



RADIO TEST REPORT

Test Report No. : 12992598H-A-R1

Applicant : NIDEC MOBILITY CORPORATION
(formerly OMRON Automotive Electronics Co. Ltd.)

Type of Equipment : CONTROL UNIT, KOS

Model No. : GGM-M006

FCC ID : OUCGGM-M006

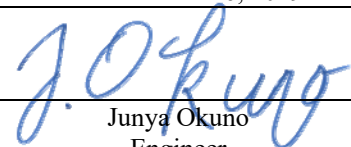
Test regulation : FCC Part 15 Subpart C: 2019

Test Result : Complied (Refer to SECTION 3.2)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio 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.
9. This report is a revised version of 12992598H-A. 12992598H-A is replaced with this report.

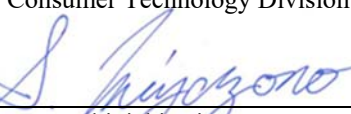
Date of test: October 4 and 16, 2019

Representative test engineer:


Junya Okuno
Engineer

Consumer Technology Division

Approved by:


Shinichi Miyazono
Engineer

Consumer Technology Division



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☒ There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No.: 12992598H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12992598H-A	November 7, 2019	-	-
1	12992598H-A-R1	December 6, 2019	P.10	Addition of the three note sentences in Clause 4.2. * The EUT does not transmit simultaneously from multiple antennas. * Antenna was evaluated with the worst duty respectively. * The EUT was set to transmit the data continuously from one antenna as a worst case, not to transmit it randomly from each antenna.

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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	PN	Pseudo random Noise
BW	BandWidth	PRBS	Pseudo-Random Bit Sequence
Cal Int	Calibration Interval	PSD	Power Spectral Density
CCK	Complementary Code Keying	QAM	Quadrature Amplitude Modulation
Ch., CH	Channel	QP	Quasi-Peak
CISPR	Comite International Special des Perturbations Radioelectriques	QPSK	Quadri-Phase Shift Keying
CW	Continuous Wave	RBW	Resolution Band Width
DBPSK	Differential BPSK	RDS	Radio Data System
DC	Direct Current	RE	Radio Equipment
D-factor	Distance factor	RF	Radio Frequency
DFS	Dynamic Frequency Selection	RMS	Root Mean Square
DQPSK	Differential QPSK	RSS	Radio Standards Specifications
DSSS	Direct Sequence Spread Spectrum	Rx	Receiving
EDR	Enhanced Data Rate	SA, S/A	Spectrum Analyzer
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	SG	Signal Generator
EMC	ElectroMagnetic Compatibility	SVSWR	Site-Voltage Standing Wave Ratio
EMI	ElectroMagnetic Interference	TR	Test Receiver
EN	European Norm	Tx	Transmitting
ERP, e.r.p.	Effective Radiated Power	VBW	Video BandWidth
EU	European Union	Vert.	Vertical
EUT	Equipment Under Test	WLAN	Wireless LAN
Fac.	Factor		
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	:	NIDEC MOBILITY CORPORATION ^{*1)}
Address	:	6368, Nenjo-zaka, Okusa, Komaki-city, Aichi 485-802 Japan
Telephone Number	:	+81-568-78-6159
Facsimile Number	:	+81-568-78-7659
Contact Person	:	Shigeyuki Kato

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No. 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 (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.

*1) The company name was changed from "OMRON Automotive Electronics Co. Ltd." to "NIDEC MOBILITY CORPORATION" on November 1, 2019.

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	CONTROL UNIT, KOS
Model No.	:	GGM-M006
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12.0 V
Receipt Date of Sample (Information from test lab.)	:	September 28, 2019
Country of Mass-production	:	China
Condition of EUT	:	Production model
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: GGM-M006 (referred to as the EUT in this report) is a CONTROL UNIT, KOS.

General Specification

Clock frequency (maximum)	:	16.00 MHz (CPU)
Operating Temperature	:	-40 deg. C to +85 deg. C

CONTROL UNIT, KOS has the following radio functions: Immobilizer system and Smart System (LF Transmitting/RF Receiving).

Radio Specification

Immobilizer system function

Equipment Type	:	Transceiver
Frequency of Operation	:	125 kHz
Type of Modulation	:	ASK
Antenna Type	:	Coil Antenna

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Smart System: LF Transmitting function

Equipment Type : Transmitter
Frequency of Operation : 125 kHz
Antenna Type : Ferrite Antenna

Smart System: RF Receiving function *

Type of Receiver : Super Heterodyne
Receiving Frequency : 433.92 MHz
Oscillator Frequency : 21.948717 MHz
Local Oscillator Frequency : 434.194 MHz
Intermediate Frequency : 274 kHz
Antenna Type : S type antenna

*The test of transmitter part was performed separately from this test report, and the conformability is confirmed.

CONTROL UNIT, KOS (model: GGM-M006) consists of the following parts:

- KOS ECU (included UHF Receiver)
- LF Antenna (5pcs)
- FOB BOX
- PUSH SW
- FOB (Normal)

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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 July 19, 2019 and effective August 19, 2019 except 15.258

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits; general requirements.

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results	Remarks
Conducted Emission	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> RSS-Gen 8.8	<FCC> Section 15.207 <ISED> RSS-Gen 8.8	-	N/A	N/A	N/A	*1)
Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> RSS-Gen 6.5, 6.12	<FCC> Section 15.209 <ISED> RSS-210 4.4 RSS-Gen 8.9	Radiated	N/A	8.23 dB 125 kHz 0 deg. PK with Duty Factor	Complied a)	-
Electric Field Strength of Spurious Emission	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> RSS-Gen 6.5, 6.6, 6.13	<FCC> Section 15.209 <ISED> RSS-210 4.4 RSS-Gen 8.9	Radiated	N/A	3.18 dB 38.000 MHz, Vertical, QP	Complied# a)	-
-26dB Bandwidth	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> -	<FCC> Reference data <ISED> -	Radiated	N/A	N/A	Complied b)	-

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 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 -26 dB Bandwidth and 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 EUT provides stable voltage constantly to the wireless transmitter regardless of input voltage.

Instead of a new battery, DC power supply was used for the test.

That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the vehicle. 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 following 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
		5.0 dB
	200 MHz to 1000 MHz (Horizontal)	5.2 dB
		6.3 dB
10 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
		4.8 dB
	200 MHz to 1000 MHz (Horizontal)	5.0 dB
		5.0 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
-20dB Bandwidth / 99 % Occupied Bandwidth	0.96 %

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3.5 Test Location

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*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.

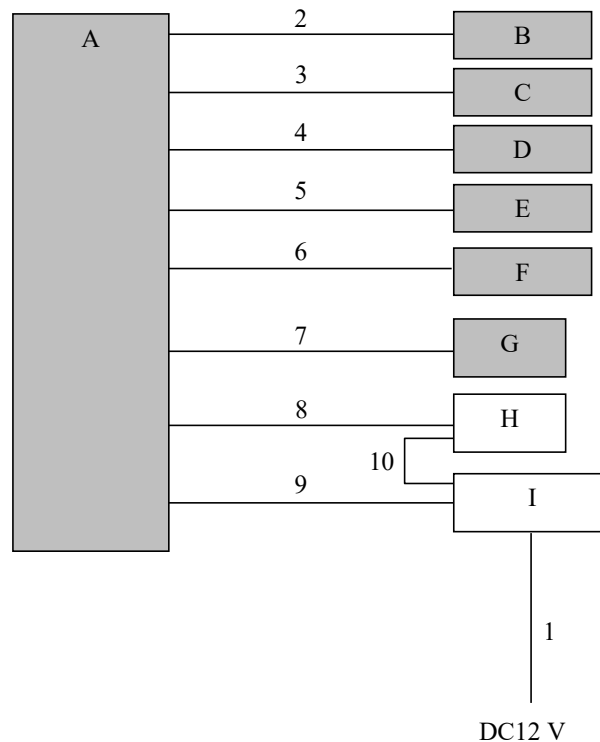
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

Test mode	Remarks
1) Continuous Transmitting mode	-

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

4.2 Configuration and peripherals



- * Cabling and setup were taken into consideration and test data was taken under worse case conditions.
- * The EUT does not transmit simultaneously from multiple antennas.
- * Antenna was evaluated with the worst duty respectively.
- * The EUT was set to transmit the data continuously from one antenna as a worst case, not to transmit it randomly from each antenna.
- * According to the result of pre-check to three antennas(DR, AS, INF), it was confirmed that there was no difference in RF characteristics among antennas.
- * The test was performed with LF Antenna (DR) as representative.

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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Keyless Operation System	GGM-M006	2669G2	NIDEC MOBILITY CORPORATION	EUT
B	LF Antenna(AS)	G8D-841M-ANT	K999030	NIDEC MOBILITY CORPORATION	EUT
C	LF Antenna(DR)	G8D-841M-ANT	K999022	NIDEC MOBILITY CORPORATION	EUT
D	LF Antenna(InF)	G8D-841M-ANT	K999032	NIDEC MOBILITY CORPORATION	EUT
E	LF Antenna(InR)	G8D-841M-ANT	K999050	NIDEC MOBILITY CORPORATION	EUT
F	LF Antenna(T/G)	G8D-841M-ANT	K999031	NIDEC MOBILITY CORPORATION	EUT
G	FOB BOX	C8Z-F116M-K-T	2920124	NIDEC MOBILITY CORPORATION	EUT
H	Switch Engine Start	C8N-B100M-Z	CA541389	NIDEC MOBILITY CORPORATION	-
I	Switch & Load Board	RJ151B-901A	-	-	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.0	Unshielded	Unshielded	-
2	Antenna Cable	2.0	Unshielded	Unshielded	-
3	Antenna Cable	2.0	Unshielded	Unshielded	-
4	Antenna Cable	2.0	Unshielded	Unshielded	-
5	Antenna Cable	2.0	Unshielded	Unshielded	-
6	Antenna Cable	2.0	Unshielded	Unshielded	-
7	Antenna Cable	2.0	Unshielded	Unshielded	-
8	Signal Cable	2.0	Unshielded	Unshielded	-
9	Signal Cable	2.0	Unshielded	Unshielded	-
10	Signal Cable	2.0	Unshielded	Unshielded	-

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SECTION 5: Radiated emission (Fundamental and Spurious Emission)

Test Procedure

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 Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

Frequency : From 9 kHz to 30 MHz

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: 0 deg., 45 deg., 90 deg., and 135 deg.) and horizontal polarization.

*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency: From 30 MHz to 1 GHz

The measuring antenna height 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.

The test was made with the detector (RBW / VBW) in the following table.

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

Test Antennas are used as below;

Frequency	Below 30 MHz	30 MHz to 200 MHz	200 MHz to 1 GHz
Antenna Type	Loop	Biconical	Logperiodic

Frequency	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
Instrument used	Test Receiver				
Detector	PK / AV	QP	PK / AV	QP	QP
IF Bandwidth	200 Hz	200 Hz	9 kHz	9 kHz	120 kHz
Test Distance	3 m *1)	3 m *1)	3 m *1)	3 m *2)	3 m

*1) Distance Factor: $40 \times \log(3 \text{ m} / 300 \text{ m}) = -80 \text{ dB}$

*2) Distance Factor: $40 \times \log(3 \text{ m} / 30 \text{ m}) = -40 \text{ dB}$

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane.

However test results were confirmed to pass against standard limit.

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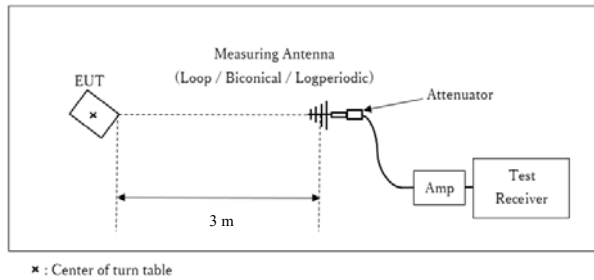
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[Test Setup]
Below 1 GHz



Test Distance: 3 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.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 9 kHz - 1 GHz
Test data : APPENDIX 1
Test result : Pass

Date: October 4, 2019
October 16, 2019

Test engineer: Ken Fujita
Junya Okuno

UL Japan, Inc.

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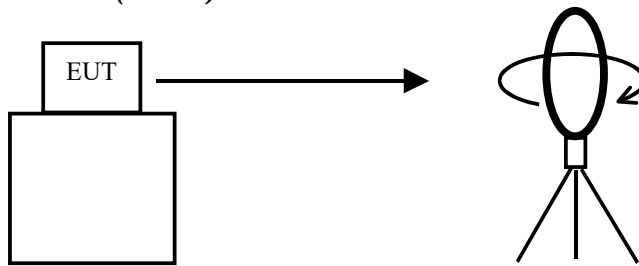
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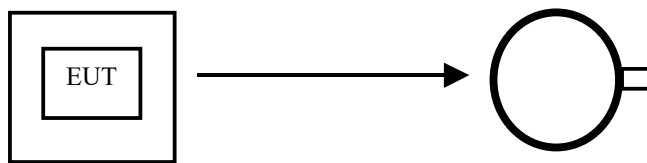
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Figure 1: Direction of the Loop Antenna

Side View (Vertical)



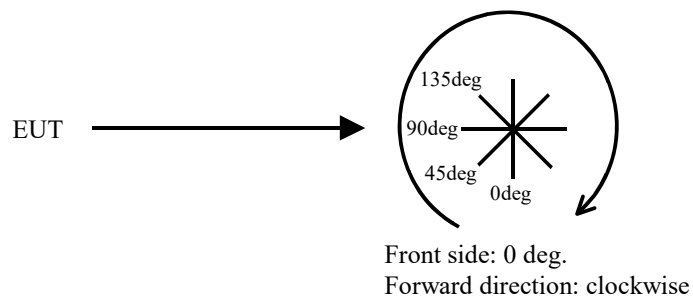
.....
Top View (Horizontal)



Antenna was not rotated.

.....

Top View (Vertical)



SECTION 6: -26dB Bandwidth

Test Procedure

The test was measured with a spectrum analyzer using a test fixture.

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
-26 dB Bandwidth	200 kHz	300 Hz	1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

Test data : APPENDIX 1
Test result : Pass

SECTION 7: 99% Occupied Bandwidth

Test Procedure

The test was measured with a spectrum analyzer using a test fixture.

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
99 % Occupied Bandwidth	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer

*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100 %.
Peak hold was applied as Worst-case measurement.

Test data : APPENDIX 1
Test result : Pass

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APPENDIX 1: Test data

Radiated Emission below 30 MHz (Fundamental and Spurious Emission)

Report No. 12992598H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.1
Date October 16, 2019
Temperature / Humidity 23 deg. C / 49 % RH
Engineer Junya Okuno
Mode Mode 1, DR Antenna

PK or QP

Ant Deg [deg] or Polarity [Hori/Vert]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	PK	103.90	19.71	-74.01	32.23	-	17.37	45.60	28.23	Fundamental
0deg	0.25000	PK	60.00	19.66	-73.97	32.19	-	-26.50	39.60	66.10	
0deg	0.37500	PK	55.70	19.64	-73.94	32.16	-	-30.76	36.10	66.86	
0deg	0.50000	QP	32.90	19.62	-33.92	32.13	-	-13.53	33.60	47.13	
0deg	0.62500	QP	45.20	19.61	-33.90	32.15	-	-1.24	31.70	32.94	
0deg	0.75000	QP	31.50	19.62	-33.87	32.17	-	-14.92	30.10	45.02	
0deg	0.87500	QP	39.60	19.61	-33.85	32.19	-	-6.83	28.70	35.53	
0deg	1.00000	QP	31.00	19.61	-33.83	32.21	-	-15.43	27.60	43.03	
0deg	1.12500	QP	36.60	19.62	-33.81	32.21	-	-9.80	26.50	36.30	
0deg	1.25000	QP	30.90	19.63	-33.79	32.21	-	-15.47	25.60	41.07	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + Filter + D.Factor) - Gain(Amplifier)

PK with Duty factor

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	AV	103.90	19.71	-74.01	32.23	0.00	17.37	25.60	8.23	
0deg	0.25000	AV	60.00	19.66	-73.97	32.19	0.00	-26.50	19.60	46.10	
0deg	0.37500	AV	55.70	19.64	-73.94	32.16	0.00	-30.76	16.10	46.86	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + Filter + D.Factor) - Gain(Amplifier) + Duty factor *

* Since the peak emission result satisfied the average limit, duty factor was omitted.

Result of the fundamental emission at 3m without Distance factor

PK or QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	PK	103.90	19.70	6.00	32.20	-	97.40	-	-	Fundamental

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

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

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

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Radiated Emission below 30 MHz (Fundamental and Spurious Emission)

Report No. 12992598H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.1
Date October 16, 2019
Temperature / Humidity 23 deg. C / 49 % RH
Engineer Junya Okuno
Mode Mode 1, InR Antenna

PK or QP

Ant Deg [deg] or Polarity [Hori/Vert]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	PK	102.40	19.71	-74.01	32.23	-	15.87	45.60	29.73	Fundamental
0deg	0.25000	PK	57.50	19.66	-73.97	32.19	-	-29.00	39.60	68.60	
0deg	0.37500	PK	41.30	19.64	-73.94	32.16	-	-45.16	36.10	81.26	
0deg	0.50000	QP	32.70	19.62	-33.92	32.13	-	-13.73	33.60	47.33	
0deg	0.62500	QP	39.50	19.61	-33.90	32.15	-	-6.94	31.70	38.64	
0deg	0.75000	QP	31.40	19.62	-33.87	32.17	-	-15.02	30.10	45.12	
0deg	0.87500	QP	35.50	19.61	-33.85	32.19	-	-10.93	28.70	39.63	
0deg	1.00000	QP	31.30	19.61	-33.83	32.21	-	-15.13	27.60	42.73	
0deg	1.12500	QP	33.60	19.62	-33.81	32.21	-	-12.80	26.50	39.30	
0deg	1.25000	QP	31.00	19.63	-33.79	32.21	-	-15.37	25.60	40.97	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + Filter + D.Factor) - Gain(Amplifier)

PK with Duty factor

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	AV	102.40	19.71	-74.01	32.23	0.00	15.87	25.60	9.73	
0deg	0.25000	AV	57.50	19.66	-73.97	32.19	0.00	-29.00	19.60	48.60	
0deg	0.37500	AV	41.30	19.64	-73.94	32.16	0.00	-45.16	16.10	61.26	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + Filter + D.Factor) - Gain(Amplifier) + Duty factor *

* Since the peak emission result satisfied the average limit, duty factor was omitted.

Result of the fundamental emission at 3m without Distance factor

PK or QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	PK	102.40	19.71	6.01	32.23	-	95.89	-	-	Fundamental

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

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

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

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Radiated Emission below 30 MHz (Fundamental and Spurious Emission)

Report No. 12992598H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.1
Date October 16, 2019
Temperature / Humidity 23 deg. C / 49 % RH
Engineer Junya Okuno
Mode Mode 1, T/G Antenna

PK or QP

Ant Deg [deg] or Polarity [Hori/Vert]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	PK	99.20	19.71	-74.01	32.23	-	12.67	45.60	32.93	Fundamental
0deg	0.25000	PK	52.00	19.66	-73.97	32.19	-	-34.50	39.60	74.10	
0deg	0.37500	PK	41.70	19.64	-73.94	32.16	-	-44.76	36.10	80.86	
0deg	0.50000	QP	32.80	19.62	-33.92	32.13	-	-13.63	33.60	47.23	
0deg	0.62500	QP	38.20	19.61	-33.90	32.15	-	-8.24	31.70	39.94	
0deg	0.75000	QP	31.40	19.62	-33.87	32.17	-	-15.02	30.10	45.12	
0deg	0.87500	QP	34.90	19.61	-33.85	32.19	-	-11.53	28.70	40.23	
0deg	1.00000	QP	31.10	19.61	-33.83	32.21	-	-15.33	27.60	42.93	
0deg	1.12500	QP	33.10	19.62	-33.81	32.21	-	-13.30	26.50	39.80	
0deg	1.25000	QP	31.00	19.63	-33.79	32.21	-	-15.37	25.60	40.97	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + Filter + D.Factor) - Gain(Amplifier)

PK with Duty factor

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	AV	99.20	19.71	-74.01	32.23	0.00	12.67	25.60	12.93	
0deg	0.25000	AV	52.00	19.66	-73.97	32.19	0.00	-34.50	19.60	54.10	
0deg	0.37500	AV	41.70	19.64	-73.94	32.16	0.00	-44.76	16.10	60.86	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + Filter + D.Factor) - Gain(Amplifier) + Duty factor *

* Since the peak emission result satisfied the average limit, duty factor was omitted.

Result of the fundamental emission at 3m without Distance factor

PK or QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	PK	99.20	19.71	6.01	32.23	-	92.69	-	-	Fundamental

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

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

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

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Radiated Emission below 30 MHz (Fundamental and Spurious Emission)

Report No. 12992598H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.1
Date October 16, 2019
Temperature / Humidity 23 deg. C / 49 % RH
Engineer Junya Okuno
Mode Mode 1, FOB BOX

PK or QP

Ant Deg [deg] or Polarity [Hori/Vert]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	PK	91.80	19.71	-74.01	32.23	-	5.27	45.60	40.33	Fundamental
0deg	0.25000	PK	36.10	19.66	-73.97	32.19	-	-50.40	39.60	90.00	
0deg	0.37500	PK	56.20	19.64	-73.94	32.16	-	-30.26	36.10	66.36	
0deg	0.50000	QP	32.80	19.62	-33.92	32.13	-	-13.63	33.60	47.23	
0deg	0.62500	QP	46.30	19.61	-33.90	32.15	-	-0.14	31.70	31.84	
0deg	0.75000	QP	40.30	19.62	-33.87	32.17	-	-6.12	30.10	36.22	
0deg	0.87500	QP	40.80	19.61	-33.85	32.19	-	-5.63	28.70	34.33	
0deg	1.00000	QP	31.00	19.61	-33.83	32.21	-	-15.43	27.60	43.03	
0deg	1.12500	QP	37.40	19.62	-33.81	32.21	-	-9.00	26.50	35.50	
0deg	1.25000	QP	33.70	19.63	-33.79	32.21	-	-12.67	25.60	38.27	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + Filter + D.Factor) - Gain(Amplifier)

PK with Duty factor

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	AV	91.80	19.71	-74.01	32.23	0.00	5.27	25.60	20.33	
0deg	0.25000	AV	36.10	19.66	-73.97	32.19	0.00	-50.40	19.60	70.00	
0deg	0.37500	AV	56.20	19.64	-73.94	32.16	0.00	-30.26	16.10	46.36	

Result = Reading + Ant Factor + Loss (Cable + Attenuator + Filter + D.Factor) - Gain(Amplifier) + Duty factor *

* Since the peak emission result satisfied the average limit, duty factor was omitted.

Result of the fundamental emission at 3m without Distance factor

PK or QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
0deg	0.12500	PK	91.80	19.71	6.01	32.23	-	85.29	-	-	Fundamental

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

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

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

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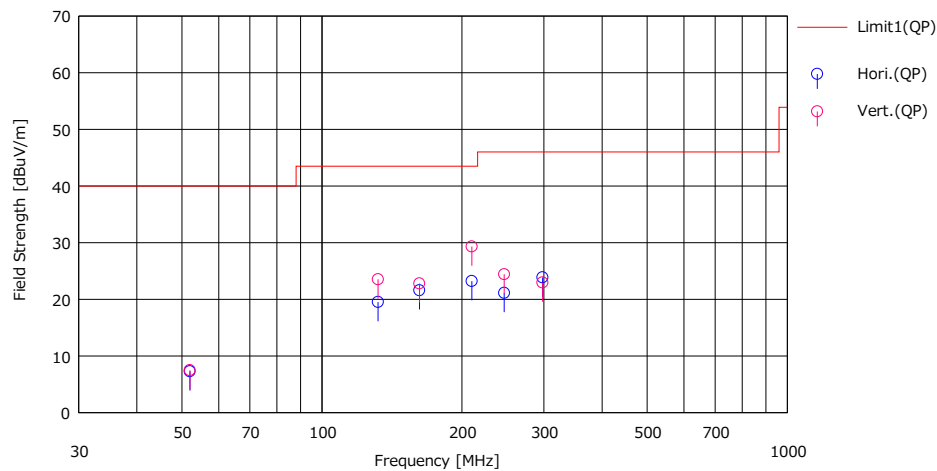
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Emission above 30 MHz (Spurious Emission)

Report No. 12992598H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 4, 2019
Temperature / Humidity 22 deg. C / 64 % RH
Engineer Fujita Ken
Mode Mode 1 DR Antenna

Limit : FCC15.209 3 m, below 1 GHz:QP, above 1 GHz:AV/PK



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]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	52.037	21.60	10.47	7.41	32.19	7.29	40.00	32.71	Hori.	400	0	BA	
2	131.994	29.20	14.00	8.44	32.11	19.53	43.50	23.97	Hori.	160	58	BA	
3	162.005	29.40	15.52	8.76	32.08	21.60	43.50	21.90	Hori.	180	148	BA	
4	209.980	34.90	11.13	9.21	32.03	23.21	43.50	20.29	Hori.	100	308	LA22	
5	246.427	31.90	11.68	9.52	31.98	21.12	46.00	24.88	Hori.	177	50	LA22	
6	298.019	32.40	13.44	9.94	31.92	23.86	46.00	22.14	Hori.	100	75	LA22	
7	52.037	21.80	10.47	7.41	32.19	7.49	40.00	32.51	Vert.	100	6	BA	
8	131.994	33.20	14.00	8.44	32.11	23.53	43.50	19.97	Vert.	100	105	BA	
9	162.005	30.60	15.52	8.76	32.08	22.80	43.50	20.70	Vert.	100	223	BA	
10	209.980	41.00	11.13	9.21	32.03	29.31	43.50	14.19	Vert.	100	14	LA22	
11	246.427	35.20	11.68	9.52	31.98	24.42	46.00	21.58	Vert.	100	352	LA22	
12	298.019	31.50	13.44	9.94	31.92	22.96	46.00	23.04	Vert.	100	346	LA22	

* 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)

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

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4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

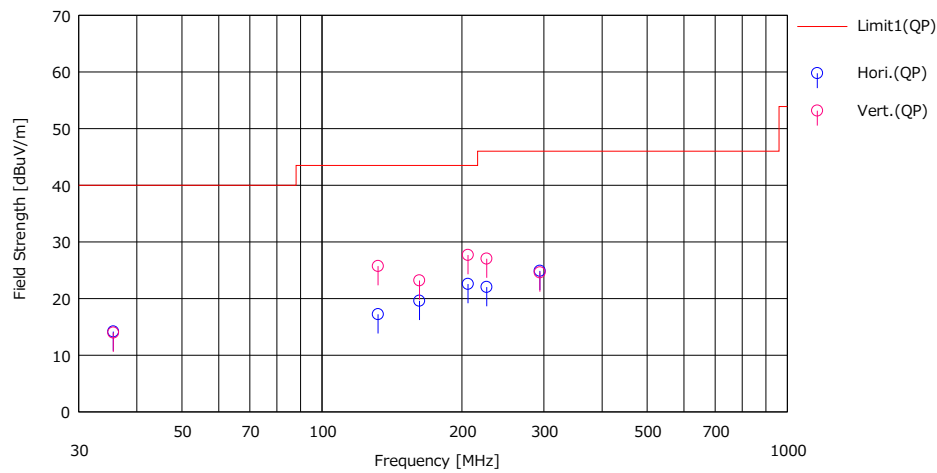
Telephone : +81 596 24 8999

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Radiated Emission above 30 MHz (Spurious Emission)

Report No. 12992598H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 4, 2019
Temperature / Humidity 22 deg. C / 64 % RH
Engineer Fujita Ken
Mode Mode 1 InR Antenna

Limit : FCC15.209 3 m, below 1 GHz:QP, above 1 GHz:AV/PK



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]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	35.611	22.80	16.45	7.13	32.21	14.17	40.00	25.83	Hori.	200	0	BA	
2	131.999	26.90	14.00	8.44	32.11	17.23	43.50	26.27	Hori.	201	288	BA	
3	161.999	27.40	15.52	8.76	32.08	19.60	43.50	23.90	Hori.	178	142	BA	
4	205.992	34.20	11.23	9.18	32.03	22.58	43.50	20.92	Hori.	180	59	LA22	
5	226.006	33.60	11.10	9.35	32.01	22.04	46.00	23.96	Hori.	213	221	LA22	
6	293.999	33.50	13.42	9.91	31.93	24.90	46.00	21.10	Hori.	100	286	LA22	
7	35.611	22.60	16.45	7.13	32.21	13.97	40.00	26.03	Vert.	100	218	BA	
8	131.999	35.40	14.00	8.44	32.11	25.73	43.50	17.77	Vert.	100	53	BA	
9	161.999	31.00	15.52	8.76	32.08	23.20	43.50	20.30	Vert.	103	7	BA	
10	205.992	39.30	11.23	9.18	32.03	27.68	43.50	15.82	Vert.	100	19	LA22	
11	226.006	38.60	11.10	9.35	32.01	27.04	46.00	18.96	Vert.	100	359	LA22	
12	293.999	33.20	13.42	9.91	31.93	24.60	46.00	21.40	Vert.	100	352	LA22	

* 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)

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

UL Japan, Inc.

Ise EMC Lab.

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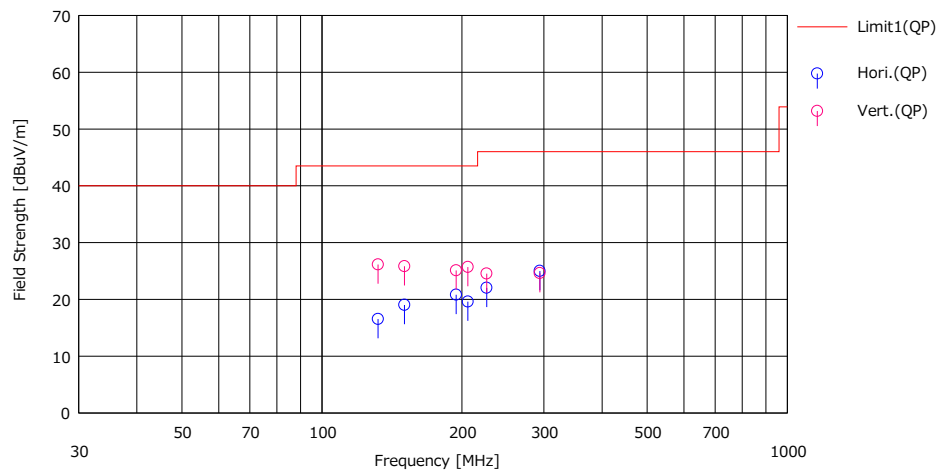
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Emission above 30 MHz (Spurious Emission)

Report No. 12992598H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 4, 2019
Temperature / Humidity 22 deg. C / 64 % RH
Engineer Fujita Ken
Mode Mode 1 T/G Antenna

Limit : FCC15.209 3 m, below 1 GHz:QP, above 1 GHz:AV/PK



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]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	131.991	26.20	14.00	8.44	32.11	16.53	43.50	26.97	Hori.	400	257	BA	
2	150.426	27.40	15.06	8.65	32.09	19.02	43.50	24.48	Hori.	400	246	BA	
3	194.333	27.10	16.67	9.07	32.05	20.79	43.50	22.71	Hori.	400	167	BA	
4	205.920	31.20	11.24	9.18	32.03	19.59	43.50	23.91	Hori.	100	276	LA22	
5	226.006	33.60	11.10	9.35	32.01	22.04	46.00	23.96	Hori.	100	105	LA22	
6	293.983	33.60	13.42	9.91	31.93	25.00	46.00	21.00	Hori.	100	359	LA22	
7	131.991	35.80	14.00	8.44	32.11	26.13	43.50	17.37	Vert.	100	7	BA	
8	150.426	34.20	15.06	8.65	32.09	25.82	43.50	17.68	Vert.	100	0	BA	
9	194.333	31.40	16.67	9.07	32.05	25.09	43.50	18.41	Vert.	100	7	BA	
10	205.920	37.30	11.24	9.18	32.03	25.69	43.50	17.81	Vert.	100	343	LA22	
11	226.006	36.10	11.10	9.35	32.01	24.54	46.00	21.46	Vert.	100	9	LA22	
12	293.983	33.20	13.42	9.91	31.93	24.60	46.00	21.40	Vert.	100	255	LA22	

* 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)

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

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Ise EMC Lab.

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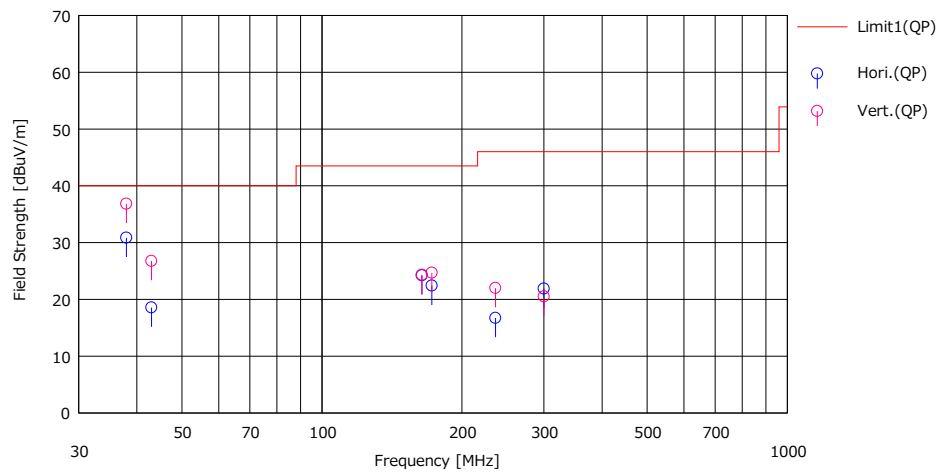
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Emission above 30 MHz (Spurious Emission)

Report No. 12992598H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 4, 2019
Temperature / Humidity 22 deg. C / 64 % RH
Engineer Fujita Ken
Mode Mode 1 FOB BOX

Limit : FCC15.209 3 m, below 1 GHz:QP, above 1 GHz:AV/PK



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]	Pol. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	38.000	40.40	15.49	7.17	32.21	30.85	40.00	9.15	Hori.	294	358	BA	
2	43.012	29.80	13.70	7.26	32.20	18.56	40.00	21.44	Hori.	400	359	BA	
3	164.005	31.90	15.61	8.78	32.08	24.21	43.50	19.29	Hori.	400	138	BA	
4	172.298	29.67	15.95	8.86	32.07	22.41	43.50	21.09	Hori.	400	143	BA	
5	236.008	27.90	11.38	9.43	32.00	16.71	46.00	29.29	Hori.	100	308	LA22	
6	300.000	30.38	13.46	9.96	31.92	21.88	46.00	24.12	Hori.	100	353	LA22	
7	38.000	46.37	15.49	7.17	32.21	36.82	40.00	3.18	Vert.	100	82	BA	
8	43.012	38.00	13.70	7.26	32.20	26.76	40.00	13.24	Vert.	100	80	BA	
9	164.005	32.00	15.61	8.78	32.08	24.31	43.50	19.19	Vert.	100	0	BA	
10	172.298	31.94	15.95	8.86	32.07	24.68	43.50	18.82	Vert.	100	0	BA	
11	236.008	33.19	11.38	9.43	32.00	22.00	46.00	24.00	Vert.	100	10	LA22	
12	300.000	29.00	13.46	9.96	31.92	20.50	46.00	25.50	Vert.	100	227	LA22	

* 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)

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

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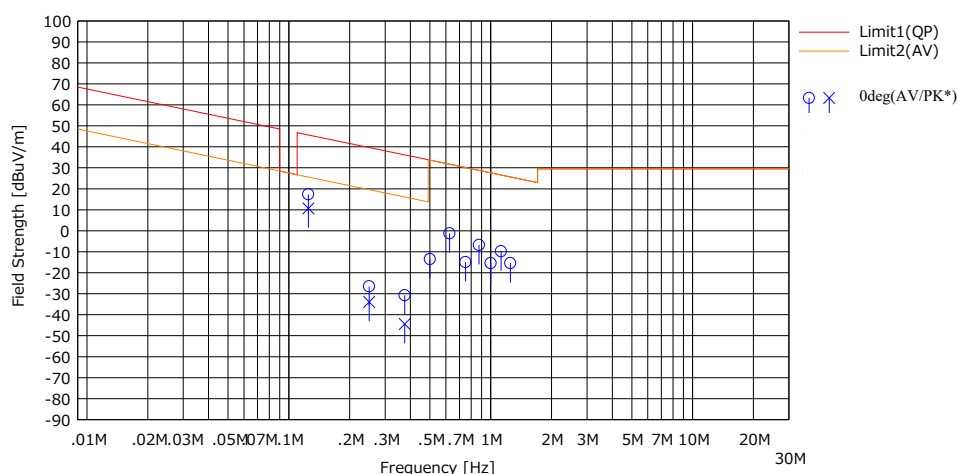
Facsimile : +81 596 24 8124

Radiated Emission Plot data, Worst case

Report No. 12992598H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date October 4, 2019
Temperature / Humidity 22 deg. C / 64 % RH
Engineer Fujita Ken
Mode Mode 1, Dr Antenna

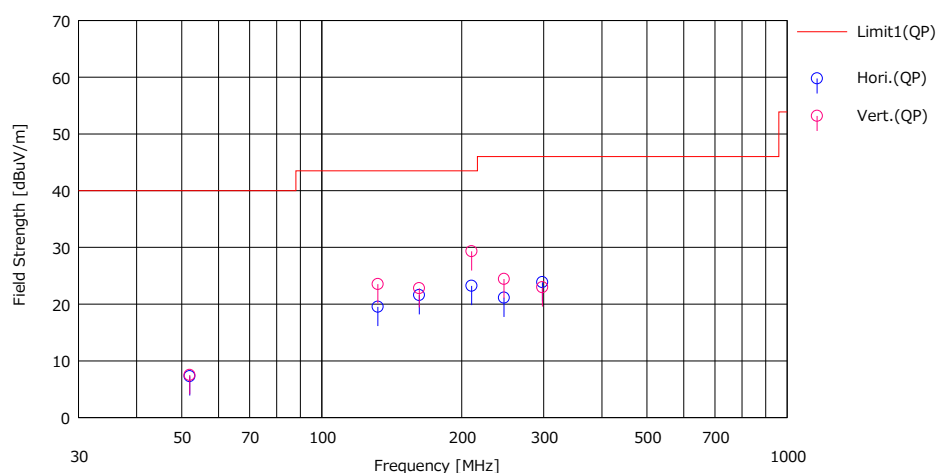
(below 30MHz)

Limit : FCC15.209(a), 9-90kHz:PK, 110-490kHz:PK, other:QP



* Data above 490 kHz were measured using a QP detector.

(above 30MHz)



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

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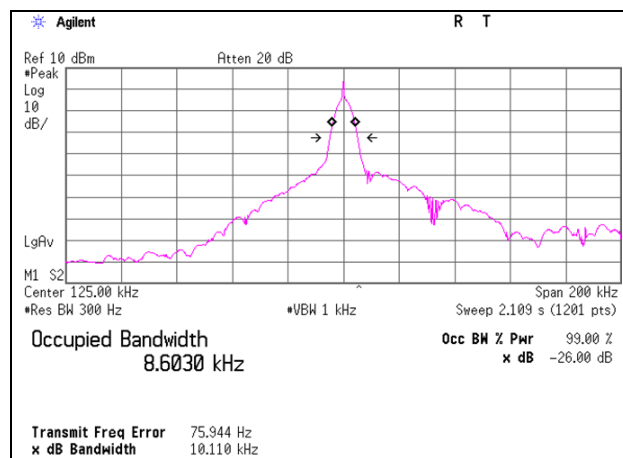
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

-26 dB Bandwidth and 99 % Occupied Bandwidth

Report No.	12992598H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	October 16, 2019
Temperature / Humidity	23 deg. C / 49 % RH
Engineer	Junya Okuno
Mode	Mode 1, Dr Antenna

-26 dB Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]
10.110	8.6030



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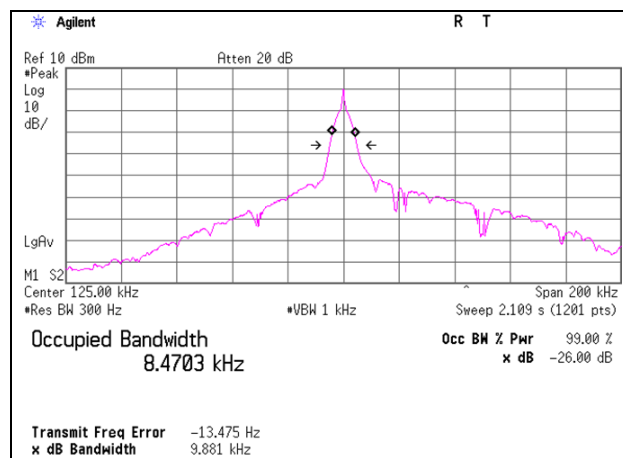
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

-26 dB Bandwidth and 99 % Occupied Bandwidth

Report No.	12992598H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	October 16, 2019
Temperature / Humidity	23 deg. C / 49 % RH
Engineer	Junya Okuno
Mode	Mode 1, InR Antenna

-26 dB Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]
9.881	8.4703



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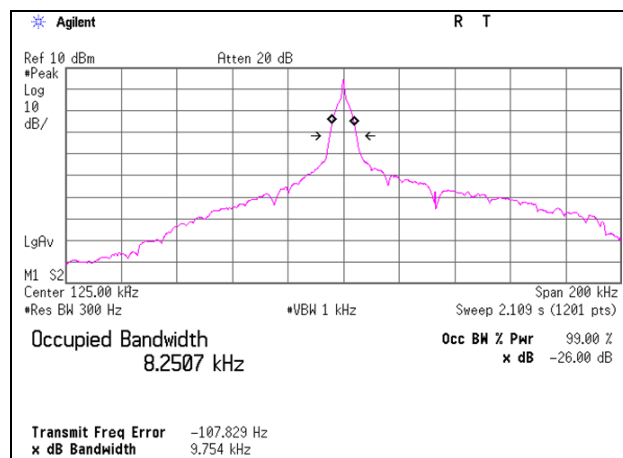
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

26 dB Bandwidth and 99 % Occupied Bandwidth

Report No.	12992598H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	October 16, 2019
Temperature / Humidity	23 deg. C / 49 % RH
Engineer	Junya Okuno
Mode	Mode 1, T/G Antenna

-26 dB Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]
9.754	8.2507



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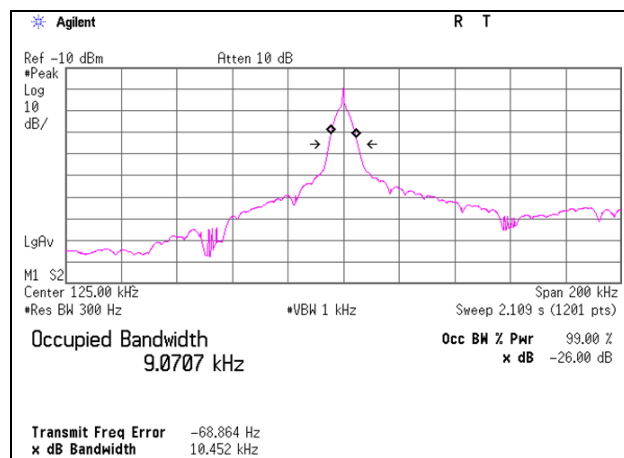
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

26 dB Bandwidth and 99 % Occupied Bandwidth

Report No.	12992598H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	October 16, 2019
Temperature / Humidity	23 deg. C / 49 % RH
Engineer	Junya Okuno
Mode	Mode 1, FOB BOX

-26 dB Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]
10.452	9.0707



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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	142226	Measure	KOMELON	KMC-36	-	-	-	-
RE	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	02/08/2019	02/29/2020	12
RE	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/18/2018	06/30/2020	24
RE	141566	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	01/11/2019	01/31/2020	12
RE	141899	Spectrum Analyzer	AGILENT	E4448A	MY46180655	08/07/2019	08/31/2020	12
RE	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/20/2019	08/31/2020	12
RE	141413	Coaxial Cable	UL Japan	-	-	06/07/2019	06/30/2020	12
RE	178648	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE	141213	Attenuator(6dB)	Weinschel Corp	2	BK7971	11/05/2018	11/30/2019	12
RE	141254	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	10/11/2018	10/31/2019	12
RE	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/27/2019	06/30/2020	12
RE	141215	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W/3D-2W/ RG400u/ RFM-E421(SW)	-/01068 (Switcher)	06/27/2019	06/30/2020	12
RE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE	141266	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	9111B-191	08/24/2019	08/31/2020	12
RE	141323	Coaxial cable	UL Japan	-	-	07/02/2019	07/31/2020	12
RE	141424	Biconical Antenna	Schwarzbeck	VHA9103+BBA9106	1915	08/24/2019	08/31/2020	12
RE	141532	DIGITAL HiTESTER	HIOKI	3805	51201197	01/29/2019	01/31/2020	12
RE	141554	Thermo-Hygrometer	CUSTOM	CTH-180	1301	01/11/2019	01/31/2020	12
RE	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	02/08/2019	02/29/2020	12
RE	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/02/2019	08/31/2020	12
RE	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	06/26/2018	06/30/2020	24
RE	142183	Measure	KOMELON	KMC-36	-	-	-	-
RE	148897	Attenuator	KEYSIGHT	8491A	MY52462349	12/20/2018	12/31/2019	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: Spurious emission

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