Kappa (κ) Engine

HYUNDAI **Drive your way** ™

Application

Engine		Transmission		Area		
		M/T	A/T	Europe	General	India
Gasoline	Kappa 1.2L (1,197cc)	M5EF2	-	-	-	○
	Kappa 1.25L (1,248cc)			○	○	-
	Gamma 1.4	M5CF1-1	A4CF1	●	●	-
	Gamma 1.6			●	●	-
Diesel	U 1.4	M5CF2-1	-	○	○	-
	U-II 1.6	M6CF3-1	-	○	-	-

● : A/T, M/T   ○ : M/T ONLY

Specification

Items	Kappa (PA)		Epsilon (TB)
	I4 1.2L	I4 1.25L	I4 1.1L
Displacement (cc)	1,197	1,248	1,086
Bore × Stroke (mm)	71×75.6	71×78.8	67×77
Bore pitch (mm)	78.5	←	72.5
Compression Ratio	10.5	←	10.1
Max. Torque (kgf.m)	11.4 / 4,000rpm	11.9 / 4,000rpm	10.1
Torque (kgf.m) @ 2000rpm	10.2	10.25	8.7
Max. Power (PS)	79 / 5,200 rpm	77 / 6,000rpm	69
Max. Speed (kph)	167	170	154

Engine Overview

Roller Swing Arm, HLA

M12 Long Reach Spark Plug

Timing Cover is combined with support bracket

Stretchy Belt

Offset Crank
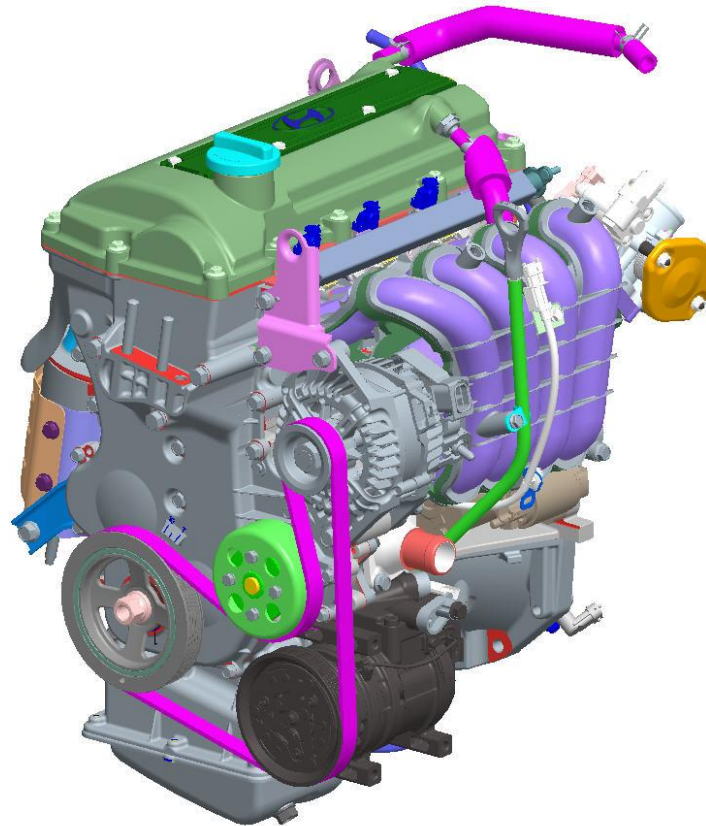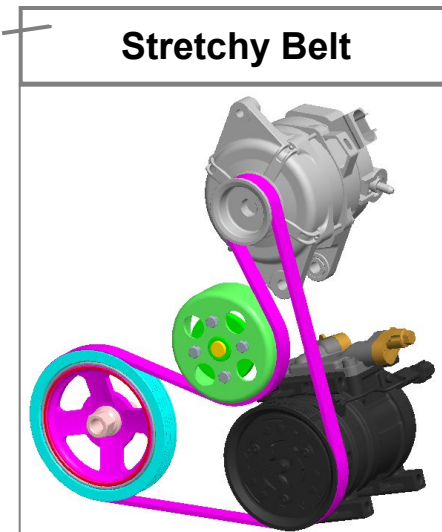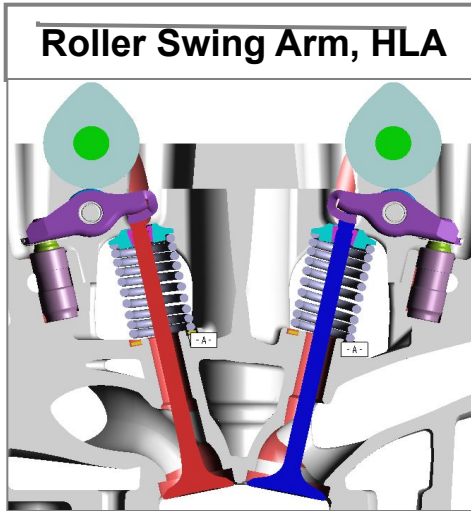
- Aluminum block
- Reversed intake and exhaust
- Timing chain
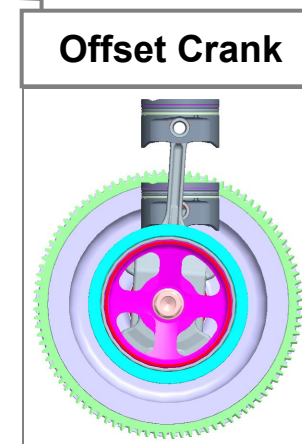
Cylinder Block / Driving Belt

Cylinder Block

Oil Pump

Ladder Frame

Oil Pan

Oil Filter

Driving Belt
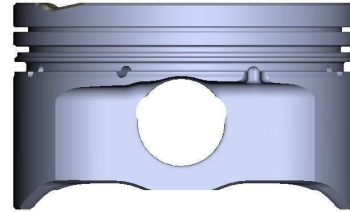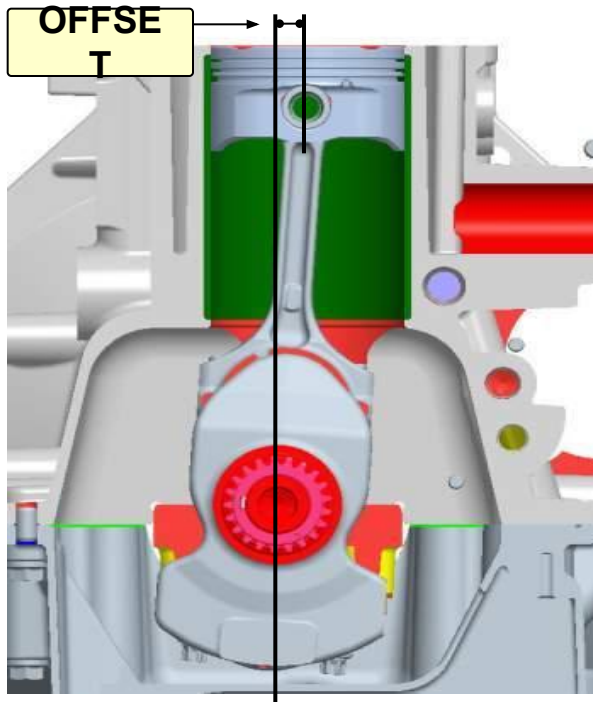
SST
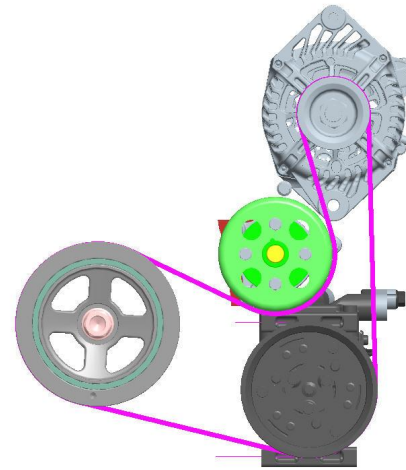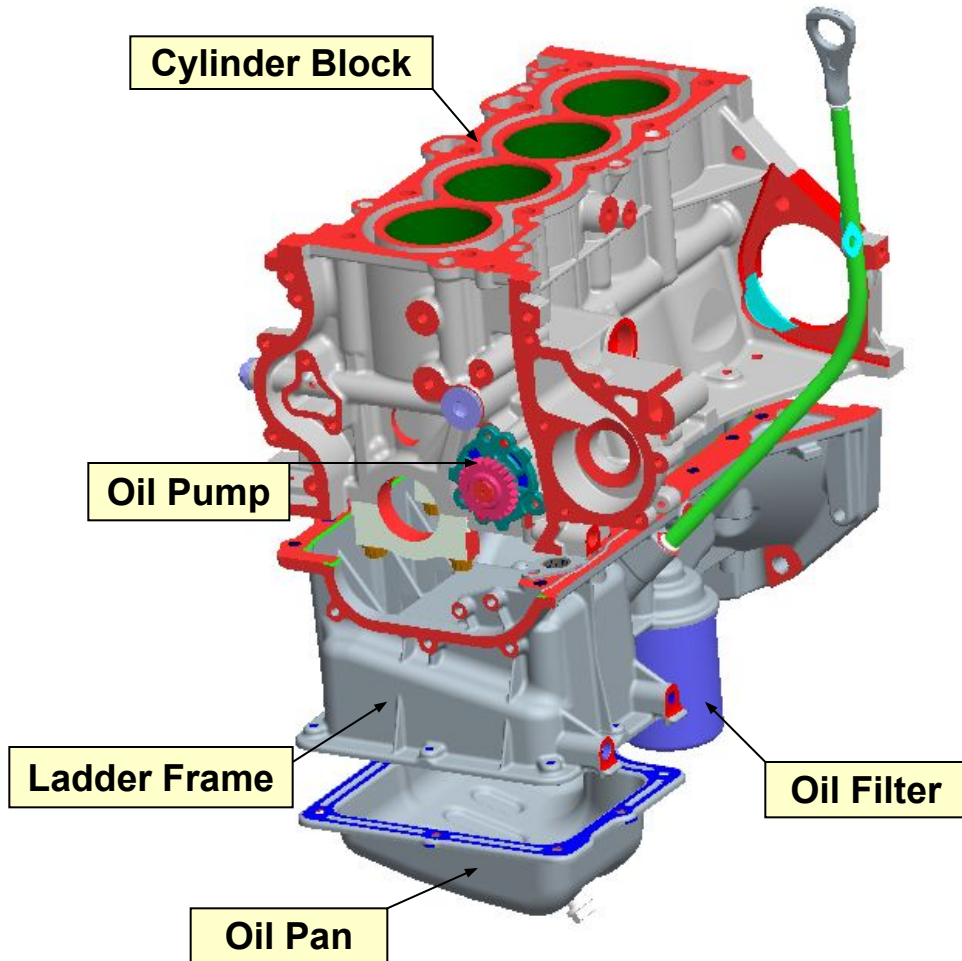
09252-03100

※ **Parts No. : 09252-03100**

▶ **HPDC Aluminum Block**

▶ **Ladder frame is applied**

▶ **Stretch serpentine driving belt is used.**

▶ **Oil pump is installed in block**

▶ **Open deck**

Moving Parts
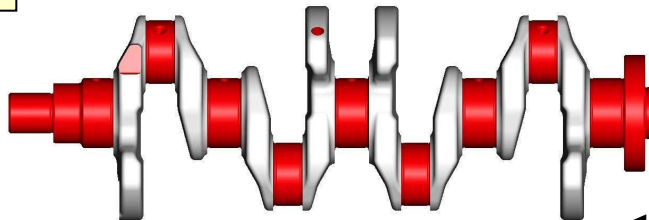

OFFSET

Oil Drain Hole

► **Reduced side force of piston**

  - Reduced fuel consumption and NVH

  ※ Offset : Bore center and Crank bore center

► **Reduced weight – 4 balance weight**

► **Applied oil drain hole between oil ring groove and pin hole.**

  - Reduced oil consumption.

► **Graphite coating (reduced friction)**

1.20L

4-B/W

1.25L

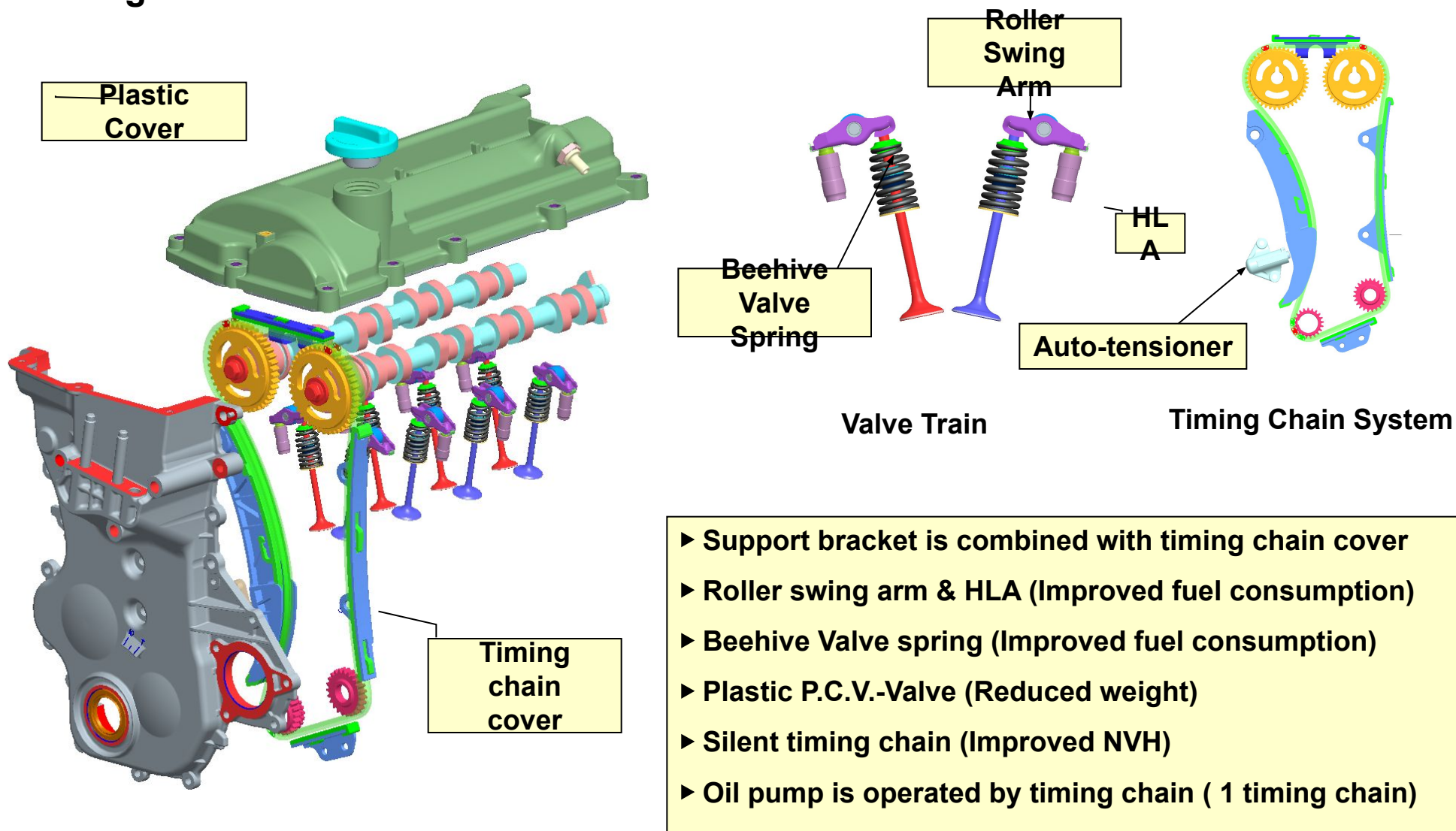**8-B/W**
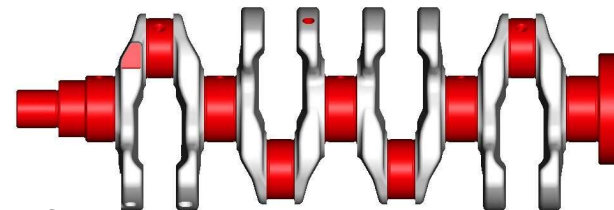
< Crankshaft >

Cylinder Head / Cooling circuit
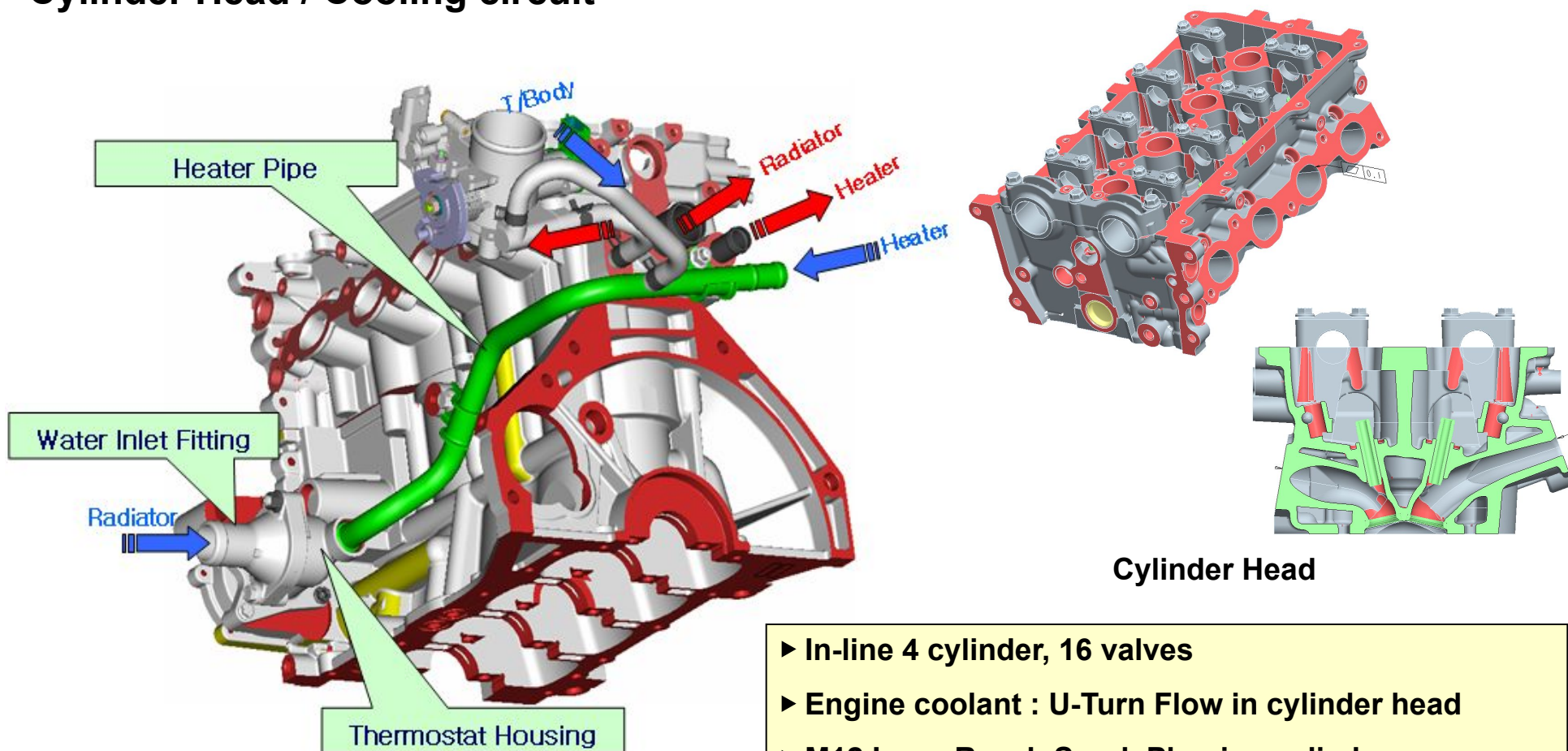
Cylinder Head

► **In-line 4 cylinder, 16 valves**

► **Engine coolant : U-Turn Flow in cylinder head**

► **M12 Long Reach Spark Plug is applied**

► **Head bolt tightening torque : 1.5kgf.m + 90° + 120°**

► **Wax type thermo-state : inlet control**

► **ECT sensor is installed on cylinder head**

Timing Chain / Valve Train

Plastic Cover

Roller Swing Arm

Beehive Valve Spring

HLA

Auto-tensioner

Timing chain cover

Valve Train

Timing Chain System

- ▶ **Support bracket is combined with timing chain cover**
- ▶ **Roller swing arm & HLA (Improved fuel consumption)**
- ▶ **Beehive Valve spring (Improved fuel consumption)**
- ▶ **Plastic P.C.V.-Valve (Reduced weight)**
- ▶ **Silent timing chain (Improved NVH)**
- ▶ **Oil pump is operated by timing chain (1 timing chain)**
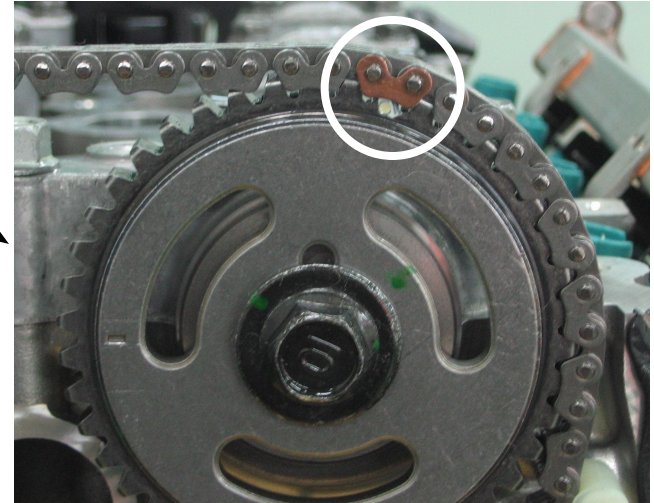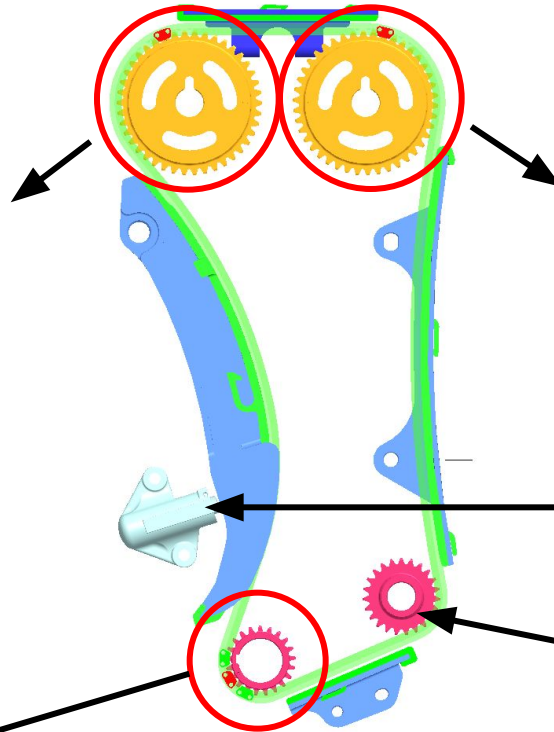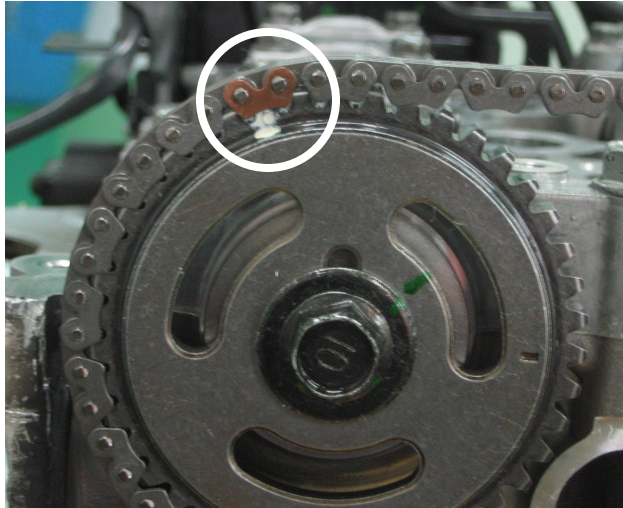
Timing Chain Marks

Auto-tensioner

Oil Pump Sprocket

Timing Chain System

Intake / Exhaust Manifold
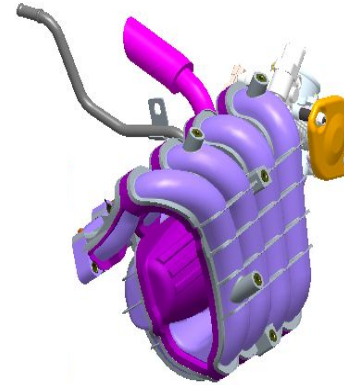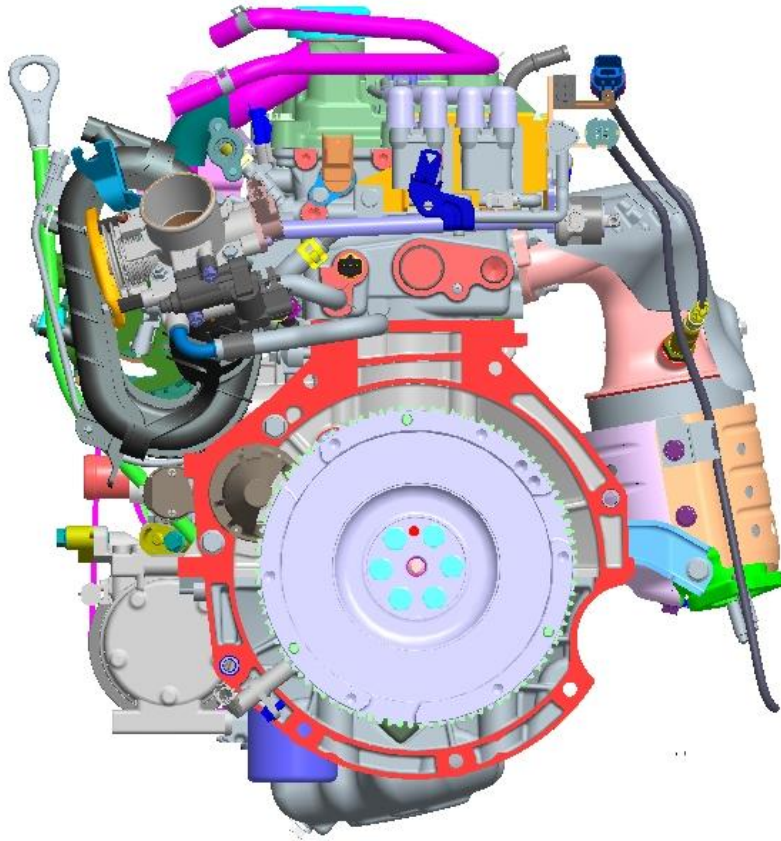
Intake Manifold
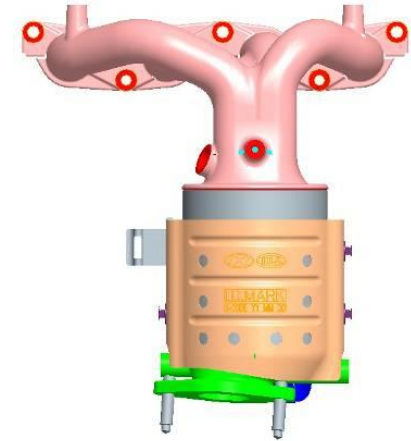
Exhaust Manifold

▶ **Plastic intake manifold : Reduced weight**

▶ **Cast iron exhaust manifold**

▶ **Intake and exhaust manifold is reversed**

▶ **Rosa type ISA is applied**

▶ **WCC is used**

Location of EMS Components

- Injector
- Delivery Pipe
- CMP
- Knock sensor Conn.
- Ignition Coil
- TPS
- PCSV
- MAP
- Oxygen sensor
- Oil Pressure S/W
- ECT
- CKP (at TM housing)

EMS Components

Long reach spark plug

Rectangular delivery pipe (SUS)

PCM (ECM+TCM)

154pin

2X2 Ignition coil

Throttle body

PCSV
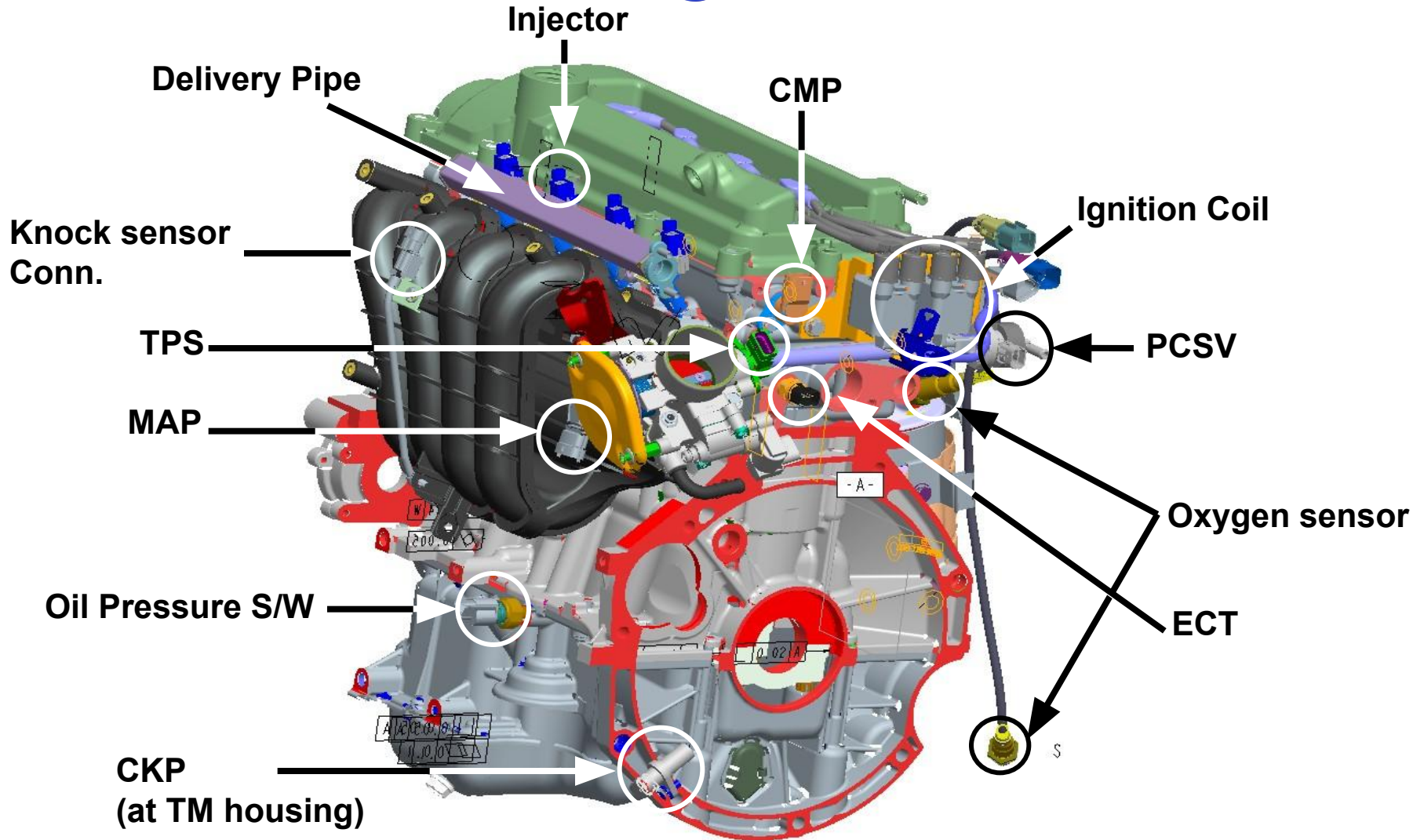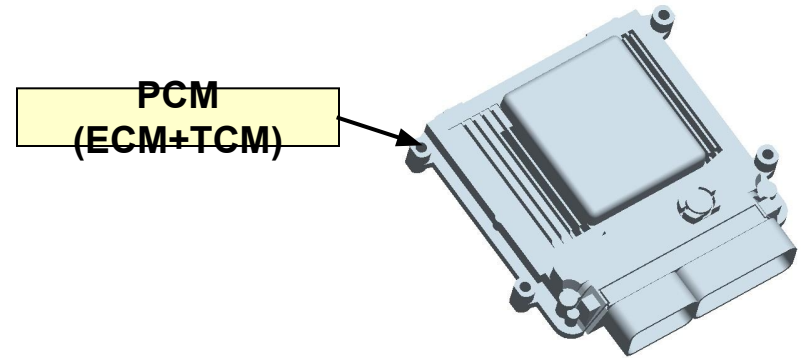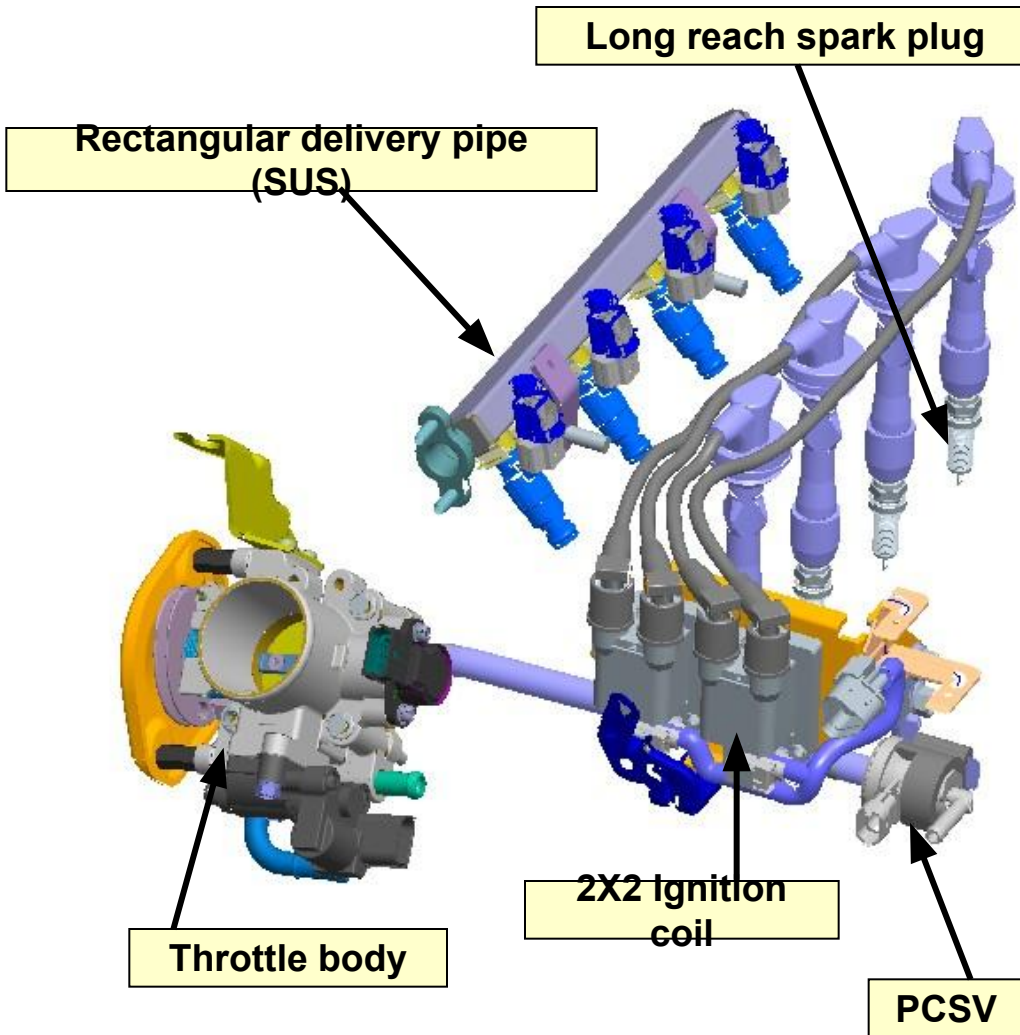
▶ **PCM (Powertrain Control Module) - ECM + TCM**

▶ **M12 Long Reach Spark Plug**

▶ **Mechanical type throttle valve**

▶ **2X2 Ignition Coil**

▶ **Rectangular delivery pipe (SUS)**

  - No needed damper

GDS – Current Data at Idle

Sensor Name	IG ON	Idle	1500rpm	3000rpm	Red zone	Unit
Transaxle Range Switch	P,N,R	P,N,R	P,N,R	P,N,R	P,N,R	-
A/C On Condition	OFF	OFF	OFF	OFF	OFF	-
A/C Switch	OFF	OFF	OFF	OFF	OFF	-
Malfunction Indicator Lamp(MIL)	ON	OFF	OFF	OFF	OFF	-
A/C Compressor	OFF	OFF	OFF	OFF	OFF	-
Fan-Low Speed	OFF	OFF	OFF	OFF	OFF	-
Fan-High Speed	OFF	OFF	OFF	OFF	OFF	-
Ignition Voltage	ON	ON	ON	ON	ON	-
Closed Throttle Position	ON	ON	OFF	OFF	OFF	-
Wide Open Throttle(WOT)	OFF	OFF	OFF	OFF	ON	-
Fuel Cut Status	OFF	OFF	OFF	OFF	OFF	-
Cranking Signal	OFF	OFF	OFF	OFF	OFF	-
Fuel Pump	OFF	ON	ON	ON	ON	-
MFI Control Relay	ON	ON	ON	ON	ON	-
Syncronizing Status-CKP/CMP	ON	ON	ON	ON	ON	-
A/F Closed Loop Control Active(Bank 1/Sensor 1)	OFF	ON	ON	ON	OFF	-
Knocking Detection	OFF	OFF	OFF	OFF	OFF	-
Engine Running Status	OFF	ON	ON	ON	ON	-
CVVT Actuation Status	OFF	OFF	OFF	OFF	OFF	-
Oxygen Sensor Operation-Bank1/Sensor1	OFF	ON	ON	ON	ON	-
Canister Purge State	OFF	OFF	ON	ON	OFF	-

GDS – Current Data at Idle

Sensor Name	IG ON Value	Idle Value	1500rpm Value	3000rpm Value	Red zone Value	Unit
☐ Canister Phase On	OFF	OFF	ON	ON	ON	-
☐ Idle Control State	ON	ON	OFF	OFF	OFF	-
☐ Manifold Absolute Pressure Sensor	4.0	1.5	1.1	0.9	3.7	V
☐ Manifold Absolute Pressure Sensor	1003	369	275	232	949	hPa
☐ Engine Load	100.0	22.3	15.7	14.5	67.9	%
☐ Throttle Position	0.5	0.4	0.5	0.5	2.5	V
☐ Throttle Position	0.0	0.0	1.2	2.4	42.7	%
☐ Adapted Throttle Position	9.3	8.5	8.5	8.5	8.6	%
☐ Battery Positive Voltage	12.6	14.0	14.2	14.2	14.2	V
☐ Battery Charging	9.4	0.0	0.0	0.0	0.0	%
☐ Engine Coolant Temperature Sensor	103	77	80	84	94	'C
☐ Intake Air Temperature Sensor	38	35	35	36	36	'C
☐ EVAP Purge Valve	0.0	0.0	5.1	11.0	0.0	%
☐ Cylinder 1 Injection Time	0.0	3.1	2.1	1.9	11.1	mS
☐ Cylinder 2 Injection Time	0.0	3.1	2.1	1.9	11.1	mS
☐ Cylinder 3 Injection Time	0.0	3.2	2.1	1.9	11.0	mS
☐ Cylinder 4 Injection Time	0.0	3.2	2.1	1.9	9.9	mS
☐ Actual Torque	0.0	11.5	11.8	11.9	0.0	%
☐ Torque Request From TCU	100.0	100.0	100.0	100.0	100.0	%
☐ Oxygen Sensor-Bank1/Sensor1	0.17	0.52	0.47	0.74	0.13	V
☐ Target Idle Speed	680	710	1410	1480	1480	RPM

Current Data

Selective Display | Full List | Graph | Record

Kappa (κ) Engine

GDS – Current Data at Idle

Current Data

Selective Display ⇕ | Full List ⇕ | Graph ⇕ | ...ecord

Sensor Name	IG ON Value	Idle Value	1500rpm Value	3000rpm Value	Red zone Value	Unit
☐ Idle Speed Control Actuator	46.5	17.6	17.6	40.5	94.5	%
☐ Engine Speed-Fine	0	726	1403	3143	6546	RPM
☐ Engine Oil Temperature	94	65	72	76	80	'C
☐ Calculated Oil Temperature	94	65	72	76	80	'C
☐ Ignition Timing Advance for 1 Cylinder	TDC 0	BTDC 3	BTDC 24	BTDC 34	BTDC 29	'
☐ Ignition Timing Advance for 2 Cylinder	TDC 0	BTDC 3	BTDC 24	BTDC 34	BTDC 29	'
☐ Ignition Timing Advance for 3 Cylinder	TDC 0	BTDC 3	BTDC 24	BTDC 34	BTDC 29	'
☐ Ignition Timing Advance for 4 Cylinder	TDC 0	BTDC 3	BTDC 24	BTDC 34	BTDC 29	'
☐ Vehicle Speed	0	0	0	0	0	km/h
☐ Short Term Fuel Trim	-1.7	22.9	-8.5	-0.2	-1.7	%
☐ Long Term Fuel Trim-Idle Load	-7.6	-5.2	-2.6	-1.2	-0.6	%
☐ Long Term Fuel Trim-Part Load	-1.7	-1.7	-1.7	-1.7	-1.7	%
☐ Knock Adaption-Cylinder 1	0.0	0.0	0.0	0.0	0.0	'
☐ Knock Adaption-Cylinder 2	0.0	0.0	0.0	0.0	0.0	'
☐ Knock Adaption-Cylinder 3	0.0	0.0	0.0	0.0	0.0	'
☐ Knock Adaption-Cylinder 4	0.0	0.0	0.0	0.0	0.0	'
☐ Camshaft Adaption-#1	158.9	158.6	158.6	159.0	158.9	'
☐ Camshaft Adaption-#2	524.0	524.3	524.3	524.2	524.0	'
☐ Angle Between CKP & CMP #1	0.0	523.8	524.0	158.4	159.6	'
☐ Camshaft Actual Position	11.8	11.3	11.5	11.2	12.5	'
☐ Camshaft Position-Target	11.8	11.8	11.8	11.8	11.8	'