ZMOTION® Pyroelectric Sensors

Product Specification

PS033606-0219

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As used herein

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# 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.

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision Level</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
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<td>Added the ZSFG323671 and ZSFG223611 PIR sensors to Table 1. Added a section for each of these sensors to describe configuration and characteristics.</td>
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<td>All</td>
</tr>
</tbody>
</table>
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
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Requirements</td>
<td>18</td>
</tr>
<tr>
<td>RoHS Compliance</td>
<td>18</td>
</tr>
<tr>
<td>Mechanical Drawings</td>
<td>19</td>
</tr>
<tr>
<td>ZSFG469711 Sensor Specification</td>
<td>22</td>
</tr>
<tr>
<td>Type of Sensor</td>
<td>22</td>
</tr>
<tr>
<td>Physical Configuration</td>
<td>22</td>
</tr>
<tr>
<td>Electrical Characteristics @ 25 ±5°C</td>
<td>22</td>
</tr>
<tr>
<td>Optical Characteristics</td>
<td>23</td>
</tr>
<tr>
<td>Environmental Requirements</td>
<td>23</td>
</tr>
<tr>
<td>RoHS Compliance</td>
<td>23</td>
</tr>
<tr>
<td>Mechanical Drawings</td>
<td>24</td>
</tr>
<tr>
<td>ZSBG446671 Sensor Specification</td>
<td>27</td>
</tr>
<tr>
<td>Type of Sensor</td>
<td>27</td>
</tr>
<tr>
<td>Physical Configuration</td>
<td>27</td>
</tr>
<tr>
<td>Electrical Characteristics @ 25 ±5°C</td>
<td>27</td>
</tr>
<tr>
<td>Optical Characteristics</td>
<td>28</td>
</tr>
<tr>
<td>Environmental Requirements</td>
<td>28</td>
</tr>
<tr>
<td>RoHS Compliance</td>
<td>28</td>
</tr>
<tr>
<td>Mechanical Drawings</td>
<td>28</td>
</tr>
<tr>
<td>Precautions</td>
<td>32</td>
</tr>
<tr>
<td>Design Restrictions and Precautions</td>
<td>32</td>
</tr>
<tr>
<td>Usage Restrictions and Precautions</td>
<td>32</td>
</tr>
<tr>
<td>Assembly Restrictions and Precautions</td>
<td>32</td>
</tr>
<tr>
<td>Handling and Storage Restrictions and Precautions</td>
<td>33</td>
</tr>
<tr>
<td>Restrictions on Product Use</td>
<td>33</td>
</tr>
<tr>
<td>Related Documents</td>
<td>34</td>
</tr>
<tr>
<td>Customer Support</td>
<td>35</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>EMI Compensation</th>
<th>White Light Immunity</th>
<th>Operating Voltage</th>
<th>Applications</th>
</tr>
</thead>
</table>
| ZRE200GE    | Basic dual-element sensor | — | — | 3.0V–10V | • General-purpose motion detectors  
• Wall mount lighting/HVAC control |
|             | • Two elements: 1.0mm x 2.0mm, spaced 1.0mm apart | | | | |
| ZSBG323671  | Premium dual-element sensor | Yes | — | ZSBG323671 3.0V–10V | • Battery-powered applications (PP)  
• Intrusion motion detectors  
• IP Cameras and Video Doorbells  
• Wall mount lighting/HVAC control  
• Multi-PIR zone detection (PP) |
| ZSBG323671PP| | | | ZSBG323671PP 1.0V–15V | |
|             | • Two elements: 1.0mm x 2.3mm, spaced 1.0mm apart  
• PP version is polarity matched | | | |
| ZSFG323671  | Premium dual-element sensor | Enhanced | Yes | 3.0V–10V | • Intrusion motion detectors  
• IP Cameras and Video Doorbells  
• Wall mount lighting/HVAC control |
<p>|             | • Two elements: 0.75mm x 2.3mm spaced 0.6mm apart | | | | |</p>
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>EMI Compensation</th>
<th>White Light Immunity</th>
<th>Operating Voltage</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZSFG223611</td>
<td>Premium dual-element sensor</td>
<td>Enhanced</td>
<td>Yes</td>
<td>1.0V–15V</td>
<td>• Battery-powered applications • Intrusion motion detectors • IP Cameras and Video Doorbells • Wall mount lighting/HVAC control</td>
</tr>
<tr>
<td></td>
<td>• Two elements: 0.75mm x 2.3mm spaced 0.6mm apart</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZSFG469711</td>
<td>Premium dual-element sensor with circular element pattern</td>
<td>Yes</td>
<td>—</td>
<td>1.0V–15V</td>
<td>• Battery powered applications • Ceiling mount 360° motion detectors • Intrusion motion detectors • Wall mount lighting/HVAC control</td>
</tr>
<tr>
<td></td>
<td>• Two elements: Tapered circular shape</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Provides circular ceiling mount pattern</td>
<td></td>
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<tr>
<td></td>
<td>• Improved wall mount walk-up detection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZSBG446671</td>
<td>Premium quad-element sensor</td>
<td>Yes</td>
<td>—</td>
<td>3.0V–10V</td>
<td>• Occupancy/Vacancy sensors • Ceiling mount 360° motion detectors • Lighting and HVAC control</td>
</tr>
<tr>
<td></td>
<td>• Four elements: 1.0mm x 1.0mm, spaced 1.0mm apart</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Symmetrical sensor organization</td>
<td></td>
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</table>
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 2.0 mm long, 1.0 mm wide and spaced 1.0 mm 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: 3–10 V DC (Rs = 47 KΩ).
- Source voltage: 0.3–1.5 V; V_D = 5 V, Rs = 47 KΩ.
- Signal output: Minimum 2.5 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/cm² from a 420 K 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%

\[ \frac{BO}{|SA + SB|} \leq 0.15, \text{ in which:} \]
- 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 420K 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.

**Field of view**
(Figure 1-a)

**Top view**
(Figure 1-b)

**Side view**
(Figure 1-c)

**Base view**
(Figure 1-d)

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 Vp.p.; typically 4.0 Vp.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 mVp.p.; typically 90 mVp.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%.

\[ \frac{BO}{|SA + SB|} \leq 0.10, \text{ in which:} \]
- \( BO = \) 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 420K 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.

Field of view
(Figure 1-a)

Top view
(Figure 1-b)

Side view
(Figure 1-c)

Base view
(Figure 1-d)

Figure 4. ZSBG323671 Mechanical Configuration
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

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

Electrical Characteristics @ 25 ±5°C

<table>
<thead>
<tr>
<th>Circuit configuration</th>
<th>Three-terminal sensor with source follower; see <strong>Figure 8 on page 15</strong>.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>3–10 V DC (Rs: 470 kΩ)</td>
</tr>
<tr>
<td>Source voltage</td>
<td>0.35–1.4 V (Vd: 5V vs. 470 kΩ)</td>
</tr>
<tr>
<td>Signal output</td>
<td>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/cm² from a 420 K black body; see <strong>Figure 9 on page 16</strong></td>
</tr>
</tbody>
</table>
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%

\[ \frac{BO}{|SA+SB|} \leq 0.15 \]

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 420K 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**

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

**Electrical Characteristics @ 25 ±5°C**

<table>
<thead>
<tr>
<th>Circuit configuration</th>
<th>Three-terminal sensor with source follower; see Figure 11 on page 20.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>1–15V DC (Rs: 470KΩ)</td>
</tr>
<tr>
<td>Source voltage</td>
<td>0.3–1.4V (V_D: 5V, 470KΩ)</td>
</tr>
<tr>
<td>Signal output</td>
<td>Minimum 2.5V_P.P; typically 3.5.0V_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 13 microW/cm² from a 420K black body. See Figure 12 on page 21.</td>
</tr>
<tr>
<td>Noise output</td>
<td>Max. 250 mV_P.P; typically 90mV_P.P. Noise output should be measured for 20 seconds when connected to an amplifier with a gain of 72.5dB at 1Hz and shielded from infrared energy. See Figure 12 on page 21.</td>
</tr>
</tbody>
</table>
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 420K 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
Occluder position

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.

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 %

\[ \text{Balance output} \leq 0.20. \]

\( Bo : \) 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

\( \geq 70 \% \) average 8 to 13 micron.

Environmental Requirements

Operating Temperature

\(-40^\circ C \) to \(+85^\circ C.\)

Storage Temperature

\(-40^\circ C \) to \(+85^\circ 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

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

Electrical Characteristics @ 25 ±5°C

<table>
<thead>
<tr>
<th>Circuit configuration</th>
<th>Three-terminal sensor with source follower; see Figure 17 on page 30.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>3–10 V DC (Rs: 470 KΩ).</td>
</tr>
<tr>
<td>Element polarity</td>
<td>Element A,C:(+) B,D:(–) or A,C:(–) B,D:(+).</td>
</tr>
<tr>
<td>Source voltage</td>
<td>0.35–1.4 V (Vd: 5V vs. 470 KΩ).</td>
</tr>
<tr>
<td>Signal output</td>
<td>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/cm² from a 420 K black body; see Figure 18 on page 31.</td>
</tr>
<tr>
<td>Noise output</td>
<td>Max. 250 mVp-p; typically 90 mVp-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.</td>
</tr>
</tbody>
</table>
Balance output Max. 15%.

\[ \frac{|S1-S2|}{|S1+S2|} \leq 0.15 \]

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 420K 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

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS0228</td>
<td>Z8 Encore! XP® F082A Series Product Specification</td>
</tr>
<tr>
<td>PB0258</td>
<td>ZMOTION Product Brief</td>
</tr>
<tr>
<td>PS0285</td>
<td>ZMOTION Detection and Control Family Product Specification</td>
</tr>
<tr>
<td>PS0286</td>
<td>ZMOTION Lenses Product Specification</td>
</tr>
<tr>
<td>PS0288</td>
<td>ZMOTION Intrusion Detection Product Specification</td>
</tr>
<tr>
<td>AN0307</td>
<td>ZMOTION Detection Module Application Walkthrough</td>
</tr>
<tr>
<td>AN0309</td>
<td>ZMOTION High Brightness White LED Lighting Application Note</td>
</tr>
<tr>
<td>WP0017</td>
<td>A New PIR Motion Detection Architecture White Paper</td>
</tr>
<tr>
<td>WP0018</td>
<td>ZMOTION Detection Lens and Pyro Sensor Configuration Guide</td>
</tr>
</tbody>
</table>

Other ZMOTION Family Products

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB0244</td>
<td>ZMOTION Detection Module II Product Brief</td>
</tr>
<tr>
<td>PS0305</td>
<td>ZMOTION Detection Module II Product Specification</td>
</tr>
</tbody>
</table>
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.

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