

3. OPERATIONG DESCRIPTION

The circuit description of remote controller

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The remote controller consists of 3 parts. The first is RF stage which transmits and receives the RF signal and it is located in the RF PCB Assy. The second is CPU and it's peripherals and it is located in the DIGITAL PCB Assy. The third is power boosting circuit which is located in the DIGITAL PCB Assy.

1. RF PCB Assy

The RF PCB Assy is connected with the DIGITAL PCB Assy with 2 connectors, CON3 & CON4. The operating power and control signal feeds from DIGITAL PCB Assy through connectors and the receiving data sends to the DIGITAL PCB Assy through connectors.

1) The TX circuit

This remote controller is using ASK method for data transmission and data receiving. The TX circuit has oscillating circuit, amplifier, antenna switch and power enable circuit. The oscillating circuit is composed of Tr (Q1) and SAW resonator (CR2 / 433.92MHz) and several passive components (C20, C21, L7, L15, C53, R7, R8, R9). The power feeds through Q3 when the transmitting data is high and it is disable when the transmitting data is low or receiving circuit is enabled. The oscillating circuit oscillates 433.92MHz directly and supplies to the amplifier circuit. The amplifier circuit is composed of Tr(Q2) and several passive components (L9, TC1, C22, C23, C27, R10, R11). It amplifies the RF signal and supplies to the antenna switching circuit. The antenna switching circuit is used to prepare the path of RF signal, for example, it passes RF signal from TX circuit to antenna and prevents RF signal from going to the RX circuit when TX mode and vice versa.

2) The RX circuit

The RX circuit has antenna switching circuit, pre-amplifier, filters and demodulators.

The received RF signal in the antenna is supplied to the pre-amplifier through antenna switching circuit. As the received RF signal is very weak, it is amplified by pre-amplifier. The pre-amplifier is composed of Tr (Q7) and several passive components (L13, R29, R30, C47, L1, C1). The amplified RF signal is supplied to the receiving IC (U1) through SAW filter. The filter passes only wanted signal and eliminates spurious signals. The receiving IC has oscillator circuit and demodulating circuit in it. The CR1 and several passive components are used to make local signal. The local signal and receiving RF signal is mixed inside of U1 and makes IF signal. IF signal is filtered by CF2 (10.7MHz) and fed to the demodulating circuit. The demodulating circuit makes recovered signal (original data signal) and the recovered signal is fed to the CPU through CON3. The receiving IC is usually in sleep mode and wakes up when needed.

The wake-up time is controlled by CPU.

2. DIGITAL PCB Assy

The CPU and it's peripherals and D/D converter circuit are located in the DIGITAL PCB Assy.

1) CPU and peripherals

The CPU (U2 / PIC16C72A) controls all the circuit of remote controller. It has 4 key buttons for key input, 2 LED's to display and one buzzer to alert tones as a peripherals.

Also, it generates transmitting data (RC1) and checks the receiving data (RA4). The resonator (CR3 / 2MHz) is used to make clocks for the CPU. The CON5 is used for the programming of CPU.

2) D/D circuit

This remote controller uses battery of AAA 1.5V. 1.5V is not enough to operate the active components such as CPU and receiving IC. So, power boosting circuit is needs to make 3.0V. The IC (U3 RH5RI302B) and several components (CH1, Q5, C42, R25, D6, C40, C41, C43) are used to boost power supply to 3.0V.