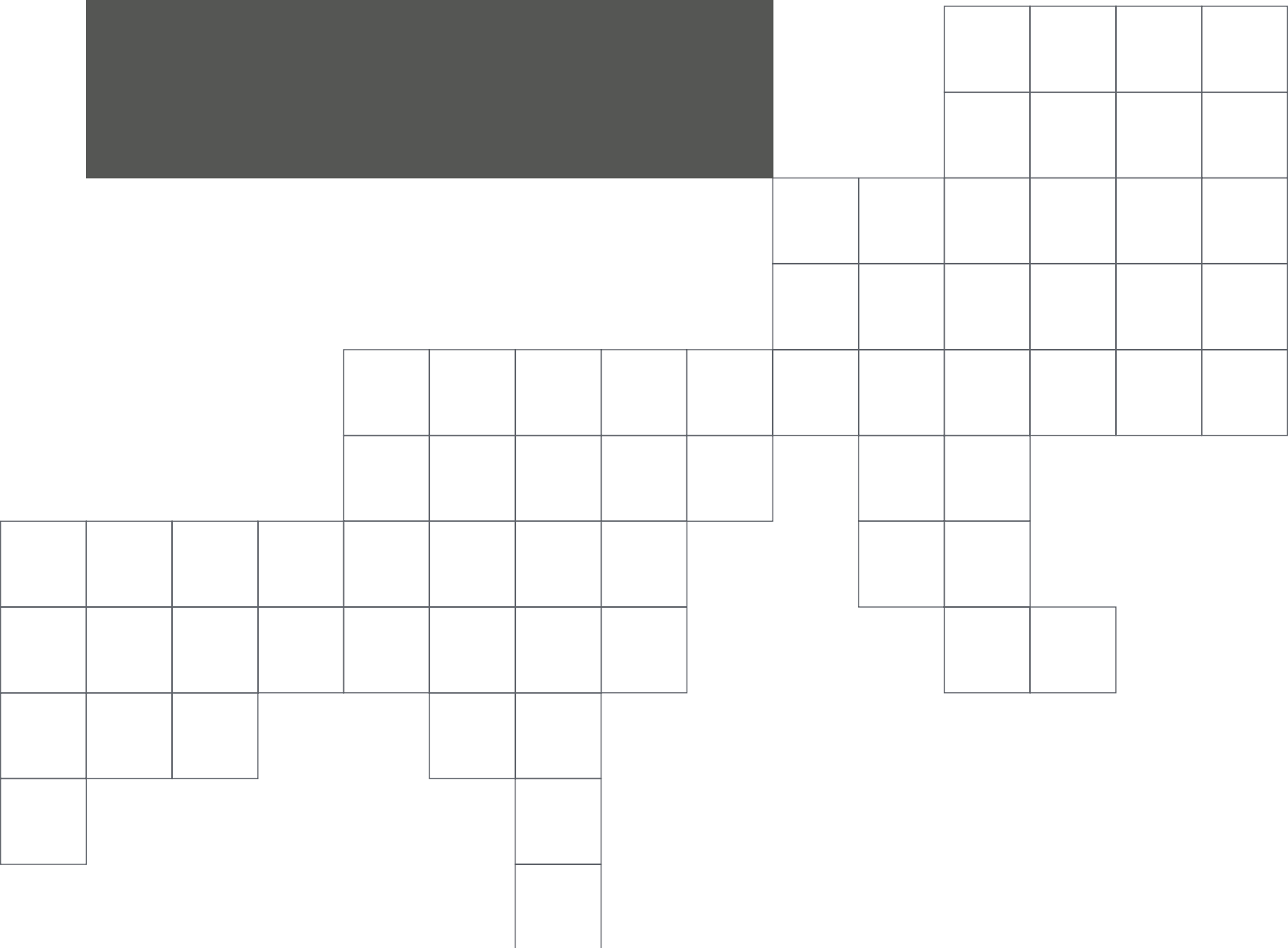


How Switches Influence Building and Home Automation



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INTRODUCTION

Switches are often found in building and home applications as connections between alarm panels and the horn, in panel controls, or as an extra security measure. Specifically, addressable switches are excellent choices for building systems because they are not hackable or electronically disrupted.

Rotary Dual In-Line Package (DIP) switches and DIP switches are excellent choices for addressable detectors and modules, horn & strobe, thermostat, and wireless alarms, etc. These devices have communication and alarm functions for building automation and home appliances. Rotary DIP Switches or DIP Switches are used to set up the node or address of Modbus or Network Interface Modules. Tactile switches are used in thermostats, garage remote controllers, and fire detection systems providing Human-Machine Interface operation feedback.

DIP SWITCH AND TACT SWITCH OPERATION

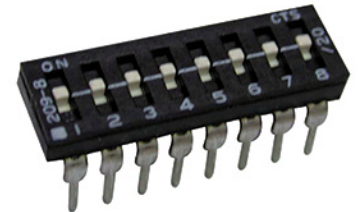
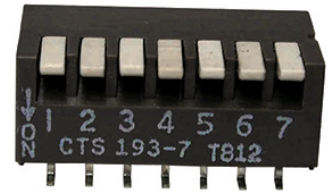
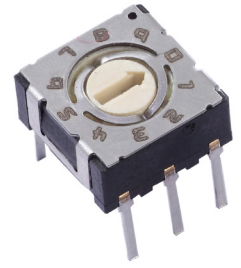
DIP switches and rotary DIP switches are typically powered with 20~50 volt DC, with the terminals providing an electrical output while the actuator slides, rotates, or presses an operation upon different switch family types. DIP switches provide a single output of either on or off, while rotary DIP switches can provide variations of on or off, becoming a 4-bit code combination at each specific rotated position. Rotary DIP switches provide binary code decimal, hexadecimal, or single pole with different output signals.

Tact switches are powered with 12~32 volt DC and provide an on or off electrical output to work with the end application's circuits. Either a contactor or dome is the major contact piece, joining with the insert molding frame so that a switch can connect to an output. Contactors are commonly fabricated with stamped copper alloys or stainless steel plates, while frame are made with polyamide resin.

EVOLUTION OF BUILDING AUTOMATION AND HOME APPLIANCES

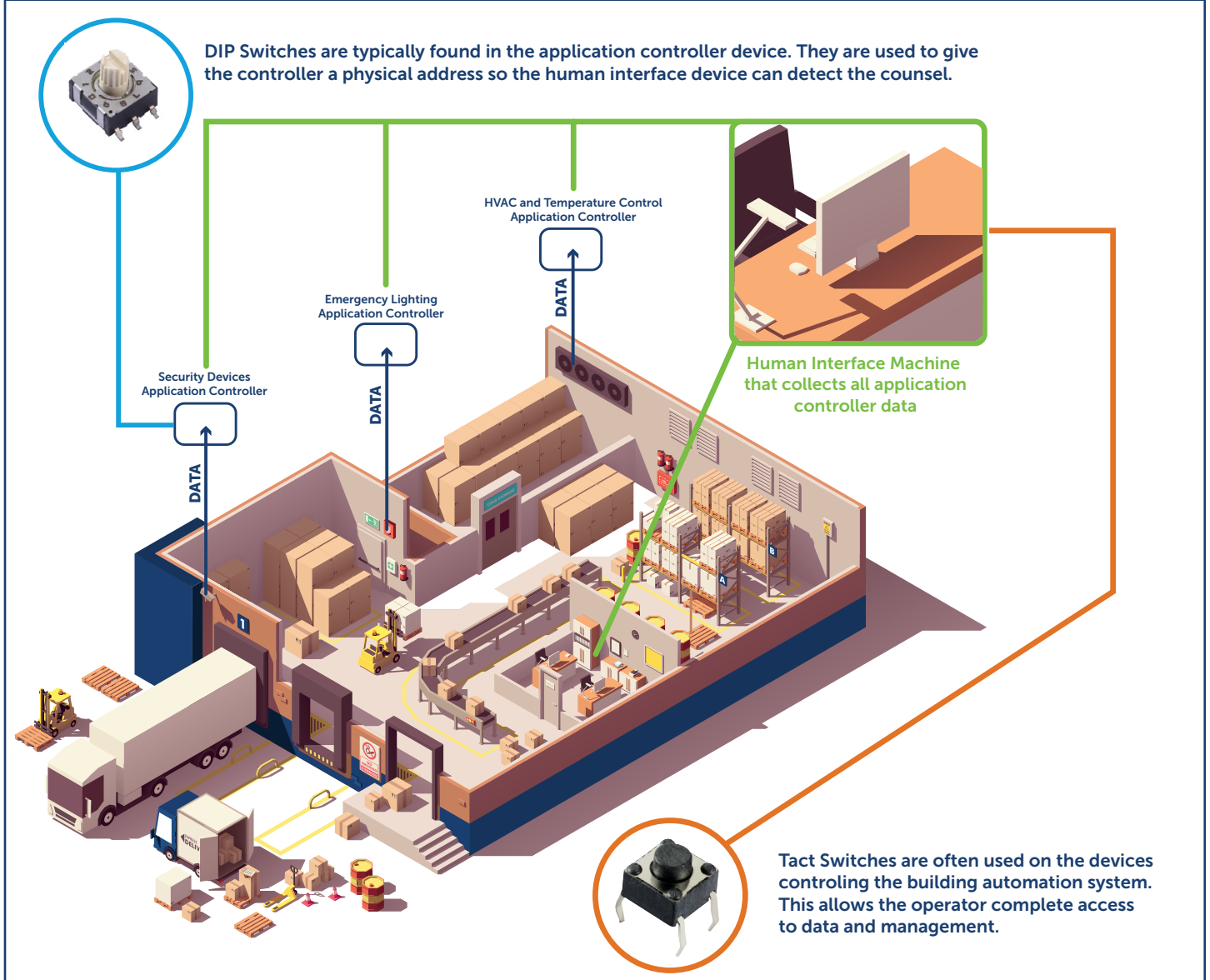
In terms of building automation and home appliances, experts are familiar with the development of smart systems and Intranet of Things (IoT). Building automation includes distributed control systems, such as the computer networking of electronic devices designed to monitor and control the mechanical, security, fire, and flood safety, lighting (especially emergency lighting), HVAC, humidity control, and ventilation systems in a building.

IoT has become necessary for integrated building automation networks to connect a variety of systems. How to integrate the user experience into systems is one key ingredient for smart buildings, and rising demands for communications between end applications and system circuits increases the need for stability in a switch output. A stable output signal starts with robust raw material, plating, and interior product design to achieve low-contact resistance, as well as energy optimization benefits. As global environmental consciousness rises, CTS chooses the most environmentally-friendly materials and manufacturing processes available. This ensures the best quality product, while actively reducing manufacturing waste.



Devices using proprietary or open protocols, such as Modbus, LonWorks, or Zone Controller, have Network Interface Modules. These networks are addressed using either standard DIP switches or rotary DIP switches. Rotary DIP switches and standard DIP switches can be used in the same applications. Typically, a rotary DIP switch would be used to set the device's node and port address, and the standard DIP switch would set the baud rate. In Human Machine Interfaces, tactile switches are the main solution for HVAC, security, fire, or light control devices. Tactile or tact switches are often used in device remote controls or directly on the device.

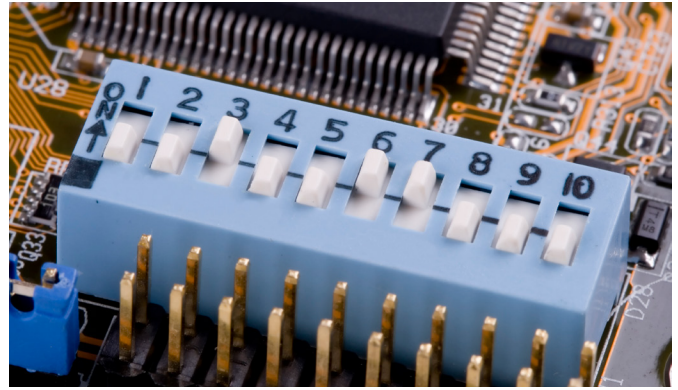
How Switches Influence Building Automation



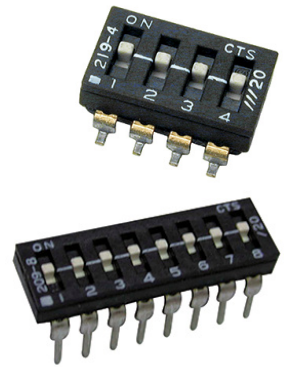
CTS provides a wide range of tact switches. Choices include hard plastic or soft silicon rubber actuators, with the option to pair them with matching knobs to support the switch and provide long-life durability. CTS provides different force options for custom operational feel, as well as stable electrical circuit output. Some upgraded models come with IP67 or IP68 waterproof protection, ideal for use in damp or dusty environments.

206, 209, 219 SERIES DIP SWITCHES

The box type 206 Series DIP switch is available with SPST, SPDT, DPST, and 3PST circuit choices. The terminals are molded into the thermoset base and provide an electrostatic discharge shield rating to 22KV when the front row of terminals are connected to ground. The optimized contact design incorporates a dimple-to-flat surface wiping interface for long-term contact corrosion resistance to achieve 10,000 switching cycles. Additionally, these terminals operate on a wide temperature range of -55°C to +85°C providing excellent performance.

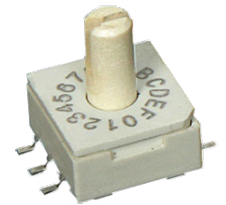


The IC type 209 and 219 series DIP switches are designed with the same housing dimensional design, but with different terminals and either a through hole or surface-mount gullwing. Either wave or reflow soldering processes would be suitable. These two series come with positive detent separated from contactors, so that contactors do not deflect during actuation. Our unique, compact design allows the switches to be used in small applications. The optional top-tape sealed structure is optimized for board washing during the soldering process. An operating temperature range of -40°C to +85°C provides excellent performance. CTS offers a special terminal design for the 209 series DIP switch, suitable for the auto-insertable nozzle of a PCBA's pick up process.



221 SERIES ROTARY DIP SWITCHES

The 10x10mm 221 Series Rotary DIP Switch is available with Binary coded decimal (10 position), Hexadecimal code output (16 position), or SPST (4 position only). The positive detent being separated from the contactor prevents the contactor from deflect during actuation, resulting in a 20,000 step-life. Larger dimensional product sizes are easier to operate manually, with hand tools or in combination with the customer's knob. A special internal structure provides washable characteristics during the soldering process, enabling higher liquid resistance.



222K, 223A, 224A SERIES TACTILE SWITCHES

The 222K Series tactile switch is designed with an IP67 protection surface mount and silicon rubber actuator to make 0.5~0.7mm travel possible. This design, chosen with an operation force of 145gf, 200gf, or 360gf, provides an extended life of 300,000 cycles per minute. 223A and 224A tact switches can be chosen in a wide range of product sizes and terminal types. The switch's life could achieve 100,000 cycles minimum for the 223A series (surface mount terminals only) and 300,000 cycles minimum for the 224A series.





Through-Hole DIP Switches

Series	Description	Actuation	Plating	Options	Life	Operating Temperature
206	 Top Actuated, .100" x .300" Terminal Spacing, ESD Protection	SPST, SPDT, DPST, 3PST	Contacts — Gold, Terminals — Tin	Bottom Epoxy Seal, Top Tape Seal, 3 Actuator Heights, Custom Marking, ON or OFF Shipping Position	10,000 Cycles	-55°C to +85°C
206RA 208RA	 Right Angle Actuated, .100" x .100" Terminal Spacing, ESD Protection	SPST, SPDT, DPST, 3PST	206RA: See 206, 208RA: See 208	Bottom Epoxy Seal, Top Tape Seal, 3 Actuator Heights, Custom Marking, ON or OFF Shipping Position	206: 10K Cycles, 208: 2K Cycles	-55°C to +85°C
208	 Top Actuated, .100" x .300" Terminal Spacing, ESD Protection	SPST, SPDT, DPST, 3PST	Contacts — Tin, Terminals — Tin	Bottom Epoxy Seal, Top Tape Seal, 3 Actuator Heights, Custom Marking, ON or OFF Shipping Position	2,000 Cycles	-55°C to +85°C
209	 Auto Insertable, Low Profile, Top Actuated, .100" Pitch Terminal Spacing, Bottom Seal	SPST	Contacts — Gold, Terminals — Tin	Bottom Epoxy Seal, Top Tape Seal, 3 Actuator Heights, Custom Marking, ON or OFF Shipping Position	2,000 Cycles	-40°C to +85°C

Surface Mount DIP Switches

Series	Description	Actuation	Plating	Options	Life	Operating Temperature
204	 Top Actuated, Gull Wing, .100" Pitch Terminal Spacing, ESD Protection	SPST, SPDT, DPST, 3PST	Contacts — Gold, Terminals — Tin	Top Tape Seal, 3 Actuator Heights, Custom Marking, ON or OFF Shipping Position, Tape and Reel Packaging	5,000 Cycles	-55°C to +85°C
218	 Low Profile, Top Actuated, .050" Pitch Terminal Spacing, Bottom Seal	SPST	Contacts — Gold, Terminals — Gold Flash	Top Tape Seal, J-Bend or Gull Wing, ON or OFF Shipping Position, Tape and Reel Packaging	1,000 Cycles	-55°C to +85°C
219	 Low Profile, Top Actuated, .100" Pitch Terminal Spacing, Bottom Seal	SPST	Contacts — Gold, Terminals — Tin	Top Tape Seal, 3 Actuator Heights, J-Bend or Gull Wing, Custom Marking, ON or OFF Shipping Position, Tape and Reel Packaging	2,000 Cycles	-55°C to +85°C

Rotary DIP Switches

Series		Typical Applications	Rating	Code	Options	Rotation
220 7x7 mm		Servers, Circuit Breakers, HVAC, Video, Industrial Communications, Security Systems	100 mA @ 50 VDC 10,000 Steps	BCD and Hexadecimal	4, 10, or 16 Positions, Shaft Style, Through-Hole, SMT-Gullwing	360° Continuous
221 10x10 mm		Servers, Circuit Breakers, HVAC, Video, Industrial Communications, Security Systems	100 mA @ 50 VDC 10,000 Steps	BCD and Hexadecimal	10 or 16 Positions, Shaft Style, Through-Hole, SMT-Gullwing or J-bend	360° Continuous

Tactile Switches

Series		Rating	Force	Options	Actuation Direction
222A 6.2x6.2 mm		12 VDC @ 50 mA 200,000 Cycles, 1 Million Cycles	100 gf 160 gf 260 gf	Actuator Height, Through-Hole and SMT	Vertical Side
222J (IP67) 6.2x6.2 mm		32 VDC @ 50 mA 32 VDC @ 10 mA 300,000 Cycles, 500,000 Cycles, 1 Million Cycles	160 gf 200 gf 350 gf	SMT Gullwing or J-Bend, Contact and Terminal Plating	Vertical
222K (IP67) 6.2x6.2 mm		32 VDC @ 50 mA 300,000 Cycles, 500,000 Cycles 5 Million Cycles	145 gf 200 gf 360 gf	SMT Gullwing or J-Bend	Vertical
223A 4.7x3.5 mm		12 VDC @ 50 mA 100,000 Cycles, 300,000 Cycles	160 gf 260 gf	SMT Gullwing or J-Bend	Vertical
224A 12x12 mm		12 VDC @ 50 mA 300,000 Cycles, 500,000 Cycles	160 gf 260 gf	Through-Hole and SMT, Actuator Height, Boss	Vertical

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