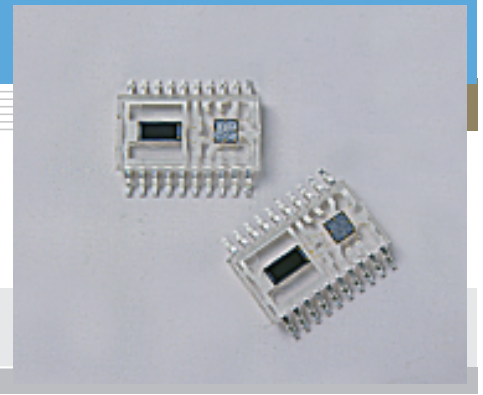


Photo IC for laser beam synchronous detection

S7858

Photo IC with switchable internal amplifier gain



S7858 uses a dual-element PIN photodiode and compares the two photocurrent signals to maintain a highly stable output even when input laser power or ambient temperature fluctuates. The internal amplifier gain is switchable with changes in the input laser power.

Features

- Switchable gain function (6 or 20)
- Photo IC for fast printing
- High sensitivity
- Stable output versus laser power or temperature variations

Applications

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

■ Absolute maximum ratings (Ta=25 °C, Vcc1=Vcc2=Vcc)

| Parameter | Symbol | Value | Unit |
|---------------------------|--------|------------------|------|
| Supply voltage | Vcc | -0.5 to +7 | V |
| Power dissipation *1 | P | 150 | mW |
| External input voltage | Vext | -0.5 to +Vcc+0.5 | V |
| Output voltage | Vo | -0.5 to Vcc | V |
| Output current | Io | 20 | mA |
| Ro1, Ro2 terminal current | IRO | 5 | mA |
| Operating temperature | Topr | -25 to +80 | °C |
| Storage temperature | Tstg | -40 to +85 | °C |
| Soldering | - | 230 °C, 5 s | - |

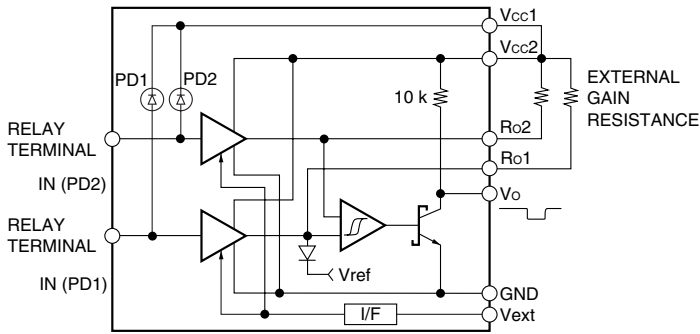
*1: Derate power dissipation at a rate of -2 mW/°C above Ta=25 °C.

■ Electrical and optical characteristics (Ta=25 °C, λ=780 nm, Vcc1=Vcc2=Vcc=5 V, Ro1=Ro2=5.1 kΩ, unless otherwise noted)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--------------------------------|--------|--|------|------|------|------|
| High level output voltage | VOH | PI=0 | 4.9 | - | - | V |
| Low level output voltage | VOL | PI=140 μW, at Vext=L PI=40 μW, at Vext=H IOL=10 mA | - | 0.4 | 0.6 | V |
| High level current consumption | ICCH | PI=0 | - | 4 | 7 | mA |
| Low level current consumption | ICCL | PI=140 μW, at Vext=L PI=40 μW, at Vext=H | - | 6 | 9 | mA |
| Threshold input power 1 | PTH | Vext=L | 25 | 35 | 45 | μW |
| Threshold input power 2 | PTH | Vext=H | 7 | 10 | 13 | μW |
| H→L propagation delay time | ΔtPHL | PI=200 μW center, at Vext=L PI=60 μW center, at Vext=H Δ PI=±10 % *2 | - | - | ±10 | ns |
| Rise time | tr | RL=510 Ω, CL=15 pF | - | 60 | 180 | ns |
| Fall time | tf | | - | 20 | 100 | ns |

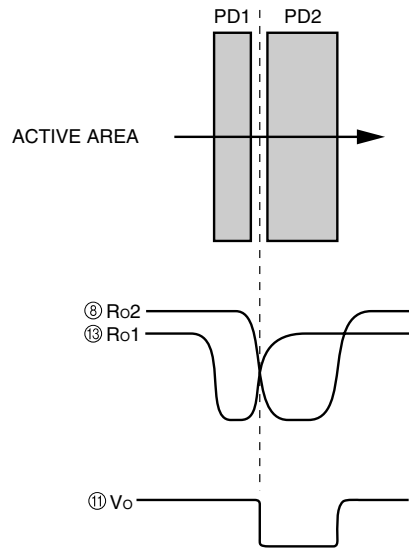
*2: Beam diameter φ (1/e²)=100 μm, scan speed=0.5 mm/μs
Not including jitter caused by polygon mirror non-uniformity, etc.

■ Equivalent circuit



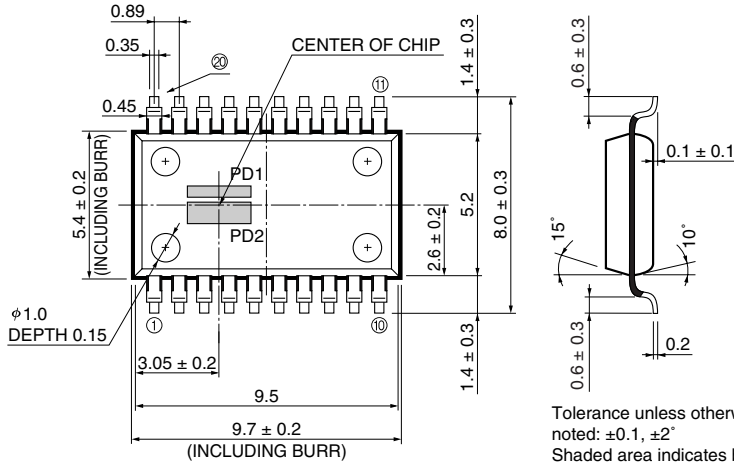
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■ Output waveforms of terminal 8, 11 and 13

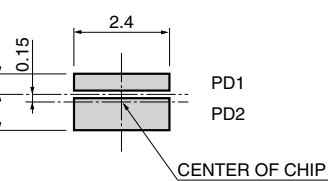
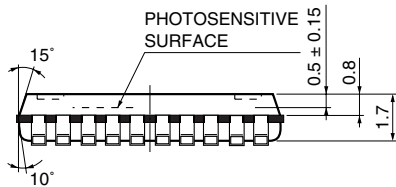


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■ Dimensional outline (unit: mm)



Tolerance unless otherwise noted: ± 0.1 , $\pm 2^\circ$
Shaded area indicates burr.



DETAILS OF PHOTODIODE

Tolerance unless otherwise noted: ± 0.03

| | |
|---|------------|
| ① | |
| ② | |
| ③ | Vcc1 |
| ④ | |
| ⑤ | |
| ⑥ | [IN (PD2)] |
| ⑦ | (GND) |
| ⑧ | Ro2 |
| ⑨ | Vext |
| ⑩ | GND |
| ⑪ | Vo |
| ⑫ | (GND) |
| ⑬ | Ro1 |
| ⑭ | Vcc2 |
| ⑮ | [IN (PD1)] |
| ⑯ | |
| ⑰ | |
| ⑱ | Vcc1 |
| ⑲ | |
| ⑳ | |
| ㉑ | |

Pins ⑦ and ⑫ should be connected to Pin ⑩ on the PC board.

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■ Gain switchable terminal logic

| Vext TTL input | Built-in gain |
|----------------|---------------|
| L | 6 times |
| H | 20 times |
| Open | 6 times |