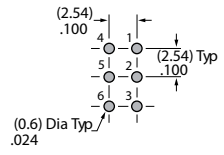
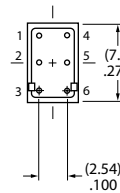
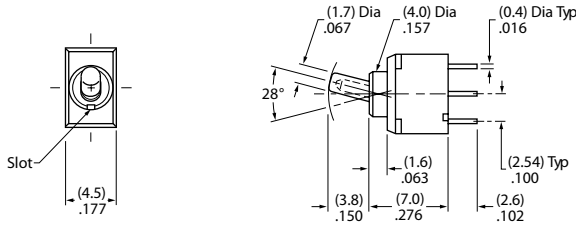


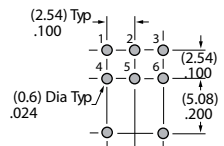
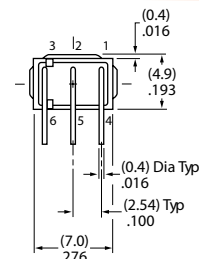
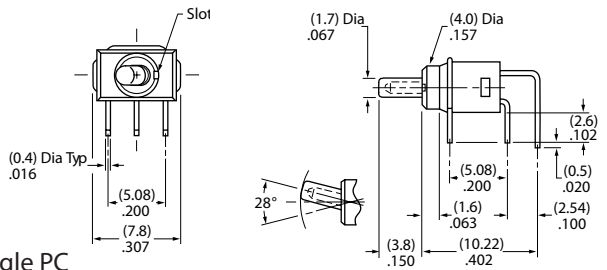
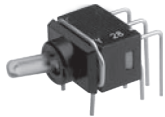
## Ultra-Miniature Fully Illuminated Toggle Switches

## G Series



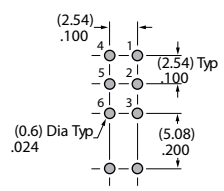
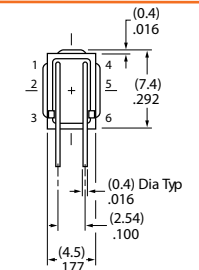
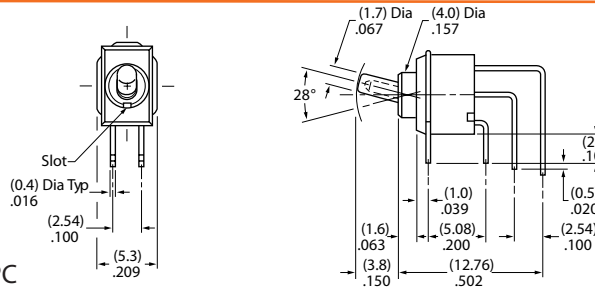
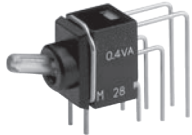
5 & 6 are LED terminals; 4 is a support pin on single color models & an LED terminal on bicolor models.

**G12JPC** Straight PC



5 & 6 are LED terminals; 4 is a support pin on single color models & an LED terminal on bicolor models.

**G12JHD** Right Angle PC



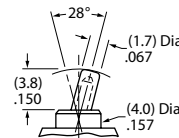
5 & 6 are LED terminals; 4 is a support pin on single color models & an LED terminal on bicolor models.

**G12JVCF** Vertical PC

POLE & CIRCUITS		Toggle Position			Connected Terminals			Throw & Schematics
Pole & Throw	Model	Up	Center	Down	Up	Center	Down	
SPDT	G12 G13	ON	NONE	ON	2-3	NONE	2-1	Note: Terminal numbers are not actually on the switch. LED circuit is isolated and requires an external power source.
		ON	OFF	ON	2-3	OPEN	2-1	 

CLEAR TOGGLE

CUTAWAY



### How to order:

G

- 1** POLES:  
1 SPDT
- 2** CIRCUITS:  
2 ON-NONE-ON (Combines with single color or bicolor LEDs)
- 3** ON-OFF-ON (Combines with bicolor LED only)
- 3** ACTUATOR:  
J Clear Actuator

- 4** PC TERMINALS:  
P Straight  
H Right Angle  
V Vertical
- 5** LEDs:  
C Red (Single Color, ON-NONE-ON only)  
D Amber (Single Color, ON-NONE-ON only)  
F Green (Single Color, ON-NONE-ON only)  
CF Red/Green (Bicolor, ON-NONE-ON & ON-OFF-ON)

### General Specifications:

**ELECTRICAL CAPACITY (Resistive Load)**  
 » Logic Level: 0.4VA max. @ 28V AC/DC max.  
 (Applicable Range 0.1mA~0.1A @ 20mV~28V)

**OTHER RATINGS:**  
 » Contact Resistance: 80m Ω max.  
 » Insulation Resistance: 500M Ω min. @ 500VDC  
 » Mechanical Life: 100,000 operations min.  
 » Electrical Life: 100,000 operations min.  
 10,000 operations min. @ 0.1A @ 28V AC/DC  
 » Normal Operating Force: 1.30N  
 » Angle of Throw: 28°

#### MATERIALS

» Movable & Stationary Contacts:  
Phosphor bronze with gold plating  
 » Power & Lamp Terminals:  
Phosphor bronze with gold plating

#### ENVIRONMENTAL DATA

» Operating Temperature: -25°C through +55°C

#### PCB PROCESSING

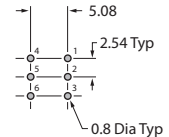
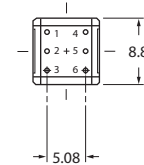
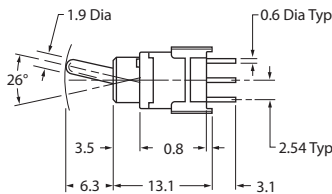
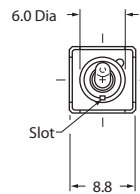
» Soldering: Wave soldering recommended.  
Manual Soldering 4 sec. max. @ 390°C max.

### LED COLORS & SPECIFICATIONS

Colors		C Red	D Amber	F Green	CF Red/Green
Forward Peak Current	I <sub>FM</sub>	25mA	25mA	25mA	25mA/25mA
Continuous Forward Current	I <sub>F</sub>	20mA	20mA	20mA	20mA/20mA
Forward Voltage	V <sub>F</sub>	2.0V	2.1V	2.1V	2.0V/2.1V
Reverse Peak Voltage	V <sub>RM</sub>	4V	4V	4V	4V/4V
Current Reduction Rate Above 25°C	ΔI <sub>F</sub>	0.33mA/°C	0.33mA/°C	0.33mA/°C	0.33mA/°C / 0.33mA/°C
Ambient Temperature Range		-25°C ~ +55°C			

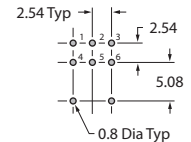
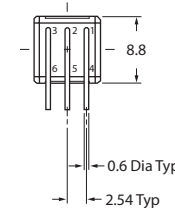
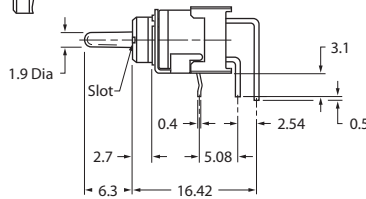
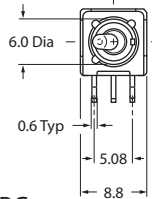
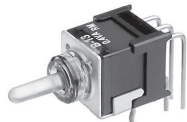
## Subminiature Fully Illuminated Toggle Switches

## B Series



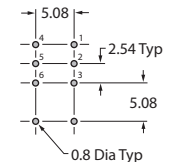
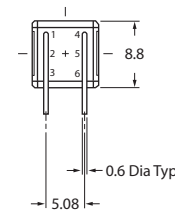
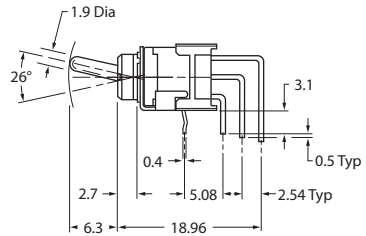
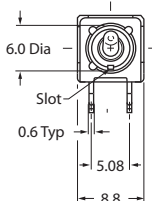
**B12JJPC** Straight PC

Terminal 4 is a support pin on single color models.



**B13JJHCF** Right Angle PC

Terminal 4 is a support pin on single color models.



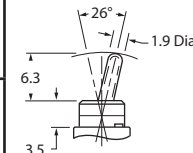
**B13JJVCF** Vertical PC

Terminal 4 is a support pin on single color models.

POLE & CIRCUITS		Toggle Position			Connected Terminals			Throw & Schematics
Pole & Throw	Model	Up	Center	Down	Up	Center	Down	
SPDT	B12 B13	ON	NONE	ON	2-1	NONE	2-3	Note: Terminal numbers are not actually on the switch. LED circuit is isolated and requires an external power source. Single Color
								Bicolor

**CLEAR TOGGLE  
CLEAR BUSHING**

**CUTAWAY**



Illuminated Switches

### How to order:

**B**

- 1** POLES:  
1 SPDT
- 2** CIRCUITS:  
2 ON-NONE-ON (Combines with single color or bicolor LEDs)
- 3** ON-OFF-ON (Combines with bicolor LED only)
- JJ** ACTUATOR & BUSHING:  
Clear Actuator & Clear Bushing

- 4** PC TERMINALS:  
Straight  
Right Angle  
Vertical
- 5** LEDs:  
C Red (Single Color, ON-NONE-ON only)  
D Amber (Single Color, ON-NONE-ON only)  
F Green (Single Color, ON-NONE-ON only)  
CF Red/Green (Bicolor, ON-NONE-ON & ON-OFF-ON)

### General Specifications:

**ELECTRICAL CAPACITY (Resistive Load)**  
 » Logic Level: 0.4VA max.@28V AC/DC max.  
 (Applicable Range 0.1mA~0.1A@20mV~28V)

**OTHER RATINGS:**  
 » Contact Resistance: 50m Ω max.  
 » Insulation Resistance: 500M Ω min.@500VDC  
 » Mechanical Life: 100,000 operations min.  
 » Electrical Life: 50,000 operations min.  
 » Normal Operating Force: 1.18N  
 » Contact Timing: Nonshorting (break-before-make)  
 » Angle of Throw: 26°

**MATERIALS**  
 » Movable Contacts: Phosphor bronze with gold plating  
 » Stationary Contacts: Brass with tin plating  
 » Terminals: Brass with gold plating

**ENVIRONMENTAL DATA**  
 » Operating Temperature: -25°C through +55°C

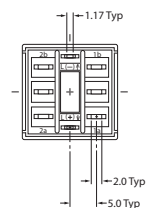
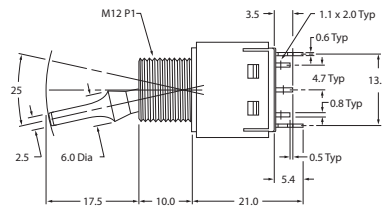
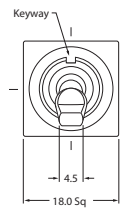
**PCB PROCESSING**  
 » Soldering: Wave soldering recommended.  
 Manual Soldering 4 sec. max. @ 390°C max.

### LED COLORS & SPECIFICATIONS

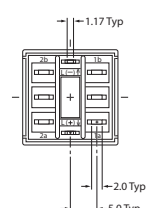
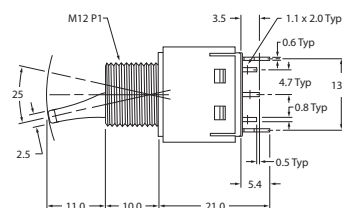
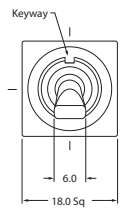
Colors		C Red	D Amber	F Green	CF Red/Green
Forward Peak Current	I <sub>FM</sub>	30mA	30mA	20mA	30mA/20mA
Continuous Forward Current	I <sub>F</sub>	20mA	20mA	10mA	20mA/10mA
Forward Voltage	V <sub>F</sub>	1.9V	1.9V	3.4V	1.9V/3.4V
Reverse Peak Voltage	V <sub>RM</sub>	5V	5V	5V	5V/5V
Current Reduction Rate Above 25°C	ΔI <sub>F</sub>	0.43mA/°C	0.43mA/°C	0.28mA/°C	0.43mA/°C / 0.28mA/°C
Ambient Temperature Range		-25°C ~ +55°C			

## Fully Illuminated Toggle Switches

## TL Series



TL22DNKW016G 17.5mm Toggle



TL22SCKG015C 11.0mm Toggle

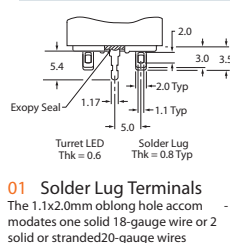
### POLES & CIRCUITS

		Toggle Position			Connected Terminals			Throw & Schematics	
Pole	Model	Down Keyway	Center	Up	Down Keyway	Center	Up	Note: Terminal numbers are not actually on the switch. Lamp circuit is isolated and requires an external power source.	
DP	TL22	ON	NONE	ON	1-1b 2-2b	OPEN	1-1a 2-2a	DPDT	

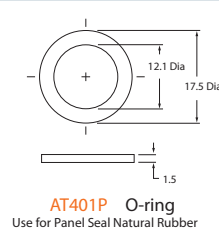
### TOGGLES

<p><b>D 17.5mm</b> Combines with silver contacts only</p>	<p><b>S 11.0mm</b> Combines with gold contacts only</p>
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### TERMINALS



### OPTIONAL HARDWARE



### CUTAWAY



## How to order:



- |   |                                    |  |  |
|---|------------------------------------|--|--|
| <b>1 POLE:</b><br>DPDT  | <b>N</b>                           | <b>For Super Bright:</b><br>No Color<br><b>For Bright:</b><br>Red<br>Amber<br>Green            | <b>G01 Solder Lug Gold</b><br>0.4VA@28 AC/DC<br>(for 11.0mm Toggle only)   |
| <b>2 CIRCUIT:</b><br>ON-NONE-ON   | <b>C</b><br><b>D</b><br><b>F</b>   | <b>HOUSING:</b><br>Black   | <b>7 LED COLOR:</b><br><b>For Super Bright:</b><br>White<br>Green<br>Blue<br><b>For Bright:</b><br>Red<br>Amber<br>Green |
| <b>3 TOGGLE LENGTH:</b><br>D 17.5mm (combines with silver contacts only)<br>S 11.0mm (combines with gold contacts only) | <b>5</b><br><b>K</b><br><b>W01</b> | <b>TERMINAL/CONTACT/RATING:</b><br>Solder Lug Silver<br>6A@125 VAC<br>(for 17.5mm Toggle only) | <b>5C</b><br><b>5D</b><br><b>5F</b>  |
| <b>4 TOGGLE COLOR:</b>  |                                    |  |  |

## General Specifications:

**ELECTRICAL CAPACITY (Resistive Load)**  
 » Power Level: 6A@125VAC or 3A@250VAC or 6A@12VDC for silver;  
 » Logic Level: 0.4VA max.@28VAC/DC max. for gold

**OTHER RATINGS:**  
 » Contact Resistance: 10m Ω max. for silver; 20m Ω max. for gold;  
 » Insulation Resistance: 1,000M Ω min.@500VDC  
 » Mechanical Life: 50,000 operations min.  
 » Electrical Life: 25,000 operations min. for silver; 50,000 operations min. for gold  
 » Nominal Operating Force: 1.9N for 17.5mm toggle; 2.5N for 11.0mm toggle  
 » Angle of Throw: 25°

**MATERIALS**  
 » Mov. Contacts: Silver alloy or copper w. gold plating  
 » Stationary Contacts: Silver plus copper with silver plating or copper with gold plating  
 » Lamp Contacts: Beryllium copper with silver plating  
 » Power Terminals: Copper with silver or gold plating  
 » Lamp Terminals: Brass with silver plating

**ENVIRONMENTAL DATA**  
 » Operating Temperature: -10°C through +55°C

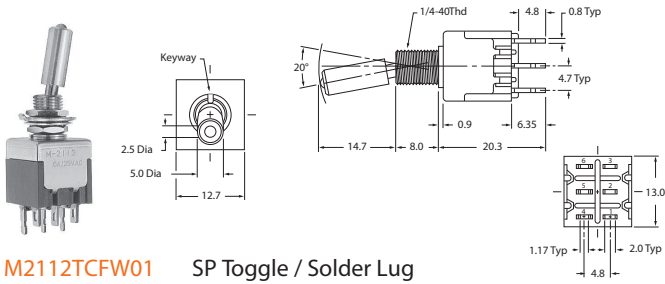
**SOLDERING**  
 » 3 sec. max. @ 350°C max. for manual soldering

### LED COLORS & SPECIFICATIONS

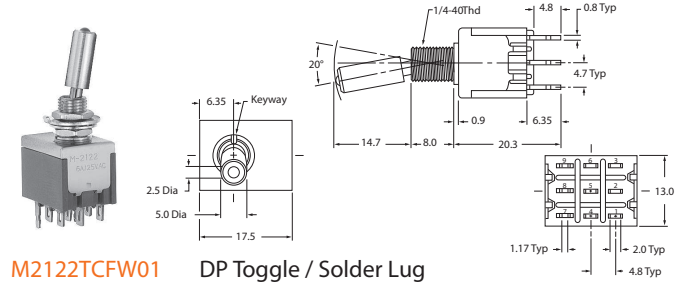
(LED not available separately)		Colored Toggle Bright LED			Clear Toggle Super Bright LED		
Colors		5C Red	5D Amber	5F Green	6B White	6F Green	6G Blue
Forward Peak Current	I <sub>FM</sub>	30mA	30mA	50mA	30mA	30mA	30mA
Continuous Forward Current	I <sub>F</sub>	20mA	20mA	20mA	20mA	20mA	20mA
Forward Voltage	V <sub>F</sub>	2.0V	2.1V	2.27V	3.6V	3.3V	3.4V
Reverse Peak Voltage	V <sub>RM</sub>	4V	4V	4V	5V	5V	5V
Current Reduction Rate Above 25°C	ΔI <sub>F</sub>	0.32mA/°C		0.50mA/°C	0.50mA/°C		0.40mA/°C
Ambient Temperature Range		-10°C ~ +55°C					

## Illuminated Switches with LED Tipped Actuator

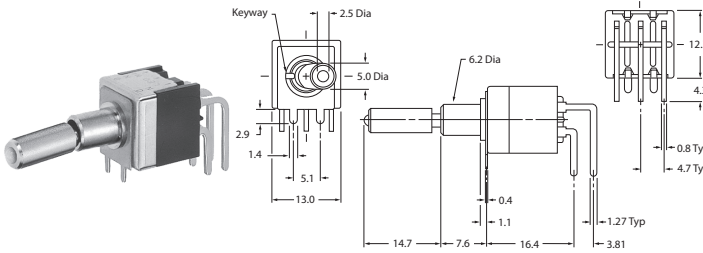
## M21 Series



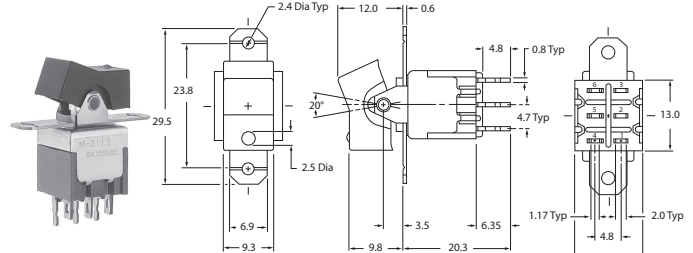
**M2112TCFW01** SP Toggle / Solder Lug



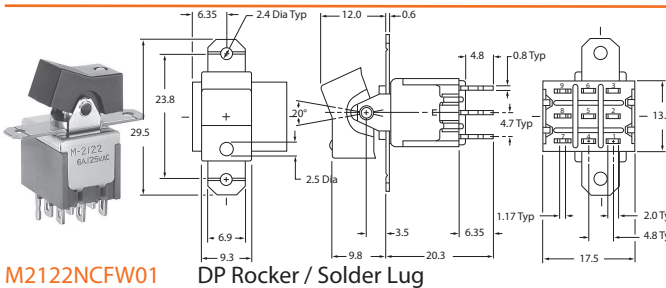
**M2122TCFW01** DP Toggle / Solder Lug



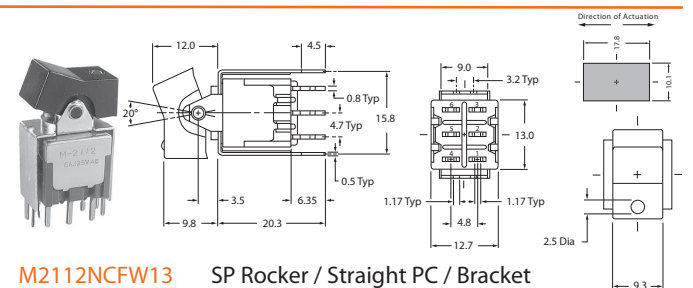
**M2112TCFG30** SP Toggle / Right Angle PC



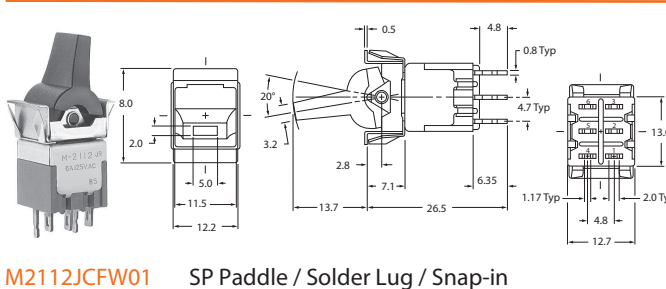
**M2112NCFW01** SP Rocker / Solder Lug



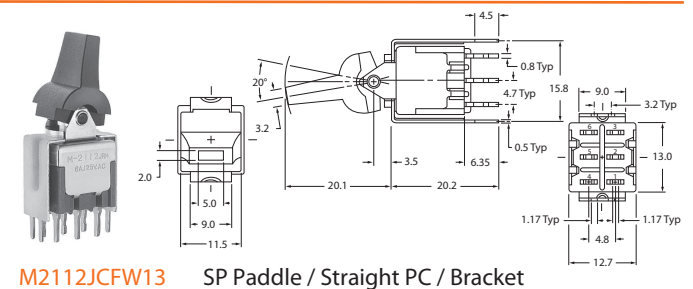
**M2122NCFW01** DP Rocker / Solder Lug



**M2112NCFW13** SP Rocker / Straight PC / Bracket



**M2112JCFW01** SP Paddle / Solder Lug / Snap-in



**M2112JCFW13** SP Paddle / Straight PC / Bracket

Illuminated Switches

### How to order:

M21       -

- 1** POLES:  
1 SPDT  
2 DPDT (Available only w/ Toggles & Rockers w/ Terminals 01, 02 & 03)
- 2** CIRCUITS:  
2 ON-NONE-ON  
3 ON-OFF-ON
- 3** LED CIRCUITS & ACTUATOR TYPES:  
Toggle:  
L Isolated  
T Synchronous  
Rocker:  
R Isolated  
N Synchronous  
Paddle:  
P Isolated  
J Synchronous
- 4** LED COLORS:  
Single Color:  
C Red  
E Yellow  
F Green  
Bicolor:  
CF Red/Green

- 5** CONTACT MATERIALS & RATINGS:  
W Silver; Rated 6A@125VAC  
G Gold; Rated 0.4VA max.@28VAC/DC max.
- 6** TERMINALS:  
01 Solder Lug with Threaded Bushing  
02 Quick Connect with Threaded Bushing  
03 Straight PC with Threaded Bushing  
13 Straight PC with Bracket Mount (Combines with Toggle/Paddle only)  
30 Right Angle PC with Smooth Bushing (Combines with Toggle/ only; Available with gold contacts only)
- 7** OPTIONAL BEZEL & COLORS FOR SNAP-IN FRAME WITH PADDLE:  
A Black  
B White  
C Red  
E Yellow  
F Green  
G Blue  
H Gray

### General Specifications:

**ELECTRICAL CAPACITY (Resistive Load)**  
 » Power Level (Code W): 6A@125VAC or 3A@250VAC or 3A@30VDC  
 » Logic Level (Code G): 0.4VA max.@28V AC/DC max.

**OTHER RATINGS:**  
 » Contact Resistance: 10m Ω max. f. silver; 20m Ω max. f. gold;  
 » Insulation Resistance: 1,000M Ω min.@500VDC  
 » Mechanical Life: 50,000 operations min.  
 » Electrical Life: 25,000 operations min.  
 » Nominal Operating Force:  
 On-to-On Position: 3.19N for Toggles & Paddles SP  
 4.41N for Toggles & Paddles DP  
 6.37N for Rockers SP  
 13.73N for Rockers DP  
 Off-to-On Position: 3.92N for Toggles & Paddles SP  
 7.06N for Toggles & Paddles DP  
 9.80N for Rockers SP  
 17.65N for Rockers DP  
 » Angle of Throw: 20°

**MATERIALS**  
 » Movable Contacts: Silver alloy / silver alloy with gold plating  
 » Stationary Contacts: Silver with silver plating / copper or brass with gold plating  
 » Lamp Contacts: Phosphor bronze  
 » Switch Terminals: Copper with silver or gold plating  
 » Lamp Terminals: Brass with silver or gold plating

**ENVIRONMENTAL DATA**  
 » Operating Temperature: -10°C through +55°C for toggles & rockers; -25°C through +70°C for paddles

**PCB PROCESSING**  
 » Soldering: Manual Soldering 4 sec. max. @ 410°C max.;  
 » For On-On Circuit: Soldering 5 sec. max. @ 270°C max.

### POLES & CIRCUITS & LED ILLUMINATION

Model		Pole & Throw	Toggle Position & Terminal Numbers			Schematics
			Down Keyway	Center	Up	
<b>M2112</b>		SPDT				<p>Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.</p>
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	
	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		
<b>M2113</b>		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		
<b>M2122</b>		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		
<b>M2123</b>		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		

Illuminated Switches

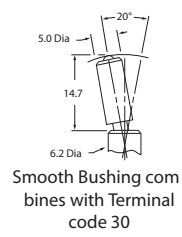
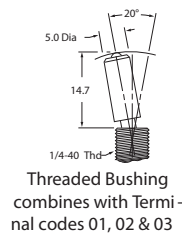
### LED COLORS & SPECIFICATIONS

Single Element LED		For Toggles & Rockers				For Paddles				Units
LED factory assembled Not Available Separately Bicolor is white in OFF state		Single Color			Bicolor	Single Color			Bicolor	
		C Red	E Yellow	F Green	CF Red/Green	C Red	E Yellow	F Green	CF 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	$I_F$	0.33	0.40	0.40	0.27/0.33	0.13	0.40	0.40	0.43/0.38	mA/°C
Ambient Temperature Range		-10°C ~ +55°C				-25°C ~ +70°C				

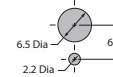
### TOGGLES: LED CIRCUIT & MOUNTING TYPE COMBINATIONS

- L Toggle with isolated LED Circuit
- T Toggle with Synchronous LED Circuit

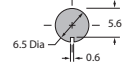
Finish: Brushed aluminum  
 Standard Hardware: 2 AT513H Hex Nuts,  
 1 AT507H Locking Ring, 1 AT509 Lock-washer



Max. Panel Thickness with Standard Hardware 2.6mm



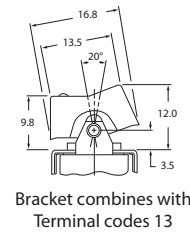
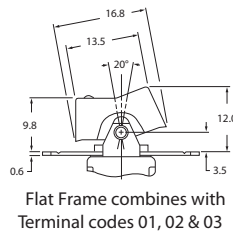
Max. Panel Thickness without Locking Ring 3.4mm



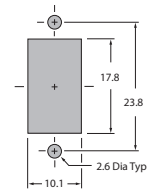
### ROCKERS: LED CIRCUIT & MOUNTING TYPE COMBINATIONS

- R Rocker with isolated LED Circuit
- N Rocker with Synchronous LED Circuit

Material: Polyamide  
 Finish: Matte  
 Color: Black



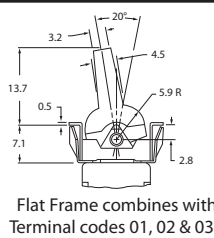
Max. Panel Thickness 3.2mm



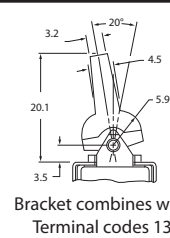
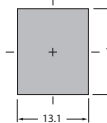
### PADDLES: LED CIRCUIT & MOUNTING TYPE COMBINATIONS

- P Paddle with isolated LED Circuit
- J Paddle with Synchronous LED Circuit

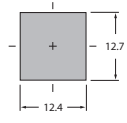
Material: Polyamide  
 Finish: Matte  
 Color: Black



Max. Panel Thickness without Bezel: 1 ~ 3.2mm;  
 Max. Panel Thickness with Bezel: 1 ~ 2.5 mm

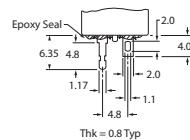


Max. Panel Thickness 3.2mm



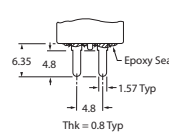
### PADDLES: LED CIRCUIT & MOUNTING TYPE COMBINATIONS

- 01 Solder Lug with Turret LED Terminal

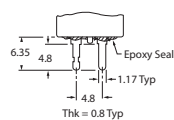


Wiring:  
 Solder lug terminals have a 1.1x2.0mm oval hole which accommodates one solid 18-gauge wire or two solid or stranded 20-gauge wires.

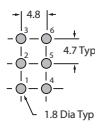
- 02 Quick Connect



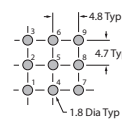
- 03 Straight PC with Turret LED Terminal



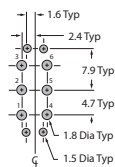
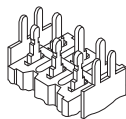
Single Pole:



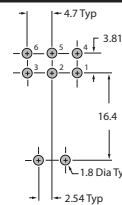
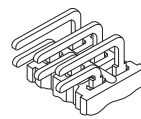
Double Pole:



- 13 Straight PC with Bracket & Turret LED Terminal



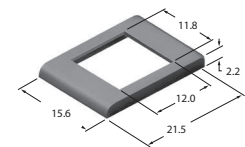
- 30 Right Angle PC



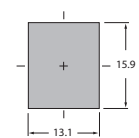
### OPTIONAL BEZEL & COLORS

AT2107  
 Bezel for snap-in Panel Frame

Material: Polyamide  
 Finish: Matte

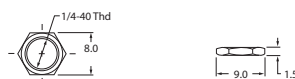


- A Black
- B White
- C Red
- E Yellow
- F Green
- G Blue
- H Gray

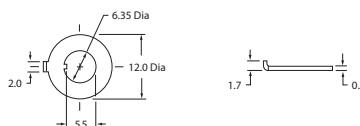


### STANDARD MOUNTING HARDWARE

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

