

















### PIR motion detector



**Building Automation** 



Expertise Applied | Answers Delivered

# Smart buildings & homes are equipped with intelligent technologies that make lives more convenient and energy efficient



Littelfuse offers protect, control, and sense technologies to improve the safety, reliability, and energy efficiency of buildings.



### Market trends and drivers for PIR motion detectors

#### Market trends and drivers

Passive Infrared is the leading technology of choice for motion sensing as it combines performance and affordability.

Government initiatives for energy savings are driving adoption in the public and commercial sectors.

Increased awareness of security and surveillance is driving the residential demand.

Wireless connectivity reduces installation costs and adds compatibility to smart home and IoT networks.

COVID-19 concerns require motion detectors for no-touch control, people counting, and distance measuring.



Source: Occupancy Sensor Market (Markets and Markets, July 2020)



### Littelfuse components for PIR motion detectors









### **PIR motion detector functional block diagram**







### **Benefits of recommended Littelfuse solutions**

	Technology	Function in application	Product series	Benefits	Features
1	MOV	Protects the power supply unit from voltage transients and lightning	LV UltraMOV	Reduces customer qualification time by complying with third-party safety standards such as UL/IEC	High peak surge current rating (up to 10 kA); high operating temperature (up to 125 °C); Wide operating voltage range $V_{MAC)RMS}$ 11 V to 95 V
	TVS diode	Protects the power supply unit from voltage transients and lightning	<u>SMBJ</u>	Compact design; improves system reliability by clamping the voltage at safe levels during transients	Excellent clamping voltage; 600 W peak pulse power capability at 10/100 µs waveform; small form-factor
2	PIR sensor	Motion detection	<u>ZSFG469711,</u> ZRE200GE	Low power consumption; high reliability	Dual element sensor; wide-angle detection; low voltage operation; pet immunity
3	MCU	Provides control signals per PIR sensing and other inputs	<u>ZMOTION™</u>	Optimized for sensor application; reduces component count and saves space; allows for cheaper ceramic capacitors	Real-time control of motion sensitivity; ambient light sensing; serial or RF communication protocol
4	Reed relay	Control switch to activate alarm based on PIR sensor input	<u>HE3600, HE3300</u>	Low power consumption; high isolation; immune to environmental effects	Miniature single in-line package; external magnetic shield option
	Solid state relay	Control switch to activate alarm based on the PIR sensor input	<u>CPC1017N,</u> <u>CPC1008N</u>	Compact design saves space; robust operation	1500 $V_{\text{rms}}$ isolation; low drive reliability; no EMI/RFI generation



### **Select safety standards for PIR motion detectors**

Standard	Title	General scope	Region
IEC 63180:2020	Methods of measurement and declaration of the detection range of detectors-passive infrared detectors for major and minor motion detection	Provides a methodology and test procedures to determine and verify the detection area for motion detectors using passive infrared technology	Global
UL 639	Standard for intrusion-detection units	Requirements cover intrusion-detection units intended to be used in burglary- protection signaling systems. These units are intended to be used in indoor or outdoor locations to automatically indicate the presence of an intruder by actuating electrical control circuits.	North America
IEC 62368-1	Audio/video, information and communication technology equipment–Part 1: safety requirements	This part of IEC 62368 is a product safety standard that classifies energy sources; prescribes safeguards against those energy sources; and provides guidance on the application of, and requirements for, those safeguards	Global



## Additional information can be found on Littelfuse.com

Explore the world of Littelfuse with the Electronics eCatalogs (http://electronicscatalogs.littelfuse.com/)



### Local resources supporting our global customers



### Partner for tomorrow's electronic systems

#### **Broad product portfolio**

A global leader with a broad product portfolio, covering every aspect of protection, sensing, and control

#### Application expertise

Our engineers partner directly with customers to help speed up product design and meet their unique needs

#### Global customer service

Our global customer service team is with you to anticipate your needs and ensure a seamless experience



#### Compliance & regulatory expertise

We help customers in the design process to account for requirements set by global regulatory authorities

#### Testing capabilities

To help customers get products to market faster, and offer certification testing to global regulatory standards

#### **Global manufacturing**

High-volume manufacturing that is committed to the highest quality standards





### Expertise Applied | Answers Delivered

#### Littelfuse.com

This document is provided by Littelfuse, Inc. ("Littelfuse") for informational and guideline purposes only. Littelfuse assumes no liability for errors or omissions in this document or for any of the information contained herein. Information is provided on an "as is" and "with all faults" basis for evaluation purposes only. Applications described are for illustrative purposes only and Littelfuse makes no representation that such applications will be suitable for the customer's specific use without further testing or modification. Littelfuse expressly disclaims all warranties, whether express, implied or statutory, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, and non-infringement. It is the customer's sole responsibility to determine suitability for a particular system or use based on their own performance criteria, conditions, specific application, compatibility with other components, and environmental conditions. Customers must independently provide appropriate design and operating safeguards to minimize any risks associated with their applications and products. Read complete Disclaimer Notice at: www.littelfuse.com/disclaimer-electronics.



Supplementary slides

## **Digital Bravo PIR motion detector**



Model number & specification				
Name	Digital Bravo			
Model Number	BV-300 & BV-600			
Description	PIR motion detector			
Specifications	Contact rating: $24 V_{DC}$ , 100 mAOperating voltage: $9.5 V_{DC} - 14.5 V_{DC}$ Standby current: $15 \text{ mA}/16.5 \text{ mA}$ Current in alarm: $18 \text{ mA}/17.5 \text{ mA}$			
Other manufacturers of similar products	Legrand, Schneider Electric, Eaton, Johnson Controls, Signify, Actuity Brands, Leviton Manufacturing, Lutron Electronics, Honeywell, Hubbell Incorporated, Texas Instruments, Osram Lichit AG, Siemens			
Littelfuse opportunities	MOV: <u>V05E25P</u> , Reed relay: <u>HE3321A0400</u> , PIR sensor: <u>ZSFG323671</u> , MCU: <u>ZMOTION™</u>			



# PIR motion detector (BV-300\*): Reed Relay designed in, MOV, PIR sensor, MCU opportunities





Technology	Function in Application	Series	Benefits	Features
MOV	Protects the power supply unit from voltage transients and lightning	<u>V05E25P</u>	Reduces customer qualification time by complying with third-party safety standards such as UL/IEC	High peak surge current rating (upto 10 kA); high operating temperature (upto 125°C); Wide operating voltage range $V_{M(AC)RMS}$ 11 V to 95 V
PIR sensor	Motion detection	ZSFG323671	Low power consumption; high reliability	Dual element sensor; wide-angle detection; low voltage operation; pet immunity
Reed relay	Control switch to activate alarm based on PIR sensor input	HE3321A0400	Low power consumption; high isolation; immune to environmental effects	Miniature single in-line package; external magnetic shield option
MCU	Provides control signals per PIR sensing and other inputs	<u>ZMOTION™</u>	Optimized for motion sensing application; reduces component count and saves space; allows for cheaper ceramic capacitors	Real time control of motion sensitivity; ambient light sensing; serial or RF communication protocol





## Leviton LED/CFL sensor and dimmer



Leviton LED/CFL sensor & dimmer

Model number & specification				
Name	Leviton LED/CFL universal occupancy sensor and dimmer			
Model Number	IPSD6-1LZ			
Description	Motion sensor switch, no neutral			
Specifications	Voltage:120 VACCurrent:5 A			
Other manufacturers of similar products	Legrand, Schneider Electric, Eaton, Johnson Controls, Signify, Actuity Brands, Lutron Electronics, Honeywell, Hubbell Incorporated, Texas Instruments, Osram Lichit AG, Siemens			
Littelfuse opportunities	MCU: <u>Z8F082APB020SG</u> , PIR sensor: <u>ZRE200GE</u> , MOV: <u>V10E150P</u> , TRIAC: <u>Q6016LH2TP</u>			





### Leviton LED/CFL sensor and dimmer teardown



Technology	Function in Application	Series	Benefits	Features
MCU	Provides control signals per PIR sensing and other inputs	Z8F082APB020SG	Optimized for sensor application; reduces component count and saves space; allows for cheaper ceramic capacitors	Real time control of motion sensitivity; ambient light sensing; serial or RF communication protocol
PIR sensor	Motion detection	ZRE200GE	Low power consumption; high reliability	Dual element sensor; wide-angle detection; low voltage operation; pet immunity
MOV	Protects the power supply unit from voltage transients and lightning	<u>V10E150P</u>	Reduces customer qualification time by complying with third-party safety standards such as UL/IEC	High peak surge current rating (up to 10 kA); high operating temperature (up to 125° C); $V_{M(AC)RMS}11$ V to 95 V
TRIAC	AC switching	<u>Q6016LH2TP</u>	Solid-state switching eliminates arcing or contact bounce that create voltage transients; no contacts to wear out; restricted (or limited) RFI generation	Voltage capability up to 1000 V; surge capability up to 200 A; electrically isolated up to 2500 $\rm V_{RMS}$
Littelfuse (6)				



## **Pyronix HIK vision motion detector**



Pyronix HIK vision motion detector

Model number & specification				
Name	Pyronix HIK vision internal motion detector			
Model Number	KX10DP			
Description	Internal motion detector			
Specifications	Operating voltage: $9 - 16$ VDC; 13.8 VDC $_{typ}$ Current consumption:13 mA - 16 mA @ 12 VmaxRelay output:50 mA; 60 VDC; 42 VAC $_{RMS}$ Tamper switch:12 V, 50 mA			
Other manufacturers of similar products	Legrand, Schneider Electric, Eaton, Johnson Controls, Signify, Actuity Brands, Leviton Manufacturing, Lutron Electronics, Honeywell, Hubbell Incorporated, Texas Instruments, Osram Lichit AG, Siemens			
Littelfuse opportunities	Solid state relay: <u>CPC1008N</u> , PIR sensor: <u>ZRE200GE</u> , MCU: <u>Z8F082APB020SG</u>			





### Pyronix motion detector teardown



Technology	Function in Application	Series	Benefits	Features
Solid state relay	Control switch to activate alarm based on PIR sensor input	CPC1008N	Compact design saves space; robust operation	1500 V <sub>rms</sub> isolation; low drive reliability; no EMI/RFI generation
PIR sensor	Motion detection	ZRE200GE	Low power consumption; high reliability	Dual element sensor; wide-angle detection; low voltage operation; pet immunity
MCU	Provides control signals per PIR sensing and other inputs	<u>Z8F082APB020SG</u>	Optimized for sensor application; reduces component count and saves space; allows for cheaper ceramic capacitors	Real time control of motion sensitivity; ambient light sensing; serial or RF communication protocol









### Expertise Applied | Answers Delivered

#### Littelfuse.com

This document is provided by Littelfuse, Inc. ("Littelfuse") for informational and guideline purposes only. Littelfuse assumes no liability for errors or omissions in this document or for any of the information contained herein. Information is provided on an "as is" and "with all faults" basis for evaluation purposes only. Applications described are for illustrative purposes only and Littelfuse makes no representation that such applications will be suitable for the customer's specific use without further testing or modification. Littelfuse expressly disclaims all warranties, whether express, implied or statutory, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, and non-infringement. It is the customer's sole responsibility to determine suitability for a particular system or use based on their own performance criteria, conditions, specific application, compatibility with other components, and environmental conditions. Customers must independently provide appropriate design and operating safeguards to minimize any risks associated with their applications and products. Read complete Disclaimer Notice at: www.littelfuse.com/disclaimer-electronics.