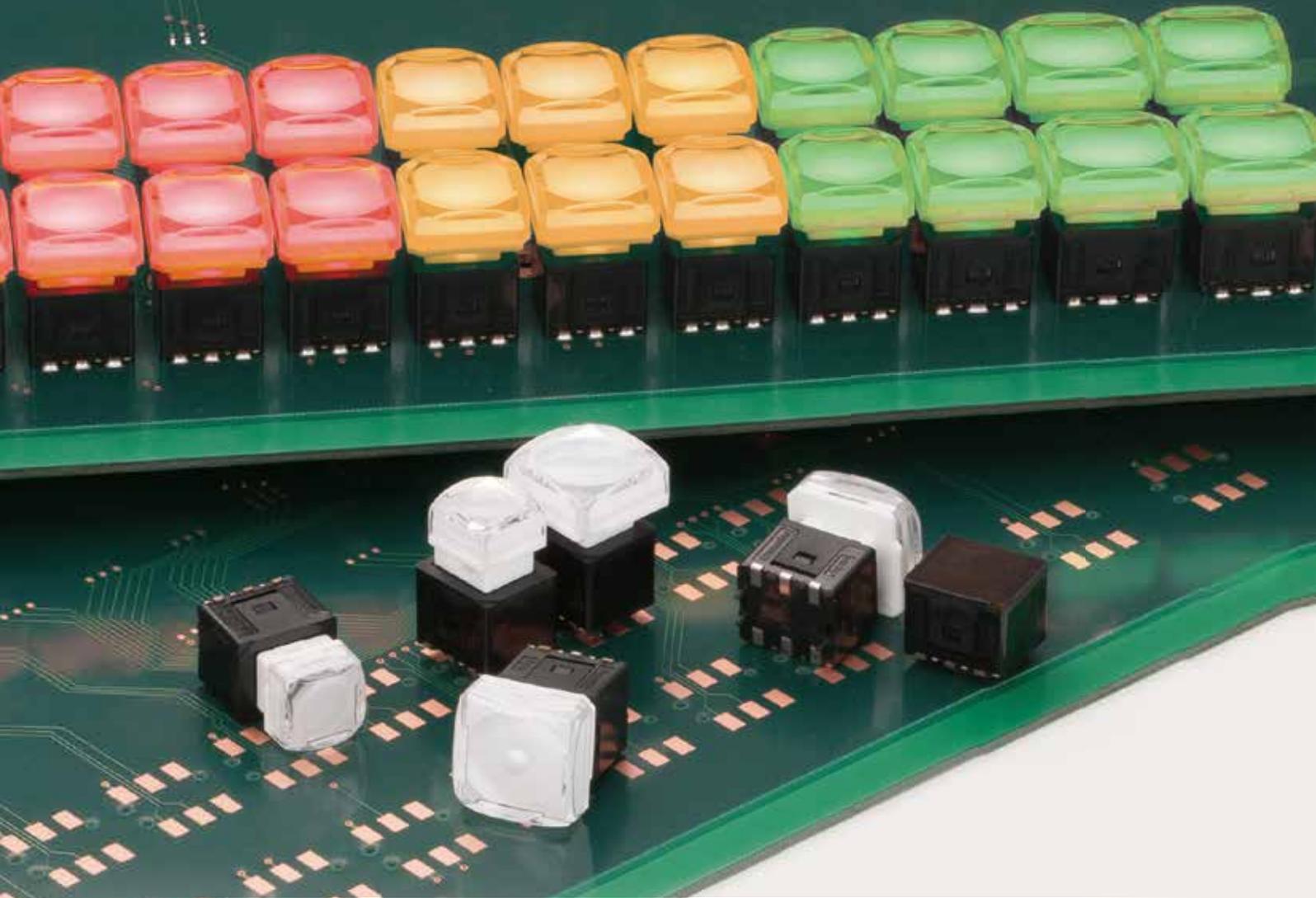


A world first in surface-mountable switches

Switch with features new and never before seen



KA Surface-mounted illuminating switch

KA Surface-mounted Illuminating Switch

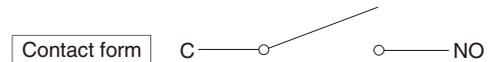
The world's first surface-mountable illuminating pushbutton.

Two types of switching action - with or without audible click.
 Concave and raised dot buttons further increases the feel and tactile feedback.

- Surface-mountable terminals for fast, reliable connection
 - Pioneering manufacturing techniques prevent slanting and twisting during mounting, which improves counting accuracy and reduces corrections of bent switches and defects.
 - Easy to assemble modular switch design features separate body and lighting section. Body is mounted to PCB and then assembled with the lighting section.
 - Stable, consistent color and brightness
 - Multicolored RGB and dual-color (red/green, red/super green) LEDs allow any color to be emitted.
 - Lighting section
- Four options available: 17.4mm size (raised dot or concave button); 12mm size (raised dot or concave button).



*Information correct at time of publishing August 2012



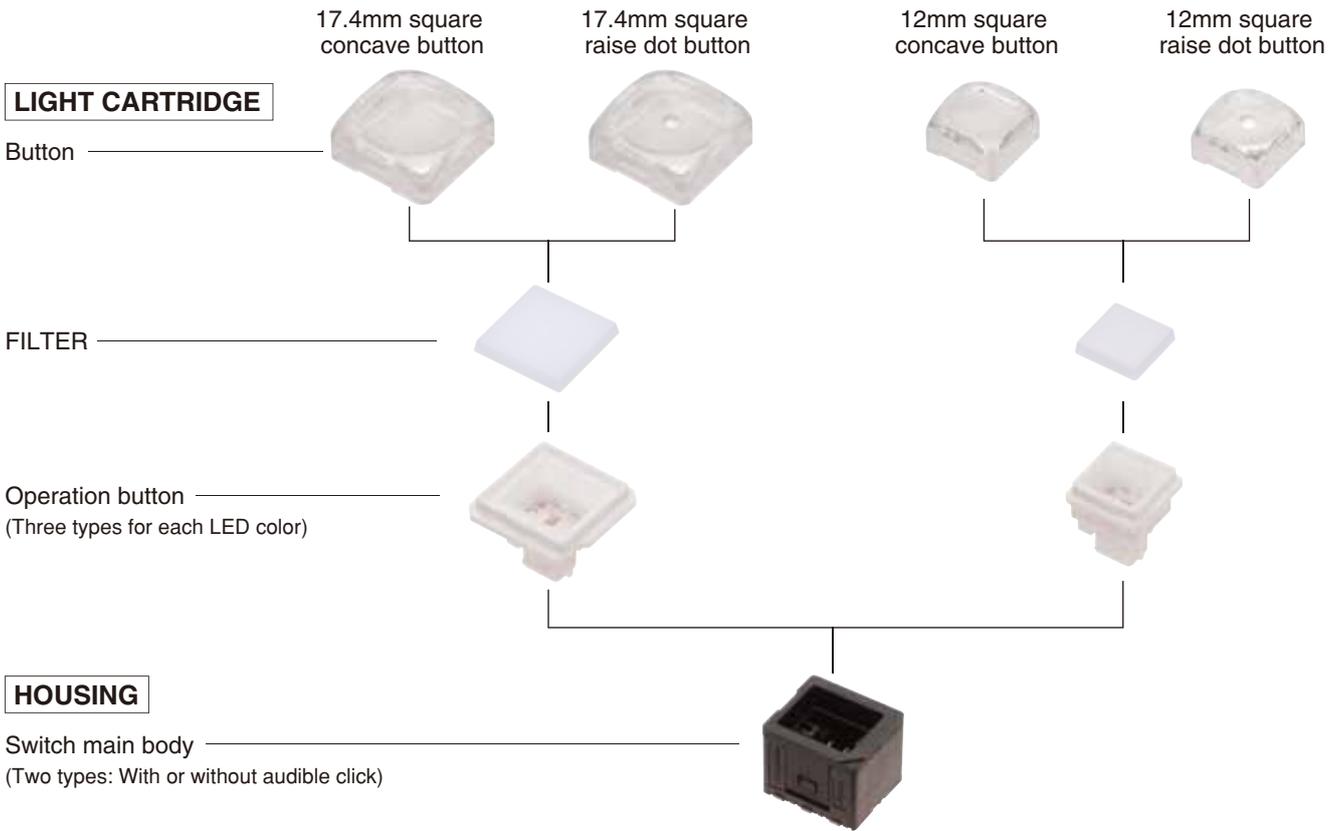
SPECIFICATIONS

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 milliohm meter, at DC6V and 0.05A
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.)

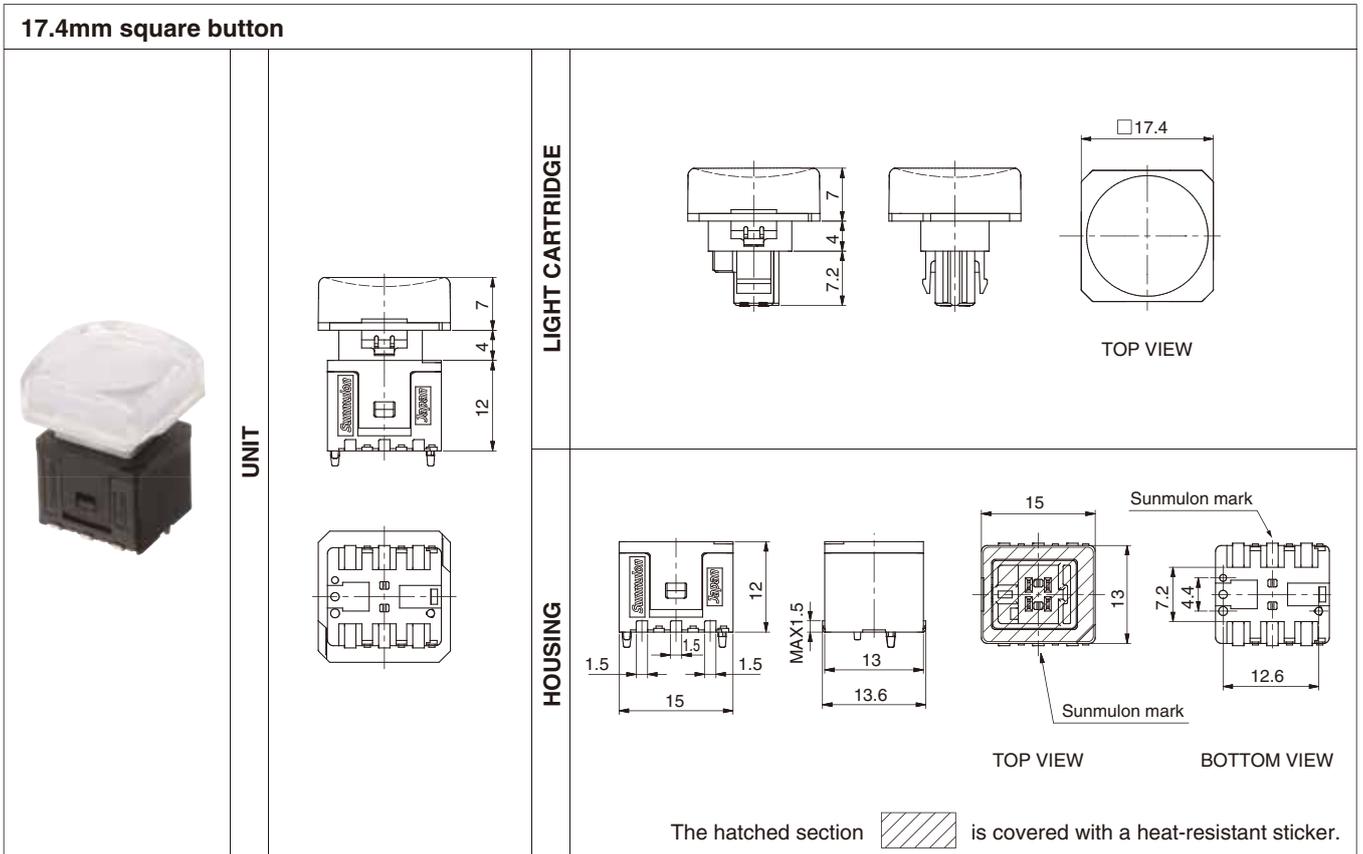
OPERATING CHARACTERISTICS

Operating Force (Max.)	2.0N	Total Travel (mm Max.)	4.0mm
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STRUCTURE

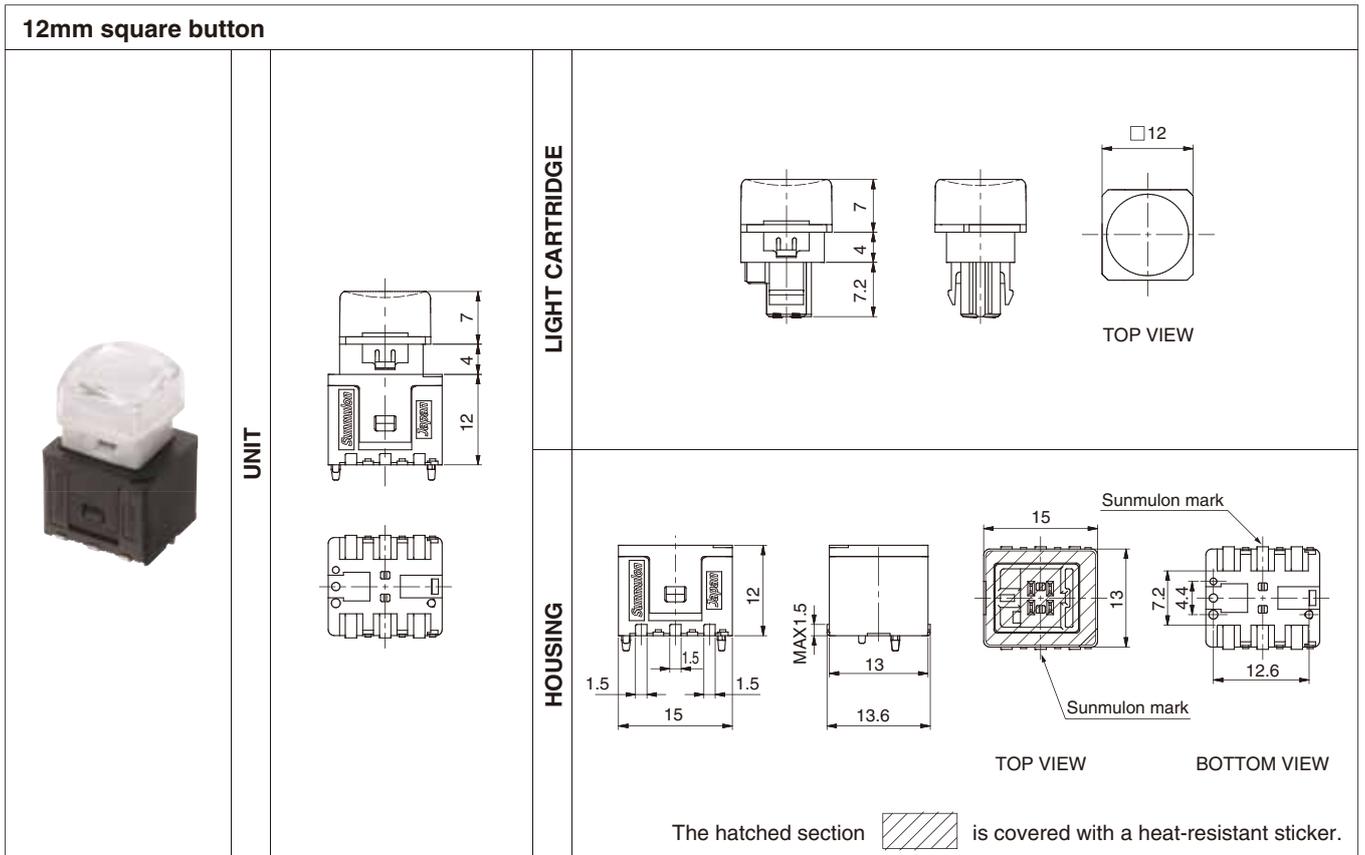


DIMENSIONS



General tolerance of drawings: ±0.4 mm

DIMENSIONS



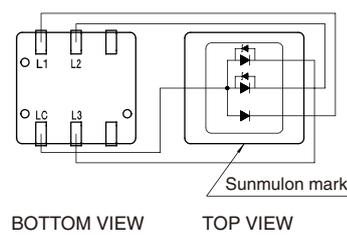
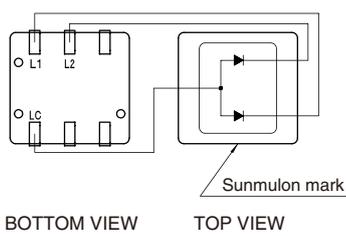
Housing is common to all the buttons.

General tolerance of drawings: ± 0.4 mm

INTERNAL CONNECTION ARRANGEMENTS

● **Dual-color light emitted**

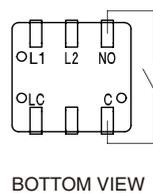
● **Multicolor light emitted**



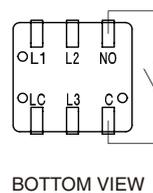
Terminals	LED color combination		
	Dual-color		Multicolor
LC-L1	Red	Red	Red
LC-L2	Green	Super green	Super green
LC-L3	—	—	Super blue

TERMINALS LAYOUT

● **Dual-color**

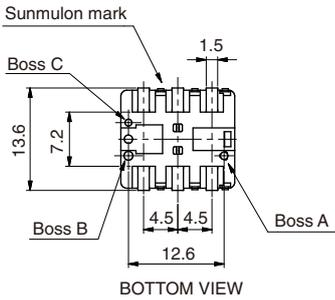


● **Multicolor**

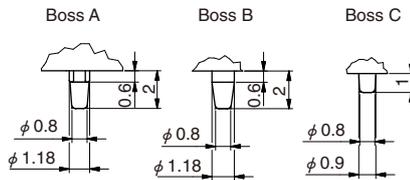


TERMINAL SHAPE / PCB HOLE CUT-OUT

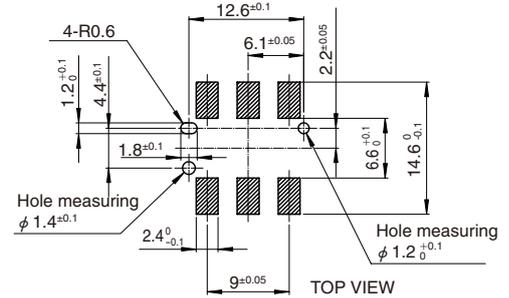
● Terminal dimensions



● Boss dimensions



● Recommended PAD PCB hole cut-out

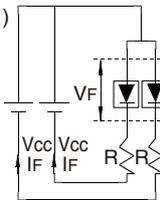


LED RATINGS / PROTECTIVE RESISTANCE

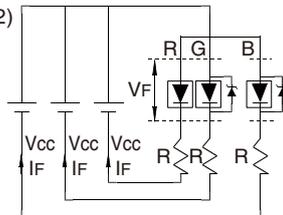
● LED ratings

Item		Full-face LED lighting (Ta=25°C)						
		Dual-color (78)		Dual-color (718)		Multicolor (22) () indicate values when simultaneously lit		
		Red	Green	Red	Super green	Red	Super green	Super blue
Max. operating current	I _{FM} (mA)	30	25	20	10	30 (30)	30 (25)	30 (15)
Maximum allowable loss	(mW)	75	65	48	38	90	120	120
DC backward voltage	V _R (V)	5	5	5	5	5	—	—
Forward voltage (standard values)	V _F (V) (standard values)	2.0	4.2	1.8	3.4	2.1	3.0	2.9
Dominant wavelength (standard values)	λ _d (nm) (standard values)	624	572	626	525	622	527	472
Recommended operating current	I _F (mA)	20	20	10	10	24	22	12
Current reduction ratio with respect to usage temperature		Figure 3		Figure 4		Figure 5		
Conditions when pulse is lit	Pulse width PW (μs)	100		400	15	10 ³	10 ³	10 ³
	Duty ratio D _R	10 ⁻¹		10 ⁻¹		20 ⁻¹		
	Allowable forward current for pulse I _{FP} (mA)	100		92	50	100	100	100
Wiring diagram		Figure 1				Figure 2		

(Figure 1)



(Figure 2)

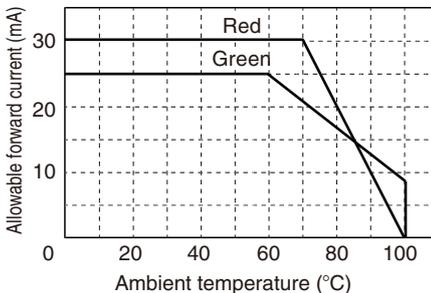


Calculate the external resistance values referring to the following equation.

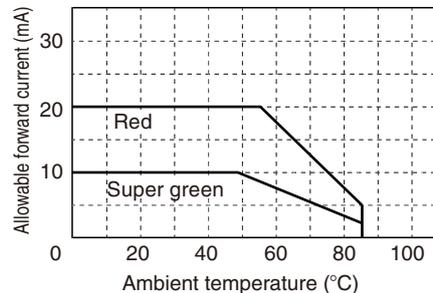
$$R = \frac{V_{CC} - V_F}{I_F}$$

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

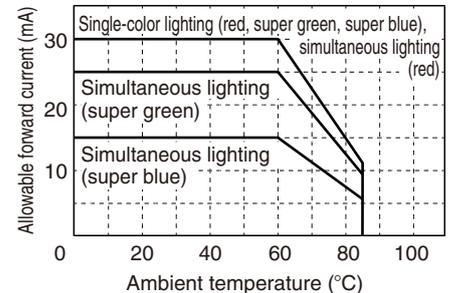
● Allowable forward current – Ambient temperature



(Figure 3)



(Figure 4)



(Figure 5)

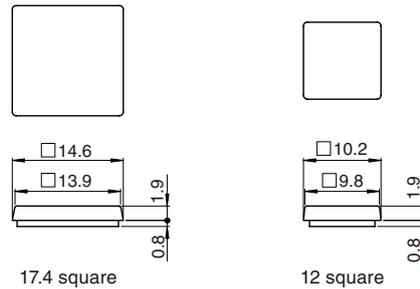
● Reference external resistance values

(Determine the resistance value referring to the table below when making the brightness of each color nearly uniform.)

Ta=25°C

Voltage	Color	Dual-color (78)		Dual-color (718)		Multicolor (22)		
		Red	Green	Red	Super green	Red	Super green	Super blue
5V		330Ω 1/8W	43Ω 1/8W	330Ω 1/8W	510Ω 1/8W	1kΩ 1/8W	1kΩ 1/8W	1.1kΩ 1/8W
12V		1kΩ 1/4W	390Ω 1/2W	1kΩ 1/4W	2kΩ 1/8W	3.6kΩ 1/8W	5kΩ 1/8W	4.3kΩ 1/8W
24V		2.2kΩ 1/2W	1kΩ 1W	2.2kΩ 1/2W	4.3kΩ 1/4W	7.5kΩ 1/4W	10kΩ 1/8W	10kΩ 1/8W
Current value (reference value)		10	20	10	5	3	2	2

FILTER DIMENSIONS



17.4 square

12 square

REPLACEMENT PARTS

Button size	Filter	Concave button	Raise dot button
12 square	KA-4604-LM	KA-4603-1CC	KA-4603-2CC
17.4 square	KA-4591-LM	KA-4590-1CC	KA-4590-2CC

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.

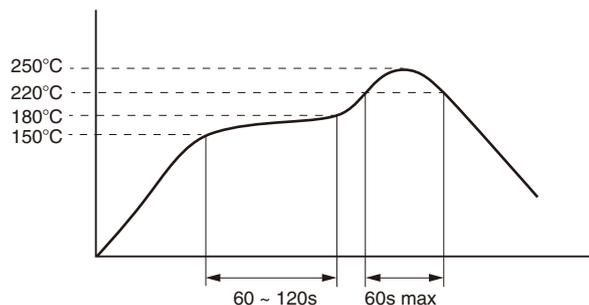
Continuous heating can result in deformity of outer contours and deterioration.

*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)

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



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

*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.

***Evaluation units for surface mounting are available (for a fee).**

ORDERING CODE

LIGHT CARTRIDGE

KA-□□□□□□

● BUTTON

12	12 square
17	17.4 square

● BUTTON SHAPE

K	Concave button
P	Raise dot button
※ X	Without button

● LED COLOR

78	Red and green
718	Red and super green
22	Multicolored
X	Without LED

● OPERATIONAL FEEL ※1)

Blank	Without momentary click feel
M	With momentary click feel

● FILTER COLOR

4	Milky white
※ X	Without filter

● BUTTON COLOR

C	Clear
※ X	Without button

HOUSING

KA□-KM

● CIRCUIT CHARACTERISTIC AND OPERATIONAL FEEL ※1)

M	With momentary click feel
S	Without momentary click feel

● TERMINAL

M	Surface-mounted terminal
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● HOUSING COLOR

K	Black
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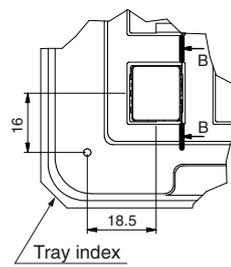
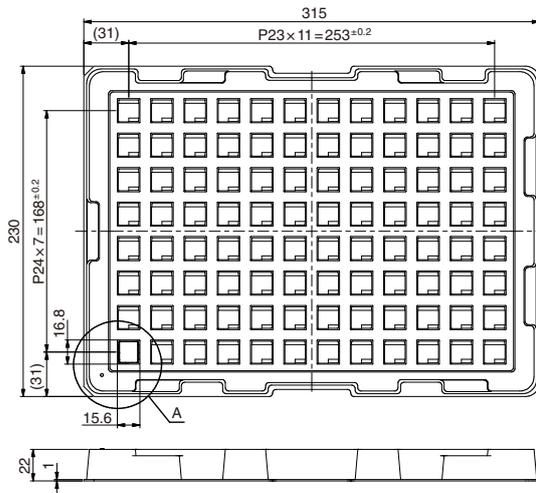
*Caution

※ In case of using without a button, the filter must be ordered separately. Please specify the filter color as X (i.e. without filter).

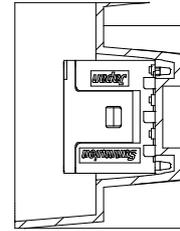
※ 1) If you specify the M(with momentary click feel) in the HOUSING (KAM-KM), please specify the M(with momentary click feel) in the LIGHT CARTRIDGE.

PACKAGING SPECIFICATIONS

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



Section A details



B-B cross-section

If ordered in 32 units or less, the order will be delivered in a product box. Trays, if needed, can be ordered by specifying the following product name and type.

Tray	Type	KA-4600
------	------	---------

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°C 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.

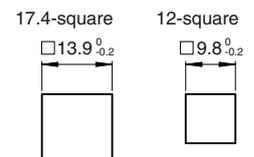
Use products promptly after opening the packaging, and store the remaining products in an area free of gas, humidity and other factors which might affect performance.

Handle the products carefully to prevent damage to terminals from deforming.

*Character films

The character film is not included in the package. To use the character film, use a heat resistant film of 0.1mm thickness or less.

Please see the figure at right for dimensions.



*For other handling precautions, refer to our comprehensive collection of brochures or PDF brochures available on our website.