Rotaries

Supplement | Accessories | Indicators

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

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

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

> 3.19N 3.92N Single Pole 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

Silver alloy or silver alloy with gold plating **Movable Contacts:**

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

Phosphor bronze **Lamp Contacts:**

Diallyl phthalate (UL94V-0) Copper with silver or gold plating **Switch Terminals:** Brass with silver or gold plating Lamp Terminals:

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

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

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

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

Single pole 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" to end of part number to order CSA certified switch.

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



A77

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.

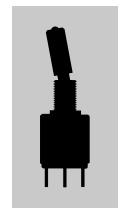
High insulating barriers protect against crossover in double pole devices.

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.



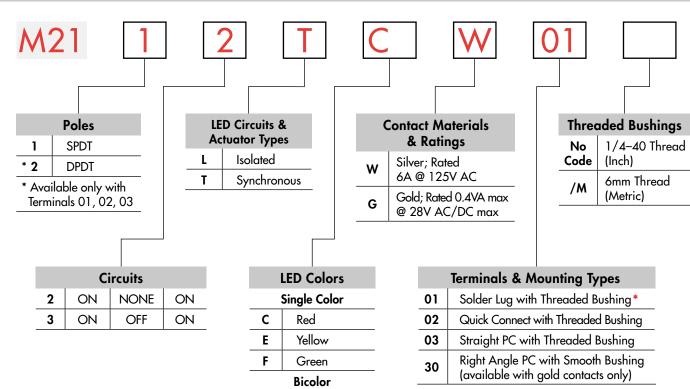






Toggles

TYPICAL SWITCH ORDERING EXAMPLE



CF

Red/Green

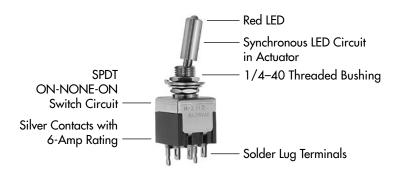
IMPORTANT:

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

Switches are supplied without UL & CSA

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2112TCW01





^{*}Wire harness & cable assemblies offered only in Americas

POLES & CIRCUITS & LED ILLUMINATION										
			Toggle Posit	ion & Termin	al Numbers	Schematics				
	Model	Pole & Throw	Down Keyway-	Center	Up	Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.				
M2112 SPDT Connected Power Terminals			ON 2-3	NONE NONE	ON 2-1	Isolated Single Color				
- <u>-</u> -	Isolated LEDs (see schematics) Connected LED Terminals		ON 4-6	NONE NONE	ON 4-6	LED 4 4 6				
LED Circuit	Synchronous Single Color LED Connected LED Terminals		ON 4-6	NONE NONE	OFF OPEN	Isolated Bicolor LED 2 ICOMI Red Green				
	Synchronous Bicolor LED Connected LED Terminals		Red 5-6	NONE NONE	Green 5-4	4 + Red 3 1 4 COM 6 (-) Green				
M2113 SPDT Connected Power Terminals			ON 2-3	OFF OPEN	ON 2-1	Synchronous Single Color				
÷	Isolated LEDs (see schematics) Connected LED Terminals		ON 4-6	ON 4-6	ON 4-6	LED				
LED Circuit	Synchronous Single Color LED Connected LED Terminals		ON 4-6	OFF OPEN	ON 4-6	Synchronous Bicolor LED 2 (COM) Red Green				
	Synchronous Bicolor LED Connected LED Terminals		Red 5-6	OFF OPEN	Green 5-4	3 1 6 5 COM (+) 4 External Connection				
M2122 DPDT Connected Power Terminals		ON 2-3 5-6	NONE NONE	ON 2-1 5-4	Isolated 2 (COM) 5 Single Color					
÷		s (see schematics) LED Terminals	ON 7-9	NONE NONE	ON 7-9	LED 3 1 6 4 7 L(+) 9 L(-)				
LED Circuit	Synchronous Single Color LED Connected LED Terminals		ON 7-9	NONE NONE	OFF OPEN	Bicolor LED 2 (COM) 5 Red Green				
	Synchronous Bicolor LED Connected LED Terminals		Red 8-9	NONE NONE	Green 8-7	(+) Red 3 1 6 4 7 COM 9 (-) Green				
	M2123 DPDT nnected Power Terminals		ON 2-3 5-6	OFF OPEN	ON 2-1 5-4	Synchronous 2 (COM) 5 Single Color				
÷	Isolated LEDs (see schematics) Connected LED Terminals		ON 7-9	ON 7-9	ON 7-9	3 1 6 4 7 LL+) 9 LL-)				
LED Circuit		Single Color LED LED Terminals	ON 7-9	OFF OPEN	ON 7-9	Synchronous 2 (COM) 5 Bicolor LED Red Green				
쁘	Synchronous Bicolor LED Connected LED Terminals		Red 8-9	OFF OPEN	Green 8-7	3 1 6 4 9 8 COM (+) 7 External Connection				

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			Single Color	Bicolor				
and not available separately. Bicolor LED is translucent white when unlit.		С	E	F	CF			
	Color	Red	Yellow	Green	Red/Green	Units		
Forward Peak 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		
Reverse Peak 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							



Supplement | Accessories

LED CIRCUIT, TOGGLE, & MOUNTING TYPE COMBINATIONS



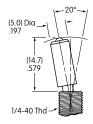
Toggle with Isolated LED Circuit



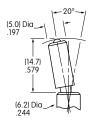
Toggle with Synchronous LED Circuit

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)



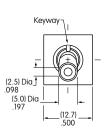
Max. Panel Thickness without Locking Ring .134" (3.4mm)



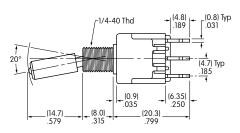
TYPICAL SWITCH DIMENSIONS

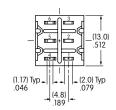
Solder Lug





Single Pole



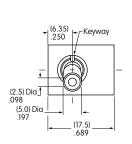


M2112TCFW01

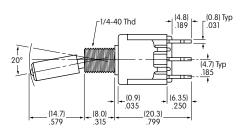
Single color LED switch does not have terminal 5.

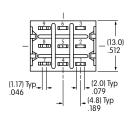
Solder Lug





Double Pole





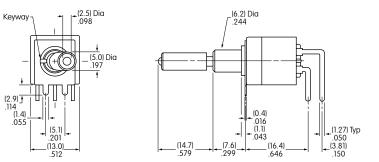
M2122TCFW01

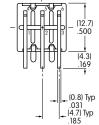
Single color LED switch does not have terminal 8.

Right Angle PC



Single Pole Only





M2112TCFG30

Single color LED switch does not have terminal 5.

Gold contact material only

CONTACT MATERIALS & RATINGS

Silver over Silver

Power Level

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

Gold over Brass or Copper

Logic Level

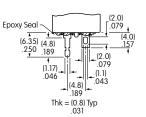
0.4VA maximum @ 28V AC/DC maximum

Complete explanation of operating range in Supplement section.

TERMINALS

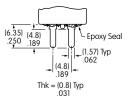
01

Solder Lug with **Turret LED Terminal**



02

Quick Connect



03

Straight PC with **Turret LED Terminal**

> .189 Thk = (0.8) Typ

- Epoxy Seal

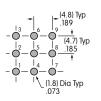
_(1.17) Typ .046



Single Pole

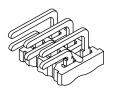


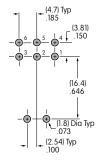
Double Pole



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

Right Angle PC





Single Pole

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

STANDARD MOUNTING HARDWARE

AT513H

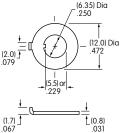
Hexagon Nuts (2 per switch) Material: Brass with nickel plating





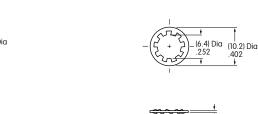
AT507H

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.

Rotaries

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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

20° Angle of Throw:

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

Diallyl phthalate (UL94V-0) Base: Copper with silver or gold plating Switch Terminals: **Lamp Terminals:** Brass with silver or gold plating

Environmental Data

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

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

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

10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range & returning Vibration:

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

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

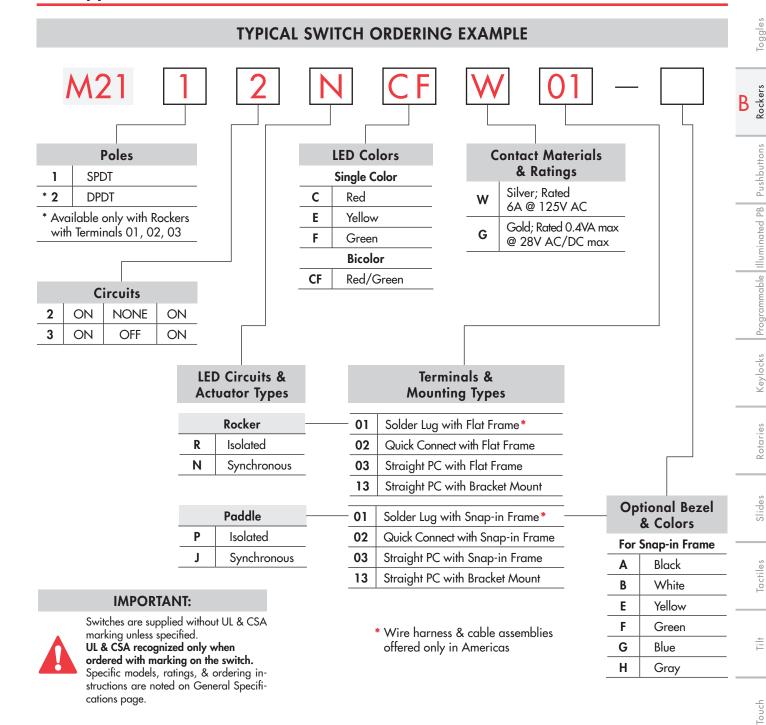
recognized at 6A @ 125V AC.

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

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

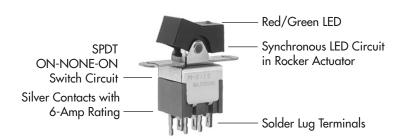
All single pole rockers with synchronous circuits & single color LEDs certified at 6A @ 125V AC.





DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2112NCFW01





Indicators

Accessories

Supplement Accessories

POLES & CIRCUITS & LED ILLUMINATION											
			Toggle Posit	ion & Termin	al Numbers	Schematics					
Model		Pole & Throw	Down	Center	Up	Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.					
M2112 SPDT Connected Power Terminals		ON 2-3	NONE NONE	ON 2-1	Isolated Single Color						
- <u>-</u>	Isolated LEDs (see schematics) Connected LED Terminals		ON 4-6	NONE NONE	ON 4-6	LED					
LED Circuit	Synchronous Single Color LED Connected LED Terminals		ON 4-6	NONE NONE	OFF OPEN	Isolated Bicolor LED 2 (COM) Red Green					
쁘	Synchronous Bicolor LED Connected LED Terminals		Red 5-6	NONE NONE	Green 5-4	4 COM 6 (-) Green					
C	M2113 SPDT Connected Power Terminals		ON 2-3	OFF OPEN	ON 2-1	Synchronous Single Color					
: <u>=</u>	Isolated LEDs (see schematics) Connected LED Terminals		ON 4-6	ON 4-6	ON 4-6	LED • • • • • • • • • • • • • • • • • • •					
LED Circuit	Synchronous Single Color LED Connected LED Terminals		ON 4-6	OFF OPEN	ON 4-6	Synchronous Bicolor LED 2 (COM) Red Green					
	Synchronous Bicolor LED Connected LED Terminals		Red 5-6	OFF OPEN	Green 5-4	3 1 6 5 COM(+) 4 External Connection					
C	M2122 DPDT Connected Power Terminals		ON 2-3 5-6	NONE NONE	ON 2-1 5-4	Isolated 2 ICOMI 5 Single Color					
. .	Isolated LEDs (see schematics) Connected LED Terminals		ON 7-9	NONE NONE	ON 7-9	LED , , , , , , , , , , , , , , , , , , ,					
LED Circuit	Synchronous Single Color LED Connected LED Terminals		ON 7-9	NONE NONE	OFF OPEN	Bicolor LED 2 (COM) 5 Red Green					
<u> </u>	Synchronous Bicolor LED Connected LED Terminals		Red 8-9	NONE NONE	Green 8-7	(+) Red 3 1 6 4 7 COM 9 (-) Green					
C	M2123 DPDT onnected Power Terminals		ON 2-3 5-6	OFF OPEN	ON 2-1 5-4	Synchronous 2 (COM) 5 Single Color					
LED Circuit	Isolated LEDs (see schematics) Connected LED Terminals		ON 7-9	ON 7-9	ON 7-9	1 6 4 7 Lt+) \$\frac{1}{9} \text{L(-)}\$					
	Synchronous Single Color LED Connected LED Terminals		ON 7-9	OFF OPEN	ON 7-9	Synchronous 2 ICOMI 5 Bicolor LED Red Green					
=	Synchronous Bicolor LED Connected LED Terminals		Red 8-9	OFF OPEN	Green 8-7	3 1 6 4 9 8 COM (+) 7 External Connection					

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				
			Single Color			Bicolor	Single Color		lor	Bicolor	
			C	E	F	CF	C	E	F	CF	
			Red	Yellow	Green	Red/Green	Red	Yellow	Green	Red/Green	Units
-	Forward Peak Current	I_{FM}	25	30	30	25	10	30	30	30/25	mA
	Typical Forward Current	I _F	20	20	20	20	8	24	24	20/20	mA
	Forward Voltage	$V_{_{\rm F}}$	2.1	2.1	2.1	1.7/2.0	1.9	2.0	2.1	2.0/2.2	٧
	Reverse Peak Voltage	$V_{_{RM}}$	4	4	4		5	5	5		٧
	Current Reduction Rate Above 25°C	$\Delta I_{_{\rm F}}$	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

(2.4) Dia Typ .094

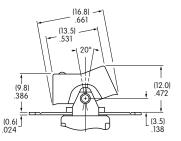
(2.5) Dia

Material: Polyamide

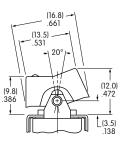
Finish: Matte Color: Black

(23.8)

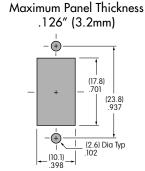
(29.5) 1.161



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

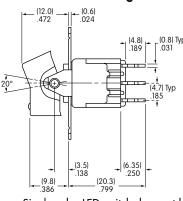


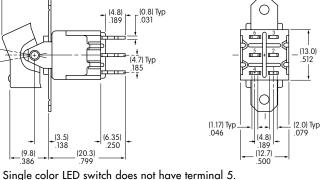
Bracket combines with Terminal code 13.



TYPICAL ROCKER SWITCH DIMENSIONS







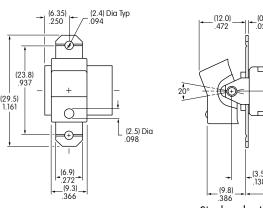


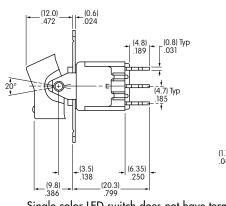
Solder Lug

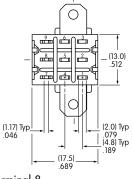
M2112NCFW01

Solder Lug

Double Pole



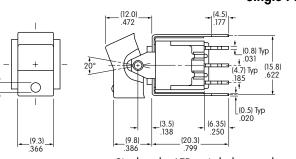


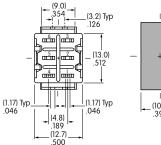


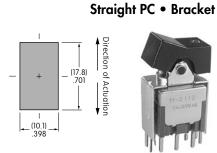
Single color LED switch does not have terminal 8.

M2122NCFW01

Single Pole Only







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

M2112NCFW13

(2.5) Dia_

www.nkk.com

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Supplement | Accessories

LED CIRCUIT, PADDLE, & MOUNTING TYPE COMBINATIONS

Paddle with Isolated LED Circuit

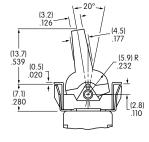
Paddle with Synchronous LED Circuit

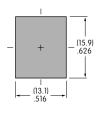
Maximum Panel Thickness .039" ~ .126" (1.0 ~ 3.2mm) without Bezel .039" ~ .098" (1.0 ~ 2.5mm) with Bezel

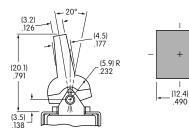
Maximum Panel **Thickness** .126" (3.2mm)

Material: Polyamide

Finish: Matte Color: Black







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

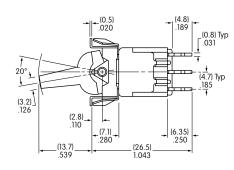
Bracket combines with Terminal code 13

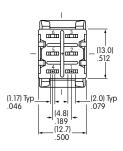
TYPICAL PADDLE SWITCH DIMENSIONS

Solder Lug • Snap-in

(18.0)

Single Pole Only

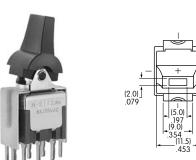




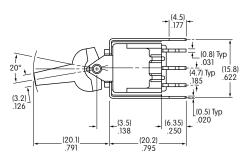
M2112JCFW01

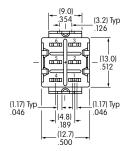
Single color LED switch does not have terminal 5.

Straight PC • Bracket



Single Pole Only





M2112JCFW13

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



CONTACT MATERIALS & RATINGS

Silver over Silver

Power Level

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

G

Gold over Brass or Copper

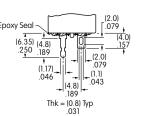
Logic Level

0.4VA maximum @ 28V AC/DC maximum

Complete explanation of operating range in Supplement section.

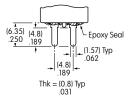
TERMINALS

Solder Lug with **Turret LED Terminal**

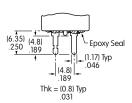


02

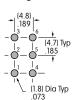
Quick Connect



Straight PC with 03 **Turret LED Terminal**



Single Pole



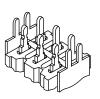
Single color LED & isolated bicolor LED switches do not have terminal 5.



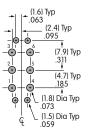
Double Pole

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

Straight PC with Bracket 13 & Turret LED Terminal



Single Pole



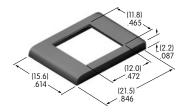
Single color LED & isolated bicolor LED switches do not have terminal 5.

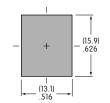
OPTIONAL BEZEL & COLORS

AT2107 Bezel for Snap-in Panel Frame

Material: Polyamide

Finish: Matte





Colors Available:





White







