

New Products

CONTACT No. 386

NIKK
SWITCHES
Innovation Driving Quality

Surface Mount Type Illuminated Pushbutton



KP04 Series

Reflow Soldering Capability
Process Optimized Design

NIKK SWITCHES CO., LTD.

Surface Mount Type Illuminated Pushbutton Switch

Compatible with Surface Mount Technology

This product is a surface mount type illuminated pushbutton switch developed to meet the needs of miniaturization, high density design, and energy efficiency.

Synchronized Switching ON Timing (Patented Technology)

The unique structure creates a click feeling upon contact connection (switching ON), enabling reliable and intuitive operation.

Light Operability

The unique inner mechanism achieves smooth and light operation. The switches are available with and without a click feeling.

Outstanding Switching Durability

Light operability achieves switching durability of over 3 million operations.

Stable Operability (Patented Technology)

Silent and smooth operation is accomplished through a round metal pin (pin rail) on the sliding part.

Compact yet Long Stroke

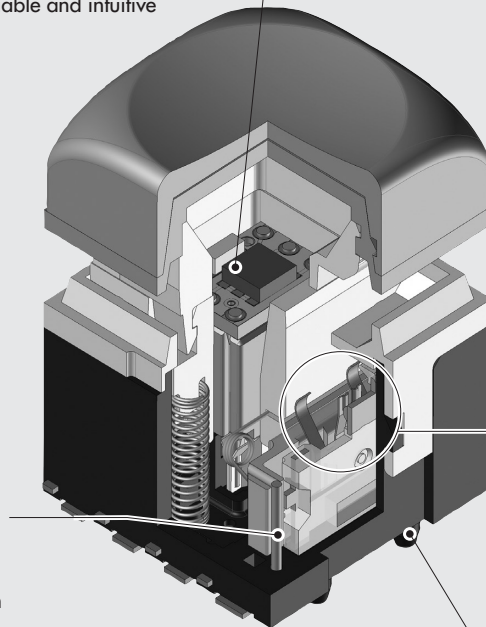
The unique structure achieves light operability with a stroke of 3.5 mm and nominal operating force of 1.6 N, although the height from PC board to the top of the cap is 23 mm. As it has the same height as the IS Series, both can be used on the same PC board, thus contributing to space-saving.

Various Color Expressions

Simultaneous illumination using red, green, and blue lights enables a variety of options for emitting light. In addition, the RGBW Type is simultaneously equipped with a white LED to reduce inconsistencies in color tone for white illumination.

Wide Variety of Actuators

Three types of actuators are available with a projected operating surface (Sculptured Cap, Flat Cap, Home Key Cap), and each button comes in three sizes: 12mm Square, 15mm Square, 17.4mm Square.



Highly-Reliable Twin Contacts with Gold Plating

Highly reliable twin contacts with gold plating ensure stable contact connection over an extended period of time.

Highly Heat-Resistant Resin

The highly heat-resistant resin achieves a long stroke without impairing operability, even after reflow soldering.

► Applications

- Broadcasting and Pro Audio & Video Equipment
- Picking System
- Communications Equipment

► Sales Start Date

March 24, 2022

► General Specifications

Common Specifications			
Rating	100 mA 12 V DC (Resistive load)	Operating Temperature Range	-25 to +50 °C
Contact Resistance	200 mΩ max. (10 mA 20 mV)	Total Travel	approx. 3.5 mm
Insulation Resistance	100 MΩ min. (250 V DC)	Nominal Operating Force	1.6 ± 0.6 N
Dielectric Strength	500 V AC (Terminal – Terminal) 1 minute min. 500 V AC (Terminal – Actuator) 1 minute min. (except LED Terminal)	Resistance to Soldering Heat	► Manual soldering: Rank A ► Reflow soldering: Rank A Refer to Handling Instructions/Soldering on page 7.
Mechanical Life	3,000,000 operations min.		
Electrical Life	3,000,000 operations min.		

⚠ Each rated value/performance value is obtained through independent testing. Therefore, the same results are not guaranteed under complex conditions. For testing conditions and judgment criteria, please refer to the full-line catalog.

► LED Specifications

LED						T _s = 25 °C
LED Color		Red (R)	Green (G)	Blue (B)	White (W)	Unit
Maximum Forward Current	I _{FM}	25	25	25	25	mA
Minimum Forward Current	I _F	5	5	5	1	mA
Measured Forward Current	I _F	20	20	20	20	mA
^{*1} Forward Voltage	V _F	2.10	2.65	2.90	3.08	V
^{*1} Dominant Wavelength	λ _d	621	530	465	-	nm
Maximum Reverse Voltage	V _{RM}	5	5	5	5	V

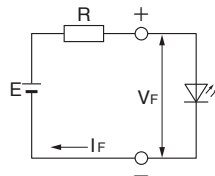
^{*1} Forward Voltage and Dominant Wavelength are typical values at Measured Forward Current.

Notes

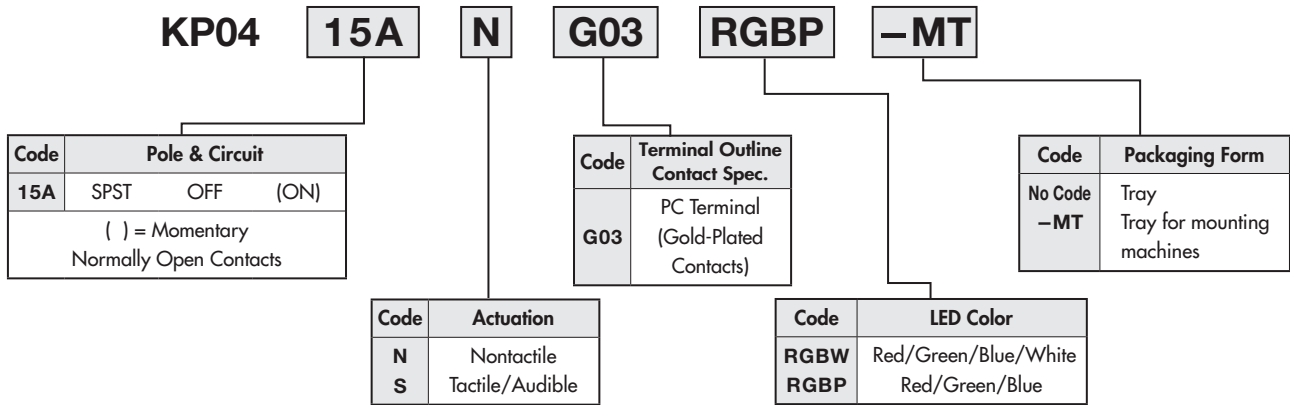
- The LED circuit is isolated and requires an external power source.
- For best results and safe use of LEDs, the supply voltage should be higher than the LED forward voltage. Also, an appropriately valued ballast resistor should be used. Without the ballast resistor, the LED will be damaged or destroyed. The resistor value for the LED circuit can be calculated by using the formula shown here.

$$R = \frac{E - V_F}{I_F}$$

where, E = Source Voltage (V)
 V_F = Forward Voltage (V)
 I_F = Forward Current (A)
 R = Resistor Value (Ohms)



► Typical Ordering Example



Actuation	Nontactile	Nontactile	Tactile/Audible	Tactile/Audible
LED Color	Red/Green/Blue/White	Red/Green/Blue	Red/Green/Blue/White	Red/Green/Blue
External View	KP0415ANG03RGBW 	KP0415ANG03RGBP 	KP0415ASG03RGBW 	KP0415ASG03RGBP

* Each photo shows the product with the heat-resistant sheet removed

► Cap Types and Colors

Sculptured Cap			Flat Cap			Home Key Cap		
AT3178JB	AT3179JB	AT3181JB	AT3183JB	AT3184JB	AT3185JB	AT3186JB	AT3187JB	AT3188JB

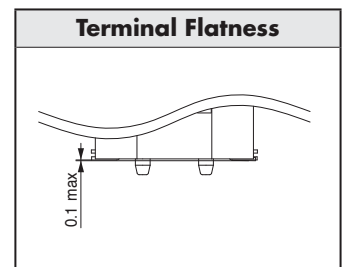
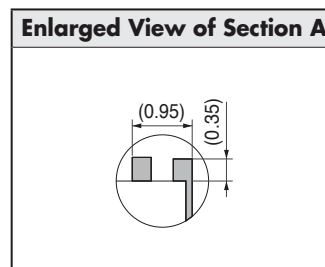
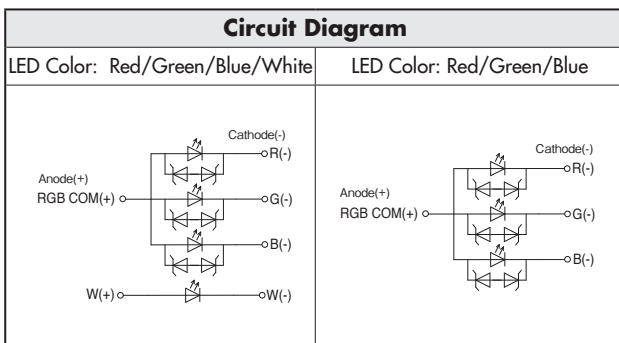
▶ Switching Function

Part Number	Actuation Tactile/Audible	LED Color	Plunger Position () = Momentary		Connected Terminals		
			Normal 	Down 	Circuit	Normal 	Down
KP0415ANG03RGBW	No	Red/Green/Blue/White	OFF	(ON)	SPST	—	1-1a
KP0415ANG03RGPB		Red/Green/Blue					

▶ Switch Dimensions

SPST	<p>KP0415ANG03RGBW (with AT3178JB)</p>	<p>Pad Layout (Reference)</p>
SPST	<p>KP0415ANG03RGBW (with AT3179JB)</p>	<p>Pad Layout (Reference)</p>
SPST	<p>KP0415ANG03RGPB (with AT3181JB)</p>	<p>Pad Layout (Reference)</p>

☒ Area comes into contact with the metal part of the product, therefore this needs to be taken into consideration when designing the PC board pattern.



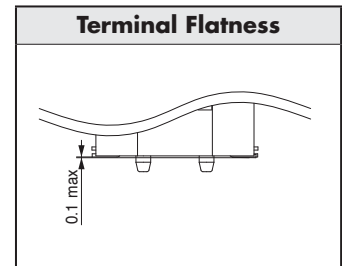
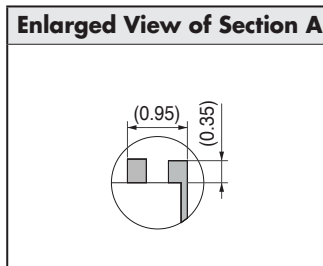
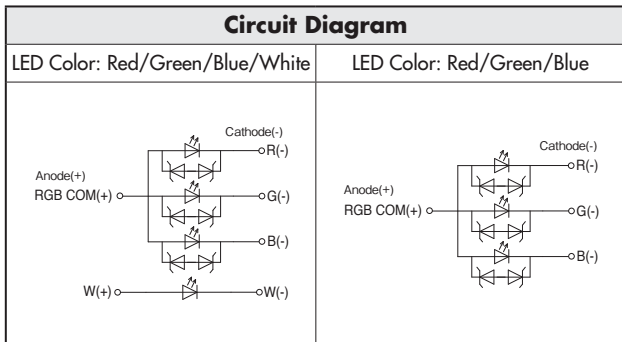
Switching Function

Part Number	Actuation Tactile/Audible	LED Color	Plunger Position () = Momentary		Connected Terminals		
			Normal	Down	Circuit	Normal	Down
KP0415ASG03RGBW	Yes	Red/Green/Blue/White			SPST	—	1-1a
KP0415ASG03RGBP		Red/Green/Blue	OFF	(ON)			

Switch Dimensions

SPST	<p>KP0415ASG03RGBW (with AT3178JB)</p>	<p>Pad Layout (Reference)</p>
SPST	<p>KP0415ASG03RGBW (with AT3179JB)</p>	<p>Pad Layout (Reference)</p>
SPST	<p>KP0415ASG03RGBP (with AT3181JB)</p>	<p>Pad Layout (Reference)</p>

☒ Area comes into contact with the metal part of the product, therefore this needs to be taken into consideration when designing the PC board pattern.



► Handling Instructions

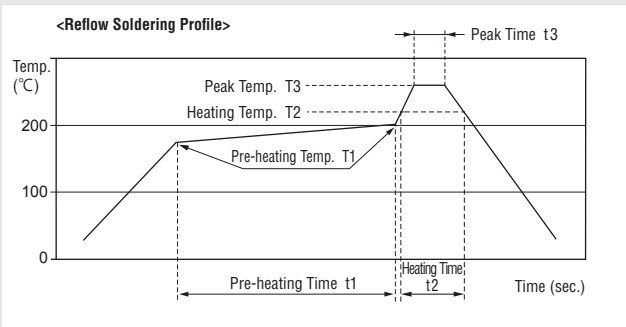
! CAUTION: Soldering Conditions

Manual Soldering Profile

Manual Solder Profile	Profile A High Temperature
Solder Iron Tip Temperature	390 °C max.
Time on Terminal	4 seconds
Cycles	2

Reflow Solder Profile for SMT

! CAUTION Reflow soldering cannot be performed with the actuator attached.



Reflow Solder Profile	Symbol	Profile A High Temperature
Preheat Temperature	T1	180 ~ 200 °C
Preheat Time	t1	120 seconds
Heating Temperature	T2	230 °C
Heating Time	t2	60 seconds
Peak Temperature (surface)	T3	250 °C
Peak Time	t3	Not Specified
Thickness of PCB		1.6 mm
Cycles		2
Comments		PCB with no Lead

- Set the configuration of the reflow furnace so that the product terminal temperatures meet the pre-heating and heating temperatures in the reflow soldering profile conditions (T1 and T2). Make sure the product temperature does not exceed the peak temperature (T3).

- The soldering conditions should be confirmed prior to soldering.
- The number of soldering operations should not exceed two, including re-soldering work such as manual reworking.

! Handling Precautions

To prevent the LED from being damaged by static electricity, handle the switch carefully by working on a conductive mat or metal plate connected to the ground as well as by grounding your body. Please note that applying a reverse voltage to the LED may lead to leakage current generation and deterioration/breakdown. Depending on the circuit condition, it may be necessary to take measures such as providing a protection circuit.

Simultaneous Illumination

Simultaneous illumination may cause color variability due to the characteristics of LEDs. Check and adjust the current value for each color used on the customer's side. If you require simultaneous illumination of a Red/Green/Blue/White type product, please consult with our sales office.

Use of Home Key Cap

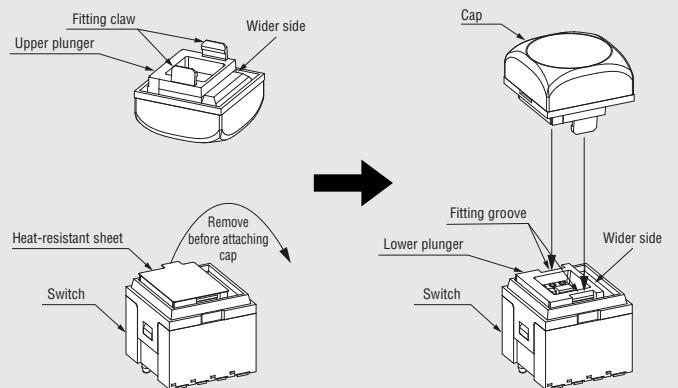
When using **AT3186JB**, **AT3187JB**, or **AT3188JB** as an actuator, do not apply pressure to the projected section with a hard object. Otherwise, the projected section may be deformed.

Actuator Attachment to Main Switch Unit

The cap should be attached to the main switch unit after reflow soldering. Please note that if reflow soldering is performed with the actuator attached, it may cause LED lighting failure, damage, malfunction, etc. Remove the heat-resistant sheet from the main switch unit before attachment. Ensure the orientation is correct when attaching an actuator. Insert fitting claws of the upper plunger into the fitting groove of the lower plunger so that the wider sides of both the upper and lower plungers are in the same direction with respect to the center of the switch. Press the actuator several times to check if it moves smoothly.

Automatic Mounting

The switches are compatible with most automatic mounting machines. Please confirm the type of mounting machine before use.



Indications on Actuator

If you wish to insert a film with indications (such as characters or symbols) into the actuator, check with our sales office first. The diffuser cannot be removed.

When operating the switch, make sure that an actuator is securely attached. Please note that operating the switch without an actuator or with an actuator mounted incompletely may cause a malfunction or other problems.

Not Washable

For flux cleaning on the PC board surface after soldering, please use an alcohol-based cleaning solution.

Precaution for Installation

After soldering, ensure no mechanical stress is applied to the terminals due to bending or warpage of the PC board.

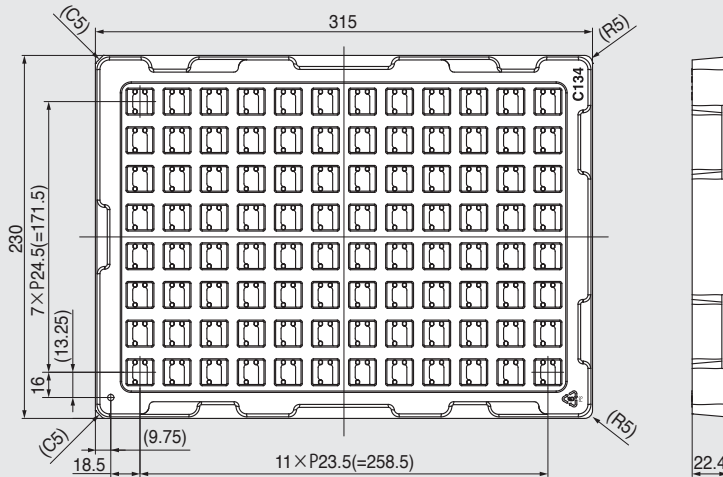
▶ Handling Instructions

Packaging Forms

There are two types of packaging forms: Tray Packaging for Mounting Machines (96 pieces included) and Tray Packaging (any quantity). Please specify the following packaging form code at the end of the product part number when ordering. Please order by packaging unit when ordering with tray packaging for mounting machines.

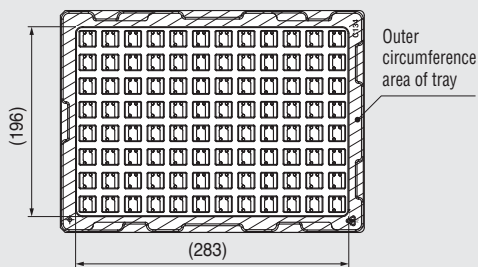
Tray Packaging (any quantity): No Code
Tray Packaging for Mounting Machines: –MT

Tray Packaging for Mounting



Notes

- (1) This specification does not apply to packaging with switches of less than 96 pieces.
- (2) When transporting the tray, only grasp the outer circumference of the tray (the hatched area in the figure below). Please note that any external force may damage the products and the tray, causing malfunctions or mounting defects.



* Specifications presented here are subject to change without prior notice. Check with our sales office for the latest specifications.

NKK SWITCHES CO., LTD.

European Office:

Alfred-Herrhausen-Allee 3-5, 65760 Eschborn, Germany

Tel: +49 61 96 400 189

www.nkkswitches.eu E-mail: contact@nkkswitches.eu