

IS1682

OPIC Light Detector

OPIC Light Detector for X40 Speed CD-ROM Drive

General Description

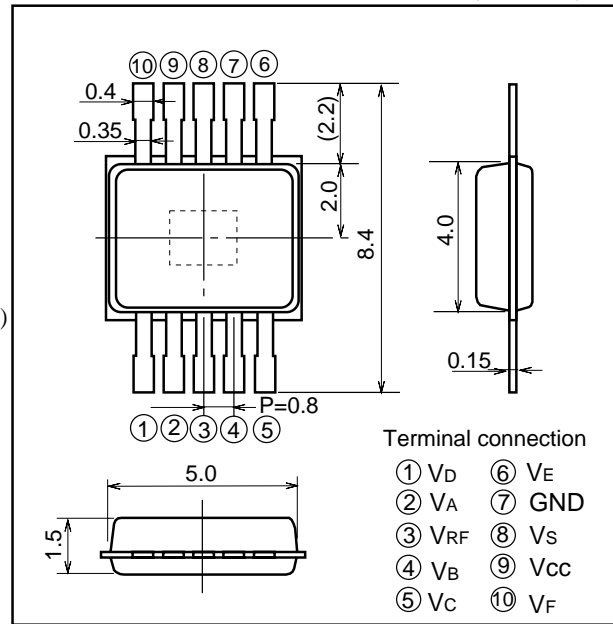
Sharp's **IS1682** is OPIC light detectors which are used for pick-up in X40 speed CD-ROM drive. They improve noise resistance characteristics and enable to read low reflective CD-RW due to built-in RF amp.

Features

- (1) High speed response (Response frequency: MIN. 45MHz)
(Best suited for optical pick-up in X40 speed CD-ROM drive)
- (2) With built-in RF amplifier
(Integrates 6-division PIN photodiode and amplifier circuit onto a single chip)
- (3) Compact and thin package
(Dimensions: 5.0 x 4.0 x 1.5mm)
- (4) Possible to supply custom-made detecting pattern
- (5) Pair use with Sharp's laser diode is recommended.
Laser diode : 780 nm / 5 mW (LT022 series)
770 to 795 nm / 60 mW (LT041NS)

Outline Dimensions

(Unit: mm)



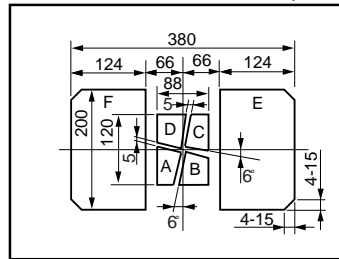
* "OPIC" (Optical IC) is a trademark of the SHARP Corporation. An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a single chip.

Applications

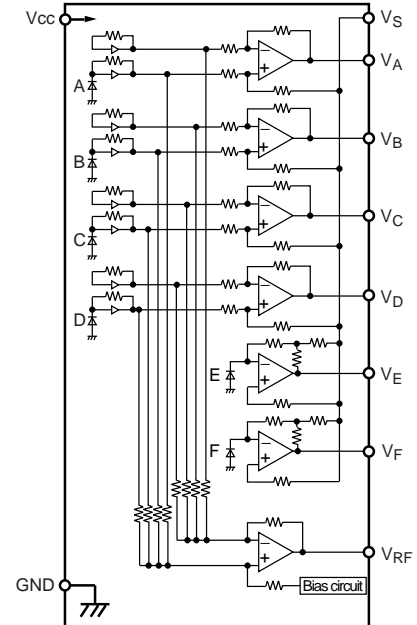
- (1) CD-ROM drive (to 40X speed)
- (2) CD-ROM drive for CD-RW

Detecting Pattern of Photodiode

Unit: μm



Internal Block Diagram



Absolute Maximum Ratings

(T_a=25°C)

| Parameter | Symbol | Rating | Unit |
|--------------------------|------------------|-----------------|------|
| Supply voltage | V _{CC} | 6.0 | V |
| *1 Output voltage | V _O | V _{CC} | V |
| Operating temperature | T _{opr} | -30 to +80 | °C |
| Storage temperature | T _{stg} | -40 to +100 | °C |
| *2 Soldering temperature | T _{sol} | 260 | °C |

*1 Applies to V_A to V_F, V_{RF}

*2 For MAX.3s at the position of 1.0mm from the resin edge.

(Notice) • In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.
• Specifications are subject to change without notice for improvement.

(Internet) • Data for Sharp's optoelectronic/power devices is provided on internet. (Address <http://www.sharp.co.jp/ecg/>)

■ Recommended Operating Conditions

(Ta=25°C)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|----------------------------|--------|------|------|------|------|
| Operating supply voltage | Vcc | 4.75 | 5.0 | 5.25 | V |
| Operating supply voltage 1 | Vs | 2.0 | 2.1 | 2.2 | V |
| Operating supply voltage 2 | Vs | 2.4 | 2.5 | 2.6 | V |

■ Electrical Characteristics 1

(Ta=25°C, Vcc=5V, Vs=2.1V, RL=10kΩ [V_{RF} terminal : RL=0 Ω] CL= 10 pF)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit | Applications |
|-----------------------------|--------|---|------|------|------|------|--------------|
| Supply current | Icc | – | 8.8 | 14.8 | 20 | mA | Vcc |
| Output off-set voltage 1 | Vod1 | Specified by voltage difference from Vs | -25 | 0 | +25 | mV | VA to VD |
| Output off-set voltage 2 | Vod2 | Specified by voltage difference from Vs | -15 | 0 | +15 | mV | VE, VF |
| Output off-set voltage 3 | Vod3 | Referred to GND | 1.25 | 1.4 | 1.55 | V | VRF |
| Extremes of off-set voltage | ΔVod | A - B | -20 | 0 | +20 | mV | VA, VB |
| | | C - D | -20 | 0 | +20 | | VC, VD |
| | | (A+C) - (B+D) | -20 | 0 | +20 | | VA to VD |
| | | E - F | -15 | 0 | +15 | | VE, VF |
| | | A+B+C+D | -40 | +5 | +50 | | VA to VD |

(Ta=25°C, Vcc=5V, Vs=2.5V, RL=10kΩ [V_{RF} terminal : RL=0 Ω] CL= 10 pF)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit | Applications |
|-----------------------------|--------|---|------|------|------|------|--------------|
| Output off-set voltage 4 | Vod1 | Specified by voltage difference from Vs | -25 | +2 | +28 | mV | VA to VD |
| Output off-set voltage 5 | Vod2 | Specified by voltage difference from Vs | -16 | 0 | +16 | mV | VE, VF |
| Output off-set voltage 6 | Vod3 | Referred to GND | 1.25 | 1.4 | 1.55 | V | VRF |
| Extremes of off-set voltage | ΔVod | (A+C) - (B+D) | -22 | 0 | +22 | mV | VA to VD |
| | | E - F | -15 | 0 | +15 | | VE, VF |
| | | A+B+C+D | -40 | +13 | +62 | | VA to VD |

■ Electrical Characteristics 2

(Ta=25°C, Vcc=5V, Vs=2.1V, RL=10kΩ [V_{RF} terminal : RL=0 Ω] CL= 10 pF)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit | Applications |
|--------------------------------|---------|-------------------------------------|------|------|------|-------|--------------|
| *3*4 Sensitivity 1 | RP1 | - | 18.0 | 24.6 | 31.2 | mV/μW | VA to VD |
| *3*4 Sensitivity 2 | RP2 | - | 31.2 | 44.7 | 58.1 | mV/μW | VE, VF |
| *3*4 Sensitivity 3 | RP3 | - | 30.2 | 43.2 | 56.1 | mV/μW | VRF |
| *5 Extreme of sensitivity | ΔRP | - | - | - | 10 | % | - |
| Sensitivity ratio 1 | RP2/RP1 | - | - | 1.81 | - | - | - |
| Sensitivity ratio 2 | RP3/RP1 | - | 1.67 | 1.76 | 1.84 | - | - |
| *4*6 Response frequency 1 | fc1 | -3dB | 34 | 65 | - | MHz | VA to VF |
| *4*6 Response frequency 2 | fc2 | -3dB | 55 | 75 | - | MHz | VRF |
| *4*6 Response frequency 3 | fc3 | -3dB | 1 | 5 | - | MHz | VE, VF |
| *4*6 Response frequency 4 | fc4 | Average of VA to VD | 45 | 65 | - | MHz | VA to VD |
| *4 High level output voltage 1 | VOH1 | - | 3.8 | - | - | V | VA to VD |
| *4 High level output voltage 2 | VOH2 | - | 3.8 | - | - | V | VRF |
| *4 Response sensitivity 1 | ΔRp1 | 1 MHz to 23.1 MHz | -1.0 | +1.0 | +2.0 | dB | VA to VF |
| *4 Response sensitivity 2 | ΔRp2 | 1 MHz to 23.1 MHz | -1.0 | +1.0 | +2.0 | dB | VRF |
| *4*7 Group delay deviation 1 | tgD1 | Average of f=1 to 23.1MHz, VA to VD | - | 2.5 | 6 | ns | VA to VD |
| *4*7 Group delay deviation 2 | tgD2 | f=1 to 23.1MHz | - | 2.5 | 6 | ns | VRF |
| Output noise level 1 | Vn1 | f=23.1MHz, BW=30kHz | - | -81 | -76 | dBm | VA to VD |
| Output noise level 2 | Vn2 | f=23.1MHz, BW=30kHz | - | -70 | -65 | dBm | VRF |

*3 10μW, φ30μm of DC light is applied to the center of each photodiode.

Under that condition, sensitivity R is shown by following formula.

$$R = (V_p - V_{od}) / 5\mu W$$

*4 Light source : laser diode of λ=780nm

*5 Extreme of sensitivity is shown by following formula.

$$2 \times (R_{p1max} - R_{p1min}) / (R_{p1max} + R_{p1min}) \times 100$$

$$2 \times (R_{p2max} - R_{p2min}) / (R_{p2max} + R_{p2min}) \times 100$$

*6 Frequency sensitivity is -3dB. (reference sensitivity : value at f= 1 MHz)

*7 In addition to 10μW, φ30μm DC light, 4μWp-p AC light is applied to the center of each photodiode. BW=10kHz