

- TPMS_STATUS PID displays LOW if the BCM has detected that at least 1 TPMS sensor is reporting low tire pressure.
- TPMS_STATUS PID displays SYSTEM ACTIVE if the TPMS is functioning normally.

Last Warning Event PID Definitions

The TPMS uses the TPMS last warning event Parameter Identifications (PIDs) to store detailed information about the last 5 times the TPMS warning indicator was activated. These Parameter Identifications (PIDs) can be used to acquire more information about a particular TPMS event, but must be used carefully.

PID	Definition
EVT1_AGE_IGN through EVT5_AGE_IGN	The number of key cycles since the TPMS was activated. This PID cycles from zero to 255 and then starts over from zero again. This can be used to determine how long ago a TPMS event occurred and the time (in key cycles) between events.
EVT1_TR_LOC through EVT5_TR_LOC	This is the last programmed location for the TPMS sensor identifier causing each TPMS event. Due to tire rotation, the sensor may no longer be at the original location. It is suggested that all the Parameter Identifications (PIDs) be recorded, the system retrained, and then the sensor identifier Parameter Identifications (PIDs) be used to pinpoint the actual location of each sensor.
EVT1_PRES_BP through EVT5_PRES_BP	This is the tire pressure associated with each TPMS indicator event. This can be used along with the function code to clearly identify the TPMS events that were strictly due to low pressure. It can also be used to determine when a sensor is transmitting inaccurate tire pressure.
EVT1_SNSR_ST through EVT5_SNSR_ST	• Describes the warning status of each TPMS event by using the information received from the TPMS_STATUS PID. If there is a communication concern, the status could be NORMAL. • UNKNOWN • NORMAL (normal operation) • LOW (low pressure event) • FAULT (sensor fault or system fault)
EVT1_SNSR_ID through EVT5_SNSR_ID	This is the identifier of the sensor involved in each TPMS event. EVT1 is the most recent event that triggered the TPMS warning indicator.

Radio Frequency Interference (RFI)

RFI can be caused by:

- Video equipment has been found to cause RFI especially when the video and power supply lines are near the TPMS.
- Anti-theft alarms (even those installed by the dealership) have been found to create enough RFI to cause the TPMS to malfunction or lose considerable range. These anti-theft alarms can be difficult to locate, as they are usually hidden somewhere out of the way for reduced accessibility.
- Many in-vehicle cell phone chargers have been found to cause considerable RFI. The vehicles with the power point closest to the RTM are the most affected. It must be noted that most cell phone chargers do not produce high levels of RFI all the time. This depends on the state of charge of the cell phone battery. The phone battery must be almost completely discharged in some cases.
- Power supplies and DC/ AC inverters typically create a lot of RFI. Most consumer grade equipment has very little filtering or shielding.

Using Hit Rate Parameter Identifiers (PIDs) to Determine the Presence of RFI

If an intermittent RFI issue is suspected, the information contained in the last 5 TPMS warning event Parameter Identifiers (PIDs) can be combined with specific Parameter Identifiers (PIDs) from the BCM to determine which TPMS sensors are being affected and if a RFI source is currently present in the vehicle.

The BCM module contains Parameter Identifiers (PIDs) used to keep track of the number of TPMS messages received from the 4 trained TPMS sensors. These Parameter Identifiers (PIDs) can provide insight on the performance of the TPMS, and can help establish the presence of an Frequency Interference (RFI) source.

- TPM_HITS_LF (Tire Pressure Monitor Hit Rate Left Front) â€“ The number of TPMS messages received by the BCM module from the LH front sensor
- TPM_HITS_RF (Tire Pressure Monitor Hit Rate Right Front) â€“ The number of TPMS messages received by the BCM module from the RH front sensor.
- TPM_HITS_LRO (Tire Pressure Monitor Hit Rate Left Rear Outer) â€“ The number of TPMS messages received by the BCM module from the LH rear sensor

- **TPM_HITS_RRO** (Tire Pressure Monitor Hit Rate Right Rear Outer) – The number of TPMS messages received by the BCM module from the RH rear sensor.

Method for determining if a RFI issue has been affecting the TPMS:

1. Collect the last 5 TPMS events and determine if they were due to system faults or low tire air pressure.
2. Collect the TPMS Hit Rate PID counters and compare them to the last 5 TPMS events.
3. If the TPMS Hit Rate PID counters are significantly different from each other or if the locations with lower hit rate values show up as fault locations in last 5 TPMS events and BCM DTC B124D:02 (Tire Pressure Sensor: General Signal Failure) is present, an intermittent RFI source is most likely preventing the signals from these TPMS sensors from reaching the BCM.
4. An intermittent RFI source can also be the case when all 4 TPMS sensors show up in the last 5 fault events and BCM DTC B1182:00 (Tire Pressure Monitoring System (TPMS): No Sub Type Information) is present. The possible cause would a strong source of RFI noise.

Original Equipment Manufacturer (OEM) Modules

In some cases the RFI may actually be caused by a module or ground on the vehicle. Depending on the severity of the concern, a dirty ground, improperly built ground shield or module can disable the system. Modules that have microcontrollers using clock circuits to create timing pulses for the microprocessor may radiate RFI.

Using Customer Electronics to Pinpoint RFI

This method can be a way to determine the cause of a concern before the sensors and module are replaced with little or no effect on system performance. Discuss with the customer what types of devices they were using when the event occurred. Determine which power points are being used and, if necessary, ask the devices be activated to determine their affect on the TPMS.

Options for Eliminating Intermittent TPMS Operation Caused by RFI

- If an Original Equipment Manufacturer (OEM) component or customer device is causing a RFI concern, replace the device.
- If a phone charger is causing a RFI concern, the customer should consult with their cell phone provider to acquire a different battery charger.
- If a device such as a dealer installed anti-theft alarm is causing a RFI concern, move the device to another location in the vehicle. In the case of a portable device move the power cord to another power point location.

In summary, if the RFI source is present and cannot be moved or replaced, the intermittent concern remains. The TPMS must accept the unwanted system operation the RFI can cause.

Ambient Temperature Change and Tire Pressure

Tire pressures fluctuate with temperature changes. For this reason, tire pressures must be set to specification when tires are at outdoor ambient temperatures. If the vehicle is allowed to warm up to shop temperatures, and the outside temperature is less than shop temperature, the tire inflation pressure must be adjusted accordingly.

If the tires are inflated to specification at shop temperatures, and the vehicle is moved outdoors when the outdoor ambient temperature is significantly lower, the tire pressure may drop enough to be detected by the TPMS and illuminate the TPMS warning indicator.

As the ambient temperature decreases by -12.2Â° C (10Â° F), tire pressure decreases 6.9 kPa (1 psi). Adjust the tire pressure by 6.9 kPa (1 psi) for each -12.2Â° C (10Â° F) of ambient temperature drop as necessary to keep the tire at the specified VC label pressure. To adjust the tire pressure indoors for colder outside temperatures, refer to the following table.

NOTE: Table is based on a garage temperature of 21Â°C (70Â°F). Max Pressure Adjustment is 50 kPa (7 psi).

	Tire Placard Pressure				
	29.7 psi (205 kPa)	31.9 psi (220 kPa)	34.1 psi (235 kPa)	34.8 psi (240 kPa)	37.7 psi (260 kPa)
Outside Temperature	Tire Target Pressure				
69.8 Â°F (21 Â°C)	29.7 psi (205 kPa)	31.9 psi (220 kPa)	34.1 psi (235 kPa)	34.8 psi (240 kPa)	37.7 psi (260 kPa)
60.8 Â°F (16 Â°C)	31.2 psi (215 kPa)	33.4 psi (230 kPa)	34.8 psi (240 kPa)	36.3 psi (250 kPa)	39.2 psi (270 kPa)
50.0 Â°F (10 Â°C)	31.9 psi (220 kPa)	34.1 psi (235 kPa)	36.3 psi (250 kPa)	37.0 psi (255 kPa)	42.1 psi (290 kPa)
39.2 Â°F (4 Â°C)	33.4 psi (230 kPa)	34.8 psi (240 kPa)	37.0 psi (255 kPa)	37.7 psi (260 kPa)	42.8 psi (295 kPa)
30.2 Â°F (-1 Â°C)	34.1 psi (235 kPa)	36.3 psi (250 kPa)	37.7 psi (260 kPa)	39.2 psi (270 kPa)	44.2 psi (305 kPa)

Component Description

BCM

The BCM is a multifunction module that monitors all sensor inputs and all CAN messages that relate to the TPMS. The BCM records and retains the unique sensor identifier of each TPMS sensor.

The BCM retains the previous sensor location information following a tire rotation. For the BCM to learn the new sensor location, the sensors must be trained (calibrated) to the BCM.

Refer to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration (204-04B Tire Pressure Monitoring System (TPMS), General Procedures).

Additionally, the sensors must be trained when a new BCM is installed.

When installing a new BCM, there are several procedures that must be carried out in order for the module to function correctly. These procedures include, but are not limited to; PMI, anti-theft parameter reset, programming keyless entry remote and setting customer preferences.

Refer to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Removal and Installation).

Additionally, the sensors must be trained when a new BCM is installed. TPMS pressure data is cleared from the BCM when the module is flashed or reconfigured. When the data is cleared, the tire pressure DID's reset to the factory default of 1033 kPa (149.96 psi) and the IPC displays dashes for the tire pressures. The sensors must be activated to transmit the latest tire pressure information.

RTM

The RTM is a radio receiver used to collect the tire pressure data from the TPMS sensors.

TPMS Sensor

Each of the 4 TPMS sensors contain a battery, a tire pressure sensor and a radio transmitter. The TPMS sensor radio transmissions are sent approximately once every 60 seconds when the vehicle speed exceeds 32.2 km/h (20 mph).

Diagnosis and Testing

Tire Pressure Monitoring System (TPMS)

DTC Charts

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

RTM DTC Chart

DTC	Description	Action
U0146:00	Lost Communication with Gateway "A": No Sub Type Information	GO to Pinpoint Test H
U0401:00	Invalid Data Received from ECM / PCM "A": No Sub Type Information	This DTC sets when the RTM receives invalid network data from the PCM. RETRIEVE and DIAGNOSE all non-network Diagnostic Trouble Codes (DTCs) in the PCM. REFER to: Electronic Engine Controls (303-14A Electronic Engine Controls - 2.0L EcoBoost (184kW/250PS) – MI4, Diagnosis and Testing). REFER to: Electronic Engine Controls (303-14B Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS), Diagnosis and Testing). REFER to: Electronic Engine Controls (303-14B Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS), Diagnosis and Testing).
U0401:82	Invalid Data Received from ECM / PCM "A": Alive / Sequence Counter Incorrect / Not Updated	This DTC sets when the RTM receives invalid network data from the PCM. RETRIEVE and DIAGNOSE all non-network Diagnostic Trouble Codes (DTCs) in the PCM. REFER to: Electronic Engine Controls (303-14A Electronic Engine Controls - 2.0L EcoBoost (184kW/250PS) – MI4, Diagnosis and Testing). REFER to: Electronic Engine Controls (303-14B Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS), Diagnosis and Testing). REFER to: Electronic Engine Controls (303-14B Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS), Diagnosis and Testing).
U1A00:00	Private Communication Network: No Sub Type Information	GO to Pinpoint Test I
U2100:00	Initial Configuration Not Complete: No Sub Type Information	• This DTC is present when a new RTM is installed, or when the RTM is incorrectly flashed or reconfigured. This DTC clears when the RTM is correctly configured. • Using a diagnostic scan tool, CONFIGURE the RTM. FOLLOW all diagnostic scan tool instructions.
U3000:04	Control Module: System Internal Failure	• CHECK vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure as directed by the diagnostic scan tool. • If there have been no recent service actions, INSTALL a new RTM to correct the failure to retain configuration data. REFER to: Radio Transceiver Module (RTM) (419-10 Multifunction Electronic Modules, Removal and Installation).

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).