

# LT-GDM-09

## Ground-Detecting Module

### Product Specifications

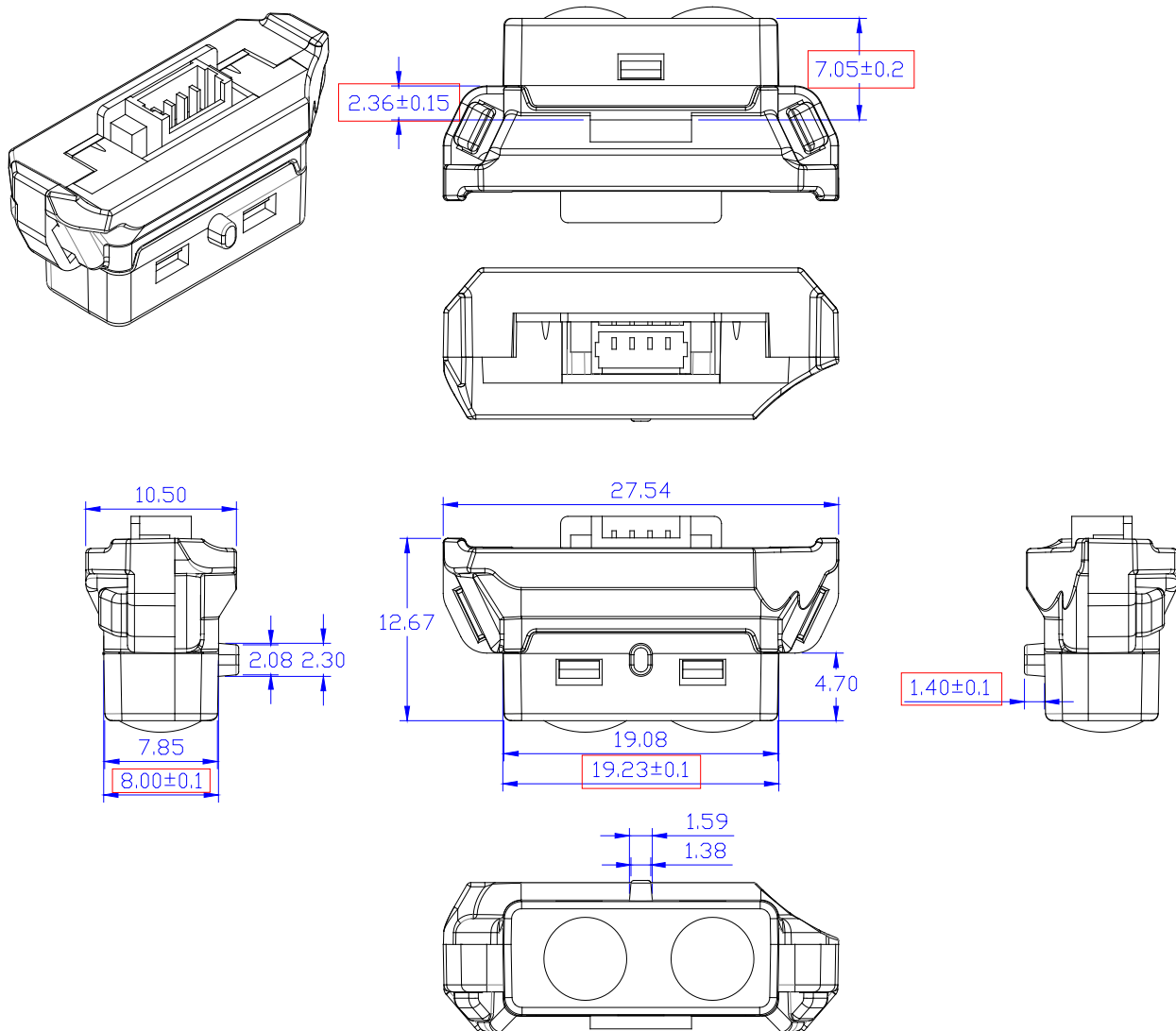
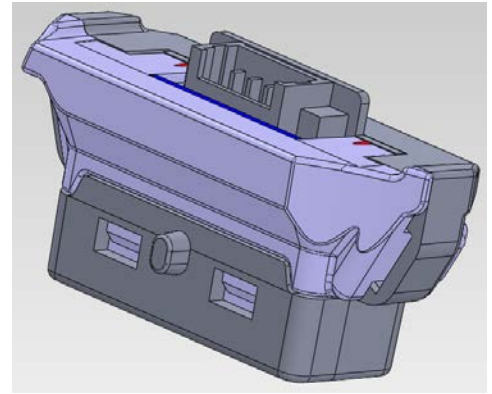
SPEC. NO. : SZ23123001  
DATE : 2024/05/06  
REV. : A/1

Approved By:

Checked By:

Prepared By:

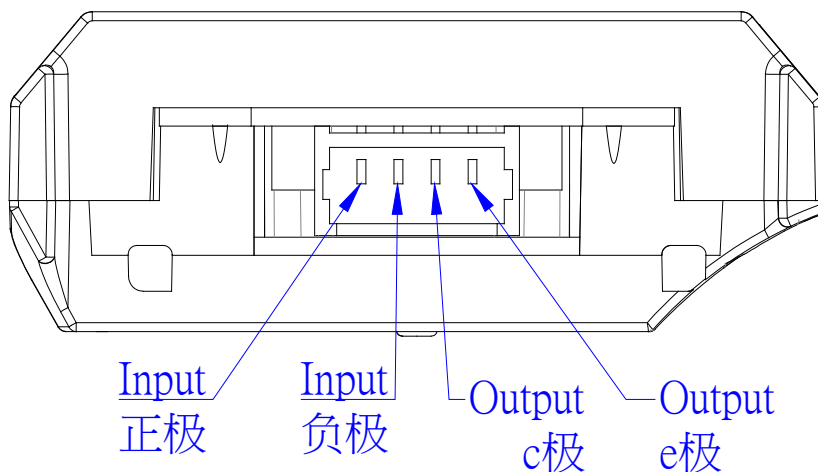
### Dimensions of Module



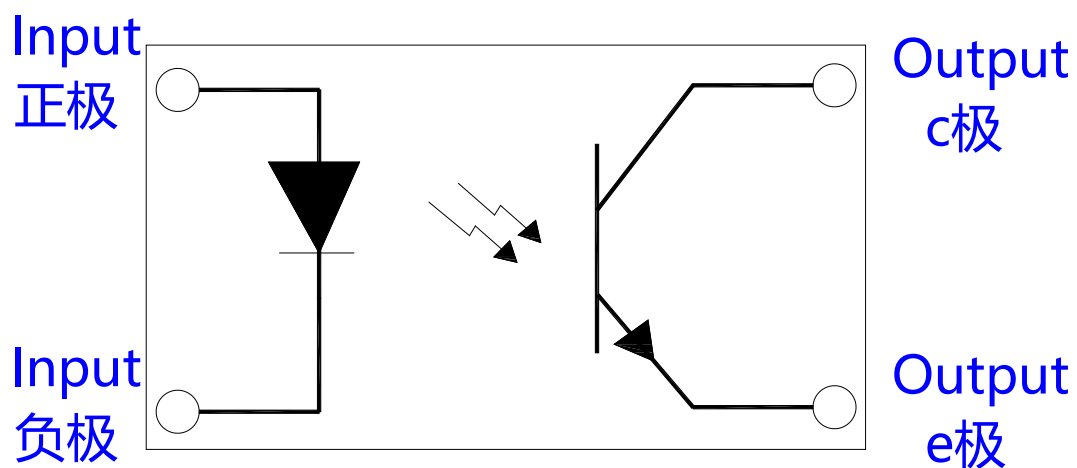
#### Notes:

1. All dimensions are in millimeters.
2. Tolerance is  $\pm 0.50\text{mm}$  unless otherwise noted.
3. The size marked on the drawing is Ground-Detecting Module.
4. Specifications are subject to change without notice.

### Polarity indication of connecting seat



### Circuit schematic diagram



### Features

- ◆ Pb free product—RoHS compliant

### Fast response time

- ◆ High sensitivity
- ◆ Invisible wavelength  $\lambda_p=940\text{nm}$
- ◆ Integration structure

### Typical Applications

- ◆ Intelligent Sweeping Robot

### Absolute Maximum Ratings at $T_a=25^\circ\text{C}$

| Parameter                                             |                                    | Symbol    | Ratings     | Unit             |
|-------------------------------------------------------|------------------------------------|-----------|-------------|------------------|
| Input                                                 | Power Dissipation                  | $P_d$     | 170         | mW               |
|                                                       | Reverse Voltage                    | $V_R$     | 5           | V                |
|                                                       | Forward Current                    | $I_F$     | 100         | mA               |
|                                                       | Peak Forward Current <sup>*1</sup> | $I_{FP}$  | 250         | mA               |
| Output                                                | Collector Power Dissipation        | $P_c$     | 75          | mW               |
|                                                       | Collector Current                  | $I_c$     | 20          | mA               |
|                                                       | Collector-Emitter Voltage          | $V_{CEO}$ | 30          | V                |
|                                                       | Emitter-Collector Voltage          | $V_{ECO}$ | 5           | V                |
| Electrostatic Discharge (HBM) <sup>*2</sup>           |                                    | ESD       | 4000        | V                |
| Electrostatic Discharge (Air Discharge) <sup>*3</sup> |                                    | ESD       | 15          | KV               |
| Operating Temperature Range                           |                                    | $T_{opr}$ | -10 to + 60 | $^\circ\text{C}$ |
| Storage Temperature Range                             |                                    | $T_{stg}$ | -40 to + 70 | $^\circ\text{C}$ |

Note: 1. Pulse width $\leq 0.1\text{msec}$ , duty cycle $\leq 1\%$ .

2. tested by contact on the module pin.

3. Install the sensor into the entire machine for testing.

### Electrical Optical Characteristics at Ta=25°C

| Input (IR)                |                   |      |      |      |       |                                 |
|---------------------------|-------------------|------|------|------|-------|---------------------------------|
| Parameter                 | Symbol            | Min. | Typ. | Max. | Unit  | Test Condition                  |
| Radiant Intensity         | I <sub>e</sub>    | 77   | 110  | ---  | mW/sr | I <sub>F</sub> =50mA (Note 1,3) |
| Viewing Angle(X)          | 2θ <sub>1/2</sub> | ---  | 20   | ---  | Deg.  | (Note 2)                        |
| Viewing Angle(Y)          |                   | ---  | 20   | ---  |       |                                 |
| Peak Wavelength           | λ <sub>p</sub>    | ---  | 940  | ---  | nm    | I <sub>F</sub> =50mA            |
| Spectral Line Half- Width | Δλ                | ---  | 50   | ---  | nm    | I <sub>F</sub> =50mA            |
| Forward Voltage           | V <sub>F</sub>    | ---  | 1.35 | 1.60 | V     | I <sub>F</sub> =50mA            |
| Reverse Current           | I <sub>R</sub>    | ---  | ---  | 10   | μA    | V <sub>R</sub> =5V              |

| Output (PT)                          |                      |      |      |      |      |                                                                        |
|--------------------------------------|----------------------|------|------|------|------|------------------------------------------------------------------------|
| Parameter                            | Symbol               | Min. | Typ. | Max. | Unit | Test Condition                                                         |
| Collector-Emitter Breakdown Voltage  | BV <sub>CEO</sub>    | 30   | ---  | ---  | V    | I <sub>C</sub> =0.1mA<br>Ee=0mW/cm <sup>2</sup>                        |
| Range of Spectral Sensitivity        | λ                    | 800  | ---  | 1100 | nm   | ---                                                                    |
| Wavelength of Max Sensitivity        | λ <sub>S MAX</sub>   | ---  | 940  | ---  | nm   | ---                                                                    |
| Emitter-Collector Breakdown Voltage  | BV <sub>ECO</sub>    | 5    | ---  | ---  | V    | I <sub>E</sub> =0.1mA<br>Ee=0mW/cm <sup>2</sup>                        |
| Collector-Emitter Saturation Voltage | V <sub>CE(SAT)</sub> | ---  | ---  | 0.4  | V    | I <sub>C</sub> =2mA<br>Ee=1.0mW/cm <sup>2</sup>                        |
| Viewing Angle(X)                     | 2θ <sub>1/2</sub>    | ---  | 35   | ---  | Deg. | (Note 1)                                                               |
| Viewing Angle(Y)                     |                      | ---  | 35   | ---  |      |                                                                        |
| Rise Time                            | T <sub>r</sub>       | ---  | 15   | ---  | μs   | V <sub>CC</sub> =5V<br>R <sub>L</sub> =1KΩ<br>I <sub>C</sub> =1mA      |
| Fall Time                            | T <sub>f</sub>       | ---  | 15   | ---  | μs   | V <sub>CE</sub> =5V<br>I <sub>F</sub> =20mA                            |
| Collector Dark Current               | I <sub>CEO</sub>     | ---  | ---  | 100  | nA   | V <sub>CE</sub> =10V<br>Ee=0mW/cm <sup>2</sup>                         |
| On State Collector Current           | I <sub>C(ON)</sub>   | 9.2  | 13.0 | ---  | mA   | V <sub>CE</sub> =5V<br>Ee=1mW/cm <sup>2</sup><br>λ <sub>p</sub> =940nm |

## Typical Electrical / Optical Characteristics Curves (IR) (25°C Ambient Temperature Unless Otherwise Noted)

Fig.1 Spectral Distribution

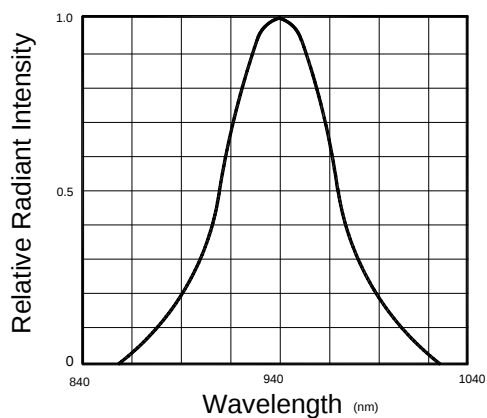


Fig.2 Forward Current Vs Ambient Temperature

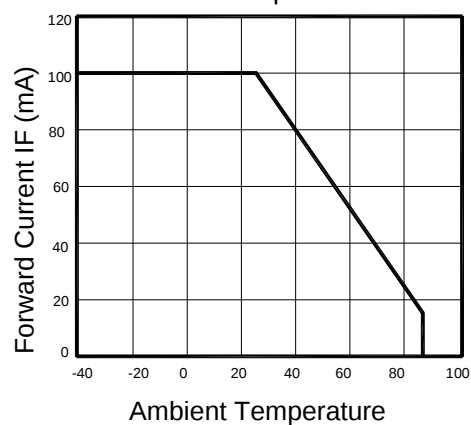


Fig.3 Forward Current Vs Forward Voltage

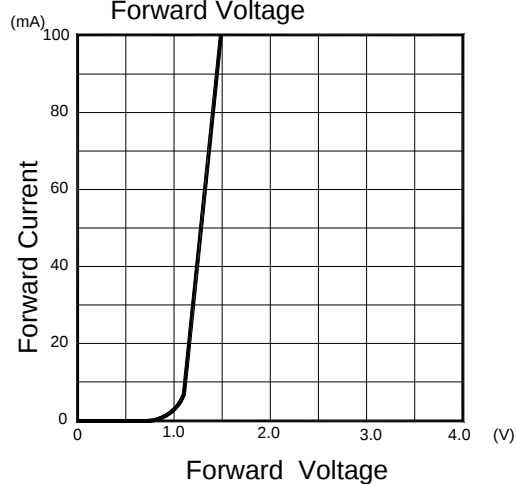


Fig.4 Relative Radiant Intensity Vs Ambient Temperature

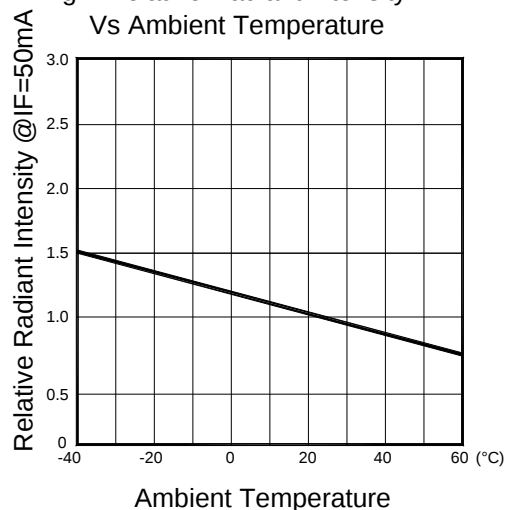


Fig.5 Relative Radiant Intensity Vs Forward Current

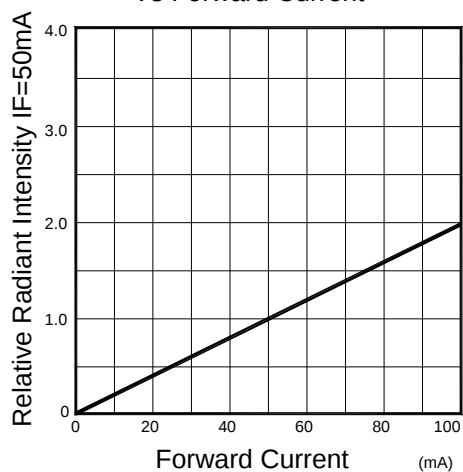
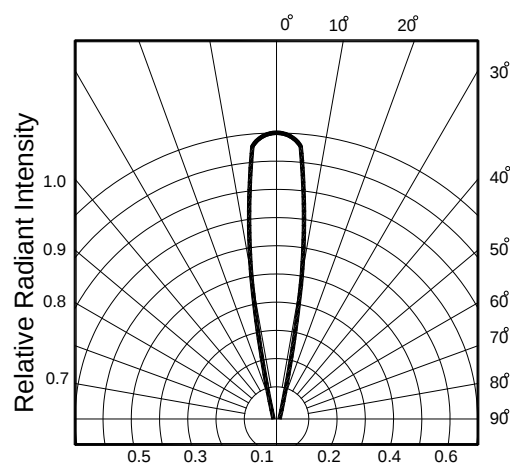


Fig.6 Radiation Diagram



## Typical Electrical / Optical Characteristics Curves (PT) (25°C Ambient Temperature Unless Otherwise Noted)

FIG.1 Relative Response vs. Wavelength

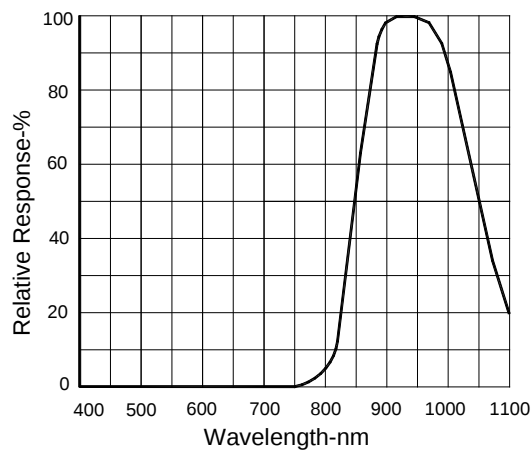


FIG.2 Power Dissipation Vs. Ambient Temperature

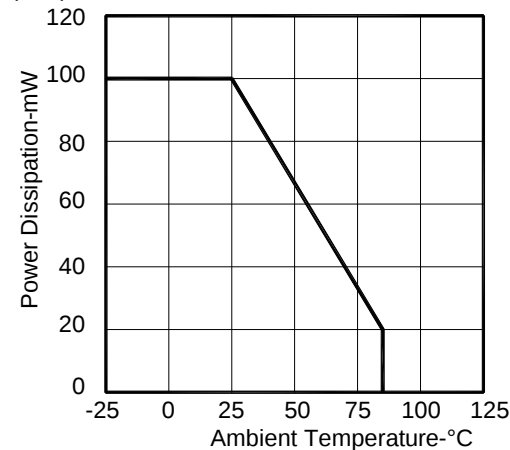


FIG.3 Rise And Fall Time Vs. Load Resistance

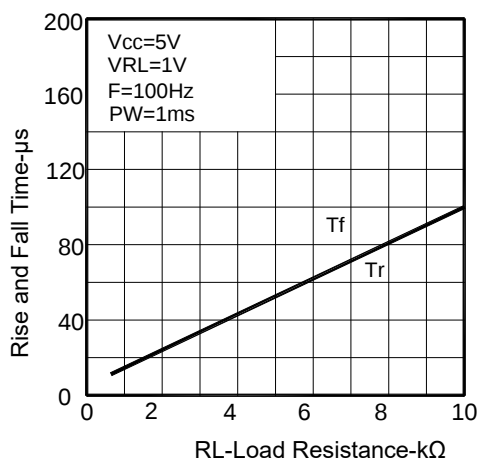


FIG.4 Relative Collector Current Vs. Irradiance

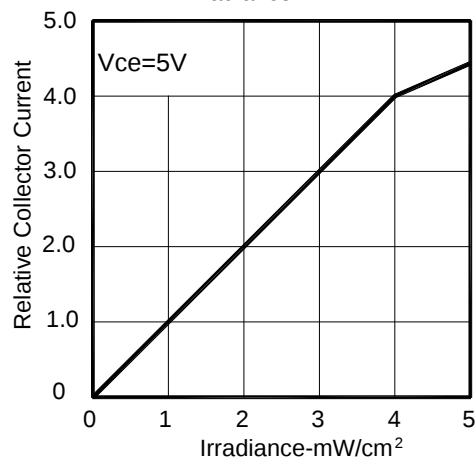


FIG.5 Collector Dark Current Vs. Ambient Temperature

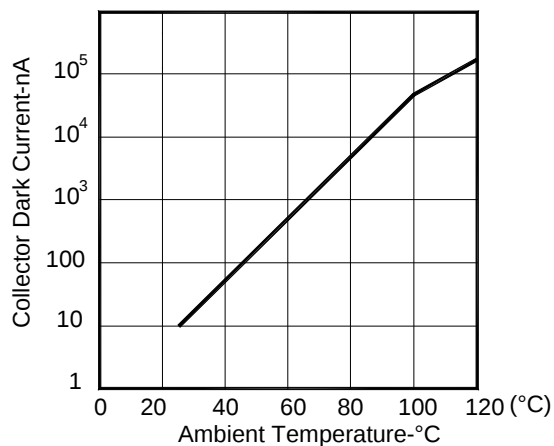
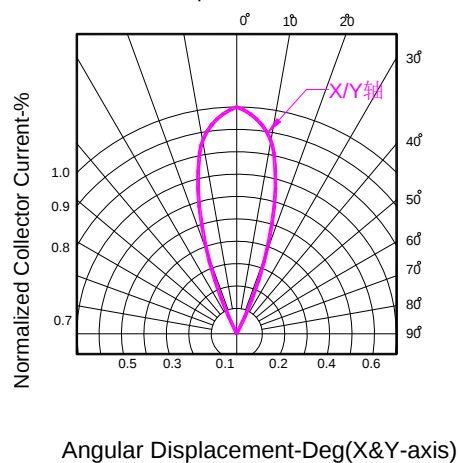
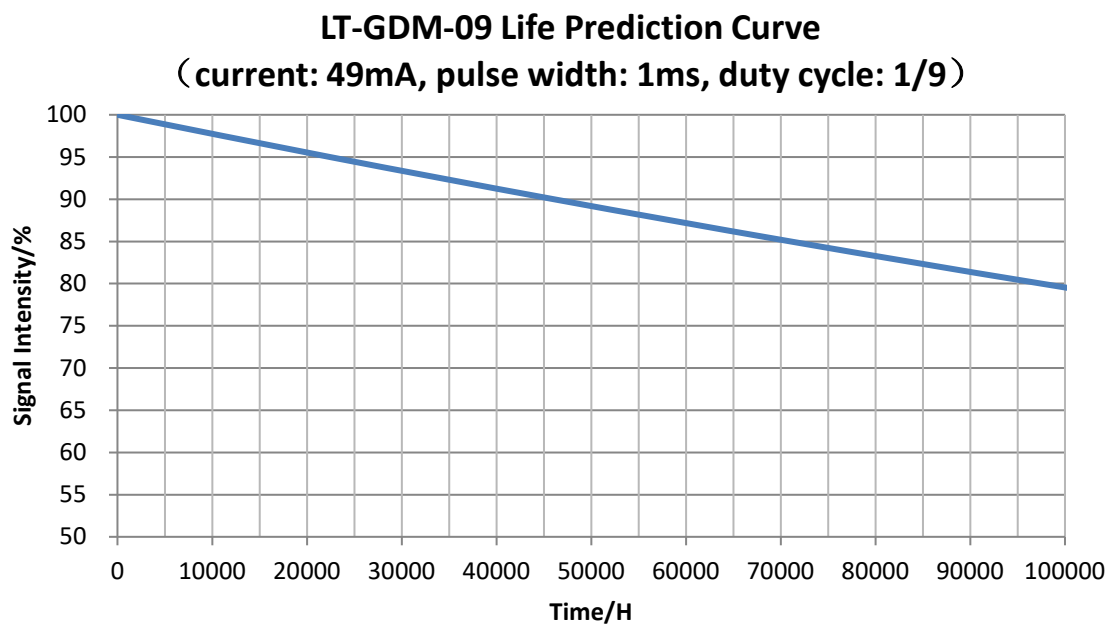


FIG.6 Light Current vs. Angular Displacement



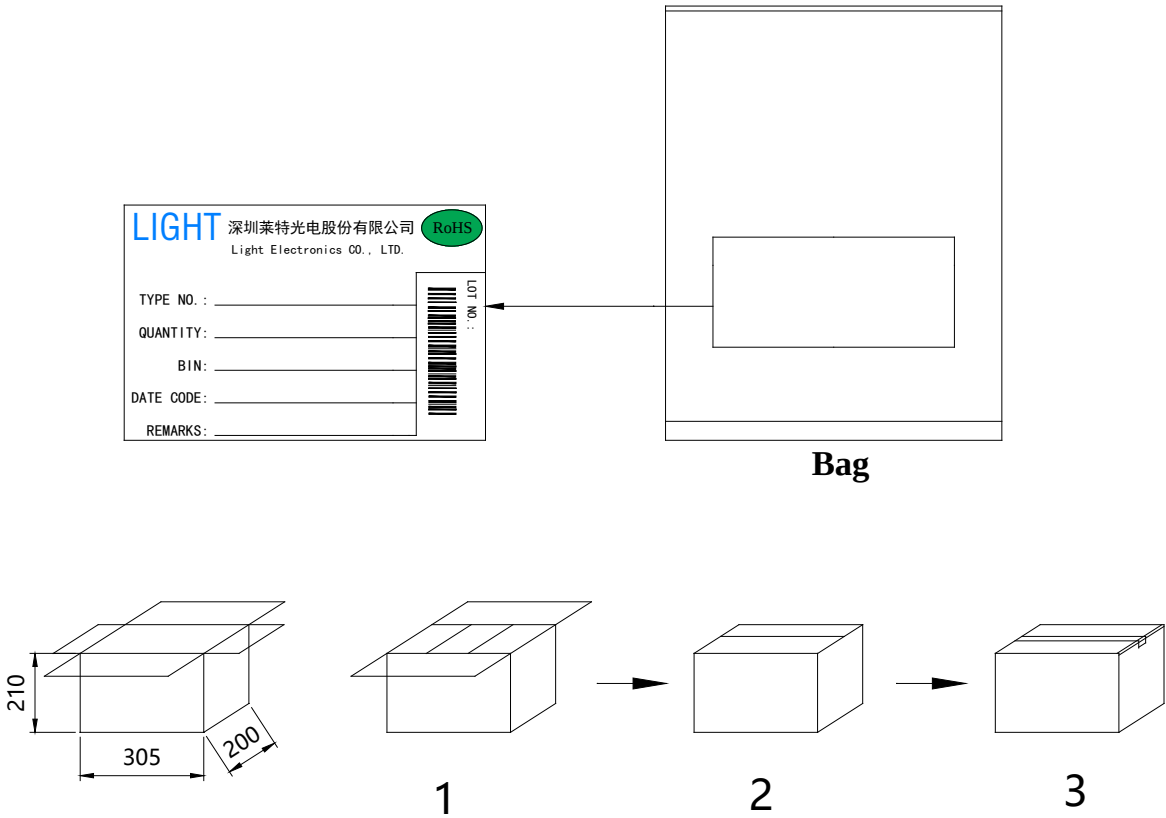
### Life Prediction Curve (According to customer conditions of use)



### ADC value standard (Standard machine provided by customer)

1. The distance from the ground detection module to the black carpet is 25mm, and the black ADC value is  $\geq 85$ .
2. The distance from the ground detection module to the whiteboard is 110mm, and the white ADC value is  $\leq 85$ .

PACKAGE



| Bag volume<br>(pcs / Bag) | Outer Carton volume<br>(Bags / Carton) |
|---------------------------|----------------------------------------|
| TBD                       | TBD                                    |