RADIO TEST REPORT

Test Report No. : 11990775H-A-R1

Applicant	:	**OMRON Automotive Electronics Co. Ltd.**
Type of Equipment	:	**FOB**
Model No.	:	**R55R3**
Test regulation	:	**FCC Part 15 Subpart C: 2017**
FCC ID	:	**OUCR55R3**
Test Result	:	**Complied**

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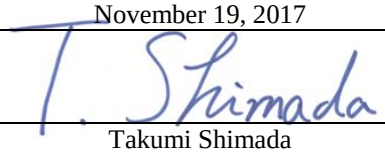
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, 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 11990775H-A. 11990775H-A is replaced with this report.

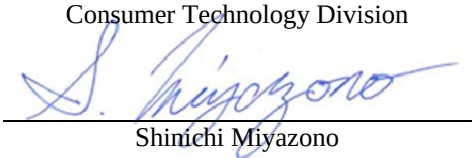
Date of test: November 19, 2017

Representative test engineer:



Takumi Shimada
Engineer
Consumer Technology Division

Approved by:



Shinichi Miyazono
Engineer
Consumer Technology Division

NVLAP TESTING

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.: 11990775H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11990775H-A	December 20, 2017	-	-
1	11990775H-A-R1	January 18, 2018	P.11	Replace the note with the following sentences; * The EUT transmits UHF when LF signal is received from a car or a button on the EUT is pressed. In both cases, the UHF transmission is stopped within 5 seconds. So the test was performed by a button-pressed operation as the worst case. Please refer to the “Theory of Operation” for details.

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
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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	:	Masashi Matsuda

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

2.1 Identification of E.U.T.

Type of Equipment	:	FOB
Model No.	:	R55R3
Serial No.	:	Refer to Clause 4.2
Rating	:	DC 3.0 V
Receipt Date of Sample	:	October 5, 2017
Country of Mass-production	:	Japan and India
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: R55R3 (referred to as the EUT in this report) is the FOB.

General Specification

Clock frequencies in the system	:	27.6 MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	433.92 MHz
Modulation	:	FSK
Power Supply (radio part input)	:	DC 3.0 V
Type of Battery	:	Lithium battery (CR2032)
Antenna type	:	Pattern antenna
Method of Frequency Generation	:	Crystal
Receiving frequency of Operation	:	125 kHz *1)

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

* Original model: R55R3 has four types; 2-buttons, 3-buttons (2-patterns), 4-buttons.
They are completely identical in RF characteristics.
The test was performed with the representative 2-buttons.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C FCC Part 15 final revised on November 2, 2017
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.231 Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
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	N/A*1)	-
Automatically Deactivate	**FCC:** ANSI C63.10:2013 6 Standard test methods **IC:** -	**FCC:** Section 15.231(a)(1) **IC:** RSS-210 A1.1	N/A	Complied	Radiated
Electric Field Strength of Fundamental Emission	**FCC:** ANSI C63.10:2013 6 Standard test methods **IC:** RSS-Gen 6.12	**FCC:** Section 15.231(b) **IC:** RSS-210 A1.2	6.1 dB 433.920 MHz Horizontal PK with Duty Factor	Complied	Radiated
Electric Field Strength of Spurious Emission	**FCC:** ANSI C63.10:2013 6 Standard test methods **IC:** RSS-Gen 6.13	**FCC:** Section 15.205 Section 15.209 Section 15.231(b) **IC:** RSS-210 A1.2, 4.4 RSS-Gen 8.9	4.6 dB 4339.200 MHz Vertical PK with Duty Factor	Complied	Radiated
-20dB Bandwidth	**FCC:** ANSI C63.10:2013 6 Standard test methods **IC:** -	**FCC:** Section 15.231(c) **IC:** Reference data	N/A	Complied	Radiated
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 does not have AC Mains.					

FCC Part 15.31 (e)
This test was performed with the New Battery (DC 3.0 V) during the tests. 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 EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Bandwidth	**IC:** RSS-Gen 6.6	**IC:** RSS-210 A1.3	N/A	Complied	Radiated

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.

Polarity	Radiated emission (Below 1 GHz)			
	(3 m*)(+/-)		(10 m*)(+/-)	
	30 MHz to 200 MHz	200 MHz to 1000 MHz	30 MHz to 200 MHz	200 MHz to 1000 MHz
Horizontal	5.0 dB	5.3 dB	5.0 dB	5.0 dB
Vertical	5.2 dB	6.3 dB	5.0 dB	5.0 dB

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

* Measurement distance

Radiated emission test(3 m)
[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.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124
NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m x 2.0 m 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.

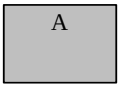
Refer to APPENDIX.

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

4.1 Operating Modes

Test Item	Mode
Automatically Deactivate	Normal use mode
Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission -20dB & 99% Occupied Bandwidth	Transmitting mode (Tx)
* The system was configured in typical fashion (as a customer would normally use it) for testing.	

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	FOB	R55R3	030 *1) 027 *2)	OMRON Automotive Electronics Co. Ltd.	EUT

*1) Used for Transmitting mode
*2) Used for Normal use mode

SECTION 5: Radiated emission (Electric Field Strength of Fundamental and Spurious Emission)

Test Procedure and conditions

[For below 1GHz]
EUT was placed on a urethane platform of nominal size, 1.5 m by 1.0 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.

[For above 1GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

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.

[Transmitting mode]
(Below 30 MHz)
The noise level was checked by moving a search-coil (Loop Antenna) close to the EUT.

(Above 30 MHz)
The Radiated Electric Field Strength has been measured on Semi anechoic chamber with a ground plane and at a distance of 3 m.
The measuring antenna height was varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization.
The radiated emission measurements were made with the following detector function of the test receiver / spectrum analyzer.

Test Antennas are used as below;

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

	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
Detector Type	Peak	Peak	Peak	Peak	Peak and Peak with Duty factor	Peak and Peak with Duty factor
IF Bandwidth	200 Hz	200 Hz	9.1 kHz	9.1 kHz	120 kHz	PK: S/A: RBW 1 MHz, VBW: 3 MHz

- 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.
Noise levels of all the frequencies were measured at the position.

This EUT has two modes which mechanical key is inserted or not. The worst case was confirmed with and without mechanical key, as a result, the test with mechanical key was the worst case. Therefore the test with mechanical key was performed only.

*The result is rounded off to the second decimal place, so some differences might be observed.

Measurement range : 9 kHz - 4.4 GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Automatically deactivate

Test Procedure

The measurement was performed with Electric field strength using a spectrum analyzer.

Test data : APPENDIX
Test result : Pass

SECTION 7: -20 dB and 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
20 dB Bandwidth	150 kHz	1.5 kHz	5.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
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.							

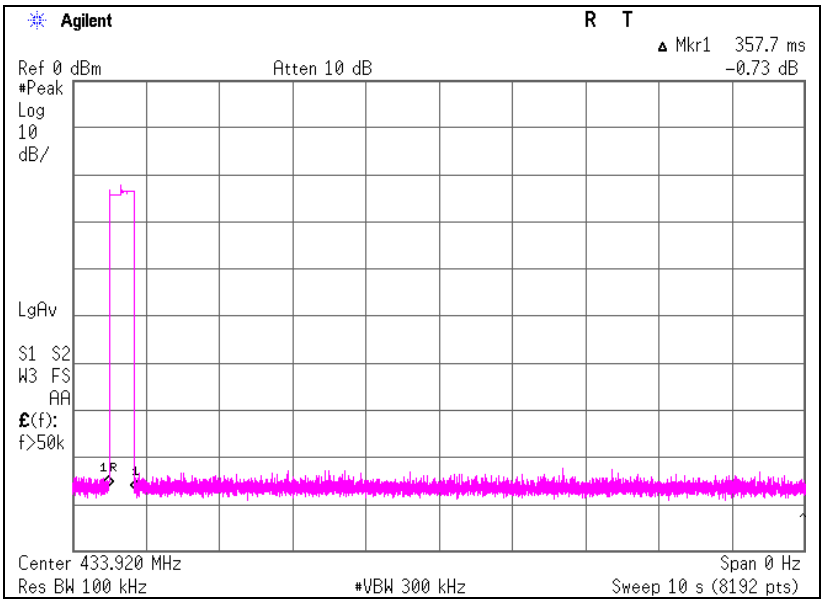
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Automatically deactivate

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11990775H
Date	11/19/2017
Temperature/ Humidity	21 deg. C / 40 % RH
Engineer	Takumi Shimada
Mode	Normal use mode

Time of Transmitting [sec]	Limit [sec]	Result
0.36	5.00	Pass



* The EUT transmits UHF when LF signal is received from a car or a button on the EUT is pressed. In both cases, the UHF transmission is stopped within 5 seconds. So the test was performed by a button-pressed operation as the worst case. Please refer to the “Theory of Operation” for details.

Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Report No.	11990775H
Date	11/19/2017
Temperature / Humidity	21 deg. C / 40 % RH
Engineer	Takumi Shimada
Mode	Tx 433.92 MHz

PK

Frequency	Detector	Reading [dBuV]		Ant Factor	Loss	Gain	Duty Factor	Result [dBuV/m]		Limit	Margin [dB]		Remark Inside or Outside
[MHz]		Hor	Ver	[dB/m]	[dB]	[dB]	[dB]	Hor	Ver	[dBuV/m]	Hor	Ver	of Restricted Bands
433.920	PK	79.6	79.2	16.4	10.8	32.1	-	74.7	74.3	100.8	26.1	26.5	Carrier
867.840	PK	37.1	35.4	21.6	13.7	31.3	-	41.1	39.4	80.8	39.7	41.4	Outside
1301.760	PK	43.0	43.7	24.9	6.2	33.9	-	40.2	40.9	73.9	33.7	33.0	Inside
1735.680	PK	46.4	46.8	26.0	5.8	32.8	-	45.4	45.8	80.8	35.4	35.0	Outside
2169.600	PK	45.5	45.3	27.2	5.8	32.2	-	46.3	46.1	80.8	34.5	34.7	Outside
2603.520	PK	45.9	45.6	27.7	6.0	32.0	-	47.6	47.3	80.8	33.2	33.5	Outside
3037.440	PK	43.6	42.4	28.3	6.1	31.8	-	46.2	45.0	80.8	34.6	35.8	Outside
3471.360	PK	43.9	44.3	28.3	6.3	31.7	-	46.8	47.2	80.8	34.0	33.6	Outside
3905.280	PK	43.9	43.9	29.1	6.5	31.6	-	47.9	47.9	73.9	26.0	26.0	Inside
4339.200	PK	43.5	43.9	30.1	6.7	31.4	-	48.9	49.3	73.9	25.0	24.6	Inside

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

PK with Duty factor

Frequency	Detector	Reading [dBuV]		Ant Factor	Loss	Gain	Duty Factor	Result [dBuV/m]		Limit	Margin [dB]		Remark
[MHz]		Hor	Ver	[dB/m]	[dB]	[dB]	[dB]	Hor	Ver	[dBuV/m]	Hor	Ver	
433.920	PK	79.6	79.2	16.4	10.8	32.1	0.0	74.7	74.3	80.8	6.1	6.5	Carrier
867.840	PK	37.1	35.4	21.6	13.7	31.3	0.0	41.1	39.4	60.8	19.7	21.4	Outside
1301.760	PK	43.0	43.7	24.9	6.2	33.9	0.0	40.2	40.9	53.9	13.7	13.0	Inside
1735.680	PK	46.4	46.8	26.0	5.8	32.8	0.0	45.4	45.8	60.8	15.4	15.0	Outside
2169.600	PK	45.5	45.3	27.2	5.8	32.2	0.0	46.3	46.1	60.8	14.5	14.7	Outside
2603.520	PK	45.9	45.6	27.7	6.0	32.0	0.0	47.6	47.3	60.8	13.2	13.5	Outside
3037.440	PK	43.6	42.4	28.3	6.1	31.8	0.0	46.2	45.0	60.8	14.6	15.8	Outside
3471.360	PK	43.9	44.3	28.3	6.3	31.7	0.0	46.8	47.2	60.8	14.0	13.6	Outside
3905.280	PK	43.9	43.9	29.1	6.5	31.6	0.0	47.9	47.9	53.9	6.0	6.0	Inside
4339.200	PK	43.5	43.9	30.1	6.7	31.4	0.0	48.9	49.3	53.9	5.0	4.6	Inside

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

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

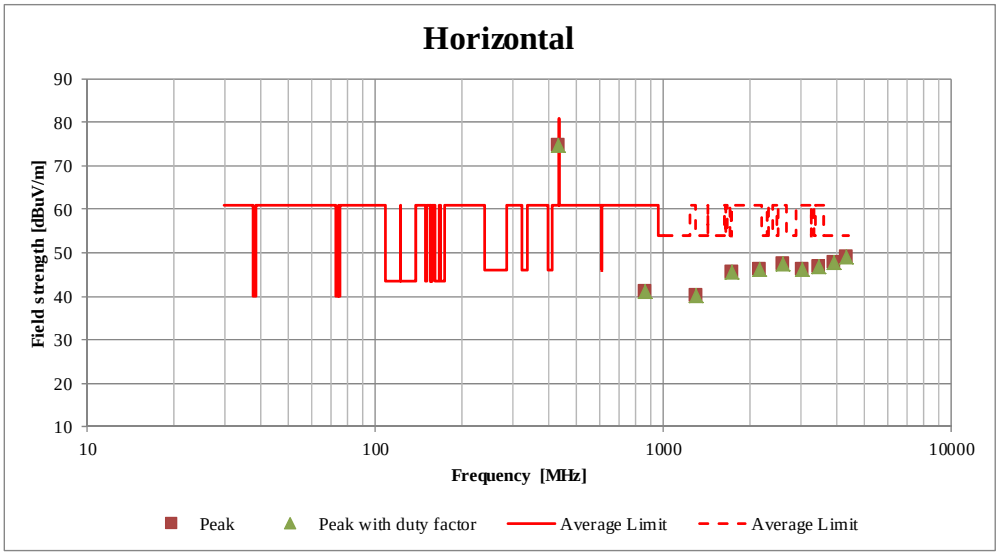
Sample calculation:
Result of PK = Reading + Ant Factor + Loss (Cable + Attenuator +Filter) - Gain (Amplifier)
Result of PK with Duty factor = Reading + Ant Factor + Loss (Cable + Attenuator + Filter) - Gain (Amplifier) + Duty factor

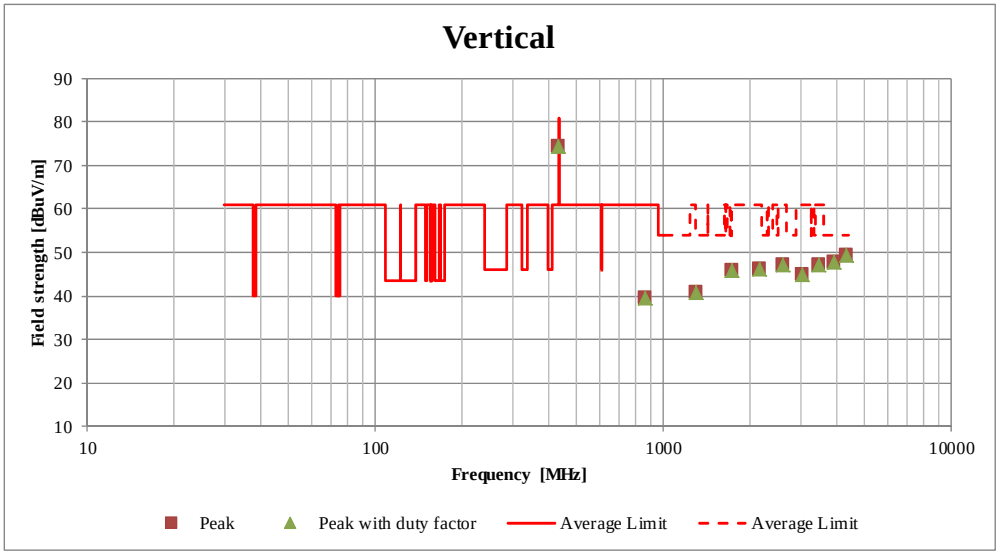
For above 1GHz : Distance Factor: 20 x log (4.0 m/3.0 m) = 2.50 dB
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Since the peak emission result satisfied the average limit, duty factor was omitted.
The result of AV (PK with Duty factor) was calculated by applying Duty 100%.

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Report No.	11990775H
Date	11/19/2017
Temperature / Humidity	21 deg. C / 40 % RH
Engineer	Takumi Shimada
Mode	Tx 433.92 MHz





*These plots data contains sufficient number to show the trend of characteristic features for EUT.

-20dB and 99% Occupied Bandwidth

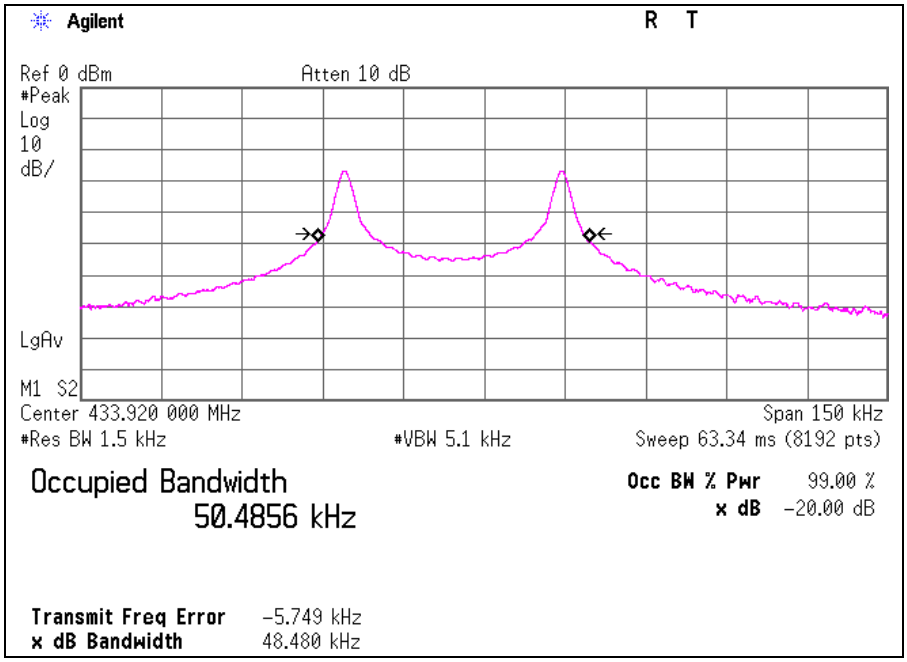
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11990775H
Date	11/19/2017
Temperature/ Humidity	21 deg. C / 40 % RH
Engineer	Takumi Shimada
Mode	Transmitting mode

Bandwidth Limit : Fundamental Frequency **433.92** MHz x 0.25% = 1084.800 kHz

* The above limit was calculated from more stringent nominal frequency.

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
48.4800	1084.800	Pass

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
50.4856	1084.800	Pass



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	2017/10/30 * 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
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2016/11/23 * 12
MLA-23	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	RE	2017/01/26 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2017/06/26 * 12
MAT-97	Attenuator	KEYSIGHT	8491A	MY52462282	RE	2017/10/12 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2017/03/27 * 12
MBF-06	Band Pass Filter	M-City	BPF0950-01	UL0002	RE	2017/03/02 * 12
MCC-38	Coaxial Cable	UL Japan	-	-	RE	2016/12/06 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2017/01/19 * 12
MRENT-140	Spectrum Analyzer	KEYSIGHT	E4440A	MY46187752	RE	2017/11/01 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2017/09/15 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2017/06/23 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2017/10/06 * 12
MHF-27	High Pass Filter(1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	RE	2017/01/16 * 12
MLPA-07	Loop Antenna	UL Japan	-	-	RE	Pre Check

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, 99 % Occupied Bandwidth, -20 dB bandwidth, and Automatically deactivate tests