



EMI TEST REPORT

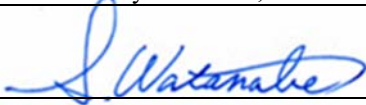
Test Report No. : 12862719H-A

Applicant : **DENSO CORPORATION**
Type of Equipment : **Remote Keyless Entry System and TPMS (Receiver)**
Model No. : **23ABN**
FCC ID : **HYQ23ABN**
Test regulation : **FCC Part 15 Subpart B: 2019**
Test Result : **Complied (Refer to SECTION 3.2)**

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 above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. 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.
8. The information provided from the customer for this report is identified in SECTION 1.

Date of test: May 20 and 28, 2019

Representative test engineer:


Shinya Watanabe
Engineer
Consumer Technology Division

Approved by:


Motoya Imura
Leader
Consumer Technology Division



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/

- ☐ 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.

Ise EMC Lab.

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REVISION HISTORY

Original Test Report No.: 12862719H-A

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SECTION 1: Customer information

Company Name	:	DENSO CORPORATION
Address	:	1-1, Showa-cho, Kariya-shi, Aichi-ken, 448-8661, Japan
Telephone Number	:	+81-566-63-7723
Facsimile Number	:	+81-566-25-4792
Contact Person	:	KOJI MURAYAMA

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No. FCC ID on the cover and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. 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 (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Remote Keyless Entry System and TPMS (Receiver)
Model No.	:	23ABN
Serial No.	:	Refer to Section 4, Clause 4.2
Receipt Date of Sample (Information from test lab.)	:	May 16, 2019
Country of Mass-production	:	Japan, China, United States of America
Condition of EUT	:	Engineering 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: 23ABN (referred to as the EUT in this report) is a Remote Keyless Entry System and TPMS (Receiver).

23ABN has 6 variations. For details of variations, see “Theory of Operation”.

Feature of EUT:

<RKES mode>

RKE System is mainly used for locking or unlocking the doors of the vehicle. The transmitter sends a radio wave signal, while the button is pushed. The receiver becomes active in response to the signal from the transmitter.

<TPMS mode>

Tire Pressure Monitoring System is used for monitoring and indicating information of air pressure in vehicle's tires. Transmitter sends receiver the data that informs air pressure in vehicle's tire to the receiver. The data also includes the information of temperature, battery voltage and identity code of transmitter. The receiver judges the data, and if the data of air pressure and others is not in a normal condition, the receiver sends signal to a warning lamp. Then, the warning lamp warns drivers.

Type of receiving system	:	Super-heterodyne
Frequency of Operation	:	RKES (CH1): 314.35 MHz RKES (CH2): 312.10 MHz TPMS: 314.98 MHz
Oscillator Frequency	:	30.265 MHz Crystal
Type of Modulation	:	RKES: FSK (F1D) TPMS: FSK (F1D)
Power Supply	:	DC 12.0 V
Antenna Type	:	Internal antenna (Inverse F antenna / Inverse L antenna)
Voltage Controlled Oscillator	:	RKES (CH1): 1884.42 MHz RKES (CH2): 1870.94 MHz TPMS: 1888.20 MHz

- * RKES : Remote Keyless Entry System
- TPMS : Tire Pressure Monitoring System

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart B
FCC Part 15 final revised on June 4, 2019 and effective July 5, 2019 except 15.258

Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

* The revision on June 4, 2019, does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result	Remarks
Conducted emission	FCC: ANSI C63.4: 2014 7. AC power - line conducted emission measurements	FCC: Part 15 Subpart B 15.107(a)	N/A	N/A	N/A	*1)
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8				
Radiated emission	FCC: ANSI C63.4: 2014 8. Radiated emission measurements	FCC: Part 15 Subpart B 15.109(a)	N/A	27.57 dB 1247.280 MHz, Vertical, AV <Mode 2>	Complied a)	-
	IC: RSS-Gen 7	IC: RSS-Gen 7.1.2				
*Note: UL Japan, Inc’s EMI Work Procedure 13-EM-W0420.						
*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.						
a) Refer to APPENDIX 1 (data of Radiated Emission)						
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.				

3.3 Addition to standard

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	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
3 m	1 GHz to 6 GHz	5.0 dB
	6 GHz to 18 GHz	5.3 dB

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3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

*NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967 / ISED Lab Company Number: 2973C

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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.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 2.0 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.

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

4.1 Operating Mode(s)

The mode used:

1. RKES Receiving mode (314.35 MHz)
2. RKES Receiving mode (312.10 MHz)
3. TPMS Receiving mode (314.98 MHz)

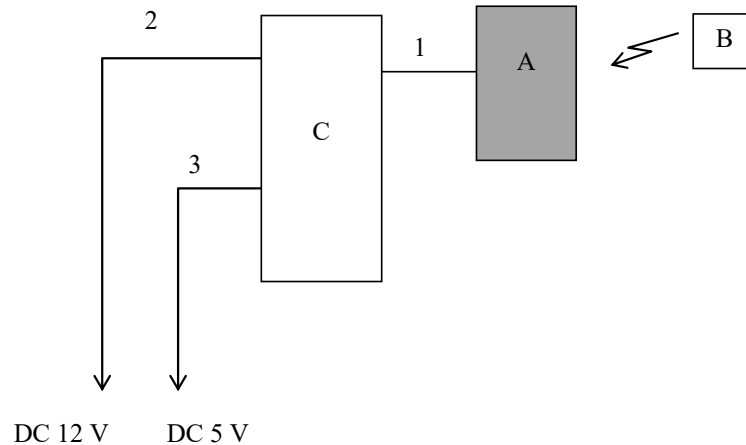
*The test signal level was confirmed to be sufficient to stabilize the local oscillator of the EUT.

* It was confirmed by using checker that the EUT receives the signal from the transmitter (pair of EUT).

*The tests were performed only with variation No.1 which was the worst variation, after the test results were compared among Variation No.1 to 6 (the table in “Theory of Operation Variation”) at pre-check.

As a result, enough margin for the limit was observed.

4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

*Item No. A includes Receiver Antenna.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Remote Keyless Entry System and TPMS (Receiver)	23ABN	001 *1)	DENSO CORPORATION	EUT
B	Transmitter	-	-	-	-
C	Check Bench	-	-	-	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Signal & DC Cable	1.8	Unshielded	Unshielded	-
2	DC Cable	0.8	Unshielded	Unshielded	-
3	DC Cable	1.2	Unshielded	Unshielded	-

*1) Variations owing to antenna matching (Inverse F Antenna Type) *See “Theory of Operation” for details.

TYPE1 which was used for the tests has (a) “Resistance 0 ohm”, (b) “Nothing”, (c) “Nothing” and (d) “Nothing”. The result of Radiated emission test was mainly from characteristics of Local Oscillator.

If the range of (a), (b), (c), and (d) becomes "Capacitor 0.1-1000pF" or “Inductor 1nH to 100nH”, there is no influence on the result of Radiated emission test.

SECTION 5: Radiated Emission

5.1 Operating environment

Test place : No.1 and No.4 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m (below 1 GHz) and 1.0 m by 1.5 m (above 1 GHz), raised 0.8 m above the conducting ground plane.

The EUT was set on the edge 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.

5.3 Test conditions

Frequency range : 30 MHz - 200 MHz (Biconical antenna) / 200 MHz - 1000 MHz (Logperiodic antenna)
1000 MHz - 10000 MHz (Horn antenna)
Test distance : 3 m
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

The height of the measuring antenna varied between 1 and 4 m 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 with the Test Receiver.

The radiated emission measurements were made with the following detector function of the Test Receiver.

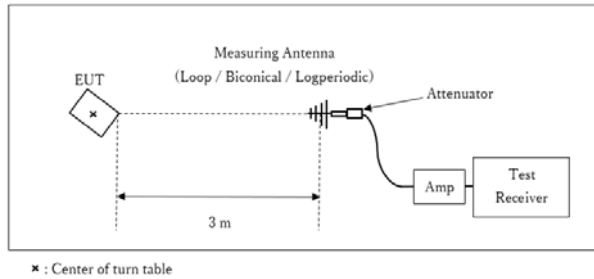
Frequency	Below 1GHz	Above 1GHz *1)
Instrument used	Test Receiver	Test Receiver
IF Bandwidth	QP: BW 120 kHz	PK: BW 1 MHz, CISPR AV: BW 1 MHz

*1) The measurement data was adjusted to a 3 m distance using the following Distance Factor.

Distance Factor: $20 \times \log (3.85 \text{ m} / 3.0 \text{ m}) = 2.17 \text{ dB}$

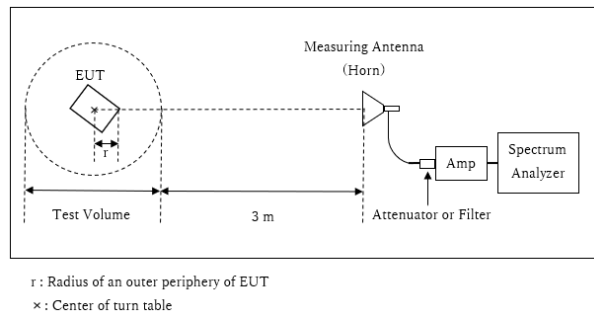
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz - 10 GHz



Distance Factor: $20 \times \log (3.85 \text{ m}^*/3.0 \text{ m}) = 2.17 \text{ dB}$

* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.85 \text{ m}$

Test Volume: 2 m

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

$r = 0.15 \text{ m}$

- 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.

5.5 Test result

Summary of the test results: Pass

The limit is rounded down to one decimal place.

The test result is rounded off to one or two decimal places, so some differences might be observed.

Date: May 20, 2019
May 28, 2019

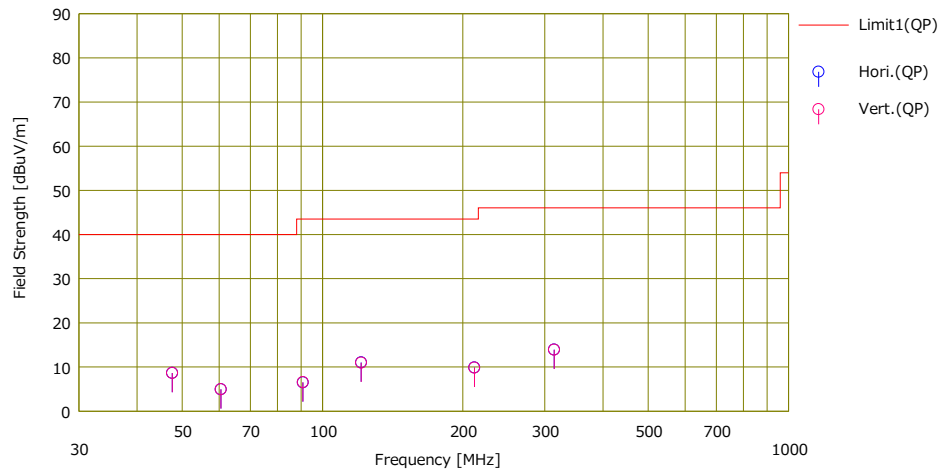
Test engineer: Shinya Watanabe
Toshifumi Yoneshige

APPENDIX 1: Test data

Radiated Emission Variation No.1

Report No. 12862719H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date May 20, 2019
Temperature / Humidity 21 deg. C / 59 % RH
Engineer Shinya Watanabe
(Below 1 GHz)
Mode Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq.	Reading	Ant.Fac	Loss	Gain	Result	Limit	Margin	Pola	Height	Angle	Ant. Type	Comment
		(QP)				(QP)	(QP)						
	(MHz)	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(H/V)	(cm)	(deg)		
1	47.600	21.35	11.97	7.50	32.17	8.65	40.00	31.35	Hori.	300	0	BC	
2	60.530	21.85	7.52	7.70	32.15	4.92	40.00	35.08	Hori.	300	0	BC	
3	90.795	21.95	8.57	8.09	32.12	6.49	43.50	37.01	Hori.	300	0	BC	
4	121.060	21.68	13.01	8.42	32.09	11.02	43.50	32.48	Hori.	300	0	BC	
5	211.855	21.60	10.96	9.28	31.97	9.87	43.50	33.63	Hori.	100	0	LA23	
6	314.070	21.80	13.98	10.05	31.92	13.91	46.00	32.09	Hori.	100	0	LA23	
7	47.600	21.33	11.97	7.50	32.17	8.63	40.00	31.37	Vert.	100	0	BC	
8	60.530	21.85	7.52	7.70	32.15	4.92	40.00	35.08	Vert.	100	0	BC	
9	90.795	22.01	8.57	8.09	32.12	6.55	43.50	36.95	Vert.	100	0	BC	
10	121.060	21.61	13.01	8.42	32.09	10.95	43.50	32.55	Vert.	100	0	BC	
11	211.855	21.56	10.96	9.28	31.97	9.83	43.50	33.67	Vert.	100	0	LA23	
12	314.070	21.79	13.98	10.05	31.92	13.90	46.00	32.10	Vert.	100	0	LA23	

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

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATT) - GAIN(AMP)

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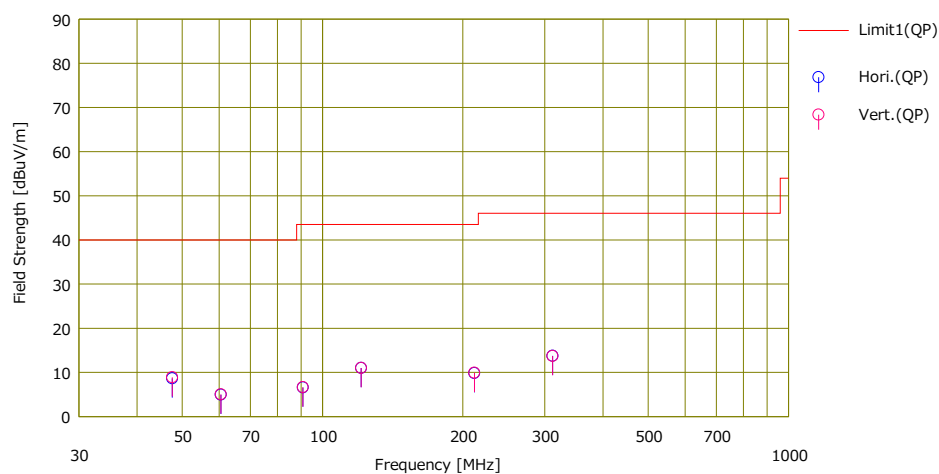
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Radiated Emission Variation No.1

Report No. 12862719H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date May 20, 2019
Temperature / Humidity 21 deg. C / 59 % RH
Engineer Shinya Watanabe
(Below 1 GHz)
Mode Mode 2

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq. [MHz]	Reading [QP] [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [QP] [dBuV/m]	Limit [QP] [dBuV/m]	Margn [QP] [dB]	Pda. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	47.600	21.36	11.97	7.50	32.17	8.66	40.00	31.34	Hori.	100	0	BC	
2	60.530	21.88	7.52	7.70	32.15	4.95	40.00	35.05	Hori.	200	0	BC	
3	90.795	22.04	8.57	8.09	32.12	6.58	43.50	36.92	Hori.	100	0	BC	
4	121.060	21.65	13.01	8.42	32.09	10.99	43.50	32.51	Hori.	400	0	BC	
5	211.855	21.55	10.96	9.28	31.97	9.82	43.50	33.68	Hori.	350	0	LA23	
6	311.820	21.71	13.92	10.03	31.92	13.74	46.00	32.26	Hori.	350	0	LA23	
7	47.600	21.59	11.97	7.50	32.17	8.89	40.00	31.11	Vert.	300	0	BC	
8	60.530	21.95	7.52	7.70	32.15	5.02	40.00	34.98	Vert.	200	0	BC	
9	90.795	22.08	8.57	8.09	32.12	6.62	43.50	36.88	Vert.	100	0	BC	
10	121.060	21.66	13.01	8.42	32.09	11.00	43.50	32.50	Vert.	400	0	BC	
11	211.855	21.64	10.96	9.28	31.97	9.91	43.50	33.59	Vert.	200	0	LA23	
12	311.820	21.67	13.92	10.03	31.92	13.70	46.00	32.30	Vert.	250	0	LA23	

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

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATT) - GAIN(AMP)

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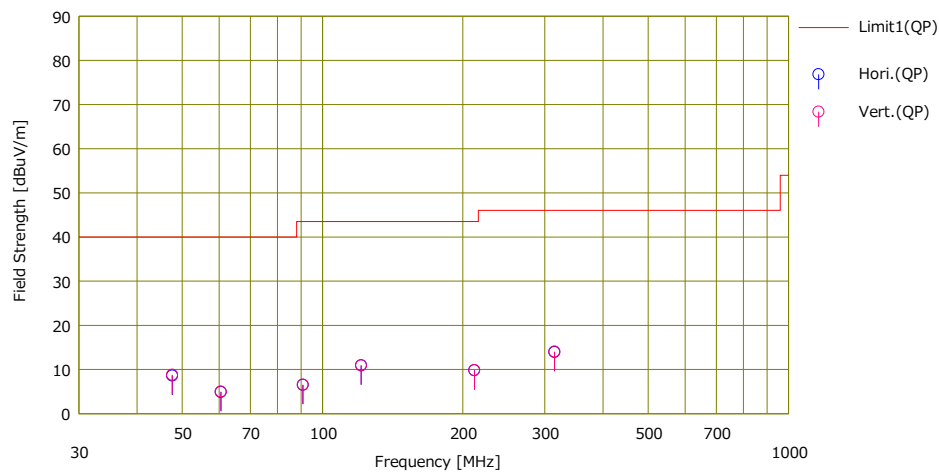
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Radiated Emission Variation No.1

Report No. 12862719H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date May 20, 2019
Temperature / Humidity 21 deg. C / 59 % RH
Engineer Shinya Watanabe
(Below 1 GHz)
Mode Mode 3

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq. [MHz]	Reading (QP)	Ant.Fac.	Loss	Gain	Result (QP)	Limit (QP)	Margn (QP)	Pola.	Height	Angle	Ant. Type	Comment
		[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]		
1	47.600	21.29	11.97	7.50	32.17	8.59	40.00	31.41	Hori.	300	0	BC	
2	60.530	21.82	7.52	7.70	32.15	4.89	40.00	35.11	Hori.	300	0	BC	
3	90.795	21.96	8.57	8.09	32.12	6.50	43.50	37.00	Hori.	300	0	BC	
4	121.060	21.60	13.01	8.42	32.09	10.94	43.50	32.56	Hori.	300	0	BC	
5	211.855	21.53	10.96	9.28	31.97	9.80	43.50	33.70	Hori.	100	0	LA23	
6	314.700	21.76	14.02	10.05	31.92	13.91	46.00	32.09	Hori.	100	0	LA23	
7	47.600	21.48	11.97	7.50	32.17	8.78	40.00	31.22	Vert.	100	0	BC	
8	60.530	21.90	7.52	7.70	32.15	4.97	40.00	35.03	Vert.	100	0	BC	
9	90.795	22.00	8.57	8.09	32.12	6.54	43.50	36.96	Vert.	100	0	BC	
10	121.060	21.55	13.01	8.42	32.09	10.89	43.50	32.61	Vert.	100	0	BC	
11	211.855	21.57	10.96	9.28	31.97	9.84	43.50	33.66	Vert.	100	0	LA23	
12	314.700	21.89	14.02	10.05	31.92	14.04	46.00	31.96	Vert.	100	0	LA23	

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

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN

CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATT) - GAIN(AMP)

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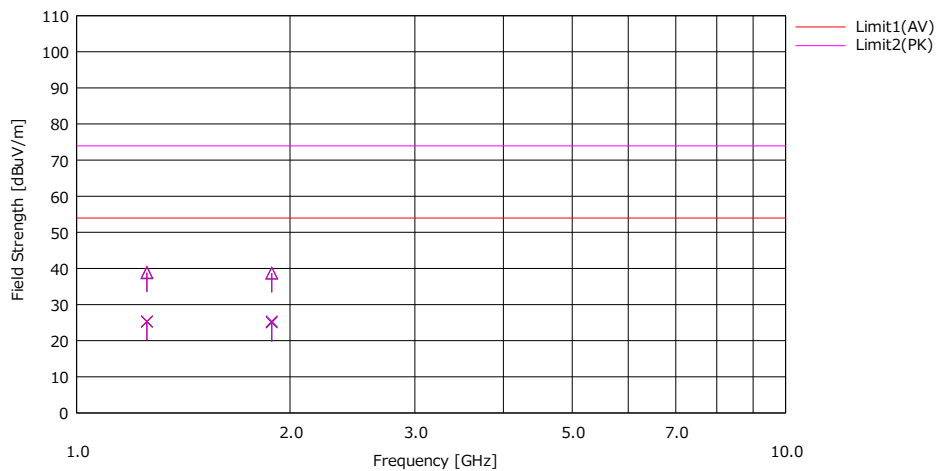
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Radiated Emission Variation No.1

Report No. 12862719H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.1
Date May 28, 2019
Temperature / Humidity 23 deg. C / 52 % RH
Engineer Toshifumi Yoneshige
(Above 1 GHz)
Mode Mode 1

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq. [MHz]	Reading		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pda. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
1	1256.280	33.00	46.50	25.86	3.55	37.15	25.26	38.76	54.00	74.00	28.74	35.24	Hor.	100	359	HA5	
2	1884.420	31.70	45.30	26.08	3.97	36.69	25.06	38.66	54.00	74.00	28.94	35.34	Hor.	100	359	HA5	
3	1256.280	33.10	46.70	25.86	3.55	37.15	25.36	38.96	54.00	74.00	28.64	35.04	Vert.	100	359	HA5	
4	1884.420	32.00	45.40	26.08	3.97	36.69	25.36	38.76	54.00	74.00	28.64	35.24	Vert.	100	359	HA5	

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

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATT) - GAIN(AMP)

UL Japan, Inc.

Ise EMC Lab.

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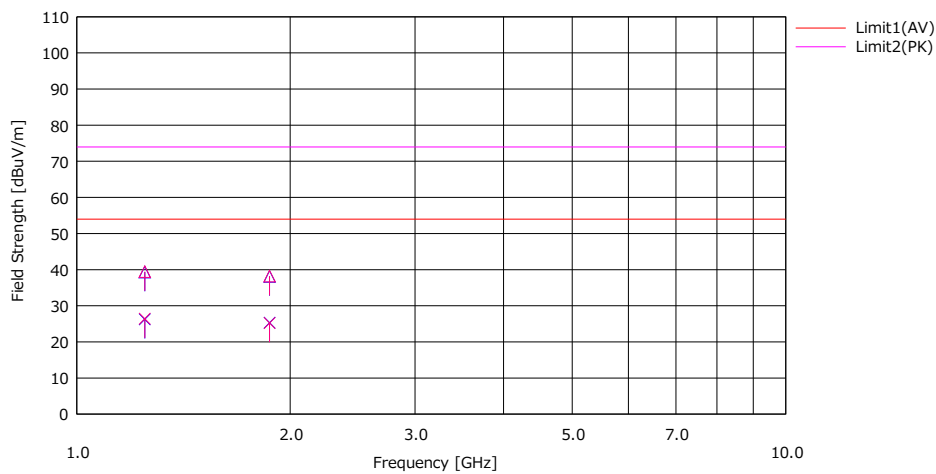
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Facsimile : +81 596 24 8124

Radiated Emission Variation No.1

Report No. 12862719H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.1
Date May 28, 2019
Temperature / Humidity 23 deg. C / 52 % RH
Engineer Toshifumi Yoneshige
(Above 1 GHz)
Mode Mode 2

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq. [MHz]	Reading		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pda [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
1	1247.280	34.10	47.20	25.74	3.55	37.16	26.23	39.33	54.00	74.00	27.77	34.67	Hor.	100	359	HA5	
2	1870.940	31.90	44.70	26.16	3.96	36.70	25.32	38.12	54.00	74.00	28.68	35.88	Hor.	100	359	HA5	
3	1247.280	34.30	47.30	25.74	3.55	37.16	26.43	39.43	54.00	74.00	27.57	34.57	Vert.	100	359	HA5	
4	1870.940	31.80	44.80	26.16	3.96	36.70	25.22	38.22	54.00	74.00	28.78	35.78	Vert.	100	359	HA5	

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

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATT) - GAIN(AMP)

UL Japan, Inc.

Ise EMC Lab.

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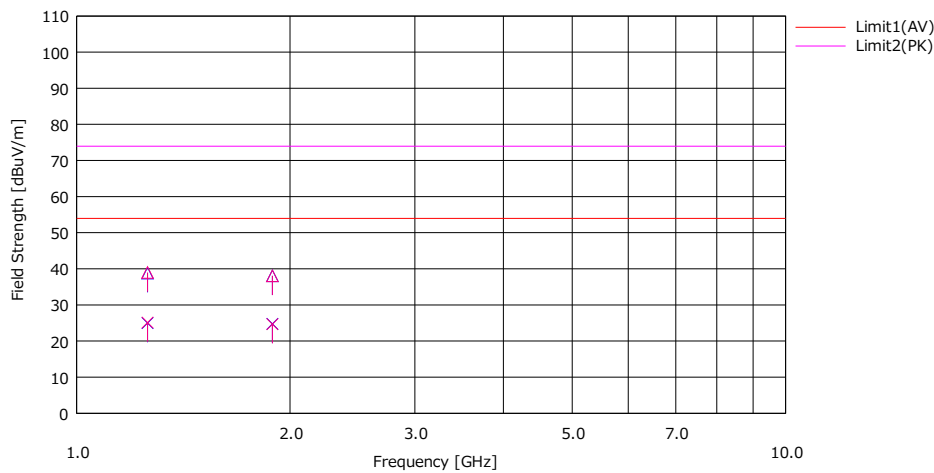
Telephone : +81 596 24 8999

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Radiated Emission Variation No.1

Report No. 12862719H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.1
Date May 28, 2019
Temperature / Humidity 23 deg. C / 52 % RH
Engineer Toshifumi Yoneshige
(Above 1 GHz)
Mode Mode 3

Limit : FCC_Part 15 Subpart B(15.109)_Class B



No.	Freq. [MHz]	Reading		Ant.Fac [dB]	Loss [dB]	Gain [dB]	Result		Limit		Margin		Pola [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		(AV) [dBuV]	(PK) [dBuV]				(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dBuV/m]	(PK) [dBuV/m]	(AV) [dB]	(PK) [dB]					
1	1258.800	32.70	46.50	25.89	3.55	37.15	24.99	38.79	54.00	74.00	29.01	35.21	Hori.	100	359	HA5	
2	1888.200	31.40	44.70	26.06	3.98	36.68	24.76	38.06	54.00	74.00	29.24	35.94	Hori.	100	359	HA5	
3	1258.800	32.80	46.70	25.89	3.55	37.15	25.09	38.99	54.00	74.00	28.91	35.01	Vert.	100	359	HA5	
4	1888.200	31.30	44.70	26.06	3.98	36.68	24.66	38.06	54.00	74.00	29.34	35.94	Vert.	100	359	HA5	

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

CHART: WITH FACTOR

ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN

CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATT) - GAIN(AMP)

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APPENDIX 2: Test instruments

Test Instruments

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	06/28/2018	06/30/2020	24
RE	148898	Attenuator	KEYSIGHT	8491A	MY52462282	10/03/2018	10/31/2019	12
RE	141942	Test Receiver	Rohde & Schwarz	ESCI	100300	08/08/2018	08/31/2019	12
RE	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	02/08/2019	02/29/2020	12
RE	141397	Coaxial Cable	UL Japan	-	-	06/13/2018	06/30/2019	12
RE	141267	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	03/21/2019	03/31/2020	12
RE	141425	Biconical Antenna	Schwarzbeck	BBA9106	1302	05/24/2019	05/31/2020	12
RE	142227	Measure	KOMELON	KMC-36	-	-	-	-
RE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE	141562	Thermo-Hygrometer	CUSTOM	CTH-201	0010	01/11/2019	01/31/2020	12
RE	141566	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	01/11/2019	01/31/2020	12
RE	141576	Pre Amplifier	AGILENT	8449B	3008A01671	02/08/2019	02/29/2020	12
RE	141393	Microwave Cable	Junkosha	MWX221	1604S254(1 m) / 1608S088(5 m)	08/08/2018	08/31/2019	12
RE	142226	Measure	KOMELON	KMC-36	-	-	-	-
RE	141510	Horn Antenna 18-26.5GHz	EMCO	3160-09	1266	05/17/2019	05/31/2020	12
RE	141511	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	04/12/2019	04/30/2020	12
RE	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/21/2018	08/31/2019	12
RE	141994	AC1_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 10m	DA-06881	04/16/2019	04/30/2020	12

*Hyphens for Last Calibration Date, Calibration Due 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.

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

UL Japan, Inc.

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