Distinctive Characteristics

Industry's first LED illumination at tip of toggle and paddle 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.
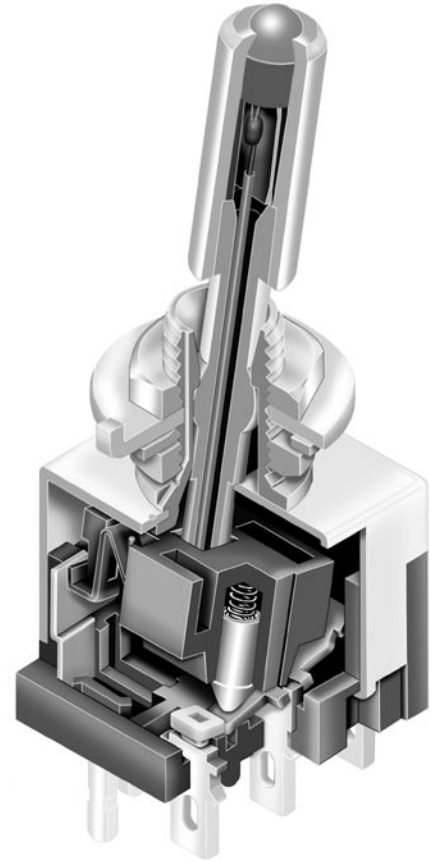
Actual Size
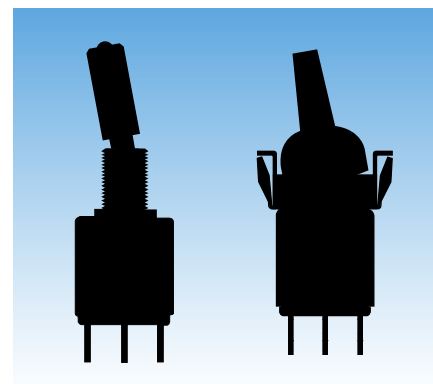
General Specifications

Electrical Capacity (Resistive Load)

Power Level (code W): 6A @ 125V AC or 3A @ 250V AC or 3A @ 30V DC
Logic Level (code G): 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
Toggles & 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

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) for toggles & rockers
−25°C through +70°C (−13°F through +158°F) for paddles
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/s^2) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)
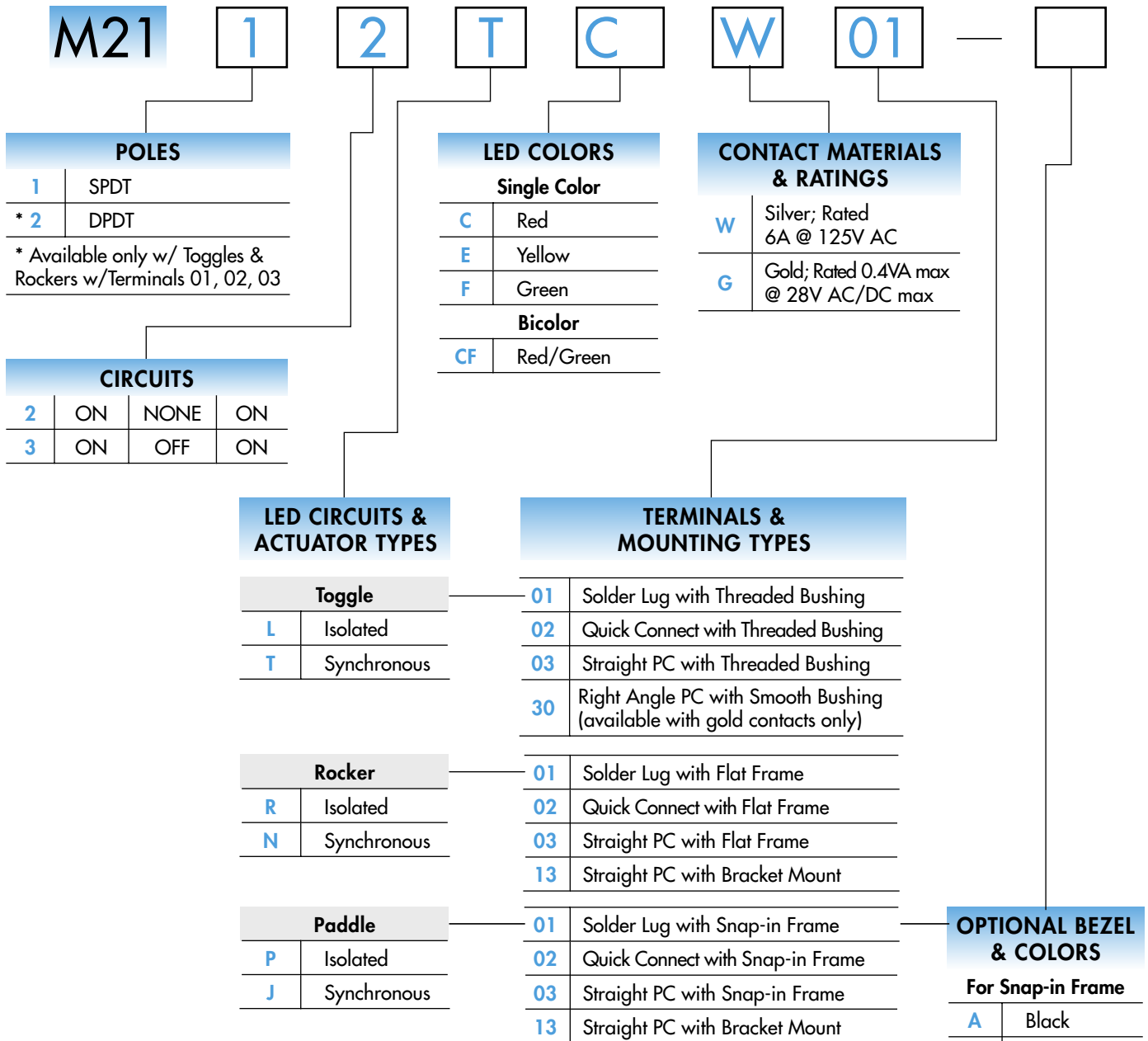
Installation

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

Standards & Certifications

Flammability Standards: UL94V-0 base
UL Recognized: Single pole toggles & rockers with synchronous circuits & solder lug or PC recognized at 6A @ 125V AC; UL File No. WOYR2.E44145; add "/U" to end of part number to order UL mark on switch.
CSA Certified: All single pole toggles & rockers with synchronous circuits certified at 6A @ 125V AC; CSA File No. 023535-0-000; add "/C" to end of part number to order CSA mark on switch.

TYPICAL SWITCH ORDERING EXAMPLE

M21	1	2	T	C	W	01	—	

POLES

1	SPDT
* 2	DPDT

* Available only w/ Toggles & Rockers w/Terminals 01, 02, 03

CIRCUITS

2	ON	NONE	ON
3	ON	OFF	ON

LED COLORS

Single Color

C	Red
E	Yellow
F	Green

Bicolor

CF	Red/Green

CONTACT MATERIALS & RATINGS

W	Silver; Rated 6A @ 125V AC
G	Gold; Rated 0.4VA max @ 28V AC/DC max

LED CIRCUITS & ACTUATOR TYPES

Toggle	
L	Isolated
T	Synchronous

Rocker	
R	Isolated
N	Synchronous

Paddle	
P	Isolated
J	Synchronous

TERMINALS & MOUNTING TYPES

01	Solder Lug with Threaded Bushing
02	Quick Connect with Threaded Bushing
03	Straight PC with Threaded Bushing
30	Right Angle PC with Smooth Bushing (available with gold contacts only)

01	Solder Lug with Flat Frame
02	Quick Connect with Flat Frame
03	Straight PC with Flat Frame
13	Straight PC with Bracket Mount

01	Solder Lug with Snap-in Frame
02	Quick Connect with Snap-in Frame
03	Straight PC with Snap-in Frame
13	Straight PC with Bracket Mount

OPTIONAL BEZEL & COLORS

For Snap-in Frame

A	Black
B	White
C	Red
E	Yellow
F	Green
G	Blue
H	Gray

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2112TCW01

- Red LED
- Synchronous LED Circuit in Toggle Actuator
- SPDT ON-NONE-ON Switch Circuit
- Silver Contacts with 6-amp Rating
- Solder Lug Terminals

IMPORTANT:

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

POLES & CIRCUITS & LED ILLUMINATION

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

LED COLORS & SPECIFICATIONS

Single Element LED		Toggles & Rockers			Toggles	Rockers	Paddles				Units
LED factory assembled **Not available separately** Bicolor is white in OFF state.		Single Color			Bicolor	Bicolor	Single Color			Bicolor	
		C	**E**	**F**	**CF**	**CF**	**C**	**E**	**F**	**CF**	
	Color	Red	Yellow	Green	Red/Green	Red/Green	Red	Yellow	Green	Red/Green	
Forward Peak Current	I_{FM}	25	30	30	25	25	10	30	30	30/25	mA
Continuous Forward Current	I_F	20	20	20	10	20	8	24	24	20/20	mA
Forward Voltage	V_F	2.1	2.1	2.1	1.9	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	0.33/0.33	0.13	0.40	0.40	0.43/0.38	mA/°C
Ambient Temperature Range		−10° ~ +55°C					−25° ~ +70°C				

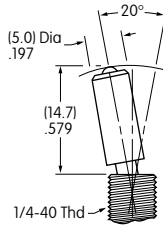## LED CIRCUIT, TOGGLE, & MOUNTING TYPE COMBINATIONS
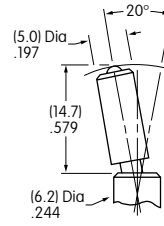
L Toggle with Isolated LED Circuit

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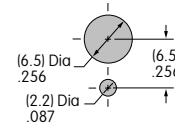
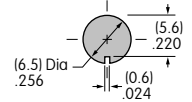Threaded Bushing combines with Terminal codes 01, 02, & 03.

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)

(5.0) Dia .197

(14.7) .579

1/4-40 Thd

(6.2) Dia .244

(6.5) Dia .256

(6.5) .256

(2.2) Dia .087

(5.6) .220

(6.5) Dia .256

(0.6) .024

TYPICAL TOGGLE SWITCH DIMENSIONS
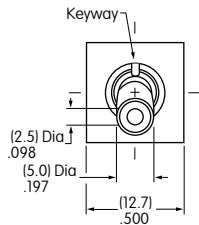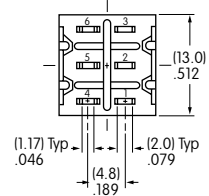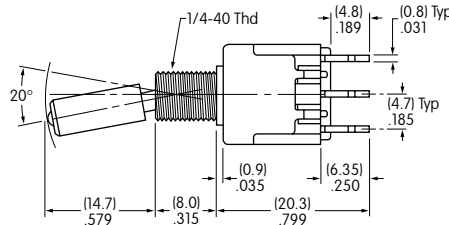
Solder Lug

Single Pole

M2112TCFW01

Keyway

(2.5) Dia .098

(5.0) Dia .197

(12.7) .500

1/4-40 Thd

20°

(4.8) .189

(0.8) Typ .031

(4.7) Typ .185

(14.7) .579

(8.0) .315

(0.9) .035

(6.35) .250

(20.3) .799

(13.0) .512

(1.17) Typ .046

(4.8) .189

(2.0) Typ .079

Single color LED switch does not have terminal 5.

Solder Lug

Double Pole

M2122TCFW01

(6.35) .250

Keyway

(2.5) Dia .098

(5.0) Dia .197

(17.5) .689

1/4-40 Thd

20°

(4.8) .189

(0.8) Typ .031

(4.7) Typ .185

(14.7) .579

(8.0) .315

(0.9) .035

(6.35) .250

(20.3) .799

(13.0) .512

(1.17) Typ .046

(2.0) Typ .079

(4.8) Typ .189
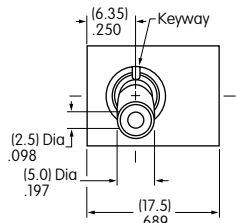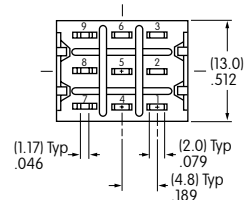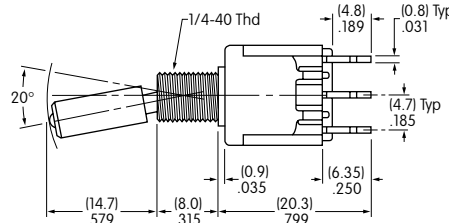
Single color LED switch does not have terminal 8.

Right Angle PC

Single Pole Only

M2112TCFG30

Keyway

(2.5) Dia .098

(5.0) Dia .197

(2.9) .114

(1.4) .055

(5.1) .201

(13.0) .512

(6.2) Dia .244

(0.4) .016

(1.1) .043

(14.7) .579

(7.6) .299

(16.4) .646

(1.27) Typ .050

(3.81) .150

(12.7) .500

(4.3) .169

(0.8) Typ .031

(4.7) Typ .185
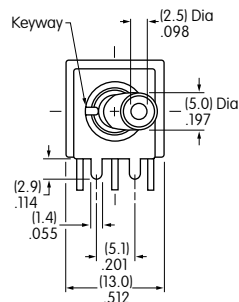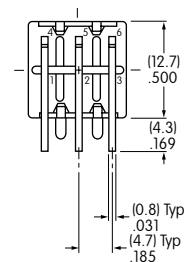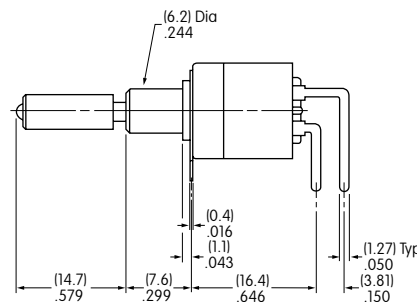
Single color LED switch does not have terminal 5.

Gold contact material only

LED CIRCUIT, ROCKER, & MOUNTING TYPE COMBINATIONS

R Rocker with Isolated LED Circuit

N Rocker with Synchronous LED Circuit

Material: Polyamide
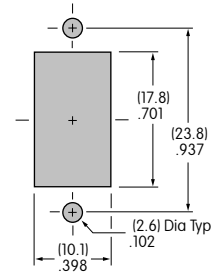
Finish: Matte

Color: Black
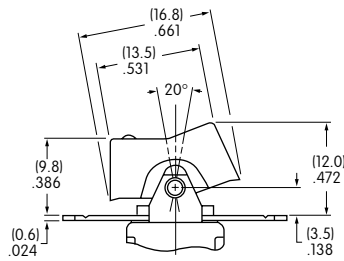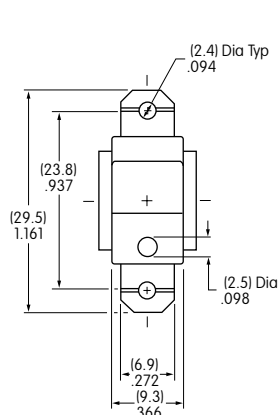
Flat Frame combines with Terminal codes 01, 02, & 03.
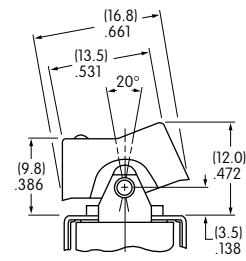
Bracket combines with Terminal code 13.
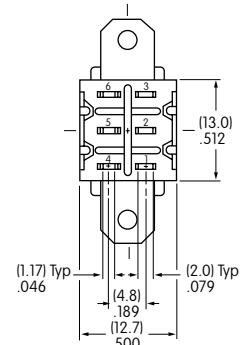
Max. Panel Thickness .126" (3.2mm)

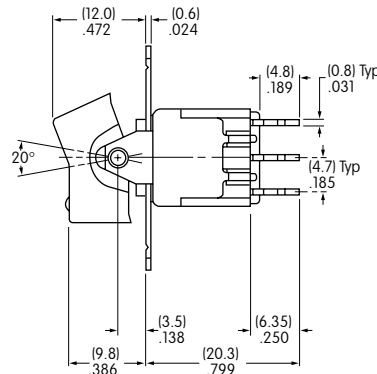## TYPICAL ROCKER SWITCH DIMENSIONS

Solder Lug   **Single Pole**
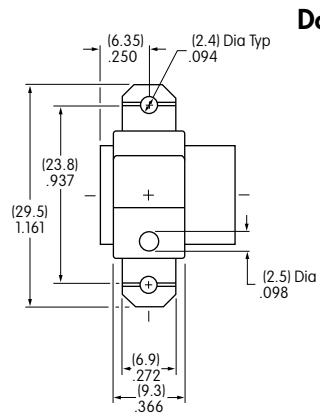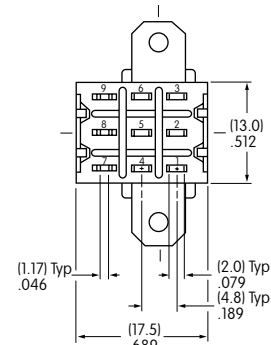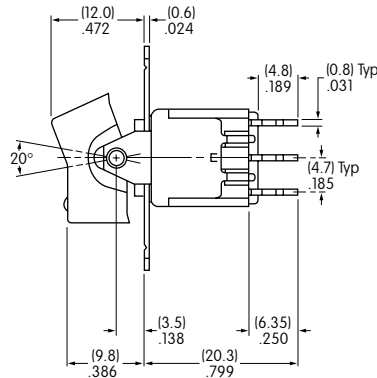
M2112NCFW01

Single color LED switch does not have terminal 5.

Solder Lug   **Double Pole**

M2122NCFW01
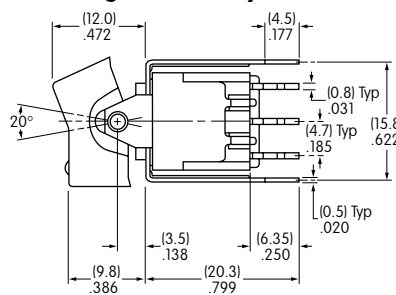
Single color LED switch does not have terminal 8.

Straight PC • Bracket   **Single Pole Only**

Direction of Actuation
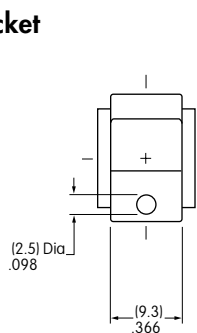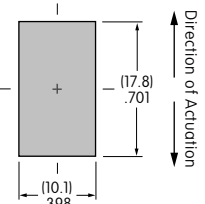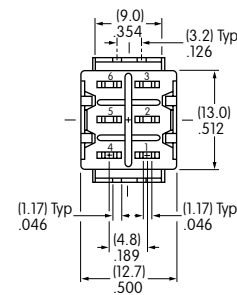
M2112NCFW13

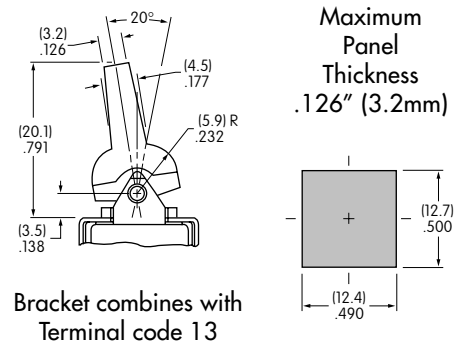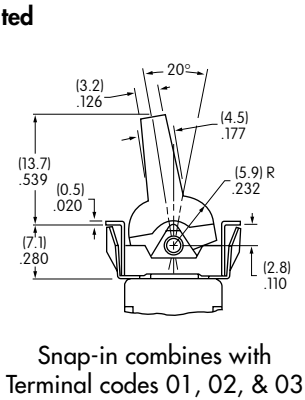Single color LED switch does not have terminal 5. Silver contact material is standard.

LED CIRCUIT, PADDLE, & MOUNTING TYPE COMBINATIONS

P Paddle with Isolated LED Circuit

J Paddle with Synchronous LED Circuit

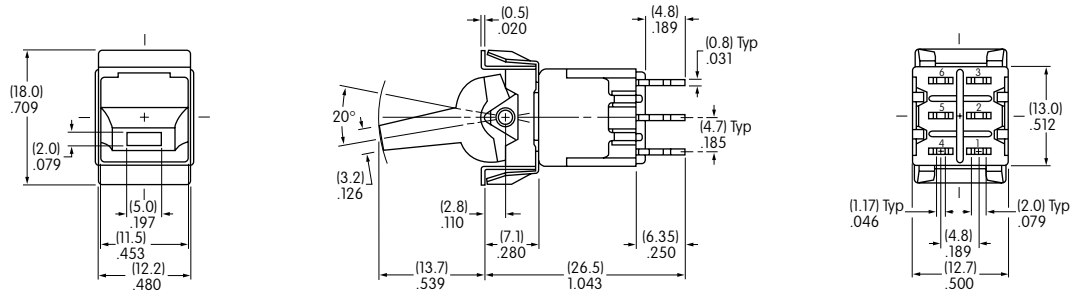Material: Polyamide
Finish: Matte
Color: Black

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)

(3.2) .126   20°
(4.5) .177
(13.7) .539
(0.5) .020
(5.9) R .232
(7.1) .280
(2.8) .110

(15.9) .626
(13.1) .516

(3.2) .126   20°
(4.5) .177
(20.1) .791
(5.9) R .232
(3.5) .138

(12.7) .500
(12.4) .490

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

(18.0) .709
(2.0) .079
(5.0) .197
(11.5) .453
(12.2) .480

(0.5) .020   (4.8) .189
(0.8) Typ .031
20°
(4.7) Typ .185
(3.2) .126
(2.8) .110   (7.1) .280   (6.35) .250
(13.7) .539   (26.5) 1.043

(13.0) .512
(1.17) Typ .046   (2.0) Typ .079
(4.8) .189
(12.7) .500

Single color LED switch does not have terminal 5.

Straight PC • Bracket

Single Pole Only

M2112JCFW13

(2.0) .079
(5.0) .197
(9.0) .354
(11.5) .453

(4.5) .177
(0.8) Typ .031
20°
(4.7) Typ .185
(15.8) .622
(3.2) .126
(0.5) Typ .020
(3.5) .138   (6.35) .250
(20.1) .791   (20.2) .795

(9.0) .354   (3.2) Typ .126
(13.0) .512
(1.17) Typ .046   (1.17) Typ .046
(4.8) .189
(12.7) .500

Silver contact material is standard. Single color LED switch does not have terminal 5.
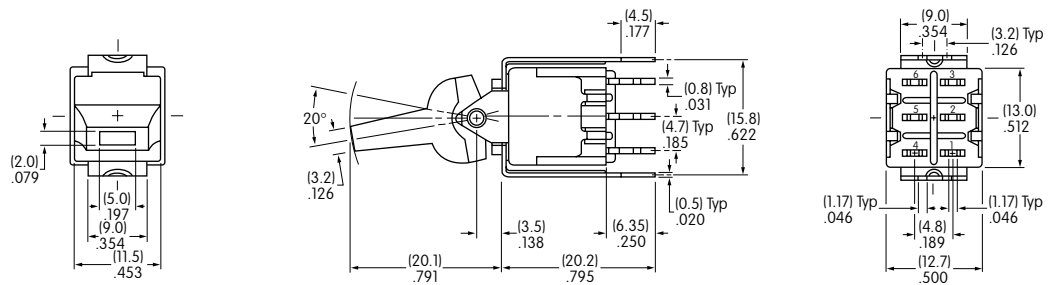
OPTIONAL BEZEL & COLORS

AT2107 Bezel for Snap-in Panel Frame

Material: Polyamide

Finish: Matte

(11.8) .465
(2.2) .087
(12.0) .472
(15.6) .614
(21.5) .846

(15.9) .626
(13.1) .516
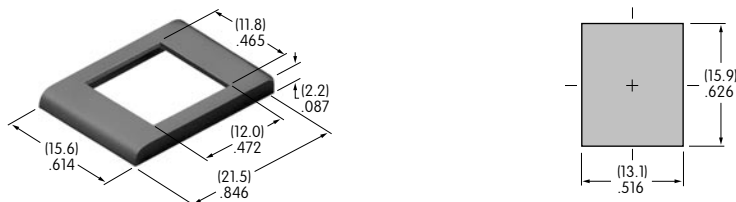
Colors Available: **A** Black **B** White **C** Red **E** Yellow **F** Green **G** Blue **H** Gray
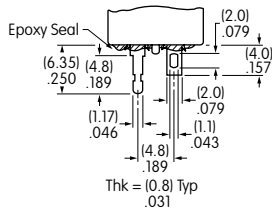
CONTACT MATERIALS & RATINGS

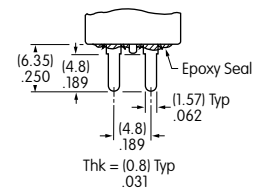| W | Silver over Silver | Power Level | 6A @ 125V AC & 3A @ 250V AC |

| G | Gold over Brass or Copper | Logic Level | 0.4VA maximum @ 28V AC/DC maximum |

Complete explanation of operating range in Supplement section.
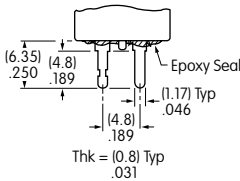
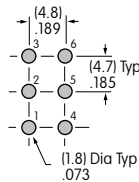## TERMINALS

01 **Solder Lug with Turret LED Terminal**

Epoxy Seal
(2.0) .079
(6.35) .250
(4.8) .189
(4.0) .157
(2.0) .079
(1.17) .046
(1.1) .043
(4.8) .189
Thk = (0.8) Typ .031

02 **Quick Connect**

(6.35) .250
(4.8) .189
Epoxy Seal
(1.57) Typ .062
(4.8) .189
Thk = (0.8) Typ .031

03 **Straight PC with Turret LED Terminal**

(6.35) .250
(4.8) .189
Epoxy Seal
(1.17) Typ .046
(4.8) .189
Thk = (0.8) Typ .031

Single Pole

(4.8) .189
(4.7) Typ .185
(1.8) Dia Typ .073
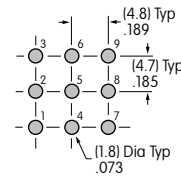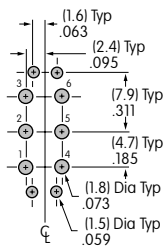
Single color LED switch does not have terminal 5.

Double Pole

(4.8) Typ .189
(4.7) Typ .185
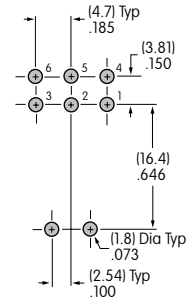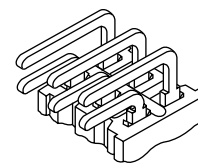(1.8) Dia Typ .073

Single color LED switch does not have terminal 8.

13 **Straight PC with Bracket & Turret LED Terminal**

(1.6) Typ .063
(2.4) Typ .095
(7.9) Typ .311
(4.7) Typ .185
(1.8) Dia Typ .073
(1.5) Dia Typ .059
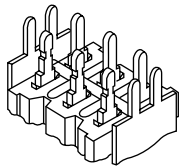
Single color LED switch does not have terminal 5.

30 **Right Angle PC**

(4.7) Typ .185
(3.81) .150
(16.4) .646
(1.8) Dia Typ .073
(2.54) Typ .100

STANDARD MOUNTING HARDWARE

AT513H
Hexagon Nuts (2 per switch)
Material: Brass with nickel plating

1/4-40 Thd
(8.0) .315
(9.0) .354
(1.5) .059
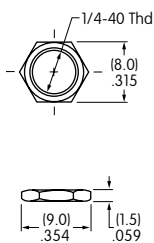
AT507H
Locking Ring (1 per switch)
Material: Steel with chromate over zinc

(6.35) Dia .250
(12.0) Dia .472
(2.0) .079
(5.5) or .229
(1.7) .067
(0.8) .031
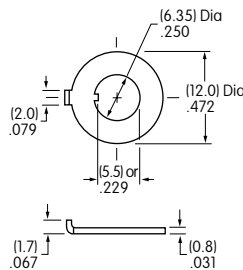
AT509
Lockwasher (1 per switch)
Material: Steel with chromate over zinc

(6.4) Dia .252
(10.2) Dia .402
(0.5) .020
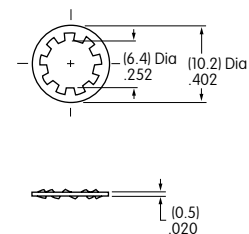
Optional Hardware: Knurled nuts, dress nuts, and ON-OFF plates are available; see details in Accessories & Hardware section.