XBOX Wireless Gamepad
Operation Principle

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1. Joypad Side Radio

The radio system is mainly composed of three parts: radio modem, frequency synthesizer and baseband microprocessor. The radio modem is a FSK modem running at 250 kbps with GFSK encoding to avoid frequency drifting. Frequency is controlled by a frequency synthesizer which adjusts a voltage-controlled RF oscillator dynamically for accurate frequency management. The antenna is an embedded PCB antenna matching is done by using lumped inductors and capacitors.

The microcontroller scans keystrokes on the joypad, then packs the data by adding preambles, frame information, and error checking bytes.The radio system uses one of 79 channels (the frequency range is 2.402-2.480GHz) to send signal in random, and the channels change frequency is 91.7 per second. Otherwise, there are 8 synchronous channels (distribute in the 79 channels uniformity), there is a sync packet between each two data packets. Station side connect joypad side via these sync packets.

The joypad radio is powered by 4-AAA side batteries and regulated to 3.0V. The power consumption of RF module is about 2.1mA, the total power consumption of the joypad side radio system is about 7 mA in normal working mode. It will enter green mode 1 if no key be pressed after 2 minutes, in this mode the channels change frequency is 45.8 per second, the power consumption of RF module is about 1mA. Also,it will enter green mode 2 if no key be pressed after 4 minutes, in this mode the channels change frequency is about 23 per second. The power consumption of RF module is about 0.5mA. It will enter sleep mode if no key be pressed after 5 minutes, in this mode the total power consumption of joypad is only about 20uA.

2. Station Side Radio

Station side radio will NEVER send RF signal, it only receives, un-packs , and sends the data to Game Cube Console.

Station side radio system will search sync packets after being powered on. In this period the power consumption is about 45mA. If any sync packets be received, the Station side radio system will enter normal working mode. Then , if station side radio system loses synchronization, it will enter search mode.

Station side radio system is powered by console(5V), power consumption is about 33 mA in normal working mode.