

Sony Aquila (VGP-WKB4US) RF Wireless Keyboard Circuit Description

The keyboard is consisted of three major blocks, one is the electronic printed circuit board (Main Board), the RF radio system, the keyboard membrane 18x8 key matrix switches, and the Printed trace Wiggle Antenna.

A. Electronic Printed Circuit Board

The keyboard is using CY8C29666 Micro-Controller Unit, The micro-Controller is the breakthrough design of a crystal-less oscillator. And the MCU is supplied by DC voltage, at 3.3VDC +/- 5%, which is supplied by two AA alkaline batteries through DC to DC converter IC and total currents consumption with full RF operation is no more than 20mA.

The CPU perform key scanning on 18x8 matrix, the 18 column outputs are open drain and the firmware will keep continue to have a running "0" pattern to scan the columns, the 8 rows input have an internal pull-up resistor about 20K Ohms, the firmware will detect the 8 rows input every time when the firmware change the running "0" pattern for column in order to make sure any key press or key release in the membrane switch..

If a key press or key release is detected, the firmware will de-bounce the events to make sure it is firmly pressed or released, then converge the key location to the Scan-codes and transfer the scan-codes to the RF Module through S.P.I. (Serial Parallel Interface).

B. RF radio system

The RF radio system is using Cypress CYWUSB6934 Micro-Controller Unit, The micro-Controller is highly integrated 2.4-GHz Direct Sequence Spread Spectrum (DSSS) Radio System-on-Chip (SoC) IC. From the Serial Peripheral Interface (SPI) to the antenna, the IC is single-chip 2.4-GHz DSSS Gaussian Frequency Shift Keying (GFSK) baseband modems that connect directly to a USB controller or a standard microcontroller.

The receiver and transmitter are a single-conversion low-Intermediate Frequency (low-IF) architecture with fully integrated IF channel matched filters to achieve high performance in the presence of interference. An integrated Power Amplifier (PA) provides an output power control range of 30 dB in seven steps. Both the receiver and transmitter integrated Voltage Controlled Oscillator (VCO) and synthesizer have the agility to cover the complete 2.4-GHz GFSK radio transmitter ISM band. The VCO loop filter is also integrated on-chip.

The RF-Controller is supplied by an external 13 MHz Crystal.

And it is supplied by DC voltage, at 3.3VDC +/- 5% and total currents consumption with full RF operation is no more than 80mA.

C. Membrane Key Matrix

The membrane key matrix is consisted of three sheets of plastic Mylar sheet , the Top and Bottom sheet is the Row and Column Mylar sheet, respectively, which is printed by conducted paints with respect to the key-matrix, the middle sheet is called "Spacer" mylar which does not have any paint to separate the top and bottom sheets but with a hole on the key position to allow the contact between the Row and Column sheet when the key is pressed.

The resistance of a key when it is pressed start from the connector is about 50 Ohms to 500 Ohms depending of the length the traces of such switch location.

D. Printed trace Wiggle Antenna

A Printed trace Wiggle Antenna is consisted of RF output signal, located on the Printed Circuit Board of the transceiver.

The radio module printed circuit board is implemented on a two-layer board. The Wiggle trace antenna and RF grounding are specially designed by Cypress Semiconductor, one side tied to the RF output end and the other side is open to the air.