

Federal Communications Commission (FCC) Statement

RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any special accessories needed for compliance must be specified in the instruction manual.

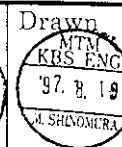
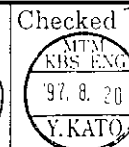
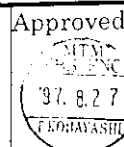
Warning: A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.

Use only shielded cables to connect I/O devices to this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

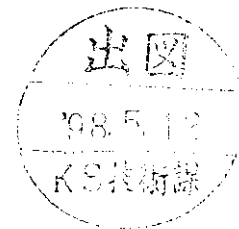


キーボード製品規格書  
 SPECIFICATION OF  
 KEYBOARD SWITCH  
 KFK type



AUG.06.1997 enact

1. Scope : This specification covers MITSUMI keyboard switch KFK series.
2. Electrical Specifications :
  - 2-1. Maximum Rating : D.C. 12V (with pulse width of 200  $\mu$  sec., duty ratio 1/50), 1mA.
  - 2-2. Contact Bounce : 5msec. Max ... Initial  
 10msec. Max ... Over life  
 (at normal pushing)
  - 2-3. Contact Resistance : 1.5K $\Omega$  Max (resistance value of membrane circuit board is included.)
  - 2-4. Insulation Resistance : 50M $\Omega$  Max (at D.C. 200V)
  - 2-5. Withstand voltage : A.C.250V , 1 minute.
  - 2-6. Circuit : Make Contact , 1 circuit.
3. Mechanical Specifications :
  - 3-1. Force :
    - (1) Operating Force : 30g typical
    - (2) Maximum Force : 50  $\pm$  20g
    - (3) Click Rate : 45  $\pm$  20%
 (Decline of Clicking Force after 10 millions operation : within 30%)
  - 3-2. Operating point : 2.2~3.5mm stroke
  - 3-3. Full Travel : 4.2  $\pm$  0.5mm (at 200g)
  - 3-4. Key Touch Feeling : Keytop must be operated without squeaking , catching , locking with normal pushing.



R E V		CODE	DRAWING NO.
		S 5 6	0214

#### 4. Endurance Specifications :

4-1. Operating Life : After 10 millions pushing , the switch must be satisfied with electrical and mechanical specifications shown on item 2&3.

4-2. Operating Temperature Range :  $-5^{\circ}\text{C} \sim +50^{\circ}\text{C}$

4-3. Storage Temperature Range :  $-20^{\circ}\text{C} \sim +65^{\circ}\text{C}$  (1000H)

4-4. Shock Proof : 20G in 3 Axis

#### 5. Test Condition :

##### 5-1. Measuring Conditions :

Measuring conditions :

Measuring conditions must be at temperature  $23 \pm 1^{\circ}\text{C}$  humidity  $50 \pm 2\% \text{RH}$ .

However the measurement may be conducted under condition of normal temperature ( $15 \sim 35^{\circ}\text{C}$ ) and normal humidity ( $45 \sim 75\% \text{RH}$ ) unless such conditions affect test results.

##### 5-2. Contact Bounce :

Test shall be made by normal pushing at a speed of 3~5 times per second with D.C 3V,  $50 \mu\text{A}$  resistance load. Contact bounce range will be measured at 80% level as shown below.

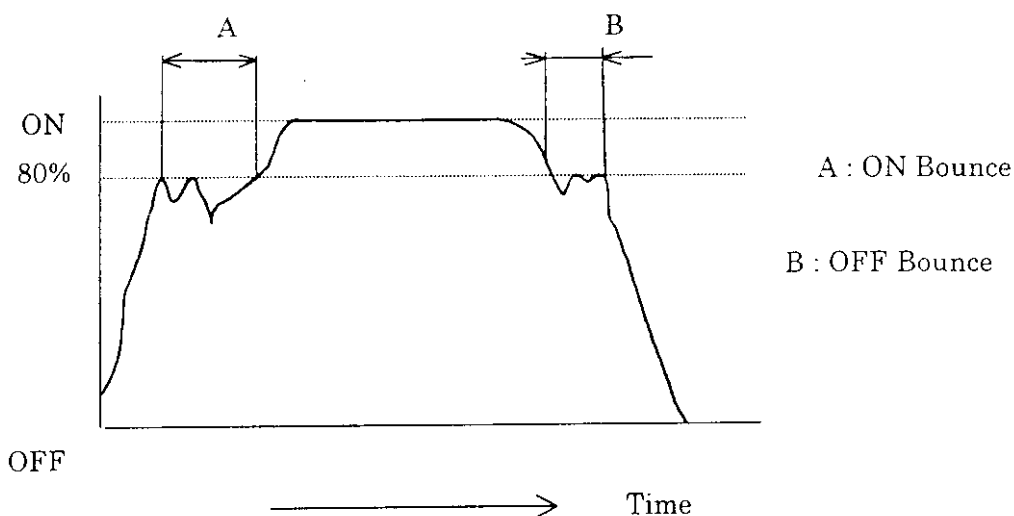


Fig.1.

### 5-3. Contact Resistance :

Contact resistance included resistance value of membrane circuit board shall be measured at D.C.24V , 0.1mA (voltage drop method) , applying static load of the keytop.

### 5-4. Insulation Resistance :

Measure , applying D.C.250V between the terminals.

### 5-5. Withstand Voltage :

After A.C.250V is applied between the terminals for 1 minute , any change and damage will not be appeared.

### 5-6. Force :

#### (1) Operating force :

Measure the operating force when switch makes contact by pushing the center of the keytop.

#### (2) Maximum Force :

Measure the maximum Force among the full travel except the full travel force.

#### (3) Minimum Force :

Measure the minimum Force among the travel after the maximum force.

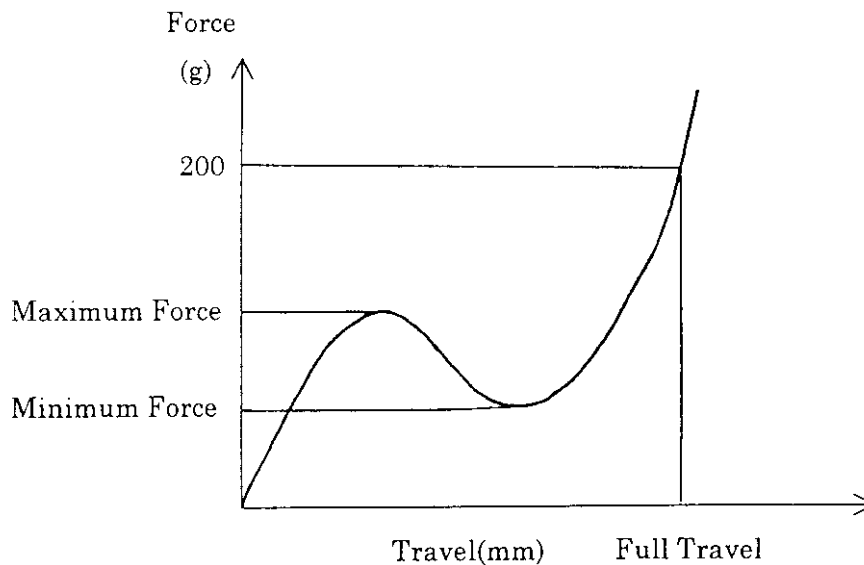


Fig.2.

5-7. Operating Point :

Measure the distance when switch makes contact by pushing the center of the keytop.

5-8. Full Travel :

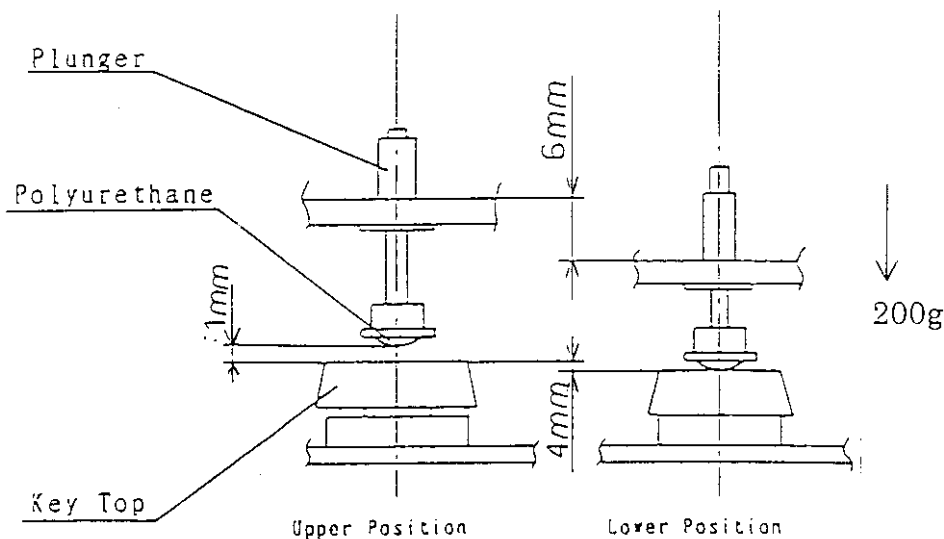
Measure the distance when static load of 200g is to be applied onto the center of the keytop.

5-9. Key touch feeling :

Keytop must be operated , without squeaking , catching , locking with normal pushing of full travel at a speed of 3~5 times per second.

5-10. Operating Life :

As illustrated in Fig.3 , operating life test shall be made at a speed of 3~7 meter per second pushing the center of the keytop with a plunger of cam life tester.



Life test condition

D.C.22V

On time : 25mmsec

Cycle : 3~7 time/sec

Pushing force : 200g

(Typical)

Fig.3.

## 6. Test Form :

### 6-1. Humidity Test :

After unit is kept for 96 hours in a chamber of temperature  $+40 \pm 2^{\circ}\text{C}$  , and relative humidity 90~95% and then is left in ambient condition for 1 hour , electrical & mechanical specifications item 2&3 shall be satisfied.

### 6-2. Low Temperature Test :

After unit is kept for 96 hours in a chamber of temperature  $-20 \pm 2^{\circ}\text{C}$  , then is left in ambient condition for 1 hour , electrical & mechanical specifications item 2&3 shall be satisfied.

### 6-3. High Temperature Test :

After unit is kept for 96 hours in a chamber of temperature  $+70 \pm 2^{\circ}\text{C}$  , then is left in ambient condition for 1 hour , electrical & mechanical specifications item 2&3 shall be satisfied.

### 6-4. Thermal Shock Test :

After unit is kept for 5 cycles (one cycle consists of  $-20 \pm 2^{\circ}\text{C}$  , 1 hour and  $+60 \pm 2^{\circ}\text{C}$  , 1 hour ) and then is left in ambient condition for 1 hour , electrical & mechanical specifications item 2&3 shall be satisfied.

### 6-5. Vibration Proof Test :

Unit shall satisfy electrical & mechanical specifications item 2&3 after the following vibration is applied.

Frequency : 10~55 Hz (cycle : 1 minute)

Full amplitude : 1.5mm

Duration : 2 hours each in 3 directions

### 6-6. Shock Proof Test :

After 20 G (half-sine wave) is applied to unit 3 times each in 3 directions , electrical & mechanical specifications item 2&3 shall be satisfied.

cf) The test (6-1~6-6) must be done under the open-circuit condition.

7. Appearance of keytop :

7-1. Disposition of keytop :

Disposition of the keytop shall be within the limit of 0.5mm as illustrated in Fig.4 in both vertical and horizontal lines.

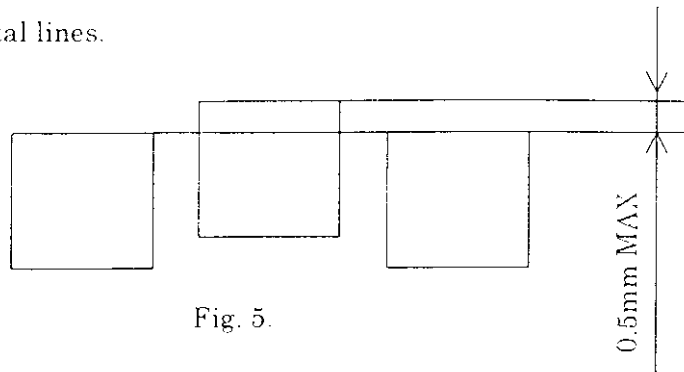


Fig. 5.

7-2. Tilt of keytop :

Tilt of keytop shall be within the limit of 0.5mm as illustrated in Fig.5.

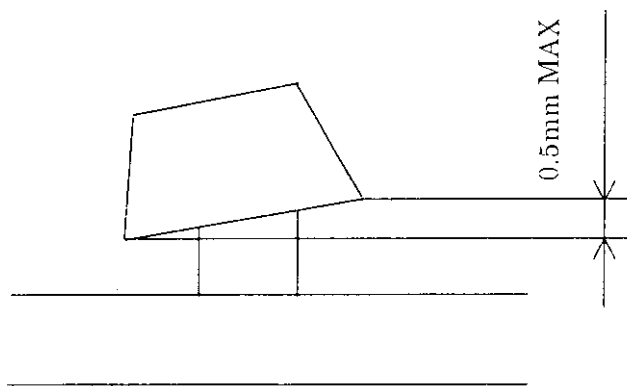


Fig .6.

7-3. Angular deviation of keytop

Angular deviation of keytop shall be within the limit of 0.5mm as illustrated in Fig 6.

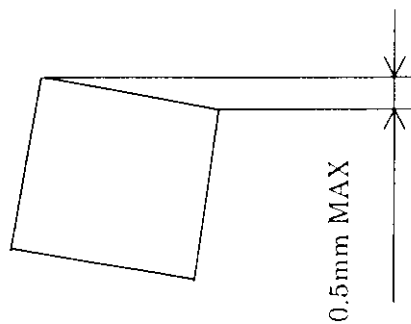
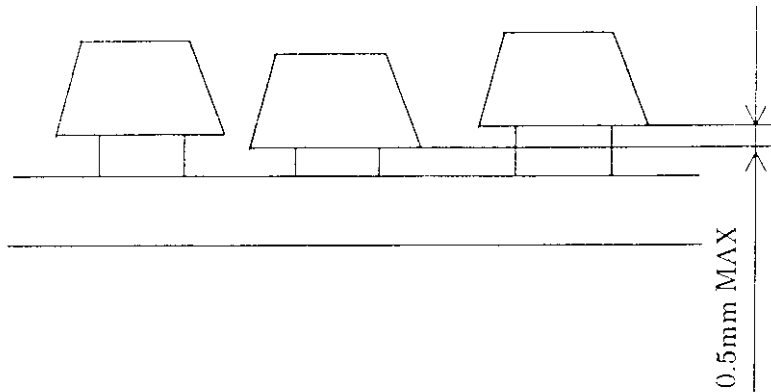


Fig .7.

#### 7.4. Uneven level of keytop :

Uneven level of keytop shall be within the limit of 0.5mm as illustrated in Fig.7.

However , exclude the bend of the frame.



0214

