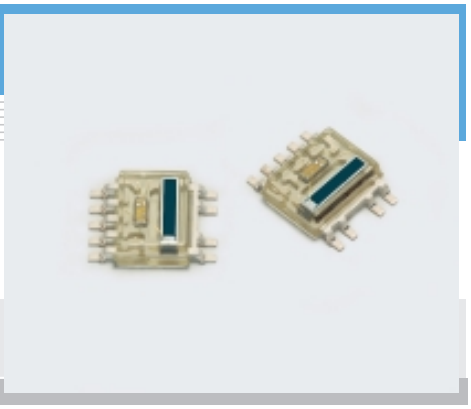
NEW

PHOTO IC

Photo IC for laser beam synchronous detection

S10317 series

Low voltage operation (3.3 V)



S10317 series photo IC uses a high-speed PIN photodiode designed for laser beam synchronous detection. S10317 series is driven by a low voltage (3.3 V) compatible with low voltage peripheral components that will be mounted on the same PC board. Two types of current amplifiers are available with a gain of 6 times (S10317-01) and 20 times (S10317) that can be selected according to laser power to be used. Tape-and-reel shipment is also available (S10317-30 and S10317-31).

Features

- Low voltage operation (3.3 V)
- High sensitivity
  Current amplifier gain: 20 times (S10317)
  6 times (S10317-01)
- Digital output
- Small package
- Suitable for lead-free solder reflow
- Active area: 2.84 × 0.5 mm

Applications

- Print start timing detection for laser printers, digital copiers, fax machines, etc.

■ Absolute maximum ratings (Ta=25 °C, unless otherwise noted)

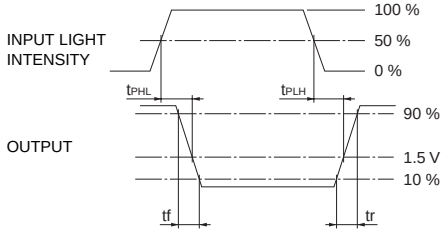
Parameter	Symbol	Value	Unit
Supply voltage	Vcc	-0.5 to +7	V
Power dissipation *1	P	300	mW
Output voltage *2	Vo	-0.5 to +7	V
Output current	Io	5	mA
Ro terminal current	I_{RO}	3	mA
Operating temperature	Topr	-25 to +80	°C
Storage temperature	Tstg	-40 to +85	°C

*1: Power dissipation decreases at a rate of 4 mW/°C above Ta=25 °C.
*2: Vcc=+0.5 V or less

■ Electrical and optical characteristics (Ta=25 °C, λ=780 nm, Vcc=3.3 V, Ro=5.1 kΩ, unless otherwise noted)

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit
Current consumption		Icc	No input	-	0.7	1.5	mA
High level output voltage		V_{OH}	I_{OH}=4 mA	2.9	-	-	V
Low level output voltage		V_{OL}	I_{OL}=4 mA *3	-	-	0.3	V
Threshold input power	S10317	P_{TH}		14	19	24	μW
	S10317-01			49.5	62	74.5	
H→L propagation delay time	S10317	t_{PHL}	P_I=57 μW (S10317) P_I=186 μW (S10317-01) Duty ratio 1:1 C_L=15 pF *4	-	130	250	ns
	S10317-01			-	100	200	
L→H propagation delay time	S10317	t_{PLH}		-	200	300	
	S10317-01			-	150	250	
Rise time		tr		-	4	7	ns
Fall time		tf		-	4	7	ns
Maximum input power		P_I Max.		-	-	P_{TH} × 8	μW

*3: Input power [P_I]=57 μW (S10317), P_I=186 μW (S10317-01)

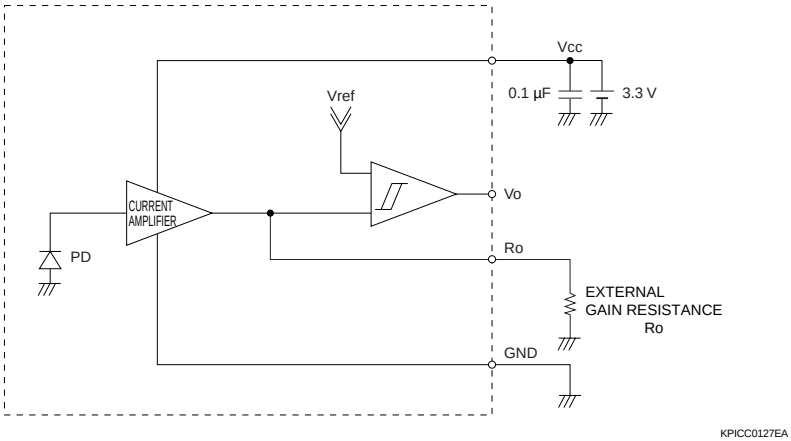


KPICC0112EA

PRELIMINARY DATA
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SOLID STATE DIVISION

■ Block diagram



■ Function

S10317 series photo IC integrates a photodiode chip and an IC chip into the same package. The photodiode chip is internally connected to the IC chip as shown in the block diagram. S10317 series should be used with terminal Ro connected to an external gain resistance Ro.

A photocurrent is generated when a laser beam enters the photodiode. This photocurrent is fed to the input terminal of the IC and, after being amplified by the current amplifier, flows to the external gain resistance. At this time, voltages V_{RO} at terminal Ro is given by the following expression.

$V_{RO}=A \times S \times P_I \times Ro$ [V] ····· (1)

A: Current amplifier gain (S10317: 20 times, S10317-01: 6 times)

S: Photodiode sensitivity [A/W] (approx. 0.44 A/W at 780 nm)

P_I: Input power [W]

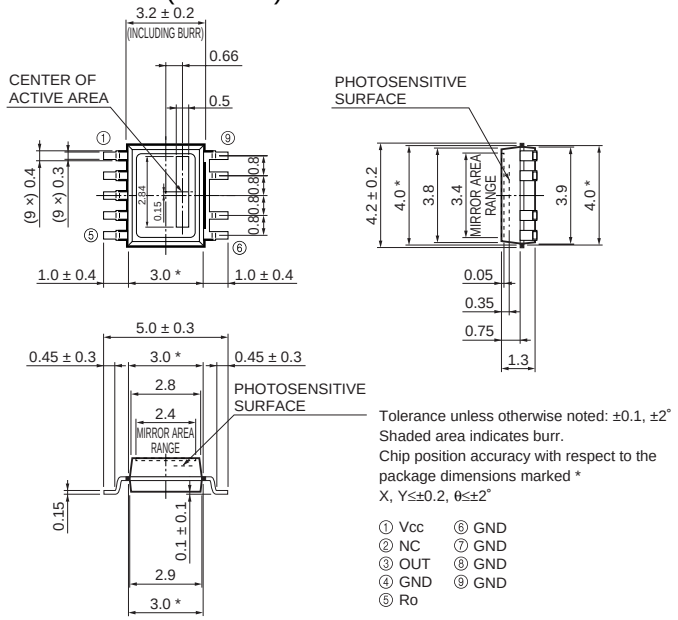
Ro: External gain resistance [Ω]; usable range 2 kΩ to 10 kΩ

V_{RO} is input to the internal comparator and compared with the internal reference voltage Vref (approx. 0.8 V) so the output Vo is "High" when V_{RO} < Vref or "Low" when V_{RO} > Vref.

In equatin (1), set the Ro value so that V_{RO} is 2 to 3 V.

(Monitoring V_{RO} shows that it is limited to about 2 V (with respect to GND) by the voltage limiting circuit. Keep this in mind when monitoring.)

■ Dimensional outline (unit: mm)



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