operating temperature	Topr	-20 to +70	°C
Storage temperature	Tstg	-30 to +80	°C
Soldering	-	230 °C, 3 s	-

* Derate power dissipation at a rate of -3.3 mW/°C above Ta=25 °C

■ Electrical and optical characteristics (Ta=25 °C, Vcc=5 V, unless otherwise noted)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Peak sensitivity wavelength	λ_p		-	850	-	nm
Photo sensitivity	S	$\lambda=900$ nm	-	0.3	-	A/W
Supply voltage	Vcc		4	5	6	V
Current consumption during measurement	Icc		-	3	5	mA
Current consumption during standby	ISTB	No background light	-	-	20	μA
High level LED output voltage	VLEDH	Source 10 mA	1.2	1.4	1.6	V
Low level LED output voltage	VLEDL	LED terminal open	-	-	0.3	V
High level LED pulse width	Tw		4.6	7	10.5	μs
Measurement time	TS	Self-running, single trigger	69	105	158	μs
Measurement cycle	TB	Self-running, Cext=0.1 μF	150	250	350	ms
Threshold input differential current	ITH	No background light	2.5	5	10	nA
Allowable background light	Ex	Between channels < 500 lx	3000	-	-	lx
Low level output voltage	Vol	Sink 100 μA	-	-	0.2	V
High level output voltage	Voh	Source 100 μA	2.2	-	-	V

■ Block diagram



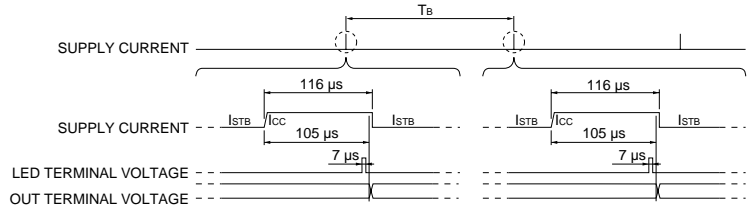
NOTE 1) Terminal polarity
 TRIG: Starts measurement at Low level
 LED: LED is driven at High level
 OUT: Changes to High level when signal is input

NOTE 2) CEXT and TRIG should be TTL input

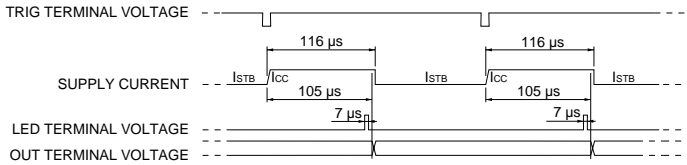
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■ Timing chart: consecutive measurements

① Self-running mode
 (Capacitor of 0.1 μF Typ. is connected between CEXT and GND. TRIG is fixed to High level.)



② Single trigger mode
 (CEXT is shorted to GND. Low level pulse with at least 20 μs width is applied to TRIG.)

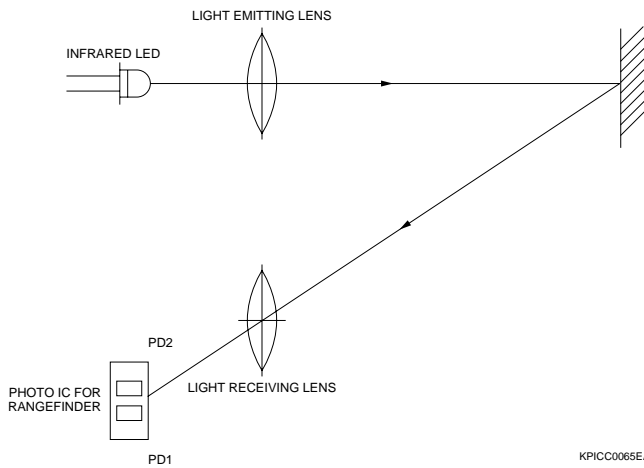


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■ Functions and optical systems

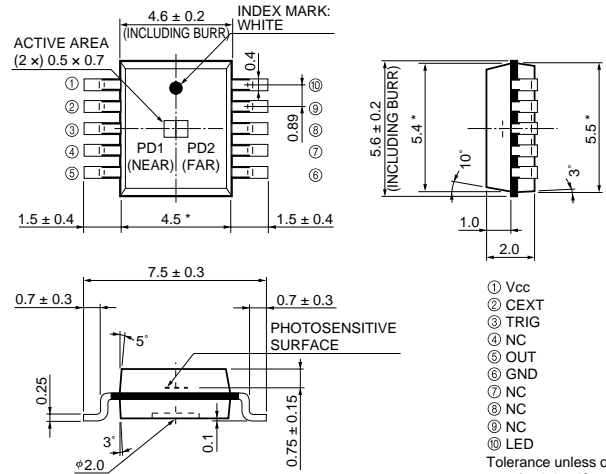
S8040 incorporates a dual photodiode (0.5 × 0.7 mm active area per channel) and a control/processing integrated circuit. When used with an infrared LED and light emitting/receiving lenses, S8040 detects the distance (near or far) to an object based on a prespecified distance by utilizing the triangular distance measurement method.

When making optical design, photodiode 2 of the dual photodiode in the photo IC for rangefinder must be set closer to the infrared LED as shown below.



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■ Dimensional outline (unit: mm)



- ① Vcc
 - ② CEXT
 - ③ TRIG
 - ④ NC
 - ⑤ OUT
 - ⑥ GND
 - ⑦ NC
 - ⑧ NC
 - ⑨ NC
 - ⑩ LED
- Tolerance unless otherwise noted: ±0.1, ±2
 Shaded area indicates burr.

Chip position accuracy with respect to the package dimensions marked *
 X, Y ≤ ±0.2, θ ≤ ±2°

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