Sunmulon

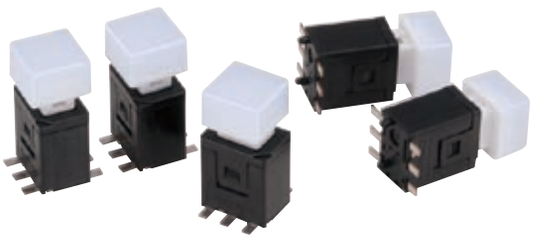
K9 Surface-mounted Illuminating Switch

K9

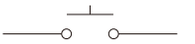
Possible Thanks to SMT-compatible Light Switches!

50% reduction in installation costs.
Improved installation quality.

- High-density mounting with a 15mm pitch
- 300,000 lifetime actuations, stroke 1.5mm
- Achieves even lighting
- Five types of color emission with single or dual color
- Select from models with or without click feedback
- Small yet robust body
- Ideal for command workstations



Contact form



SPECIFICATIONS

Contact	Gold-Plated
Electrical Rating	Maximum load: DC24V, 20 mA (resistance load)
Insulation Resistance	100 MΩ or or greater with a DC 500 Megger
Dielectric Strength	Between terminals of the same pole: AC1000V Between terminals and the ground: AC1500V At 50/60 Hz, each for 60 sec. and normal temperature and humidity
Contact Resistance	200 mΩ or less (Initial), measured by voltage descent method or milliohmmeter, at DC6V and 0.1A
Electrical life	More than 3 million operations at max. rated load
Mechanical life	More than 3 million operations
Ambient Temperature	−15°C to +50°C
Ambient Humidity	85% RH (max.)

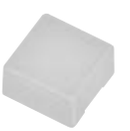
OPERATING CHARACTERISTICS

Operating Force (Max.)	2.0N	Total Travel (Max.)	2.0mm

STRUCTURE

LIGHT CARTRIDGE

Button

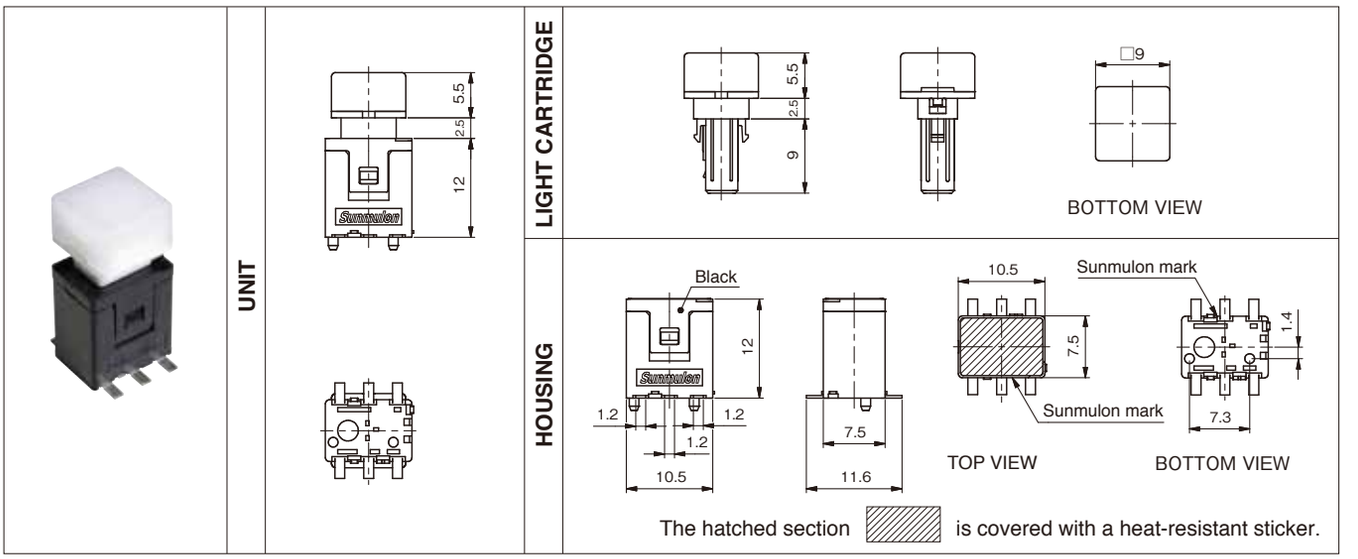


Operation button
(5 types for each LED color)

HOUSING

Switch main body
(Two types: With or without audible click)

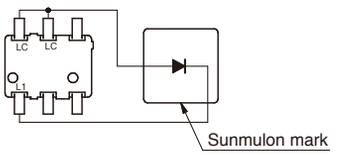
DIMENSIONS



General tolerance of drawings: ±0.4 mm

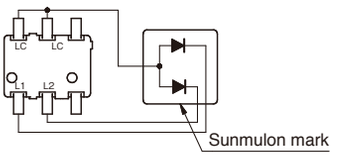
INTERNAL CONNECTION ARRANGEMENTS

• Mono-color light emitted



BOTTOM VIEW TOP VIEW

• Dual-color light emitted

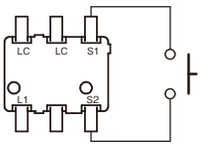


BOTTOM VIEW TOP VIEW

Terminals	LED color combination				
	Mono-color			Dual-color (78)	Dual-color (718)
LC-L1	Red	Green	Blue	Red	Red
LC-L2				Green	Super green

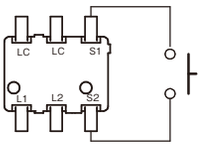
TERMINALS LAYOUT

• Mono-color



BOTTOM VIEW

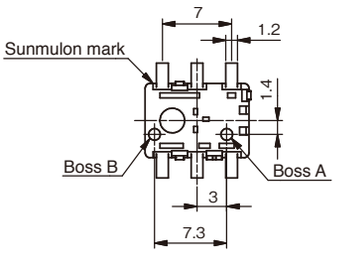
• Dual-color



BOTTOM VIEW

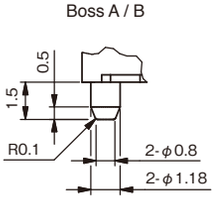
TERMINAL SHAPE / PCB HOLE CUT-OUT

• Terminal dimensions

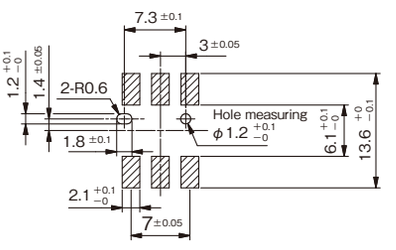


BOTTOM VIEW

• Boss dimensions



• Recommended PAD PCB hole cut-out



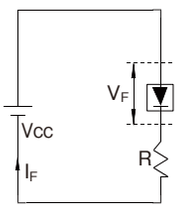
TOP VIEW

LED RATINGS / PROTECTIVE PESISTANCE

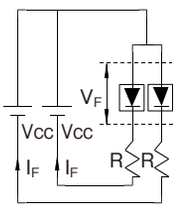
●LED ratings

Item \ Color		Full-face LED lighting (Ta=25℃)						
		Mono-color			Dual-color (78)		Dual-color (718)	
		Red	Green	Yellow	Red	Green	Red	Super green
Max. operating current	IFM (mA)	25	20	25	25(17)	20(14)	20(16)	10(8)
Maximum allowable loss	(mW)	60	48	60	60	48	48	38
DC backward voltage	VR (V)	5	5	5	5	5	5	5
Forward voltage	VF (V) (standard values) ※	1.9	2.1	1.9	1.9	2.1	1.8	3.4
Dominant wavelength	λd (nm) ※	626	572	595	626	572	626	525
Forward current under the conditions of the above-mentioned ※ mark (mA)		20	20	20	20	20	10	10
Current reduction ratio with respect to usage temperature		Figure 3			Figure 4		Figure 5	
Conditions when pulse is lit	Pulse width PW (μs)	400			400		400	15
	Duty ratio DR	10^{-1}			10^{-1}		10^{-1}	
	Allowable forward current for pulse IFP(mA)	92			92		92	50
Wiring diagram		Figure 1			Figure 2			

( ) indicate values when simultaneously lit



(Figure 1)



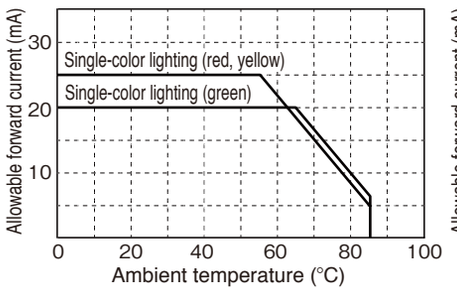
(Figure 2)

$$R = \frac{V_{CC} - V_F}{I_F}$$

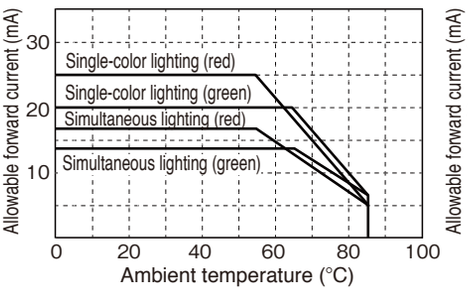
V_F : LED forward voltage
V_{CC} : Power supply voltage
I_F : Recommended operating current

● Allowable forward current — Ambient temperature

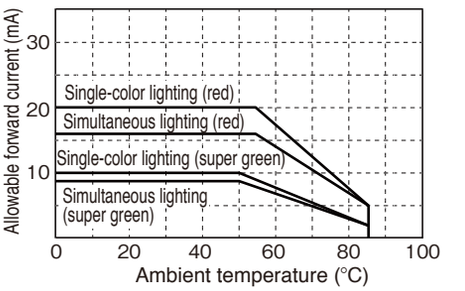
Simultaneous lighting (red)



(Figure 3)



(Figure 4)



(Figure 5)

*See Figure 1 and Figure 2 for operating circuitry.

●Reference external resistance values

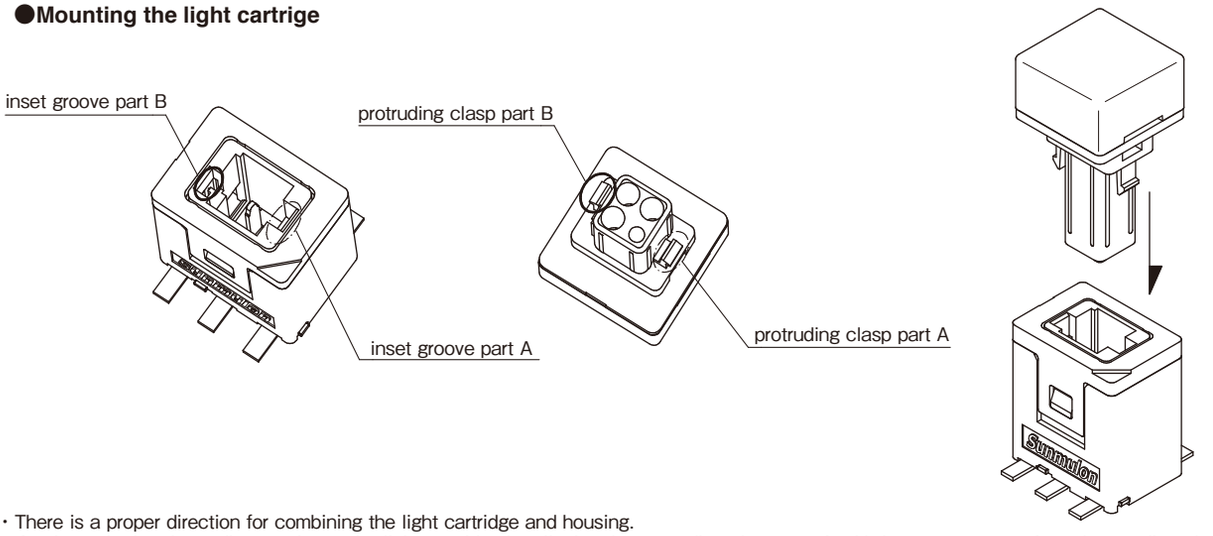
(*When adjusting the brightness of other colors to be mostly uniform using solid green as a guide, reference the following table to determine resistance values.)

Color / Voltage	Mono-color			Dual-color (78)		Dual-color (718)	
	Red	Green	Yellow	Red	Green	Red	Super green
5V	750Ω 1/16W	150Ω 1/8W	510Ω 1/16W	750Ω 1/16W	150Ω 1/8W	630Ω 1/16W	1.2kΩ 1/16W
12V	2.4kΩ 1/8W	510Ω 1/2W	1.6kΩ 1/8W	2.4kΩ 1/8W	510Ω 1/8W	2kΩ 1/8W	4.7kΩ 1/16W
24V	5.6kΩ 1/4W	1.1kΩ 1W	3.6kΩ 1/4W	5.6kΩ 1/4W	1.1kΩ 1W	4.3kΩ 1/4W	11kΩ 1/8W
Current value (reference value)	4	20	6	4	20	5	2

REPLACEMENT PARTS

Button size	Filter
9 square	K9–4707–LM

●**Mounting the light cartrige**



・There is a proper direction for combining the light cartridge and housing.
As shown in the above diagram, insert the light cartridge by aligning the protruding clasp part A with inset groove part A, and protruding clasp part B with inset groove part B.

SOLDERING SPECIFICATIONS

***Soldering**

(1) Conduct preliminary testing for confirming the soldering conditions.
Switches could be deformed by heat depending on the baseboard type, pattern and round.

(2) Perform soldering no more than twice, including corrective re-soldering.
When soldering repeatedly, wait at least five minutes between the first and second soldering until the work cools to room temperature.
Continuous heating can result in deformity of outer contours and deterioration.

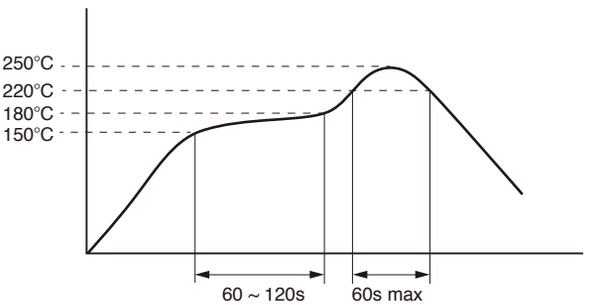
***Recommended conditions for reflow soldering** (when attaching single terminal)

Fix a thermocouple on the side of the terminal using a high melting point solder (high-temperature adhesive), and set a reflow furnace referring to the temperature profile example shown below for the terminal temperature. Deformity could result due to the heat if the product temperature exceeds 260°C,therefore ensure that the temperature on the product surface remains below 260°C.

Preliminary heating: 150°C to 180°C
60-120 sec
Actual heating : 220°C or above
Within 30-60 sec
Solder type : Sn96.5
Ag3
Cu0.5
*A30C5 (JIS indication)

*** Consult with us if you wish to attach parts continuously or in high density.**

[Temperature profile example when lead-free solder is used]



***Manual soldering**

(1) Soldering temperature: 350°C or less at tip of solder applicator
(2) Soldering time: within 3 sec

***Cleaning**

The switches may not be washed.
Washing may cause flux and foreign matter on the baseboard to get inside the switch along with detergent, and could cause failure.

***Printed baseboard**

(1) Resistance to soldering heat could be affected depending on the type, thickness and round pattern of the printed baseboard.
We recommend confirming the volume-production conditions of the printed baseboard beforehand.

(2) Handle the baseboard carefully after attaching the switches.
Scattered powder from baseboards could get inside the switch while separating the baseboard.
Avoid piling printed baseboards.

ORDERING CODE

LIGHT CARTRIDGE

K9 — □ □ □ □ X

● BUTTON

9	9 square

● BUTTON SHAPE

S	Square flat
X	Without button

● LED COLORLED

7	Red
8	Green
9	Yellow
78	Red and green
718	Red and super green
X	Without LED

● FILTER COLOR

X	Without filter

● BUTTON COLOR

M	Milky white
X	Without button

HOUSING

K9 □ — K M

● CIRCUIT CHARACTERISTIC AND OPERATIONAL FEEL

M	With momentary click feel
S	Without momentary click feel

● TERMINAL

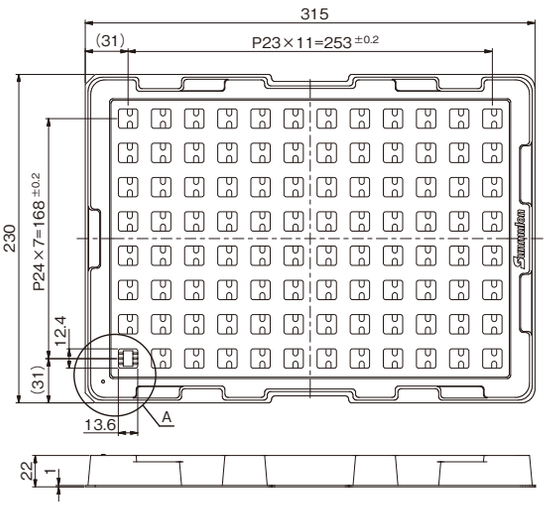
M	Surface-mounted terminal

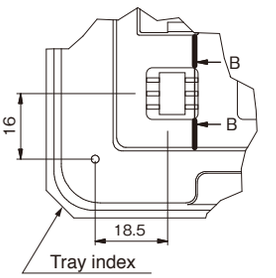
● HOUSING COLOR

K	Black

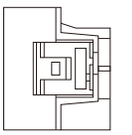
PACKAGING SPECIFICATIONS

● The main body of K2-type switches is delivered in a tray. Tray specifications are as shown below.





Section A details



B-B cross-section

Tray	Type	K2-4704

The lighting section is always delivered in a product box.

HANDLING PRECAUTIONS

***Handling of switches**

(1) Usage environment

Prior to setting the product in the environment for actual usage, check that no corrosive or other gas is emitted from component parts in the vicinity.
Avoid using in atmospheres containing sulfidizing gas (H2S, SO2), ammonia gas (NH3), nitrate gas (NH3), chlorine gas (CL2) or other corrosive gases, or under high temperature or humidity.

(2) Contact errors could result if silicon is present in the vicinity of the switch.

Remove the source of silicon if silicon oil, silicon filler, silicon wire or other silicon products are present around the switch.

(3) Dust-prevention measures

Avoid using the switches in places where dust is generated.

(4) Waterproofing and drip-proofing

The switches are not waterproof or drip-proof. Avoid installing or using them in places where they might be splashed with liquids.

(5) Automatic mounting

The switches can be mounted automatically on baseboards, but this may not be possible with some types of mounting machines. We recommend checking beforehand when using the product this way.

(6) Strength of terminals

Note that if a terminal is bent or twisted, its strength declines and the terminal could break.

***Matters for caution when storing**

(1) Storage environment

When storing the product, please take full consideration that the atmosphere, humidity and other storage conditions could affect the ease of soldering of terminals and packaging functions.
-Packaging material is expected to age more rapidly under high temperatures and humidity. We recommend storing the products indoors at temperatures up to 25℃ and relative humidity up to 50%.
-Avoid storing the products in an environment with sulfidizing or other corrosive gases.
-Avoid direct sunlight and dust.

(2) Storage conditions

Store the products in the packaging.
Use products promptly after opening the packaging, and store the remaining products in an area free of gas, humidity and other factors which might affect performance.
Handle the products carefully to prevent damage to terminals from deforming.