

2008 Chevy Truck Silverado 2500 2WD V8-6.6L DSL Turbo

Vehicle > ALL Diagnostic Trouble Codes ( DTC ) > Testing and Inspection > P Code Charts > P2453

## ENGINE CONTROLS AND FUEL

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# Diagnostic Instructions

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

## DTC Descriptor

**DTC P2453**

Particulate Matter Trap Differential Pressure Sensor Signal Performance

## Diagnostic Fault Information

Circuit	Short to Ground	High Resistance	Open	Short to Voltage	Signal Performance
Exhaust Differential Pressure Sensor 5V Reference	P0117, P0652, P2454	P2453	P2454	P0118, P0653, P2455	P2453
Exhaust Differential Pressure Sensor Signal	P2454	P2453	P2455	P2455	P2453
Exhaust Differential Pressure Sensor Low Reference	—	P2453	P2455	—	P2453

## Typical Scan Tool Data

### Particulate Filter Pressure Variance

Circuit	Short to Ground	Open	Short to Voltage
<b>Operating Conditions:</b> Ignition ON, Engine OFF			
<b>Parameter Normal Range:</b> -1.0 to +0.3 kPa			
Exhaust Differential Pressure Sensor 5V Reference	-14.5 kPa	-14.5 kPa	99 kPa
Exhaust Differential Pressure Sensor Signal	-14.5 kPa	99 kPa	99 kPa

Circuit	Short to Ground	Open	Short to Voltage
Exhaust Differential Pressure Sensor Low Reference	—	99 kPa	—

## Circuit/System Description

The exhaust differential pressure sensor measures the pressure difference across the inlet and outlet of the diesel particulate filter (DPF). The pressure difference across the DPF increases as the captured particulates in the DPF increase. A diaphragm within the differential pressure sensor is displaced by the pressure changes that occur from particulate matter loading. The sensor translates this action into electrical resistance. The engine control module (ECM) supplies a 5V reference circuit and a ground on the low reference circuit. The differential pressure sensor provides a signal voltage to the ECM, relative to the back pressure as a function of exhaust flow, DPF temperature, and soot loading. The ECM converts the signal voltage input into a pressure value.

## Conditions for Running the DTC

- The engine has been running and then turned off for at least 60 seconds.  
OR
- DTC P2453 runs continuously when the engine is running.  
AND
- DTC P2453 runs once after the ignition has been turned OFF.

## Conditions for Setting the DTC

- Engine OFF, the ECM detects that the differential pressure is greater than or less than the calibrated threshold for 0.5 second.  
OR
- Engine running, the ECM detects that the differential pressure is greater than or less than the calibrated threshold for 1 second.  
OR
- The ECM detects that the differential pressure does not respond relative to an increase or decrease in exhaust flow for greater than 1 second.

## Action Taken When the DTC Sets

- DTC P2453 is a Type A DTC.
- A message center or an indicator may display Clean Exhaust Filter.

## Conditions for Clearing the MIL/DTC

DTC P2453 is a Type A DTC.

## Diagnostic Aids

- A skewed or stuck exhaust differential pressure sensor will cause this DTC to set.
- The flexible part of the exhaust differential pressure lines are made of a high temperature hose that is protected by a braided covering. If the hoses are twisted or bent, they will not return to their normal size

and shape. If the hoses are restricted, it may cause this DTC to set.

- A turbocharger charge air cooler (CAC) hoses leak may cause this DTC to set.
- An air induction air leak or a skewed mass air flow (MAF) sensor may cause this DTC to set.
- An engine stall, low engine idle speed, or an engine misfire may cause this DTC to set.

## Reference Information

### Schematic Reference

Engine Controls Schematics

### Connector End View Reference

Component Connector End Views

### Description and Operation Reference

Diesel Particulate Filter (DPF) System Description

### Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

### DTC Type Reference

Powertrain Diagnostic Trouble Code (DTC) Type Definitions

### Scan Tool Reference

Control Module References for scan tool information

### Special Tools

- Mityvac
- Metal Mityvac

## Circuit/System Verification

1. Verify that DTCs P0101, P0102, P0103, P0234, P0299, P0300–P0308, P0401, P0402, P0652, P0653, P0698, P0699, or P2563 are not set.
  - If any of the DTCs are set, refer to Diagnostic Trouble Code (DTC) List - Vehicle.
2. Ignition ON, engine OFF, observe the scan tool Particulate Filtration Pressure Variance parameter. The value should be between  $-1.0$  and  $+0.3$  kPa.
3. Engine running at a warm stabilized idle, observe the scan tool Particulate Filtration Pressure Variance parameter. The value should be between  $0.0$ – $3.0$  kPa.
4. Engine running at a warm stabilized idle, observe the scan tool Particulate Filtration Pressure Variance

parameter. Increase the engine speed to 3,000 RPM. The value should increase.

5. Operate the vehicle within the Conditions for Running the DTC to verify that the DTC does not reset. You may also operate the vehicle within the conditions that you observed from the Freeze Frame/Failure Records data.

## Circuit/System Testing

**Note:** Perform the Repair Verification after completing the Circuit/System Testing.

1. Verify the integrity of the DPF system by visually and physically inspecting any of the following conditions:
  - Any damaged exhaust system components
  - Loose or improperly installed exhaust system components—Ensure the smaller diameter pressure line is connected to the front of the DPF and to the smaller port of the differential pressure sensor.
  - Restrictions in the exhaust differential pressure sensor ports
  - Damaged, bent, completely restricted, exhaust differential pressure lines—The lines should not be modified and should have a continuous downward gradient from the sensor.
  - Inspect for fuel contaminates. Refer to Contaminants-in-Fuel Diagnosis.
2. Verify the integrity of the entire air induction system by inspecting for the following conditions:
  - A loose air inlet duct
  - A loose turbocharger air inlet clamp
  - A damaged air cleaner housing
  - A missing or damaged air cleaner restriction indicator
  - A loose, leaking, or cracked intake manifold air resonator
3. Remove and inspect the flexible part of the exhaust differential pressure lines for internal restrictions.
  - If a condition is found replace the exhaust pressure lines.
4. Engine running, verify that the scan tool Particulate Filt. Pressure Variance parameter is greater than 0 kPa (0 psi), and increases as engine speed is increased.
  - If less than the specified range, and the parameter decreases as engine speed is increased, inspect for incorrect differential pressure line routing, or a blockage in the rear pressure line.
5. Ignition OFF, disconnect the harness connector at the exhaust differential pressure sensor.
6. Ignition OFF and scan tool disconnected for 90 seconds, test for less than 5  $\Omega$  between the low reference circuit terminal 1 and ground.
  - If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the ECM.
7. Ignition ON, test for 4.8–5.2V between the 5V reference circuit terminal 3 and ground.
  - If less than the specified range, test the 5V reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
  - If greater than the specified range, test the 5V reference circuit for a short to voltage. If the circuit tests normal, replace the ECM.
8. Verify the scan tool Particulate Filt. Pressure Variance parameter is greater than 98 kPa.

- If less than the specified range, test the signal circuit for a short to ground. If the circuit tests normal, replace the ECM.
9. Install a jumper wire between the low reference circuit terminal 1 and signal circuit terminal 2. Verify the scan tool Particulate Filt. Pressure Variance parameter is less than  $-13.0$  kPa.
- If greater than the specified range, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
10. Connect the harness connector at the exhaust differential pressure sensor.
11. Allow the engine coolant temperature to reach a minimum of  $50^{\circ}\text{C}$  ( $122^{\circ}\text{F}$ ). With the engine running in Park depress the accelerator pedal until maximum engine speed is obtained. While the engine is at maximum speed, observe the scan tool Particulate Filt. Pressure Variance parameter. The value should be greater than  $5$  kPa ( $0.73$  psi).
- If less than the specified value, inspect the DPF substrate. If the substrate is missing or damaged, replace the DPF.
12. Road test the vehicle while performing a snapshot of the after-treatment data list and the actions listed below:
1. Drive the vehicle at a steady speed between  $48$ – $64$  kph ( $30$ – $40$  mph) for 90 seconds.
  2. Gradually increase the vehicle speed for 5 seconds, then decrease the vehicle speed. When conditions are safe, bring the vehicle to a stop.
  3. Graph the MAF Sensor g/s and the APP Indicated parameters. The MAF Sensor g/s parameter should follow the APP Indicated parameter, change smoothly without any spikes or dropouts during all driving conditions.
- If the MAF Sensor g/s parameter does not follow the APP Indicated parameter, or has spikes/dropouts, test all MAF circuits for an open/short to ground, or a poor connection. If the circuits test normal, replace the MAF sensor.
13. If all circuits, the exhaust system, fuel system, air intake, MAF sensor, DPF, and the differential pressure lines test normal, test the exhaust differential pressure sensor. Refer to Component Testing.

## Component Testing

**Note:** You must perform the Circuit/System Testing in order to verify the integrity of the exhaust differential pressure sensor circuits before proceeding with Component Testing.

1. Ignition OFF, remove the exhaust differential pressure sensor.
  2. Install a 3A fused jumper wire between the 5V reference circuit terminal 3 and the corresponding terminal of the exhaust differential pressure sensor. Install a jumper wire between the low reference circuit terminal 1 of the exhaust differential pressure sensor and ground.
  3. Connect a DMM between terminal 2 of the exhaust differential pressure sensor and ground.
  4. Ignition ON, with the or connected to the exhaust differential pressure sensor rear pressure port, slowly apply vacuum while monitoring the voltage on the DMM. The voltage should vary and transition smoothly without any spikes or dropouts.
- If the voltage is erratic, replace the exhaust differential pressure sensor.

## Repair Instructions

- Diesel Particulate Filter (DPF) Regeneration Enable
- Exhaust Pressure Differential Sensor Pipe Replacement
- Exhaust Pressure Differential Sensor Replacement
- Mass Airflow Sensor with Intake Air Temperature Sensor Replacement
- Control Module References for ECM and IPC replacement, setup, and programming

## Repair Verification

1. Install any components or connectors that have been removed or replaced during diagnosis.
2. Perform any adjustment, programming, or setup procedures that are required when a component or module is removed or replaced.
3. Clear the DTCs.
4. Turn OFF the ignition for 90 seconds.
5. Duplicate the Conditions for Running the DTC and use the freeze Frame/Failure Records, if applicable, in order to verify the DTC does not reset. If the DTC resets or another DTC is present, refer to the Diagnostic Trouble Code (DTC) List - Vehicle and perform the appropriate diagnostic procedure.
6. To avoid the customer's return to the service department, perform the Diesel Particulate Filter (DPF) Regeneration Enable.