

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.

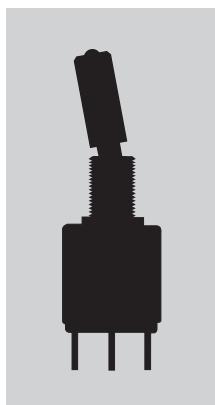
High insulating barriers protect against crossover in double pole devices.

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

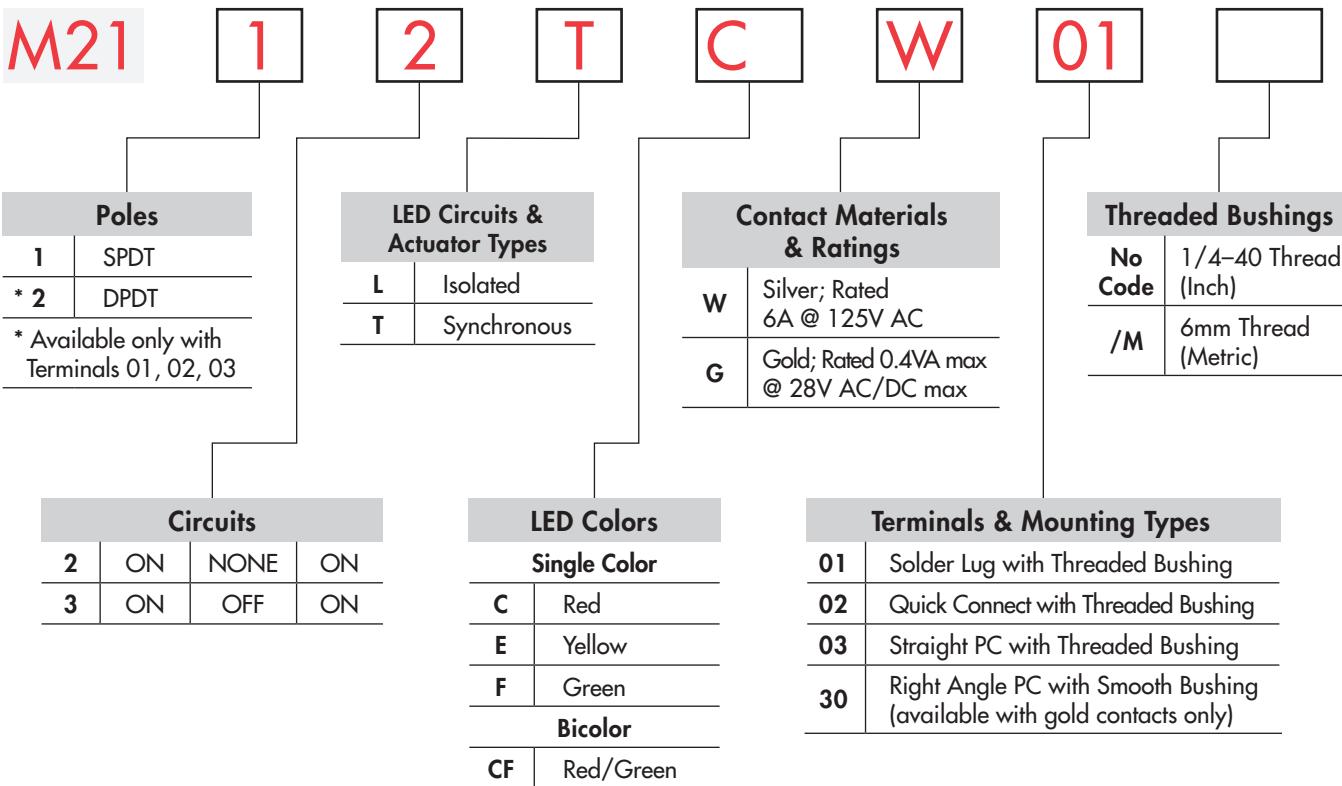
1,500V dielectric strength between switch contacts and case is accomplished by clinching the frame away from the terminals.



Actual Size



TYPICAL SWITCH ORDERING EXAMPLE



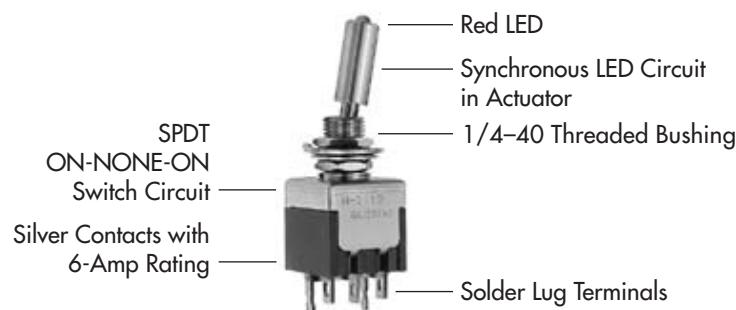
IMPORTANT:

Switches are supplied without UL & CSA marking unless specified.
UL & CSA recognized only when ordered with marking on the switch.
 Specific models, ratings, & ordering instructions are noted on the General Specifications page.



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	<p>Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.</p> <p>Isolated Single Color LED</p> <p>Isolated Bicolor LED</p> <p>Synchronous Single Color LED</p> <p>Synchronous Bicolor LED</p>
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals	ON 4-6	NONE NONE	ON 4-6	
	Synchronous Single Color LED Connected LED Terminals	ON 4-6	NONE NONE	OFF OPEN	
	Synchronous Bicolor LED Connected LED Terminals	Red 5-6	NONE NONE	Green 5-4	
	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	<p>Isolated Single Color LED</p> <p>Isolated Bicolor LED</p> <p>Synchronous Single Color LED</p> <p>Synchronous Bicolor LED</p>
	Synchronous Single Color LED Connected LED Terminals	ON 4-6	OFF OPEN	ON 4-6	
	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	<p>Isolated Single Color LED</p> <p>Isolated Bicolor LED</p> <p>Synchronous Single Color LED</p> <p>Synchronous Bicolor LED</p>
	Synchronous Single Color LED Connected LED Terminals	ON 7-9	NONE NONE	OFF OPEN	
	Synchronous Bicolor LED Connected LED Terminals	Red 8-9	NONE NONE	Green 8-7	
	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	<p>Isolated Single Color LED</p> <p>Isolated Bicolor LED</p> <p>Synchronous Single Color LED</p> <p>Synchronous Bicolor LED</p>
	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

The electrical specifications shown are determined at a basic temperature of 25°C. LED circuit is isolated and requires an external power source. If the source voltage exceeds the rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula in Supplement Section.

Color	Single Color			Bicolor	
	C Red	E Yellow	F Green	CF Red/Green	Units
Maximum Forward Current I_{FM}	25	30	30	25	mA
Typical Forward Current I_F	20	20	20	10	mA
Forward Voltage V_F	2.1	2.1	2.1	1.7/2.0	V
Maximum Reverse Voltage V_{RM}	4	4	4	—	V
Current Reduction Rate Above 25°C ΔI_F	0.33	0.40	0.40	0.33/0.33	mA/°C
Ambient Temperature Range	-10° ~ +55°C				

LED CIRCUIT, TOGGLE, & MOUNTING TYPE COMBINATIONS



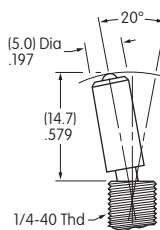
L Toggle with Isolated LED Circuit



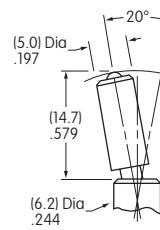
T Toggle with Synchronous LED Circuit

Finish: Brushed aluminum

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

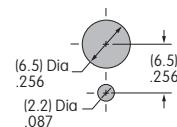


Threaded Bushing combines with Terminal codes 01, 02, & 03.

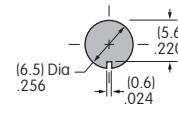


Smooth Bushing combines with Terminal code 30.

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



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



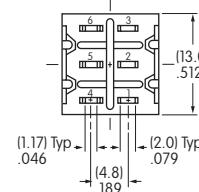
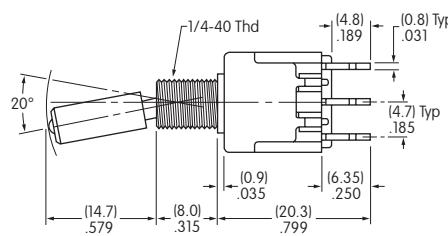
TYPICAL SWITCH DIMENSIONS

Solder Lug



M2112TCFW01

Single Pole



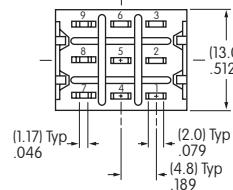
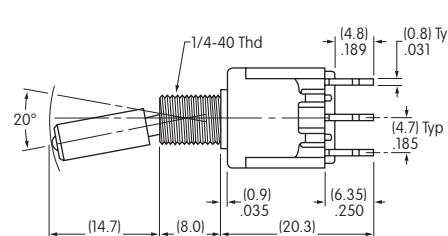
Single color LED switch does not have terminal 5.

Solder Lug



M2122TCFW01

Double Pole

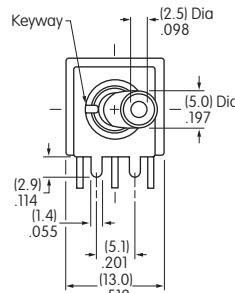


Single color LED switch does not have terminal 8.

Right Angle PC

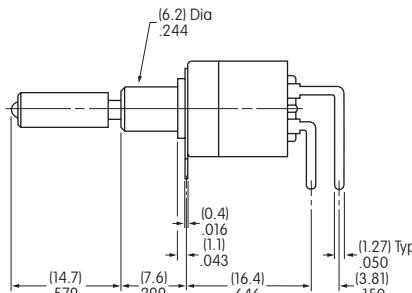


M2112TCFG30



Single color LED switch does not have terminal 5.

Single Pole Only



Gold contact material only

CONTACT MATERIALS & RATINGS

W

Silver over Silver

Power Level

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

G

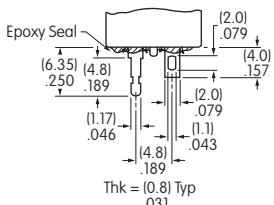
Gold over Brass or Copper

Logic Level

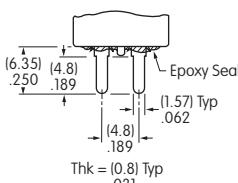
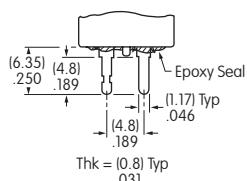
0.4VA maximum @ 28V AC/DC maximum

Complete explanation of operating range in Supplement section.

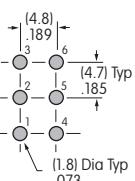
TERMINALS

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

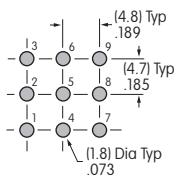
Quick Connect

**03**Straight PC with
Turret LED Terminal

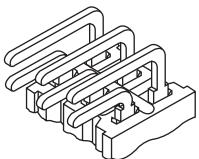
Single Pole

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

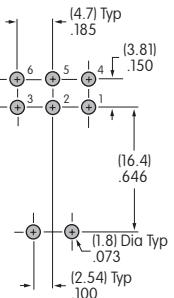
Double Pole

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

Right Angle PC

LED terminals
only available
in brass with
silver plating

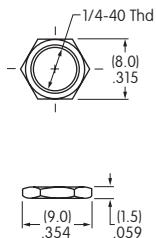
Single Pole

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

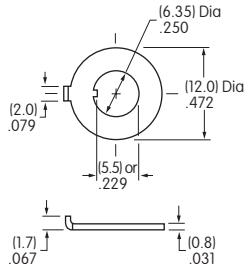
STANDARD MOUNTING HARDWARE

AT513H

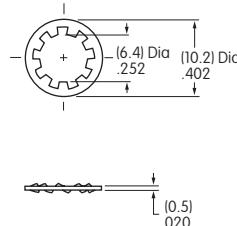
Hexagon Nuts (2 per switch)

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

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

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

Cleaning:

Standards & Certifications

Flammability Standards: UL94V-0 base

UL: File No. E44145 - Recognized only when ordered with marking on switch.

Add "/U" before dash in part number to order UL recognized switch.

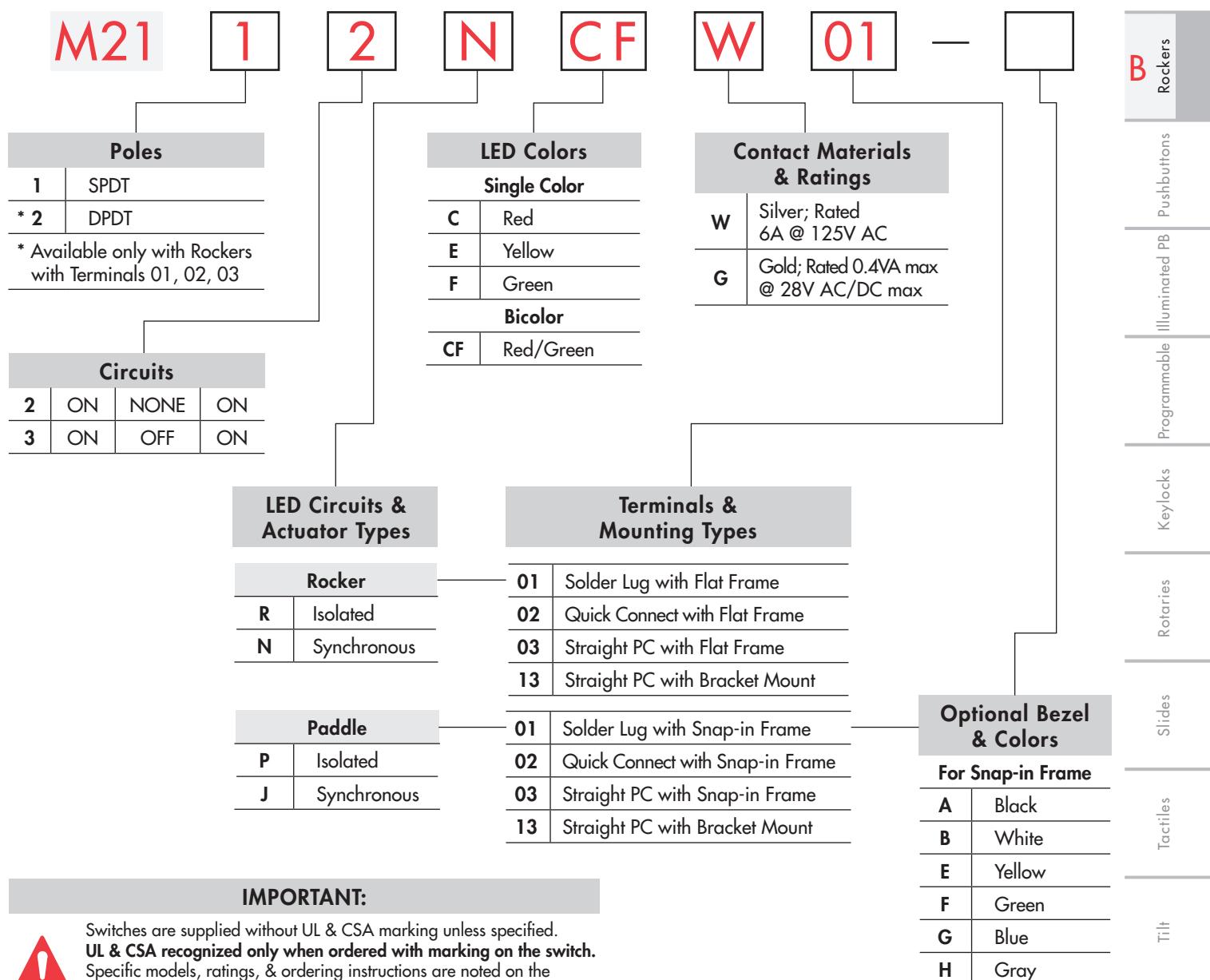
Single pole rockers with synchronous circuits & single color LEDs & solder lug or PC recognized at 6A @ 125V AC.

CSA: File No. 023535_0_000 - Certified only when ordered with marking on switch.

Add "/C" before dash in part number to order CSA certified switch.

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

TYPICAL SWITCH ORDERING EXAMPLE



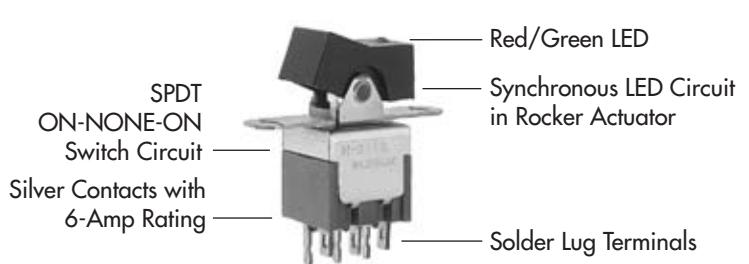
IMPORTANT:



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UL & CSA recognized only when ordered with marking on the switch.
 Specific models, ratings, & ordering instructions are noted on the
 General Specifications page.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2112NCFW01



Series M2100

LED Tipped Rockers & Paddles

Toggles
Rockers B

Pushbuttons

Programmable PB

Keylocks

Rotaries

Slides

Tactiles

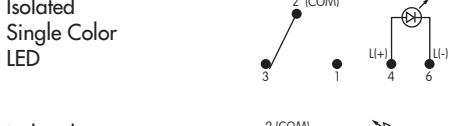
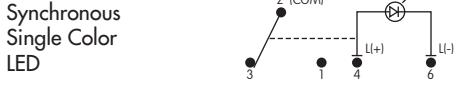
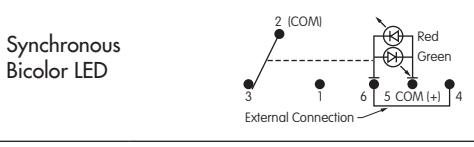
Touch

Indicators

Accessories

Supplement

POLES & CIRCUITS & LED ILLUMINATION

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

The electrical specifications shown are determined at a basic temperature of 25°C. LED circuit is isolated and requires an external power source. If the source voltage exceeds the rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula in Supplement Section. The LED is an integral part of the switch and not available separately. Bicolor LED is translucent white when unlit.

		Rockers			Paddles			Units	
		Single Color		Bicolor	Single Color		Bicolor		
		C	E	F	CF	C	E	F	
Maximum Forward Current	I_{FM}	25	30	30	25	25	30	25	30/25 mA
Typical Forward Current	I_F	20	20	20	20	20	20	20	20/20 mA
Forward Voltage	V_F	2.1	2.1	2.1	1.7/2.0	2.25	2.1	2.2	2.0/2.2 V
Maximum Reverse 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	0.33	0.40	0.33	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

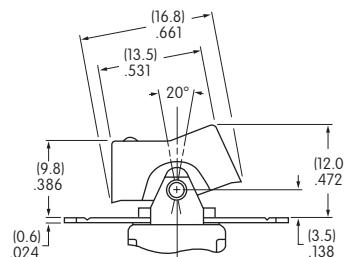


Rocker with Synchronous LED Circuit

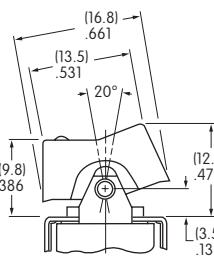
Material: Polyamide

Finish: Matte

Color: Black

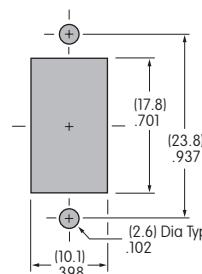


Flat Frame combines with Terminal codes 01, 02, & 03.

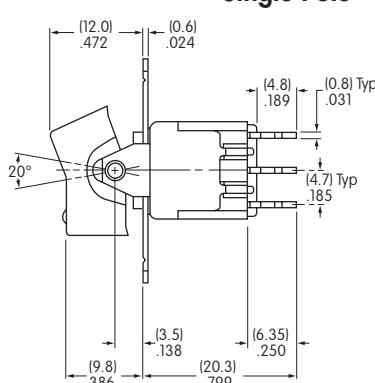
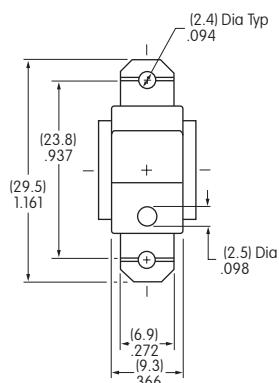


Bracket combines with Terminal code 13.

Maximum Panel Thickness .126" (3.2mm)

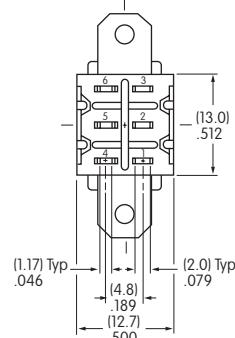


TYPICAL ROCKER SWITCH DIMENSIONS

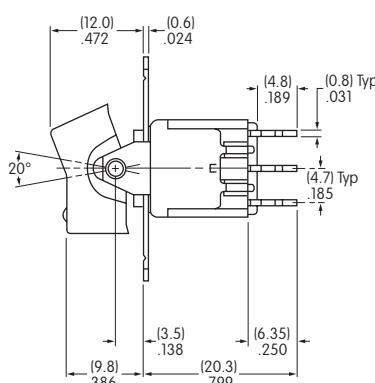
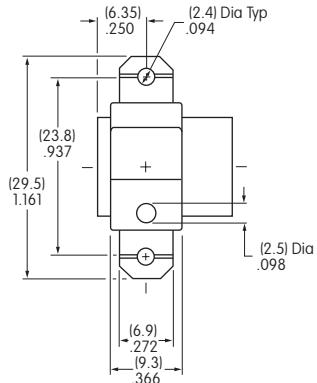


Single Pole

Solder Lug

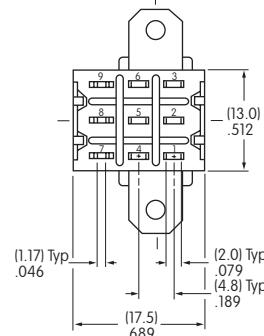


M2112NCFW01

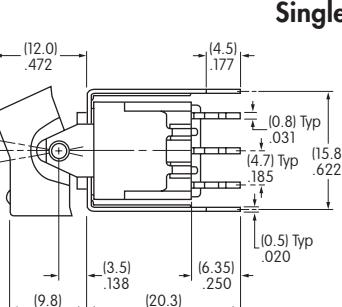
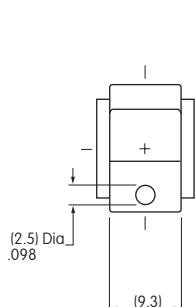


Double Pole

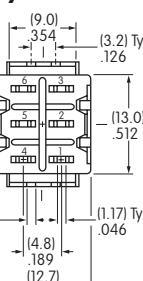
Solder Lug



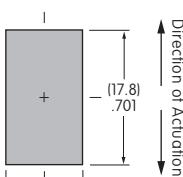
M2122NCFW01



Single Pole Only



Straight PC • Bracket



Direction of Actuation



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

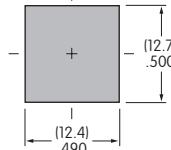
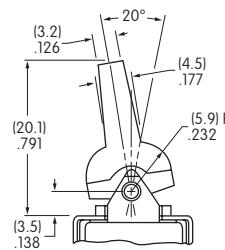
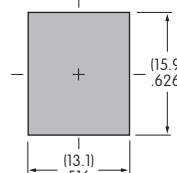
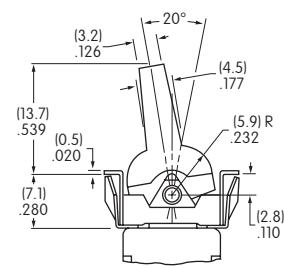
Maximum Panel Thickness
.039" ~ .126" (1.0 ~ 3.2mm)
without Bezel
.039" ~ .098" (1.0 ~ 2.5mm)
with Bezel

Maximum
Panel
Thickness
.126" (3.2mm)

J

Paddle with Synchronous LED Circuit

Material: Polyamide
Finish: Matte
Color: Black

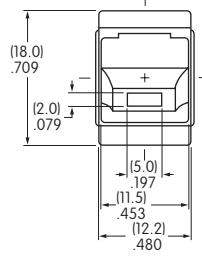


Snap-in combines with Terminal codes 01, 02, & 03

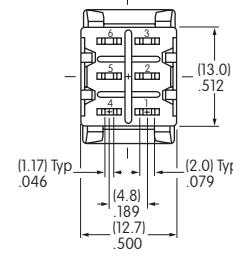
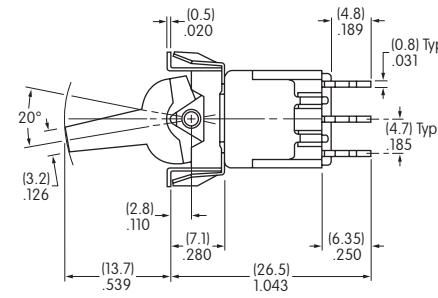
Bracket combines with Terminal code 13

TYPICAL PADDLE SWITCH DIMENSIONS

Solder Lug • Snap-in



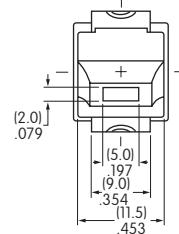
Single Pole Only



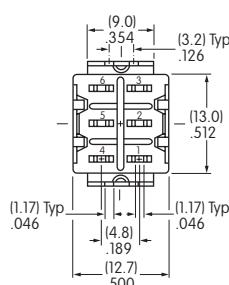
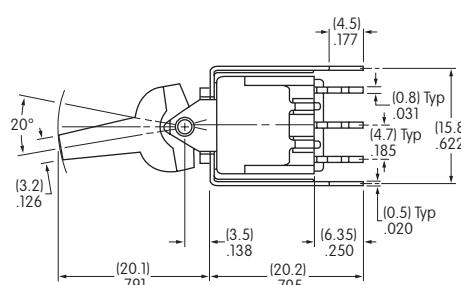
M2112JCFW01

Single color LED switch does not have terminal 5.

Straight PC • Bracket



Single Pole Only



M2112JCFW13

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

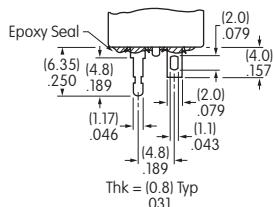
Logic Level

0.4VA maximum @ 28V AC/DC maximum

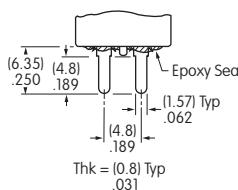
Complete explanation of operating range in Supplement section.

01

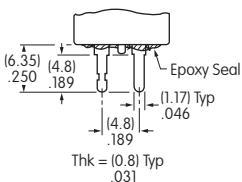
Solder Lug with Turret LED Terminal

**02**

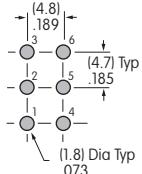
Quick Connect

**03**

Straight PC with Turret LED Terminal

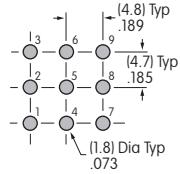


Single Pole



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

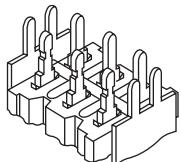
Double Pole



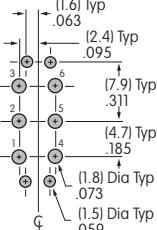
Single color LED & isolated bicolor LED switches do not have terminal 8.

13

Straight PC with Bracket & Turret LED Terminal



Single Pole



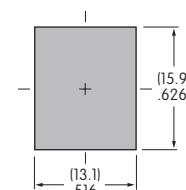
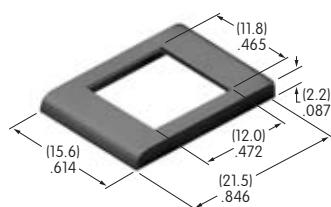
Single color LED & isolated bicolor LED switches do not have terminal 5.

OPTIONAL BEZEL & COLORS

AT2107 Bezel for Snap-in Panel Frame

Material: Polyamide

Finish: Matte



Colors Available:

A

Black

B

White

E

Yellow

F

Green

G

Blue

H

Gray



OCEAN CHIPS

Океан Электроники

Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибутором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибутором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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