

To:

**Light touch switch
and Detector switch
Product Introduction
for Smartphone**

May 2025

Panasonic Industry Co., Ltd.

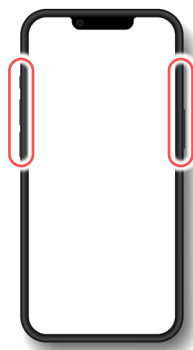
Panasonic
INDUSTRY

**IN Your
Innovation**

Light touch switch for Smartphone

Light touch switch for Smartphone

Power button, Volume button



IP67
EVPBW



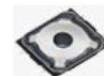
3.0mmx2.0mm
h=0.6mm
Travel: 0.13mm,0.15mm
Life: 300K,500K cycles

IP67
EVPBL



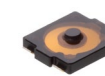
2.8mmx1.9mm
h=0.53mm, 0.57mm, 0.6mm
Travel: 0.15mm
Life: 300K cycles

IP67
EVPBK



4.9mmx4.0mm
h=0.63mm
Travel: 0.23mm
Life: 1000K cycles

IP67
EVPAY



3.4mmx2.9mm
h=0.7mm
Travel: 0.15mm
Life: 500K cycles

Home button



IP67
EVPBB



2.6mmx1.6mm
h=0.5mm, 0.53mm,
h= 0.55mm, 0.57mm
Travel: 0.08mm,0.11mm
Life: 200K,500K cycles

EVPAX



3.0mmx2.6mm
h=0.7mm
Travel: 1st 0.07mm
2nd 0.16mm
Life: 100Kcycles

IP67
EVPAT



3.4mmx1.7mm
h=1.65mm
Travel: 0.08mm,0.11mm
Life: 500K cycles

IP67
EVPAK



3.9mmx2.05mm
h=1.6mm
Travel: 0.12mm
Life: 500K cycles

Other

IP67
EVPAT



3.4mmx1.7mm
h=1.65mm
Travel: 0.08mm,0.11mm
Life: 500K cycles

IP67
EVPAK



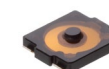
3.9mmx2.05mm
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IP67
EVPBB



2.6mmx1.6mm
h=0.5mm, 0.53mm,
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IP67
EVPAY



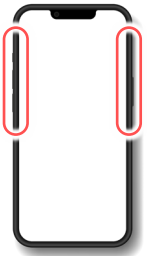
3.4mmx2.9mm
h=0.7mm
Travel: 0.15mm
Life: 500K cycles

Needs trend for Smartphone and the features of light touch switches

Small size, good click feel, and high reliability such as dustproof, waterproof, and flux resistance

Side key

Volume•Power key etc.



- ✓ Small size
- ✓ Dustproof and waterproof
- ✓ Flux resistance
- ✓ Good operability and click feel

Home key

Menu key etc.



- ✓ Dustproof and waterproof
- ✓ Flux resistance
- ✓ Long operating life
- ✓ Long stroke feeling

Other

- ✓ Dustproof and waterproof
- ✓ Long operating life
- ✓ Good operability and click feel

1. Dustproof, Waterproof

- High waterproofness due to the sealing structure by laser welding.

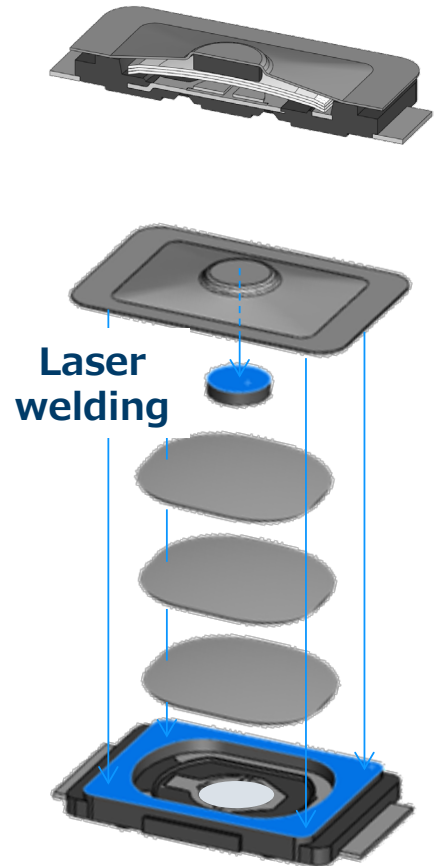
2. Flux resistance

- High flux resistance due to terminal surface treatment.

3. Good operability, Click feel

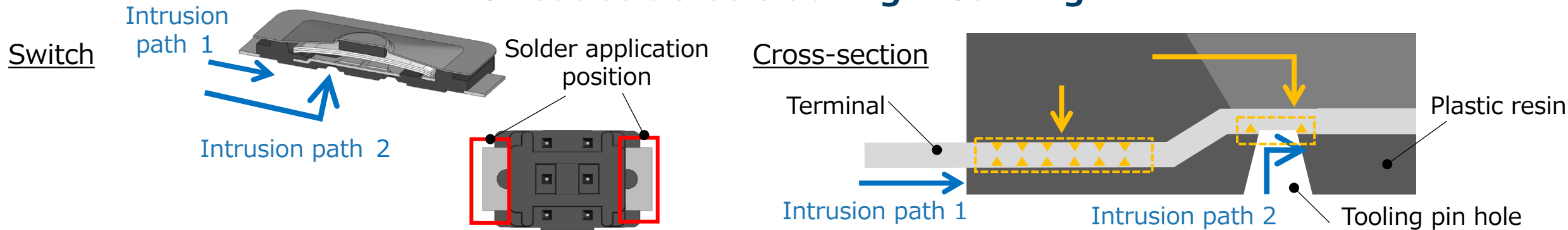
- Good operability and click feel due to the structure with push plate.
- Good operability and click feel due to the in-house metal dome.

Laser welded push plate-film & film-molding case



Feature	Laser welding	Film adhesive
Water-proof / Oil resistance		
Good click feeling	Switch click feeling ≡ Metal dome click feeling 	Switch click feeling ≡ Metal dome click feeling + adhesive influence Adhesive
Easy assembling	Inner actuator (The actuator is under the cover film) 	The actuator is sticking out on the surface

Improved waterproofing and flux ingress resistance to reduce defects during mounting



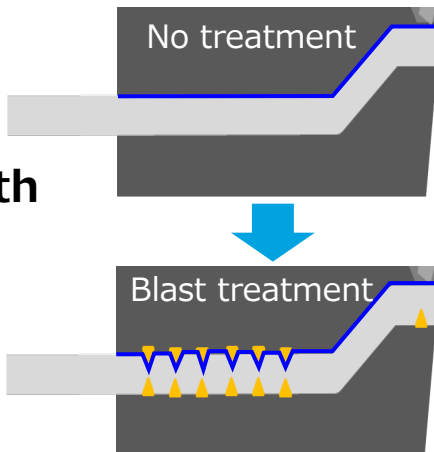
Effect of blast treatment

1. Strong adhesive between terminal & plastic resin

Higher adhesive by anchor effect.

2. Extended length of intrusion path

Longer path by rough surface.



Products with blast treatment

3.0mm x 2.0 mm SMD LSW



2.8mm x 1.9 mm SMD LSW



2.6mm x 1.6 mm SMD LSW



Dustproof, Water-proof, Flux resistant

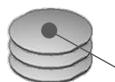
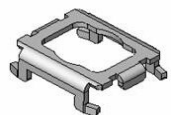
Higher waterproof performance compared

IP67

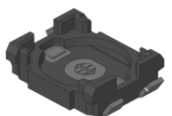
Dustproof / Water-proofing	IP6x	IPx7	Resist-Flux /UF intrusion
Condition	- Dust : Talc (Type 4) - Density: 2kg/m³ - Duration of test: 8h - No switch push	- Test agent: Water - Submerged depth: 1.0m - Submerged time: 30 min. - No switch push in water	- Solder paste: Indium 8.9HF - Solder volume : 0.324mm³ ※4 x Panasonic recommendation - UF coating : UF3808 - Volume : 1.5 mg
Criteria	No dust ingress to the inside of switch	Mechanical & Electrical characteristic met spec	- Flux intrusion - UF intrusion
3.0mm x 2.0 mm SMD LTSW	OK	OK	OK
2.8mm x 1.9 mm SMD LTSW			
2.6mm x 1.6 mm SMD LTSW			

Ensure reliability by optimal number of metal dome/our plating technology

Metal dome



Metal dome

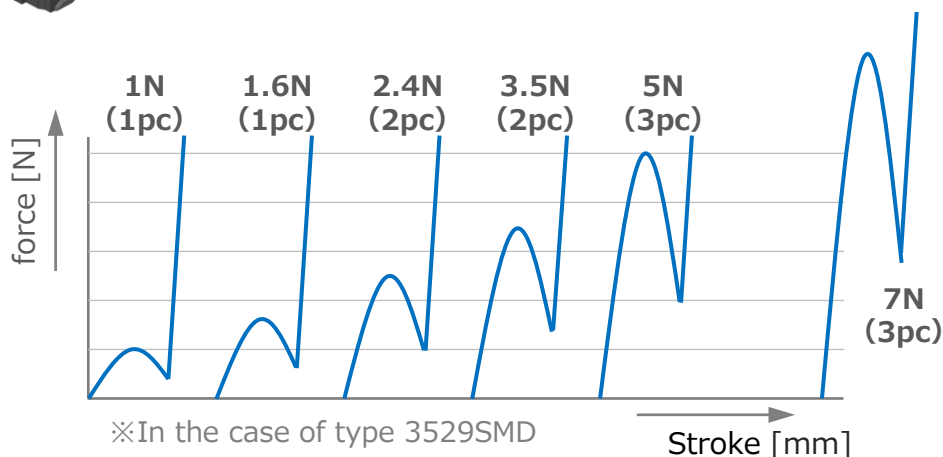


Multiple metal dome

Adjust the number of metal domes based on required operation force and life cycle



Achieve high operation force/ long life by dispersing stress with multiple metal dome structure.



Plating

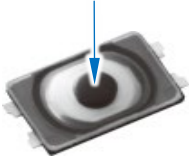
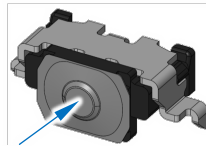
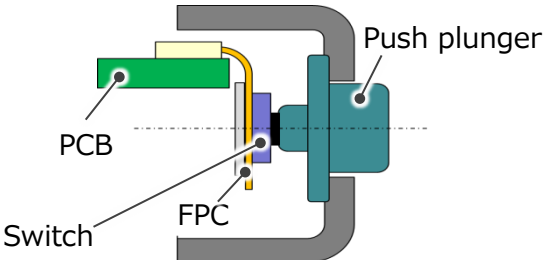
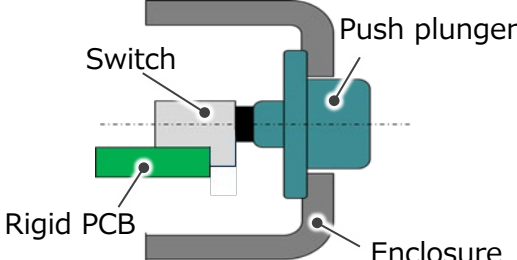
Our plating is more difficult to be worn down from high operation force and long push.

Plating Structure

	Plating
General	Stainless steel (SUS) Ni Plating Ag Plating
Panasonic	Stainless steel (SUS) Ni Plating Cu Plating Ag Plating

Prevents plating worn-down by improves adhesion of plating by inserting Cu plating between Ag and Ni.

Rigid PCB mounting is possible for button placement on the side of the Enclosure

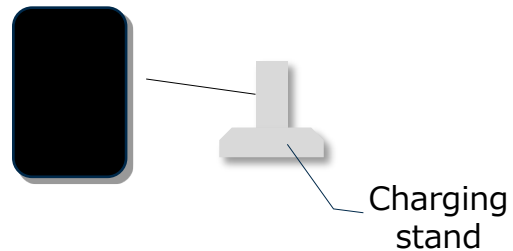
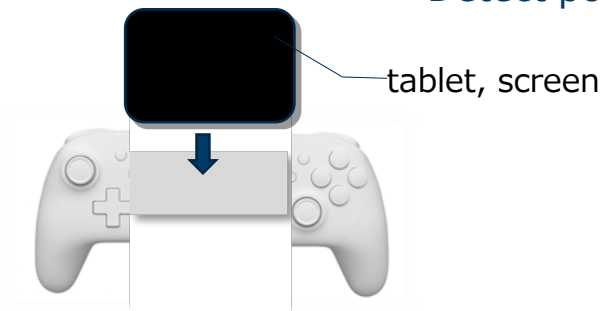
	Top push	Side push
Operating direction	Operating direction is perpendicular to PCB Operating direction 	Operating direction is horizontal to PCB 
Structure around button for side key		
Advantage	✓ A lot of flexibility in device design, ✓ Higher peeling off strength.	✓ Can design thinner device thickness, ✓ Cost-competitive because of no FPC.
Dis-advantage	✓ XY dimension of switch influences on device thickness. ✓ Not so cost-competitive because of FPC.	✓ Limited flexibility because of PCB position. ✓ Concerning about peeling off switch from rigid PCB.

Detector switch for Smartphone

Detector switch for Smartphone

Peripheral Applications

Detect mounting of tablet, screen and accessories
Detect mounting to charger
Detect position of charging coil of wireless charger



Space-saving arrangement by small switch

ESE16



2.2mmx3.35mm
h=1.5mm

ESE58



3.5mmx3.0mm
h=0.9mm

ESE11



6.4mmx3.0mmx4.9mm

ESE13



4.2mmx3.6mm
h=1.2mm

ESE18



4.0mmx4.4mm
h=1.2mm

ESE31



5.9mmx5.4mm
h=1.7mm

ESE22



5.7mmx1.9mmx4.1mm

Needs trend for Smartphone Peripherals and feature of Detector Switches

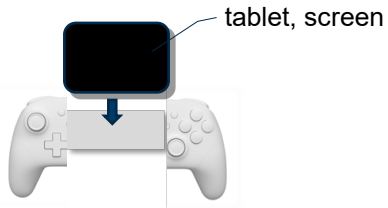
Detector switches supports a variety of applications

Detect accessories and charging

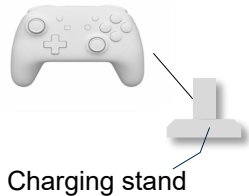
Detect mounting of tablet, screen and accessories

Detect mounting to charger

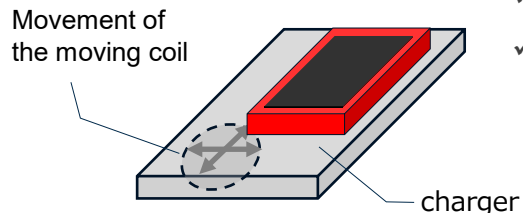
Detect position of charging coil of wireless charger



- ✓ Small and thin
- ✓ Lightweight
- ✓ Light operation force



- ✓ Improved operability



- ✓ Reduction of power consumption
- ✓ High reliability

1. Designability

- Compatible with various operation modes
- Plenty of substrate mounting modes

2. Proposal of various operation switches

- Realization of various operation switches such as rotation operation, slide operation, seesaw operation, etc.

3. Reduction of power consumption

- Reduce power consumption of sets by using normal close specifications

Detector switches | Designability

- ◆ Small and abundant detection direction, operation mode and mounting method improve design freedom.
- ◆ Overstroke (through operation) allows detection of large movement amount even though it is small SW.

▶ Contribute to downsizing of device.



Size **2.2×3.35mm**



Mounting height **0.9mm**

ESE16type

ESE58type

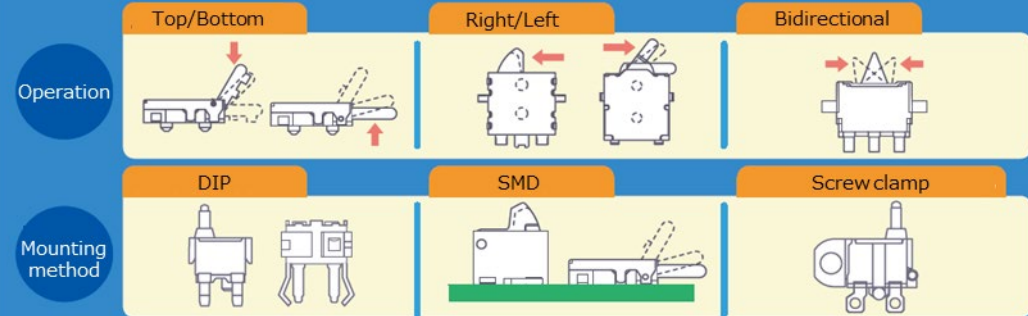


circuits: N.O circuits
direction of operation:
vertical, horizontal
(Horizontal can be operated through)



Circuit: N.O & N.C Circuit
Operating direction: Horizontal,
each two directions
(Horizontal operation can be
performed through)

▶ Contribute to customer's design flexibility.



ESE13type

ESE18type

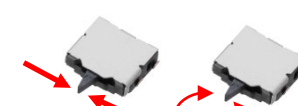
ESE23type



Vertical detection
on PCB



Horizontal
detection on PCB



Two-way
detection

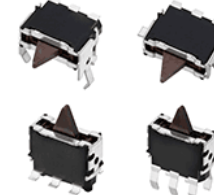
ESE11type



ESE22type



ESE24type

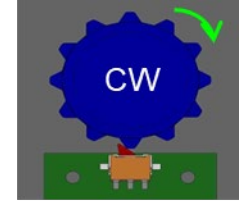
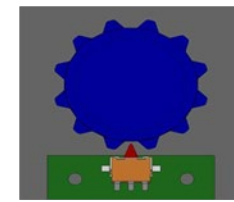
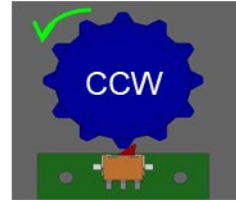
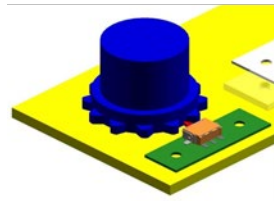


N.O= Normally open type, N.C= Normally Closed Type

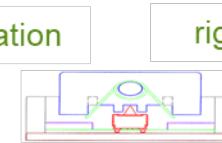
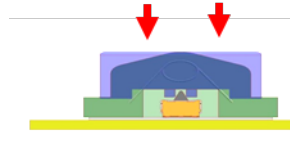
Detector switches | Various operation

Enables set rotation, sliding, and seesaw operations

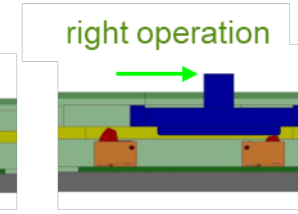
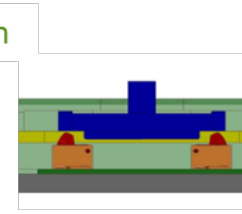
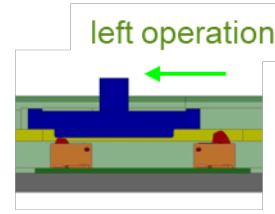
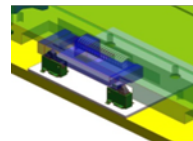
rotational operation



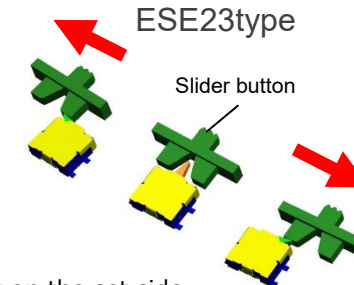
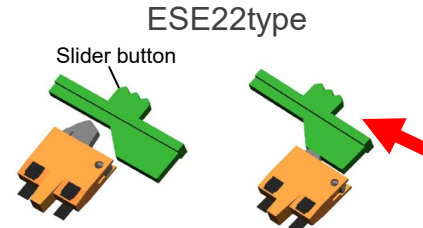
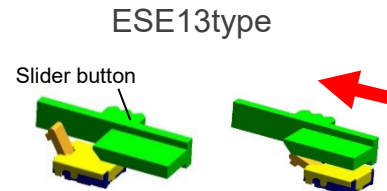
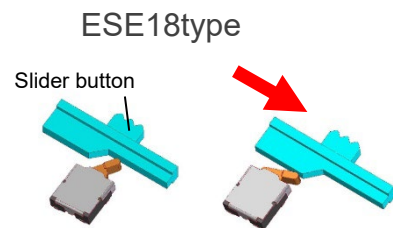
seesaw operation



slide operation



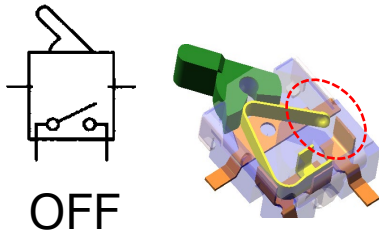
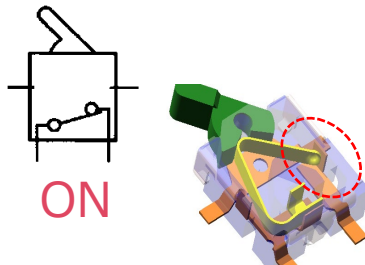
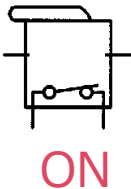
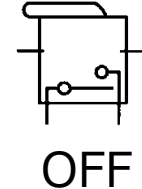
Slide operations (example)



*The click feel of the operation button and the recovery force are not provided by the switch. Please set it on the set side.
*The switch is not dustproof or waterproof. Please set it on the set side.

Detector switches | Reduction of power consumption

Switch with several circuit choices helps save power to the set

	N.O. (Normally Open type)	N.C. (Normally Closed type)
Normal position	 OFF	 ON
Lever Pressing	 ON	 OFF

<Compatible with normally closed (N.C.) specification>
Type that **turns ON when operated (Normally open)**
Type that **turns OFF when operated (Normally closed)**

Contribute to reduce power consumption.

Example/ Detection of an opening-closing cover

Cover closed state

Cover open state

ON status

OFF status

ESE18type



ESE58type



Body Size (mm) : 4.0×4.4×H1.2

Body Size (mm) : 3.5×3.0×H0.9

Circuit: N.O Circuit & N.C Circuit

Operation direction: PCB in two horizontal directions

(through operation is possible for horizontal operation)

Self-cleaning structure ensures high reliability of contacts

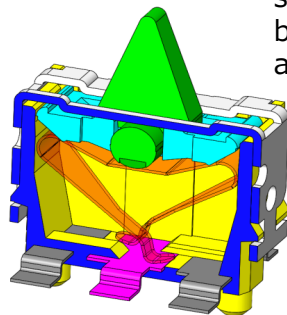
▶ Ensure high contact reliability with Original structure of plate spring wiping contacts.



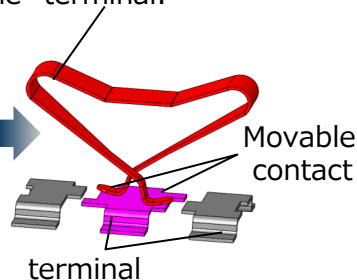
- Quality stability with simple structure
- Long life
- Stable manufacturing

Structure (example)

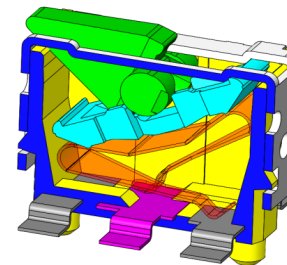
ESE24type
normal state



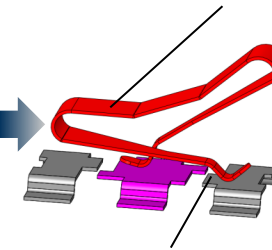
The spring force of the leaf spring makes stable contact between the "movable contact" and the "terminal."



Example of lever
left operation



The "movable contact" of the operated leaf spring slides on the "terminal" and makes stable contact

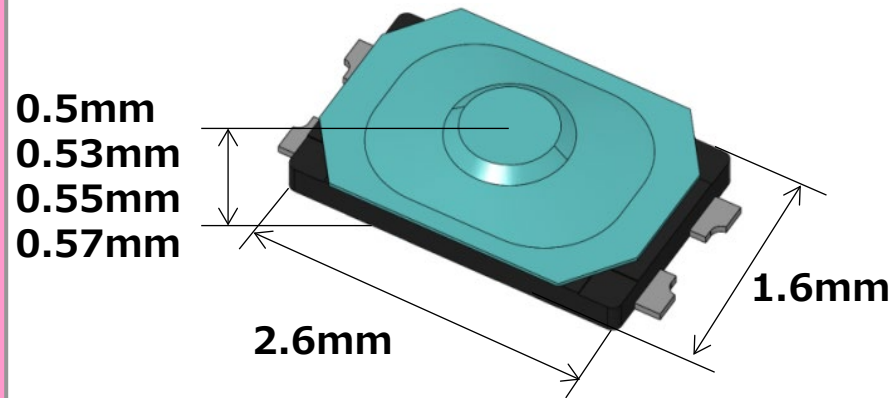


Leaf springs (movable contacts) provide stable quality and manufacturing through integrated automatic assembly from mold processing to assembly of raw materials.

Product leaflet

Top operational switch with small width dimension (1.6mm)

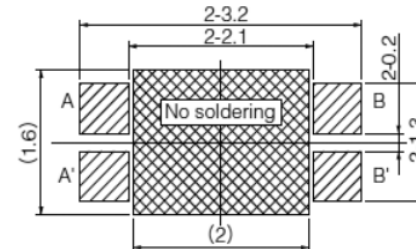
Dimension



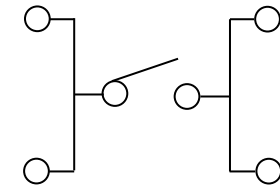
Features

- * Small width dimension (1.6mm)
- * Good feeling
(Click ratio ability target 50%)
- * High resistance against coating
by laser welding

Land Pattern



Circuit diagram

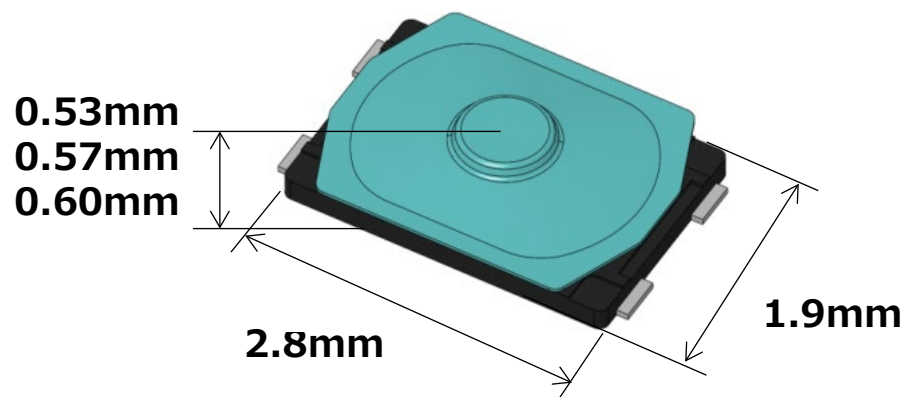


Major specifications

- * Operating force : 0.7N, 1.0N, 1.6N, 2.4N, 3.0N
- * Click ratio : 30% min.(0.7N,1.0N,3.0N)
40% min.(1.6N,2.4N)
- * Travel : 0.08mm(0.7N,1.0N)
0.11mm(1.6N,2.4N,3.0N)
- * Life cycle : 500K(1.0N,1.6N,2.4N,3.0N)
200K(0.7N)
- * IP67

Top operational switch with small width dimension (1.9mm)

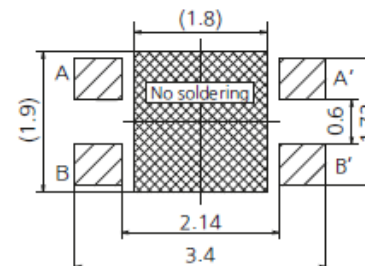
Dimension



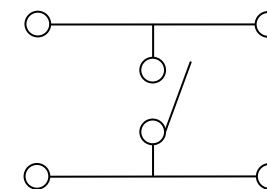
Features

- * Small width dimension
- * Good feeling
(Click ratio ability target 50%)
- * High resistance against coating
by laser welding

Land Pattern



Circuit diagram

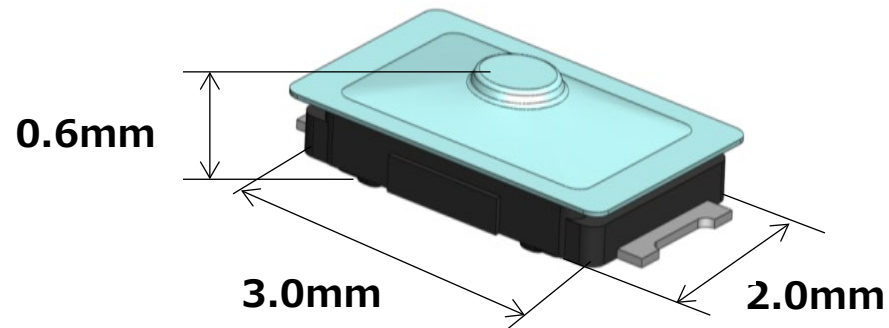


Major specifications

- * Operating force : 0.7N, 1.6N, 2.25N, 3.0N
- * Click ratio : 30% min.
- * Travel : 0.11mm(0.7N)
0.15mm(1.6N,2.25N,3.0N)
- * Life cycle : 300K
- * IP67

Top operational switch with small width dimension (2.0mm)

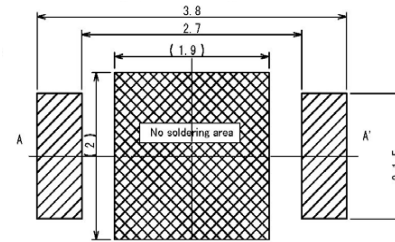
Dimension



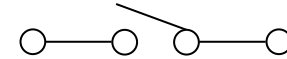
Features

- * Small width dimension (2.0mm)
- * Good feeling
(Click ratio ability target 50%)
- * High resistance against coating
by laser welding

Land Pattern



Circuit diagram

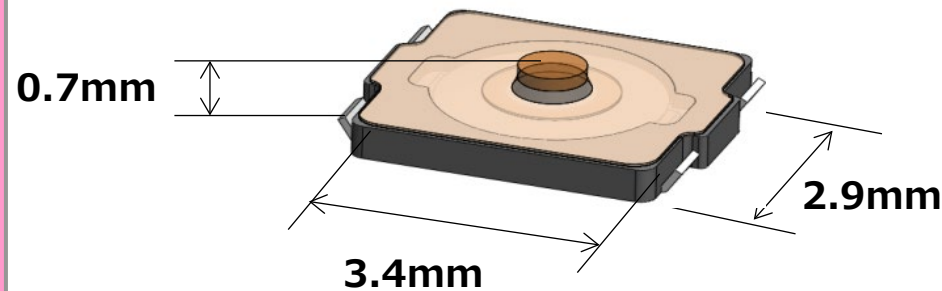


Major specifications

- * Operating force : 1.6N, 2.4N, 3.0N, 3.3N
- * Click ratio : 40% min.
- * Travel : 0.13mm (1.6N, 2.4N), 0.15mm (3.0N, 3.3N)
- * Life cycle : 500K(1.6N, 2.4N), 300K(3.0N, 3.3N)
- * IP67

Top operational switch with small depth dimension (2.9mm)

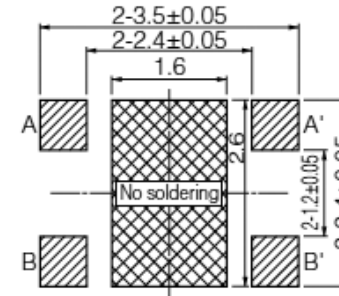
Dimension



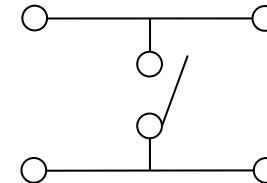
Features

- * Small width dimension
- * Good click feeling by spacer film
(only for 1.6N)
- * Good click feeling by actuator

Land Pattern



Circuit diagram

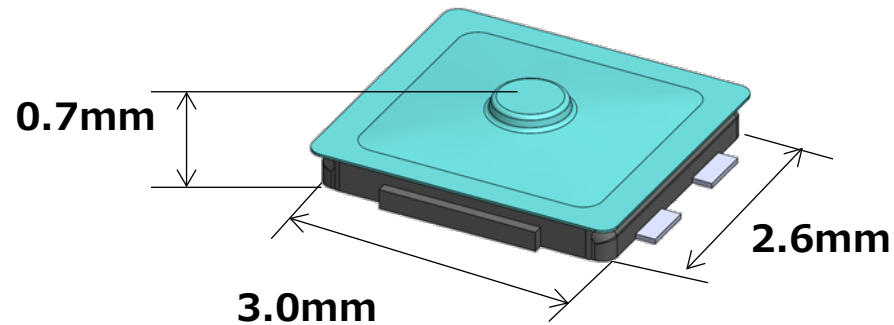


Major specifications

- * Operating force : 1.6N, 2.4N
- * Click ratio : 30% min.
- * Travel : 0.15mm
- * Life cycle : 500K
- * IP67

Double Action switch with small width dimension (2.6mm)

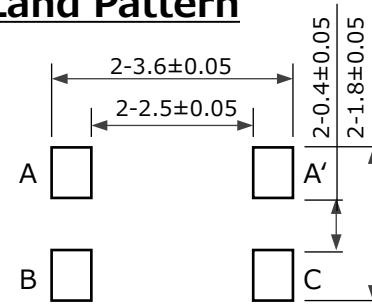
Dimension



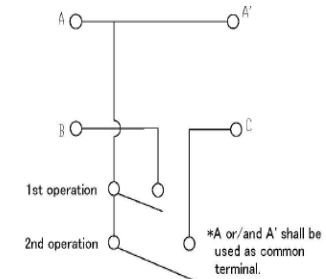
Features

- * Small width dimension
- * Double Action functionality
- * High peel strength by laser welding

Land Pattern



Circuit diagram

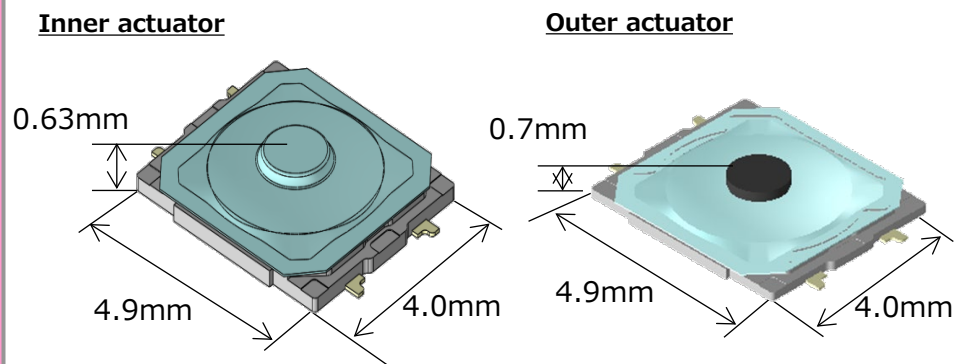


Major specifications

- * Operating force : 1st 0.7N, 2nd 2.0N
- * Travel : 1st 0.07mm, 2nd 0.16mm
- * Life cycle : 100K

Top operational switch with small height dimension

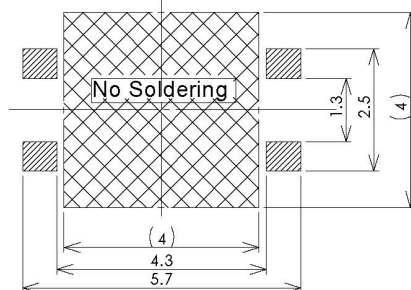
Dimension



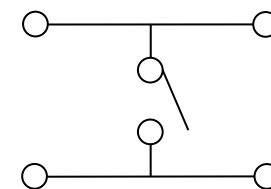
Features

- * Small height dimension
- * Good feeling
(Click ratio ability target 50%)
- * High resistance against coating
by laser welding

Land Pattern



Circuit diagram

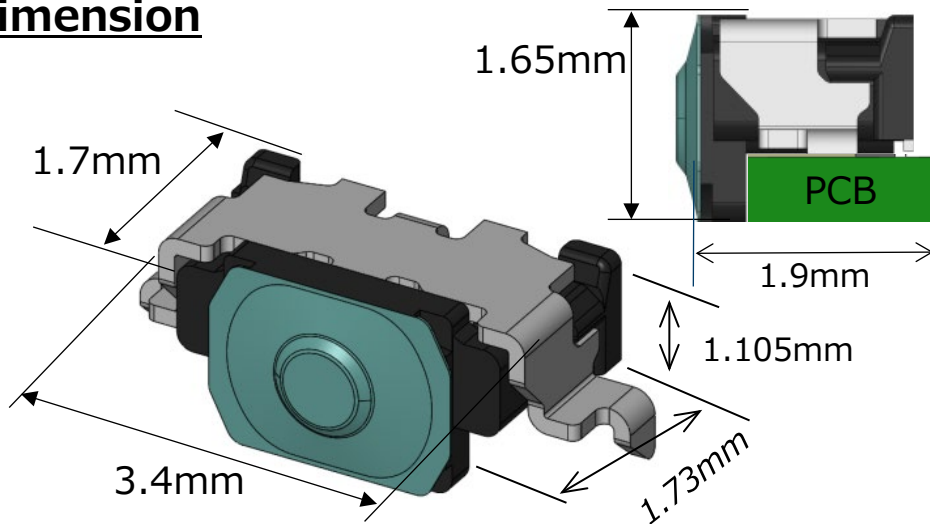


Major specifications

- * Operating force : 1.65N, 2.5N
- * Click ratio : 40% min.
- * Travel : 0.2mm(1.65N),0.23mm(2.5N)
- * Life cycle : 1,000K
- * IP67

Side operational switch with small depth dimension (1.7mm)

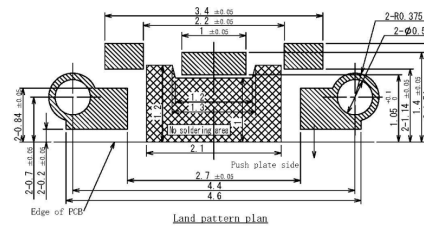
Dimension



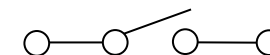
Features

- * Small size contributes smaller set design
- * High peel-off strength by edge mount structure and insertion mounting metal
- * High resistance against coating by laser welding

Land Pattern



Circuit diagram

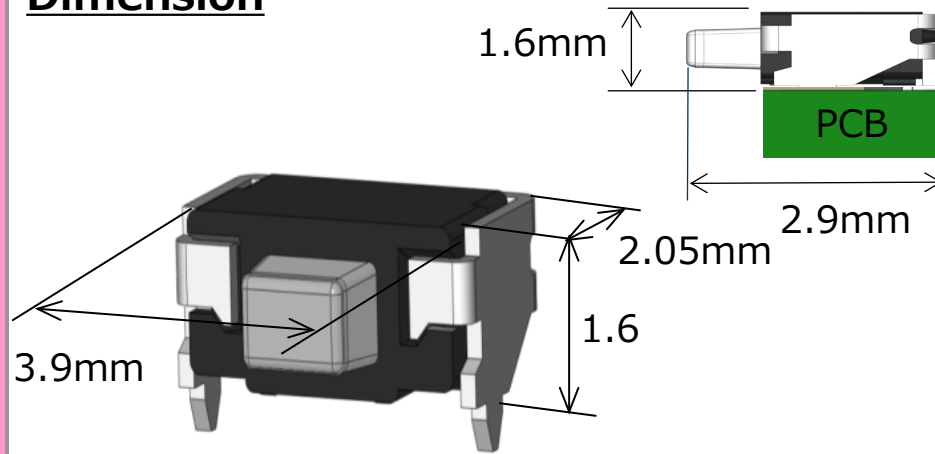


Major specifications

- * Operating force : 1.0N, 1.6N, 2.4N
- * Click ratio : 30% min.(1.0N)
40% min.(1.6N, 2.4N)
- * Travel : 0.08mm(1.0N), 0.11 mm(1.6N, 2.4N)
- * Life cycle : 500K
- * IP67

High soldering strength with depth dimension(2.05mm)

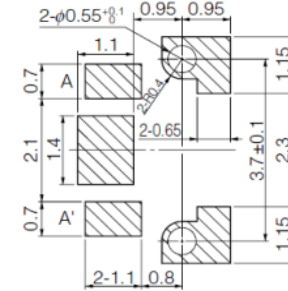
Dimension



Features

- * Small size contributes smaller set design
- * High solder peeling-off strength
by the terminal insertion
- * Water-proofing with special sticking film

Land Pattern



Circuit diagram

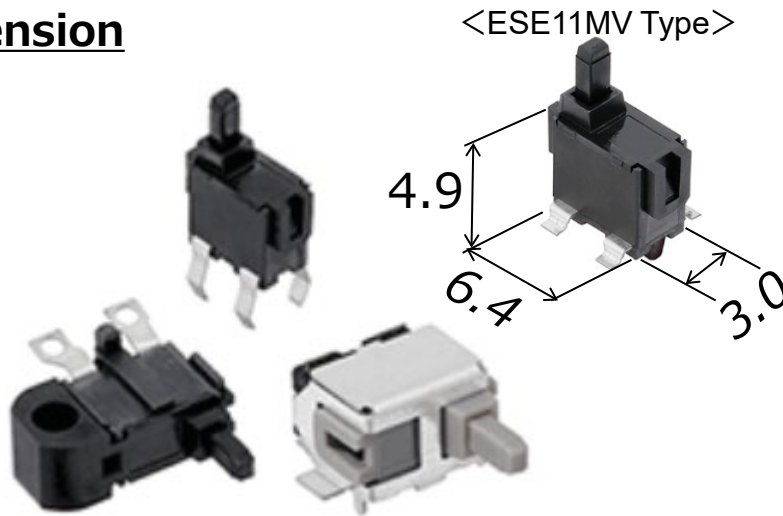


Major specifications

- * Operating force : 1.6N
- * Click ratio : 40% min.
- * Travel : 0.12mm
- * Life cycle : 500K
- * IP67

Variety of mounting forms

Dimension



Features

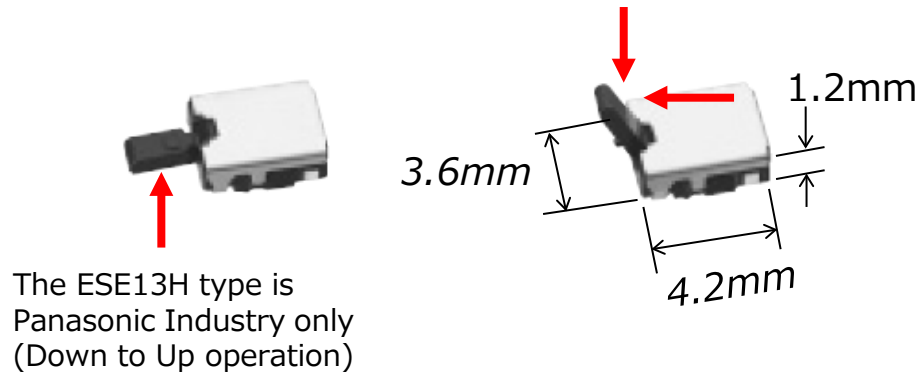
- * Variety of mounting forms available
- * Plenty of Operation Forms
- * Reflow solder type also available

Major specifications

- * Rated: 50 μ A 3 V DC to 10 mA 5 V DC (resistive load)
- * Full stroke (indentation):
 - ESE11SV Type 6.1 mm (2.4 mm)
 - ESE11MV Type 6.1 mm (2.4 mm)
 - ESE11SH Type 3.0 mm (2.4 mm)
 - ESE11MH Type 1.7 mm (2.4 mm)
 - ESE11HS Type 6.3 mm (2.4 mm)
- * Operating force: 350 mN or less
- * Life: 50 K or more
- * Number of circuits and contacts:
1 circuit 1 contact
- * Circuit type: Normally open type (N.O.)

Thin and Long Stroke

Dimension



Features

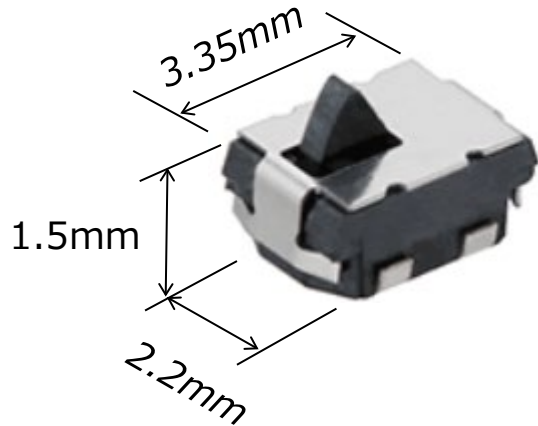
- * Compact and Thin Compatible
(Body Thickness 1.2 mm)
- * Plenty of Operation Forms
(Only Panasonic can handle ESE13H type operations)
- * Halogen Free Compatible

Major specifications

- * Rated: 50 μ A 3 V DC to 10 mA 5 V DC
(resistive load)
- * Full stroke (indentation):
ESE13V Type 0.95 mm (2.1 mm)
ESE13H Type 3.05 mm (2.1 mm)
- * Operating force: 300 mN or less
- * Life: 50 k or more
- * Number of circuits and contacts:
1 circuit 1 contact
- * Circuit type: Normally open type (N.O.)

Small

Dimension



Features

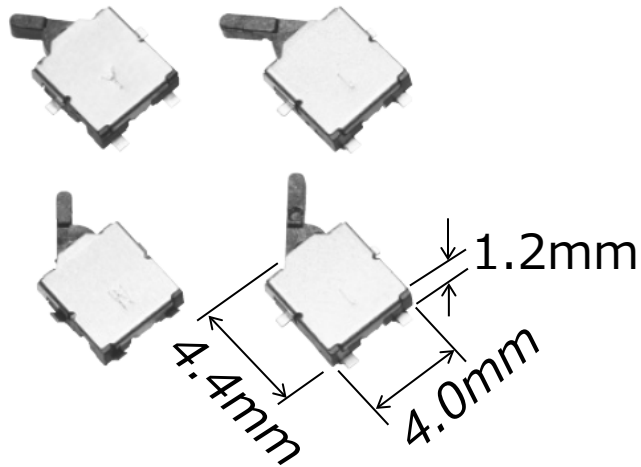
- * Compact and Thin Compatible
(Body Thickness 1.2 mm)
- * Plenty of Operation Forms
(Only Panasonic can handle ESE13H type operations)
- * Halogen Free Compatible

Major specifications

- * Rated: 50 μ A 3 V DC to 10 mA 5 V DC
(resistive load)
- * Full stroke (indentation):
1.5 mm (1.0 mm)
- * Operating force: 250 mN or less
- * Life: 50 k or more
- * Number of circuits and contacts:
1 circuit 1 contact
- * Circuit type: Normally open type (N.O.)

Thin and N.O./N.C. compatible

Dimension



Features

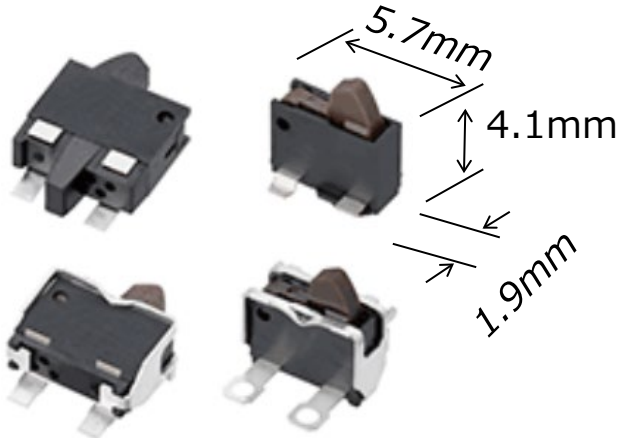
- * Compact and Thin Compatible (Body Thickness 1.2 mm)
- * Plenty of Variations (Right or left operation, N.O. or N.C. circuit compatible, lever length (Standard or Long), Terminal type)
- * Halogen Free Compatible

Major specifications

- * Rated: 50 μ A 3 V DC to 10 mA 5 V DC (resistive load)
- * Full stroke (indentation):
 - Standard stroke type
 - With boss 1.4 mm (1.5 mm)
 - Without boss 2.1 mm (1.5 mm)
 - Long stroke type
 - With boss 1.4 mm (2.15 mm)
 - Without boss 2.1 mm (2.15 mm)
- * Working force: 300 mN or less
- * Life: 50 K or more
- * Number of circuits and contacts:
 - 1 circuit 1 contact
- * Circuit type: Normally open type (N.O.)
Normally closed type (N.C.)

Variety of mounting forms and operating directions

Dimension



Features

- * Several operating directions (Horizontal, Vertical)
- * Support for reflow solder
- * Light operating force

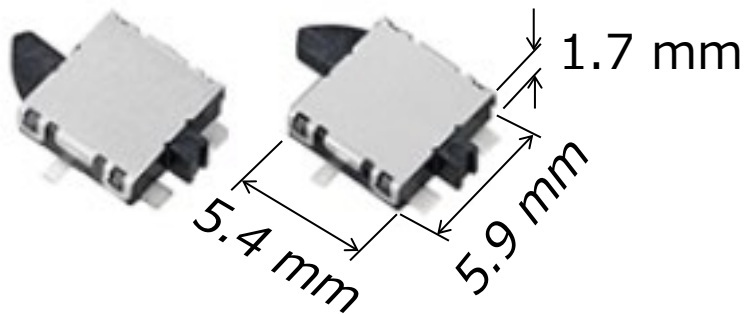
Major specifications

- * Rated: 50 μ A 3 V DC to 10 mA 5V DC(resistive load)
- * Full stroke (indentation):
 - ESE22MV-type 4.25 mm (2.05 mm)
 - ESE22MH-with Frame 0.6 mm (2.0 mm)
 - ESE22MH-type 1.2 mm (2.0 mm)
- * Operating force: 290 mN or less
- * Life: 50 K or more
- * Number of circuits and contacts:
1 circuit 1 contact
- * Circuit type: Normally open type (N.O.)

Detector switch | ESE31 type

Support multiple operating directions, Improve mounting strength

Dimension



Features

- * Increased mounting strength:
Mounting strength 80 N (reference)
- * Reduced switch height: 1.7 mm
- * Improved contact reliability

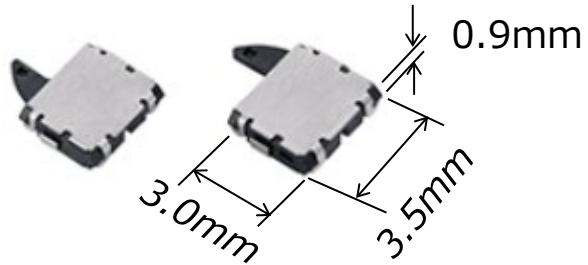
Major specifications

- * Rated: 50 μ A 3 V DC to 10 mA 5 V DC (resistive load)
- * Full stroke (indentation):
1.05 mm (2.15 mm)
- * Operating force: 390 mN or less
- * Life: 50 k or more
- * Number of circuits and contacts:
1 circuit 1 contact
- * Circuit type: Normally open type (N.O.)

Industry's Thinnest Level *

(* According to our own research,
as of March 2025)

Dimension



Features

- * Compact and Thin Compatible
(Body Thickness 0.9 mm)
- * Right or left operation, N.O. or N.C. circuit,
With Boss or Without Boss
- * Allows horizontal and vertical manipulation

Major specifications

- * Rated: 50 μ A 3 V DC to 10 mA5V DC
(resistive load)
- * Full stroke (indentation):
With boss 1.5 mm (1.4 mm)
Without boss 1.25 mm (1.4 mm)
- * Working force: 300 mN or less
- * Life: 50 K or more
- * Number of circuits and contacts:
1 circuit 2 contacts (midpoint OFF)
- * Circuit type: Normally open type (N.O.)
Normally closed type (N.C.)

Panasonic
INDUSTRY