



# RADIO TEST REPORT

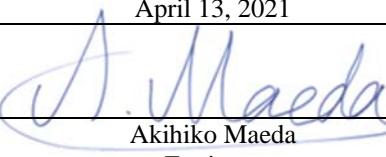
**Test Report No. : 13760085H-A-R1**

**Applicant** : Marelli Corporation  
**Type of EUT** : SW ASSY-SMART KEYLESS  
**Model Number of EUT** : R55T0  
**FCC ID** : KBRR55T0  
**Test regulation** : FCC Part 15 Subpart C: 2021  
**Test Result** : Complied (Refer to SECTION 3)

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 the A2LA accreditation body.
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. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in Section 1..
10. This report is a revised version of 13760085H-A. 13760085H-A is replaced with this report.

**Date of test:** April 13, 2021

**Representative test engineer:**



Akihiko Maeda  
Engineer

**Approved by:**



Shinichi Miyazono  
Engineer



CERTIFICATE 5107.02

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

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**Ise EMC Lab.**

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## **REVISION HISTORY**

### **Original Test Report No.: 13760085H-A**

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13760085H-A	May 17, 2021	-	-
1	13760085H-A-R1	June 23, 2021	P.6	<p>Correction of specification for Electric Field Strength of Spurious Emission in Clause 3.2;</p> <p>From “ISED: RSS-210 A1.2, 4.4” To “ISED: RSS-210 A1.2”</p>
1	13760085H-A-R1	June 23, 2021	P.6	<p>Correction of “FCC Part 15.31 (e)” in Clause 3.2;</p> <p>From The test was performed with the New Battery (DC 3.0 V) and the stable voltage was supplied to the EUT during the tests. Therefore, this EUT complies with the requirement.</p> <p>To The test was performed with the New Battery during the tests.</p> <p>Therefore, this EUT complies with the requirement.</p>

## Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	MCS	Modulation and Coding Scheme
AC	Alternating Current	MRA	Mutual Recognition Arrangement
AFH	Adaptive Frequency Hopping	N/A	Not Applicable
AM	Amplitude Modulation	NIST	National Institute of Standards and Technology
Amp, AMP	Amplifier	NS	No signal detect.
ANSI	American National Standards Institute	NSA	Normalized Site Attenuation
Ant, ANT	Antenna	NVLAP	National Voluntary Laboratory Accreditation Program
AP	Access Point	OBW	Occupied Band Width
ASK	Amplitude Shift Keying	OFDM	Orthogonal Frequency Division Multiplexing
Atten., ATT	Attenuator	P/M	Power meter
AV	Average	PCB	Printed Circuit Board
BPSK	Binary Phase-Shift Keying	PER	Packet Error Rate
BR	Bluetooth Basic Rate	PHY	Physical Layer
BT	Bluetooth	PK	Peak
BT LE	Bluetooth Low Energy	PK/w	Peak with duty factor
BW	BandWidth	PN	Pseudo random Noise
Cal Int	Calibration Interval	PRBS	Pseudo-Random Bit Sequence
CCK	Complementary Code Keying	PSD	Power Spectral Density
Ch., CH	Channel	QAM	Quadrature Amplitude Modulation
CISPR	Comite International Special des Perturbations Radioelectriques	QP	Quasi-Peak
CW	Continuous Wave	QPSK	Quadri-Phase Shift Keying
DBPSK	Differential BPSK	RBW	Resolution Band Width
DC	Direct Current	RDS	Radio Data System
D-factor	Distance factor	RE	Radio Equipment
DFS	Dynamic Frequency Selection	RF	Radio Frequency
DQPSK	Differential QPSK	RMS	Root Mean Square
DSSS	Direct Sequence Spread Spectrum	RSS	Radio Standards Specifications
EDR	Enhanced Data Rate	Rx	Receiving
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	SA, S/A	Spectrum Analyzer
EMC	ElectroMagnetic Compatibility	SG	Signal Generator
EMI	ElectroMagnetic Interference	SVSWR	Site-Voltage Standing Wave Ratio
EN	European Norm	TR	Test Receiver
ERP, e.r.p.	Effective Radiated Power	Tx	Transmitting
EU	European Union	VBW	Video BandWidth
EUT	Equipment Under Test	Vert.	Vertical
Fac.	Factor	WLAN	Wireless LAN
FCC	Federal Communications Commission		
FHSS	Frequency Hopping Spread Spectrum		
FM	Frequency Modulation		
Freq.	Frequency		
FSK	Frequency Shift Keying		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
IEC	International Electrotechnical Commission		
IEEE	Institute of Electrical and Electronics Engineers		
IF	Intermediate Frequency		
ILAC	International Laboratory Accreditation Conference		
ISED	Innovation, Science and Economic Development Canada		
ISO	International Organization for Standardization		
JAB	Japan Accreditation Board		
LAN	Local Area Network		
LIMS	Laboratory Information Management System		

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## **SECTION 1: Customer information**

Company Name : Marelli Corporation  
Address : 2-1917 Nissin-cho, Kita-ku, Saitama-shi, Saitama 331-8501 JAPAN  
Telephone Number : +81-48-660-2111  
Contact Person : DAISUKE MORI

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages

- Operating/Test Mode(s) (Mode(s)) on all the relevant pages

- SECTION 1: Customer information

- SECTION 2: Equipment under test (EUT)

- SECTION 4: Operation of EUT during testing

\* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

## **SECTION 2: Equipment under test (EUT)**

### **2.1. Identification of EUT**

Type : SW ASSY-SMART KEYLESS  
Model Number : R55T0  
Serial Number : Refer to SECTION 4.2  
Rating : DC 3.0 V  
Receipt Date : March 8, 2021  
Country of Mass-production : India  
Condition : Production prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification : No Modification by the test lab.

### **2.2. Product Description**

Model: R55T0 (referred to as the EUT in this report) is a SW ASSY-SMART KEYLESS.

#### **Radio Specification**

##### **[Transmitter part]**

Radio Type : Transmitter  
Frequency of Operation : 433.92 MHz  
Modulation : FSK  
Antenna type : Internal Antenna  
Clock frequency (maximum) : 27.6 MHz

##### **[Receiver part] \*1)**

Type of Receiver : Receiver  
Frequency of Operation : 125 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  
 FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021

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 does not affect the test result conducted before its effective date.

\*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)			
	ISED: RSS-Gen 8.8	ISED: RSS-Gen 8.8						
Automatically Deactivate	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.231(a)(1)	N/A	Complied a)	Radiated			
	ISED: -	ISED: RSS-210 A1.1						
Electric Field Strength of Fundamental Emission	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.231(b)	1.3 dB 433.920 MHz Vertical PK with Duty factor	Complied# b)	Radiated			
	ISED: RSS-Gen 6.12	ISED: 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)	11.4 dB 1301.760 MHz Horizontal / Vertical PK with Duty factor	Complied b)	Radiated			
	ISED: RSS-Gen 6.13	ISED: RSS-210 A1.2 RSS-Gen 8.9						
-20dB Bandwidth	FCC: ANSI C63.10:2013 6 Standard test methods	FCC: Section 15.231(c)	N/A	Complied c)	Radiated			
	ISED: -	ISED: 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.								
a) Refer to APPENDIX 1 (data of Automatically Deactivate)								
b) Refer to APPENDIX 1 (data of Radiated Emission (Fundamental and Spurious Emission))								
c) Refer to APPENDIX 1 (data of -20 dB Bandwidth / 99 % Occupied Bandwidth )								
Symbols: Complied The data of this test item has enough margin, more than the measurement uncertainty. Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.								

### **FCC Part 15.31 (e)**

The test was performed with the New Battery during the tests.

Therefore, this 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	Remarks	Deviation	Worst margin	Results
99 % Occupied Band Width	RSS-Gen 6.7	-	Radiated	N/A	N/A	-

Note: UL Japan, Inc.'s EMI 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

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

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

#### Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
	(Vertical)	5.0 dB
	200 MHz to 1000 MHz (Horizontal)	5.2 dB
	(Vertical)	6.3 dB
10 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
	(Vertical)	4.8 dB
	200 MHz to 1000 MHz (Horizontal)	5.0 dB
	(Vertical)	5.0 dB
3 m	1 GHz to 6 GHz	4.9 dB
	6 GHz to 18 GHz	5.2 dB
1 m	10 GHz to 26.5 GHz	5.5 dB
	26.5 GHz to 40 GHz	5.5 dB
10 m	1 GHz to 18 GHz	5.2 dB

#### Antenna Terminal test

Test Item	Uncertainty (+/-)
-26 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %

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### 3.5 Test Location

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\*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 199967

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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Test site	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	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	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	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	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.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
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	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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## SECTION 4: Operation of EUT during testing

### 4.1. Operating Mode(s)

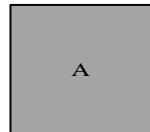
Test Item*	Mode
Automatically Deactivate	Normal use mode
Electric Field Strength of Fundamental Emission	Transmitting mode (Tx, 433.92 MHz) *1)
Electric Field Strength of Spurious Emission	
-20 dB Bandwidth / 99 % Occupied Bandwidth	

\* 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.)

\* EUT was set by the software as follows;  
 Software: STPR017 version 017  
 (Date: 2020/12/10, Storage location: EUT memory)

\*This setting of software is the worst case.  
 Any conditions under the normal use do not exceed the condition of setting.  
 In addition, end users cannot change the settings of the output power of the product.

### 4.2. Configuration and peripherals



\* Setup was taken into consideration and test data was taken under worse case conditions.

#### Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	SW ASSY-SMART KEYLESS	R55T0	0061 *1) 0083 *2)	Marelli Corporation	EUT

\*1) Used for Normal use mode

\*2) Used for Transmitting mode

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## **SECTION 5: Radiated emission (Fundamental and Spurious Emission)**

### **Test Procedure**

[For below 30 MHz]

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

[For 30 MHz to 1 GHz]

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 1 GHz]

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.

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.

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

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

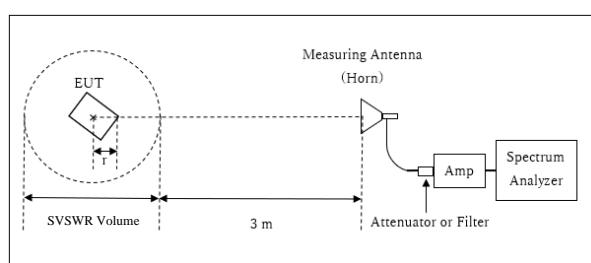
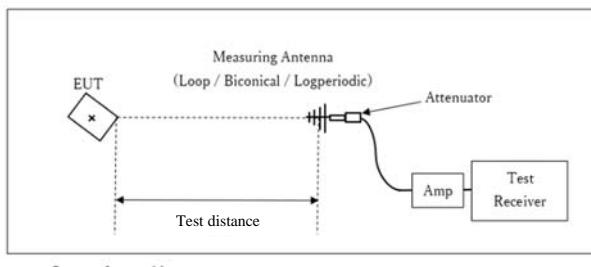
The radiated emission measurements were made with the following detector function of the test receiver / spectrum analyzer.

### **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

[Test Setup]  
 Below 1 GHz



Test Distance: 3 m

Distance Factor:  $20 \times \log (4.0 \text{ m} / 3.0 \text{ m}) = 2.5 \text{ dB}$

\* Test Distance:  $(3 + \text{SVSWR Volume} / 2) - r = 4.0 \text{ m}$

SVSWR Volume : 2.0 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.0 \text{ m}$

\* The test was performed with  $r = 0.0 \text{ m}$  since EUT is small and it was the rather conservative condition.

- 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.

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 without mechanical key was the worst case. Therefore, the test without mechanical key was performed only.

The test results and limit are rounded off to one 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 Bandwidth and 99% 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	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
99 % Occupied Bandwidth							

\*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.

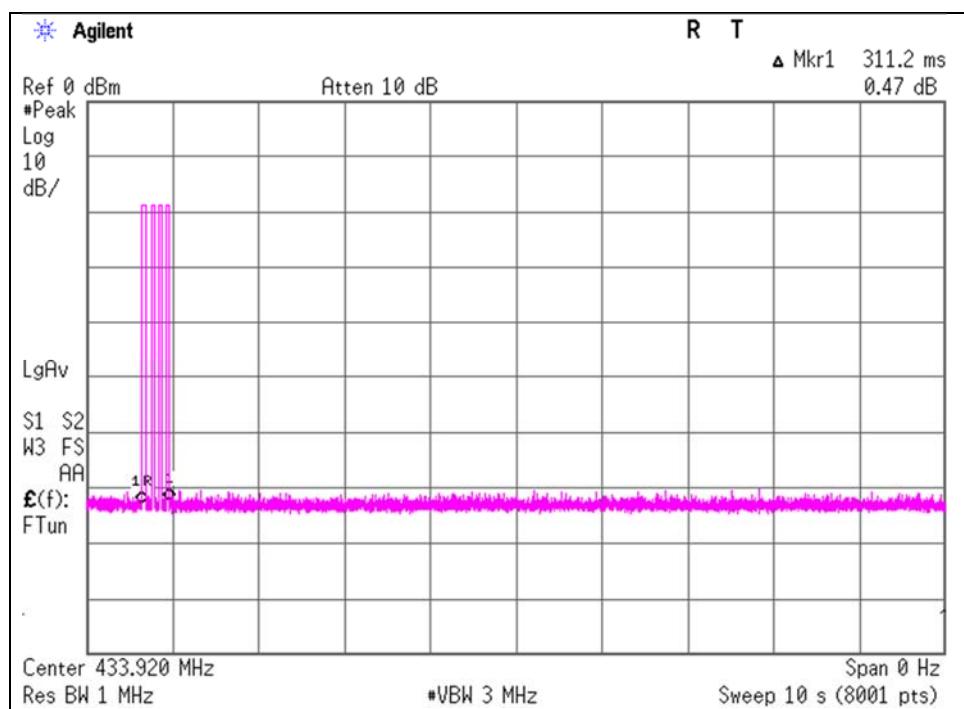
**Test data** : APPENDIX  
**Test result** : Pass

## APPENDIX 1: Test data

### Automatically deactivate

Report No. 13760085H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.1  
Date April 13, 2021  
Temperature / Humidity 22 deg. C / 56 % RH  
Engineer Akihiko Maeda  
Mode Normal use mode

Time of Transmitting [sec]	Limit [sec]	Result
0.3112	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. (Refer to Theory of operation-specification.)

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## Radiated Emission (Fundamental and Spurious Emission)

Report No. 13760085H  
 Test place Ise EMC Lab.  
 Semi Anechoic Chamber No.1  
 Date April 13, 2021  
 Temperature / Humidity 22 deg. C / 56 % RH  
 Engineer Akihiko Maeda  
 Mode Transmitting mode (Tx, 433.92 MHz)

Polarity [Hori/Vert]	Frequency [MHz]	Reading (PK) [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dut Factor [dB]	Result (PK) [dBuV/m]	Result (PK / W) [dBuV/m]	Limit (PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (PK) [dB]	Margin (AV) [dB]	Inside or Outside of Restricted Bands	Remarks
Hori.	433.920	89.0	16.4	11.7	38.4	0.0	78.7	78.7	100.8	80.8	22.1	2.1	Carrier	
Hori.	867.840	42.9	21.6	14.4	38.0	0.0	40.9	40.9	80.8	60.8	39.9	19.9	Outside	
Hori.	1301.760	47.1	26.0	6.1	36.7	0.0	42.5	42.5	73.9	53.9	31.4	11.4	Inside	
Hori.	1735.680	47.0	25.1	5.7	36.4	0.0	41.4	41.4	80.8	60.8	39.4	19.4	Outside	
Hori.	2169.600	47.4	28.4	5.7	36.1	0.0	45.4	45.4	80.8	60.8	35.4	15.4	Outside	
Hori.	2603.520	44.5	27.7	5.9	36.1	0.0	42.0	42.0	80.8	60.8	38.8	18.8	Outside	Floor Noise
Hori.	3037.440	44.1	28.4	6.0	36.0	0.0	42.5	42.5	80.8	60.8	38.3	18.3	Outside	Floor Noise
Hori.	3471.360	44.3	28.6	6.2	35.8	0.0	43.3	43.3	80.8	60.8	37.5	17.5	Outside	Floor Noise
Hori.	3905.280	44.1	29.7	6.4	35.6	0.0	44.6	44.6	73.9	53.9	29.3	9.3	Inside	Floor Noise
Hori.	4339.200	43.9	30.4	6.6	35.6	0.0	45.3	45.3	73.9	53.9	28.6	8.6	Inside	Floor Noise
Vert.	433.920	89.8	16.4	11.7	38.4	0.0	79.5	79.5	100.8	80.8	21.3	1.3	Carrier	
Vert.	867.840	41.2	21.6	14.4	38.0	0.0	39.2	39.2	80.8	60.8	41.6	21.6	Outside	
Vert.	1301.760	47.1	26.0	6.1	36.7	0.0	42.5	42.5	73.9	53.9	31.4	11.4	Inside	
Vert.	1735.680	46.3	25.1	5.7	36.4	0.0	40.7	40.7	80.8	60.8	40.1	20.1	Outside	
Vert.	2169.600	47.2	28.4	5.7	36.1	0.0	45.2	45.2	80.8	60.8	35.6	15.6	Outside	
Vert.	2603.520	44.5	27.7	5.9	36.1	0.0	42.0	42.0	80.8	60.8	38.8	18.8	Outside	Floor Noise
Vert.	3037.440	44.1	28.4	6.0	36.0	0.0	42.5	42.5	80.8	60.8	38.3	18.3	Outside	Floor Noise
Vert.	3471.360	44.3	28.6	6.2	35.8	0.0	43.3	43.3	80.8	60.8	37.5	17.5	Outside	Floor Noise
Vert.	3905.280	44.1	29.7	6.4	35.6	0.0	44.6	44.6	73.9	53.9	29.3	9.3	Inside	Floor Noise
Vert.	4339.200	43.9	30.4	6.6	35.6	0.0	45.3	45.3	73.9	53.9	28.6	8.6	Inside	Floor Noise

NS: No signal detected

### Sample calculation:

Result of PK = Reading + Ant Factor + Loss {Cable + Attenuator + Filter (above 1GHz) +Distance factor (above 1 GHz)} - Gain (Amplifier)

Result of PK with Duty factor (PK / W) = Reading + Ant Factor + Loss {Cable + Attenuator + Filter (above 1 GHz) +Distance factor (above 1 GHz)} - Gain (Amplifier) + Duty factor

For above 1GHz : Distance Factor:  $20 \times \log (4.0 \text{ m} / 3.0 \text{ m}) = 2.50 \text{ dB}$

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.

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

**UL Japan, Inc.**

**Ise EMC Lab.**

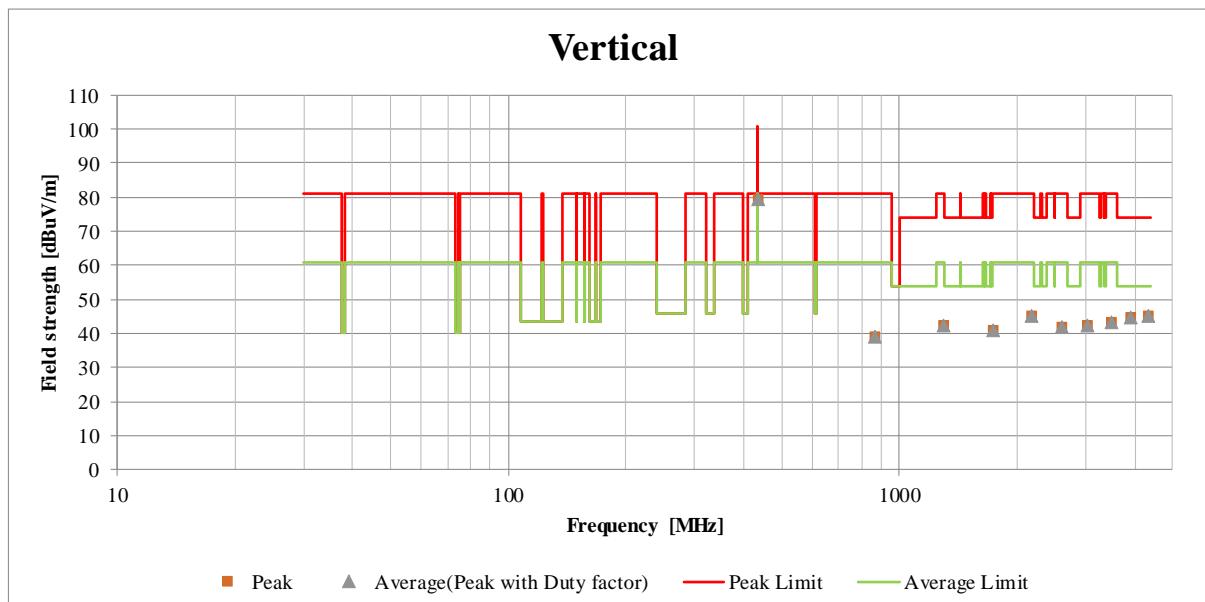
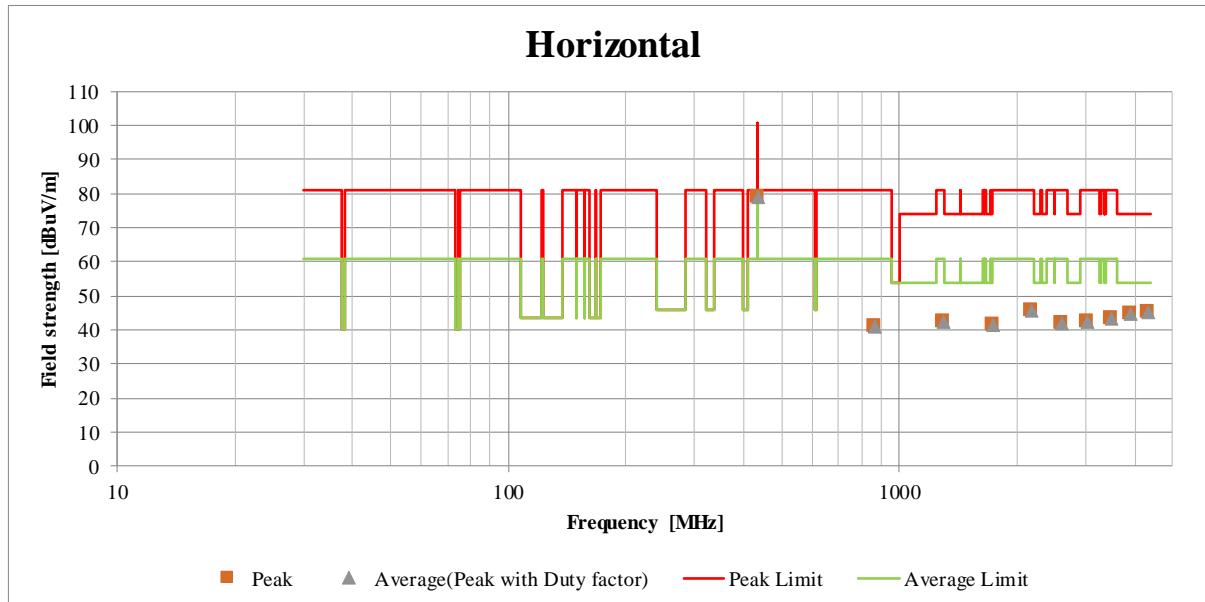
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## Radiated Spurious Emission (Plot data, Worst case)

Report No. 13760085H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.1  
Date April 13, 2021  
Temperature / Humidity 22 deg. C / 56 % RH  
Engineer Akihiko Maeda  
Mode Transmitting mode (Tx, 433.92 MHz)



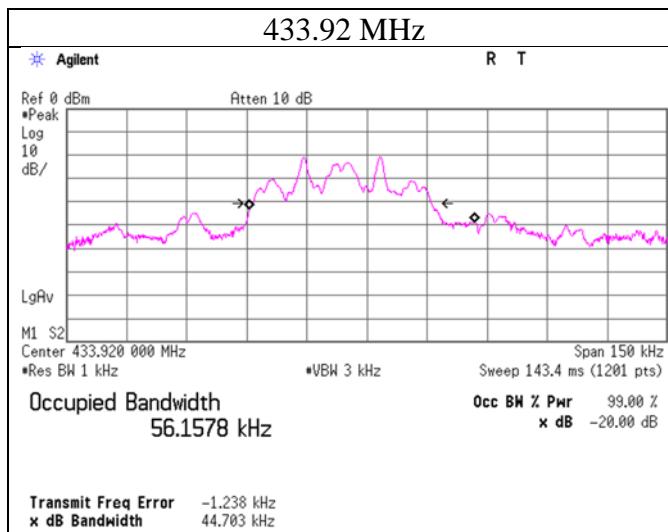
## -20 dB Bandwidth / 99 % Occupied Bandwidth

Report No. 13760085H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.1  
Date April 13, 2021  
Temperature / Humidity 22 deg. C / 56 % RH  
Engineer Akihiko Maeda  
Mode Transmitting mode (Tx, 433.92 MHz)

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

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
44.703	1084.800	Pass

99% Occupied Bandwidth Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
56.1578	1084.800	Pass



## APPENDIX 2: Test instruments

### Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	MAEC-01	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/08/2020	24
RE	MOS-27	141566	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	A08Q26	01/15/2021	12
RE	MMM-03	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/18/2020	12
RE	MJM-25	142226	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-ME MI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-01-SVSWR	141994	AC1_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 10m	DA-06881	04/05/2021	24
RE	MSA-04	141885	Spectrum Analyzer	Keysight Technologies Inc	E4448A	US44300523	11/09/2020	12
RE	YBA-03	197990	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHBB 9124 + BBA 9106	01365	11/15/2020	12
RE	LA-17	160924	Logperiodic Antenna	Schwarzbeck Mess - Elektronik	VUSLP9111B	225	11/15/2020	12
RE	MAT-08	141213	Attenuator(6dB)	Weinschel Corp	2	BK7971	11/13/2020	12
RE	MCC-02	141350	Coaxial Cable	Suhner/storm/Agilent/ TSJ	-	-	06/25/2020	12
RE	MPA-19	141585	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	02/18/2021	12
RE	MHA-05	141511	Horn Antenna 1-18GHz	Schwarzbeck Mess - Elektronik	BBHA9120D	253	09/01/2020	12
RE	MPA-01	141576	Pre Amplifier	Keysight Technologies Inc	8449B	3008A01671	02/18/2021	12
RE	MCC-217	141393	Microwave Cable	Junkosha	MWX221	1604S254(1 m) / 1608S088(5 m)	08/03/2020	12
RE	MHF-27	141297	High Pass Filter (1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	01/14/2021	12
RE	MLPA-07	142645	Loop Antenna	UL Japan	-	-	-	-

\*Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

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 test

**UL Japan, Inc.**

**Ise EMC Lab.**

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