

About Battery Life Calculation

APPLICATION DOCUMENT FOR DRF5150

V1.00

This document is written for providing customers reference in designing power-sensitive applications powered up by battery. The battery life of DRF5150 mainly is determined by two factors: Transmit time / period and sensor power consumption.

1. Transmit Time / Period

The transmit time is dependant on the RF data rate and the length of data package. In other words faster data rate and shorter data package mean shorter transmit time, thereby, lower average power consumption. The transmit time can be calculated by the function below:

$$\text{Transmit time (ms)} = (\text{data length in bytes} + 10) * 8 / \text{RF data rate (Kbps)}$$

For example, in analogue sensor mode, the data format of transmit is totally five bytes [Group ID (1 bytes) + Slave ID (1 byte) + Data (2 bytes) + Bat (1 byte)]. If the RF data rate is 50K bps, the transmit time can be calculated as:

$$\text{Transmit time (ms)} = (5+10)*8 / 50 = 2.4\text{ms}$$

The start-up time of crystal on DRF5150 module is about 1ms and the current in the start-up stage of crystal is about 7mA. The transmit current of DRF5150 is 14mA and the current in sleep mode is 1.5uA. If the tx transmit period is 1s, the average current is:

$$\text{Average current (mA)} = (2.4\text{ms} / 1000\text{ms}) * 14\text{mA} + 1\text{ms}/1000\text{ms} * 7\text{mA} + 0.0015\text{mA} = 0.0421\text{mA}.$$

2. Sensor Power Consumption

- In analogue sensor mode DRF5150 module supplies power to sensor for 1ms. The power consumption is mainly determined by the sensor and the resistor in that period. What's more the DRF5150 consumes about 0.5mA current in 1ms.
- In DS18B20 mode DRF5150 will start the measurement on DS18B20 in advance for 1s and then enter sleep mode. The data will be read in next second and be transmitted. Because DS18B20 consumes about 1mA current and the measurement is done in the sleep mode of DRF5150, the power consumption introduced by this sensor can be omitted.
- In SHT1x and SHT2x mode DRF5150 module starts the measure and waits until the measurement is done. The module consumes about 0.5mA current in that period. The actual power consumption of sensors will be decided by the actual sensor type.

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