

**zilog**<sup>®</sup>

A **Littelfuse** Company

**ZSFM323511**  
**Pyroelectric Sensor**  
**Product Specification**

PS040701-0222



**Warning: DO NOT USE IN LIFE SUPPORT**

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## Revision History

Each instance in this document's revision history reflects a change from its previous edition. For more details, refer to the corresponding page(s) or appropriate links furnished in the table below.

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<b>Date</b>	<b>Revision Level</b>	<b>Description</b>	<b>Pages</b>
Feb. 2022	01	Original issue.	All

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## Overview

Zilog's Passive Infrared (PIR) sensors are designed to deliver high performance and excellent EMI immunity for the most demanding motion detection applications.

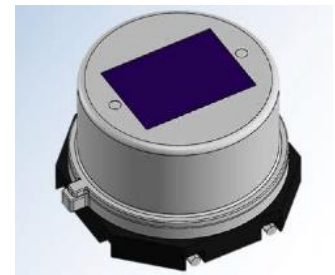
The ZSFM323511 PIR sensor is a surface mount device compatible with IR reflow processes. It is used in combination with a PIR lens and consists of two sensing elements behind a spectral filter window tuned to 8-13um wavelength to help block out unwanted IR energy sources. The 0.6mm element spacing provides additional white light protection.

The ZSFM323511 has a standard profile making it compatible with clip-on lenses used with standard TO5 package PIR sensors.

## Features

The key features of ZSFM323511 are:

- Dual-element balanced differential (series opposed) PIR sensor
- High PSRR
- Built in EMI compensation
- White Light Protection
- Elements are 0.75mm x 2.3mm spaced 0.6mm apart
- Surface Mount package
- Recommended operating voltage range of 1V to 15V
- Operating temperature range of -40°C to +70°C



## Applications

- General purpose motion detectors
- Lighting
- Video Doorbell
- IP Camera

## Ordering Information

Part Number	Description
ZSFM323511	Dual-Element Pyroelectric Sensor – Surface Mount, Standard Profile

## Electrical Characteristics

- |                            |   |
|----------------------------|---|
| 1) Signal output:          | Min. 2.0 V <sub>P-P</sub> (Typ. 3.5 V <sub>P-P</sub> )  |
| 2) Noise output:           | Max. 250 mV <sub>P-P</sub> (Typ. 70 mV <sub>P-P</sub> )   |
| 3) Balance output:         | Max. 10%<br>$Bo = [SA-SB / SA+SB] \times 100$<br>Bo: Balance output<br>SA: Absolute signal output on Element A<br>SB: Absolute signal output on Element B |
| 4) Source voltage:         | 0.3 V to 1.4 V (Vd: 5V, Rs: 47K ohm)  |
| 5) Operating voltage (Vd): | 1 V to 15 V (Rs: 47K ohm)   |

### Notes:

Test set-up block diagram see Figure 1 and Figure 2.  
Test circuit configuration see Figure 3.  
Items 1,2 ,3 and 4 are 100% tested.

## Optical Characteristics

- |                           |  |
|---------------------------|--|
| 1) Typical field of view: | 134 degrees from center of element on axis X<br>120 degrees from center of element on axis Y<br>(See Figure 4) |
| 2) Filter substrate:      | Silicon  |
| 3) Cut on (5%T ABS):      | 5.0 ±1.0 micron  |
| 4) Transmissivity:        | ≥70% average 8 to 13 micron  |

## Environmental Characteristics

- |                           |                          |
|---------------------------|--------------------------|
| 1) Operating temperature: | -40°C to +70°C           |
| 2) Storage temperature:   | -40°C to +80°C           |
| 3) Operating humidity:    | 95% RH or less (at 30°C) |
| 4) Storage humidity:      | 95% RH or less (at 30°C) |

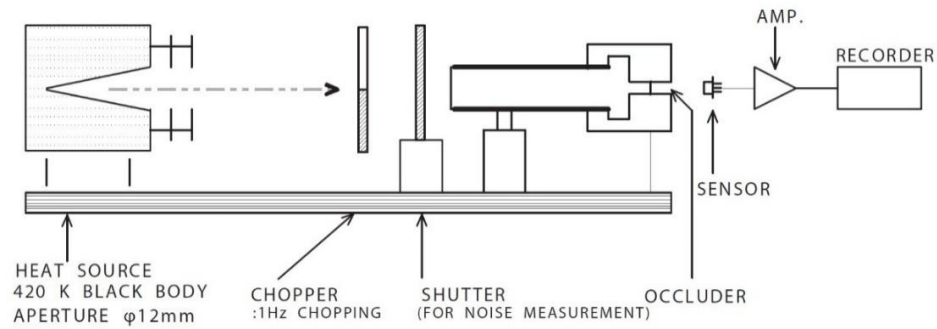
## RoHS Compliance

This product conforms to the RoHS Directive in force at the date of issuance of this Product Specification.

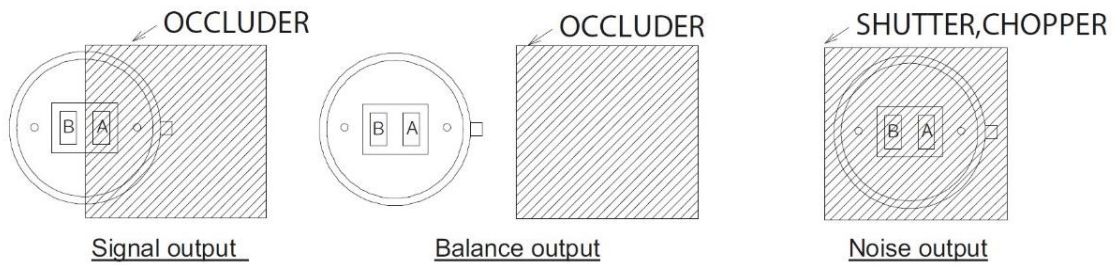
## Test Conditions

The figures below show the configuration under which the PIR sensor electrical characteristics are tested.

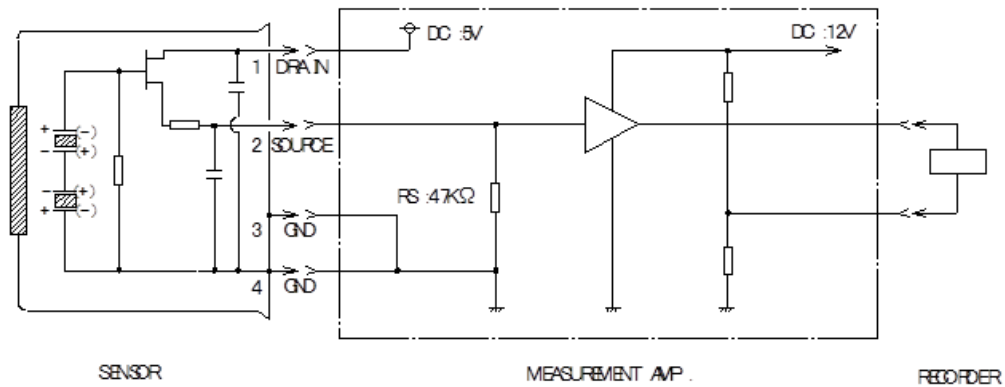
**Figure 1 - Test Set-up Configuration**



**Figure 2 - Occluder Position**



**Figure 3 - Test Circuit Configuration**



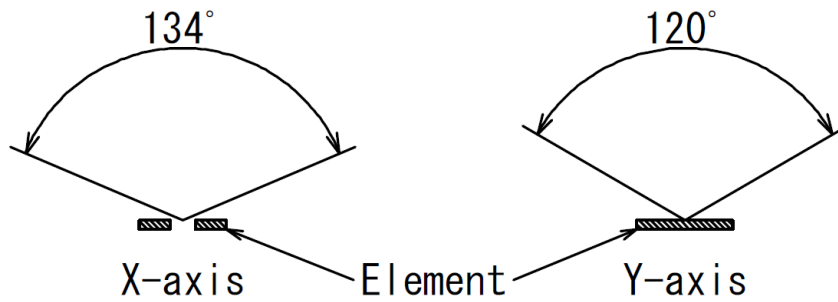
Measurement Amp. Characteristics:

Type: Non-inverting; Gain: 72.5 dB at 1 Hz; Bandwidth: 0.4 to 2.7 Hz / -3 dB

## Field of View

The typical field of view of the ZSFM323511 PIR sensor is shown in Figure 4.

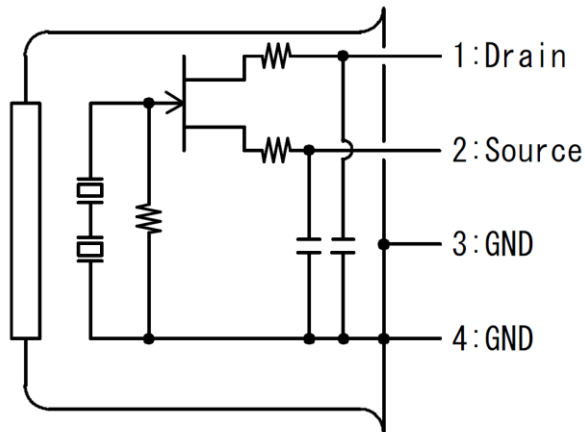
**Figure 4 - Field of View**



## PIR Sensor Circuit Diagram

The ZSFM323511 circuit diagram is shown in Figure 5.

**Figure 5 - Circuit Diagram**



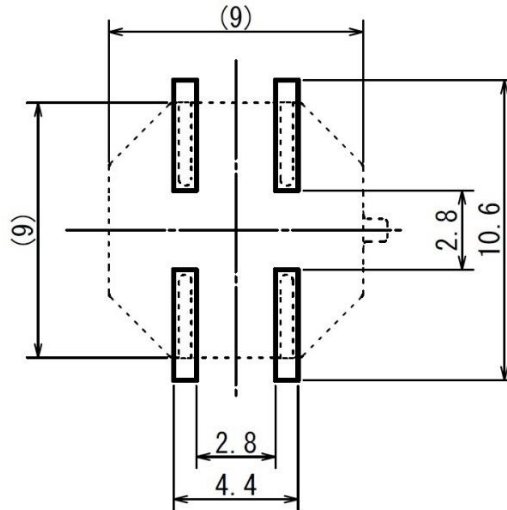




## Recommended Pad Design

The recommended dimensions for the PCB layout pad design are shown in Figure 9.

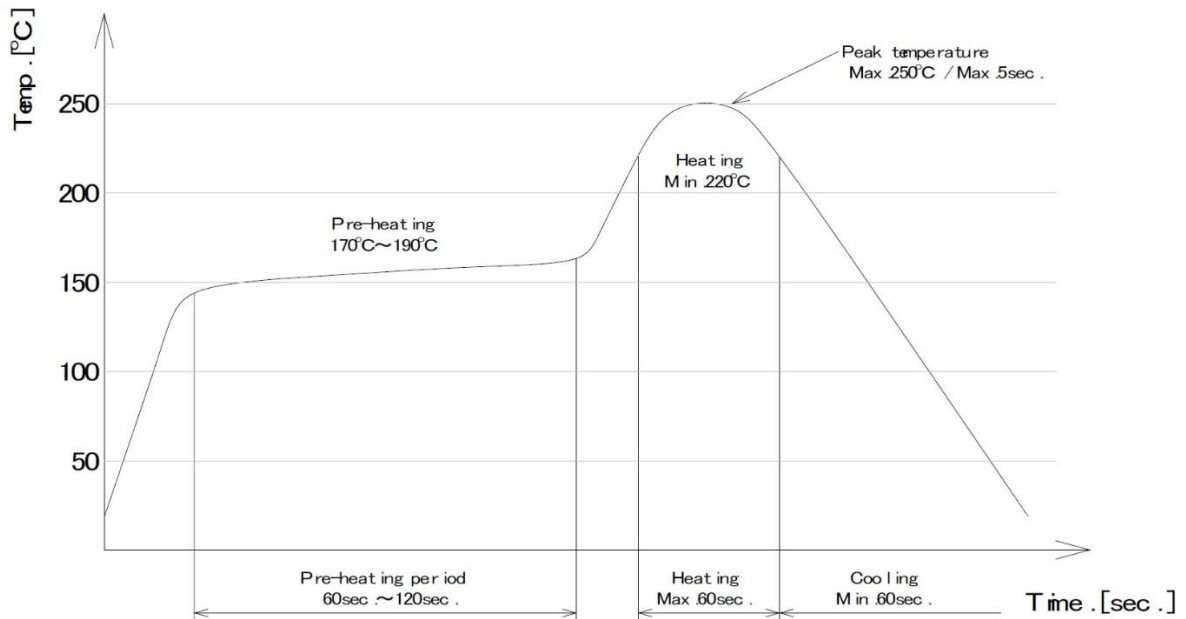
**Figure 9 - Recommended Land Design**



## IR Reflow Profile

Figure 10 shows the recommended IR reflow soldering profile. Actual conditions should be verified with production PCB's.

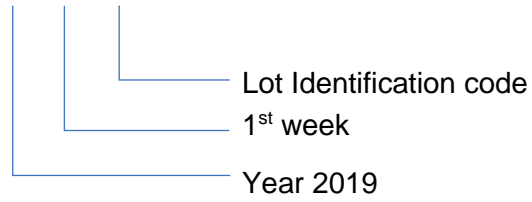
**Figure 10 - IR Reflow Profile**



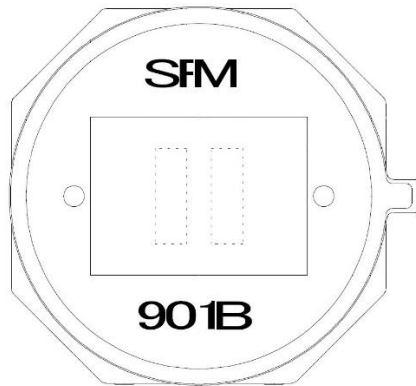
## Device Markings

Lot number information is marked on the top surface of the PIR sensor.

Example: 9 01 B



**Figure 11 - Device Markings**



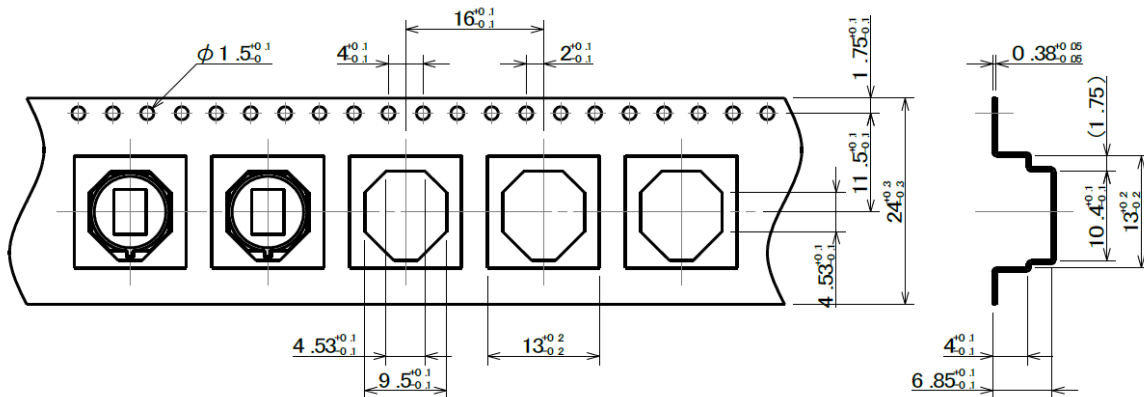
## Packaging

The ZSFM323511 PIR Sensor is shipped in standard embossed tape and reel and packed in boxes as shown in Figure 12 through Figure 17. Each reel consists of 500 pieces. The reels are packed in a carton (1 reel/carton) and 6 cartons are packed in a box for a total of 3,000 pieces per box.

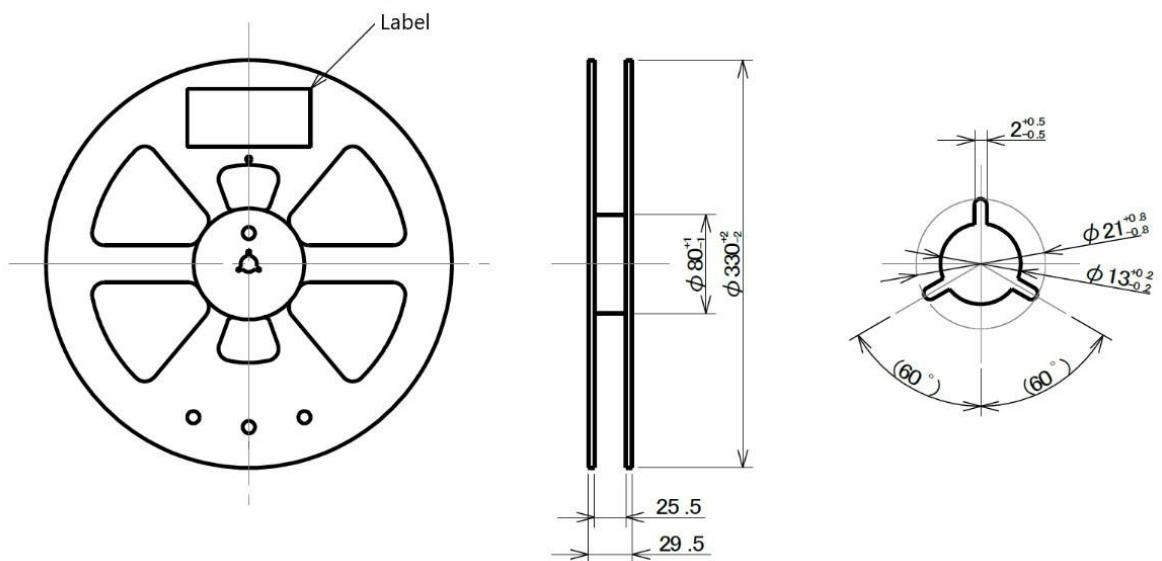
### Tape & Reel Specification

- 1) Standard Reel Quantity: 500 pieces.
- 2) Dimensions in Figure 12 and Figure 13 are in mm.

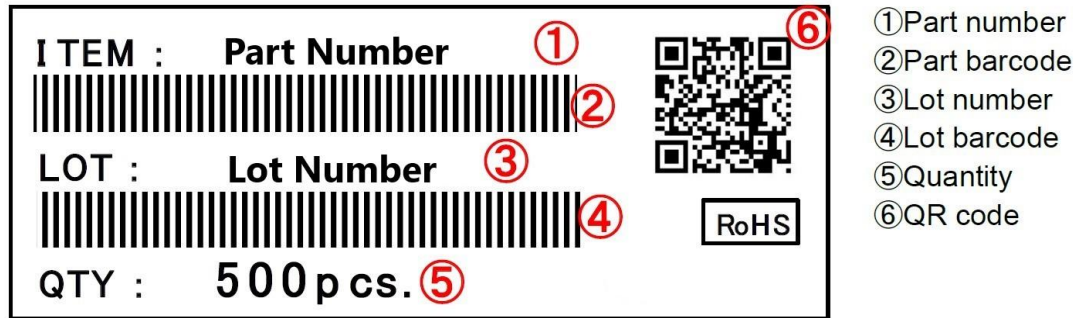
**Figure 12 - Tape Configuration and Dimensions**



**Figure 13 - Reel Configuration and Dimensions**



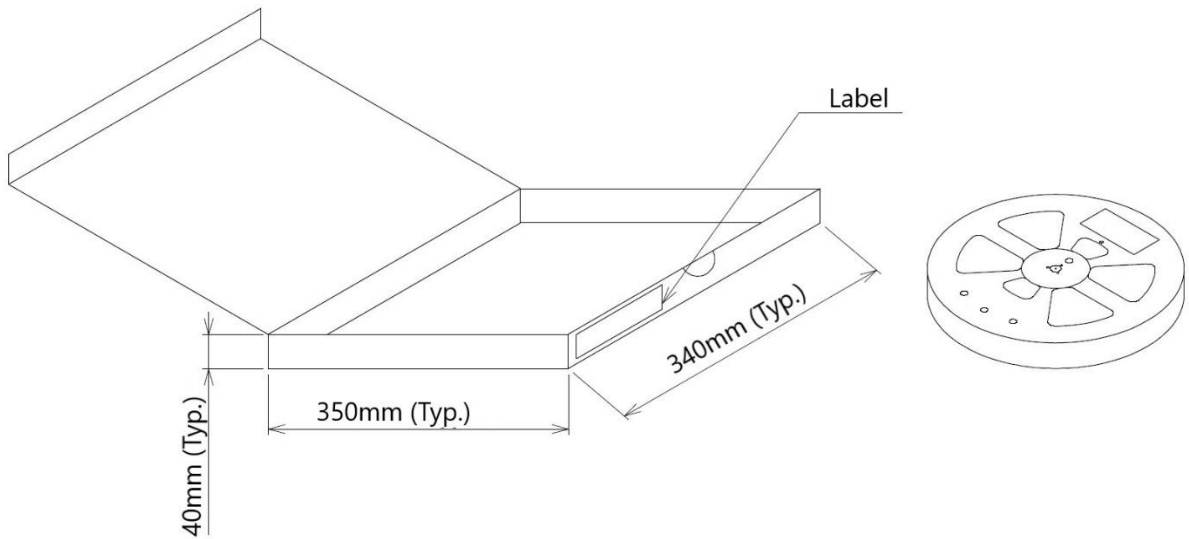
**Figure 14 - Reel Label**



**Carton and Box Specification**

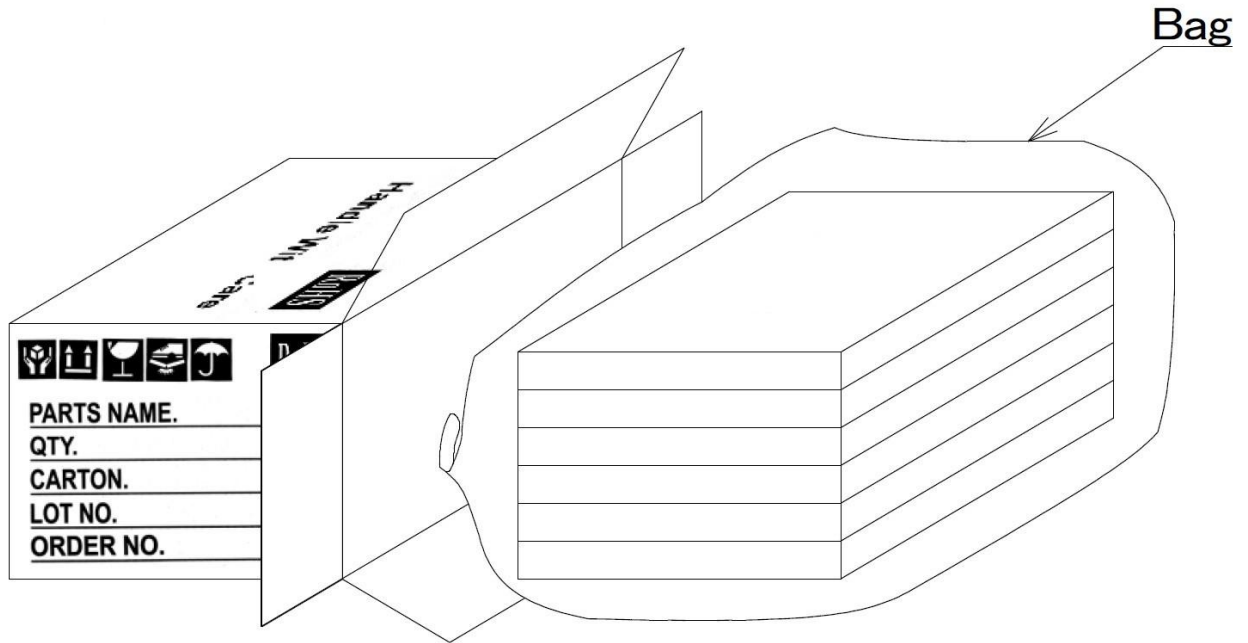
- 1) Standard carton quantity: 500 pieces (1 reel)

**Figure 15 - Carton Dimensions**



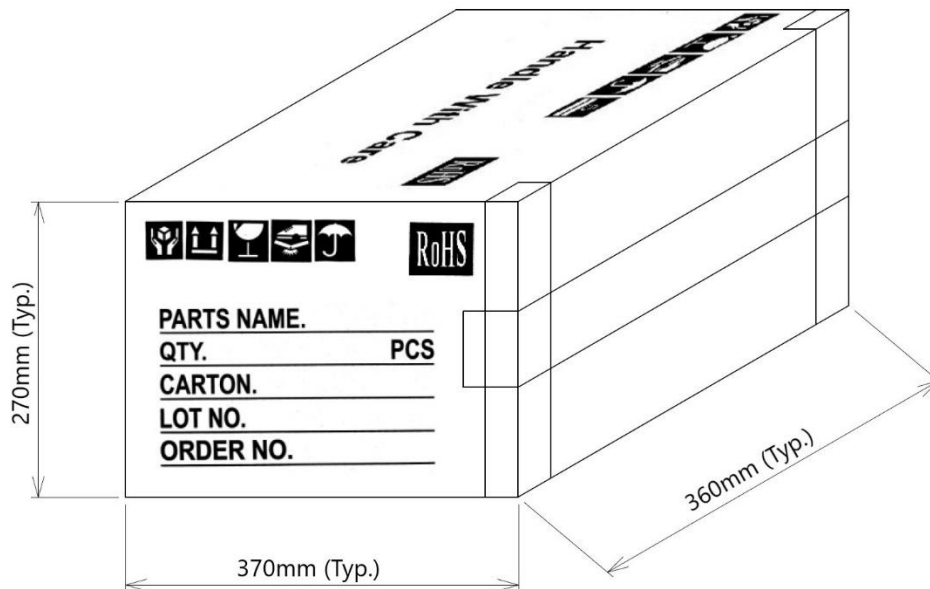
2) Standard Box Quantity: 3,000 pieces (6 cartons/reels)

**Figure 16 - Box/Carton Packaging**



3) The Standard Box dimensions are as follows

**Figure 17 - Standard Box Dimensions**



## Usage Restrictions and Precautions

This section presents restrictions and precautions that apply to Zilog pyroelectric sensors.

### Design Restrictions and Precautions

This sensor is designed for indoor purposes in which secondary accidents due to operation failure or malfunctions can be anticipated; therefore, add appropriate fail-safe functionality to your design. If these sensors are intended for outdoor applications, be sure to apply suitable supplementary optical filters and use a waterproof enclosure.

### Usage Restrictions and Precautions

To prevent sensor malfunctions, operational failure, or any deterioration of their characteristics, do not operate these PIR sensors under the following, or similar, conditions:

- Rapid environmental temperature changes
- Strong shocks or vibrations
- In places where there are obstructing materials (glass, fog, etc.) through which infrared rays cannot pass within the detection area
- In fluids, corrosive gases, and sea breezes
- Under continual high-humidity atmospheric conditions
- Exposed to direct sunlight or automobile headlights
- Exposed to directly to forced-air currents from a heater or air conditioner

### Handling and Storage Restrictions and Precautions

To prevent sensor malfunctions, operational failure, appearance damage, or any deterioration of their characteristics, do not expose these sensors to the following, or similar, handling and storage conditions:

- Vibrations over extended periods
- Strong shocks
- Static electricity or strong electromagnetic waves
- High temperature and humidity over extended periods
- Corrosive gases or sea breezes
- Dirty and dusty environments that may contaminate the optical window

## Related Documents

The documents associated with the ZSFM323511 PIR sensor are listed below. Each of these documents, and others can be obtained from the [ZMOTION Product Page](#) on the Zilog website: <http://www.zilog.com>.

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Document Number	Description
PB0263	PIR Sensor Product Brief
PB0258	ZMOTION MCU Product Brief
PS0264	PIR Lens Product Brief

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