

RADIO TEST REPORT

Test Report No. 15742589S-F-R1

Customer	AlphaTheta Corporation
Description of EUT	DJ Mixer
Model Number of EUT	DJM-V5
FCC ID	2AM73-0005
Test Regulation	FCC Part 15 Subpart C
Test Result	Complied
Issue Date	August 19, 2025
Remarks	Except for Frequency Tolerance test

Representative test engineer

Makoto Hosaka
Engineer

Approved by

Shunsaku Yumi
Engineer

CERTIFICATE 1266.03

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Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 24.0

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- For any test report referred in this report, the latest version (including any revisions) is always referred to.
- If the latest version is a revision, it replaces the previous version. See the table below for revisions and versions.

REVISION HISTORY

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15742589S-F	June 27, 2025	-
1	15742589S-F-R1	August 19, 2025	<p>Page 6 Correction of the statement of compliance requirements for FCC Part 15.31 (e). From: The stable voltage was supplied by the end product which was required to have a power supply regulator. Therefore, the EUT complies with the requirement. To: This EUT provides the stable voltage constantly to RF Part regardless of input voltage. Therefore, this EUT complies with the requirement.</p> <p>Page 9 Addition of firmware creation date and storage location.</p>

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	Comité International Special des Perturbations Radioélectriques	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	5
SECTION 2: Equipment Under Test (EUT).....	5
SECTION 3: Test Summary.....	6
SECTION 4: Operation of EUT during testing	9
SECTION 5: Conducted Emission.....	12
SECTION 6: Radiated Emission (Fundamental, Spurious Emission and Spectrum Mask)	13
SECTION 7: Other tests.....	15
APPENDIX 1: Test data	16
Conducted Emission	16
Fundamental Emission and Spectrum Mask	18
Spurious Emission	19
20 dB Bandwidth and 99% Occupied Bandwidth	21
APPENDIX 2: Test instruments	22
APPENDIX 3: Photographs of test setup.....	23
Conducted Emission	23
Radiated Emission (Below 30 MHz)	24
Radiated Emission (Above 30 MHz)	25

SECTION 1: Customer Information

Company Name	AlphaTheta Corporation
Address	6F, Yokohama i-Mark Place, 4-4-5 Minatomirai, Nishi-ku, Yokohama, Kanagawa 220-0012 Japan
Telephone Number	+81-70-3367-4439
Contact Person	Yoshifumi Iketani

The information provided by 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

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	DJ Mixer
Model Number	DJM-V5
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	April 11, 2025
Test Date	April 14 and 15, 2025

2.2 Product Description

General Specification

Rating	AC 110 V to 240 V, 1 A, 50 / 60 Hz
Operating Temperature	5 deg. C to 35 deg. C

Radio Specification

RFID

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

SECTION 3: Test Summary

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.

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

3.2 Reference Standards

ANSI/USEMCSC C63.2-2023
ANSI C63.4-2014+C63.4a-2017
ANSI C63.5-2017
ANSI C63.10-2020
ANSI C63.25.1-2018
RSS-Gen Issue 5/Amendment 1/Amendment 2 for ISED

3.3 Summary of Test Results

Item	Specification	Results	Remarks
Conducted Emission	<FCC> Section 15.207 ----- <ISED> RSS-Gen 8.8	Complied	-
Electric Field Strength of Fundamental Emission	<FCC> Section 15.225(a) ----- <ISED> RSS-210 B.6 (a)	Complied	Radiated
Spectrum Mask	<FCC> Section 15.225(b)(c) ----- <ISED> RSS-210 B.6 (a)	Complied	Radiated
20 dB Bandwidth	<FCC> Section15.215(c) ----- <SED> -	Complied	Radiated
Electric Field Strength of Spurious Emission	<FCC> Section 15.209, Section 15.225 (d) ----- <SED> RSS-210 B.6 (a) RSS-Gen 8.9	Complied	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.

FCC Part 15.31 (e)

This EUT provides the stable voltage constantly to RF Part regardless of input voltage.
Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT.
Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.4 Addition to standard

Item	Test Procedure	Results	Remarks
99 % emission bandwidth	<ISED>RSS-Gen 6.7	-	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.

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

3.5 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 $k = 2$.

Item	Frequency range	Uncertainty (+/-)
Conducted Emission (AC Mains) LISN	150 kHz to 30 MHz	3.0 dB
Radiated Emission (Measurement distance: 3 m)	9 kHz to 30 MHz	3.3 dB
	30 MHz to 200 MHz	4.8 dB
	200 MHz to 1 GHz	6.1 dB
	1 GHz to 6 GHz	4.7 dB
	6 GHz to 18 GHz	5.3 dB
	18 GHz to 40 GHz	5.5 dB

Antenna terminal test	Uncertainty (+/-)
Frequency Measurement (13.56 MHz)	1.6×10^{-7}
Bandwidth Measurement	0.012 %
Temperature	2.2 deg. C.
Humidity	3.4 %
Voltage	0.92 %

3.6 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 Japan
Telephone: +81-463-50-6400
A2LA Certificate Number: 1266.03
(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

Test room	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber (SAC1)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber (SAC2)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber (SAC3)	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber (SAC4)	8.1 x 5.1 x 3.55	8.1 x 5.1	-
Wireless anechoic chamber 1 (WAC1)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
Wireless anechoic chamber 2 (WAC2)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 Shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-
No.2 Measurement room	4.5 x 3.5 x 2.5	-	-
Wireless shielded room 1	3.0 x 4.5 x 2.7	3.0 x 4.5	-
Wireless shielded room 2	3.0 x 4.5 x 2.7	3.0 x 4.5	-

3.7 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Mode used:

Test mode	Remarks
1) Transmitting mode (Tx)	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.

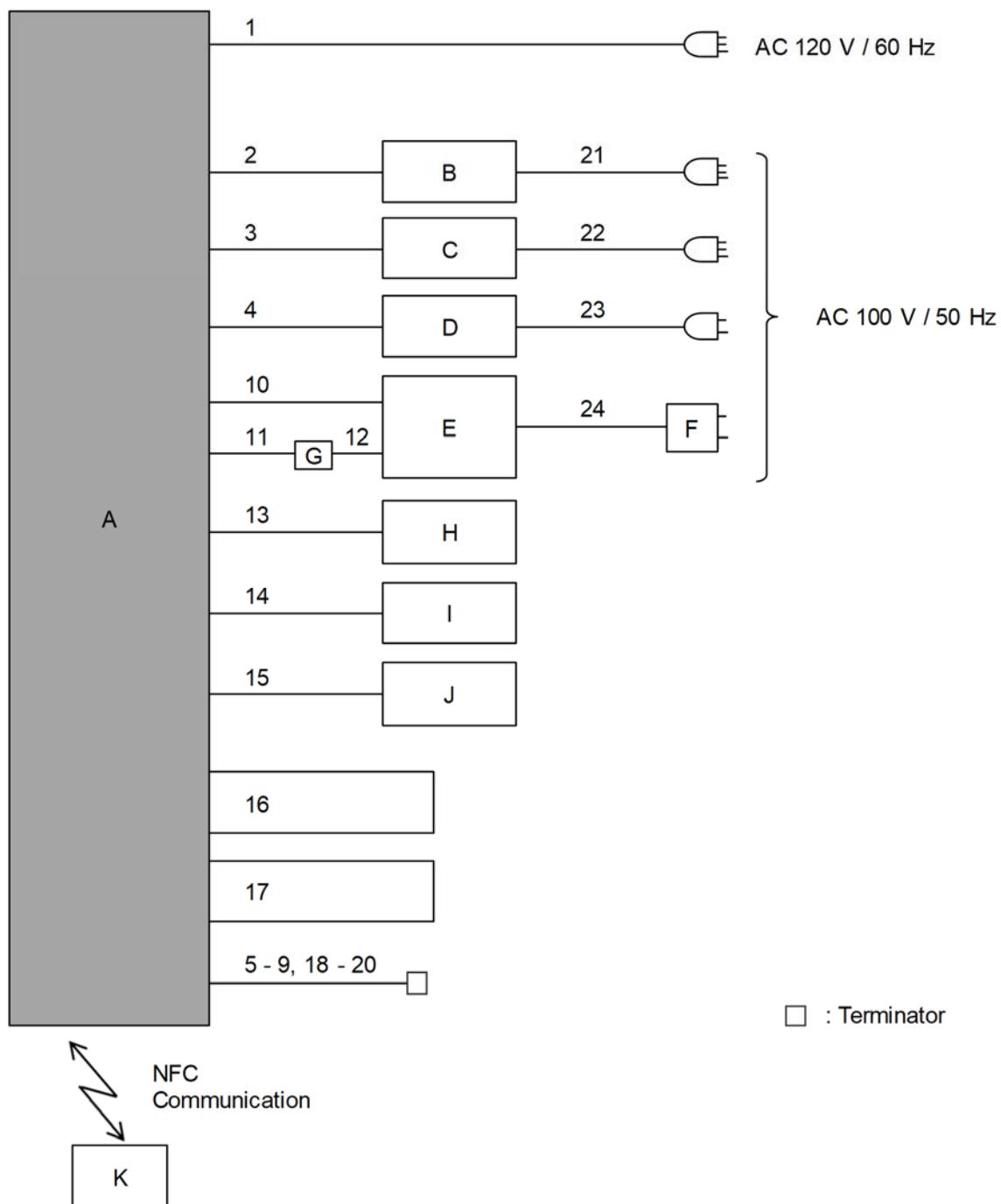
*Power of the EUT was set by the software as follows;
Firmware: Version: 9.492
(Date: 2025.04.09, Storage location: EUT memory)
*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of 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, with Tag
Electric Field Strength of Fundamental Emission	Tx Mod on, with Tag
Spectrum Mask	Tx Mod on, with Tag
20 dB Bandwidth and 99 % Occupied Bandwidth	Tx Mod on, with Tag
Electric Field Strength of Spurious Emission	Tx Mod on, with/without Tag

This EUT has two modes which Tag is attached or not.

The worst case was confirmed with and without Tag attached, as a result, the test was performed the worst case.

4.2 Configuration and peripherals



* 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	DJ Mixer	DJM-V5	EBMP000043DP	AlphaTheta	EUT
B	Speaker	MSP3A	JFBM01744	YAMAHA	-
C	Speaker	MSP3A	JFBM01945	YAMAHA	-
D	MULTI PLAYER	CDJ-850	S1G-9697	Pioneer DJ	-
E	Laptop Computer	A2251	C02F707SML7H	Apple	-
F	AC Adapter	A1947	-	Apple	-
G	USB-C to Ethernet Adapter	F2CU040	-	belkin	-
H	Tablet	A2993	JK2GF4MG35	Apple	-
I	MIC	AT-VD4	-	audio-technica	-
J	Headphones	HDJ-2000	-	Pioneer DJ	-
K	NFC Tag	-	1-6	-	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	AC	2.0	Unshielded	Unshielded	-
2	MASTER L	3.0	Shielded	Shielded	-
3	MASTER R	3.0	Shielded	Shielded	-
4	CH1 LINE L/R	1.5	Shielded	Shielded	-
5	CH1 PHONO L/R	1.5	Shielded	Shielded	-
6	CH2 LINE L/R	1.5	Shielded	Shielded	-
7	CH2 PHONO L/R	1.5	Shielded	Shielded	-
8	CH3 LINE L/R	1.5	Shielded	Shielded	-
9	CH3 PHONO L/R	1.5	Shielded	Shielded	-
10	USB	4.0	Shielded	Shielded	-
11	LAN	1.5	Shielded	Shielded	Cat.5e
12	USB	0.1	Shielded	Shielded	-
13	USB	1.0	Shielded	Shielded	-
14	MIC	3.0	Shielded	Shielded	-
15	HEADPHONE	1.0	Shielded	Shielded	-
16	MULTI I/O RETURN L - SEND L	3.0	Shielded	Shielded	-
17	MULTI I/O RETURN R - SEND R	3.0	Shielded	Shielded	-
18	REC OUT L/R	1.5	Shielded	Shielded	-
19	BOOTH L	3.0	Shielded	Shielded	-
20	BOOTH R	3.0	Shielded	Shielded	-
21	AC	2.0	Unshielded	Unshielded	-
22	AC	2.0	Unshielded	Unshielded	-
23	AC	2.0	Unshielded	Unshielded	-
24	DC	2.0	Shielded	Shielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 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.

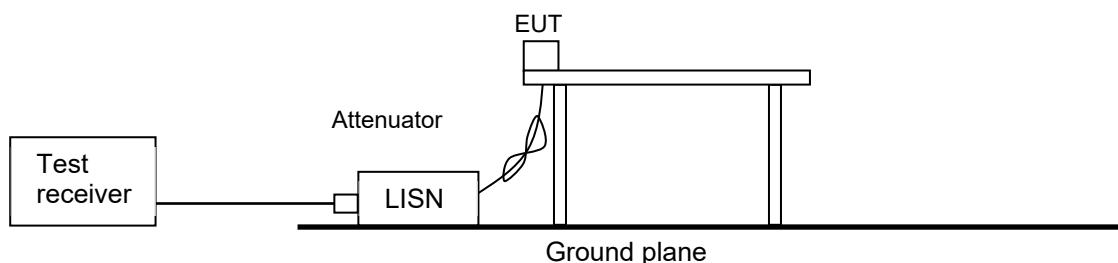
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected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

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Shielded Room.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

Figure 1: Test Setup



Test results are rounded off and limits are rounded down, 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 and 0.5 m by 0.5 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 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to $45.5 - 51.5 = -6.0$ 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.

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

Figure 2: Test Setup

Below 1 GHz

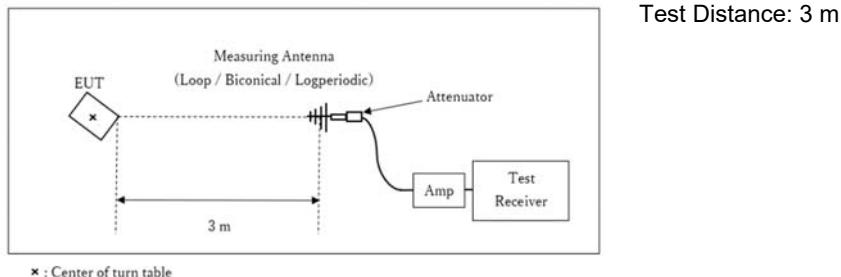
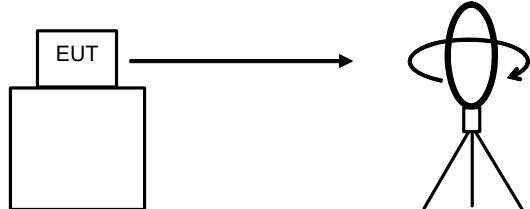
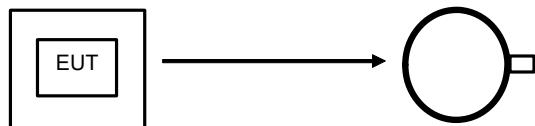


Figure 3: Direction of the Loop Antenna

Side View (Vertical)

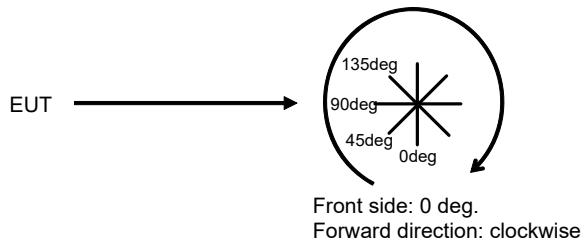


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



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

Test results are rounded off and limits are rounded down, so some differences might be observed.

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

SECTION 7: Other tests

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20 dB Bandwidth	700 kHz	3.9 kHz	12 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth	Enough width to display emission skirts	3.9 kHz	12 kHz	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 %.

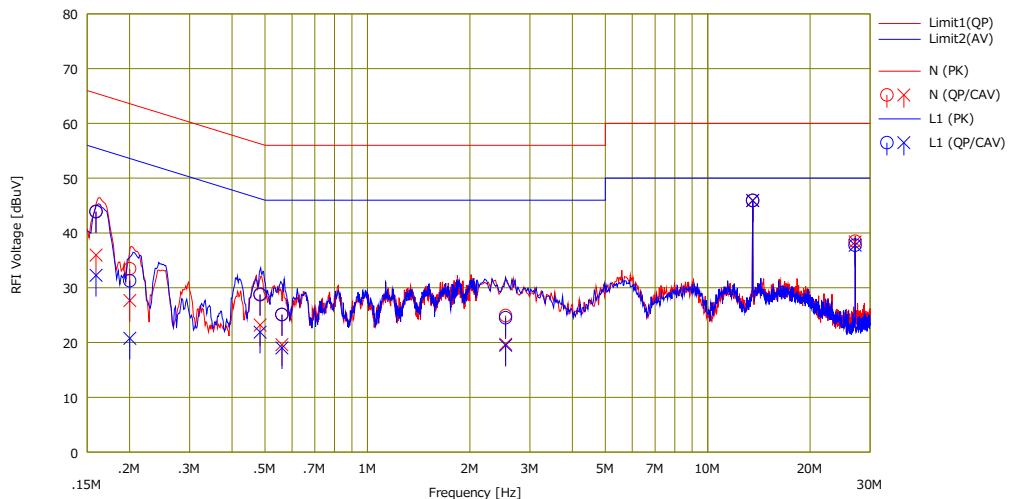
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

Test place Shonan EMC Lab. No.3 Shielded Room
Date April 14, 2025
Temperature / Humidity 25 deg. C / 39 % RH
Engineer Makoto Hosaka
Mode Transmitting 13.56 MHz with tag

Limit: FCC Part 15 Subpart C (15.207)



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		$\langle QP \rangle$ [dBuV]	$\langle CAV \rangle$ [dBuV]		$\langle QP \rangle$ [dBuV]	$\langle CAV \rangle$ [dBuV]	$\langle QP \rangle$ [dBuV]	$\langle AV \rangle$ [dBuV]	$\langle QP \rangle$ [dB]	$\langle AV \rangle$ [dB]		
1	0.15930	28.60	20.60	15.35	43.95	35.95	65.50	55.50	21.5	19.5	N	
2	0.20010	18.10	12.30	15.36	33.46	27.66	63.61	53.61	30.1	25.9	N	
3	0.48360	13.30	7.80	15.38	28.68	23.18	56.28	46.28	27.6	23.1	N	
4	0.56062	9.70	4.20	15.39	25.09	19.59	56.00	46.00	30.9	26.4	N	
5	2.54638	9.40	4.20	15.50	24.90	19.70	56.00	46.00	31.1	26.3	N	
6	13.56000	30.00	30.00	15.92	45.92	45.92	60.00	50.00	14.0	4.0	N	Ref. Carrier
7	27.12000	22.10	22.00	16.38	38.48	38.38	60.00	50.00	21.5	11.6	N	
8	0.15930	28.50	16.90	15.37	43.87	32.27	65.50	55.50	21.6	23.2	L1	
9	0.20010	15.90	5.40	15.37	31.27	20.77	63.61	53.61	32.3	32.8	L1	
10	0.48360	13.40	6.50	15.40	28.80	21.90	56.28	46.28	27.4	24.3	L1	
11	0.56062	9.70	3.60	15.41	25.11	19.01	56.00	46.00	30.8	26.9	L1	
12	2.54638	9.00	4.00	15.50	24.50	19.50	56.00	46.00	31.5	26.5	L1	
13	13.56000	30.10	30.10	15.82	45.92	45.92	60.00	50.00	14.0	4.0	L1	Ref. Carrier
14	27.12000	21.70	21.70	16.05	37.75	37.75	60.00	50.00	22.2	12.2	L1	

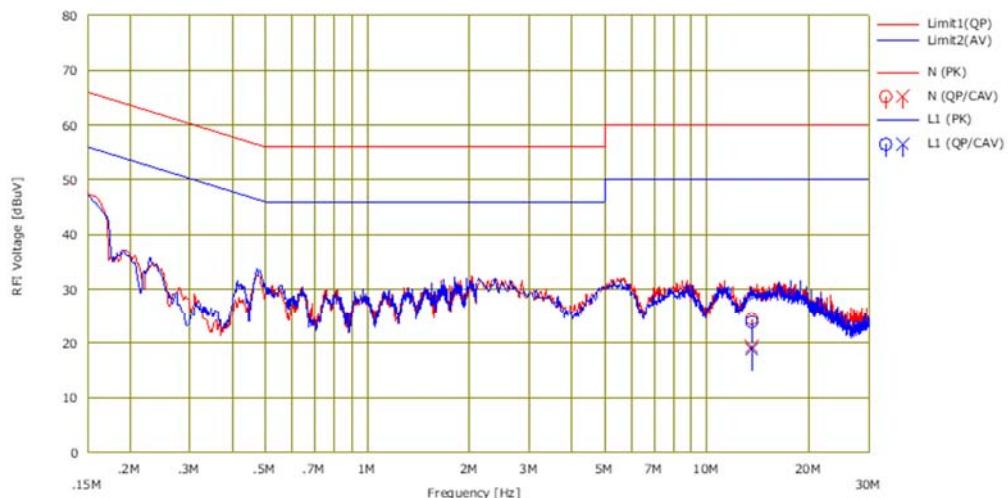
Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN)=LIMS ID: 145542

Except for the above table: adequate margin data below the limits.

Conducted Emission

Test place: Shonan EMC Lab. No.3 Shielded Room
 Date: April 14, 2025
 Temperature / Humidity: 25 deg. C / 39 % RH
 Engineer: Makoto Hosaka
 Mode: Transmitting 13.56 MHz, Antenna Terminated

Limit: FCC Part 15 Subpart C (15.207)



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		$\langle QP \rangle$ [dBuV]	$\langle CAV \rangle$ [dBuV]		$\langle QP \rangle$ [dB]	$\langle CAV \rangle$ [dBuV]	$\langle QP \rangle$ [dBuV]	$\langle AV \rangle$ [dBuV]	$\langle QP \rangle$ [dB]	$\langle AV \rangle$ [dB]		
		13.56000	8.50		3.50	15.92	24.42	19.42	60.00	50.00	35.5	II
2	13.56000	8.10	3.00	15.82	23.92	18.82	60.00	50.00	36.0	31.1	L1	carrier

Calculation: Result[dBuV] = Reading[dBuV] + C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN)=LIMS ID: 145542

Except for the above table: adequate margin data below the limits.

Fundamental Emission and Spectrum Mask

Test place	Shonan EMC Lab.						
Semi Anechoic Chamber	SAC2						
Date	April 15, 2025						
Temperature / Humidity	24 deg. C / 31 % RH						
Engineer	Makoto Hosaka						
Mode	Transmitting 13.56 MHz						
Remarks	with Tag , Vertical polarization (antenna angle) of the worst case: 45 deg						

Fundamental emission

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor	Loss [dB]	AMP GAIN [dB]	Distance factor [dB]	RESULT		LIMIT (30 m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.560	59.6	70.0	9.4	6.6	32.0	-40.0	3.6	14.0	83.9	80.3	69.9

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

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

Spurious emission within the band

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor	Loss [dB]	AMP GAIN [dB]	Distance factor [dB]	RESULT		LIMIT (30 m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.110	28.7	34.7	9.6	6.6	32.0	-40.0	-27.1	-21.1	29.5	56.6	50.6
2	13.405	28.3	32.7	9.4	6.6	32.0	-40.0	-27.7	-23.3	40.5	68.2	63.8
3	13.410	28.4	32.5	9.4	6.6	32.0	-40.0	-27.6	-23.5	40.5	68.1	64.0
4	13.553	45.6	55.8	9.4	6.6	32.0	-40.0	-10.4	-0.2	50.4	60.8	50.6
5	13.567	45.0	55.2	9.4	6.6	32.0	-40.0	-11.0	-0.8	50.4	61.4	51.2
6	13.710	28.3	33.2	9.4	6.6	32.0	-40.0	-27.7	-22.8	40.5	68.2	63.3
7	13.716	28.5	34.4	9.4	6.6	32.0	-40.0	-27.5	-21.6	40.5	68.0	62.1
8	14.010	28.5	35.0	9.3	6.6	32.0	-40.0	-27.6	-21.1	29.5	57.1	50.6

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

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

Outside filed strength frequencies

- $F_c \pm 7 \text{ kHz}$: 13.553 MHz to 13.567 MHz
- $F_c \pm 150 \text{ kHz}$: 13.410 MHz to 13.710 MHz
- $F_c \pm 450 \text{ kHz}$: 13.110 MHz to 14.010 MHz

$F_c = 13.56 \text{ MHz}$

Spurious Emission

Test place Shonan EMC Lab.
 Semi Anechoic Chamber SAC2
 Date April 15, 2025
 Temperature / Humidity 24 deg. C / 31 % RH
 Engineer Makoto Hosaka
 Mode Transmitting 13.56 MHz
 Remarks Below 30 MHz (with Tag), Vertical polarization (antenna angle) of the worst case: 90deg
 Above 30 MHz (without Tag)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	27.120	QP	45.3	7.5	6.9	31.9	-40.0	-12.3	29.5	41.8	-	68	* Limit: 30 m
Hori.	40.680	QP	25.7	14.6	7.1	31.9	0.0	15.4	40.0	24.6	218	271	
Hori.	54.240	QP	30.3	9.8	7.2	31.9	0.0	15.4	40.0	24.6	323	18	
Hori.	67.800	QP	39.1	6.9	7.2	31.9	0.0	21.2	40.0	18.8	264	10	
Hori.	143.774	QP	41.1	14.6	8.5	31.8	0.0	32.4	43.5	11.1	119	97	
Hori.	294.911	QP	51.6	12.9	6.6	31.7	0.0	39.3	46.0	6.7	100	126	
Hori.	516.102	QP	42.9	17.8	8.1	31.7	0.0	37.1	46.0	8.9	173	99	
Hori.	614.402	QP	42.8	19.6	8.6	31.6	0.0	39.4	46.0	6.6	150	98	
Hori.	761.857	QP	38.9	21.3	9.4	31.4	0.0	38.2	46.0	7.8	100	190	
Vert.	27.120	QP	43.6	7.5	6.9	31.9	-40.0	-14.0	29.5	43.5	-	168	* Limit: 30 m
Vert.	38.160	QP	34.2	15.6	7.0	31.9	0.0	24.8	40.0	15.2	100	229	
Vert.	40.680	QP	34.3	14.6	7.1	31.9	0.0	24.0	40.0	16.0	100	90	
Vert.	47.340	QP	41.0	12.1	7.2	31.9	0.0	28.4	40.0	11.6	100	135	
Vert.	54.240	QP	35.8	9.8	7.2	31.9	0.0	20.9	40.0	19.1	100	101	
Vert.	64.171	QP	49.4	7.4	7.0	31.9	0.0	31.9	40.0	8.1	100	177	
Vert.	67.800	QP	42.4	6.9	7.2	31.9	0.0	24.5	40.0	15.5	100	150	
Vert.	614.404	QP	42.6	19.6	8.6	31.6	0.0	39.2	46.0	6.8	100	38	

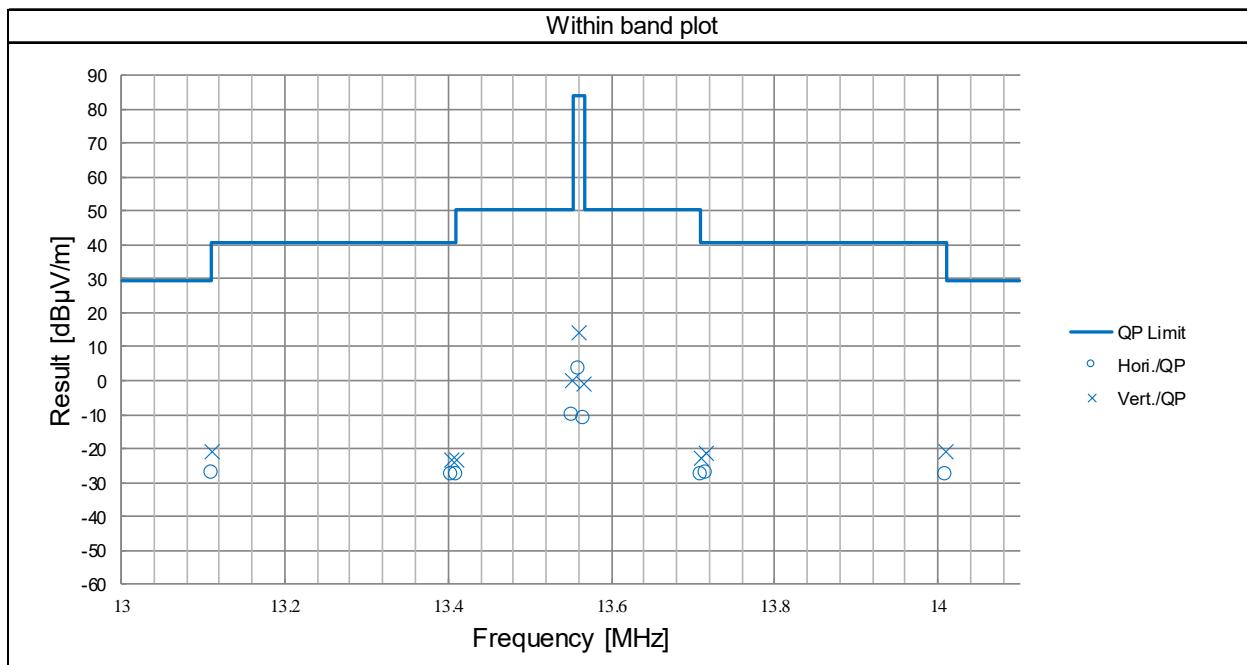
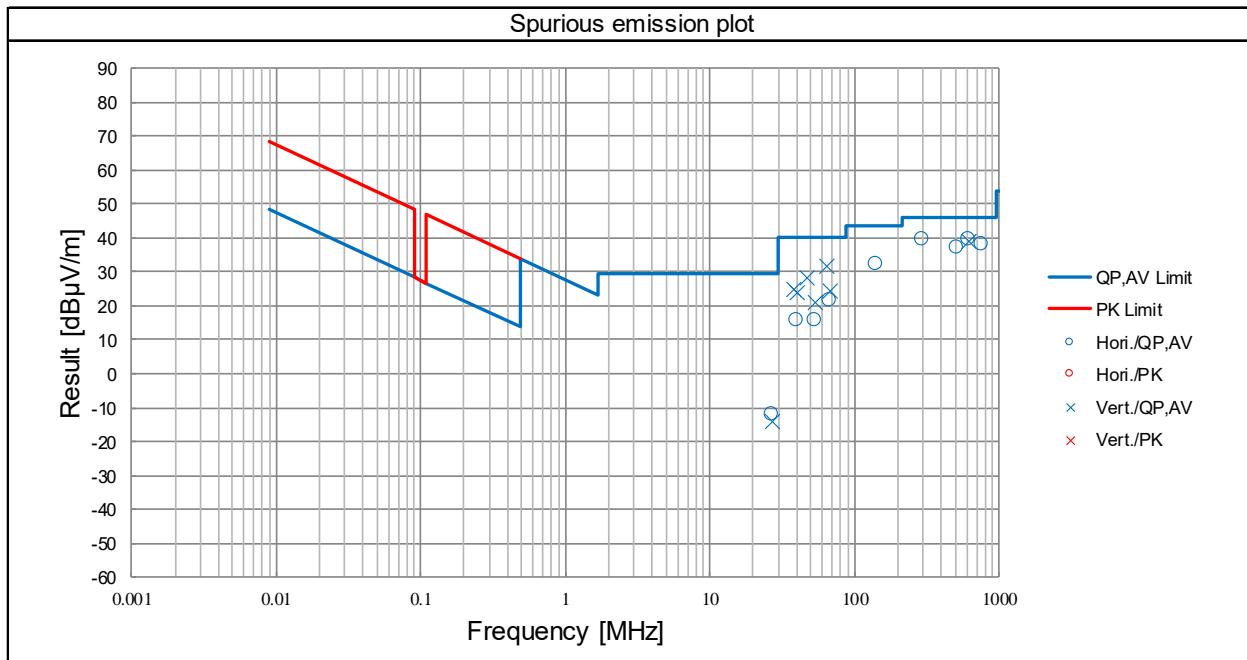
Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30 MHz)) - Gain(Amplifier) + Distance factor(below 30 MHz)

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

* Carrier level (Result at 3 m): Hor= 43.6 dBuV/m, Ver= 54 dBuV/m

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

Test place Shonan EMC Lab.
Semi Anechoic Chamber SAC2
Date April 15, 2025
Temperature / Humidity 24 deg. C / 31 % RH
Engineer Makoto Hosaka
Mode Transmitting 13.56 MHz

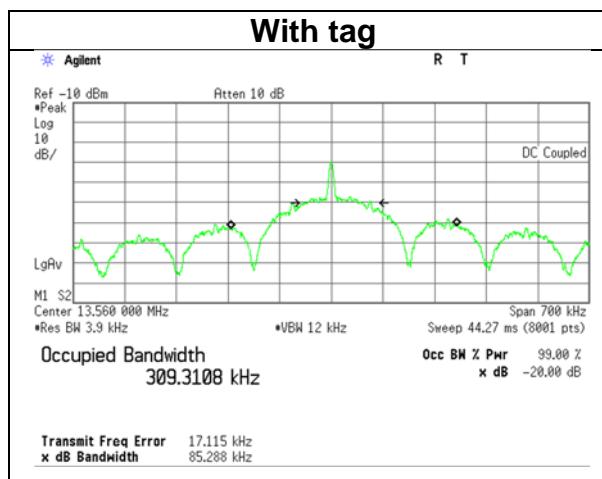


*These plots data contain sufficient number to show the trend of characteristic features for EUT.

20 dB Bandwidth and 99% Occupied Bandwidth

Test place Shonan EMC Lab.
Semi Anechoic Chamber SAC2
Date April 15, 2025
Temperature / Humidity 24 deg. C / 31 % RH
Engineer Makoto Hosaka
Mode Transmitting 13.56 MHz

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	With Tag	85.288	309.31



APPENDIX 2: Test instruments

Test Equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
BW	150461	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186392	2024/06/11	12
CE	199786	Attenuator	JFW	50HF-006N	-	2024/06/14	12
CE	145035	Coaxial Cable	Suhner	RG223U	-	2025/04/05	12
CE	146210	Digital Hitter	HIOKI E. E. CORPORATION	3805-50	80997823	2024/09/24	12
CE	145541	LISN	Rohde & Schwarz	ENV216	100514	2025/02/01	12
CE	145542	LISN	Rohde & Schwarz	ENV216	100516	2025/02/01	12
CE	146432	Tape Measure	TAJIMA	GL19-55	-	-	-
CE	146188	Terminator	TME	CT-01 BP	-	2024/11/21	12
CE	146208	Test Receiver	Rohde & Schwarz	ESCI	101259	2024/05/27	12
CE	259711	Thermo-Hygrometer	CUSTOM. Inc	CTH-230	-	2025/04/11	12
CE, RE	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	Ver 3.1.0546	-	-
RE	150921	Attenuator	JFW	50HF-003N	-	2025/02/19	12
RE	248305	Attenuator	JFW	50HFFA-006-2/18N	-	2024/05/06	12
RE	144932	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	1926	2025/03/18	12
RE	144975	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	2025/04/05	12
RE	145792	Digital Hitter	HIOKI E. E. CORPORATION	3805-50	80997812	2024/09/24	12
RE	236418	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VULP 9118 B	00975	2024/07/03	12
RE	145568	Semi Anechoic Chamber(ME)	TDK	Semi Anechoic Chamber 3m/10m	1, 2, 3	2024/10/12	24
RE	145563	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	2025/03/05	12
RE	207277	Tape Measure	ASKUL	-	-	-	-
RE	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2024/08/06	12
RE, BW	167096	Attenuator	JFW	50HF-006N	-	2025/02/19	12
RE, BW	194601	Coaxial Cable	Fjikura	5D-2W	-	2024/11/21	12
RE, BW	144976	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	2025/04/05	12
RE, BW	245074	Loop(Active) Antenna	ETS-Lindgren	6502	00262458	2024/04/02	12
RE, BW	145004	Pre Amplifier	SONOMA	310N	290212	2025/02/19	12
RE, BW	259709	Thermo-Hygrometer	CUSTOM. Inc	CTH-230	-	2025/04/11	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
- BW: Bandwidth