



RADIO TEST REPORT


Test Report No. : 10828763H-B

Applicant : Honda Lock Mfg. Co., Ltd.
Type of Equipment : 2R Smart Key system (FOB)
Model No. : HLSS-3
Test regulation : FCC Part 15 Subpart C: 2015
FCC ID : MLBHLSS-3B
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.
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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)

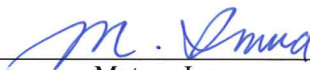
Date of test: June 6 and 19, 2015

Representative test engineer:


Masatoshi Nishiguchi

Engineer
Consumer Technology Division

Approved by:


Motoya Imura

Engineer
Consumer Technology Division



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://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10828763H-B

[illegible]

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SECTION 1: Customer information

Company Name : Honda Lock Mfg. Co., Ltd.
Address : 535-14 Oaza-Ishizue, Takanezawamachi, Shioya-Gun, Tochigi,
329-1225 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 : 2R Smart Key system (FOB)
Model No. : HLSS-3
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 3.0 V (CR2032 x 1)
Receipt Date of Sample : April 18, 2015
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: HLSS-3 (referred to as the EUT in this report) is the 2R Smart Key system (FOB).

General Specification

Clock frequencies in the system : 5 MHz

Radio Specification

[Transmitter]

Radio Type : Transceiver
Frequency of Operation : 433.92 MHz
Modulation : ASK
Antenna type : Pattern antenna
Method of Frequency Generation : SAW Resonator
Operating voltage (Radio part) : DC 2.0 V to 3.3 V
Operating temperature range : -20 to +60 deg. C

[Receiver] *1)

Radio Type : Receiver
Frequency of Operation : 133.3 kHz
Operating temperature range : -20 to +60 deg. C
Receiver Bandwidth : 120 kHz

*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: 2015, final revised on January 21, 2015

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.231 Periodic operation in the band 40.66 - 40.70MHz
and above 70MHz

* The EUT complies with FCC Part 15 Subpart B: 2015, final revised on January 21, 2015.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	FCC: ANSI C63.4:2009 7. AC powerline conducted emission measurements IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	N/A	N/A*1)	-
Automatically Deactivate	FCC: ANSI C63.4:2009 13. Measurement of intentional radiators IC: -	FCC: Section 15.231(a)(1) IC: RSS-210 A1.1.1	N/A	Complied	Radiated
Electric Field Strength of Fundamental Emission	FCC: ANSI C63.4:2009 13. Measurement of intentional radiators IC: RSS-Gen 6.12	FCC: Section 15.231(b) IC: RSS-210 A1.1.2	24.2 dB 433.920 MHz Horizontal / Vertical	Complied	Radiated
Electric Field Strength of Spurious Emission	FCC: ANSI C63.4:2009 13. Measurement of intentional radiators IC: RSS-Gen 6.13	FCC: Section 15.205 Section 15.209 Section 15.231(b) IC: RSS-210 A1.1.2, 2.5.1 RSS-Gen 8.9	3.2 dB 1301.760 MHz Vertical	Complied	Radiated
-20dB Bandwidth	FCC: ANSI C63.4:2009 13. Measurement of intentional radiators 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 3.0V) and the constant voltage was supplied to the EUT 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.

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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 A1.1.3	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 $k = 2$.

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.3dB	5.5dB	6.3dB	5.5dB	5.8dB	5.8dB	4.3dB
No.2	4.2dB	5.4dB	6.3dB	5.4dB	5.7dB	5.9dB	5.6dB
No.3	4.4dB	5.4dB	6.4dB	5.2dB	5.5dB	5.8dB	5.5dB
No.4	4.7dB	5.6dB	6.4dB	5.3dB	5.7dB	5.9dB	5.5dB

*3m/1m/0.5m = 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

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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 7.7	7.0 x 6.0	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room
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
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	-	8.0 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 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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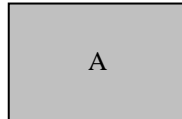
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SECTION 4: Operation of E.U.T. during testing

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 Duty Cycle	Continuous Transmitting mode (Tx) *1)
<p>* The system was configured in typical fashion (as a user would normally use it) for testing. *1) The software of this mode is the same as one of normal product, except that EUT continues to transmit when transmitter button is being pressed (For Normal use mode, EUT stops to transmit in a given time, even if transceiver button is being pressed.) End users cannot change the settings of the output power of the product.</p>	

4.2 Configuration and peripherals



*Setup was 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	2R Smart Key system (FOB)	HLSS-3	4	Honda Lock Mfg. Co., Ltd.	EUT

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

Test Procedure and conditions

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

[Transmitting mode]

(Below 30MHz)

The noise level was checked by moving a search-coil (Loop Antenna) close to the EUT.

(Above 30MHz)

The Radiated Electric Field Strength has been measured on Semi anechoic chamber with a ground plane and at a distance of 3m.

The measuring antenna height was varied between 1 and 4m 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 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

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

- 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 four modes. After the worst case was confirmed with four modes, the test was performed with the worst one.

Please refer to Worst case position of “APPENDIX 3: Photographs of test setup”.

*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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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: -20dB and 99% Occupied Bandwidth

Test Procedure

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

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20dB Bandwidth	400 kHz	1.3 kHz	3.9 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

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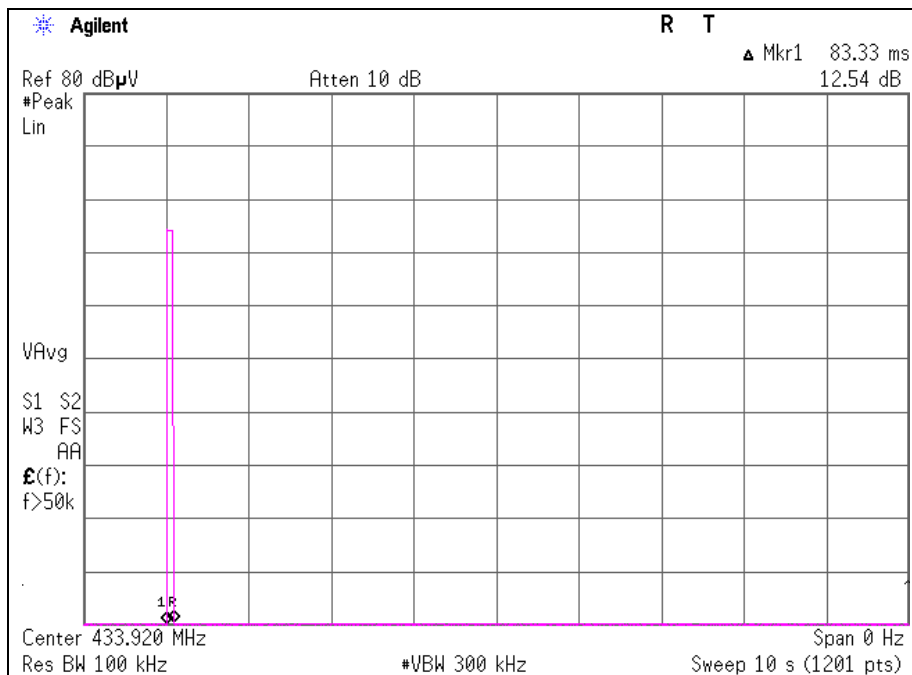
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APPENDIX 1: Test data

Automatically deactivate

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 10828763H
Date : 06/19/2015
Temperature/ Humidity : 22 deg. C / 65% RH
Engineer : Masatoshi Nishiguchi
Mode : Normal use mode 433.92 MHz

Time of Transmitting [sec]	Limit [sec]	Result
0.083	5.00	Pass



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

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 10828763H
Date : 06/05/2015
Temperature/ Humidity : 23 deg. C / 68% RH
Engineer : Satofumi Matsuyama
Mode : Continuous Transmitting mode 433.92MHz

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 of Restricted Bands
		Hor	Ver					Hor	Ver		Hor	Ver	
433.920	PK	67.0	67.0	18.6	10.8	32.1	-	64.3	64.3	100.8	36.5	36.5	Carrier
867.840	PK	41.8	42.3	24.1	13.1	31.2	-	47.8	48.3	80.8	33.0	32.5	Outside
1301.760	PK	65.2	65.4	25.1	1.9	34.0	-	58.2	58.4	73.9	15.7	15.5	Inside
1735.680	PK	52.2	57.4	26.2	2.2	33.0	-	47.6	52.8	80.8	33.2	28.0	Outside
2169.600	PK	54.0	51.7	26.9	2.4	32.4	-	50.9	48.6	80.8	29.9	32.2	Outside
2603.520	PK	65.6	61.7	27.8	2.6	32.2	-	63.8	59.9	80.8	17.0	20.9	Outside
3037.440	PK	60.4	57.2	28.4	2.8	32.1	-	59.5	56.3	80.8	21.3	24.5	Outside
3471.360	PK	49.3	46.3	29.2	3.1	32.0	-	49.6	46.6	80.8	31.2	34.2	Outside
3905.280	PK	51.8	49.2	29.9	3.3	31.8	-	53.2	50.6	73.9	20.7	23.3	Inside
4339.200	PK	50.5	50.0	30.3	3.4	31.7	-	52.5	52.0	73.9	21.4	21.9	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	67.0	67.0	18.6	10.8	32.1	-7.7	56.6	56.6	80.8	24.2	24.2	Carrier
867.840	PK	41.8	42.3	24.1	13.1	31.2	-7.7	40.1	40.6	60.8	20.7	20.2	Outside
1301.760	PK	65.2	65.4	25.1	1.9	34.0	-7.7	50.5	50.7	53.9	3.4	3.2	Inside
1735.680	PK	52.2	57.4	26.2	2.2	33.0	-7.7	39.9	45.1	60.8	20.9	15.7	Outside
2169.600	PK	54.0	51.7	26.9	2.4	32.4	-7.7	43.2	40.9	60.8	17.6	19.9	Outside
2603.520	PK	65.6	61.7	27.8	2.6	32.2	-7.7	56.1	52.2	60.8	4.7	8.6	Outside
3037.440	PK	60.4	57.2	28.4	2.8	32.1	-7.7	51.8	48.6	60.8	9.0	12.2	Outside
3471.360	PK	49.3	46.3	29.2	3.1	32.0	-7.7	41.9	38.9	60.8	18.9	21.9	Outside
3905.280	PK	51.8	49.2	29.9	3.3	31.8	-7.7	45.5	42.9	53.9	8.4	11.0	Inside
4339.200	PK	50.5	50.0	30.3	3.4	31.7	-7.7	44.8	44.3	53.9	9.1	9.6	Inside

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

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

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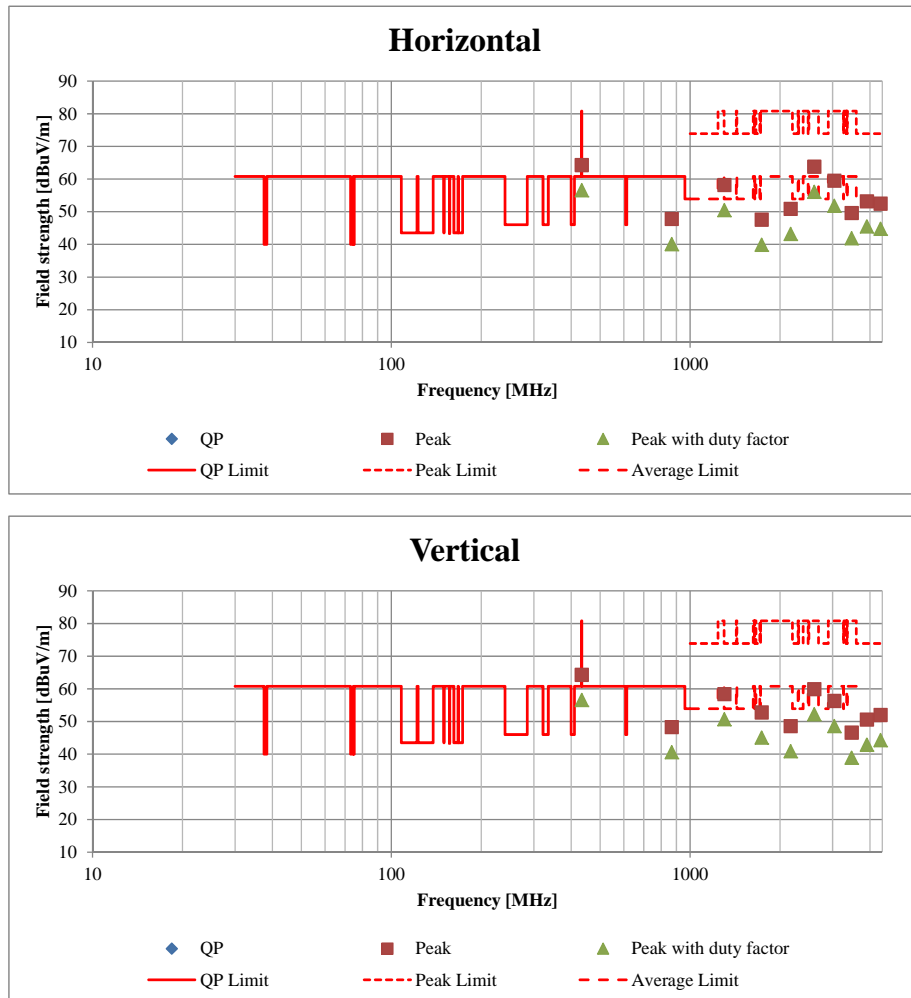
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Radiated Spurious Emission (Plot data, Worst case)

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 10828763H
Date : 06/05/2015
Temperature/ Humidity : 23 deg. C / 68% RH
Engineer : Satofumi Matsuyama
Mode : Continuous Transmitting mode 433.92 MHz



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

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-20dB and 99% Occupied Bandwidth

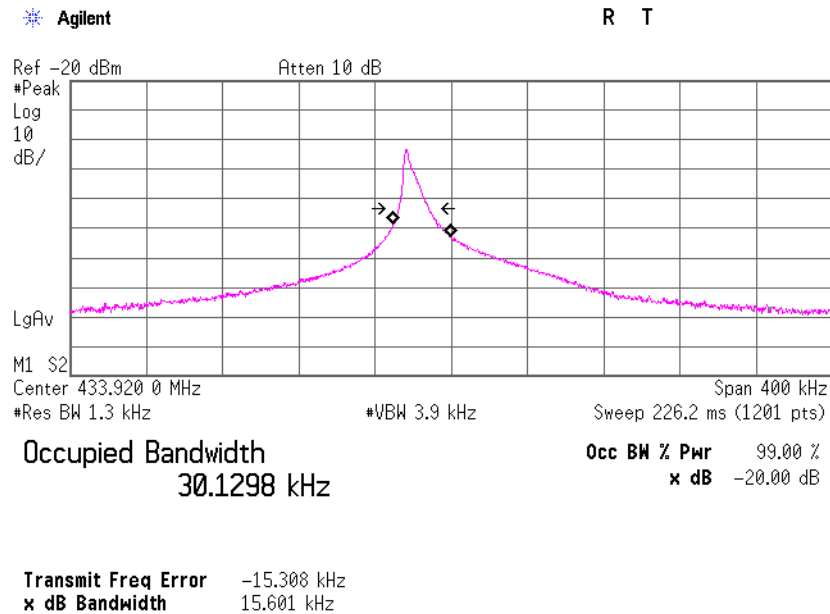
Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 10828763H
Date : 06/05/2015
Temperature/ Humidity : 23 deg. C / 68% RH
Engineer : Satofumi Matsuyama
Mode : Continuous Transmitting mode 433.92MHz

Bandwidth Limit : Fundamental Frequency **433.92** MHz x 0.25% = 1084.80 kHz

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

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
15.6010	1084.80	Pass

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
30.1298	1084.80	Pass



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Duty Cycle

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. 10828763H
Date 06/05/2015
Temperature/ Humidity 23 deg. C / 68% RH
Engineer Satofumi Matsuyama
Mode Continuous Transmitting mode 433.92 MHz

Type	Times	ON time(One pulse) [ms]	ON time(in One Cycle) [ms]
A	14	1.009	14.126
B	40	0.493	19.720

*1)ON time(in One Cycle) = Times * ON time(One pulse)

(Total)

ON time [ms]	Cycle [ms]	Duty (On time/Cycle)	Duty [dB]
33.85	81.67	0.41	-7.7

*3)ON time = Type A's ON time (in One Cycle) + Type B's ON time (in One Cycle)

*4)Duty = $20\log_{10}(\text{ON time/Cycle})$

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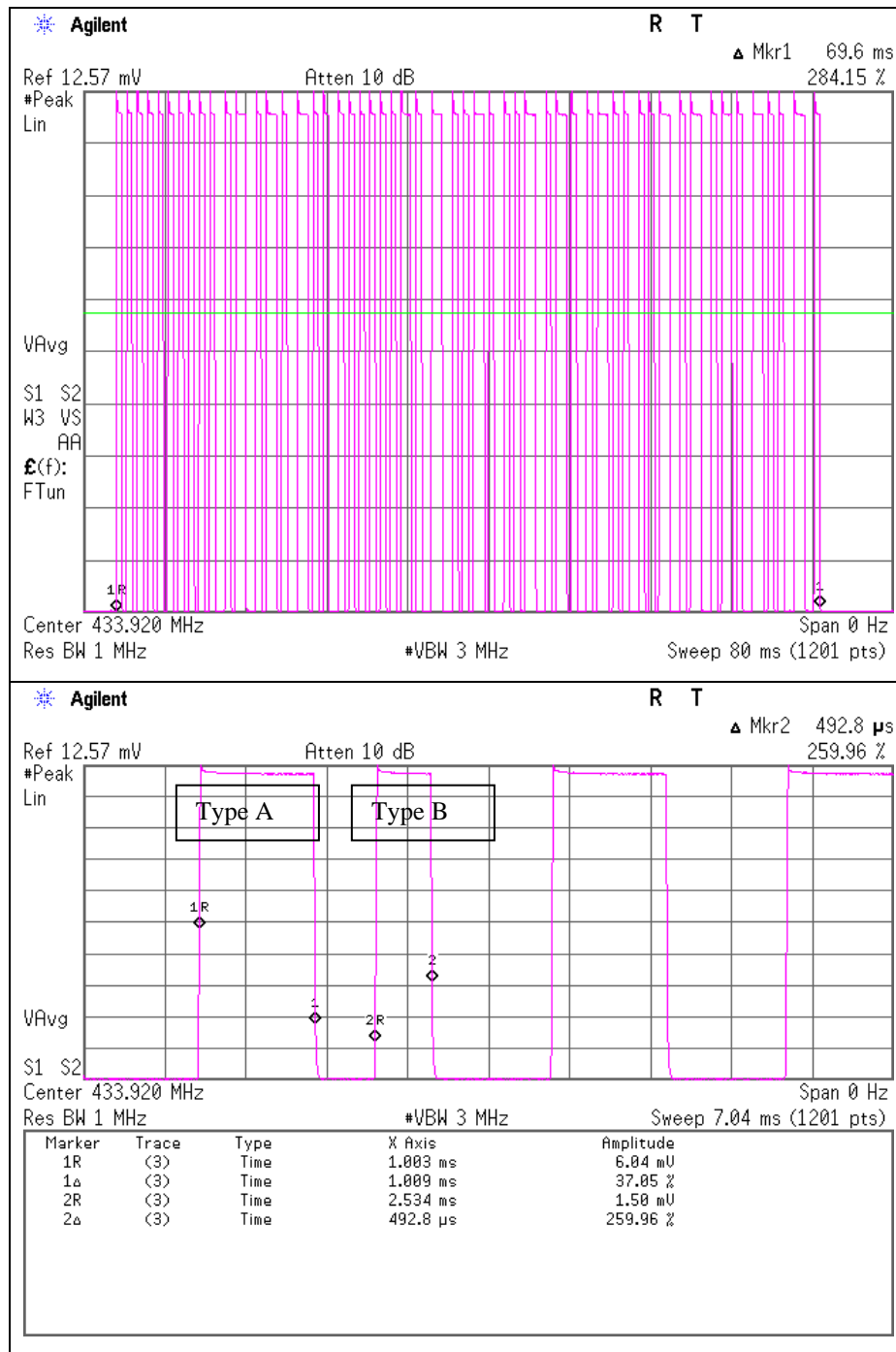
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Duty Cycle



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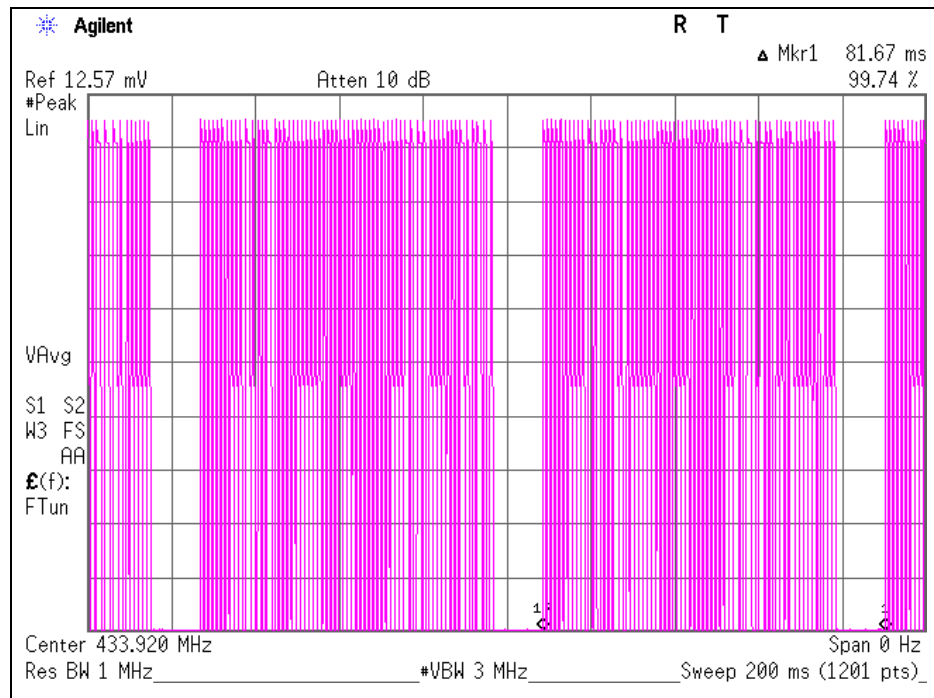
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APPENDIX 2: Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/02/26 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2015/01/13 * 12
MJM-23	Measure	ASKUL	-	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE	2014/11/10 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2014/11/22 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2014/11/22 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2014/06/02 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2014/11/11 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2015/03/09 * 12
MSA-03	Spectrum Analyzer	Advantest	R3131A	101000368	RE	Pre Check
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2014/08/12 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2014/06/11 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2015/03/12 * 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, 99% Occupied Bandwidth, -20dB bandwidth, Automatically deactivate and Duty cycle tests

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