TONELUCK
Switch & Micro Switch

MQS-4 Series Micro Switch Product Specifications

File/Edition: MQS-421BC02-Ag01-SPC.001

Description: Miniature Quick Switch

Customer Name: Model No.: MQS-42 (Series)

Customer P/N: Toneluck P/N: MQS-421BC02-Ag01

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: Shan Hong 2021-03-08

Checked by: Bink Wan 2021-03-08

Approved by: Norris Xie 2021-03-10

1. General Characteristics

1.1 Application: This specification is applied to the miniature quick switch for general applications.
1.2 Operating Temperature Range: -40°C to +85°C
1.3 Operating Relative Humidity: ≤96% 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.

3.Ratings & Life

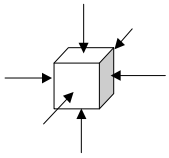
Rating	Operating Life with Load	Operating Life without Load
Refer to individual product drawing.		

4.Electrical Characteristics

	Item	Criteria	Test Method
4.1	Contact Resistance	Refer to individual product drawing.	After push the switch 1 - 3 cycles, measure contact resistance at 1A, 5V DC by voltage drop method.
4.2	Insulation Resistance	Refer to individual product drawing.	500±50VDC voltage is applied between all terminals and between terminals and ground (frame) for 60±5s.
4.3	Dielectric Voltage	Refer to individual product drawing.	500VAC (50~60Hz,cut-off current 10mA) is applied between non-connected terminals and 500VAC (50~60Hz,cut-off current 10mA) between terminals and ground (frame) for 60±5s.

5.Mechanical Characteristics

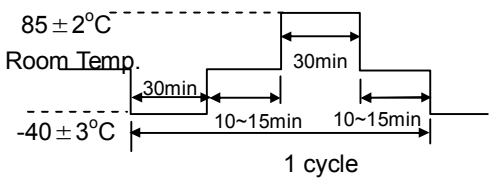
	Item	Criteria	Test Method
5.1	Operating Force	Refer to individual product drawing.	Apply a tension meter on the midpoint of the actuator (or tip of the shaft) to supply a pressure vertically from its free position to operating position.
5.2	Releasing Force	Refer to individual product drawing.	The value to which the force in the actuator midpoint(or tip of the shaft) must be reduced to allow the contact to the normal position.
5.3	Operation Position	Refer to individual product drawing.	When switch is being converted, the distance between the actuator midpoint (or tip of the shaft) and the center of mounting hole.
5.4	Pre Travel	Refer to individual product drawing.	The distance vertically through which the midpoint of the actuator (or tip of the shaft) trip move from its free position to operating position.
5.5	Movement Differential travel	Refer to individual product drawing.	The distance vertically through which the midpoint of the actuator(or tip of the shaft) trip move from its operating position to releasing position.
5.6	Free Position	Refer to individual product drawing.	The distance between the actuator midpoint (or tip of the shaft) and datum location when no external force is applied.

5.7	The degree of protection	IP67(Plunger side)	GB4208-93 (IEC60529)
5.8	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 10N shall be applied to the tip of terminal in a desired direction for 10±1s. The test shall be done once per terminal.
5.9	Vibration Proof	After test, - Contact resistance: 200mΩ Max. - Insulation Res. : 50MΩ Min. - Electrical performance requirements specified in item 4.3 shall be satisfied. -Operating force: Within ±10% 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)
5.10	Mechanical Shock	After test, - Contact resistance: 200mΩ Max. - Insulation Res. : 50MΩ Min. - Electrical performance requirements specified in item 4.3 shall be satisfied. -Operating force: Within ±10% of specified value. -Shall be free from mechanical abnormalities.	Switch shall be measured after following test : (1) Mounting Method: Normal (2) Acceleration: 294m/s^2 (30G) (3) Duration: 11 ms (4) Test Direction: 6 directions  (5)Number of shocks: 3 times per direction (18 times in total)
5.11	Solderability	-More than 90% of immersed part shall be covered with solder.	Switch shall be checked after following test: (1) Soldering Temperature: 260±5°C Immersing Time: 3±0.5 s (2) Immersion Depth: It should be immersed up to 1.6mm from the root of terminal.
5.12	Solder Heat Resistance	-No abnormalities shall be observed in appearance and operation. -The electrical performance requirements specified in item 4 shall be satisfied.	Switch shall be measured after following test : (1) Solder: H63A (JIS Z3282) (2) Flux: Rosin Flux (JIS K 5902) having a nominal composition of 25% solids by mass of water white rosin in methyl alcohol (JIS K1501) solution. (3) Soldering Temperature & Immersing Time Dip Soldering: 260±5°C, 5±1s Manual Soldering: 350±10°C, 3~4s (4) Immersion Depth:(For Dip Soldering) It should be immersed up to 1.6mm from the root of terminal.

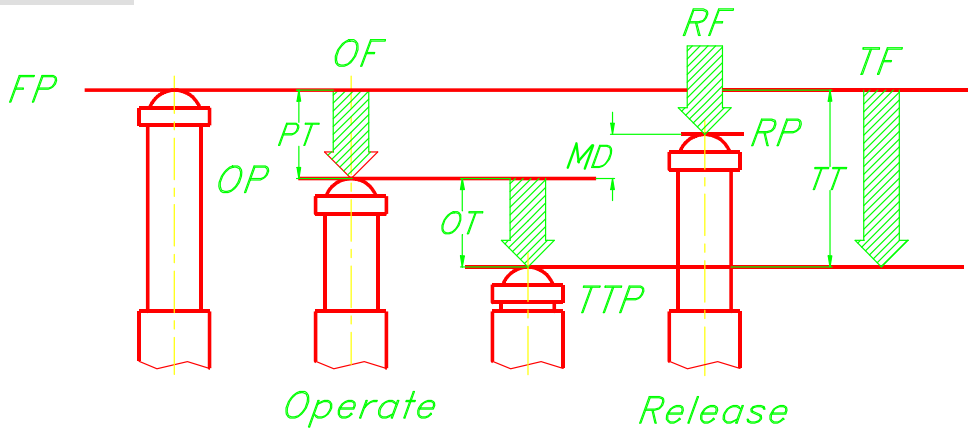
6.Durability Characteristics

	Item	Criteria	Test Method
6.1	Operating Life without Load	After test, - Operating force shall be within ±30% of specified value. - The switch shall be free from abnormalities in appearance & construction.	1,000,000 cycles of operation shall be performed continuously at a rate of 60~120 cycles per minute without any load.
6.2	Operating Life with Load	After test, - Contact resistance: 500mΩ Max. - Insulation Res. : 50MΩ Min. - Electrical performance requirements specified in item 4.3 shall be satisfied. - Operating force shall be within ±30% of specified value. - The switch shall be free from abnormalities in appearance & construction.	Operation shall be performed continuously at a rate of 15~30 cycles per minute with load as follow: 2A 12VDC 100,000 cycles 2A 24VDC 50,000 cycles

7.Weather Proof Characteristics

	Item	Criteria	Test Method
7.1	Cold Proof	After test, - Contact resistance : 200mΩ Max. - Insulation Res. : 50MΩ Min. - Electrical performance requirements specified in item 4.3 shall be satisfied. - Operating force shall be within ±10% of specified value. - The switch shall be free from abnormalities in appearance & construction.	After testing at –40±3°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 85±2°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±2°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. 

Note: **Operating data diagram**

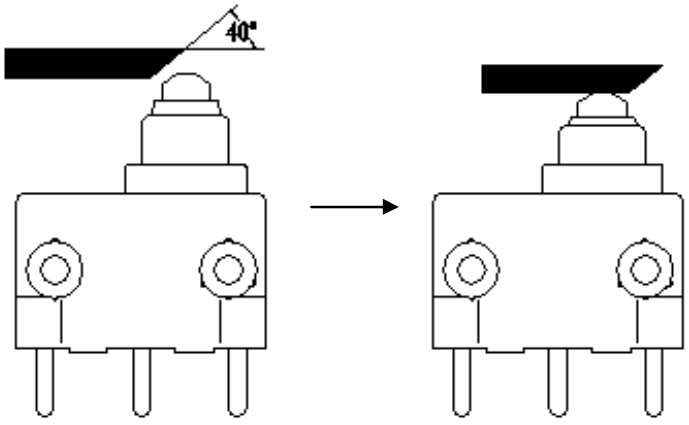


OF: Operating Force
RF: Release Force
TF: Total travel Force
FP: Free Position
OP: Operating Position
TTP:Total Travel Position

RP: Release Position
PT: Pre Travel
OT: Over Travel
MD: Movement Differential Travel
TT: Total Travel

Special Notes:

Actuation Angle: Besides actuating the micro-switch vertically,the special robust actuator design allows actuation from all directions with an approach angle as less as 40。



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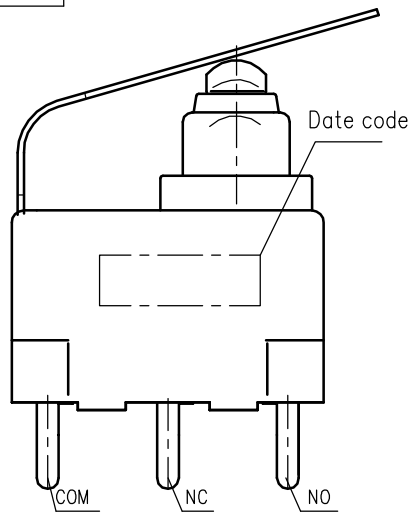
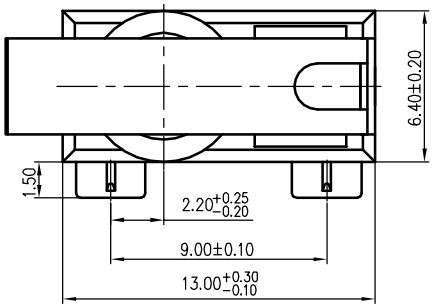
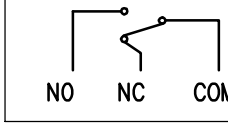
XX.XX	CONTROL DIMENSION
△	CRITICAL CHARACTERISTIC

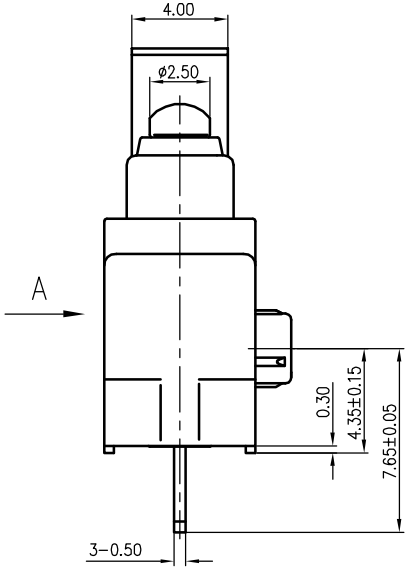


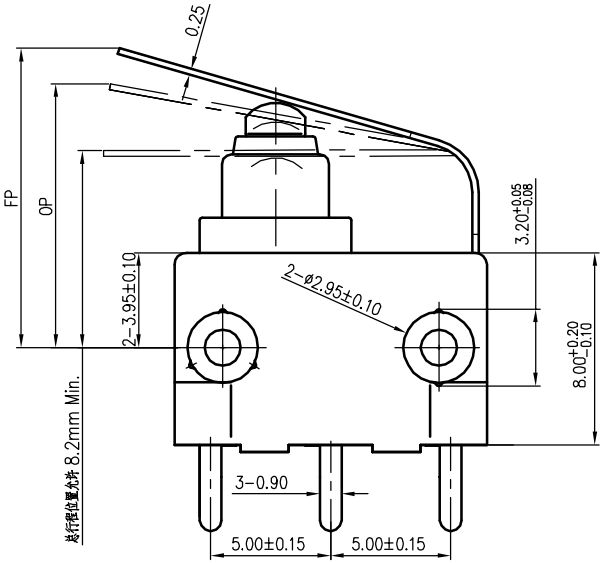
A向视图



Circuit Diagram







Mechanical Characteristics:	
Item	Criteria
Operating Force (OF)	250gf Max
Releasing Force (RF)	60 gf Min.
Pre Travel (PT)	4.0mm Max.
Movement Differential Travel (MD)	1.1mm Max.
Operating Position (OP)	10.6±1.2mm
Free Position (FP)	14.0mm Max.

Electrical Characteristics		
Operating life with load	2A 12VDC	100,000 cycles
	2A 24VDC	50,000 cycles
Operating life without load	500,000 cycles	
Contact Resistance:	50mΩMax.	
Insulation Resistance:	100MΩMin.	
Operating Temperature Range:	−40℃~+85℃	
Dielectric:	500VAC(50~60HZ) for one minute	− between non−connected terminals −between terminals and dead parts

Material List	
Seal Rubber	Silicon Rubber
Switch Base	Thermoplastics UL94 V−0
Switch Cover	Thermoplastics UL94 V−0
Terminals	Copper Alloy, Silver plated
Actuator	Thermoplastics UL94HB
Contacts	Silver Alloy
Aux Actuator(Lever)	Stainless Steel

MASS PRODUCTION RELEASE

				Tolerance Unless Otherwise Specified					
Project Ref:	Micro Switch			~3	>3~10	>10~30	>30~80	>80~180	Angle
Part No:	MQS−421BC02−Ag01			±0.20	±0.30	±0.40	±0.60	±0.80	±3°
Drawing No:	− − −	Eng Ver	A1	Unit: mm		Size: A4		Scale:	
Drafted by:	Li Yongyi	Date:	2013−8−1						
Checked by:	SKY	Date:	2013−8−1	THIRD ANGLE		TONELUCK Switches & Control Solutions			
Approved by:	SKY	Date:	2013−8−1						