



EMI TEST REPORT

Test Report No. : 11012811H-A-R1

Applicant : TOKAI RIKA CO., LTD.
Type of Equipment : RECEIVER
Model No. : BG3AW
FCC ID : MOZBG3AW
Test regulation : FCC Part 15 Subpart B: 2015
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 the limits of the above regulation.
4. The test results in this test 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.
6. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
7. This report is a revised version of 11012811H-A. 11012811H-A is replaced with this report.

Date of test: October 18 to 21, 2015

Representative test engineer:

Shinya Watanabe
Engineer
Consumer Technology Division

Approved by:

Motoya Imura
Engineer
Consumer Technology Division



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation. *As for the range of Accreditation in NVLAP, you may refer to the WEB address, http://japan.ul.com/resources/emc_accredited/

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13-EM-F0429

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SECTION 1: Customer information

Company Name : TOKAI RIKA CO., LTD.
Address : 3-260 Toyota, Oguchi-cho, Niwa-gun, Aichi 480-0195, Japan
Telephone Number : +81-587-95-0093
Facsimile Number : +81-587-95-5471
Contact Person : Hiroki Unno

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

2.1 Identification of E.U.T.

Type of Equipment : RECEIVER
Model No. : BG3AW
Serial No. : Refer to Section 4, Clause 4.2
Receipt Date of Sample : October 9, 2015
Condition of EUT : Engineering 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

Model No: BG3AW (referred to as the EUT in this report) is the RECEIVER which has two modes: Smart Key System mode and Tire Pressure Monitoring System (TPMS) mode.

These two modes are switched by signals from Electronic Control Unit (ECU).

Model No. BG3AW has variant models. Refer to Section 4, Clause 4.1 for details.

Feature of EUT:

<RKE mode>

Remote Keyless Entry System is mainly used for locking/unlocking doors of a vehicle. RECEIVER receives radio wave signals from Remote Key, and sends demodulated signals to ECU.

<TPMS mode>

RECEIVER receives radio wave signals from Transmitters on vehicle tires. The signals include information on levels of air pressure/temperature in the vehicle tires and the identity code of Transmitters.

When RECEIVER diagnoses the tire(s) as malfunction, RECEIVER sends a warning signal.

Type of receiving system : Super-heterodyne
Frequency of Operation * : RKE (CH1): 314.35 MHz
RKE (CH2): 312.10 MHz
TPMS: 314.98 MHz
Oscillator Frequency : 30.32 MHz (RF-IC), 20.03 MHz (CPU)
Local Oscillalized Frequency : RKE (CH1): 1884.42 MHz
RKE (CH2): 1870.92 MHz
TPMS: 1888.20 MHz
Type of Modulation : RKE: FSK
TPMS: FSK
Power Supply : DC 12.0 V
Antenna Type : ANT1: External antenna
ANT2: Internal antenna

* Note: These channels do not work together at a time. When one channel receives a signal, the other two receive no signals.

*RKE: Remote Keyless Entry, TPMS: Tire Pressure Monitoring System

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart B: 2015, final revised on November 23, 2015
 *Some parts are effective on and after December 17, 2015 or December 23, 2015.
 The revision does not affect the test specification applied to the EUT.

Title : FCC 47CFR Part15 Radio Frequency Device
 Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	FCC: ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Part 15 Subpart B 15.107(a)	N/A *1)	N/A	N/A
Radiated emission	FCC: ANSI C63.4: 2003 8. Radiated emission measurements	Part 15 Subpart B 15.109(a)	N/A	20.7 dB 800.000MHz Vertical / Horizontal, QP	Complied
Antenna Terminal	FCC: ANSI C63.4: 2003 12. Measurement of unintentional radiators other than ITE	Part 15 Subpart B 15.111	N/A	17.6 dB 47.600 MHz, PK	Complied

*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420.

*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.

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

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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						
	(3 m*)(+dB)			(1 m*)(+dB)		(0.5 m*)(+dB)	
	9 kHz - 30 MHz	30 MHz - 300 MHz	300 MHz - 1 GHz	1 GHz - 10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz
No.1	4.3 dB	5.1 dB	6.2 dB	5.5 dB	5.8 dB	5.8 dB	4.3 dB
No.2	4.2 dB	5.1 dB	6.2 dB	5.4 dB	5.7 dB	5.9 dB	5.6 dB
No.3	4.4 dB	5.1 dB	6.3 dB	5.2 dB	5.5 dB	5.8 dB	5.5 dB
No.4	4.7 dB	5.3 dB	6.3 dB	5.3 dB	5.7 dB	5.9 dB	5.5 dB

*3m/1m/0.5m = Measurement distance

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)	
Below 1 GHz	1 GHz - 3 GHz	3 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz- 40 GHz
1.4 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB

Radiated emission test(3m)

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

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3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
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	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	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	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	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	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	4.0 x 4.5 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	-	8.8 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

* 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 data, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating modes

The mode used: 1) TPMS Receiving (314.98MHz) mode
2) RKE Receiving (314.35MHz/314.98MHz) mode

*The test signal level was confirmed to be sufficient to stabilize the local oscillator of the EUT.

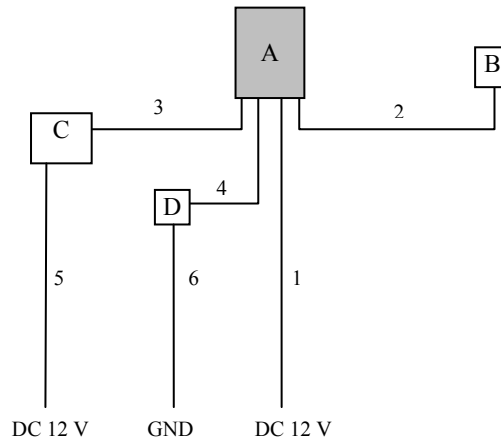
As for RKE Receiving mode, the test was evaluated with the EUT which receives 314.35MHz and 312.10MHz by time sharing.

Requirement	Test Mode
Radiated Emission	1),2)
Antenna Terminal	1),2)

<Variant models>

	2nd Antenna Synthesis circuit	Antenna matching switching circuit	CAN communication
Tested Model	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Variant model	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Variant model	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Variant model	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Variant model	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Variant model	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Variant model	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Variant model	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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	Remarks
A	RECEIVER	BG3AW	2-1-1	TOKAI RIKA CO., LTD.	EUT
B	External Antenna	-	1	TOKAI RIKA CO., LTD.	-
C	SW BOX	-	-	TOKAI RIKA CO., LTD.	-
D	CAN Terminator	-	-	TOKAI RIKA CO., LTD.	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	3.0	Unshielded	Unshielded	-
2	Antenna Cable	2.0	Unshielded	Unshielded	-
3	Signal Cable	2.0	Unshielded	Unshielded	-
4	Signal Cable	2.0	UnShielded	UnShielded	-
5	DC Cable	3.0	UnShielded	UnShielded	-
6	GND Cable	3.0	UnShielded	UnShielded	-

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SECTION 5: Radiated Emission

5.1 Operating environment

Test place : No.3 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8m above the conducting ground plane.

The EUT was set on the edge of the tabletop.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

Photographs of the set up are shown in Appendix 3.

5.3 Test conditions

Frequency range : 30MHz - 300MHz (Biconical antenna) / 300MHz - 1000MHz (Logperiodic antenna)
1000 MHz - 10000 MHz (Horn antenna)
Test distance : 3 m
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

The height of the measuring antenna 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 with the Test Receiver.

The radiated emission measurements were made with the following detector function of the Test Receiver.

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW 120 kHz	PK: RBW: 1 MHz / VBW: 1 MHz AV *1): RBW: 1 MHz / VBW: 10 Hz

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

- The noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

5.5 Test result

Summary of the test results: Pass

Date: October 18, 2015
October 19, 2015

Test engineer: Satofumi Matsuyama
Shinya Watanabe

UL Japan, Inc.

Ise EMC Lab.

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SECTION 6: Antenna Terminal

6.1 Operating environment

Test place : No.7 Shielded room
Temperature : See data
Humidity : See data

6.2 Test configuration

EUT was placed on a wooden table of nominal size, 0.5m by 1.0m, raised 0.8m from the ground.

6.3 Test conditions

Frequency range : 30 MHz - 1000 MHz / 1000 MHz - 10000 MHz
Test distance : N/A
EUT position : Table top
EUT operation mode : See Clause 4.1

6.4 Test procedure

The Antenna Terminal was measured with a spectrum analyzer connected to the antenna port.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Spectrum Analyzer	Spectrum Analyzer
IF Bandwidth	PK: RBW:100kHz/VBW: 100kHz	PK: RBW:1MHz/VBW: 3MHz

6.5 Test result

Summary of the test results: Pass

Date: October 21, 2015

Test engineer: Shinya Watanabe

UL Japan, Inc.

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APPENDIX 1: Test data

Radiated Emission
 (Below 1GHz)

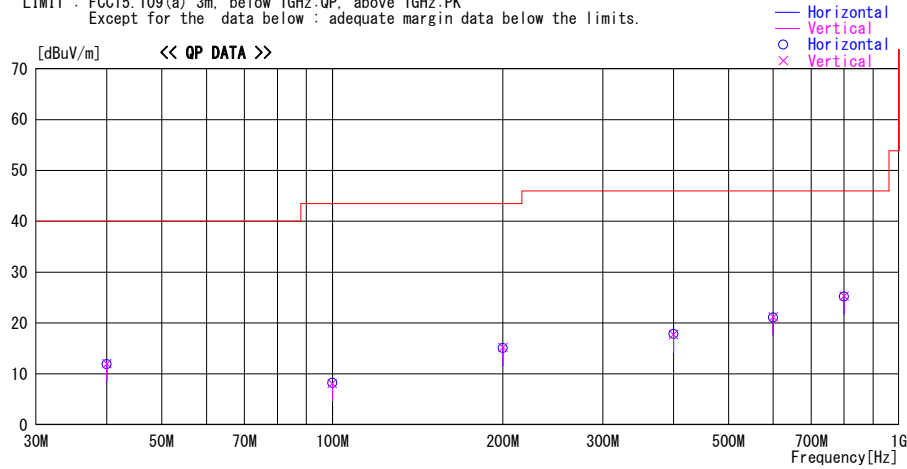
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2015/10/18

Report No. : 11012811H
 Temp./Humi. : 21deg. C / 59% RH
 Engineer : Satofumi Matsuyama

Mode / Remarks : 1) (Refer to Section 4, Clause 4.1)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
 Except for the data below : adequate margin data below the limits.



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]	
40.000	22.5	QP	14.5	-25.0	12.0	0	100	Vert.	40.0	28.0	No Signal
40.000	22.4	QP	14.5	-25.0	11.9	0	300	Hori.	40.0	28.1	No Signal
100.000	22.4	QP	10.1	-24.3	8.2	0	300	Hori.	43.5	35.3	No Signal
100.000	22.3	QP	10.1	-24.3	8.1	0	100	Vert.	43.5	35.4	No Signal
200.000	21.7	QP	16.5	-23.1	15.1	0	300	Hori.	43.5	28.4	No Signal
200.000	21.8	QP	16.5	-23.1	15.2	0	100	Vert.	43.5	28.3	No Signal
400.000	21.5	QP	17.6	-21.4	17.7	0	200	Vert.	46.0	28.3	No Signal
400.000	21.6	QP	17.6	-21.4	17.8	0	200	Hori.	46.0	28.2	No Signal
600.000	22.0	QP	19.5	-20.3	21.2	0	200	Vert.	46.0	24.8	No Signal
600.000	21.9	QP	19.5	-20.3	21.1	0	200	Hori.	46.0	24.9	No Signal
800.000	21.8	QP	22.2	-18.7	25.3	0	200	Vert.	46.0	20.7	No Signal
800.000	21.7	QP	22.2	-18.7	25.2	0	200	Hori.	46.0	20.8	No Signal

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

*The limit is rounded down to one decimal place.

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

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Radiated Emission
 (Above 1GHz)

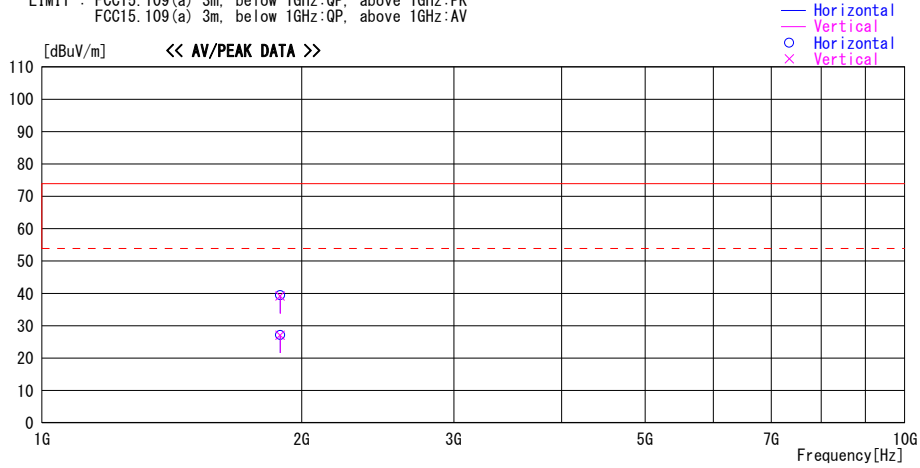
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2015/10/19

Report No. : 11012811H
 Temp./Humi. : 22deg. C / 53% RH
 Engineer : Shinya Watanabe

Mode / Remarks : 1) (Refer to Section 4, Clause 4.1)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
 FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency	Reading	DET	Antenna	Loss &	Level	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain							
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
1888.200	43.3	PK	26.3	-30.2	39.4	0	100	Hori.	73.9	34.5	NS
1888.200	43.1	PK	26.3	-30.2	39.2	0	100	Vert.	73.9	34.7	NS
1888.200	31.0	AV	26.3	-30.2	27.1	0	100	Hori.	53.9	26.8	NS
1888.200	31.0	AV	26.3	-30.2	27.1	0	100	Vert.	53.9	26.8	NS

NS: No signal detected

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

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

Radiated Emission
(Below 1GHz)

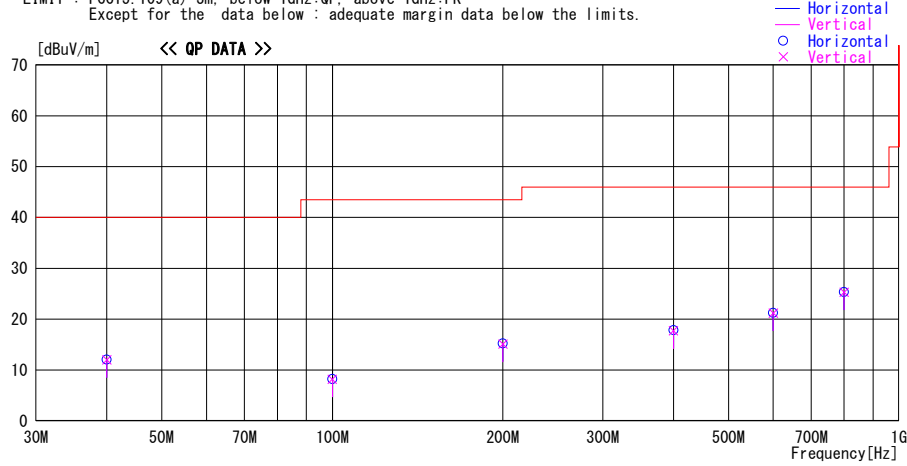
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Report No. : 11012811H
Temp./Humi. : 21deg. C / 59% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : 2) (Refer to Section 4, Clause 4.1)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
Except for the data below : adequate margin data below the limits.



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss & Gain [dB]							
40.000	22.5	QP	14.5	-25.0	12.0	0	100	Vert.	40.0	28.0	No Signal
40.000	22.5	QP	14.5	-25.0	12.0	0	300	Hori.	40.0	28.0	No Signal
100.000	22.4	QP	10.1	-24.3	8.2	0	300	Hori.	43.5	35.3	No Signal
100.000	22.4	QP	10.1	-24.3	8.2	0	100	Vert.	43.5	35.3	No Signal
200.000	21.8	QP	16.5	-23.1	15.2	0	300	Hori.	43.5	28.3	No Signal
200.000	21.7	QP	16.5	-23.1	15.1	0	100	Vert.	43.5	28.4	No Signal
400.000	21.5	QP	17.6	-21.4	17.7	0	200	Vert.	46.0	28.3	No Signal
400.000	21.6	QP	17.6	-21.4	17.8	0	200	Hori.	46.0	28.2	No Signal
600.000	22.0	QP	19.5	-20.3	21.2	0	200	Vert.	46.0	24.8	No Signal
600.000	22.0	QP	19.5	-20.3	21.2	0	200	Hori.	46.0	24.8	No Signal
800.000	21.8	QP	22.2	-18.7	25.3	0	200	Vert.	46.0	20.7	No Signal
800.000	21.8	QP	22.2	-18.7	25.3	0	200	Hori.	46.0	20.7	No Signal

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

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

Radiated Emission
(Above 1GHz)

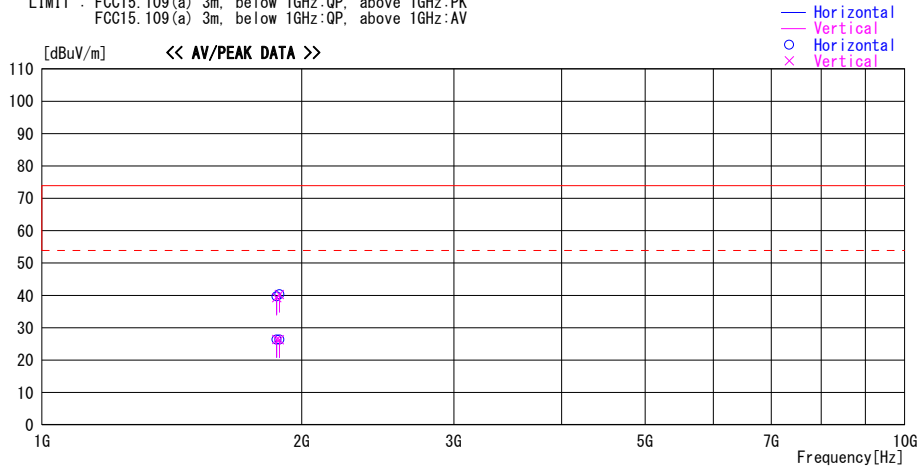
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Report No. : 11012811H
Temp./Humi. : 22deg. C / 53% RH
Engineer : Shinya Watanabe

Mode / Remarks : 2) (Refer to Section 4, Clause 4.1)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss & Gain [dB]							
1870.920	43.7	PK	26.3	-30.3	39.7	0	100	Hori.	73.9	34.2	NS
1870.920	43.3	PK	26.3	-30.3	39.3	0	100	Vert.	73.9	34.6	NS
1870.920	30.4	AV	26.3	-30.3	26.4	0	100	Hori.	53.9	27.5	NS
1870.920	30.4	AV	26.3	-30.3	26.4	0	100	Vert.	53.9	27.5	NS
1884.420	44.2	PK	26.3	-30.2	40.3	0	100	Hori.	73.9	33.6	NS
1884.420	44.2	PK	26.3	-30.2	40.3	0	100	Vert.	73.9	33.6	NS
1884.420	30.2	AV	26.3	-30.2	26.3	0	100	Hori.	53.9	27.6	NS
1884.420	30.2	AV	26.3	-30.2	26.3	0	100	Vert.	53.9	27.6	NS

NS: No signal detected

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

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

Antenna Terminal Conducted Emission (Below 1GHz)

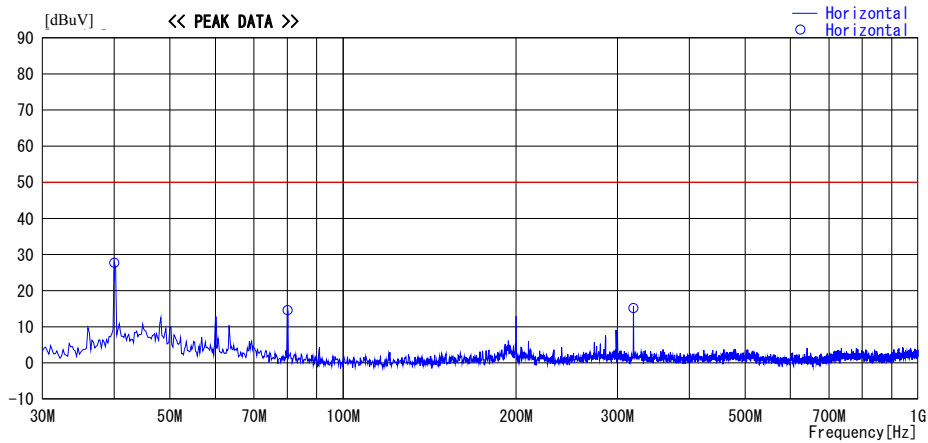
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.7 shielded room
 Date : 2015/10/21

Report No. : 11012811H
 Temp./Humi. : 23deg. C / 51% RH
 Engineer : Shinya Watanabe

Mode / Remarks : 1) (Refer to Section 4, Clause 4.1)

LIMIT : FCC15.111 Antenna terminal measurement
 All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Gain [dB]					
40.060	49.8	PK	0.0	-22.1	27.7	-	50.0	22.3	
80.100	36.6	PK	0.0	-22.0	14.6	-	50.0	35.4	
320.000	36.9	PK	0.0	-21.7	15.2	-	50.0	34.8	

CALCULATION: RESULT = READING + LOSS & GAIN(CABLE+ATTEN. - GAIN (AMP))

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Antenna Terminal Conducted Emission
 (Above 1GHz)

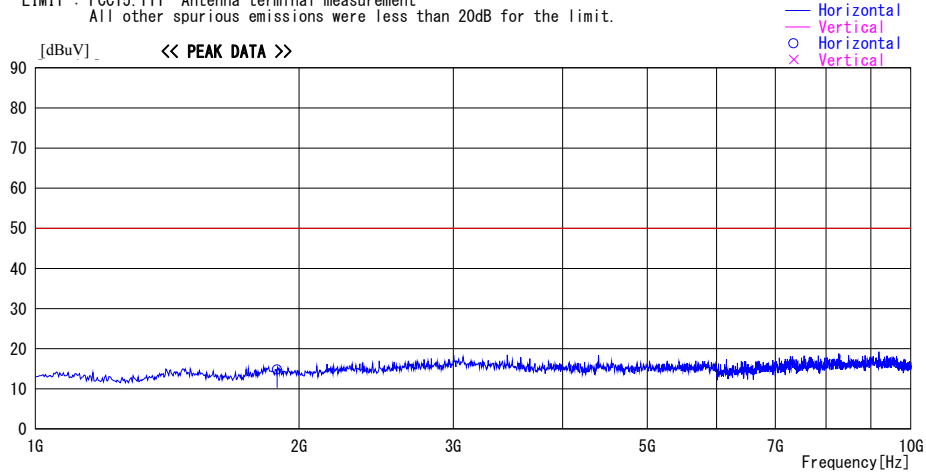
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.7 shielded room
 Date : 2015/10/21

Report No. : 11012811H
 Temp./Humi. : 23deg. C / 51% RH
 Engineer : Shinya Watanabe

Mode / Remarks : 1) (Refer to Section 4, Clause 4.1)

LIMIT : FCC15.111 Antenna terminal measurement
 All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Gain [dB]					
1888.200	36.2	PK	0.0	-21.4	14.8	-	50.0	35.2	

CALCULATION: RESULT = READING + LOSS & GAIN(CABLE+ATTEN. - GAIN (AMP))

Antenna Terminal Conducted Emission (Below 1GHz)

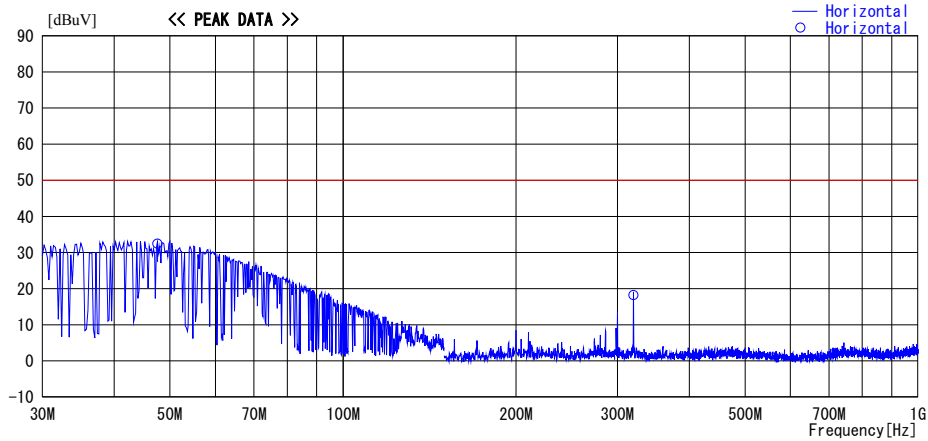
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.7 shielded room
 Date : 2015/10/21

Report No. : 11012811H
 Temp./Humi. : 23deg. C / 51% RH
 Engineer : Shinya Watanabe

Mode / Remarks : 2) (Refer to Section 4, Clause 4.1)

LIMIT : FCC15.111 Antenna terminal measurement
 All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Gain [dB]					
47.600	54.5	PK	0.0	-22.1	32.4	-	50.0	17.6	
320.000	39.9	PK	0.0	-21.7	18.2	-	50.0	31.8	

CALCULATION: RESULT = READING + LOSS & GAIN(CABLE+ATTEN. - GAIN (AMP))

Antenna Terminal Conducted Emission
 (Above 1GHz)

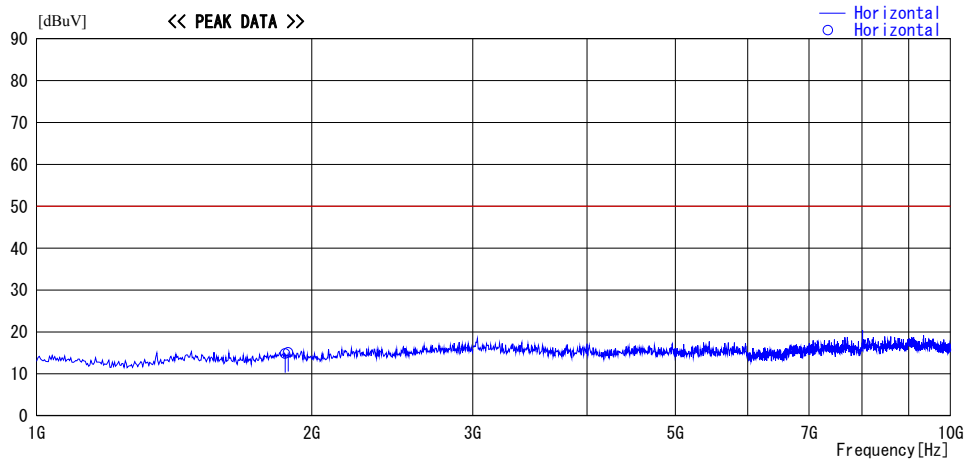
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.7 shielded room
 Date : 2015/10/21

Report No. : 11012811H
 Temp./Humi. : 23deg. C / 51% RH
 Engineer : Shinya Watanabe

Mode / Remarks : 2) (Refer to Section 4, Clause 4.1)

LIMIT : FCC15.111 Antenna terminal measurement
 All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV]	Polar.	Limit	Margin	Comment
			Factor [dB/m]	Gain [dB]			[dBuV/m]	[dB]	
1870.920	36.3	PK	0.0	-21.5	14.8	-	50.0	35.2	
1884.420	36.5	PK	0.0	-21.4	15.1	-	50.0	34.9	

CALCULATION: RESULT = READING + LOSS & GAIN(CABLE+ATTEN. - GAIN (AMP))

APPENDIX 2: 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	2015/10/01 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2015/01/13 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/AT	-
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	RE	2015/10/07 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2014/10/18 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2014/10/18 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2015/07/13 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2015/04/08 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2015/03/10 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2015/01/16 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2015/05/18 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2015/05/21 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2015/03/19 * 12
MOS-34	Thermo-Hygrometer	Custom	CTH-201	3401	AT	2015/01/13 * 12
MRENT-126	Spectrum Analyzer	KEYSIGHT	E4440A	MY46185516	AT	2015/07/31 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	AT	2014/11/19 * 12
MCC-38	Coaxial Cable	UL Japan	-	-	AT	2014/12/02 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	AT	2015/03/09 * 12
MAT-25	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71642	AT	2015/06/18 * 12
MCC-66	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28636/2	AT	2015/04/02 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	AT	2015/03/19 * 12

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

All equipment is calibrated with valid calibrations. Each measurement data 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

AT: Antenna Terminal

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