RADIO TEST REPORT

Test Report No.: 10433442S-A

Applicant	:	**Honda Lock Mfg. Co., Ltd.**
Type of Equipment	:	**Transmitter of Keyless Entry**
Model No.	:	**HLIK6-1TA**
Test regulation	:	**FCC Part15 Subpart C: 2014**
FCC ID	:	**MLBHLIK6-1TA**
Test result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
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 any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: October 12, 2014

Tested by:

Makoto Hosaka
Engineer
Consumer Technology Division

Approved by :

Toyokazu Imamura
Leader
Consumer Technology Division

RTL02610

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

REVISION HISTORY

Original Test Report No.: 10433442S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10433442S-A	October 20, 2014	-	-
1	10433442S-A	October 28, 2014	11	Correction of Figure 1
			14	Correction of typo

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Contents

Page

SECTION 1: Customer information

Company Name	:	Honda Lock Mfg. Co., Ltd.
Address	:	535-14 Oaza-Ishizue, Takanezawamachi, Shioya-Gun, Tochigi, 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	:	Transmitter of Keyless Entry
Model No.	:	HLIK6-1TA
Serial No.	:	Refer to 4.2 in this report.
Rating	:	DC3.0V
Receipt Date of Sample	:	September 24, 2014
Country of Mass-production	:	China
Condition of EUT	:	Production model
Modification of EUT	:	No modification by the test lab.

2.2 Product description

Model: HLIK6-1TA (referred to as the EUT in this report) is a Transmitter of Keyless Entry.

Clock frequency(ies) in the system : 2MHz

<Radio part>

Equipment type	:	Transmitter
Frequency of operation	:	433.92MHz
Type of modulation	:	FSK
Antenna type	:	Pattern
Emission designation	:	F1D
Operating temperature range	:	-20 to +60 deg.C

FCC 15.31 (e)
The test was performed with a new battery (DC3.0V) and the stable voltage was supplied to the EUT during the tests. Therefore, the EUT complies with the requirement.

FCC 15.203
The equipment and its antenna comply with this requirement since the antenna is mounted inside of the EUT.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2014, final revised on August 15, 2014 and effective October 14, 2014
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.231 Periodic operation in the band 40.66 - 40.70 MHz and above 70 MHz

* The revision on August 15, 2014 does not affect the test specification applied to the EUT.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1)	N/A	N/A
Automatically deactivate	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.231 (a)(1)	Radiated	N/A	-	Complied
Electric field strength of Fundamental emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.231(b)	Radiated	N/A	1.8dB Freq.: 433.920MHz Polarization: Vertical	Complied
Electric field strength of Spurious emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.205 FCC 15.209 FCC 15.231 (b)	Radiated	N/A	4.2dB Freq.: 3905.280MHz Polarization: Horizontal Detector: Average	Complied
20dB bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.231 (c)	Radiated	N/A	-	-
Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422 *1) The test is not applicable since the EUT does not have AC Mains.						

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 4.6.1	RSS-210 A1.1.3 RSS-Gen 4.6.1	Radiated	-	-
Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422					

* Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Item	Frequency range	No.1 SAC*1 (±)	No.2 SAC (±)	No.3 SAC (±)
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.5 dB	3.5 dB
	30MHz-300MHz	4.8 dB	4.9 dB	4.7 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-18GHz	4.9 dB	4.9 dB	4.9 dB

*1: SAC=Semi-Anechoic Chamber

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Bandwidth Measurement uncertainty for this test was: (±) 0.66%
Time Measurement uncertainty for this test was: (±) 0.012%

3.5 Test location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone number : +81 463 50 6400
Facsimile number : +81 463 50 6401
JAB Accreditation No. : RTL02610

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☒ No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☐ No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☐ No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating mode

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Operating mode	Tested frequency
Electric field strength of Fundamental and Spurious emission	Transmitting (FSK) *1)	433.920MHz
Other items	Normal use mode	433.920MHz

*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.

Power settings : Setting is controlled by the firmware and cannot be changed.
Software : GHR-H003-0010.HEX ver.1.3.2

Justification: The system was configured in typical fashion (as customer would normally use it) for testing.

4.2 Configuration and peripherals

* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Keyless transmitter	HLIK6-1TA	*2)	Honda Lock Mfg. Co., Ltd.	EUT

*2) Electric field strength: 1, other items: 2

SECTION 5: Automatically deactivate

Test procedure

The time was measured with a spectrum analyzer and a search coil placed by the EUT.
Limit: A manually transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Summary of the test results: Pass
Refer to APPENDIX 2.

SECTION 6: Radiated emission (Fundamental and Spurious emission)

6.1 Operating environment

The test was carried out in a semi-anechoic chamber.

Temperature : Refer to APPENDIX 2.
Humidity : Refer to APPENDIX 2.

6.2 Test configuration

EUT was placed on a polyethylene platform of nominal size, 0.5m by 0.5m, raised 0.8m above the conducting ground plane. Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 9kHz - 5GHz
EUT position : Table top

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m
Frequency: From 9kHz to 30MHz at distance 3m

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: 0deg., 45deg., 90deg., and 135 deg.) and horizontal polarization. *Refer to Figure 1 about Direction of the Loop Antenna.

Frequency: From 30MHz to 4.5GHz at distance 3m (Refer to Figure 2).

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 intensity.
The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with QP, PK, and AV detector.

The radiated emission measurements were made with the following detector function.
<Below 30MHz> Antenna type: Loop, Test Distance: 3m

Frequency	9kHz to 90kHz & 110kHz to 150kHz	90kHz to 110kHz	150kHz to 490kHz	490kHz to 30MHz
Detection type	PK/AV	QP	PK/AV	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz
Distance factor *1)	-80dB	-80dB	-80dB	-40dB

*1) -80dB = 40 x log (3m/300m), -40dB = 40 x log (3m/30m)

<Above 30MHz>

Antenna type: Biconical (30MHz to 300MHz), Logperiodic (300MHz to 1GHz), Horn (Above 1GHz)

Frequency	30-1000MHz *2),*3)	Above 1GHz	
Detection type	Quasi-Peak	Peak	* Average
IF Bandwidth	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz

*2) The test below1GHz was performed with QP detect.
Because it was generated at the repetition cycle of 20Hz or more the pulse emission.

*3) The test below1GHz was performed with QP detect because the transmitting duty was 100% on all tests.
Frequency shift width is 18.5kHz, which is much lower than 120kHz.
Therefore, the measurement was performed with duty 100%.

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

The carrier levels and noise levels were measured at each position of X, Y and Z, and the position that has the maximum noise was determined. With the position, the noise levels of all the frequencies were measured.

Combinations of the worst case

Frequency / Antenna polarization	Carrier	Spurious	
		Below 1GHz	Above 1GHz
Horizontal	X	X	X
Vertical	Y	Y	Z

6.5 Results

Summary of the test results : Pass

Refer to APPENDIX 2.

Figure 1. Direction of the Loop Antenna

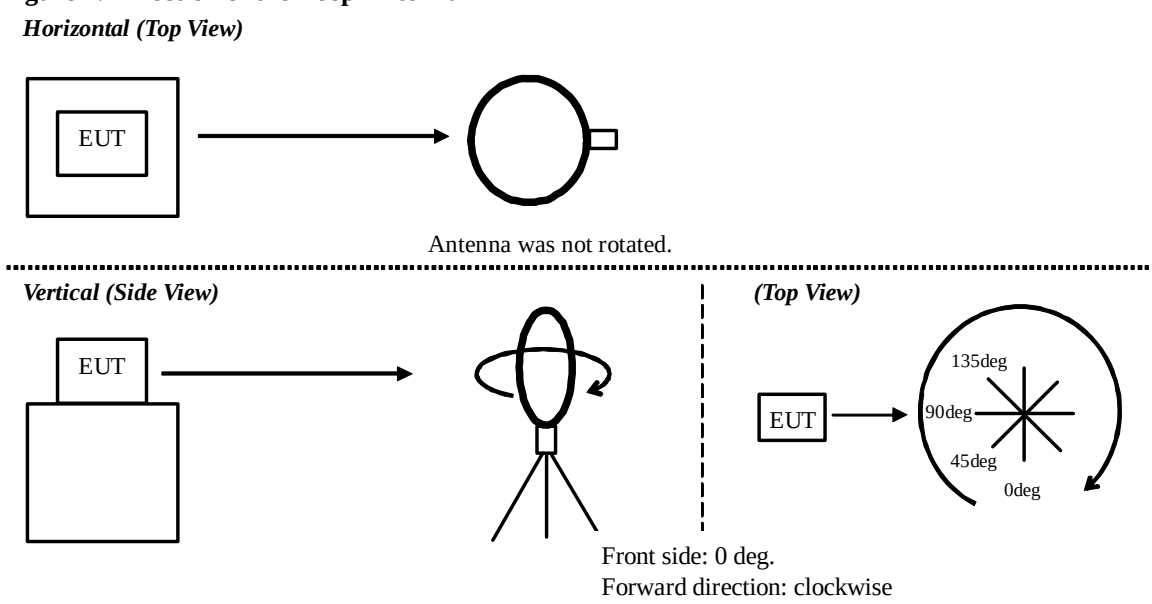
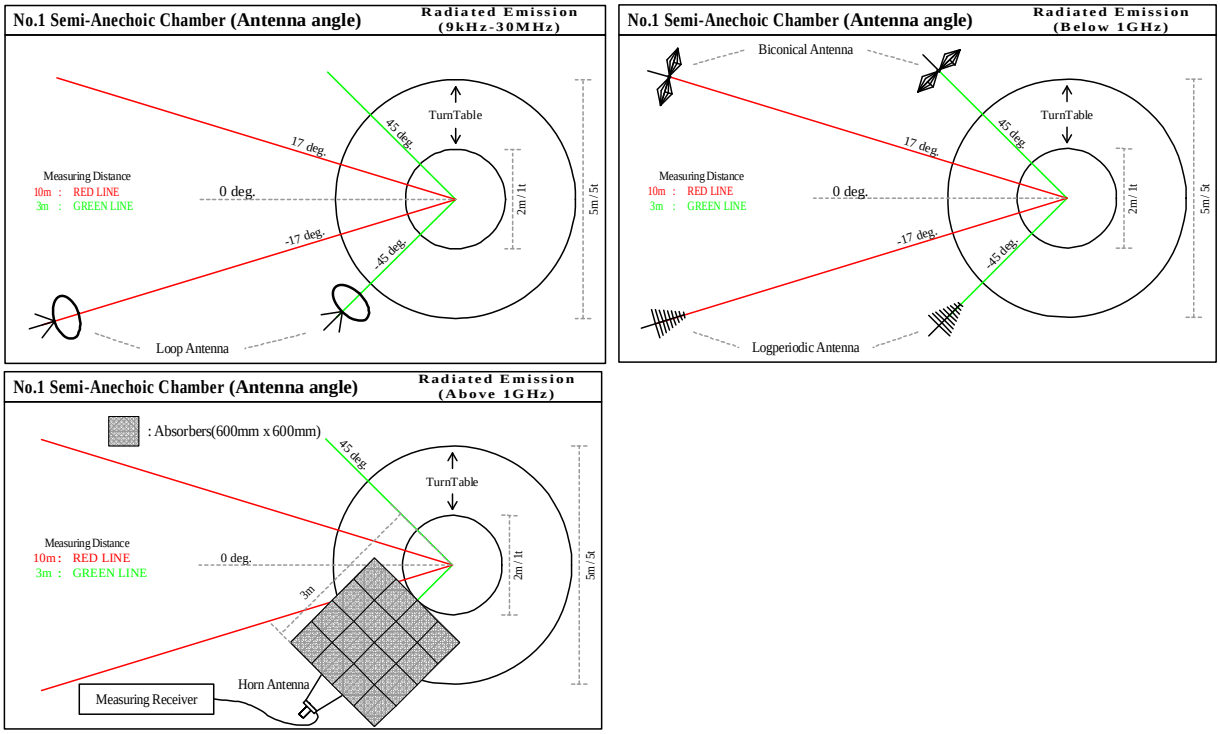


Figure 2. Antenna angle



SECTION 7: 20dB bandwidth & Occupied bandwidth (99%)

Test procedure

The bandwidth was measured with a spectrum analyzer and a search coil placed by the EUT.

Summary of the test results: Pass
Refer to APPENDIX 2.

Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

Automatically deactivate
Radiated emission
Bandwidth

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Radiated emission
Pre-check of the worst position

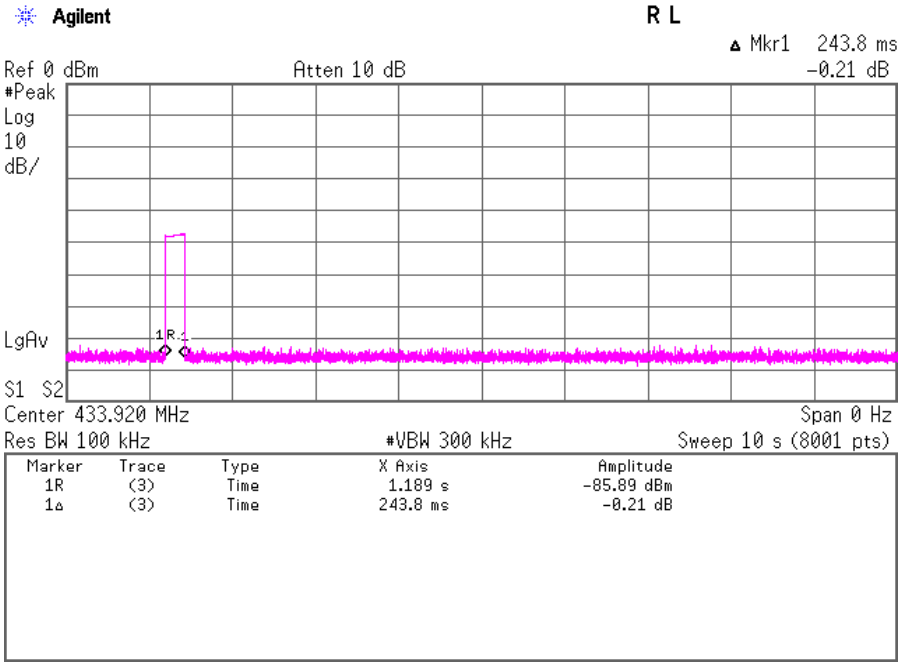
APPENDIX 1: Data of radio tests

Automatically deactivate: FCC 15.231(a)(1)

UL Japan, Inc.
Shonan EMC Lab. No.1 Semi-Anechoic Chamber
Order No. : 10433442S

Company	: Honda Lock Mfg. Co., Ltd.	Regulation	: FCC Part15C Section 15.231(a)(1)
Equipment	: Transmitter of Keyless Entry	Regulation	: RSS-210 A1.1.1(a)
Model	: HLIK6-1TA	Test Distance	: -
Sample No.	: 2	Date	: October 12, 2014
Power	: DC 3.0V (Battery)	Temperature	: 24deg.C
Mode	: Transmitting (433.92 MHz)	Humidity	: 50%RH
		ENGINEER	: Makoto Hosaka

Time of Transmitting [sec]	Limit [sec]	Result
0.2438	5	PASS



Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission

UL Japan, Inc.
Shonan EMC Lab. No.1 Semi-Anechoic Chamber
Order No. : 10433442S

Company	: Honda Lock Mfg. Co., Ltd.	Regulation	: FCC Part15C Section 15.231(b), 15.209
Equipment	: Transmitter of Keyless Entry	Regulation	: RSS-210 A1.1 (Table A), A1.1.2
Model	: HLIK6-1TA	Test Distance	: 3m
Sample No.	: 1	Date	: October 12, 2014
Power	: DC 3.0V (Battery)	Temperature	: 24deg.C
Mode	: Transmitting (433.92 MHz)	Humidity	: 50%RH
		ENGINEER	: Makoto Hosaka

Quasi-Peak detector

Frequency	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	76.9	77.0	16.6	17.3	31.9	-	78.9	79.0	80.8	1.9	1.8	Carrier
867.840	32.5	30.7	21.1	19.4	31.6	-	41.4	39.6	60.8	19.4	21.2	Outside

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

Peak detector

Frequency	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
1301.760	50.7	50.5	24.2	4.4	41.0	-	38.3	38.1	73.9	35.6	35.8	Inside
1735.680	53.1	49.9	24.8	4.3	41.0	-	41.2	38.0	80.8	39.6	42.8	Outside
2169.600	57.7	54.6	25.4	5.0	41.0	-	47.1	44.0	80.8	33.7	36.8	Outside
2603.520	52.5	52.8	26.4	5.6	40.9	-	43.6	43.9	80.8	37.2	36.9	Outside
3037.440	61.7	62.1	27.3	6.0	41.3	-	53.7	54.1	80.8	27.1	26.7	Outside
3471.360	56.8	56.3	28.1	6.3	41.7	-	49.5	49.0	80.8	31.3	31.8	Outside
3905.280	59.6	59.4	28.8	6.5	42.1	-	52.8	52.6	73.9	21.1	21.3	Inside
4339.200	54.0	53.0	29.3	6.7	42.2	-	47.8	46.8	73.9	26.1	27.1	Inside

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

Average detector

Frequency	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
1301.760	43.6	43.9	24.2	4.4	41.0	-	31.2	31.5	53.9	22.7	22.4	Inside
1735.680	47.4	39.2	24.8	4.3	41.0	-	35.5	27.3	60.8	25.3	33.5	Outside
2169.600	54.7	49.9	25.4	5.0	41.0	-	44.1	39.3	60.8	16.7	21.5	Outside
2603.520	46.9	46.8	26.4	5.6	40.9	-	38.0	37.9	60.8	22.8	22.9	Outside
3037.440	59.4	59.7	27.3	6.0	41.3	-	51.4	51.7	60.8	9.4	9.1	Outside
3471.360	53.2	52.4	28.1	6.3	41.7	-	45.9	45.1	60.8	14.9	15.7	Outside
3905.280	56.5	56.2	28.8	6.5	42.1	-	49.7	49.4	53.9	4.2	4.5	Inside
4339.200	48.6	46.5	29.3	6.7	42.2	-	42.4	40.3	53.9	11.5	13.6	Inside

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

REMARKS

Antenna Type: 9k-30MHz: Loop / 30M-300MHz Biconical / 300M-1000MHz Logperiodic / 1G-5GHz Horn

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

*Below 30MHz: No noise detected signal from EUT.

Burst rate confirmation (Fundamental)

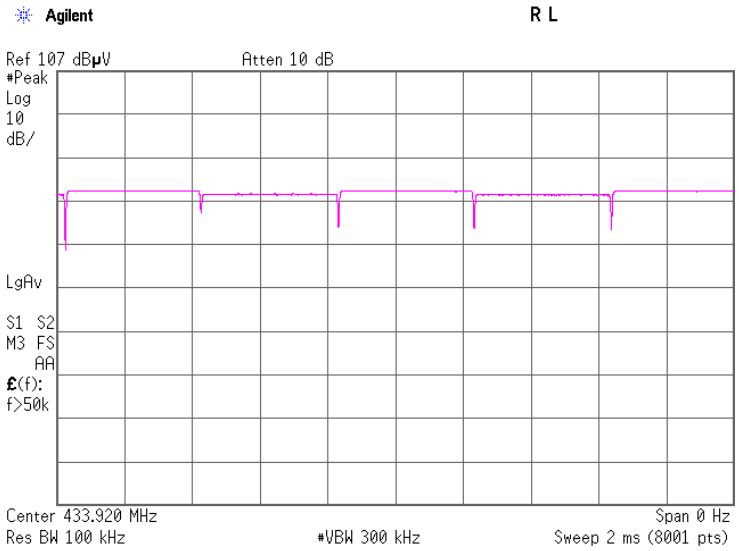
UL Japan, Inc.
Shonan EMC Lab. No.1 Semi-Anechoic Chamber
Order No. : 10433442S

Company : Honda Lock Mfg. Co., Ltd.
Equipment : Transmitter of Keyless Entry
Model : HLIK6-1TA
Sample No. : 2
Power : DC 3.0V (Battery)
Mode : Transmitting (433.92 MHz)

Regulation : FCC Part15C Section 15.231(b), 15.35(c)
Regulation : RSS-210 & RSS-Gen
Test Distance : -
Date : October 12, 2014
Temperature : 24deg.C
Humidity : 50%RH
ENGINEER : Makoto Hosaka

ON time [usec]	Cycle [usec]	Duty (On time /	Duty [dB]
2000	2000	1.00	0.00

*Duty = 20log (On time / Cycle)



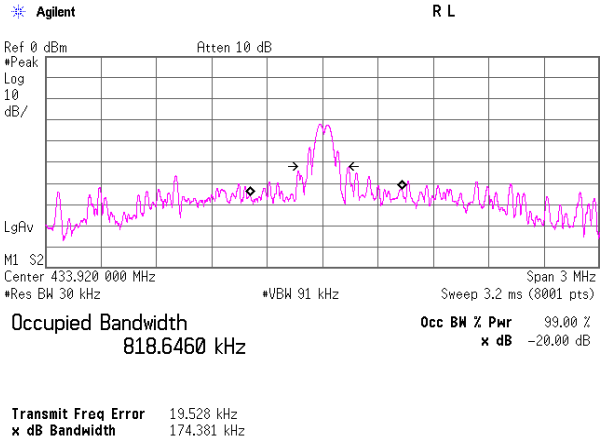
20dB Bandwidth: FCC 15.231(c)

UL Japan, Inc.
Shonan EMC Lab. No.1 Semi-Anechoic Chamber
Order No. : 10433442S

Company	: Honda Lock Mfg. Co., Ltd.	Regulation	: FCC Part15C Section 15.231(c)
Equipment	: Transmitter of Keyless Entry	Regulation	: RSS-210 A1.1.3
Model	: HLIK6-1TA	Test Distance	: -
Sample No.	: 2	Date	: October 12, 2014
Power	: DC 3.0V (Battery)	Temperature	: 24deg.C
Mode	: Transmitting (433.92 MHz)	Humidity	: 50%RH
		ENGINEER	: Makoto Hosaka

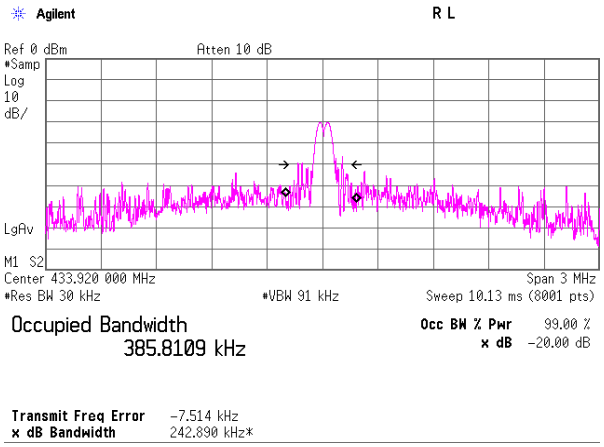
Bandwidth Limit : fundamental Frequency 433.92 X 0.25%= 1084.8kHz

20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
174.381	1084.8	PASS



Bandwidth Limit : fundamental Frequency 433.92 X 0.25%= 1084.8kHz

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
385.8109	1084.8	PASS



APPENDIX 2
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2014/02/17 * 12
KAT6-04	Attenuator	INMET	18N-6dB	-	RE	2013/12/26 * 12
SAT3-09	Attenuator	JFW	50HF-003N	-	RE	2014/09/02 * 12
SAT10-01	Attenuator	JFW	50HF-010N	-	RE	2014/02/17 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2013/10/13 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 * 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0888	RE	2013/10/26 * 12
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2013/11/08 * 12
SAT6-07	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2014/02/21 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2013/11/20 * 12
SJM-13	Measure	ASKUL	-	-	RE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2014/07/09 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE	-
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2014/03/14 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2014/04/22 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2014/05/15 * 12
SFL-01	Highpass Filter	MICRO-TRONICS	HPM50115	001	RE	2013/11/22 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2014/08/12 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	RE	2014/02/03 * 12

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards.
Test Item :
RE: Radiated emission,