



RADIO TEST REPORT

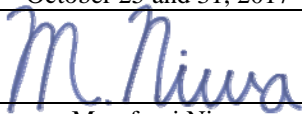
Test Report No. : 11993428H

Applicant : Honda Lock Mfg.Co.,Ltd.
Type of Equipment : Smart system (FOB)
Model No. : HLSS-2B
Test regulation : FCC Part 15 Subpart C: 2017
FCC ID : MLBHLSS-2B
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)

Date of test: October 25 and 31, 2017

Representative test engineer:


Masafumi Niwa
Engineer
Consumer Technology Division

Approved by:


Shinichi Miyazono
Engineer
Consumer Technology Division



NVLAP LAB CODE: 200572-0

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UL Japan, Inc.

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11993428H

[illegible]

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SECTION 1: Customer information

Company Name : Honda Lock Mfg.Co.,Ltd.
Address : 3700,Shimonaka, Sadowara-cho Miyazak-shi, Miyazaki Pref,880-0293
Japan
Telephone Number : +81-50-3757-5700
Facsimile Number : +81-28-680-1045
Contact Person : Sadanori Watarai

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

2.1 Identification of E.U.T.

Type of Equipment : Smart system (FOB)
Model No. : HLSS-2B
Serial No. : Refer to Clause 4.2
Rating : DC 3 V (CR2032)
Receipt Date of Sample : October 23, 2017
Country of Mass-production : Vietnam
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: HLSS-2B (referred to as the EUT in this report) is the Smart system (FOB).

General Specification

Clock frequencies in the system : 16 MHz (CPU), 13.0000 MHz (XTAL)

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 433.92 MHz
Modulation : FSK
Power Supply (radio part input) : DC 3.0 V
Antenna type : Pattern antenna

Radio Type : Receiver
Frequency of Operation : 125 kHz *1)

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

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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.

* The revision on November 2, 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

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.207	N/A	N/A*1)	-
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8			
Automatically Deactivate	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.231(a)(1)	N/A	Complied	Radiated
	IC: -	IC: RSS-210 A1.1			
Electric Field Strength of Fundamental Emission	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.231(b)	2.9 dB PK with Duty factor Horizontal	Complied	Radiated
	IC: RSS-Gen 6.12	IC: RSS-210 A1.2			
Electric Field Strength of Spurious Emission	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.205 Section 15.209 Section 15.231(b)	6.2 dB 4339.200 MHz PK with Duty factor Horizontal	Complied	Radiated
	IC: RSS-Gen 6.13	IC: RSS-210 A1.2, 4.4 RSS-Gen 8.9			
-20dB Bandwidth	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.231(c)	N/A	Complied	Radiated
	IC: -	IC: Reference data			

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

The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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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 report meets the limits unless the uncertainty is taken into consideration.

[Electric Field Strength of Spurious Emission]

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

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3.5 Test Location

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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 2.0m 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.

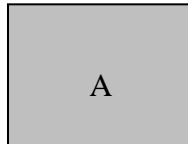
Refer to APPENDIX.

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

4.1 Operating Modes

Test Item	Mode
Automatically Deactivate	Normal use mode, 433.92 MHz
Electric Field Strength of Fundamental Emission Electric Field Strength of Spurious Emission -20dB & 99% Occupied Bandwidth	Transmitting mode (Tx), 433.92 MHz *1)
* The system was configured in typical fashion (as a customer would normally use it) for testing. * 1) End users cannot change the settings of the output power of the product.	

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	Smart system (FOB)	HLSS-2B	2B-TM01 *1) 2B-NM01 *2)	Honda Lock Mfg.Co.,Ltd.	EUT

*1) Used for Transmitting mode.

*2) Used for Normal use mode.

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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, 0.5 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	Below 30 MHz	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	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.

*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

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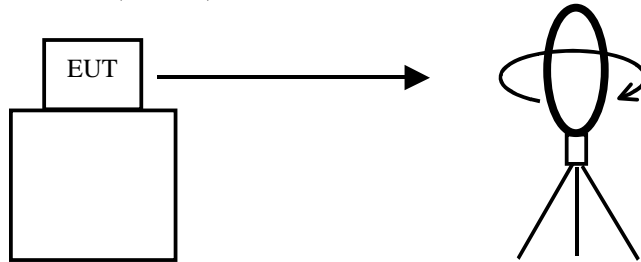
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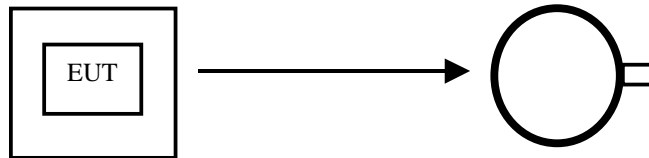
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Figure 1: Direction of the Loop Antenna

Side View (Vertical)

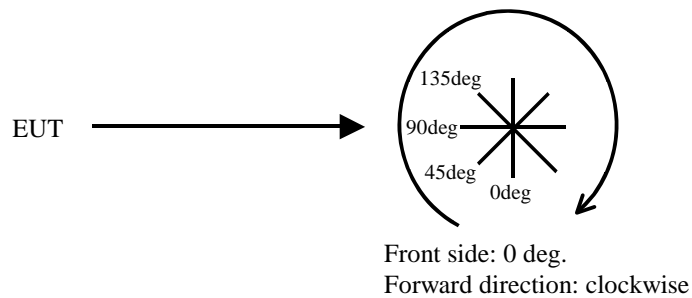


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



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.							

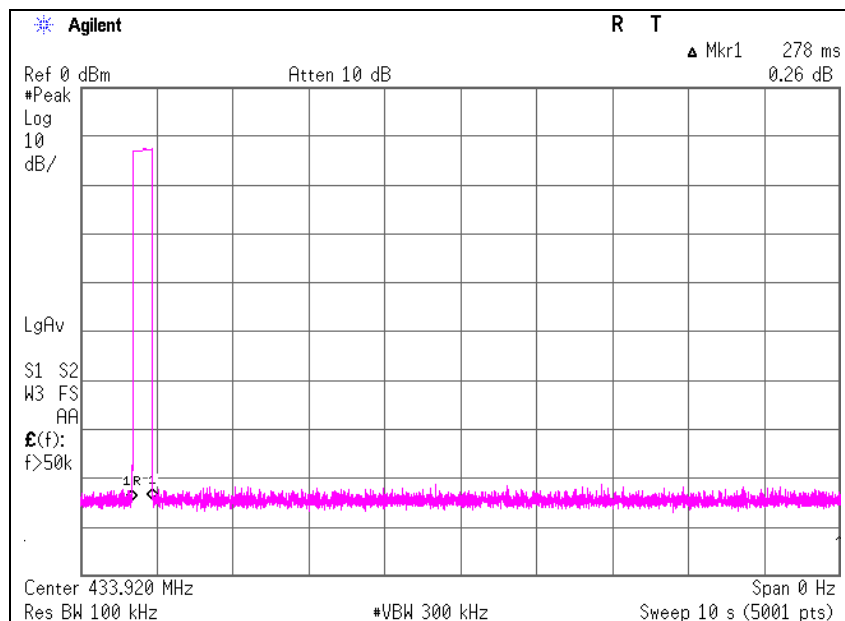
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Automatically deactivate

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 11993428H
Date : 2017/10/31
Temperature/ Humidity : 21 deg. C / 45% RH
Engineer : Ken Fujita
Mode : Normal use mode

Time of Transmitting [sec]	Limit [sec]	Result
0.278	5.00	Pass



* The test was performed by a button-pressed operation as representative, because the EUT transmits UHF when LF signal is received from a car or a button on the EUT is pressed, and the UHF transmission is stopped within 5 seconds even when receiving request signal.

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

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 11993428H
Date : 2017/10/25
Temperature/ Humidity : 23 deg. C / 46 % RH
Engineer : Masafumi Niwa
Mode : Transmitting mode

QP or PK

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 Inside or Outside
		Hor	Ver					Hor	Ver		Hor	Ver	
433.920	PK	81.9	81.7	16.4	9.4	29.8	-	77.9	77.7	100.8	22.9	23.1	Carrier
867.840	PK	28.9	29.3	21.7	11.1	28.3	-	33.4	33.8	80.8	47.4	47.0	Outside
1301.760	PK	47.9	47.7	24.9	5.5	35.4	-	42.9	42.7	73.9	31.0	31.2	Inside
1735.680	PK	47.1	46.9	26.6	5.1	35.0	-	43.8	43.6	80.8	37.0	37.2	Outside
2169.600	PK	51.4	52.2	27.2	5.1	34.7	-	49.0	49.8	80.8	31.8	31.0	Outside
2603.520	PK	50.8	49.9	27.2	5.2	34.6	-	48.6	47.7	80.8	32.2	33.1	Outside
3037.440	PK	48.5	47.3	28.0	5.4	34.6	-	47.3	46.1	80.8	33.5	34.7	Outside
3471.360	PK	45.1	45.2	28.4	5.6	34.2	-	44.9	45.0	80.8	35.9	35.8	Outside
3905.280	PK	45.3	45.0	29.4	5.8	33.8	-	46.7	46.4	73.9	27.2	27.5	Inside
4339.200	PK	45.2	44.9	30.3	6.0	33.8	-	47.7	47.4	73.9	26.2	26.5	Inside

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

PK with Duty factor

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
		Hor	Ver					Hor	Ver		Hor	Ver	
433.920	PK	81.9	81.7	16.4	9.4	29.8	0.0	77.9	77.7	80.8	2.9	3.1	Carrier
867.840	PK	28.9	29.3	21.7	11.1	28.3	0.0	33.4	33.8	60.8	27.4	27.0	Outside
1301.760	PK	47.9	47.7	24.9	5.5	35.4	0.0	42.9	42.7	53.9	11.0	11.2	Inside
1735.680	PK	47.1	46.9	26.6	5.1	35.0	0.0	43.8	43.6	60.8	17.0	17.2	Outside
2169.600	PK	51.4	52.2	27.2	5.1	34.7	0.0	49.0	49.8	60.8	11.8	11.0	Outside
2603.520	PK	50.8	49.9	27.2	5.2	34.6	0.0	48.6	47.7	60.8	12.2	13.1	Outside
3037.440	PK	48.5	47.3	28.0	5.4	34.6	0.0	47.3	46.1	60.8	13.5	14.7	Outside
3471.360	PK	45.1	45.2	28.4	5.6	34.2	0.0	44.9	45.0	60.8	15.9	15.8	Outside
3905.280	PK	45.3	45.0	29.4	5.8	33.8	0.0	46.7	46.4	53.9	7.2	7.5	Inside
4339.200	PK	45.2	44.9	30.3	6.0	33.8	0.0	47.7	47.4	53.9	6.2	6.5	Inside

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

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 (Refer to Duty factor data sheet)

For above 1GHz : Distance Factor: $20 \times \log(3.75\text{m}/3.0\text{ m}) = 2.50\text{ dB}$

*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.

Although Duty of this product was 100% or less, the result of AV (PK with Duty factor) was calculated by applying Duty 100% as worst.

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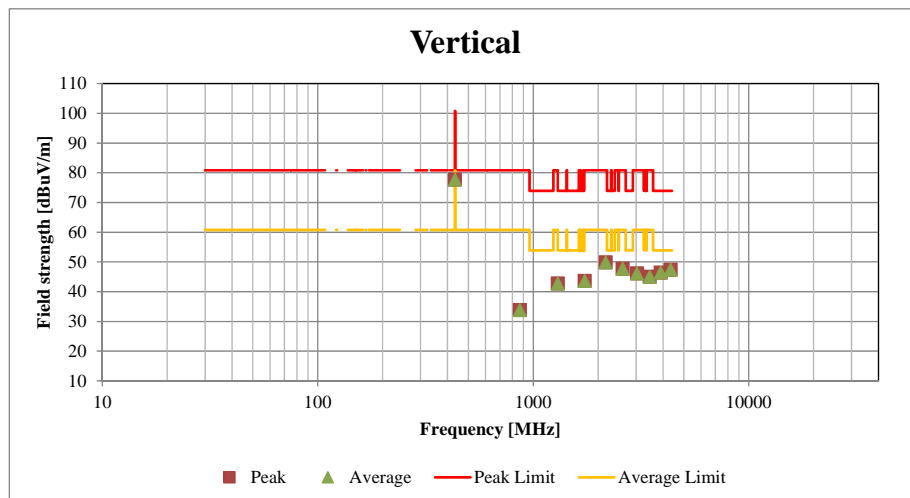
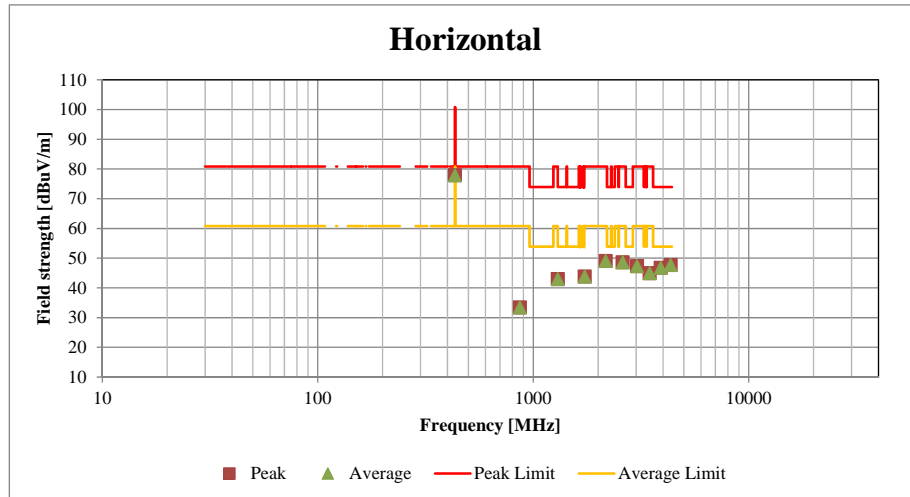
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Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11993428H
Date	2017/10/25
Temperature / Humidity	23 deg. C / 46 % RH
Engineer	Masafumi Niwa
Mode	Transmitting mode



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

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-20dB and 99% Occupied Bandwidth

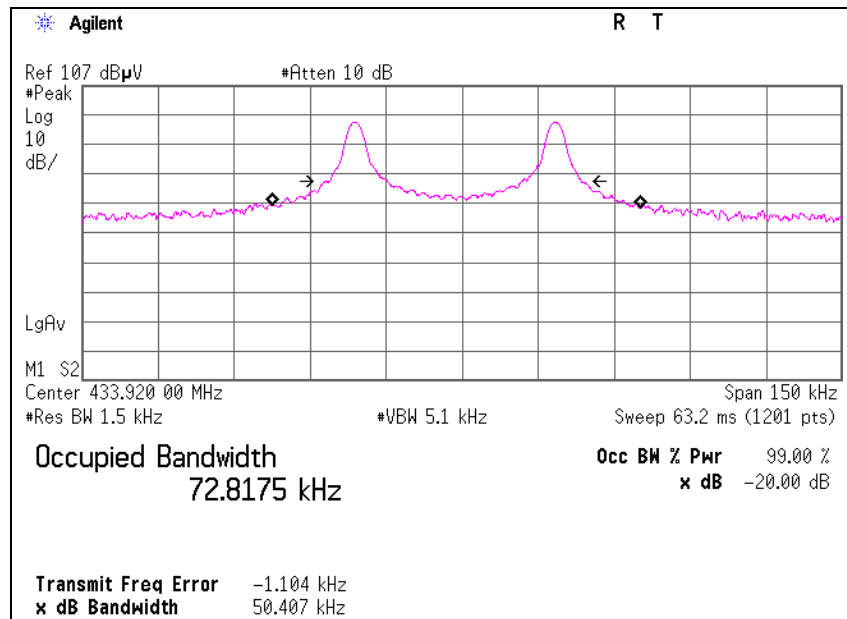
Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 11993428H
Date : 2017/10/31
Temperature/ Humidity : 21 deg. C / 45 % RH
Engineer : Ken Fujita
Mode : Transmitting mode

Bandwidth Limit : Fundamental Frequency $433.92 \text{ MHz} \times 0.25\% = 1084.80 \text{ kHz}$

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

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
50.407	1084.80	Pass

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
72.8175	1084.80	Pass



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APPENDIX 2: Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2017/08/31 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2016/12/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2016/11/10 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2017/08/21 * 12
MBA-08	Biconical Antenna	Schwarzbeck	VHA9103B	08031	RE	2017/09/13 * 12
MLA-21	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-190	RE	2017/01/05 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2017/02/24 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2016/11/28 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2017/09/27 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	RE	2017/08/07 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2017/02/24 * 12
MCC-216	Microwave Cable	Junkosha	MWX221	1604S253(1 m) / 1608S087(5 m)	RE	2017/08/04 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2017/01/16 * 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, Automatically deactivate and Duty cycle tests

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