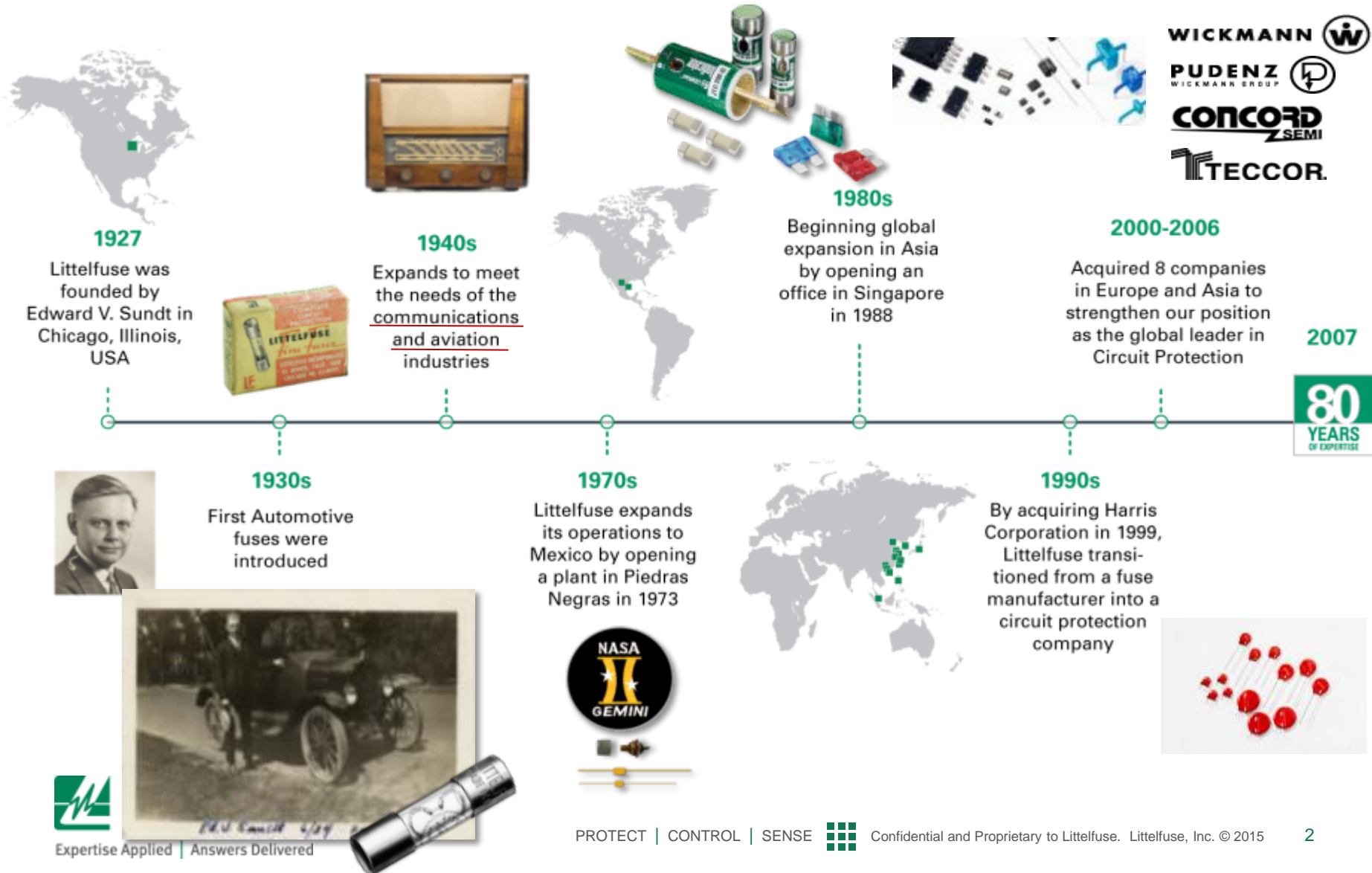




# Littelfuse History – 1927 to 2007

The foundations of Littelfuse' success were made



# Littelfuse History – 2007 to 2015

## Consolidation and Expansion in New Business Areas

**2008**  
Acquisition of Startco and Shock Block Brands

**2008 - 2009**  
The Downturn also hits Littelfuse

**2009 - 2011**  
Consolidation and Restructuring of Littelfuse Global Fab Cluster

**2010**  
Acquisition of Cole Hersee Brand for Commercial Vehicle Products

**2010**  
All NEW Semiconductor Plant in Wuxi / China ramps up volume shipments of TVS & Thyristor Products

**2011**  
Acquisition of SELCO Brand for Relay Products in Europe

**2012**  
Acquisition of Accel Brand  
Littelfuse enters market for Automotive Sensors

**2013**  
Acquisition of Hamlin Brand for Sensors, Switches and Relays

**2016**  
Acquire TE CPD business unit for various circuit protection technology

**85 YEARS OF EXPERTISE**

**Littelfuse, Inc.**  
NASDAQ: LFUS - 4月1日 下午4:00 [GMT-4]  
123.40 USD ↑0.29 (0.24%)

PROTECT | CONTROL | SENSE

Confidential and Proprietary to Littelfuse. Littelfuse, Inc. © 2015



# Present – 2015 (Sales for 2015 were \$867.9 million ; Exclude TE CP)

## #1 Brand in Circuit Protection , Emerging Player in Power Ctrl and Sensing

### Electronics (47%)

- Passives
- Semis
- Sensors



### Automotive (38%)

- Auto Fuse
- Commercial Vehicle
- Sensors



### Electrical (15%)

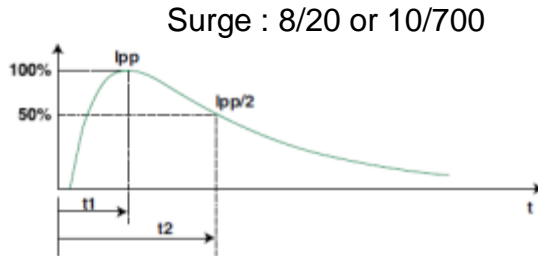
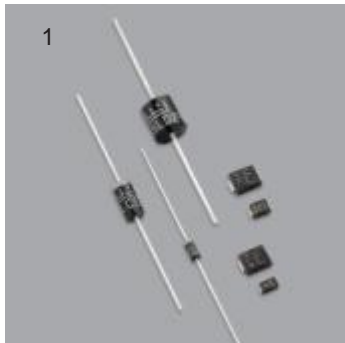
- Power Fuse
- Relay/Custom



Littelfuse has the broadest and deepest portfolio of circuit protection products serving three major market segments.

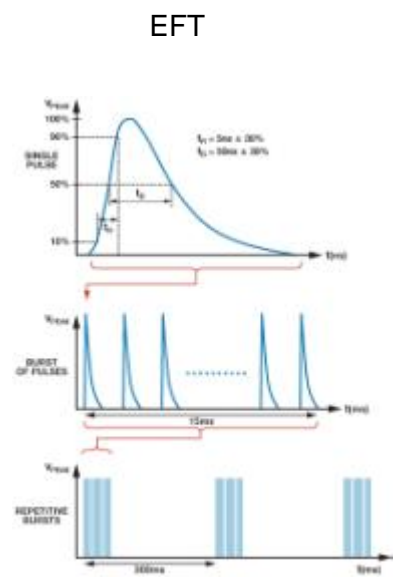
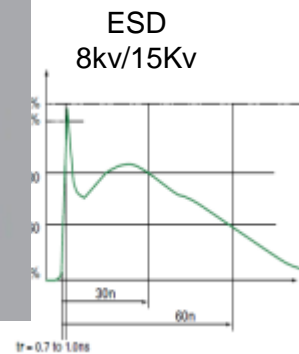
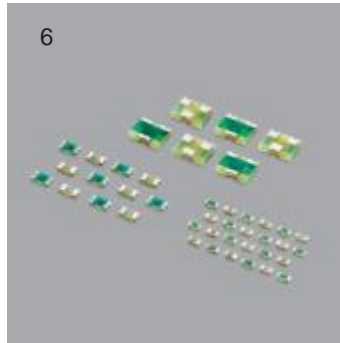
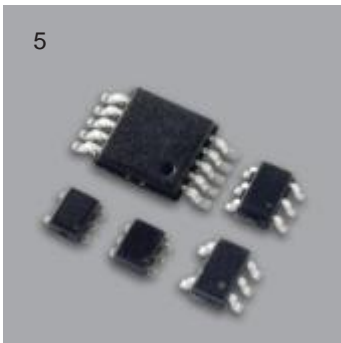
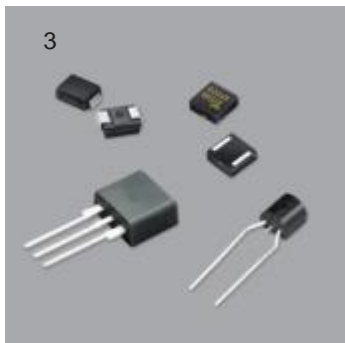
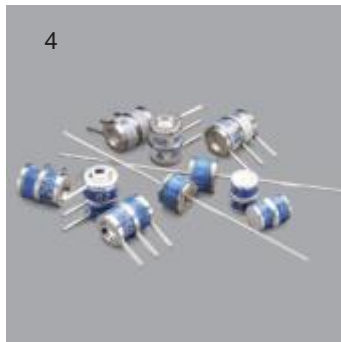


# Littelfuse Circuit Protection Solution 1-6

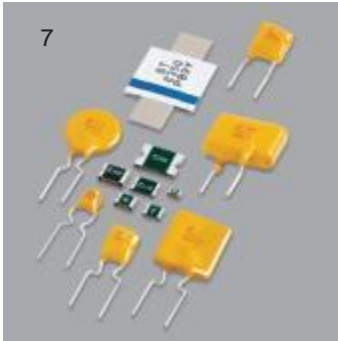


## OVERVOLTAGE SUPPRESSION TECHNOLOGIES (1-6)

1. TVS Diodes
2. Varistors
3. SIDACTor® Devices
4. Gas Discharge Tubes (GDTs)
5. Silicon Protection Arrays (SPA™)
6. PulseGuard® ESD Suppressors



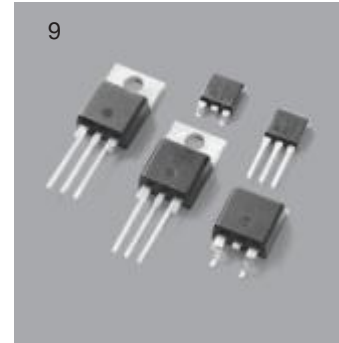
# Littelfuse Circuit Protection Solution 7-10



## OVERCURRENT PROTECTION TECHNOLOGIES (7-8)

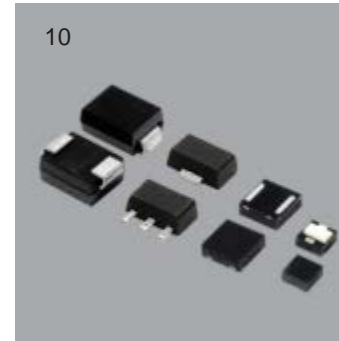
### 7. Positive Temperature Coefficient Devices (PTCs)

### 8. Fuses and Holders



## SWITCHING TECHNOLOGIES

### 9. Switching Thyristors



## SPECIAL APPLICATION PRODUCTS

### 10. PLED LED Protectors

# Littelfuse Electronics

## Industry & Market Segments Using Littelfuse Products



### Consumer Electronics

- TV
- Set Top Box
- Gaming
- Digital Camera
- Portable Medical

### Computing

- Desktop
- Notebook
- Peripherals
- External Storage

### Mobile Handheld

- Mobile Handset
- eReader
- Tablet

### Datacom/Telecom

- DSL Modem
- Ethernet Switch
- Gateway
- Router
- ONT
- Base-station

### High Reliability / Automotive

- Automotive
- Medical
- Aerospace
- Military

### Industrial / Home Appliance

- UPS
- Lighting
- Motor Control
- White Goods
- Small Appliances
- HVAC
- Power Tool

### Green/Alternative Energy

- Solar Inverter
- Smart Meter
- LED Lighting



Expertise Applied | Answers Delivered

PROTECT | CONTROL | SENSE



Confidential and Proprietary to Littelfuse. Littelfuse, Inc. © 2015

V6.0-A

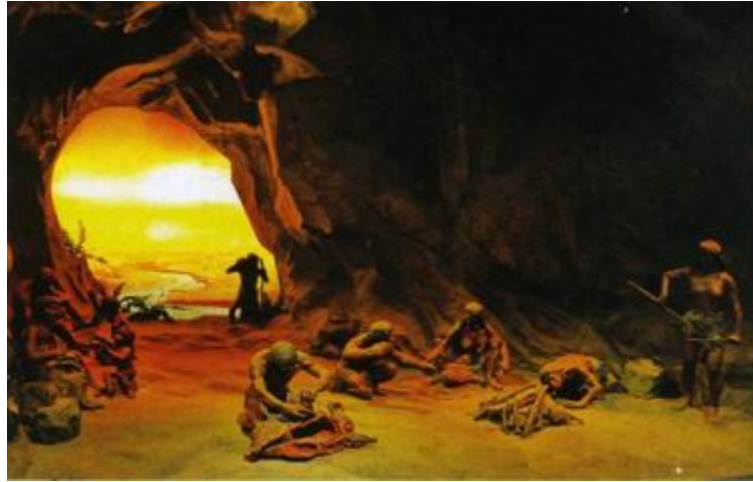
智慧家庭之建構與發展現狀，  
對應之智慧裝置應用與保護。

# Smart Home Architecture Developing and Smart Devices Protection & Application



# House Basic Functions for Human Living & Shielding

---



# Smart Home Evolution(1)

## Power & Water System



# Smart Home Evolution (2)

## Home Appliance & Home Entertainment





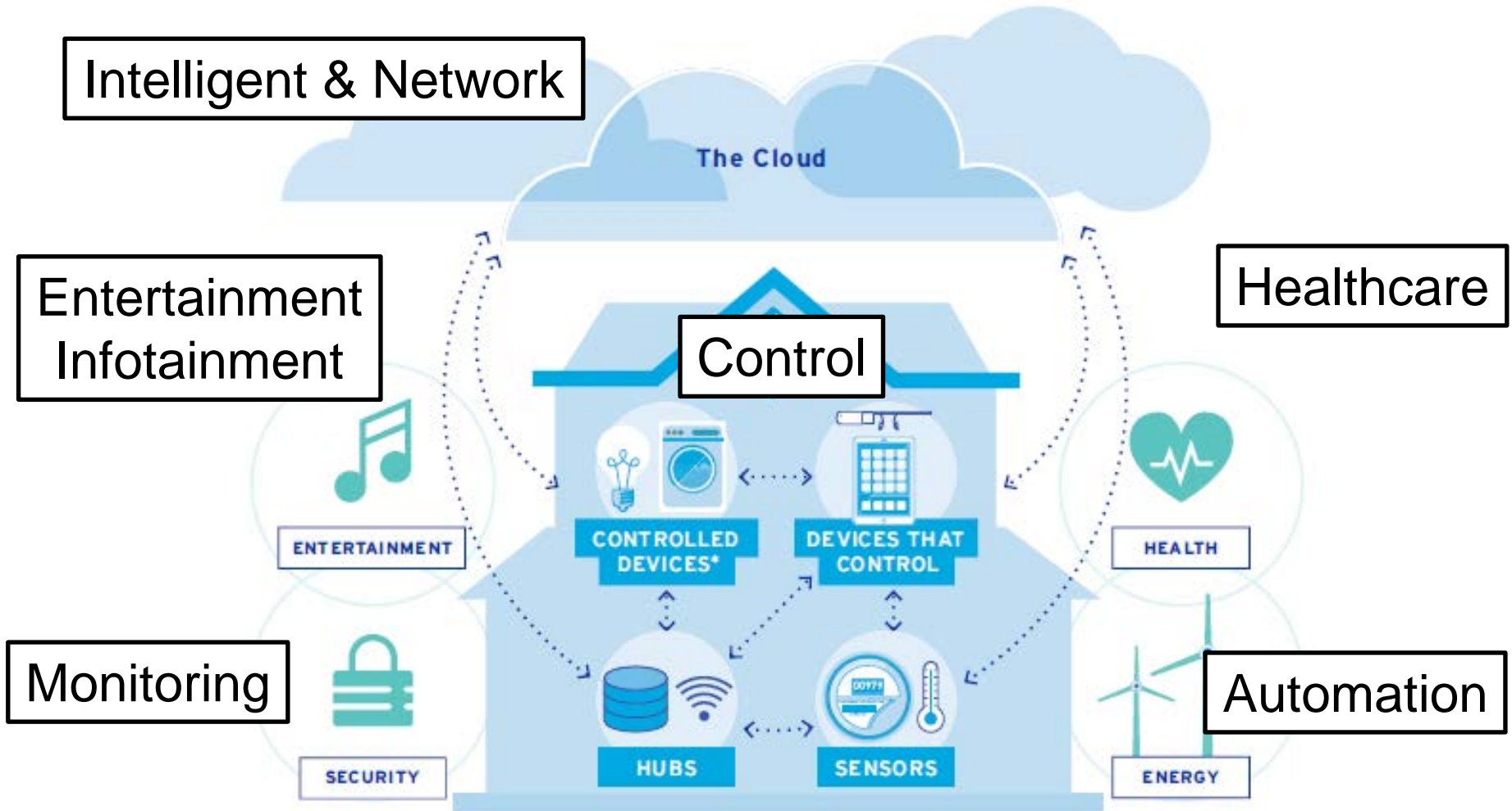
# Smart Home Evolution (3)

## PC & Internet & Wireless communication

---

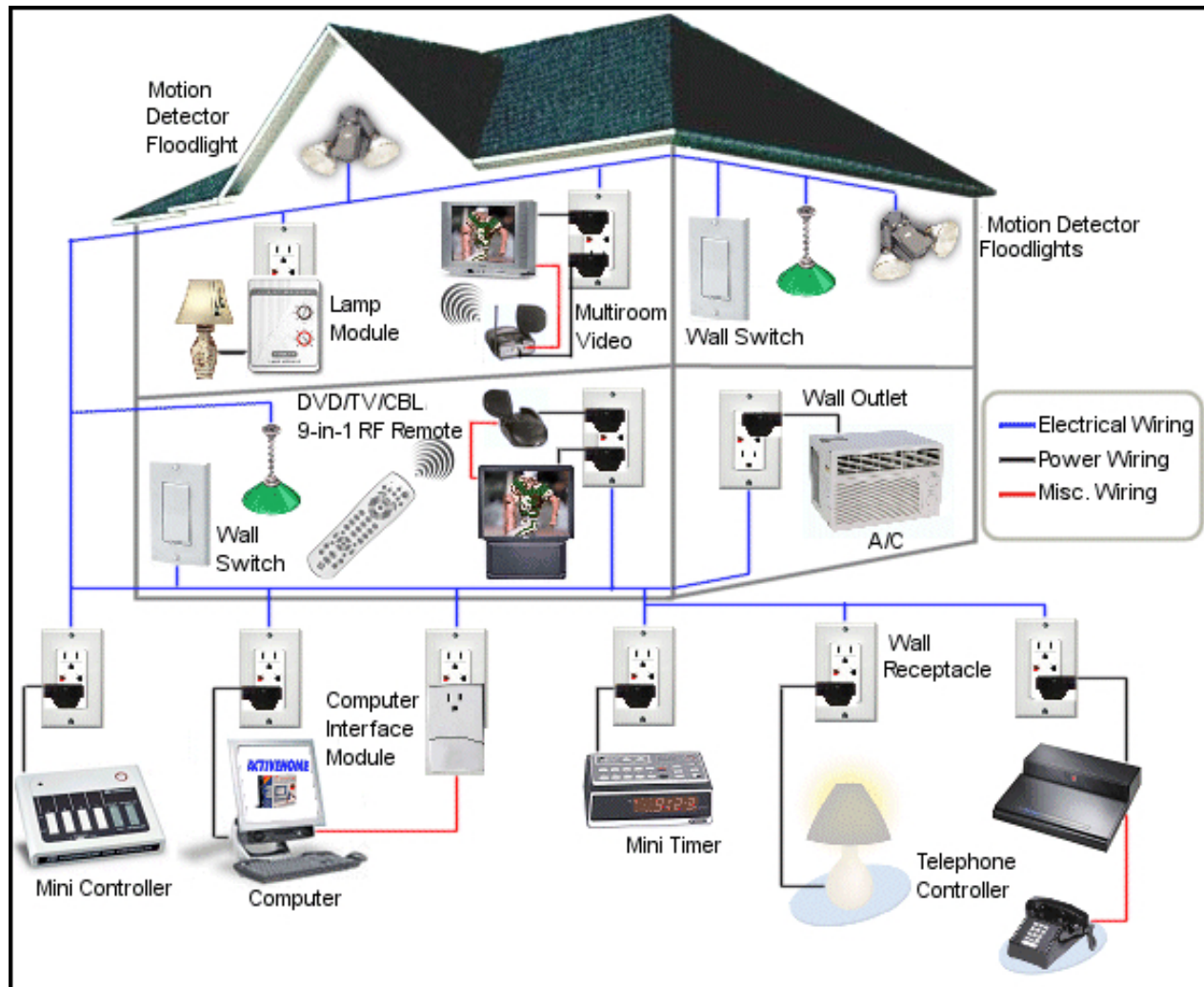


# What is Smart Home ?





# Smart Home Architecture



## Communications

- ✓ Wire/Wireless
- ✓ Internet Service (Broadband)
  - xDSL
  - CM
  - FTTx
  - 3G/4G
  - Satellite
- ✓ Home Area
  - Gateway
  - Wireless
    - Wifi
    - BT
    - Zigbee
    - Z-wave
  - Power Line

## Systems

- ✓ Internet of Things (IoT)
- ✓ Framework
  - Protocols
  - Security
- ✓ Currently Systems:
  - Homekit(Apple)
  - Thread Group(Google)
  - OIC(Intel)
  - All Seen Alliance(Qualcomm)

## Applications

- ✓ Home monitoring
- ✓ Access control
- ✓ Lighting control
- ✓ Fire detection - Leak detection
- ✓ Energy efficiency
- ✓ Temperature monitoring and HVAC control
- ✓ Automated meter reading
- ✓ Family care

# Communications Networks

## Communications

- ✓Wire/Wireless
- ✓Internet Service (Broadband)
  - xDSL
  - CM
  - FTTx
  - 3G/4G
  - Satellite
- ✓Home Area
  - Gateway
  - Wireless
    - Wifi
    - BT
    - Zigbee
    - Z-wave
  - Power Line

- Home Connection
  - Internet Service
    - ◆ Twist pair
    - ◆ Coax Cable
    - ◆ Fiber
    - ◆ Wireless ( 2G/3G/4G/..)
  - Video Streaming (TV program)
  - Telephone Service
  - Clouding Service

- Connectivity Home Devices
  - Sensors & Switch
  - White Goods
  - Light
  - Surveillance system
  - Alert system
  - .....

# Smart Home Service Provider & System Developer

# Platform Developer

## Apple -- What is HomeKit?

---

- HomeKit is a framework for communicating with and controlling connected accessories in a user's home.
- You can enable users to discover HomeKit accessories in their home and configure them, or you can create actions to control those devices.
- Users can group actions together and trigger them using Siri.





# Platform Developer

## Google -- What is Thread?

---

- Thread was designed with one goal in mind: to create the very best way to connect and control products in the home.
- Built on open standards and IPv6/6LoWPAN protocols, Thread's approach to wireless networking offers numerous technological advantages, including a secure and reliable mesh network with no single point of failure, simple connectivity and low power.
- All Thread networks are easy to set up and secure to use with banking-class encryption to close security holes that exist in other wireless protocols.

 **THREAD**  
GROUP



# Platform Developers

## AllSeen -- AllJoyn<sup>®</sup> Framework

---

- AllJoyn is an open source software framework that makes it easy for devices and apps to discover and communicate with each other.
- Developers can write applications for interoperability regardless of transport layer, manufacturer, and without the need for Internet access.
- The software has been and will continue to be openly available for developers to download, and runs on popular platforms such as Linux and Linux-based Android, iOS, and Windows, including many other lightweight real-time operating systems.



# Platform Developers

## OIC -- WHAT IS OCF?

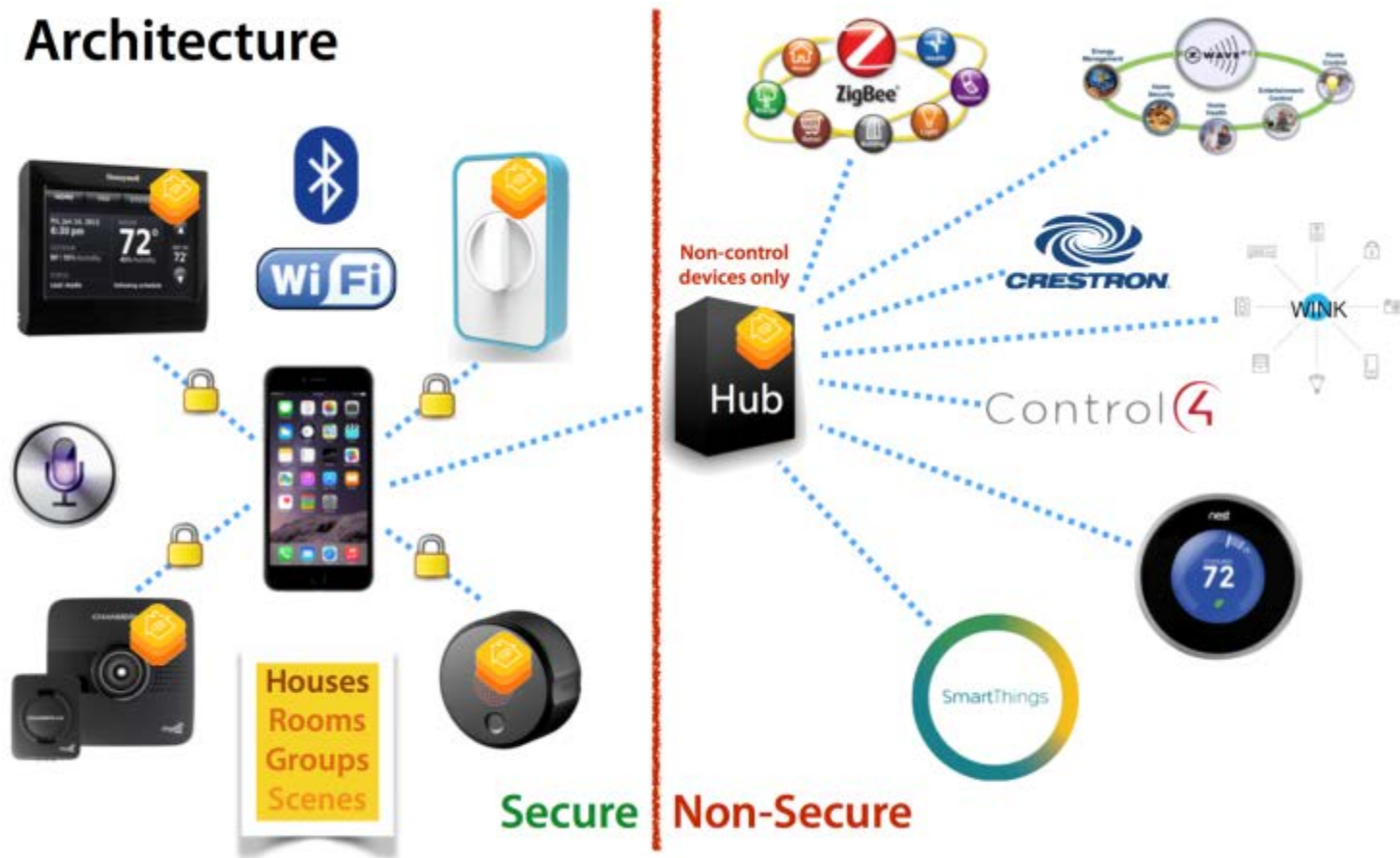
---

- Billions of connected devices (devices, phones, computers and sensors) should be able to communicate with one another regardless of manufacturer, operating system, chipset or physical transport.
- The **Open Connectivity Foundation (OCF)** is creating a specification and sponsoring an open source project to make this possible.
- OCF will unlock the massive opportunity in the IoT market, accelerate industry innovation and help developers and companies create solutions that map to a single open specification.
- OCF will help ensure secure interoperability for consumers, business, and industry.



# Communication and Control with Security

## Architecture



# Service Provider : CHT Smart Home



Monthly Rent

適用對象 居家安全需求較高並有環境監控需求者。

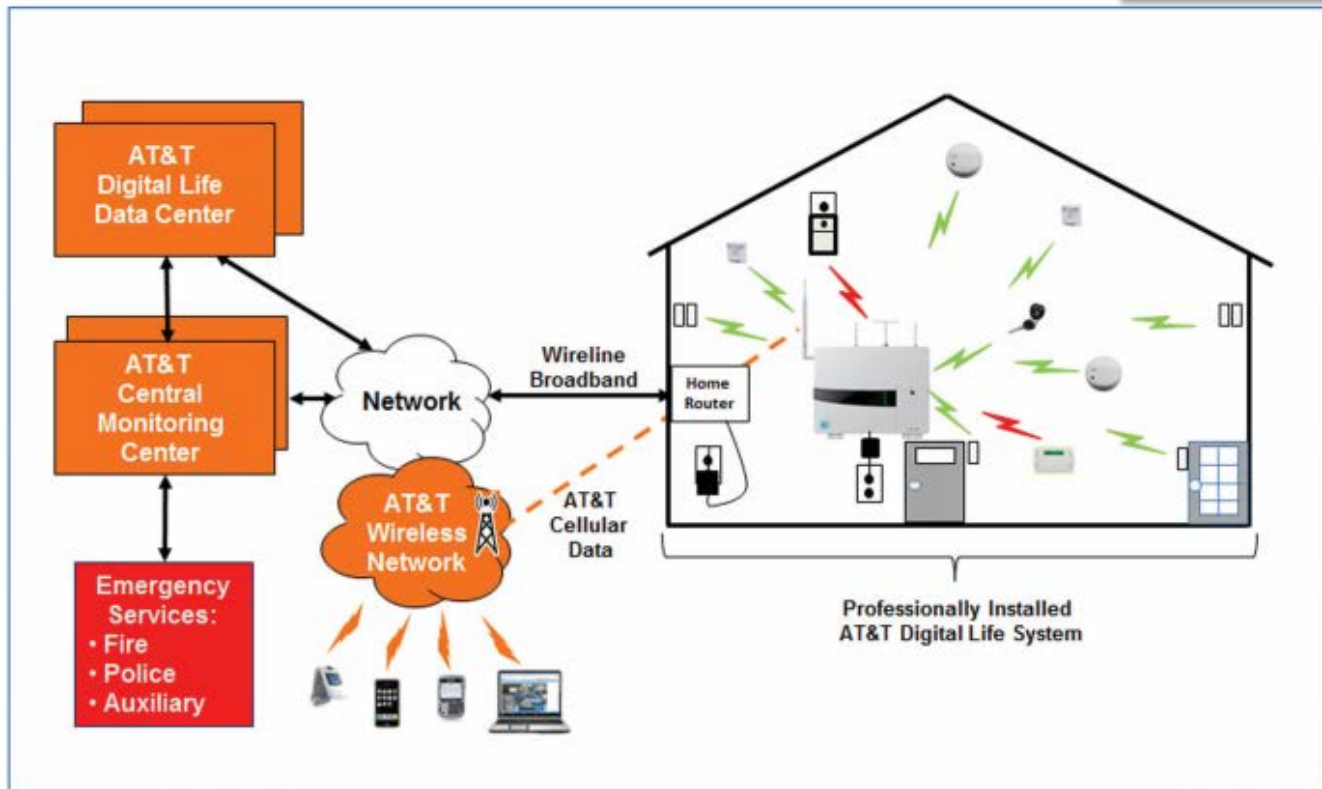


Home Gateway



# Service Provider : AT&T – Digital Life

Monthly Rent



# Wireless Communications inside Smart Home

Type	WiFi	Bluetooth	Zigbee	UWB	RFID	NFC
Speed	11-54Mbps	1Mbps	100Kbps	53-480Mbps	1Kbps	424Kbps
Transmission range	20-200Meter	20-200Meter	2-20Meter	0.2-40Meter	<10Meter	20Meter
Frequency band	2.4GHz	2.4GHz	2.4GHz	3.1GHz 10.6GHz		13.56GHz
Security Level	Low	High	High	High		Very High
Power dissipation	10-50mA	20mA	5mA	10-50mA	10mA	10mA
cost	High	Low	Low	High	Very Low	Low

# Smart Home Applications & Devices

# Smart Things

---

- **Control**

- Smart Lights
- Smart Outlets
- Smart Thermostat
- Smart Lock

- **Information & Sensor**

- Smart Presence
- Smart Alarm Sensor
- Smart Door/Window Sensors
- Smart Weather Sensor
- Smart Smoke Detector

- **Entertainment**

- Smart TV
- Smart Theater

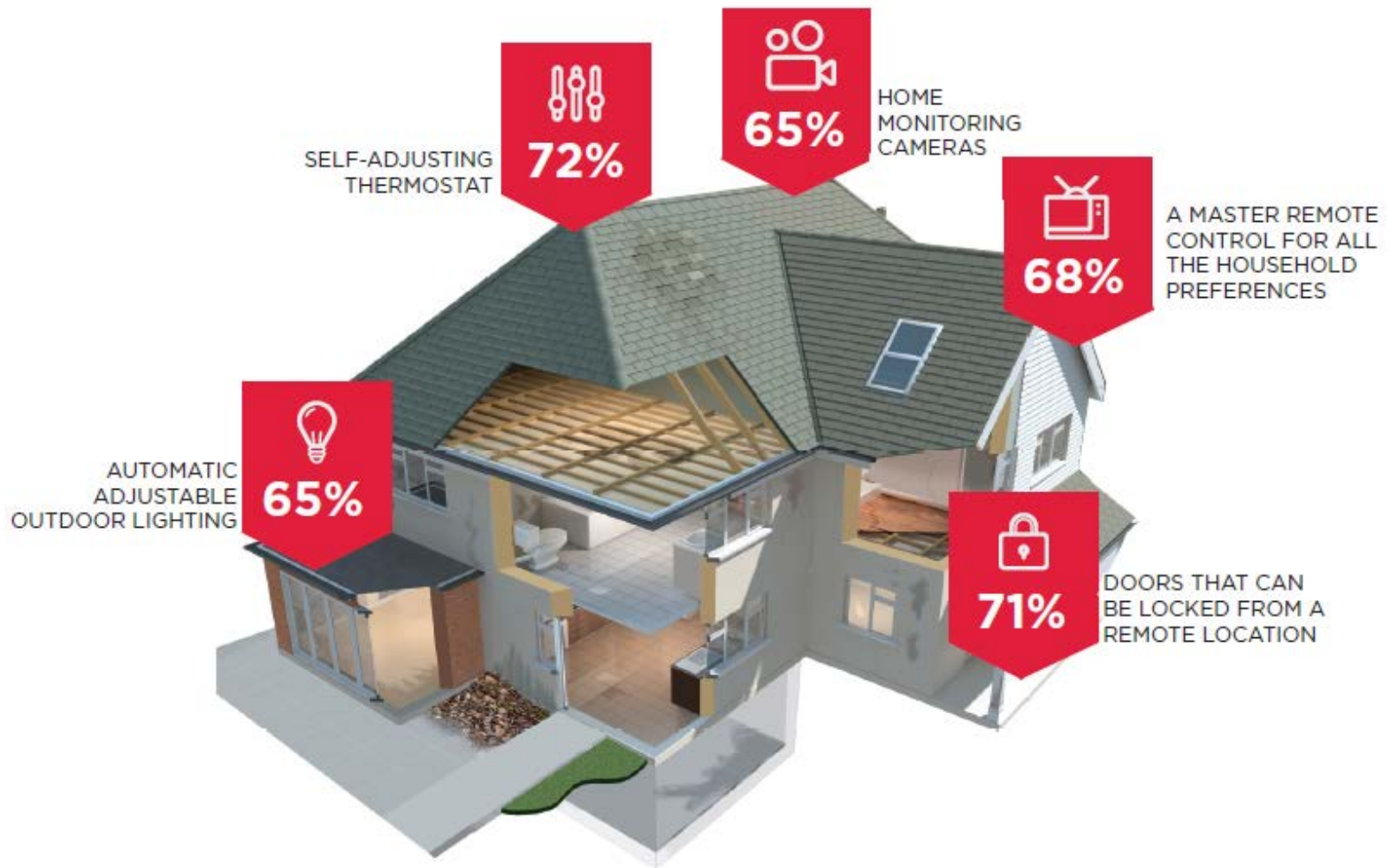
- **Others**

- Smart Meters
- Smart Refrigerator
- Smart Automatic

- .....

Smart == Micro Controller  
Controlling  
Scheduling  
Automation  
Programmable

# The Most Desired Smart Home Devices







# Littelfuse Sensors & Circuit Protection for Smart Home

# Littelfuse Circuit Protection for Smart Home

## Overview

**OverCurrent Protection**

- PTC Fuses
- SMD/Cartridge Fuses

**OverVoltage Protection**

- TVS Diodes
- Diode Arrays
- MLV/MOVs
- PulseGuard
- SIDACtor
- SPD Modules

**Power Control Solutions**

- Triac's
- Quadrac's
- Schottky Diodes
- Ultrafast Rectifiers

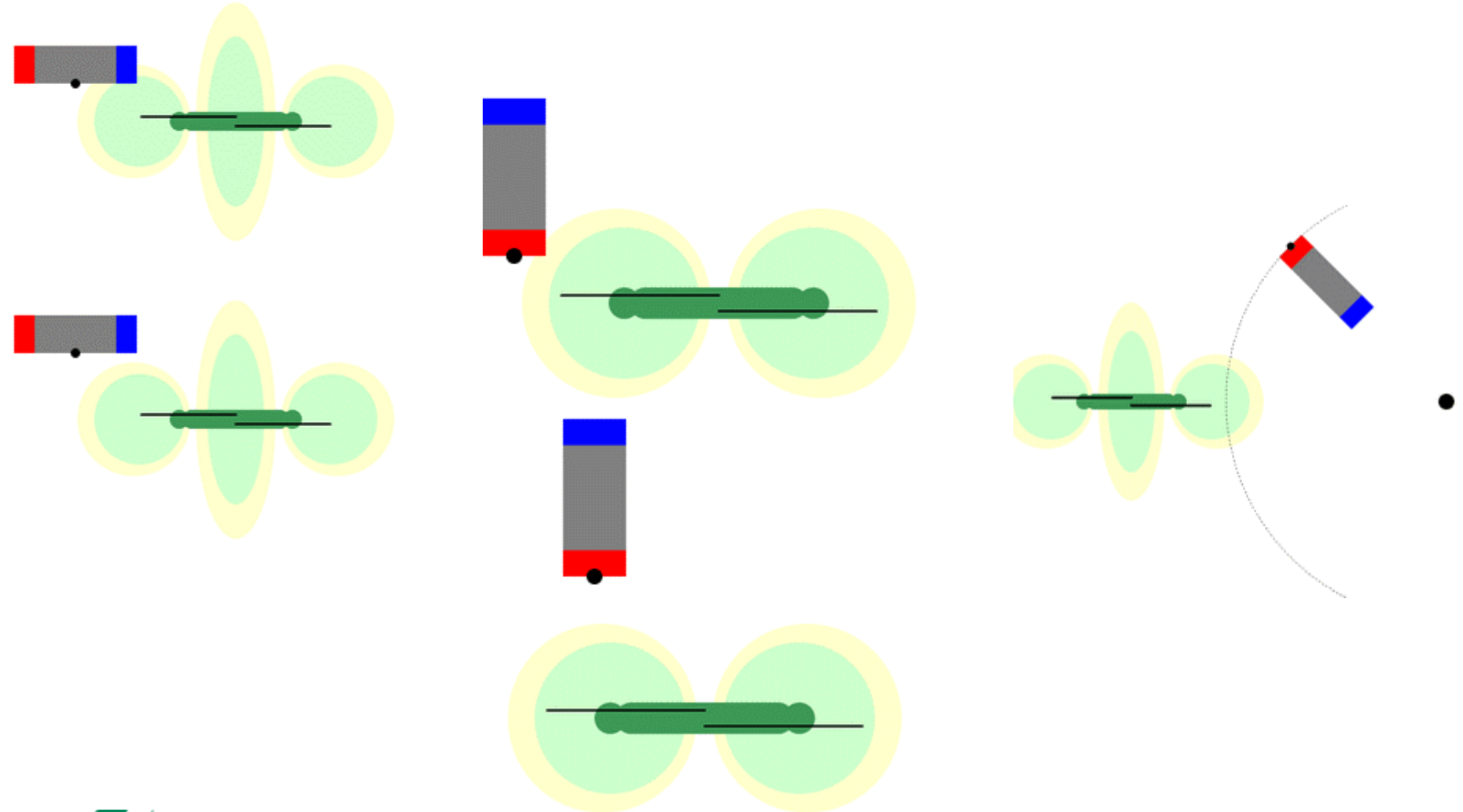
**Sensing Solutions**

- Reed Switches
- Reed Sensors
- Hall Effect Sensors

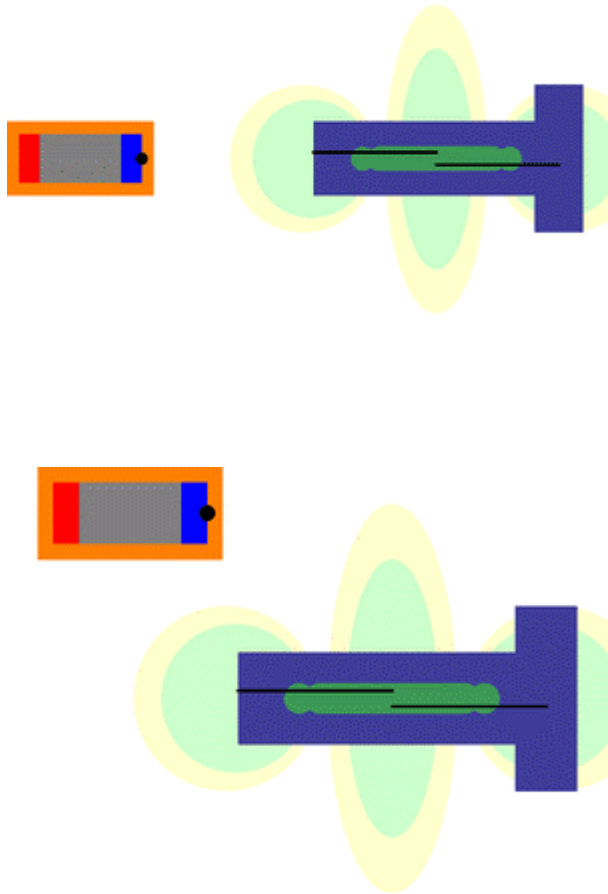


# Reed Switch: Here are some possible configurations.

---



# Reed Switch to Reed Sensors

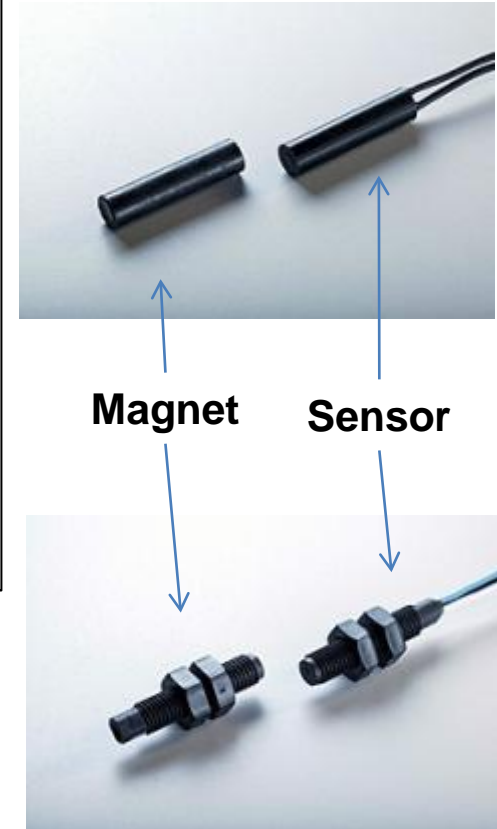


**Learn to look past packaging!!!**

**Focus on where the magnet and reed switch are!!!**

**From the standpoint of function, both of these packages are the same.**

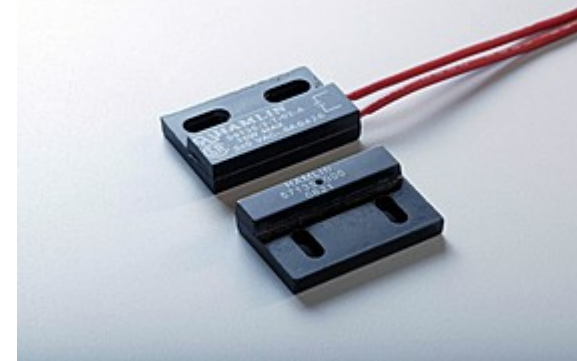
**The two animations on the left can apply to either package on the right.**



# Standard Reed Sensor



The animation shows a common way of using these types of sensors.

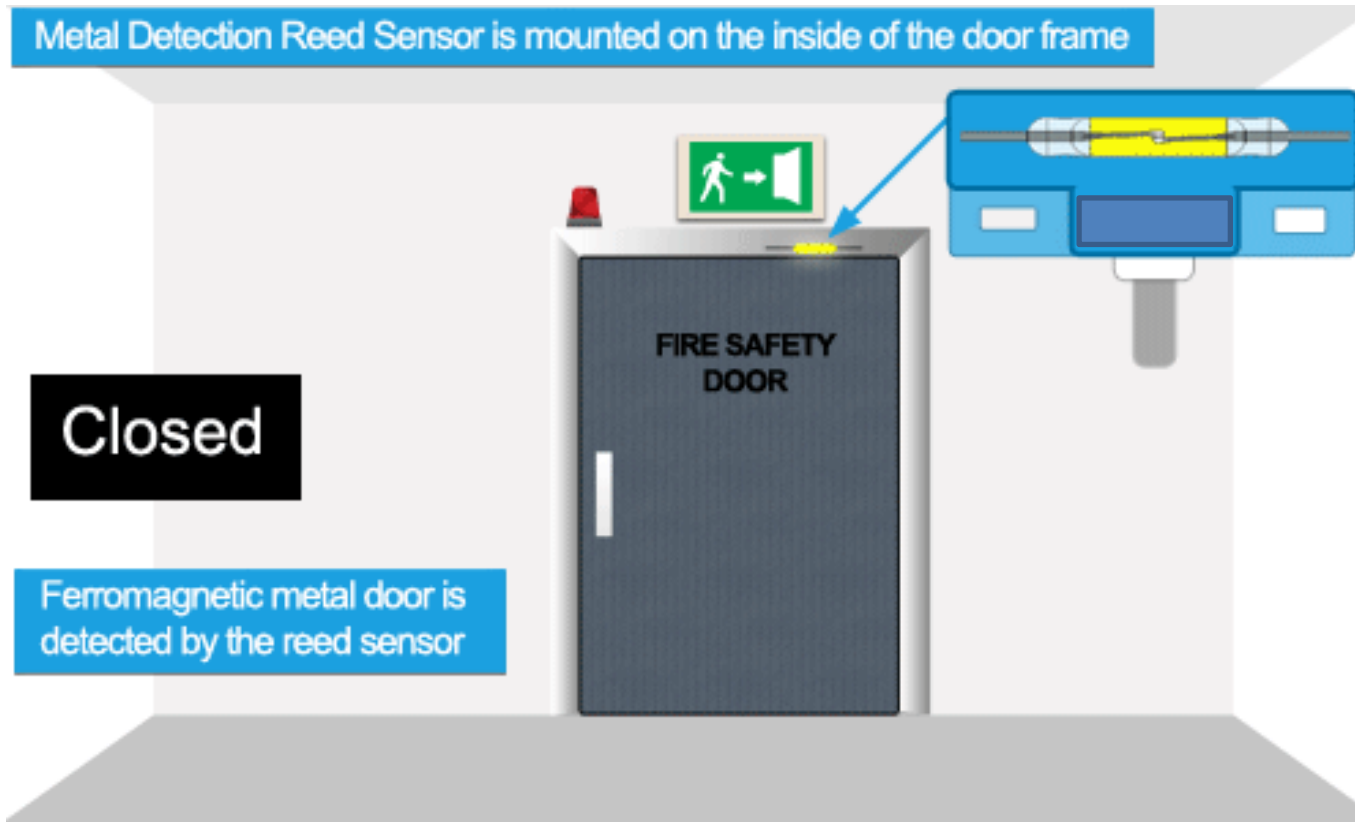




# Security Applications

- Security Door Reed Sensors
- Window Reed Sensors

Metal Detection Reed Sensor is mounted on the inside of the door frame



Expertise Applied | Answers Delivered

PROTECT | CONTROL | SENSE



Confidential and Proprietary to Littelfuse. Littelfuse, Inc. © 2016

# Littelfuse Circuit Protection for Smart Home

## Overview

### OverCurrent Protection

- PTC Fuses
- SMD/Cartridge Fuses

### OverVoltage Protection

- TVS Diodes
- Diode Arrays
- MLV/MOVs
- PulseGuard
- SIDACtor
- SPD Modules

### Power Control Solutions

- Triac's
- Quadrac's
- Schottky Diodes
- Ultrafast Rectifiers

### Sensing Solutions

- Reed Switches
- Reed Sensors
- Hall Effect Sensors



# Suger/Lighting Protection Requested

## Broadband Gateway, Smart Home Gateway and Power Supply

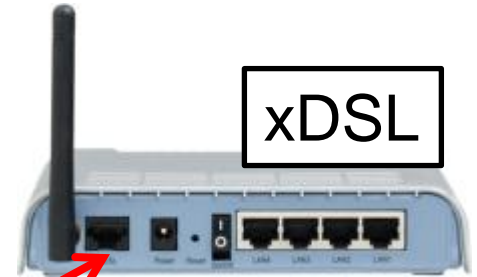
Cable Modem



Power Adapter



xDSL

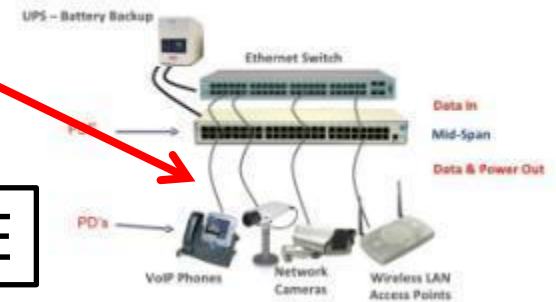


Surge Coupling

STB



Switch + PoE Injector = PSE Mid-Span



PoE

# Littelfuse Suger/Lighting Protectors



GDT

TVS

Series	Image	Standard Application (200-5000W)	AC Voltage Range	DC Voltage
		SOD-123	5.0-54	200W
		DO-214AC	5.0-440	400W
P4SMA		DO-214AC	5.8-495	400W
SMA6J		DO-214AC	5.0-12	600W
SMA6L		DO-221AC	5.0-85	800W
SACB		DO-214AA	5.0-50	500W
SMBJ		DO-214AA	5.0-440	600W
P6SMB		DO-214AA	5.8-495	600W
1KSMB		DO-214AA	5.8-136	1000W
SMCJ		DO-214AB	5.0-440	1500W
1.5SMC		DO-214AB	5.8-495	1500W
3.0SMC		DO-214AB	20-33	
SMDJ		DO-214AB	5.0-220	3000W
5.0SMDJ		DO-214AB	12-170	5000W

High Exposure Surge Protection:

SIDACTor

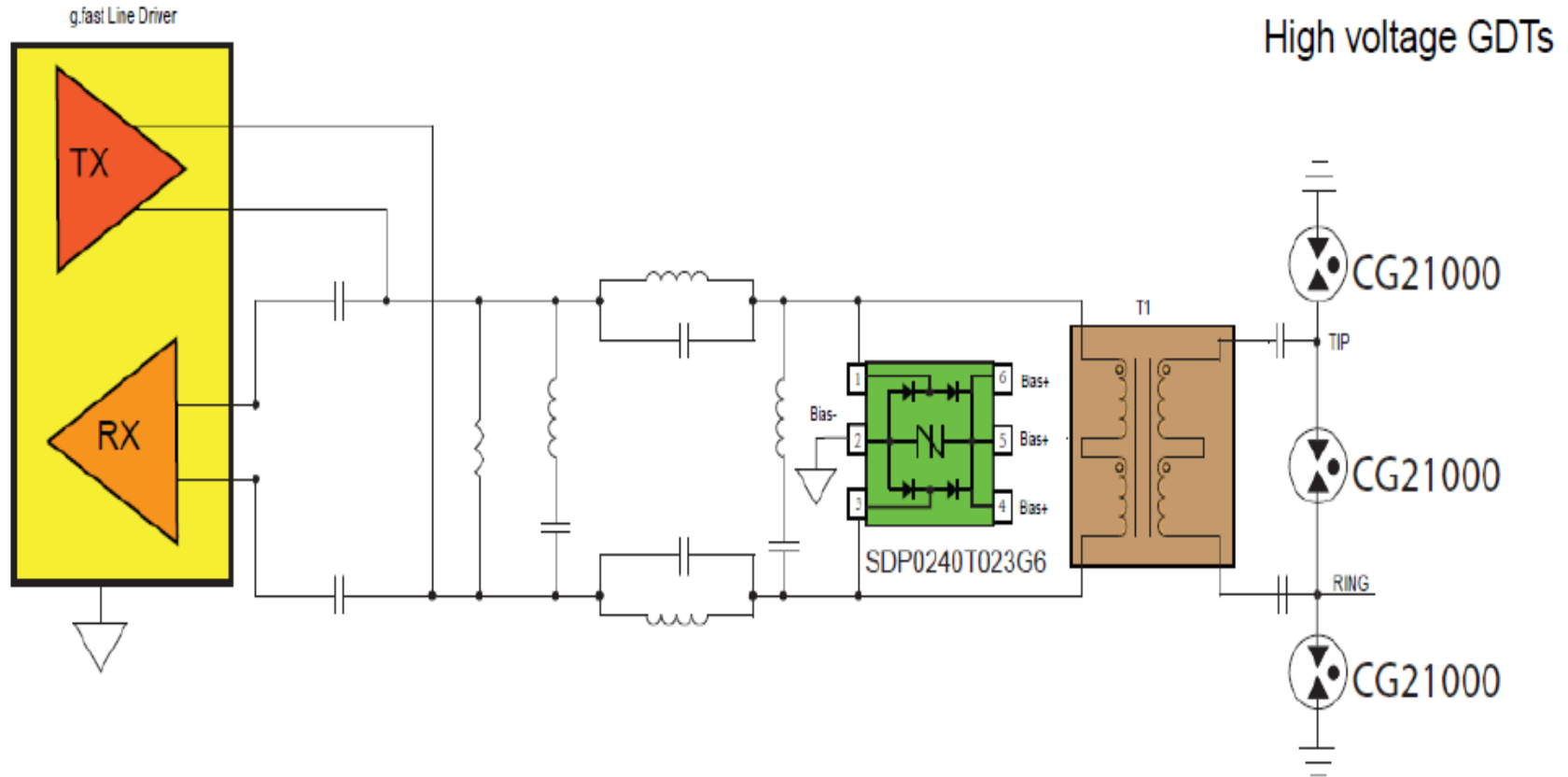
Series	Image	Case	Technology	AC Voltage Range	DC Voltage	Surge Current
Primary Protection Series		Cell	C	25-275		
		Modified TO-220	C	Pins 1-2,3-2: 25-275 Pins 1-3: 50-550	Pins 1-2,3-2: 40-350 Pins 1-3: 80-700	500A, 100A, 400A
Primary Protection Balanced Series		Modified TO-220	C	Pins 1-2, 3-2: 130-420 Pins 1-3: 130-420	Pins 1-2, 3-2: 180-600 Pins 1-3: 180-600	500A, 100A, 400A
5kA Series		TO-218	E	140-180	180-280	5000A
High Surge Current Series		DO-214AA	D	6-320	25-400	1000A, 200A, 800A

Varistor

Series Name <sup>1</sup>	Image	Technology Type	AC Voltage Range	DC Voltage	Surge Current
<b>Surface Mount MLVs and MOVs:</b>					
MHS		Multi-Layer Zinc Oxide (MLV)	2.5 - 107	3.5 - 120	4 - 500
MLE					
MLA					
MLA Automotive					
AU/ML		Zinc Oxide (MOV)	2.5 - 40	3.5 - 48	500
MLN					
CH		Zinc Oxide (MOV)	4 - 14	5.5 - 18	30
SM7					
SM20					
SM20					
<b>Radial Leaded MOVs:</b>					
LV UltraMOV <sup>®</sup> Varistor		Zinc Oxide	11 - 95	14 - 127	500 - 10000
UltraMOV <sup>®</sup> Varistor					
UltraMOV <sup>®</sup> 25S Varistor					
C-III					
LA			130 - 1000	175 - 1200	1200 - 6500

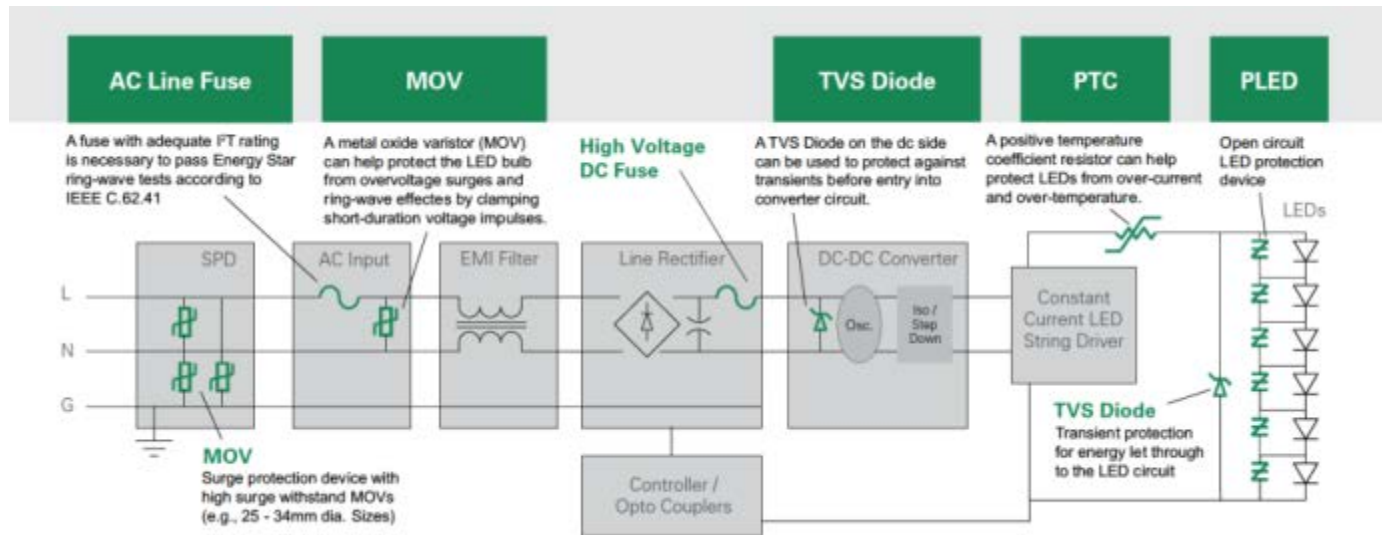


# For Example: G.Fast Surge Protection Schematic

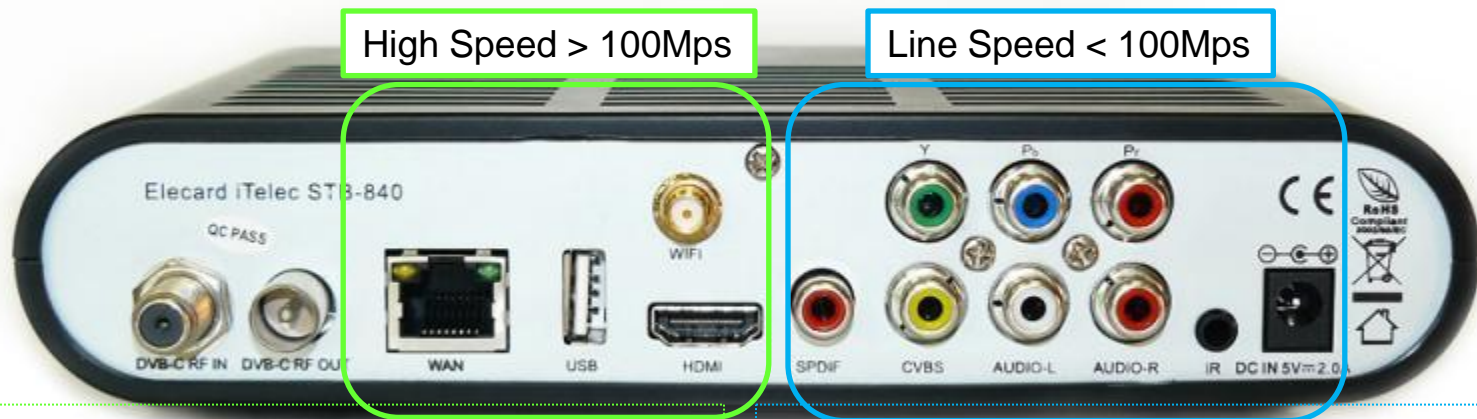




# Outside LED Light Surge Protection SPD Module



# ESD Protection Requested for Interfaces



- **Wireless Antenna**
  - for Zigbee/Z-Wave/BT/wifi/2G/3G/4G/GPS
- **USB2.0/3.0/3.1**
- **HDMI/DP**
- **Micro SD card reader**
- ...

- **Composit/Component video out**
- **Audio out**
- **RS-232/RS-422/RS485**
- **I2C**
- **DC Power Line**
- **Buttons**
- **Touch Panel**
- **SIM card**
- ...

# ESD Stress in Everywhere



# Littelfuse ESD protectors for High Speed Interface



## RF2193

### Features:

- 0.13pF MAX bidirectional
- 0.25pF MAX unidirectional
- ESD protection of  $\pm 20\text{kV}$  contact discharge,
- Low clamping voltage of 10V @ IPP=2A
- Low profile 0201 and 0402 DFN packages
- Facilitates excellent signal integrity
- AEC-Q101 qualified
- EVL Compliant



## RF3077

### Features:

- 0.20pF Typ capacitance
- ESD protection of  $\pm 20\text{kV}$  contact discharge
- Low clamping voltage of +9.2/-0.8V @ IPP=2.0A
- Facilitates excellent signal integrity
- AEC-Q101 qualified (1004)
- EVL Compliant



## XGD10402

### Features:

- 0.04pF
- High ESD withstand rating – 30kV contact/air discharge
- Extremely low leakage current, low capacitance
- High stand-off voltage, 24V maximum
- High operating temperature at 125° C
- Fast response time
- Flat top surface, compatible with pick/place processes
- Bi-directional
- Withstands multiple ESD strikes
- RoHS-compliant, halogen-free, Pb-free



# Littelfuse ESD protectors for Small Form Factor



## SP1013

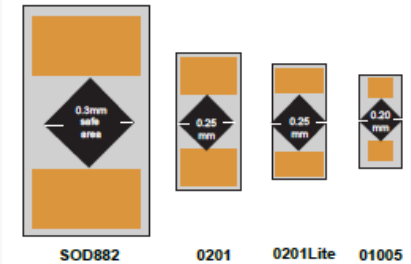
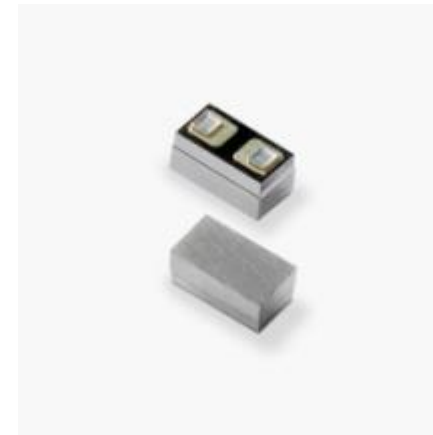
### Features:

ESD IEC61000-4-2,  $\pm 30\text{kV}$  contact,  $\pm 30\text{kV}$  air  
EFT, IEC61000-4-4, 40A (5/50ns)  
Lightning, IEC61000-4-5, 8A ( $t_P=8/20\mu\text{s}$ )  
Low capacitance of 30pF (@  $V_R=0\text{V}$ )  
Low leakage current of 0.1 $\mu\text{A}$  at 5V  
Industries smallest, manufacturable ESD footprint (True 0201)

## SP1014

### Features:

ESD IEC61000-4-2,  $\pm 12\text{kV}$  contact,  $\pm 15\text{kV}$  air  
EFT, IEC61000-4-4, 40A (5/50ns)  
Lightning, IEC61000-4-5, 2A ( $t_P=8/20\mu\text{s}$ )  
Low capacitance of 6pF (@  $V_R=0\text{V}$ )  
Low leakage current of 0.1 $\mu\text{A}$  at 5V  
Industries smallest, manufacturable ESD footprint (True 0201)



## SP1020

### Features:

ESD IEC61000-4-2,  $\pm 30\text{kV}$  contact,  $\pm 30\text{kV}$  air  
EFT, IEC61000-4-4, 40A (5/50ns)  
Lightning, IEC61000-4-5, 5A ( $t_P=8/20\mu\text{s}$ )  
Low capacitance of 20pF (@  $V_R=0\text{V}$ )  
Low leakage current of 0.1 $\mu\text{A}$  at 5V  
Industries smallest ESD footprint available (01005)

## SP1021

### Features:

ESD IEC61000-4-2,  $\pm 12\text{kV}$  contact,  $\pm 15\text{kV}$  air  
EFT, IEC61000-4-4, 40A (5/50ns)  
Lightning, IEC61000-4-5, 2A ( $t_P=8/20\mu\text{s}$ )  
Low capacitance of 6pF (@  $V_R=0\text{V}$ )  
Low leakage current of 0.1 $\mu\text{A}$  at 5V  
Industries smallest ESD footprint available (01005)



# Littelfuse ESD protectors

## for Line Speed < 100Mbps & ESD+Surge



### SP1005

#### Features:

ESD, IEC61000-4-2,  $\pm 30\text{kV}$  contact,  $\pm 30\text{kV}$  air  
EFT, IEC61000-4-4, 40A (5/50ns)  
Lightning, IEC61000-4-5, 10A ( $t_P=8/20\mu\text{s}$ )  
Low capacitance of 30pF (@  $V_R=0\text{V}$ )  
Low leakage current of  $0.1\mu\text{A}$  at 5V  
Space efficient 0201 and 0402 footprint



### SP4020

#### Features

Superb surge protection  
Peak pulse power of 750W  
Lightning, IEC61000-4-5, 30A  
Low capacitance of 2.5pF (typ)  
Enhanced ESD capability  
ESD, IEC61000-4-2,  $\pm 30\text{kV}$  contact  
Low dynamic resistance  
RDYN is  $0.7\Omega$  for SP4020

# Littelfuse Circuit Protection for Smart Home

## Overview

**OverCurrent Protection**

- PTC Fuses
- SMD/Cartridge Fuses

**OverVoltage Protection**

- TVS Diodes
- Diode Arrays
- MLV/MOVs
- PulseGuard
- SIDACtor
- SPD Modules

**Power Control Solutions**

- Triac's
- Quadrac's
- Schottky Diodes
- Ultrafast Rectifiers

**Sensing Solutions**

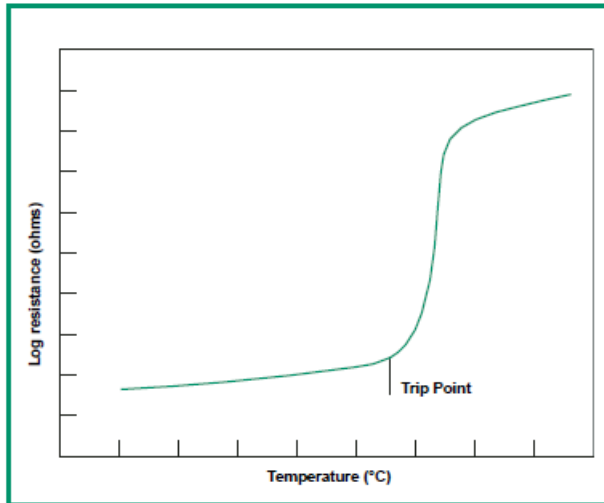
- Reed Switches
- Reed Sensors
- Hall Effect Sensors



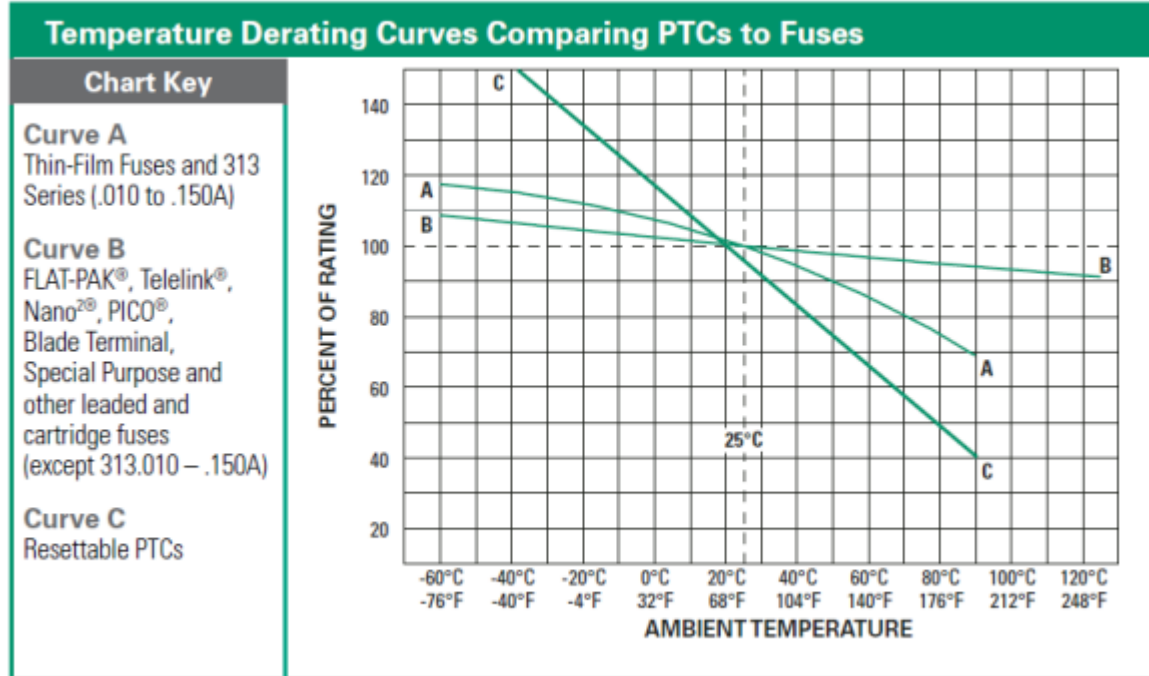
# Overt Current protection

## PTC Foundation

### Ohm vs Tem.



### Thermal derating



# Overt Current protection

## PTC Select table




PTC Selection Table

	SURFACE MOUNT						RADIAL LEADED	
Series Name	0805L	1206L	1210L	1812L	2016L	2920L	USBR	30R
Photos								
Chip Size	0805 (2012)	1206 (3216)	1210 (3225)	1812 (4532)	2016 (5041)	2920 (7351)		
Hold Current ( $I_{HOLD}$ )	0.10-1.00A	0.125-2.00A	0.05-1.75A	0.10-2.60A	0.3-2.00A	0.30-3.00A	0.75-2.5A	0.9-9.00A
Max voltage ( $V_{MAX}$ )	15V	30V	30V	60V	60V	60V	16V	30V
Max fault current ( $I_{MAX}$ )	40A	100A	100A	100A	40A	40A	40A	40A
Operating Temperature Range	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C	-40°C to 85°C
Agency approval	cULus, TUV	cULus, TUV	cULus, TUV	cULus, TUV	cULus, TUV	cULus, TUV	cULus, TUV	cULus, TUV
RoHS Compliant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead-Free	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes



# Overt Current protection

## SMD Type Fuse






































































































































































































































































































	Series Name <sup>1</sup>	View Datasheet	Order Samples	Size <sup>2</sup>	Time Lag	Fast Acting	Very Fast Acting	Device Range <sup>3</sup> (Operating Current Options in Amps)	Max. Voltage Rating <sup>2</sup> (Volts)	Interrupting Rating at Max. Voltage Rating <sup>3</sup> (Amps)	Operating Temperature Range	Agency Approvals <sup>3</sup>					Halogen Free	RoHS Compliant	Lead Free		
												UL	UR	CSA	PSE	ULMF					
<b>Surface Mount:</b>																					
Ceramic Chip		437	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	1206			0.25 - 8	125 / 63 / 32	50	-55°C to +150°C		•				•	•	•		
		438	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	0603			0.25 - 6	32 / 24	50			•					•	•	•	
		440	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	1206				1.75 - 8	32		50		•	•				•	•	•
		441	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	0603				2 - 6	32		50		•	•				•	•	•
		469	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	1206	•			1 - 8	24 / 32		24 - 63		•	•				•	•	•
		501	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	1206		•		10, 12, 15, 20	32		150		•					•	•	•
Thin Film		466	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	1206			0.125 - 5	125 / 63 / 32	50	-55°C to +90°C		•	•			•	•	•		
		429	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	1206			7	24	35			•	•				•	•	•	
		468	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	1206	•			0.5 - 3	63 / 32		35 - 50		•	•				•	•	•
		467	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	0603				0.25 - 5	32		35 - 50		•	•				•	•	•
		494	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	0603	•			0.25 - 5	32		35 - 50		•	•				•	•	•
		435	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	0402				0.25 - 5	32		35		•	•				•	•	•
Nano <sup>2</sup> Fuse		448	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	2410			0.062 - 15	125 / 65	35 - 50	-55°C to +125°C		•	•	•		•	•	•		
		449	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	2410	•		0.375 - 5	125	50			•	•	•			•	•	•	
		451 / 453	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	2410				0.062 - 15	125 / 65		35 - 50	•	•	•	•		•	•	•	
		452 / 454	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	2410	•			0.375 - 12	125 / 72		50		•	•	•			•	•	•
		456	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	4012				20, 25, 30, 40	125		100		•					•	•	•
		458	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	1206		•		1.0 - 10	75 / 63		50		•					•	•	•
		443	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	4012	•			0.5 - 5	250		50		•					•	•	•
		464	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	4818		•		0.5 - 6.3	250		100				•	•		•	•	•
		465	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	4818	•			1 - 6.3	250		100				•	•		•	•	•
		462	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	4118	•			0.500 - 5	350		100	-40°C to +80°C		•		•		•	•	•
485	<a href="#">View Datasheet</a>	<a href="#">Order Samples</a>	4818		•		0.500 - 3.15	600	100	-55°C to +125°C		•				•	•	•			



# Overt Current protection

## Cartridge Type Fuse

### Axial Leaded / Cartridge:

PICO® Fuse / PICO® II Fuse Axial		251					•	0.062 - 15	125	300DC / 50AC	-55°C to +125°C															
		253					•	0.062 - 15	125	300DC / 50AC																
		275					•	20 - 30	32	300DC / 50AC																
		263					•	0.062 - 5	250	50																
		471						•	0.5 - 5	125		50														
		472						•	0.5 - 5	125		50														
		473						•	0.375 - 7	125		50														
		265/266/267							•	0.062 - 15		125	300DC / 50AC													
3.6x10 mm		874					•	0.1 - 10	250	50	-55°C to +125°C															
		875						•	0.1 - 10	250		50														
		876						•	0.125 - 5	250		35 - 50														
		877						•	2 - 6.3	250		35 - 63														
		208					•		0.125 - 10	350		100														
4.5x14.5 mm (2AG)		209						0.25 - 7	350	100	-55°C to +125°C															
		220					Special Fuse	0.3 - 7	250 / 300 / 350	35 - 100																
		2205							0.25 - 2.5	250		35														
		224/225						•	0.375 - 10	250 / 125		35 - 500														
		229/230						•	0																	

# Littelfuse Circuit Protection for Smart Home

## Overview

- ### OverCurrent Protection
- PTC Fuses
  - SMD/Cartridge Fuses

- ### OverVoltage Protection
- TVS Diodes
  - Diode Arrays
  - MLV/MOVs
  - PulseGuard
  - SIDACtor
  - SPD Modules

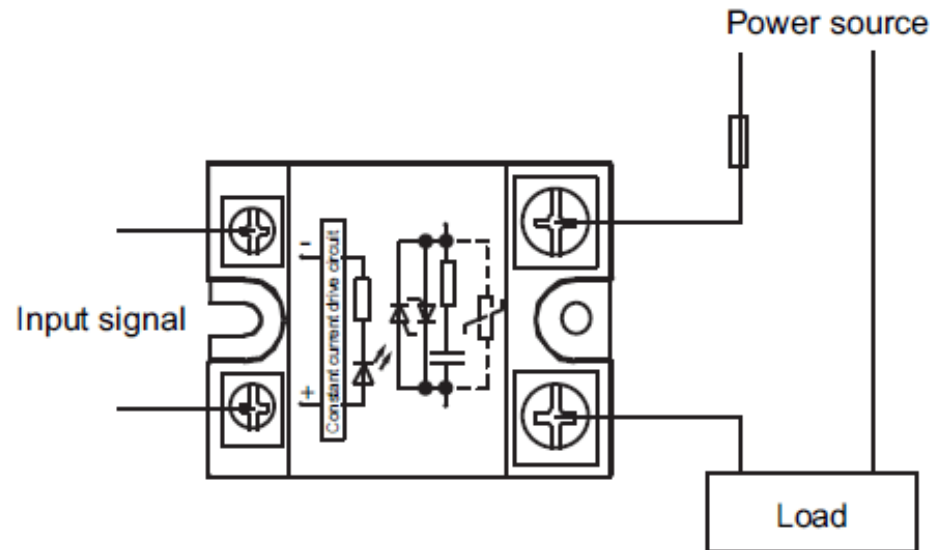
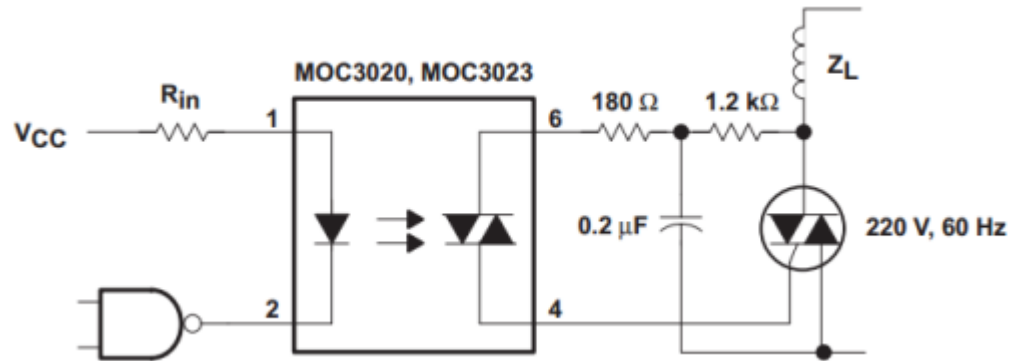
- ### Power Control Solutions
- Triac's
  - Quadrac's
  - Schottky Diodes
  - Ultrafast Rectifiers

- ### Sensing Solutions
- Reed Switches
  - Reed Sensors
  - Hall Effect Sensors



# Littelfuse Others Products

## Solid State Relay (SSR)



# Littelfuse Thyristor

## PRODUCT SELECTION GUIDE

### Switching Thyristors

Switching Thyristors are solid state switches that are normally open circuits (very high impedance), capable of withstanding rated blocking/off-state voltage until triggered to on state. Used for circuit control applications, Littelfuse offers TRIAC, QUADRAC, SCRs, SIDAC, Rectifiers plus Alternistor Triacs for best commutating and noise immunity. Offered in various and other configurations for a wide range of currents blocking/off-state voltages, packages, and triggering.

### Through-Hole Packages:



### Others:



### Surface Mount Packages:



Max. power = 1000V&100A



# Smart Outlets

---





# Conclusion

## Smart Home

---

- System Integration
- Remote Control from Mobile Devices
- Automation/Management with Intelligent
- Security between Communications
- New Market and More Business Opportunities

# Thank you for your attention! Any questions?



<https://www.speed2design.com/education-center/circuit-protection-for-automotive-applications/>

