

# **SK-8808**

## **RF Wireless Keyboard**

### **Manual and Specifications**

## **1. General**

This Product Specification defines an RF wireless Desk Top PC Keyboard with a USB dual receiver which is for both RF keyboard and RF mouse. The wireless mouse specification is separate from this specification. However, the final package should include the wireless keyboard(Rapid Access III USB RF PC Keyboard), wireless mouse(ScrollPoint III USB RF Mouse) and the common receiver. This product group operates at 27Mhz for worldwide market.

### **1.1 The Common Receiver:**

The receiver provides 12 channel operation to prevent like frequency interference. The receiver interface with both the wireless keyboard and the wireless mouse to the system through the USB endpoint port. There are three LEDs on the receiver for Keyboard Data, Mouse Data and Power indication. Due to the USB power limitation, there is no remote wake-up feature but using the Power button on this monitor to wake up the receiver. The RF receiver is desired to be common to the RF mouse as well as the keyboard.

### **1.2 USB and software requirement**

The common receiver must meet the USB specification version 1.1 or higher for Human Interface Devices. The keyboard, receiver and drivers shall be compatible with all operating systems that are WIN98, Windows Millennium or Windows 2000 and their future releases.

The software driver must be designed to work as a USB device and the keyboard, mouse, and USB hub microcode must support Plug-N-Play installation of this driver. All of the HID codes generated by the keyboard/mouse receiver and messaging sent to the receiver must meet the USB specification noted in this specification. The driver-application also must meet all current and future Microsoft WHQL requirements.

The software driver-application must also support a variety of languages. The vendor will be responsible for accurate translations of all screens and help files. IBM Translation Verification Testers will provide final approval of translations.

### **1.3 The Keyboard**

The base keyboard will be in both Stealth Black and Pearl White. The Japanese version top case will be painted Platinum Mist Silver. The keyboard is approximately 410 mm long x 180 cm deep x 45 mm tall. This model includes a detachable palm rest. There are six channels available for keyboard to use. The RF receiver and transmitter should have a range of approximately 2 to 3 meters.

### **1.4 Features of keyboard**

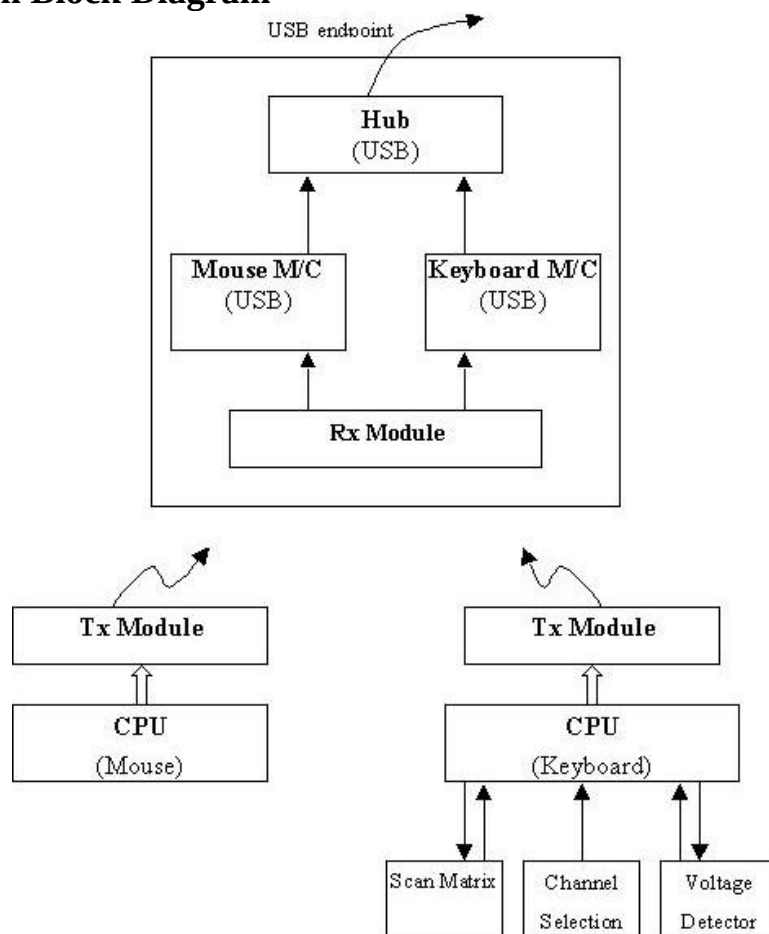
- ◆ The Rapid Access Module shell contain 15 special function keys. There is no LEDs at all on the keyboard to reduce the power consumption.
- ◆ Seven of the keys are permanently programmed to perform the media control functions for Audio and CD/DVD Controls. These are the play/pause, stop, volume up, volume down, mute, next track/chapter, and last track/chapter. These controls comply with the Microsoft media control specifications and shall be located in the upper right area of the keyboard.
- ◆ One of the keys will be permanently programmed to comply with the Microsoft ACPI suspend/wake function while a hot key is for access the e-mail.
- ◆ Six of the buttons will launch application, file, or URLs that will either pre-coded before shipment or can be customized by the customer. One of these six buttons may be assigned to launch a customer selected E-MAIL application.
- ◆ SK-8808 model is OEM for IBM .It is configurable for 106/107/108/109/111 key layout with languages according to customer requirement.
- ◆ Three special function keys, Win-L, Win-R and Application allow this model of keyboard to be used with USB spec 1.1 or its compatibles running Windows 98 and Windows 2000 operating system.

- ◆ There is no USB cable for RF transmission. Four AAA batteries are to be installed at the bottom of the keyboard for operation.
- ◆ There is a Channel Selection button at the bottom of the keyboard near the battery cover.

## 1.6 Keyboard Key Definition

The SK-8808 keyboard is available in 5 languages at 106,107,108,109 and 111 keys.

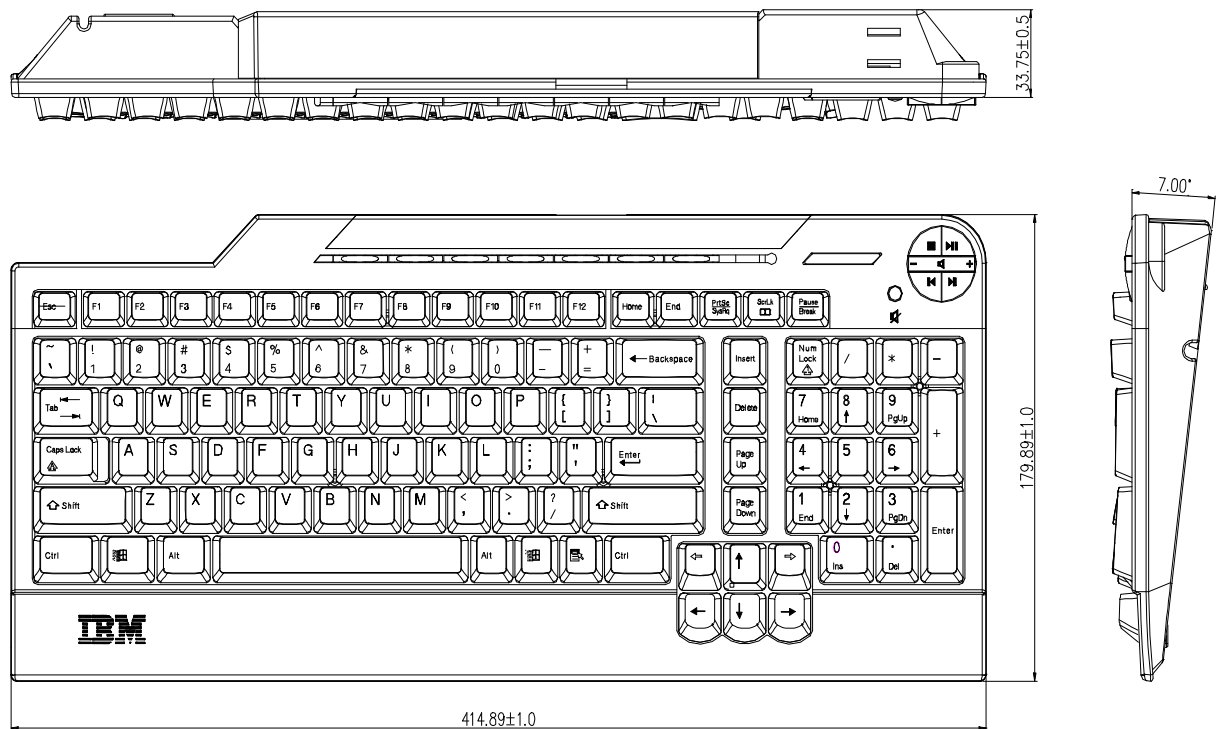
## 1.7 System Block Diagram



## 2. Mechanical Specifications

### 2.1 Keyboard

#### 2.1.1 Dimensions and weight



##### 2.1.1.1 Unpacked

Dimensions :

Length :  $415\text{mm} \pm 3\text{mm}$

Depth :  $180\text{mm} \pm 3\text{mm}$

Height :  $39\text{mm} \pm 2\text{mm}$

Weight :

Bare keyboard :  $0.745\text{ kg} \pm 0.1\text{kg}$

Palm-rest :  $0.126\text{ kg} \pm 0.05\text{kg}$

### 2.1.1.2 Packed

Including packing / buffering material

Dimensions :

|        |                                                               |
|--------|---------------------------------------------------------------|
| Length | : 440mm $\pm$ 3 mm                                            |
| Depth  | : 220mm $\pm$ 3 mm                                            |
| Height | : 60mm $\pm$ 2 mm                                             |
| Weight | : 1.09kg $\pm$ 0.1 kg (Keyboard with brown box and buffering) |

### 2.1.2 Material

|                          |                        |
|--------------------------|------------------------|
| Upper casework           | HI-PS 94 HB            |
| Lower casework           | HI-PS 94 HB            |
| Brackets                 | HI-PS 94 HB            |
| Key caps                 | ABS 94 HB ( TECHNO K4) |
| Audio pad keys           | ABS 94 HB (TECHNO K4)  |
| Rubber sheet switch(K/B) | LIMS Rubber            |
| Hot Key switch           | LIMS Rubber            |

### 2.1.3 Colors

|                              |                                                                                         |
|------------------------------|-----------------------------------------------------------------------------------------|
| Top Enclosure                | IBM Stealth Black & PMS Cool Gray 9 C with Silver Paining for Japanese Layout           |
| Bottom Enclosure             | IBM Stealth Black                                                                       |
| Keycap                       | Stealth Black, Raven Black and Blue                                                     |
| Plastic flip feet            | IBM Stealth Black                                                                       |
| Volume Control key (Plastic) | Raven Black                                                                             |
| Easy Access keys (Plastic)   | Raven Black, PMS 347C, PMS 384C, PMS 2746C, PMS 188C, PMS 267C, IBM Blue and Snow White |
| Channel Key                  | IBM Blue                                                                                |
| Mute Key (Plastic)           | Raven Black                                                                             |
| Media Key( Plastic)          | Stealth Black                                                                           |
| IBM Logo                     | IBM Blue & PMS 877C for Japanese Layout                                                 |

### 2.1.4 Detachability

#### 2.1.4.1 Palm-rest

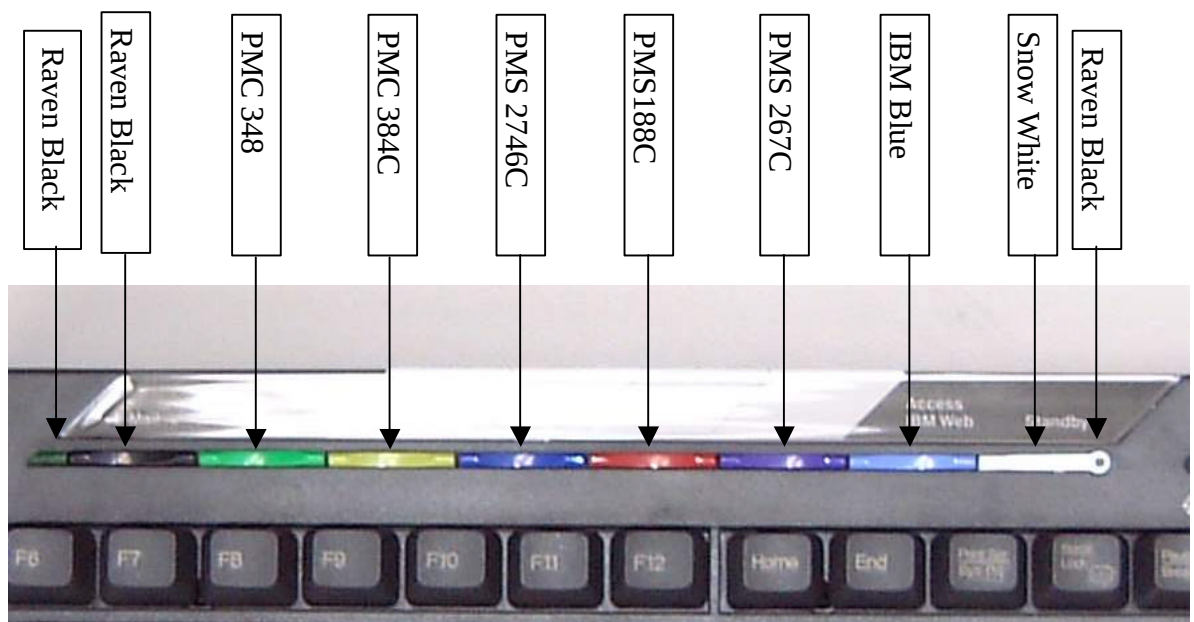
The palm-rest can be detached. However, the palm-rest does not affect the functions of the keyboard.

#### 2.1.4.2 Battery cover

The battery cover can be removed for battery installation.

### 2.1.7 Easy access key

The easy access buttons will feel different from the rest of the Key switches. The easy access buttons will have a 140+/-40grams Force and 1.5+/-0.3mm travel with Life cycle at 0.5million times(3cycle/second, 15-20lbs).



### 2.1.8 Specification of key cap

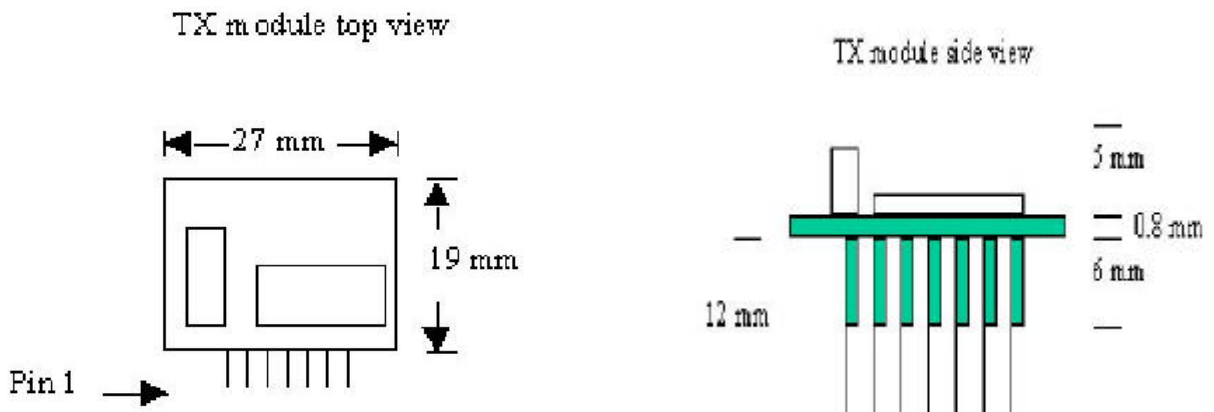
#### 2.1.8.1 Retention force

1.5 kg minimum to pull up the keys from frame on the first attempt and 1.0 kg min. on the tenth removal.

#### 2.1.8.2 Gaps

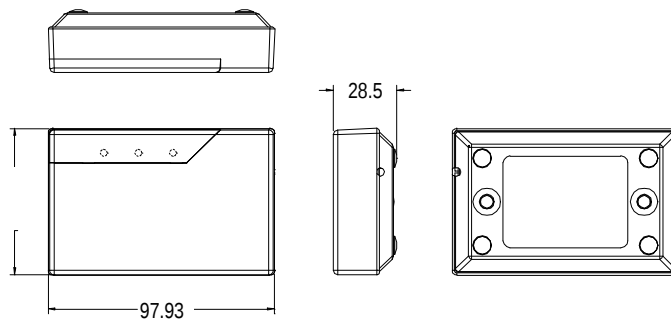
Gaps between adjacent row or column of keys: 1.0 +/-0.3 mm

### 2.1.9 Transmitter module dimensions



## 2.2 RECEIVER

### 2.2.1 Dimensions and Weight



#### Dimensions:

Length : 98.0 mm  $\pm$  2mm  
 Depth : 64.0 mm  $\pm$  2mm  
 Height : 28.5 mm  $\pm$  2mm

Weight: 125 g  $\pm$  10g

### 2.2.2 Material

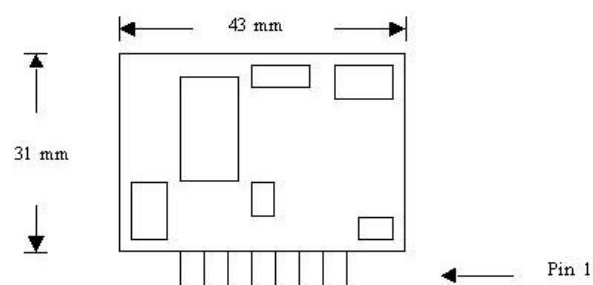
Upper Case : HIPS,94HB  
 Lower Case : HIPS,94HB  
 Channel Button : ABS,94HB  
 Clear Window : PC  
 Cable : UL material

### 2.2.3 Colors

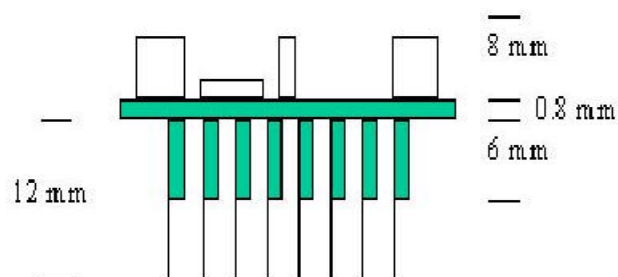
|                    |   |                   |
|--------------------|---|-------------------|
| Upper Case         | : | IBM Stealth Black |
| Lower Case         | : | IBM Stealth Black |
| Channel Button     | : | IBM Blue          |
| Lens               | : | Smoke Gray        |
| Cable              | : | Black             |
| Mini DIN Connector | : | White             |

### 2.2.4 Receiver module dimensions

RX module top view



RX module side view

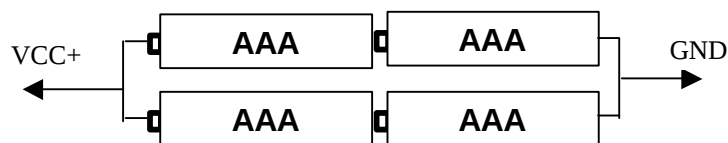


## 3. Electrical Specification

### 3.1 Keyboard Transmitter

#### 3.1.1 Operating voltage

The operating voltage range for keyboard is 2.6 ~ 3.6 Vdc. It is capable of supplying a load current up to 25 mA. There are 4 AAA batteries providing 3.0V for operation.



#### 3.1.2 Current consumption

Typical current consumption is 15 mA (average max.) when supplied with 3.3V DC power. Power down current consumption is less than 50  $\mu$ A.

#### 3.1.3 Power consumption

The power consumption is less than 15 mA at operation mode and 12uA at sleep mode.

#### 3.1.4 Low Power Indicator

Low power indicator on the screen will be lit when the battery voltage in the keyboard transmitter is less than 2.6V.

#### 3.1.5 Circuitry

##### 3.1.5.1 PCB Assembly

Microprocessor EMC 451 QFP 44 pin is applied. The module is placed on top of the PCB main board. There is also an antenna connected to this PCB.

##### 3.1.5.2 Membrane

Key matrix traces with switch contact fingers are placed and routed on three layers. Switch contacts and route path are printed with silver ink. The contact resistance is less than 400 ohm.

### **3.1.5.3 Connecting PCBA and membrane**

Mechanical clamping mechanism provides contact between membrane and PCBA for connection scan lines and return lines on membrane key matrix to PCBA circuits via Contact fingers.

### **3.1.6 Keyboard Matrix**

Following are keyboard matrices for 106, 107, 108, 109, 111-key language keyboards. Each box in the matrix contains the key name and key number.

### **3.1.7 Battery Life**

The battery life under the operating condition of 10 keystrokes/sec continuous use is 80 hours for alkaline type and 30 hours for Zinc-Carbon type.

### **3.1.8 Effective Transmission Distance**

Effective transmission distance is 2 meters. Effective transmission is defined as the distance where no one character in a continuous transmission of 40 characters is dropped.

## **3.2 Receiver**

### **3.2.1 Operating voltage**

Voltage supplied to keyboard: 5+/-0.25 VDC

With ripple lower than 150mv, and capable of supply load current up to 100 mA with voltage drop less than 0.25 VDC

### **3.2.2 Current consumption**

Under nominal 5 VDC power supplied, typical current

Consumption is 90 mA +/- 10% with three LED indicators on.

### **3.2.3 Power consumption**

Under normal operation, the power consumption of total unit will be less than 0.5/0.8 Watt.

### **3.2.4 Signal timing and level**

Level and timing of signals presented on data and clock Pins are compatible

with both TTL or MOS termination on the host PC motherboard.

### **3.2.5 Pin outs of 4 pin USB min-DIN connector**

Compatible with USB spec V1.1.

### **3.2.6 LED indicators**

There are three indicators(green) on the receiver: Mouse Data, Keyboard Data and Power. The Data indicators will be ON only when data is receiving from the transmitter. The Power will be ON only when the system is ON. During the Suspend and Sleep modes, the Power LED will be OFF.

### **3.2.7 Circuitry**

#### **3.2.7.1 PCB Assembly**

There are three microprocessor, two MOTOROLA JB8 for functions of Mouse and keyboard individually and one ALCOR MICRO AU9254 as USB Hub IC. The module is placed on top of the PCB main board.

#### **3.2.7.2 Cable**

Pin outs of cable at mini-DIN end connector and is USB compatible. The cable length is 1.0 meter.

#### **3.2.7.3 USB wake up**

There is no USB remote wake-up function. Instead, the Receiver is waken up by pressing the Power button on the Monitor.

## **3.3 Function description**

### **3.3.1 Modes of operation**

There is no LED indicator on the keyboard. However, there are six icons and will be used to display the following information on the screen:

- Email Waiting Status
- Keyboard Status
- Keyboard Num Lock Status
- Keyboard Caps Lock Status

- Keyboard Scroll Lock Status
- Mouse Status

The icons and status bar will be sized to match the same proportions as the Windows Taskbar on the screen display. Its default location will be in the lower right corner above the default Windows Taskbar location. The user will have the option to drag and drop the status bar to any location on the active desktop.

### 3.3.3 Interface specification with host PC

The keyboard uses bi-directional serial interface to transmit and receive signals between the keyboard and the host unit.

### 3.3.4 USB Mode Protocol

Data transmission from the keyboard consists of D+/D- different data stream sent out serially over the 'D+/D-' lines.

## 3.4 Channel Selection

### 3.4.1. Channel and ID default setting

|       | Channel | ID |
|-------|---------|----|
| K/B   | 1       | 1  |
| Mouse | 4       | 1  |

Note: preset in the production line as default setting before delivery

### 3.4.2 Channel and ID numbers

Channel: six channels to Keyboard and six channels to Mouse

|      |       |       |         |         |         |         |         |         |       |       |       |
|------|-------|-------|---------|---------|---------|---------|---------|---------|-------|-------|-------|
| 1    | 2     | 3     | 4       | 5       | 6       | 7       | 8       | 9       | 10    | 11    | 12    |
| K/B1 | K/B 2 | K/B 3 | Mouse 1 | Mouse 2 | Mouse 3 | Mouse 4 | Mouse 5 | Mouse 6 | K/B 4 | K/B 5 | K/B 6 |

ID: There are 16 ID from 0000 to 1111 for keyboard and another same 16 for Mouse.

| Keyboard |      | Mouse |      |
|----------|------|-------|------|
| 1        | 0000 | 1     | 0000 |
| 2        | 0001 | 2     | 0001 |
| 3        | 0010 | 3     | 0010 |
| 4        | 0011 | 4     | 0011 |
| 5        | 0100 | 5     | 0100 |
| 6        | 0101 | 6     | 0101 |
| 7        | 0110 | 7     | 0110 |

|    |      |    |      |
|----|------|----|------|
| 8  | 0111 | 8  | 0111 |
| 9  | 1000 | 9  | 1000 |
| 10 | 1001 | 10 | 1001 |
| 11 | 1010 | 11 | 1010 |
| 12 | 1011 | 12 | 1011 |
| 13 | 1100 | 13 | 1100 |
| 14 | 1101 | 14 | 1101 |
| 15 | 1110 | 15 | 1110 |
| 16 | 1111 | 16 | 1111 |

Note: The ID indication is to prevent one keyboard/Mouse controlling more than one receiver.

### 3.4.3. EEPROM

There is one EEPROM IC in the Receiver and no EEPROM in Transmitter.

### 3.4.4 Operations

#### 3.4.4.1 Battery removal

When the batteries are removed from the keyboard, the channel goes back to its default setting on the keyboard while the channel in Receiver is no change.

#### 3.4.4.2 Channel Reset –to default setting

Procedure is as follows:

1. Click on the Channel Selection button on Rx (see Note 1 below).
2. Press on the Channel Selection button on Tx (see Note 2 below).

Note 1: (on Receiver)

Click once to clear all channel and ID from the memory of EEPROM.

The LED on the Rx will then be ON and ready to receive channel and ID setting from the Tx.

Note 2: (on Keyboard/Mouse)

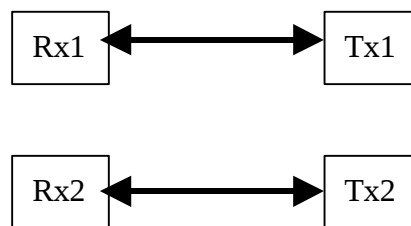
- ◆ Press and hold the button for more than 3 seconds: both channel and ID go to Default. The LED on Rx is flashing and turn off when the data is received.
- ◆ It can also be done by re-installing the batteries.

#### 3.4.4.3 Only one set of Keyboard or/and Mouse with the Receiver

Channel is in the default setting. No manual setting is required when initial use.

#### 3.4.4.4 Channel change – for more than one set of same devices within available transmission distance

Take keyboard as example for description. The description is the same as to the Mouse operation.



When the Rx2 and Tx2 are to be used after Rx1 and Tx1 already in use, due to the same default channel and ID, both receivers will be confused by signals from either keyboard. Therefore, the Rx2 and Tx2 have to go through the Channel change procedure described as follows while Rx1 is not pressed. (It is also applicable to change channel in Rx1 and Tx1 while Rx2 is not pressed.)

1. Click the Channel Selection button on Rx2 once to be ready to be ready for receiving channel change from the keyboard.
2. Click the Channel Selection button once on the keyboard (for less than 3 seconds).  
The Channel number will add one up at each click while ID number is generated automatically from random. For example, the current Channel is 2 and ID is 5. After the above procedure once, the channel moves to 3 and ID maybe 9 or any other random number from 1 to 16.

Note: the Channel will not be changed if the Channel Selection button on the Receiver has not yet been clicked once.

#### 3.4.4.5 Channel and ID display

The computer screen will display the Channel number.

#### 3.4.4.6 Action before packaging – Channel Reset \*\*\* for factory \*\*\*

Follow Channel Reset procedure as 3.4.4.2 to ensure that all products leave the production line in their default setting.

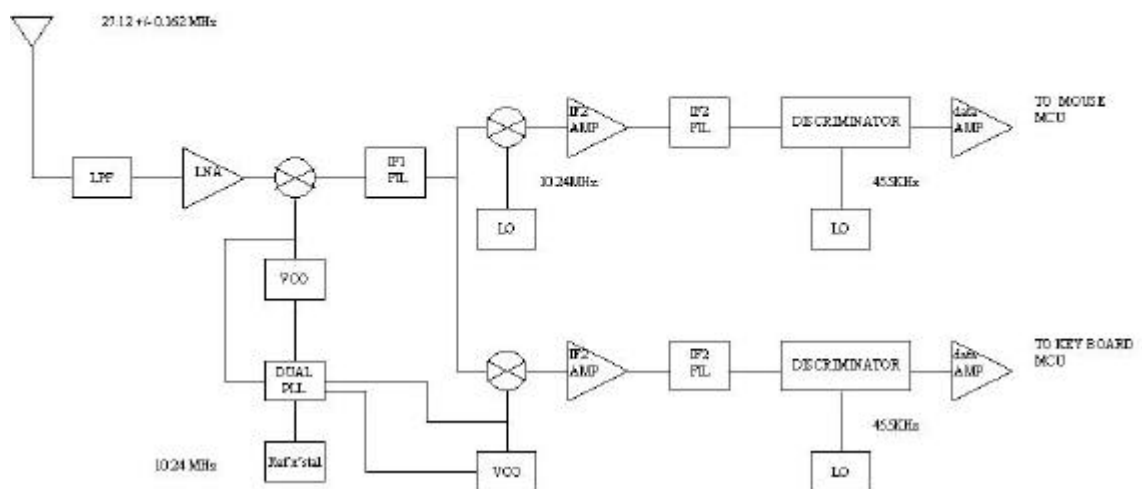
#### 3.4.4.7 Initial use of device

It is recommended that the user is to reset the channel as described in 3.4.4.2 to default setting before use.

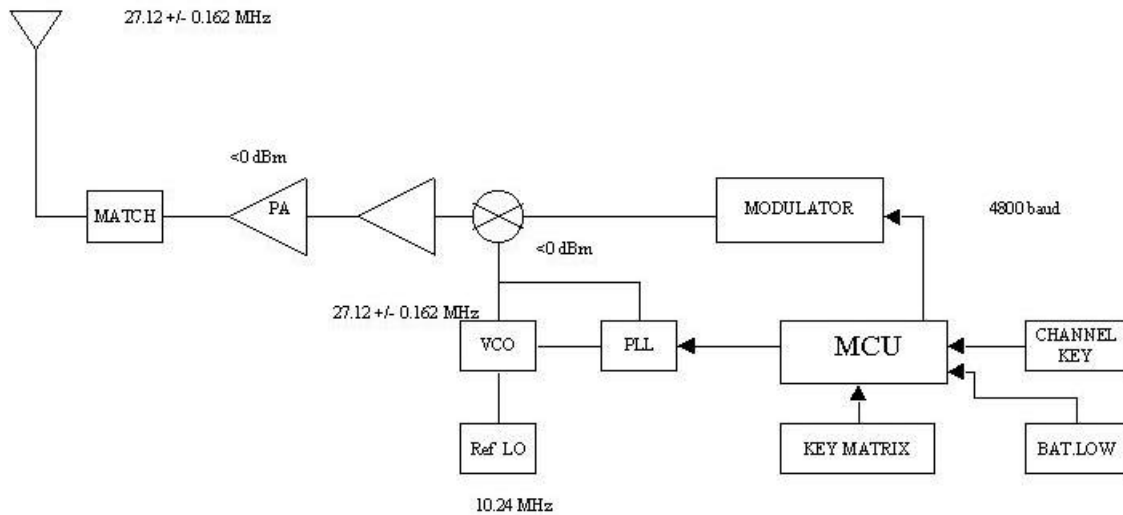
### 3.5 Module description

#### 3.5.1 Block Diagram

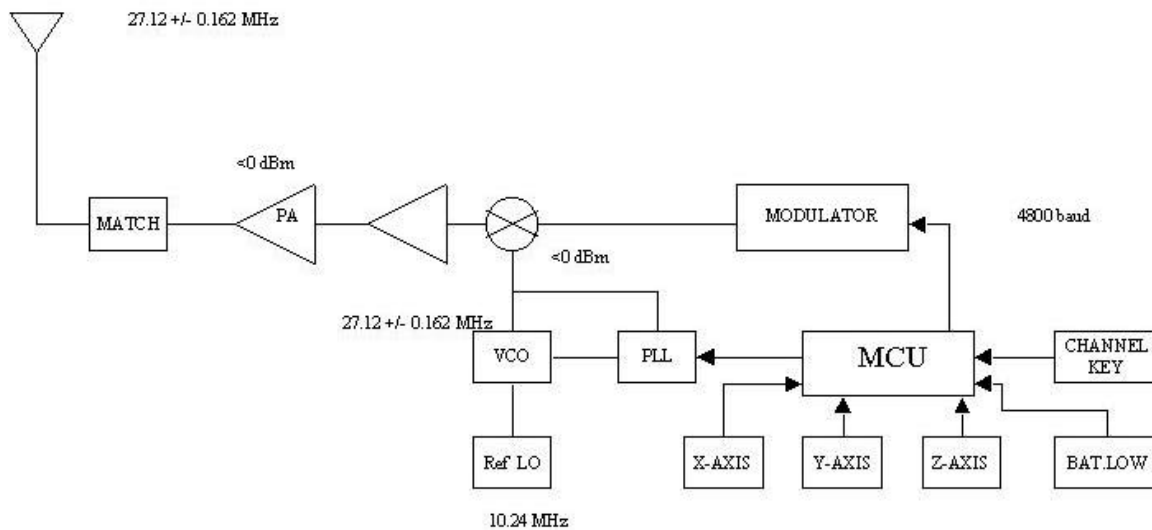
27 MHz MOUSE AND KEYBOARD RECEIVER DIAGRAM



## 27MHz KEYBOARD TRANSMITTER DIAGRAM



## 27MHz MOUSE TRANSMITTER DIAGRAM



### 3.5.2 Module specification (multi-channel RF Tx, and dual Rx)

#### 3.5.2.1 Features

- ◆ PLL synthesizer design
- ◆ RF communication distance at least 2 meters, Omni-directional operation
- ◆ Low power consumption
- ◆ Multi RF communication channel for home and office use
- ◆ For low cost wireless application
- ◆ Digital interface design

#### 3.5.2.2 Specification/Models

|                                                                          |                                                                                             |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Description & Commodity                                                  | : For wireless data communication                                                           |
| Model                                                                    | : 27M2400T, 27M2400RX2                                                                      |
| Baud rate                                                                | : Up to 7200 baud                                                                           |
| Transmission distance                                                    | : 2 meter                                                                                   |
| Operation Frequency                                                      | : 27.12 MHz +/- 0.163 MHz                                                                   |
| Modulation scheme                                                        | : FSK                                                                                       |
| PLL lock time                                                            | : <20 ms                                                                                    |
| Min. timing of dummy data to TX module of transmit first package of data | : >60 ms @ 1 kHz tone                                                                       |
| Modulation input impedance of TX module                                  | : >100 K $\Omega$ @ 3 V <sub>pp</sub> CMOS signal ①                                         |
| Size of TX module                                                        | : 22mm L * 28 mm W * 7 mm H                                                                 |
| Demodulation output of RX module                                         | : High impedance TTL signal                                                                 |
| Size of RX module                                                        | : 29mm L * 41 mm W * 10 mm H                                                                |
| Power consumption                                                        | : <25 mA @ transmitter working mode at 3 V<br><30 mA @ dual receiver working mode at 5V     |
| RF output power                                                          | : <1mW                                                                                      |
| Communication mode                                                       | : Simplex                                                                                   |
| Power supply                                                             | : 2.7 ~ 5.5 Vdc                                                                             |
| Channel ②                                                                | : 6 channel of 25KHz channel spacing(for Tx)<br>12 channel of 25KHz channel spacing(for Rx) |
| Antenna type                                                             | : antenna match at 27 MHz                                                                   |

**Note:**

① If the input voltage higher, it will get the high deviation of the signal. The normal

deviation  $\pm 2.5\text{KHz}$  to  $\pm 5\text{ kHz}$ . It will get the best performance of the TX module.

② When there is dual receiver working at the same package. It is only 6 channel for each to select.

### 3.5.3 Module pin description

#### 3.5.3.1 RX module

|                   |                                                                    |
|-------------------|--------------------------------------------------------------------|
| Pin1 : DEMOD OUT2 | keyboard demodulation data output pin, data rate up to 7200 baud ① |
| Pin2 : DEMOD OUT1 | mouse demodulation data output pin, data rate up to 7200 baud ①    |
| Pin3 : SYN/D      | synthesizer serial data input                                      |
| Pin4 : SYN/C      | synthesizer clock input                                            |
| Pin5 : SYN/E      | synthesizer data latch enable pin                                  |
| Pin6 : GROUND     | ground for RX module                                               |
| Pin7 : EXT ANT    | external antenna input                                             |
| Pin8 : Vcc        | Vcc for RX module, 4.5 to 5.5 Vdc                                  |

Note: ① High impedance TTL output from 4.5V to 5V.

#### 3.5.3.2 TX module

|                |                                                        |
|----------------|--------------------------------------------------------|
| Pin1 : MOD IN  | modulation data input pin, data rate up to 7200 baud ① |
| Pin2 : SYN/E   | synthesizer data latch enable pin                      |
| Pin3 : SYN/C   | synthesizer clock input                                |
| Pin4 : SYN/D   | synthesizer serial data input                          |
| Pin5 : GROUND  | ground for TX module                                   |
| Pin6 : EXT ANT | external antenna input                                 |
| Pin7 : Vcc     | Vcc for TX module, 2.7 to 3.6 Vdc                      |

Note:

- ① If the input voltage higher, it will get the higher deviation of the signal. The normal deviation is  $\pm 2.5\text{ kHz}$  to  $\pm 5\text{ kHz}$ . It will get the best performance of the TX module. @ Normally, it works at 3 Vdc. If the VCC of the TX module is about 3.6 Vdc or up to 5 Vdc , it must serial  $15\text{ K}\Omega$  to  $30\text{ K}\Omega$  to reduce the modulation power. It can cause the deviation within  $\pm 2.5\text{ kHz}$  to  $\pm 5\text{ kHz}$ .

## 3.6 Electrical Specifications for RF Keyboard

### 3.6.1 Feature

- ◆ Plug and play design
- ◆ RF communication distance up to 2 meter, Omni-directional operation
- ◆ Error correction transmission capability
- ◆ Power saving management
- ◆ 4 bit security code each for keyboard and Mouse to avoid interference of operation at the same channel

### 3.6.2 Specification

|                            |                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------|
| Description & Commodity    | : Wireless keyboard for computer                                                     |
| Model                      | : SK-8808                                                                            |
| Operation Frequency        | : 27 MHz                                                                             |
| Operation Range            | : 2 meter                                                                            |
| Power consumption          | : 14.5 ± 2 mA for keyboard at operation mode<br>12 ± 5 uA for keyboard at sleep mode |
| Battery life               | : 6 month                                                                            |
| RF output power            | : 4mW (+6dbm)                                                                        |
| Power supply               | : 4 * AAA Alkaline battery for keyboard (3V in operation)                            |
| Channel                    | : 6 channel with 4 bit security ID for keyboard                                      |
| Receiver power consumption | : 52 mA at operation mode and 466 uA at sleep mode                                   |
| Receiver Sensibility       | : -95 dbm                                                                            |
| System Requirement         | : IBM PC compatible                                                                  |
| Storage temperature        | : -10 ~ 85 °C                                                                        |
| Working temperature        | : 0 ~ 40 °C                                                                          |

~ End of SK-8808 Product Specification ~