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APPROVAL SHEET

No: _____

Date: 2002/08/16

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Customer: _____

Customer Part No: _____

Parts Name: RF Keyboard-FSK (912MHZ)

Part No.: KBAZUS22-904

Spec. No.: TSAZ-904

Note: _____

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| Signature For Return |
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**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

TABLE OF CONTENTS

- 0. Table of date revision
- 1. FCC GUIDELINES
- 2. Description
- 3. Physical Description and Specification
 - 3-1 Dimensions
 - 3-2 Weight
- 4. RF Keyboard Specification
 - 4-1 Main Feature
 - 4-2 RF Characteristics
- 5. Electronical Block Diagram
 - 5-1 FSK (912MHZ) Transmitter
 - 5-2 FSK (912MHZ) Receiver

Table of date-revision

| | | |
|--|--|--|
| | | |
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|-------|------|------|-------|-------|-------|-------|-------|-------|-----------|-----------------------------|
| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

TABLE OF CONTENTS

- 6. Electrical Characteristics
 - 6-1 GENERAL SPECIFICATION
 - 6-2 Operational Range
 - 6-3 Electrostatic Discharge (ESD) Sensitivity
 - 6-4 AC/DC Characteristics
 - 6-5 Membrane Switch Specifications
- 7. Endurance Test
 - 7-1 Test conditions
 - 7-2 Low Temperature Test
 - 7-3 High Temperature Test
 - 7-4 Humidity Test
 - 7-5 Temperature Cycline Test
 - 7-6 Vibration Test
 - 7-7 Drop Test
 - 7-8 Character Endurance Test
- 8. Mechanical Requirement
 - 8-1 Operating Force
 - 8-2 Operating Travel
 - 8-3 Feeling
 - 8-4 Operation Life
 - 8-5 Keytop Alignment Requirement
 - 8-6 Key Pitch
- 9. Assembly & Packing Drawing

| | | | | | | | | | | |
|-------|------|------|-------|-------|-------|-------|-------|-------|-----------|-----------------------------|
| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

FCC GUIDELINES

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 or relocate 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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|-------|------|------|-------|-------|-------|-------|-------|-------|-----------|-----------------------------|
| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

2. Description:

The Topseed RF Keyboard is a FSK (Frequency Shift Key) Transmitter for the frequency band 902-928 MHz. The RF Keyboard offers a full-integrated PLL synthesizer and a high efficiency power amplifier to drive a loop antenna; A special circuit design and a unique power amplifier design are used to save current consumption and to save battery live.

This keyboard specification applies 88/89 key membrane keyboard that is fully compatible with IBM PC AT system. FSK-550 series keyboard are silent -touch and spill-resistant.

For the Receiver Modular use with USB 1.1 compliant can be easily actuated without affecting the position of the Keyboard.

Note that the Channel button (Red button) on the receiver should flash any time the Cordless device is moved or a button is pressed. Then, it will remember your product ID and Channel ID



The Radio Frequency designed in this Version of RF Keyboard is FSK 912MHz and can be use in a range to about 10 Meter from the Receiver at any directions. The Keyboard can operate for 10-12 months with two AA Alkaline batteries.

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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

3. Physical Description and Specification:



3.1 Dimensions

The approximate dimensions of the Keyboard' s transmitter is as follows:

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|--------|----------|
| Length | 289 mm |
| Width | 163.6 mm |
| Height | 27 mm |

3.2 Weight

The approximate dimensions of the Keyboard' s transmitter is as follows:

Weight of the RF Keyboard not to exceed 950 grams (with batteries).

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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

4.RF Keyboard Specification

4-1 Main Feature

The RF Keyboard consists of three major parts; a baseband controller, a radio that suitable for America available 902–928 MHz frees ISM band applications, and a low power uC-controlled, includes RF antenna supporting circuitry, together with basic RF software level.

- 4-1 Range in meters: About 10 Meter from the Receiver
- 4-2 Frequency Range: 912MHz+/-50KHz (64 channels ID for Keyboard)
- 4-3 Data transmitting by transistor module
- 4-4 Operational voltage: 3.0 V
- 4-5 Low power consumption: on normal operation 4 mA and 10 uA on sleep mode.
- 4-6 Scrolling by mechanical encoder (24 detents every circle)
- 4-7 Support Power down Mode and high efficiency power amplifier.
- 4-8 Receiver Fully Compliant Low Speed (1.5Mbps) USB 1.1 Interface
- 4-9 Suspend/resume operation and device remote wakeup
- 4-10 Two channel ID selectable by slide switch

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|-------|------|------|-------|-------|-------|-------|-------|-------|-----------|-----------------------------|
| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
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| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

4.RF Keyboard Specification

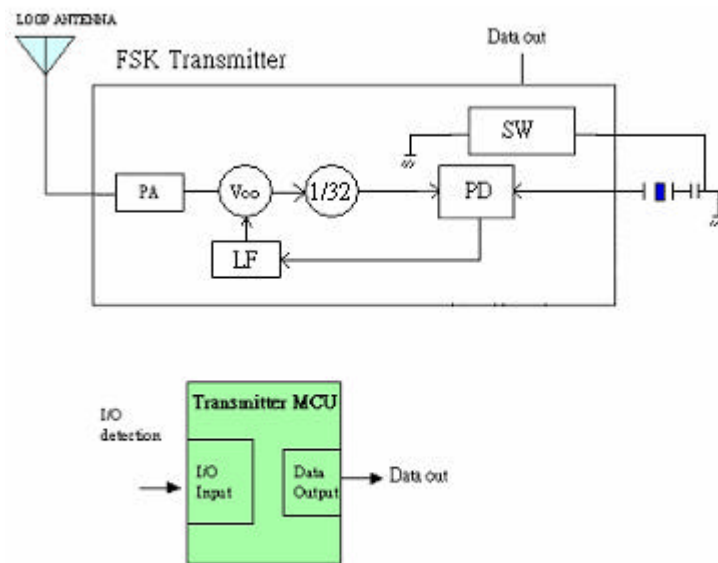
4-2 RF Characteristics

| | |
|---------------------------|--------------------------|
| Frequency Range | 912 MHz |
| Modulation | FSK |
| Channel No. | 1 |
| Channel I.D | 6 bits 64 |
| Operation Voltage | 3V |
| Battery | AA*2 Alkaline batteries. |
| Batter Life | 10 - 12 months |
| TX Power | < 0dBm (1mW) |
| Transmission rate | 6K bps |
| TX FM frequency deviation | +/- 60 KHz |
| Frequency tolerance | +/- 20ppm |
| Key Num. | 88/89 |
| Transmission Distance | 10 Meter |

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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
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| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

5. Electrical Block Diagram

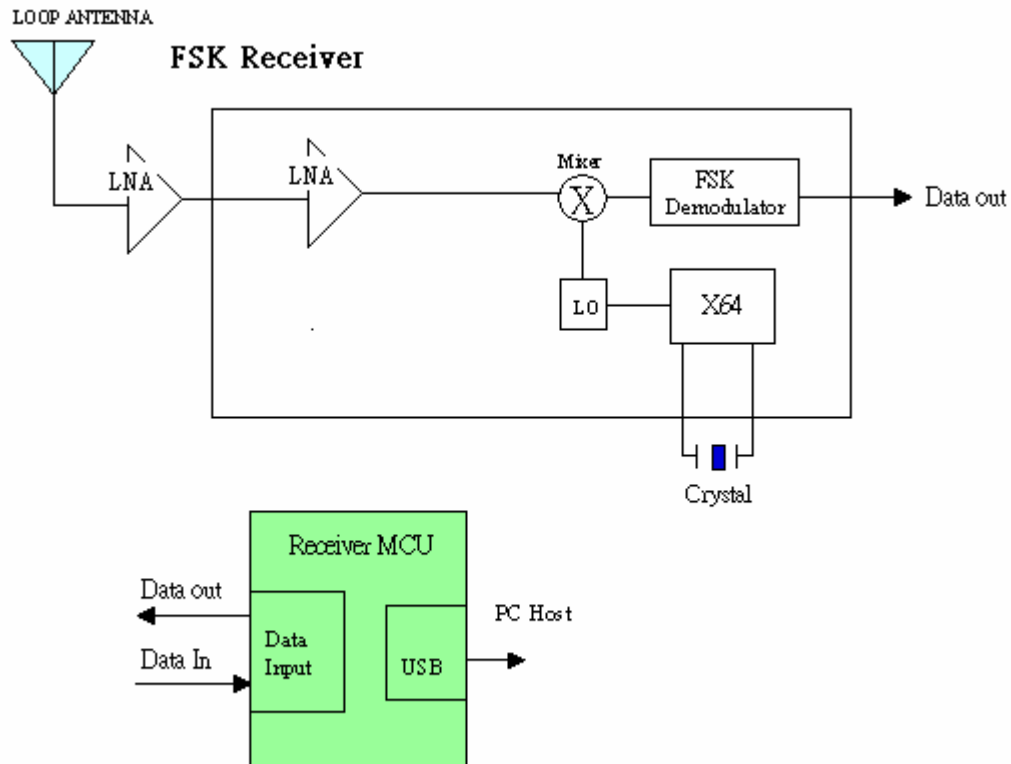
5-1 FSK (912MHZ) Transmitter



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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)

5-2 FSK (912MHZ) Receiver



USB 1.1 compliant The module is a USB high-speed class device (12 Mbps) and has the full functionality of a USB slave

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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

6. Electrical Characteristics:

6.1 GENERAL SPECIFICATION

6.1.1 Operation temperature range : -10 ~ + 55

6.1.2 Storage temperature range : - 25 ~ + 65

6.1.3 Relative humidity range : 10 %~ 95 % RH

6.2 Operational Range

| Parameter | Min | Max | Unit |
|----------------------------|-----------------------|------------|------------|
| Supply Voltage | 2.3 | 3.6 | V |
| Frequency (US) | 912MHz+/-50KHz | | MHZ |
| Ambient temperature | -10 | 60 | |

6.3 Electrostatic Discharge (ESD) Sensitivity

Direct discharge:

Test Voltage: Not less than 8 KV for Air discharge

Not less than 4 KV for Contact discharge

Indirect discharge:

Test Voltage: Not less than 4 KV for HCP

Not less than 4 KV for VCP

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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

6.4 AC/DC Characteristics

Supply Voltage: VS= 3.0 V

| Parameter | | Min | Typ | Max | Unit |
|------------------------------|---------------|-----|------|-----|------|
| Current Consumption | Sleep mode | | 5 | 10 | uA |
| | Transmit Mode | | 4 | 8 | mA |
| Data rate | | | 6K | | bps |
| Sensitivity | | | -102 | | dbm |
| Transmitter settling time | | | 2.2 | | ms |
| Power amplifier output | | -4 | -2 | 0 | dbm |
| Output power (Transmit mode) | | | 1 | | mW |

6.5 Membrane switch specifications:

6.5.1 Electrical requirements:

(1). **Max rating:** DC 3.6V, 0.3 mA

Recommendation: DC 3V, 0.1 mA

(2). **Contact resistance:** (include line resistance)

Less than 300 Ohm under the condition of making contact with 150 grams of depressing force onto center of the key switch.

(3). **Chattering (bounce):** 15ms Max at on and off point

(4). **Insulation resistance:** DC 125V 10M Ohm Min.

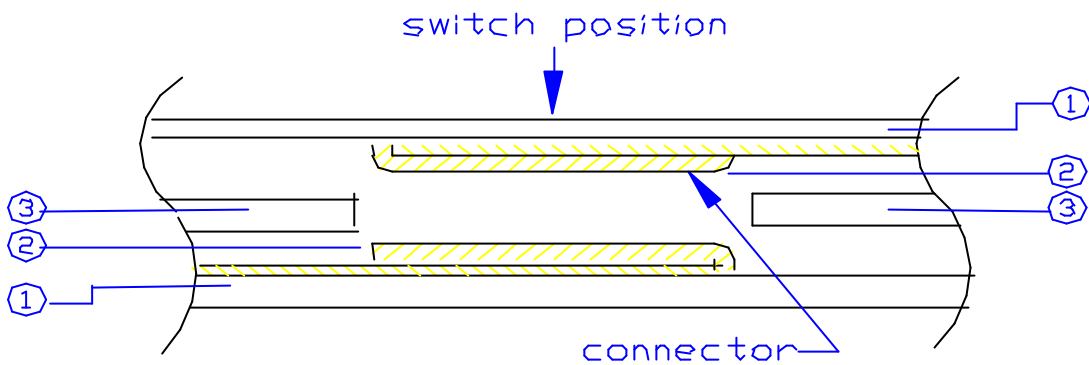
(5). **Withstand:** AC 250V 50Hz or 60 Hz. 1 minute.

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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)

6.5.2 Mechanical requirements:

(1). Membrane structure:



| | component | material | standard |
|---|------------------|----------------|-------------------------|
| 1 | base film | polyester film | $\mu\text{m} \pm 10\%$ |
| 2 | contact position | silver | over $10\mu\text{m}(t)$ |
| 3 | spacer | polyester film | $\mu\text{m} \pm 10\%$ |

(2). Composition properties

Line/space resolution: 0.1 mm
 Silver content: 70 +/- 1 %
 Resistivity: $\leq 0.01 \text{ Ohm/Sq. AT } 0.025\text{mm}$

(3). Thickness of plastics film

Top circuit layer: 0.075 mm
 Spacer layer: 0.1 mm
 Bottom circuit layer: 0.1 mm

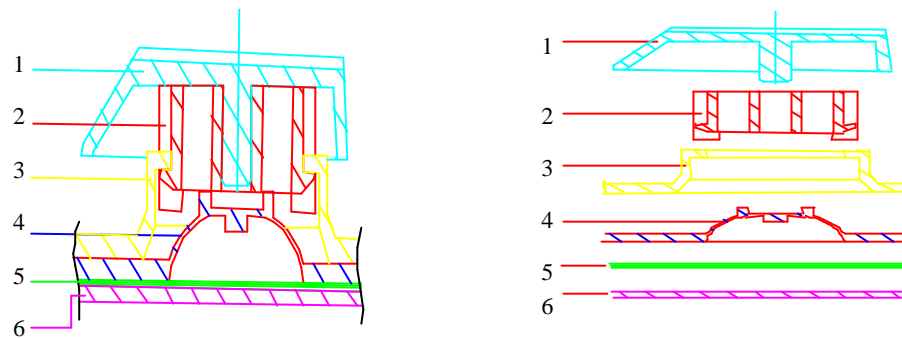
(4). Action force: 15 g MIN.

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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

6.5.3 Keyboard structure:

This keyboard is in membrane type with tactile feeling, its structure is as following

- 1.Keytop
- 2.Plunger
- 3.Housing frame
- 4.Rubber dome
- 5.Membrane switch
- 6.Bottom plate



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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

7. Endurance test

7-1. Test conditions

Test and measurements shall be made in following standard conditions unless otherwise specified:

Normal temperature: +5 to +35

Normal humidity: 45% to 85% RH

Normal pressure: 860 to 1060 MB

7-2. Low temperature test:

Measurement after the test with following conditions and lefts in chamber (normal temp, normal humidity) for one hour.

- (1). Temperature: -25 +/- 2
- (2). Time: 72 hours
- (3). Dew condensation shall be removed.

7-3. High temperature test

Measurement after the test with following conditions and lefts in chamber (normal temp, normal humidity) for one hour

- (1). Temperature: + 65 +/- 2
- (2). Time: 72 hours

7-4. Humidity test

Measurement after the test with following conditions and lefts in chamber (normal temp, normal humidity) for 24 hours.

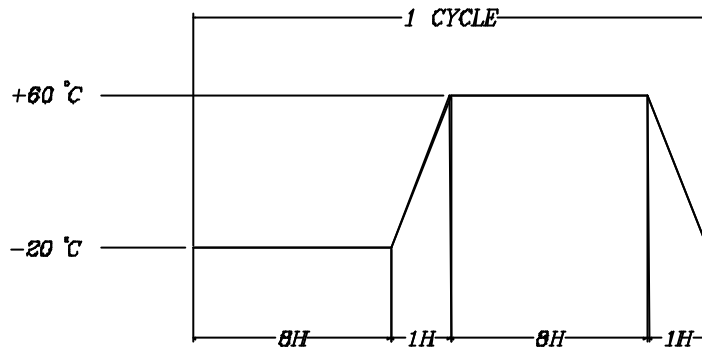
- (1). Temperature: +50 +/- 2
- (2). Relative humidity: 90 to 95% RH
- (3). Time: 72 hours
- (4). Dew condensation shall be removed.

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|-------|------|------|-------|-------|-------|-------|-------|-------|-----------|-----------------------------|
| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

7-5. Temperature cycling test

Measurement after the test (temp cycles =4) and left in chamber (normal temp, normal humidity) for one hour.



7-6. Vibration test

Storage: 10 to 300 Hz, 2.0 G 1 hour per axis
 Operation: 10 to 500 Hz, 0.5 G 1 hour per axis

7-6-2 Shock test

Storage: 60G 1/4sines wave pulses, 11 ms DURATION
 Operation: 5G 1/4sines wave pulses, 11 ms DURATION

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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

7-7. Drop test

The package carton, on the condition of 91cm height, after 1 corner, 3 edges, and 6 faces dropping, electrical and mechanical characters will still be in normal conditions.

7-8. Character endurance test:

7.8.1. Rubber eraser:

Material: Lion #510 for pencil

Speed: 2 Round per second

Stroke: 20mm

Force: 200 gf

Cycle: 600 time

Judgement: legend shall be legible and have no crack

7.8.2. Alcohol

Material: flannel soaked with ISOPROPYL alcohol

Speed: 2 Round per second

Stroke: 20mm

Force: 200 gf

Cycle: 60 time

Judgement: legend shall be legible and have no crack

7.8.3 Neutral detergent

Material: flannel soaked with neutral detergent

Speed: 2 Round per second

Stroke: 20mm

Force: 200 gf

Cycle: 120 time

Judgement: legend shall be legible and have no crack

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|-------|------|------|-------|-------|-------|-------|-------|-------|-----------|-----------------------------|
| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
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| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

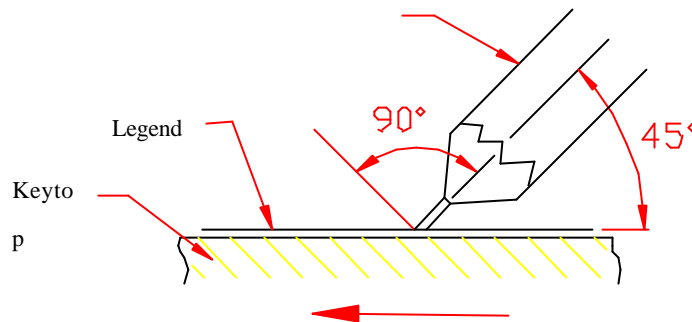
**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

7.8.4.Pencil hardness

There shall be no legend peel off when a pencil (manufacturer name: Mitsubishi type in hardness type b whose load shall be cut at right angle shall be applied to the legend in a direction of 45 degree. Pressure: approx. 1 kg. (Lead shall not be snapped.)

Speed: 0.5mm/sec

Test cycle: 1 time



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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

8.Mechanical requirement:

8-1. Operating force

Normal key: Peak force 55 g+/- 10 g
Special key: Peak force 65 g +/- 15g

8-2. Operating travel

Full travel: 3.0 +/- 0.3mm
Peak travel: 0.8 +/- 0.3 mm

8-3. Operating life:

Over 5 million cycles under the condition of DC 5V 0.1mA load with 4 cycles/sec depress speed.

8-4. Feeling

Tactile feeling without sticky at any point of keytop under the condition of 4 cycles/sec of depressing speed.

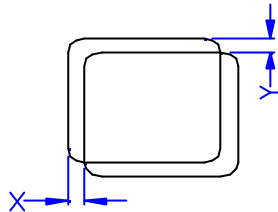
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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | | |
| | | | | | | | | | TSAZ-904 | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | | |

SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)

8-5. Keytop alignment

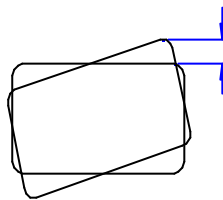
8-5-1. Shift of keytops

Less than 0.5 mm for full amplitude on both X and Y directions.



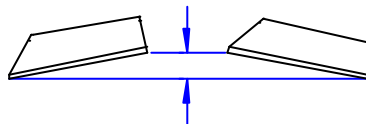
8-5-2. Angle twist of keytop

The twist of the keytops shall be less than 0.5mm



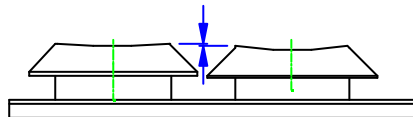
8-5-3. Slant

The slant of the keytops shall be less than 0.5mm



8-5-4. Height diversity

It shall be less than 0.5mm from neighboring keytops in the same row.

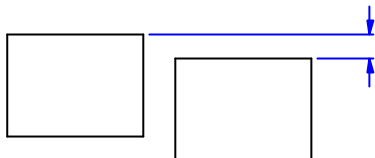


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| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
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| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |

**SPECIFICATION FOR
RF Keyboard-FSK (912MHZ)**

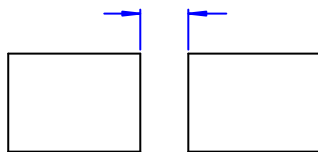
8-5-5.Line diversity

It shall be less than 0.5mm from neighboring keytops.



8-5-6.Gap between keytops:

More than 0.3 mm



8-6.Key pitch: 19.00mm

NOTE: When using RF products, keep away from hi-frog electric products.

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|-------|------|------|-------|-------|-------|-------|-------|-------|-----------|-----------------------------|
| | | | | | | APPD. | CHKD. | DSGD. | SPEC. NO. | RF Keyboard FSK (912MHZ) |
| | | | | | | | | | TSAZ-904 | |
| | | | | | | | | | | |
| SYMB. | PAGE | DATE | APPD. | SHKD. | OSGD. | | | | | |