

EMI TEST REPORT

Test Report No.15106472S-B-R1

Customer	NITTOKU CO., LTD.
Description of EUT	HF Band RFID Reader/Writer
Model Number of EUT	ITS-HRW110
FCC ID	2A29TITSHRW110S2404
Test Regulation	FCC Part 15 Subpart B, Class A
Test Result	Complied
Issue Date	September 3, 2024
Remarks	-

Representative test engineer

Yusuke Tanikawara
Engineer

Approved by

Kazutaka Takeyama
Leader

CERTIFICATE 1266.03

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".

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 23.0

ANNOUNCEMENT

- This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
- The results in this report apply only to the sample tested. (Laboratory was not involved in sampling.)
- This sample tested is in compliance with the limits of the above regulation.
- The test results in this test report are traceable to the national or international standards.
- This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
- This test report covers EMC technical requirements.
It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
- The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
- The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
- The information provided by the customer for this report is identified in Section 1.
- The laboratory is not responsible for information provided by the customer which can impact the validity of the results.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No. 15106472S-B

This report is a revised version of 15106472S-B. 15106472S-B is replaced with this report.

Revision	Test report No.	Date	Revised Contents
- (Original)	15106472S-B	April 22, 2024	-
1	15106472S-B-R1	September 3, 2024	P.5 The current value of Rating was corrected from 0.2 A to 0.15 A. P.8, P.9 The description of "form" was corrected to "from".

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	ICES	Interference-Causing Equipment Standard
AAN	Asymmetric Artificial Network	I/O	Input/Output
AC	Alternating Current	IEC	International Electrotechnical Commission
AE	Auxiliary equipment	IEEE	Institute of Electrical and Electronics Engineers
AM	Amplitude Modulation	IF	Intermediate Frequency
AMN	Artificial Mains Network	ILAC	International Laboratory Accreditation Conference
Amp, AMP	Amplifier	ISED	Innovation, Science and Economic Development Canada
ANSI	American National Standards Institute	ISN	Impedance Stabilization Network
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	LCL	Longitudinal Conversion Loss
AV	Average	LIMS	Laboratory Information Management System
BPSK	Binary Phase-Shift Keying	LISN	Line Impedance Stabilization Network
BR	Bluetooth Basic Rate	MRA	Mutual Recognition Arrangement
BT	Bluetooth	N/A	Not Applicable
BT LE	Bluetooth Low Energy	NIST	National Institute of Standards and Technology
BW	BandWidth	NS	No signal detect.
C.F	Correction Factor	NSA	Normalized Site Attenuation
Cal Int	Calibration Interval	OBW	Occupied BandWidth
CAV	CISPR AV	OFDM	Orthogonal Frequency Division Multiplexing
CCK	Complementary Code Keying	PER	Packet Error Rate
CDN	Coupling Decoupling Network	PK	Peak
Ch., CH	Channel	P _{LT}	long-term flicker severity
CISPR	Comite International Special des Perturbations Radioelectriques	POHC(A)	Partial Odd Harmonic Current
Corr.	Correction	Pol., Pola.	Polarization
CPE	Customer premise equipment	PR-ASK	Phase Reversal ASK
CW	Continuous Wave	P _{ST}	short-term flicker severity
DBPSK	Differential BPSK	QAM	Quadrature Amplitude Modulation
DC	Direct Current	QP	Quasi-Peak
DET	Detector	QPSK	Quadrature Phase Shift Keying
D-factor, D.fac.	Distance factor	r.m.s., RMS	Root Mean Square
Dmax	maximum absolute voltage change during an observation period	RBW	Resolution BandWidth
DQPSK	Differential QPSK	RE	Radio Equipment
DSSS	Direct Sequence Spread Spectrum	REV	Reverse
DUT	Device Under Test	RF	Radio Frequency
EDR	Enhanced Data Rate	RFID	Radio Frequency Identifier
e.i.r.p., EIRP	Equivalent Isotropically Radiated Power	RNSS	Radio Navigation Satellite Service
EM clamp	Electromagnetic clamp	RSS	Radio Standards Specifications
EMC	ElectroMagnetic Compatibility	Rx	Receiving
EMI	ElectroMagnetic Interference	S.fac.	Site factor
EMS	ElectroMagnetic Susceptibility	SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
EN	European Norm	S/N	Signal to Noise ratio
e.r.p., ERP	Effective Radiated Power	SA, S/A	Spectrum Analyzer
ETSI	European Telecommunications Standards Institute	SABS	South African Bureau of Standards
EU	European Union	SANS	South African National Standards
EUT	Equipment Under Test	SG	Signal Generator
Fac.	Factor	SVSWR	Site-Voltage Standing Wave Ratio
FCC	Federal Communications Commission	THC(A)	Total Harmonic Current
FHSS	Frequency Hopping Spread Spectrum	THD(%)	Total Harmonic Distortion
FM	Frequency Modulation	TR, T/R	Test Receiver
Freq.	Frequency	Tx	Transmitting
FSK	Frequency Shift Keying	VBW	Video BandWidth
Fund	Fundamental	Vert.	Vertical
FWD	Forward	WLAN	Wireless LAN
GFSK	Gaussian Frequency-Shift Keying	xDSL	Generic term for all types of DSL technology (DSL: Digital Subscriber Line)
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
HPF	High-Pass Filter		

CONTENTS

	Page
Section 1 : Customer information	5
Section 2 : Equipment under test (EUT)	5
Section 3 : Test specification, procedures and results	6
Section 4 : Operation of EUT during testing	8
Section 5 : Conducted emission	11
Section 6 : Radiated emission	12
Appendix 1 : Data of EMI test	14
Appendix 2 : Test instruments	19
Appendix 3 : Photographs of test setup	20

Section 1: Customer information

Company Name	NITTOKU CO., LTD.
Address	2-292-1 Azuma-cho, Omiya-ku, Saitama-city, Saitama-pref, 330-0841 Japan
Telephone Number	+81-48-615-2117
Contact Person	Takamasa Shirako

The information provided by the customer is as follows:

- Customer, Description of EUT, Model Number of EUT on the cover page 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	HF Band RFID Reader/Writer
Model Number	ITS-HRW110
Serial Number	Refer to 4.2.
Condition	Production model
Modification	No Modification by the test lab.
Receipt Date	December 9 and 25, 2023 and February 27, 2024
Test Date	December 20, 2023 to March 1, 2024

2 . 2 Product description

General Specification

Rating	DC 12 V, 0.15 A
Clock frequency (ies) in the system	16 MHz

Radio Specification

Equipment Type	Transceiver
Frequency of Operation	13.56 MHz
Type of Modulation	ASK
Antenna type	Loop

Section 3 : Test specification, procedures and results

3 . 1 Test specification

Test Specification	FCC Part 15 Subpart B The latest version on the first day of the testing period
Title	FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators

3 . 2 Procedures & results

Item	Test procedure	Limits	Worst margin	Result	Remarks
Conducted emission	ANSI C 63.4:2014 /C 63.4a:2017 7. AC powerline conducted emission measurements	Class A	10.3 dB Freq.: 11.25101 MHz Detector: Average Phase: N Remarks: With Tag: ISO15693 Tag 1, Antenna: ITS-HAN10R	Complied	-
Radiated emission	ANSI C 63.4:2014 /C 63.4a:2017 8. Radiated emission measurements	Class A	1.5 dB Freq.: 47.997 MHz Detector: Quasi-Peak Polarization: Vertical Remarks: With Tag: ISO15693 Tag 1, Antenna: ITS-HAN10R	Complied	*1)

Note: UL Japan's EMI work procedure: Work Instructions-ULID-003591

*1) Measurements have been performed up to 1 GHz since the highest frequency of internal source of the EUT is less than 108 MHz.

3 . 3 Deviation from standard

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 $k = 2$.

Item	Frequency range	Calculated Uncertainty (\pm)
Conducted emission (AC Mains) AMN/LISN	9 kHz to 150 kHz	3.0 dB
	150 kHz to 30 MHz	3.2 dB
Radiated emission (Measurement distance: 10 m)	30 MHz to 200 MHz	4.8 dB
	200 MHz to 1 GHz	4.9 dB

3 . 5 Test location

UL Japan, Inc. Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 Japan

Telephone number : +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 . 6 Test setup, test data & test instruments

Refer to Appendix 1 to 3.

Section 4 : Operation of EUT during testing

4 . 1 Operating modes

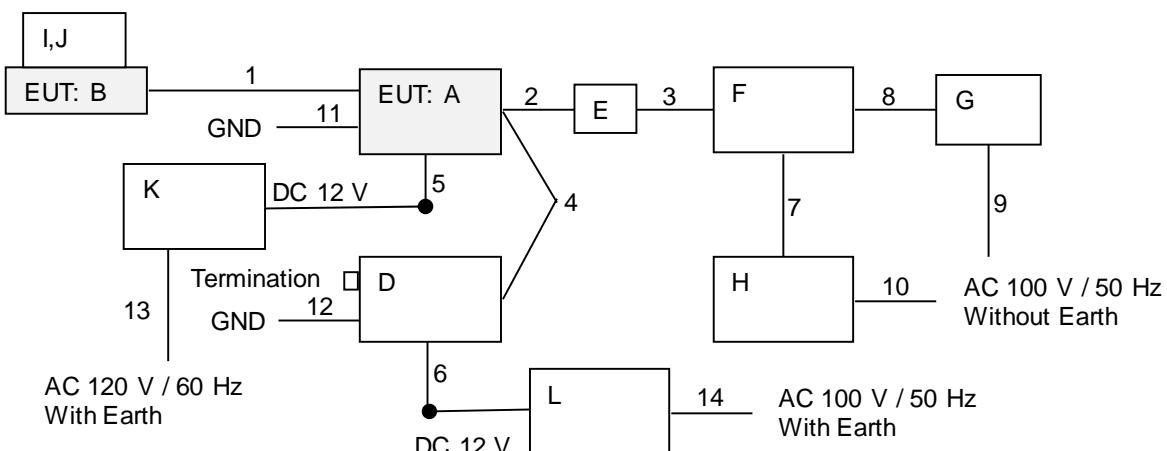
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Operation mode(s)	Operation mode
Fiirmware	Ver 1.54
Justification	The system was configured in typical fashion (as a customer would normally use it) for testing.

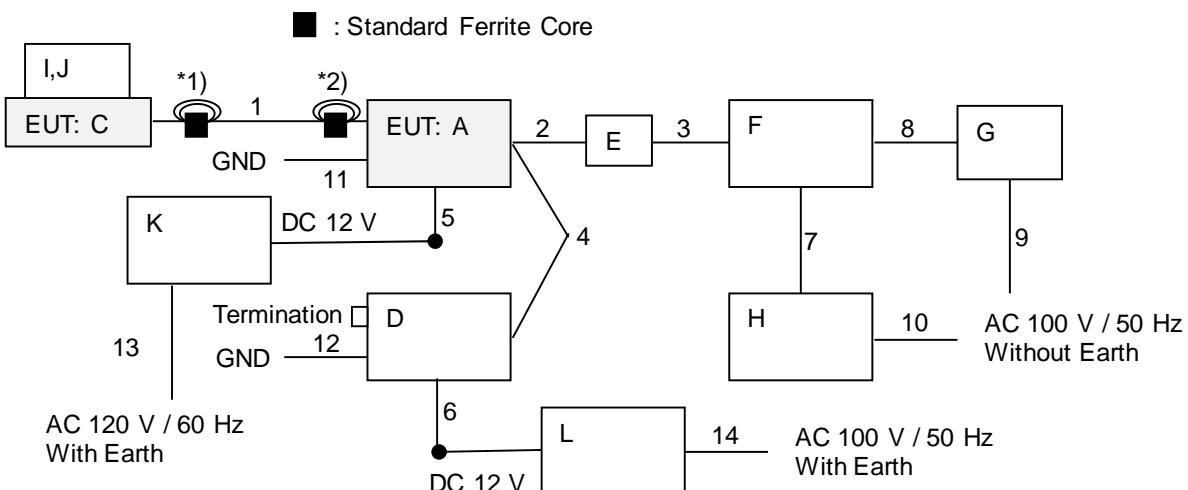
4 . 2 Configuration and peripherals

<Conducted emission>

Antenna : ITS-HAN10R



Antenna : ITS-HAN60S



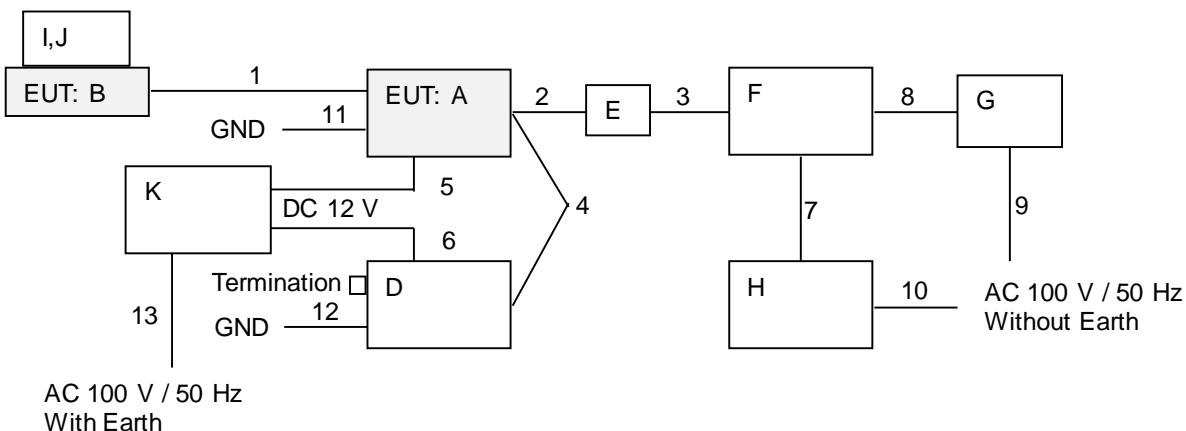
*1) Ferrite core Model No. TFN 081610 (Manufacture: TKK) 2 cm from Item A, 3 turns

*2) Ferrite core Model No. TFN 081610 (Manufacture: TKK) 2 cm from Item C, 3 turns

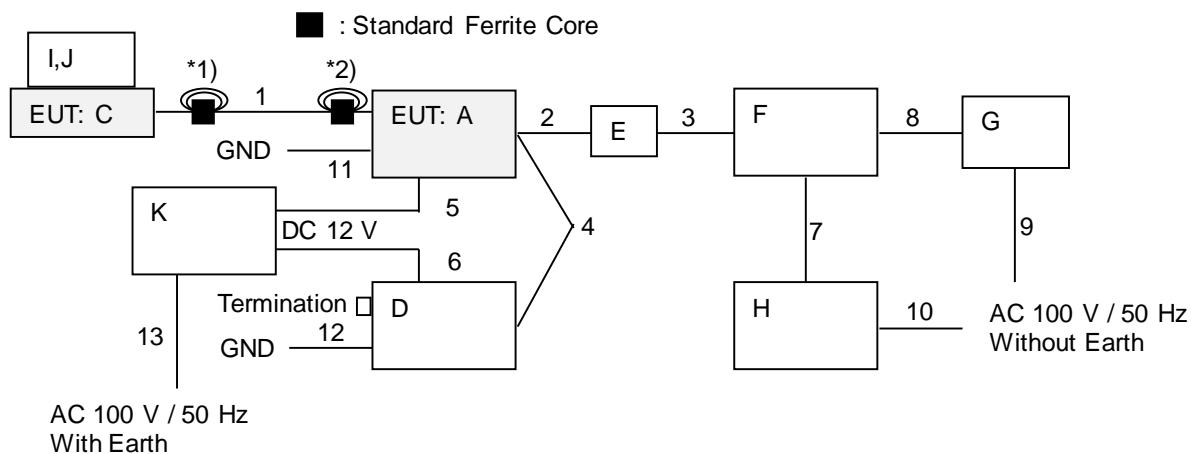
* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

<Radiated emission>

Antenna : ITS-HAN10R



Antenna : ITS-HAN60S



*1) Ferrite core Model No. TFN 081610 (Manufacture: TKK) 2 cm from Item A, 3 turns

*2) Ferrite core Model No. TFN 081610 (Manufacture: TKK) 2 cm from Item C, 3 turns

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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	HF Band RFID Reader/Writer	ITS-HRW110	2000000289	NITTOKU	EUT
B	Antenna	ITS-HAN10R	10R243	NITTOKU	EUT
C	Antenna	ITS-HAN60S	60S243	NITTOKU	EUT
D	HF Band RFID Reader/Writer	ITS-HRW110	2000000290	NITTOKU	-
E	USB to Serial Adaptor	UPort 1130I	TBCAQ 1020267	MOXA	-
F	Laptop Computer	ThinkPad L580	PF1PMM0X	LENOVO	-
G	AC Adapter	ADLX45YLC2A	8SSA10E75842L1CZ9480J61	LENOVO	-
H	Switching HUB	EHC-G05MN-HJW	6AL829502966A	ELECOM	-
I	ISO15693 Tag 1	ITS HTG21F52K	-	NITTOKU	-
J	ISO15693 Tag 2	ITS HTG61F52K	-	NITTOKU	-
K	Power Supply (DC)	PAN35-10A	DE001677	KIKUSUI	-
L	Power Supply (DC)	PAN35-10A	NL002383	KIKUSUI	-

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	Antenna	2.0	Shielded	Shielded	-
2	Signal	3.0	Unshielded	Unshielded	-
3	USB	0.8	Shielded	Shielded	-
4	Signal	3.0	Unshielded	Unshielded	-
5	DC	3.0	Unshielded	Unshielded	-
6	DC	3.0	Unshielded	Unshielded	-
7	LAN	3.0	Unshielded	Unshielded	-
8	DC	1.8	Unshielded	Unshielded	-
9	AC	0.9	Unshielded	Unshielded	-
10	AC	1.8	Unshielded	Unshielded	-
11	Earth	3.0	Unshielded	Unshielded	-
12	Earth	3.0	Unshielded	Unshielded	-
13	AC	2.0	Unshielded	Unshielded	-
14	AC	2.0	Unshielded	Unshielded	-

Section 5 : Conducted emission

5 . 1 Test conditions

Frequency range	0.15 MHz to 30 MHz
EUT position	Table top

5 . 2 Test configuration

The EUT was placed on a 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 was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. The EUT was located 0.8 m from Line Impedance Stabilization Network (LISN) 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. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment. Photographs of the setup are shown in Appendix 1.

5 . 3 Test procedure

The emission had been measured with the EUT in the shielded room. An overview sweep with peak detection has been performed. The measurements had been performed with a quasi-peak detector and if required, with a CISPR average detector (CAV).

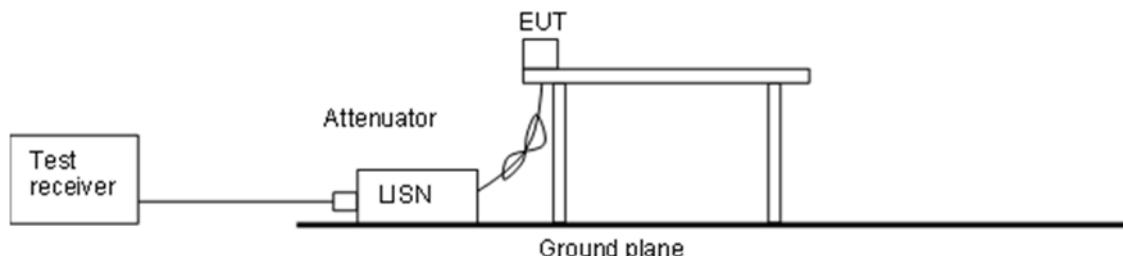
The conducted emission measurements were made with the following detector function.

Detector Type	QP / CAV
IF Bandwidth	9 kHz / 9 kHz

5 . 4 Results

Summary of the test results: Pass

Figure 1. Test Setup



Section 6 : Radiated emission

6 . 1 Test conditions

Frequency range	30 MHz to 1000 MHz
EUT position	Table top

6 . 2 Test configuration

The EUT was placed on a platform of nominal size, 1.0 m by 1.5 m or 1.0m by 2.0m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrene and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity. The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop. 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.

Photographs of the setup are shown in Appendix 1.

6 . 3 Test procedure

The Radiated Electric Field Strength intensity has been measured in a Semi-Anechoic Chamber with a ground plane at a distance of 10 m*.

* Measuring distance (below 1 GHz)

The boundary of the EUT is defined by an imaginary circular periphery.

The measuring antenna height was varied between 1 m 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 radiated emission measurements were made with the following detector function.

Detector Type	QP
IF Bandwidth	120 kHz

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

	EUT Axis	Antenna: ITS-HAN10R	Antenna: ITS-HAN60S
Horizontal	Z-axis	X-axis	X-axis
Vertical	X-axis	X-axis	X-axis

6 . 4 Results

Summary of the test results: Pass

Figure 2. Antenna angle

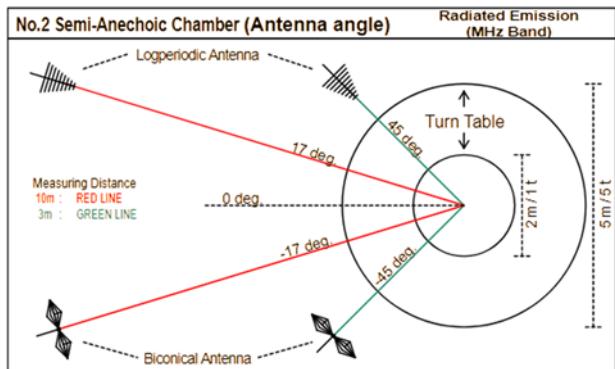
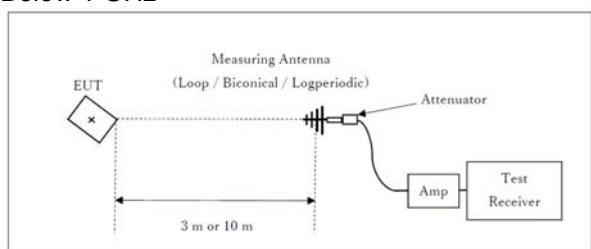


Figure 3. Test Setup

Below 1 GHz



Test Distance: 10 m

* : Center of turn table

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2023/12/26

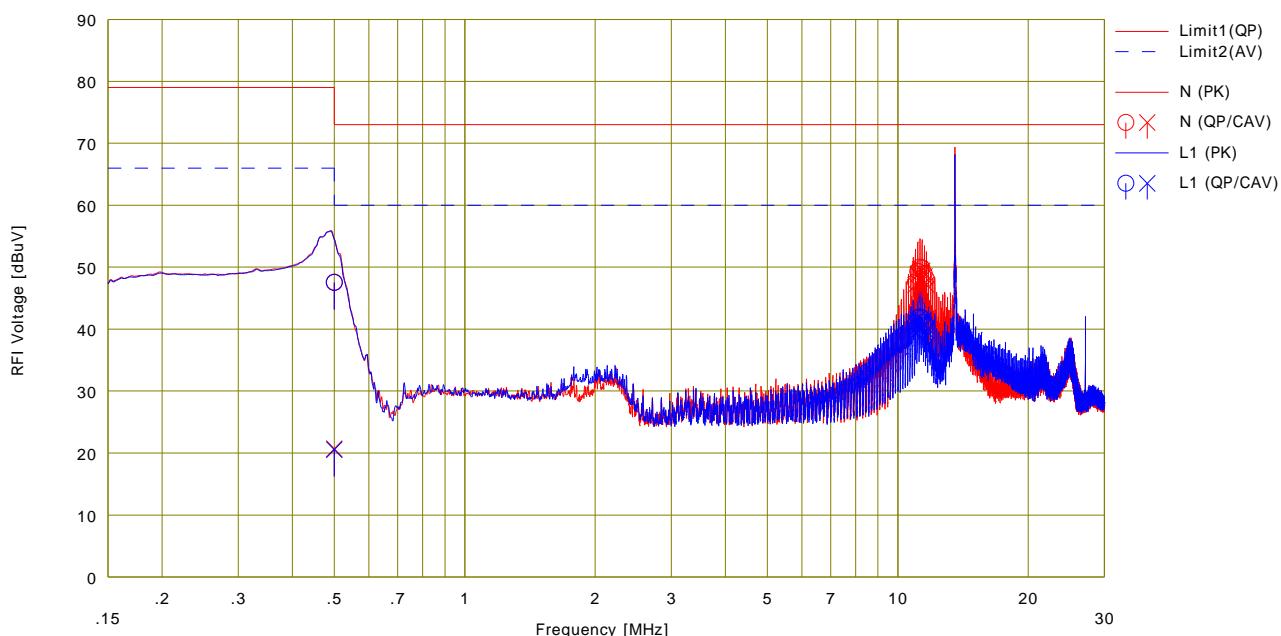
Company : NITTOKU ENGINEERING CO., LTD.
 Kind of EUT : HF Band Intelligent Reader/Writer
 Model No. : ITS-HRW110
 Serial No. : 2000000289
 Remarks : With Tag: ISO15693 Tag 1, Antenna : ITS-HAN10R

Mode : Operation mode
 Order No. : 15106472
 Power : DC 12 V (AC 120 V / 60 Hz)
 Temp./Humi. : 21 deg.C / 24 %RH

Limit : FCC_Part 15 Subpart B(15.107)_Class A

Engineer : Naoki Saga

※ 13.56 MHz is NFC Carrier and 27.12 MHz is Second harmonic of NFC Carrier.



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<CAV>		<QP>	<CAV>	<QP>	<AV>	<QP>	<AV>		
		[MHz]	[dBuV]		[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.50000	35.10	8.26	12.46	47.56	20.72	73.00	60.00	25.4	39.2	N	
2	10.98779	34.56	34.07	13.06	47.62	47.13	73.00	60.00	25.3	12.8	N	
3	11.11825	36.27	35.76	13.07	49.34	48.83	73.00	60.00	23.6	11.1	N	
4	11.25101	36.95	36.55	13.08	50.03	49.63	73.00	60.00	22.9	10.3	N	
5	11.38377	36.79	36.39	13.08	49.87	49.47	73.00	60.00	23.1	10.5	N	
6	11.51649	35.88	35.44	13.09	48.97	48.53	73.00	60.00	24.0	11.4	N	
7	11.64925	35.02	34.09	13.09	48.11	47.18	73.00	60.00	24.8	12.8	N	
8	0.50000	35.04	8.06	12.47	47.51	20.53	73.00	60.00	25.4	39.4	L1	
9	10.98778	27.92	26.29	13.10	41.02	39.39	73.00	60.00	31.9	20.6	L1	
10	11.11828	28.72	27.38	13.11	41.83	40.49	73.00	60.00	31.1	19.5	L1	
11	11.25100	28.82	28.14	13.12	41.94	41.26	73.00	60.00	31.0	18.7	L1	
12	11.38378	28.66	28.17	13.13	41.79	41.30	73.00	60.00	31.2	18.7	L1	
13	11.51652	27.98	27.52	13.13	41.11	40.65	73.00	60.00	31.8	19.3	L1	
14	11.64925	27.48	26.56	13.14	40.62	39.70	73.00	60.00	32.3	20.3	L1	

Calculation: Result[dBuV] = Reading[dBuV] + C.Fac(LISN(AMN) + Cable + ATT)[dB]
 LISN(AMN): 145540

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2024/03/01

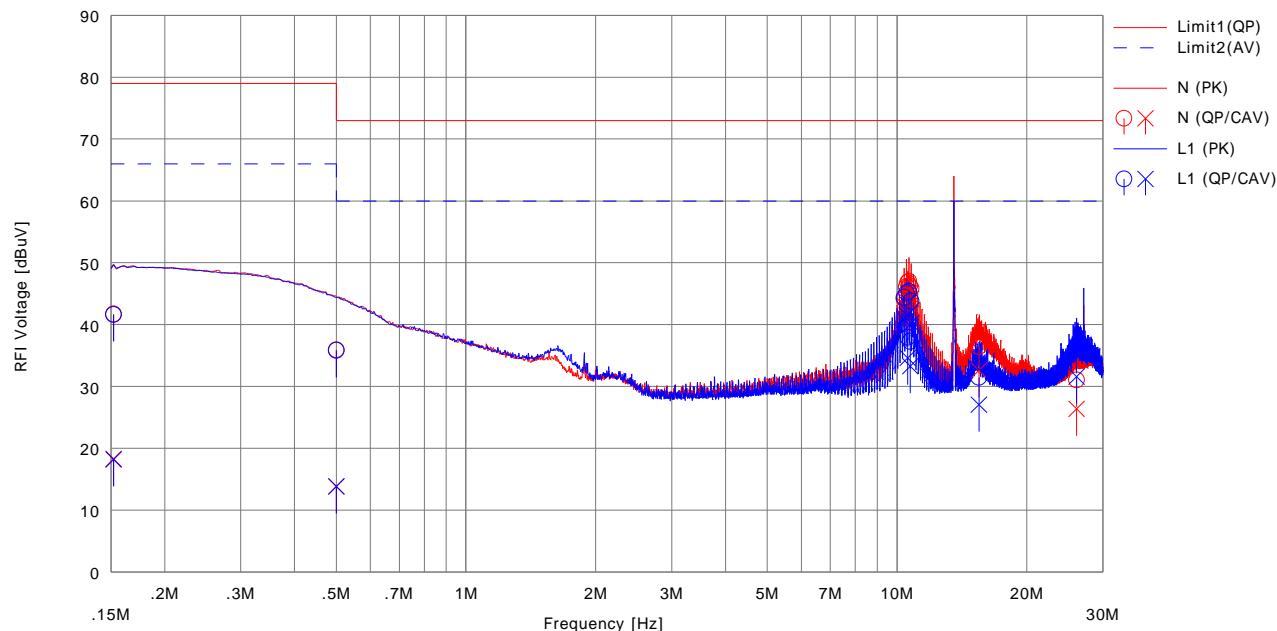
Company : NITTOKU ENGINEERING CO., LTD.
Kind of EUT : HF Band Intelligent Reader/Writer
Model No. : ITS-HRW110
Serial No. : 2000000289
Remarks : With Tag: ISO15693 Tag 1, Antenna : ITS-HAN60S

Mode : Operation mode
Order No. : 15106472
Power : DC 12 V (AC 120 V / 60 Hz)
Temp./Humi. : 23 deg.C / 33 %RH

Limit : FCC_Part 15 Subpart B(15.107)_Class A

Engineer : Yusuke Tanikawara

※ 13.56 MHz is NFC Carrier and 27.12 MHz is Second harmonic of NFC Carrier



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<CAV>		<QP>	<CAV>	<QP>	<AV>	<QP>	<AV>		
		[MHz]	[dBuV]		[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15225	26.20	2.79	15.50	41.70	18.29	79.00	66.00	37.3	47.7	N	
2	0.50014	20.37	-1.70	15.55	35.92	13.85	73.00	60.00	37.0	46.1	N	
3	10.39073	27.88	26.79	16.28	44.16	43.07	73.00	60.00	28.8	16.9	N	
4	10.52059	29.83	28.35	16.29	46.12	44.64	73.00	60.00	26.8	15.3	N	
5	10.58441	30.51	27.28	16.30	46.81	43.58	73.00	60.00	26.1	16.4	N	
6	10.64948	30.73	28.73	16.30	47.03	45.03	73.00	60.00	25.9	14.9	N	
7	10.71410	29.99	26.86	16.30	46.29	43.16	73.00	60.00	26.7	16.8	N	
8	10.77910	29.60	27.81	16.31	45.91	44.12	73.00	60.00	27.0	15.8	N	
9	15.48761	19.86	16.03	16.58	36.44	32.61	73.00	60.00	36.5	27.3	N	
10	26.11894	13.78	9.11	17.27	31.05	26.38	73.00	60.00	41.9	33.6	N	
11	0.15225	26.12	2.70	15.50	41.62	18.20	79.00	66.00	37.3	47.8	L1	
12	0.50014	20.31	-1.67	15.52	35.83	13.85	73.00	60.00	37.1	46.1	L1	
13	10.39408	28.27	24.69	16.14	44.41	40.83	73.00	60.00	28.5	19.1	L1	
14	10.52568	28.97	25.36	16.16	45.13	41.52	73.00	60.00	27.8	18.4	L1	
15	10.58954	21.78	18.49	16.16	37.94	34.65	73.00	60.00	35.0	25.3	L1	
16	10.65464	29.21	25.64	16.16	45.37	41.80	73.00	60.00	27.6	18.2	L1	
17	10.72101	21.14	17.10	16.16	37.30	33.26	73.00	60.00	35.7	26.7	L1	
18	10.78518	27.61	24.01	16.17	43.78	40.18	73.00	60.00	29.2	19.8	L1	
19	15.48489	15.12	10.70	16.37	31.49	27.07	73.00	60.00	41.5	32.9	L1	
20	26.11894	19.52	14.68	16.96	36.48	31.64	73.00	60.00	36.5	28.3	L1	

DATA OF CONDUCTED EMISSION TEST

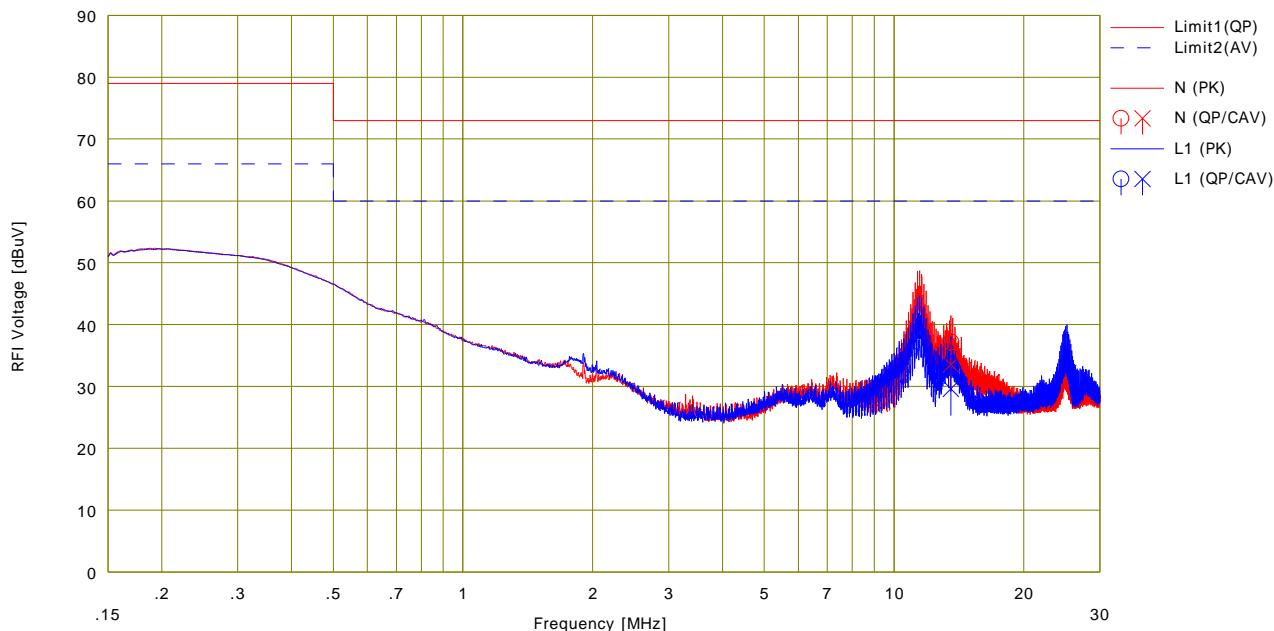
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2023/12/26

Company : NITTOKU ENGINEERING CO., LTD.
Kind of EUT : HF Band Intelligent Reader/Writer
Model No. : ITS-HRW110
Serial No. : 2000000289
Remarks : Antenna terminated

Mode : Operation mode
Order No. : 15106472
Power : DC 12 V (AC 120 V / 60 Hz)
Temp./Humi. : 21 deg.C / 24 %RH

Limit : FCC_Part 15 Subpart B(15.107)_Class A

Engineer : Naoki Saga



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<CAV> [dBuV]		<QP> [dBuV]	<CAV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	13.56000	24.02	20.37	13.16	37.18	33.53	73.00	60.00	35.8	26.4	N	
2	13.56000	20.30	16.41	13.22	33.52	29.63	73.00	60.00	39.4	30.3	L1	

DATA OF RADIATED EMISSION TEST

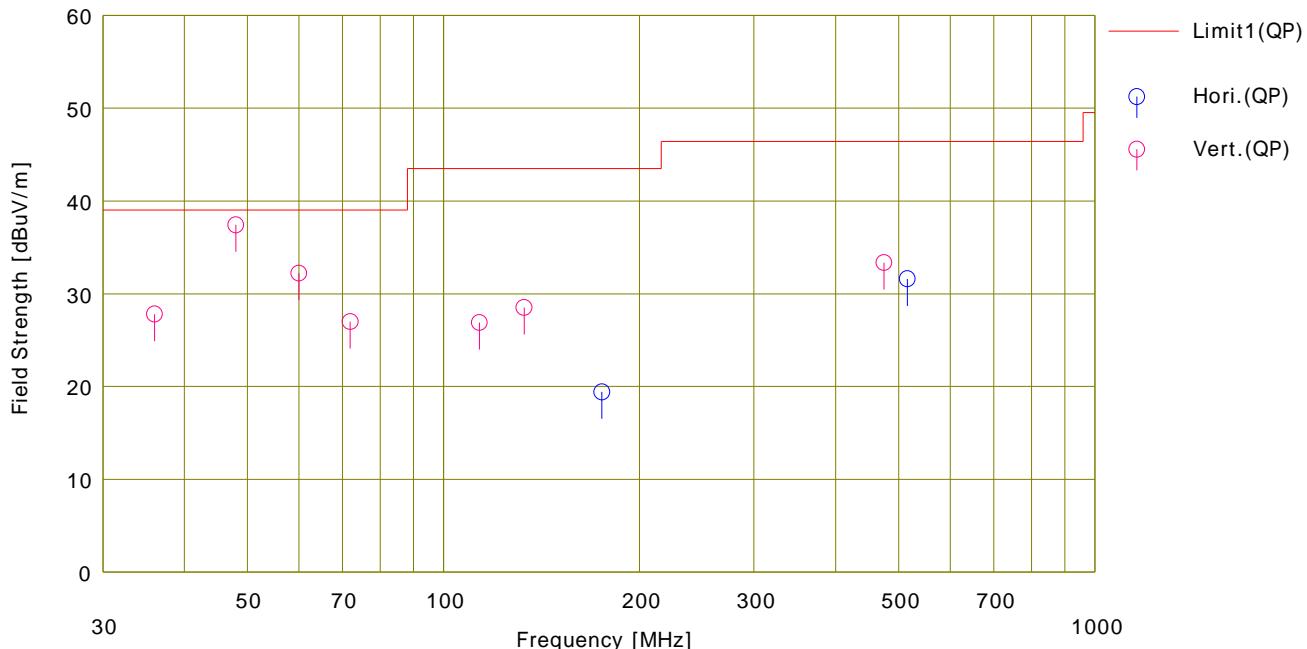
UL Japan, Inc. Shonan EMC Lab. No.2 Semi-Anechoic Chamber
Date : 2023/12/20

Company : NITTOKU ENGINEERING CO., LTD.
Kind of EUT : HF Band Intelligent Reader/Writer
Model No. : ITS-HRW110
Serial No. : 2000000289
Remarks : EUT Axis : Z,X, Antenna Axis : X,X, With Tag : ISO15693 Tag 1, Antenna : ITS-HAN10R

Mode : Operation mode
Order No. : 15106472
Power : DC 12 V
Temp./Humi. : 20 deg.C / 28 %RH

Limit : FCC_Part 15 Subpart B(15.109)_Class A

Engineer : Kouki Yamada



No.	Freq. [MHz]	Reading <QP>		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [dB]	Result <QP>	Limit <QP>	Margin [dB]	Pola.	Height [cm]	Angle [deg]	Ant. Type	Comment
		Reading [dBuV]	Ant.Fac [dB/m]												
1	175.123	26.53	15.84	8.82	31.78	0.00	19.41	43.50	24.0	Hori.	400	323	BC		
2	515.276	37.40	17.74	8.05	31.60	0.00	31.59	46.40	14.8	Hori.	242	322	LP		
3	36.009	36.40	16.31	7.07	31.90	-0.08	27.80	39.00	11.2	Vert.	100	12	BC		
4	47.997	50.20	11.87	7.27	31.90	-0.03	37.41	39.00	1.5	Vert.	100	135	BC		
5	60.031	48.90	8.11	7.45	31.89	-0.37	32.20	39.00	6.8	Vert.	194	107	BC		
6	71.959	45.00	6.35	7.62	31.88	-0.10	26.99	39.00	12.0	Vert.	178	71	BC		
7	113.629	38.40	12.36	8.16	31.85	-0.17	26.90	43.50	16.6	Vert.	100	136	BC		
8	132.980	38.00	14.04	8.38	31.83	-0.09	28.50	43.50	15.0	Vert.	100	156	BC		
9	474.594	40.00	17.12	7.83	31.60	0.00	33.35	46.40	13.0	Vert.	100	40	LP		

Calculation:Result[dBuV/m] = Reading[dBuV] + Ant.Fac[dB/m] + Loss(Cable+ATT)[dB] - Gain(AMP)[dB] + S.Fac(AF)[dB]
Ant.Type=BC:Biconical Antenna LP:Logperiodic Antenna **SH*: Horn Antenna

DATA OF RADIATED EMISSION TEST

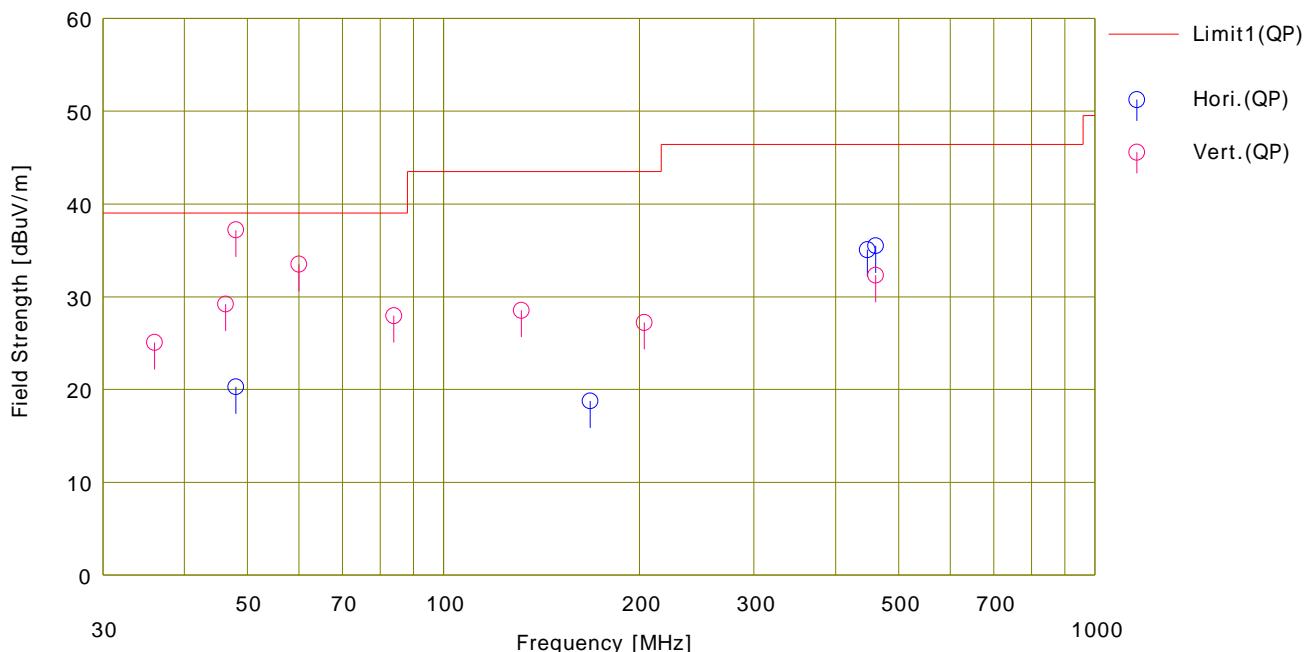
UL Japan, Inc. Shonan EMC Lab. No.2 Semi-Anechoic Chamber
Date : 2024/02/29

Company : NITTOKU ENGINEERING CO., LTD.
Kind of EUT : HF Band Intelligent Reader/Writer
Model No. : ITS-HRW110
Serial No. : 2000000289
Remarks : EUT Axis : Z,X, Antenna Axis : X,X, With Tag : ISO15693 Tag 1, Antenna : ITS-HAN60S

Mode : Operation mode
Order No. : 15106472
Power : DC 12 V
Temp./Humi. : 23 deg.C / 30 %RH

Limit : FCC_Part 15 Subpart B(15.109)_Class A

Engineer : Yusuke Tanikawara



No.	Freq. [MHz]	Reading <QP>		Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [dB]	Result <QP>	Limit <QP>	Margin <QP>	Pola.	Height [cm]	Angle [deg]	Ant. Type	Comment
		Freq. [MHz]	Reading [dBuV]												
1	48.022	33.10	11.86	7.29	31.93	-0.03	20.29	39.00	18.7	Hori.	400	177	BC		
2	168.034	26.20	15.56	8.77	31.84	0.08	18.77	43.50	24.7	Hori.	400	13	BC		
3	447.486	42.40	16.66	7.68	31.68	0.00	35.06	46.40	11.3	Hori.	298	182	LP		
4	461.039	42.50	16.92	7.76	31.68	0.00	35.50	46.40	10.9	Hori.	285	233	LP		
5	36.027	33.70	16.30	7.08	31.94	-0.08	25.06	39.00	13.9	Vert.	100	354	BC		
6	46.300	41.40	12.49	7.26	31.93	-0.02	29.20	39.00	9.8	Vert.	284	85	BC		
7	48.014	50.00	11.87	7.29	31.93	-0.03	37.20	39.00	1.8	Vert.	100	121	BC		
8	60.002	50.20	8.12	7.46	31.92	-0.37	33.49	39.00	5.5	Vert.	100	89	BC		
9	84.007	44.60	7.02	7.80	31.91	0.44	27.95	39.00	11.0	Vert.	159	79	BC		
10	131.686	38.20	13.94	8.37	31.87	-0.11	28.53	43.50	14.9	Vert.	100	213	BC		
11	203.402	43.30	9.93	5.80	31.81	0.00	27.22	43.50	16.2	Vert.	100	27	LP		
12	461.041	39.30	16.92	7.76	31.68	0.00	32.30	46.40	14.1	Vert.	100	353	LP		

Calculation:Result[dBuV/m] = Reading[dBuV] + Ant.Fac[dB/m] + Loss(Cable+ATT)[dB] - Gain(AMP)[dB] + S.Fac(AF)[dB]
Ant.Type=BC:Biconical Antenna LP:Logperiodic Antenna **SH*: Horn Antenna

APPENDIX 2

Test Instruments

EMI test equipment

Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
CE	144896	Attenuator	JFW IND. INC.	50HF-003N	-	2023/07/11	12
CE	144969	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-270(RF Selector)	2023/04/18	12
CE	145540	LISN	Rohde & Schwarz	ENV216	100513	2024/02/06	12
CE	145541	LISN	Rohde & Schwarz	ENV216	100514	2024/02/06	12
CE	145746	Terminator	TME	CT-01 BP	-	2023/12/08	12
CE	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2023/08/25	12
CE	191839	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/01	12
CE	199781	Attenuator	JFW	50HF-006N	-	2023/06/14	12
CE	213530	Test Receiver	Rohde & Schwarz	ESW44	103068	2024/02/22	12
CE,RE	145793	Digital Hitemeter	HIOKI E.E. CORPORATION	3805-50	80997819	2023/05/26	12
CE,RE	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
CE,RE	207277	Measuring	ASKUL	-	-	-	-
RE	144975	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	2023/04/18	12
RE	144976	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	2023/04/18	12
RE	145004	Pre Amplifier	SONOMA	310N	290212	2024/02/13	12
RE	145022	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032665	2023/04/12	12
RE	145563	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	2023/03/28	12
RE	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2023/04/22	12
RE	150921	Attenuator	JFW	50HF-003N	-	2024/02/13	12
RE	167095	Attenuator	JFW	50HF-006N	-	2024/02/13	12
RE	191838	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/03	12
RE	236418	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VULP 9118 B	00975	2023/07/11	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