



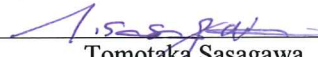
RADIO TEST REPORT

Test Report No. : 30EE0137-HO-02-A

Applicant : Toyota Motor Corporation
Type of Equipment : Immobilizer
Model No. : TMIMB-3
Test regulation : FCC Part 15 Subpart C : 2009
Section 15.209
FCC ID : NI4TMIMB-3
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test: January 13, 2010

Tested by: 
Tomotaka Sasagawa
EMC Services

Approved by: 
Makoto Kosaka
EMC Services

NVLAP[®]

NVLAP LAB CODE: 200572-0

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*As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://uljapan.co.jp/emc/nvlap.html>

UL Japan, Inc.

Head Office EMC Lab.

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MF060b (06.08.09)

CONTENTS	PAGE
SECTION 1: Customer information	3
SECTION 2: Equipment under test (E.U.T.).....	3
SECTION 3: Test specification, procedures & results	4
SECTION 4: Operation of E.U.T. during testing	7
SECTION 5: Radiated emission (Fundamental and Spurious Emission).....	8
SECTION 6: -26dB Bandwidth.....	10
SECTION 7: 99% Occupied Bandwidth.....	10
APPENDIX 1: Photographs of test setup	11
Radiated Emission.....	11
Worst Case Position (EUT: X-axis)	12
APPENDIX 2: Data of EMI test.....	13
Radiated Emission below 30MHz (Fundamental and Spurious Emission)	13
Radiated Emission above 30MHz (Spurious Emission).....	14
-26dB Bandwidth and 99% Occupied Bandwidth	15
APPENDIX 3: Test instruments	16

SECTION 1: Customer information

Company Name : Toyota Motor Corporation
Address : 1, Toyota-Cho, Toyota, Aichi, 471-8572 Japan
Telephone Number : +81-565-94-1007
Facsimile Number : +81-565-94-1192
Contact Person : Tetsuya Matsuo

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Immobilizer
Model No. : TMIMB-3
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC5.0V
Receipt Date of Sample : December 11, 2009
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product description

General Specification

Clock frequency(ies) in the system : 4MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 134.2kHz
Modulation : ASK
Method of Frequency Generation : Oscillator circuit with Ceramic Resonator
Antenna type : Coil Antenna

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C: 2009, final revised on December 2, 2009
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.209 Radiated emission limits, general requirements

FCC 15.31 (e)

The RF part of EUT is constantly provided with voltage (DC 5.0V) through regulator. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted Emission	<FCC> ANSI C63.4:2003 7. AC powerline conducted emission measurements <IC> RSS-Gen 7.2.2	<FCC> Section 15.207 <IC> RSS-Gen 7.2.2	-	N/A *1)	N/A	N/A
2	Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.8, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.6, 2.7	Radiated	N/A	25.2dB 0.13496MHz 0 deg. AV	Complied
3	Electric Field Strength of Spurious Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.9, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.6, 2.7	Radiated	N/A	0.7dB 160.350MHz, Horizontal	Complied
4	-26dB Bandwidth	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> -	<FCC> Reference data <IC> -	Radiated	N/A	N/A	N/A

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15.

*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

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3.3 Addition to standard

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	N/A	N/A	N/A

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	Radiated emission (10m*)(±dB)			Radiated emission (3m*)(±dB)					
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	(3m*)(±dB)					(1m*)(±dB)
				9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -18GHz	18GHz -26.5GHz	
No.1	2.7dB	4.8dB	5.0dB	2.9dB	4.8dB	5.0dB	3.9dB	4.5dB	4.4dB
No.2	-	-	-	3.5dB	4.8dB	5.1dB	4.0dB	4.3dB	4.2dB
No.3	-	-	-	3.8dB	4.6dB	4.7dB	4.0dB	4.5dB	4.4dB
No.4	-	-	-	3.5dB	4.4dB	4.9dB	4.0dB	4.6dB	4.5dB

*10m/3m/1m = Measurement distance

Radiated emission test (3m)

[Electric Field Strength of Fundamental Emission]

The data listed in this test report has enough margin, more than the site margin.

[Electric Field Strength of Spurious Emission]

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test set up, Data of EMI, and Test instruments

Refer to APPENDIX 1 to 3.

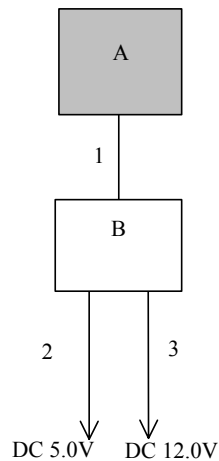
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

Operation : Transmitting mode (134.2kHz)

Justification : The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals



* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Immobilizer	TMIMB-3	40	-	EUT
B	Jig	-	-	-	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC and Signal Cable	2.0	Unshielded	Unshielded	-
2	DC Cable	0.9	Unshielded	Unshielded	-
3	DC Cable	1.1	Unshielded	Unshielded	-

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SECTION 5: Radiated emission (Fundamental and Spurious Emission)

Test Procedure

The Radiated Electric Field Strength intensity has been measured on No. 3 semi anechoic chamber with a ground plane and at a distance of 3m.

Frequency : From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical polarization (antenna angle: 0deg., 45deg., 90deg., and 135 deg.) and horizontal polarization.

*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency : From 30MHz to 1GHz at distance 3m

The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with a QP, PK, and AV detector.

The radiated emission measurements were made with the following detector function of the test receiver.

	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

- The carrier level (or, noise levels) was (or were) measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.

With the position, the noise levels of all the frequencies were measured.

* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)

[Limit at 3m]=[Limit at 300m]-40 x log (3[m]/300[m])

[Limit at 3m]=[Limit at 30m]-40 x log (3[m]/30[m])

Test data : **APPENDIX 2**

Test result : **Pass**

Date: January 13, 2009

Test engineer: Tomotaka Sasagawa

UL Japan, Inc.

Head Office EMC Lab.

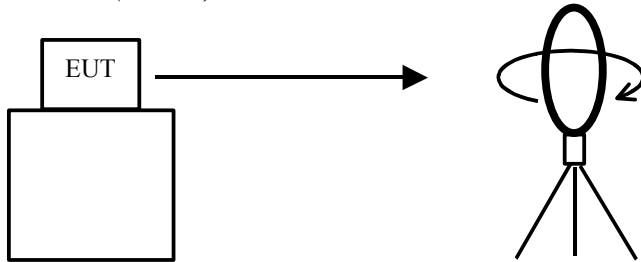
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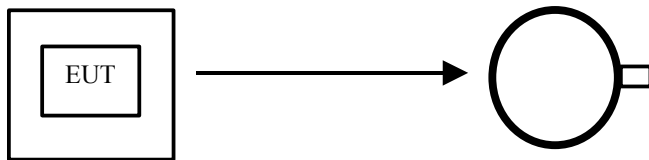
Facsimile : +81 596 24 8124

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

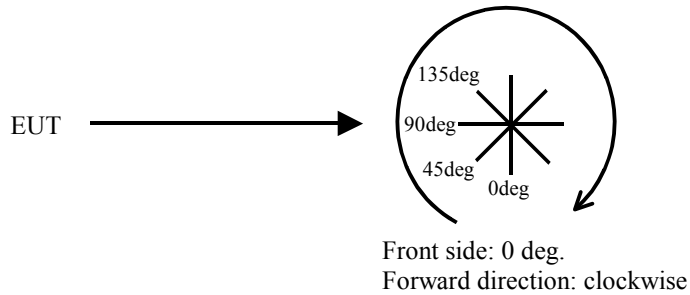


.....
Top View (Horizontal)



Antenna was not rotated.

.....
Top View (Vertical)



SECTION 6: -26dB Bandwidth

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test data : APPENDIX 2
Test result : Pass

SECTION 7: 99% Occupied Bandwidth

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test data : APPENDIX 2
Test result : Pass

APPENDIX 1: Photographs of test setup

Radiated Emission



Photo 1

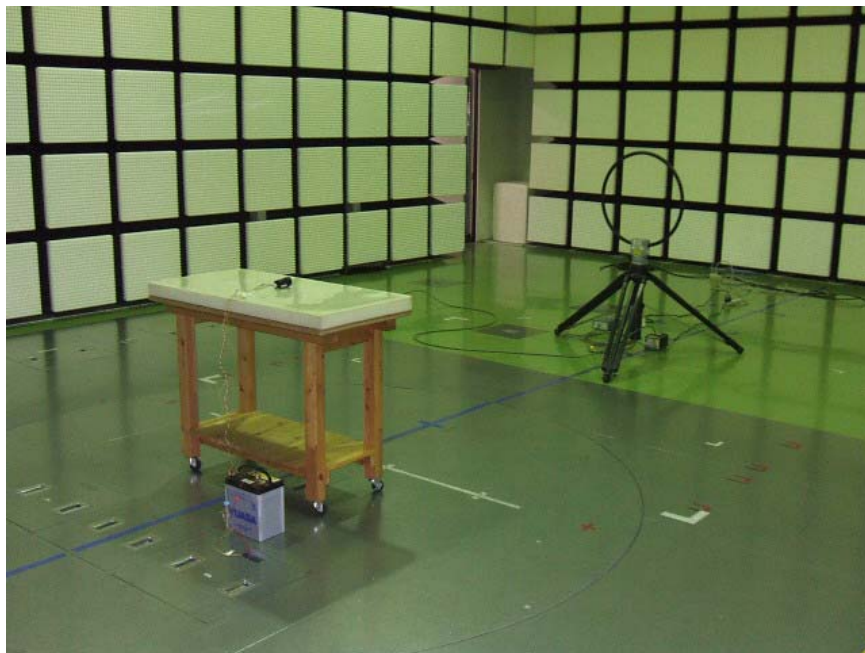
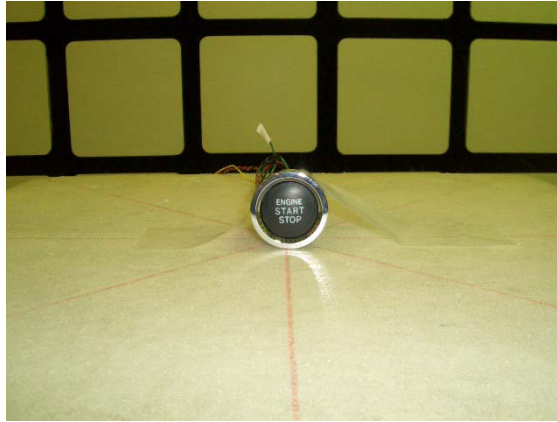


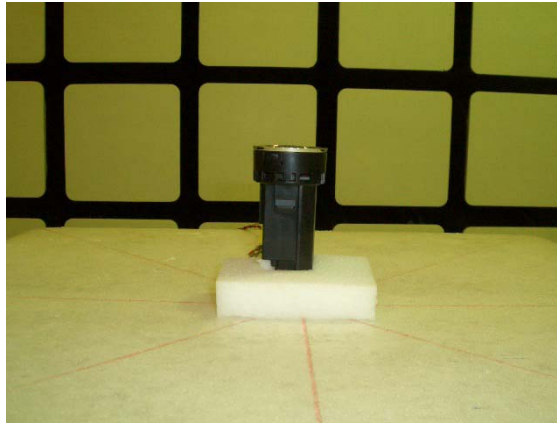
Photo 2

Worst Case Position (EUT: X-axis)

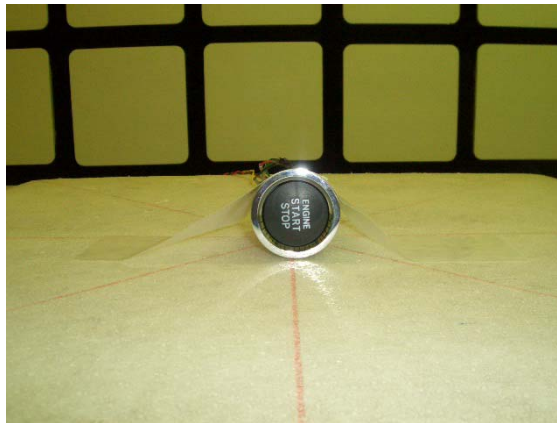
X-axis



Y-axis



Z-axis



APPENDIX 2: Data of EMI test

Radiated Emission below 30MHz (Fundamental and Spurious Emission)

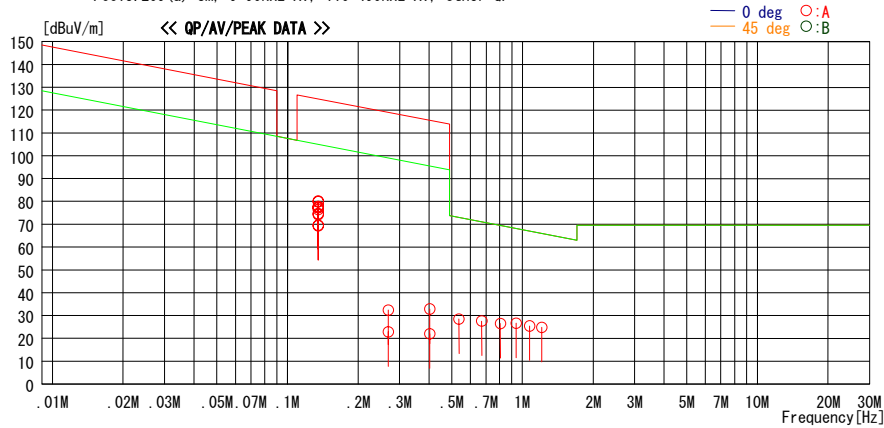
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2010/01/13

Company : Toyota Motor Corporation Report No. : 30EE0137-HO-02
Kind of EUT : Immobilizer Power : DC 12.0V
Model No. : TMIMB-3 Temp. / Humi. : 23deg. C. / 47%
Serial No. : 001 Engineer : Tomotaka Sasagawa

Mode / Remarks : Transmitting mode 134.2kHz / Worst-axis:X-axis

LIMIT : FCC15. 209(a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15. 209(a) 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
0.13496	92.4	PEAK	20.0	0.1	32.4	80.1	124.9	44.8	0	A	0 X-axis
0.13496	89.7	PEAK	20.0	0.1	32.4	77.4	124.9	47.5	45	A	0 X-axis
0.13496	87.0	PEAK	20.0	0.1	32.4	74.7	124.9	50.2	90	A	67 X-axis
0.13496	90.2	PEAK	20.0	0.1	32.4	77.9	124.9	47.0	135	A	0 X-axis
0.13496	92.1	AV	20.0	0.1	32.4	79.8	105.0	25.2	0	A	0 X-axis
0.13496	88.9	AV	20.0	0.1	32.4	76.6	105.0	28.4	45	A	0 X-axis
0.13496	86.5	AV	20.0	0.1	32.4	74.2	105.0	30.8	90	A	67 X-axis
0.13496	89.6	AV	20.0	0.1	32.4	77.3	105.0	27.7	135	A	0 X-axis
0.13496	81.9	PEAK	20.0	0.1	32.4	69.6	124.9	55.3	Hor	A	0 X-axis
0.13496	81.7	AV	20.0	0.1	32.4	69.4	105.0	35.6	Hor	A	0 X-axis
0.26840	44.6	PEAK	19.9	0.2	32.3	32.4	119.0	86.6	0	A	352
0.26840	35.1	AV	19.9	0.2	32.3	22.9	99.0	76.1	0	A	352
0.40260	45.1	PEAK	19.8	0.2	32.2	32.9	115.5	82.6	0	A	154
0.40260	34.2	AV	19.8	0.2	32.2	22.0	95.5	73.5	0	A	154
0.53680	40.7	QP	19.8	0.2	32.2	28.5	73.0	44.5	0	A	185
0.67100	39.8	QP	19.8	0.2	32.2	27.6	71.1	43.5	0	A	324
0.80520	38.7	QP	19.8	0.2	32.2	26.5	69.5	43.0	0	A	224
0.93940	38.9	QP	19.8	0.2	32.2	26.7	68.1	41.4	0	A	324
1.07360	37.6	QP	19.8	0.2	32.2	25.4	66.9	41.5	0	A	14
1.20780	36.9	QP	19.8	0.3	32.2	24.8	65.9	41.1	0	A	169

CHART: WITH FACTOR, ANT TYPE: LOOP. Except for the data below: adequate margin data below the limits.
CALCULATION: RESULT[dBuV] = READING[dBuV] + ANT FACTOR[dB] + LOSS[dB] (CABLE + ATTEN. - AMP.)

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission above 30MHz (Spurious Emission)

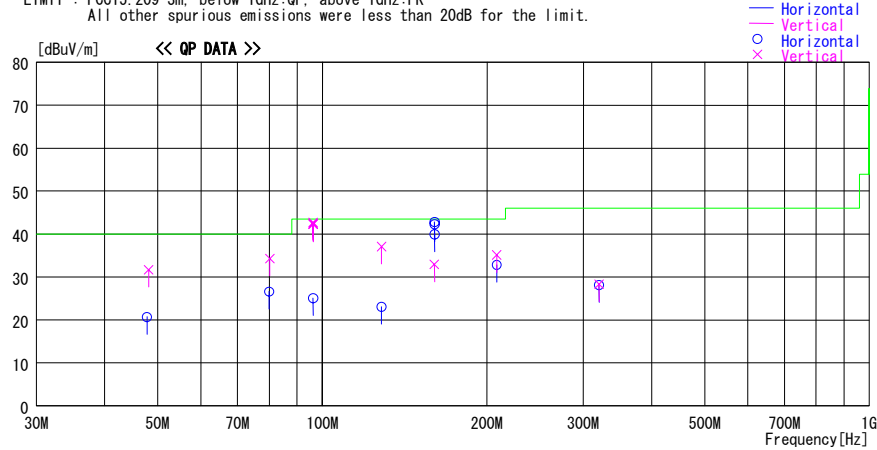
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2010/01/13

Company : Toyota Motor Corporation
Kind of EUT : Immobilizer
Model No. : TM1MB-3
Serial No. : 001
Report No. : 30EE0137-HO-02
Power : DC 12.0V
Temp./Humi. : 23deg. C / 34%
Engineer : Tomotaka Sasagawa

Mode / Remarks : Transmitting mode 134.2kHz / Worst-axis(H:X-axis / V:Y-axis)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain							
			[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
47.820	34.5	QP	11.0	-24.8	20.7	272	221	Hori.	40.0	19.3	
48.117	45.6	QP	10.9	-24.8	31.7	163	100	Vert.	40.0	8.3	
79.950	44.7	QP	6.1	-24.2	26.6	263	245	Hori.	40.0	13.4	
80.174	52.4	QP	6.1	-24.2	34.3	235	100	Vert.	40.0	5.7	
96.150	40.4	QP	8.7	-24.0	25.1	113	122	Hori.	43.5	18.4	
96.219	57.6	QP	8.8	-24.0	42.4	224	100	Vert.	43.5	1.1	X-axis
96.219	57.9	QP	8.8	-24.0	42.7	221	100	Vert.	43.5	0.8	Y-axis
96.219	57.4	QP	8.8	-24.0	42.2	234	100	Vert.	43.5	1.3	Z-axis
128.242	33.1	QP	13.5	-23.6	23.0	261	165	Hori.	43.5	20.5	
128.280	47.2	QP	13.5	-23.6	37.1	243	100	Vert.	43.5	6.4	
160.350	51.0	QP	15.1	-23.3	42.8	106	180	Hori.	43.5	0.7	X-axis
160.350	50.5	QP	15.1	-23.3	42.3	121	182	Hori.	43.5	1.2	Z-axis
160.350	48.1	QP	15.1	-23.3	39.9	111	178	Hori.	43.5	3.6	Y-axis
160.324	41.1	QP	15.1	-23.3	32.9	10	100	Vert.	43.5	10.6	
208.442	38.7	QP	16.8	-22.7	32.8	117	221	Hori.	43.5	10.7	
208.445	41.0	QP	16.8	-22.7	35.1	231	100	Vert.	43.5	8.4	
320.644	34.7	QP	15.5	-21.9	28.3	78	100	Vert.	46.0	17.7	
320.658	34.5	QP	15.5	-21.9	28.1	70	100	Hori.	46.0	17.9	

CHART: WITH FACTOR ANT TYPE : -30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz-: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

*The test result is rounded off to one or two decimal places, so some differences might be observed.

-26dB Bandwidth and 99% Occupied Bandwidth

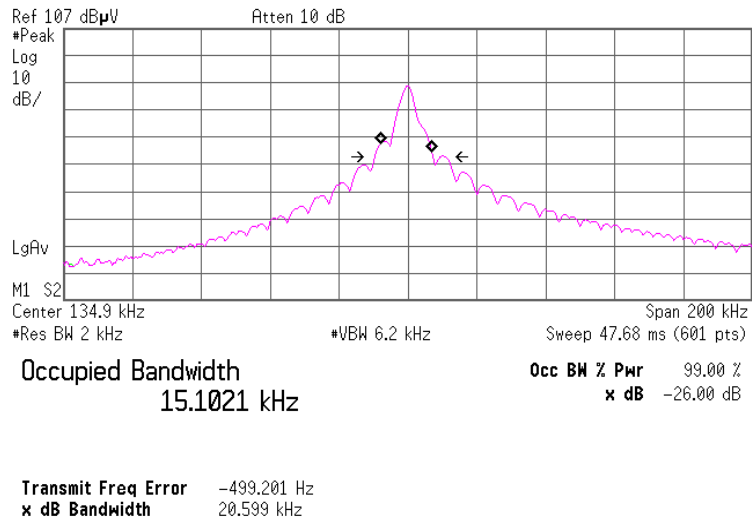
UL Japan, Inc.
Head Office EMC Lab. No.3 Semi Anechoic Chamber

COMPANY	: Toyota Motor Corporation	REPORT NO	: 30EE0137-HO-02
EQUIPMENT	: Immobilizer	REGULATION	: Reference Data (for FCC)/RSS-Gen 4.6.1
MODEL	: TMIMB-3	TEST DISTANCE	: 3m
S/ N	: 001	DATE	: 01/13/2010
POWER	: DC 12V	TEMPERATURE	: 23 deg.C
MODE	: Transmitting mode 134.2kHz	HUMIDITY	: 41 %
		Engineer	: Tomotaka Sasagawa

FREQ	-26dB Bandwidth	99% Occupied Bandwidth
[kHz]	[kHz]	[kHz]
134.9	20.6	15.102

※ Agilent

R T



APPENDIX 3: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2009/02/02 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2009/02/06 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-09	Spectrum Analyzer	Advantest	R3273	95090115	RE	2009/12/11 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2009/06/30 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	836553/009	RE	2009/11/19 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(3m)/ sucoform141-PE(1m)/ 421-010(1.5m)/ RFM-E321(Switcher)	-/00640	RE	2009/07/02 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	2009/06/22 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2009/03/18 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2009/01/19 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2009/01/10 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2009/07/02 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2009/11/12 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

RE: Radiated emission, 99% Occupied Bandwidth, -20dB bandwidth

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