|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Mode (hex)** | **PID (hex)** | **Data bytes returned** | **Description** | **Min value** | **Max value** | **Units** | **Formula** |
| 01 | 00 | 4 | PIDs supported [01 - 20] |  |  |  | Bit encoded [A7..D0] == [PID 0x01..PID 0x20] |
| 01 | 01 | 4 | Monitor status since DTCs cleared. (Includes malfunction indicator lamp (MIL) status and number of DTCs.) |  |  |  | Bit encoded. [See below.](http://en.wikipedia.org/wiki/OBD-II_PIDs#Bitwise_encoded_PIDs) |
| 01 | 02 | 2 | Freeze [DTC](http://en.wikipedia.org/wiki/Diagnostic_Trouble_Code) |  |  |  |  |
| 01 | 03 | 2 | Fuel system status |  |  |  | Bit encoded. [See below.](http://en.wikipedia.org/wiki/OBD-II_PIDs#Bitwise_encoded_PIDs) |
| 01 | 04 | 1 | Calculated engine load value | 0 | 100 | % | A\*100/255 |
| 01 | 05 | 1 | Engine coolant temperature | -40 | 215 | °C | A-40 |
| 01 | 06 | 1 | Short term fuel % trim—Bank 1 | -100 (Rich) | 99.22 (Lean) | % | (A-128) \* 100/128 |
| 01 | 07 | 1 | Long term fuel % trim—Bank 1 | -100 (Rich) | 99.22 (Lean) | % | (A-128) \* 100/128 |
| 01 | 08 | 1 | Short term fuel % trim—Bank 2 | -100 (Rich) | 99.22 (Lean) | % | (A-128) \* 100/128 |
| 01 | 09 | 1 | Long term fuel % trim—Bank 2 | -100 (Rich) | 99.22 (Lean) | % | (A-128) \* 100/128 |
| 01 | 0A | 1 | Fuel pressure | 0 | 765 | kPa (gauge) | A\*3 |
| 01 | 0B | 1 | Intake manifold absolute pressure | 0 | 255 | kPa (absolute) | A |
| 01 | 0C | 2 | Engine RPM | 0 | 16,383.75 | rpm | ((A\*256)+B)/4 |
| 01 | 0D | 1 | Vehicle speed | 0 | 255 | km/h | A |
| 01 | 0E | 1 | Timing advance | -64 | 63.5 | ° relative to #1 cylinder | A/2 - 64 |
| 01 | 0F | 1 | Intake air temperature | -40 | 215 | °C | A-40 |
| 01 | 10 | 2 | MAF air flow rate | 0 | 655.35 | g/s | ((A\*256)+B) / 100 |
| 01 | 11 | 1 | Throttle position | 0 | 100 | % | A\*100/255 |
| 01 | 12 | 1 | Commanded secondary air status |  |  |  | Bit encoded. [See below.](http://en.wikipedia.org/wiki/OBD-II_PIDs#Bitwise_encoded_PIDs) |
| 01 | 13 | 1 | Oxygen sensors present |  |  |  | [A0..A3] == Bank 1, Sensors 1-4. [A4..A7] == Bank 2... |
| 01 | 14 | 2 | Bank 1, Sensor 1: Oxygen sensor voltage, Short term fuel trim | 0 -100(lean) | 1.275 99.2(rich) | Volts % | A \* 0.005 (B-128) \* 100/128 (if B==0xFF, sensor is not used in trim calc) |
| 01 | 15 | 2 | Bank 1, Sensor 2: Oxygen sensor voltage, Short term fuel trim | 0 -100(lean) | 1.275 99.2(rich) | Volts % | A \* 0.005 (B-128) \* 100/128 (if B==0xFF, sensor is not used in trim calc) |
| 01 | 16 | 2 | Bank 1, Sensor 3: Oxygen sensor voltage, Short term fuel trim | 0 -100(lean) | 1.275 99.2(rich) | Volts % | A \* 0.005 (B-128) \* 100/128 (if B==0xFF, sensor is not used in trim calc) |
| 01 | 17 | 2 | Bank 1, Sensor 4: Oxygen sensor voltage, Short term fuel trim | 0 -100(lean) | 1.275 99.2(rich) | Volts % | A \* 0.005 (B-128) \* 100/128 (if B==0xFF, sensor is not used in trim calc) |
| 01 | 18 | 2 | Bank 2, Sensor 1: Oxygen sensor voltage, Short term fuel trim | 0 -100(lean) | 1.275 99.2(rich) | Volts % | A \* 0.005 (B-128) \* 100/128 (if B==0xFF, sensor is not used in trim calc) |
| 01 | 19 | 2 | Bank 2, Sensor 2: Oxygen sensor voltage, Short term fuel trim | 0 -100(lean) | 1.275 99.2(rich) | Volts % | A \* 0.005 (B-128) \* 100/128 (if B==0xFF, sensor is not used in trim calc) |
| 01 | 1A | 2 | Bank 2, Sensor 3: Oxygen sensor voltage, Short term fuel trim | 0 -100(lean) | 1.275 99.2(rich) | Volts % | A \* 0.005 (B-128) \* 100/128 (if B==0xFF, sensor is not used in trim calc) |
| 01 | 1B | 2 | Bank 2, Sensor 4: Oxygen sensor voltage, Short term fuel trim | 0 -100(lean) | 1.275 99.2(rich) | Volts % | A \* 0.005 (B-128) \* 100/128 (if B==0xFF, sensor is not used in trim calc) |
| 01 | 1C | 1 | OBD standards this vehicle conforms to |  |  |  | Bit encoded. [See below.](http://en.wikipedia.org/wiki/OBD-II_PIDs#Bitwise_encoded_PIDs) |
| 01 | 1D | 1 | Oxygen sensors present |  |  |  | Similar to PID 13, but [A0..A7] == [B1S1, B1S2, B2S1, B2S2, B3S1, B3S2, B4S1, B4S2] |
| 01 | 1E | 1 | Auxiliary input status |  |  |  | A0 == Power Take Off (PTO) status (1 == active) [A1..A7] not used |
| 01 | 1F | 2 | Run time since engine start | 0 | 65,535 | seconds | (A\*256)+B |
| 01 | 20 | 4 | PIDs supported 21-40 |  |  |  | Bit encoded [A7..D0] == [PID 0x21..PID 0x40] |
| 01 | 21 | 2 | Distance traveled with malfunction indicator lamp (MIL) on | 0 | 65,535 | km | (A\*256)+B |
| 01 | 22 | 2 | Fuel Rail Pressure (relative to manifold vacuum) | 0 | 5177.265 | kPa | (((A\*256)+B) \* 10) / 128 |
| 01 | 23 | 2 | Fuel Rail Pressure (diesel) | 0 | 655350 | kPa (gauge) | ((A\*256)+B) \* 10 |
| 01 | 24 | 4 | O2S1\_WR\_lambda(1): Equivalence Ratio Voltage | 0 0 | 2 8 | N/A V | ((A\*256)+B)/32768 ((C\*256)+D)/8192 |
| 01 | 25 | 4 | O2S2\_WR\_lambda(1): Equivalence Ratio Voltage | 0 0 | 2 8 | N/A V | ((A\*256)+B)/32768 ((C\*256)+D)/8192 |
| 01 | 26 | 4 | O2S3\_WR\_lambda(1): Equivalence Ratio Voltage | 0 0 | 2 8 | N/A V | ((A\*256)+B)/32768 ((C\*256)+D)/8192 |
| 01 | 27 | 4 | O2S4\_WR\_lambda(1): Equivalence Ratio Voltage | 0 0 | 2 8 | N/A V | ((A\*256)+B)/32768 ((C\*256)+D)/8192 |
| 01 | 28 | 4 | O2S5\_WR\_lambda(1): Equivalence Ratio Voltage | 0 0 | 2 8 | N/A V | ((A\*256)+B)/32768 ((C\*256)+D)/8192 |
| 01 | 29 | 4 | O2S6\_WR\_lambda(1): Equivalence Ratio Voltage | 0 0 | 2 8 | N/A V | ((A\*256)+B)/32768 ((C\*256)+D)/8192 |
| 01 | 2A | 4 | O2S7\_WR\_lambda(1): Equivalence Ratio Voltage | 0 0 | 2 8 | N/A V | ((A\*256)+B)/32768 ((C\*256)+D)/8192 |
| 01 | 2B | 4 | O2S8\_WR\_lambda(1): Equivalence Ratio Voltage | 0 0 | 2 8 | N/A V | ((A\*256)+B)/32768 ((C\*256)+D)/8192 |
| 01 | 2C | 1 | Commanded EGR | 0 | 100 | % | 100\*A/255 |
| 01 | 2D | 1 | EGR Error | -100 | 99.22 | % | (A-128) \* 100/128 |
| 01 | 2E | 1 | Commanded evaporative purge | 0 | 100 | % | 100\*A/255 |
| 01 | 2F | 1 | Fuel Level Input | 0 | 100 | % | 100\*A/255 |
| 01 | 30 | 1 | # of warm-ups since codes cleared | 0 | 255 | N/A | A |
| 01 | 31 | 2 | Distance traveled since codes cleared | 0 | 65,535 | km | (A\*256)+B |
| 01 | 32 | 2 | Evap. System Vapor Pressure | -8,192 | 8,192 | Pa | ((A\*256)+B)/4 (A is signed) |
| 01 | 33 | 1 | Barometric pressure | 0 | 255 | kPa (Absolute) | A |
| 01 | 34 | 4 | O2S1\_WR\_lambda(1): Equivalence Ratio Current | 0 -128 | 2 128 | N/A mA | ((A\*256)+B)/32768 ((C\*256)+D)/256 - 128 |
| 01 | 35 | 4 | O2S2\_WR\_lambda(1): Equivalence Ratio Current | 0 -128 | 2 128 | N/A mA | ((A\*256)+B)/32768 ((C\*256)+D)/256 - 128 |
| 01 | 36 | 4 | O2S3\_WR\_lambda(1): Equivalence Ratio Current | 0 -128 | 2 128 | N/A mA | ((A\*256)+B)/327685 ((C\*256)+D)/256 - 128 |
| 01 | 37 | 4 | O2S4\_WR\_lambda(1): Equivalence Ratio Current | 0 -128 | 2 128 | N/A mA | ((A\*256)+B)/32768 ((C\*256)+D)/256 - 128 |
| 01 | 38 | 4 | O2S5\_WR\_lambda(1): Equivalence Ratio Current | 0 -128 | 2 128 | N/A mA | ((A\*256)+B)/32768 ((C\*256)+D)/256 - 128 |
| 01 | 39 | 4 | O2S6\_WR\_lambda(1): Equivalence Ratio Current | 0 -128 | 2 128 | N/A mA | ((A\*256)+B)/32768 ((C\*256)+D)/256 - 128 |
| 01 | 3A | 4 | O2S7\_WR\_lambda(1): Equivalence Ratio Current | 0 -128 | 2 128 | N/A mA | ((A\*256)+B)/32768 ((C\*256)+D)/256 - 128 |
| 01 | 3B | 4 | O2S8\_WR\_lambda(1): Equivalence Ratio Current | 0 -128 | 2 128 | N/A mA | ((A\*256)+B)/32768 ((C\*256)+D)/256 - 128 |
| 01 | 3C | 2 | Catalyst Temperature Bank 1, Sensor 1 | -40 | 6,513.5 | °C | ((A\*256)+B)/10 - 40 |
| 01 | 3D | 2 | Catalyst Temperature Bank 2, Sensor 1 | -40 | 6,513.5 | °C | ((A\*256)+B)/10 - 40 |
| 01 | 3E | 2 | Catalyst Temperature Bank 1, Sensor 2 | -40 | 6,513.5 | °C | ((A\*256)+B)/10 - 40 |
| 01 | 3F | 2 | Catalyst Temperature Bank 2, Sensor 2 | -40 | 6,513.5 | °C | ((A\*256)+B)/10 - 40 |
| 01 | 40 | 4 | PIDs supported 41-60 |  |  |  | Bit encoded [A7..D0] == [PID 0x41..PID 0x60] |
| 01 | 41 | 4 | Monitor status this drive cycle |  |  |  | Bit encoded. [See below.](http://en.wikipedia.org/wiki/OBD-II_PIDs#Bitwise_encoded_PIDs) |
| 01 | 42 | 2 | Control module voltage | 0 | 65.535 | V | ((A\*256)+B)/1000 |
| 01 | 43 | 2 | Absolute load value | 0 | 25,700 | % | ((A\*256)+B)\*100/255 |
| 01 | 44 | 2 | Command equivalence ratio | 0 | 2 | N/A | ((A\*256)+B)/32768 |
| 01 | 45 | 1 | Relative throttle position | 0 | 100 | % | A\*100/255 |
| 01 | 46 | 1 | Ambient air temperature | -40 | 215 | °C | A-40 |
| 01 | 47 | 1 | Absolute throttle position B | 0 | 100 | % | A\*100/255 |
| 01 | 48 | 1 | Absolute throttle position C | 0 | 100 | % | A\*100/255 |
| 01 | 49 | 1 | Accelerator pedal position D | 0 | 100 | % | A\*100/255 |
| 01 | 4A | 1 | Accelerator pedal position E | 0 | 100 | % | A\*100/255 |
| 01 | 4B | 1 | Accelerator pedal position F | 0 | 100 | % | A\*100/255 |
| 01 | 4C | 1 | Commanded throttle actuator | 0 | 100 | % | A\*100/255 |
| 01 | 4D | 2 | Time run with MIL on | 0 | 65,535 | minutes | (A\*256)+B |
| 01 | 4E | 2 | Time since trouble codes cleared | 0 | 65,535 | minutes | (A\*256)+B |
| 01 | 51 | 1 | Fuel Type |  |  |  | From fuel type table [see below](http://en.wikipedia.org/wiki/OBD-II_PIDs#Fuel_Type_Coding) |
| 01 | 52 | 1 | Ethanol fuel % | 0 | 100 | % | A\*100/255 |
| 01 | 53 | 2 | Absoulute Evap system Vapour Pressure | 0 | 327675 | kpa | 1/200 per bit |
| 01 | 54 |  | Evap system vapor pressure |  |  |  |  |
| 01 | 55 |  | Short term secondary oxygen sensor trim bank 1 and bank 3 |  |  |  |  |
| 01 | 56 |  | Long term secondary oxygen sensor trim bank 1 and bank 3 |  |  |  |  |
| 01 | 57 |  | Short term secondary oxygen sensor trim bank 2 and bank 4 |  |  |  |  |
| 01 | 58 |  | Long term secondary oxygen sensor trim bank 2 and bank 4 |  |  |  |  |
| 01 | 59 |  | Fuel rail pressure (absolute) |  |  |  |  |
| 01 | 5A |  | Relative accelerator pedal position |  |  |  |  |
| 01 | 5B |  | Hybrid battery pack remaining life |  |  |  |  |
| 01 | 5C |  | Engine oil temperature |  |  |  |  |
| 01 | 5D |  | Fuel injection timing |  |  |  |  |
| 01 | 5E |  | Engine fuel rate |  |  |  |  |
| 01 | 5F |  | Emission requirements to which vehicle is designed |  |  |  |  |
| 01 | 61 |  | Driver's demand engine - percent torque |  |  |  |  |
| 01 | 62 |  | Actual engine - percent torque |  |  |  |  |
| 01 | 63 |  | Engine reference torque |  |  |  |  |
| 01 | 64 |  | Engine percent torque data |  |  |  |  |
| 01 | 65 |  | Auxiliary input / output supported |  |  |  |  |
| 01 | 66 |  | Mass air flow sensor |  |  |  |  |
| 01 | 67 |  | Engine coolant temperature |  |  |  |  |
| 01 | 68 |  | Intake air temperature sensor |  |  |  |  |
| 01 | 69 |  | Commanded EGR and EGR Error |  |  |  |  |
| 01 | 6A |  | Commanded Diesel intake air flow control and relative intake air flow position |  |  |  |  |
| 01 | 6B |  | Exhaust gas recirculation temperature |  |  |  |  |
| 01 | 6C |  | Commanded throttle actuator control and relative throttle position |  |  |  |  |
| 01 | 6D |  | Fuel pressure control system |  |  |  |  |
| 01 | 6E |  | Injection pressure control system |  |  |  |  |
| 01 | 6F |  | Turbocharger compressor inlet pressure |  |  |  |  |
| 01 | 70 |  | Boost pressure control |  |  |  |  |
| 01 | 71 |  | Variable Geometry turbo (VGT) control |  |  |  |  |
| 01 | 72 |  | Wastegate control |  |  |  |  |
| 01 | 73 |  | Exhaust pressure |  |  |  |  |
| 01 | 74 |  | Turbocharger RPM |  |  |  |  |
| 01 | 75 |  | Turbocharger temperature |  |  |  |  |
| 01 | 76 |  | Turbocharger temperature |  |  |  |  |
| 01 | 77 |  | Charge air cooler temperature (CACT) |  |  |  |  |
| 01 | 78 |  | Exhaust Gas temperature (EGT) |  |  |  |  |
| 01 | 79 |  | Exhaust Gas temperature (EGT) |  |  |  |  |
| 01 | 7A |  | Diesel particulate filter (DPF) |  |  |  |  |
| 01 | 7B |  | Diesel particulate filter (DPF) |  |  |  |  |
| 01 | 7C |  | Diesel Particulate filter (DPF) temperature |  |  |  |  |
| 01 | 7D |  | NOx NTE control area status |  |  |  |  |
| 01 | 7E |  | PM NTE control area status |  |  |  |  |
| 01 | 7F |  | Engine run time |  |  |  |  |
| 01 | 81 |  | Engine run time for AECD |  |  |  |  |
| 01 | 82 |  | Engine run time for AECD |  |  |  |  |
| 01 | 83 |  | NOx sensor |  |  |  |  |
| 01 | 84 |  | Manifold surface temperature |  |  |  |  |
| 01 | 85 |  | NOx reagent system |  |  |  |  |
| 01 | 86 |  | Particulate matter (PM) sensor |  |  |  |  |
| 01 | 87 |  | Intake manifold absolute pressure |  |  |  |  |
| 01 | C3 | ? | ? | ? | ? | ? | Returns numerous data, including Drive Condition ID and Engine Speed\* |
| 01 | C4 | ? | ? | ? | ? | ? | B5 is Engine Idle Request B6 is Engine Stop Request\* |
| 02 | 02 | 2 | Freeze frame trouble code |  |  |  | BCD encoded, [See below.](http://en.wikipedia.org/wiki/OBD-II_PIDs#Bitwise_encoded_PIDs) |
| 03 | N/A | n\*6 | Request trouble codes |  |  |  | 3 codes per message frame, BCD encoded. [See below.](http://en.wikipedia.org/wiki/OBD-II_PIDs#Bitwise_encoded_PIDs) |
| 04 | N/A | 0 | Clear trouble codes / Malfunction indicator lamp (MIL) / Check engine light |  |  |  | Clears all stored trouble codes and turns the MIL off. |
| 05 | 0100 |  | OBD Monitor IDs supported ($01 - $20) |  |  |  |  |
| 05 | 0101 |  | O2 Sensor Monitor Bank 1 Sensor 1 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0102 |  | O2 Sensor Monitor Bank 1 Sensor 2 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0103 |  | O2 Sensor Monitor Bank 1 Sensor 3 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0104 |  | O2 Sensor Monitor Bank 1 Sensor 4 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0105 |  | O2 Sensor Monitor Bank 2 Sensor 1 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0106 |  | O2 Sensor Monitor Bank 2 Sensor 2 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0107 |  | O2 Sensor Monitor Bank 2 Sensor 3 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0108 |  | O2 Sensor Monitor Bank 2 Sensor 4 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0109 |  | O2 Sensor Monitor Bank 3 Sensor 1 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 010A |  | O2 Sensor Monitor Bank 3 Sensor 2 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 010B |  | O2 Sensor Monitor Bank 3 Sensor 3 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 010C |  | O2 Sensor Monitor Bank 3 Sensor 4 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 010D |  | O2 Sensor Monitor Bank 4 Sensor 1 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 010E |  | O2 Sensor Monitor Bank 4 Sensor 2 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 010F |  | O2 Sensor Monitor Bank 4 Sensor 3 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0110 |  | O2 Sensor Monitor Bank 4 Sensor 4 | 0.00 | 1.275 | Volts | 0.005 Rich to lean sensor threshold voltage |
| 05 | 0201 |  | O2 Sensor Monitor Bank 1 Sensor 1 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 0202 |  | O2 Sensor Monitor Bank 1 Sensor 2 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 0203 |  | O2 Sensor Monitor Bank 1 Sensor 3 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 0204 |  | O2 Sensor Monitor Bank 1 Sensor 4 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 0205 |  | O2 Sensor Monitor Bank 2 Sensor 1 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 0206 |  | O2 Sensor Monitor Bank 2 Sensor 2 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 0207 |  | O2 Sensor Monitor Bank 2 Sensor 3 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 0208 |  | O2 Sensor Monitor Bank 2 Sensor 4 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 0209 |  | O2 Sensor Monitor Bank 3 Sensor 1 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 020A |  | O2 Sensor Monitor Bank 3 Sensor 2 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 020B |  | O2 Sensor Monitor Bank 3 Sensor 3 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 020C |  | O2 Sensor Monitor Bank 3 Sensor 4 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 020D |  | O2 Sensor Monitor Bank 4 Sensor 1 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 020E |  | O2 Sensor Monitor Bank 4 Sensor 2 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 020F |  | O2 Sensor Monitor Bank 4 Sensor 3 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 05 | 0210 |  | O2 Sensor Monitor Bank 4 Sensor 4 | 0.00 | 1.275 | Volts | 0.005 Lean to Rich sensor threshold voltage |
| 09 | 00 | 4 | mode 9 supported PIDs 01 to 20 |  |  |  | Bit encoded |
| 09 | 01 | 1x5 | VIN Message Count in command 09 02 |  |  |  | Returns 1 line/packet (49 01 05 00 00 00 00), where 05 means 05 packets will be returned in VIN digits. |
| 09 | 02 | 5x5 | Vehicle identification number (VIN) |  |  |  | Returns 5 lines, A is line ordering flag, B-E ASCII coded VIN digits. |
| 09 | 04 | varies | calibration ID |  |  |  | Returns multiple lines, ASCII coded |
| 09 | 06 | 4 | calibration |  |  |  |  |

In the formula column, letters A, B, C, etc. represent the decimal equivalent of the first, second, third, etc. bytes of data. Where a (?) appears, contradictory or incomplete information was available. Someone with a copy of the 2006 SAE HS-3000 should fact-check these.

**Fuel Type Coding**

Mode 1 PID 0x51 returns a value from an enumerated list giving the fuel type of the vehicle. The fuel type is returned as a single byte, and the value is given by

01 Gasoline

02 Methanol

03 Ethanol

04 Diesel

05 LPG

06 CNG

07 Propane

08 Electric

09 Bifuel running Gasoline

0A Bifuel running Methanol

0B Bifuel running Ethanol

0C Bifuel running LPG

0D Bifuel running CNG

0E Bifuel running Prop

0F Bifuel running Electricity

10 Bifuel mixed gas/electric

11 Hybrid gasoline

12 Hybrid Ethanol

13 Hybrid Diesel

14 Hybrid Electric

15 Hybrid Mixed fuel

16 Hybrid Regenerative

**Mode 3**: (no PID required) A request for this mode returns information about the DTCs that have been set. The response will be an integer number of packets each containing 6 data bytes. Each trouble code requires 2 bytes to describe, so the number of packets returned will be the number of codes divided by three, rounded up. A trouble code can be decoded from each pair of data bytes. The first character in the trouble code is determined by the first two bits in the first byte:

A7 A6 First DTC character

-- -- -------------------

0 0 P - Powertrain

0 1 C - Chassis

1 0 B - Body

1 1 U - Network

As of September 2005, only P and U generic DTCs are standardized.

The second character in the DTC is a number defined by

A5 A4 Second DTC character

-- -- --------------------

0 0 0

0 1 1

1 0 2

1 1 3

The third character in the DTC is a number defined by

A3 A2 A1 A0 Third DTC character

-- -- -- -- -------------------

0 0 0 0 0

0 0 0 1 1

0 0 1 0 2

0 0 1 1 3

0 1 0 0 4

0 1 0 1 5

0 1 1 0 6

0 1 1 1 7

1 0 0 0 8

1 0 0 1 9

The fourth and fifth characters are defined in the same way as the third, but using bits B7..B4 and B3..B0. The resulting five-character code should look something like "U0158" and can be looked up in a table of OBD-II DTCs.

**Mode 1 PID 01**: A request for this PID returns 4 bytes of data. The first byte contains two pieces of information. Bit A7 (the eighth bit of byte A, the first byte) indicates whether or not the MIL (check engine light) is illuminated. Bits A0 through A6 represent the number of diagnostic trouble codes currently flagged in the ECU. The second, third, and fourth bytes give information about the availability and completeness of certain on-board tests. Note that test availability signified by set (1) bit; completeness signified by reset (0) bit:

Test available Test incomplete

Misfire B0 B4

Fuel System B1 B5

Components B2 B6

Reserved B3 B7

Catalyst C0 D0

Heated Catalyst C1 D1

Evaporative System C2 D2

Secondary Air System C3 D3

A/C Refrigerant C4 D4

Oxygen Sensor C5 D5

Oxygen Sensor Heater C6 D6

EGR System C7 D7