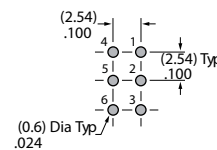
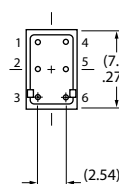
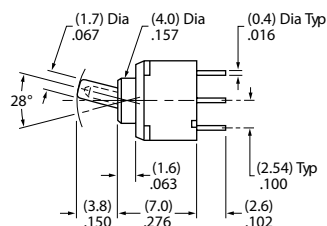
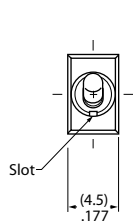


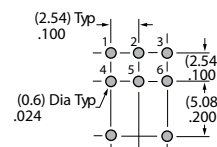
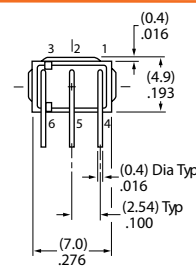
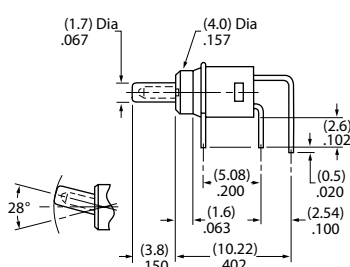
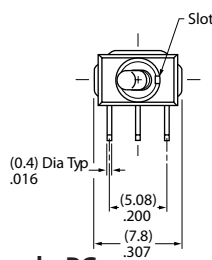
Illuminated Switches

Ultra-Miniature Fully Illuminated Toggle Switches

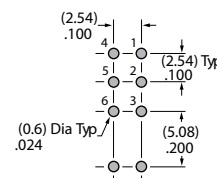
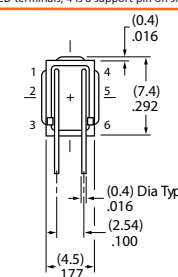
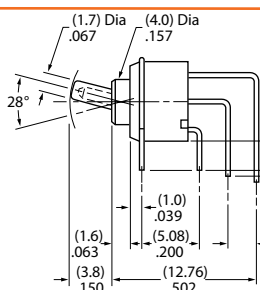
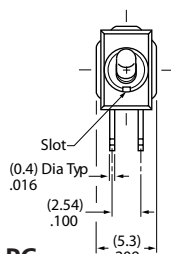
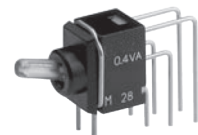
G Series



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



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



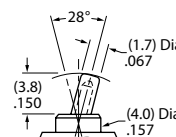
5 & 6 are LED terminals; 4 is a support pin on single color models & an LED terminal on bicolor models.

G12JVCF Vertical PC

POLE & CIRCUITS		Toggle Position			Connected Terminals			Throw & Schematics	
Pole & Throw	Model	Up	Center	Down	Up	Center	Down	Note: Terminal numbers are not actually on the switch. LED circuit is isolated and requires an external power source.	
SPDT	G12 G13	ON ON	NONE OFF	ON ON	2-3 2-3	NONE OPEN	2-1 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: 80mΩ max.
- » Insulation Resistance: 500MΩ min. @500VDC
- » Mechanical Life: 100,000 operations min.
- » Electrical Life: 100,000 operations min.
- 10,000 operations min. @ 0.1A @ 28V AC/DC
- » Norminal 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.

nikkai

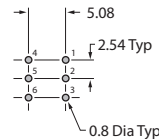
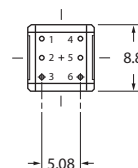
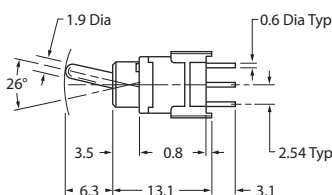
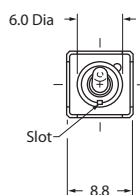
LED COLORS & SPECIFICATIONS

Colors		C Red	D Amber	F Green	CF Red/Green
Forward Peak Current	I_{FM}	25mA	25mA	25mA	25mA/25mA
Continuous Forward Current	I_F	20mA	20mA	20mA	20mA/20mA
Forward Voltage	V_F	2.0V	2.1V	2.1V	2.0V/2.1V
Reverse Peak Voltage	V_{RM}	4V	4V	4V	4V/4V
Current Reduction Rate Above 25°C	ΔI_F	0.33mA/°C	0.33mA/°C	0.33mA/°C	0.33mA/°C / 0.33mA/°C
Ambient Temperature Range		-25°C ~ +55°C			

Illuminated Switches

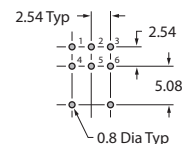
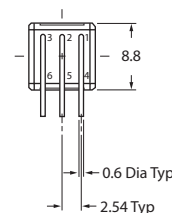
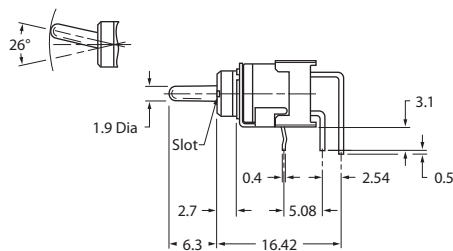
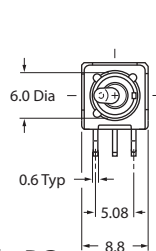
Subminiature Fully Illuminated Toggle Switches

B Series



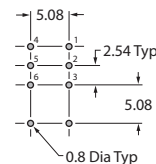
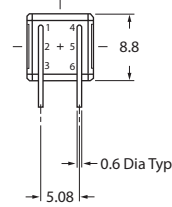
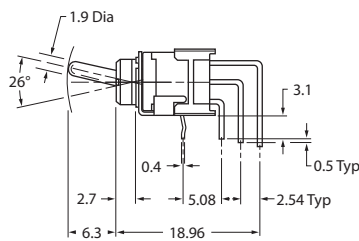
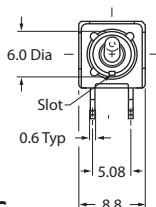
B12JJPC Straight PC

Terminal 4 is a support pin on single color models.



B13JJHCF Right Angle PC

Terminal 4 is a support pin on single color models.



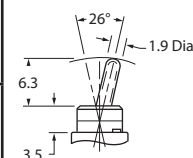
B13JJVCF Vertical PC

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	Note: Terminal numbers are not actually on the switch. LED circuit is isolated and requires an external power source.  	
SPDT	B12 B13	ON ON	NONE OFF	ON ON	2-1 2-1	NONE OPEN	2-3 2-3		

**CLEAR TOGGLE
CLEAR BUSHING**

CUTAWAY



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)
- 3 ACTUATOR & BUSHING:**
JJ Clear Actuator & Clear Bushing

- 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: 50mΩ max.
- » Insulation Resistance: 500MΩ 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.

nikkai

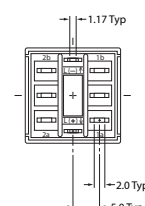
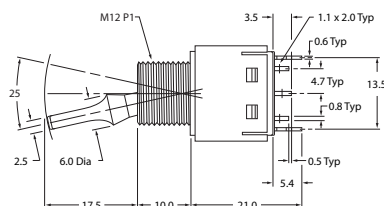
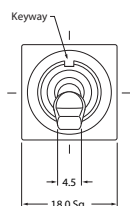
LED COLORS & SPECIFICATIONS

Colors	C	D	F	CF
	Red	Amber	Green	Red/Green
Forward Peak Current	I_{FM}	30mA	30mA	20mA
Continuous Forward Current	I_F	20mA	20mA	10mA
Forward Voltage	V_F	1.9V	1.9V	3.4V
Reverse Peak Voltage	V_{RM}	5V	5V	5V/5V
Current Reduction Rate Above 25°C	ΔI_F	0.43mA/°C	0.43mA/°C	0.28mA/°C
Ambient Temperature Range	-25°C ~ +55°C			

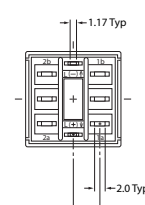
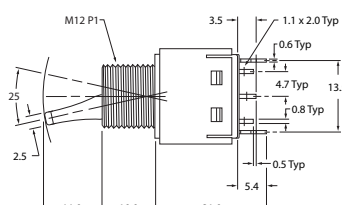
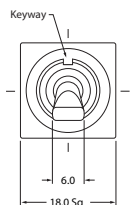
Illuminated Switches

Fully Illuminated Toggle Switches

TL Series



TL22DNKW016G 17.5mm Toggle

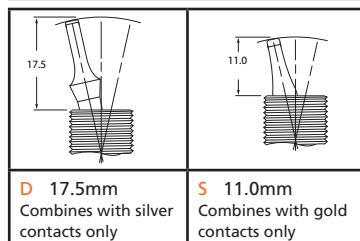


TL22SCKG015C 11.0mm Toggle

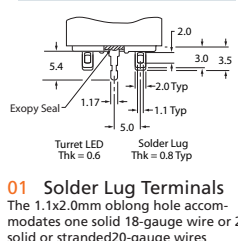
POLES & CIRCUITS

		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	

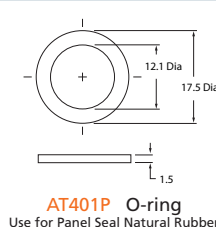
TOGGLES



TERMINALS



OPTIONAL HARDWARE



CUTAWAY



How to order:

TL 1 2 3 4 5 6 7

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

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_{FM}	30mA	30mA	50mA	30mA	30mA	30mA
Continuous Forward Current	I_F	20mA	20mA	20mA	20mA	20mA	20mA
Forward Voltage	V_F	2.0V	2.1V	2.27V	3.6V	3.3V	3.4V
Reverse Peak Voltage	V_{RM}	4V	4V	4V	5V	5V	5V
Current Reduction Rate Above 25°C	ΔI_F	0.32mA/°C		0.50mA/°C	0.50mA/°C	0.40mA/°C	
Ambient Temperature Range		-10°C ~ +55°C					

General Specifications:

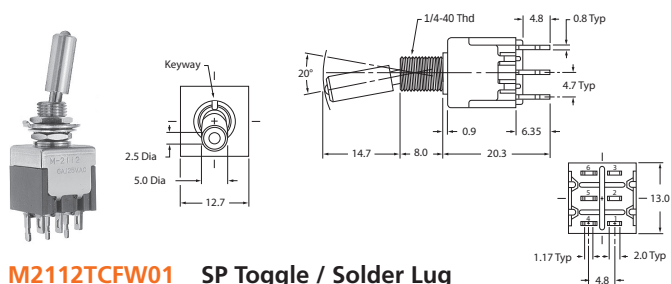
- ELECTRICAL CAPACITY (Resistive Load)**
- » Power Level: 6A@125VAC or 3A@250VAC or 6A@12VDC for silver;
 - » Logic Level: 0.4VA max.@28VAC/DC max. for gold
- OTHER RATINGS:**
- » Contact Resistance: 10mΩ max. for silver; 20mΩ max. for gold;
 - » Insulation Resistance: 1,000MΩ min.@500VDC
 - » Mechanical 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



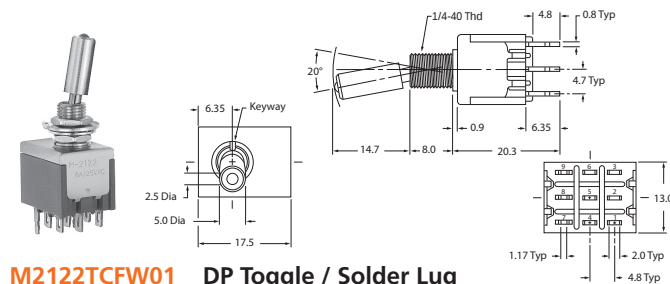
Illuminated Switches

Illuminated Switches with LED Tipped Actuator

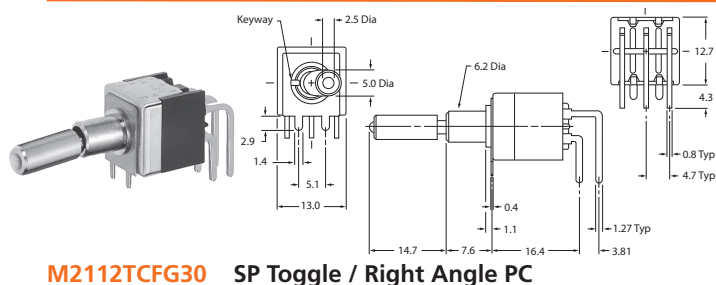
M21 Series



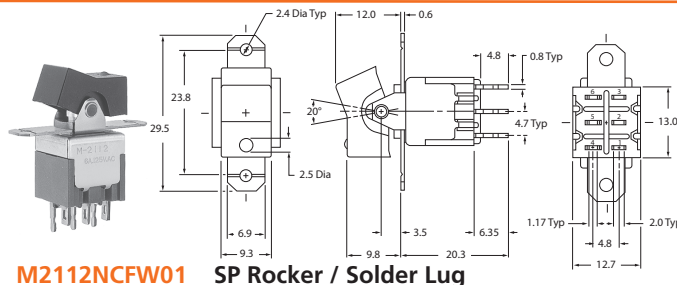
M2112TCFW01 SP Toggle / Solder Lug



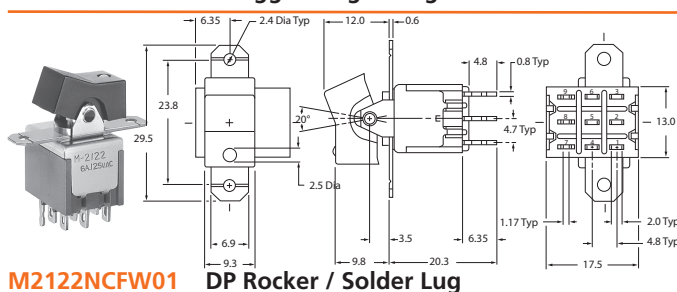
M2122TCFW01 DP Toggle / Solder Lug



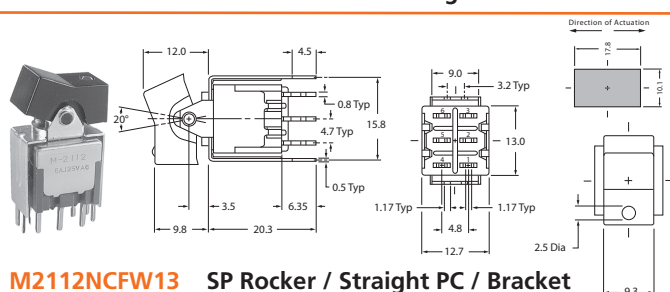
M2112TCFG30 SP Toggle / Right Angle PC



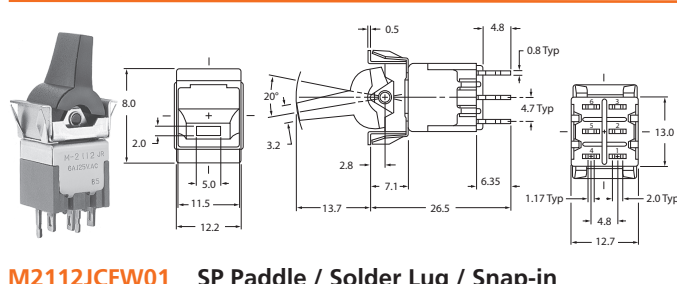
M2112NCFW01 SP Rocker / Solder Lug



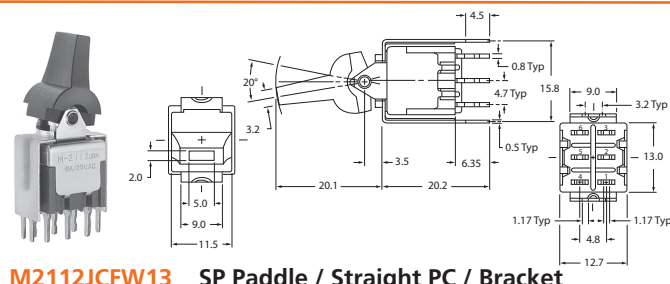
M2122NCFW01 DP Rocker / Solder Lug



M2112NCFW13 SP Rocker / Straight PC / Bracket



M2112JCFW01 SP Paddle / Solder Lug / Snap-in



M2112JCFW13 SP Paddle / Straight PC / Bracket

How to order:

M21 1 2 3 4 5 6 - 7

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/Paddle 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: 10mΩ max. f. silver; 20mΩ max. f. gold;
» Insulation Resistance: 1,000MΩ 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.

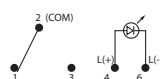
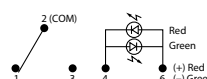
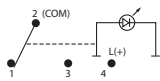
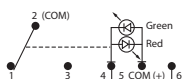
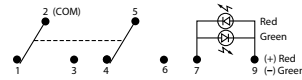
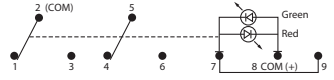


Illuminated Switches

Illuminated Switches with LED Tipped Actuator

M21 Series

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

Illuminated Switches

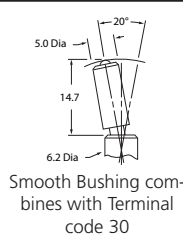
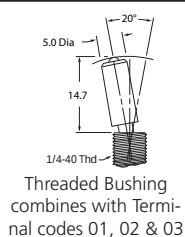
Illuminated Switches with LED Tipped Actuator

M21 Series

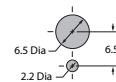
TOGGLES: LED CIRCUIT & MOUNTING TYPE COMBINATIONS

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

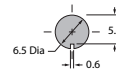
Finish: Brushed aluminum
Standard Hardware: 2 AT513H Hex Nuts,
1 AT507H Locking Ring, 1 AT509 Lock-
washer



Max. Panel Thickness
with Standard Hard-
ware 2.6mm



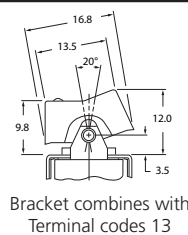
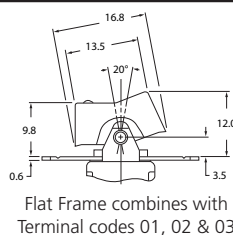
Max. Panel Thickness
without Locking Ring
3.4mm



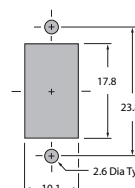
ROCKERS: LED CIRCUIT & MOUNTING TYPE COMBINATIONS

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

Material: Polyamide
Finish: Matte
Color: Black



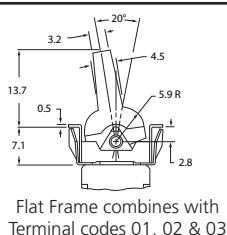
Max. Panel Thickness 3.2mm



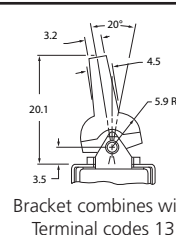
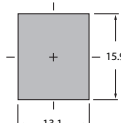
PADDLES: LED CIRCUIT & MOUNTING TYPE COMBINATIONS

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

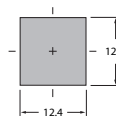
Material: Polyamide
Finish: Matte
Color: Black



Max. Panel Thickness with-
out Bezel: 1 ~ 3.2mm;
Max. Panel Thickness with
Bezel: 1 ~ 2.5 mm

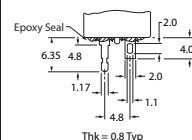


Max. Panel Thickness
3.2mm



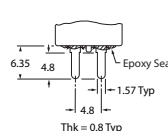
PADDLES: LED CIRCUIT & MOUNTING TYPE COMBINATIONS

- 01** Solder Lug with Turret LED Terminal

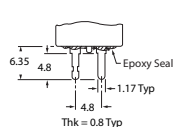


Wiring:
Solder lug terminals have a
1.1x2.0mm oval hole which accom-
modates one solid 18-gauge wire or
two solid or stranded 20-gauge wires.

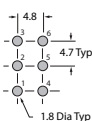
- 02** Quick Connect



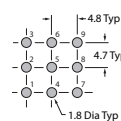
- 03** Straight PC with Turret LED Terminal



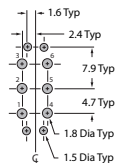
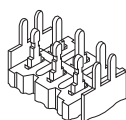
Single Pole:



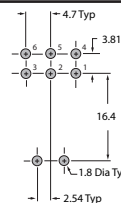
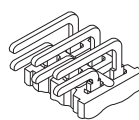
Double Pole:



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



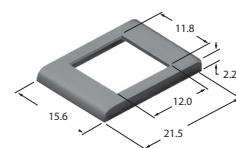
- 30** Right Angle PC



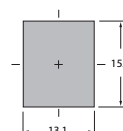
OPTIONAL BEZEL & COLORS

AT2107
Bezel for snap-in Panel Frame

Material: Polyamide
Finish: Matte

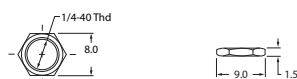


- A** Black
- B** White
- C** Red
- E** Yellow
- F** Green
- G** Blue
- H** Gray

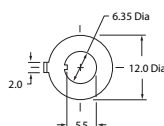


STANDARD MOUNTING HARDWARE

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

