

File/Edition: D221M-DA2-01-SPC.001

Description:	Door Switch		
Customer Name:		Model No.:	D2 (Series)
Customer P/N:		Toneluck P/N:	D221M-DA2-01
Representative:		Project Code:	

### Specifications Receipt Confirmation

Received by: \_\_\_\_\_ Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Remark:

1. This product specification is considered as the technical agreement between the receiving customer and Toneluck. Any information on the general product catalog which is in conflict with or different from the corresponding information of this document is considered as invalid.
2. If customer issue purchase orders without confirmation by signature of this specification after receipt, such confirmation will be considered as granted upon receipt of the first purchase order.

Prepared by: Lishuang 2012-05-03

Checked by: Ganzhenxing 2012-05-03

Approved by: Ray Xu 2012-05-03

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### 1. General Characteristics

1.1 Application :	This specification is applied to the Door Switch for general applications.		
1.2 Operating Temperature Range :	-25°C to +200°C		
1.3 Operating Relative Humidity :	≤95%RH at +40°C		
1.4 Test Conditions :	Unless otherwise specified, the atmospheric conditions for making measurements and tests are as follows :		
	Ambient Temperature :	5~35°C	
	Relative Humidity:	45~85%	
	Air Pressure :	86~106kPa (860~1060mbar)	

### 2. Appearance, Structure & Dimensions

2.1 Appearance :	The switch shall have good finishing, and no rust, crack or plating defects.		
2.2 Structure & Dimensions :	Refer to individual product drawing.		
2.3 Markings :	Refer to individual product drawing.		
2.4 Approved by Standards:	2A 125/250VAC (UL1054)		

### 3. Ratings & Life

Rating	Operating Life with Load	Operating Life without Load
2A 125/250VAC	100,000 cycles (UL1054)	200,000 cycles

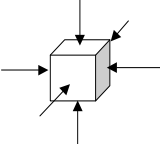
### 4. Electrical Characteristics

Item	Criteria	Test Method
4.1 Insulation Resistance	100MΩ Min.	500VDC voltage is applied between all terminals and between terminal and ground (frame) for 60±5s.
4.2 Dielectric Voltage	No dielectric breakdown shall occur.	1000VAC (50~60Hz, cut-off current 10mA) is applied between non-connected terminals and 1500VAC (50~60Hz, cut-off current 10mA) between terminals and ground (frame) for 60±5s.

### 5. Mechanical Characteristics

Item	Criteria	Test Method
5.1 Fully Travel Position Force	850gf Max	Apply a tension meter on the midpoint of the actuator (or tip of the shaft) to supply a pressure vertically from its free position to Fully Travel Position.
5.2 Pre Travel ①	0.4mm Max	The distance vertically through which the midpoint of the actuator (or tip of the shaft) trip move from its free position to the operating position that normally closed terminal must be open

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5.3	Pre Travel ②	0.75mm Max.	The distance vertically through which the midpoint of the actuator(or tip of the shaft) trip move from its free position to operating position that normally open terminal must be open
5.4	Pre Travel ③	3.95mm max	The distance vertically through which the midpoint of the actuator(or tip of the shaft) trip move from its free position to operating position that normally open terminal must be closed
5.5	Terminal Strength	- Shall be free from terminal looseness, damage and insulator breakage. - The electrical performance requirements specified in section 4 shall be satisfied.	A static load of 25N shall be applied to the tip of terminal in a outward direction for 10±1s. The test shall be done once per terminal.
5.6	Abnormally Push	The switch shall be free from Damage in construction.	Install switches into application and push the actuator inward with a force of 200N.and hold for 30 seconds, Repeat procedure a minimum of three times on each switch
5.7	Vibration Proof	After test, - Insulation Res. : 50MΩ Min. - Electrical performance requirements specified in item 4.2 shall be satisfied. -Operating force: Within ±20%of specified value. -No abnormalities shall be recognized in appearance and construction.	Switch shall be secured to a testing machine by a normal mounting device and method. Switch shall be measured after following test. (1) Vibration frequency range = 10~55 Hz (2) Total amplitude = 1.5mm (3) Sweep ratio : 10~55~10Hz Approx. 1 min. (4) Method of changing the sweep vibration frequency : logarithmic or linear (5) Direction of vibration : Three perpendicular directions including actuating direction. (6)Duration :2 hours @ (6 hours in total)
5.8	Mechanical Shock	After test, - Insulation Res. : 50MΩ Min. - Electrical performance requirements specified in item 4.2 shall be satisfied. -Operating force: Within ± 20%of specified value. -Shall be free from mechanical abnormalities.	Switch shall be measured after following test : (1) Mounting Method : Normal (2) Acceleration : 200m/s <sup>2</sup> (20G) (3) Duration : 11 ms (4) Test Direction : 6 directions  (5)Number of shocks :3 times per direction (18 times in total)

**6.Durability Characteristics**

	Item	Criteria	Test Method
6.1	Operating Life without Load	After test, - Insulation Res. 50MΩ Min. - Electrical performance requirements specified in item 4.2 shall be satisfied. - Operating force shall be within ±30% of specified value. - The switch shall be free from abnormalities in appearance & construction.	200,000 cycles of operation shall be performed continuously at a rate of 30~60 cycles per minute without any load.

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6.2	Operating Life with Load	After test, -the switch shall comply with corresponding standard.	① According to UL1054, Switch shall be operated 100,000 cycles with load as 2A 125/250VAC (UL1054)

**7.Weather Proof Characteristics**

Item	Criteria	Test Method
7.1 Cold Proof	After test, - Insulation Res. : 50MΩ Min. - Electrical performance requirements specified in item 4.2 shall be satisfied. - Operating force shall be within ±20% of specified value. - The switch shall be free from abnormalities in appearance & construction.	After testing at $-25\pm 3^{\circ}\text{C}$ for 96 hours, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be eliminated.
7.2 Hot Proof		After testing at $200\pm 2^{\circ}\text{C}$ for 96 hours, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that.
7.3 Moisture Resistance		After testing at $40\pm 2^{\circ}\text{C}$ , 90~95% RH for 96 hours, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be eliminated.
7.4 Temperature Cycling		After 5 cycles of following conditions, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be eliminated. 

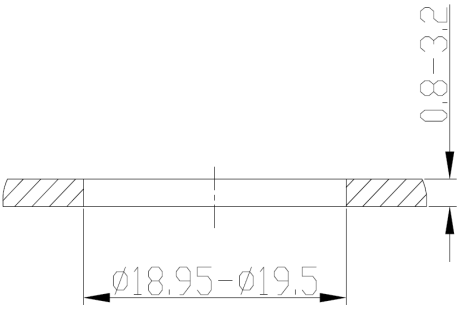
**Special Notes:**

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1. Switch Mounting

(1) Switch Mounting

- Please insert the switch into the mounting hole ,the switch will be automatic tighter by retaining clip
- Mounting Holes graphics, Show as below

<p>The graphics to mounting holes.  <math>\Phi 18.95 \sim \Phi 19.15</math> mm dia. mounting hole                  The material thickness include 0.8~3.2 mm</p> 	<p>Notes of switch operation</p> <ul style="list-style-type: none"> <li>✓ Operation parts shall keep away from switch button, and enough spacing for motion is required.</li> <li>✓ Please negotiate with us in advance if inertial lash company with operation.</li> <li>✓ Please take into account the operating force when you specified the location of operating parts.</li> </ul>
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(2) Insulated wire used in switches mounting

Please pay attention to the spacing and border after matching wire, special insulation plate is available, that's recommended.

(3) Connecting wire to switch

Select suitable socket and wire to connect to switch, confirm it is tightened totally. (Refer to the spec. of the drawing)

2. Deposition of switch

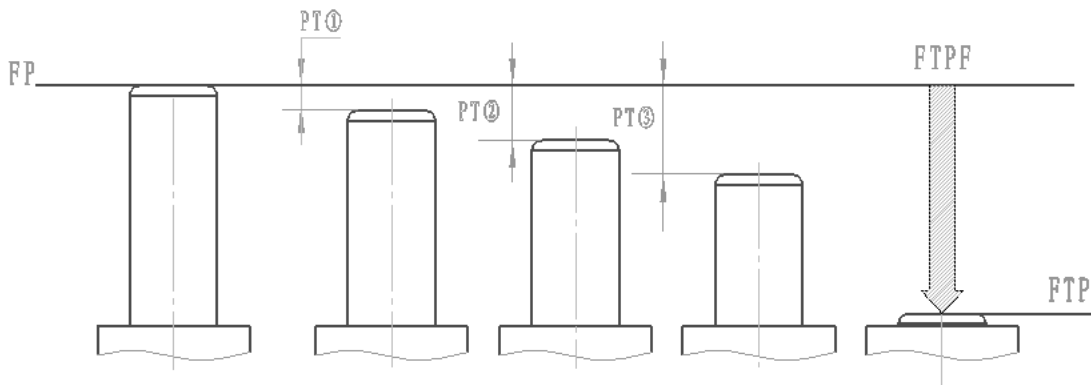
- Please keep away from polluted gas, organic gas (e.g. oil stove), dust and humidity.
- Storage temperature: 5~35°C; Humidity: ≤80%RH.

Material List For D24 Door Switch

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No.	Parts Name	Material And Specifications	Quantity	Flammability	Remarks
1.	Button	PPS	1	UL94V-0	
2.	NO Terminal	Brass Strip	2		
3.	NO Terminal Contact	Ag Alloy	2		
4.	Retaining Clip	Steel Strip	1		
5.	NC Contact Plate	Brass Strip	1		
6.	NO Contact Plate	Brass Strip	1		
7.	NO Contact Plate Contact	Ag Alloy	2		
8.	Litter Spring	Stainless Steel	2		
9.	Big Spring	Stainless Steel	1		
10.	Cover	PPS	1	UL94V-0	
11.	Base	PPS	1	UL94V-0	

**Note:** Operating data diagram



**FP** : Free Position

**PT①** : Pre Travel(Normally Closed Terminal Must Be Open)

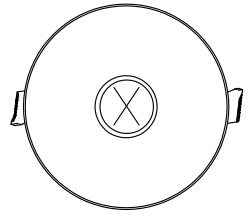
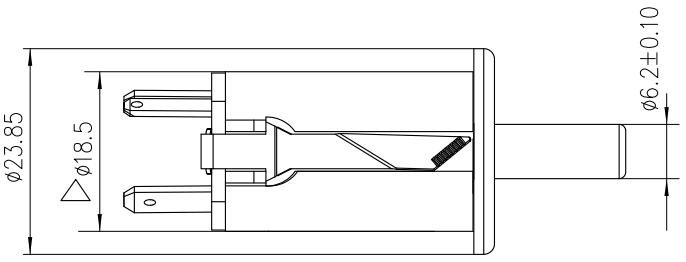
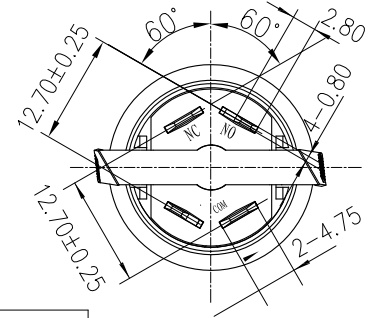
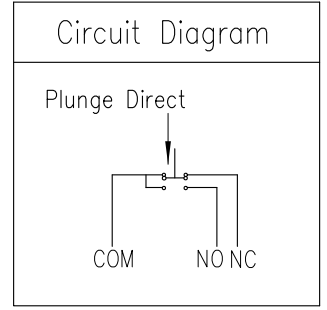
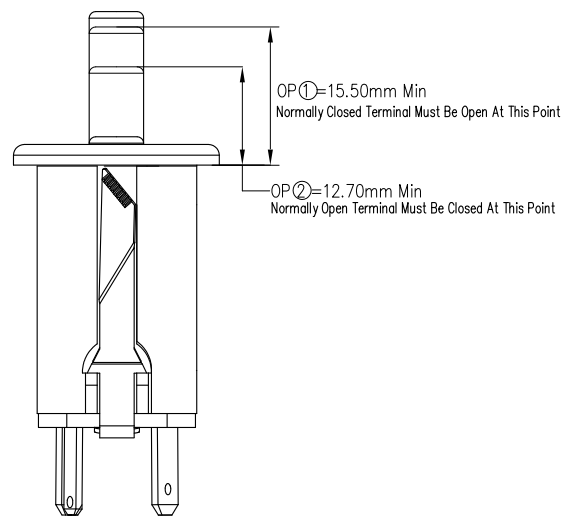
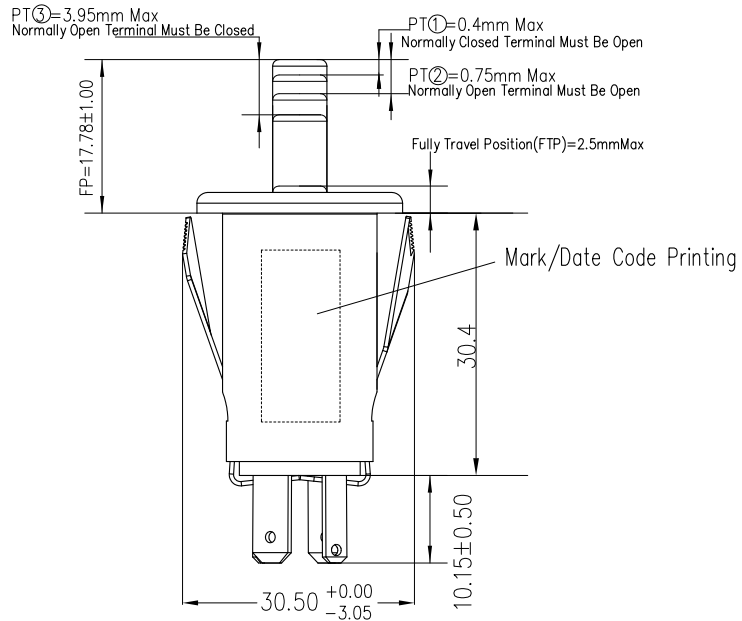
**PT②** : Pre Travel(Normally Open Terminal Must Be Open)

**PT③** : Pre Travel(Normally Open Terminal Must Be Closed)

**FTP** :Fully Travel Position

**FTPF** :Fully Travel Position Force

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Mechanical Characteristics:	
Item	Criteria
Fully Travel Position Force	850gf Max
Fully Travel Position	2.5mm Max
Free Position	17.78±1.00mm
Plunge Travel①	0.4mm Max
Plunge Travel②	0.75mm Max
Plunge Travel③	3.95mm Max
Operating Position①	15.50mm Min
Operating Position②	12.70mm Min

Electrical Characteristics:	
Ratings	Operating Life
2A 125/250VAC	100,000 cycles with load(UL1054)
Insulation Resistance:	100MaMin Initial.
Dielectric:	1000VAC(50~60HZ) - between non-connected terminals
	1500VAC(50~60HZ) - between terminals and ground
	- between terminals and non-live-metal parts

Other Spec. :

Operating Life Without Load:	200,000 cycles.
Operating Temperature Range:	-25℃~+200℃

Material List	
Switch Base	Thermoplastics UL94 V-0
Switch Cover	Thermoplastics UL94 V-0
Terminals	Copper Alloy, Silver plated
Actuator	Thermoplastics UL94 V-0
Contacts	Silver Alloy

**MASS PRODUCTION RELEASE**

Project Ref: D2 Door Switch		Tolerance Unless Otherwise Specified							
Part No:	D221M-DA2-01	~3	>3~10	>10~30	>30~80	>80~180	Angle		
Drawing No:	- - -	Eng Ver	A1	±0.20	±0.30	±0.40	±0.60	±0.80	±3°
Drafted by:	LiShuang	Date:	2010-12-23	Unit: mm	Size: A4	Scale:			
Checked by:	HeShiyang	Date:	2010-12-23	THIRD ANGLE					
Approved by:	RayXu	Date:	2010-12-23						

**TONELUCK**  
Switches & Control Solutions