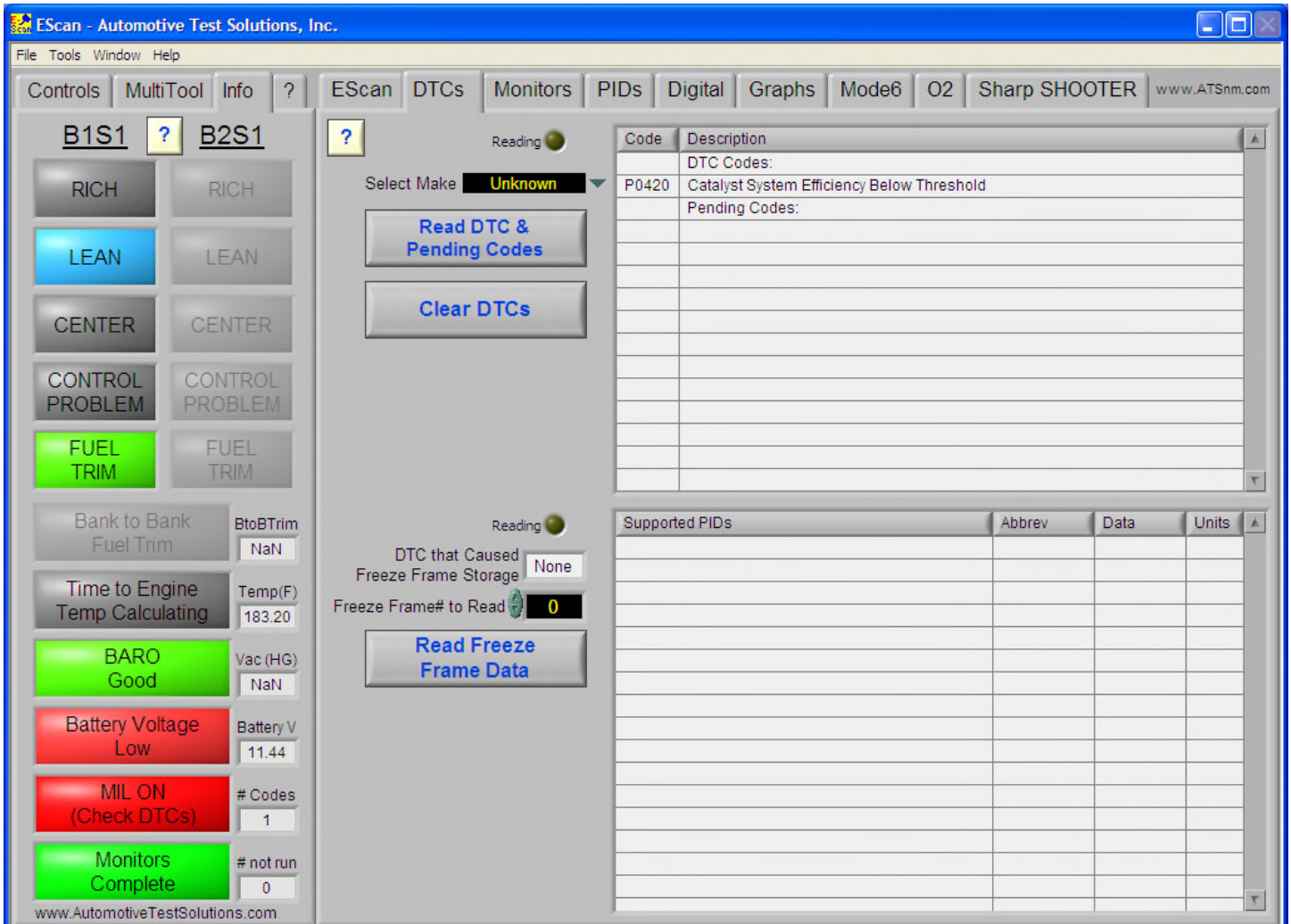


Dear Customer (actual name removed),

As you requested, one of our certified technicians has diagnosed the cause for the Check Engine Light to be illuminated on your 2002 Chevrolet Impala. The code that is present is P0420 Bank 1 Catalyst Efficiency Low.



While some vehicles have multiple catalytic converters on them, yours only has one. The vehicle's on-board computer monitors various components under specified conditions, and then gives them a pass/fail result. Your catalytic converter has failed multiple times – thus the check engine light. Here is a capture using software built into one of the scan tools we use, which shows how efficiently your catalytic is working:

EScan | DTCs | Monitors | PIDs | Digital | Graphs | Mode6 | O2 | Sharp SHOOTER | www.AT3nm.com

Fuel Trim | Volumetric Eff | Simulated Injector | Power | Catalyst Eff | Temperature | Auto Diag

?
! Test will not perform !
correctly if vehicle has
Wide Range O2 sensors

**Prepare for Test
(Calculate Below)**

O2 Sensors Present

Bank 1 - Sensor 1 Bank 2 - Sensor 1
 Bank 1 - Sensor 2 Bank 2 - Sensor 2
 Bank 1 - Sensor 3 Bank 2 - Sensor 3
 Bank 1 - Sensor 4 Bank 2 - Sensor 4

All Lights below must be green
for test results to be accurate

- No DTCs or Pending
- Fuel Control
- Fuel Trim
- Coolant Temp (Must be > 170F)
- RPM (Run engine above 1800 RPM for 1 minute)
- Rear O2 (Snap throttle twice after RPM turns green)

Test Setup	Bank One	Bank Two
Front	O2B1S1	O2B2S1
Rear	O2B1S2	O2B2S2

RPM
1497

Catalyst Efficiency %
66

Test Running

Catalyst Efficiency %
NaN

Bank One

Bank Two

1-
Voltage
0-
Time
O2B1S1
O2B1S2

1-
Voltage
0-
Time
O2B2S1
O2B2S2

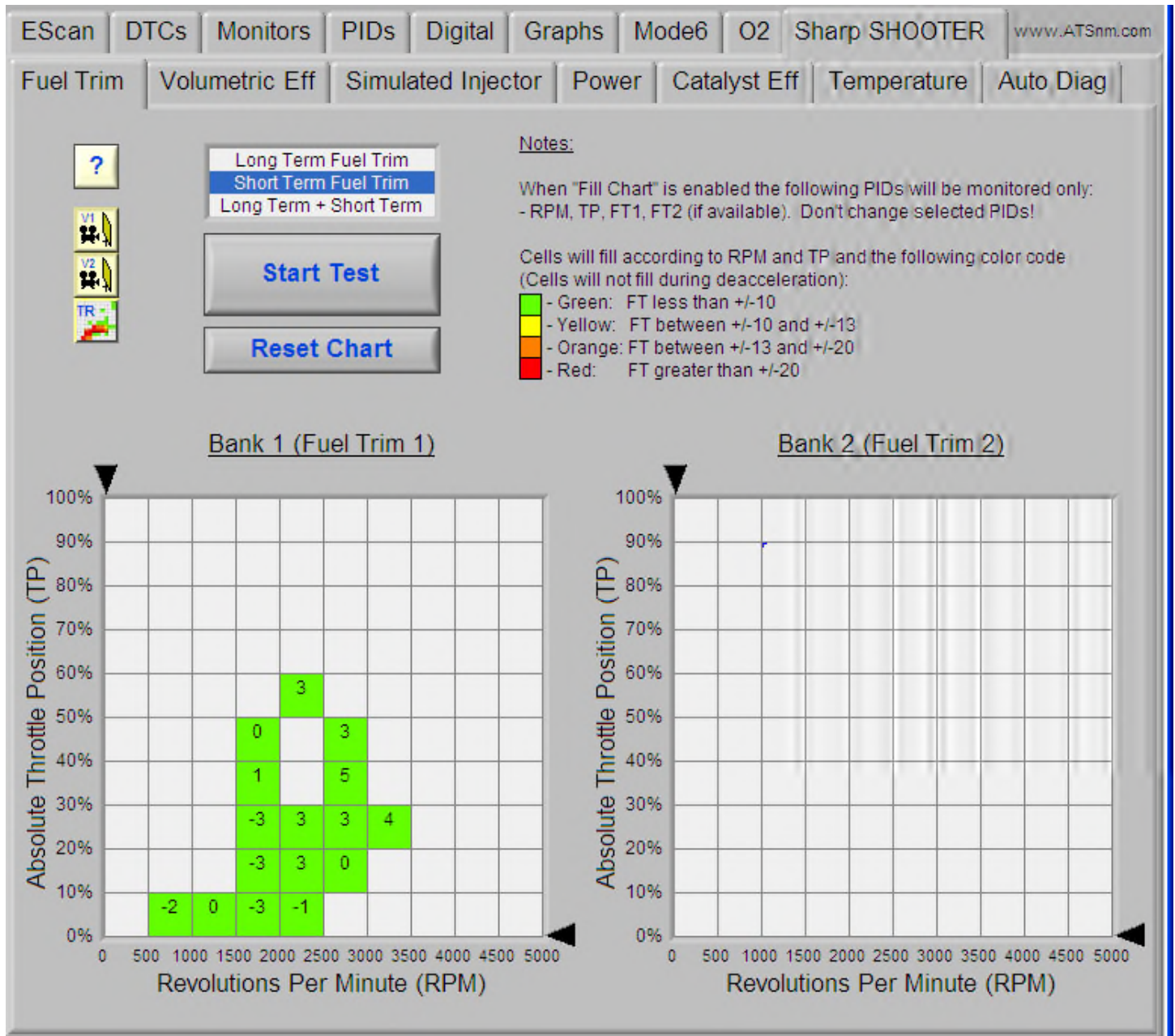
As you can see, the catalyst is working at roughly 66%. Typically, it should be above 80%. Our technician also noticed while testing your vehicle, that the catalytic converter has been replaced previously, with a universal catalytic converter.



Please note the use of a reducer pipe, and the 2 exhaust clamps used, typically when the car comes from the factory, or when a direct-fit catalytic converter is used, this is all one piece. Now, I'm sure you're wondering "Why would another catalytic converter be bad on my car with 126,000 miles?". There are several answer's for this question. The first possibility is the use of the smaller, universal catalyst. Secondly, a poor running engine can damage the catalyst in a matter of minutes. The technician noted that the car has the original spark plug wires, and what seem to be the original spark plugs.



Notice the number on the spark plug wire? This is indicative that the plug wires are original. Also, if there is an error in the fuel control system of the vehicle, the catalyst may be damaged as well. Generally speaking the fuel control system is doing OK if it is adding or subtracting less than 10% of the fuel mixture. Here is a capture that the technician took while on a test drive with your car.



As you can see, all the grids are green, indicating that the system is operating within spec at this time. We also checked for software updates to your on-board computer, and there are none at this time. So our recommendations at this time are to replace the spark plugs, spark plug wires, and install a direct-fit catalytic converter. I will be following up with a phone call, to give you an estimate, and answer any questions you may have.

Thank you,

Ryan Kooiman

PS While checking the results of the tests that the car's on-board computer runs, I also noticed that the results for the evaporative emissions system are getting close to the failing point. This isn't something that you should necessarily worry about at this time. I thought you should be aware of it, in case the Check Engine Light should come back on after today's repair.

The screenshot shows the EScan software interface for a GM vehicle. The main data table contains the following information:

Test ID (TID)	Component ID (CID)	Test Value	Min Limit	Max Limit	Units
\$05: O2 Sensor Monitors and Constants	\$01: B1S1 Rich to Lean Threshold	400.094		2047.969	mV
\$05: O2 Sensor Monitors and Constants	\$02: B1S1 Lean to Rich Threshold	475.000		2047.969	mV
\$05: O2 Sensor Monitors and Constants	\$03: B1S1 Low Switch Time Calculation	299.469		2047.969	mV
\$05: O2 Sensor Monitors and Constants	\$04: B1S1 High Switch Time Calculation	598.937		2047.969	mV
\$05: O2 Sensor Monitors and Constants	\$05: B1S1 Rich to Lean Switch Time	30.990		139.955	msec
\$05: O2 Sensor Monitors and Constants	\$06: B1S1 Lean to Rich Switch Time	20.993		74.976	msec
\$05: O2 Sensor Monitors and Constants	\$87: B1S1 Rich to Lean Switches	178.000	45.000		sw
\$05: O2 Sensor Monitors and Constants	\$88: B1S1 Lean to Rich Switches	180.000	45.000		sw
\$06: O2 Sensor Heater Monitor	\$41: B1S2 Heater Time to Activity	34.000		104.000	sec
\$06: O2 Sensor Heater Monitor	\$35: B1S1 Heater Time to Activity	26.000		57.000	sec
\$07: Exhaust Gas Recirc Sys Monitor	\$4D: EGR decel test	-45.000		1.498	kPa
\$0A: EVAP Monitor #2 (.020 Leak)	\$01: EVPD canister vent restriction test 1	0.000		15.000	sec
\$0A: EVAP Monitor #2 (.020 Leak)	\$C2: EVPD canister vent restriction test 2	6.007	6.000		liters
\$0A: EVAP Monitor #2 (.020 Leak)	\$13: EVAP weak vacuum test	0.000		12.000	liters
\$0A: EVAP Monitor #2 (.020 Leak)	\$84: EVPD weak vacuum followup test	0.000	0.000		sec
\$0A: EVAP Monitor #2 (.020 Leak)	\$05: EVPD .040" leak test	0.002		0.032	inches
\$0A: EVAP Monitor #2 (.020 Leak)	\$87: EVPD purge pass test	60.000	60.000		sec
\$0A: EVAP Monitor #2 (.020 Leak)	\$48: EVPD purge vacuum fail test	0.100		10.000	inH2O
\$0A: EVAP Monitor #2 (.020 Leak)	\$06: EVPD .020" leak test	0.003		0.013	inches
\$0C: Catalyst Efficiency Monitor	\$60: Bank 1 Catalyst Test OSC	0.731		0.000	sec

Additional interface details: The left-hand panel shows 'B1S1' selected, with 'RICH' and 'FUEL TRIM' indicators. The 'MIL ON (Check DTCs)' indicator is red, showing 1 code. The 'Monitors Complete' indicator is green, showing 0 not run. The bottom status bar indicates 'Related DTC: Unavailable' and 'Explanation: Catalyst Test Bank 1 (using OSC compensation units)'.