

Digital Tire Pressure Monitoring System Alarm Device

Transmitting Circuit Design

Digital tire pressure monitoring system alarm device is a direct TPMS. It adopted external installation in the valve stem and monitor each tire pressure and temperature. When abnormal tire status is detected, the sensor will transmit the signal and the system will alarm automatically. The transmitting circuit consists of sensor, signal processor and RF transmitting chips. The sensor adopted SP30 manufactured by Infineon. The RISC quick performance time will greatly reduce power consumption and it is suitable for battery power supply. SP30 inner sensor, watchdog timer, multicenter 15 bit ADC and two on-chip oscillators, power saving sleep mode multi-operational models etc.; Low Frequency Wakeup and Interval Timer Wakeup interrupt system etc supported with accurate collection, quick response, low power consumption, good wireless communication effect and reliable performance. RF transmitting chip adopted MICRF112 manufactured by Micrel, its operation voltage range is 1.8~3.6V and it is suitable for battery power supply. The maximum output frequency can reach +10dBm. Modulating ASK or FSK coding data is optional. Data(ASK, 433.92MHZ and Manchester coding data)transmitting rate can reach 50Kbps. The chip has strong function, reliable transmitting signal and strong anti-interruption ability. The transmission circuit will be installed directly in the valve stem with sensor together. The installation is very easy with low cost and good effect.

The detailed working principle is as follows:

Sensor U2 in transmitting circuit will monitor the tire pressure and temperature and the timing alarm coding signal will be output (JP is U2 program I/O port) and modulate to chip U1 to output 433.92 MHz transmitting signal. (This transmitting system power is 3V with low power consumption and power saving sleep mode), Local Oscillation circuit is consist of capacitance C6, C7 and Q1. The frequency is 13.56MHz and is internally processed by chip U1. P9 output signal will match will L1, C4, L2, C5 and antenna matching network. +10dBm output power is transmitted omnidirectionally by helical antenna

when the wheel is rotating with high speed. The helical antenna design already considered the transmitting blind spot when electromagnetic field is rotating with high speed. The blind spot can't be completely eliminated. It completely depends on antenna transmitting efficiency, gain and direction.