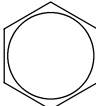
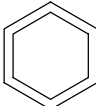
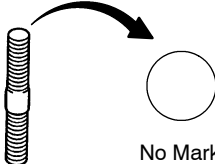
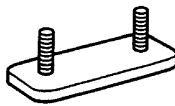
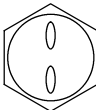
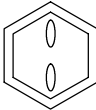
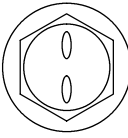
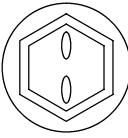
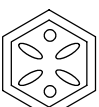


STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS02S-01

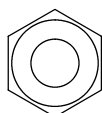
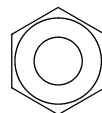
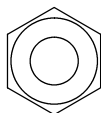
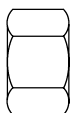
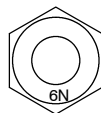
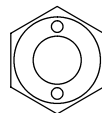
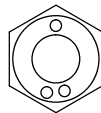
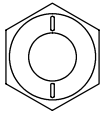
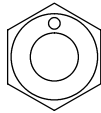
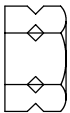
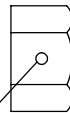
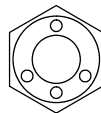
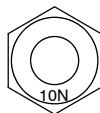
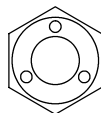
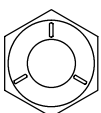
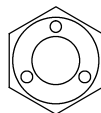
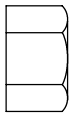
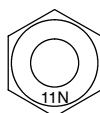
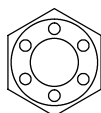
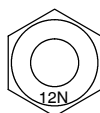
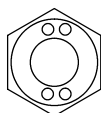
Bolt Type				Class
Hexagon Head Bolt		Stud Bolt	Weld Bolt	
Normal Recess Bolt	Deep Recess Bolt			
  No Mark	 No Mark	 No Mark		4T
 				5T
  w/ Washer	 w/ Washer			6T
 	 			7T
		 		8T
				9T
	 			10T
	 			11T

B06431

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N·m	kgf·cm	ft·lbf	N·m	kgf·cm	ft·lbf
4T	6	1	5	55	48 in.·lbf	6	60	52 in.·lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	–	–	–
5T	6	1	6.5	65	56 in.·lbf	7.5	75	65 in.·lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	–	–	–
6T	6	1	8	80	69 in.·lbf	9	90	78 in.·lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	–	–	–
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	–	–	–
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

HOW TO DETERMINE NUT STRENGTH

Nut Type			Class
Present Standard Hexagon Nut	Old Standard Hexagon Nut		
	Cold Forging Nut	Cutting Processed Nut	
 No Mark			4N
 No Mark (w/ Washer)	 No Mark (w/ Washer)	 No Mark	5N (4T)
  			6N
	 	  *	7N (5T)
 			8N
 	 	 No Mark	10N (7T)
 			11N
 			12N

*: Nut with 1 or more marks on one side surface of the nut.

HINT:

Use the nut with the same number of the nut strength classification or the greater than the bolt strength classification number when tightening parts with a bolt and nut.

Example: Bolt = 4T

Nut = 4N or more

LEXUS GS300/GS430 SUP (RM786E)

MAINTENANCE

SS01E-01

SERVICE DATA

Chassis	Front wheel alignment	3.0 mm/m (0.118 in./3.3 ft) or less
	Side slip	

ENGINE MECHANICAL (3UZ-FE)

SS0C8-06

SERVICE DATA

Compression pressure	at 250 rpm STD Minimum Difference of pressure between each cylinder	1,226 kPa (12.5 kgf/cm ² , 178 psi) or more 981 kPa (10.0 kgf/cm ² , 142 psi) 98 kPa (1.0 kgf/cm ² , 14 psi) or less
Valve clearance	at cold Intake Exhaust Valve clearance adjusting shim No.00 No.02 No.04 No.06 No.08 No.10 No.12 No.14 No.16 No.18 No.20 No.22 No.24 No.26 No.28 No.30 No.32 No.34 No.36 No.38 No.40 No.42 No.44 No.46 No.48 No.50 No.52 No.54 No.56 No.58 No.60 No.62 No.64 No.66 No.68 No.70 No.72 No.74 No.76 No.78 No.80	0.15 – 0.25 mm (0.006 – 0.010 in.) 0.25 – 0.35 mm (0.010 – 0.014 in.) 2.000 mm (0.0787 in.) 2.020 mm (0.0795 in.) 2.040 mm (0.0803 in.) 2.060 mm (0.0811 in.) 2.080 mm (0.0819 in.) 2.100 mm (0.0827 in.) 2.120 mm (0.0835 in.) 2.140 mm (0.0843 in.) 2.160 mm (0.0850 in.) 2.180 mm (0.0858 in.) 2.200 mm (0.0866 in.) 2.220 mm (0.0874 in.) 2.240 mm (0.0882 in.) 2.260 mm (0.0890 in.) 2.280 mm (0.0898 in.) 2.300 mm (0.0906 in.) 2.320 mm (0.0913 in.) 2.340 mm (0.0921 in.) 2.360 mm (0.0929 in.) 2.380 mm (0.0937 in.) 2.400 mm (0.0945 in.) 2.420 mm (0.0953 in.) 2.440 mm (0.0961 in.) 2.460 mm (0.0969 in.) 2.480 mm (0.0976 in.) 2.500 mm (0.0984 in.) 2.520 mm (0.0992 in.) 2.540 mm (0.1000 in.) 2.560 mm (0.1008 in.) 2.580 mm (0.1016 in.) 2.600 mm (0.1024 in.) 2.620 mm (0.1031 in.) 2.640 mm (0.1039 in.) 2.660 mm (0.1047 in.) 2.680 mm (0.1055 in.) 2.700 mm (0.1063 in.) 2.720 mm (0.1071 in.) 2.740 mm (0.1079 in.) 2.760 mm (0.1087 in.) 2.780 mm (0.1094 in.) 2.800 mm (0.1102 in.)
Ignition timing	w/ Terminals TC and E1 connected of DLC1	8 –12° BTDC @ idle
Idle speed	–	750 ± 50 rpm
Timing belt tensioner	Protrusion from housing end	9.5 – 10.5 mm (0.374 – 0.413 in.)

Cylinder head	Warpage	Maximum	0.10 mm (0.039 in.)
	Valve seat		
	Refacing angle		30°, 45°, 60°
	Contacting angle		45°
	Contacting width		1.0 – 1.4 mm (0.039 – 0.055 in.)
	Valve guide bushing bore diameter	STD	10.285 – 10.306 mm (0.4049 – 0.4057 in.)
		O/S 0.05	10.335 – 10.356 mm (0.4069 – 0.4077 in.)
	Cylinder head bolt thread inside diameter	STD	9.770 – 9.960 mm (0.3846 – 0.3921 in.)
		Minimum	9.70 mm (0.3819 in.)
Valve guide bushing	Inside diameter		5.510 – 5.530 mm (0.2169 – 0.2177 in.)
	Outside diameter (for repair part)	STD	10.333 – 10.344 mm (0.4068 – 0.4072 in.)
		O/S 0.05	10.383 – 10.394 mm (0.4088 – 0.4092 in.)
Valve	Valve overall length	STD Intake	94.80 – 95.30 mm (3.7323 – 3.7520 in.)
		Exhaust	94.85 – 95.35 (3.7342 – 3.7539 in.)
		Minimum Intake	94.55 mm (3.7224 in.)
		Exhaust	94.60 mm (3.7244 in.)
	Valve face angle		44.5°
	Stem diameter	Intake	5.470 – 5.485 mm (0.2154 – 0.2159 in.)
		Exhaust	5.465 – 5.480 mm (0.2152 – 0.2157 in.)
	Stem oil clearance	STD Intake	0.025 – 0.060 mm (0.0010 – 0.0024 in.)
		Exhaust	0.030 – 0.065 mm (0.0012 – 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD	1.0 mm (0.039 in.)
		Minimum	0.5 mm (0.020 in.)
Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length		54.05 – 54.15 mm (2.1279 – 2.1319 in.)
	Installed tension	at 35.04 mm (1.3795 in.)	210 – 226 N (21.4 – 23.0 kgf-cm, 47.2 – 50.7 lbf)
Valve lifter	Lifter diameter		30.968 – 30.976 mm (1.2192 – 2.2195 in.)
	Lifter bore diameter		31.000 – 31.016 mm (1.2205 – 1.2211 in.)
	Oil clearance	STD	0.024 – 0.048 mm (0.0009 – 0.0018 in.)
		Maximum	0.07 mm (0.0028 in.)
Camshaft	Thrust clearance	STD Intake	0.060 – 0.100 mm (0.0024 – 0.0039 in.)
		Exhaust	0.030 – 0.075 mm (0.0012 – 0.0030 in.)
		Maximum Intake	0.13 mm (0.0051 in.)
		Exhaust	0.12 mm (0.0047 in.)
	Journal oil clearance	STD	0.030 – 0.067 mm (0.0012 – 0.0026 in.)
		Maximum	0.100 mm (0.0039 in.)
	Journal diameter	for camshaft bearing	26.954 – 26.970 mm (1.0612 – 1.0618 in.)
		for camshaft timing tube	30.984 – 31.000 mm (1.2198 – 1.2205 in.)
	Circle runout		0.08 mm (0.0031 in.)
	Cam lobe height	STD Intake	42.610 – 42.710 mm (1.6776 – 1.6815 in.)
		Exhaust	42.630 – 42.730 mm (1.6783 – 1.6823 in.)
		Minimum Intake	42.46 mm (1.6717 in.)
		Exhaust	42.48 mm (1.6724 in.)
	Camshaft gear backlash	STD	0.020 – 0.200 mm (0.0008 – 0.0079 in.)
		Maximum	0.30 mm (0.0188 in.)
	Camshaft gear spring end free distance		18.2 – 18.8 mm (0.712 – 0.740 in.)
Camshaft timing tube	Journal diameter		39.955 – 39.964 mm (1.5730 – 1.5734 in.)
	Journal oil clearance	STD	0.036 – 0.057 mm (0.0014 – 0.0022 in.)
		Maximum	0.075 mm (0.0030 in.)
Manifold	Warpage	Maximum Intake	0.15 mm (0.0059 in.)
		Exhaust	0.50 mm (0.0197 in.)

SERVICE SPECIFICATIONS – ENGINE MECHANICAL (3UZ-FE)

Cylinder block	Cylinder head surface warpage	Maximum	0.07 mm (0.0028 in.)
	Cylinder bore diameter	STD Mark 1	91.000 – 91.008 mm (3.5827 – 3.5830 in.)
		Mark 2	91.008 – 91.021 mm (3.5830 – 3.5835 in.)
		Mark 3	91.021 – 91.029 mm (3.5835 – 3.5838 in.)
		Maximum	91.229 mm (3.59169 in.)
	Main bearing cap bolt tension portion diameter	STD	7.500 – 7.600 mm (0.2953 – 0.2992 in.)
		Minimum	7.20 mm (0.2835 in.)
Piston and piston ring	Piston diameter	STD Mark 1	90.910 – 90.920 mm (3.5791 – 3.5795 in.)
		Mark 2	90.920 – 90.928 mm (3.5795 – 3.5798 in.)
		Mark 3	90.928 – 90.938 mm (3.5798 – 3.5802 in.)
	Piston oil clearance	STD	0.080 – 0.101 mm (0.0031 – 0.0040 in.)
		Maximum	0.121 mm (0.0048 in.)
	Piston ring groove clearance	No.1	0.030 – 0.080 mm (0.0012 – 0.0031 in.)
		No.2	0.020 – 0.060 mm (0.0008 – 0.0024 in.)
	Piston ring end gap	STD No.1	0.300 – 0.500 mm (0.0118 – 0.0197 in.)
		No.2	0.400 – 0.600 mm (0.0157 – 0.0236 in.)
		Oil	0.150 – 0.500 mm (0.0059 – 0.0197 in.)
		Maximum No.1	1.10 mm (0.0433 in.)
		No.2	1.20 mm (0.0472 in.)
		Oil	1.10 mm (0.0433 in.)
Connecting rod	Thrust clearance	STD	0.160 – 0.290 mm (0.0063 – 0.0138 in.)
		Maximum	0.35 mm (0.0138 in.)
	Connecting rod thickness		22.880 – 22.920 mm (0.9008 – 0.9024 in.)
	Connecting rod oil clearance	STD	0.021 – 0.047 mm (0.0008 – 0.0019 in.)
		Maximum	0.065 mm (0.0026 in.)
	Connecting rod bearing center wall thickness (Reference)	Mark 2	1.487 – 1.490 mm (0.0585 – 0.0587 in.)
		Mark 3	1.490 – 1.493 mm (0.0587 – 0.0588 in.)
		Mark 4	1.493 – 1.496 mm (0.0588 – 0.0589 in.)
		Mark 5	1.496 – 1.499 mm (0.0589 – 0.0590 in.)
		Mark 6	1.499 – 1.502 mm (0.0590 – 0.0591 in.)
		Mark 7	1.502 – 1.505 mm (0.0591 – 0.0593 in.)
	Rod bend	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
	Bushing inside diameter		22.005 – 22.014 mm (0.8663 – 0.8667 in.)
	Piston pin diameter		21.997 – 22.006 mm (0.8660 – 0.8664 in.)
	Bushing oil clearance	STD	0.005 – 0.011 mm (0.0002 – 0.0004 in.)
		Maximum	0.05 mm (0.0020 in.)
	Connecting rod bolt tension portion diameter	STD	7.200 – 7.300 mm (0.2835 – 0.2874 in.)
		Minimum	7.00 mm (0.2756 in.)
Crankshaft	Thrust clearance	STD	0.020 – 0.220 mm (0.0008 – 0.0087 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness		2.440 – 2.490 mm (0.0961 – 0.0980 in.)
	Main journal bore diameter on cylinder block (with main bearing)		66.986 – 67.000 mm (2.6372 – 2.6378 in.)
	Main journal oil clearance	STD No.1 and No.5	0.017 – 0.033 mm (0.0007 – 0.0013 in.)
		Others	0.029 – 0.045 mm (0.0011 – 0.0018 in.)
		Maximum No.1 and No.5	0.043 mm (0.0017 in.)
		Others	0.055 mm (0.0022 in.)
	Main journal diameter		66.988 – 67.000 mm (2.6373 – 2.6378 in.)

Crankshaft (cont'd)	Main bearing center wall thickness (Reference)		
	No.1 and No.5	Mark 3	2.492 – 2.495 mm (0.0981 – 0.0982 in.)
		Mark 4	2.495 – 2.498 mm (0.0982 – 0.0983 in.)
		Mark 5	2.498 – 2.501 mm (0.0983 – 0.0985 in.)
		Mark 6	2.501 – 2.504 mm (0.0985 – 0.0986 in.)
		Mark 7	2.504 – 2.507 mm (0.0986 – 0.0987 in.)
	Others	Mark 1	2.486 – 2.489 mm (0.0979 – 0.0980 in.)
		Mark 2	2.489 – 2.492 mm (0.0980 – 0.0981 in.)
		Mark 3	2.492 – 2.495 mm (0.0981 – 0.0982 in.)
		Mark 4	2.495 – 2.498 mm (0.0982 – 0.0983 in.)
		Mark 5	2.498 – 2.501 mm (0.0983 – 0.0985 in.)
	Crank pin diameter		51.982 – 52.000 mm (2.0465 – 2.0472 in.)
	Circle runout	Maximum	0.08 mm (0.0031 in.)
	Main journal taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
	Crank pin taper and out-of-round	Maximum	0.02 mm (0.0008 in.)

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
No.1 timing belt idler pulley, No.2 timing belt idler pulley x Oil pump		34.5	350	25
Drive belt tensioner x Cylinder block		15.5	160	11
Camshaft timing pulley x Camshaft timing tube		7.5	80	66
Timing belt tensioner x Oil pump		26	270	19
Crankshaft pulley x Crankshaft		245	2,500	181
No.1 drive belt idler pulley x Cylinder block	12 mm head	16	160	12
	14 mm head	32	330	24
No.2 timing belt cover x Cylinder block		16	160	12
No.2 drive belt idler pulley x Fan bracket		39	398	29
Exhaust manifold x Cylinder head		44	450	32
Cylinder head x Cylinder block	1st	59	600	44
	2nd	Turn 90°	Turn 90°	Turn 90°
Camshaft drive gear x Camshaft timing tube		7.5	80	66 in.·lbf
Camshaft timing tube x Intake manifold		78	790	58
Screw plug x Camshaft timing tube		15	150	11
Camshaft bearing cap x Cylinder head	Bolt C	7.5	80	66 in.·lbf
	Others	16	160	12
Cylinder head cover x Cylinder head		6.0	60	53 in.·lbf
Engine hanger x Cylinder head		37	380	27
Front water bypass joint, Rear water bypass joint x Cylinder head		18	185	13
Water bypass pipe x Cylinder Block		18	185	13
Timing belt rear plate x Cylinder head		7.5	80	66 in.·lbf
Intake air control valve x Upper intake manifold		8.5	85	75 in.·lbf
Upper intake manifold, Accelerator cable bracket x Lower intake manifold		18	185	13
Vacuum tank for ACIS x Lower intake manifold		18	185	13
Lower intake manifold x Cylinder head		18	185	13
Drive plate x Crankshaft		49	500	36
		Turn 90°	Turn 90°	Turn 90°
Transmission x Cylinder block		72	730	53
Transmission x No.1 oil pan		37	380	27
Drive plate x Torque converter clutch		41	420	30
Flywheel housing under cover x Transmission		18	185	13
Rear engine mounting member x Body		25.5	260	19
Rear engine mounting member x Rear engine mounting insulator		13.5	135	10
Front suspension crossmember x Engine mounting insulator		68	700	50
PS gear housing x Front suspension crossmember		65	660	48
Sliding yoke x Steering intermediate shaft		35	360	26
A/C compressor x Cylinder block, No.1 drive belt idler pulley		49	500	36
A/C compressor stay x Oil filter bracket		29	300	21
PS pump x Cylinder head	Bolt	39.2	400	29
	Nut	43.1	440	32
Center front floor brace x Body		13	130	9
Front suspension member brace x Front suspension crossmember, Strut bar bracket plate		58	590	43

Main bearing cap x Cylinder block	2 progressive type 1st 2nd Others	27 Turn 90° 49	275 Turn 90° 500	20 Turn 90° 36
Connecting rod cap x Connecting rod	1st 2nd	25 Turn 90°	250 Turn 90°	18 Turn 90°
Rear oil seal retainer x Cylinder block		8.0	80	71 in.·lbf
Engine coolant drain union x Cylinder block		49	500	36
Water seal plate x Cylinder block		14	145	10
Engine mounting bracket x Cylinder block		36	370	27
TWC x Exhaust manifold		62	630	46
Front exhaust pipe x TWC		44	450	32
Front exhaust pipe support bracket x Transmission		44	450	32
Center exhaust pipe x Tailpipe		44	450	32
Heated oxygen sensor x Front exhaust pipe		44	450	32

EMISSION CONTROL (2JZ-GE)

TORQUE SPECIFICATION

SS1HX-01

Part tightened	N·m	kgf·cm	ft·lbf
Exhaust Manifold x Front Exhaust Pipe	44	440	32
Front Exhaust Pipe x Center Exhaust Pipe	44	440	32
Heated Oxygen Sensor x Exhaust Manifold	45	450	33

EMISSION CONTROL (3UZ-FE)

SS0CA-05

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
TWC x Exhaust manifold	62	630	46
TWC x Front exhaust pipe	44	440	32
Charcoal Canister Assembly x Body	5.5	55	48 in.·lbf

ELECTRONIC FUEL INJECTION (2JZ-GE)

SS1HV-01

SERVICE DATA

Air flow meter	Resistance (THA – E2)	at -20°C (-4°F)	13.6 – 18.4 kΩ
		at 20°C (68°F)	2.21 – 2.69 kΩ
		at 60°C (140°F)	0.493 – 0.667 kΩ

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Air flow meter set screw	10.7	109	8

ELECTRONIC FUEL INJECTION (3UZ-FE)

SS0CB-11

SERVICE DATA

Fuel pressure regulator	Fuel pressure	304 – 343 kPa (3.1 – 3.5 kgf/cm ² , 44 – 50 psi)
Fuel pump	Resistance at 20°C (68°F)	0.2 – 3.0 Ω
Injector	Resistance at 20°C (68°F) Injection volume Difference between each cylinder Fuel leakage	13.4 – 14.2 Ω 60 – 73 cm ³ (3.7 – 4.5 cu in.) per 15 seconds 13 cm ³ (0.8 cu in.) or less 1 drop or less per 12 minutes
Air flow meter	Resistance (THA – E2) at –20°C (–4°F) at 20°C (68°F) at 60°C (140°F)	13.6 – 18.4 kΩ 2.21 – 2.69 kΩ 0.49 – 0.67 kΩ
Throttle body	Throttle body fully closed angle	4°
Throttle position sensor	Resistance (VC – ETA) at 20°C (68°F)	1.25 – 2.35 kΩ
Accelerator pedal position sensor	Resistance (Vcp ₁ – Ep ₁), (Vcp ₂ – Ep ₂) at 20°C (68°F)	1.5 – 6.0 kΩ
Throttle control motor	Motor resistance at 20°C (68°F)	0.3 – 100 Ω
Camshaft timing oil control valve	Resistance at 20°C (68°F)	6.9 – 7.9 Ω
VSV for EVAP	Resistance at 20°C (68°F)	30 – 34 Ω
VSV for ACIS	Resistance at 20°C (68°F)	33 – 39 Ω
VSV for vapor pressure sensor	Resistance at 20°C (68°F)	33 – 39 Ω
Water temperature sensor	Resistance at –20°C (–4°F) 0°C (32°F) 20°C (68°F) 40°C (104°F) 60°C (140°F) 80°C (176°F)	10 – 20 kΩ 4 – 7 kΩ 2 – 3 kΩ 0.9 – 1.3 kΩ 0.4 – 0.7 kΩ 0.2 – 0.4 kΩ
Vapor Pressure sensor	Power source voltage	4.5 – 5.5 V
Heated oxygen sensor	Heater coil resistance at 20°C (68°F)	11 – 16 Ω
VVT sensor	Resistance Cold Hot	835 – 1,400 Ω 1,060 – 1,645 Ω
Fuel cut rpm	Fuel return rpm	1,400 rpm

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Fuel inlet hose (Rear fuel pipe) x Fuel main tube for use with SST	32	330	24
Fuel tank vent tube set plate x Fuel tank	3.5	36	31 in·lbf
Delivery pipe x Lower intake manifold	18	185	13
Fuel pressure pulsation damper x Delivery pipe for use with SST	33 39	340 400	24 29
Fuel sender gauge x Fuel tank	1.5	15	13 in·lbf
Fuel tank x Body	39	400	29
Water bypass pipe x Throttle body	5.4	55	48 in·lbf
Throttle body x Upper intake manifold, Lower intake manifold	18	185	13
Camshaft oil control valve x Camshaft bearing cap	7.5	80	66 in·lbf
Intake air control valve x Upper intake manifold	8.5	85	75 in·lbf
Intake air control valve actuator x Upper intake manifold	8.5	85	75 in·lbf
Vacuum tank for ACIS x Lower intake manifold	18	185	13
Water temperature sensor x Front water bypass joint	19.6	200	14
Knock sensor x Cylinder block	45	450	33
Heated oxygen sensor x Exhaust manifold, Front exhaust pipe	44	450	32
VVT sensor x Cylinder head	6.5	65	58 in·lbf

COOLING (3UZ-FE)

SERVICE DATA

SS0CD-03

Thermostat	Valve opening temperature Valve lift at 95°C (203°F)	80 – 84°C (176 – 183°F) 10 mm (0.39 in.) or more
Radiator cap	Relief valve opening pressure STD Minimum	93 – 123 kPa (0.95 – 1.25 kgf/cm ² , 13.5 – 17.8 psi) 78 kPa (0.8 kgf/cm ² , 11.4 psi)
Electric cooling fan	Rotating amperage at 20°C (68°F)	8.5 – 11.5 A

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Drain plug x Union on cylinder block	24.5	250	18
Water pump x Cylinder block	18	185	13
Water inlet housing x Water pump	18	185	13
Water inlet x Water inlet housing	18	185	13
Oil cooler x Radiator lower tank	8.3	85	73 in.·lbf
Oil cooler pipe x Oil cooler	14.7	150	11
Upper radiator support x Body	13.5	135	10
Electric cooling fan x radiator	5.0	50	44 in.·lbf

LUBRICATION (3UZ-FE)

SSOCF-04

SERVICE DATA

Oil pressure		at idle speed at 3,000 rpm	29 kPa (0.3 kgf/cm ² , 43 psi) or more 294 – 588 kPa (3.0 – 6.0 kgf/cm ² , 43 – 85 psi)
Oil pump	Tip clearance	STD	0.060 – 0.180 mm (0.0024 – 0.0071 in.)
		Maximum	0.180 mm (0.0071 in.)
	Side clearance	STD	0.030 – 0.090 mm (0.0012 – 0.0035 in.)
		Maximum	0.090 mm (0.0035 in.)
	Body clearance	STD	0.250 – 0.325 mm (0.0098 – 0.0128 in.)
		Maximum	0.325 mm (0.0128 in.)

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Drain plug x No.2 oil pan	39	400	29
Oil pump body cover x Oil pump body	10	105	7
Oil pump body x Plug for relief valve	49	500	36
Oil pump x Cylinder block	12 mm head	15.5	160
	14 mm head and 6 mm hexagon head	30.5	310
Oil strainer x Cylinder block, Oil pump	7.5	80	66 in.·lbf
No.1 oil pan x Oil pump, Rear oil seal retainer	7.5	80	66 in.·lbf
No.1 oil pan x Cylinder block	10 mm head	7.5	80
	12 mm head	28	290
Oil pan baffle plate x No.1 oil pan	7.5	80	66 in.·lbf
No.2 oil pan x No.1 oil pan	7.5	80	66 in.·lbf
Oil level sensor x No.1 oil pan	5.4	55	48 in.·lbf
Crankshaft position sensor x Oil pump	6.5	65	58 in.·lbf
Oil filter bracket x Oil pump	18	185	13
Oil cooler x Union bolt	78.5	800	58

IGNITION (2JZ-GE)

SS01M-04

SERVICE DATA

Spark plug	Recommended spark plug	DENSO made	SK16R-P11
	Correct electrode gap for new plug		1.1 mm (0.043 in.)
	Maximum electrode gap for used plug		1.2 mm (0.047 in.)

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	18	180	13

IGNITION (3UZ-FE)

SS0CH-05

SERVICE DATA

Firing order	–	1 – 8 – 4 – 3 – 6 – 5 – 7 – 2
Spark plug	Recommended spark plug ND made NGK made Correct electrode gap for new spark plug Maximum electrode gap for used spark plug	SK20R11 IFR6A11 1.1 mm (0.043 in.) 1.2 mm (0.047 in.)
Camshaft position sensor	Resistance Cold Hot	835 – 1,400 Ω 1,060 – 1,645 Ω
Crankshaft position sensor	Resistance Cold Hot	1,630 – 2,740 Ω 2,065 – 3,225 Ω

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	17.5	180	13
Ignition coil x Cylinder head cover	7.5	80	66 in.·lbf
Camshaft position sensor x LH cylinder head	7.5	80	66 in.·lbf
Crankshaft position sensor x Oil pump	6.5	65	58 in.·lbf

STARTING (3UZ-FE)

SERVICE DATA

SS0CJ-04

Starter (1.4 kW)	Rated voltage and output power		12 V 1.4 kW
	No-load characteristics	Current	90 A or less at 11.5 V
		rpm	3,000 rpm or less
	Brush length	STD	15.5 mm (0.610 in.)
		Minimum	8.5 mm (0.335 in.)
	Spring installed load	STD	17.6 – 23.5 N (1.8 – 2.4 kgf, 4.0 – 5.3 lbf)
		Minimum	11.8 N (1.2 kgf, 2.7 lbf)
	Commutator		
	Diameter	STD	30.0 mm (1.181 in.)
		Minimum	29.0 mm (1.142 in.)
Starter (2.0 kW)	Undercut depth	STD	0.6 mm (0.024 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)
	Rated voltage and output power		12 V 2.0 kW
	No-load characteristics	Current	100 A or less at 11.5 V
		rpm	2,500 rpm or less
	Brush length	STD	15.0 mm (0.591 in.)
		Minimum	9.0 mm (0.354 in.)
	Spring installed load	STD	21.5 – 27.5 N (2.2 – 2.8 kgf, 4.9 – 6.2 lbf)
		Minimum	12.7 N (1.3 kgf, 2.9 lbf)
	Commutator		
	Diameter	STD	35.0 mm (1.378 in.)
		Minimum	34.0 mm (1.339 in.)
	Undercut depth	STD	0.7 mm (0.028 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Terminal 30 nut, Terminal C nut x Terminal bolt		17	173	13
End cover x Magnetic switch housing	1.4 kW	2.5	25	22 in.·lbf
	2.0 kW	3.6	37	32 in.·lbf
End cover x Brush holder	1.4 kW	1.5	15	13 in.·lbf
	2.0 kW	3.8	39	34 in.·lbf
Starter housing x Magnetic switch	1.4 kW	5.9	60	52 in.·lbf
	2.0 kW	9.3	95	82 in.·lbf
End cover with field frame x Starter housing	1.4 kW	5.9	60	52 in.·lbf
	2.0 kW	9.3	95	82 in.·lbf
Lead wire of field coil x Terminal C		5.9	60	52 in.·lbf
Starter x Cylinder block		37	380	27
Starter cable x Starter		9.8	100	87 in.·lbf
Throttle body x Upper intake manifold, Lower intake manifold		18	185	13

CHARGING (3UZ-FE)

SERVICE DATA

SSOCL-05

Battery	Specific gravity	at 20° C (68° F)	1.25 – 1.29
	Voltage	at 20° C (68° F)	12.5 – 12.9 V
Alternator	Rated output		12 V – 100 A
	Rotor coil resistance	at 20° C (68° F)	2.2 – 2.4 Ω
	Slip ring diameter	STD	14.2 – 14.4 mm (0.559 – 0.567 in.)
		Minimum	12.8 mm (0.504 in.)
	Brush exposed length	STD	9.5 – 11.5 mm (0.374 – 0.453 in.)
		Minimum	1.5 mm (0.059 in.)
Voltage regulator	Regulating voltage		13.2 – 14.8 V

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Bearing retainer x Drive end frame	3.0	31	27 in·lbf
Alternator pulley x Rotor	110.5	1,125	82
Rectifier holder x Lead wire on rectifier end frame, Rectifier holder	2.94	30	26 in·lbf
Rectifier end frame x Drive end frame	w/ Cord clip	5.4	48 in·lbf
	w/o Cord clip	4.5	40 in·lbf
Voltage regulator x Rectifier end frame, Rectifier holder	2.0	20	18 in·lbf
Brush holder x Rectifier holder, Voltage regulator	2.0	20	18 in·lbf
Rear end cover x Rectifier end frame	4.4	45	39 in·lbf
Plate terminal x Rectifier holder, Rectifier end frame	3.8	39	34 in·lbf
Terminal insulator x Rectifier holder	6.5	66	58 in·lbf
Alternator x Cylinder block	39	400	29
PS pump pulley x PS pump	43	440	32

AUTOMATIC TRANSMISSION

SERVICE DATA

SSOCS-08

Europe (2JZ-GE)		
Line pressure (Wheel locked)	Idling	
	D range	395 – 455 kPa (4.0 – 4.6 kgf·cm ² , 57 – 65 psi)
	R range	0
	Stall	
	D range	1,200 – 1,360 kPa (12.2 – 13.8 kgf·cm ² , 174 – 196 psi)
	R range	1,655 – 1,960 kPa (16.9 – 19.8 kgf·cm ² , 240 – 282 psi)
Engine stall revolution (D range)		2,700 ± 150 rpm
Time lag	N → D range	Less than 1.2 seconds
	N → R range	Less than 1.5 seconds
Engine idle speed (N range and A/C OFF)		700 ± 50 rpm
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter sleeve runout	Max.	0.30 mm (0.0118 in.)
Torque converter installation (Correct distance)		More than 0.1 mm (0.004 in.)
Extension housing oil seal drive in depth from flat end		2.0 mm (0.079 in.)
Shift schedule (NORM and PWR mode)		
Differential gear ratio 3.916		
D, M range		
(Throttle valve fully opened)	1 → 2	57 – 67 km/h (35 – 42 mph)
	2 → 3	88 – 99 km/h (55 – 61 mph)
	3 → 4	134 – 150 km/h (83 – 93 mph)
	4 → 5	190 – 209 km/h (118 – 130 mph)
	5 → 4	184 – 199 km/h (114 – 123 mph)
	4 → 3	121 – 133 km/h (75 – 82 mph)
	3 → 2	67 – 74 km/h (42 – 46 mph)
	2 → 1	37 – 42 km/h (23 – 26 mph)
	4 → 5	42 – 48 km/h (26 – 30 mph)
	5 → 4	24 – 29 km/h (15 – 18 mph)
(Throttle valve fully closed)		
3 range		
(Throttle valve fully opened)	1 → 2	57 – 67 km/h (35 – 42 mph)
	2 → 3	88 – 99 km/h (55 – 61 mph)
	4 → 3	139 – 152 km/h (86 – 94 mph)
	3 → 2	67 – 74 km/h (42 – 46 mph)
	2 → 1	37 – 42 km/h (23 – 26 mph)
2 range		
(Throttle valve fully opened)	1 → 2	57 – 67 km/h (35 – 42 mph)
	3 → 2	93 – 101 km/h (58 – 63 mph)
	2 → 1	37 – 42 km/h (23 – 26 mph)
L range		
(Throttle valve fully opened)	2 → 1	17 – 22 km/h (11 – 14 mph)

Shift schedule (SNOW mode)		
Differential gear ratio 3.916		
D, M range		
(Throttle valve fully opened)	1 → 2	45 – 61 km/h (28 – 38 mph)
	2 → 3	73 – 92 km/h (45 – 57 mph)
	3 → 4	111 – 139 km/h (69 – 86 mph)
	4 → 5	159 – 194 km/h (99 – 120 mph)
	5 → 4	84 – 116 km/h (52 – 72 mph)
	4 → 3	44 – 61 km/h (27 – 38 mph)
	3 → 2	21 – 35 km/h (13 – 22 mph)
	2 → 1	4 – 9 km/h (2 – 6 mph)
(Throttle valve fully closed)	4 → 5	42 – 48 km/h (26 – 30 mph)
	5 → 4	24 – 29 km/h (15 – 18 mph)
3 range		
(Throttle valve fully opened)	1 → 2	45 – 61 km/h (28 – 38 mph)
	2 → 3	73 – 92 km/h (45 – 57 mph)
	4 → 3	139 – 152 km/h (86 – 94 mph)
	3 → 2	21 – 35 km/h (13 – 22 mph)
	2 → 1	4 – 9 km/h (2 – 6 mph)
2 range		
(Throttle valve fully opened)	1 → 2	45 – 61 km/h (28 – 38 mph)
	3 → 2	93 – 101 km/h (58 – 63 mph)
	2 → 1	4 – 9 km/h (2 – 6 mph)
L range		
(Throttle valve fully opened)	2 → 1	17 – 22 km/h (11 – 14 mph)
Lock-up point (Differential gear ratio 3.916)		
(Throttle valve opening 5 %)		
5th gear (D range)	Lock-up ON	64 – 71 km/h (40 – 44 mph)
	Lock-up OFF	63 – 69 km/h (39 – 43 mph)
4th gear (4 range)	Lock-up ON	69 – 76 km/h (43 – 47 mph)
	Lock-up OFF	63 – 69 km/h (39 – 43 mph)
Flex lock-up point (Differential gear ratio 3.916)		
(Throttle valve opening 3 %)		
D range (When accelerating)		
5th gear	Lock-up ON	42 – 48 km/h (26 – 30 mph)
	Lock-up OFF	41 – 47 km/h (25 – 29 mph)
4th gear	Lock-up ON	32 – 37 km/h (20 – 23 mph)
	Lock-up OFF	30 – 36 km/h (19 – 22 mph)
4 range (When accelerating)		
4th gear	Lock-up ON	32 – 37 km/h (20 – 23 mph)
	Lock-up OFF	30 – 36 km/h (19 – 22 mph)
(Throttle valve fully closed)		
D range (When deceleration / A/C ON)		
5th gear	Lock-up ON	100 – 111 km/h (62 – 69 mph)
	Lock-up OFF	34 – 58 km/h (21 – 36 mph)
M range (When deceleration / A/C ON)		
4th gear	Lock-up ON	100 – 111 km/h (62 – 69 mph)
	Lock-up OFF	25 – 44 km/h (16 – 27 mph)
D range (When deceleration / A/C OFF)		
5th gear	Lock-up ON	100 – 111 km/h (62 – 69 mph)
	Lock-up OFF	34 – 40 km/h (21 – 25 mph)
M range (When deceleration / A/C OFF)		
4th gear	Lock-up ON	100 – 111 km/h (62 – 69 mph)
	Lock-up OFF	25 – 31 km/h (16 – 19 mph)

SERVICE SPECIFICATIONS - AUTOMATIC TRANSMISSION

Australia (2JZ-GE)		
Line pressure (Wheel locked)	Idling	
	D range	395 – 455 kPa (4.0 – 4.6 kgf·cm ² , 57 – 65 psi)
	R range	0
	Stall	
	D range	1,200 – 1,360 kPa (12.2 – 13.8 kgf·cm ² , 174 – 196 psi)
	R range	1,655 – 1,960 kPa (16.9 – 19.8 kgf·cm ² , 240 – 282 psi)
Engine stall revolution (D range)		2,700 ± 150 rpm
Time lag	N → D range	Less than 1.2 seconds
	N → R range	Less than 1.5 seconds
Engine idle speed (N range and A/C OFF)		700 ± 50 rpm
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter sleeve runout	Max.	0.30 mm (0.0118 in.)
Torque converter installation (Correct distance)		More than 0.1 mm (0.004 in.)
Extension housing oil seal drive in depth from flat end		2.0 mm (0.079 in.)
Shift schedule (NORM and PWR mode)		
Differential gear ratio 3.916		
D, M range (Throttle valve fully opened)	1 → 2	52 – 62 km/h (32 – 38 mph)
	2 → 3	81 – 91 km/h (50 – 57 mph)
	3 → 4	123 – 138 km/h (76 – 86 mph)
	4 → 5	176 – 193 km/h (109 – 120 mph)
	5 → 4	170 – 183 km/h (105 – 113 mph)
	4 → 3	111 – 123 km/h (69 – 76 mph)
	3 → 2	62 – 69 km/h (38 – 43 mph)
	2 → 1	34 – 39 km/h (21 – 24 mph)
	4 → 5	39 – 45 km/h (24 – 28 mph)
	5 → 4	22 – 27 km/h (14 – 17 mph)
(Throttle valve fully closed)		
3 range (Throttle valve fully opened)	1 → 2	52 – 62 km/h (32 – 38 mph)
	2 → 3	81 – 91 km/h (50 – 57 mph)
	4 → 3	128 – 140 km/h (79 – 87 mph)
	3 → 2	62 – 69 km/h (38 – 43 mph)
	2 → 1	34 – 39 km/h (21 – 24 mph)
2 range (Throttle valve fully opened)	1 → 2	52 – 62 km/h (32 – 38 mph)
	3 → 2	86 – 93 km/h (53 – 58 mph)
	2 → 1	34 – 39 km/h (21 – 24 mph)
L range (Throttle valve fully opened)		
	2 → 1	16 – 21 km/h (10 – 13 mph)

Shift schedule (SNOW mode)		
Differential gear ratio 3.916		
D, M range		
(Throttle valve fully opened)	1 → 2	36 – 48 km/h (22 – 30 mph)
	2 → 3	57 – 73 km/h (35 – 45 mph)
	3 → 4	88 – 110 km/h (55 – 68 mph)
	4 → 5	126 – 154 km/h (78 – 95 mph)
	5 → 4	68 – 87 km/h (42 – 54 mph)
	4 → 3	40 – 53 km/h (25 – 33 mph)
	3 → 2	18 – 29 km/h (11 – 18 mph)
	2 → 1	4 – 8 km/h (2 – 5 mph)
(Throttle valve fully closed)	4 → 5	39 – 45 km/h (24 – 28 mph)
	5 → 4	22 – 27 km/h (14 – 17 mph)
3 range		
(Throttle valve fully opened)	1 → 2	36 – 48 km/h (22 – 30 mph)
	2 → 3	57 – 73 km/h (35 – 45 mph)
	4 → 3	128 – 140 km/h (79 – 87 mph)
	3 → 2	18 – 29 km/h (11 – 18 mph)
	2 → 1	4 – 8 km/h (2 – 5 mph)
2 range		
(Throttle valve fully opened)	1 → 2	36 – 48 km/h (22 – 30 mph)
	3 → 2	86 – 93 km/h (53 – 58 mph)
	2 → 1	4 – 8 km/h (2 – 5 mph)
L range		
(Throttle valve fully opened)	2 → 1	17 – 22 km/h (11 – 14 mph)
Lock-up point (Differential gear ratio 3.916)		
(Throttle valve opening 5 %)		
5th gear (D range)	Lock-up ON	55 – 62 km/h (34 – 38 mph)
	Lock-up OFF	54 – 60 km/h (33 – 37 mph)
4th gear (4 range)	Lock-up ON	55 – 62 km/h (34 – 38 mph)
	Lock-up OFF	54 – 60 km/h (34 – 37 mph)
Flex lock-up point (Differential gear ratio 3.916)		
(Throttle valve opening 3 %)		
D range (When accelerating)		
5th gear	Lock-up ON	39 – 45 km/h (24 – 28 mph)
	Lock-up OFF	38 – 43 km/h (24 – 27 mph)
4th gear	Lock-up ON	29 – 35 km/h (18 – 22 mph)
	Lock-up OFF	28 – 33 km/h (17 – 21 mph)
4 range (When accelerating)		
4th gear	Lock-up ON	29 – 35 km/h (18 – 22 mph)
	Lock-up OFF	28 – 33 km/h (17 – 20 mph)
(Throttle valve fully closed)		
D range (When deceleration / A/C ON)		
5th gear	Lock-up ON	92 – 103 km/h (57 – 64 mph)
	Lock-up OFF	32 – 54 km/h (20 – 33 mph)
4 range (When deceleration / A/C ON)	Lock-up ON	92 – 103 km/h (57 – 64 mph)
4th gear	Lock-up OFF	23 – 41 km/h (14 – 25 mph)
D range (When deceleration / A/C OFF)		
5th gear	Lock-up ON	92 – 103 km/h (57 – 64 mph)
	Lock-up OFF	32 – 37 km/h (20 – 23 mph)
4 range (When deceleration / A/C OFF)	Lock-up ON	92 – 103 km/h (57 – 64 mph)
4th gear	Lock-up OFF	23 – 28 km/h (14 – 17 mph)

SERVICE SPECIFICATIONS – AUTOMATIC TRANSMISSION

G.C.C. countries (2JZ-GE)		
Line pressure (Wheel locked)	Idling	
	D range	395 – 455 kPa (4.0 – 4.6 kgf·cm ² , 57 – 65 psi)
	R range	0
	Stall	
	D range	1,200 – 1,360 kPa (12.2 – 13.8 kgf·cm ² , 174 – 196 psi)
	R range	1,655 – 1,960 kPa (16.9 – 19.8 kgf·cm ² , 240 – 282 psi)
Engine stall revolution (D range)		2,700 ± 150 rpm
Time lag	N → D range	Less than 1.2 seconds
	N → R range	Less than 1.5 seconds
Engine idle speed (N range and A/C OFF)		700 ± 50 rpm
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter sleeve runout	Max.	0.30 mm (0.0118 in.)
Torque converter installation (Correct distance)		More than 0.1 mm (0.004 in.)
Extension housing oil seal drive in depth from flat end		2.0 mm (0.079 in.)
Shift schedule (NORM and PWR mode)		
Differential gear ratio 3.916		
D, M range (Throttle valve fully opened)	1 → 2	57 – 67 km/h (35 – 42 mph)
	2 → 3	88 – 99 km/h (55 – 61 mph)
	3 → 4	134 – 150 km/h (83 – 93 mph)
	4 → 5	190 – 209 km/h (118 – 130 mph)
	5 → 4	184 – 199 km/h (114 – 123 mph)
	4 → 3	121 – 133 km/h (75 – 82 mph)
	3 → 2	67 – 74 km/h (42 – 46 mph)
	2 → 1	37 – 42 km/h (23 – 26 mph)
	4 → 5	42 – 48 km/h (26 – 30 mph)
	5 → 4	24 – 29 km/h (15 – 18 mph)
(Throttle valve fully closed)		
3 range (Throttle valve fully opened)	1 → 2	57 – 67 km/h (35 – 42 mph)
	2 → 3	88 – 99 km/h (55 – 61 mph)
	4 → 3	139 – 152 km/h (86 – 94 mph)
	3 → 2	67 – 74 km/h (42 – 46 mph)
	2 → 1	37 – 42 km/h (23 – 26 mph)
2 range (Throttle valve fully opened)	1 → 2	57 – 67 km/h (35 – 42 mph)
	3 → 2	93 – 101 km/h (58 – 63 mph)
	2 → 1	37 – 42 km/h (23 – 26 mph)
L range (Throttle valve fully opened)	2 → 1	17 – 22 km/h (11 – 14 mph)

Shift schedule (SNOW mode)		
Differential gear ratio 3.916		
D, M range		
(Throttle valve fully opened)	1 → 2	39 – 52 km/h (24 – 32 mph)
	2 → 3	62 – 79 km/h (39 – 49 mph)
	3 → 4	95 – 119 km/h (59 – 74 mph)
	4 → 5	137 – 167 km/h (85 – 104 mph)
	5 → 4	63 – 82 km/h (39 – 51 mph)
	4 → 3	33 – 45 km/h (20 – 28 mph)
	3 → 2	13 – 23 km/h (8 – 14 mph)
	2 → 1	4 – 9 km/h (2 – 6 mph)
(Throttle valve fully closed)	4 → 5	42 – 48 km/h (26 – 30 mph)
	5 → 4	24 – 29 km/h (15 – 18 mph)
3 range		
(Throttle valve fully opened)	1 → 2	39 – 52 km/h (24 – 32 mph)
	2 → 3	62 – 79 km/h (39 – 49 mph)
	4 → 3	139 – 152 km/h (86 – 94 mph)
	3 → 2	13 – 23 km/h (8 – 14 mph)
	2 → 1	4 – 9 km/h (2 – 6 mph)
2 range		
(Throttle valve fully opened)	1 → 2	39 – 52 km/h (24 – 32 mph)
	3 → 2	93 – 101 km/h (58 – 63 mph)
	2 → 1	4 – 9 km/h (2 – 6 mph)
L range		
(Throttle valve fully opened)	2 → 1	17 – 22 km/h (11 – 14 mph)
Lock-up point (Differential gear ratio 3.916)		
(Throttle valve opening 5 %)		
5th gear (D range)	Lock-up ON	64 – 71 km/h (40 – 44 mph)
	Lock-up OFF	63 – 69 km/h (39 – 43 mph)
4th gear (4 range)	Lock-up ON	69 – 76 km/h (43 – 47 mph)
	Lock-up OFF	63 – 69 km/h (39 – 43 mph)
Flex lock-up point (Differential gear ratio 3.916)		
(Throttle valve opening 3 %)		
D range (When accelerating)		
5th gear	Lock-up ON	42 – 48 km/h (26 – 30 mph)
	Lock-up OFF	41 – 47 km/h (25 – 29 mph)
4th gear	Lock-up ON	32 – 37 km/h (20 – 23 mph)
	Lock-up OFF	30 – 36 km/h (19 – 22 mph)
4 range (When accelerating)		
4th gear	Lock-up ON	32 – 37 km/h (20 – 23 mph)
	Lock-up OFF	30 – 36 km/h (19 – 22 mph)
(Throttle valve fully closed)		
D range (When deceleration / A/C ON)		
5th gear	Lock-up ON	100 – 111 km/h (62 – 69 mph)
	Lock-up OFF	34 – 58 km/h (21 – 36 mph)
M range (When deceleration / A/C ON)		
4th gear	Lock-up ON	100 – 111 km/h (62 – 69 mph)
	Lock-up OFF	25 – 44 km/h (16 – 27 mph)
D range (When deceleration / A/C OFF)		
5th gear	Lock-up ON	100 – 111 km/h (62 – 69 mph)
	Lock-up OFF	34 – 40 km/h (21 – 25 mph)
M range (When deceleration / A/C OFF)		
4th gear	Lock-up ON	100 – 111 km/h (62 – 69 mph)
	Lock-up OFF	25 – 31 km/h (16 – 19 mph)

SERVICE SPECIFICATIONS - AUTOMATIC TRANSMISSION

3UZ-FE		
Line pressure (Wheel locked)	Idling D range R range Stall D range R range	395 – 455 kPa (4.0 – 4.6 kgf·cm ² , 57 – 65 psi) 0 1,200 – 1,360 kPa (12.2 – 13.8 kgf·cm ² , 174 – 196 psi) 1,655 – 1,960 kPa (16.9 – 19.8 kgf·cm ² , 240 – 282 psi)
Engine stall revolution (D range)		2,450 ± 150 rpm
Time lag	N → D range N → R range	Less than 1.2 seconds Less than 1.5 seconds
Engine idle speed (N range and A/C OFF)		750 ± 50 rpm
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter sleeve runout	Max.	0.30 mm (0.0118 in.)
Torque converter installation (Correct distance)		More than 0.1 mm (0.004 in.)
Extension housing oil seal drive in depth from flat end		2.0 mm (0.079 in.)
Shift schedule (NORM and PWR mode)		
Differential gear ratio 3.266		
D, 4 range (Throttle valve fully opened)	1 → 2 2 → 3 3 → 4 4 → 5 5 → 4 4 → 3 3 → 2 2 → 1	62 – 71 km/h (38 – 44 mph) 93 – 103 km/h (58 – 64 mph) 145 – 160 km/h (90 – 99 mph) 212 – 227 km/h (131 – 141 mph) 204 – 216 km/h (126 – 134 mph) 136 – 147 km/h (84 – 91 mph) 80 – 86 km/h (50 – 53 mph) 42 – 47 km/h (26 – 29 mph)
(Throttle valve fully closed)	4 → 5 5 → 4	34 – 39 km/h (21 – 24 mph) 25 – 30 km/h (16 – 19 mph)
3 range (Throttle valve fully opened)	1 → 2 2 → 3 4 → 3 3 → 2 2 → 1	62 – 71 km/h (38 – 44 mph) 93 – 103 km/h (58 – 64 mph) 154 – 165 km/h (95 – 102 mph) 80 – 86 km/h (50 – 53 mph) 42 – 47 km/h (26 – 29 mph)
2 range (Throttle valve fully opened)	1 → 2 3 → 2 2 → 1	62 – 71 km/h (38 – 44 mph) 100 – 107 km/h (62 – 66 mph) 42 – 47 km/h (26 – 29 mph)
L range (Throttle valve fully opened)	2 → 1	39 – 44 km/h (24 – 27 mph)

Shift schedule (SNOW mode)		
Differential gear ratio 3.266		
D, 4 range		
(Throttle valve fully opened)	1 → 2	36 – 48 km/h (22 – 30 mph)
	2 → 3	59 – 75 km/h (37 – 47 mph)
	3 → 4	87 – 109 km/h (54 – 68 mph)
	4 → 5	136 – 176 km/h (84 – 109 mph)
	5 → 4	86 – 109 km/h (53 – 68 mph)
	4 → 3	57 – 73 km/h (35 – 45 mph)
	3 → 2	5 – 40 km/h (3 – 25 mph)
	2 → 1	5 – 10 km/h (3 – 6 mph)
(Throttle valve fully closed)	4 → 5	34 – 39 km/h (21 – 24 mph)
	5 → 4	24 – 30 km/h (16 – 19 mph)
3 range		
(Throttle valve fully opened)	1 → 2	36 – 48 km/h (22 – 30 mph)
	2 → 3	59 – 75 km/h (37 – 47 mph)
	4 → 3	154 – 165 km/h (95 – 102 mph)
	3 → 2	5 – 40 km/h (3 – 25 mph)
	2 → 1	5 – 10 km/h (3 – 6 mph)
2 range		
(Throttle valve fully opened)	1 → 2	36 – 48 km/h (22 – 30 mph)
	3 → 2	100 – 107 km/h (62 – 66 mph)
	2 → 1	5 – 10 km/h (2 – 6 mph)
L range		
(Throttle valve fully opened)	2 → 1	39 – 44 km/h (24 – 27 mph)
Lock-up point (Differential gear ratio 3.266)		
(Throttle valve opening 5 %)		
5th gear (D range)	Lock-up ON	59 – 65 km/h (37 – 40 mph)
	Lock-up OFF	55 – 61 km/h (39 – 43 mph)
4th gear (4 range)	Lock-up ON	140 – 151 km/h (87 – 94 mph)
	Lock-up OFF	133 – 143 km/h (83 – 89 mph)
Flex lock-up point (Differential gear ratio 3.266)		
(Throttle valve opening 3 %)		
D range (When accelerating)		
5th gear	Lock-up ON	47 – 53 km/h (29 – 33 mph)
	Lock-up OFF	45 – 51 km/h (28 – 32 mph)
4th gear	Lock-up ON	35 – 41 km/h (22 – 25 mph)
	Lock-up OFF	34 – 39 km/h (21 – 24 mph)
3rd gear	Lock-up ON	25 – 30 km/h (16 – 19 mph)
	Lock-up OFF	23 – 28 km/h (14 – 17 mph)

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Vehicle speed sensor x Extension housing		5.4	55	48 in.·lbf
O/D direct clutch speed sensor x Transmission case		5.4	55	48 in.·lbf
Solenoid connector x Transmission case		5.4	55	48 in.·lbf
Solenoid wire clamp set bolt		6.4	65	56 in.·lbf
Oil strainer x Valve body		9.8	100	7
Oil pan x Transmission case		7.4	75	65 in.·lbf
Drain plug		20	205	15
Neutral start switch x Transmission	Bolt	13	130	9
Neutral start switch x Transmission	Nut	6.9	70	61 in.·lbf
Shift lever assembly x Body		8.3	85	74 in.·lbf
Control shaft x Control lever		13	128	9
Shift lock control unit assembly x Shift lever plate		2.0	20	17 in.·lbf
Shift lever housing set bolt and nut		3.9	40	35 in.·lbf
Heated oxygen sensor x Front exhaust pipe		44	450	33
Front floor center brace x Body		7.4	75	65 in.·lbf
Front TWC x Front exhaust pipe	3UZ-FE	44	450	33
Pipe support bracket x Transmission		44	450	33
Center exhaust pipe x Tail pipe		44	450	33
Front TWC x Exhaust manifold	3UZ-FE	62	630	46
Shift control rod x Shift lever assembly		13	130	9
Oil cooler pipe union nut		44	450	33
Oil cooler pipe clamp set bolt		5.4	55	48 in.·lbf
Flywheel housing under cover x Transmission housing	3UZ-FE	18	185	13
Torque converter x Drive plate		48	490	35
Engine rear mounting x Body		26	270	20
Transmission x Engine	17 mm head	72	730	53
	14 mm head	37	380	27

SUSPENSION AND AXLE

SERVICE DATA

SSOFD-08

Cold tire inflation pressure (GS430)	(Tire size: 235/45ZR17)		
	Less than 160 km/h (100 mph)	*1Front	230 kPa (2.3 kgf/cm ² , 33 psi)
		*1Rear	230 kPa (2.3 kgf/cm ² , 33 psi)
		*2Front	230 kPa (2.3 kgf/cm ² , 33 psi)
		*2Rear	240 kPa (2.4 kgf/cm ² , 35 psi)
	160 – 230 km/h (100 – 143 mph)	*1Front	240 kPa (2.4 kgf/cm ² , 35 psi)
		*1Rear	240 kPa (2.4 kgf/cm ² , 35 psi)
		*2Front	250 kPa (2.6 kgf/cm ² , 36 psi)
		*2Rear	280 kPa (2.9 kgf/cm ² , 41 psi)
	More than 230 km/h (143 mph)	*1Front	260 kPa (2.7 kgf/cm ² , 38 psi)
		*1Rear	260 kPa (2.7 kgf/cm ² , 38 psi)
		*2Front	280 kPa (2.9 kgf/cm ² , 41 psi)
		*2Rear	340 kPa (3.5 kgf/cm ² , 49 psi)
Cold tire inflation pressure (GS300)	Europe and G.C.C. countries (Tire size: 225/55R16 94V)		
	Less than 160 km/h (100 mph)	*1Front	220 kPa (2.2 kgf/cm ² , 32 psi)
		*1Rear	220 kPa (2.2 kgf/cm ² , 32 psi)
		*2Front	240 kPa (2.4 kgf/cm ² , 35 psi)
		*2Rear	250 kPa (2.6 kgf/cm ² , 36 psi)
	160 – 210 km/h (100 – 131 mph)	*1Front	230 kPa (2.3 kgf/cm ² , 33 psi)
		*1Rear	230 kPa (2.3 kgf/cm ² , 33 psi)
		*2Front	240 kPa (2.4 kgf/cm ² , 35 psi)
		*2Rear	280 kPa (2.9 kgf/cm ² , 41 psi)
	More than 210 km/h (131 mph)	*1Front	240 kPa (2.4 kgf/cm ² , 35 psi)
		*1Rear	250 kPa (2.6 kgf/cm ² , 36 psi)
		*2Front	260 kPa (2.7 kgf/cm ² , 38 psi)
		*2Rear	340 kPa (3.5 kgf/cm ² , 49 psi)
	Europe (Tire size: 235/45ZR17)		
	Less than 160 km/h (100 mph)	*1Front	230 kPa (2.3 kgf/cm ² , 33 psi)
		*1Rear	230 kPa (2.3 kgf/cm ² , 33 psi)
		*2Front	230 kPa (2.3 kgf/cm ² , 33 psi)
		*2Rear	240 kPa (2.4 kgf/cm ² , 35 psi)
	160 – 210 km/h (100 – 131 mph)	*1Front	240 kPa (2.4 kgf/cm ² , 35 psi)
		*1Rear	240 kPa (2.4 kgf/cm ² , 35 psi)
		*2Front	250 kPa (2.6 kgf/cm ² , 36 psi)
		*2Rear	280 kPa (2.9 kgf/cm ² , 41 psi)
	More than 210 km/h (131 mph)	*1Front	260 kPa (2.7 kgf/cm ² , 38 psi)
		*1Rear	260 kPa (2.7 kgf/cm ² , 38 psi)
		*2Front	280 kPa (2.9 kgf/cm ² , 41 psi)
		*2Rear	340 kPa (3.5 kgf/cm ² , 49 psi)
	Australia (Tire size: 225/55R16 94V)		
	Less than 140 km/h (87 mph)	*1Front	220 kPa (2.2 kgf/cm ² , 32 psi)
		*1Rear	220 kPa (2.2 kgf/cm ² , 32 psi)
		*2Front	240 kPa (2.4 kgf/cm ² , 35 psi)
		*2Rear	270 kPa (2.8 kgf/cm ² , 39 psi)
	More than 140 km/h (87 mph)	*1Front	240 kPa (2.4 kgf/cm ² , 35 psi)
		*1Rear	250 kPa (2.6 kgf/cm ² , 36 psi)
		*2Front	300 kPa (3.1 kgf/cm ² , 44 psi)
		*2Rear	340 kPa (3.5 kgf/cm ² , 49 psi)

SERVICE SPECIFICATIONS – SUSPENSION AND AXLE

Cold tire inflation pressure (GS300)	Australia (Tire size: 235/45ZR17)	
	Less than 140 km/h (87 mph)	*1Front 230 kPa (2.3 kgf/cm ² , 33 psi)
		*1Rear 230 kPa (2.3 kgf/cm ² , 33 psi)
		*2Front 230 kPa (2.3 kgf/cm ² , 33 psi)
		*2Rear 270 kPa (2.8 kgf/cm ² , 39 psi)
	More than 140 km/h (87 mph)	*1Front 260 kPa (2.7 kgf/cm ² , 38 psi)
		*1Rear 260 kPa (2.7 kgf/cm ² , 38 psi)
		*2Front 280 kPa (2.9 kgf/cm ² , 41 psi)
		*2Rear 340 kPa (3.5 kgf/cm ² , 49 psi)
Front axle	Wheel bearing backlash	0.05 mm (0.0020 in.)
	Axle hub deviation	0.05 mm (0.0020 in.)
Front wheel alignment	Vehicle height	
	Tire size: 225/55R16	*3Front 239 mm (9.41 in.)
		*4Rear 225 mm (8.86 in.)
	Tire size: 235/45ZR17	*3Front 237 mm (9.33 in.)
		*4Rear 223 mm (8.78 in.)
	Camber	–0° 18' ± 30' (–0.3° ± 0.5°)
	Left–right error	30' (0.5°) or less
	Caster	7° 28' ± 30' (7.47° ± 0.5°)
	Left–right error	30' (0.5°) or less
	Steering axis inclination	8° 54' ± 30' (8.9° ± 0.5°)
	Left–right error	30' (0.5°) or less
	Toe–in (total)	0° 09' ± 12' (0.15° ± 0.2°, 1.5 ± 2 mm, 0.06 ± 0.08 in.)
	Rack end length difference	1.5 mm (0.059 in.) or less
	Wheel angle	Inside wheel
		38° 51' (36° 51' – 39° 51')
		38.85° (36.85° – 39.85°)
		Outside wheel: Reference
		32° 08'
		32.13°

*1: Up to 4 passengers

*2: More than the 4 passengers

*3: Measure the distance from the ground to the center of the lower suspension arm mounting bolt.

*4: Measure the distance from the ground to the center of the No.2 lower suspension arm mounting bolt.

TORQUE SPECIFICATION

Part tighten	N·m	kgf·cm	ft·lbf
Camber adjusting cam nut	172	1,755	127
Tie rod end lock nut	56	570	41

BRAKE

TORQUE SPECIFICATION

SS063-20

Part tightened	N·m	kgf·cm	ft·lbf
Brake line union nut	15	155	11
Hydraulic brake booster clevis lock nut	25	260	19
Hydraulic brake booster assembly x Pedal bracket	13	130	9
Reservoir set screw	1.7	17.5	15.2 in.·lbf
Oil presser sensor x Hydraulic brake booster	81	830	60
Accumulator x Booster pump motor	54	550	36

STEERING

SERVICE DATA

SSoF3-03

POWER STEERING FLUID		
Fluid level rise	Maximum	5 mm (0.20 in.)
Fluid pressure at idle speed with valve closed	Minimum	8,336 kPa (85 kgf/cm ² , 1,209 psi)
STEERING WHEEL		
Steering wheel freeplay	Maximum	30 mm (1.18 in.)
Steering effort at idle speed	Maximum	7 N·m (70 kgf·cm, 61 in.·lbf)
PS VANE PUMP (3UZ-FE)		
Vane pump rotating torque	Maximum	0.25 N·m (2.5 kgf·cm, 2.2 in.·lbf)
Oil clearance between pump shaft and bushing	STD	0.03 – 0.045 mm (0.0012 – 0.0017 in.)
Oil clearance between pump shaft and bushing	Maximum	0.07 mm (0.0028 in.)
Vane plate height	Minimum	8.1 mm (0.319 in.)
Vane plate thickness	Minimum	1.797 mm (0.0707 in.)
Vane plate length	Minimum	14.988 mm (0.5901 in.)
Clearance between the rotor groove and plate	Maximum	0.028 mm (0.0011 in.)
Vane plate length	Pump rotor and cam ring mark	
	NONE	14.996 – 14.998 mm (0.59039 – 0.59047 in.)
	1	14.994 – 14.996 mm (0.59032 – 0.59039 in.)
	2	14.992 – 14.994 mm (0.59024 – 0.59032 in.)
	3	14.990 – 14.992 mm (0.59016 – 0.59024 in.)
	4	14.988 – 14.990 mm (0.59008 – 0.59016 in.)
Spring free length	Minimum	36.0 mm (1.42 in.)

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
STEERING COLUMN			
Column tube support set bolt	20	200	14
No.2 intermediate shaft assembly x Main shaft	35	360	26
Steering column assembly set nut	25	260	19
Intermediate shaft assembly x Control valve shaft	35	360	26
No.2 intermediate shaft assembly x Intermediate shaft assembly	35	360	26
Steering wheel set nut	50	510	37
Steering wheel pad set screw (Torx screw)	8.8	90	78 in.·lbf
POWER STEERING VANE PUMP (3UZ-FE)			
Front housing x Rear bracket	39	400	29
Solenoid valve x Front housing	51 (69)	520 (700)	38 (51)
Suction port union set bolt	13	130	9
Air control valve	29	300	22
Vane pump pulley set nut	43	440	32
Pump assembly set nut	43	440	32
Pump assembly set bolt	39	400	29
Union bolt	49	500	36
POWER STEERING GEAR			
PS gear assembly set bolt	65	660	48
Tube clamp set bolt	5	55	48 in.·lbf
Pressure feed and return tube set union bolt	49	500	36
Suspension member brace	58	590	43

(): For use without SST

SUPPLEMENTAL RESTRAINT SYSTEM
TORQUE SPECIFICATION

SS0FC-07

Part tightened	N·m	kgf·cm	ft·lbf
Curtain shield airbag assembly x Body	9.8	100	86 in·lbf
Front seat outer belt retractorUpper Bolt:	7.5	75	67 in·lbf
Front seat outer belt retractorLower Bolt:	42	428	31
Side and curtain shield airbag sensor assembly	20	205	15

BODY

TORQUE SPECIFICATION

SSOFF-04

Part tightened	N·m	kgf·cm	ft·lbf
HOOD	–	–	–
Hood support x Hood	22	225	16
Hood x Hood hinge	13	130	9
Radiator support upper seal x Door lock	8.0	82	71
Hood lock nut x Hood lock	8.0	82	71
FRONT DOOR	–	–	–
Outside handle x Door panel	5.5	56	49 in·lbf
Door lock striker x Door panel	23	235	17
Door hinge x Body	32.5	331	24
Door hinge x Door panel	32.5	331	24
Window regulator x Door panel	11	112	8
Door lock x Door panel	5.5	56	49 in·lbf
REAR DOOR	–	–	–
Outside handle x Door panel	5.5	56	49 in·lbf
Door hinge x Door panel	32.5	331	24
Door hinge x Body	32.5	331	24
Window regulator x Door panel	8.0	82	71 in·lbf
Door lock x Door panel	5.5	56	49 in·lbf
Retractor x Body Upper bolt:	4.9	50	43 in·lbf
Retractor x Body Lower bolt:	42	430	31
FUEL LID	–	–	–
Lock retainer x Opening lid	5.5	56	49 in·lbf
Fuel lid lock assembly x Body Luggage side nut:	5.5	56	49 in·lbf
Fuel lid lock assembly x Body Fuel lid side nut:	8.0	82	71 in·lbf
WINDSHIELD	–	–	–
Wiper arm x Wiper link	22	220	16
SLIDING ROOF	–	–	–
Sliding roof housing x Body	5.5	56	49 in·lbf
Bracket x Body	8.0	82	71 in·lbf
Sliding roof glass x Drive gear	5.5	56	49 in·lbf
ROOF HEAD LINING	–	–	–
Seatback x Body	18	185	13
Front pillar garnish x Body	9.8	100	7
FRONT SEAT	–	–	–
Seat x Body	37	375	27
Seatback x Seat adjuster	61	622	45
Seat cushion x Seat adjuster	19	194	14
Inner belt x Seat	42	430	31
Vertical seat link sub-assembly x Seat track assembly	26	270	20
Vertical seat link sub-assembly x Bracket	7.8	80	69 in·lbf
No. 2 vertical seat link sub-assembly x Reclining seat adjuster assembly Nut:	20	200	14

No. 2 vertical seat link sub-assembly x Reclining seat adjuster assembly Bolt:	29	300	22
Reclining seat adjuster assembly x Seat track assembly	20	200	14
Belt anchor bracket x Vertical seat link sub-assembly	26	270	20

AIR CONDITIONING

SERVICE DATA

SS0F5-06

Refrigerant volume		600 ± 50 g (21.16 ± 1.76 oz.)
Idle-up Speed (3UZ-FE)	Magnetic clutch not engaged	750 ± 50 rpm
	Magnetic clutch engaged	800 ± 50 rpm
Magnetic clutch clearance		0.5 ± 0.15 mm (0.020 ± 0.0059 in.)

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Compressor x Discharge hose	10	100	7
Compressor x Suction hose	10	100	7
Compressor x Engine	Bolt	49	36
	Nut	29	22
A/C unit x Liquid and suction tube	10	100	7
Condenser x Discharge hose	10	100	7
Condenser x Liquid tube	10	100	7
Pressure switch x Liquid tube	10	100	7
Suction line	10	100	7