

## 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.

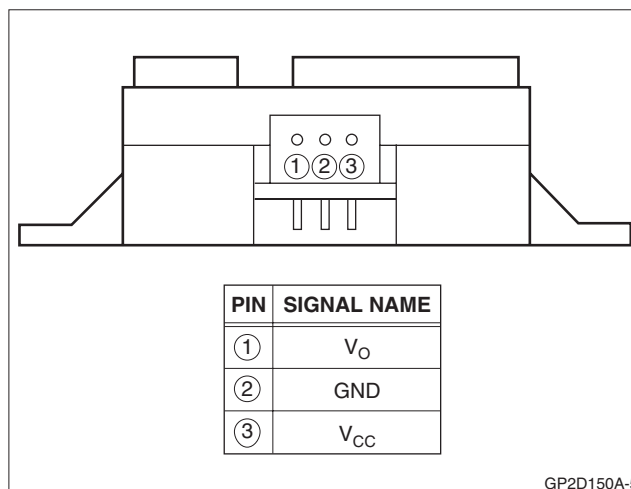


Figure 1. Pinout

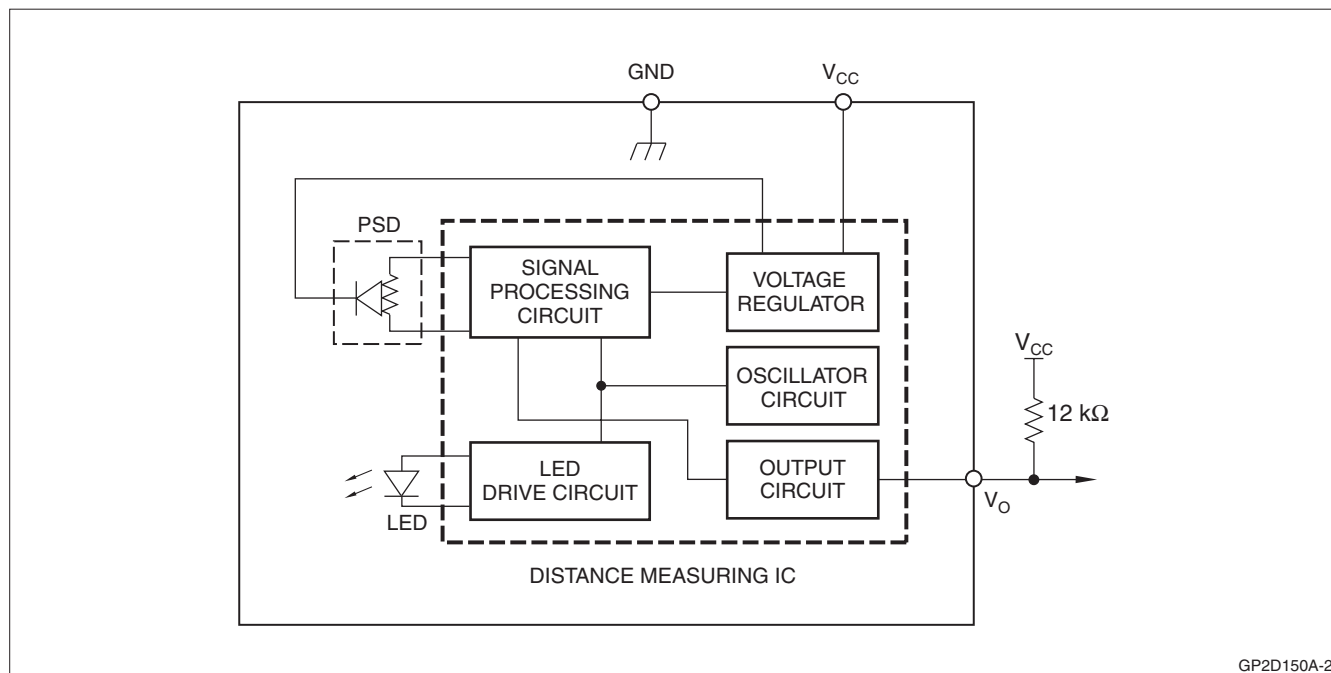


Figure 2. Block Diagram

## 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    |

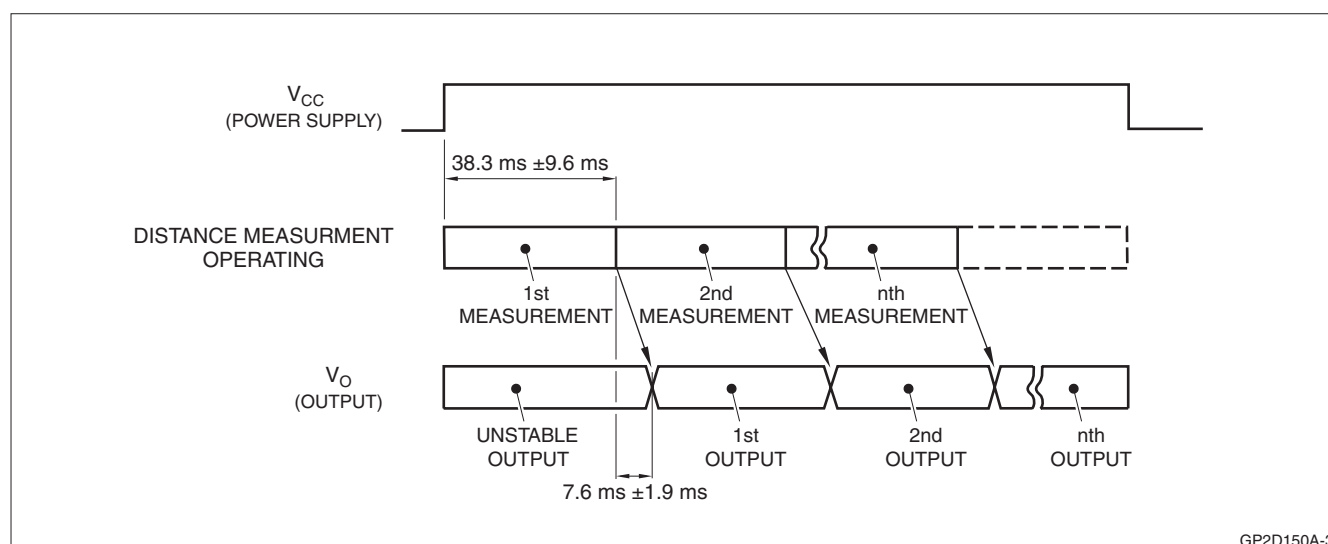
### Electro-optical Characteristics

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

| 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.

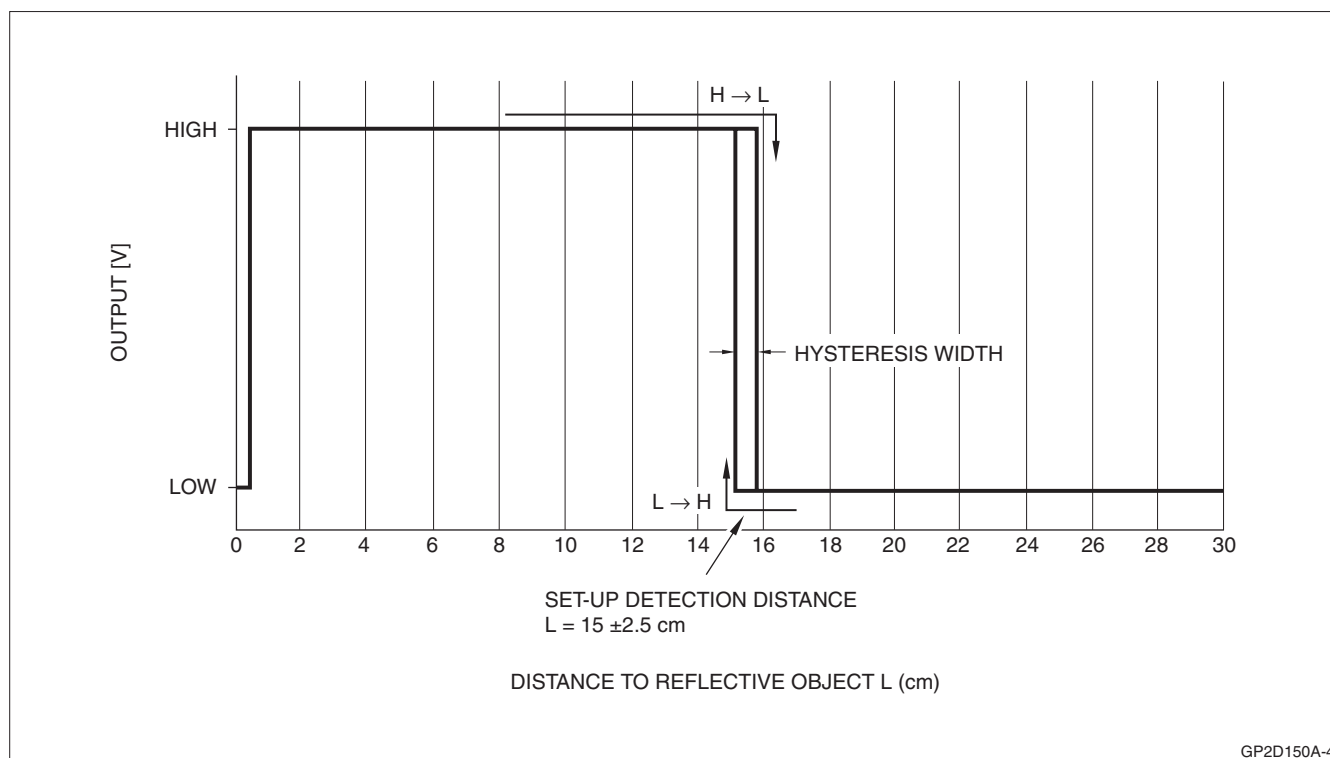
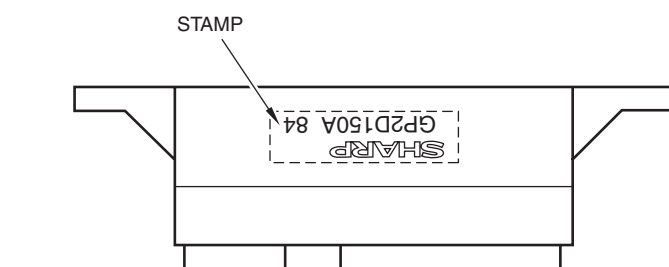


Figure 4. GP2D150A Example of Output Distance Characteristics

## PACKAGE SPECIFICATIONS



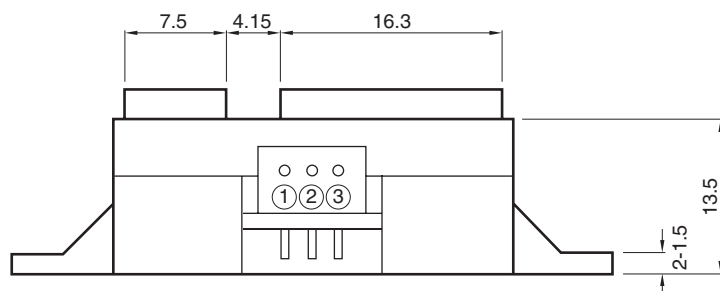
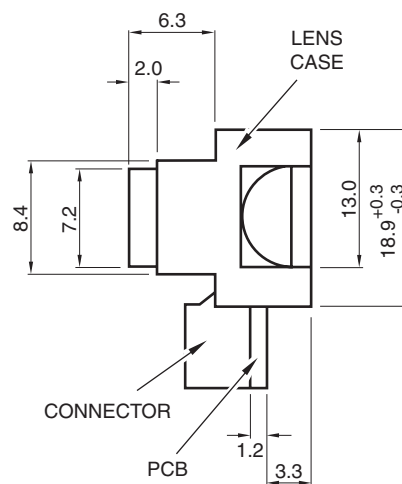
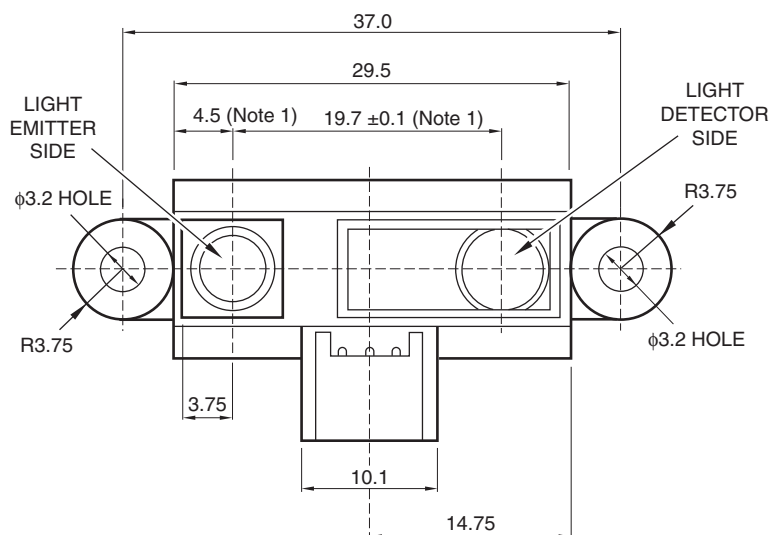
## STAMP EXAMPLE

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> |

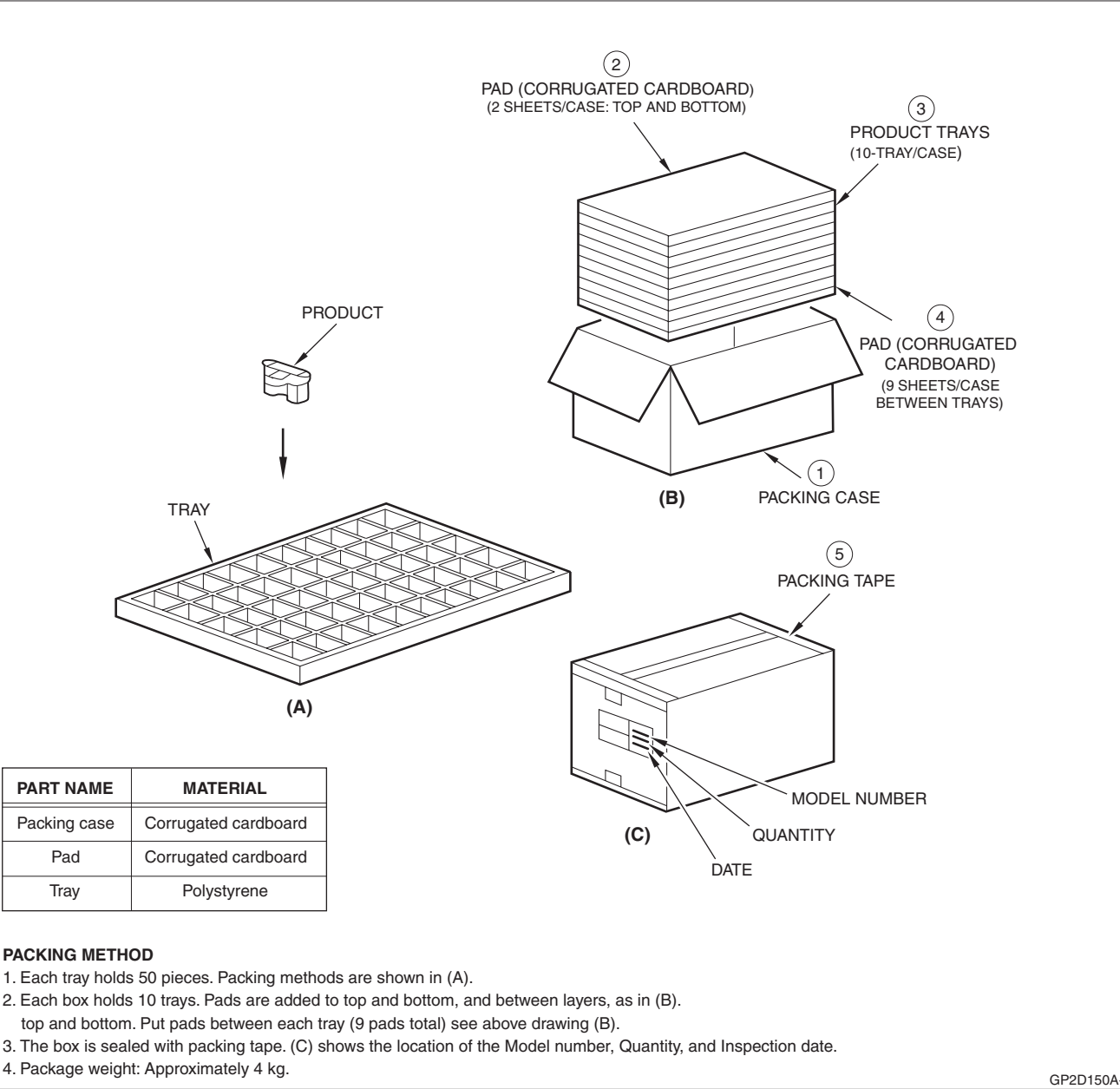
Connector: J.S.T. Trading Company, LTD  
S3B-PH

## 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.

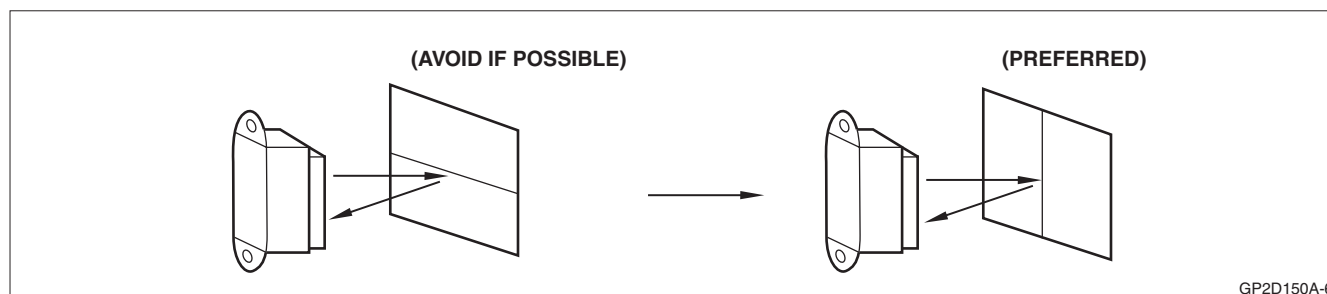


Figure 5. Proper Alignment to Surface Being Measured

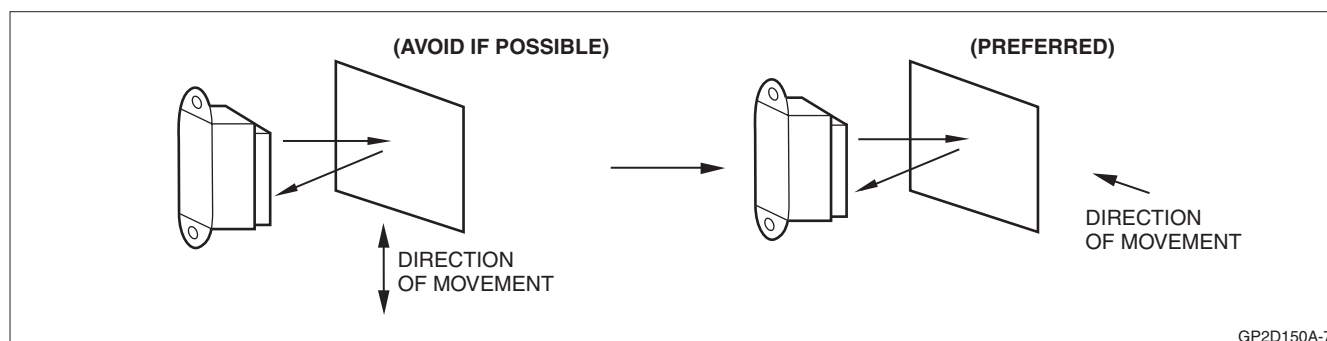


Figure 6. Proper Alignment to Moving Surfaces

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