

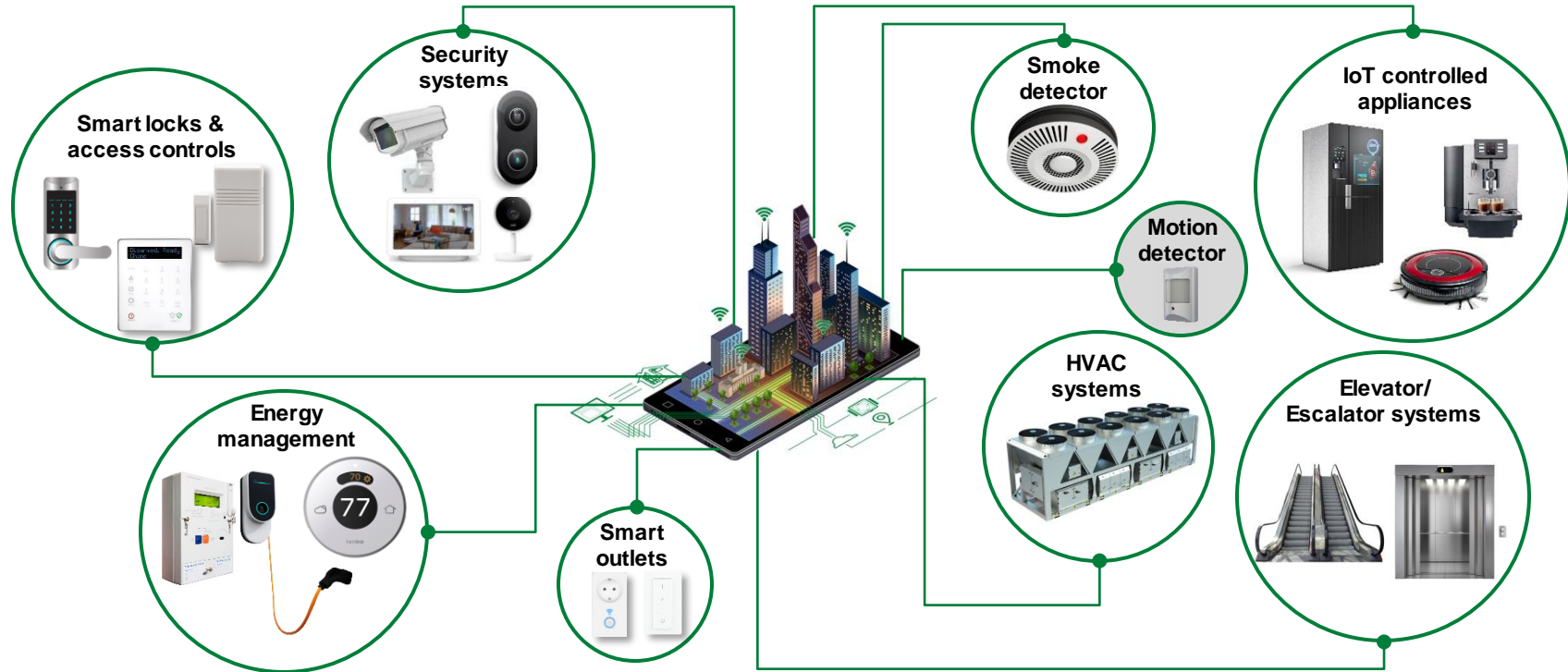


# PIR motion detector

 Building Automation

 **Littelfuse®**  
Expertise Applied | Answers Delivered

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



Littelfuse offers protect, control, and sense technologies to improve 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

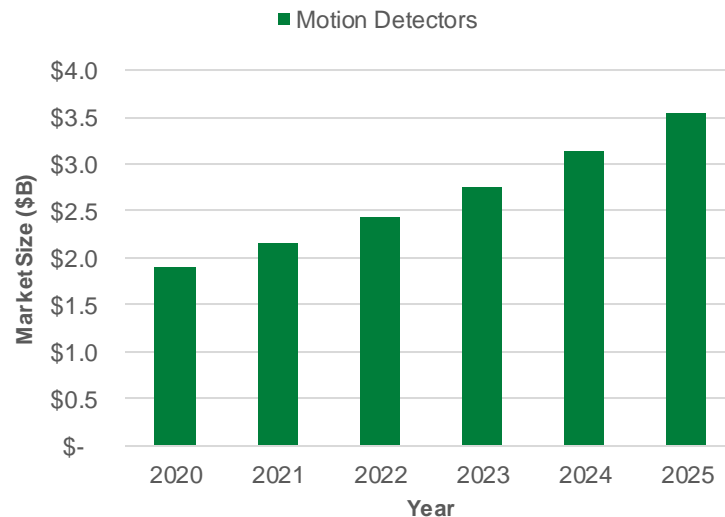
Government initiatives for energy savings are driving adoption in the public and commercial sectors

Increased awareness on security and surveillance are 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

## Rapid growth at ~13.3% CAGR



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

# Littelfuse components for PIR motion detector

## AC/DC power stage

- MOV
- TVS diode



## Microcontroller unit

- ZMOTION™



## Alarm

- Reed relay
- Solid state relay

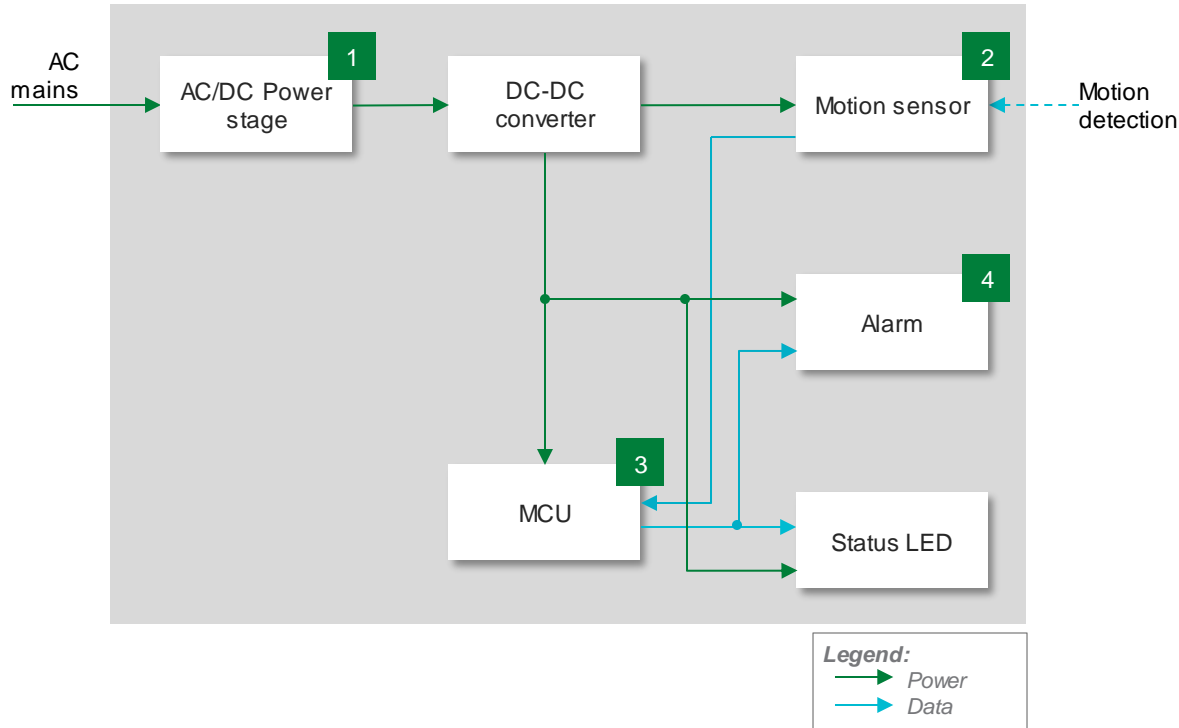


## Motion sensor

- PIR sensor



# PIR motion detector functional block diagram



	Technology	Series
1	MOV	<a href="#">LV UltraMOV</a>
	TVS diode	<a href="#">SMBJ</a>
2	PIR sensor	<a href="#">ZSFG469711</a> , <a href="#">ZRE200GE</a>
3	MCU	<a href="#">ZMOTION™</a>
4*	Reed relay	<a href="#">HE3600</a> , <a href="#">HE3300</a>
	Solid state relay	<a href="#">CPC1017N</a> , <a href="#">CPC1008N</a>

\* Reed relay is preferred when no leakage current is preferred at the output load (eg battery applications). SSR offers smallest possible form-factor



# 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	<a href="#">LV UltraMOV</a>	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 $V_{MAC}RMS$ 11 V to 95 V
	TVS diode	Protects the power supply unit from voltage transients and lightning	<a href="#">SMBJ</a>	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 $\mu$ s waveform; small form-factor
2	PIR sensor	Motion detection	<a href="#">ZSFG469711</a> , <a href="#">ZRE200GE</a>	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	<a href="#">ZMOTION™</a>	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	<a href="#">HE3600</a> , <a href="#">HE3300</a>	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 PIR sensor input	<a href="#">CPC1017N</a> , <a href="#">CPC1008N</a>	Compact design saves space; robust operation	1500 $V_{rms}$ isolation; low drive reliability; no EM/RFI generation

# Select safety standards for PIR motion detector

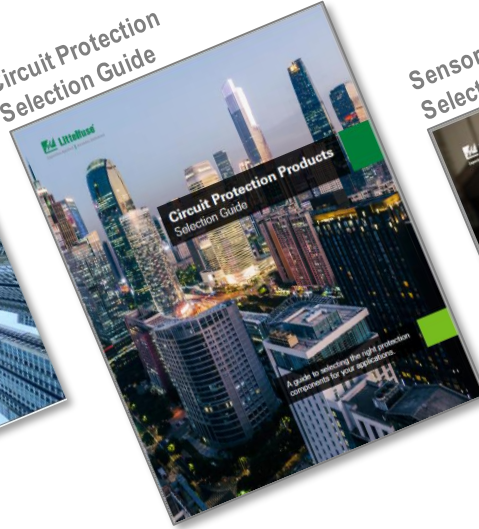
Standard	Title	General scope	Region
IEC 63180:2020	Methods of measurement and declaration of the detection range of detectors—Passive infrared detectors for major and minor motion detection	Provides a methodology and test procedures to be able to declare and verify the detection area for motion detectors 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; provides guidance on the application of, and requirements for, those safeguards	Global

# Additional information can be found on [Littelfuse.com](http://Littelfuse.com)

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application guide



Circuit Protection  
Selection Guide



Sensor Products  
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Selection Guide



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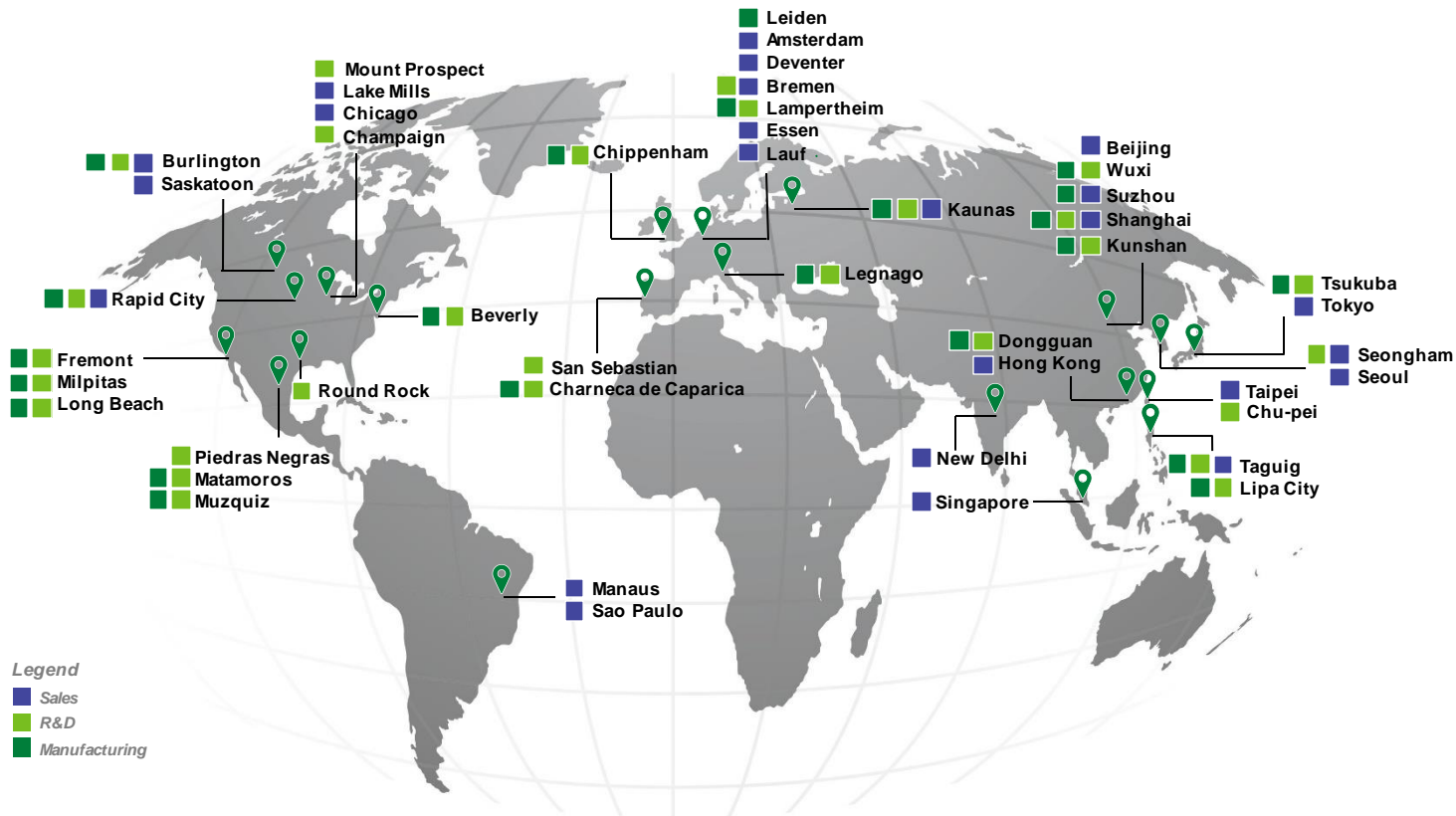
Integrated Circuits  
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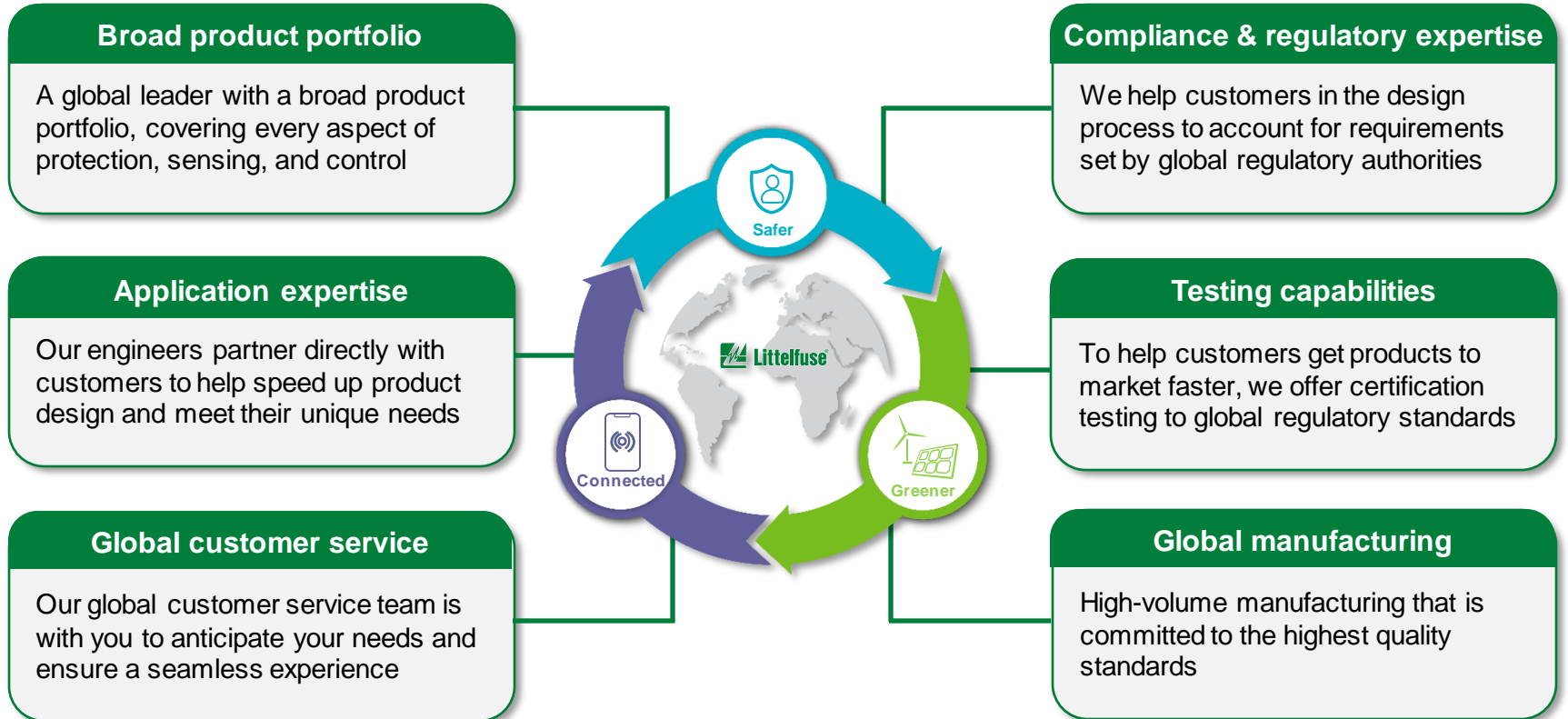


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Supplementary slides

# Digital Bravo PIR motion detector



BV-300

BV-600


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 <sub>DC</sub> , 100 mA Operating voltage: 9.5 V <sub>DC</sub> – 14.5 V <sub>DC</sub> Standby current: 15 mA/16.5 mA Current in alarm: 18 mA/17.5 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 Licht AG, Siemens
Littelfuse opportunities	MOV: <a href="#">V05E25P</a> , Reed relay: <a href="#">HE3321A0400</a> , PIR sensor: <a href="#">ZSFG323671</a> , MCU: <a href="#">ZMOTION™</a>


# PIR motion detector (BV-300\*): Reed Relay

 Click on the product series in the table below for more info

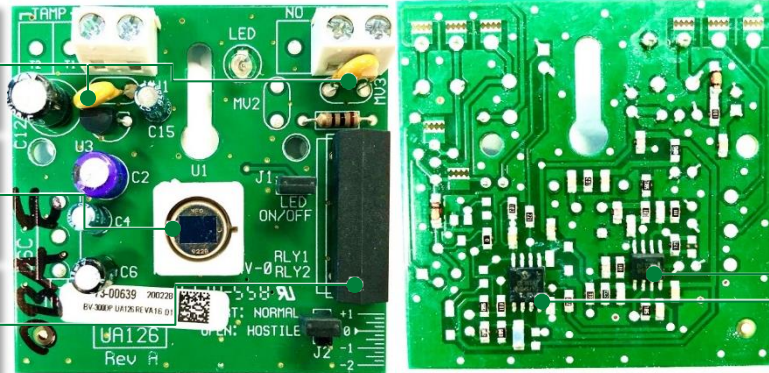
## designed in, MOV, PIR sensor, MCU opportunities


- 

MOV 5 mm 25 V<sub>RMS</sub>  
Make: Joyin Co. Ltd  
LFUS: [V05E25P](#)
- 

PIR sensor dual element, through hole  
Make: Littelfuse  
LFUS: [ZSFG323671](#)
- 

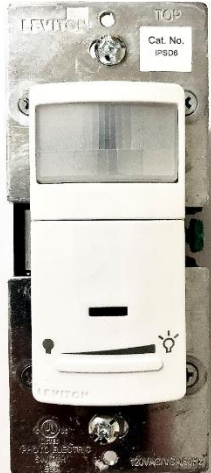
Reed relay SPST-NO 5V<sub>DC</sub>  
Make: Littelfuse  
LFUS: [HE3321A0400](#)



 8-bit MCU + Dual op-amp  
Make: Microchip  
LFUS: [ZMOTION™](#)  
(Combines MCU + Op-amp functionality)

Technology	Function in Application	Series	Benefits	Features
MOV	Protects the power supply unit from voltage transients and lightning	<a href="#">V05E25P</a>	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	<a href="#">ZSFG323671</a>	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	<a href="#">HE3321A0400</a>	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	<a href="#">ZMOTION™</a>	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

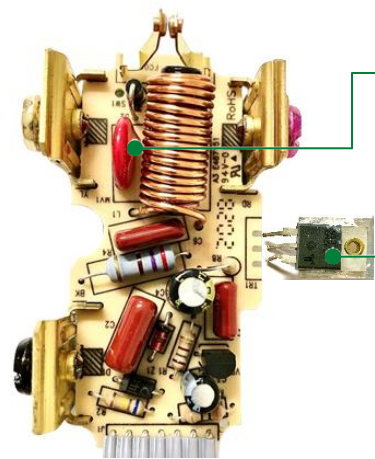
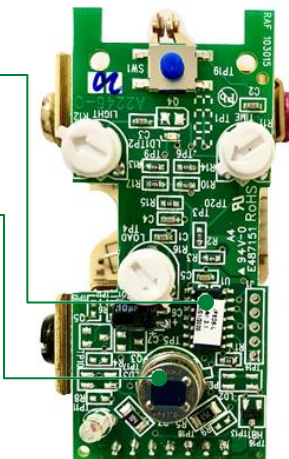
Model number & specification	
Name	Leviton LED/CFL universal occupancy sensor and dimmer
Model Number	IPSD6-1LZ
Description	Motion sensor switch, no neutral
Specifications	Voltage: 120 VAC Current: 5 A
Other manufacturers of similar products	Legrand, Schneider Electric, Eaton, Johnson Controls, Signify,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

# Leviton LED/CFL sensor and dimmer teardown

8-bit Flash microcontroller  
 Make: Microchip  
 LFUS: [Z8F082APB020SG](#)



PIR sensor surface mount  
 Make: Excelitas Technologies  
 LFUS: [ZRE200GE](#)



MOV 10 mm 150 V<sub>RMS</sub>  
 Make: Littelfuse  
 LFUS: [V10E150P](#)



TRIAC 600 V, 16 A  
 Make: Littelfuse  
 LFUS: [Q6016LH2TP](#)



Technology	Function in Application	Series	Benefits	Features
MCU	Provides control signals per PIR sensing and other inputs	<a href="#">Z8F082APB020SG</a>	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	<a href="#">ZRE200GE</a>	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	<a href="#">V10E150P</a>	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 <sub>M(AO)RMS</sub> 11 V to 95 V
TRIAC	AC switching	<a href="#">Q6016LH2TP</a>	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 V <sub>RMS</sub>



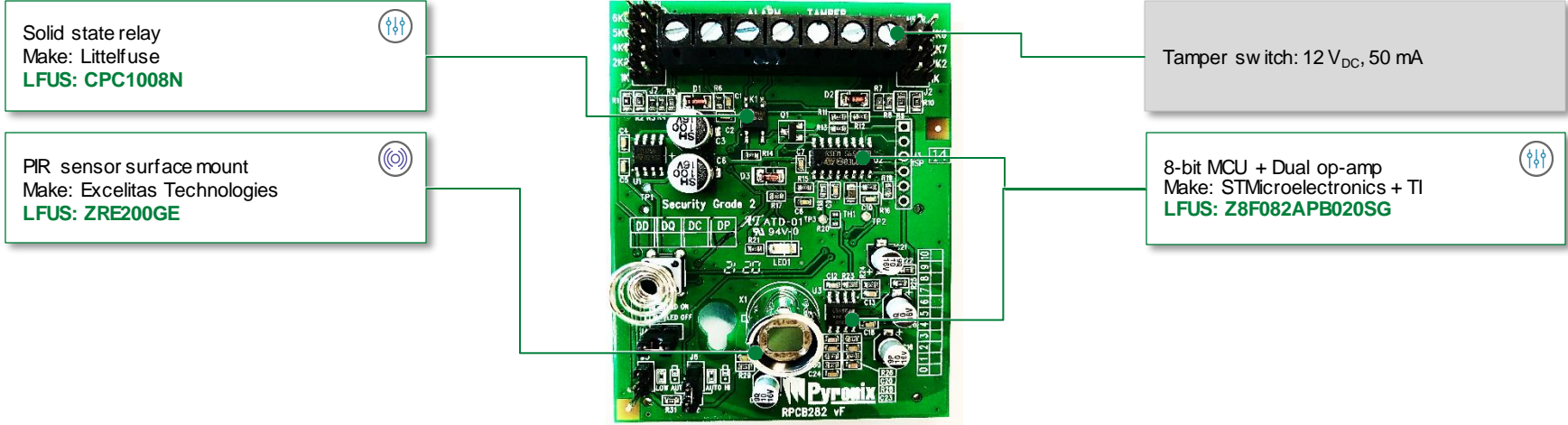
# Pyronix HIK vision motion detector



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 <sub>typ</sub> Current consumption: 13 mA – 16 mA @ 12 Vmax Relay output: 50 mA; 60 VDC; 42 VAC <sub>RMS</sub> 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: <a href="#">CPC1008N</a> , PIR sensor: <a href="#">ZRE200GE</a> , MCU: <a href="#">Z8F082APB020SG</a>

# Pyronix motion detector teardown



Technology	Function in Application	Series	Benefits	Features
Solid state relay	Control switch to activate alarm based on PIR sensor input	<a href="#">CPC1008N</a>	Compact design saves space; robust operation	1500 V <sub>rms</sub> isolation; low drive reliability; no EMI/RFI generation
PIR sensor	Motion detection	<a href="#">ZRE200GE</a>	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	<a href="#">Z8F082APB020SG</a>	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



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