RADIO TEST REPORT

Test Report No. 14758222H-A-R1

Customer	**Tokyo Communication Equipment MFG Co.,ltd.**
Description of EUT	**NRWA5.10 / NRWA5.11**
Model Number of EUT	**PC-1070005-1 / PC-1070005-2**
FCC ID	**2ACJJNRWA51X**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied**
Issue Date	**May 26, 2023**
Remarks	**-**

Representative test engineer	Approved by
	
Takumi Nishida Engineer	Takumi Shimada Engineer

CERTIFICATE 5107.02

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

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- The information provided from the customer for this report is identified in SECTION 1.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No. 14758222H-A

This report is a revised version of 14758222H-A. 14758222H-A is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14758222H-A	May 17, 2023	-
1	14758222H-A-R1	May 26, 2023	Correction of the FCC Part 15.31 (e) in Clause 3.2

Reference: Abbreviations (Including words undescribed in this report)

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

CONTENTS PAGE

SECTION 1: Customer Information

Company Name	Tokyo Communication Equipment MFG Co.,ltd.
Address	3-8-14 Takanawa Minato-ku Tokyo 108-0074 Japan
Telephone Number	+81-3-3447-2421
Contact Person	Masaya Mikami

The information provided from the customer is as follows;
- Customer, Description of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer Information
- SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
- SECTION 4: Operation of EUT during testing

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

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	NRWA5.10 / NRWA5.11
Model Number	PC-1070005-1 / PC-1070005-2
Serial Number	Refer to SECTION 4.2
Condition	Production model
Modification	No Modification by the test lab
Receipt Date	April 13, 2023
Test Date	April 14 to 18, 2023

2.2 Product Description

General Specification

Rating	DC 5 V
Operating Temperature	0 deg. C to 50 deg. C

Radio Specification

Equipment Type	Transceiver
Frequency of Operation	13.56 MHz
Type of Modulation	ASK

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart C The latest version on the first day of the testing period
Title	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.225 Operation within the band 13.110-14.010 MHz.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	<FCC> ANSI C63.10:2013 6 Standard test methods	<FCC> Section 15.207	34.21 dB 0.48655 MHz AV Phase L (Mode 2)	Complied	-
	<ISED> RSS-Gen 8.8	<ISED> RSS-Gen 8.8			
Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.10:2013 6 Standard test methods	<FCC> Section 15.225(a)	57.53 dB, 13.56000 MHz, QP, 0 deg. (Mode 2 with Tag)	Complied	Radiated
	<ISED> RSS-Gen 6.4, 6.12	<ISED> RSS-210 B.6			
Spectrum Mask	<FCC> ANSI C63.10:2013 6 Standard test methods	<FCC> Section 15.225(b)(c)	36.43 dB, 13.56700 MHz, QP, 0 deg. (Mode 2 with Tag)	Complied	Radiated
	<ISED> RSS-Gen 6.4, 6.13	<ISED> RSS-210 B.6			
20 dB Bandwidth	<FCC> ANSI C63.10:2013 6 Standard test methods	<FCC> Section15.215(c)	See data	Complied	Conducted
	<ISED> -	<ISED> -			
Electric Field Strength of Spurious Emission	<FCC> ANSI C63.10:2013 6 Standard test methods	<FCC> Section 15.209, Section 15.225 (d)	0.52 dB 271.215 MHz, Vertical, QP (Mode 2 with Tag)	Complied	Radiated
	<ISED> RSS-Gen 6.4, 6.13	<ISED> RSS-210 B.6 RSS-Gen 8.9			
Frequency Tolerance	<FCC> ANSI C63.10:2013 6 Standard test methods	<FCC> Section 15.225(e)	See data	Complied	Conducted
	<ISED> RSS-Gen 6.11, 8.11	<ISED> RSS-210 B.6			
Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.					

FCC Part 15.31 (e)

The stable voltage was provided to the EUT during the tests.
Therefore, the EUT complies with the requirement.
However, the supply voltage was varied and tested at 85 % and 115 % of the nominal rated supply voltage during frequency tolerance test according to Section 15.225(e).

FCC Part 15.203/212 Antenna requirement

It is impossible for end users to replace the antenna, because it is soldered on the circuit board.
Therefore the equipment complies with the requirement of 15.203/212.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% emission bandwidth	<ISED>RSS-Gen 6.7	-	N/A	-	Conducted

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

3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.
Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

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

Test Item		Frequency range		Uncertainty (+/-)
Conducted emission AMN (LISN)		0.009 MHz to 0.15 MHz		3.7 dB
		0.15 MHz to 30 MHz		3.3 dB
Radiated emission	3 m	9 kHz to 30 MHz		3.2 dB
	10 m			3.0 dB
	3 m	30 MHz to 200 MHz	Horizontal	4.8 dB
			Vertical	5.0 dB
		200 MHz to 1000 MHz	Horizontal	5.1 dB
			Vertical	6.2 dB
	10 m	30 MHz to 200 MHz	Horizontal	4.8 dB
			Vertical	4.8 dB
		200 MHz to 1000 MHz	Horizontal	5.0 dB
			Vertical	5.0 dB
	3 m	1 GHz to 6 GHz		4.9 dB
		6 GHz to 18 GHz		5.2 dB
	1 m	10 GHz to 26.5 GHz		5.4 dB
		26.5 GHz to 40 GHz		5.4 dB
Frequency Tolerance		-		0.01541 ppm
20 dB Bandwidth / 99 % Occupied Bandwidth		-		0.96 %

3.5 Test Location

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Telephone: +81-596-24-8999
*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919
ISED Lab Company Number: 2973C / CAB identifier: JP0002

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

* Size of vertical conducting plane (for Conducted Emission test): 2.0 x 3.0 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 EUT during testing

4.1 Operating Mode(s)

The mode is used:

Test mode	Remarks
1) Transmitting mode (Tx) NRWA5.10 2) Transmitting mode (Tx) NRWA5.11	The EUT Transmits and Receives at the same time and there is no receiving mode.
The EUT was operated in a manner similar to typical use during the tests.	
*Power of the EUT was set by the software as follows; Software: Version: Ver1.0 (Date: 2023.03 09, Storage location: EUT memory) *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	
Justification: The system was configured in typical fashion (as a user would normally use it) for testing.	

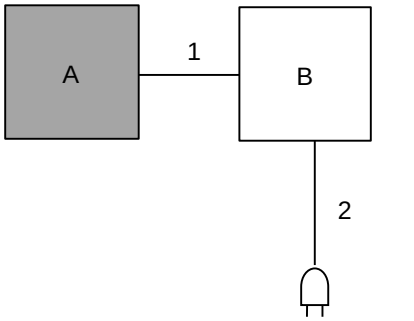
Test Item	Operating mode
Conducted Emission	Tx Mod on, without Tag*2)
	Tx Mod on, without Tag (50 ohm terminated)*2)
Electric Field Strength of Fundamental Emission	Tx Mod on, with Tag
	Tx Mod on, without Tag
Spectrum Mask	Tx Mod on, with Tag
	Tx Mod on, without Tag
20 dB Bandwidth and 99 % Occupied Bandwidth*1)	Tx Mod on, with Tag
	Tx Mod on, without Tag
Electric Field Strength of Spurious Emission	Tx Mod on, with Tag*2)
Frequency Tolerance*1)	Tx Mod on, without Tag*2)

*1) The test was only performed with Mode 2 as representative.
*2) After the comparison of the test data between with Tag and without Tag, the tests were performed with the worst case.

Frequency Tolerance:	
Temperature	-20 deg. C to +50 deg. C Step 10 deg. C
Voltage	Normal Voltage DC 5 V Maximum Voltage DC 5.75 V (DC 5 V +15 %) Minimum Voltage DC 4.25 V (DC 5 V -15 %)
*This EUT provides stable voltage constantly to RF Part regardless of input voltage	

4.2 Configuration and peripherals

For Conducted Emission



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

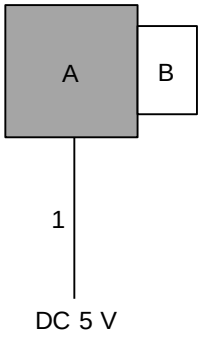
Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remark
A	NRWA5.10 / NRWA5.11	PC-1070005-1 / PC-1070005-2	No.1 / No.2	Tokyo Communication Equipment MFG Co.,ltd.	EUT
B	DC Power Supply	PMC35-2A	13090501	Kikusui Electronics Industry Co.	-

List of Cables Used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	0.5	Unshielded	Unshielded	-
2	AC Cable	1.0	Unshielded	Unshielded	-

For Radiated Emission



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

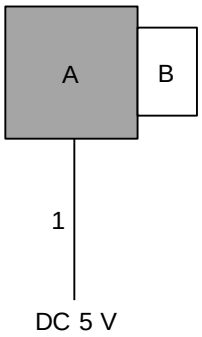
Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remark
A	NRWA5.10 / NRWA5.11	PC-1070005-1 / PC-1070005-2	No.1 / No.2	Tokyo Communication Equipment MFG Co.,ltd.	EUT
B	Tag	PC-1070002	No100	Tokyo Communication Equipment MFG Co.ltd.	-

List of Cables Used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	2.1	Unshielded	Unshielded	-

For Antenna Terminal Conducted Emission



* Cabling and setup 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	Remark
A	NRWA5.11	PC-1070005-2	No.4	Tokyo Communication Equipment MFG Co.,ltd.	EUT
B	Tag	PC-1070002	No100	Tokyo Communication Equipment MFG Co.ltd.	-

List of Cables Used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	2.1	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

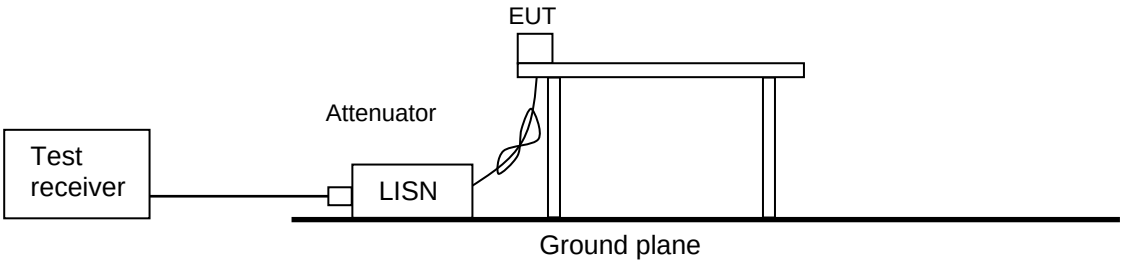
Test Procedure and conditions

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 rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

Figure 1: Test Setup



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

Detector : QP and CISPR AV
Measurement range : 0.15 MHz to 30 MHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Radiated emission (Fundamental, Spurious Emission and Spectrum Mask)

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.

[Limit conversion]

The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohmes. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to 45.5 - 51.5 = -6.0 dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

[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 3 about Direction of the Loop Antenna.

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.

[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.

[Test instruments and test settings]

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

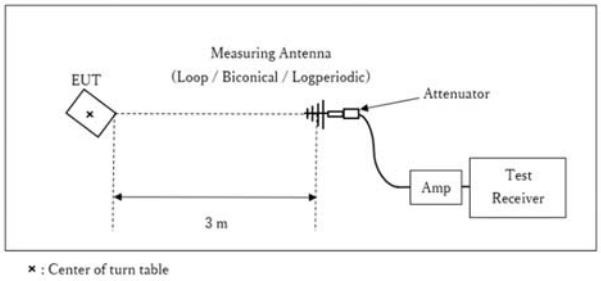
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

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 x log (3 m / 300 m) = -80 dB
*2) Distance Factor: 40 x log (3 m / 30 m) = -40 dB

Figure 2: Test Setup

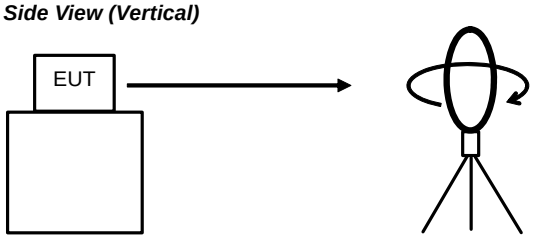
Below 1 GHz



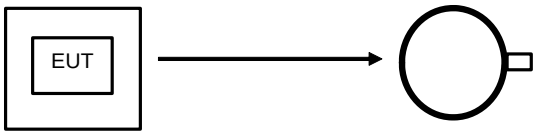
Test Distance: 3 m

Figure 3: Direction of the Loop Antenna

Side View (Vertical)

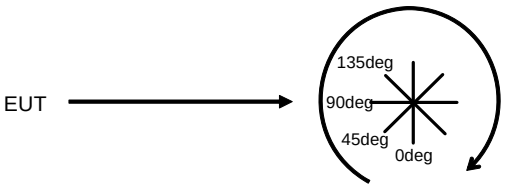


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

- 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 to 1 GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna Terminal Conducted Emission

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20 dB Bandwidth	100 kHz	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency counter
Peak hold was applied as Worst-case measurement.							

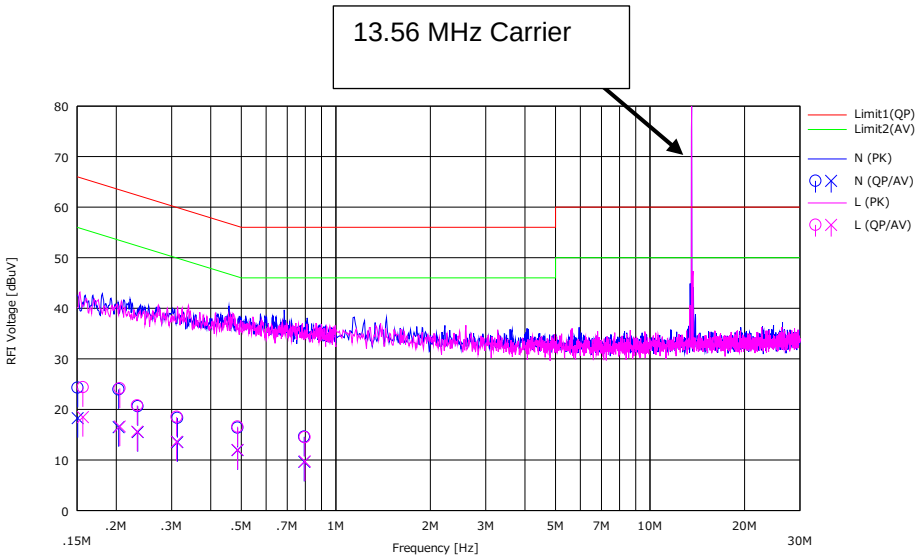
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 18, 2023
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Takumi Nishida
Mode	Mode 1 without Tag

Limit : FCC_Part 15 Subpart C(15.207)



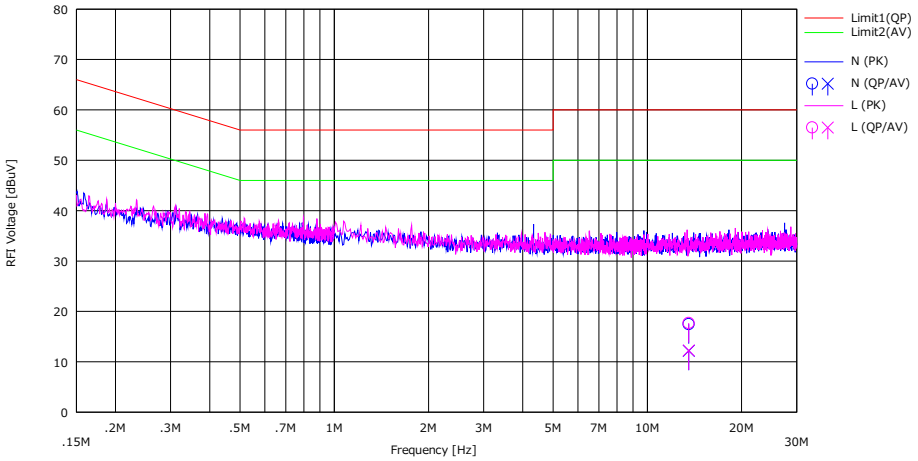
No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈AV〉			〈QP〉	〈AV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15085	11.11	5.12	0.05	13.11	24.27	18.28	65.95	55.95	41.68	37.67	N	
2	0.20355	10.78	3.30	0.05	13.12	23.95	16.47	63.46	53.46	39.51	36.99	N	
3	0.23415	7.43	2.32	0.05	13.13	20.61	15.50	62.30	52.30	41.69	36.80	N	
4	0.31320	5.10	0.32	0.05	13.15	18.30	13.52	59.89	49.89	41.59	36.37	N	
5	0.48660	3.12	-1.31	0.06	13.18	16.36	11.93	56.23	46.23	39.87	34.30	N	
6	0.79345	1.30	-3.65	0.06	13.22	14.58	9.63	56.00	46.00	41.42	36.37	N	
7	0.15663	11.23	5.34	0.02	13.11	24.36	18.47	65.64	55.64	41.28	37.17	L	
8	0.20525	11.00	3.45	0.03	13.12	24.15	16.60	63.40	53.40	39.25	36.80	L	
9	0.23330	7.60	2.44	0.03	13.13	20.76	15.60	62.33	52.33	41.57	36.73	L	
10	0.31150	5.32	0.41	0.04	13.15	18.51	13.60	59.93	49.93	41.42	36.33	L	
11	0.48660	3.34	-1.24	0.05	13.18	16.57	11.99	56.23	46.23	39.66	34.24	L	
12	0.79685	1.21	-3.54	0.05	13.22	14.48	9.73	56.00	46.00	41.52	36.27	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)
Except for the above table: adequate margin data below the limits.

Conducted Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 18, 2023
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Takumi Nishida
Mode	Mode 1 without Tag (50 ohm terminated)

Limit : FCC_Part 15 Subpart C(15.207)



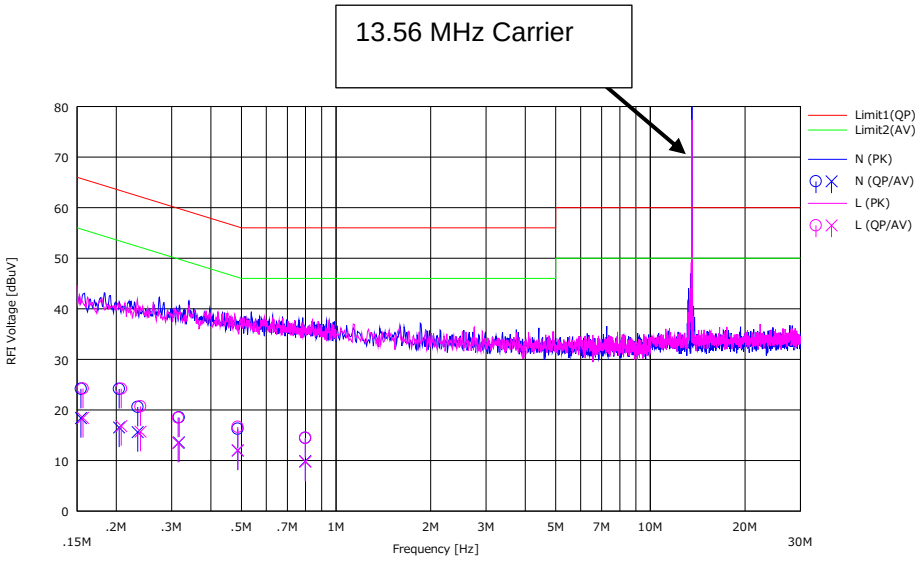
No.	Freq.	Reading ⟨QP⟩	Reading ⟨AV⟩	LISN	LOSS	Results ⟨QP⟩	Results ⟨AV⟩	Limit ⟨QP⟩	Limit ⟨AV⟩	Margin ⟨QP⟩	Margin ⟨AV⟩	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	13.56000	3.10	-2.20	0.32	14.05	17.47	12.17	60.00	50.00	42.53	37.83	N	
2	13.56000	3.31	-2.13	0.31	14.05	17.67	12.23	60.00	50.00	42.33	37.77	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)
Except for the above table: adequate margin data below the limits.

Conducted Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 18, 2023
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Takumi Nishida
Mode	Mode 2 without Tag

Limit : FCC_Part 15 Subpart C(15.207)



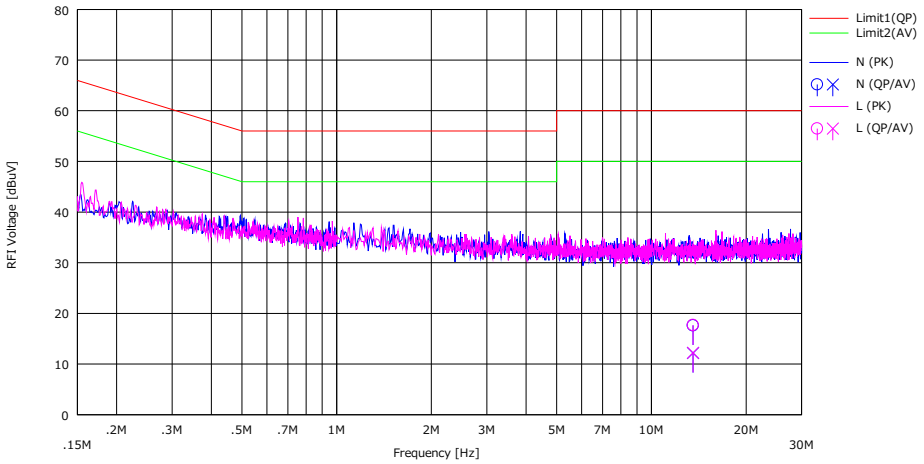
No.	Freq.	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈AV〉			〈QP〉	〈AV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15435	11.01	5.23	0.05	13.11	24.17	18.39	65.76	55.76	41.59	37.37	N	
2	0.20415	10.99	3.36	0.05	13.12	24.16	16.53	63.44	53.44	39.28	36.91	N	
3	0.23403	7.42	2.44	0.05	13.13	20.60	15.62	62.31	52.31	41.71	36.69	N	
4	0.31657	5.32	0.38	0.05	13.15	18.52	13.58	59.80	49.80	41.28	36.22	N	
5	0.48657	3.02	-1.25	0.06	13.18	16.26	11.99	56.23	46.23	39.97	34.24	N	
6	0.79845	1.19	-3.41	0.06	13.22	14.47	9.87	56.00	46.00	41.53	36.13	N	
7	0.15659	11.11	5.29	0.02	13.11	24.24	18.42	65.64	55.64	41.40	37.22	L	
8	0.20746	11.03	3.64	0.03	13.13	24.19	16.80	63.31	53.31	39.12	36.51	L	
9	0.23878	7.54	2.55	0.03	13.13	20.70	15.71	62.14	52.14	41.44	36.43	L	
10	0.31457	5.28	0.31	0.04	13.15	18.47	13.50	59.85	49.85	41.38	36.35	L	
11	0.48655	3.41	-1.21	0.05	13.18	16.64	12.02	56.23	46.23	39.59	34.21	L	
12	0.79888	1.19	-3.51	0.05	13.22	14.46	9.76	56.00	46.00	41.54	36.24	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)
Except for the above table: adequate margin data below the limits.

Conducted Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 18, 2023
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Takumi Nishida
Mode	Mode 2 without Tag (50 ohm terminated)

Limit : FCC_Part 15 Subpart C(15.207)



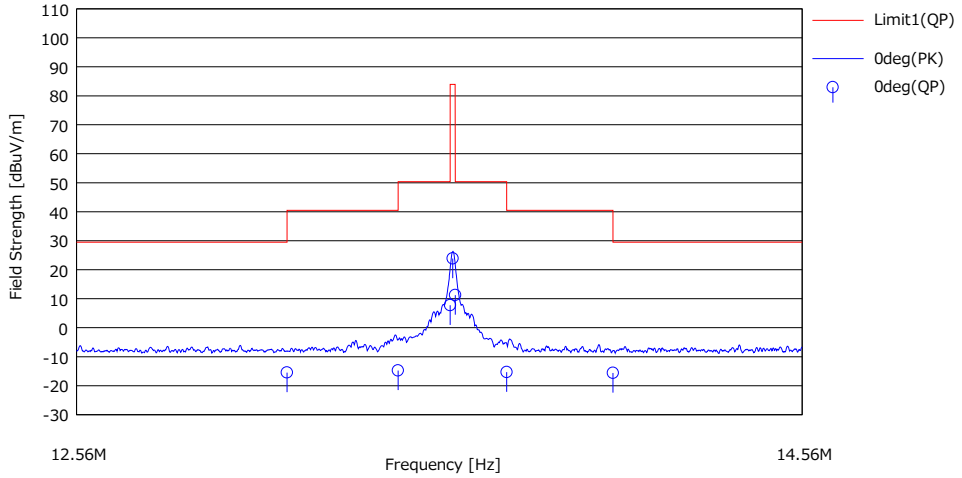
No.	Freq.	Reading ⟨QP⟩	Reading ⟨AV⟩	LISN	LOSS	Results ⟨QP⟩	Results ⟨AV⟩	Limit ⟨QP⟩	Limit ⟨AV⟩	Margin ⟨QP⟩	Margin ⟨AV⟩	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	13.56000	3.25	-2.22	0.32	14.05	17.62	12.15	60.00	50.00	42.38	37.85	N	
2	13.56000	3.32	-2.14	0.31	14.05	17.68	12.22	60.00	50.00	42.32	37.78	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + LISN + LOSS (CABLE + ATT)
Except for the above table: adequate margin data below the limits.

Fundamental emission and Spectrum Mask

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 14, 2023
Temperature / Humidity	20 deg. C / 32 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 1 With Tag

Limit : FCC15.225(a), 9-90kHz:PK, 110-490kHz:PK, other:QP



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]	Antenna	Table [deg]	Comment
1	13.11000	30.40	19.27	-33.01	32.13	-15.47	29.50	44.97	0deg	346	
2	13.41000	31.10	19.29	-33.00	32.13	-14.74	40.50	55.24	0deg	346	
3	13.55300	53.60	19.29	-32.99	32.13	7.77	50.40	42.63	0deg	346	
4	13.56000	69.70	19.29	-32.99	32.13	23.87	83.90	60.03	0deg	346	
5	13.56700	57.10	19.29	-32.99	32.13	11.27	50.40	39.13	0deg	346	
6	13.71000	30.50	19.30	-32.98	32.13	-15.31	40.50	55.81	0deg	346	
7	14.01000	30.20	19.31	-32.96	32.13	-15.58	29.50	45.08	0deg	346	

RESULT = READING + ANT FACTOR + LOSS (CABLE + Attenuator + Distance Factor*) - GAIN(AMP))
*) Distance Factor: 40 x log (3 m / 30 m) = -40 dB

Result of the fundamental emission at 3 m without Distance factor

QP

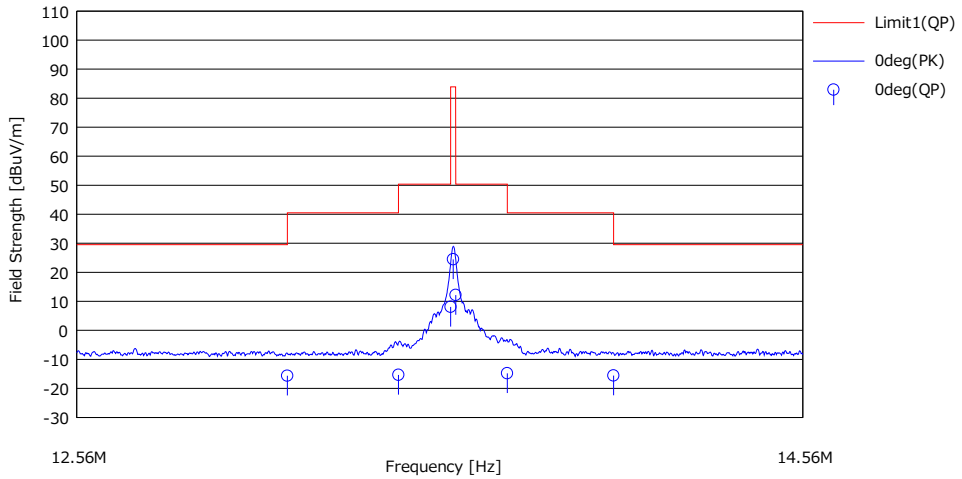
Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	69.70	19.29	7.01	32.13	-	63.87	-	-	Fundamental

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

Fundamental emission and Spectrum Mask

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 14, 2023
Temperature / Humidity	20 deg. C / 32 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 1 Without Tag

Limit : FCC15.225(a), 9-90kHz:PK, 110-490kHz:PK, other:QP



No.	Freq.	Reading ⟨QP⟩	Ant.Fac	Loss	Gain	Result ⟨QP⟩	Limit ⟨QP⟩	Margin ⟨QP⟩	Antenna	Table	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]		[deg]	
1	13.11000	30.20	19.27	-33.01	32.13	-15.67	29.50	45.17	0deg	347	
2	13.41000	30.50	19.29	-33.00	32.13	-15.34	40.50	55.84	0deg	347	
3	13.55300	53.90	19.29	-32.99	32.13	8.07	50.40	42.33	0deg	347	
4	13.56000	70.30	19.29	-32.99	32.13	24.47	83.90	59.43	0deg	347	
5	13.56700	58.00	19.29	-32.99	32.13	12.17	50.40	38.23	0deg	347	
6	13.71000	31.00	19.30	-32.98	32.13	-14.81	40.50	55.31	0deg	347	
7	14.01000	30.20	19.31	-32.96	32.13	-15.58	29.50	45.08	0deg	347	

RESULT = READING + ANT FACTOR + LOSS (CABLE + Attenuator + Distance Factor*) - GAIN(AMP))
*) Distance Factor: 40 x log (3 m / 30 m) = -40 dB

Result of the fundamental emission at 3 m without Distance factor

QP

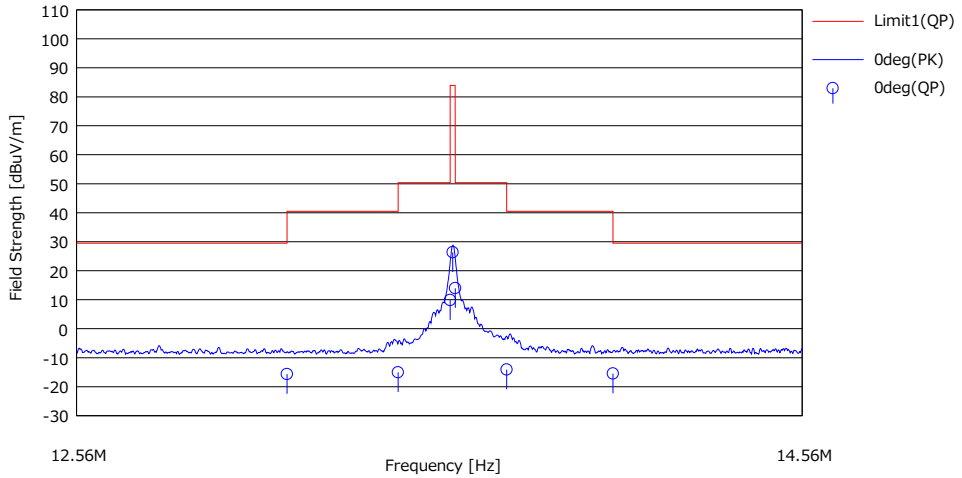
Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	70.30	19.29	7.01	32.13	-	64.47	-	-	Fundamental

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

Fundamental emission and Spectrum Mask

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 14, 2023
Temperature / Humidity	20 deg. C / 32 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 2 With Tag

Limit : FCC15.225(a), 9-90kHz:PK, 110-490kHz:PK, other:QP



No.	Freq.	Reading ⟨QP⟩	Ant.Fac	Loss	Gain	Result ⟨QP⟩	Limit ⟨QP⟩	Margin ⟨QP⟩	Antenna	Table	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]		[deg]	
1	13.11000	30.20	19.27	-33.01	32.13	-15.67	29.50	45.17	0deg	345	
2	13.41000	30.80	19.29	-33.00	32.13	-15.04	40.50	55.54	0deg	345	
3	13.55300	55.70	19.29	-32.99	32.13	9.87	50.40	40.53	0deg	345	
4	13.56000	72.20	19.29	-32.99	32.13	26.37	83.90	57.53	0deg	345	
5	13.56700	59.80	19.29	-32.99	32.13	13.97	50.40	36.43	0deg	345	
6	13.71000	31.70	19.30	-32.98	32.13	-14.11	40.50	54.61	0deg	345	
7	14.01000	30.30	19.31	-32.96	32.13	-15.48	29.50	44.98	0deg	345	

RESULT = READING + ANT FACTOR + LOSS (CABLE + Attenuator + Distance Factor*) - GAIN(AMP))
*) Distance Factor: 40 x log (3 m / 30 m) = -40 dB

Result of the fundamental emission at 3 m without Distance factor

QP

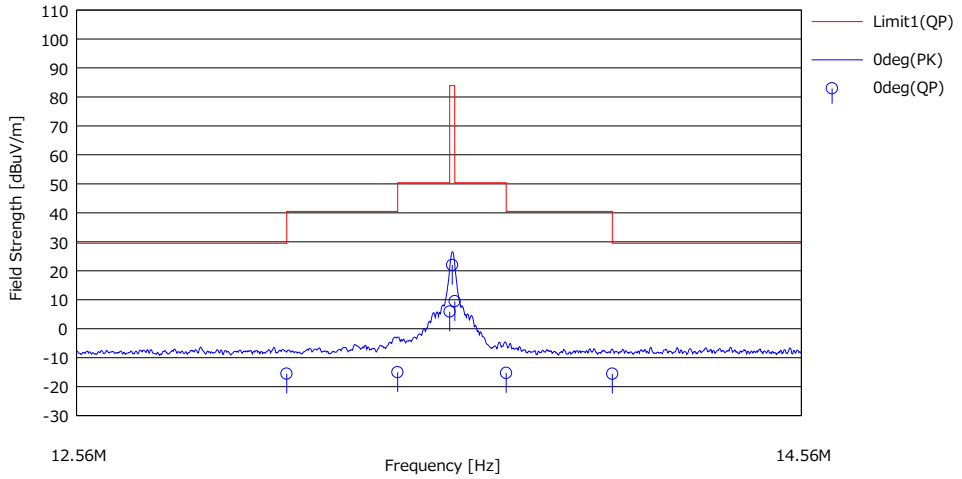
Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	72.20	19.29	7.01	32.13	-	66.37	-	-	Fundamental

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

Fundamental emission and Spectrum Mask

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 14, 2023
Temperature / Humidity	20 deg. C / 32 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 2 Without Tag

Limit : FCC15.225(a), 9-90kHz:PK, 110-490kHz:PK, other:QP



No.	Freq.	Reading (QP)	Ant.Fac	Loss	Gain	Result (QP)	Limit (QP)	Margin (QP)	Antenna	Table	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]		[deg]	
1	13.11000	30.30	19.27	-33.01	32.13	-15.57	29.50	45.07	0deg	347	
2	13.41000	30.80	19.29	-33.00	32.13	-15.04	40.50	55.54	0deg	347	
3	13.55300	51.70	19.29	-32.99	32.13	5.87	50.40	44.53	0deg	347	
4	13.56000	67.80	19.29	-32.99	32.13	21.97	83.90	61.93	0deg	347	
5	13.56700	55.30	19.29	-32.99	32.13	9.47	50.40	40.93	0deg	347	
6	13.71000	30.50	19.30	-32.98	32.13	-15.31	40.50	55.81	0deg	347	
7	14.01000	30.20	19.31	-32.96	32.13	-15.58	29.50	45.08	0deg	347	

RESULT = READING + ANT FACTOR + LOSS (CABLE + Attenuator + Distance Factor*) - GAIN(AMP))
*) Distance Factor: 40 x log (3 m / 30 m) = -40 dB

Result of the fundamental emission at 3 m without Distance factor

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
0	13.56000	QP	67.80	19.29	7.01	32.13	-	61.97	-	-	Fundamental

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

Spurious emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 14, 2023
Temperature / Humidity	20 deg. C / 32 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 1 with Tag

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	27.120	QP	29.60	20.33	-32.46	32.11	-	-14.64	29.5	44.14	
Hori.	81.364	QP	23.70	7.06	7.20	28.48	-	9.48	40.0	30.52	
Hori.	271.215	QP	40.20	13.53	8.53	27.76	-	34.50	46.0	11.52	
Hori.	298.367	QP	32.60	13.90	8.68	27.75	-	27.43	46.0	18.59	
Hori.	325.178	QP	35.10	14.90	8.83	27.90	-	30.93	46.0	15.09	
Hori.	352.578	QP	30.20	15.32	8.98	28.06	-	26.44	46.0	19.58	
Hori.	379.704	QP	36.70	15.42	9.14	28.31	-	32.95	46.0	13.07	
Vert.	81.364	QP	32.90	7.06	7.20	28.48	-	18.68	40.0	21.32	
Vert.	271.215	QP	42.30	13.53	8.53	27.76	-	36.60	46.0	9.42	
Vert.	298.340	QP	33.50	13.90	8.68	27.75	-	28.33	46.0	17.69	
Vert.	325.458	QP	29.00	14.92	8.83	27.90	-	24.85	46.0	21.17	

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

Spurious emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 14, 2023
Temperature / Humidity	20 deg. C / 32 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 2 with Tag

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	27.120	QP	29.80	20.33	-32.46	32.11	-	-14.44	29.5	43.94	
Hori.	81.367	QP	24.00	7.06	7.20	28.48	-	9.78	40.0	30.22	
Hori.	216.974	QP	32.40	11.79	8.20	27.91	-	24.48	46.0	21.54	
Hori.	244.093	QP	34.20	12.13	8.37	27.79	-	26.91	46.0	19.11	
Hori.	271.215	QP	49.50	13.53	8.53	27.76	-	43.80	46.0	2.22	
Hori.	284.773	QP	29.90	13.97	8.60	27.76	-	24.71	46.0	21.31	
Hori.	298.341	QP	37.80	13.90	8.68	27.75	-	32.63	46.0	13.39	
Vert.	81.367	QP	38.50	7.06	7.20	28.48	-	24.28	40.0	15.72	
Vert.	216.974	QP	37.90	11.79	8.20	27.91	-	29.98	46.0	16.04	
Vert.	244.093	QP	37.80	12.13	8.37	27.79	-	30.51	46.0	15.51	
Vert.	271.215	QP	51.20	13.53	8.53	27.76	-	45.50	46.0	0.52	
Vert.	284.773	QP	36.00	13.97	8.60	27.76	-	30.81	46.0	15.21	

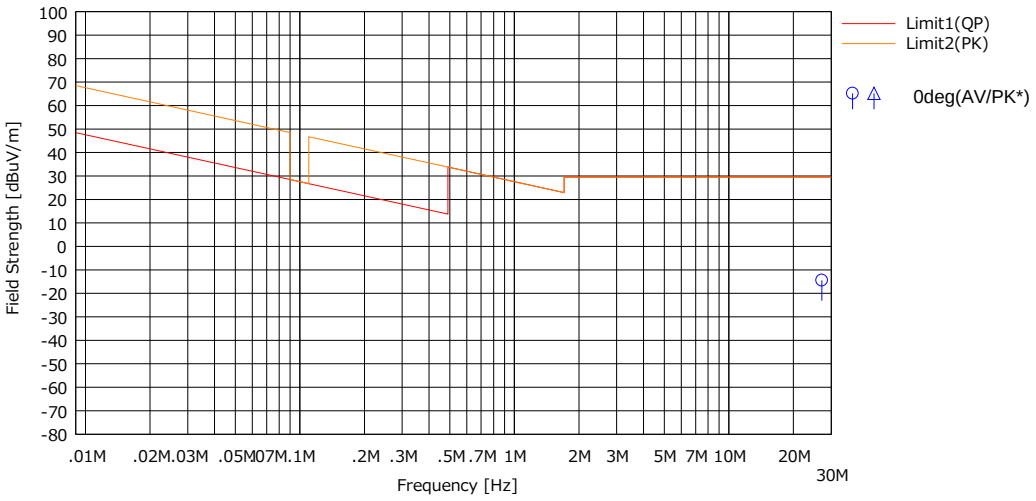
Result = Reading + Ant Factor + Loss (Cable + Attenuator + D.Factor) - Gain(Amprifier)

Spurious emission
(Plot data, Worst case for Spurious Emission)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 14, 2023
Temperature / Humidity	20 deg. C / 32 % RH
Engineer	Hiroyuki Furutaka
Mode	Mode 2 with Tag

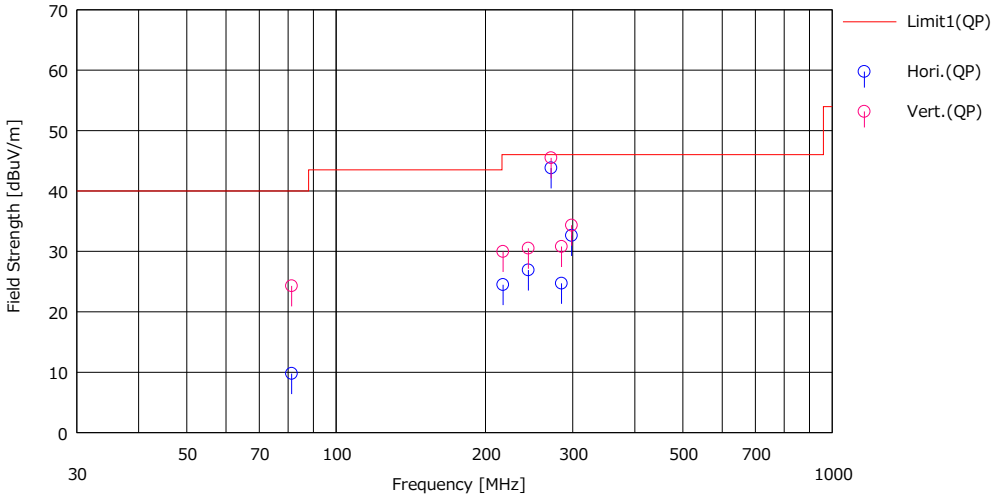
(below 30MHz)

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



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

(above 30MHz)

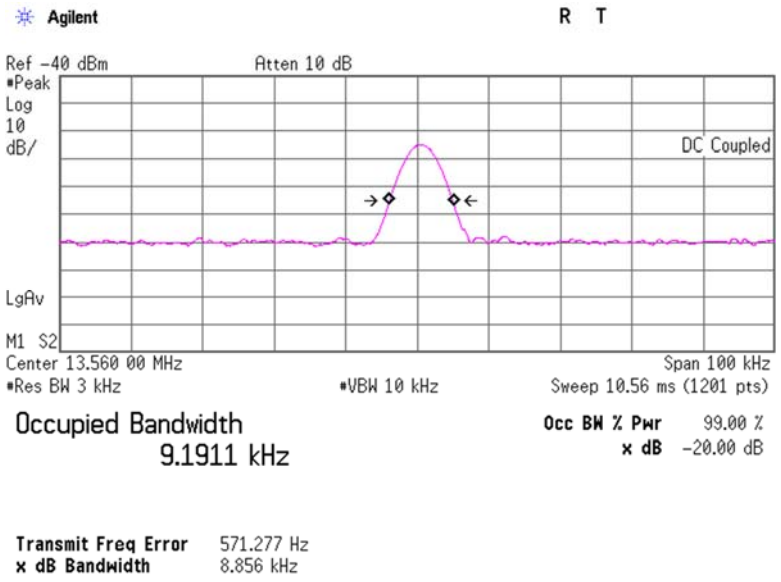


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

20 dB Bandwidth and 99% Occupied Bandwidth

Test place	Ise EMC Lab.
Measurement Room	No.6
Date	April 17, 2023
Temperature / Humidity	22 deg. C / 30 % RH
Engineer	Daiki Matsui
Mode	Mode 2 with Tag

FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	8.856	9.1911

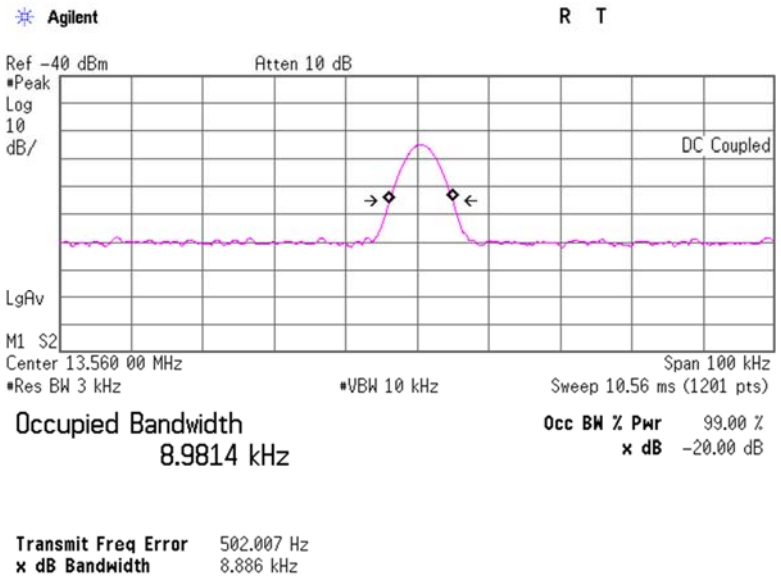


Since the transmitter signal is CW-like it is impractical to use a RBW setting of 1 - 5 % of the emission bandwidth since the emission bandwidth will be proportional to the RBW.

20 dB Bandwidth and 99% Occupied Bandwidth

Test place	Ise EMC Lab.
Measurement Room	No.6
Date	April 17, 2023
Temperature / Humidity	22 deg. C / 30 % RH
Engineer	Daiki Matsui
Mode	Mode 2 without Tag

FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	8.886	8.9814



Since the transmitter signal is CW-like it is impractical to use a RBW setting of 1 - 5 % of the emission bandwidth since the emission bandwidth will be proportional to the RBW.

Frequency Tolerance

Test place	Ise EMC Lab.
Measurement Room	No.6
Date	April 17, 2023
Temperature / Humidity	22 deg. C / 30 % RH
Engineer	Daiki Matsui
Mode	Mode 2 without Tag

Test condition		Tested	Measured	Frequency	Result		Limit
Temp.	Voltage	timing	frequency	error			
[deg. C]	[V]		[MHz]	[MHz]	[%]	[ppm]	[+/- %]
50	5	Power on	13.560462	0.000462	0.00341	34.1	0.01
		+ 2 min.	13.560461	0.000461	0.00340	34.0	0.01
		+ 5 min.	13.560462	0.000462	0.00341	34.1	0.01
		+ 10 min.	13.560463	0.000463	0.00341	34.1	0.01
40	5	Power on	13.560474	0.000474	0.00350	35.0	0.01
		+ 2 min.	13.560469	0.000469	0.00346	34.6	0.01
		+ 5 min.	13.560467	0.000467	0.00344	34.4	0.01
		+ 10 min.	13.560463	0.000463	0.00341	34.1	0.01
30	5	Power on	13.560501	0.000501	0.00369	36.9	0.01
		+ 2 min.	13.560495	0.000495	0.00365	36.5	0.01
		+ 5 min.	13.560492	0.000492	0.00363	36.3	0.01
		+ 10 min.	13.560484	0.000484	0.00357	35.7	0.01
20	5	Power on	13.560528	0.000528	0.00389	38.9	0.01
		+ 2 min.	13.560522	0.000522	0.00385	38.5	0.01
		+ 5 min.	13.560518	0.000518	0.00382	38.2	0.01
		+ 10 min.	13.560516	0.000516	0.00381	38.1	0.01
20	4.25	Power on	13.560519	0.000519	0.00383	38.3	0.01
	(5V -15%)	+ 2 min.	13.560517	0.000517	0.00381	38.1	0.01
		+ 5 min.	13.560515	0.000515	0.00380	38.0	0.01
		+ 10 min.	13.560513	0.000513	0.00378	37.8	0.01
20	5.75	Power on	13.560510	0.000510	0.00376	37.6	0.01
	(5V +15%)	+ 2 min.	13.560509	0.000509	0.00375	37.5	0.01
		+ 5 min.	13.560507	0.000507	0.00374	37.4	0.01
		+ 10 min.	13.560505	0.000505	0.00372	37.2	0.01
10	5	Power on	13.560552	0.000552	0.00407	40.7	0.01
		+ 2 min.	13.560546	0.000546	0.00403	40.3	0.01
		+ 5 min.	13.560544	0.000544	0.00401	40.1	0.01
		+ 10 min.	13.560541	0.000541	0.00399	39.9	0.01
0	5	Power on	13.560558	0.000558	0.00412	41.2	0.01
		+ 2 min.	13.560559	0.000559	0.00412	41.2	0.01
		+ 5 min.	13.560557	0.000557	0.00411	41.1	0.01
		+ 10 min.	13.560550	0.000550	0.00406	40.6	0.01
-10	5	Power on	13.560546	0.000546	0.00403	40.3	0.01
		+ 2 min.	13.560552	0.000552	0.00407	40.7	0.01
		+ 5 min.	13.560556	0.000556	0.00410	41.0	0.01
		+ 10 min.	13.560559	0.000559	0.00412	41.2	0.01
-20	5	Power on	13.560521	0.000521	0.00384	38.4	0.01
		+ 2 min.	13.560538	0.000538	0.00397	39.7	0.01
		+ 5 min.	13.560544	0.000544	0.00401	40.1	0.01
		+ 10 min.	13.560546	0.000546	0.00403	40.3	0.01

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

Tested frequency: 13.56 MHz
Limit (+/-): 0.01 % (+/- 100ppm)

The test was begun from 50 deg.C and the temperature was lowered each 10 deg.C.

APPENDIX 2: Test instruments

Test Equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MAEC-02	142004	AC2_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	05/30/2022	24
CE	MAT-64	141290	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	12/22/2022	12
CE	MCC-13	141222	Coaxial Cable	Fujikura,HP,Mini-Circits,Fujikura	3D-2W(12m)/ 5D-2W(5m)/ 5D-2W(0.8m)/ 5D-2W(1m)	-	02/01/2023	12
CE	MJM-27	142228	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
CE	MLS-23	141357	LISN(AMN)	Schwarzbeck Mess-Elektronik OHG	NSLK8127	8127-729	07/28/2022	12
CE	MMM-01	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/12/2022	12
CE	MOS-41	192300	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0013	12/17/2022	12
CE	MTR-03	141942	Test Receiver	Rohde & Schwarz	ESCI	100300	07/29/2022	12
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-02	142004	AC2_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	05/30/2022	24
RE	MAT-112	220646	Attenuator	Huber+Suhner	6806_N-50-1	-	03/17/2023	12
RE	MBA-08	141427	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103B+ BBA9106	08031	07/30/2022	12
RE	MCC-112	141216	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM14/ sucoform141-PE/ 421-010/ RFM-E321(SW)	-/00640	07/09/2022	12
RE	MCC-12	141317	Coaxial Cable	UL Japan	-	-	09/27/2022	12
RE	MCC-13	141222	Coaxial Cable	Fujikura,HP,Mini-Circits,Fujikura	3D-2W(12m)/ 5D-2W(5m)/ 5D-2W(0.8m)/ 5D-2W(1m)	-	02/01/2023	12
RE	MCC-255	207745	Coaxial Cable	UL Japan	-	-	05/17/2022	12
RE	MJM-27	142228	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
RE	MLA-21	141265	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-190	07/30/2022	12
RE	MLPA-01	141254	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	05/31/2022	12
RE	MMM-01	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/12/2022	12
RE	MOS-41	192300	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0013	12/17/2022	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	04/05/2023	12
RE	MPA-24	141594	Pre Amplifier	Keysight Technologies Inc	8447D	2944A10150	02/02/2023	12
RE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	07/25/2022	12
AT	MCC-244	197219	Microwave cable	Huber+Suhner	SF126E/11PC35/ 11PC35/2000MM	536999/ 126E	03/09/2023	12
AT	MCH-04	141429	Temperature and Humidity Chamber	Espec	PL-2KP	14015723	08/11/2022	12
AT	MFC-01	141498	Microwave Counter	ADVANTEST	R5373	120100309	07/15/2022	12
AT	MMM-18	141558	Digital Tester(TRUE RMS MULTIMETER)	Fluke Corporation	115	17930030	05/17/2022	12
AT	MOS-14	141561	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1401	01/13/2023	12
AT	MSA-13	141900	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185823	09/27/2022	12

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

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

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test item:

CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted Emission