



TPMS technical specification

Version 1



Warning

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- 1) this device may not cause harmful interference
- 2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.



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1. System introduction

1.1 General survey

This document is used to define the design scheme of TPMS project applicable to CFMOTO model according to the relevant technical agreement and preparation requirements of CFMOTO Research Institute on Tire Pressure monitoring system (TPMS). The document specifies the structure, function, performance, installation position and other characteristics of the developed product.

1.2 Part number

Part number	Vehicle Part number	Function Description

1.3 Reference codes and regulations

No.	Standard no.	Standard name	Standard type
1	ISO 20653-2006	Road vehicles - Degrees of protection (IP-Code) - Protection of electrical equipment against foreign objects, water and access	International standard
2	ISO 16750-2006	Road vehicles – Environmental conditions and testing for electrical and electronic equipment	International standard
3	GB 14023	Vehicles, boats and internal combustion engine – Radio disturbance characteristics – Limits and methods of measurement for the	International standard



		protection of off-board receivers	
4	GB 18655-2002	Limits and methods of measurement of radio disturbance characteristics for the protection of receivers used on board vehicles	International standard
5	GB/T 17619-1998	Limits and methods of testing for immunity of electrical/electronic subassemblies in vehicles to electromagnetic radiation	International standard
6	GB/T 19951-2006	Experimental method of electromagnetic disturbance generated by electrostatic discharge in road vehicles	International standard
7	GB/T 21437.2-2008	Electrical disturbance of road vehicles due to conduction and coupling - Part 2	International standard
8	GB/T 2423.17-1993	Basic environmental test procedure for electrical and electronic products-Test Ka: salt spray test method	International standard
9	GB/T 26149-2010	Automobile tire pressure detection system	International standard
10	QC/T 413-2002	Basic technical conditions of automotive electrical equipment	Occupation standard

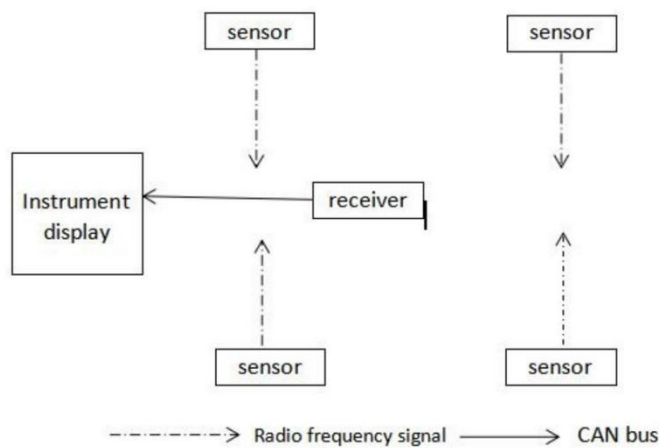
1.4 Term interpretation or noun definition

Term/definition/abbreviation	Descriptions
Tire pressure monitoring system (TPMS)	The device for real-time monitoring of tire pressure, temperature and other information of the vehicle can provide a communication interface as a subsystem of the vehicle information system according to user requirements.

sensor	A device that transmits information such as the detected pressure and temperature of automobile tires through radio frequency.
pressure	Unless otherwise specified, the pressure described in this standard is relative pressure, that is, absolute pressure minus 101kPa.

2. System

2.1 System block diagram



2.2 System description

The TPMS system is composed of a sensor and a receiver. The sensor is installed in the tire to directly measure the pressure and temperature of the tire, and the tire information detected is sent to the receiver through radio frequency signal. The receiver is installed in the car, and the tire information received wirelessly is transmitted to the vehicle instrument through CAN bus. Allows the driver to check tire pressure and temperature.

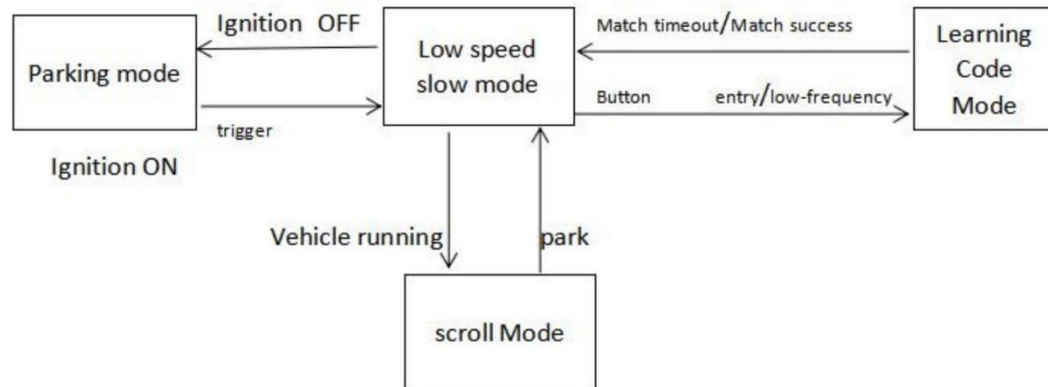


2.4.2 System operating mode

The working mode of the system can be divided into four types: parking mode, traffic light mode, driving mode and learning code mode.

Working mode	Condition	Function description
Parking mode		The sensor only detects whether it has entered the driving state;
Traffic Light Mode	Stationary vehicle	The sensor is in parking mode or slow driving mode (see sensor working mode);
Driving mode	Vehicle running	The sensor is in driving mode;

2.4.3 System state logic diagram



2.5 system performance parameters

2.5.1 Electrical characteristics

Operating voltage and current characteristics

The working voltage and current are shown in the table below:

product name	Lower limit working voltage	rated voltage	Upper limit working voltage	Power supply mode
sensor	2.1V	3V	3.6V	battery

product name	Sampling current	Emission Current	quiescent current
sensor	1~2.5mA	9~13mA	<0.7uA

Working environment conditions

The ambient temperature applicable to each component of the TPMS varies depending on its function and installation environment. The working and storage temperatures of each component are shown in the table below:



product name	Lower operating temperature (° C)	Lower storage temperature (° C)	Upper operating temperature (° C)	Upper storage temperature (° C)
sensor	-40	-40	125	125

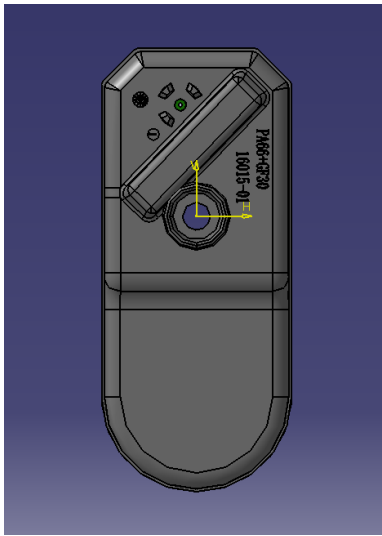
4. TPMS sensor

4.1 TPMS Sensor performance parameters

sensor	
Transmission frequency(Bluetooth)	2.4GHz
Low frequency reception frequency	$125 \pm 5\text{KHZ}$
Transmitting power	8dbm
Pressure measuring range	0-900kPa(Absolute pressure)
Pressure Error(100~500Kpa) (V=2. 1~3.6V)	$\pm 5\text{Kpa}(0\sim 70^{\circ}\text{C})$
	$\pm 10\text{Kpa}(-40\sim 0^{\circ}\text{C}/70\sim 125^{\circ}\text{C})$
pressure error (501~900Kpa)	$\pm 7\text{Kpa}(0\sim 70^{\circ}\text{C})$
	$\pm 15\text{Kpa}(-40\sim 0^{\circ}\text{C}/70\sim 125^{\circ}\text{C})$
Temperature measurement range	-40~ 125 °C
Temperature error (V=2. 1~3.6V)	$\pm 5^{\circ}\text{C}(-40\sim -20^{\circ}\text{C})$
	$\pm 3^{\circ}\text{C}(-20\sim 90^{\circ}\text{C})$
	$\pm 5^{\circ}\text{C}(90\sim 125^{\circ}\text{C})$
Quick air leakage alarm	When the vehicle is in driving mode, 4S detects the primary pressure, when the secondary pressure changes to 8.25Kpa compared with the last time
Battery life	≥ 5 years or 100k km

* Battery life will be affected by the use of the environment, this life calculation is estimated to be based on the control process and working mode, and normal temperature daily driving 4 hours。

4.2 TPMS Sensor structure diagram



4.4 TPMS Sensor operating mode

- The sensor has 24-hour uninterrupted monitoring function, which is mainly divided into parking mode, driving mode, parking alarm mode, driving alarm mode, and learning code mode.
- Parking mode: After the sensor is powered on, it initializes the action and then enters this mode, in which the vehicle is at rest.
- Driving mode: When the vehicle acceleration is greater than 3.5G, the vehicle is in driving mode.



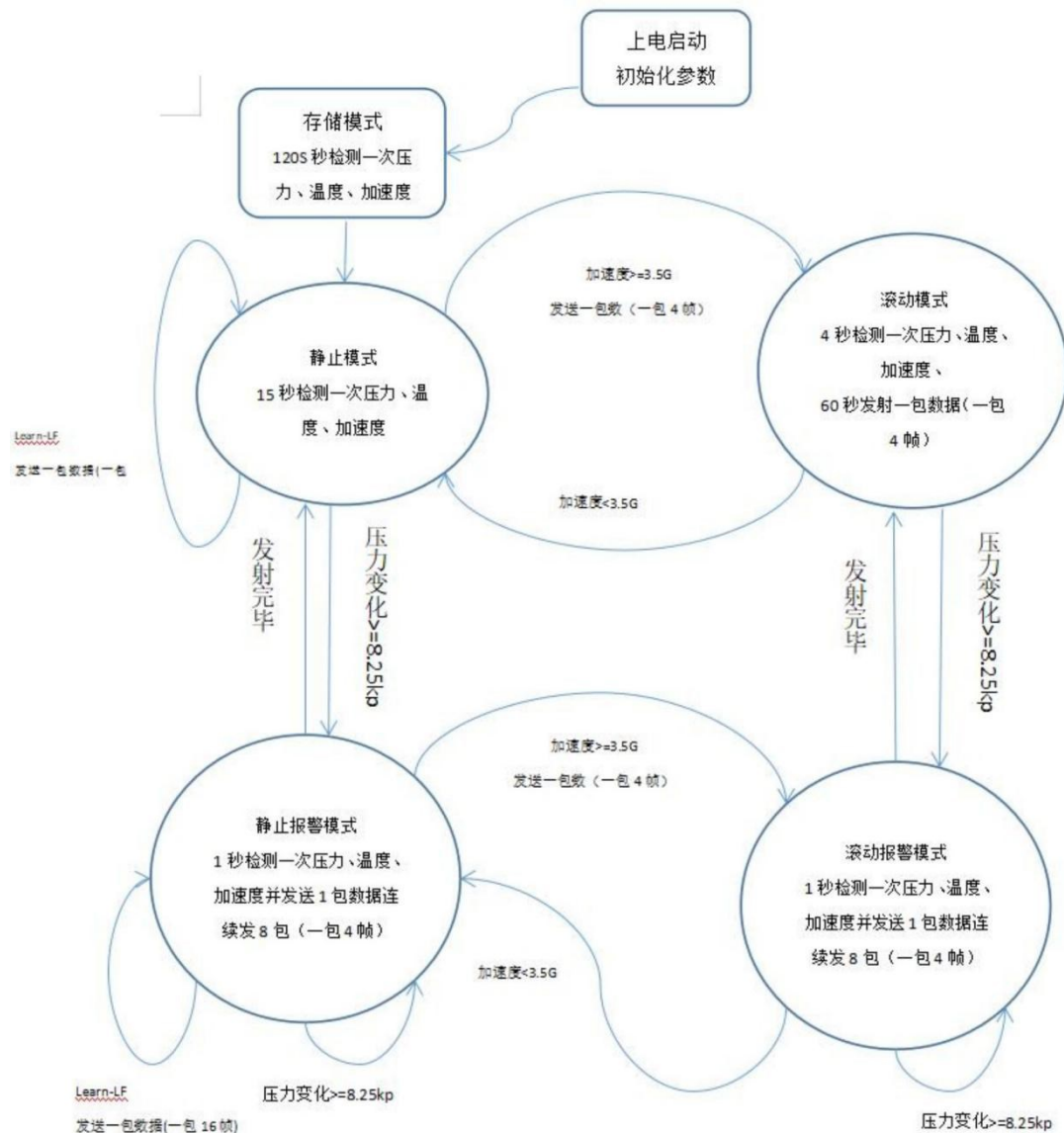
- Parking alarm mode: When the sensor is in parking mode, the sensor pressure change is greater than or equal to 8.25KP, entering the parking alarm mode.

- Driving alarm mode: When the sensor is in driving mode, the sensor pressure change is greater than or equal to 8.25KP, entering the driving alarm mode.

- Code learning mode: Use the code learning trigger to trigger the sensor, so that the receiving module can learn or collect the sensor information status.

	Storage mode	Parking mode	Parking alarm mode	driving mode	Driving alarm mode	Learning Code Mode
Launch interval	X	X	Measure acceleration, pressure, and temperature every second, and transmit a packet of data (1 packet of 4 frames) every second, continuously sending 8 times.	60S	Measure acceleration, pressure, and temperature every second, transmit a packet of data (1 packet of 4 frames) every second, and continuously send 8 times.	When the trigger is triggered, the sensor emits a packet of data (1 packet of 16 frames)
Number of transmitted frames	0	0		4		
Pressure measurement interval	120S	15S		4S		
Temperature measurement interval	120S	15S		4S		
Acceleration measurement interval	120S	15S		4S		

4.5 TPMS sensor logic state diagram



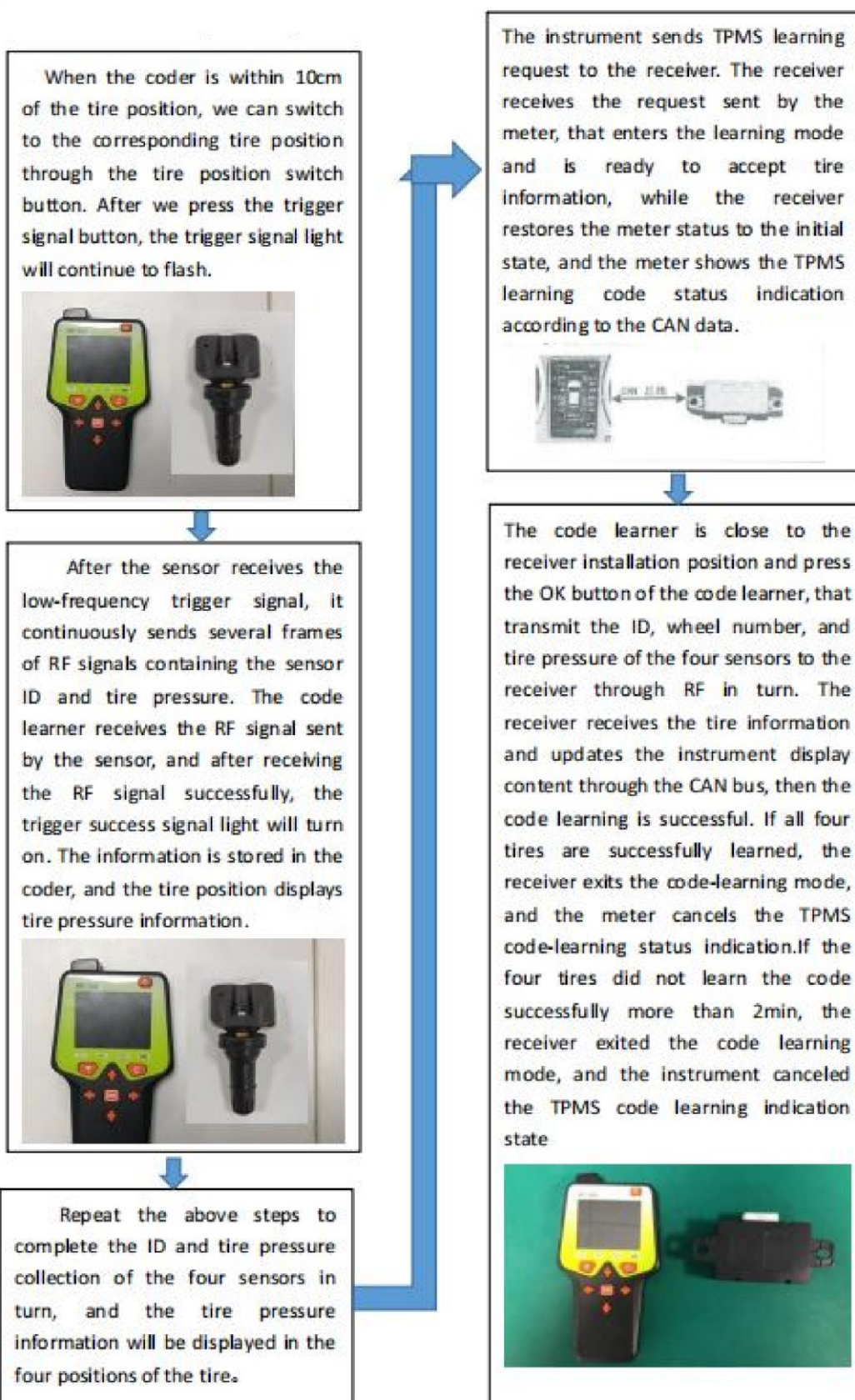
5. TPMS Learning code matching function

5.1 TPMS Learning code tools

The TPMS code learning device is mainly used for sensor code matching during vehicle assembly of TPMS and tire maintenance. It uses low-frequency technology to trigger sensors inside the tire, and records the ID code and corresponding position sent by the sensor. The recorded ID and corresponding tire position are sent to the TPMS receiver through transmission buttons.



5.2 TPMS Learn the code operation process





6. Revise resume

Version	Date (YY/MM/DD)	Author	approve	description
01	2025/07/04	Yao Jiahao		Publication and distribution