漢 元 電 機 股 份 有 限 公 司

HIMAKE ELECTRONICS CO., LTD.

產 品 規 格 承 認 書

Product Specification

承 認 客 戶 : _____

CUSTOMER :

式　　樣 : _____

TYPE :

機　　種 : _____

ITEM :

規　　格 : _____

DESCRIPTION :

承 認 書 編 號 : _____ **版 本 :** _____

SPEC. NO. : **EDITION:**

送 件 日 期 : _____ **頁 數 :** _____

DATE : **PAGE :**

備 註 (Remark) :

規 格 書 : _____ **份.** **樣 品 :** _____ **個**

Spec : _____ **copy.** **Sample :** _____ **pcs**

核　准 approved by		核　對 Reviewed by		經　辦 Prepared by	

HIMAKE ELECTRONICS CO., LTD.

STANDARD SPECIFICATION

NO : 001C

AK-CN2/AK-DN2 Type

Date : 2000.1.20

A. General: 1.Scope 2. Operating temperature 3.Storage temperature 4. Ambient humidity	 Keyboard Switch (AK-CN2 Click Type) (AK-DN2 NO ClickType) －25°C ＋60°C －30°C ＋70°C 85%RH Max.
B. Contact arrangement	S.P.S.T
C. Rating	10mA 12VDC
D. Performance: 1.Electrical: a.Contact resistance b.Insulation resistance c.Dielectric withstanding voltage d.Bounce 2.Mechanical: a.Operating force b. Operating Travel c. Total Travel d.Operating speed e.Operating frequency f.Type of Actuation	 1Ω Max(Initial) 500MΩ Min (Between adjacent contact) 100VAC50/60Hz for 1 minute. 5m sec.Max 60±15g f(AK-CN2 Type) 70±15gf(AK-DN2 Type) 1.5±0.5 mm 3.5±0.5 mm 0.1mm~1 m/s Less than 120 Operations/Minute Momentary
E. Endurance: 1.Operating life 2.Vibration restance: Malfunction durability 3.Impact shock resistance 4.Soldering and cleaning process: a.Preheating b.Preheat Time c.Soldering Temperature d.Duration Of Solder Immersion e.Allowable Frequency Solderin Process	 10,000,000 Cycles Min 10HZ~55HZ~10HZ 0.5mm Double amplitude during 2 hours Mechanical approx . 80G Fluxing with organic flux 100°C Max 45 Sec.Max 255°C Max. 5 Sec Max. 2Time Max.
F. Weight :	About 1.8g

APPROVE		CHECK		PRODUCER	
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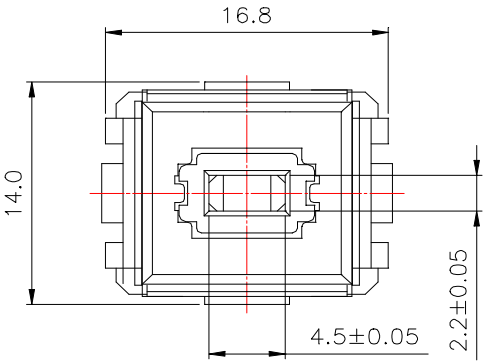
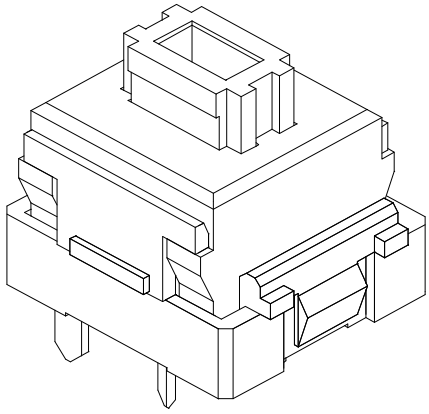
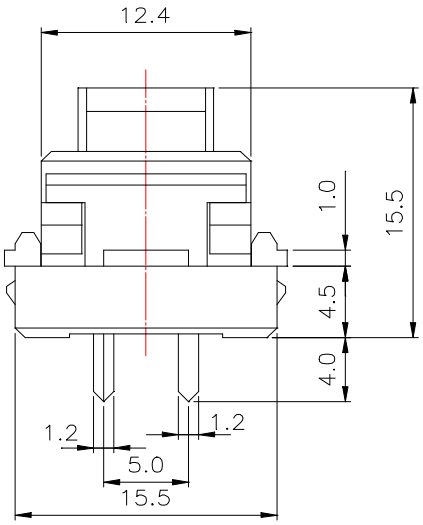
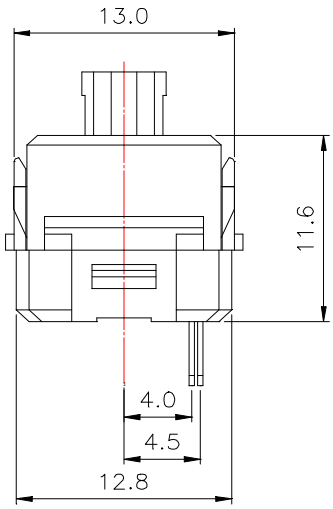


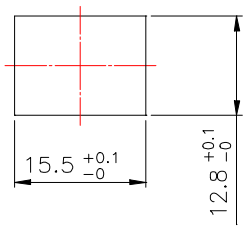




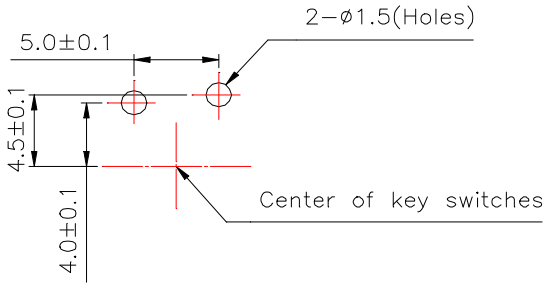


Circuit Diagran

Mounting Panel
Hole Dimensions



P.C.B Mounting
Hole Dimensions

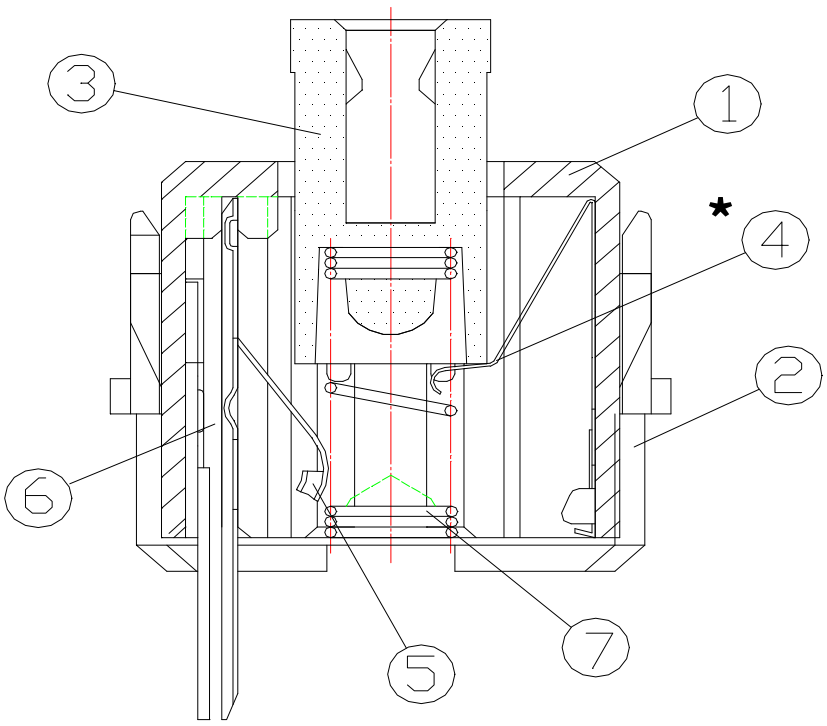


***Notes:**

1.General dimension tolerance: ±0.3.

2.The mouting panel to be 1.0 mm to 1.2 mm in thickness.

Type Item	Description Of Good	Operating Life	Stem Color
AK−CN2	Click type	10,000,000	Ivory
AK−DN2	No Click type	10,000,000	Green



NO.	TITLE	MATERIAL
1	Housing	ABS
2	Cover	POM
3	Stem	POM
*4	Click Blade	PBS
5	Movable Blade	PBS
6	Terminal	Brass Copper
7	Spring	SUS304

*Note:

1. AK-CN2 Type With Click Blade
2. AK-DN2 Type Without Click Blade

1.General

1.1 Scope This specification covers the requirements for single key switchs which have no keytop(Keyboard Switches)

1.2 Operating Temperature Range

-25 to 60℃ (normal humidity,normal press)

1.3 Storage Temperature Range

-30 to 70℃ (normal humidity,normal press)

1.4 Test Conditions Tests and measurements shall be made in the following standard conditions unless otherwise specified:

Normal temperature(temperature 5 to 35℃)

Normal humidity(relative humidity 45 to 85%)

Normal pressure(pressure 860 to 1060 m bars)

In case any question arises from the judgement made,tests shall be conducted in the following conditions:

Temperature (20±2℃)

Relative humidity (65±5%)

Pressure (860 to 1060 m bars)

2.Appearance,Style,And Dimensions

2.1Appearance there shall be no defects that affect the serviceability of the product.

2.2 Style and Dimensions

Shall conform to the assembly drawings.

3.Type of Actuation

Momentary

4.Contact Arrancement

1 poles 1 throws

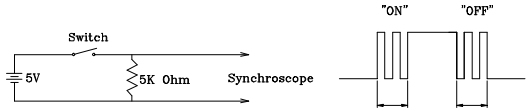
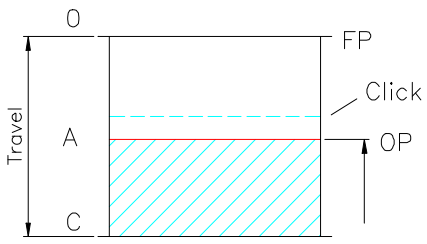
(Details of contact arrangement are given in the assembly drawings.)

5.Maximum Ratings

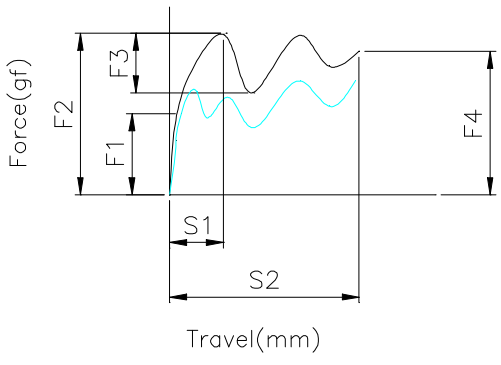
DC 12 V 10 mA

6.Performance

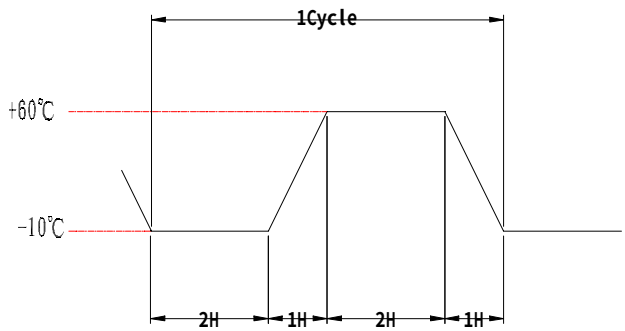
6.1 Electrical

Item	Test Conditions	Requirements
6.1.1. Contact Resistance	Applying a static load twice the actuating force to the center of the stem, measurerments shall be made with a 1 kHz small-current contact resistance meter.	1 Ohm max. (Initial)
6.1.2 Insulation Resistance	Measurements shall be made following application of DC 250 V potential across terminals and across terminals and metal frame for one minute.	50 M Ohm max.
6.1.3 Dielectric with-standing voltage	AC 100 V(50Hz or 60Hz)shall be applied across terminals and across terminals and metal frame for one minute.	There shall be no breakdown.
6.1.4 Bounce	Lightly striking the center of the stem at a rate encountered in normal use (3 to 4 operations per sec).bounce shall be tested at"ON" and "OFF". 	5 m sec max.
6.1.5 Switching positions	Placing the switch such that the direction of switch operation is vertical and then carefully operating the stem ,positions at which the switch makes and breaks the required curcuit shall be measured.  Total OFF range ON~OFF Switching range Total ON range	Total "OFF" range O~A **:** 1.0 mm Min. Total "ON" range B~C**:** 1.5 mm Min.

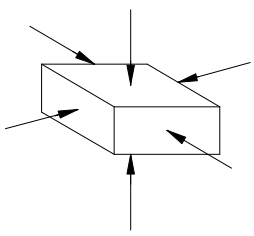
6.2 Mechanical

Item		Requirements
6.2.1 Actuating Force	Placing the switch such that the direction of switch operation is vertical and then gradually increasing the load applied to the center of the stem,The maximum load required for the stem to come to a stop shall be measured.	60±15gf (AK-CN2 Type) 70±15gf (AK-DN2 Type)
6.2.2 Travel	Placing the switch such that the direction of switch operation is vertical and then applying a static load twice the actuating force to the center of the stem, The travel distance for the tem to come to a stop shall be measuted.	3.5±0.5 mm
6.2.3 Stop Strength	Placing the switch such that the direction of switch operation is verical, a static load of 5 kgf shall be applied in the direction of stem operation for a period of 60 seconds.	There shall no sign of damage mechanically and electrically.
6.2.4 Stem Strength	Placing the switch such that the direction of switch operation is vertical,The maximum force to withstand a pull applied opposite to the direction of stem operation shall be measured.	5 kgf
6.2.5 Tactility	The center of the stem shall be struck lightly at a rate encountered in normal use (3 to 4 operations per second).	Free of noticeable binding.
6.2.6 Click Feel (AK-CN2 Type)		F1:Pro-Load 30±10gf F2:Peak-Load 60±15gf F3:Drop-Load 30±10gf F4:End-Load 50±20gf S1:Peak Point 1.5±0.2mm S2:End Travel 3.5±0.5mm

6.3 Environmental

Item	Test Conditions	Requirements
6.3.1 Resistance to Low Temperatures	Following the test set forth below the sample shall be left in normal temperature and humidify conditons for one hour before measurements are made. (1)Temperature: - 30±2℃ (2)Time: 96 hours (3)Waterdrops shall be removed.	Item 6.1 Item 6.2.1 Item 6.2.2
6.3.2 Heat resistance	Following the test set forth below the sample shall be left in normal temperature and humidity conditions for one hour before measurements are made. (1)Temperature: 70±2℃ (2)Time: 96 hours	Item 6.1 Item 6.2.1 Item 6.2.2
6.3.3 Moisture Resistance	Following the test set forth below the sample shall be left in normal temperature and humidity conditions for one hour before measurements are made: (1)Temperature: 60±2℃ (2)Relative humidity: 70 to 80 (3)time: 96 hours (4)waterdrops shall be removed	Contact resistance 1 Ohm Max. Insulation resistance 10 M Ohm Min Item 6.1.3 Item 6.1.4 Item 6.2.1 Item 6.2.2
6.3.4 Temperature cycling	Following five cycles of the temperature cycling test set forth below the sample shall be left in normal temperature and humidity conditions for one hour before measurements are made. During this test,waterdrops shall be removed. 	Item 6.1 Item 6.2.1 Item 6.2.2

6.4 Endurance

Item	Test Conditions	Requirements
6.4.1 Operating life	Measurements shall be made following the test set forth below: (1)DC 5V 5mA resistive load (2)Rate of operation 3 to5 operation per second (3)Depression**:** Twice the actuating force (4)Cycles of operation**:** 1000×10^4 cycles	Contact resistance**:** 5 Ohm Max. Insulation resistance**:** 50 M Ohm Min. Bounce: 5 m sec Max. Actuating force**:** + 50 % or - 30 % of initial force Item 6.1.3 Item 6.2.2
6.4.2 Vibration Resistance	Measurements shall be made following the test set forth below: (1)Range of oscillation:10 to 55Hz (2)Amplitude,pk-to-pk:1.5mm (3)Cycle of sweep:10-55-10 Hz in one minute approx (4)Mode of sweep:Logarithmical sweep or uniform sweep (5)Direction of oscillation: Three mutually perpendicular directions, including the direction of stem travel (6)Duration of testing: 2 hours each,for a total of 12 hours	Item 6.1 Item 6.2.1 Item 6.2.2
6.4.3 Impact shock Resistance	Measurements shall be made following the test set forth below: (1)Acceleration 80G ($784m/S^2$) (2)Cycles of test: 3 cycles each in 6 directions,for a total of 18 cycles. 	Item 6.1 Item 6.2.1 Item 6.2.2

7. Switch Handling Precatuions

7.1 Conditions of Soldering

(1)Use the flux with specific gravity of 0.83 at min.
(MH-820V or CF220V by TAMURA Corporation,or their equivalents)

(2)Dip the switch under the following conditions:

*Pre-heat:110℃ at max. 60sec at max.(The temperature:arround the soldered side of the PC board)

*Qusntity of flux foam**:** Do not exceed the height of adjoining parts on the parts mounted side of the PC board.Do not apply the extra flux to the terminals of the switch on the parts mounted side.

*Soldering 260℃ at max. 6 sec at max.(For manual soldering,260℃ at max 2 sec at max.)

*Frequency**:** 2 times at max.(The second time should be done after the switch returns to the normal temperature)

(3)Prevent the flux from getting into the switch from the top of it by scattering of flux.

(4)Do not cleanse with solvent after soldering.

7.2 Foreign Matter Invaded From Outside

Since this switch does not have perfectly sealed structure,if it is used in a severe enviromnent with plenty of dust,it may have contact failure caused by the dust which invades through the clearance between the stem and the housing

Dusty Environment When you use this switch,precaution must be taken against the dust.

The followings are examples of dust invasion:

(1)Debris from the cut or hole of PCB in process,or wastes from the PCB protection material(e.g.newspaper,foamed polystyrene.etc.)invaded the switch.

(2)Flux or powdered flux produced by stacking PCB's or excess foaming invaded the switch.

7.3 Side-Force Resistance

Do not apply load from the side.If the tip of the stem receives force of more than 4.9N(500gf) from the side,the stem strength may be affected.

7.4 Area To Press

Press the center of the stem.Click feel may be changed if the edge of the stem is pressed because of out-of-center caused by improper structure of hinge or comulative tolerance on the set.

7.5 Conditions For Thermosetting Oven

When the board on which the switch is mounted has to be put in the oven so as to harden adhesive for other parts,the conditions shall be 160℃at Max.(on the parts mounted side of PCB) and not longer than 2 minutes.

7.6 Storage

(1)Try to seal the container for the switches after use.

(2)Do not store the switches in the place of high temperature or high humidity Do not stack too many switches for storage.

7.7 In case an automatic flow soldering apparatus is used for soldering,adhere to the following conditions:

Item	Soldering condition
(1)Preheat Temperature	100℃ Max (Ambient temperature of printed circuit board on its soldering side)
(2)Preheat Time	45 sec. Max.
(3)The way of flux application	The stucture of the switch is designed withcare of a flux . But please take care that the flux will not invade inside of the switch when the flux is used and applied . The recommendable flux is TAMURA SEISAKUSHO'S MH-820V or an equivalent to that.
(4)Soldering Temperature	255℃ Max.
(5)Duration of solder immersion	5 sec Max.
(6)Allowable Frequency of soldering process	2 times Max.

7.8 Other Precautions

(1)Follwing the soldering process.do not try to clean the switch with a solvent or the like.

(2)Safeguard the switch assembly against flux penetration from its top side.

(3)No holes shall be designed under the switches except holes for the switches when designing a P.C.Board.

(4)Please have the products keep in close status and the storage time is 90 days guaranty after delivering the goods at most.

8. Packing

AK-CN2 , AK-DN2

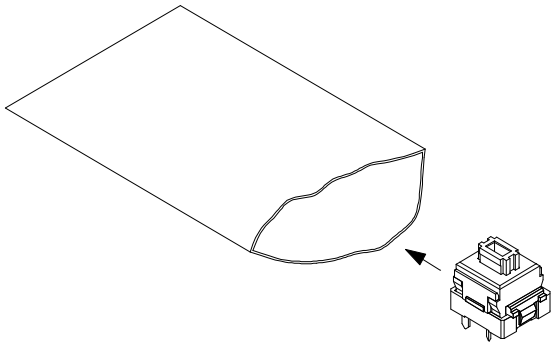
8.1 Scops This Specification covers the requirements for AK-CN2 , AK-DN2 series type of Keyboard switches.

8.2 Packing Material

Item	Substance
Carton Box	Corrugated Paper
Plastic Bag	PE

8.3 Packing Unit

8.3.1 Every plastic bag contains 1000 pcs goods at most.



According to assembly drawing

8.3.2 The capacity of carton box

Every carton box contains 6 plastic bag at most.