Protection Solutions for Building Automation Systems

Enhancing System Reliability through Protection in BAS Brochure

BOURNS®

Introduction

Office lighting, HVAC, security systems, and smart home controls are being fundamentally transformed through the integration of Building Automation Systems (BAS). This shift is fueled by the convergence of power connectivity, data communication and the addition of smart features into traditional infrastructure.

To ensure system reliability, it is essential to implement robust overvoltage and overcurrent protection. These safeguards protect sensitive electronics from a range of electrical threats, from major power surges to minor Electrostatic Discharges (ESD). Such protection is essential to prevent costly damage and repairs, especially as BAS become integral to a building's daily operation.

Bourns offers a wide range of industrial-grade components specifically designed to power and protect electronic circuits. The extensive product catalog includes devices such as POWrTherm™ NTC Thermistors, Current Sense Resistors, Power Resistors, TVS Diodes and Arrays, Rectifier Diodes, ChipGuard® ESD Surge Protectors, Metal Oxide Varistors (MOVs), TBU® High-Speed Protectors (HSPs), TISP® Thyristor Surge Protectors, SinglFuse™ SMD Fuses, Multifuse® Polymer PTC Resettable Fuses, TCS™ High-Speed Protectors (HSPs), and Trimpot® Trimming Potentiometers.

Power over Ethernet (PoE) in Building Automation Systems (BAS)

Power over Ethernet integrates power delivery and data transmission into a single cable. This integration is critical for Building Automation Systems, where numerous devices require both power and data communication. By combining power and data in one line, PoE enables faster deployment, greater flexibility and significantly reduces both maintenance and installation costs.

However, PoE requires specialized protection strategies that differ from those used in traditional power or data systems. Ensuring proper protection for PoE lines is essential to maintaining the overall safety, reliability and uptime of BAS buildings.

General Design Considerations

BAS are designed for durability and resilience, with the ability to withstand physical wear and general neglect over time. As the central infrastructure network of a building, BAS must remain operational under all conditions. In the event of a failure, system design must ensure damage is contained and isolated.

The interconnected nature of BAS presents both advantages and challenges. On the one hand, it supports Internet of Things (IoT) functionality, enabling remote use capabilities.

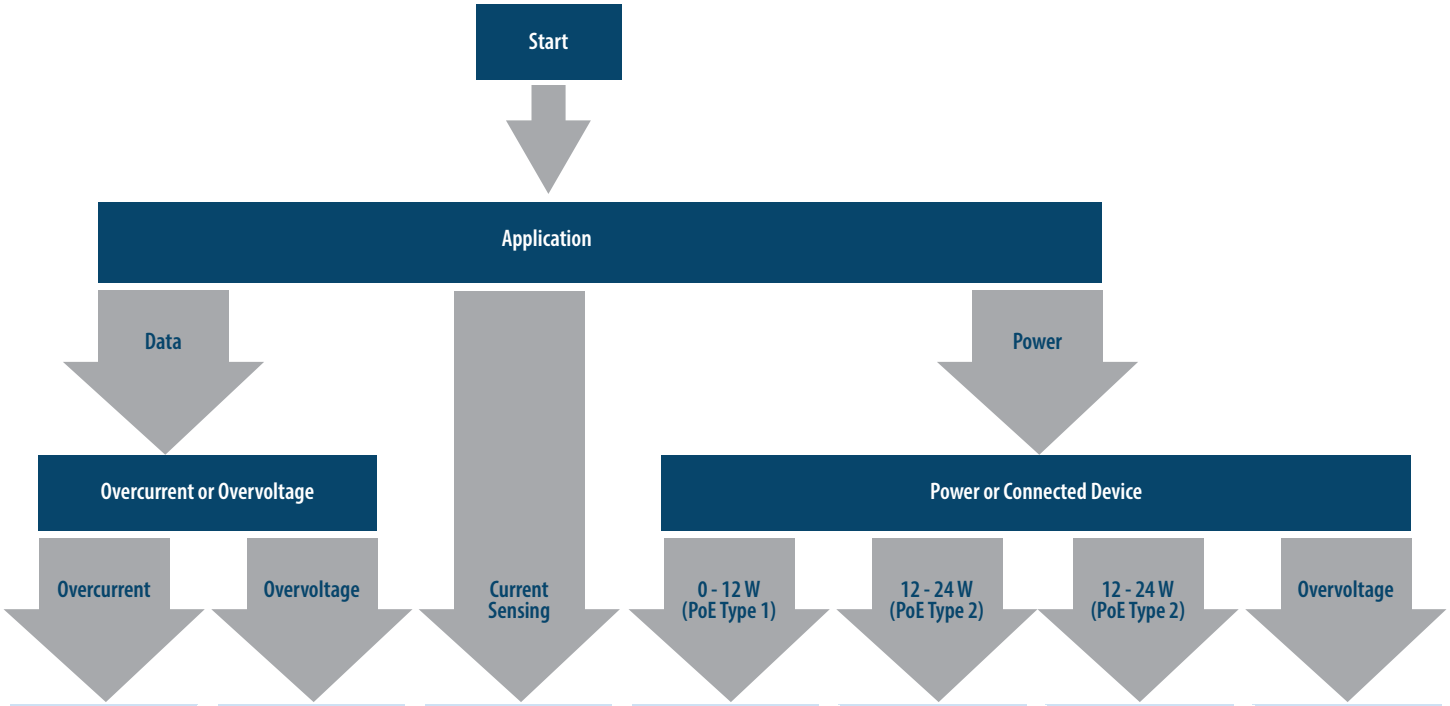
On the other hand, increased connectivity also introduces security risks due to the increased number of potential failure points in data communications.

When combined with PoE, BAS systems gain enhanced flexibility and scalability, allowing seamless integration of diverse smart devices throughout a building.

Bourns® Product Offerings

- POWrTherm™ NTC Thermistors
- Current Sense Resistors
- Power Resistors
- TVS Diodes and Arrays
- Rectifier Diodes
- ChipGuard® ESD Surge Protectors
- Metal Oxide Varistors (MOVs)
- TBU® High-Speed Protectors (HSPs)
- TCS™ High Speed Protectors (HSPs)
- TISP® Thyristor Surge Protectors
- SinglFuse™ SMD Fuses
- Multifuse® Polymer PTC Resettable Fuses
- Trimpot® Trimming Potentiometers

Device Selection Flowchart



TBU® High-Speed Protectors (HSPs)
TBU-DB-Q Series
TBU-DF Series
TBU-PL Series
P-G Series

TCS™ High Speed Protectors (HSPs)
TCS-DL004-250-WH Series
TCS-DL004-750-WH Series

Diode Arrays
CDDFN10-2547N
CDDFN10-3304NA
CDDFN10-3324P

TISP® Thyristor Surge Protectors
TISP6nTP2x Series
TISP61089QB Series
TISP6xxxx Series
TISP82xxx Series
TISP83xxx Series
TISP9xxxx Series

ChipGuard® ESD Surge Protectors
CG0201MLA-5.5MH
CG201MLC-05H
CG0402MLA Series
CG0603MLA Series
CG0402MLU Series
CG0603MLU Series

Current Sense Resistors
CSI2H-2512 Series
CSI4J-4026 Series
CSS2H-3920 Series

OVERVOLTAGE PROTECTION:
TVS Diodes
SMAJ16CA
SMA6J16CA

Metal Oxide Varistors (MOVs)
ZV8-L-0603-300
ZVX-6S-0805-400
BVR1206-04PF

OVERCURRENT PROTECTION:
Multifuse® PPTC Resettable Fuses
MF-MSMF075/24

POWrTherm™ NTC Thermistors
BN-LG05Y4R0Mx

SinglFuse™ SMD Fuses
SF-0402F200-2

OVERVOLTAGE PROTECTION:
TVS Diodes
SMAJ33CA
SMAJ40CA-Q

Metal Oxide Varistors (MOVs)
DV-25-K-3225
ZVX-25-S-1206-400

OVERCURRENT PROTECTION:
Multifuse® PPTC Resettable Fuses
MF-SMDF100/33X
MF-LSMF185/33X

POWrTherm™ NTC Thermistors
BN-LG13Y5R0Mx

SinglFuse™ SMD Fuses
SF-0603F-160-2
SF-1206F-250-2

OVERVOLTAGE PROTECTION:
TVS Diodes
SMA6J38CA
SMBJ51CA

Metal Oxide Varistors (MOVs)
DV-50-K-3225
PV-50-K-4032
ZV-50-K-1812-401

OVERCURRENT PROTECTION:
Multifuse® PPTC Resettable Fuses
MF-SM075/60

POWrTherm™ NTC Thermistors
BN-LG20Y6R0Mx

SinglFuse™ SMD Fuses
SF-1206F-125-2
SF-0603 Series
SF-1206 Series

OVERVOLTAGE PROTECTION:
TVS Diodes
SMA6J60CA
SMBJ80CA

Metal Oxide Varistors (MOVs)
ZV-50-K-2220-801
DV-50-K-4032
ZV-60-K-1206-121

OVERCURRENT PROTECTION:
SinglFuse™ SMD Fuses
SF-1206F200-2
SF-1206FP200-2

POWrTherm™ NTC Thermistors
BN-LG25Y8R0Mx

POWER AND PRECISION COMPONENTS

Resistors
CRT Series
PWR2615 Series
CR Series
CMP Series
PWR163 Series
PWR263S Series

Diode Bridges
CD-HD0x Series
CD-HD2x(L) Series

Schottky Diodes
CD123D-B1xR
CD214A-B1xR Series

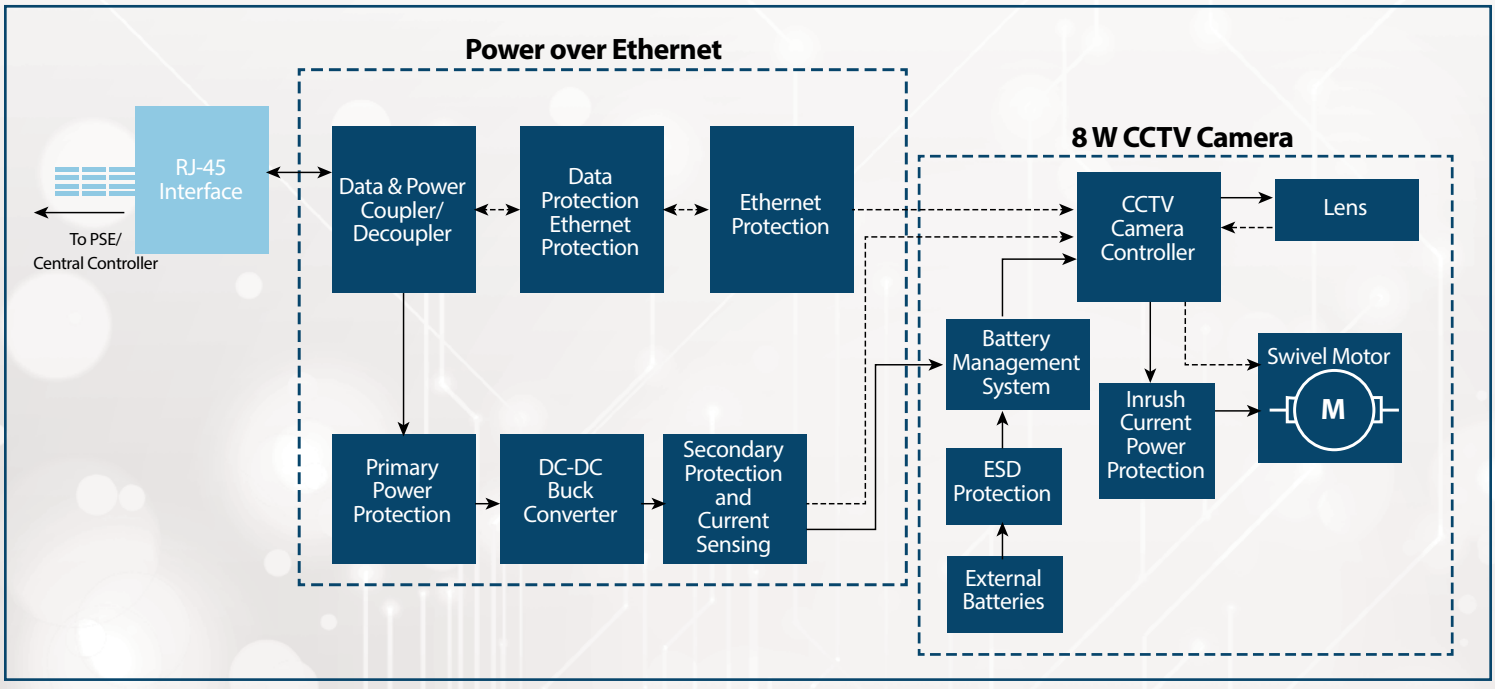
Trimpot® Trimming Potentiometers
3214
3223
3224

BAS Application Examples

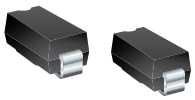
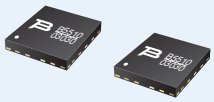
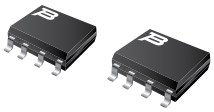
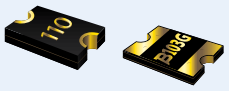
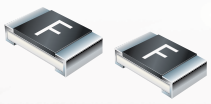
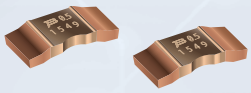
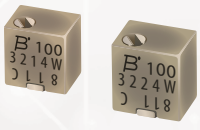
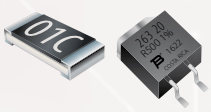
CCTV Cameras

CCTV cameras function as an extension of a central surveillance system, transmitting their video feed through connected networks. Each camera typically includes a lens and swivel motors, enabling pan and tilt movements that are controlled by a microcontroller.

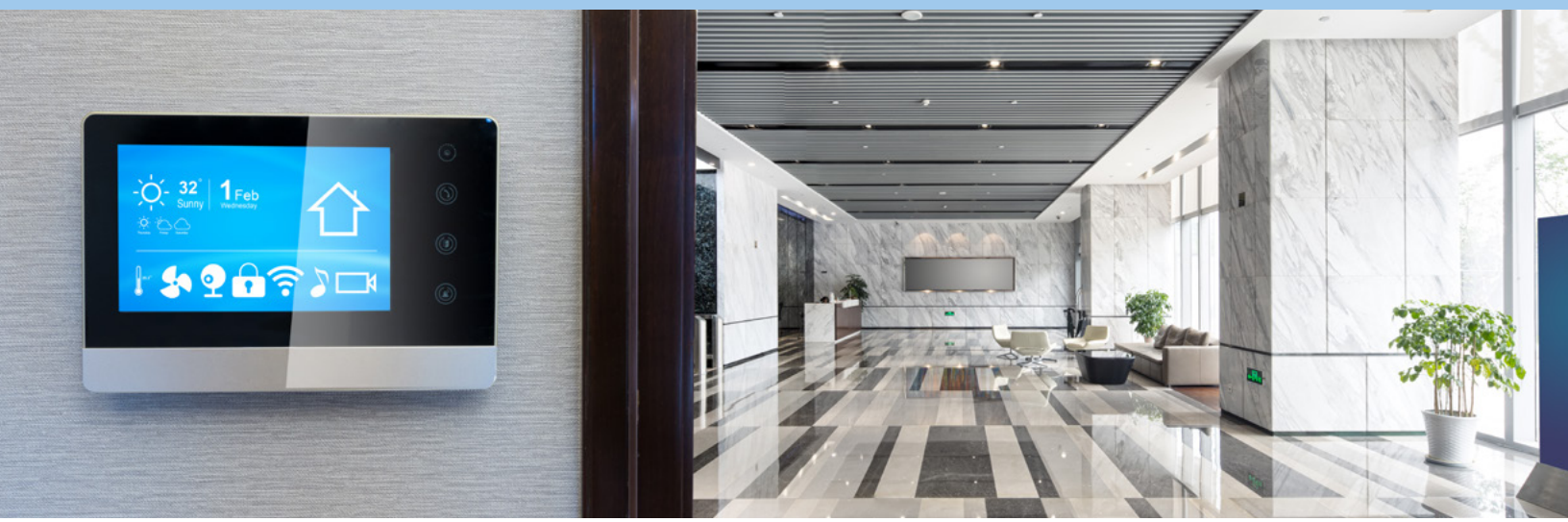
Connections via PoE allow the camera to have quick installation and high-speed data transmission to a central network, making it ideal for scalable and secure surveillance networks. External batteries provide back-up power, allowing continuous operation during power outages or attempts at tampering.



Bourns® Product Recommendations for CCTV Camera Circuit Protection

Product Image	Recommended Products	Function
	POWrTherm™ NTC Thermistors BN-LGxxY	Protects against inrush currents from damaging sensitive equipment
	TVS Diodes SMA6J Series SMBJ Series	Protects from overvoltage events like electrostatic discharge and surges
	TBU® High-Speed Protectors (HSPs) TBU-DB-Q TBU-DF	Protects data communications from transient currents at high speeds
	TISP® Thyristor Surge Protectors TISP6xxxx TISP82xx	Protects sensitive data lines from transient voltages
	Multifuse® Polymer PTC Resettable Fuses MF-USMF MF-MSMF MF-SMDF	Resettable overcurrent protection devices minimize maintenance downtime
	SinglFuse™ SMD Fuses SF-0603F SF-1206F	Protects device from dangerous overcurrent events
	Current Sense Resistors CSI2H CSI4J CSS2H	Shunt resistors create a voltage drop that enables accurate current monitoring
	Trimpot® Trimming Potentiometers 3214 3223 3224	Allows resistance adjustments for precision setting
	Rectifier Diodes CD-HD0x Series CD-HD2xL Series CD123D-B1xR Series	Packaged bridge rectifier diodes and Schottky diodes are commonly used in DC-DC conversion circuits
	Resistors CRT Series PWR163 Series PWR263 Series	Thick film, thin film, and wirewound technologies enable designers the flexibility between precision and power

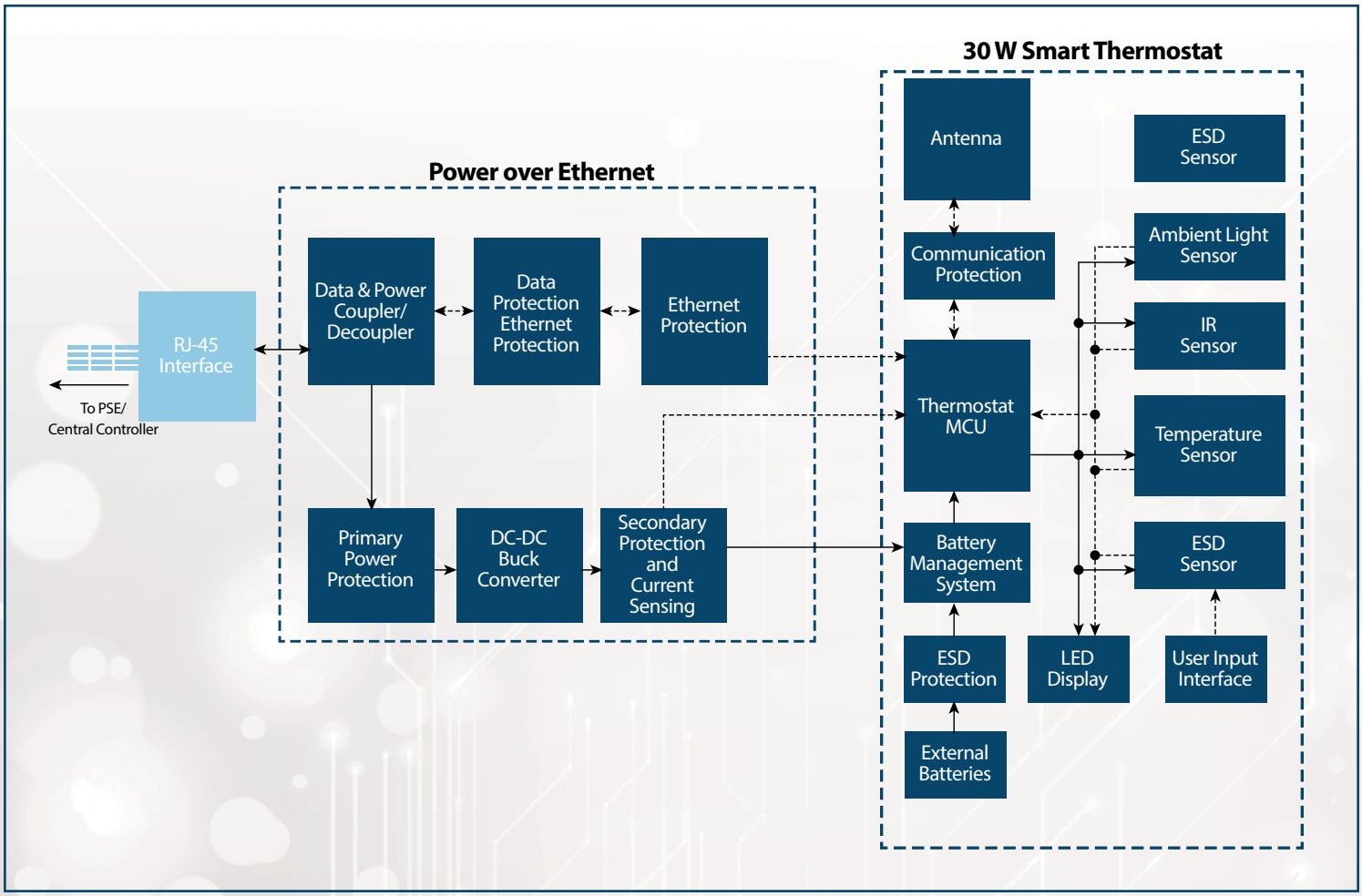
BAS Application Examples



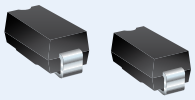
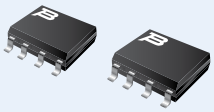
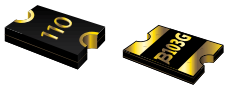
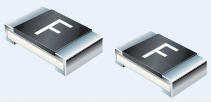
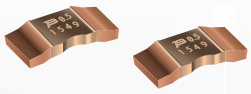
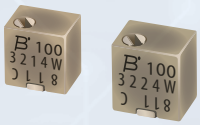
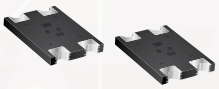
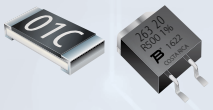
Smart Thermostats

Smart thermostats provide multiple input methods to control indoor temperature, including temperature sensing, manual adjustments, and remote commands.

The thermostat communicates with the central network and the connected HVAC system regulates climate conditions. For enhanced reliability, optional external batteries and an antenna provide greater flexibility and wireless communication of the thermostat in the event of a PoE cable failure.



Bourns® Product Recommendations for Smart Thermostat Circuit Protection

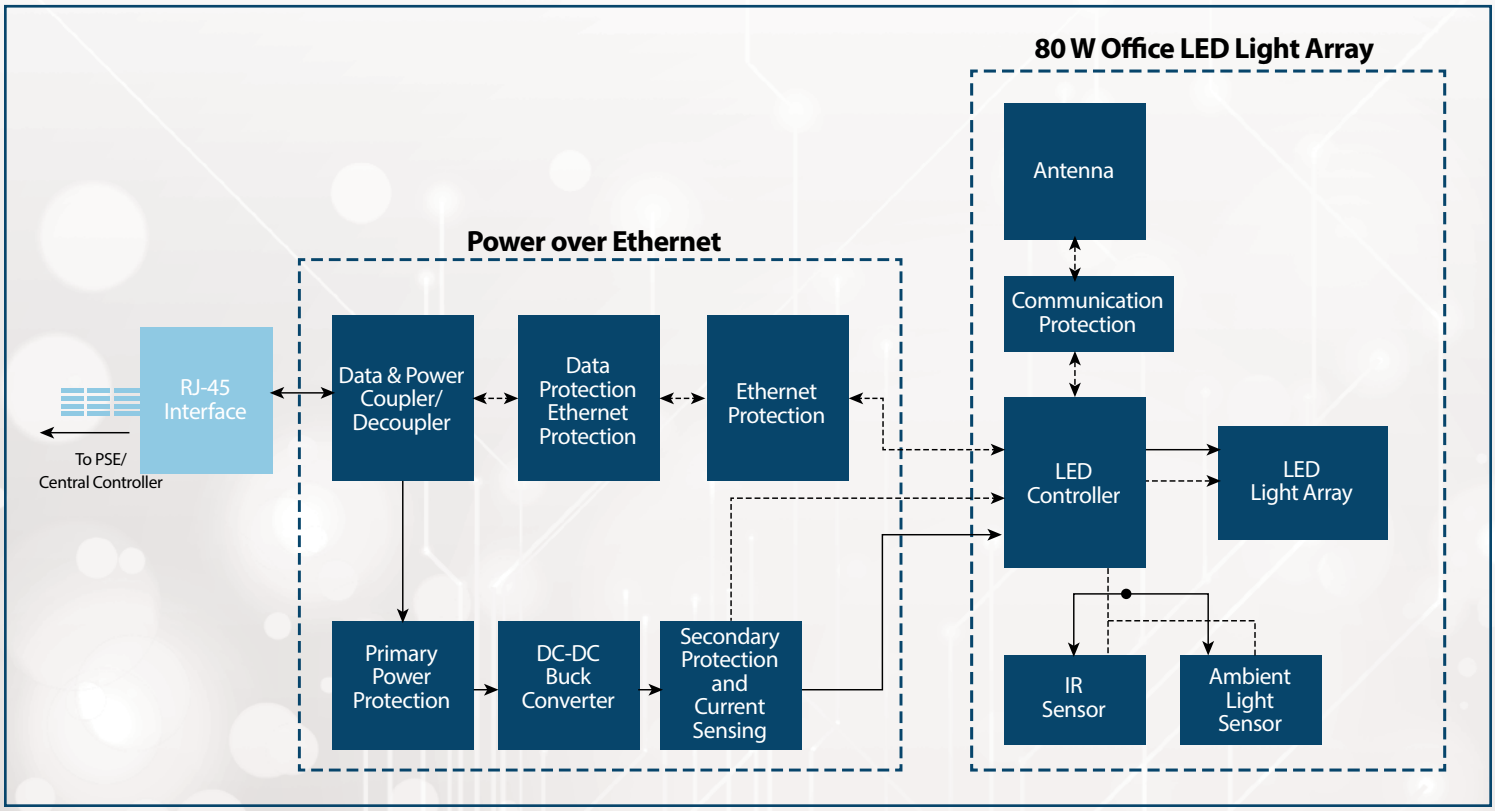
Product Image	Recommended Products	Function
	TVS Diodes SMA6J Series SMBJ Series	Protects ports from electrostatic discharge
	TBU® High-Speed Protectors (HSPs) TBU-DB-Q TBU-DF	Protects data communications from transient currents at high speeds
	TISP® Thyristor Surge Protectors TISP6xxxx TISP82xx	Protects sensitive data lines from transient voltages
	Multifuse® Polymer PTC Resettable Fuses MF-USMF MF-MSMF MF-SMDF	Resettable overcurrent protection for devices requiring minimal maintenance downtime
	SinglFuse™ SMD Fuses SF-0603F SF-1206F	Protects the device from dangerous overcurrent events
	Current Sense Resistors CSI2H CSI4J CSS2H	Shunt resistors for voltage drops that enable efficient and accurate current measurement
	Trimpot® Trimming Potentiometers 3214 3223 3224	Allows modification of resistances for precision setting
	Rectifier Diodes CD-HD0x Series CD-HD2xL Series CD123D-B1xR Series	Packaged bridge rectifier diodes and Schottky diodes offer rectification and DC-DC conversion circuits
	Resistors CRT Series PWR163 Series PWR263 Series	Thick film, thin film, and wirewound technologies enable designers the flexibility between precision and power

BAS Application Examples

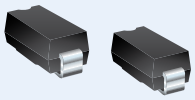
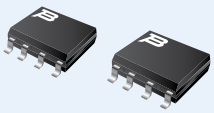
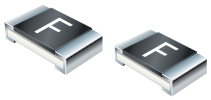
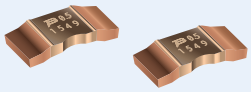
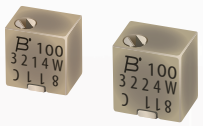
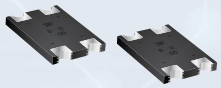
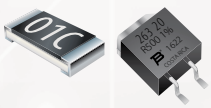
LED Lighting

Smart LED lights support wall switches, remote controls, scheduled timers, and motion sensors. They can automatically control brightness based on input from daylight sensors, making them a key component in a BAS.

The integration of various sensors and a microcontrollers enable fully automated lighting control within a building. An antenna can be included to enable wireless communication when powered through a standard AC mains connection instead of PoE.



Bourns® Product Recommendations for LED Lighting Circuit Protection

Product Image	Recommended Products	Function
	TVS Diodes SMA6J Series SMBJ Series	Protects ports from electrostatic discharge
	TBU® High-Speed Protectors (HSPs) TBU-DB-Q TBU-DF	Protects data communications from transient currents at high speeds
	TISP® Thyristor Surge Protectors TISP6xxxx TISP82xx	Protects sensitive data lines from transient voltages
	SinglFuse™ SMD Fuses SF-0603F SF-1206F	Protects the device from dangerous overcurrent events
	Current Sense Resistors CSI2H CSI4J CSS2H	Shunt resistors allow measurable voltage drop for efficient current measuring
	Trimpot® Trimming Potentiometers 3214 3223 3224	Allows modification of resistances for precision setting
	Rectifier Diodes CD-HD0x Series CD-HD2xL Series CD123D-B1xR Series	Packaged bridge rectifier diodes provide AC-DC rectification while Schottky diodes are used in DC-DC conversion circuits voltage drop and fast switching capabilities
	Resistors CRT Series PWR163 Series PWR263 Series	Thick film, thin film, and wirewound technologies offer designers flexibility between precision and power

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