



RADIO TEST REPORT

Test Report No. : 13719493H-C-R1

Applicant : Sony Group Corporation
Type of EUT : UHF SYNTHESIZED DIVERSITY TUNER
Model Number of EUT : URX-P41D
FCC ID : AK8URXP41D
Test regulation : FCC Part 15 Subpart C: 2021
Test Result : Complied (Refer to SECTION 3)

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
9. The information provided from the customer for this report is identified in Section 1.
10. This report is a revised version of 13719493H-C. 13719493H-C is replaced with this report.

Date of test: July 14 to October 4, 2021

Representative test engineer:


Junki Nagatomi
Engineer

Approved by:


Tsubasa Takayama
Leader



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".

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

REVISION HISTORY

Original Test Report No.: 13719493H-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13719493H-C	October 22, 2021	-	-
1	13719493H-C-R1	December 21, 2021	P 6	Deletion of the Antenna Gain for NFC part from Clause 2.2.
1	13719493H-C-R1	December 21, 2021	P 13 to 15	Deletion of an Audio Cable. Addition of a Stereo Headphone and a Headphone Cable.

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

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		

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.....	5
SECTION 2: Equipment under test (EUT).....	5
SECTION 3: Test specification, procedures & results.....	7
SECTION 4: Operation of EUT during testing.....	11
SECTION 5: Conducted Emission.....	16
SECTION 6: Radiated emission (Fundamental, Spurious Emission and Spectrum Mask).....	17
SECTION 7: Other test.....	20
APPENDIX 1: Test data	21
Conducted Emission	21
Fundamental emission and Spectrum Mask.....	24
Spurious emission	25
20 dB Bandwidth and 99 % Occupied Bandwidth.....	27
Frequency Tolerance.....	28
APPENDIX 2: Test instruments	31
APPENDIX 3: Photographs of test setup	33
Conducted Emission	33
Radiated Emission.....	34
Worst Case Position	36
Frequency Tolerance.....	39

SECTION 1: Customer information

Company Name	:	Sony Global Manufacturing & Operations Corporation
Address	:	8-4, Shiomi, Kisarazu-shi, Chiba, 292-0834 Japan
Telephone Number	:	+81-438-37-4704
Contact Person	:	Youhei Hisano

***Remarks**

Sony Global Manufacturing & Operations Corporation (Subsidiary Company Name) is on behalf of the applicant: Sony Group Corporation.

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT 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
- SECTION 4: Operation of EUT during testing

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

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type	:	UHF SYNTHESIZED DIVERSITY TUNER
Model Number	:	URX-P41D
Serial Number	:	Refer to SECTION 4.2
Rating	:	DC 3 V (Battery), DC 5 V (USB)
Receipt Date	:	July 13, 2021
Country of Mass-production	:	Korea
Condition	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	:	No Modification by the test lab

2.2 Product Description

Model: URX-P41D (referred to as the EUT in this report) is a UHF SYNTHESIZED DIVERSITY TUNER.

General Specification

Clock frequency(ies) in the system	:	DSP: 12 MHz (SPXO) PLL: 26 MHz (TCXO)
Operating temperature	:	0 deg. C to +50 deg. C

Radio Specification

[Radio microphone part]

Radio type	:	Receiver
Modulation type	:	Frequency Modulation
Channel spacing	:	25 kHz
Frequency of operation	:	UC14: 470.125 MHz to 541.875 MHz UC25: 536.125 MHz to 607.875 MHz U90: 941.625 MHz to 951.875 MHz 953.000 MHz to 956.125 MHz 956.625 MHz to 959.625 MHz
IF Frequency	:	CH1 1st 244 MHz, 2nd 10.7 MHz CH2 1st 243.9 MHz, 2nd 10.7 MHz
LO Frequency	:	CH1 1st Receiving Frequency + 244 MHz, 2nd 233.3 MHz CH2 1st Receiving Frequency + 243.9 MHz, 2nd 233.2 MHz
Antenna type	:	1/4 Lambda Monopole antenna
Antenna Gain	:	2.14 dBi

[NFC part] *1)

Radio Type	:	Transceiver
Modulation type	:	ASK (amplitude-shift keying)
Frequency of Operation	:	13.56 MHz
Method of frequency generation	:	Crystal unit (SPXO)
Antenna Type	:	Loop Antenna

*1) This test report applies to NFC part.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.225 Operation within the band 13.110-14.010 MHz.

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> RSS-Gen 8.8	<FCC> Section 15.207 ----- <ISED> RSS-Gen 8.8	4.98 dB 27.12000 MHz AV, N, With Tag	Complied a)	-
Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> RSS-Gen 6.4, 6.12	<FCC> Section 15.225(a) ----- <ISED> RSS-210 B.6	74.00 dB, 13.56000 MHz, QP, 0 deg.	Complied b)	Radiated
Spectrum Mask	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> RSS-Gen 6.4, 6.13	<FCC> Section 15.225(b)(c) ----- <ISED> RSS-210 B.6	34.17 dB, 14.01000 MHz, QP	Complied b)	Radiated
20 dB Bandwidth	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> -	<FCC> Section15.215(c) ----- <ISED> -	See data	Complied c)	Radiated
Electric Field Strength of Spurious Emission	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> RSS-Gen 6.4, 6.13	<FCC> Section 15.209, Section 15.225 (d) ----- <ISED> RSS-210 B.6 RSS-Gen 8.9	5.08 dB 98.578 MHz, Horizontal, QP	Complied d)	Radiated
Frequency Tolerance	<FCC> ANSI C63.10:2013 6 Standard test methods <ISED> RSS-Gen 6.11, 8.11	<FCC> Section 15.225(e) ----- <ISED> RSS-210 B.6	See data	Complied e)	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422

- a) Refer to APPENDIX 1 (data of Conducted Emission)
b) Refer to APPENDIX 1 (data of Fundamental emission and Spectrum Mask)
c) Refer to APPENDIX 1 (data of 20 dB Bandwidth and 99% Occupied Bandwidth)
d) Refer to APPENDIX 1 (data of Spurious emission)
e) Refer to APPENDIX 1 (data of Frequency Tolerance)

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.

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

FCC Part 15.31 (e)

This EUT provides stable voltage constantly to RF Module regardless of input voltage. Therefore, this 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 Antenna requirement

The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Band Width	<ISED>RSS-Gen 6.7	-	N/A	- a)	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

a) Refer to APPENDIX 1 (data of 20 dB Bandwidth and 99% Occupied Bandwidth)

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 $k = 2$.

Conducted emission

using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.4 dB
	0.15 MHz to 30 MHz	2.9 dB

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) (Vertical)	4.8 dB
		5.0 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.2 dB
		6.3 dB
10 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		4.8 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.0 dB
		5.0 dB
3 m	1 GHz to 6 GHz	4.9 dB
	6 GHz to 18 GHz	5.2 dB
1 m	10 GHz to 26.5 GHz	5.5 dB
	26.5 GHz to 40 GHz	5.5 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
Frequency Tolerance	0.0154 ppm
20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

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

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.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	-	-

* 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.

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

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

The mode is used :

Mode	Remarks
1) Transmitting mode (Tx) (USB power Supply/ Battery power Supply/ MI-Shoe power Supply)	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. The EUT Transmits and Receives at the same time and there is no receiving mode. EUT was set by the software as follows; Software: Version T.08 (Date: 2021.05.27, Storage location: EUT memory)	

Test Item	Operating mode *1)
Conducted Emission	Tx Mod on, with Tag, without Tag, RFID Antenna Terminated
Electric Field Strength of Fundamental Emission	Tx Mod on, without Tag *2)
Spectrum Mask	Tx Mod on, without Tag *2)
20 dB Bandwidth 99 % OccupiedBandwidth	Tx Mod on, with Tag, without Tag
Electric Field Strength of Spurious Emission	Tx Mod on, with Tag (2nd harmonic) *2)
	Tx Mod on, without Tag (Other than 2nd harmonic) *2)
Frequency Tolerance	Tx Mod off

*1) EUT has 3 kinds of power supply conditions (USB power Supply/ Battery power Supply/ MI-Shoe power Supply) , the tests were performed with the worst case.

*2) After the comparison of the test data between with Tag and without Tag, the tests were performed with the worst case.

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

Frequency Tolerance:

Temperature : 20 deg. C
Voltage : Normal Voltage DC 3 V
(Battery) Maximum Voltage DC 3.45 V (DC 3 V +15 %)
Minimum Voltage DC 2.55 V (DC 3 V -15 %)

*This EUT provides stable voltage constantly to RF Part regardless of input voltage

Frequency Tolerance:

Temperature : -30 deg. C to +50 deg. C Step 10 deg. C (-30deg.C: Reference)
Voltage : Normal Voltage DC 5 V
(USB) 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

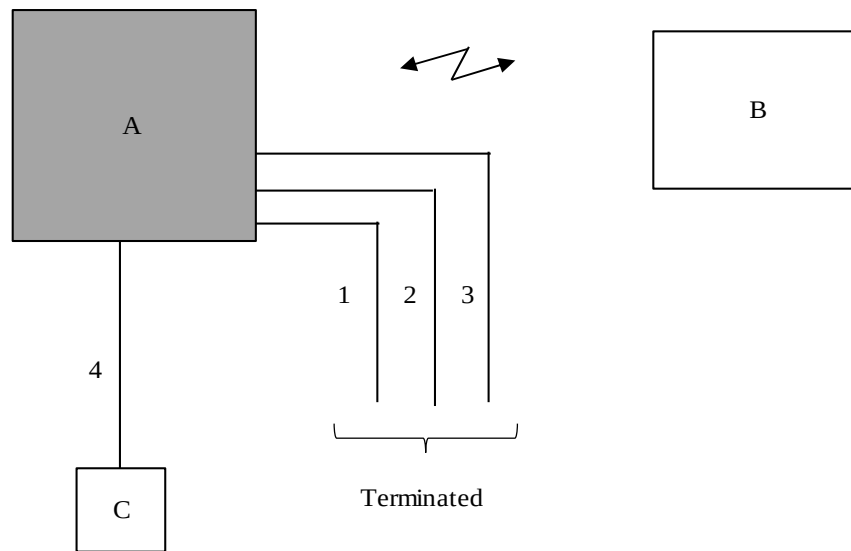
Frequency Tolerance:

Temperature : 20 deg. C
Voltage : Normal Voltage DC 7.2 V
(MI-Shoe) Maximum Voltage DC 8.28 V (DC 7.2 V +15 %)
Minimum Voltage DC 6.12 V (DC 7.2 V -15 %)

*This EUT provides stable voltage constantly to RF Part regardless of input voltage

4.2 Configuration and peripherals

Battery power Supply



* 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	Remarks
A	UHF SYNTHESIZED DIVERSITY TUNER	URX-P41D	001	Sony Group Corporation	EUT
B	UHF SYNTHESIZED TRANSMITTER	UTX-B40	33-001	Sony Group Corporation	Tag
C	Stereo Headphone	MDR-CD380	-	Sony Group Corporation	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Audio Cable	0.4	Shielded	Shielded	-
2	Audio Cable	0.4	Shielded	Shielded	-
3	Audio Cable	0.4	Shielded	Shielded	-
4	Headphone Cable	3.6	Shielded	Shielded	-

UL Japan, Inc.

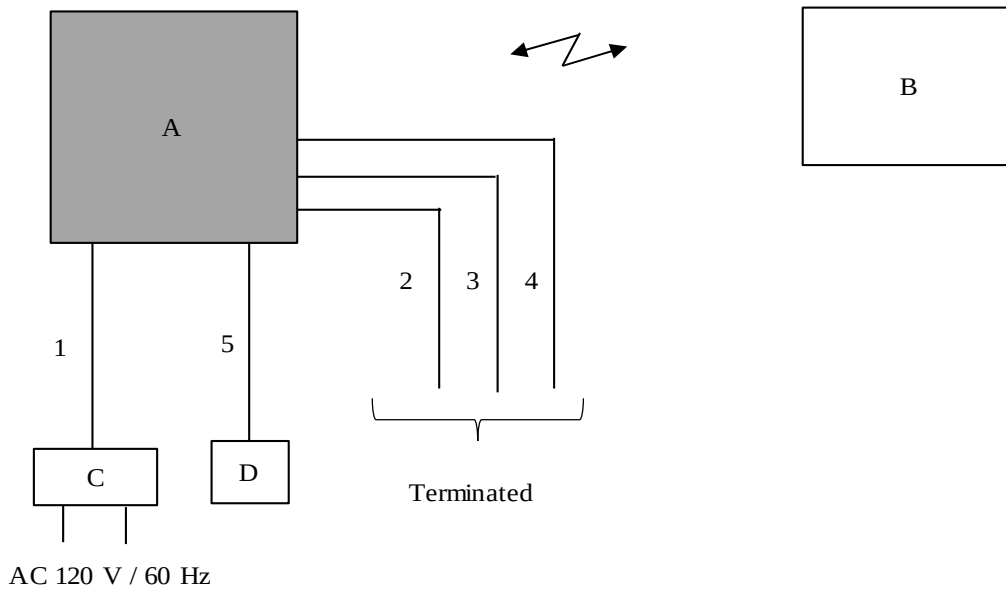
Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

USB power Supply



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

*As a result of comparing AC 120 V and AC 240 V at pre-check, conducted emission test was performed with AC 120 V of the worst voltage as representative.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	UHF SYNTHESIZED DIVERSITY TUNER	URX-P41D	001	Sony Group Corporation	EUT
B	UHF SYNTHESIZED TRANSMITTER	UTX-B40	33-001	Sony Group Corporation	Tag
C	AC Adaptor	CP-AD2	5385990	Sony Group Corporation	-
D	Stereo Headphone	MDR-CD380	-	Sony Group Corporation	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	1.2	Shielded	Shielded	-
2	Audio Cable	0.4	Shielded	Shielded	-
3	Audio Cable	0.4	Shielded	Shielded	-
4	Audio Cable	0.4	Shielded	Shielded	-
5	Headphone Cable	3.6	Shielded	Shielded	-

UL Japan, Inc.

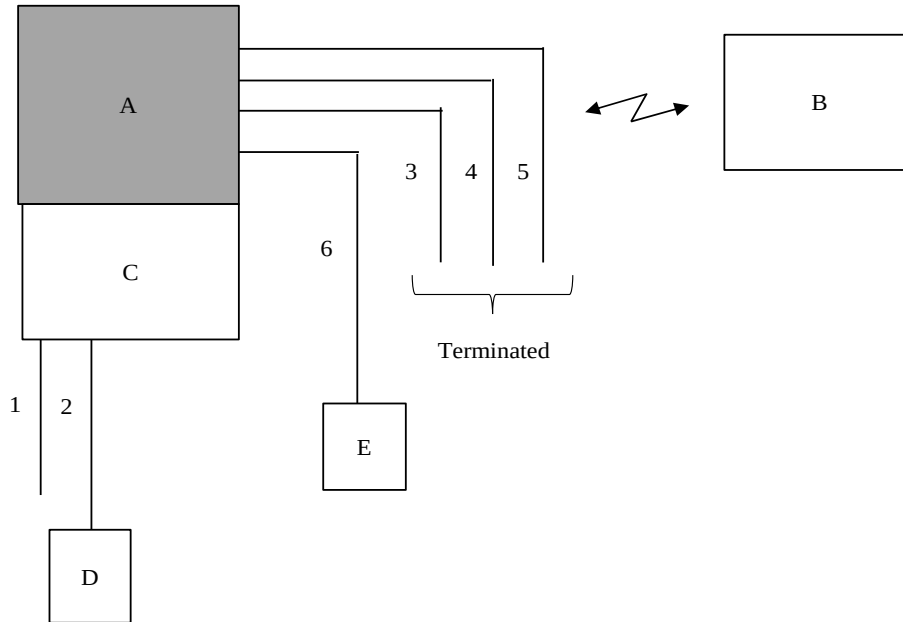
Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

MI-Shoe power Supply



* 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	Remarks
A	UHF SYNTHESIZED DIVERSITY TUNER	URX-P41D	001	Sony Group Corporation	EUT
B	UHF SYNTHESIZED TRANSMITTER	UTX-B40	33-001	Sony Group Corporation	Tag
C	MI Shoe	SMAD-P5	001	Sony Group Corporation	-
D	Battery Pack	N-FV100A	E7ALQ1EB	Sony Group Corporation	-
E	Stereo Headphone	MDR-CD380	-	Sony Group Corporation	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	MIC Cable	0.50	Unshielded	Unshielded	-
2	Signal Cable	0.05	Unshielded	Unshielded	-
3	Audio Cable	0.40	Shielded	Shielded	-
4	Audio Cable	0.40	Shielded	Shielded	-
5	Audio Cable	0.40	Shielded	Shielded	-
6	Headphone Cable	3.60	Shielded	Shielded	-

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

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.

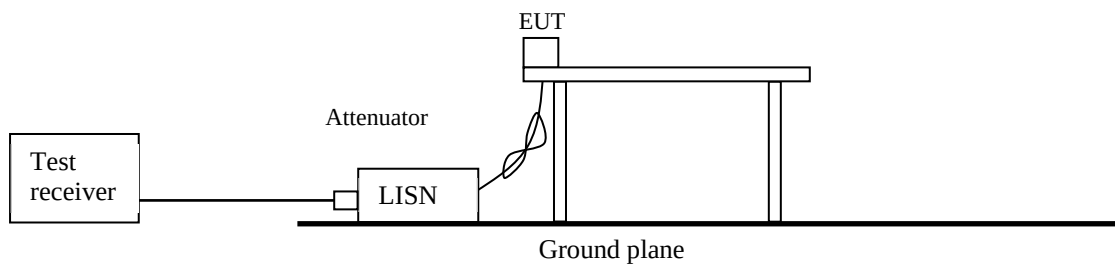
For the tests on EUT with other peripherals (as a whole system)

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.

[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 - 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.

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., 135 deg and 180 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: $40 \times \log(3 \text{ m} / 30 \text{ m}) = -40 \text{ dB}$

The test was performed on the worst mode by comparing modes, USB Supply, Battery Supply and MI-Shoe Supply.

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.

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 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to $45.5 - 51.5 = -6.0 \text{ dBuA/m}$, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

UL Japan, Inc.

Ise EMC Lab.

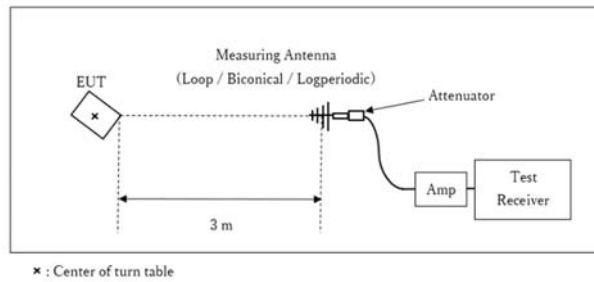
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

[Test Setup]

Below 1 GHz



Test Distance: 3 m

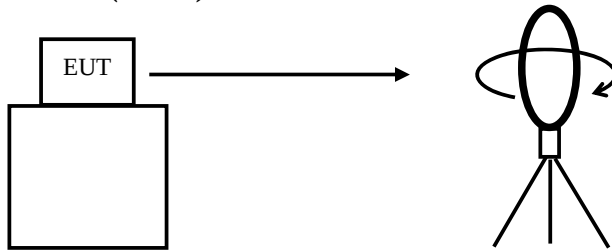
- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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

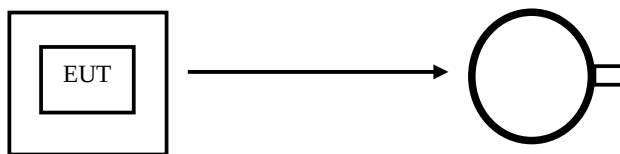
Measurement range : 9 kHz - 1 GHz
Test data : APPENDIX 1
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

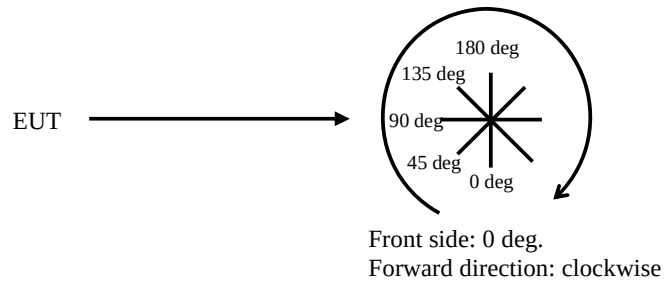


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



SECTION 7: Other test

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20 dB Bandwidth	50 kHz	1 kHz	3 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth	Enough width to display emission skirts	1 kHz	3 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency counter
Peak hold was applied as Worst-case measurement.							

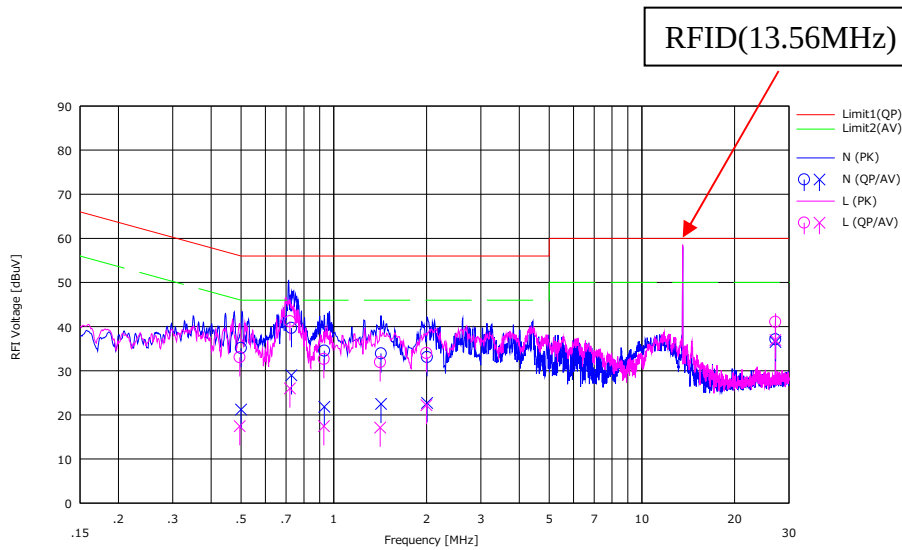
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

Report No. 13719493H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.2
Date September 22, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Hiroyuki Furutaka
Mode Mode 1 (with USB power Supply) without Tag

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq. [MHz]	Reading		USN	LOSS	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]			<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.50020	21.70	7.80	0.24	13.20	35.14	21.24	56.00	46.00	20.86	24.76	N	
2	0.72885	26.20	15.50	0.25	13.23	39.68	28.98	56.00	46.00	16.32	17.02	N	
3	0.93200	21.00	8.30	0.27	13.26	34.53	21.83	56.00	46.00	21.47	24.17	N	
4	1.42300	20.30	8.90	0.29	13.31	33.90	22.50	56.00	46.00	22.10	23.50	N	
5	2.00800	19.40	9.00	0.31	13.38	33.09	22.69	56.00	46.00	22.91	23.31	N	
6	27.14000	19.10	18.50	3.52	14.51	37.13	36.53	60.00	50.00	22.87	13.47	N	
7	0.49510	19.70	4.10	0.15	13.20	33.05	17.45	56.00	46.00	23.03	28.63	L	
8	0.72035	27.80	12.60	0.16	13.23	41.19	25.99	56.00	46.00	14.81	20.01	L	
9	0.92860	19.20	4.00	0.18	13.26	32.64	17.44	56.00	46.00	23.36	28.56	L	
10	1.41400	18.40	3.60	0.20	13.31	31.91	17.11	56.00	46.00	24.09	28.89	L	
11	1.99900	20.40	8.60	0.22	13.37	33.99	22.19	56.00	46.00	22.01	23.81	L	
12	27.12000	23.00	18.90	3.55	14.51	41.06	36.96	60.00	50.00	18.94	13.04	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.

UL Japan, Inc.

Ise EMC Lab.

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

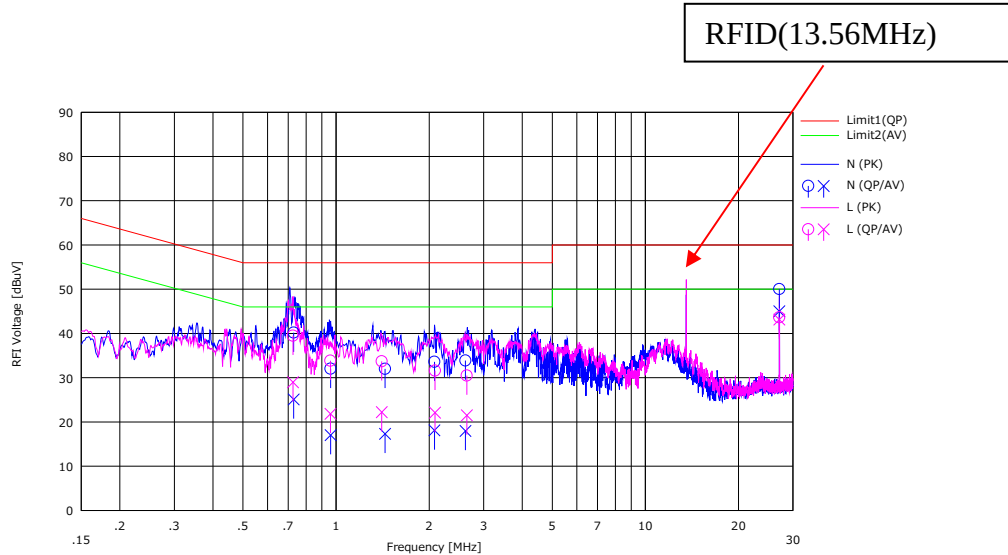
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Emission

Report No. 13719493H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.2
Date September 22, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Hiroyuki Furutaka
Mode Mode 1 (with USB power Supply) with Tag

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq. [MHz]	Reading		LISN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		[dBUV]	[dBA]			[dBUV]	[dBA]	[dBUV]	[dBA]	[dBA]	[dBA]		
1	0.72970	26.70	11.60	0.25	13.23	40.18	25.08	56.00	46.00	15.82	20.92	N	
2	0.96005	18.50	3.50	0.27	13.26	32.03	17.03	56.00	46.00	23.97	28.97	N	
3	1.44100	18.40	3.70	0.29	13.32	32.01	17.31	56.00	46.00	23.99	28.69	N	
4	2.08000	19.90	4.40	0.31	13.38	33.59	18.09	56.00	46.00	22.41	27.91	N	
5	2.62000	20.10	4.20	0.33	13.44	33.87	17.97	56.00	46.00	22.13	28.03	N	
6	27.12000	32.00	27.00	3.51	14.51	50.02	45.02	60.00	50.00	9.98	4.98	N	
7	0.72545	26.10	15.60	0.16	13.23	39.49	28.99	56.00	46.00	16.51	17.01	L	
8	0.95920	20.40	8.40	0.18	13.26	33.84	21.84	56.00	46.00	22.16	24.16	L	
9	1.40500	20.20	8.70	0.20	13.31	33.71	22.21	56.00	46.00	22.29	23.79	L	
10	2.08900	18.00	8.50	0.22	13.38	31.60	22.10	56.00	46.00	24.40	23.90	L	
11	2.64700	16.80	7.80	0.25	13.44	30.49	21.49	56.00	46.00	25.51	24.51	L	
12	27.12000	25.60	25.10	3.55	14.51	43.66	43.16	60.00	50.00	16.34	6.84	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.

UL Japan, Inc.

Ise EMC Lab.

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

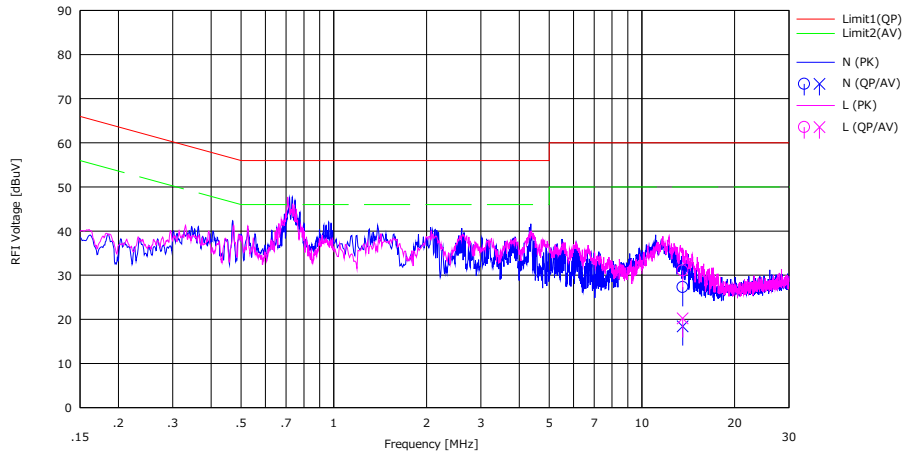
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Emission

Report No. 13719493H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.2
Date October 4, 2021
Temperature / Humidity 23 deg. C / 58 % RH
Engineer Hiroki Numata
Mode Mode 1 (with USB power Supply) RFID Antenna Terminated

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq. [MHz]	Reading		LISN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]			<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	13.56000	11.80	2.90	1.47	14.04	27.31	18.41	60.00	50.00	32.69	31.59	N	
2	13.56000	15.60	4.80	1.40	14.04	31.04	20.24	60.00	50.00	28.96	29.76	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.

UL Japan, Inc.

Ise EMC Lab.

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

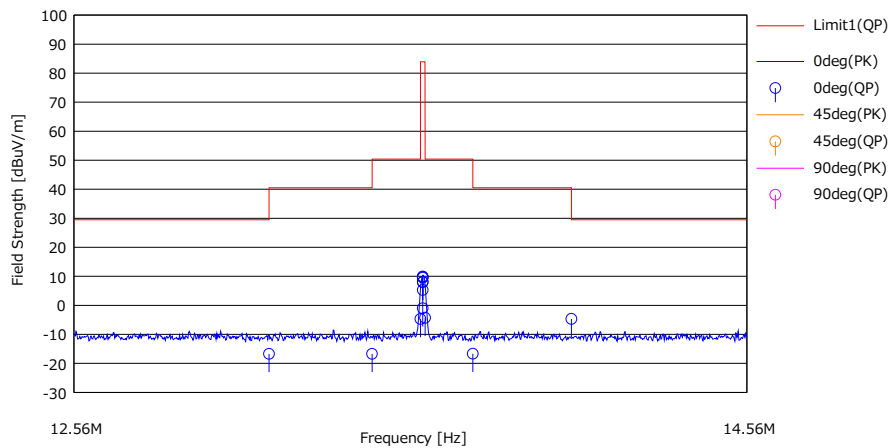
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Fundamental emission and Spectrum Mask

Report No. 13719493H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date July 14, 2021
Temperature / Humidity 22 deg. C / 62 % RH
Engineer Junki Nagatomi
Mode Mode 1 (with USB power Supply)

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



No.	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna [deg]	Table [deg]	Comment
1	13.11000	29.20	19.26	-33.14	32.05	-16.73	29.50	46.23	0deg	0	
2	13.41000	29.20	19.27	-33.13	32.05	-16.71	40.50	57.21	0deg	0	
3	13.55300	41.20	19.27	-33.12	32.05	-4.70	50.40	55.10	0deg	0	
4	13.56000	55.80	19.27	-33.12	32.05	9.90	83.90	74.00	0deg	0	0 deg
5	13.56000	54.00	19.27	-33.12	32.05	8.10	83.90	75.80	0deg	168	45 deg
6	13.56000	51.20	19.27	-33.12	32.05	5.30	83.90	78.60	0deg	92	90 deg
7	13.56000	53.90	19.27	-33.12	32.05	8.00	83.90	75.90	0deg	12	135 deg
8	13.56000	55.40	19.27	-33.12	32.05	9.50	83.90	74.40	0deg	0	180 deg
9	13.56000	44.90	19.27	-33.12	32.05	-1.00	83.90	84.90	0deg	300	Hori
10	13.56000	55.70	19.27	-33.12	32.05	9.80	83.90	74.10	0deg	300	0 deg With Tag
11	13.56700	41.60	19.27	-33.12	32.05	-4.30	50.40	54.70	0deg	0	
12	13.71000	29.20	19.27	-33.12	32.05	-16.70	40.50	57.20	0deg	0	
13	14.01000	41.20	19.28	-33.10	32.05	-4.67	29.50	34.17	0deg	0	

RESULT = READING + ANT FACTOR + LOSS (CABLE + Attenuator + Distance Factor*) - GAIN(AMP))

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

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	55.40	19.27	6.88	32.05	-	49.50	-	-	Fundamental

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

The pre amplifier used for carrier frequency measurement was not saturated.

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

Spurious emission

Report No.	13719493H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	July 14, 2021	July 15, 2021
Temperature / Humidity	22 deg. C / 62 % RH	22 deg. C / 65 % RH
Engineer	Junki Nagatomi (Below 30 MHz)	Junki Nagatomi (Above 30 MHz)
Mode	Mode 1 (with USB power Supply)	

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
180 deg	27.120	QP	47.70	19.43	-32.77	32.04	-	2.32	29.5	27.18	
Hori.	98.578	QP	52.60	9.87	7.96	31.99	-	38.44	43.5	5.08	
Hori.	245.222	QP	43.30	11.70	9.18	31.89	-	32.29	46.0	13.73	
Hori.	300.616	QP	38.60	13.62	9.57	31.85	-	29.94	46.0	16.08	
Hori.	392.750	QP	36.60	15.55	10.13	31.91	-	30.37	46.0	15.65	
Hori.	583.080	QP	31.70	18.73	11.12	32.06	-	29.49	46.0	16.53	
Hori.	855.520	QP	31.20	21.51	12.17	31.39	-	33.49	46.0	12.53	
Vert.	102.985	QP	43.50	10.58	8.00	31.99	-	30.09	43.5	13.43	
Vert.	232.216	QP	41.50	11.35	9.08	31.90	-	30.03	46.0	15.99	
Vert.	555.960	QP	31.20	18.00	11.00	32.04	-	28.16	46.0	17.86	
Vert.	583.080	QP	34.10	18.73	11.12	32.06	-	31.89	46.0	14.13	
Vert.	610.200	QP	33.30	19.29	11.24	32.08	-	31.75	46.0	14.27	
Vert.	817.931	QP	32.80	20.72	12.02	31.58	-	33.96	46.0	12.06	

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

UL Japan, Inc.

Ise EMC Lab.

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

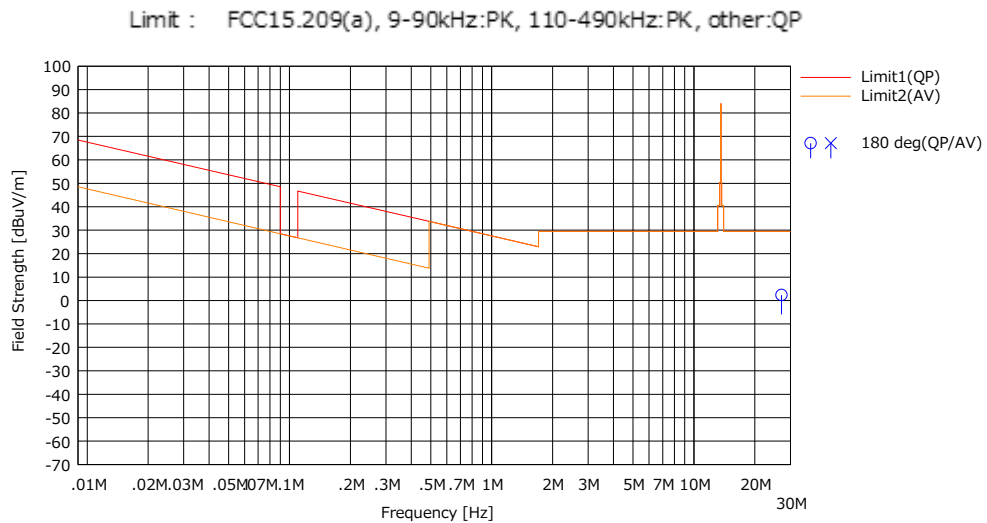
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

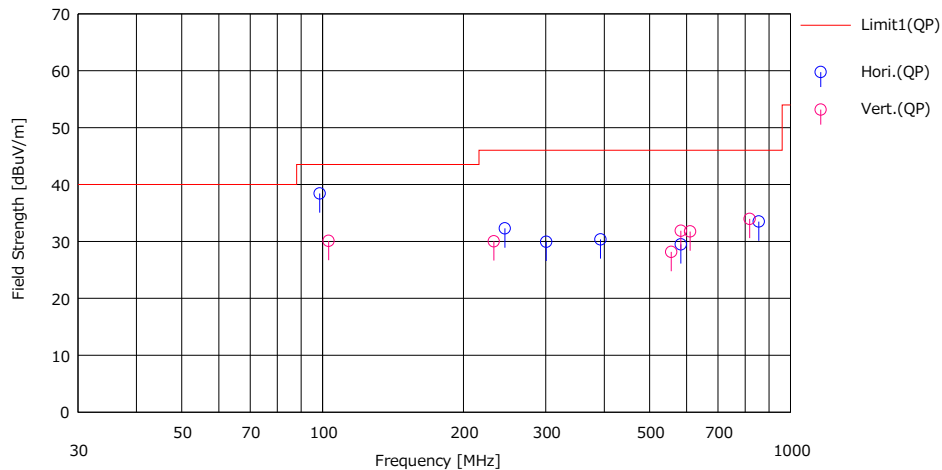
Radiated Emission Plot data, Worst case

Report No.	13719493H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	July 14, 2021	July 15, 2021
Temperature / Humidity	22 deg. C / 62 % RH	22 deg. C / 65 % RH
Engineer	Junki Nagatomi (Below 30 MHz)	Junki Nagatomi (Above 30 MHz)
Mode	Mode 1 (with USB power Supply)	

(below 30MHz)



(above 30MHz)

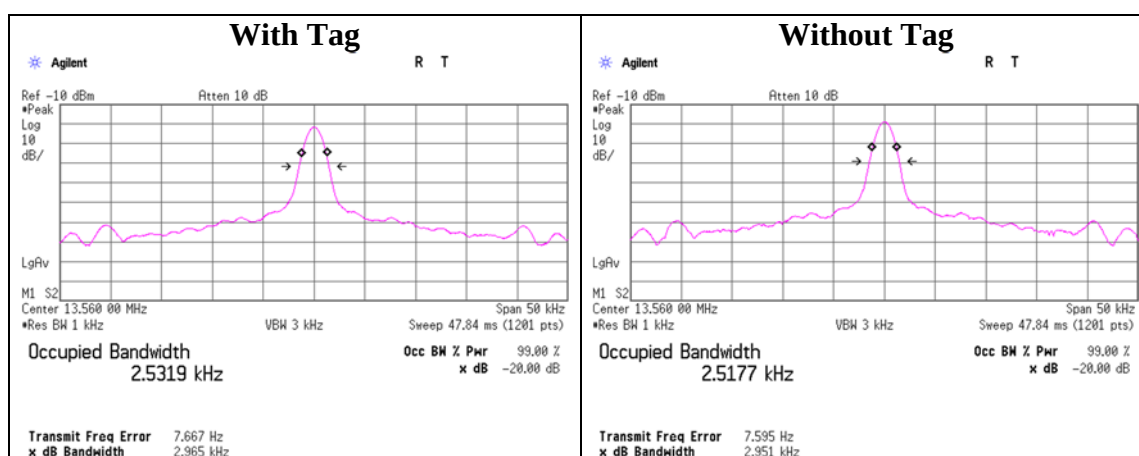


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

20 dB Bandwidth and 99 % Occupied Bandwidth

Report No.	13719493H
Test place	Ise EMC Lab.
Measurement Room	No.6
Date	July 18, 2021
Temperature / Humidity	23 deg. C / 52 % RH
Engineer	Takafumi Noguchi
Mode	Mode 1 (with USB power Supply)

Mode1	FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
With Tag	13.56	2.965	2.5319
Without Tag	13.56	2.951	2.5177



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

Frequency Tolerance

Report No. 13719493H
Test place Ise EMC Lab.
Measurement Room No.6
Date July 16, 2021
Temperature / Humidity 24 deg. C / 48 % RH
Engineer Takafumi Noguchi
Mode Mode 1 (with Battery power Supply)

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit [+/- %]
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
20	3	Power on	13.560086	0.000086	0.00063	6.3	0.01
		+ 2 min.	13.560071	0.000071	0.00053	5.3	0.01
		+ 5 min.	13.560068	0.000068	0.00050	5.0	0.01
		+ 10 min.	13.560066	0.000066	0.00049	4.9	0.01
20	2.55 (3V -15%)	Power on	13.560074	0.000074	0.00055	5.5	0.01
		+ 2 min.	13.560064	0.000064	0.00047	4.7	0.01
		+ 5 min.	13.560063	0.000063	0.00047	4.7	0.01
		+ 10 min.	13.560063	0.000063	0.00046	4.6	0.01
20	3.45 (3V +15%)	Power on	13.560071	0.000071	0.00053	5.3	0.01
		+ 2 min.	13.560064	0.000064	0.00047	4.7	0.01
		+ 5 min.	13.560064	0.000064	0.00047	4.7	0.01
		+ 10 min.	13.560064	0.000064	0.00047	4.7	0.01

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

Frequency Tolerance

Report No. 13719493H
Test place Ise EMC Lab.
Measurement Room No.6 No.6
Date July 16, 2021 July 17, 2021
Temperature / Humidity 24 deg. C / 48 % RH 26 deg. C / 52 % RH
Engineer Takafumi Noguchi Junki Nagatomi
Mode Mode 1 (with USB power Supply)

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
50	5	Power on	13.559960	-0.000040	-0.00029	-2.9	0.01
		+ 2 min.	13.559953	-0.000047	-0.00035	-3.5	0.01
		+ 5 min.	13.559952	-0.000048	-0.00036	-3.6	0.01
		+ 10 min.	13.559952	-0.000048	-0.00036	-3.6	0.01
40	5	Power on	13.559997	-0.000003	-0.00002	-0.2	0.01
		+ 2 min.	13.559988	-0.000012	-0.00009	-0.9	0.01
		+ 5 min.	13.559980	-0.000020	-0.00015	-1.5	0.01
		+ 10 min.	13.559980	-0.000020	-0.00015	-1.5	0.01
30	5	Power on	13.560018	0.000018	0.00013	1.3	0.01
		+ 2 min.	13.560017	0.000017	0.00013	1.3	0.01
		+ 5 min.	13.560018	0.000018	0.00013	1.3	0.01
		+ 10 min.	13.560014	0.000014	0.00010	1.0	0.01
20	5	Power on	13.560094	0.000094	0.00070	7.0	0.01
		+ 2 min.	13.560073	0.000073	0.00054	5.4	0.01
		+ 5 min.	13.560069	0.000069	0.00051	5.1	0.01
		+ 10 min.	13.560071	0.000071	0.00053	5.3	0.01
20	4.25 (5V -15%)	Power on	13.560085	0.000085	0.00063	6.3	0.01
		+ 2 min.	13.560071	0.000071	0.00053	5.3	0.01
		+ 5 min.	13.560068	0.000068	0.00050	5.0	0.01
		+ 10 min.	13.560065	0.000065	0.00048	4.8	0.01
20	5.75 (5V +15%)	Power on	13.560087	0.000087	0.00064	6.4	0.01
		+ 2 min.	13.560074	0.000073	0.00054	5.4	0.01
		+ 5 min.	13.560069	0.000069	0.00051	5.1	0.01
		+ 10 min.	13.560065	0.000065	0.00048	4.8	0.01
10	5	Power on	13.560120	0.000120	0.00089	8.9	0.01
		+ 2 min.	13.560112	0.000112	0.00082	8.2	0.01
		+ 5 min.	13.560109	0.000109	0.00080	8.0	0.01
		+ 10 min.	13.560108	0.000108	0.00080	8.0	0.01
0	5	Power on	13.560147	0.000147	0.00109	10.9	0.01
		+ 2 min.	13.560144	0.000144	0.00106	10.6	0.01
		+ 5 min.	13.560148	0.000148	0.00109	10.9	0.01
		+ 10 min.	13.560141	0.000141	0.00104	10.4	0.01
-10	5	Power on	13.560158	0.000158	0.00117	11.7	0.01
		+ 2 min.	13.560165	0.000165	0.00122	12.2	0.01
		+ 5 min.	13.560164	0.000164	0.00121	12.1	0.01
		+ 10 min.	13.560165	0.000165	0.00122	12.2	0.01
-20	5	Power on	13.560152	0.000152	0.00112	11.2	0.01
		+ 2 min.	13.560164	0.000164	0.00121	12.1	0.01
		+ 5 min.	13.560161	0.000161	0.00119	11.9	0.01
		+ 10 min.	13.560164	0.000164	0.00121	12.1	0.01
-30	5	Power on	13.560098	0.000098	0.00072	7.2	0.01
		+ 2 min.	13.560128	0.000128	0.00094	9.4	0.01
		+ 5 min.	13.560127	0.000127	0.00094	9.4	0.01
		+ 10 min.	13.560124	0.000124	0.00092	9.2	0.01

Calculation formula:

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

Frequency Tolerance

Report No. 13719493H
Test place Ise EMC Lab.
Measurement Room No.6
Date July 16, 2021
Temperature / Humidity 24 deg. C / 48 % RH
Engineer Takafumi Noguchi
Mode Mode 1 (with MI-Shoe power Supply)

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit [+/- %]
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
20	7.2	Power on	13.560081	0.000081	0.00060	6.0	0.01
		+ 2 min.	13.560072	0.000072	0.00053	5.3	0.01
		+ 5 min.	13.560068	0.000068	0.00050	5.0	0.01
		+ 10 min.	13.560065	0.000065	0.00048	4.8	0.01
20	6.12 (7.2V -15%)	Power on	13.560070	0.000070	0.00052	5.2	0.01
		+ 2 min.	13.560064	0.000064	0.00047	4.7	0.01
		+ 5 min.	13.560064	0.000064	0.00047	4.7	0.01
		+ 10 min.	13.560064	0.000064	0.00047	4.7	0.01
20	8.28 (7.2V +15%)	Power on	13.560091	0.000091	0.00067	6.7	0.01
		+ 2 min.	13.560074	0.000074	0.00054	5.4	0.01
		+ 5 min.	13.560071	0.000071	0.00052	5.2	0.01
		+ 10 min.	13.560067	0.000067	0.00049	4.9	0.01

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

APPENDIX 2: Test instruments

Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	MAEC-02	142004	AC2_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	05/26/2020	24
CE	MOS-41	192300	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0013	12/06/2020	12
CE	MMM-01	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/10/2021	12
CE	MJM-27	142228	Measure	KOMELON	KMC-36	-	-	-
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MLS-24	141358	LISN(AMN)	Schwarzbeck Mess-Elektronik OHG	NSLK8127	8127-730	07/18/2021	12
CE	MAT-67	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	12/07/2020	12
CE	MCC-13	141222	Coaxial Cable	Fujikura,HP,Mini-Circuits,Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	02/18/2021	12
CE	MTR-08	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/05/2021	12
RE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/25/2020	24
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/15/2021	12
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/07/2021	12
RE	MJM-29	142230	Measure	KOMELON	KMC-36	-	-	-
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MTR-09	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	-	-
RE	MSA-15	141902	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187105	10/15/2020	12
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	02/02/2021	12
RE	MCC-113	141217	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM141/421-010/sucoform141-PE/RFM-E121(SW)	-/04178	06/02/2021	12
RE	MLPA-01	141254	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	04/17/2021	12
RE	MCC-255	207745	Coaxial Cable	UL Japan Inc.	-	-	05/17/2021	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+BBA9106	VHA 91031302	08/28/2021	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	11/06/2020	12
RE	MLA-23	141267	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-192	08/28/2021	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	02/18/2021	12
RE	MOS-14	141561	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1401	01/15/2021	12
RE	MMM-12	141547	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	60500120	02/01/2021	12
RE	MSA-04	141885	Spectrum Analyzer	Keysight Technologies Inc	E4448A	US44300523	11/09/2020	12
RE	MLPA-08	202511	Loop Antenna	UL Japan	-	-	-	-
FT	MOS-14	141561	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1401	01/15/2021	12
FT	MMM-12	141547	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	60500120	02/01/2021	12
FT	MSA-04	141885	Spectrum Analyzer	Keysight Technologies Inc	E4448A	US44300523	11/09/2020	12
FT	MCH-04	141429	Temperature and Humidity Chamber	Espec	PL-2KP	14015723	08/05/2021	12
FT	MLPA-08	202511	Loop Antenna	UL Japan	-	-	-	-

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

*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

FT: Frequency Tolerance