EMI TEST REPORT

Test Report No. : 12868049H-G

Applicant	:	**DENSO TEN Limited**
Type of Equipment	:	**Car Audio**
Model No.	:	**FT0108A**
FCC ID	:	**BABFT0108A**
Test regulation	:	**FCC Part 15 Subpart B: 2019 Class B**
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 24 and 25, 2019

Representative test engineer:
Masaya Minami
Engineer
Consumer Technology Division

Approved by:
Tsubasa Takayama
Leader
Consumer Technology Division

NVLAP TESTING NVLAP LAB CODE 200572-0

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".

REVISION HISTORY

Original Test Report No.: 12868049H-G

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12868049H-G	June 28, 2019	-	-

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	DENSO TEN Limited
Address	:	2-28, Gosho-dori 1-Chome, Hyogo-ku, Kobe, 652-8510 JAPAN
Telephone Number	:	+81-78-682-2159
Facsimile Number	:	+81-78-671-7160
Contact Person	:	FUKII DAISUKE

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	:	Car Audio
Model No.	:	FT0108A
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12.0 V
Receipt Date of Sample (Information from test lab.)	:	May 9, 2019
Country of Mass-production	:	Mexico
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: FT0108A (referred to as the EUT in this report) is a Car Audio.

Radio Specification

Radio Type : Transceiver
Clock frequency (Crystal) : 48 MHz

	IEEE802.11b	IEEE802.11g/n (20 M band)	IEEE802.11a/n/ac (20 M band)	IEEE802.11n/ac (40 M band)	IEEE802.11ac (80 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz	5210 MHz 5290 MHz 5530 MHz - 5610 MHz 5775 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM(IEEE802.11ac only))		
Channel spacing	5MHz		20MHz	40MHz	80MHz
Antenna type	Inverted F Antenna				
Antenna Connector type	U.FL-LP-066				
Antenna Gain	4.7 dBi (2.4 GHz Band), 5.7 dBi (5 GHz Band)				

	Bluetooth Ver.4.1 with EDR function
Frequency of operation	2402 MHz - 2480 MHz
Type of modulation	BT: FHSS (GFSK, π/4-DQPSK, 8-DPSK) LE: GFSK
Channel spacing	BT: 1 MHz LE: 2 MHz
Antenna type	Inverted F Antenna
Antenna Connector type	U.FL-LP-066
Antenna Gain	4.7 dBi

	Broadcast Receiver
Radio Type	Receiver
Frequency of Operation	AM: 530 kHz - 1710 kHz FM: 87.7 MHz - 107.9 MHz
Channel spacing	AM: 10 kHz FM: 0.2 MHz
Antenna connector type	Fakra antenna terminal

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 IEEE 187:2003 **IC:** ICES-003 Issue 6: 2016 + Amendment 1: 2017	Class B	N/A	-	N/A	*1)
Radiated emission	**FCC:** ANSI C63.4: 2014 8. Radiated emission measurements IEEE 187:2003 **IC:** ICES-003 Issue 6: 2016 + Amendment 1: 2017	Class B	N/A	2.61 dB 828.774MHz QP, Horizontal	Complied# a)	-
Antenna Terminal	**FCC:** ANSI C63.4: 2014 12. Measurement of unintentional radiators other than ITE IEEE 187:2003 **IC:** -	Class B	N/A	17.42 dB 1989.038 MHz	Complied b)	-

*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)
b) Refer to APPENDIX 1 (data of Antenna Terminal Conducted 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
10 m	30 MHz to 200 MHz	(Horizontal)	4.8 dB
		(Vertical)	4.9 dB
	200 MHz to 1000 MHz	(Horizontal)	5.0 dB
		(Vertical)	5.0 dB
3 m	1 GHz to 6 GHz		5.0 dB
	6 GHz to 18 GHz		5.3 dB
1 m	10 GHz to 26.5 GHz		5.8 dB
	26.5 GHz to 40 GHz		5.8 dB
10 m	1 GHz to 18 GHz		5.2 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
Antenna terminal conducted emission / Power density / Burst power	2.7 dB

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
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124

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

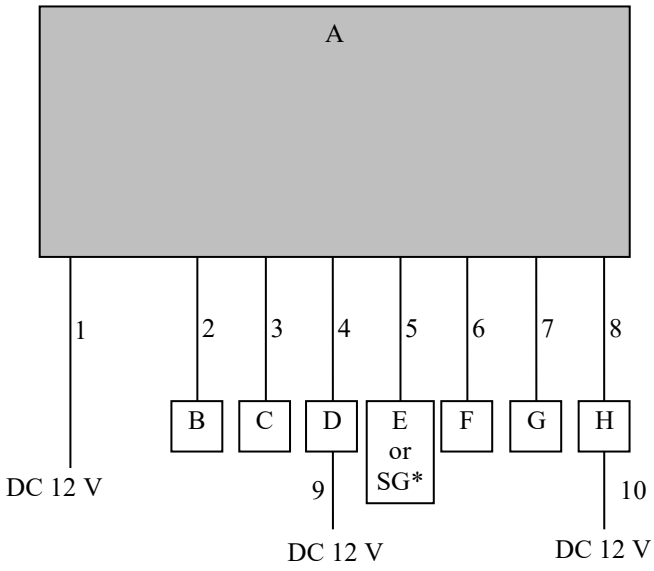
Refer to APPENDIX.

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

4.1 Operating Mode(s)

The mode(s): 1. FM Receiving mode (Local / Other) (Radiated Emission test)
2. USB Memory Play mode (Radiated Emission test)
3. FM Tuning mode (Antenna Terminal test)

4.2 Configuration and peripherals



*SG(Signal Generator) for Mode 1,
Item E for other

* Cabling and setup(s) were 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	Remarks
A	Car Audio	FT0108A	100115942-003	DENSO TEN Limited	EUT
B	Speaker Load	-	-	-	-
C	USB Memory	USM4GB	17116DGCNN	Sony	-
D	Ether Load	MY19TCP	845109804E	-	-
E	AM / FM Load	-	-	-	-
F	XM Load	-	-	-	-
G	Digital Camera	GMRVC	2392959 06	-	-
H	Jig Box	-	-	-	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	3.0	Unshielded	Unshielded	-
2	Speaker Cable	2.4	Unshielded	Unshielded	-
3	USB Cable	1.1	Shielded	Shielded	-
4	Ether Cable	2.0	Unshielded	Unshielded	-
5	AM / FM Cable	0.4	Shielded	Shielded	-
6	XM Cable	2.5	Shielded	Shielded	-
7	Digital Camera Cable	2.4	Shielded	Shielded	-
8	Signal Cable	2.3	Unshielded	Unshielded	-
9	DC Cable	3.0	Unshielded	Unshielded	-
10	DC Cable	3.0	Unshielded	Unshielded	-

SECTION 5: Radiated Emission

5.1 Operating environment

Test place : No.2 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, 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 - 40000 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, or the Spectrum Analyzer.
The radiated emission measurements were made with the following detector function of the Test Receiver and the Spectrum Analyzer.

For Mode 1, test was performed under the condition that signal of FM 98 MHz from Signal Generator was input to the EUT.

The test of Local oscillator spurious has been measured up to appropriate frequency based on the result of the antenna terminal test.

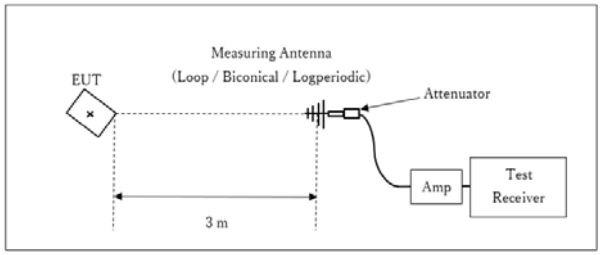
For above 1 GHz, test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

Frequency	Below 1 GHz	Above 1 GHz *1)
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW 120 kHz	PK: RBW: 1 MHz / VBW: 3 MHz AV *2): RBW: 1 MHz / VBW: 10 Hz

*1) The measurement data was adjusted to a 3 m distance using the following Distance Factor.
1 GHz - 13 GHz: 20 x log (3.0 m*/3.0 m) = 0.00 dB
13 GHz - 40 GHz: 20 x log (1.0 m* / 3.0 m) = -9.54 dB
*2) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Figure 1: Test Setup

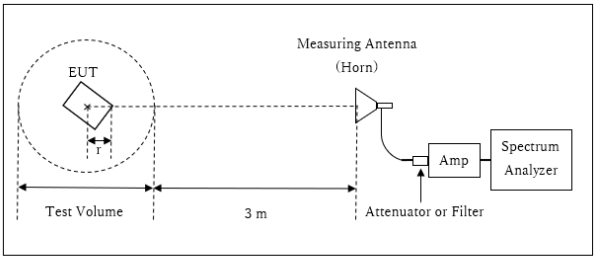
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz

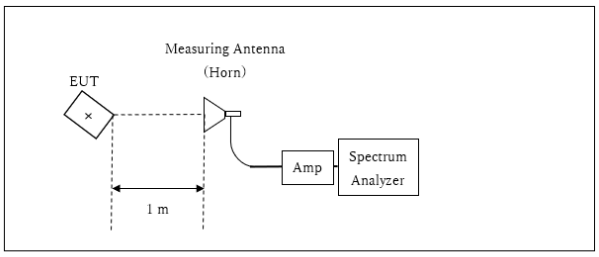


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.0 m*/3.0 m) = 0.00 dB
* Test Distance: (3 + Test Volume /2) - r = 3.0 m

Test Volume: 1.5 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.75 m

13 GHz - 40.0 GHz



× : Center of turn table

Distance Factor: 20 x log (1.0 m* / 3.0 m) = -9.54 dB
*Test Distance: 1 m

The test was made on EUT at the normal use position.

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 24, 2019
May 25, 2019

Test engineer: Yuta Moriya
Masaya Minami

SECTION 6: Antenna Terminal

6.1 Operating environment

Test place : No.2 Measurement room
Temperature : See data
Humidity : See data

6.2 Test configuration

EUT was placed on a wooden table of nominal size, 1.0 m by 1.5 m, raised 0.8 m from the ground.

6.3 Test conditions

Frequency range : 30 MHz - 1000 MHz / 1000 MHz - 40000 MHz
Test distance : N / A
EUT position : Table top
EUT operation mode : See Clause 4.1

6.4 Test procedure

The Antenna Terminal was measured with a spectrum analyzer connected to the antenna port.

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Spectrum Analyzer	Spectrum Analyzer
IF Bandwidth	PK: RBW: 100 kHz / VBW: 300 kHz	PK: RBW: 1 MHz / VBW: 3 MHz

6.5 Test result

Summary of the test results: Pass

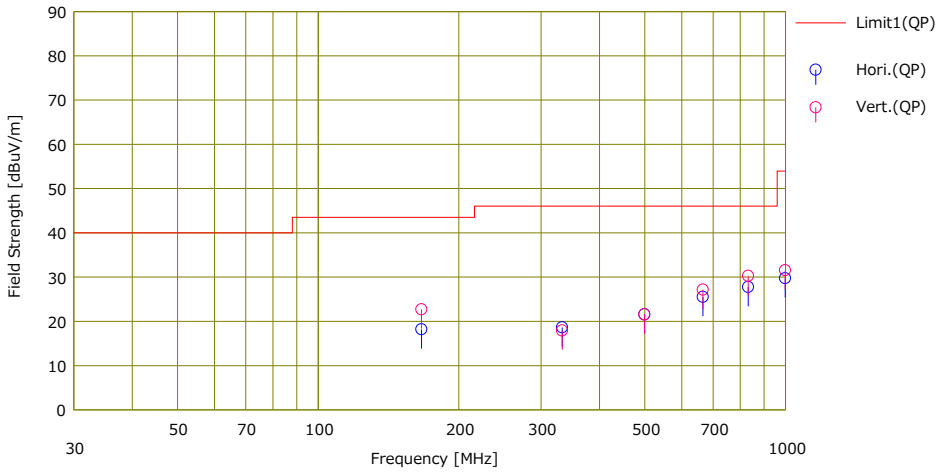
Date: May 24, 2019 Test engineer: Yuta Moriya
May 25, 2019 Masaya Minami

APPENDIX 1: Test data

Radiated Emission

Report No.	12868049H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	May 25, 2019
Temperature / Humidity	25 deg. C / 40 % RH
Engineer	Masaya Minami
	(Below 1 GHz)
Mode	Mode 1 (Local)

Limit : FCC_Part 15 Subpart B(15.109)_Class B



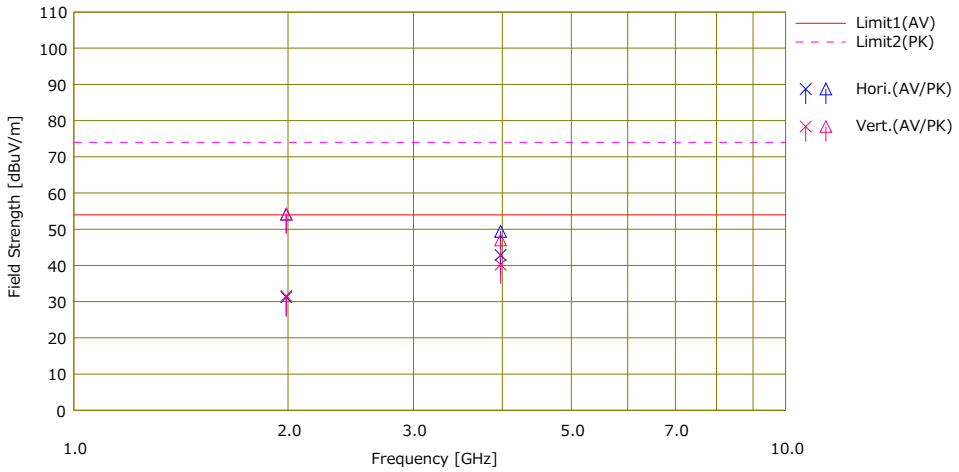
No.	Freq. [MHz]	Reading (QP) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (QP) [dBuV/m]	Limit (QP) [dBuV/m]	Margin (QP) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	166.394	24.60	15.53	7.95	29.87	18.21	43.50	25.29	Hori.	100	0	BA	
2	332.781	24.30	14.61	9.11	29.37	18.65	46.00	27.35	Hori.	100	127	LA21	
3	499.180	24.10	17.69	9.77	29.99	21.57	46.00	24.43	Hori.	100	0	LA21	
4	665.578	25.10	19.41	10.42	29.38	25.55	46.00	20.45	Hori.	126	238	LA21	
5	831.977	24.10	21.08	11.03	28.45	27.76	46.00	18.24	Hori.	100	149	LA21	
6	998.377	23.20	22.39	11.62	27.46	29.75	54.00	24.25	Hori.	100	30	LA21	
7	166.394	29.10	15.53	7.95	29.87	22.71	43.50	20.79	Vert.	100	132	BA	
8	332.781	23.60	14.61	9.11	29.37	17.95	46.00	28.05	Vert.	100	0	LA21	
9	499.180	24.10	17.69	9.77	29.99	21.57	46.00	24.43	Vert.	100	0	LA21	
10	665.578	26.70	19.41	10.42	29.38	27.15	46.00	18.85	Vert.	100	0	LA21	
11	831.977	26.60	21.08	11.03	28.45	30.26	46.00	15.74	Vert.	100	203	LA21	
12	998.377	25.00	22.39	11.62	27.46	31.55	54.00	22.45	Vert.	100	181	LA21	

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)

Radiated Emission

Report No.	12868049H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	May 25, 2019
Temperature / Humidity	25 deg. C / 40 % RH
Engineer	Masaya Minami
	(Above 1 GHz)
Mode	Mode 1 (Local)

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
		〈AV〉	〈PK〉				〈AV〉	〈PK〉	〈AV〉	〈PK〉	〈AV〉	〈PK〉					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg.]		
1	1989.038	37.16	60.07	26.10	2.36	34.39	31.23	54.14	54.00	74.00	22.77	19.86	Hori.	175	304	HA6	
2	3978.076	43.07	49.61	29.84	3.34	33.41	42.84	49.38	54.00	74.00	11.16	24.62	Hori.	149	172	HA6	
3	1989.038	37.52	60.09	26.10	2.36	34.39	31.59	54.16	54.00	74.00	22.41	19.84	Vert.	268	192	HA6	
4	3978.076	40.45	47.27	29.84	3.34	33.41	40.22	47.04	54.00	74.00	13.78	26.96	Vert.	100	201	HA6	

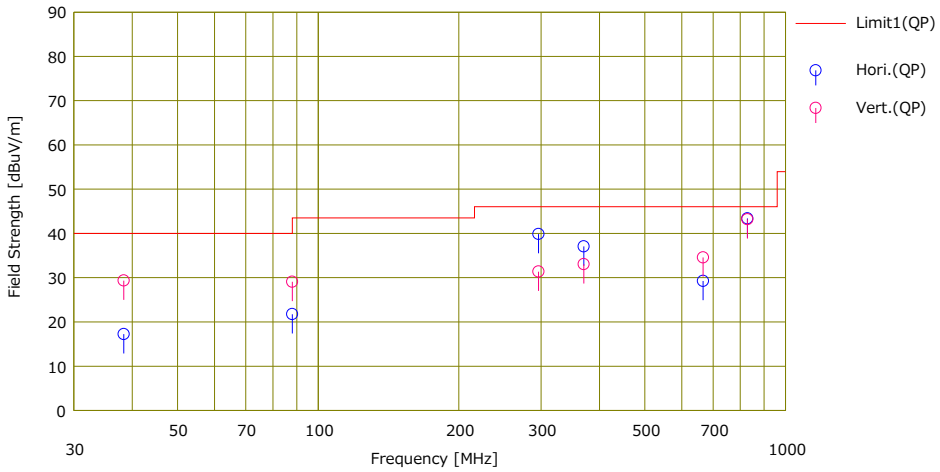
CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATT) - GAIN (AMP)

*No signal was detected above 10 GHz

Radiated Emission

Report No.	12868049H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	May 25, 2019
Temperature / Humidity	25 deg. C / 40 % RH
Engineer	Masaya Minami
	(Below 1 GHz)
Mode	Mode 1 (Other)

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]	Margin (QP) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	38.365	26.00	14.92	6.82	30.50	17.24	40.00	22.76	Hori.	100	133	BA	
2	88.000	36.80	7.93	7.35	30.32	21.76	40.00	18.24	Hori.	300	176	BA	
3	296.080	46.80	13.47	8.80	29.20	39.87	46.00	6.13	Hori.	100	255	LA21	
4	370.104	42.20	15.03	9.39	29.57	37.05	46.00	8.95	Hori.	100	108	LA21	
5	666.175	28.80	19.43	10.42	29.38	29.27	46.00	16.73	Hori.	100	333	LA21	
6	828.774	39.80	21.05	11.01	28.47	43.39	46.00	2.61	Hori.	100	143	LA21	
7	38.365	38.10	14.92	6.82	30.50	29.34	40.00	10.66	Vert.	100	132	BA	
8	88.000	44.10	7.93	7.35	30.32	29.06	40.00	10.94	Vert.	100	158	BA	
9	296.080	38.30	13.47	8.80	29.20	31.37	46.00	14.63	Vert.	100	169	LA21	
10	370.104	38.20	15.03	9.39	29.57	33.05	46.00	12.95	Vert.	141	103	LA21	
11	666.175	34.10	19.43	10.42	29.38	34.57	46.00	11.43	Vert.	100	0	LA21	
12	828.774	39.60	21.05	11.01	28.47	43.19	46.00	2.81	Vert.	100	180	LA21	

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)

Radiated Emission

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Engineer	Masaya Minami
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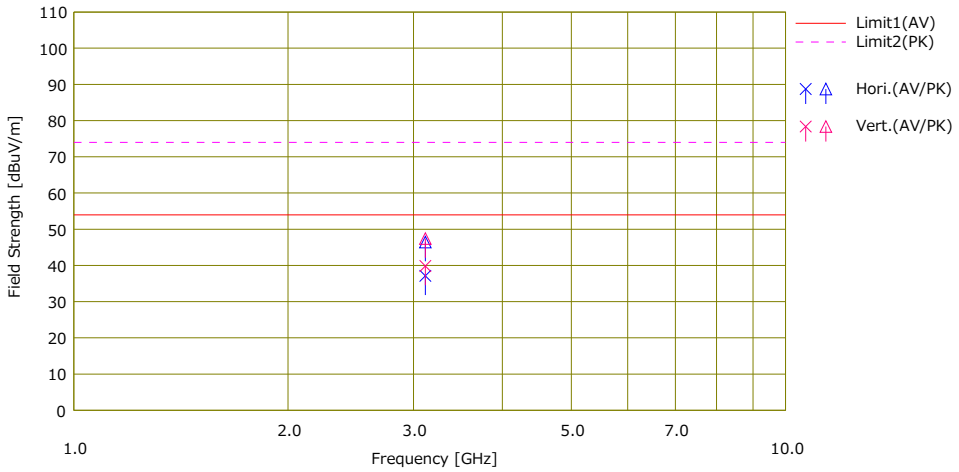
Mode	Mode 1 (Other)

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
		〈AV〉	〈PK〉				〈AV〉	〈PK〉	〈AV〉	〈PK〉	〈AV〉	〈PK〉					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg.]		
1	3118.282	39.63	48.97	28.56	2.95	34.02	37.12	46.46	54.00	74.00	16.88	27.54	Hori.	100	188	HA6	
2	3118.282	42.34	49.92	28.56	2.95	34.02	39.83	47.41	54.00	74.00	14.17	26.59	Vert.	241	183	HA6	

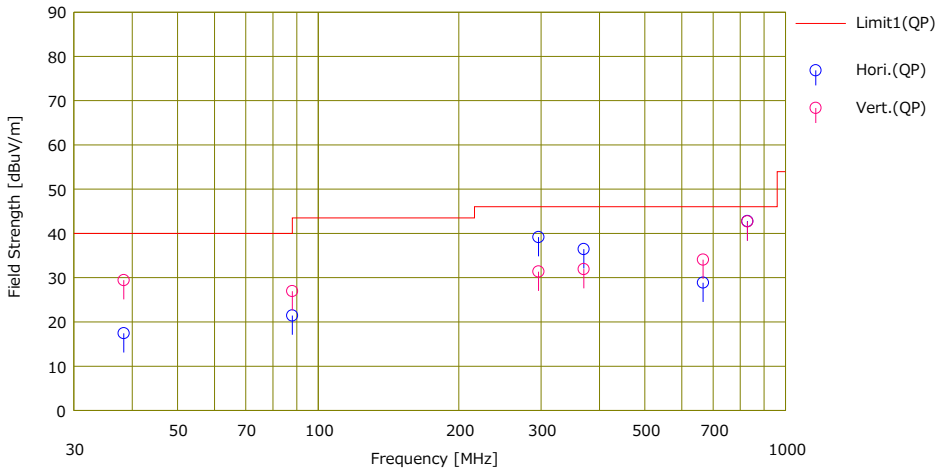
CHART: WITH FACTOR
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC, 1000 MHz -: HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATT) - GAIN (AMP)

*No signal was detected above 10 GHz

Radiated Emission

Report No.	12868049H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	May 25, 2019
Temperature / Humidity	25 deg. C / 40 % RH
Engineer	Masaya Minami
	(Below 1 GHz)
Mode	Mode 2

Limit : FCC_Part 15 Subpart B(15.109)_Class B



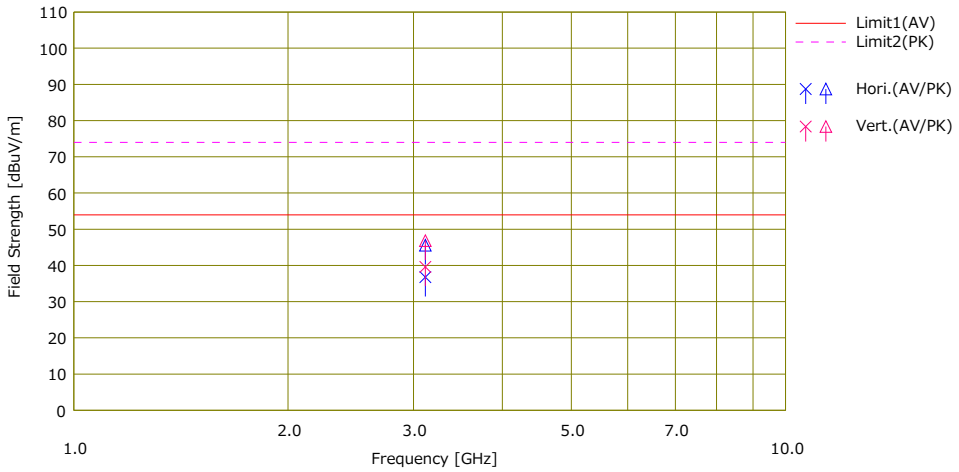
No.	Freq. [MHz]	Reading (QP) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (QP) [dBuV/m]	Limit (QP) [dBuV/m]	Margin (QP) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	38.365	26.20	14.92	6.82	30.50	17.44	40.00	22.56	Hori.	100	132	BA	
2	88.000	36.50	7.93	7.35	30.32	21.46	40.00	18.54	Hori.	300	180	BA	
3	296.080	46.10	13.47	8.80	29.20	39.17	46.00	6.83	Hori.	100	144	LA21	
4	370.104	41.60	15.03	9.39	29.57	36.45	46.00	9.55	Hori.	100	131	LA21	
5	666.175	28.40	19.43	10.42	29.38	28.87	46.00	17.13	Hori.	100	211	LA21	
6	828.774	39.20	21.05	11.01	28.47	42.79	46.00	3.21	Hori.	100	140	LA21	
7	38.365	38.20	14.92	6.82	30.50	29.44	40.00	10.56	Vert.	100	134	BA	
8	88.000	42.00	7.93	7.35	30.32	26.96	40.00	13.04	Vert.	100	162	BA	
9	296.080	38.30	13.47	8.80	29.20	31.37	46.00	14.63	Vert.	100	144	LA21	
10	370.104	37.10	15.03	9.39	29.57	31.95	46.00	14.05	Vert.	137	119	LA21	
11	666.175	33.60	19.43	10.42	29.38	34.07	46.00	11.93	Vert.	100	5	LA21	
12	828.774	39.10	21.05	11.01	28.47	42.69	46.00	3.31	Vert.	100	177	LA21	

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)

Radiated Emission

Report No.	12868049H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	May 24, 2019
Temperature / Humidity	24 deg. C / 38 % RH
Engineer	Yuta Moriya
	(Above 1 GHz)
Mode	Mode 2

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
		〈AV〉	〈PK〉				〈AV〉	〈PK〉	〈AV〉	〈PK〉	〈AV〉	〈PK〉					
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]		
1	3118.282	39.25	48.10	28.56	2.95	34.02	36.74	45.59	54.00	74.00	17.26	28.41	Hori.	102	190	HA6	
2	3118.282	42.11	49.34	28.56	2.95	34.02	39.60	46.83	54.00	74.00	14.40	27.17	Vert.	242	182	HA6	

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)

*No signal was detected above 10 GHz

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Ise EMC Lab.
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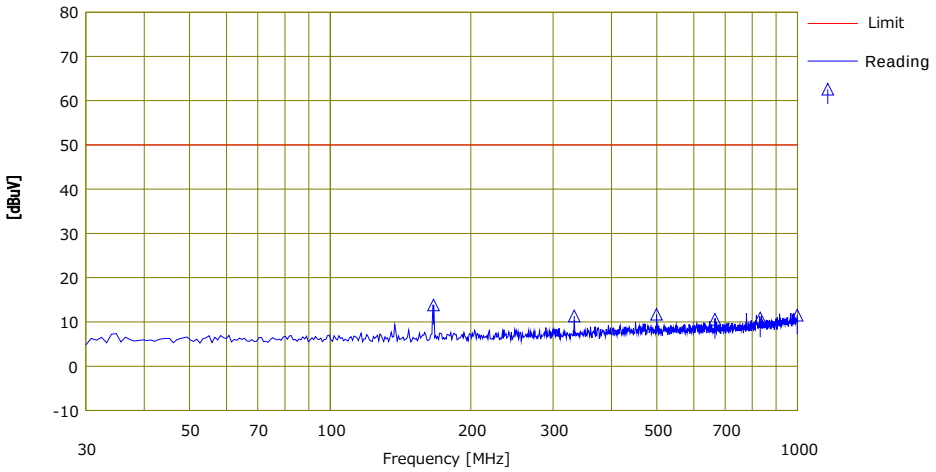
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Antenna Terminal Conducted Emission

Report No.	12868049H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	May 25, 2019
Temperature / Humidity	25 deg. C / 40 % RH
Engineer	Minami Masaya
	(Below 1 GHz)
Mode	Mode 3

Limit : FCC15.111 Antenna terminal measurement



No.	Freq. [MHz]	Reading (PK) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (PK) [dBuV]	Limit *1) (PK) [dBuV]	Margin (PK) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	166.394	37.76	0.00	8.09	32.03	13.82	50.00	36.18	---	0	0	---	
2	332.781	34.05	0.00	9.24	31.93	11.36	50.00	38.64	---	0	0	---	
3	499.180	33.80	0.00	9.91	31.98	11.73	50.00	38.27	---	0	0	---	
4	665.578	32.16	0.00	10.56	32.11	10.61	50.00	39.39	---	0	0	---	
5	831.977	31.21	0.00	11.17	31.47	10.91	50.00	39.09	---	0	0	---	
6	998.377	30.40	0.00	11.75	30.62	11.53	50.00	38.47	---	0	0	---	

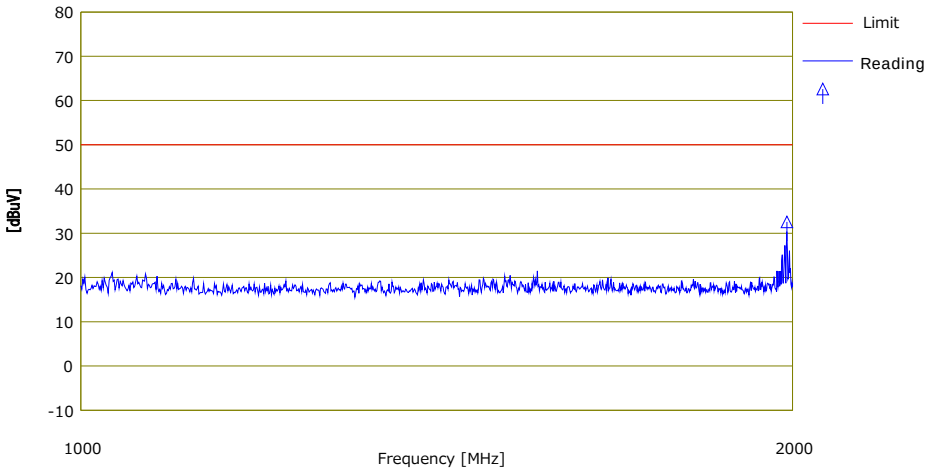
*1) 2nW = -57dBm = 50dBuV

CHART: WITH FACTOR
CALCULATION: RESULT = READING + LOSS (CABLE + MATCHING PAD) - GAIN (AMP)

Antenna Terminal Conducted Emission

Report No.	12868049H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	May 24, 2019
Temperature / Humidity	24 deg. C / 38 % RH
Engineer	Yuta Moriya
	(1 GHz - 2 GHz)
Mode	Mode 3

Limit : FCC15.111 Antenna terminal measurement



No.	Freq. [MHz]	Reading (PK) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (PK) [dBuV]	Limit *1) (PK) [dBuV]	Margin (PK) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	1989.038	58.45	0.00	8.51	34.39	32.57	50.00	17.43	---	0	0	---	

*1) 2nW = -57dBm = 50dBuV

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

*No signal was detected above 2 GHz

APPENDIX 2: Test instruments

Test Instruments

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	142228	Measure	KOMELON	KMC-36	-	-	-	-
RE/AT	141899	Spectrum Analyzer	AGILENT	E4448A	MY46180655	08/10/2018	08/31/2019	12
RE/AT	141556	Thermo-Hygrometer	CUSTOM	CTH-201	0003	12/05/2018	12/31/2019	12
RE	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/15/2018	06/30/2019	12
RE	142004	AC2_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	06/29/2018	06/30/2020	24
RE	141578	Pre Amplifier	AGILENT	8447D	2944A10845	09/19/2018	09/30/2019	12
RE	141265	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-190	03/25/2019	03/31/2020	12
RE/AT	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE/AT	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/21/2018	08/31/2019	12
RE	141317	Coaxial Cable	Fujikura/Agilent	-	-	02/25/2019	02/29/2020	12
RE	141427	Biconical Antenna	Schwarzbeck	VHA9103B	8031	04/12/2019	04/30/2020	12
RE	141203	Attenuator(6dB)	Weinschel Corp	2	BK7970	11/05/2018	11/30/2019	12
AT	141577	Microwave System Power Amplifier	AGILENT	83050A	MY39500610	10/04/2018	10/31/2019	12
AT	141325	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	03/04/2019	03/31/2020	12
AT	141550	Matching Pad Anritsu	ANRITSU	MB-009	40063	07/18/2018	07/31/2019	12
RE/AT	141579	Pre Amplifier	AGILENT	8449B	3008A02142	01/21/2019	01/31/2020	12
RE/AT	141392	Microwave Cable	Junkosha	MWX221	1604S253(1 m) / 1608S087(5 m)	08/08/2018	08/31/2019	12
RE	141512	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	05/09/2019	05/31/2020	12
RE	142006	AC2_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-06902	04/01/2019	04/30/2020	12

***Hyphens for Last Calibration Date, Calibration Due Date and Cal Int 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
AT: Antenna Terminal Conducted test