FAA2400

2.4GHz WIRELESS DATA TRANSCEIVER MODULE

FAA2400 is a wireless transceiver module for half-duplex data transmission in the 2.4GHz ISM band. **FAA2400** operates with digital data rates of more than 500kbps over distances of about 200m (line of sight) or 30m (inside buildings).
FAA2400 allows the construction of 2.4GHz wireless links accordingly BAPT222 ZV125 in Germany and I-ETS-300440 in Europe and the corresponding international regulations in combination with a simple microcontroller.

Features

- Miniature module for PCB mount
- Size (without contact pins) 33 x 30.5 x 8 mm³
- Mounting and electrical connection with contact pins (2.54mm grid)
- BAPT222 ZV125 and I-ETS-300440 tested and approved, meets also other international regulations for 2.4GHz ISM
- Worldwide registration for the 2.4GHz ISM band possible
- Maximum halfduplex data rate of 500kbps
- Modulation type 2FSK (2 Level Frequency Shift Keying)
- Frequency range 2.4 bis 2.4835 GHz (up to 2.5 GHz also possible), PLL synthesizer
- Frequency steps and frequency channels free programmable
- Receive and transmit frequency programmable also while operating
- Transmission power –30 to +5dBm typical (50W) with simple DC control
- Typical input sensitivity of –96dBm (Baudrate 200kbit/s)
- Range of about 30m inside buildings and about 200m with line of sight (using 2.4GHz 0dBd antenna, full transmit output power)
- Current consumption of typical 55mA in transmit and 50mA in receive mode at 3.2 to 6.0V
- Standby mode for power saving
- Logic inputs and outputs 3V CMOS compatible
- Separate data input and output

Note: Please take care for sufficient ESD protection when using the FAA2400!

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FAA2400 includes all necessary functions for wireless transmission of any digital baseband signal over 2.4GHz with 2FSK modulation, and for receiving a corresponding 2.4GHz signal and change it back to a digital baseband signal. Main parameters like frequency, transmission power and several operating modes can be controlled via digital and analog control lines.

FAA2400 is a dual superhet receiver in **receive mode**. This allows a very good input sensitivity and selectivity. The 2FSK modulated RF signal between 2.400 and 2.4835GHz comes from the antenna pin over the RF filter and the Rx/Tx switch to the low noise amplifier (LNA).
The amplified and filtered signal is mixed by the first mixer with the RF local oscillator (LO) frequency (RF VCO and PLL frequency synthesizer work as LO). The resulting first intermediate frequency (IF) is 323.0MHz. The RF LO frequency f_{LO1} for a given receive frequency f_{RF} is determined by $f_{LO1} = f_{RF} - 323.0\text{MHz}$ (see section ”Programming the PLL Frequency Synthesizer”). The IF signal is filtered, amplified and mixed with a second local oscillator signal to the second IF of 5.7MHz.
Frequency of second LO has to be $f_{LO2} = 323.0\text{MHz}-5.7\text{MHz} = 317.3\text{MHz}$. Second IF is amplified, filtered and limited to get a constant amplitude for demodulation.
FSK demodulator and comparator deliver the demodulated baseband signal on pin DATA OUT. The RSSI output is an analog voltage as measure of the RF input power on the selected frequency.

In **transmit mode** the frequency of the first IF is 2FSK modulated with the data signal from DATA IN. The modulated IF signal is amplitude regulated and mixed to the desired transmit frequency between 2.400 and 2.4835GHz. This is done by the transmit mixer and the second LO. Power amplifier (PA) delivers the necessary output power.
The RF reaches pin ANTENNA over the Tx/Rx switch and a 2.4GHz bandpass. An analog DC voltage on TX POWER controls the output power from –30 to +5dBm typical.
The frequency of IF LO is the same like receiving.
RF LO programming is $f_{LO1} = f_{RF} - 317.3\text{MHz}$ (see section $f_{LO1} = f_{RF} - 317.3\text{MHz}$ „Programming the PLL Frequency Synthesizer”).

STANDBY disables all functions and reduces the current consumption to a minimum. With changing from transmit to receive mode and back, after putting on DC supply and after STANDBY the PLL frequency synthesizer must be programmed (see section „Programming the PLL Frequency Synthesizer”). Programming is done like described above dependent on operating mode.