33-1253 Technical description:

Introduction:

The 33-1253 consists of a 2.4GHz dongle and a 2.4GHz headphone. Any analog music source that is applied to the dongle will be sent to the headphone via 2.4GHz RF link without any compression. The audio being sent by the dongle will be reproduced at the headphone side.

Headphone operation:

The role of the headphone is to receive the RF data by the RF transceiver chip nRF24Z1 (U8) that is configured as receiver mode and then the data are validated and converted back to audio stream format and fed to the corresponding audio output interface. There is also a link state and a synchronization state operation.

DAC:

The Digital to Analog chip uDA1334 (U10) is interfaced with the RF chip (U8). The 16 bit digital data is converted back to analog audio signal and then is feed to the external left and right speakers through a stereo variable resistor (VR1) to control the output volume level. The EEPROM chip (U5) is also stores the initial configuration of the RF chip (U8).

Low battery:

The battery monitor chip XC61CN2002MR/BU4820 (U3) that connects its input to the battery, works as a 2V battery monitor chip. When the battery voltage drops below 2V, it's output will be dropped from Vdd (Vbat) to zero volt. Then the DAC chip (U10) is muted and the LED (D3) will also be turned off.

Battery charging for both dongle and headphone:

Once the charging hub (provided) is connected to the power jack of either the dongle or the headphone. The battery voltage is disconnected from the main circuit and therefore the unit can not be operated when it is charging.

32-1253 uses a single chip transceiver IC from Nordic nRF24Z1.

RF PART

The single chip transceiver IC contains all necessary RF circuit. It converts the RF FSK signal picked up by the antenna for further processing. Besides, the base band digital signal, including voice and commands, will be modulated to FSK format on the RF carrier during transmission. The main building blocks of the RF parts includes a LNA, Mixer, IF Band pass filter, VCO with frequency synthesiser, RF power amplifier for transmission. Among those building blocks, the RF circuit can be divided into two sections.

A: RX section

This product employs traditional single conversion architecture with the following functional blocks:

1. The LNA has low noise figure and high insertion gain.
2. The LO signal is generated VCO and the LO frequency is controlled by the frequency synthesizer after received command from external MCU.
3. The mixer is to convert RF signal to an IF signal. This IF signal will further filter by the IF band pass filter.
4. The IF signal is then down converted to digital signals, i.e. CLK and DATA.
5. The digital DATA is further convert to analogue voice signal through the external DAC IC.

B: TX section

1. The digital DATA is from the external ADC and it is applied to the transceiver IC.
2. It is further filtered by the GFSK filter before going to the VCO and the frequency of transmission is controlled by the frequency synthesizer.
3. The FSK modulated signal is amplified by the internal PA.
4. The amplified RF signal is applied to the antenna with the external matching circuit.