

2004 Ford Mustang V8-4.6L SOHC VIN X

Vehicle > Technical Service Bulletins

TIRE MONITOR SYS - TPMS IDENTIFICATION

General Service Bulletin (GSB):

Tire Pressure Monitoring System (TPMS) GSB

GSB Overview:

Information on TPMS identification, Ford versus non-Ford sensors along with warrantable versus non-warrantable issues

NOTE: This information is not intended to replace or supersede any warranty, parts and service policy, Work Shop Manual (WSM) procedures or technical training or wiring diagram information.

Tires Overview

Tires are designed to operate within a specific range of air pressures. The recommended inflation pressure is printed on the decal on the driver's door jamb (B-Pillar). The decal specifies the proper tire inflation.

Tire pressure should be checked monthly as recommended in the Owner's Manual because all tires lose pressure over time.

A tire's inflation pressure cannot be judged by appearance alone. For example; often by the time a low profile radial tire looks low it may be 10 to 15 PSI underinflated.

The accuracy of some new inexpensive tire pressure gauges can be off by several PSI. Checking tire inflation pressure requires an accurate tire pressure gauge.

TPMS Overview

Tire Pressure Monitoring System, or TPMS as it is typically referred to, uses an instrument panel warning light or message center to alert the driver to low tire pressure.

The United States Congress passed the Transportation, Recall, Enhancement, Accountability and Documentation (TREAD) Act in 2000. Part of the TREAD Act addresses concerns of low tire pressure.

The TREAD Act legislated that vehicle manufacturers must equip all passenger vehicles and light trucks with TPMS by the start of the 2008 model year. Industry-wide compliance was phased in starting with the 2006 model year. The 2003 Explorer and Mountaineer were the first Ford Motor Company products to receive the TPMS system. These systems are required to alert the driver if the tire pressure falls to 25 percent below the manufacturer's recommended tire pressure.

TPMS Technology

Currently, Ford Motor Company vehicles utilize the direct measurement TPMS sensor. The sensors are very accurate, usually within .25 PSI or less.

Direct measurement TPMS sensors use a small pressure sensor with a built-in battery and transponder. There is one sensor per tire. (The spare tire does not have a sensor in it.) The sensor sends a radio signal at a predetermined interval to a control module in the vehicle. The control module identifies the signal from each wheel and tracks the tire pressure. If the air pressure drops below a predetermined threshold, the control module turns on the warning light on the instrument panel.

When the vehicle begins to move, a switch inside the sensor activates the pressure measurement and signal sending function. At about 20 mph, the sensor begins measuring the pressure every 30 seconds and transmits the results once each minute to the control module.

Motorcraft sensors complete an electrical connection either by a roll switch or an accelerometer. The roll switch was used on the 2003-2005 Explorer/Mountaineer and 2003-2006 Expedition/Navigator. All other vehicles use the accelerometer type switch.

The sensors transmit tire pressure data to the control module at 315 Mhz. (Some early sensors used 433 Mhz.)

Each wheel sensor has a unique identification code so the control module can recognize each sensor. When the vehicle is parked and has not moved for 15 minutes, the sensors will stop transmitting.

If the tire pressure drops below the minimum setting, the module will turn on the warning light. The warning light will not indicate which tire is low. All tires need to be inspected for proper tire pressure using an accurate tire pressure gauge. The recommended tire pressure is located on the tire label on the driver's door jamb (B-Pillar).

After inflating the tires to the recommended inflation pressure, the vehicle must be driven at 20 mph or more for a few minutes for the light to turn OFF.

Some heavier duty vehicles like F-150, F-Super Duty, or E-Series have tire pressures which are different in the front and rear tires. (Consult the tire label on the driver's door jamb for the recommended inflation pressures.) This is known as the split placard system.

When the tires are rotated on the split placard system, the TPMS system will need to be retrained to identify where the tires/sensors are located to determine the proper tire pressures.

All Ford and Lincoln/Mercury sensors can be retrained by using Rotunda Tool number 204-363 or Motorcraft Tool number TPMS-19. The valve mounted bolt-on sensors can also use Rotunda tool number 204-324.

Ford Motor Company uses two different designs of TPMS sensor:

- Valve mounted bolt-on sensors
- Valve mounted Snap-in sensors

Valve Mounted Snap-In Sensor

Beginning in 2009 with the Escape and F-150, a two piece snap-in valve mounted sensor was used. The sensor and valve stem are separate pieces which are screwed together and can be replaced separately. **NOTE: MUST USE NEW VALVE STEM PART NUMBER 9L3Z-1700-A.**

The sensor is referred to as "snap-in" because it uses a more traditional rubber valve stem for installation and does not use a hex nut fastener or rubber o-ring for attachment.

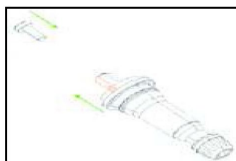
Valve Mounted Bolt-On Sensors

The valve mounted sensors (also known as Schrader Valve Sensors) are one-piece "bolt-on" valve mounted sensors where the sensor and valve stem are molded together. The sensor is secured in place by a hex nut and uses a rubber grommet to prevent any leaks.

Snap-In Valve Mounted Sensor



The Snap-in sensor does not require the use of a grommet or a hex nut like the bolt-on sensor. The sensor is mounted to the valve by using a Torx screw. When the valve needs to be replaced, the sensor can be removed and a new valve kit installed. The valve kit consists of a new valve, valve cap and Torx screw.



Note: All of these TPMS systems require specific instructions for tire mounting and dismount procedures. See instructions on following pages.

Note: Use of Tire Sealers in Tires/Wheels Equipped With TPMS Systems

Whenever emergency tire sealers are used on a vehicle equipped with a TPMS system, the sensor and valves must be replaced, which is not covered under the new vehicle warranty. Before installing a new tire, all of the sealant must be removed from the tire/wheel assembly. Failure to do so can cause the TPMS system to give false tire pressure measurements and cause the new sensor to fail.

Bolt-On Valve

Starting with the 2013 model year, the TPMS system on the Shelby GT500 has a bolt-on valve. The wheels are designed so the valve is recessed to limit the chance of contact which could damage the valve. The valve and sensor can be purchased as an assembly or the valve can be purchased in a separate kit shown above. The screw which secures the sensor to the valve is a self-tapping design, which cannot be reused. If the sensor is removed from the valve, the valve must be replaced. The valve retaining nut torque is 7.5-8.5 Nm (66-75 lb-in) and the sensor screw torque is 1.2-1.6 Nm (11-14 lb-in). The angled edge of the valve seat (red arrow) must be indexed toward the inside of the rim.



Things you should know about TPMS

Whether the vehicle being serviced uses Snap-in or Valve Mounted Bolt-On TPMS sensors, there are several key items you need to know to properly service the vehicle.

Cold Weather- During colder weather, a drop in ambient temperature will cause tire pressure to decrease because air molecules are closer together in the tire. This may cause the TPMS warning light to turn ON. Tire pressure drops 1 PSI for every 10° F drop in ambient temperature.

Mounting Tires onto Wheels- Special care must be taken when removing or installing tires on wheels with the TPMS system. The sensors can be damaged by the tire machine or the tire if the proper mounting and dismounting procedures are not used. For the proper procedure, review the enclosed GSB or the appropriate Workshop Manual.

Sensor ID- Each Sensor has a unique identification code which is identified by the TPMS control module. The TPMS module uses this information to ensure that it is monitoring the proper vehicle tire pressure and does not receive a stray signal from another vehicle.

Sensor Reset/Training- The TPMS needs to identify each sensor location. Heavy duty vehicles may have different tire pressures on the front and rear axles. This is known as split placard. To verify the vehicle has split placard, review the tire label on the driver's door or door jamb. The TPMS system needs to identify the locations of each sensor to be able to determine the proper tire pressure setting. When the tires are rotated the system must be reset. A reset tool is included in the Owner Information Kit in the glove box and the Owner's Manual has the instructions on how to reset the TPMS system. The tool can be purchased and the Motorcraft number is TPMS-19.



For the 2010 model year, some vehicles with the split placard system have a new procedure to reset the TPMS system and do not require the use of the tool. The procedure can be found in the Owner's Manual or the Workshop Manual.

Aerosol Inflators With Sealant- Tire inflators with sealant should only be used for emergencies. Use of these products can damage the TPMS sensor and cause the system to malfunction. If these products are used, the TPMS sensor will need to be replaced at the customer's expense. When the tire is repaired or replaced, all of the sealant must be cleaned from the tire and rim to ensure the new TPMS sensor is not damaged.

TPMS Sensor Batteries- All TPMS sensors contain a small battery to power the sensor and the transponder. The batteries are designed to have an estimated life of 10 years or 150,000 miles. When the batteries are at the end of the useful life, the TPMS system may start setting diagnostic codes. If the vehicle requires a replacement tire near 10 years or 150,000 miles, the TPMS sensors should be replaced as part of preventative maintenance.

Tire Pressure- When inspecting the tire pressure setting, always use a high quality tire pressure gauge. Inexpensive gauges can be inaccurate. When filling the tire with air, always use clean dry air to prevent damage to the TPMS sensor.

Tire Changers- Tires should be mounted using a tire changer to guarantee a proper fit and to prevent damage to the TPMS sensor. The tire, rim, and changer should be clean of dust and dirt. If dirt or moisture gets into the tire, the TPMS sensor can malfunction. Always use the proper mounting and dismounting procedures outlined in this GSB or in the Workshop Manual.

Tire Replacement- Always replace the tires with the proper size that were installed on the vehicle as original equipment. This information can be found on the tire label located on the B-Pillar. Failure to do so can cause the TPMS system to operate improperly.

TPMS Identification Chart

Model	Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Expedition/Navigator		#2	#2	#4	#4	#4	#4	#6	#6	#6	#6	#6	#6
Explorer ('03-'15) & Mountaineer ('03-'10)		#1	#3	#3	#3	#3	#3	#6	#6	#6	#6	#6	#6
Aviator		#1											
Explorer Sport Trac				#3	#3	#3	#3						
Escape ('06-'15) / Mariner ('06-'11)			#3	#3	#3	#6	#6	#6	#6	#6	#6	#6	#6
Freestar / Monterey			#3	#3									
Edge / MKX				#4	#4	#4	#4	#6	#6	#6	#6	#8	#8
Mustang				#3	#3	#3	#6	#6	#6	#6	#6	#8	#8
Shelby GT500				#3	#3	#3	#6	#6	#6	#7	#7	#7	#9
F150 ('07-'15) / Mark LT ('07-'08)				#3	#3	#6	#6	#6	#6	#6	#6	#6	#6
F Series Heavy Duty				#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
Ranger				#3	#3	#3	#3						
Focus					#4	#4	#6	#6	#6	#6	#6	#6	#6
E-Series Under 10,000 GVWR					#5	#5	#5 or #6	#6	#6	#6	#6	#6	#6
Fusion / MKZ ('08-'15) & Milan ('08-'11)					#3	#3	#6	#6	#6	#6	#6	#6	#6
Taurus / Sable / Taurus X					#4	#4							
Crown Vic./Grand Mar./Town Car					#3	#3	#3	#3					
F-Super Duty Under 10,000 GVWR					#5	#5	#6	#6	#6	#6	#6	#8	#8
MKS						#4	#4	#6	#6	#6	#6	#6	#6
Flex						#4	#4	#6	#6	#6	#6	#6	#6
MKT							#4	#6	#6	#6	#6	#6	#6
Taurus / Sable / Taurus X							#4	#6	#6	#6	#6	#6	#6
Transit Connect							#6	#6	#6	#6	#6	#6	#6
Fiesta								#6	#6	#6	#6	#6	#6
C-Max										#6	#6	#6	#6
MKC												#6	#6
Transit												#6	#6



Snap-In Sensor







Bolt-On Sensor





Bolt-On Sensor

TPMS Snap-In / New Bolt-In Sensor



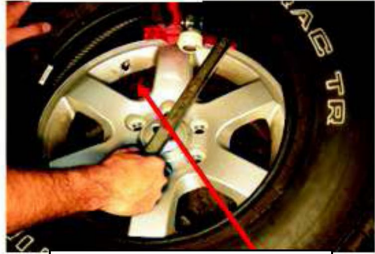

Sensor/Valve Identification

			
The valve mounted sensor is screwed to the valve stem	The Snap-In TPMS sensor has a brass collar	Bolt-on sensor nickel plated brass valve	Bolt-on sensor finish side

Breaking Tire Bead

<p>Tire machine with Side Paddle</p>  <ul style="list-style-type: none">• Locate valve stem @ 6 o'clock or 12 o'clock (For front & back side of wheel breaking)	<p>-OR-</p>	<p>Tire machine with Top & Bottom Rollers</p>  <ul style="list-style-type: none">• Locate valve stem at any position.• Do not push bead into sensor from bottom side.
---	-------------	---

TPMS Snap-In Sensor

<p>Top Bead Removal</p>  <ul style="list-style-type: none">• Set the valve stem to 11:00• Put removal tool at 12:00• Remove top bead	<p>Top Bead Installation</p>  <ul style="list-style-type: none">• Set the valve stem to 6:00• Put installation tool at 12:00• Install top bead
<p>Bottom Bead Removal</p>  <ul style="list-style-type: none">• Set the valve stem to 11:00• Put installation tool at 12:00• Remove bottom bead	<p>Bottom Bead Installation</p>  <ul style="list-style-type: none">• Set the valve stem to 6:00• Put installation tool at 12:00• Install top bead

TPMS Warranty

TPMS Sensor Non-Warrantable Issues

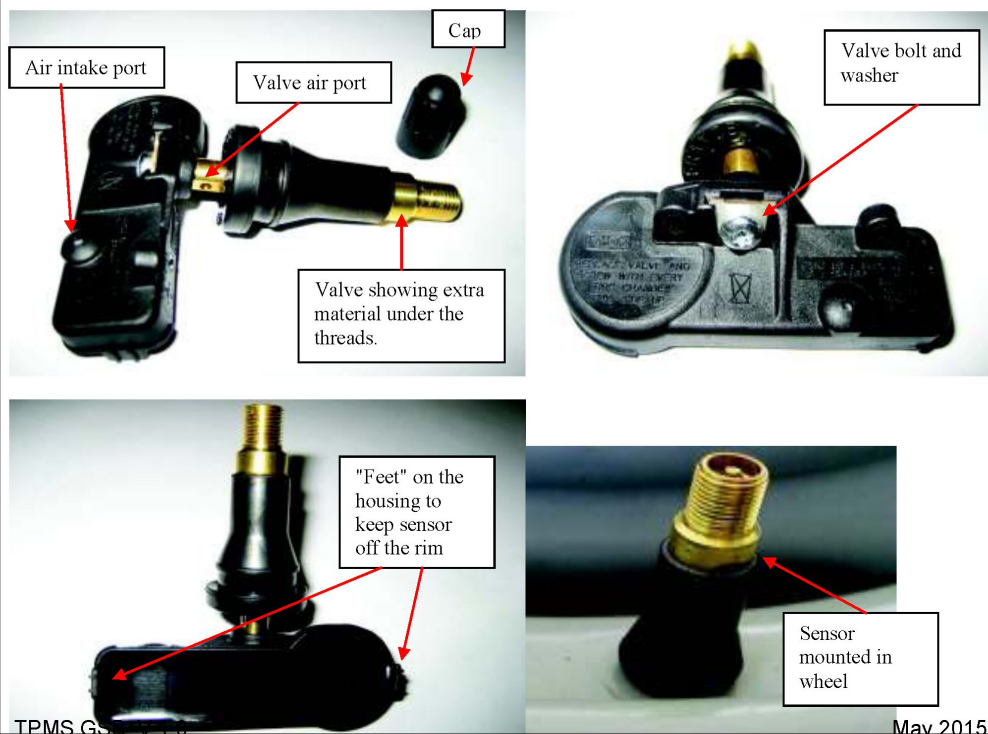
With the introduction of the new valve-mounted sensor, care must be taken to ensure the sensor type is identified, and that the correct mount and dismount procedure is used for each type of TPMS sensor. Damage to new valve-mounted sensor is also identifiable, with each part being reviewed prior to warranty approval. As with the older sensors, the sensor may not respond for a number of non-warrantable reasons that require the replacement of the sensor. They are:

- Damage due to improper tire mount and/or dismount procedure.
- Damage due to being run on a flat or severely under-inflated tire.
- Damage due to impact
- Damage due to improper removal of the valve with the sensor still attached on Valve Mounted Sensors.
- Damage due to improper sensor removal from the cradle on Band-On sensors.
- Sensor replaced due to the use of tire sealant
- Port plugged due to the use of sealants or other materials (rubber, grease, balancing materials, etc..)
- Damage due to mounting on wheels not designed to accommodate TPMS sensors properly.

Other Non-Warrantable Conditions:

- Installing sensors on aftermarket wheels that do not have TPMS sensors.
- Moving sensors to aftermarket wheels.
- Moving sensors to customer provided wheels.

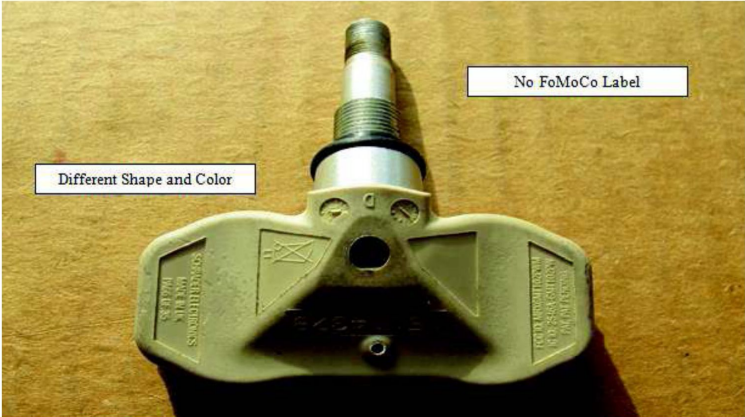
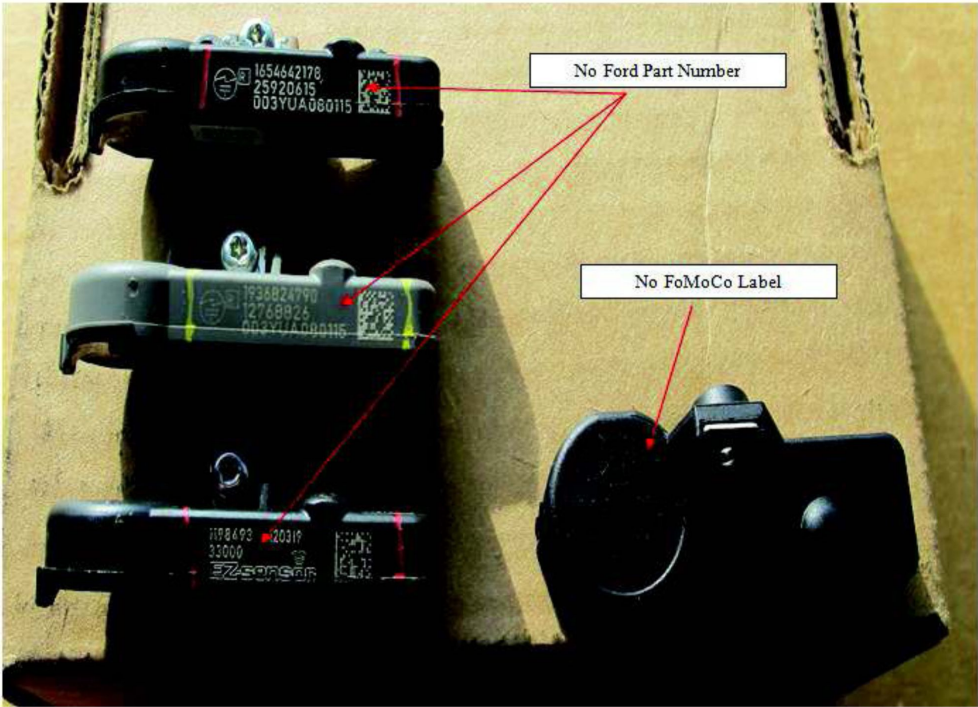
Examples of Good Parts:



TPMS GS 1010

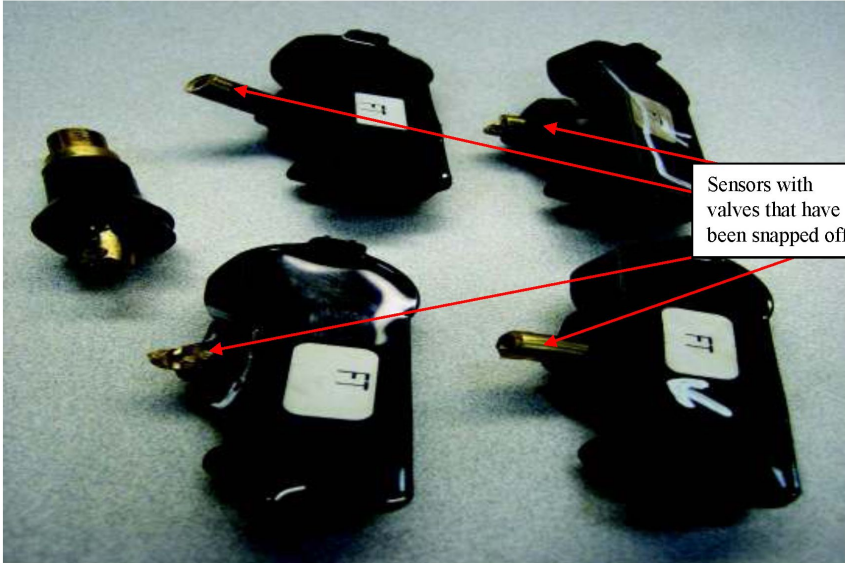
May 2015

TPMS Warranty
Non-Ford Part Details

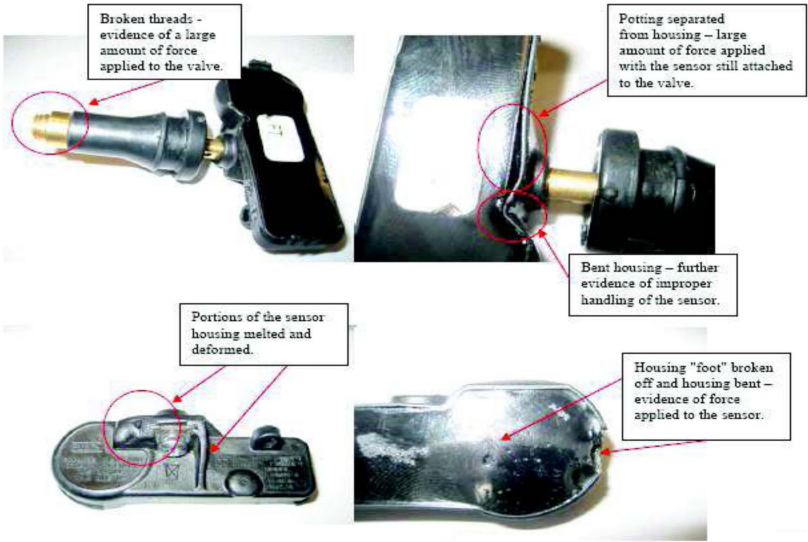


TPMS Warranty

Examples of Non-Warrantable Damage on the New Valve-mounted sensor:

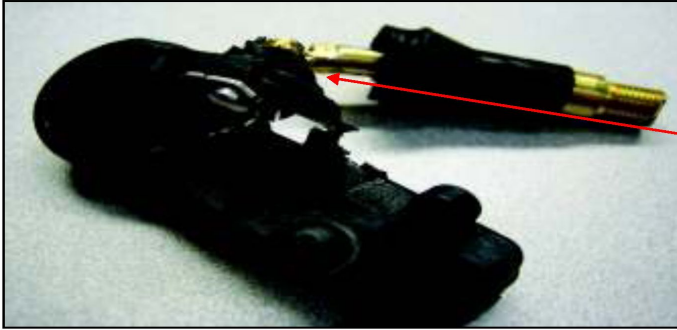


Examples of Non-Warrantable Damage on the New Valve-mounted sensor:

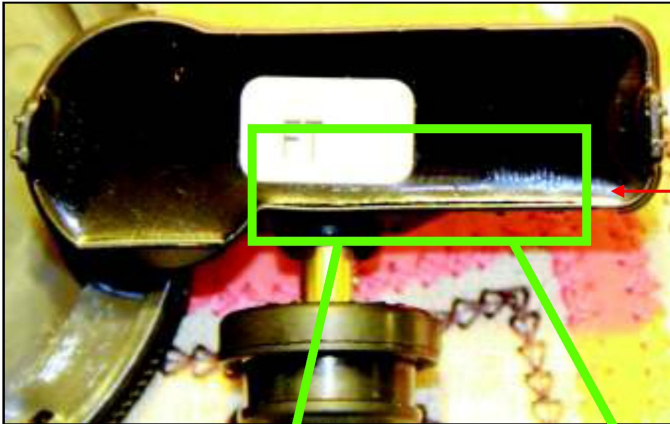


TPMS Warranty

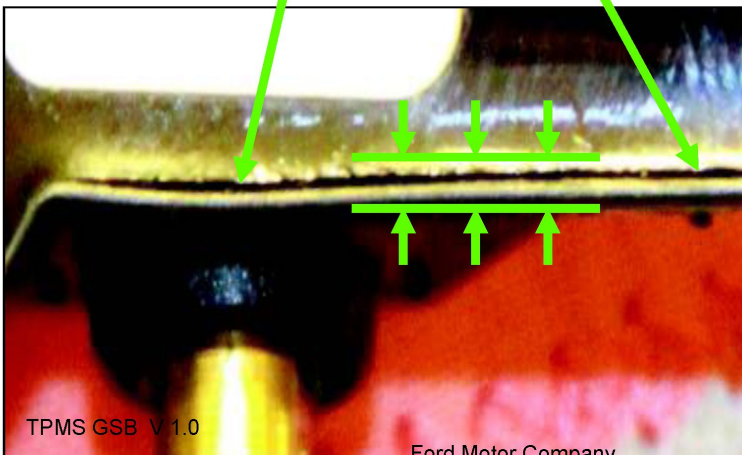
Examples of Non-Warrantable Damage on the New Valve-mounted sensor:



Severe chassis damage from attempting to pull the valve out with sensor attached



Detail of housing showing potting separation due to heavy force applied to the valve. If a finger nail or business card can be inserted between the TPMS sensor housing and potting, the TPMS sensor has been damaged. Damage of this nature is most often caused by improper tire removal or attempting to remove the valve stem like a conventional rubber valve stem.

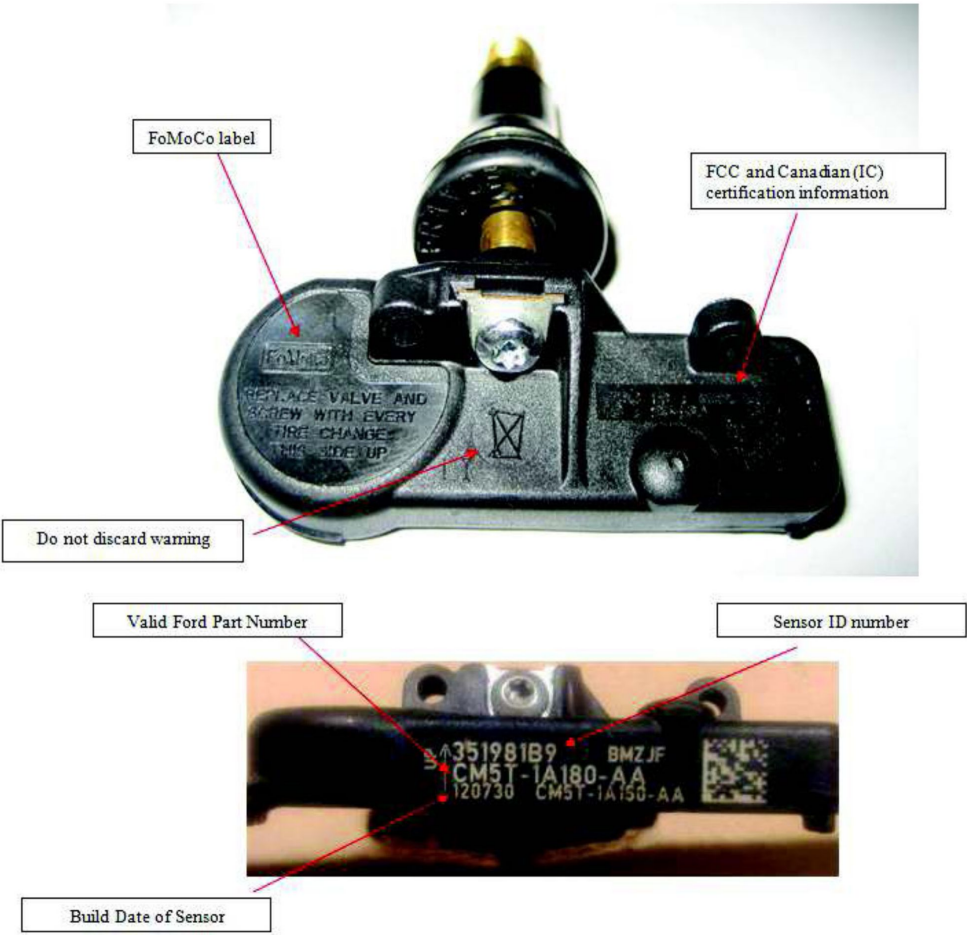


TPMS GSB V 1.0

Ford Motor Company

TPMS Warranty

Ford Sensor Markings and Part Details



TPMS Warranty

Identifying Correct Ford Sensor for a Particular Vehicle



9L3T – the first generation of valve mounted sensor.
Not a valid sensor type for any 2012, 13, 14 or 15 model year vehicle.



CM5T – the second generation of valve mounted sensor.
Not a valid sensor type for any 2014 or 2015 model year vehicle.



DE8T – current valve mounted sensor.
Valid sensor type only for 2014 and 2015 model year vehicles.

QUICK REFERENCE: TPMS FAQ

Q: How does TPMS work?

A: A vehicle's TPMS continuously monitors tire pressure through sensors located in the tires (called a Direct System) or through the ABS sensors to measure wheel speed (called the Indirect System). The low tire pressure warning lamp illuminates when a tire pressure is low. If the lamp flashes then the system needs to be tested.

Q: What's the TPMS warning lamp look like?

A: There are two different style icons approved by the TREAD Act as low tire pressure warning indicators. Ford and Lincoln Mercury vehicles use an image of a cross-section of a tire with an exclamation mark inside.

(Some OE designs employ the alternate icon; an image of a top-down view of a vehicle showing all four tires.)



Q: Can low tire pressure be easily detected visually?

A: Under-inflated tires are hard to detect with the eye. Consequently, tires should be inspected and checked monthly with an accurate tire gauge. Note: TPM systems are not designed to be a substitute for regular tire maintenance. Drivers should be encouraged to review their Owner Guide for additional information on tire care and TPMS.

Q: What's it mean if the TPMS warning lamp comes on?

A: When the TPMS warning Lamp on the instrument panel illuminates it means the system has detected at least one tire with pressure that is low. All the tires should be inspected and the tire pressures adjusted as soon as possible. The lamp will go out after the tires are properly inflated and the vehicle is driven two minutes over 20 mph (33 kph).

Q: What's it mean if the warning lamp goes on and off?

A: The warning lamp may illuminate for a short period of time and then go out on cold mornings. This is generally caused by marginally low tire pressure that drops below the minimum tire pressure overnight. As the vehicle is driven the air in the tire heats up and expands causing the tire pressure to rise above the minimum level. This causes the warning lamp to turn off.

(Note: Every 10 degree drop in ambient air temperature results in a one psi drop in tire pressure).

The tire pressure needs to be inspected when the tires are cold. The tire pressure needs to be adjusted according to the pressures indicated on the tire label on the driver's door jamb.

Q: What's it mean if the warning lamp flashes on and off and then stays lit?

A: TPMS is designed to warn the driver when the system is not working properly. A system malfunction is indicated by a flashing of the TPMS warning lamp for 60 to 90 seconds. The warning lamp will stay lit after the flashing ends. This sequence repeats every time the vehicle is started until the concern is corrected. (Note: Prior to September 2007, the Ford system would flash and then go OFF to signal a fault.)

Q: Why is proper tire inflation important?

A: Proper tire inflation is important for safe vehicle operation. Vehicles with properly inflated tires exhibit the optimum in ride and handling characteristics, tire life, as well as fuel economy.

Q: Why does tire pressure change?

A: Tire pressure drops about one psi for every 10 degree F drop in ambient temperature. In addition, tires lose as much as 1.5 psi per month as air escapes naturally from the porosity of the tire and rim. (For those interested in the science behind this, it's $PV=nRT$.)

Q: What is the TREAD Act?

A: The TREAD Act is a law administered by the National Highway Traffic Safety Administration that requires that all passenger cars, light trucks, and vans (Gross weight less than 10,000 pounds) be equipped with TPMS starting in model year 2008 (specifically September 1, 2007). Incomplete vehicles under 10,000 GVW have until September 1, 2008. The program was phased-in starting in the 2006 model year.

Q: Can other aftermarket devices affect the TPMS system?

A: Some aftermarket devices can cause radio frequency interference that will block the TPMS sensor signal causing an intermittent concern. This can cause the TPMS lamp to illuminate. Some of the more common items are: cell phone chargers, GPS power supplies, or any other aftermarket electronic device. Unplugging the aftermarket devices can help determine if they are the cause of an intermittent concern.

Tire Pressure Monitoring System GSB V1.0