

General Specifications

Electrical Capacity (Resistive Load)

Power Level (silver): 6A @ 125V AC or 3A @ 250V AC or 3A @ 30V DC

Logic Level (gold): 0.4VA maximum @ 28V AC/DC maximum

(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)

Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 10 milliohms maximum for silver; 20 milliohms maximum for gold

Insulation Resistance: 1,000 megohms minimum @ 500V DC

Dielectric Strength: 1,000V AC minimum between contacts for 1 minute minimum;

1,500V AC minimum between contacts & case for 1 minute minimum

Mechanical Life: 50,000 operations minimum

Electrical Life: 25,000 operations minimum

Nominal Operating Force: On-to-On Position Off-to-On Position

Single Pole 3.19N 3.92N

Double Pole 4.41N 7.06N

Angle of Throw: 20°

Materials & Finishes

Bushing: Brass with nickel plating

Housing: Stainless steel

Mounting Bracket: Steel with tin plating

Movable Contacts: Silver alloy or silver alloy with gold plating

Stationary Contacts: Silver with silver plating or copper or brass with gold plating

Lamp Contacts: Phosphor bronze

Base: Diallyl phthalate (UL94V-0)

Switch Terminals: Copper with silver or gold plating

Lamp Terminals: Brass with silver or gold plating

Environmental Data

Operating Temp Range: -10°C through +55°C (+14°F through +131°F)

Humidity: 90 ~ 95% humidity for 96 hours @ 40°C (104°F)

Vibration: 10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range & returning in 1 minute; 3 right angled directions for 2 hours

Shock: 50G (490m/s²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

Installation

Mounting Torque: 1.47Nm (13 lb-in) for double nut; .67Nm (6 lb-in) for single nut

Soldering Time & Temp: Wave Soldering (PC version): See Profile B in Supplement section.

Manual Soldering: See Profile B in Supplement section.

Note: Lever must be in center position while soldering.

PC mountable device is not process sealed. Hand clean locally using alcohol based solution.

Standards & Certifications

Flammability Standards: UL94V-0 base

UL: File No. E44145

Single pole with synchronous circuits & solder lug or PC recognized at 6A @ 125V AC

Add "/U" to end of part number to order UL mark on switch.

CSA: File No. 023535_0_000

All single pole with synchronous circuits certified at 6A @ 125V AC

Add "/C" to end of part number to order CSA mark on switch.

Distinctive Characteristics

Industry's first LED illumination at tip of toggle switches.

Single color LEDs of red, yellow, and green, plus bicolor red/green, to meet varied design requirements.

LEDs can operate independently from or synchronously with switching operation.

Antijamming feature to protect contacts from damage due to excessive downward force on the toggle.

High torque bushing prevents the bushing from rotating or separating from the metal frame during installation.

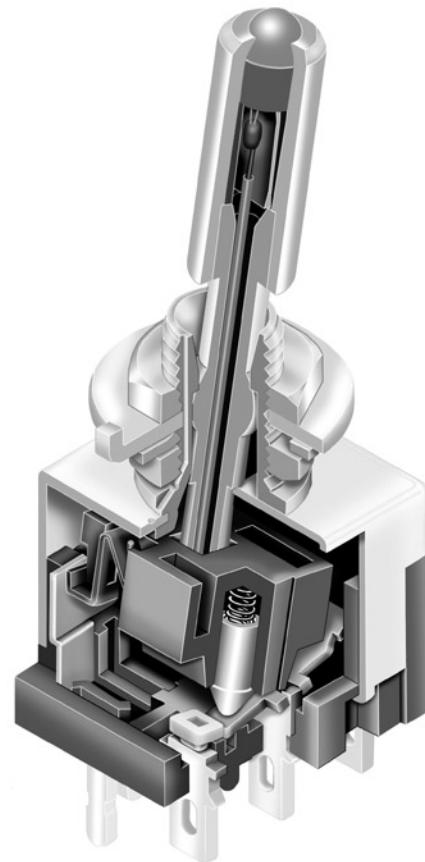
Stainless steel frame resists corrosion.

Silver contacts are of specially composed alloy for hardness.

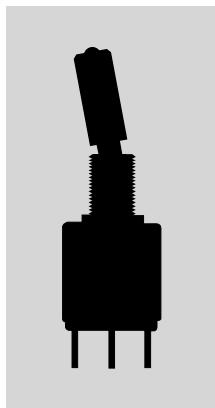
High insulating barriers protect against crossover in double pole devices.

Terminals are molded in and epoxy sealed to lock out flux, dust, and other contaminants.

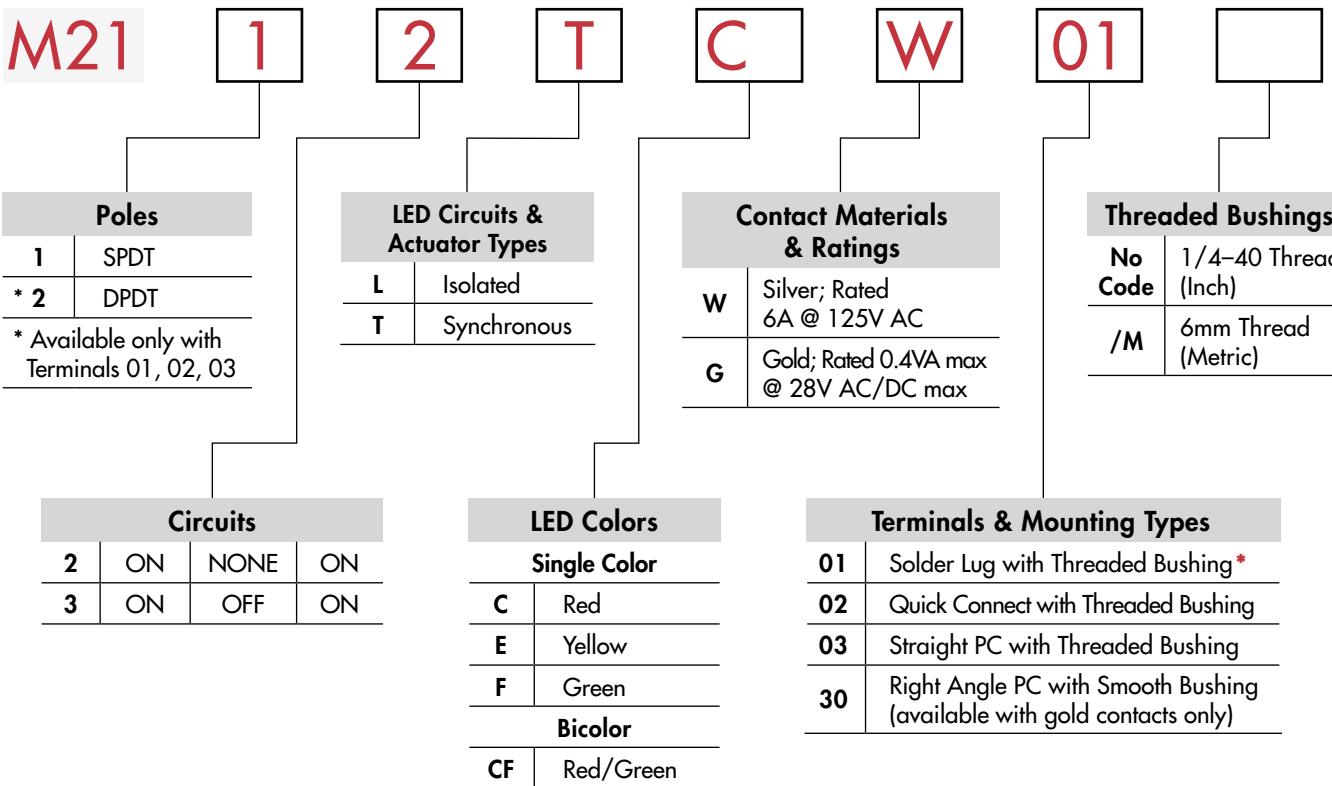
1,500V dielectric strength between switch contacts and case is accomplished by clinching the frame away from the terminals.



Actual Size



TYPICAL SWITCH ORDERING EXAMPLE



IMPORTANT:

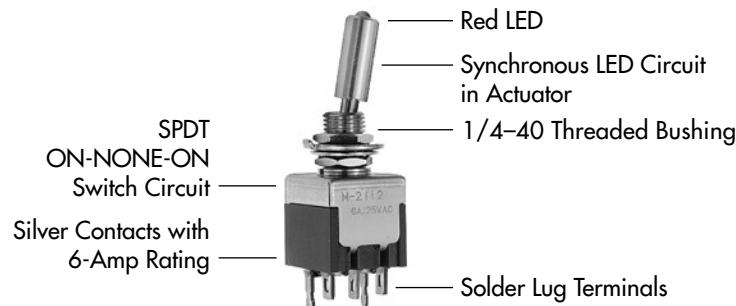


Switches are supplied without UL & CSA marking unless specified. Specific models & ratings noted on General Specifications page.

*Wire harness & cable assemblies offered only in Americas

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2112TCW01



POLES & CIRCUITS & LED ILLUMINATION

Model	Pole & Throw	Toggle Position & Terminal Numbers			Schematics
		Down Keyway	Center	Up	
M2112	SPDT Connected Power Terminals	ON 2-3	NONE NONE	ON 2-1	
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 4-6	NONE NONE	ON 4-6	Isolated Single Color LED
	Synchronous Single Color LED Connected LED Terminals	ON 4-6	NONE NONE	OFF OPEN	Isolated Bicolor LED
	Synchronous Bicolor LED Connected LED Terminals	Red 5-6	NONE NONE	Green 5-4	Synchronous Single Color LED
					Synchronous Bicolor LED
M2113	SPDT Connected Power Terminals	ON 2-3	OFF OPEN	ON 2-1	
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 4-6	ON 4-6	ON 4-6	Isolated Single Color LED
	Synchronous Single Color LED Connected LED Terminals	ON 4-6	OFF OPEN	ON 4-6	Synchronous Bicolor LED
	Synchronous Bicolor LED Connected LED Terminals	Red 5-6	OFF OPEN	Green 5-4	
M2122	DPDT Connected Power Terminals	ON 2-3 5-6	NONE NONE	ON 2-1 5-4	
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 7-9	NONE NONE	ON 7-9	Isolated Single Color LED
	Synchronous Single Color LED Connected LED Terminals	ON 7-9	NONE NONE	OFF OPEN	Isolated Bicolor LED
	Synchronous Bicolor LED Connected LED Terminals	Red 8-9	NONE NONE	Green 8-7	Synchronous Single Color LED
					Synchronous Bicolor LED
M2123	DPDT Connected Power Terminals	ON 2-3 5-6	OFF OPEN	ON 2-1 5-4	
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 7-9	ON 7-9	ON 7-9	
	Synchronous Single Color LED Connected LED Terminals	ON 7-9	OFF OPEN	ON 7-9	
	Synchronous Bicolor LED Connected LED Terminals	Red 8-9	OFF OPEN	Green 8-7	

LED COLORS & SPECIFICATIONS

Single Element LED

LED factory assembled Not available separately Bicolor LED is translucent white when unlit.	Color	Single Color			Bicolor
		C Red	E Yellow	F Green	CF Red/Green
Forward Peak Current	I_{FM}	25	30	30	25
Continuous Forward Current	I_F	20	20	20	10
Forward Voltage	V_F	2.1	2.1	2.1	1.9
Reverse Peak Voltage	V_{RM}	4	4	4	—
Current Reduction Rate Above 25°C	ΔI_F	0.33	0.40	0.40	0.33/0.33
Ambient Temperature Range				-10° ~ +55°C	

LED CIRCUIT, TOGGLE, & MOUNTING TYPE COMBINATIONS



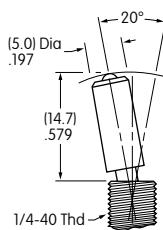
Toggle with Isolated LED Circuit



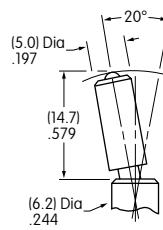
Toggle with Synchronous LED Circuit

Finish: Brushed aluminum

Standard Hardware: 2 AT513H Hex Nuts, 1 AT507H Locking Ring, 1 AT509 Lockwasher Standard & optional hardware details in Accessories & Hardware section.

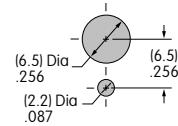


Threaded Bushing combines with Terminal codes 01, 02, & 03.

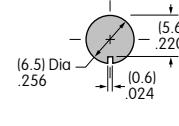


Smooth Bushing combines with Terminal code 30.

Max. Panel Thickness with Standard Hardware .102" (2.6mm)



Max. Panel Thickness without Locking Ring .134" (3.4mm)

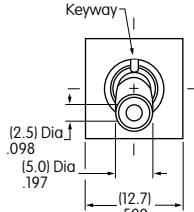


TYPICAL SWITCH DIMENSIONS

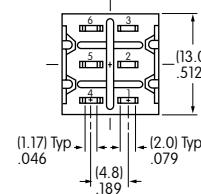
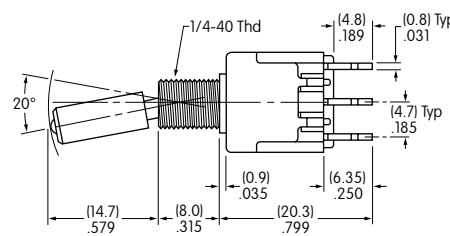
Solder Lug



M2112TCFW01



Single Pole

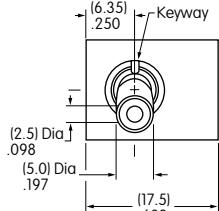


Single color LED switch does not have terminal 5.

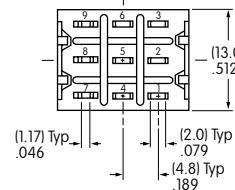
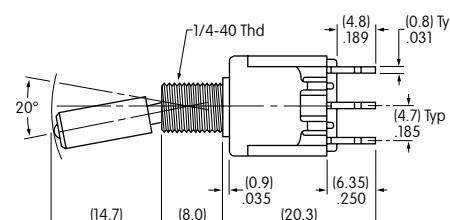
Solder Lug



M2122TCFW01



Double Pole

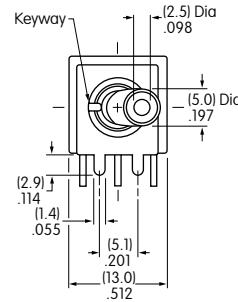


Single color LED switch does not have terminal 8.

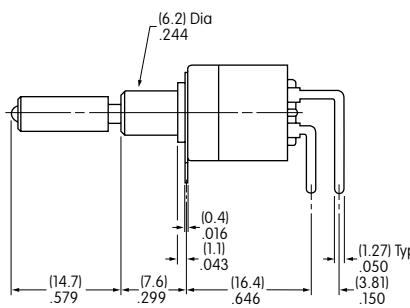
Right Angle PC



M2112TCFG30



Single Pole Only



Gold contact material only

Single color LED switch does not have terminal 5.

CONTACT MATERIALS & RATINGS

W

Silver over Silver

Power Level

6A @ 125V AC & 3A @ 250V AC

G

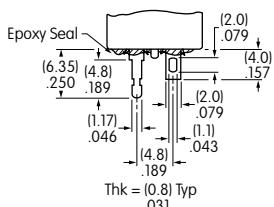
Gold over Brass or Copper

Logic Level

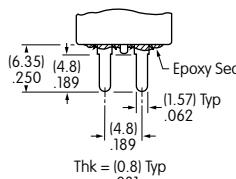
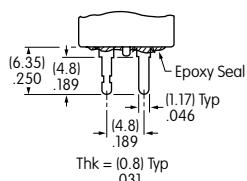
0.4VA maximum @ 28V AC/DC maximum

Complete explanation of operating range in Supplement section.

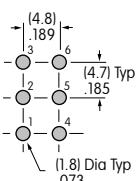
TERMINALS

01Solder Lug with
Turret LED Terminal**02**

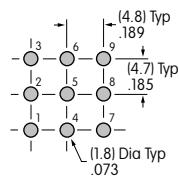
Quick Connect

**03**Straight PC with
Turret LED Terminal

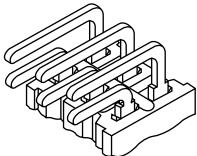
Single Pole

Single color LED
& isolated bicolor
LED switches do not
have terminal 5.

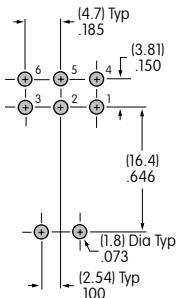
Double Pole

Single color LED
& isolated bicolor
LED switches do not
have terminal 8.**30**

Right Angle PC



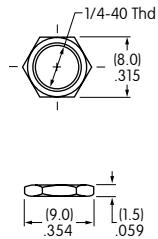
Single Pole

Single color LED
& isolated bicolor
LED switches do not
have terminal 5.

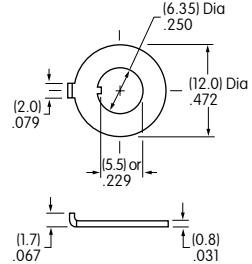
STANDARD MOUNTING HARDWARE

AT513H

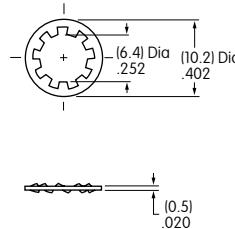
Hexagon Nuts (2 per switch)

Material: Brass with nickel plating**AT507H**

Locking Ring (1 per switch)

Material: Steel with chromate over zinc**AT509**

Lockwasher (1 per switch)

Material: Steel with chromate over zinc**Optional Hardware:** Knurled nuts, dress nuts, and ON-OFF plates are available; see details in Accessories & Hardware section.

General Specifications

Electrical Capacity (Resistive Load)

Power Level (silver): 6A @ 125V AC or 3A @ 250V AC or 3A @ 30V DC

Logic Level (gold): 0.4VA maximum @ 28V AC/DC maximum

(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)

Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 10 milliohms maximum for silver; 20 milliohms maximum for gold

Insulation Resistance: 1,000 megohms minimum @ 500V DC

Dielectric Strength: 1,000V AC minimum between contacts for 1 minute minimum;

1,500V AC minimum between contacts & case for 1 minute minimum

Mechanical Life: 50,000 operations minimum

Electrical Life: 25,000 operations minimum

		On-to-On Position	Off-to-On Position
Nominal Operating Force:	Paddles	Single Pole 3.19N	3.92N
		Double Pole 4.41N	7.06N
Rockers		Single Pole 6.37N	9.80N
		Double Pole 13.73N	17.65N

Angle of Throw: 20°

Materials & Finishes

Housing: Stainless steel

Mounting Bracket: Steel with tin plating

Movable Contacts: Silver alloy or silver alloy with gold plating

Stationary Contacts: Silver with silver plating or copper or brass with gold plating

Lamp Contacts: Phosphor bronze

Base: Diallyl phthalate (UL94V-0)

Switch Terminals: Copper with silver or gold plating

Lamp Terminals: Brass with silver or gold plating

Environmental Data

Operating Temp Range: -10°C through +55°C (+14°F through +131°F) for rockers

-25°C through +70°C (-13°F through +158°F) for paddles

90 ~ 95% humidity for 96 hours @ 40°C (104°F)

Vibration: 10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range & returning in 1 minute; 3 right angled directions for 2 hours

Shock: 50G (490m/s²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

Installation

Soldering Time & Temp: Wave Soldering (PC version): See Profile B in Supplement section.

Manual Soldering: See Profile B in Supplement section.

Note: Lever must be in center position while soldering.

Cleaning: PC mountable device is not process sealed. Hand clean locally using alcohol based solution.

Standards & Certifications

Flammability Standards: UL94V-0 base

UL: File No. E44145

Single pole rockers with synchronous circuits & solder lug or PC recognized at 6A @ 125V AC.

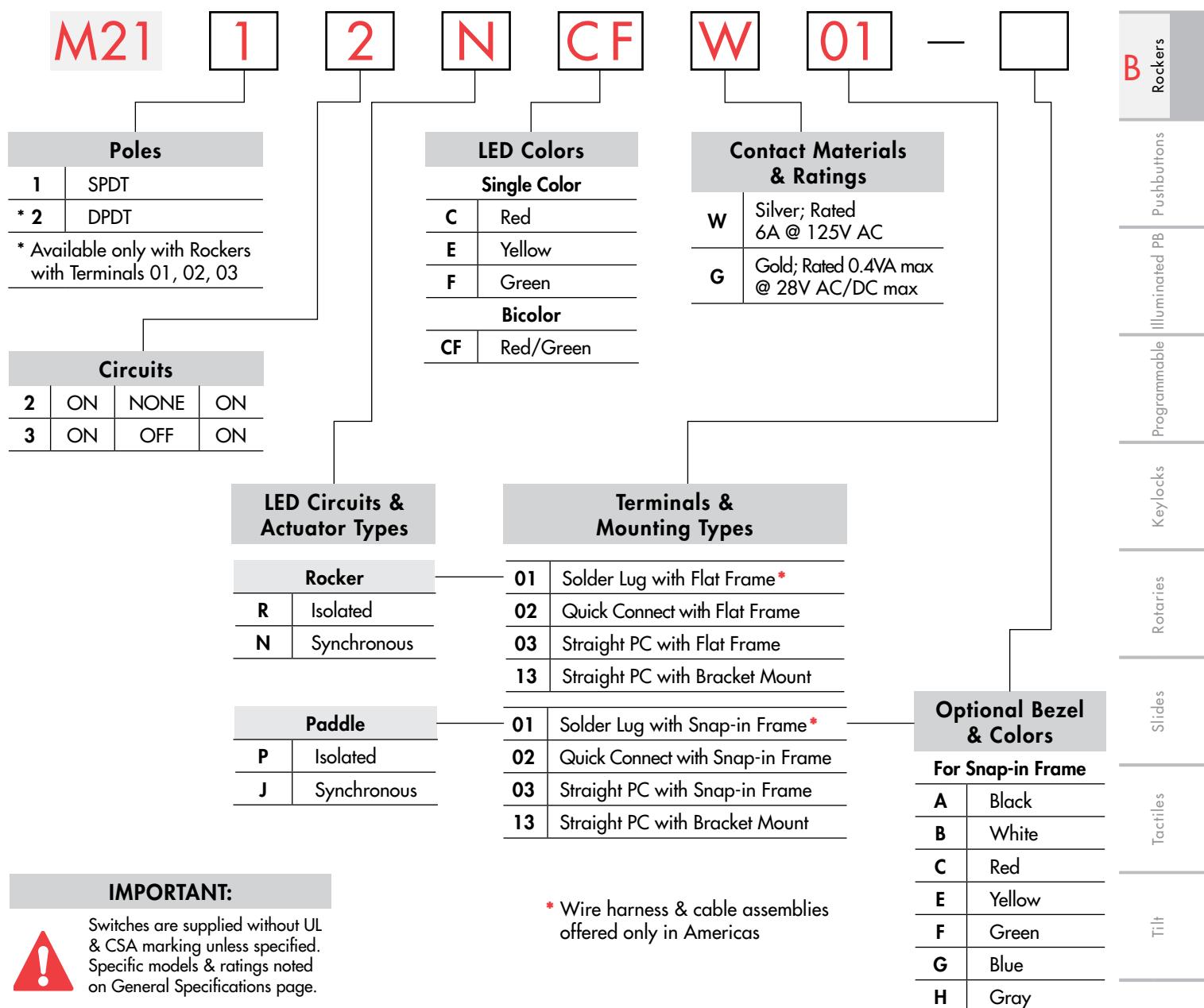
Add "/U" to end of part number to order UL mark on switch.

CSA: File No. 023535_0_000

All single pole rockers with synchronous circuits certified at 6A @ 125V AC.

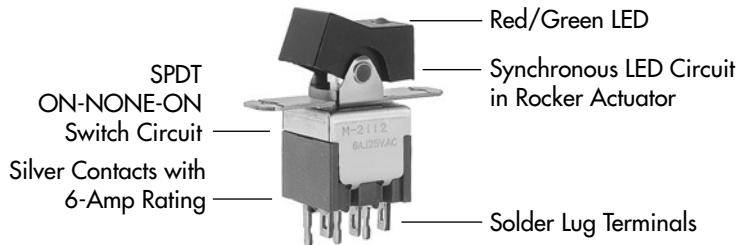
Add "/C" to end of part number to order CSA mark on switch.

TYPICAL SWITCH ORDERING EXAMPLE



DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2112NCFW01



Model		Pole & Throw			Toggle Position & Terminal Numbers		Schematics	
		Down	Center	Up	Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.			
M2112	SPDT	ON 2-3	NONE NONE	ON 2-1			Isolated Single Color LED	
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 4-6	NONE NONE	ON 4-6			Isolated Bicolor LED	
	Synchronous Single Color LED Connected LED Terminals	ON 4-6	NONE NONE	OFF OPEN			Synchronous Single Color LED	
	Synchronous Bicolor LED Connected LED Terminals	Red 5-6	NONE NONE	Green 5-4			Synchronous Bicolor LED	
	M2113	SPDT	OFF OPEN	ON 2-1				
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 4-6	ON 4-6	ON 4-6			Isolated Single Color LED	
	Synchronous Single Color LED Connected LED Terminals	ON 4-6	OFF OPEN	ON 4-6			Synchronous Single Color LED	
	Synchronous Bicolor LED Connected LED Terminals	Red 5-6	OFF OPEN	Green 5-4			Synchronous Bicolor LED	
	M2122	DPDT	ON 2-3 5-6	NONE NONE	ON 2-1 5-4			
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 7-9	NONE NONE	ON 7-9			Isolated Single Color LED	
	Synchronous Single Color LED Connected LED Terminals	ON 7-9	NONE NONE	OFF OPEN			Isolated Bicolor LED	
	Synchronous Bicolor LED Connected LED Terminals	Red 8-9	NONE NONE	Green 8-7			Synchronous Single Color LED	
	M2123	DPDT	ON 2-3 5-6	OFF OPEN	ON 2-1 5-4			Synchronous Bicolor LED
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 7-9	ON 7-9	ON 7-9				
	Synchronous Single Color LED Connected LED Terminals	ON 7-9	OFF OPEN	ON 7-9				
	Synchronous Bicolor LED Connected LED Terminals	Red 8-9	OFF OPEN	Green 8-7				

LED COLORS & SPECIFICATIONS

Single Element LED			Rockers			Paddles			Units	
			Single Color		Bicolor	Single Color		Bicolor		
Color	C	E	F	CF	Color	C	E	F	CF	
LED factory assembled Not available separately Bicolor LED is translucent white when unlit.	Red	Yellow	Green	Red/Green	Red	Yellow	Green	Red/Green		
Forward Peak Current	I_{FM}	25	30	30	25	10	30	30	30/25	mA
Continuous Forward Current	I_F	20	20	20	20	8	24	24	20/20	mA
Forward Voltage	V_F	2.1	2.1	2.1	2.1	1.9	2.0	2.1	2.0/2.2	V
Reverse Peak Voltage	V_{RM}	4	4	4	—	5	5	5	—	V
Current Reduction Rate Above 25°C	ΔI_F	0.33	0.40	0.40	0.33/0.33	0.13	0.40	0.40	0.43/0.38	mA/°C
Ambient Temperature Range	-10° ~ +55°C					-25° ~ +70°C				

LED CIRCUIT, ROCKER, & MOUNTING TYPE COMBINATIONS



Rocker with Isolated LED Circuit

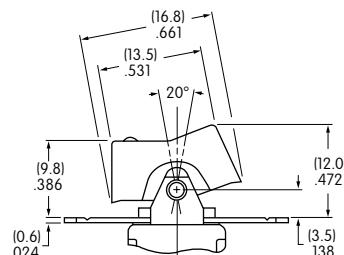


Rocker with Synchronous LED Circuit

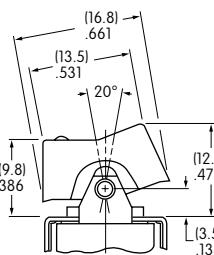
Material: Polyamide

Finish: Matte

Color: Black

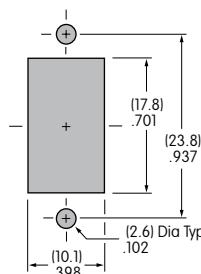


Flat Frame combines with Terminal codes 01, 02, & 03.



Bracket combines with Terminal code 13.

Maximum Panel Thickness .126" (3.2mm)



Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Touch

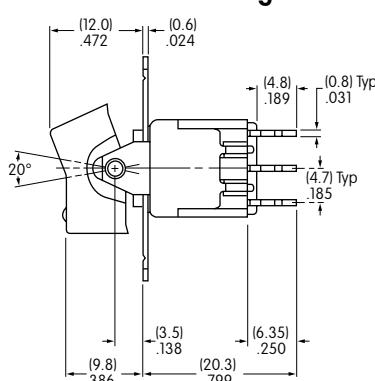
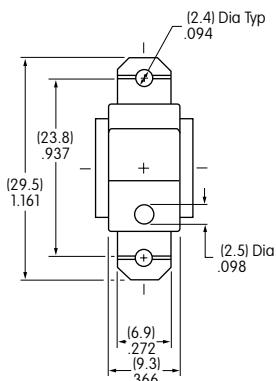
Indicators

Accessories

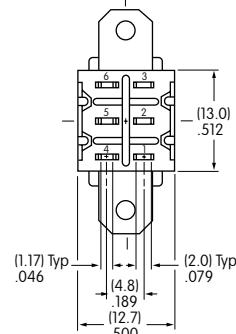
Supplement

TYPICAL ROCKER SWITCH DIMENSIONS

Single Pole

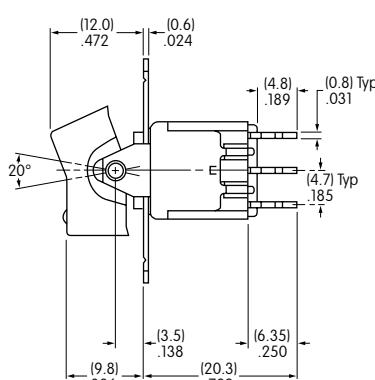
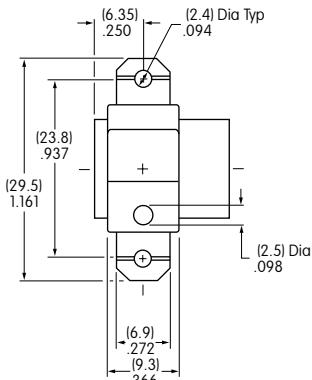


Solder Lug

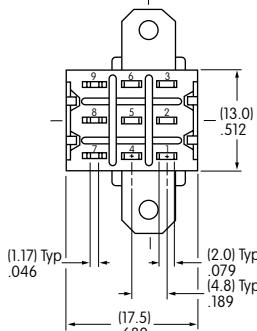


M2112NCFW01

Double Pole

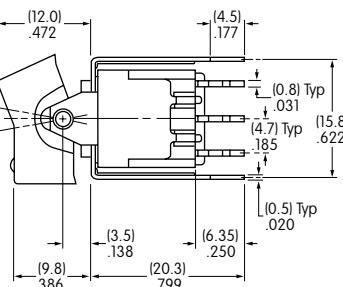
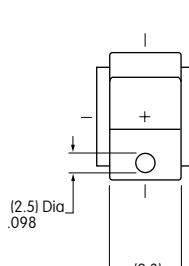


Solder Lug

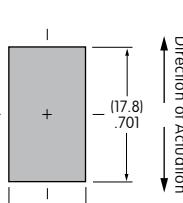
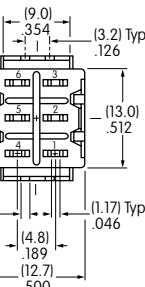


M2122NCFW01

Single Pole Only



Straight PC • Bracket



Single color LED switch does not have terminal 5. Silver contact material is standard.

M2112NCFW13

LED CIRCUIT, PADDLE, & MOUNTING TYPE COMBINATIONS

P

Paddle with Isolated LED Circuit

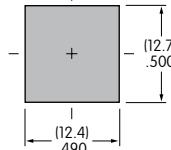
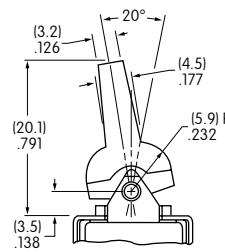
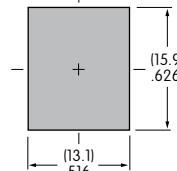
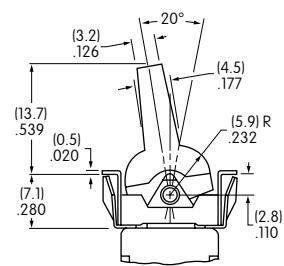
Maximum Panel Thickness
.039" ~ .126" (1.0 ~ 3.2mm)
without Bezel
.039" ~ .098" (1.0 ~ 2.5mm)
with Bezel

Maximum
Panel
Thickness
.126" (3.2mm)

J

Paddle with Synchronous LED Circuit

Material: Polyamide
Finish: Matte
Color: Black

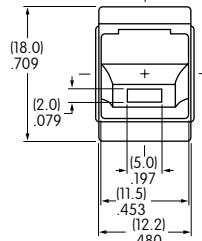


Snap-in combines with Terminal codes 01, 02, & 03

Bracket combines with Terminal code 13

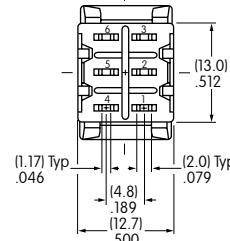
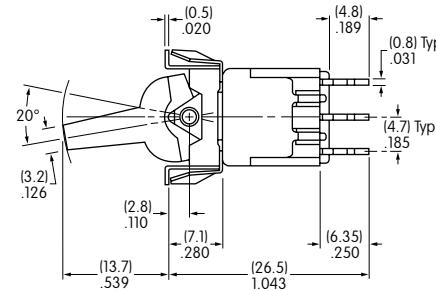
TYPICAL PADDLE SWITCH DIMENSIONS

Solder Lug • Snap-in



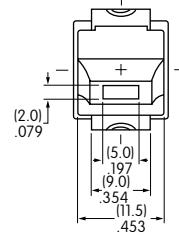
M2112JCFW01

Single Pole Only



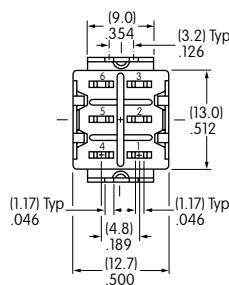
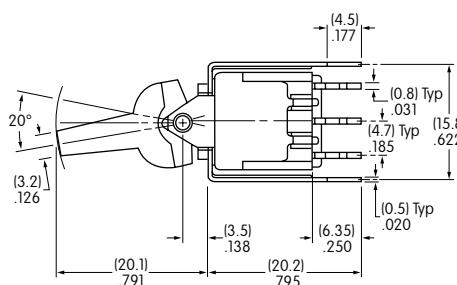
Single color LED switch does not have terminal 5.

Straight PC • Bracket



M2112JCFW13

Single Pole Only



Silver contact material is standard. Single color LED switch does not have terminal 5.

CONTACT MATERIALS & RATINGS

W

Silver over Silver

Power Level

6A @ 125V AC & 3A @ 250V AC

G

Gold over Brass or Copper

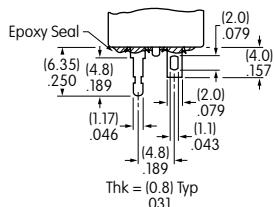
Logic Level

0.4VA maximum @ 28V AC/DC maximum

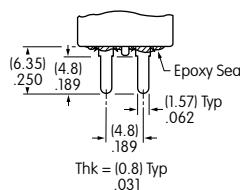
Complete explanation of operating range in Supplement section.

01

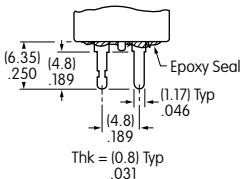
Solder Lug with Turret LED Terminal

**02**

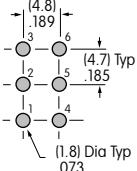
Quick Connect

**03**

Straight PC with Turret LED Terminal

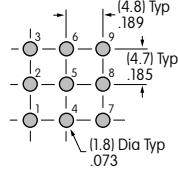


Single Pole



Single color LED & isolated bicolor LED switches do not have terminal 5.

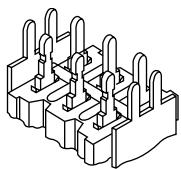
Double Pole



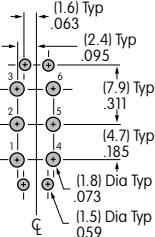
Single color LED & isolated bicolor LED switches do not have terminal 8.

13

Straight PC with Bracket & Turret LED Terminal



Single Pole



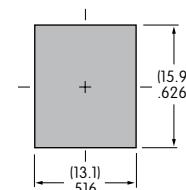
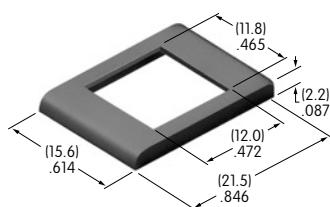
Single color LED & isolated bicolor LED switches do not have terminal 5.

OPTIONAL BEZEL & COLORS

AT2107 Bezel for Snap-in Panel Frame

Material: Polyamide

Finish: Matte



Colors Available:

A

Black

B

White

C

Red

E

Yellow

F

Green

G

Blue

H

Gray