RADIO TEST REPORT

Test Report No. : 11745236H-A-R1

Applicant	:	**OMRON Automotive Electronics Co. Ltd.**
Type of Equipment	:	**UNIT ASSY**
Model No.	:	**GHR-H014-R**
FCC ID	:	**OUCGHR-H014R**
Test regulation	:	**FCC Part 15 Subpart C: 2017**
Test Result	:	**Complied**

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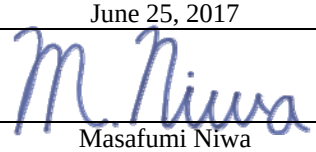
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11745236H-A.

Date of test: June 25, 2017

Representative test engineer:



Masafumi Niwa
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/

REVISION HISTORY

Original Test Report No.: 11745236H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11745236H-A	July 14, 2017	-	-
1	11745236H-A-R1	July 26, 2017	P.5	Correction of FCC Part 15.31 (e) in Clause 3.2

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CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	OMRON Automotive Electronics Co. Ltd.
Address	:	6368 NENJOZAKA OKUSA KOMAKI AICHI, 485-0802 JAPAN
Telephone Number	:	+81-568-78-6159
Facsimile Number	:	+81-568-78-7659
Contact Person	:	Takashi Betsui

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

2.1 Identification of E.U.T.

Type of Equipment	:	UNIT ASSY
Model No.	:	GHR-H014-R
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12.0 V
Receipt Date of Sample	:	May 30, 2017
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

Model No: GHR-H014-R (referred to as the EUT in this report) is the UNIT ASSY.

General Specification

Clock frequencies in the system	:	CPU: 8MHz

Radio Specification

[LF Transmitter]

Radio Type	:	Transmitter
Frequency of Operation	:	125 kHz
Modulation	:	ASK
Method of Frequency Generation	:	Crystal Resonator
Antenna Type	:	Ferrite bar antenna

[RF Receiver]*

Radio Type	:	Receiver
Frequency of Operation	:	314.975 MHz
Method of Frequency Generation	:	Crystal

*The test of receiver part was performed separately from this test report, and the conformability is confirmed.

UNIT ASSY (model: GHR-H014-R) consists of the following parts:

- BCM (included UHF Receiver)
- LF ANT (Front)
- LF ANT (Rear)

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted Emission Section 15.209 Radiated emission limits, general requirements

* The revision on June 14, 2017, does not affect the test specification applied to the EUT.

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted Emission	<FCC> ANSI C63.10:2013 6 Standard test methods <IC> RSS-Gen 8.8	<FCC> Section 15.207 <IC> RSS-Gen 8.8	-	N/A *1)	N/A	N/A
2	Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.10:2013 6 Standard test methods <IC> RSS-Gen 6.4, 6.12	<FCC> Section 15.209 <IC> RSS-210 4.4 RSS-Gen 8.9	Radiated	N/A	11.0 dB 125 kHz 0 deg. PK with Duty factor <LF ANT (Rear)>	Complied
3	Electric Field Strength of Spurious Emission	<FCC> ANSI C63.10:2013 6 Standard test methods <IC> RSS-Gen 6.4, 6.13	<FCC> Section 15.209 <IC> RSS-210 4.4 RSS-Gen 8.9	Radiated	N/A	14.9 dB 32.097 MHz Vertical, QP <LF ANT (Rear)>	Complied
4	-26dB Bandwidth	<FCC> ANSI C63.10:2013 6 Standard test methods <IC> -	<FCC> Reference data <IC> -	Radiated	N/A	N/A	N/A

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*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.

FCC Part 15.31 (e)
The EUT provides stable voltage (DC 6 V) constantly to the wireless transmitter regardless of input voltage.
Instead of a new battery, DC power supply was used for the test.
That does not affect the test result, therefore the 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 vehicle. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99 % Occupied Band Width	RSS-Gen 6.6	-	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 distance	Radiated emission (+/-)
	9 kHz - 30 MHz
3 m	3.8 dB
10 m	3.7 dB

*Measurement distance

Polarity	Radiated emission (Below 1 GHz)			
	(3 m*)(+/-)		(10 m*)(+/-)	
	30 MHz - 200 MHz	200 MHz - 1000 MHz	30 MHz - 200 MHz	200 MHz - 1000 MHz
Horizontal	5.0 dB	5.3 dB	5.0 dB	5.0 dB
Vertical	4.7 dB	5.9 dB	5.0 dB	5.1 dB

Radiated emission (Above 1 GHz)				
(3 m*)(+/-)		(1 m*)(+/-)		(10 m*)(+/-)
1 GHz - 6 GHz	6 GHz - 18 GHz	10 GHz - 26.5 GHz	26.5 GHz - 40 GHz	1 GHz -18 GHz
5.2 dB	5.4 dB	5.5 dB	5.5 dB	5.4 dB

* Measurement distance

Radiated emission test(3 m)
The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999 Facsimile : +81 596 24 8124

	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	-	8.0 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.

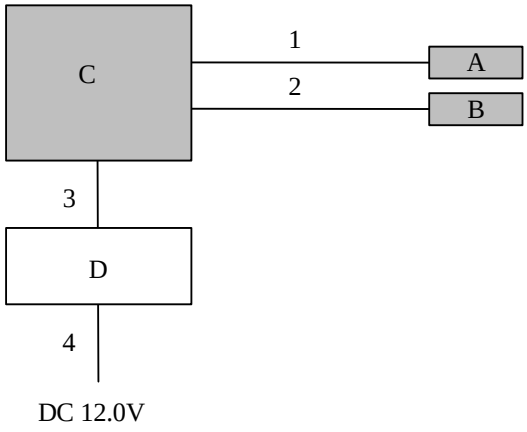
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

Test mode	Remarks
Transmitting mode (Tx) 125 kHz	-

Justification : The system was configured in typical fashion (as a user 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.

* The EUT does not transmit simultaneously from two antennas.
* Antennas were evaluated with the worst duty respectively.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	LF Antenna (Front)	38387-TYO-J01	No.1	OMRON Automotive Electronics Co. Ltd.	EUT
B	LF Antenna (Rear)	38389-MKC-A01	No.1	OMRON Automotive Electronics Co. Ltd.	EUT
C	ECU	GHR-H014-R01	No.3	OMRON Automotive Electronics Co. Ltd.	EUT
D	ECU Simulator	-	No.3	OMRON Automotive Electronics Co. Ltd.	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Antenna Cable	1.0	Unshielded	Unshielded	-
2	Antenna Cable	1.4	Unshielded	Unshielded	-
3	Signal Cable	1.6	Unshielded	Unshielded	-
4	DC Cable	2.0	Unshielded	Unshielded	-

SECTION 5: Radiated emission (Fundamental and Spurious Emission)

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

Frequency : From 9 kHz to 30 MHz
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: 0 deg., 45 deg., 90 deg., and 135 deg.) and horizontal polarization.
*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency: From 30 MHz to 1 GHz
The measuring antenna height varied between 1 and 4 m 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.

The test was made with the detector (RBW / VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	Below 30 MHz	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

Frequency	From 9 kHz to 90 kHz and From 110 kHz to 150 kHz	From 90 kHz to 110 kHz	From 150 kHz to 490 kHz	From 490 kHz to 30 MHz	From 30 MHz to 1 GHz	Above 1 GHz	
Instrument used	Test Receiver					Spectrum Analyzer	
Detector	PK / AV	QP	PK / AV	QP	QP	PK	AV
IF Bandwidth	200 Hz	200 Hz	9 kHz	9 kHz	120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 10 Hz
Test Distance	3 m *1)	3 m *1)	3 m *1)	3 m *2)	3 m	3 m	3 m

*1) Distance Factor: 40 x log (3 m / 300 m) = -80 dB
*2) Distance Factor: 40 x log (3 m / 30 m) = -40 dB

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane.
However test results were confirmed to pass against standard limit.

- The carrier level and 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.

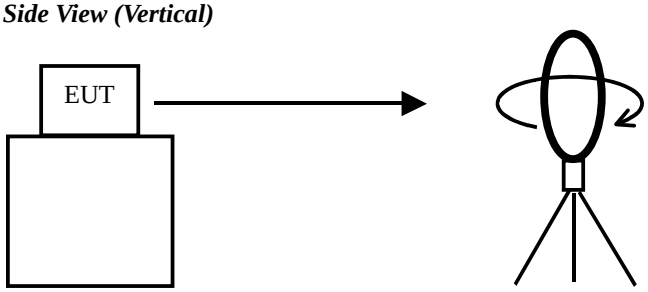
The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 9 kHz - 1 GHz
Test data : APPENDIX 1
Test result : Pass

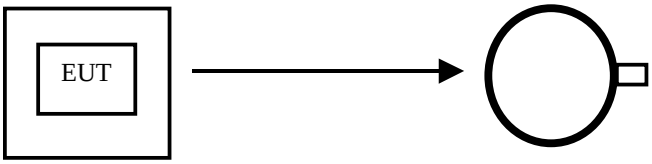
Date: June 25, 2017 Test engineer: Masafumi Niwa

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

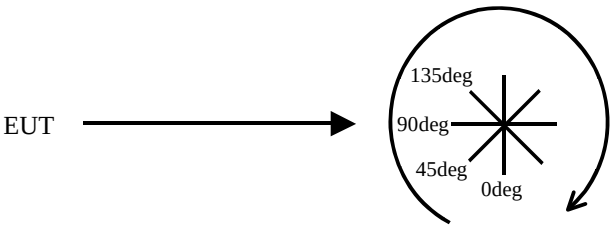


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

SECTION 6: -26dB Bandwidth

Test Procedure

The test was measured with a spectrum analyzer using a test fixture.

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
-26 dB Bandwidth	50 kHz	510 Hz	1.5 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

Test data : APPENDIX 1
Test result : Pass

SECTION 7: 99% Occupied Bandwidth

Test Procedure

The test was measured with a spectrum analyzer using a test fixture.

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
99 % Occupied Bandwidth	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100 %. Peak hold was applied as Worst-case measurement.							

Test data : APPENDIX 1
Test result : Pass

APPENDIX 1: Test data

Radiated Emission below 30 MHz (Fundamental and Spurious Emission)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Order No.	11745236H
Date	25/06/2017
Temperature/ Humidity	22 deg. C / 65 % RH
Engineer	Masafumi Niwa
Mode	Tx 125 kHz LF ANT (Front)

PK or QP

Ant Deg [deg] or Polarity [Hori/Vert	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	0.12500	PK	100.7	19.7	-73.7	32.2	-	14.5	45.6	31.1	Fundamental
0	0.25000	PK	63.1	19.6	-73.7	32.2	-	-23.2	39.6	62.8	
0	0.37500	PK	59.3	19.6	-73.7	32.2	-	-27.0	36.1	63.1	
0	0.50000	QP	44.7	19.5	-33.7	32.1	-	-1.6	33.6	35.2	
0	0.62500	QP	43.8	19.5	-33.7	32.2	-	-2.6	31.7	34.3	
0	0.75000	QP	40.6	19.5	-33.7	32.2	-	-5.8	30.1	35.9	
0	0.87500	QP	35.4	19.5	-33.6	32.2	-	-10.9	28.7	39.6	
0	1.00000	QP	37.6	19.5	-33.6	32.2	-	-8.7	27.6	36.3	
0	1.12500	QP	31.4	19.5	-33.6	32.2	-	-14.9	26.5	41.4	
0	1.25000	QP	35.3	19.5	-33.6	32.2	-	-11.0	25.6	36.6	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + D.Factor) - Gain(Amprifier)

PK with Duty factor

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	0.125	AV	100.7	19.7	-73.7	32.2	0.0	14.5	25.6	11.1	
0	0.250	AV	63.1	19.6	-73.7	32.2	0.0	-23.2	19.6	42.8	
0	0.375	AV	59.3	19.6	-73.7	32.2	0.0	-27.0	16.1	43.1	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + D.Factor) - Gain(Amprifier) + Duty factor *

* Since the peak emission result satisfied the average limit, duty factor was omitted.

Result of the fundamental emission at 3m without Distance factor

PK or QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	0.12500	PK	100.7	19.7	6.3	32.2	-	94.5	-	-	Fundamental

Result = Reading + Ant Factor + Loss (Cable + Attenuator) - Gain(Amprifier)

* All spurious emissions lower than this result.

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

Radiated Emission below 30 MHz (Fundamental and Spurious Emission)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Order No.	11745236H
Date	25/06/2017
Temperature/ Humidity	22 deg. C / 65 % RH
Engineer	Masafumi Niwa
Mode	Tx 125 kHz LF ANT (Rear)

PK or QP

Ant Deg [deg] or Polarity [Hori/Vert	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	0.12500	PK	100.8	19.7	-73.7	32.2	-	14.6	45.6	31.0	Fundamental
0	0.25000	PK	63.5	19.6	-73.7	32.2	-	-22.8	39.6	62.4	
0	0.37500	PK	59.4	19.6	-73.7	32.2	-	-26.9	36.1	63.0	
0	0.50000	QP	45.1	19.5	-33.7	32.1	-	-1.2	33.6	34.8	
0	0.62500	QP	44.2	19.5	-33.7	32.2	-	-2.2	31.7	33.9	
0	0.75000	QP	40.8	19.5	-33.7	32.2	-	-5.6	30.1	35.7	
0	0.87500	QP	35.9	19.5	-33.6	32.2	-	-10.4	28.7	39.1	
0	1.00000	QP	38.0	19.5	-33.6	32.2	-	-8.3	27.6	35.9	
0	1.12500	QP	31.4	19.5	-33.6	32.2	-	-14.9	26.5	41.4	
0	1.25000	QP	35.6	19.5	-33.6	32.2	-	-10.7	25.6	36.3	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + D.Factor) - Gain(Amprifier)

PK with Duty factor

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	0.125	AV	100.8	19.7	-73.7	32.2	0.0	14.6	25.6	11.0	
0	0.250	AV	63.5	19.6	-73.7	32.2	0.0	-22.8	19.6	42.4	
0	0.375	AV	59.4	19.6	-73.7	32.2	0.0	-26.9	16.1	43.0	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + D.Factor) - Gain(Amprifier) + Duty factor *

* Since the peak emission result satisfied the average limit, duty factor was omitted.

Result of the fundamental emission at 3m without Distance factor

PK or QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	0.12500	PK	100.8	19.7	6.3	32.2	-	94.6	-	-	Fundamental

Result = Reading + Ant Factor + Loss (Cable + Attenuator) - Gain(Amprifier)

* All spurious emissions lower than this result.

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

Radiated Emission above 30 MHz (Spurious Emission)

LF ANT (Front)

DATA OF RADIATED EMISSION TEST

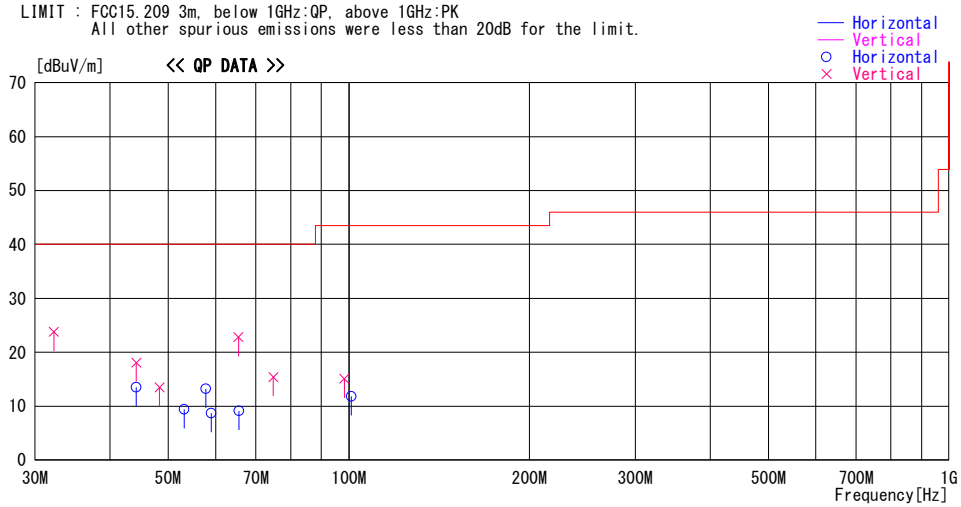
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2017/06/25

Report No. : 11745236H

Temp./Humi. : 24 deg. C / 55 % RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 125 kHz LF ANT (Front) Worst Axis (Ant Hori: Y, Vert: Y / ECU: Hori: Z, Vert: Z)

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



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
32.264	38.1	QP	17.1	-31.4	23.8	263	100	Vert.	40.0	16.2	
44.247	31.8	QP	12.8	-31.1	13.5	0	335	Hori.	40.0	26.5	
44.251	36.4	QP	12.8	-31.1	18.1	312	100	Vert.	40.0	21.9	
48.385	33.4	QP	11.2	-31.1	13.5	242	100	Vert.	40.0	26.5	
53.194	30.9	QP	9.5	-31.0	9.4	0	100	Hori.	40.0	30.6	
57.796	36.1	QP	8.0	-30.9	13.2	0	361	Hori.	40.0	26.8	
58.995	31.9	QP	7.7	-30.9	8.7	359	391	Hori.	40.0	31.3	
65.626	33.3	QP	6.6	-30.8	9.1	325	322	Hori.	40.0	30.9	
65.498	46.9	QP	6.7	-30.8	22.8	229	100	Vert.	40.0	17.2	
74.875	39.6	QP	6.4	-30.6	15.4	280	100	Vert.	40.0	24.6	
98.325	35.8	QP	9.7	-30.4	15.1	318	100	Vert.	43.5	28.4	
101.024	32.0	QP	10.1	-30.3	11.8	339	173	Hori.	43.5	31.7	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-200MHz:BICONICAL, 200MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION : RESULT = READING + ANT FACTOR + LOSS & GAIN(CABLE - GAIN(AMP) + D.factor)

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

Radiated Emission above 30 MHz (Spurious Emission)

LF ANT (Rear)

DATA OF RADIATED EMISSION TEST

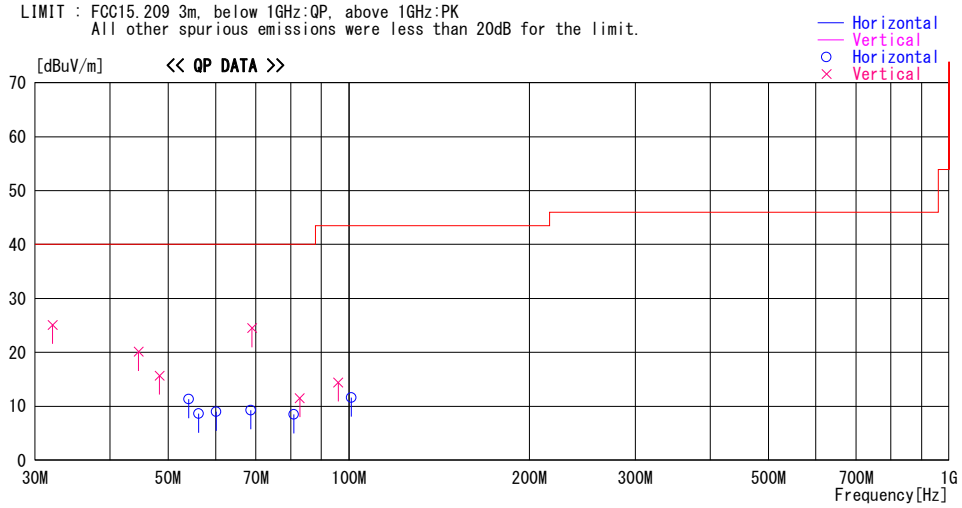
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2017/06/25

Report No. : 11745236H

Temp./Humi. : 24 deg. C / 55 % RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 125 kHz LF ANT (Rear) Worst Axis (Ant Hori: X, Vert: X / ECU: Hori: Z, Vert: Z)

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



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
32.097	39.3	QP	17.2	-31.4	25.1	290	100	Vert.	40.0	14.9	
44.625	38.5	QP	12.7	-31.1	20.1	225	100	Vert.	40.0	19.9	
48.378	35.6	QP	11.2	-31.1	15.7	0	100	Vert.	40.0	24.3	
54.078	33.1	QP	9.2	-31.0	11.3	0	100	Hori.	40.0	28.7	
56.241	31.0	QP	8.5	-30.9	8.6	0	367	Hori.	40.0	31.4	
60.074	32.4	QP	7.4	-30.8	9.0	0	391	Hori.	40.0	31.0	
68.624	33.7	QP	6.3	-30.7	9.3	0	273	Hori.	40.0	30.7	
68.999	49.0	QP	6.2	-30.7	24.5	236	100	Vert.	40.0	15.5	
80.999	32.1	QP	6.9	-30.5	8.5	182	252	Hori.	40.0	31.5	
82.874	34.8	QP	7.2	-30.5	11.5	268	119	Vert.	40.0	28.5	
96.000	35.4	QP	9.4	-30.4	14.4	287	100	Vert.	43.5	29.1	
101.013	31.8	QP	10.1	-30.3	11.6	172	339	Hori.	43.5	31.9	

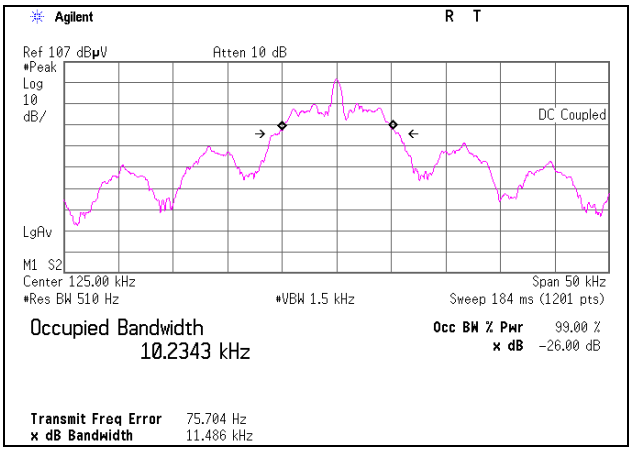
CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-200MHz:BICONICAL, 200MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION : RESULT = READING + ANT FACTOR + LOSS & GAIN(CABLE - GAIN(AMP) + D.factor)

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

-26 dB Bandwidth and 99 % Occupied Bandwidth

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Order No.	11745236H
Date	25/06/2017
Temperature/ Humidity	22 deg. C / 65 % RH
Engineer	Masafumi Niwa
Mode	Tx 125 kHz LF ANT (Front)

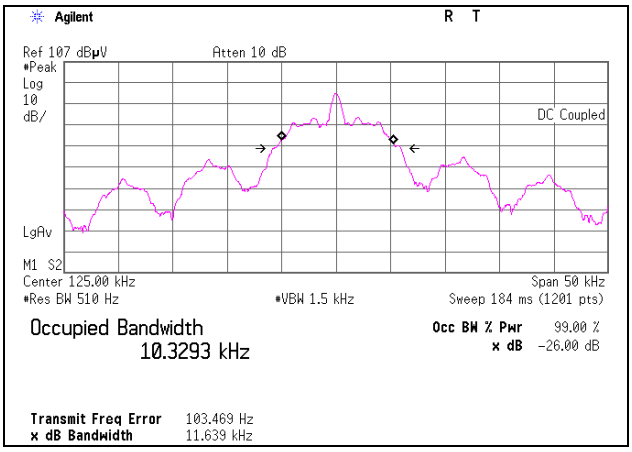
-26 dB Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]
11.486	10.2343



-26 dB Bandwidth and 99 % Occupied Bandwidth

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Order No.	11745236H
Date	25/06/2017
Temperature/ Humidity	22 deg. C / 65 % RH
Engineer	Masafumi Niwa
Mode	Tx 125 kHz LF ANT (Rear)

-26 dB Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]
11.639	10.3293



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2016/10/19 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2017/01/20 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MTR-10	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	RE	2017/01/12 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2016/10/14 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(5m)/ 421-010(1m)/ sucoform141-PE(1m)/ RFM-E121(Switcher)	-/04178	RE	2016/07/20 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2017/06/12 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2017/03/27 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2017/01/19 * 12
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2016/09/30 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE	2017/01/20 * 12
MJM-25	Measure	KOMELON	KMC-36	-	RE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	RE	2016/06/25 * 12
KBA-05	Biconical Antenna	Schwarzbeck	BBA9106	2513	RE	2016/11/23 * 12
MLA-20	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-189	RE	2017/01/05 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2016/11/28 * 12
MCC-02	Coaxial Cable	Suhner/storm/Agilent /TSJ	-	-	RE	2016/09/09 * 12
MPA-19	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	RE	2017/02/08 * 12
MMM-03	Digital Tester	Fluke	FLUKE 26-3	78030621	RE	2016/08/23 * 12
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	RE	2016/10/14 * 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: Spurious emission