ZMOTION® Pyroelectric Sensors

Product Specification

PS033606-0219

www.zilog.com

Warning: DO NOT USE THIS PRODUCT IN LIFE SUPPORT SYSTEMS.

LIFE SUPPORT POLICY

ZILOG'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS PRIOR WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF ZILOG CORPORATION.

As used herein

Life support devices or systems are devices which (a) are intended for surgical implant into the body, or (b) support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in a significant injury to the user. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.

Document Disclaimer

 Information in this publication concerning the devices, applications, or technology described is intended to suggest possible uses and may be superseded. ZILOG, INC. DOES NOT ASSUME LIABILITY FOR OR PROVIDE A REPRESENTATION OF ACCURACY OF THE INFORMATION, DEVICES, OR TECHNOLOGY DESCRIBED IN THIS DOCUMENT. ZILOG ALSO DOES NOT ASSUME LIABILITY FOR INTELLECTUAL PROPERTY INFRINGEMENT RELATED IN ANY MANNER TO USE OF INFORMATION, DEVICES, OR TECHNOLOGY DESCRIBED HEREIN OR OTHERWISE. The information contained within this document has been verified according to the general principles of electrical and mechanical engineering.

Revision History

Each instance in the revision history table reflects a change to this document from its previous revision. For more details, refer to the corresponding pages or appropriate links provided in the table below.

Date	Revision Level	Description	Page
Feb 2019	06	Added the ZSFG323671 and ZSFG223611 PIR sensorsto Table 1. Added a section for each of these sensors to describe configuration and characteristics.	2, 12, 17
Jul 2018	05	Added the ZSBG323611PP PIR sensor.	8
Apr 2018	04	Added the ZSFG469711 pyroelectric sensor to Table 1; Updated the Pyro Sensor Specifications section to include ZSFG469711 configuration and characteristics.	2, 22
Jan 2018	03	Added dimensions to the Side view drawing in Figure 4.	10
Sep 2017	02	Updated drawings for the ZSBG323671 and ZSBG446671 pyro sensors.	10, 14
Dec 2014	01	Original issue, split into its own document from the former ZMOTION Lens and Pyroelectric Sensor Product Specification (PS0286), which is now titled ZMOTION Lenses Product Specification.	All

Table of Contents

Revision History iii
Table of Contents iv
List of Figures vi
List of Tables vi
Overview 1
ZMOTION Pyroelectric Sensor Selection Guide 2
ZMOTION Pyroelectric Sensor Specifications 4
ZRE200GE Sensor Specification 4
Type of Sensor 4
Physical Configuration 4
Electrical Characteristics @ 25 ±5°C 4
Optical Characteristics 5
Environmental Requirements 5
RoHS Compliance 5
ZSBG323671 and ZSBG323611PP Sensor Specification 8
Type of Sensor 8
Physical Configuration 8
Electrical Characteristics @ 25 ±5°C 8
Optical Characteristics 9
Environmental Requirements 9
RoHS Compliance 9
Mechanical Drawings 10
ZSFG323671 Sensor Specification 12
Type of Sensor 12
Physical Configuration 12
Electrical Characteristics @ 25 ±5°C 12
Optical Characteristics 13
Environmental Requirements 13
RoHS Compliance 13
Mechanical Drawings 14
ZSFG223611 Sensor Specification 17
Type of Sensor 17
Physical Configuration 17
Electrical Characteristics @ 25 ±5°C 17
Optical Characteristics 18

Environmental Requirements 18
RoHS Compliance 18
Mechanical Drawings 19
ZSFG469711 Sensor Specification 22
Type of Sensor 22
Physical Configuration 22
Electrical Characteristics @ 25 ±5°C 22
Optical Characteristics 23
Environmental Requirements 23
RoHS Compliance 23
Mechanical Drawings 24
ZSBG446671 Sensor Specification 27
Type of Sensor 27
Physical Configuration 27
Electrical Characteristics @ 25 ±5°C 27
Optical Characteristics 28
Environmental Requirements 28
RoHS Compliance 28
Mechanical Drawings 28
Precautions 32
Design Restrictions and Precautions 32
Usage Restrictions and Precautions 32
Assembly Restrictions and Precautions 32
Handling and Storage Restrictions and Precautions 33
Restrictions on Product Use 33
Related Documents 34
Customer Support 35

List of Figures

Figure 1. ZRE200GE Mechanical Configuration 6
Figure 2. ZRE200GE Circuit Configuration 7
Figure 3. ZRE200GE Test Setup Block Diagram 7
Figure 4. ZSBG323671 Mechanical Configuration 10
Figure 5. ZSBG323671 Circuit Configuration 11
Figure 6. ZSBG323671 Test Setup Block Diagram 11
Figure 7. ZSFG323671 Mechanical Configuration 14
Figure 8. ZSFG323671 Circuit Configuration 15
Figure 9. ZSFG323671 Test Setup Block Diagram 16
Figure 10. ZSFG223611 Mechanical Configuration 19
Figure 11. ZSFG223611 Circuit Configuration 20
Figure 12. ZSFG223611 Test Setup Block Diagram 21
Figure 13. ZSFG469711 Mechanical Configuration 24
Figure 14. ZSFG469711 Circuit Configuration 25
Figure 15. ZSFG469711 Test Setup Block Diagram 26
Figure 16. ZSBG446671 Mechanical Configuration 29
Figure 17. ZSBG446671 Circuit Configuration 30
Figure 18. ZSBG446671 Test Setup Block Diagram 31

List of Tables

Table 1. ZMOTION Pyroelectric Sensors 2
Table 2. Related Documents 34

Overview

Zilog's ZMOTION Detection and Control and Intrusion Detection product families provide integrated and flexible solutions for Passive Infrared (PIR)-based motion detection applications. These product families are based on the ZMOTION MCU, a high-performance microcontroller featuring integrated PIR motion detection algorithms. Each family includes a selection of lenses and PIR sensors to fit a wide range of application requirements. Each lens and sensor combination is optimized for its intended application by configuration settings loaded into the ZMOTION MCU ensuring the best possible performance while significantly reducing development risk and minimizing time to market. Zilog's PIR Motion Detection Technology provides a dramatic improvement in both sensitivity and stability over traditional designs and is scalable to many market segments including Security/Intrusion Detection, Lighting Control, HVAC, Access Control, Vending, Display, Proximity, Power Management, Occupancy Sensing and many others.

This document provides the optical, electrical, and mechanical specifications for the Zilog-supported pyroelectric sensors included in the ZMOTION Family. Each supported lens and pyroelectric sensor combination is provided with an associated configuration file for the ZMOTION MCU. For more information on configuration files for specific lens and sensor combinations, refer to WP0018 ZMOTION Detection Lens and Pyro Electric Sensor Configuration Guide. It is possible to use other lenses and pyroelectric sensors not directly supported by Zilog by developing the appropriate configuration settings based on one of the existing files.

All pyroelectric sensors listed in this document are available from Zilog or from their associated manufacturers. Because Zilog is regularly adding new sensor support to these ZMOTION product families, please obtain the latest version of this document from our website at zilog.com/ZMOTION.

ZMOTION Pyroelectric Sensor Selection Guide

Table 1 presents a short list of available pyroelectric sensors that support applications that employ ZMOTION Detection and Control and ZMOTION Intrusion Detection MCUs. Select your pyroelectric sensor from this table based on your intended application.

Table 1. ZMOTION Pyroelectric Sensors

Part Number	Description	EMI Compensation	White Light Immunity	Operating Voltage	Applications
ZRE200GE	Basic dual-element sensor • Two elements: 1.0mm x 2.0mm, spaced 1.0mm apart	—	—	3.0V–10V	• General-purpose motion detectors • Wall mount lighting/HVAC control
ZSBG323671 ZSBG323671PP	Premium dual-element sensor • Two elements: 1.0mm x 2.3mm, spaced 1.0mm apart • PP version is polarity matched	Yes	—	ZSBG323671 3.0V–10V ZSBG323671PP 1.0V–15V	• Battery-powered applications (PP) • Intrusion motion detectors • IP Cameras and Video Doorbells • Wall mount lighting/HVAC control • Multi-PIR zone detection (PP)
ZSFG323671	Premium dual-element sensor • Two elements: 0.75mm x 2.3mm spaced 0.6mm apart	Enhanced	Yes	3.0V–10V	• Intrusion motion detectors • IP Cameras and Video Doorbells • Wall mount lighting/HVAC control

Table 1. ZMOTION Pyroelectric Sensors (Continued)

Part Number	Description	EMI Compensation	White Light Immunity	Operating Voltage	Applications
ZSFG223611	Premium dual-element sensor • Two elements: 0.75mm x 2.3mm spaced 0.6mm apart	Enhanced	Yes	1.0V–15V	• Battery-powered applications • Intrusion motion detectors • IP Cameras and Video Doorbells • Wall mount lighting/HVAC control
ZSFG469711	Premium dual-element sensor with circular element pattern • Two elements: Tapered circular shape • Provides circular ceiling mount pattern • Improved wall mount walk-up detection	Yes	—	1.0V–15V	• Battery powered applications • Ceiling mount 360o motion detectors • Intrusion motion detectors • Wall mount lighting/HVAC control
ZSBG446671	Premium quad-element sensor • Four elements: 1.0mm x 1.0mm, spaced 1.0mm apart • Symmetrical sensor organization	Yes	—	3.0V–10V	• Occupancy/ Vacancy sensors • Ceiling mount 360°motion detectors • Lighting and HVAC control

ZMOTION Pyroelectric Sensor Specifications

This chapter presents specifications for the pyroelectric sensors selected for the ZMOTION family of products. To see the specifications for lenses used in Zilog's ZMOTION Detection and Control and Intrusion Detection applications, refer to the ZMOTION Lenses Specification (PS0286).

ZRE200GE Sensor Specification

This section describes the specifications for the ZRE200GE passive infrared pyroelectric sensor.

Type of Sensor

Balanced differential (series-opposed type)

Physical Configuration

Package	TO-5 nickel-plated metal can with dimensions; see Side View, Figure 1 on page 6.
Element geometry	Two sensitive areas 2.0mm long, 1.0mm wide and spaced 1.0mm apart.
Element orientation	See Top View, Figure 1 on page 6.
Lead configuration	See Side and Base views, Figure 1 on page 6.

Electrical Characteristics @ 25 ±5°C

Circuit configuration	Three-terminal sensor with source follower; see Figure 2 on page 7.
Operating voltage	3–10V DC (Rs = 47KΩ).
Source voltage	0.3–1.5V; V_D = 5V, Rs = 47KΩ.
Signal output	Minimum 2.5V_{P-P}; typically 4.0V_{P-P}. Signal output is measured at a chopper frequency of 1Hz when connected to an amplifier with a gain of 72.5dB at 1Hz and submitted to an infrared energy emission of 13microW/cm^2 from a 420K black body. See Figure 3 on page 7.

Noise output	Max. 250 mV_{P-P}; typically 90 mV_{P-P}. Noise output should be measured for 20 seconds when connected to an amplifier with a gain of 72.5 dB at 1 Hz and shielded from infrared energy. See Figure 3 on page 7.
Balance output	Max. 15% [BO / |SA+SB|] ≤ 0.15, in which: BO = Balance Output SA = Signal output on Element A SB = Signal output on Element B Balance output is measured at a chopper frequency of 1 Hz when connected to an amplifier with a gain of 72.5 dB at 1 Hz and submitted to an infrared energy emission of 13 microW/cm2 from a 420 K black body. See Figure 3 on page 7.
Frequency response	0.3 Hz to 3.0 Hz / ±10 dB

Optical Characteristics

Field of view	138° from center of element on Axis X 125° from center of element on Axis Y See Field of View, Figure 1
Filter substrate	Silicon.
Cut on (5 %T ABS)	5.0 ±0.5 µm
Transmission	≥ 70%; average 7–14 µm

Environmental Requirements

Operating temperature	–30°C to +70°C
Storage temperature	–40°C to +80°C
Relative humidity	The sensor operates without an increase in noise output when continuously exposed to 90–95% RH at 30°C.
Hermetic seal	The sensor must be sealed to withstand a vacuum of 21.28 kPa.

RoHS Compliance

The ZRE200GE Sensor conforms to the RoHS directive in force at the date of issuance of this specification.

Figures 1 through 3 present mechanical drawings of the ZRE200GE pyroelectric sensor.

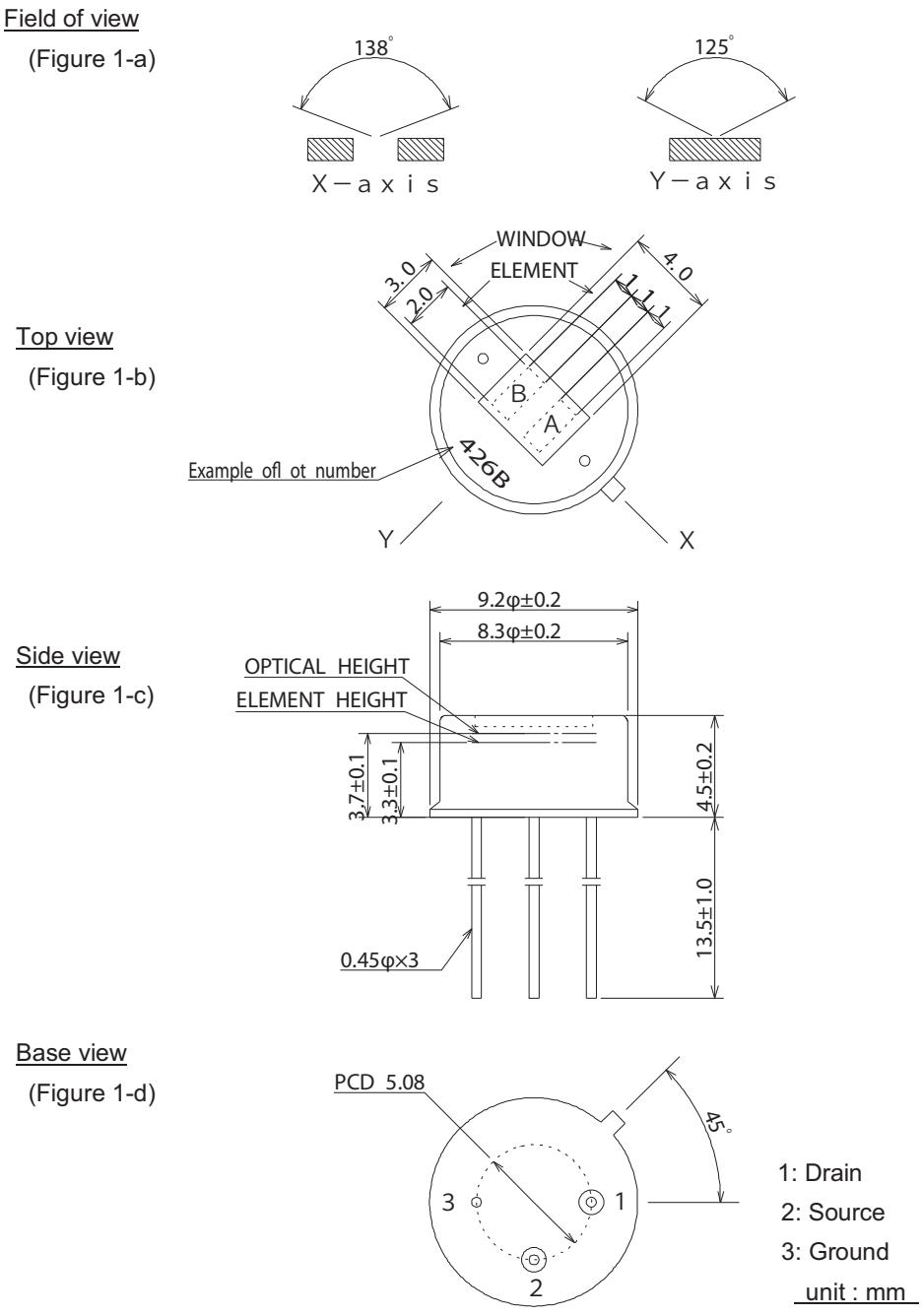
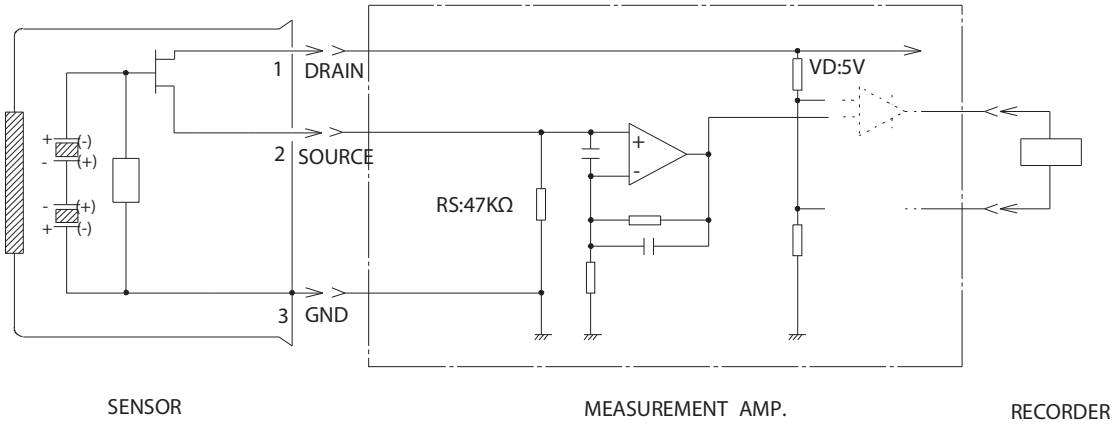


Figure 1. ZRE200GE Mechanical Configuration



Measurement Amp.: Non-inverted type, gain 72.5 dB at 1 Hz , 0.4 to 2.7 Hz／-3 dB

Figure 2. ZRE200GE Circuit Configuration

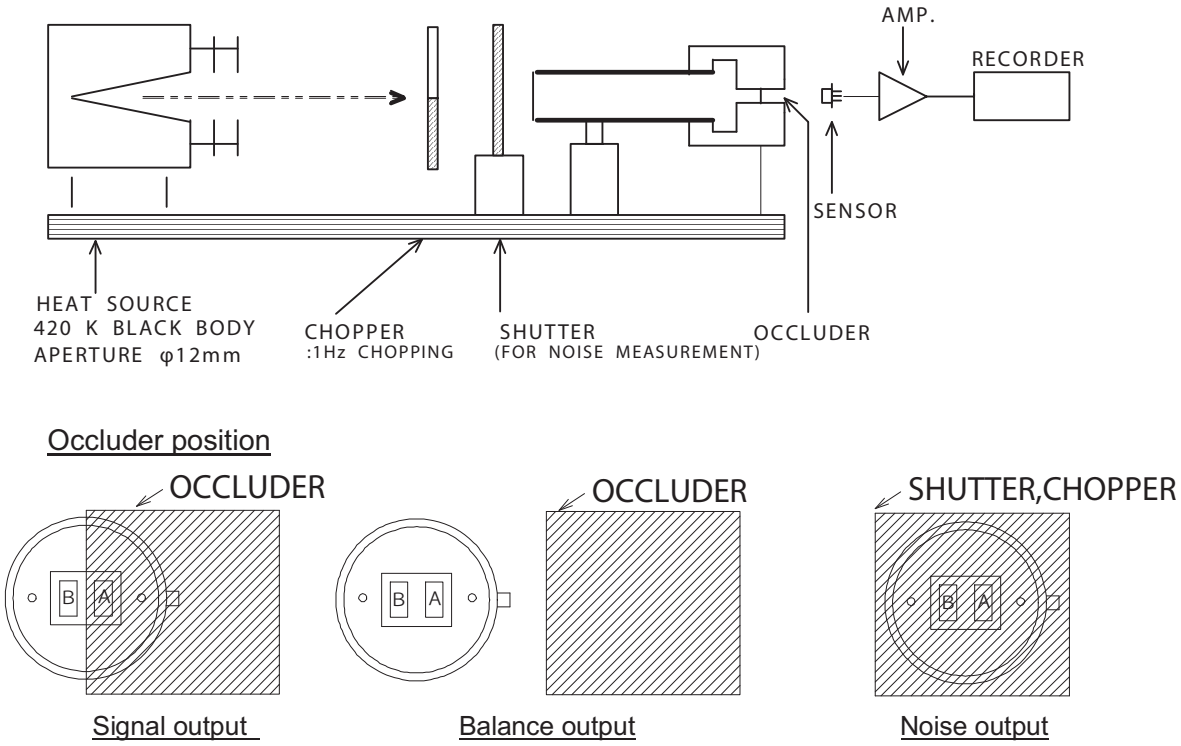


Figure 3. ZRE200GE Test Setup Block Diagram

ZSBG323671 and ZSBG323611PP Sensor Specification

This section describes the specifications for the ZSBG323671 and passive infrared pyroelectric sensor. The ZSBG323611PP is a special binned version of the sensor. All devices exhibit the same element polarity. When the element is subjected to an increase in heat energy ($\Delta T > 0$), the output signal polarity is positive. All other specifications are the same as the ZSBG323671.

Type of Sensor

Balanced differential (series-opposed type)

Physical Configuration

Package	TO-5 nickel-plated metal can with dimensions as shown in Side View, Figure 4 on page 10.
Element geometry	Two sensitive areas 2.3 mm long, 1.0 mm wide and spaced 1.0 mm apart.
Element orientation	See Top View, Figure 4 on page 10.
Lead configuration	See Side and Base views, Figure 4 on page 10.

Electrical Characteristics @ 25 ±5°C

Circuit configuration	Three-terminal sensor with source follower; see Figure 5 on page 11.
Operating voltage	ZSBG323671: 3–10 V DC (Rs: 470 KΩ) ZSBG323611PP: 1–15 V DC (Rs: 470 KΩ)
Source voltage	0.35–1.4 V (V_D: 5 V vs. 470 KΩ)
Signal output	Minimum 2.6 V_{P-P}; typically 4.0 V_{P-P}. Signal output is measured at a chopper frequency of 1 Hz when connected to an amplifier with a gain of 72.5 dB at 1 Hz and submitted to an infrared energy emission of 13 microW/cm^2 from a 420 K black body. See Figure 6 on page 11.
Noise output	Max. 250 mV_{P-P}; typically 90 mV_{P-P}. Noise output should be measured for 20 seconds when connected to an amplifier with a gain of 72.5 dB at 1 Hz and shielded from infrared energy. See Figure 6 on page 11.

Balance output	Max. 10%. [BO / |SA+SB|] ≤ 0.10, in which: BO = Balance Output SA = Signal output on Element A SB = Signal output on Element B Balance output is measured at a chopper frequency of 1 Hz when connected to an amplifier with a gain of 72.5 dB at 1 Hz and submitted to an infrared energy emission of 13 microW/cm2 from a 420 K black body. See Figure 6 on page 11.
Frequency response	0.3 Hz to 3.0 Hz / ±10 dB

Optical Characteristics

Field of view	134° from center of element on Axis X 120° from center of element on Axis Y See Field of View, Figure 4
Filter substrate	Silicon
Cut on (5 %T ABS)	5.5 ±0.5 µm
Transmission	≥ 70%; average 8–13 µm

Environmental Requirements

Operating temperature	–30°C to +70°C
Storage temperature	–40°C to +80°C
Relative humidity	The sensor operates without an increase in noise output when continuously exposed to 90–95% RH at 30°C.
Hermetic seal	The sensor must be sealed to withstand a vacuum of 21.28 kPa.

RoHS Compliance

The ZSBG323671 Sensor conforms to the RoHS directive in force at the date of issuance of this specification.

Mechanical Drawings

Figures 4 through 6 present mechanical drawings of the ZSBG323671 pyro sensor.

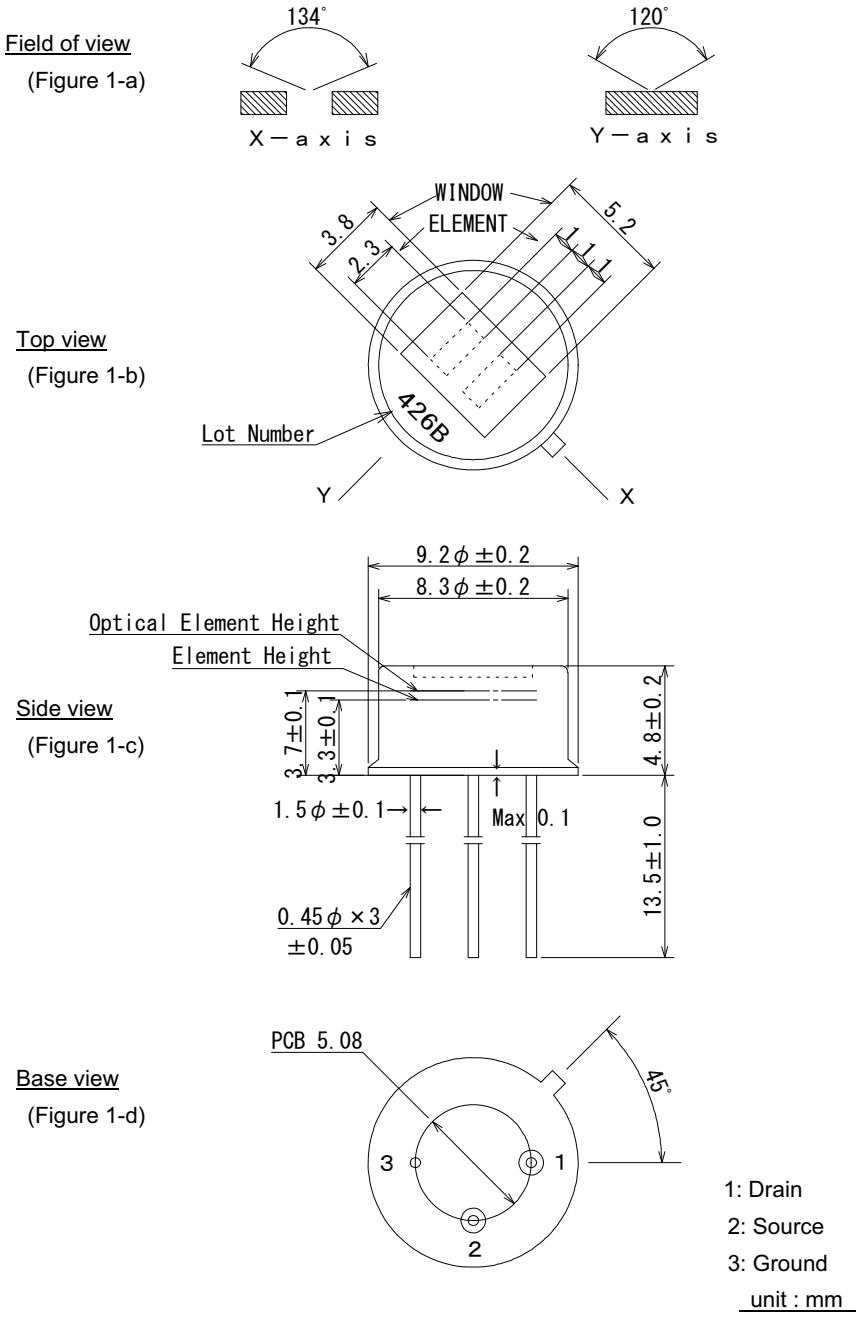
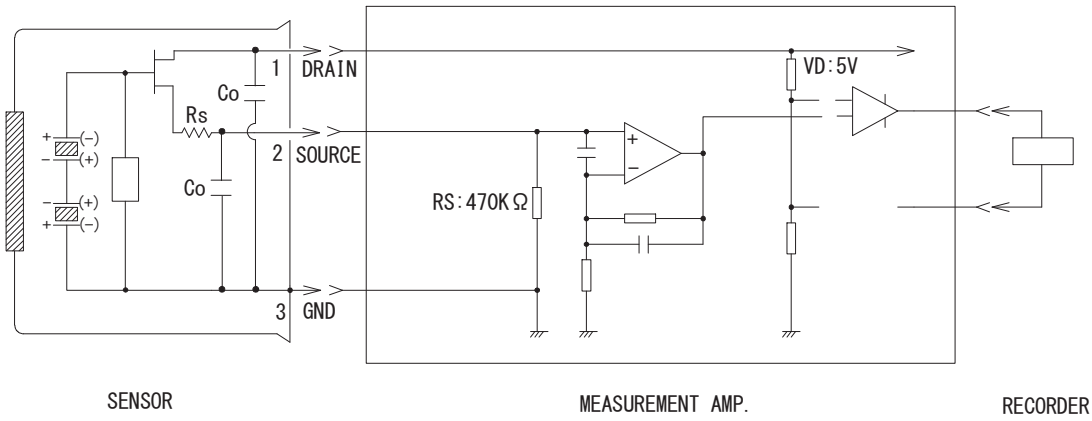


Figure 4. ZSBG323671 Mechanical Configuration



Measurement Amp.: Non-inverted type, gain 72.5 dB at 1 Hz, 0.4 to 2.7 Hz ／ –3 dB

Figure 5. ZSBG323671 Circuit Configuration

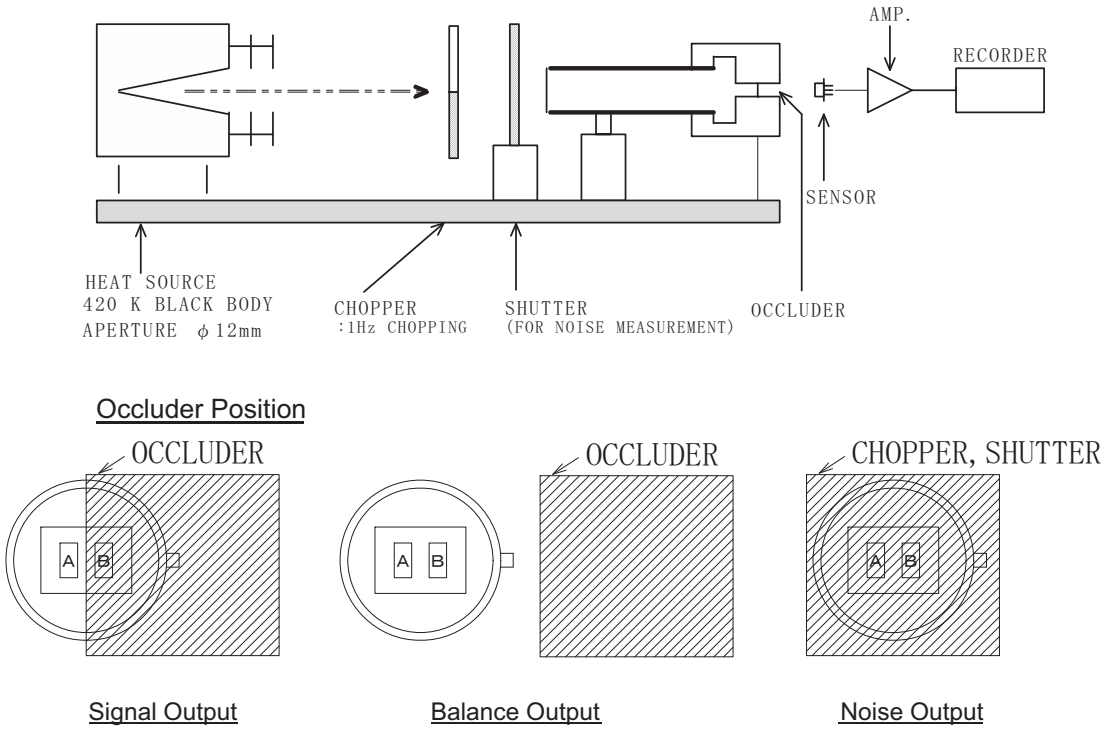


Figure 6. ZSBG323671 Test Setup Block Diagram

ZSFG323671 Sensor Specification

This section describes the specifications for the ZSFG323671 passive infrared pyroelectric sensor.

Type of Sensor

Balanced differential (series-opposed type)

Physical Configuration

Package	TO-5 nickel-plated metal can with dimensions as shown in Side View, Figure 7 on page 14
Element geometry	Two elements 0.75 mm * 2.3 mm and spaced 0.6 mm apart
Element orientation	See Top View, Figure 7 on page 14
Lead configuration	See Side and Base views, Figure 7 on page 14

Electrical Characteristics @ 25 ±5°C

Circuit configuration	Three-terminal sensor with source follower; see Figure 8 on page 15.
Operating voltage	3–10 V DC (Rs: 470 KΩ)
Source voltage	0.35–1.4 V (Vd: 5V vs. 470 KΩ)
Signal output	Min. 2.0 Vp-p; typically 3.5 Vp-p. (S1, S2) signal output is measured at a chopper frequency of 1 Hz when connected to an amplifier with a gain of 72.5 dB at 1 Hz and submitted to an infrared energy emission of 13 microW/cm^2 from a 420 K black body; see Figure 9 on page 16

Noise output	Max. 250 mV_{P-P}; typically 70 mV_{P-P}. Noise output should be measured for 20 seconds when connected to an amplifier with a gain of 72.5 dB at 1 Hz and shielded from infrared energy; see Figure 9 on page 16
Balance output	Max. 10% [BO/|SA+SB|] ≤ 0.15 BO = Balance Output SA = signal output on Element A SB = signal output on Element B Balance output is measured at a chopper frequency of 1 Hz when connected to an amplifier with a gain of 72.5 dB at 1 Hz and submitted to an infrared energy emission of 13 microW/cm2 from a 420 K black body. See Figure 9 on page 16.

Optical Characteristics

Field of view	134° from center of element on Axis X 120° from center of element on Axis Y See Field of View, Figure 7.
Filter substrate	Silicon
Cut on (5 %T ABS)	5.0 ± 1.0 µm
Transmission	≥ 70%; average 8–13 µm

Environmental Requirements

Operating temperature	–40°C to +70°C
Storage temperature	–40°C to +80°C
Relative humidity	The sensor operates without an increase in noise output when continuously exposed to 90–95% RH at 30°C.

RoHS Compliance

The ZSFG323671 Sensor conforms to the RoHS directive in force at the date of issuance of this specification.

Mechanical Drawings

Figures 7 through 9 present mechanical drawings of the ZSFG323671 pyro sensor.

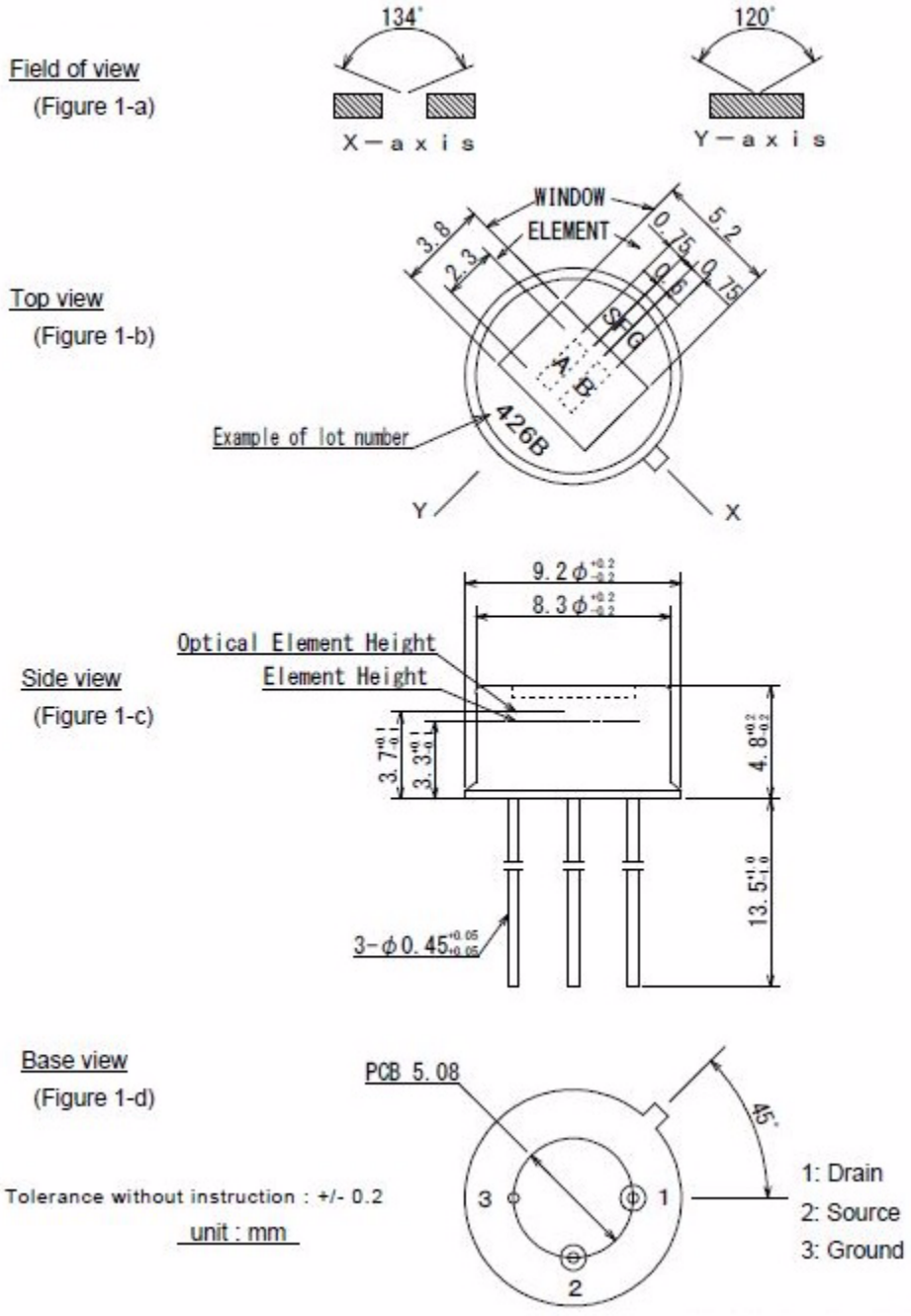


Figure 7. ZSFG323671 Mechanical Configuration

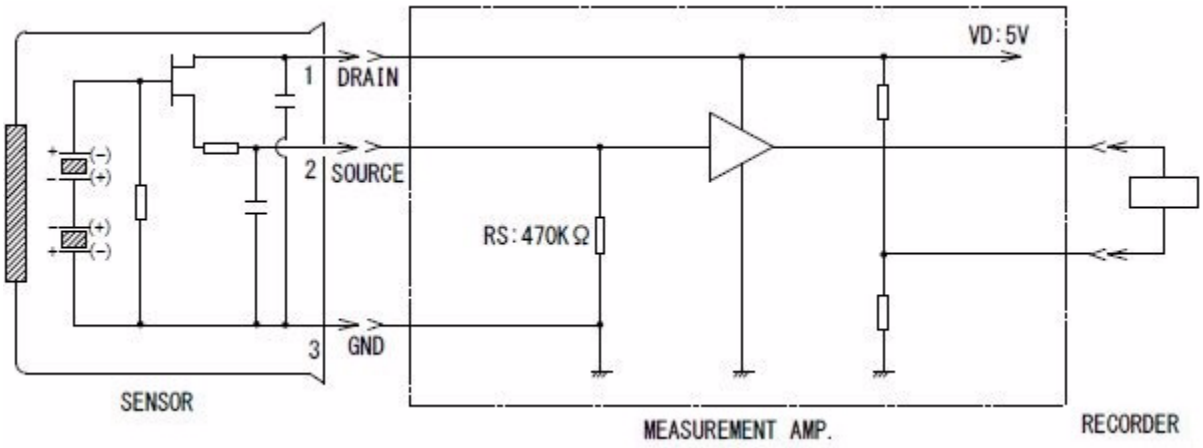


Figure 8. ZSFG323671 Circuit Configuration

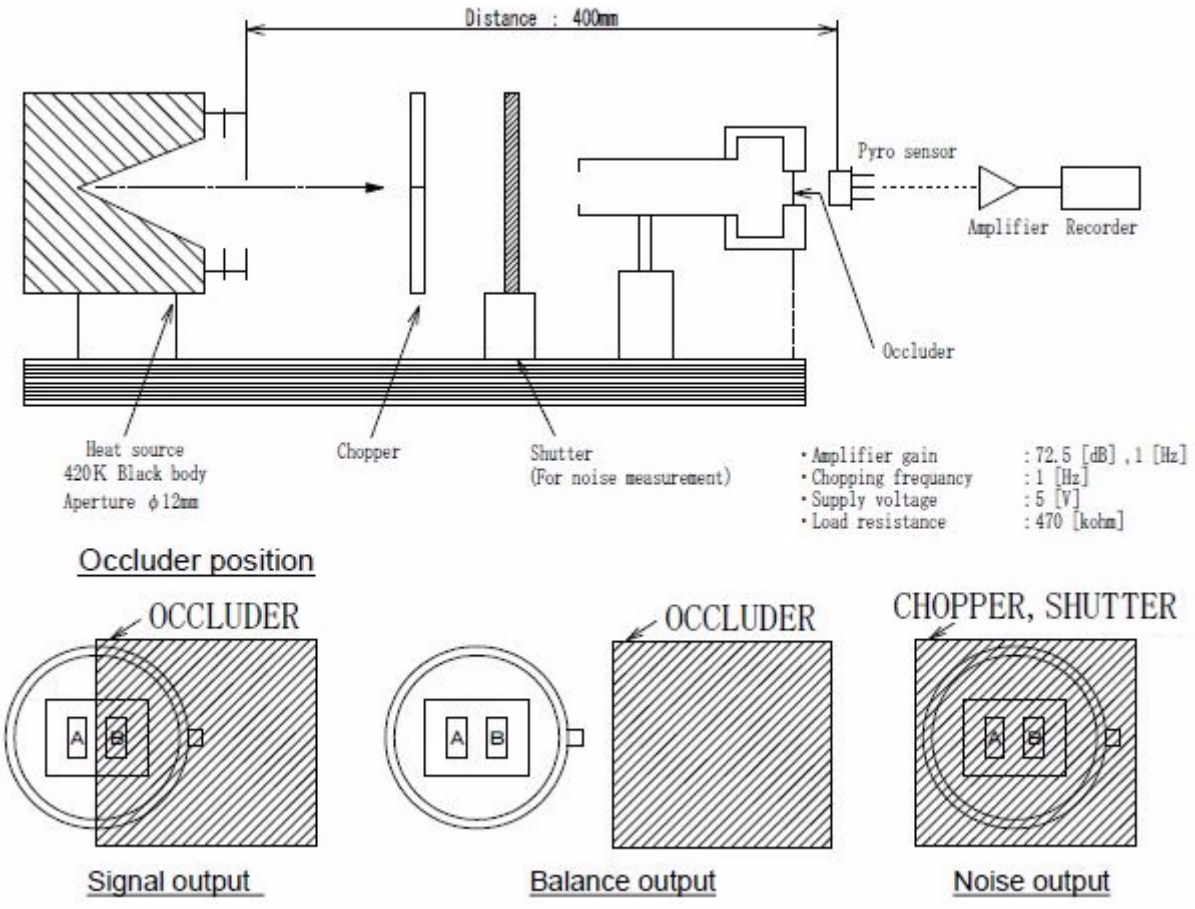


Figure 9. ZSFG323671 Test Setup Block Diagram

ZSFG223611 Sensor Specification

This section describes the specifications for the ZSFG223611 passive infrared pyroelectric sensor.

Type of Sensor

Balanced differential (series-opposed type)

Physical Configuration

Package	TO-5 nickel-plated metal can with dimensions as shown in Side View, Figure 10 on page 19.
Element geometry	Two elements 0.75 mm long, 2.3 mm wide and spaced 1.0 mm apart.
Element orientation	See Top View, Figure 10 on page 19.
Lead configuration	See Side and Base views, Figure 10 on page 19.

Electrical Characteristics @ 25 ±5°C

Circuit configuration	Three-terminal sensor with source follower; see Figure 11 on page 20.
Operating voltage	1–15 V DC (Rs: 470 KΩ)
Source voltage	0.3–1.4 V (V_D: 5 V, 470 KΩ)
Signal output	Minimum 2.5 V_{P-P}; typically 3.5.0 V_{P-P}. Signal output is measured at a chopper frequency of 1 Hz when connected to an amplifier with a gain of 72.5 dB at 1 Hz and submitted to an infrared energy emission of 13 microW/cm^2 from a 420 K black body. See Figure 12 on page 21.
Noise output	Max. 250 mV_{P-P}; typically 90 mV_{P-P}. Noise output should be measured for 20 seconds when connected to an amplifier with a gain of 72.5 dB at 1 Hz and shielded from infrared energy. See Figure 12 on page 21.

Balance output	Max. 15% [BO/|SA+SB|] ≤ 0.10 BO = Balance Output SA = signal output on Element A SB = signal output on Element B Balance output is measured at a chopper frequency of 1 Hz when connected to an amplifier with a gain of 72.5 dB at 1 Hz and submitted to an infrared energy emission of 13 microW/cm2 from a 420 K black body. See Figure 12 on page 21.

Optical Characteristics

Field of view	145° from center of element on Axis X 136° from center of element on Axis Y See Field of View, Figure 10
Filter substrate	Silicon
Cut on (5 %T ABS)	5.5 ± 1.0 µm
Transmission	≥ 70%; average 8–13 µm

Environmental Requirements

Operating temperature	–50°C to +70°C
Storage temperature	–50°C to +80°C
Operating humidity	90–95% RH or less at 30°C
Storage humidity	90–95% RH or less at 30°C

RoHS Compliance

The ZSFG223611 Sensor conforms to the RoHS directive in force at the date of issuance of this specification.

Mechanical Drawings

Figures 10 through 12 present mechanical drawings of the ZSFG223611 pyro sensor.

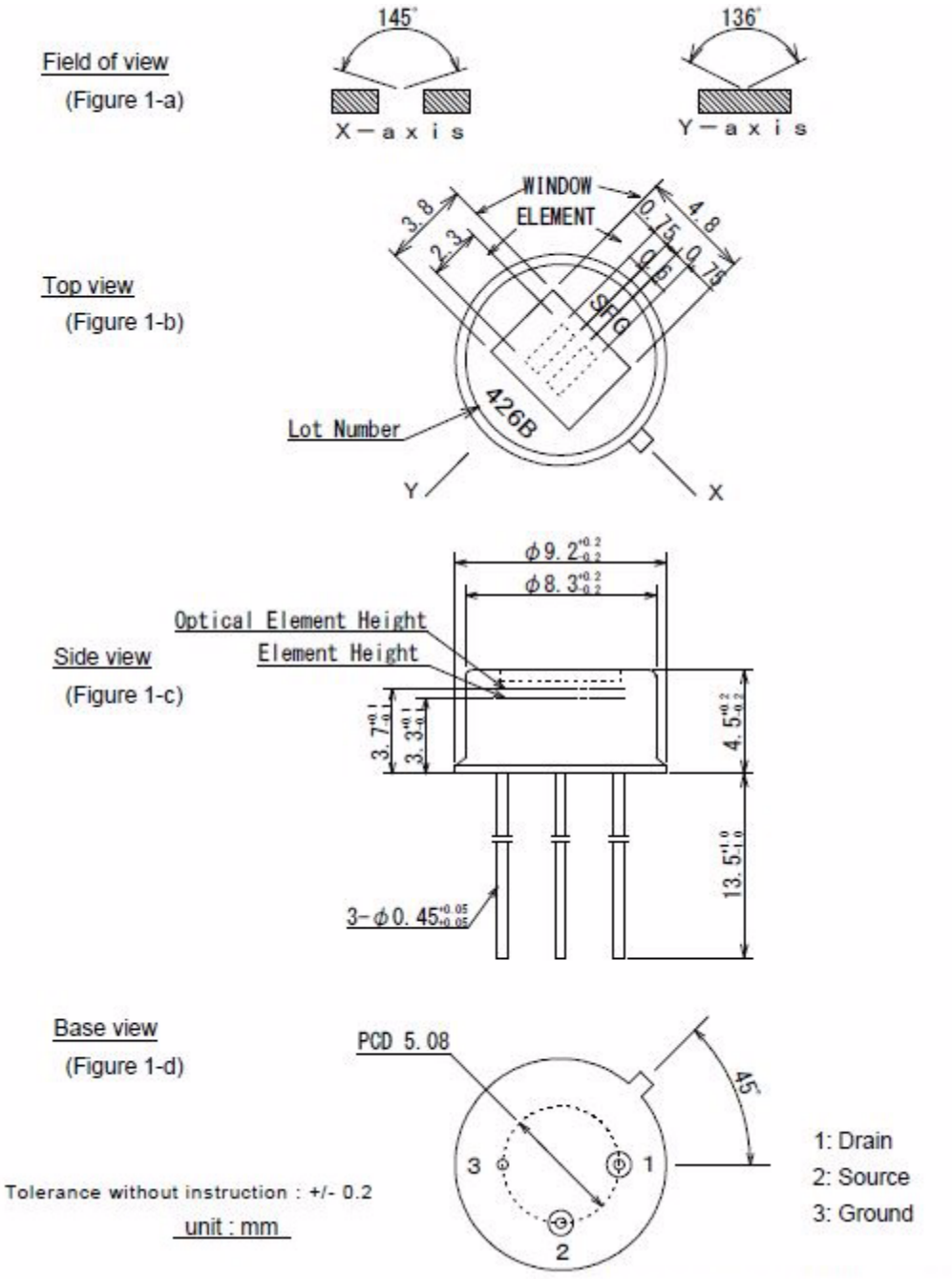


Figure 10. ZSFG223611 Mechanical Configuration

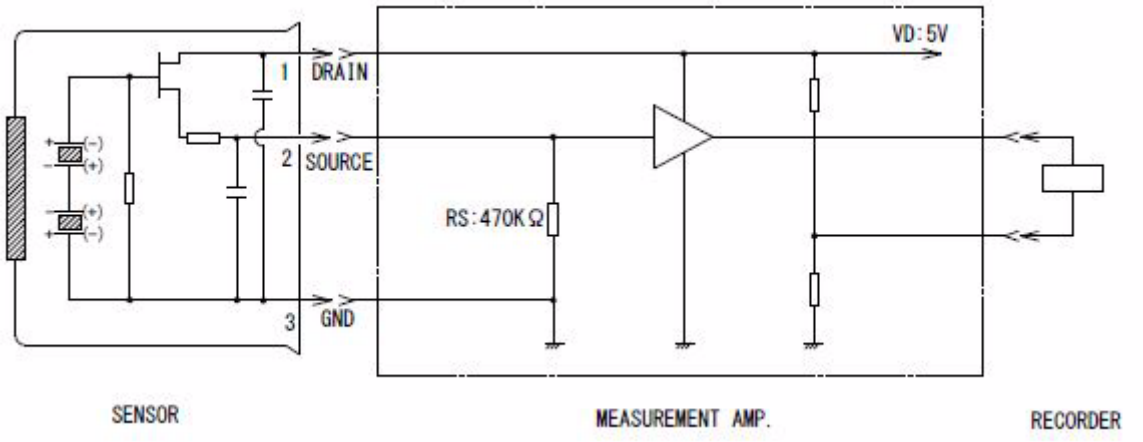


Figure 11. ZSFG223611 Circuit Configuration

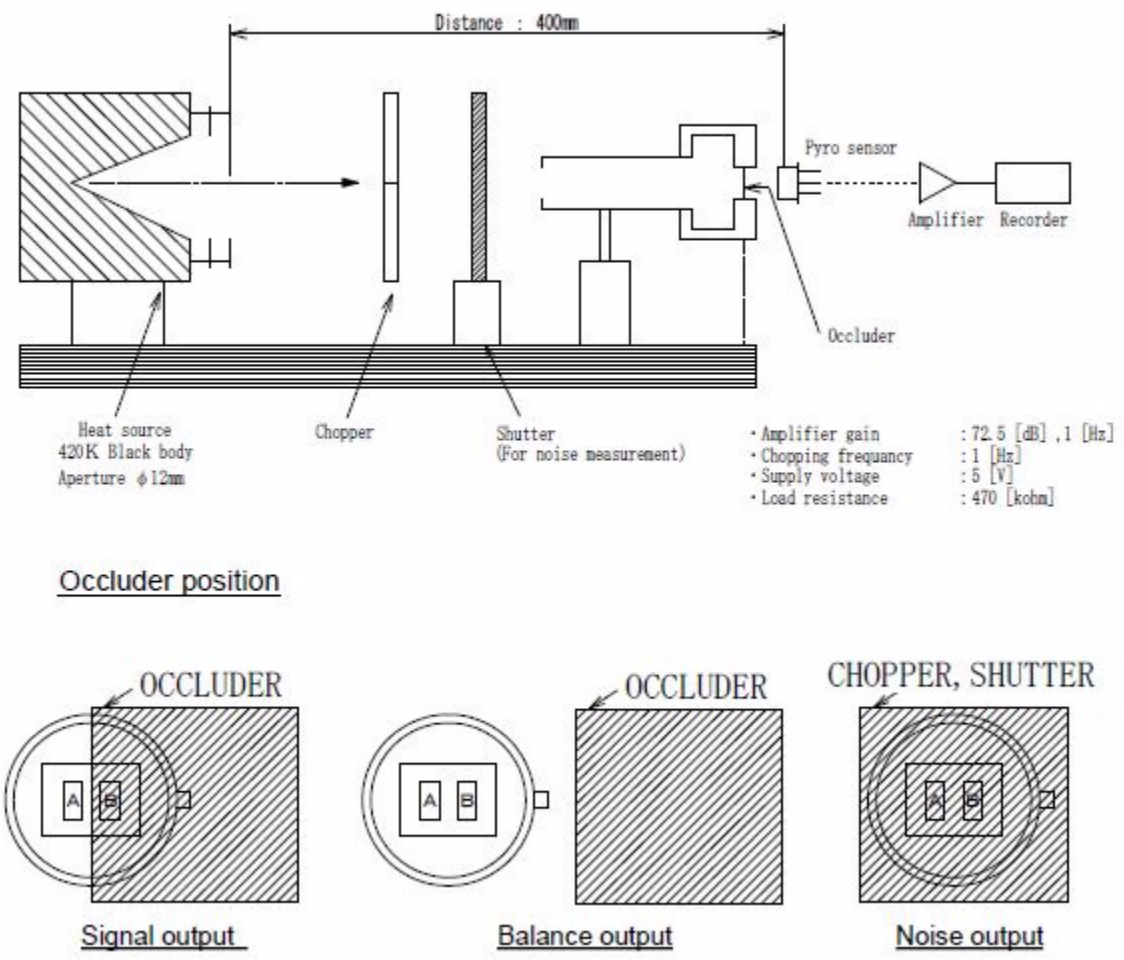


Figure 12. ZSFG223611 Test Setup Block Diagram

ZSFG469711 Sensor Specification

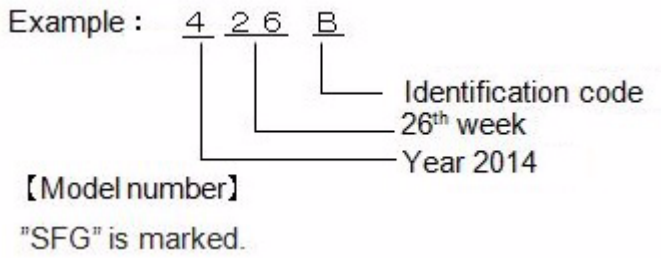
This section describes the specifications for the ZSFG469711 passive infrared pyroelectric sensor.

Type of Sensor

Balanced differential (series-opposed type)

Physical Configuration

Package	TO-5 metal can with dimensions shown in Figure 1-c (Ni-plated).
Element geometry	Two sensitive areas 7.24 mm2.
Element orientation	See Figure 13 on page 24.
Lead configuration	See Figure 13 on page 24.
Code	Lot number is marked on top surface of detector. To show last one digit of the A.D. year and week of the year of an inspection completion Identification code.



Electrical Characteristics @ 25 ±5°C

Circuit configuration	Three-terminal sensor with source follower. See Figure 14 on page 25.
Operating voltage	1 ~ 15 V dc (Rs: 470kohm).
Source voltage	0.3 ~ 1.4 V (Vd: 5V, Rs: 470kohm).
Signal output	Min. 3.0 Vp-p (Typ. 5.0 Vp-p). Signal output is measured at chopper frequency of 1 Hz when connected to the amplifier of gain 72.5 dB (at 1 Hz) and submitted to the emission of Infrared energy of 13 microW/cm2 from 420 K Black Body. See Figure 15 on page 26.

Noise output	Max. 200 mVp-p (Typ. 60 mVp-p). Noise output shall be measured for 20 seconds when connected to the amplifier of gain 72.5 dB (at 1 Hz) and shut out from Infrared energy. See Figure 15 on page 26.
Balance output	Max. 20 % [Bo / |SA+SB| ≤ 0.20. Bo : Balance output. SA : Signal output on Element A. SB : Signal output on Element B. Balance output is measured at chopper frequency of 1 Hz when connected to the amplifier of gain 72.5 dB (at 1 Hz) and submitted to the emission of Infrared energy of 13 microW/cm2 from 420 K Black Body. See Figure 15 on page 26.
Frequency response	0.3 Hz to 3.0 Hz / (+/-) 10 dB.

Optical Characteristics

Field of view	132° from center of element on axis X. 146° from center of element on axis Y. See Figure 13 on page 24.
Filter substrate	Silicon.
Cut on (5 %T ABS)	5 (+/-) 1 micron.
Transmission	≥ 70 % average 8 to 13 micron.

Environmental Requirements

Operating Temperature	–40°C to +85°C.
Storage Temperature	–40°C to +85°C.
Relative Humidity	The sensor shall operate without increase in noise output when exposed to 90 ~ 95 % RH at 30°C continuously.
Hermetic Seal	The sensor shall be sealed to withstand a vacuum of 21.28 kPa.

RoHS Compliance

The ZSFG469711 Sensor conforms to the RoHS directive in force at the date of issuance of this specification.

Mechanical Drawings

Figures 13 through 15 present mechanical drawings of the ZSFG469711 pyro sensor.

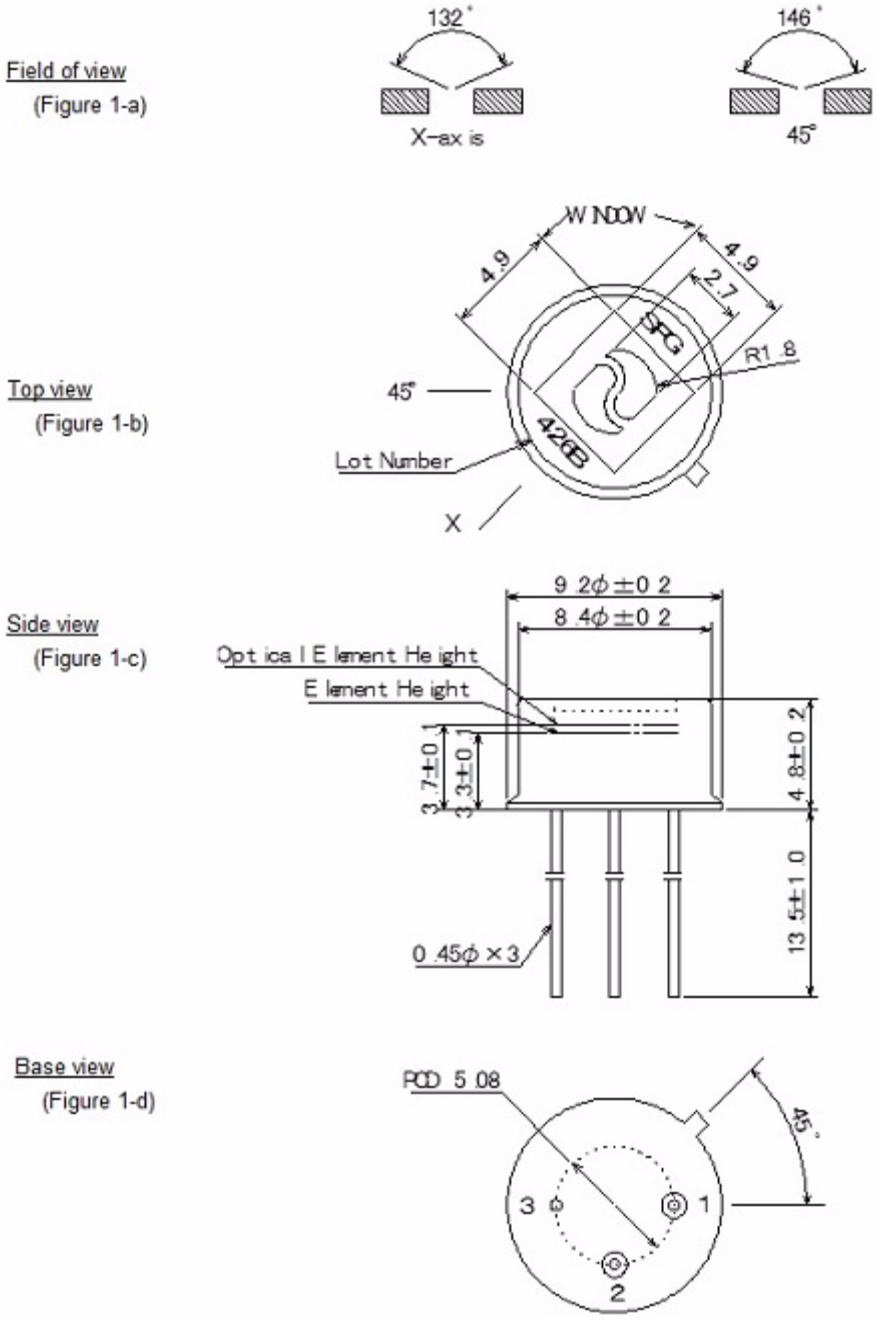
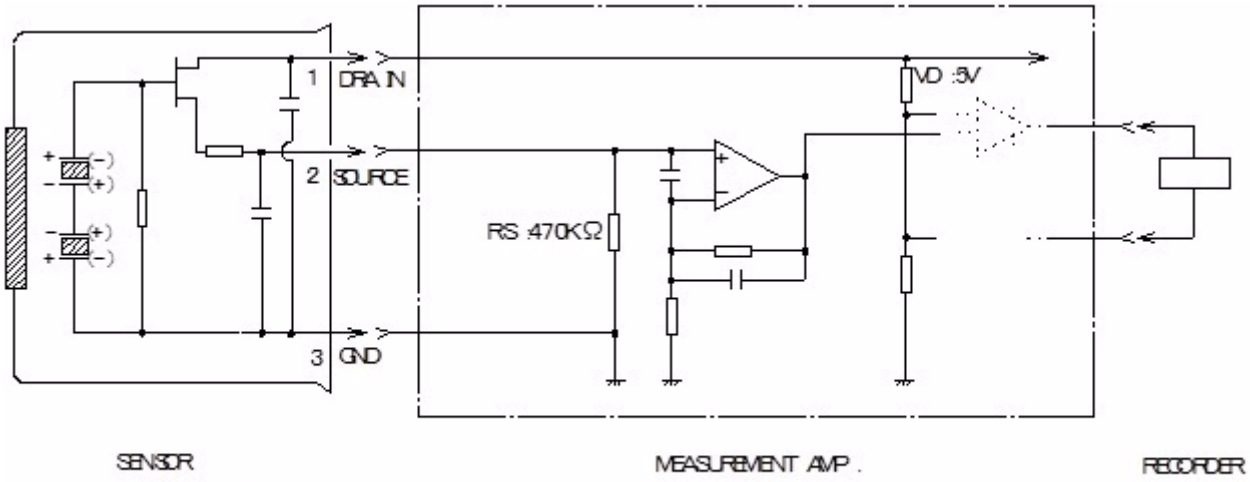


Figure 13. ZSFG469711 Mechanical Configuration



Measurement Amp.: Non-inverted type, gain 72.5 dB at 1 Hz , 0.4 to 2.7 Hz／–3 dB

Figure 14. ZSFG469711 Circuit Configuration

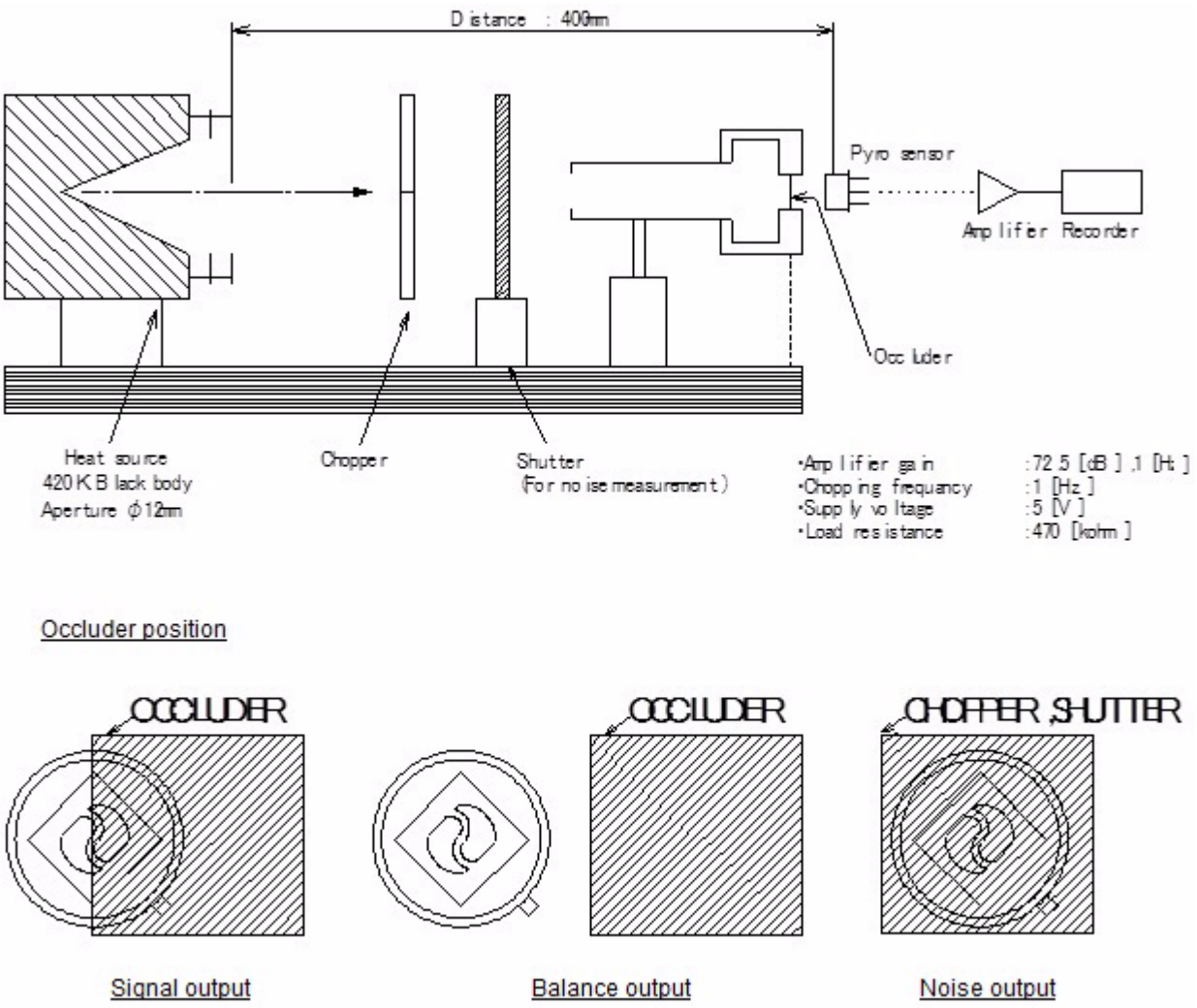


Figure 15. ZSFG469711 Test Setup Block Diagram

ZSBG446671 Sensor Specification

This section describes the specifications for the ZSBG446671 passive infrared pyroelectric sensor.

Type of Sensor

Balanced differential (series-opposed type)

Physical Configuration

Package	TO-5 nickel-plated metal can with dimensions as shown in Side View, Figure 16 on page 29.
Element geometry	Four sensitive areas 1.0 mm * 1.0 mm and spaced 1.0 mm apart.
Element orientation	See Top View, Figure 16 on page 29.
Lead configuration	See Side and Base views, Figure 16 on page 29.

Electrical Characteristics @ 25 ±5°C

Circuit configuration	Three-terminal sensor with source follower; see Figure 17 on page 30.
Operating voltage	3–10 V DC (Rs: 470 KΩ).
Element polarity	Element A,C:(+) B,D:(–) or A,C:(–) B,D:(+).
Source voltage	0.35–1.4 V (Vd: 5V vs. 470 KΩ).
Signal output	Min. 4.5 Vp-p; typically 6.5 Vp-p. (S1, S2) signal output is measured at a chopper frequency of 1 Hz when connected to an amplifier with a gain of 72.5 dB at 1 Hz and submitted to an infrared energy emission of 13 microW/cm^2 from a 420 K black body; see Figure 18 on page 31.
Noise output	Max. 250 mV_{P-P}; typically 90 mV_{P-P}. Noise output should be measured for 20 seconds when connected to an amplifier with a gain of 72.5 dB at 1 Hz and shielded from infrared energy; see Figure 18 on page 31.

Balance output	Max. 15%. [|S1–S2| / |S1+S2|] ≤ 0.15 S1 = signal output on Elements A + C S2 = signal output on Elements B + D Balance output is measured at a chopper frequency of 1 Hz when connected to an amplifier with a gain of 72.5 dB at 1 Hz and submitted to an infrared energy emission of 13 microW/cm2 from a 420 K black body. See Figure 18 on page 31.
Frequency response	0.3 Hz to 3.0 Hz / ±10 dB.

Optical Characteristics

Field of view	132° from center of element on Axis X. 146° from center of element on 45°. See Field of View, Figure 4.
Filter substrate	Silicon.
Cut on (5 %T ABS)	5.5 ±0.5 µm.
Transmission	≥ 70%; average 8–13 µm.

Environmental Requirements

Operating temperature	–30°C to +70°C.
Storage temperature	–40°C to +80°C.
Relative humidity	The sensor operate without an increase in noise output when continuously exposed to 90–95% RH at 30°C.
Hermetic seal	The sensor must be sealed to withstand a vacuum of 21.28 kPa.

RoHS Compliance

The ZSBG446671 Sensor conforms to the RoHS directive in force at the date of issuance of this specification.

Mechanical Drawings

Figures 7 through 9 present mechanical drawings of the ZSBG446671 pyro sensor.

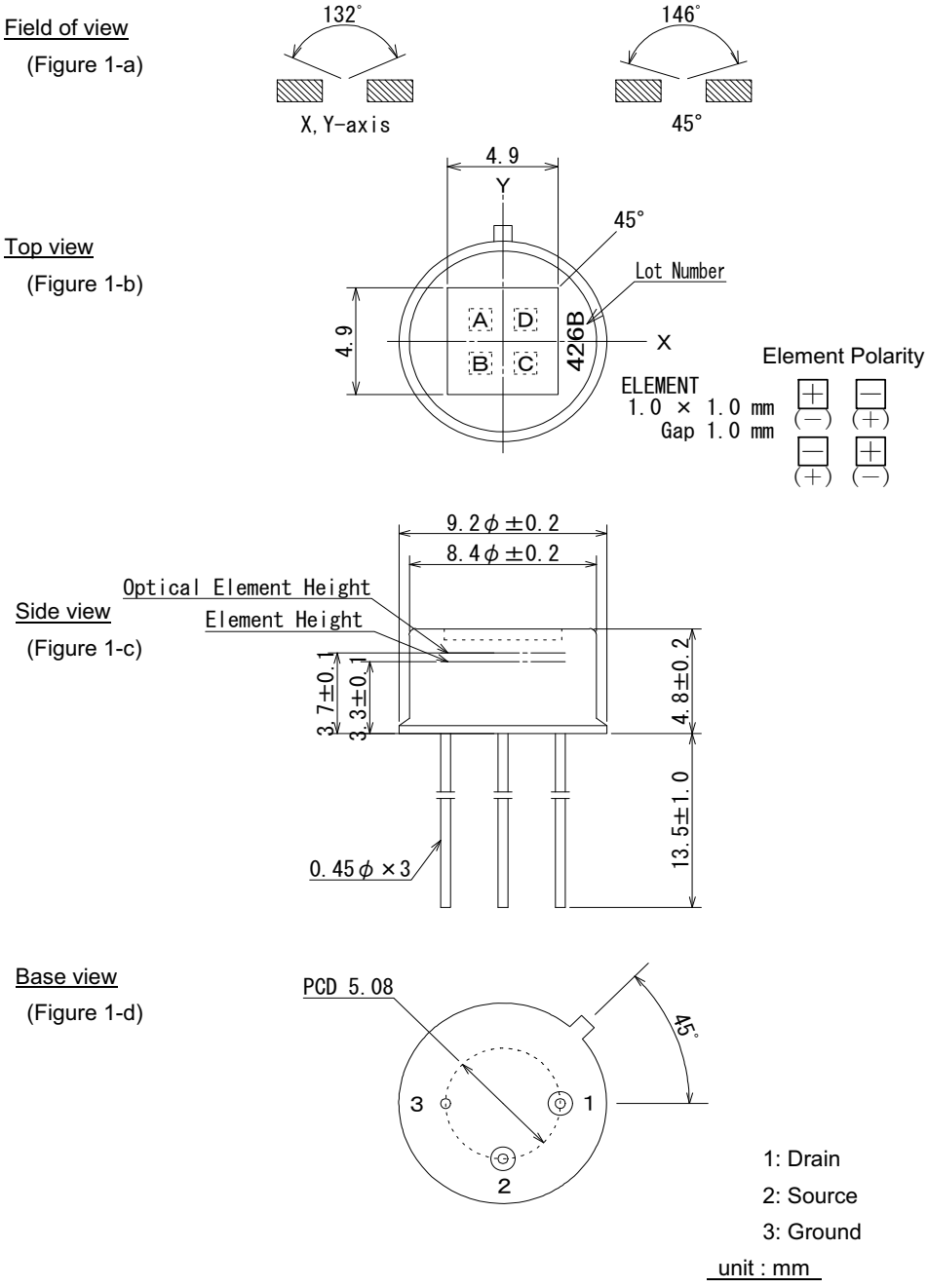
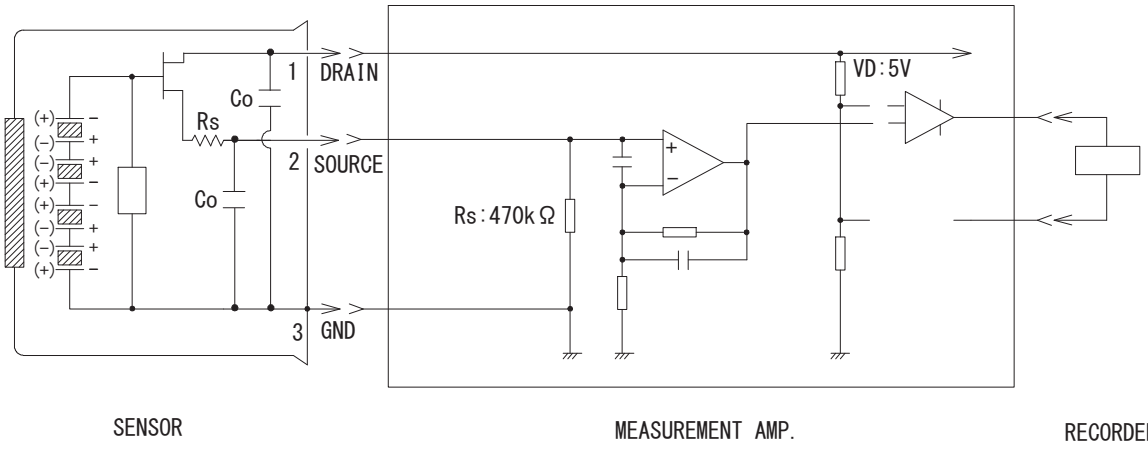


Figure 16. ZSBG446671 Mechanical Configuration



Measurement Amp.: Non-inverted type, gain 72.5 dB at 1 Hz , 0.4 to 2.7 Hz ／–3 dB

Figure 17. ZSBG446671 Circuit Configuration

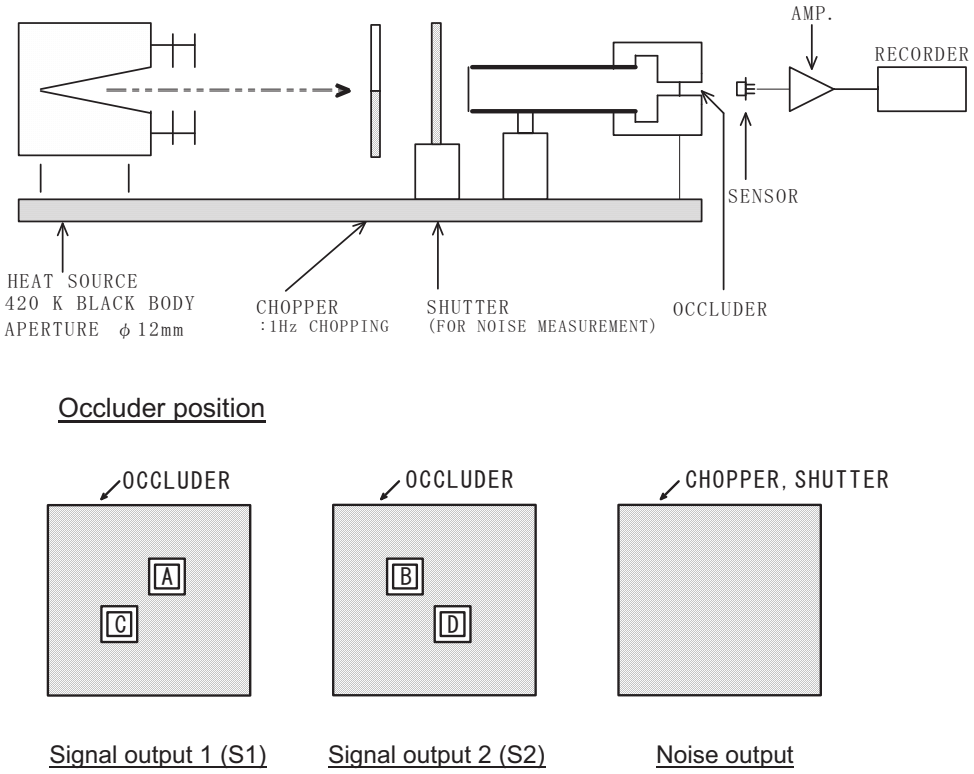


Figure 18. ZSBG446671 Test Setup Block Diagram

Precautions

This chapter presents restrictions and precautions that apply to ZMOTION 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 design with drip-proof, anti-dew construction materials.

Usage Restrictions and Precautions

To prevent sensor malfunctions, operational failure, or any deterioration of their characteristics, do not operate these ZMOTION 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
- When exposed to direct sunlight or automobile headlights
- When exposed to directly to forced-air currents from a heater or air conditioner

Assembly Restrictions and Precautions

Soldering:

- Use soldering irons when soldering
- Avoid extended durations of heat on the sensors' pins, because excessive heat may cause deterioration of the sensor (e.g., durations beyond 5 seconds at 350°C)

Washing:

- Be sure to wash out all flux after soldering, because remaining solder materials may cause malfunctions

- Use a brush when washing; washing with an ultrasonic cleaner may cause operational failure

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

Restrictions on Product Use

The products described in this document shall not be used or embedded into any downstream products for which their manufacture, use, and/or sale are prohibited under any applicable laws and regulations.

Sensor troubles resulting from misuse and/or inappropriate handling or storage are not the manufacturer's responsibility.

Related Documents

Additional information about the ZMOTION Families of Motion Detection MCUs can be found in the documents listed in Table 2, which are available from the Zilog website at www.zilog.com.

Table 2. Related Documents

Document Number	Description
PS0228	Z8 Encore! XP® F082A Series Product Specification
PB0258	ZMOTION Product Brief
PS0285	ZMOTION Detection and Control Family Product Specification
PS0286	ZMOTION Lenses Product Specification
PS0288	ZMOTION Intrusion Detection Product Specification
AN0307	ZMOTION Detection Module Application Walkthrough
AN0309	ZMOTION High Brightness White LED Lighting Application Note
WP0017	A New PIR Motion Detection Architecture White Paper
WP0018	ZMOTION Detection Lens and Pyro Sensor Configuration Guide
Other ZMOTION Family Products	
PB0244	ZMOTION Detection Module II Product Brief
PS0305	ZMOTION Detection Module II Product Specification

Customer Support

To share comments, get your technical questions answered, or report issues you may be experiencing with our products, please visit Zilog's Technical Support page at http://support.zilog.com.

To learn more about this product, find additional documentation, or to discover other facets about Zilog product offerings, please visit the Zilog Knowledge Base at http://zilog.com/kb or consider participating in the Zilog Forum at http://zilog.com/forum.

This publication is subject to replacement by a later edition. To determine whether a later edition exists, please visit the Zilog website at http://www.zilog.com.