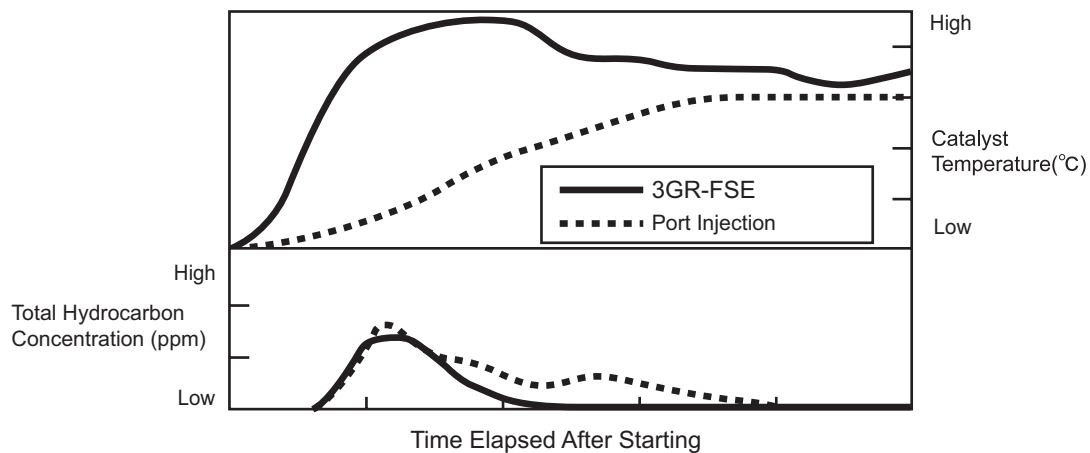


D-4 EFI (Electronic Fuel Injection) System

- The D-4 (Direct Injection 4-Stroke Gasoline Engine) consists of a high-pressure fuel injector that is installed directly in the combustion chamber in order to precisely and optimally control the fuel injection timing in accordance with the driving conditions.
- Uses an airflow meter to detect the intake air volume in order to control the fuel injection volume.
- Based on the signals obtained from various sensors, the engine ECU controls the injection volume and injection timing to suit the engine speed and the engine load, in order to achieve an optimal state of combustion.
- Unlike an ordinary gasoline engine, the fuel injection system simultaneously controls the injection timing and injection volume in order to inject fuel directly into the cylinders. In addition, asynchronous injection that takes place in an ordinary gasoline engine does not exist in this engine.
- To promote the warm-up of the catalyst during cold starting, this system effects lean-burn control through weak stratification combustion.

Weak Stratification Combustion

- The system injects fuel during the latter half of the compression stroke immediately after the engine is cold-started, to effect a weak stratification combustion. This raises the combustion temperature, promotes the warm-up of the catalyst, and dramatically improves exhaust emission performance.



The effect of reducing the total hydrocarbon concentration by injecting fuel during the compression stroke during cold starting

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Homogeneous Combustion

- By injecting fuel during the first half of the intake stroke, the engine creates a more homogeneous air-fuel mixture. In addition, by utilizing the heat of evaporation of the injected fuel to cool the compressed air, the engine has increased its charging efficiency and produces a higher power output.

Air-Fuel Ratio Control

Air-Fuel Ratio Control	The system determines the fuel injection volume based on the engine speed and the intake air volume (which is detected by the airflow meter). After the engine is started, feedback control is effected on the air-fuel ratio based on signals from the air-fuel ratio sensor.
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Control and Combustion Classification

		State of Combustion	Injection Timing	Control Condition
(1)	Lean Air-Fuel Ratio Control	weak stratification combustion	compression stroke	At the time of starting between the colds
(2)	Stoichiometric Air-Fuel Ratio Control	homogeneous combustion	intake stroke	Except (1) and (3)
(3)	Air-Fuel Ratio Feedback Control Prohibition	homogeneous combustion	intake stroke	High load driving (large)
				At the time of low engine coolant temperature

Fuel Cut

- The system temporarily stops the injection of fuel to protect the engine and improve fuel economy.

The following are the three types of fuel cutoff

Deceleration Fuel Cutoff	Stops the injection of fuel when the engine speed is higher than the specified value during deceleration (throttle OFF detected by ECM). This prevents the TWC (Three-Way Catalyst) from overheating due to misfiring and improves fuel economy. The fuel cutoff and resumption speeds are higher when the coolant temperature is low.
Engine Speed Fuel Cutoff	Stops the injection of fuel when the engine speed is higher than the specified value to prevent over-revolution.
N → D Shift Fuel Cutoff	Stops the injection of fuel for a prescribed length of time when shifting from N → D, if the engine speed is higher than the specified value to reduce shift shock.

Fuel Pump Control (For High Pressure Side)

- The system varies the high fuel pressure between 4 and 13 MPa to suit the driving conditions, in order to reduce friction loss.
- When the engine is started, the solenoid spill valve opens, allowing the fuel to be sent to the delivery pipe at the pressure regulator pressure (400 kPa).