

# Navigation Switches

## Product Selection Guide

Navigation						
Series		TSW	TPA	TPC	QSA	Spring Finger
Number of directions		3 7	3 4 5	3	2 4	1 2
Size on PCB L x W (mm)		∅ 21 ∅ 34,4	9,3 x 8	11,5 x 5,3	23 x 18	4,19 x 0,8
Total Height (mm)		3,5 6,0	5	1,65	H1 - 22,4 H3 - 23,5	0,9 min.
Actuator Type		Custom	Hard, custom	Scroll, custom	Hard, custom	Dome
Actuation Force (N)		2,2	1,8 scanning 4,0 selection	0,8 scanning 1,8 select	3,5	2,0
Contact Type		Silver	Silver Gold	Silver Gold	Gold	Gold
Max. Voltage (V)		10	24 24	32	30	32
Max. Switching Power (VA)		.01	1 0.2	1	0.2	1
Life Cycles/ per way		1,000,000	200,000	150,000 (cumulated operations)	100,000	100,000
Sealing		Not sealed	IP50	IP40	Not sealed	Flux tight
Page Number		C-3	C-7	C-10	C-13	C-16



Navigation

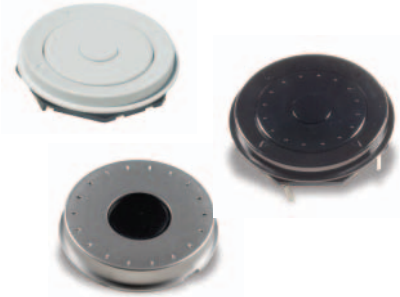
# TSW Series 3 or 7 Function Tact and Scroll Wheel

## Features/Benefits

- Compact and slim
- Multiple function in one component (rotary, select)
- Easy installation
- Through hole termination
- Integrated decoration (B type)

## Typical Applications

- Remote controls
- Desk phones
- Keyboards
- Printers
- Entertainment systems
- White goods



## Operation Characteristics

OPERATING FORCE: See chart below  
24 detent - 12 pulses/360°

## Specifications

INITIAL CONTACT RESISTANCE: Max. 300mΩ  
INSULATION RESISTANCE: Min. 100 MΩ (100 VDC)  
RATING: 1mA 10 VDC  
LIFE CYCLE: See chart below  
OPERATING FREQUENCY:  
Rotation - Max. 30 operations per minute  
Push - Max. 120 operations per minute  
Depression - Max. 300 gf

## Environmental

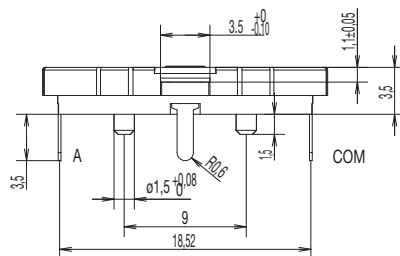
OPERATING TEMPERATURE: 0°C / 40°C  
STORAGE TEMPERATURE: -40°C / 70°C  
VIBRATION RESISTANCE: 10 ~ 55 Hz, displacement 0.75mm (p-p)  
SHOCK RESISTANCE: Destruction 1,000 m/s<sup>2</sup> (approx. 100G) max.  
WAVE SOLDERING: Max. 260°C for 5 seconds  
HAND SOLDERING: Max. 260°C for 5 seconds

Designation	Number of Circuits	Rotation Actuation Force	Push Actuation Force	Cycle Life Rotation (per direction)	Cycle Life Push
TSWA	3	Max. 60g - cm	220g ± 50g	1,000K cycles	1,000K cycles
TSWB	5	Max. 50g - cm	Max 300g	1,000K cycles	1,000K cycles

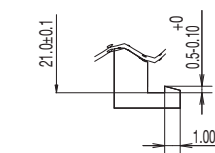
Part Number	Description	Tray	Box
TSWA-3N-C LFS	Base switch with jog and select, no decoration	80	160
TSWA-3N-CB11 LFS	Base switch with jog and select, white central button, white dial	65	130
TSWA-3N-CD23 LFS	Base switch with jog and select, black central button, grey dial	30	60
TSWB-3N-CB111 LFS	Central select with jog and 4 directions, white central button, dial & direction ring	30	60
TSWB-3N-CB222 LFS	Central select with jog and 4 directions, black central button, dial & direction ring	30	60

## TSWA-3N-C LFS

Base switch with jog and select, no decoration



## COVER DESIGN GUIDELINE

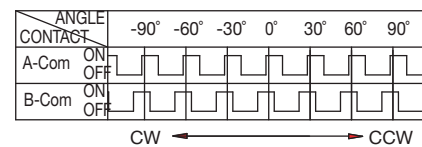


## CONTACT CONFIGURATION

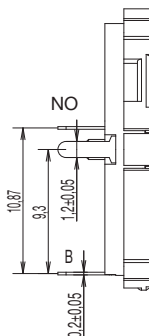
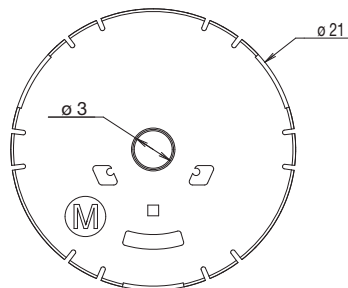
Push



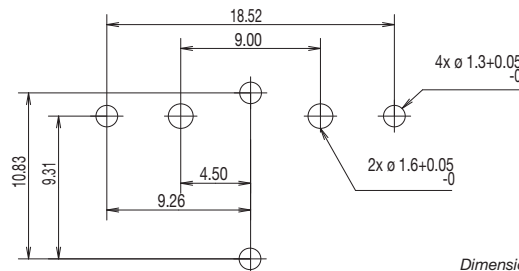
## Rotation output waveform



Numbers of detent : 24  
Pulse/Rotation : 12 pulse/360°



## PCB LAYOUT



Dimensions are shown: mm  
Specifications and dimensions subject to change



# TSW Series

## 3 or 7 Function Tact and Scroll Wheel

### TSWA-3N-CB11 LFS

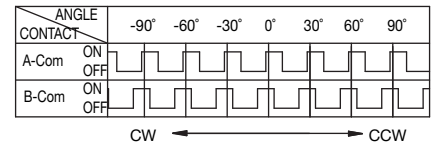
Base switch with jog and select, white central button, white dial

#### CONTACT CONFIGURATION

Push



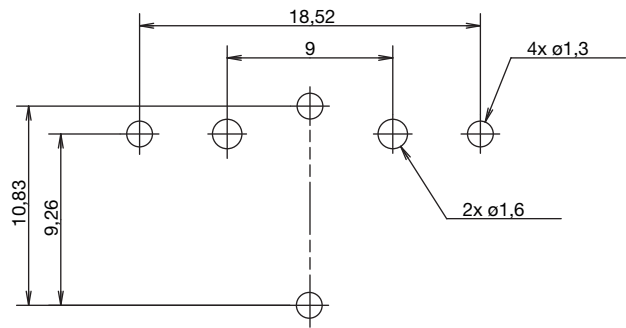
#### Rotation output waveform



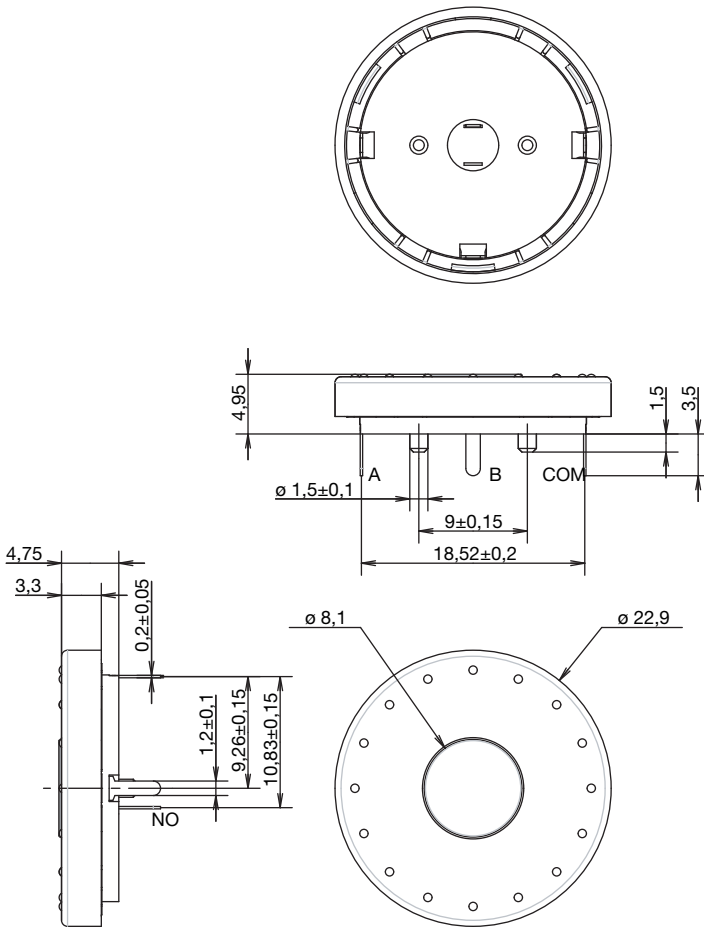
Numbers of detent : 24

Pulse/Rotation : 12 pulse/360°

#### PCB LAYOUT



Navigation



First Angle  
Projection

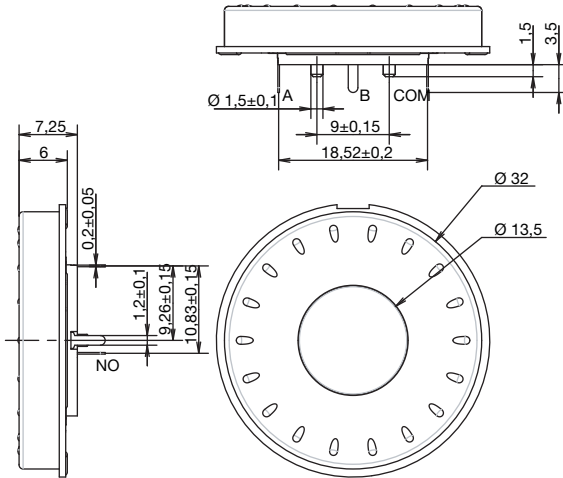
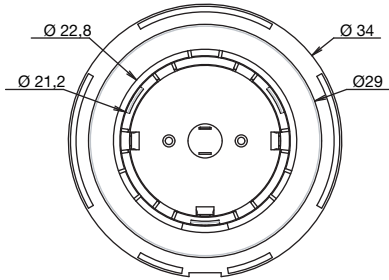
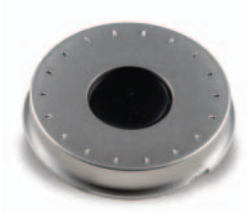
Dimensions are shown: mm  
Specifications and dimensions subject to change

# TSW Series

## 3 or 7 Function Tact and Scroll Wheel

### TSWA-3N-CD23 LFS

Base switch with jog and select, black central button, grey dial

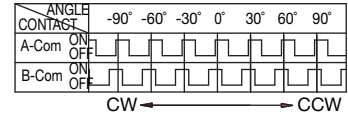


#### CONTACT CONFIGURATION

Push

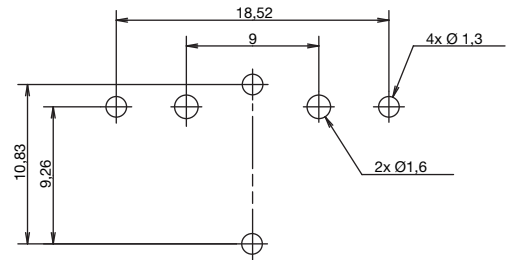


#### Rotation output waveform



Numbers of detent : 24  
Pulse/Rotation : 12 pulse/360°

#### PCB LAYOUT



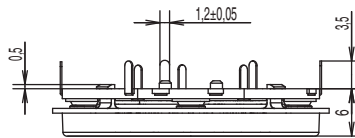
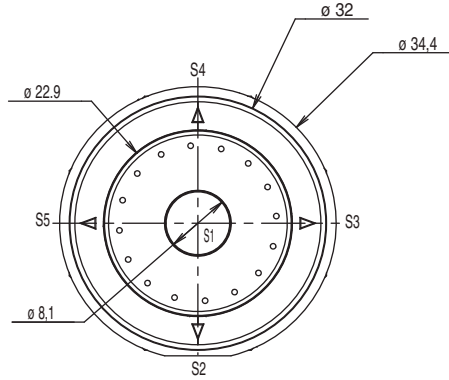
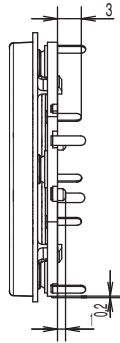
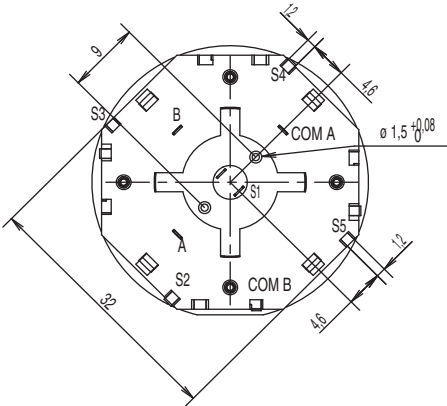
Navigation

# TSW Series

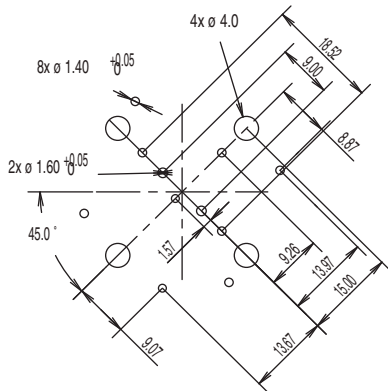
## 3 or 7 Function Tact and Scroll Wheel

**TSWB-3N-CB111 LFS**  
**TSWB-3N-CB222 LFS**

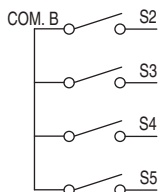
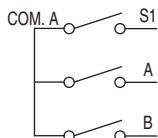
Central select with jog and 4 directions, white central button, dial & direction ring  
 Central select with jog and 4 directions, black central button, dial & direction ring



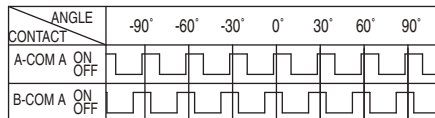
PCB LAYOUT



ELECTRICAL FUNCTION



Rotational Output Waveform



CW ← → CCW

Numbers of detent : 24  
 Pulse/Rotation : 12 pulse/360°

Navigation



First Angle Projection

Dimensions are shown: mm  
 Specifications and dimensions subject to change



# TPA Series Multi-direction SMT Navigation Switch

## Features/Benefits

- One touch, 5 way switching
- Distinctive tactile feel for scanning and select functions
- Normally open momentary contacts
- Push down to select possible in any position
- Optional pegs for improved mechanical strength and easier PCB positioning
- RoHS compliant and compatible

## Typical Applications

- Electronic devices requiring direct control on LCD display
- MP3 player
- Bluetooth Headset
- Digital cameras
- GPS navigation systems
- Home entertainment systems
- Security



## Construction

FUNCTION: Multi-directional momentary action  
 CONTACT ARRANGEMENT: Make contact = SP, N.O.  
 TERMINALS: Gullwing type for SMT  
 IP50

## Mechanical

SHAFT DISPLACEMENT:  
 Orthogonal 4 horizontal directions  
 Vertical Push down  
 TRAVEL TO MAKE:  
 Orthogonal 0.35 mm±0.15 mm  
 Push to select 0.25 mm±0.15 mm  
 OPERATING FORCE:  
 Scanning Orthogonal 1.8 N ± 0.5 N  
 Push to select Vertical 4.0 N ± 0.8 N  
 MAXIMUM APPLIED FORCE:  
 Scanning 20N  
 Select 40N  
 Button design may prevent overload (see next page)  
 LIFE EXPECTANCY:  
 Scanning 200,000 operations in each direction  
 Push to select 200,000 operations

## Electrical

	Silver	Gold
MAXIMUM POWER:	1 VA	0.2 VA
MAXIMUM VOLTAGE:	24 V	24 V
MAXIMUM CURRENT DC:	50 mA	10 mA
MINIMUM CURRENT DC:	1 mA	1 mA

DIELECTRIC STRENGTH: 250 Vrms  
 CONTACT RESISTANCE, INITIAL: 200 mΩ  
 INSULATION RESISTANCE (100 VDC): 100 MΩ  
 BOUNCE TIME: < 10 ms

## Environmental

	Silver	Gold
OPERATING TEMPERATURE:	-40°C to +85°C	-40°C to +85°C
STORAGE TEMPERATURE:	-40°C to +85°C	-40°C to +85°C

## Packaging

Tape and reels in reels of 1,000 pieces.  
 External diameter 330mm ± 2mm.

## Process

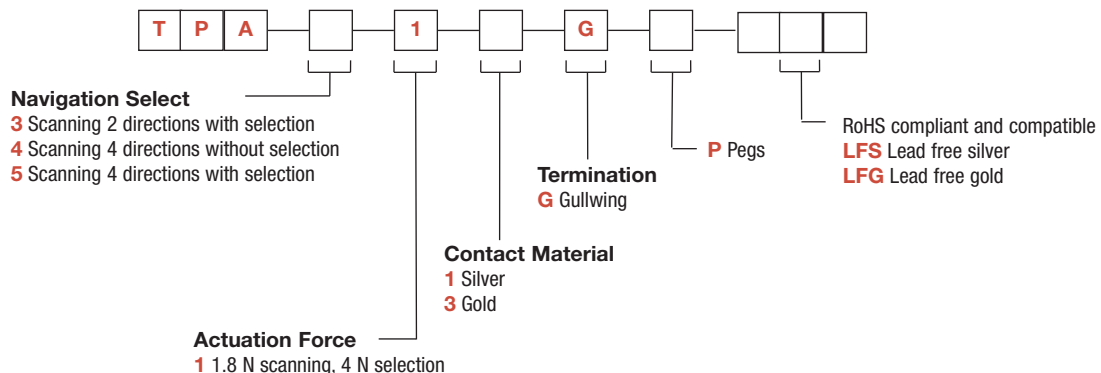
Infrared reflow soldering in accordance with IEC 61760-1

**Note:** Specifications listed above are for switches with standard options.

## How To Order

Our easy build-a-switch concept allows you to mix and match options to create the switch you need. To order, select desired option from each category and place it in the appropriate box.

### SWITCH



Dimensions are shown: mm  
 Specifications and dimensions subject to change





# TPC Series Tri-direction Scan Switch



## Features/Benefits

- One touch, 3 way switching
- Superior tactile feel
- Rotation of actuator closes two individual contacts
- Ultra-low profile housing
- Normally open contacts
- Custom actuator by request
- RoHS compliant and compatible

## Typical Applications

- Mobile phones
- PDA
- Handheld electronic devices
- Digital cameras, camcorders
- Communication equipment

## Construction

FUNCTION: Multi-directional momentary action  
CONTACT ARRANGEMENT: Make contact = SP, N.O.  
TERMINALS: Gullwing type for SMT

## Mechanical

MAXIMUM ACTUATION FORCE: 20 N (select), 10 N (left & right).  
OPERATING FORCE/TRAVEL:

Direction	Actuation Force	Travel
Left	0.8 ± 0.5 N	16° ± 4°
Right	0.8 ± 0.5 N	16° ± 4°
Select	1.8 ± 0.6 N	0.75 +/-0.15 mm

Operating life = 150 K cumulated operations (50 K ops in both scanning directions then 50 K ops in select direction)

## Packaging

Tape and reels in reels of 2,000 pieces.  
External diameter 330mm ± 2mm.

## Electrical

MAXIMUM POWER: 1.0 VA  
MAXIMUM VOLTAGE: 32 V  
MAXIMUM CURRENT DC: 50 mA  
MINIMUM CURRENT DC: 1 mA  
LOW LEVEL USE: 20mV-1mA  
DIELECTRIC STRENGTH: 250 Vrms  
CONTACT RESISTANCE: ≤ 300 mΩ (select) ≤ 1Ω (left & right)  
INSULATION RESISTANCE (100 VDC): 10<sup>9</sup> Ω  
BOUNCE TIME: < 10 ms

## Environmental

	SILVER	GOLD
OPERATING TEMPERATURE:	-40°C to 85°C	-40°C to 125°C
STORAGE TEMPERATURE:	-55°C to 85°C	-55°C to 125°C

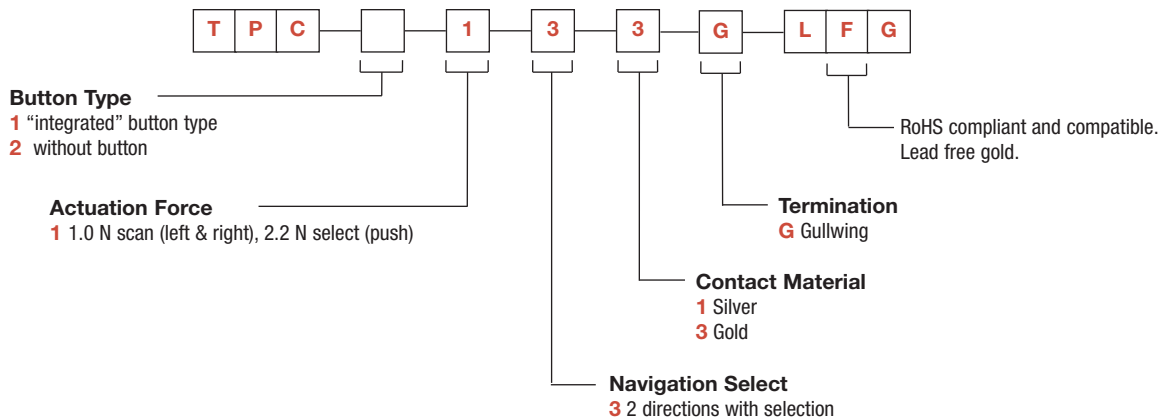
## Process

Infrared reflow soldering in accordance with IEC 61760-1

**Note:** Specifications listed above are for switches with standard options.

## How To Order

Our easy build-a-switch concept allows you to mix and match options to create the switch you need. To order, select desired option from each category and place it in the appropriate box.



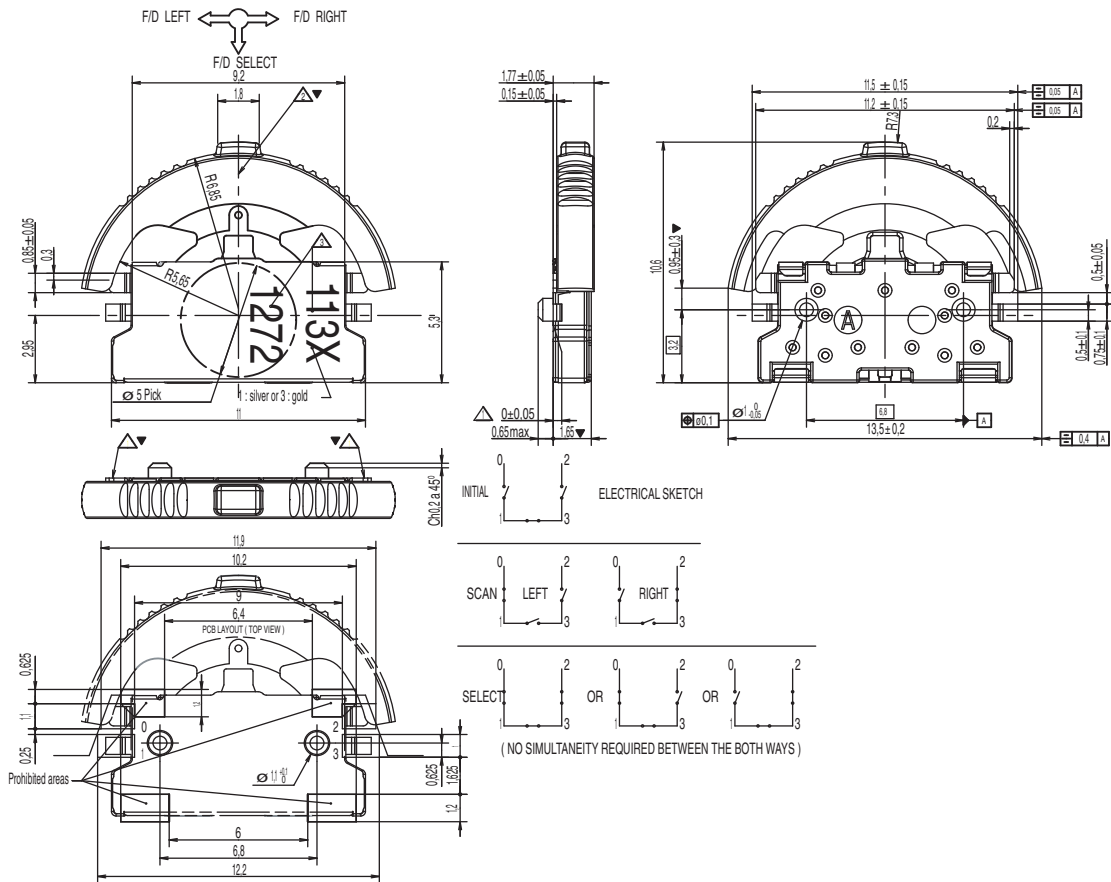
First Angle  
Projection

Dimensions are shown: mm

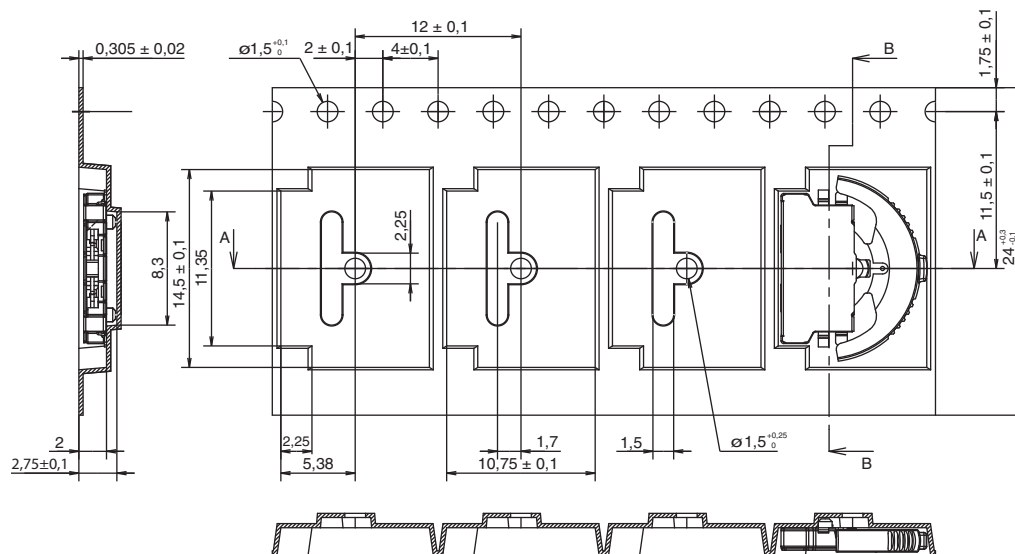
Specifications and dimensions subject to change

# TPC Series Tri-direction Scan Switch

## TPC 1133G



## TAPE & REEL

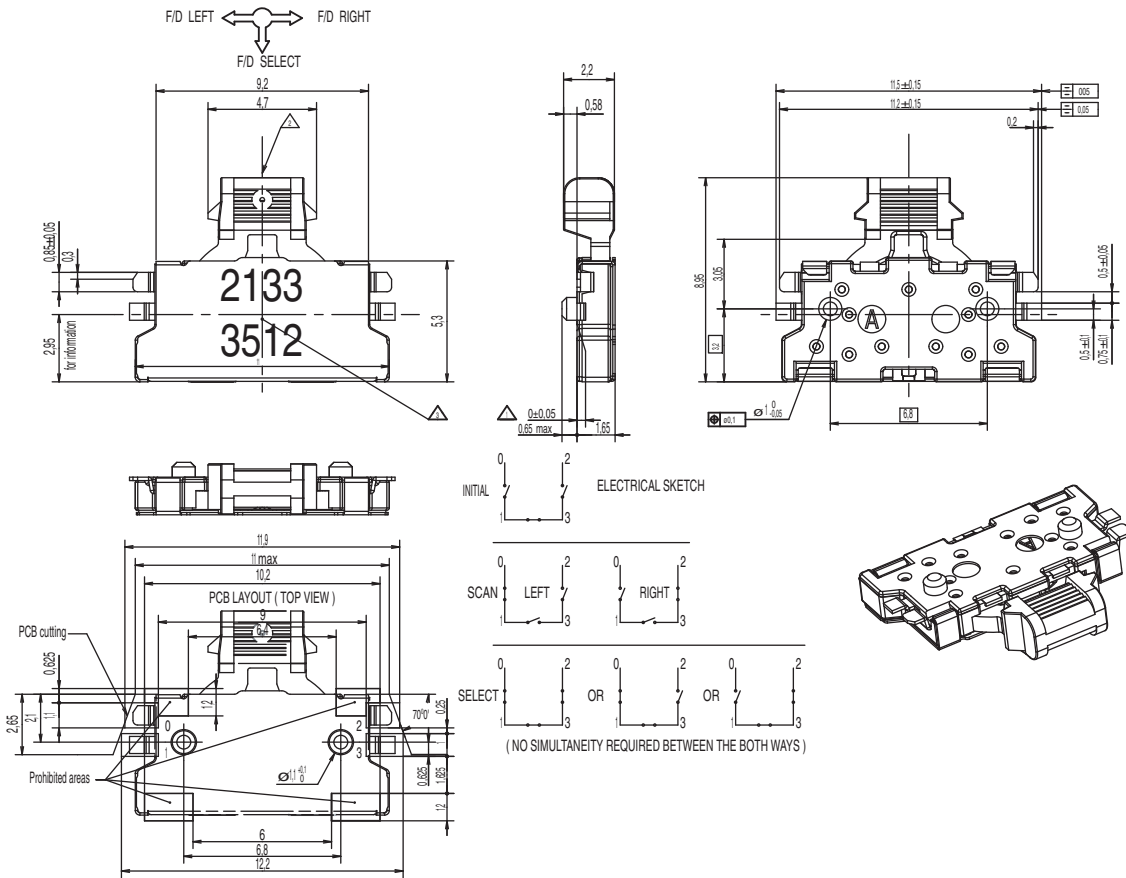


Dimensions are shown: mm  
Specifications and dimensions subject to change

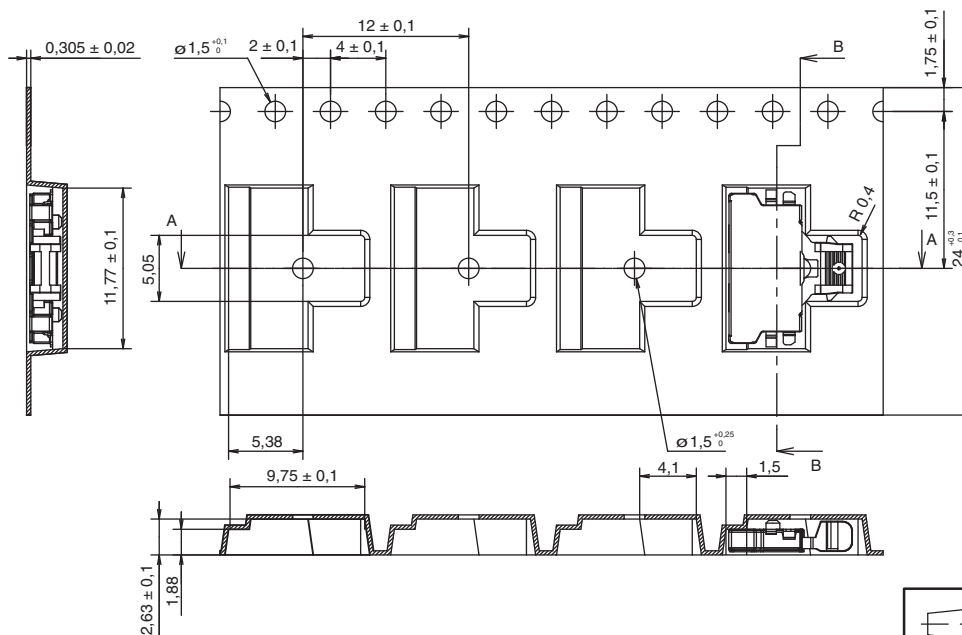


# TPC Series Tri-direction Scan Switch

TPC2133G



## TAPE & REEL



First Angle Projection

Dimensions are shown: mm  
Specifications and dimensions subject to change



# QSA Series Silent Navigation Switch for SMT

## Features/Benefits

- Excellent tactile feel
- Plunger can be custom designed
- SMT switch adapted for low current
- Only actuate 1 direction at a time
- Provides logic level control
- RoHS compliant

## Typical Applications

- Seat adjustments
- Industrial controls
- Mirror adjustment
- Home entertainment
- Multi-function steering wheel



## Construction

FUNCTION:	QSA2: 2 way switch QSA4: 4 way switch
TYPE OF SWITCH:	QSA2: 2x make contacts QSA4: 4x make contacts
FOOTPRINT:	23 mm x 18 mm, operating direction diagonal
HEIGHT:	Housing: 9 mm, total height: 22,4 mm (H1 version)
PINS:	Solder pins, SMD
ATTACHMENT:	Snap-in pegs provided to help secure and locate switches
ACTUATOR:	ø3,5 mm with button fastener

## Mechanical

OPERATION DIRECTION:	In X-Y direction along the diagonal axis of the switch. Rotation point is 5,5 mm over the PCB surface.
TRAVEL: (H1 G8 version)	Travel of the actuator measured on an axis parallel to and 19 mm above PCB. switch point/stop (4,0 N force) 1,2 ± 0,4 mm / 1,9+0,5 mm
ACTUATION ANGLE:	G8 version To switch point / stop (4,0 N force) 6,5° / 8,5°
ACTUATION FORCE:	3,3 ± 1 N
TACTILE EFFECT:	15%
LIFE:	30,000 cycles in each direction (≤ 20 N force)

For further information and test reports concerning life, please consult factory.

## Mechanical (continued)

RETURN FORCE:	0,8 ± 0,3N
ACTUATION STRENGTH:	>50 N, parallel to PCB >100 N, vertical (push) to PCB >50 N traction (pull) force

## Electrical

SWITCHING POWER MAX:	0,20 VA
MIN / MAX SWITCHING VOLTAGE: (VDC)	20mV / 30 V
MIN / MAX SWITCHING CURRENT:	1mA / 50mA
BOUNCE:	< 1 ms

## Environmental

OPERATING TEMPERATURE:	-40°C to 85°C
STORAGE TEMPERATURE:	-40°C to 95°C

## Process

AUTOMATIC SOLDERING: Reflow compatible per CECC00802

## Other Data

CONTACT MATERIAL:	Au on Ni layer
SOLDERING PINS:	Au flash
HOUSING MATERIAL:	Thermoplastic

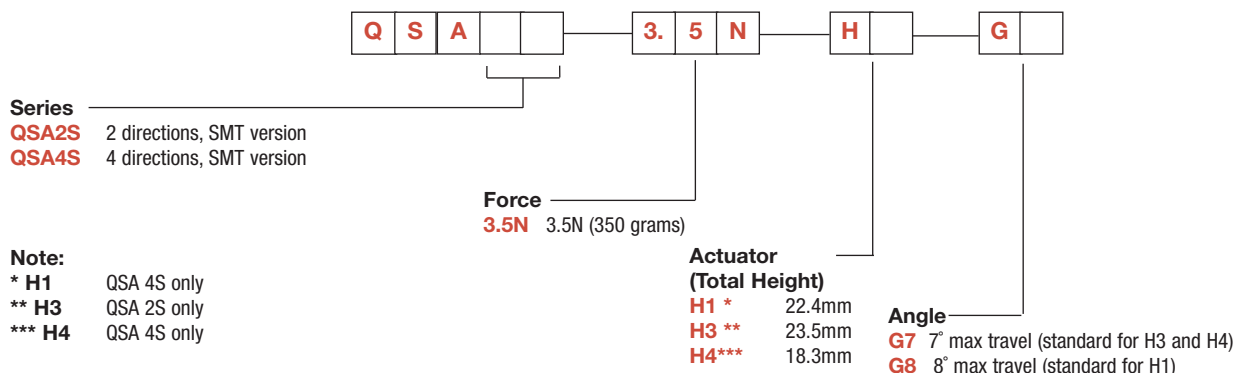
## Packaging

Trays 80 pieces.

**Note:** Specifications listed above are for switches with standard options. For information on specific and custom switches, consult Customer Service Center.

## How To Order

Our easy build-a-switch concept allows you to mix and match options to create the switch you need. To order, select desired option from each category and place it in the appropriate box.







# Spring Finger Contact Switch



## Features/Benefits

- Ultra thin construction
- Solderless
- High performance in drop test
- Reduced space on PCB

## Typical Applications

- Cell phones
- Medical
- MP3 player
- Audio headsets
- Automotive

## Construction (typical)

FUNCTION: Momentary action  
 CONTACT ARRANGEMENT: Normally open  
 CONNECTIONS: Spring Finger  
 MOUNTING: Springloaded

## Mechanical (typical)

MAXIMUM ACTUATION FORCE: 20 N (4.4 lbs.)  
 OPERATING FORCE/LIFE/TRAVEL:

Actuation Force	Life Expectancy	Travel to Make	Total
2 N ± 50%	100,000 operations	0.15 mm+0.15/-0mm	0.45 mm

## Electrical (typical)

	Silver	Gold
MAXIMUM POWER:	1 VA	0.2 VA
MAXIMUM VOLTAGE:	32 V	32 V
MAXIMUM CURRENT DC:	50 mA	10 mA
MINIMUM CURRENT DC:	1 mA	1 mA

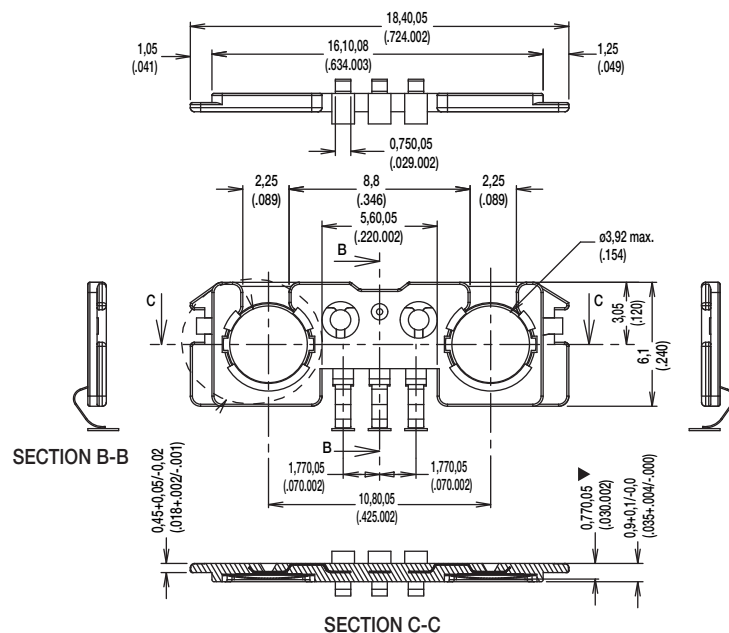
DIELECTRIC STRENGTH: 250 Vrms  
 CONTACT RESISTANCE: ≤500 mΩ  
 INSULATION RESISTANCE (100 VDC): 10<sup>9</sup> Ω  
 BOUNCE TIME: < 5 ms

## Environmental (typical)

OPERATING TEMPERATURE: -40°C to +85°C  
 STORAGE TEMPERATURE: -55°C to 125°C

## How To Order

Standard part numbers are not available for this product line. The Spring Finger switch is designed to meet application specific requirements. Consult our Customer Service Center to discuss your application.



Actuation force can be specified in order to meet custom requirements.

ESD Shielding up to 12KV is possible.

Lock feature of Spring Finger contact switches in casing with button is possible.

The PCB contact area and positioning on the Spring Finger terminals are specified in order to meet custom requirements.

The Spring Finger tact switches material and construction excel in shock, vibration and mechanical stress tests.

These characteristics are the same for gold plated contact versions.



First Angle Projection

Dimensions are shown: mm  
 Specifications and dimensions subject to change