

CANBUS USER MANUAL

1.1. REQUIREMENTS

1.1.1. PHYSICAL REQUIREMENTS

The module shall be compatible with various types of power supply for different commercial vehicles, mainly 12V and 24V.

Normal operating conditions:

- Operating temperature: -40°C — $+85^{\circ}\text{C}$;
- Relative humidity: 45%—75%;
- Pressure: 86Kpa—106Kpa (absolute pressure value) ;
- Storage temperature range: -40°C — $+85^{\circ}\text{C}$.

1.1.2. FUNCTION REQUIREMENT

CAN module shall be able to receive, process, analyze, store and transmit data from the sensors and the tool. Its main functions are as follows:

- Reliable data receiving: the receiving rate shall $> 90\%$
- Time setting
- Data storage
- Serial Port data transmission
- Sensor ID registration

The module communicates with TPMS Smart Tool and realizes ID LEARNING. After TPMS is started, the CAN module will transmit its ID to TPMS Smart Tool by RF. Then the Sensor ID of each tire will be learned by TPMS Smart Tool. All the Sensors ID and CAN module ID in the TPMS Smart Tool are transmitted to CANBUS again for registration. Besides, the data of pressure and temperature of tires will be transmitted by CANBUS, not by RF.

1.1.3. PROPERTIES REQUIREMENT

- Reverse polarity requirements: after one-minute connection of reverse polarity, the product shall be able to function properly with normal power supply;
- Receiver's contact discharge level is 8KV, air discharge level is 15KV.

1.2. CAN MODULE PRINCIPLE

CAN module is used to receive wireless information, and appropriately process and display information. Main parts and functions of CAN module are:

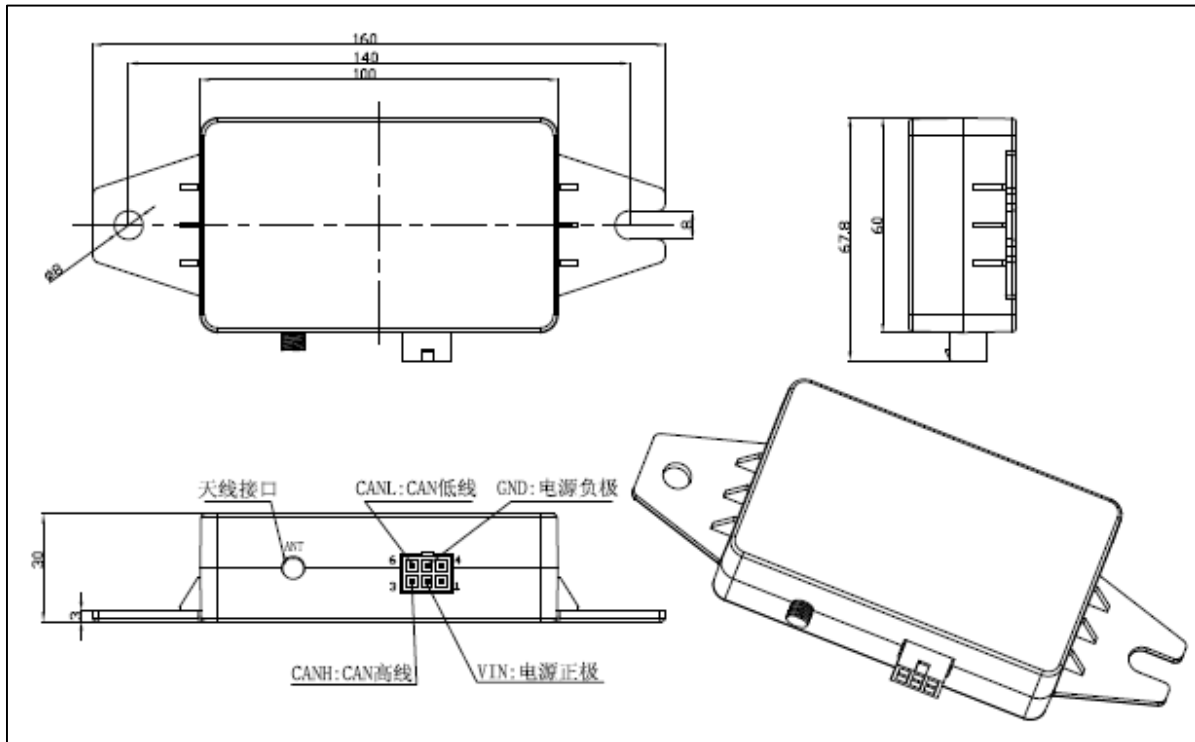
- R/F receiver module decodes high frequency signal transmitted by tractor's transmitting module and transceiver module; then it sends the data package to MCU through SPI port.
- MCU analyzes data information in the data package. In the case of tire pressure sensor signal, sensor ID will be analyzed. If sensor ID is the same with its predetermined ID information, its temperature and pressure information will be collected and processed; once sensor ID is different with its predetermined ID information, the data will not be considered as that vehicle's tire data and will not be processed.
- Power system will change 12V or 24V vehicle power supply into normal operating voltages for different modules.

CAN module

- Memory module records tire information stored by the receiver (if any abnormality occurred in any tire, the tire information will be immediately stored), the data can be downloaded to a computer through Serial Port or wirelessly for analysis.

1.3. CAN MODULE PERFORMANCE DISCRIPTION

1.3.1. MODULE INTERFACE CIRCUIT AND INSTALLATION DIMENSION



Note: ANT is antenna interface. Wire is extended to vehicle chassis. Length of wire is defined by vehicle manufacturer according to different vehicle models.

1.3.2. DEFINITION OF PORT

- CAN BUS port:
Socket type: MOLEX 39-01-2060 or 5569-06AIS (corresponding plug model as 39-01-2060 or 5557-06R) 6pin

Definition of pin:

5 pin	2 pin	3 pin	6pin
GND (black)	VIN (DC24/12V compatible, red)	CANH (yellow)	CANL (green)

- RF port:
REVERSE SMA port (90° angle)

1.3.3. FUNCTIONS

1.3.3.1. HIGH PRESSURE WARNING

When tire pressure is $\geq 10.8\text{Bar}$ ($8.3*1.3$), high pressure warning level two, potential risky status, driver shall stop the vehicle and adjust tire pressure immediately.

When tire pressure is $\geq 9.5\text{Bar}$ ($8.3*1.15$), high pressure warning level one, it calls driver's attention to tire pressure and adjust tire pressure accordingly.

1.3.3.2. LOW PRESSURE WARNING

When tire pressure is $< 7.4\text{Bar}$ ($8.3*0.9$), low pressure warning level one, it calls driver's attention to tire pressure and adjust tire pressure accordingly.

When tire pressure is $< 6.6\text{Bar}$ ($8.3*0.8$), low pressure warning level two, potential risky status, driver shall stop the vehicle and adjust tire pressure immediately.

1.3.3.3. HIGH TEMPERATURE WARNING:

When tire pressure is $\geq 80^{\circ}\text{C}$, it gives out high temperature warning, driver shall stop the vehicle and lower the temperature of the tire.

1.3.3.4. FAST LEAKAGE WARNING:

When the tire pressure loss is $\geq 0.33\text{Bar}$ within 16s, it gives out fast leakage warning, driver shall stop the vehicle and make appropriate treatment.

1.3.3.5. NON-RECEIVING DATA WARNING:

When the system does not receive tire pressure information for more than 20 minutes, it gives out non-receiving data warning.

1.3.3.6. CAN BUS COMMUNICATIONS

When any of the above 5 kinds of information is received, the system will send data to ICM through CAN BUS for processing.

1.3.3.7. DATA STORAGE

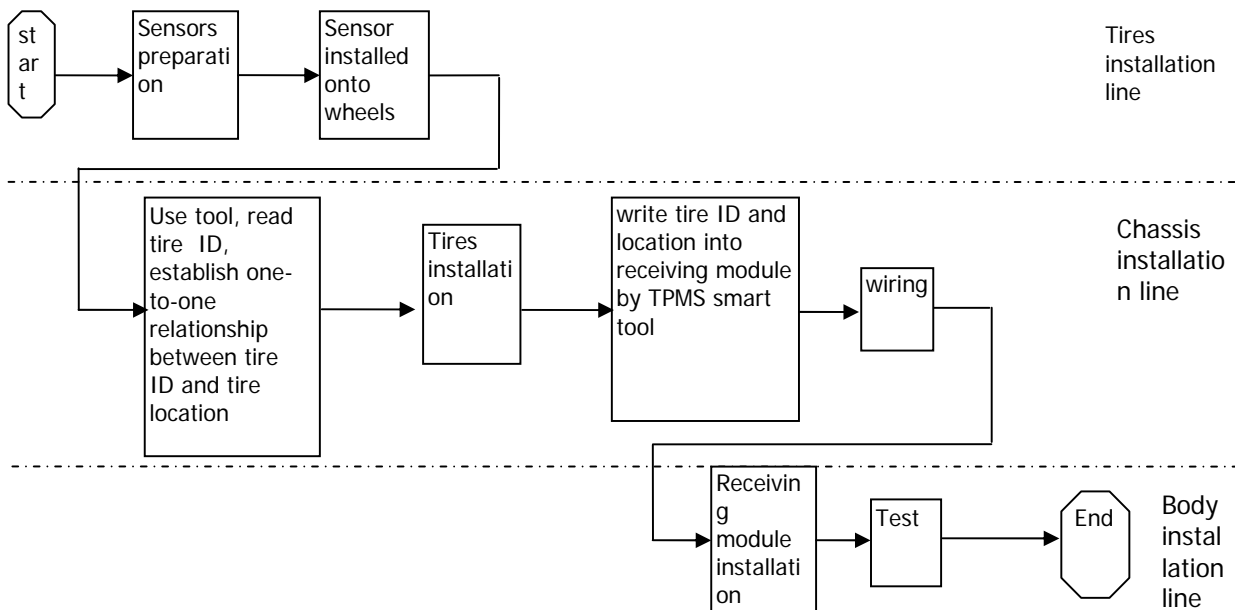
The system can store 4300 of tire information. Under normal conditions, data shall be stored every 30 minutes; under abnormal condition, data shall be stored every 10s. When abnormality occurs in any tire, the stored information shall be reviewed. The function is similar to Black Box.

1.3.3.8. ID LEARNING

The module communicates with TPMS Smart Tool and realizes ID LEARNING;

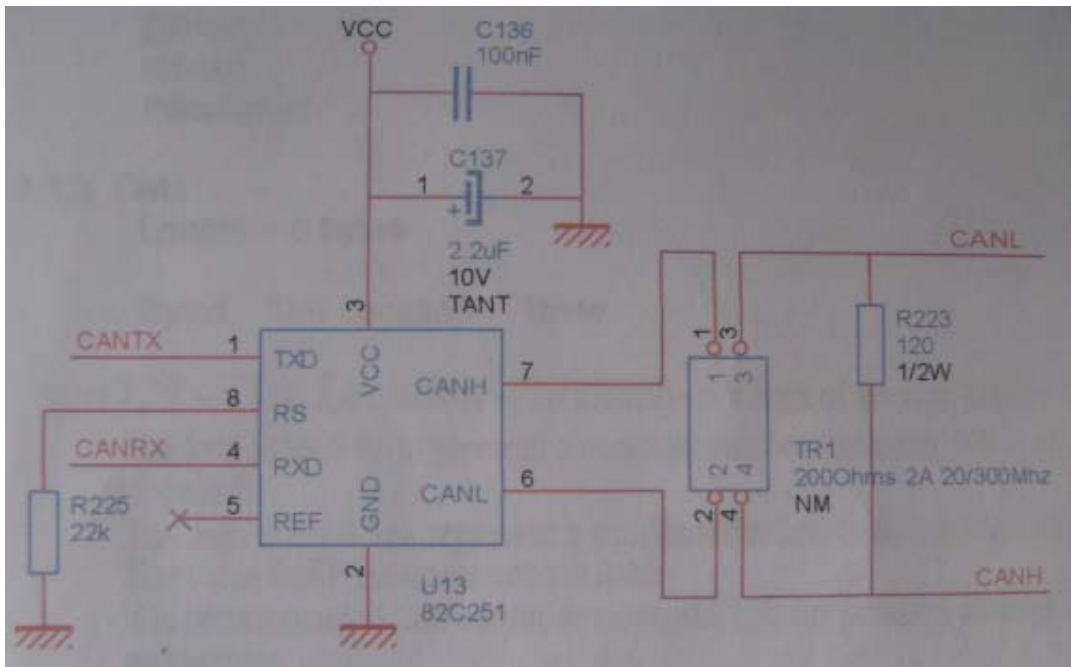
To make integration of TPMS to vehicles simple, save installation time, our proposed installation process is as follows:

CAN module



1.3.3.9. CAN BUS COMMUNICATIONS PROTOCOL

- CAN BUS communications protocol is based on J1939
- Transmission rate: 250Kbits/S
- CAN2.0B, Extended Super Frame
- Recommend circuit:



Note: The load resistor (marked R223) whether to need depends on the CAN bus design.

- Communications time sequence:
 - 1) Under normal conditions: All tire data are transmitted every 10S after the first data is received; the time interval between every two tires is 100ms.

CAN module

- 2) Under abnormal conditions: When an abnormal data is received, it will be transferred through CAN BUS immediately.
- 3) Under abnormal conditions: All abnormal tire data are transmitted every 10S, the time interval between every two tires is 100ms.

CAN module

Signal name	Signal description	Transmission Mode	BCM Gateway	SPN	Signal type	Period (ms)	Parameter name	PCN	CAN ID	Start Bit Location	Length	Unit	Ratio factor	Offset	Physical minimum value	Physical maximum value	Data minimum value	Data maximum value	Default	Unavailable value	Explanation	
Tire Location	Tire position	TPMS	ICM	929		10000	Tire Condition	65268	0x18FEF433	1.1	8									255	The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward). The high order 4 bits represent a position number, counting front to back on the vehicle. Examples: 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire)	
Tire Pressure	Tire pressure	TPMS	ICM	241		10000	Tire Condition	65268	0x18FEF433	2.1	8	kPa	5.5	0	0	1000	0	250				Pressure at which air is contained in cavity formed by tire and rim, 5.5kpa/bit Example: 0x79(hex)means the pressure: 121 (Dec) *5.5=665kpa=6.65bar=6.6bar
Tire Temperature	Tire temperature	TPMS	ICM	242		10000	Tire Condition	65268	0x18FEF433	3.1	16	degC	0.03125	-273	-273	1735	0	64255				Temperature at the surface of the tire sidewall, 0.03125C/bit Example: Byte3: 0x8D(HEX); Byte4: 0x24(HEX) 0x248D(HEX, dec value:9357; absolute temperature: 9357*0.03125=292.4 Celsius degree: 292.4-273=19.4C
CTI Wheel Electrical Fault	NOT receiving data	TPMS	ICM	1697		10000	Tire Condition	65268	0x18FEF433	5.5	2										00=Normal, 01=Not receive the tire signal in the past 20 minutes, Others=Rev.	
CTI Tire Status	Leakage warning	TPMS	ICM	1698		10000	Tire Condition	65268	0x18FEF433	5.3	2										00=Normal 01=Leakage Others=Rev.	
CTI Wheel Sensor Status	Temperature warning	TPMS	ICM	1699		10000	Tire Condition	65268	0x18FEF433	5.1	2										00=Normal 01=high temperature warning Others=Rev.	
Tire Air Leakage Rate	Pressure leakage rate	TPMS	ICM	2586		10000	Tire Condition	65268	0x18FEF433	6.1	16	Pa/s	0.1	0	0	6425.5	0	64255				The pressure loss rate of a tire. Example: Byte6: 0x80; Byte7: 0x24 0x2480(HEX, dec value 9357; Leakage rate: 9357*0.1=935.7Pa/s=9.35kpa/s=0.09 Bar/s
Tire Pressure Threshold Detection	Pressure warning level	TPMS	ICM	2587		10000	Tire Condition	65268	0x18FEF433	8.6	3										Pressure warning range 00=Over high pressure, P≥10.8bar; 001=High pressure, 9.5bar≤P<10.8bar; 010= Normal; 7.4bar≤P<9.5bar 011= Low pressure; 6.6bar≤P<7.4bar; 100=Over low pressure; P<6.6bar	

1.4. TECHNICAL PARAMETERS

1.4.1. OPERATING CONDITIONS

Normal operating conditions

- Operating Temperature: -40°C — $+85^{\circ}\text{C}$;
- Relative humidity: 45%—75%;
- Pressure: 86Kpa—106Kpa(absolute pressure value)
- Storage temperature range: -40°C — $+85^{\circ}\text{C}$.

1.4.2. PROPERTIES PARAMETER

- Voltage supply: 12V or 24V
- Receiving sensitivity: -95dbm ~ -105dbm

1.5. FCC'S AUTHENTICATION ANNOUNCEMENT

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, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. You can test that if this equipment does cause harmful interference to radio or television reception by turning the equipment off and on.

Caution content: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.