

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 copper alloy with gold plating
Stationary Contacts:	Silver alloy with silver plating or copper or brass with gold plating
Lamp Contacts:	Phosphor bronze
Base:	Diallyl phthalate resin (UL94V-0)
Switch Terminals:	Brass or copper with silver or gold plating
Lamp Terminals:	Brass or copper 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 240 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:	500 m/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:	These devices are not process sealed. Hand clean locally using alcohol based solution.

Standards & Certifications

Flammability Standards:	UL94V-0 base
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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.

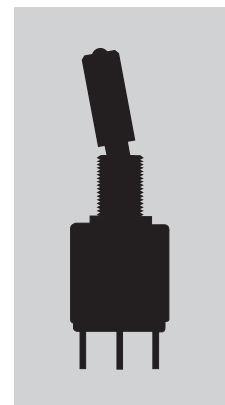
High insulating barriers protect against crossover in double pole devices.

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



A
Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

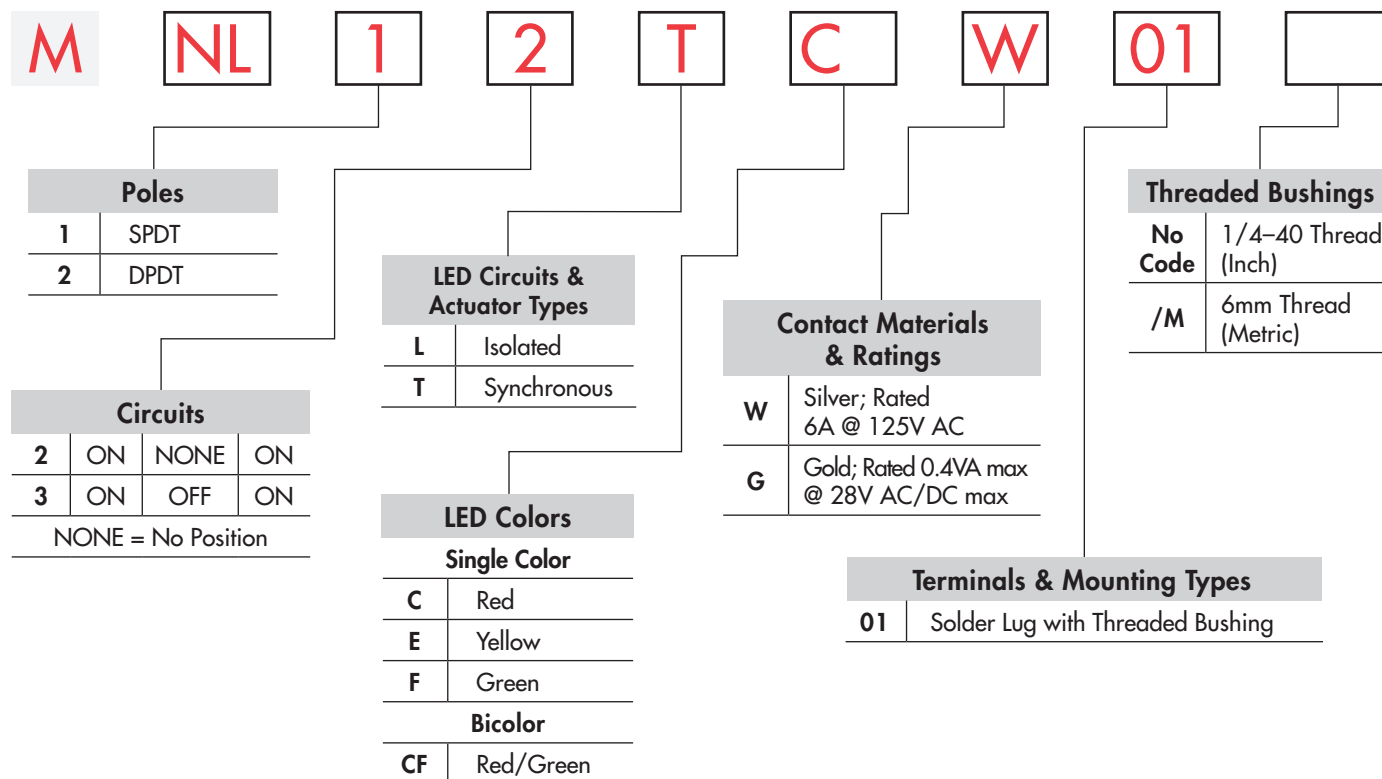
Touch

Indicators

Accessories

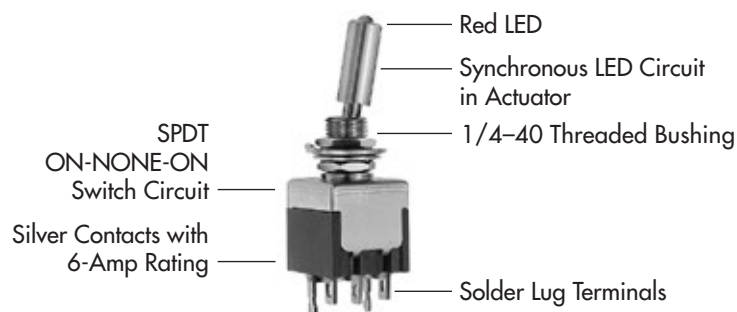
Supplement

TYPICAL SWITCH ORDERING EXAMPLE

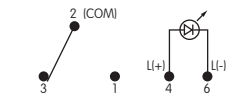
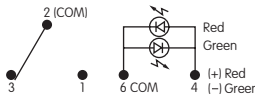
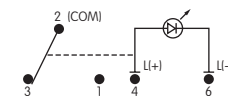
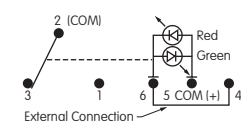
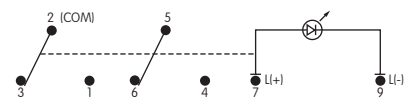
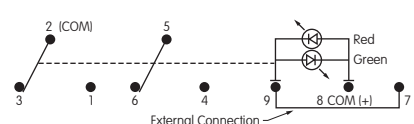


DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

MNL12TCW01



POLES & CIRCUITS & LED ILLUMINATION

Model		Pole & Throw	Toggle Position & Terminal Numbers NONE = No Position			Schematics
			Down 	Center 	Up 	Notes: Terminal numbers are not actually on the switch. LEDs require an external power source.
MNL12 SPDT Connected Power Terminals		ON 2-3	NONE NONE	ON 2-1	Isolated Single Color LED  Isolated Bicolor LED 	
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		
MNL13 SPDT Connected Power Terminals		ON 2-3	OFF OPEN	ON 2-1	Synchronous Single Color LED  Synchronous Bicolor LED 	
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		
MNL22 DPDT Connected Power Terminals		ON 2-3 5-6	NONE NONE	ON 2-1 5-4	Isolated Single Color LED  Isolated Bicolor LED 	
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		
MNL23 DPDT Connected Power Terminals		ON 2-3 5-6	OFF OPEN	ON 2-1 5-4	Synchronous Single Color LED  Synchronous Bicolor LED 	
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		

A
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LED COLORS & SPECIFICATIONS

The electrical specifications shown are determined at a basic temperature of 25°C. LED circuit is isolated and requires an external power source. If the source voltage exceeds the rated voltage, a ballast resistor is required. The resistor value can be calculated by using the formula in Supplement Section.

The LED is an integral part of the switch and not available separately. Bicolor LED is translucent white when unlit.		Single Color			Bicolor	
		C Red	E Yellow	F Green	CF Red/Green	Units
Maximum Forward Current	I_{FM}	30	30	30	25	mA
Typical Forward Current	I_F	20	20	20	10	mA
Forward Voltage	V_F	2.2	2.1	2.2	1.7/2.0	V
Maximum Reverse Voltage	V_{RM}	4	4	4	—	V
Current Reduction Rate Above 25°C	ΔI_F	0.38	0.38	0.38	0.33/0.33	mA/°C
Ambient Temperature Range		-10° ~ +55°C				

LED CIRCUIT, TOGGLE, & MOUNTING TYPE COMBINATIONS



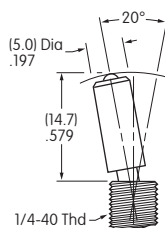
Toggle with Isolated LED Circuit



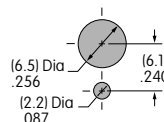
Toggle with Synchronous LED Circuit

Finish: Brushed aluminum

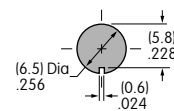
Standard Hardware: 2 AT513H
Hex Nuts, 1 AT507H Locking Ring,
1 AT509 Lockwasher Standard &
optional hardware details in
Accessories & Hardware section.



Threaded Bushing
combines with
Terminal code 01.



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

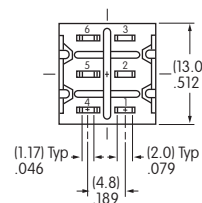
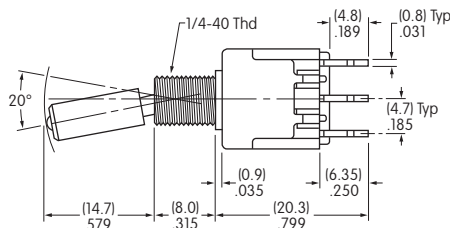
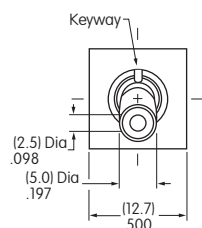


Max. Panel Thickness
without Locking Ring
.134" (3.4mm)

TYPICAL SWITCH DIMENSIONS

Solder Lug

Single Pole



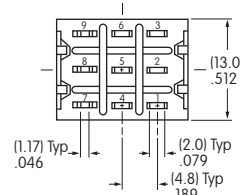
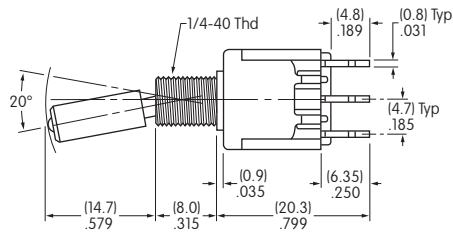
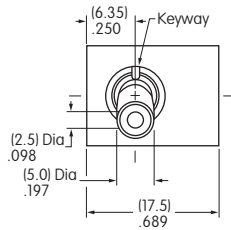
MNL12TCFW01

Single color LED switch does not have terminal 5.

TYPICAL SWITCH DIMENSIONS

Double Pole

Solder Lug



MNL22TCFW01

Single color LED switch does not have terminal 8.

CONTACT MATERIALS & RATINGS



Silver

Power Level

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



Gold

Logic Level

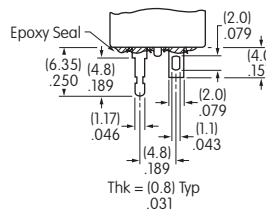
0.4VA maximum @ 28V AC/DC maximum

Complete explanation of operating range in Supplement section.

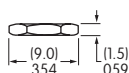
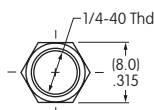
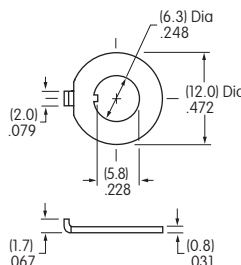
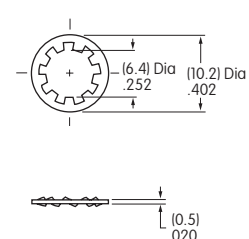
TERMINALS

01

Solder Lug with Turret LED Terminal



STANDARD MOUNTING HARDWARE

AT513H Hexagon Nut
(2 per switch)Material:
Brass with nickel platingAT507H Locking Ring
(1 per switch)Material:
Steel with chromate over zincAT509 Lockwasher
(1 per switch)Material:
Steel with chromate over zincOptional Hardware: Knurled nuts, dress nuts, and ON-OFF plates are available;
see details in Accessories & Hardware section.