

## FEATURES

- Factory set trigger point: 15°
- Digital Output
- Range: 4 to 30 cm
- Typical response time: 39 ms
- Typical start up delay: 46 ms
- Average current consumption: 33 mA

## DESCRIPTION

The GP2D150A is a distance measuring sensor with digital output.

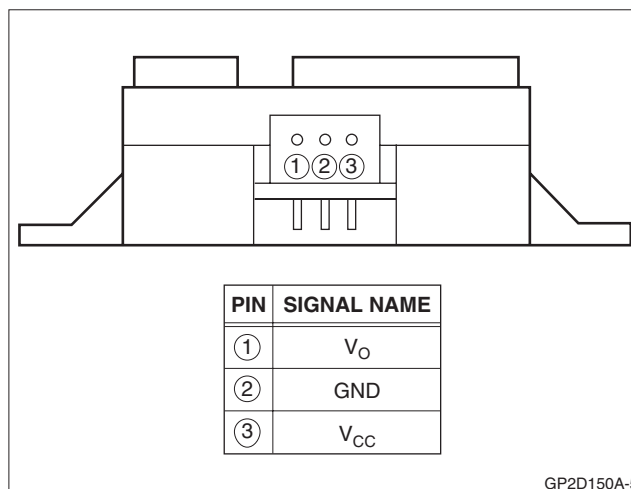


Figure 1. Pinout

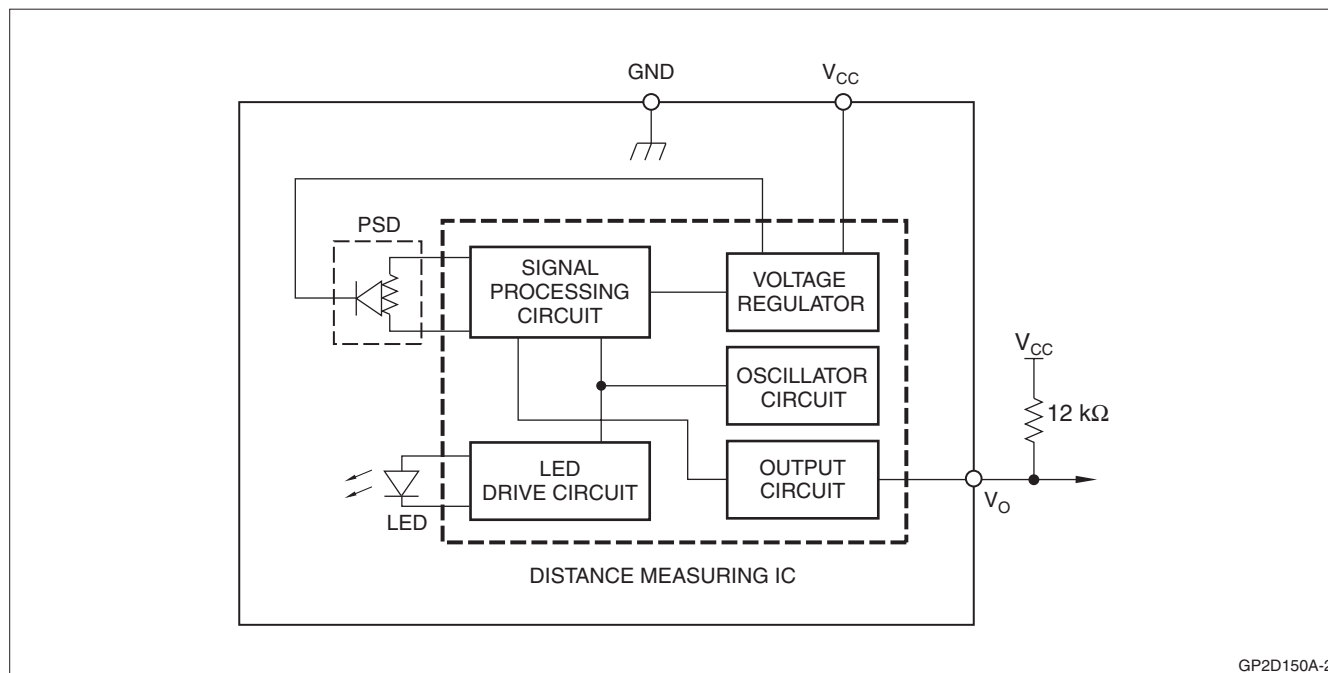


Figure 2. Block Diagram

## ELECTRICAL SPECIFICATIONS

### Absolute Maximum Ratings

$T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{ VDC}$

| PARAMETER               | SYMBOL    | RATING                     | UNIT             | REMARKS               |
|-------------------------|-----------|----------------------------|------------------|-----------------------|
| Supply Voltage          | $V_{CC}$  | -0.3 to +7.0               | V                |                       |
| Output Terminal Voltage | $V_O$     | -0.3 to ( $V_{CC} + 0.3$ ) | V                | Open collector output |
| Operating Temperature   | $T_{opr}$ | -10 to +60                 | $^\circ\text{C}$ |                       |
| Storage Temperature     | $T_{stg}$ | -40 to +70                 | $^\circ\text{C}$ |                       |

### Operating Supply Voltage

| PARAMETER                | SYMBOL   | RATING     | UNIT |
|--------------------------|----------|------------|------|
| Operating Supply Voltage | $V_{CC}$ | 4.5 to 5.5 | V    |

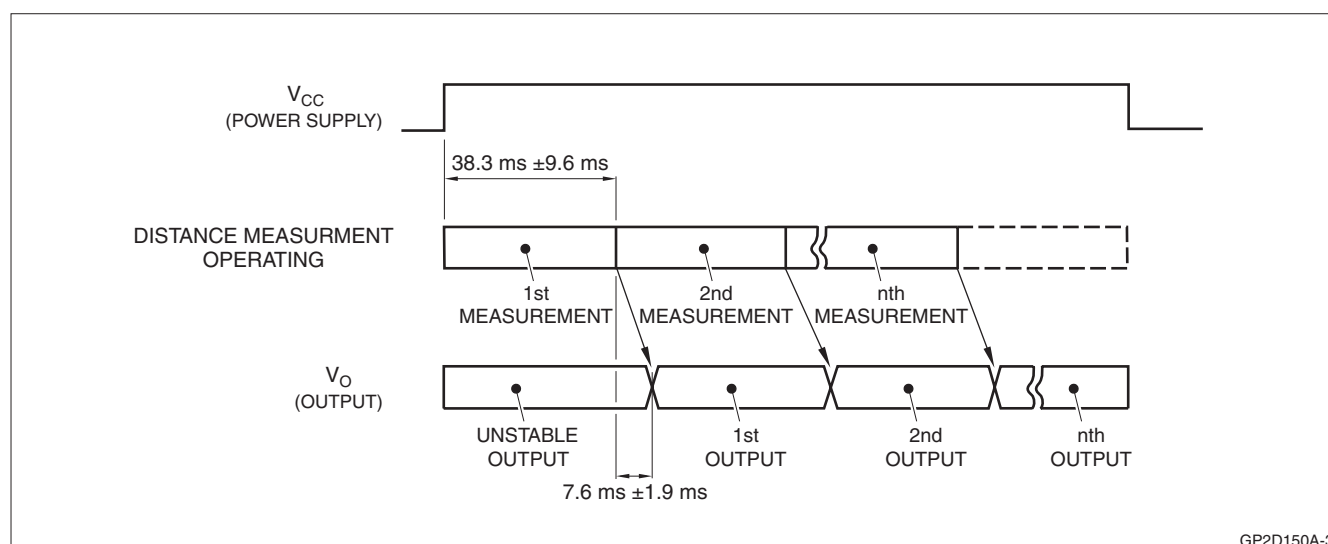
### Electro-optical Characteristics

$T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{ VDC}$

| PARAMETER                       | SYMBOL     | CONDITIONS                   | MIN.           | TYP. | MAX. | UNIT | NOTES   |
|---------------------------------|------------|------------------------------|----------------|------|------|------|---------|
| Measuring Distance Range        | $\Delta L$ |                              | 3              | —    | 30   | cm   | 1, 3    |
| Output Terminal Voltage         | $V_{OH}$   | Output voltage at high level | $V_{CC} - 0.3$ | —    | —    | V    | 1       |
|                                 | $V_{OL}$   | Output voltage at low level  | —              | —    | 0.6  | V    | 1       |
| Output Distance Characteristics | $V_O$      |                              | 12.5           | 15   | 17.5 | cm   | 1, 2, 4 |
| Average Supply Current          | $I_{CC}$   |                              | —              | 33   | 50   | mA   |         |

#### NOTES:

- Measurements made with Kodak R-27 Gray Card, using the white side, (90% reflectivity).
- Each device is factory set for output switching at  $L = 15\text{ cm} \pm 2.5\text{ cm}$ .
- Distance measuring range of the sensor optics.
- Output switching has hysteresis. The distance specified by  $V_O$  is the distance at which the output switches from LOW to HIGH.
- $L$  = Distance to reflective object.



GP2D150A-3

Figure 3. Timing Diagram

## REALIABILITY

The reliability of requirements of this device are listed in Table 1.

**Table 1. Reliability**

| TEST ITEMS                                 | TEST CONDITIONS                                                                    | FAILURE JUDGEMENT CRITERIA                                      | SAMPLES (n), DEFECTIVE (C) |
|--------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------|
| Temperature Cycling                        | One cycle -40°C (30 min.) to +70°C in 30 minutes, repeated 25 times                | Initial $\times 0.8 > V_O$<br>$V_O > \text{Initial} \times 1.2$ | n = 11, C = 0              |
| High Temperature and High Humidity Storage | +40°C, 90% RH, 500h                                                                |                                                                 | n = 11, C = 0              |
| High Temperature Storage                   | +70°C, 500h                                                                        |                                                                 | n = 11, C = 0              |
| Low Temperature Storage                    | -40°C, 500h                                                                        |                                                                 | n = 11, C = 0              |
| Operational Life (High Temperature)        | +60°C, $V_{CC} = 5\text{ V}$ , 500h                                                |                                                                 | n = 11, C = 0              |
| Mechanical Shock                           | 100 m/s <sup>2</sup> , 6.0 ms<br>3 times/ $\pm X$ , $\pm Y$ , $\pm Z$ direction    |                                                                 | n = 6, C = 0               |
| Variable Frequency Vibration               | 10-to-55-to-10 Hz in 1 minute<br>Amplitude: 1.5 mm<br>2h in each X, Y, Z direction |                                                                 | n = 6, C = 0               |

### NOTES:

1. Test conditions are according to Electro-optical Characteristics, shown on page 2.
2. At completion of the test, allow device to remain at nominal room temperature and humidity (non-condensing) for two hours.
3. Confidence level: 90%, Lot Tolerance Percent Defect (LTPD): 20%/40%.

## INCOMING INSPECTION

### Inspection Lot

Inspection shall be carried out per each delivery lot.

### Inspection Method

A single sampling plan, normal inspection level II based on ISO 2859 shall be adopted.

**Table 2. Quality Level**

| DEFECT       | INSPECTION ITEM/TEST METHOD                                              | AQL (%) |
|--------------|--------------------------------------------------------------------------|---------|
| Major Defect | Electro-optical characteristics defect                                   | 0.4     |
| Minor Defect | Defect to appearance or dimensions (crack, split, chip, scratch, stain)* | 1.0     |

**NOTE:** Any one of these that affects the Electro-optical Characteristics shall be considered a defect.

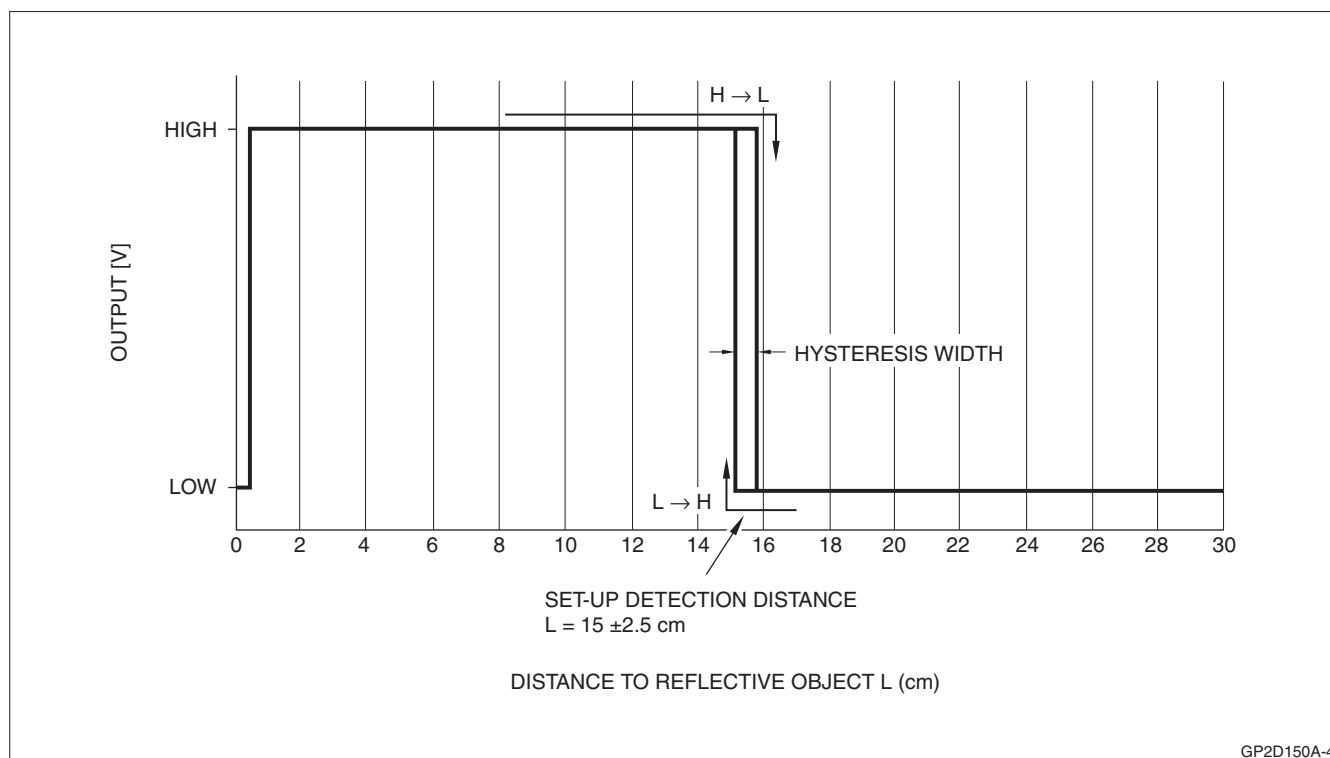
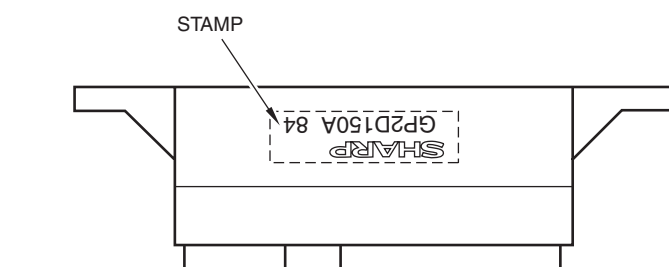


Figure 4. GP2D150A Example of Output Distance Characteristics

## PACKAGE SPECIFICATIONS



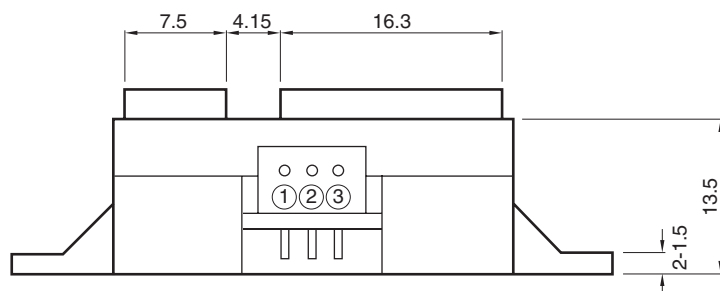
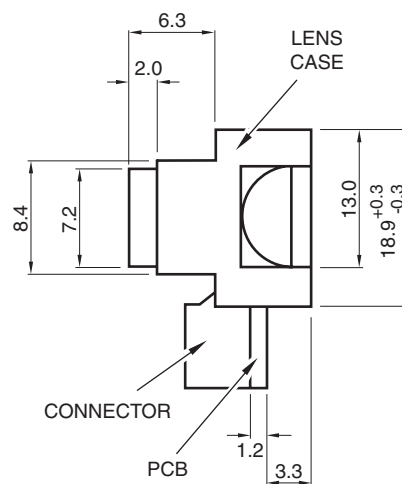
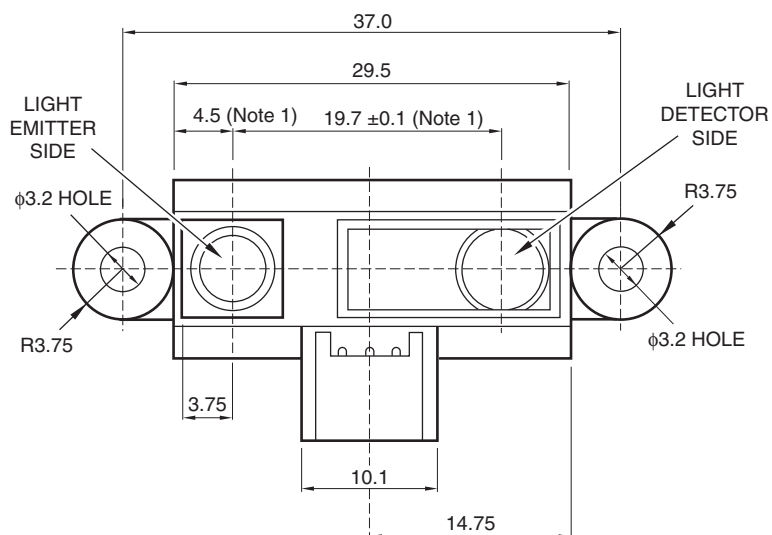
## STAMP EXAMPLE

GP2D150A 5 3

Month (1 to 9, X, Y, Z)

Year (2005 = 5)

Model Name



## MATERIAL

Lens: Acrylic acid resin  
(Visible light cut-off resin)

Case: Carbonic ABS  
(Electro-conductive resin)

PCB: Paper phenol

## CONNECTOR SIGNAL

| PIN | SIGNAL NAME     |
|-----|-----------------|
| ①   | V <sub>O</sub>  |
| ②   | GND             |
| ③   | V <sub>CC</sub> |

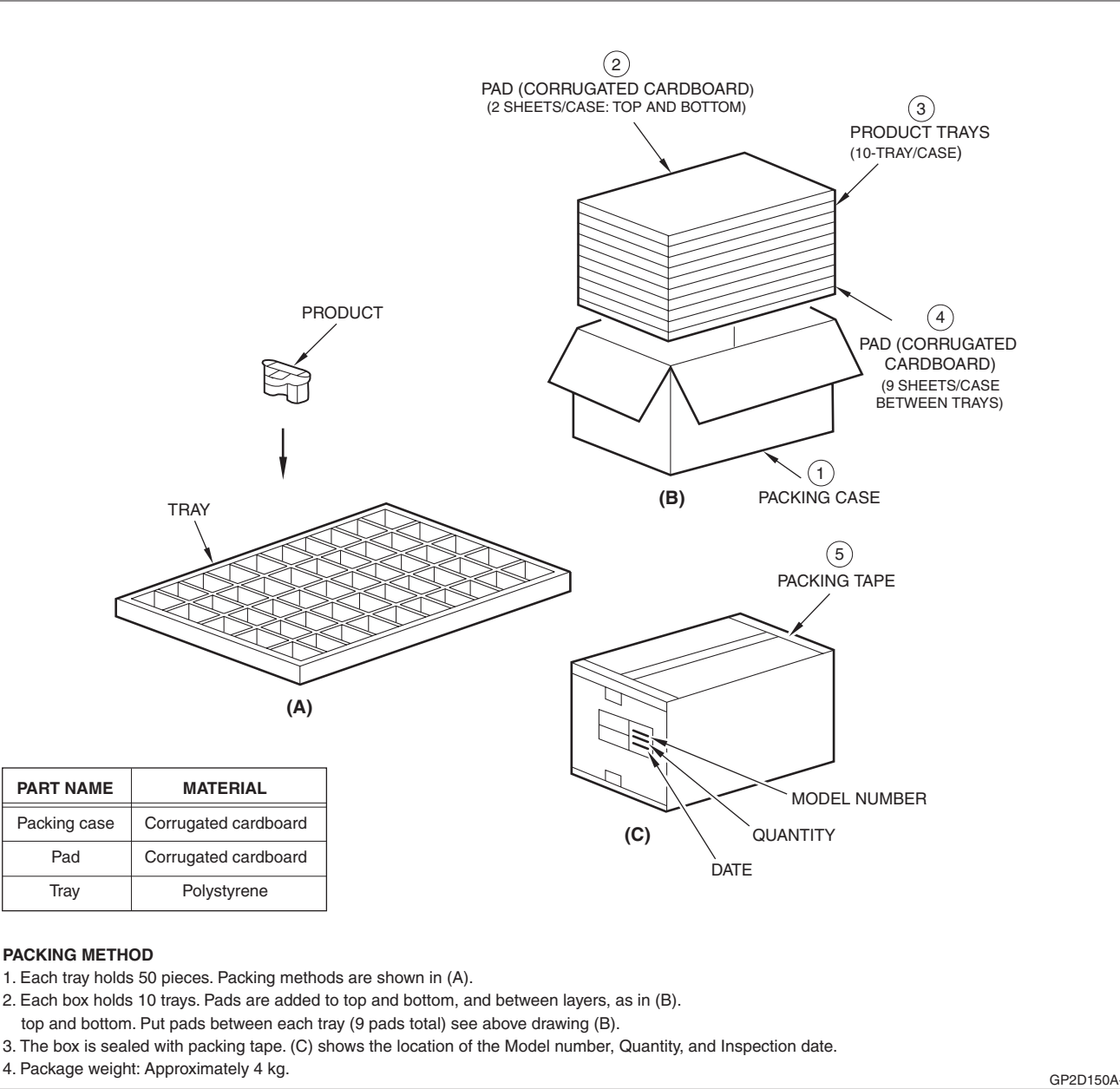
Connector: J.S.T. Trading Company, LTD  
S3B-PH

## NOTES:

1. Dimensions reference lens center.
2. Unspecified tolerances are  $\pm 0.3$  mm.
3. Dimensions are in mm.

GP2D150A-1

PACKING SPECIFICATION



GP2D150A-8

## NOTES

- Keep the sensor lens clean. Dust, water, oil, and other contaminants can deteriorate the characteristics of this device. Applications should be designed to eliminate sources of lens contamination.
- When using a protective cover over the emitter and detector, ensure the cover efficiently transmits light throughout the wavelength range of the LED ( $\lambda = 850 \text{ nm} \pm 70 \text{ nm}$ ). Both sides of the protective cover should be highly polished. Use of a protective cover may decrease the effective distance over which the sensor operates. Ensure that any cover does not negatively affect the operation over the intended application range.
- Objects in proximity to the sensor may cause reflections that can affect the operation of the sensor.
- Sources of high ambient light (the sun or strong artificial light) may affect measurement. For best results, the application should be designed to prevent interference from direct sunlight or artificial light.
- Using the sensor with a mirror can induce measurement errors. Often, changing the incident angle on the mirror can correct this problem.
- If a prominent boundary line exists in the surface being measured, it should be aligned vertically to avoid measurement error. See Figure 5 for further details.
- When measuring the distance to objects in motion, align the sensor so that the motion is in the horizontal direction instead of vertical. Figure 6 illustrates the preferred alignment.
- A 10  $\mu\text{F}$  (or larger) bypass capacitor between  $V_{CC}$  and GND near the sensor is recommended.
- To clean the sensor, use a dry cloth. Use of any liquid to clean the device may result in decreased sensitivity or complete failure.
- Excessive mechanical stress can damage the internal sensor or lens.

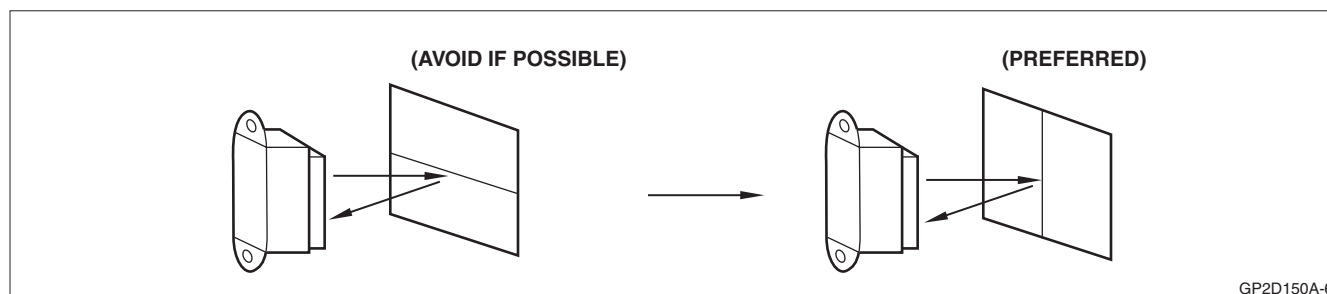


Figure 5. Proper Alignment to Surface Being Measured

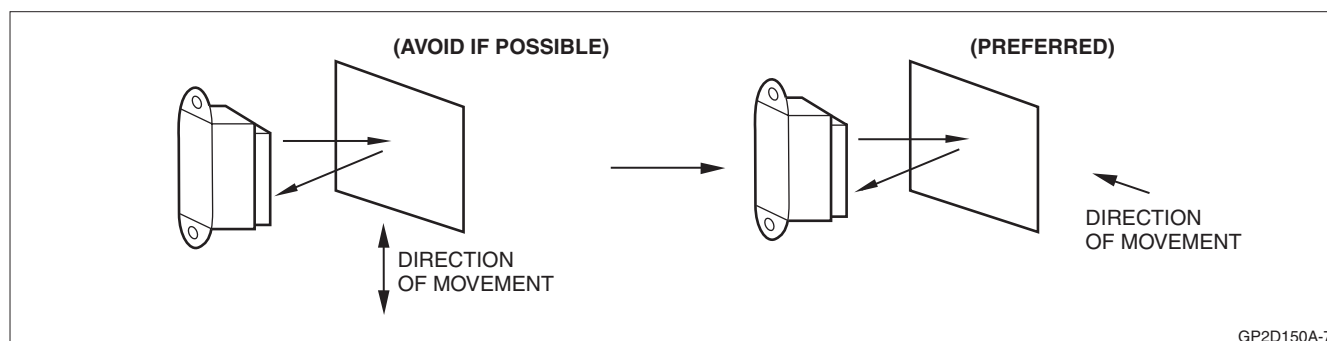


Figure 6. Proper Alignment to Moving Surfaces

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22-22 NAGAIKE-CHO, ABENO-KU, OSAKA 545-8522, JAPAN

PHONE: (81) 6-6621-1221

FAX: (81) 6117-725300, 6117-725301, 6117-725302

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## Countries and Areas

### U.S.A.

#### SHARP MICROELECTRONICS OF THE AMERICAS

##### North American Head Office

5700 North West Pacific Rim Boulevard

Camas, Washington 98607 USA

PHONE: (1)360-834-2500

FAX: (1)360-834-8903

<http://www.sharpsma.com>

##### Western Area

1980 Zanker Road, San Jose, CA 95112

PHONE: (1)408-436-4900

FAX: (1)408-436-0924

5901 Bolsa Ave.

Huntington Beach, CA 92647-2053

PHONE: (1)714-903-4600

FAX: (1)714-903-0295

6390 Greenwich Drive, Suite 175

San Diego, CA 92122

PHONE: (1)858-597-0982

FAX: (1)858-597-8701

##### Central Area

85 W. Algonquin Road, Suite 280

Arlington Heights, IL 60005

PHONE: (1)847-258-2750

FAX: (1)847-439-2479

6303 Commerce Drive, Suite 175 Irving, TX 75063

PHONE: (1)972-582-1710

FAX: (1)972-580-7537

8911 Capitol of Texas Hwy. Suite 3130

Austin, TX 78759

PHONE: (1)512-349-7262

FAX: (1)512-349-7002

20333 State Hwy. 249, Suite 200 Houston, TX 77070

PHONE: (1)281-378-1520

FAX: (1)281-378-1521

W129 S 9647 Tony Lema Lane Muskego, WI 53150

PHONE: (1)414-529-9568

FAX: (1)414-529-9569

3001 West Big Beaver Road, Suite 722

Troy, MI 48064

PHONE: (1)248-458-1527

FAX: (1)248-458-6255

##### Eastern Area

1070 N. Kimbles Road, Yardley, PA 19067

PHONE: (1)215-321-5530

FAX: (1)215-321-5534

200 Wheeler Rd., Burlington, MA 01803

PHONE: (1)781-270-7979; (1)781-229-5100

FAX: (1)781-229-9117

8000 Regency Parkway, Suite 280 Cary, NC 27511

PHONE: (1)919-460-0695

FAX: (1)919-460-0795

2321 Sidney St. Pittsburgh, PA 15203

PHONE: (1)412-381-1191

FAX: (1)412-381-1192

4875 North Federal Highway, Third Floor

Ft. Lauderdale, FL 33318

PHONE: (1)954-267-8883

FAX: (1)954-267-0254

### EUROPE

#### SHARP MICROELECTRONICS EUROPE

A division of Sharp Electronics (Europe) GmbH

##### Head Office

Sonninstrasse 3, 20097, Hamburg, Germany

PHONE: (49)180-5073507

FAX: (49)40-2376-2232

<http://www.sharpsme.com/>

##### Germany

SME München Office

Fuerstenriederstrasse 5, 80687 München, Germany

PHONE: (49)89-5468420

FAX: (49)89-54 684250

##### France

SME Paris Office

1 Rue Raoul Follereau Bussy Saint Georges

77608 Marne la Vallée Cedex 3

PHONE: (33)1 6476 22 22

FAX: (33)1 6476 22 23

##### Italy

SME Milano Office

Centro Direzionale Colleoni

Palazzo Taurus Ingresso 2

20041 Agrate Brianza, Milano, Italy

PHONE: (390)39-68 99 946

FAX: (390)39-68 99 948

##### U.K .

SME London Office

Centennial Court, Easthampstead Road,

Bracknell, Berkshire R G12 1YQ, United Kingdom

PHONE: (44)1344-86 99 22

FAX: (44)1344-36 09 03

##### Ireland

SME Dublin Office

First Floor, Block 1, St. Johns Court, Santry,

Dublin 9, Ireland

PHONE: (353)1-842 87 05

FAX: (353)1-842 84 55

### ASIA

#### SHARP ELECTRONICS (SHANGHAI) CO., LTD.

Microelectronics Sales & Marketing Division

16F, King Tower, 28 Xin Jin Qiao Road,

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PHONE: (86)21-5854-7710/21-5834-6056

FAX: (86)21-5854-4340/21-5834-6057

#### Registered Address

No. 11, De Bao Road, Xin Development BLDG

46 Wai Gao Qiao Free Trade Zone, Shanghai

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#### Beijing Office

Room 1062, Beijing Jing An Center No. 8 East

Bei San Huan Road, Chao Yang DIST, Beijing

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#### Shenzhen Representative Office

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PHONE: (86)755-83273731

FAX: (86)755-83273735

#### SHARP ELECTRONIC COMPONENTS

(TAIWAN) CORPORATION

8F-A, No. 16, Sec. 4, Nanking E. R d., Taipei, Taiwan

PHONE: (886)2-2577-7341

FAX: (886)2-2577-7326/2-2577-7328

#### SHARP ELECTRONICS (SINGAPORE) PTE ., LTD.

396 Alexandra Road #07-00

BP Tower Singapore 119954

PHONE: (65) 62713566

FAX: (65) 62713855

<http://www.sesl-sharp.com>

#### SHARP MICROELECTRONICS

TECHNOLOGY (M) SDN BHD.

Suite E 408, 4th Floor, East Tower,

Wisma Consplant 1, No. 2 J In. SS 16/4,

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PHONE: (60) 3-5637-8964

FAX: (60) 3-5638-4029

#### SHARP ELECTRONIC COMPONENTS

(KOREA) CORPORATION

RM 501 iLsin B/D. 541, Dohwa-dong,

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[www.lifeelectronics.ru](http://www.lifeelectronics.ru)