Model:	**IA-AIR-00**
Description:	**FM Transmitter**
Date:	**30.Nov.2004**

Introduction

IA-AIR-00 is a stereo audio signal transmitter over FM band. It works as a slave device of **iPOD** and controlled by the digital command from **iPOD** through UART interface. It operates in either one of the two frequency bands. The two bands are hardware programmable by factory jumper setting of open and short. One is 88.1 to 107.9 MHz for U.S. The other one is 76.0 to 96.0 MHz for Japan. Both are in the step of 200 kHz.

Features

a. A LCD displays 4 digits in 7-segment format with one decimal place. Digits show the transmission frequency in the unit of MHz.

b. Two buttons to adjust the transmission frequency.

c. A DC power rates 3.3 Volts and 60mA whose is from the external device (No battery cell is needed or built-in).

d. Stereo analog audio input is from external device.

e. The operation mode of IA-AIR-00 is controlled by external device.

Description

The ID appearance of IA-AIR-00 is shown in Figure 1 and 2. The functional block diagram of IA-AIR-00 is depicted in Figure 3. And the schematic is shown in Figure 4. The first stage is the transmitter plug-in **iPOD** and is tuned with the selected frequency.

ID appearance

The front of IA-AIR-00 has the said LCD and two control buttons. The LCD shows the transmission frequency in MHz with one decimal place and the display will switch off automatically for power saving purpose after no further key operation in 3sec. One of the control button symbolic "—" has the function of tuning the transmission frequency downward in 200kHz step. Another control button marked "＋" tunes the frequency upward in 200kHz.

At the bottom side of IA-AIR-00, there are two connectors. The audio plug is the audio signal input connector. And the dedicated 4 pins connector is the UART signal interface connection medium.

On the top of IA-AIR-00, a customer logo is silk-screen printed.

A brief product description is printed on the rear side of IA-AIR-00.

Block diagram

In the block diagram, there are totally six functional blocks, (1) Power management; (2) RF transmission; (3) Micro-controller unit; (4) Input device and interface; (5) Output device; (6) Memory.

Schematic

The key components of power management have REG710NA-5TI and MMBT3906.

BH1415F is the key chips of RF transmission.

EM78P806A is the essential part of IA-AIR-00 as the centralized control block. The dedicated firmware is resident inside the ROM part of the micro-controller.

The control buttons are the input device. The interface is the audio signal input and the UART interface.

The output device is LCD panel and the display backlight.

HT2201 works as the memory of IA-AIR-00. It stores the transmission frequency and provides the last transmission frequency.

Appearance

Figure 1

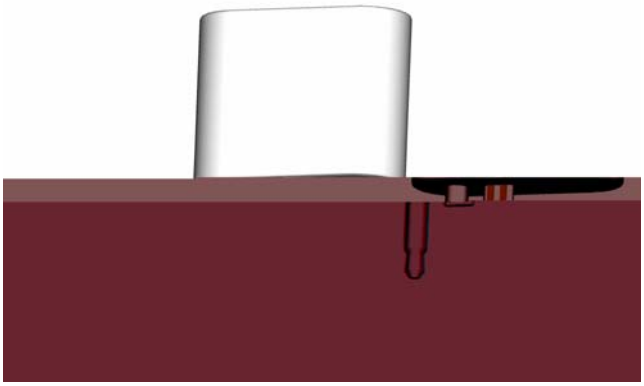

Figure 2

Operation

The default frequencies are 88.1MHz for US.

Pressing the two buttons "＋" or "—" step the transmission frequency up or down respectively. Holding down the two buttons "＋" or "—" for 3sec will accelerate the stepping frequency.

IA-AIR-00 will turn on and start transmission for receiving the "Begin Transmission" command through UART interface or receiving audio signal through the audio plug for 3sec.

System will turn off automatically for receiving the "End Transmission" command though UART interface or not receiving audio signal for 60sec.

LCD of IA-AIR-00 will only be activated and turn on either system is plugged into **iPOD** or one of the control buttons is pressed. LCD will turn off automatically for no further activation in 8sec.

The UART of IA-AIR-00 hires two pins, Rx and Tx, for interfacing to **iPOD**. The baud rate is either 9600bps or 19200bps. Communications use 8 data bits, no parity and one stop bit, i.e. 8-N-1.

Upon power up of **iPOD**, IA-AIR-00 will wait 80msec and then send a "Sync" byte. Then will wait for another 20msec and send the "Identify" packet to identify itself to the **iPOD**. (See table 2.)

Once the packet transmission has begun, the maximum time between transmitted characters must be less than 20msec. (See table 1 for packet format).

The packet payload length is the number of bytes in the packet not including the "Sync" byte, packet start byte, packet payload length byte, or packet payload checksum bytes. That is, it is the length of the Command ID plus Lingo plus the Command data. Lingo ID for IA-AIR-00 is 0x05.

IA-AIR-00 will send the packet shown in Table 2 at start up to identify itself and request power more than 5mA. Upon receipt of the begin transmission command (Table 3), system can begin drawing more than 5mA (up to 100mA).

IA-AIR-00 will return to less than 5mA power usage within 1sec of receipt of an end transmission packet (Table 4).

The **iPOD** may send a request to IA-AIR-00 to ask system to re-identify (Table 5). At this time system will send the identify packet to re-identify. The identify data payload is the command ID 0x01 followed by a single byte of the same values as the lingo specification of the functionality the device implements. The identify packet returned in response to a request identify packet does not need to have the extra sync bytes and delays used during the device startup process.

INSTRUCTION TO THE USER

This equipment has been tested and found to comply with the limits for a 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.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.