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
Single Pole	3.19N	3.92N
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
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)
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: File No. E44145
Single pole with synchronous circuits & solder lug or PC recognized at 6A @ 125V AC
Add "/U" to end of part number to order UL mark on switch.
CSA: File No. 023535_0_000
All single pole with synchronous circuits certified at 6A @ 125V AC
Add "/C" to end of part number to order CSA mark on switch.

Distinctive Characteristics

Industry's first LED illumination at tip of toggle switches.

Single color LEDs of red, yellow, and green, plus bicolor red/green, to meet varied design requirements.

LEDs can operate independently from or synchronously with switching operation.

Antijamming feature to protect contacts from damage due to excessive downward force on the toggle.

High torque bushing prevents the bushing from rotating or separating from the metal frame during installation.

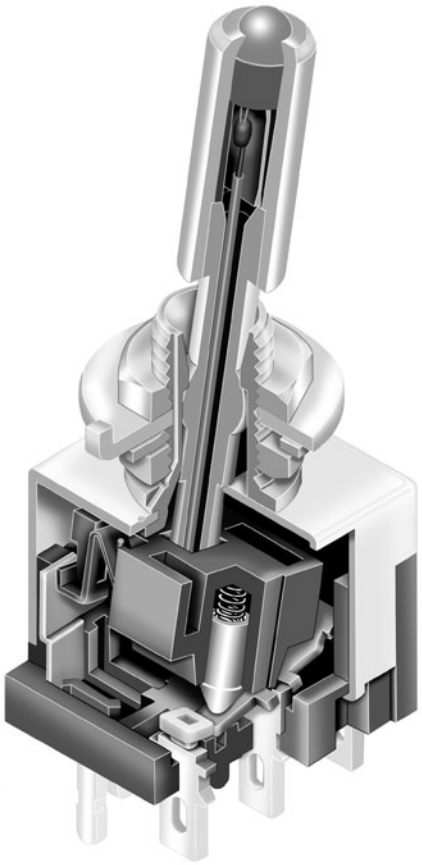
Stainless steel frame resists corrosion.

Silver contacts are of specially composed alloy for hardness.

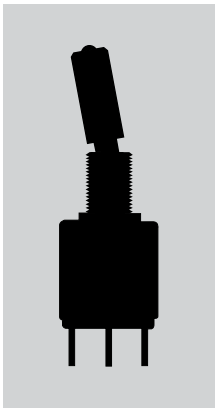
High insulating barriers protect against crossover in double pole devices.

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

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



Actual Size



TYPICAL SWITCH ORDERING EXAMPLE

M21 [1] [2] [T] [C] [W] [01] [ ]

Poles

1	SPDT
*** 2**	DPDT

* Available only with Terminals 01, 02, 03

LED Circuits & Actuator Types

L	Isolated
T	Synchronous

Contact Materials & Ratings

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

Threaded Bushings

No Code	1/4–40 Thread (Inch)
/M	6mm Thread (Metric)

Circuits

2	ON	NONE	ON
3	ON	OFF	ON

LED Colors

Single Color	
C	Red
E	Yellow
F	Green
Bicolor	
CF	Red/Green

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)

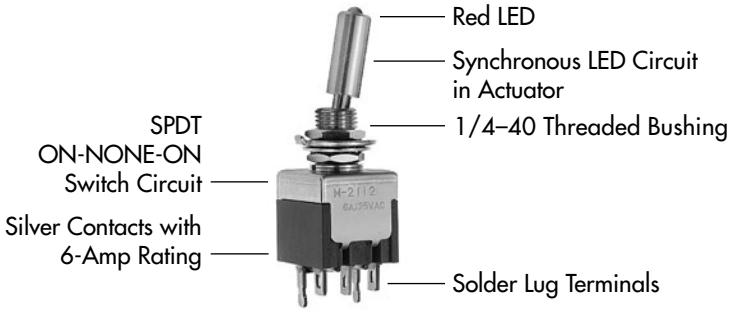
*Wire harness & cable assemblies offered only in Americas

IMPORTANT:

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

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2112TCW01



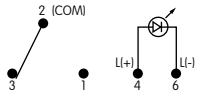
POLES & CIRCUITS & LED ILLUMINATION

Model	Pole & Throw	Toggle Position & Terminal Numbers: Down (Keyway)	Center	Up
M2112 Connected Power Terminals	**SPDT**	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
LED Circuit: **Synchronous Single Color LED** Connected LED Terminals		ON 4-6	NONE NONE	OFF OPEN
LED Circuit: **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
LED Circuit: **Isolated LEDs** (see schematics) Connected LED Terminals		ON 4-6	ON 4-6	ON 4-6
LED Circuit: **Synchronous Single Color LED** Connected LED Terminals		ON 4-6	OFF OPEN	ON 4-6
LED Circuit: **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
LED Circuit: **Isolated LEDs** (see schematics) Connected LED Terminals		ON 7-9	NONE NONE	ON 7-9
LED Circuit: **Synchronous Single Color LED** Connected LED Terminals		ON 7-9	NONE NONE	OFF OPEN
LED Circuit: **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
LED Circuit: **Isolated LEDs** (see schematics) Connected LED Terminals		ON 7-9	ON 7-9	ON 7-9
LED Circuit: **Synchronous Single Color LED** Connected LED Terminals		ON 7-9	OFF OPEN	ON 7-9
LED Circuit: **Synchronous Bicolor LED** Connected LED Terminals		Red 8-9	OFF OPEN	Green 8-7

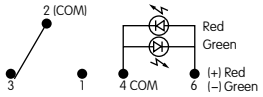
Schematics

Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.

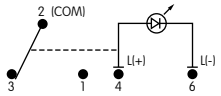
Isolated Single Color LED



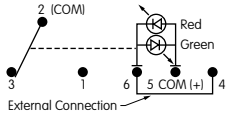
Isolated Bicolor LED



Synchronous Single Color LED

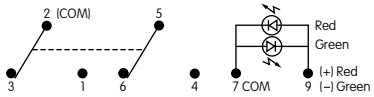


Synchronous Bicolor LED

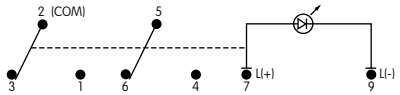


Isolated Single Color LED

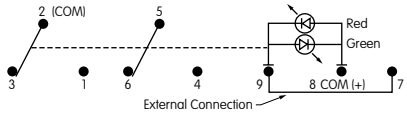
Isolated Bicolor LED



Synchronous Single Color LED



Synchronous Bicolor LED



LED COLORS & SPECIFICATIONS

Single Element LED

LED factory assembled
Not available separately
Bicolor LED is translucent white when unlit.

	Color	Single Color: C Red	Single Color: E Yellow	Single Color: F Green	Bicolor: CF Red/Green
Forward Peak Current	I_{FM}	25	30	30	25
Continuous Forward Current	I_F	20	20	20	10
Forward Voltage	V_F	2.1	2.1	2.1	1.9
Reverse Peak Voltage	V_{RM}	4	4	4	—
Current Reduction Rate Above 25°C	ΔI_F	0.33	0.40	0.40	0.33/0.33
Ambient Temperature Range		−10° ~ +55°C			

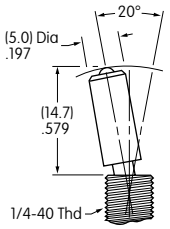
LED CIRCUIT, TOGGLE, & MOUNTING TYPE COMBINATIONS

L **Toggle with Isolated LED Circuit**

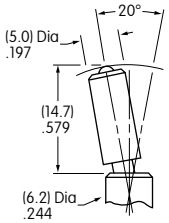
T **Toggle with Synchronous LED Circuit**

Finish: Brushed aluminum

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

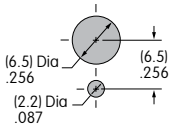


Threaded Bushing combines with Terminal codes 01, 02, & 03.

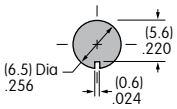


Smooth Bushing combines with Terminal code 30.

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



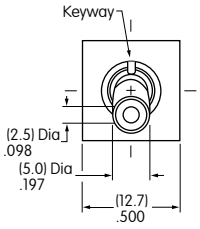
Max. Panel Thickness without Locking Ring .134" (3.4mm)



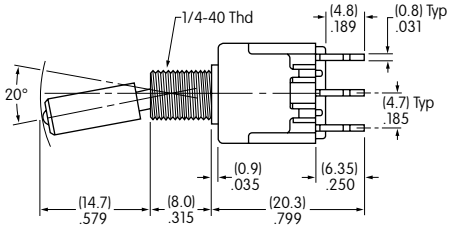
TYPICAL SWITCH DIMENSIONS

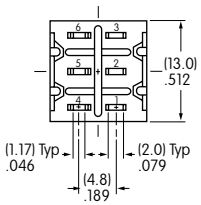
Solder Lug

M2112TCFW01



Single Pole

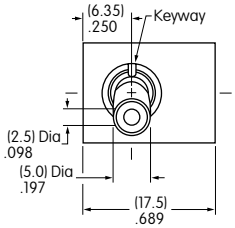




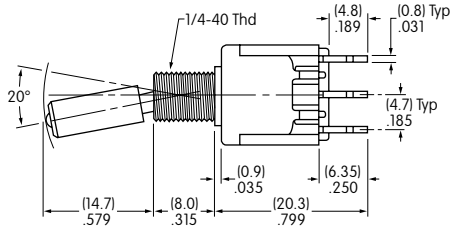
Single color LED switch does not have terminal 5.

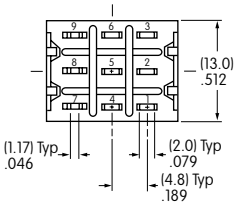
Solder Lug

M2122TCFW01



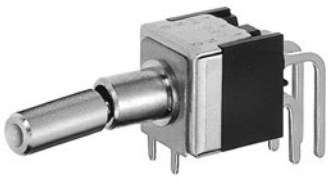
Double Pole



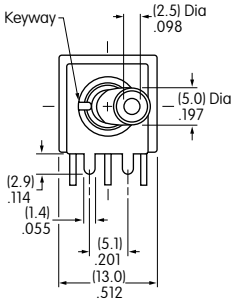


Single color LED switch does not have terminal 8.

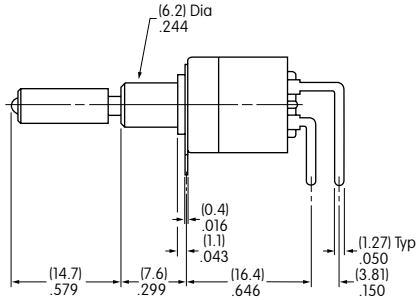
Right Angle PC

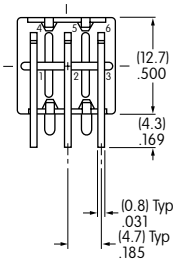


M2112TCFG30



Single Pole Only





Single color LED switch does not have terminal 5.

Gold contact material only

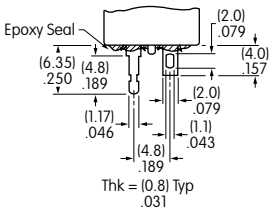
CONTACT MATERIALS & RATINGS

W	**Silver over Silver**	**Power Level**	**6A @ 125V AC & 3A @ 250V AC**
G	**Gold over Brass or Copper**	**Logic Level**	**0.4VA maximum @ 28V AC/DC maximum**

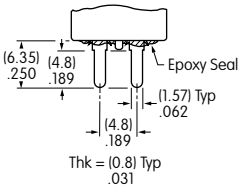
Complete explanation of operating range in Supplement section.

TERMINALS

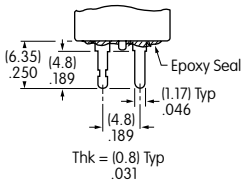
01 **Solder Lug with Turret LED Terminal**



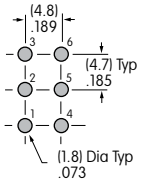
02 **Quick Connect**



03 **Straight PC with Turret LED Terminal**

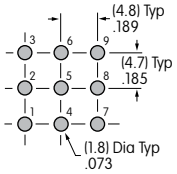


Single Pole



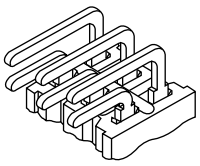
Single color LED & isolated bicolor LED switches do not have terminal 5.

Double Pole

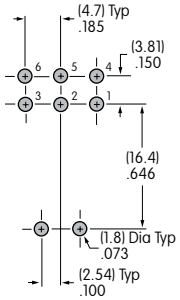


Single color LED & isolated bicolor LED switches do not have terminal 8.

30 **Right Angle PC**



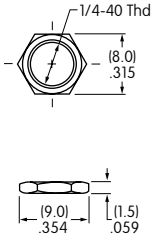
Single Pole



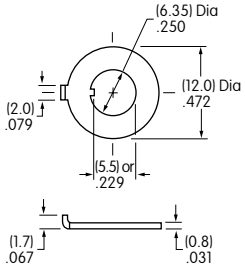
Single color LED & isolated bicolor LED switches do not have terminal 5.

STANDARD MOUNTING HARDWARE

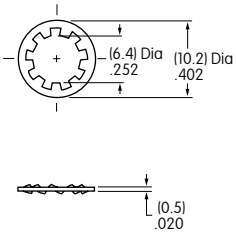
AT513H
Hexagon Nuts (2 per switch)
Material: Brass with nickel plating



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.

General Specifications

Electrical Capacity (Resistive Load)

Power Level (silver): 6A @ 125V AC or 3A @ 250V AC or 3A @ 30V DC
Logic Level (gold): 0.4VA maximum @ 28V AC/DC maximum
(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
Note: Find additional explanation of operating range in Supplement section.

Other Ratings

Contact Resistance: 10 milliohms maximum for silver; 20 milliohms maximum for gold
Insulation Resistance: 1,000 megohms minimum @ 500V DC
Dielectric Strength: 1,000V AC minimum between contacts for 1 minute minimum;
1,500V AC minimum between contacts & case for 1 minute minimum
Mechanical Life: 50,000 operations minimum
Electrical Life: 25,000 operations minimum
Nominal Operating Force:

		On-to-On Position	Off-to-On Position
Paddles	Single Pole	3.19N	3.92N
	Double Pole	4.41N	7.06N
Rockers	Single Pole	6.37N	9.80N
	Double Pole	13.73N	17.65N

Angle of Throw: 20°

Materials & Finishes

Housing: Stainless steel
Mounting Bracket: Steel with tin plating
Movable Contacts: Silver alloy or silver alloy with gold plating
Stationary Contacts: Silver with silver plating or copper or brass with gold plating
Lamp Contacts: Phosphor bronze
Base: Diallyl phthalate (UL94V-0)
Switch Terminals: Copper with silver or gold plating
Lamp Terminals: Brass with silver or gold plating

Environmental Data

Operating Temp Range: –10°C through +55°C (+14°F through +131°F) for rockers
–25°C through +70°C (–13°F through +158°F) for paddles
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

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: File No. E44145
Single pole rockers with synchronous circuits & solder lug or PC recognized at 6A @ 125V AC.
Add "/U" to end of part number to order UL mark on switch.
CSA: File No. 023535_0_000
All single pole rockers with synchronous circuits certified at 6A @ 125V AC.
Add "/C" to end of part number to order CSA mark on switch.

TYPICAL SWITCH ORDERING EXAMPLE

M21 [1] [2] [N] [CF] [W] [01] — [ ]

Poles

1	SPDT
* 2	DPDT

* Available only with Rockers with 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

Rocker	
R	Isolated
N	Synchronous

Paddle	
P	Isolated
J	Synchronous

Terminals & Mounting Types

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

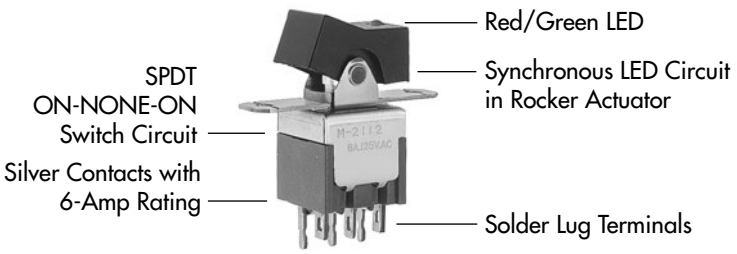
IMPORTANT:

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

* Wire harness & cable assemblies offered only in Americas

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2112NCFW01



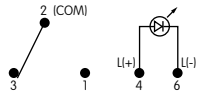
POLES & CIRCUITS & LED ILLUMINATION

Model	Pole & Throw	Toggle Position & Terminal Numbers: Down	Center	Up
M2112	**SPDT**	ON	NONE	ON
Connected Power Terminals		2-3	NONE	2-1
LED Circuit: **Isolated LEDs** (see schematics)		ON	NONE	ON
Connected LED Terminals		4-6	NONE	4-6
LED Circuit: **Synchronous Single Color LED**		ON	NONE	OFF
Connected LED Terminals		4-6	NONE	OPEN
LED Circuit: **Synchronous Bicolor LED**		Red	NONE	Green
Connected LED Terminals		5-6	NONE	5-4
M2113	**SPDT**	ON	OFF	ON
Connected Power Terminals		2-3	OPEN	2-1
LED Circuit: **Isolated LEDs** (see schematics)		ON	ON	ON
Connected LED Terminals		4-6	4-6	4-6
LED Circuit: **Synchronous Single Color LED**		ON	OFF	ON
Connected LED Terminals		4-6	OPEN	4-6
LED Circuit: **Synchronous Bicolor LED**		Red	OFF	Green
Connected LED Terminals		5-6	OPEN	5-4
M2122	**DPDT**	ON	NONE	ON
Connected Power Terminals		2-3 5-6	NONE	2-1 5-4
LED Circuit: **Isolated LEDs** (see schematics)		ON	NONE	ON
Connected LED Terminals		7-9	NONE	7-9
LED Circuit: **Synchronous Single Color LED**		ON	NONE	OFF
Connected LED Terminals		7-9	NONE	OPEN
LED Circuit: **Synchronous Bicolor LED**		Red	NONE	Green
Connected LED Terminals		8-9	NONE	8-7
M2123	**DPDT**	ON	OFF	ON
Connected Power Terminals		2-3 5-6	OPEN	2-1 5-4
LED Circuit: **Isolated LEDs** (see schematics)		ON	ON	ON
Connected LED Terminals		7-9	7-9	7-9
LED Circuit: **Synchronous Single Color LED**		ON	OFF	ON
Connected LED Terminals		7-9	OPEN	7-9
LED Circuit: **Synchronous Bicolor LED**		Red	OFF	Green
Connected LED Terminals		8-9	OPEN	8-7

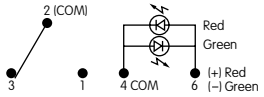
Schematics

Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.

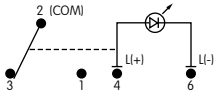
Isolated Single Color LED



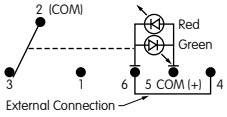
Isolated Bicolor LED



Synchronous Single Color LED

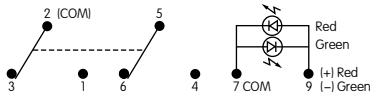


Synchronous Bicolor LED

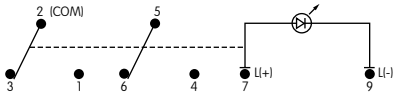


Isolated Single Color LED

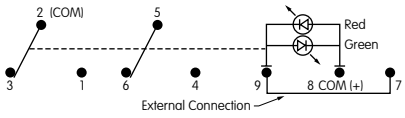
Isolated Bicolor LED



Synchronous Single Color LED



Synchronous Bicolor LED



LED COLORS & SPECIFICATIONS

Single Element LED		Rockers				Paddles				
		Single Color			Bicolor	Single Color			Bicolor	
LED factory assembled **Not available separately** Bicolor LED is translucent white when unlit.	Color	C Red	E Yellow	F Green	CF Red/Green	C Red	E Yellow	F Green	CF Red/Green	Units
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	ΔI_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

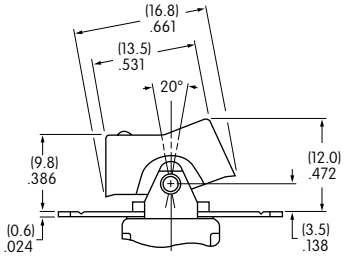
R **Rocker with Isolated LED Circuit**

N **Rocker with Synchronous LED Circuit**

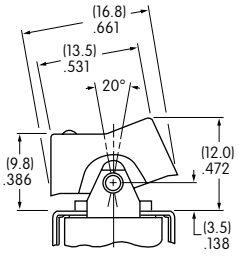
Material: Polyamide

Finish: Matte

Color: Black

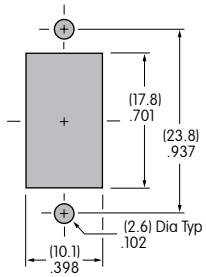


Flat Frame combines with Terminal codes 01, 02, & 03.



Bracket combines with Terminal code 13.

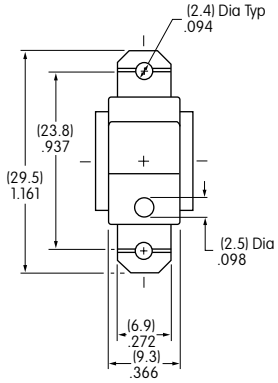
Maximum Panel Thickness .126" (3.2mm)

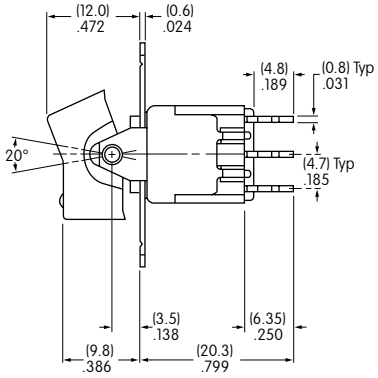


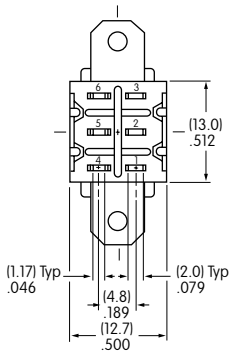
TYPICAL ROCKER SWITCH DIMENSIONS

Single Pole

Solder Lug





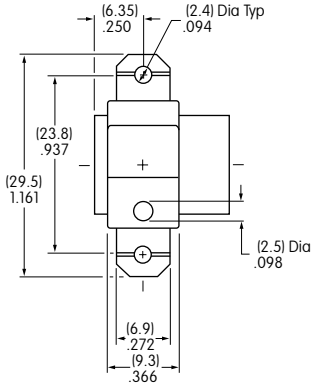


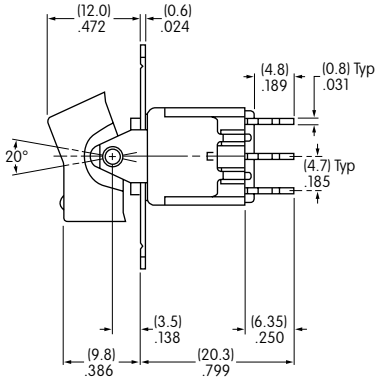
Single color LED switch does not have terminal 5.

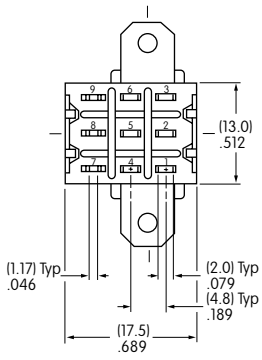
M2112NCFW01

Double Pole

Solder Lug





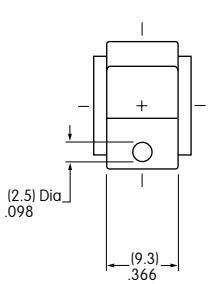


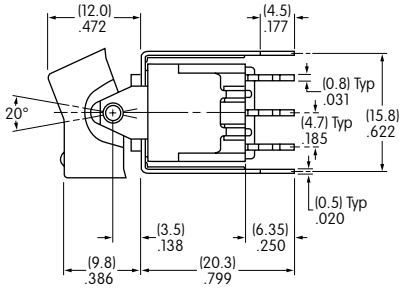
Single color LED switch does not have terminal 8.

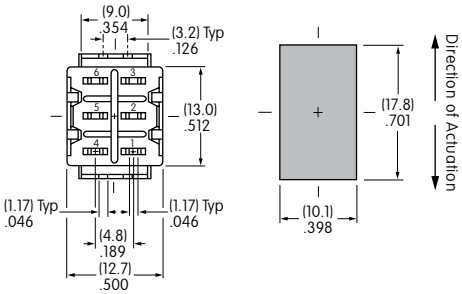
M2122NCFW01

Single Pole Only

Straight PC • Bracket







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

M2112NCFW13

LED CIRCUIT, PADDLE, & MOUNTING TYPE COMBINATIONS

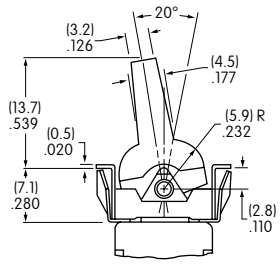
P **Paddle with Isolated LED Circuit**

J **Paddle with Synchronous LED Circuit**

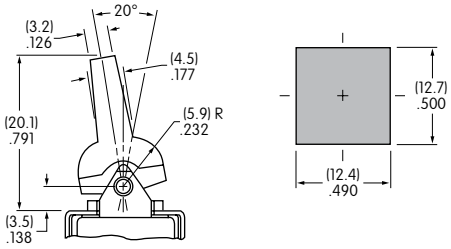
Maximum Panel Thickness
.039" ~ .126" (1.0 ~ 3.2mm)
without Bezel
.039" ~ .098" (1.0 ~ 2.5mm)
with Bezel

Maximum Panel Thickness .126" (3.2mm)

Material: Polyamide
Finish: Matte
Color: Black



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

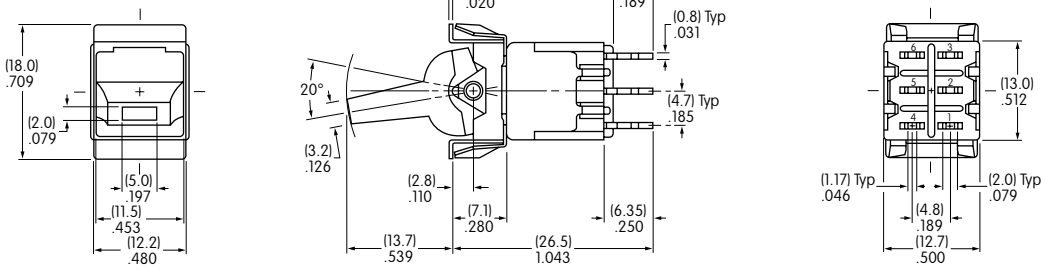


Bracket combines with Terminal code 13

TYPICAL PADDLE SWITCH DIMENSIONS

Solder Lug • Snap-in

Single Pole Only

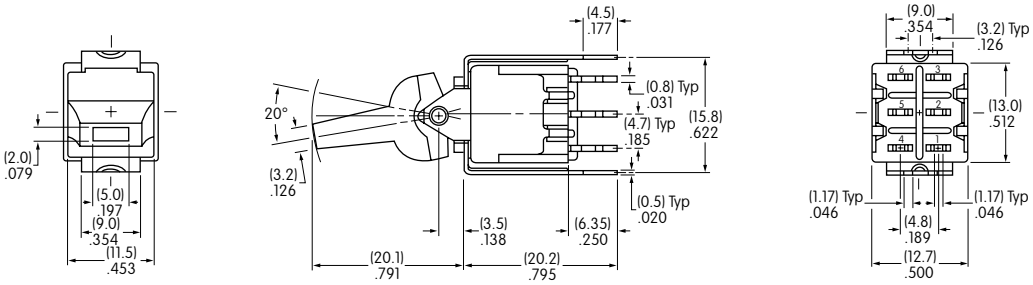


M2112JCFW01

Single color LED switch does not have terminal 5.

Straight PC • Bracket

Single Pole Only



M2112JCFW13

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

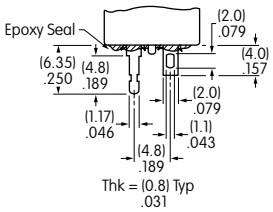
CONTACT MATERIALS & RATINGS

W	Silver over Silver	Power Level	6A @ 125V AC & 3A @ 250V AC
G	Gold over Brass or Copper	Logic Level	0.4VA maximum @ 28V AC/DC maximum

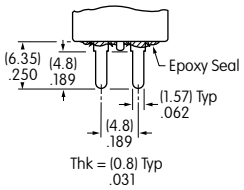
Complete explanation of operating range in Supplement section.

TERMINALS

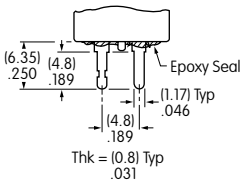
01 **Solder Lug with Turret LED Terminal**



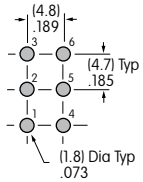
02 **Quick Connect**



03 **Straight PC with Turret LED Terminal**

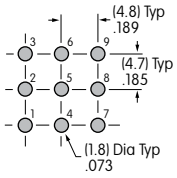


Single Pole



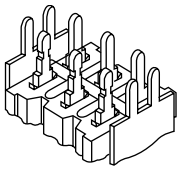
Single color LED & isolated bicolor LED switches do not have terminal 5.

Double Pole

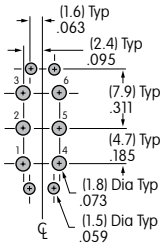


Single color LED & isolated bicolor LED switches do not have terminal 8.

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



Single Pole



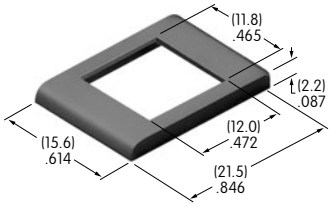
Single color LED & isolated bicolor LED switches do not have terminal 5.

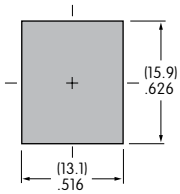
OPTIONAL BEZEL & COLORS

AT2107 Bezel for Snap-in Panel Frame

Material: Polyamide

Finish: Matte





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