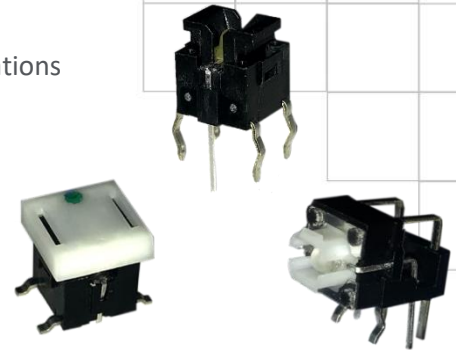


Series 228F

7.4 x 7.0mm Illuminated Tactile Switch

- Surface mount gull-wing terminal or standard through hole configurations
- Compatible with IR reflow, manual soldering
- Single color display during illumination
- Variety of LED color options
- Halogen Free



Ordering Information

Series	Terminal Type	Actuating Direction	Actuation Force	LED Color	LED Type	Packaging																																																																												
228F	D	S	A	R	B	R																																																																												
<table><tr><th>Code</th><th>Spec.</th></tr><tr><td>D</td><td>Standard though hole</td></tr><tr><td>M</td><td>Surface mount gull wing</td></tr></table>		Code	Spec.	D	Standard though hole	M	Surface mount gull wing	<table><tr><th>Code</th><th>Spec.</th></tr><tr><td>V</td><td>Vertical</td></tr><tr><td>*S</td><td>Side</td></tr></table> *Side actuation is only available with standard though hole terminal		Code	Spec.	V	Vertical	*S	Side	<table><tr><th>Code</th><th>Spec.</th></tr><tr><td>A</td><td>Amber</td></tr><tr><td>B</td><td>Blue</td></tr><tr><td>G</td><td>Pure Green</td></tr><tr><td>L</td><td>Olive Green</td></tr><tr><td>R</td><td>Red</td></tr><tr><td>W</td><td>White</td></tr><tr><td>Y</td><td>Yellow</td></tr><tr><td>BA</td><td>Blue & Amber</td></tr><tr><td>GA</td><td>Pure Green & Amber</td></tr><tr><td>LA</td><td>Olive Green & Amber</td></tr><tr><td>LR</td><td>Olive Green & Red</td></tr><tr><td>LY</td><td>Olive Green & Yellow</td></tr><tr><td>RB</td><td>Red & Blue</td></tr><tr><td>RL</td><td>Red & Olive Green</td></tr><tr><td>WA</td><td>White & Amber</td></tr><tr><td>YW</td><td>Yellow & Red</td></tr></table>		Code	Spec.	A	Amber	B	Blue	G	Pure Green	L	Olive Green	R	Red	W	White	Y	Yellow	BA	Blue & Amber	GA	Pure Green & Amber	LA	Olive Green & Amber	LR	Olive Green & Red	LY	Olive Green & Yellow	RB	Red & Blue	RL	Red & Olive Green	WA	White & Amber	YW	Yellow & Red	<table><tr><th>Code</th><th>Spec.</th></tr><tr><td>R</td><td>Tape & reel packaging (only available for surface mount gull wing type)</td></tr><tr><td>Blank</td><td>Tray packaging (only available for side standard thought hole type)</td></tr><tr><td>B</td><td>Tube packaging (only available for vertical standard through hole type)</td></tr></table>	Code	Spec.	R	Tape & reel packaging (only available for surface mount gull wing type)	Blank	Tray packaging (only available for side standard thought hole type)	B	Tube packaging (only available for vertical standard through hole type)																						
Code	Spec.																																																																																	
D	Standard though hole																																																																																	
M	Surface mount gull wing																																																																																	
Code	Spec.																																																																																	
V	Vertical																																																																																	
*S	Side																																																																																	
Code	Spec.																																																																																	
A	Amber																																																																																	
B	Blue																																																																																	
G	Pure Green																																																																																	
L	Olive Green																																																																																	
R	Red																																																																																	
W	White																																																																																	
Y	Yellow																																																																																	
BA	Blue & Amber																																																																																	
GA	Pure Green & Amber																																																																																	
LA	Olive Green & Amber																																																																																	
LR	Olive Green & Red																																																																																	
LY	Olive Green & Yellow																																																																																	
RB	Red & Blue																																																																																	
RL	Red & Olive Green																																																																																	
WA	White & Amber																																																																																	
YW	Yellow & Red																																																																																	
Code	Spec.																																																																																	
R	Tape & reel packaging (only available for surface mount gull wing type)																																																																																	
Blank	Tray packaging (only available for side standard thought hole type)																																																																																	
B	Tube packaging (only available for vertical standard through hole type)																																																																																	
		<table><tr><th>Code</th><th>Spec.</th></tr><tr><td>A</td><td>160 gf</td></tr></table>		Code	Spec.	A	160 gf	<table><tr><th></th><th>228FDV</th><th>228FMV</th><th>228FDS</th></tr><tr><td>A</td><td>v</td><td>v</td><td>v</td></tr><tr><td>B</td><td>v</td><td>v</td><td>v</td></tr><tr><td>G</td><td></td><td></td><td>v</td></tr><tr><td>L</td><td>v</td><td>v</td><td>v</td></tr><tr><td>R</td><td>v</td><td>v</td><td>v</td></tr><tr><td>W</td><td>v</td><td>v</td><td>v</td></tr><tr><td>Y</td><td>v</td><td>v</td><td>v</td></tr></table>			228FDV	228FMV	228FDS	A	v	v	v	B	v	v	v	G			v	L	v	v	v	R	v	v	v	W	v	v	v	Y	v	v	v	<table><tr><th></th><th>228FDV</th><th>228FMV</th><th>228FDS</th></tr><tr><td>BA</td><td>v</td><td>v</td><td>v</td></tr><tr><td>GA</td><td></td><td></td><td>v</td></tr><tr><td>LA</td><td>v</td><td>v</td><td></td></tr><tr><td>LR</td><td></td><td></td><td>v</td></tr><tr><td>LY</td><td>v</td><td>v</td><td>v</td></tr><tr><td>RB</td><td>v</td><td>v</td><td>v</td></tr><tr><td>RL</td><td>v</td><td>v</td><td></td></tr><tr><td>WA</td><td></td><td></td><td>v</td></tr><tr><td>YW</td><td>v</td><td>v</td><td></td></tr></table>		228FDV	228FMV	228FDS	BA	v	v	v	GA			v	LA	v	v		LR			v	LY	v	v	v	RB	v	v	v	RL	v	v		WA			v	YW	v	v	
Code	Spec.																																																																																	
A	160 gf																																																																																	
	228FDV	228FMV	228FDS																																																																															
A	v	v	v																																																																															
B	v	v	v																																																																															
G			v																																																																															
L	v	v	v																																																																															
R	v	v	v																																																																															
W	v	v	v																																																																															
Y	v	v	v																																																																															
	228FDV	228FMV	228FDS																																																																															
BA	v	v	v																																																																															
GA			v																																																																															
LA	v	v																																																																																
LR			v																																																																															
LY	v	v	v																																																																															
RB	v	v	v																																																																															
RL	v	v																																																																																
WA			v																																																																															
YW	v	v																																																																																

Consult CTS if you have demands for specific cap type

Consult CTS if you have demands for specific cap type

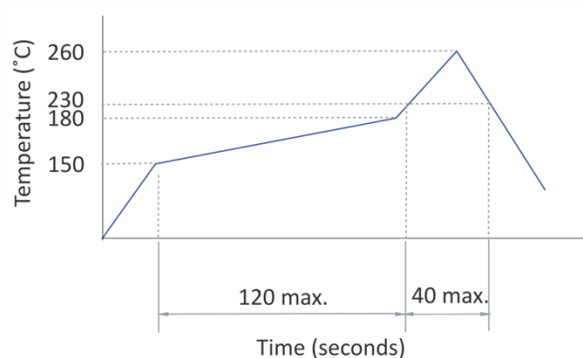
Electrical Specifications

Parameter	Conditions & Remarks	Min	Max	Unit
Contact Resistance			100	milliohms
Insulation Resistance	Between insulated terminals	100		megohms
Dielectric Strength	250 VAC between adjacent switches		1	minute
Nonswitching Rating			50 or 12	mA or VDC

Mechanical and Environmental

Soldering	Maximum manual temperature, 350°C for 3 seconds Maximum reflow temperature, 260°C for 5 seconds (vertical standard through hole) Maximum reflow temperature, 255°C for 5 seconds (side standard through hole) Maximum reflow temperature, 260°C for 3 seconds (vertical surface mount)
RoHS	Lead-Free. Fully compliant to RoHS Directive 2011/65/EU
Halogen Free	Halogen Free
Operating Force	160±50 gf
Actuation Life	228FMV/228FDS: 100,000 cycles 228FDV: 500,000 cycles
Actuator Strength	Push: 3 Kgf maximum Pull: 1 Kgf minimum
Travel	0.25 ^{+0.2} _{-0.1} mm
Packaging	Tray packaging for side standard through hole Tube packaging for vertical standard through hole Tape & Reel packaging for vertical surface mount
Operating Temperature Range	-20°C to +70°C
Storage Temperature Range	-30°C to +80°C

Soldering Profile



LED Specifications for Vertical Actuation Product

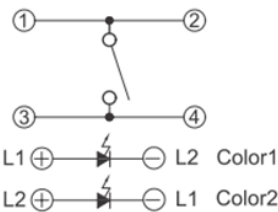
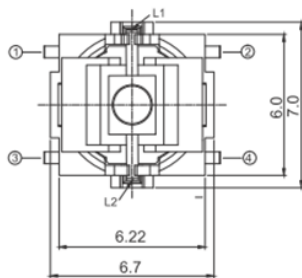
Color	Reversed Voltage (Max)	Reversed Current (Max)	Recommended Operating Current	Forward Voltage at 20mA			
				Nor	Max		
Red	5 Vdc	100 μA	30 mA	2.1V	2.6V		
Olive Green	5 Vdc	100 μA	30 mA	2.0V	2.6V		
Yellow	5 Vdc	100 μA	30 mA	2.1V	2.6V		
Amber	5 Vdc	100 μA	30 mA	2.0V	2.6V		
Blue	5 Vdc	100 μA	30 mA	3.2V	3.6V		
				Forward Voltage at 5mA		Chromaticity Coordinates	
						X	Y
White	5 Vdc	100 μA	30 mA	2.8V	3.2V	0.32	0.33

LED Specifications for Side Actuation Product

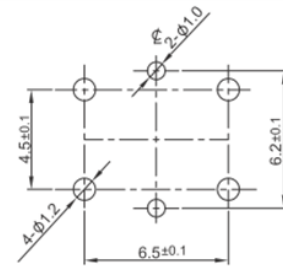
Color	Reversed Voltage (Max)	Reversed Current (Max)	Recommended Operating Current	Forward Voltage at 20mA		Chromaticity Coordinates	
				Nor	Max		
Red	5 Vdc	100 μA	20 mA	2.1V	2.6V		
Olive Green	5 Vdc	100 μA	20 mA	2.0V	2.6V		
Yellow	5 Vdc	100 μA	20 mA	2.1V	2.6V		
Amber	5 Vdc	100 μA	20 mA	2.0V	2.6V		
Blue	5 Vdc	100 μA	20 mA	3.2V	3.8V		
Pure Green	5 Vdc	100 μA	20 mA	3.0V	4.0V		
						X	Y
White	5 Vdc	100 μA	20 mA	3.2V	3.8V	0.284	0.275

Mechanical Specifications

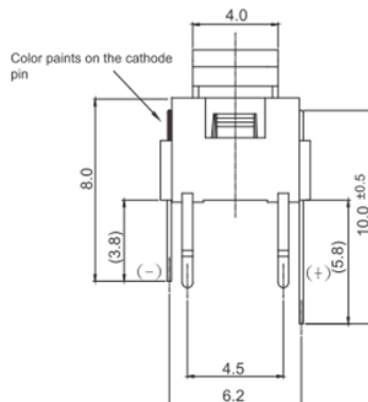
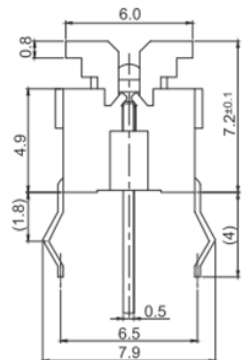
Figure 1 – 228FDV, Standard Though Hole, Vertical Actuation



CIRCUIT DIAGRAM



PCB LAYOUT



DIMENSION : mm
STANDARD TOLERANCE : ± 0.3

Figure 2 – 228FMV, Surface Mount Gull Wing, Vertical Actuation

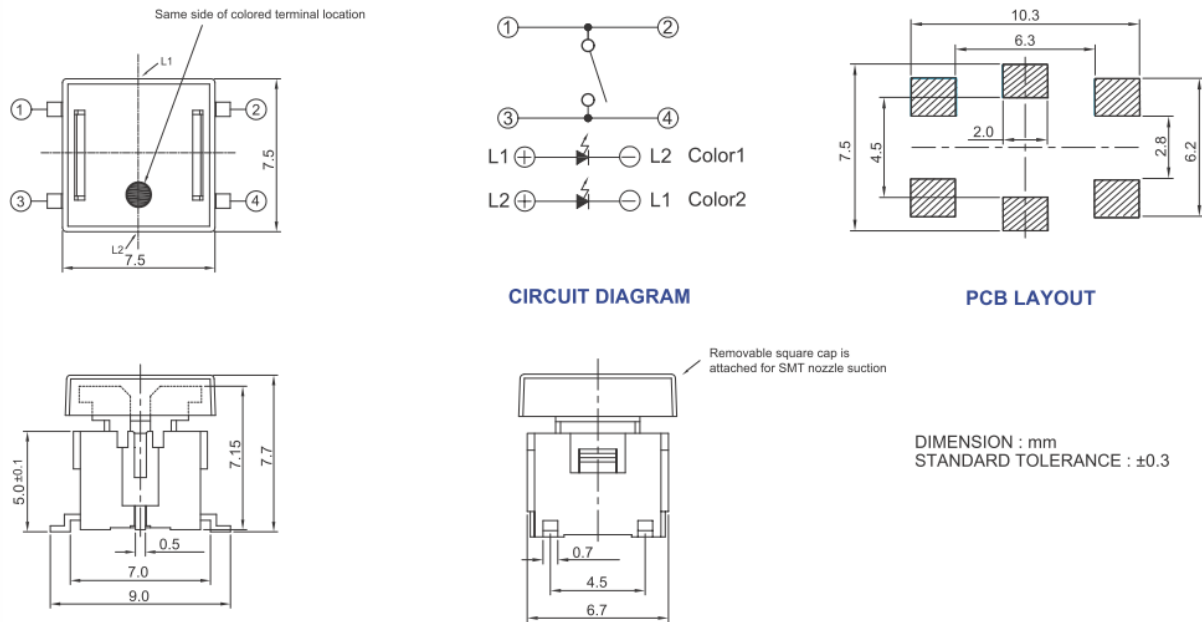
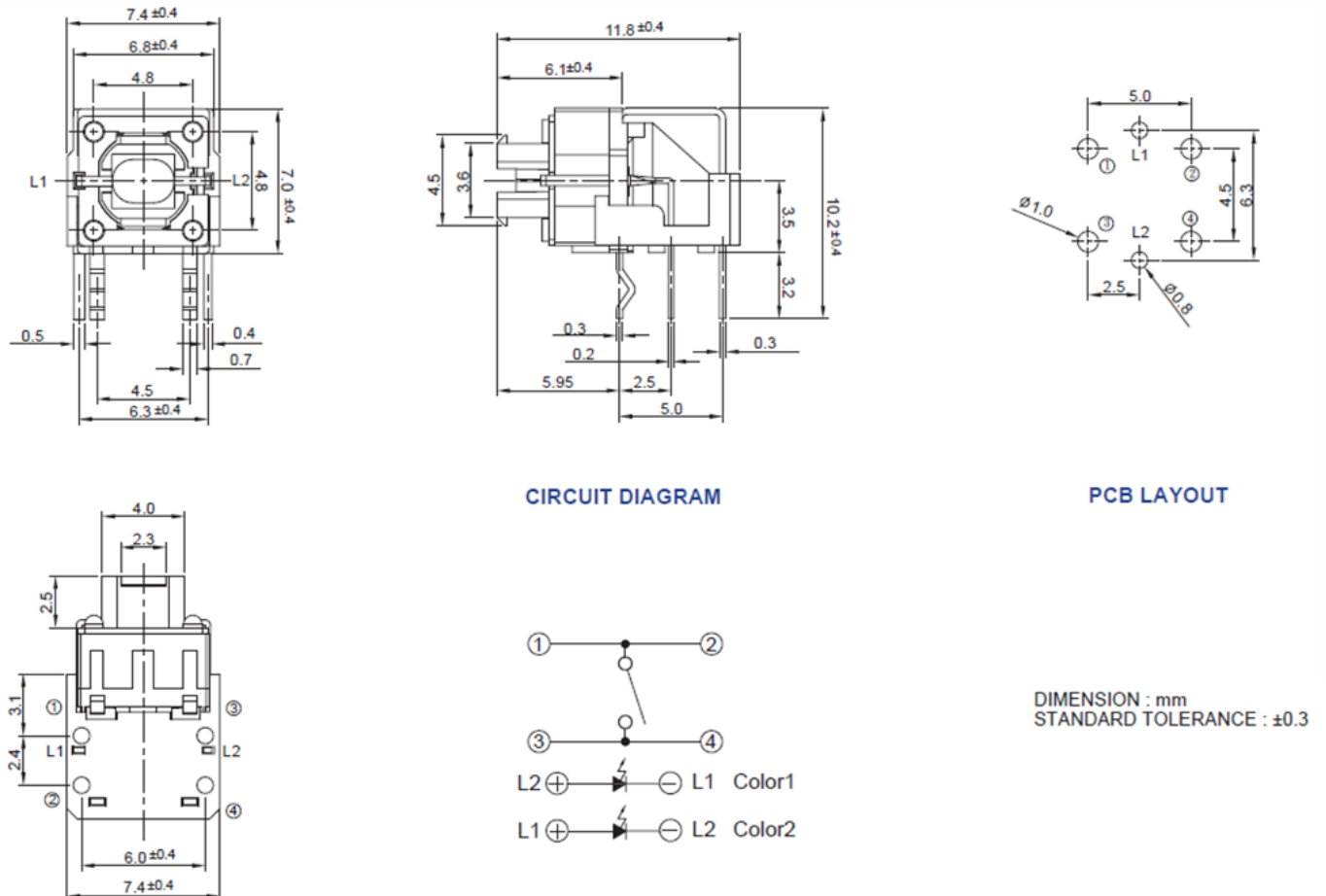


Figure 3 – 228FDS, Standard Though Hole, Side Actuation

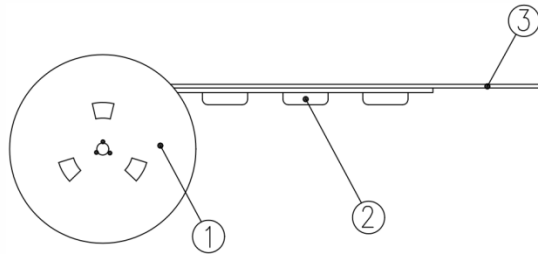


Packing: Tape and Reel

Surface Mount Gull Wing, Actuator Height 7.7mm

The packing specifications:

1. Structure and materials:



No	PART NAME	MATERIAL
①	REEL	POLYSTYRENE
②	CARRIER TAPE	POLYSTYRENE
③	COVER TAPE	POLYESTER

2. Packing quantity: 500 pcs/reel

3. More than 160mm empty pockets should remain at each end of the carrier tape for each reel. After reel packaging, the end of tape 180mm, shall be empty and the tape edge shall be cut in 45°. The cover tape shall be extended 180±10 mm from the tape edge and fixed with tape.

4. Shortage of less than 2 pcs a reel is acceptable.

5. Stripping strength of cover tape is between 10 gf to 130 gf and stripping angle should be within 165°~180°.

6. The product in the pocket of carrier tape should be placed in a specified correct position.

7. Tape and reel per EIA-481.

8. Dimensions:

