



EMI TEST REPORT

Test Report No.: 13801638S-B-R3

Applicant : NITTOKU CO.,LTD
Type of EUT : HF-Band RFID READER/WRITER
Model Number of EUT : ITS-HRW110
FCC ID : 2A29TITSHRW110S2109
Test regulation : FCC Part 15 Subpart B: 2021, Class A
Test result : Complied (Refer to Section 3)

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3. This sample tested is in compliance with the limits of the above regulation.
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8. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
9. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
10. The information provided from the customer for this report is identified in Section 1.
11. This report is a revised version of 13801638S-B-R2. 13801638S-B-R2 is replaced with this report.

Date of test: September 23 to 24, 2021

Representative test engineer:

S. Terasawa

Shuma Terasawa
Engineer

Approved by:

K. Noda

Kazuya Noda
Leader



CERTIFICATE 1266.03

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

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REVISION HISTORY

Original Test Report No.: 13801638S-B

Revision	Test report No.	Date	Page revised	Contents						
- (Original)	13801638S-B	October 5, 2021	-	-						
1	13801638S-B-R1	October 14, 2021	1, 5, 9, 16-17	Modification of Type of EUT: From "HF Band Intelligent Reader/Writer" To "HF-Band RFID READER/WRITER"						
			1, 5, 16-17	Update of Applicant / Company Name: From "NITTOKU ENGINEERING CO., LTD." to "NITTOKU CO.,LTD"						
			19	Reduction of page Appendix 4: Signature of an official of the responsible party						
2	13801638S-B-R2	October 15, 2021	5	Update of Telephone Number, Facsimile Number: <table border="1"><tr><td>From</td><td>To</td></tr><tr><td>+81-48-844-1287</td><td>+81-48-615-2117</td></tr><tr><td>+81-48-837-2061</td><td>+81-48-615-2118</td></tr></table>	From	To	+81-48-844-1287	+81-48-615-2117	+81-48-837-2061	+81-48-615-2118
From	To									
+81-48-844-1287	+81-48-615-2117									
+81-48-837-2061	+81-48-615-2118									
3	13801638S-B-R3	October 19, 2021	1-15	Addition of "FCC ID: 2A29TITSHRW110S2109"						
			8	Correction of errors in Numbers in Figures (Cable No. "1")						

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Reference: Abbreviations (Including words undescribed in this report)

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

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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
Facsimile Number : +81-48-615-2118
Contact Person : Akitomo Kiriyama

The information provided from the customer is as follows:

- Applicant, Type of Equipment, Model No. 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 (E.U.T.) other than the Receipt Date of Sample
- Section 4: Operation of E.U.T. during testing

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

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

2 . 1 Identification of E.U.T.

Type of Equipment : HF-Band RFID READER/WRITER
Model No. : ITS-HRW110
Serial No. : Refer to Section 4.2
Rating : DC 12 V, 0.2 A
Receipt Date of Sample : September 17, 2021
Country of Mass-production : Japan
Condition of EUT : Production model
Modification of EUT : No Modification by the test lab.

2 . 2 Product description

Model: ITS-HRW110 (referred to as the EUT in this report) is a HF-Band RFID READER/WRITER.

General Specification

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

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Section 3 : Test specification, procedures and results

3 . 1 Test specification

Test Specification : FCC Part 15 Subpart B
 FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021
 Title : FCC 47CFR Part15 Radio Frequency Device
 Subpart B Unintentional Radiators

3 . 2 Procedures & results

Item	Test procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4:2014+C 63.4a :2017 7. AC powerline conducted emission measurements	Class A	N/A	35.3 dB Freq.: 26.00052 MHz Detector: Average Phase: N	Complied a)
Radiated emission	ANSI C63.4:2014+C 63.4a :2017 8. Radiated emission measurements	Class A	N/A *1)	7.2 dB Freq.: 72.000 MHz Detector: Quasi-Peak Polarization: Vertical	Complied b)
Note: UL Japan's EMI work procedure No. 13-EM-W0420					
*1) Measurements have been performed up to 1 GHz since the highest frequency of internal source of the EUT is less than 108 MHz.					
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.					

a) Refer to Appendix 2 (data of Conducted emission)
 b) Refer to Appendix 2 (data of Radiated emission)

3 . 3 Deviation from standard

No addition, exclusion nor deviation has been made from the standard.

3 . 4 Confirmation

**UL Japan, Inc. hereby confirms that E.U.T., in the configuration tested, complies with the specifications
FCC Part 15 Subpart B: 2021, Class A.**

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3.5 Uncertainty

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

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.

Item	Frequency range	No.1 SAC ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) AMN/LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.7 dB
Radiated emission (Measurement distance: 10 m)	30 MHz-200 MHz	4.5 dB	4.5 dB	-
	200 MHz-1 GHz	4.6 dB	4.6 dB	-

*1: SAC=Semi-Anechoic Chamber

*2: SR= Shielded Room is applied besides radiated emission

3.6 Test location

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A2LA Certificate Number: 1266.03

(FCC Test Firm Registration Number: 839876, ISED Lab Company Number: 2973D)

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10 m	No.1 Shielded room	6.8 x 4.1 x 2.7
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10 m	No.2 Shielded room	6.8 x 4.1 x 2.7
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35 Maximum measurement distance: 5 m	No.3 Shielded room	6.3 x 4.7 x 2.7
No.4 Semi-anechoic chamber	8.1 x 5.1 x 3.55	No.4 Shielded room	4.4 x 4.7 x 2.7
		No.5 Shielded room	7.8 x 6.4 x 2.7
		No.6 Shielded room	7.8 x 6.4 x 2.7
		No.7 Shielded room	2.76 x 3.76 x 2.4
		No.8 Shielded room	3.45 x 5.5 x 2.4
		No.1 Measurement room	2.55 x 4.1 x 2.5

3.7 Test setup, Data of EMC & Test instruments

Refer to Appendix 1 to 3.

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Section 4 : Operation of E.U.T. 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.

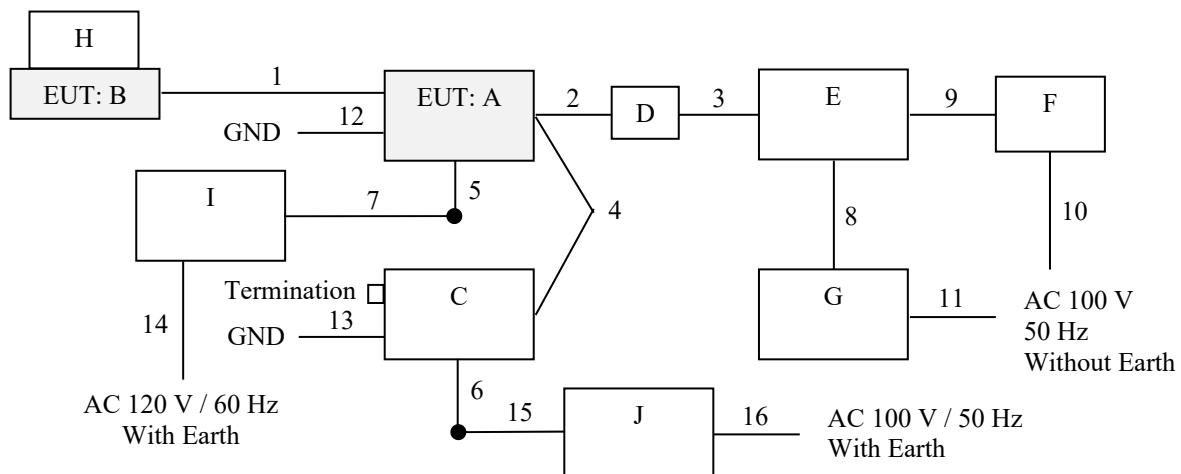
Test sequence is used : Operation mode

Software : MONITORING Version 1.27

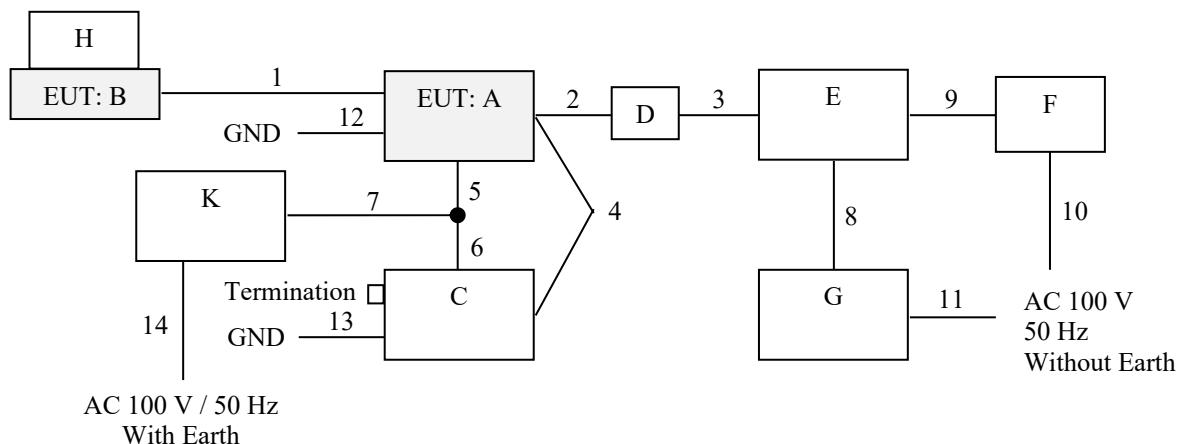
Justification: The system was configured in a typical fashion, as a customer would normally use it, for testing.

4.2 Configuration and peripherals

<Conducted emission>



<Radiated emission>



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

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	HF-Band RFID READER/WRITER	ITS-HRW110	1018200017	NITTOKU	EUT
B	Antenna	ITS-HAN10R	H217-2N001	NITTOKU	EUT
C	HF-Band RFID READER/WRITER	ITS-HRW110	1018200029	NITTOKU	-
D	USB to Serial Adaptor	UPort 1130I	309304 7000021	MOXA	-
E	Laptop Computer	ThinkPad L580	PF-1PMM0X	LENOVO	-
F	AC Adapter	ADLX45YLC2A	8SSA10E75842L1CZ9 480J61	LENOVO	-
G	Switching HUB	EHC-G05MN-HJW	6AL829502975A	ELECOM	-
H	Tag	ITS-HTG21F52K	E00801424E53A77F	NITTOKU	-
I	DC Power Supply	PAN35-10A	DE001677	KIKUSUI	-
J	DC Power Supply	PAN60-10A	NL002383	KIKUSUI	-
K	DC Power Supply	PAN35-10A	NA000955	KIKUSUI	-

List of cable used

No.	Item	Length (m)	Shield	Remark
1	Antenna	2.0	Shielded	-
2	Signal	0.6	Unshielded	-
3	USB	0.8	Shielded	-
4	Signal	0.3	Unshielded	-
5	DC	0.5	Unshielded	-
6	DC	0.3	Unshielded	-
7	DC	2.0	Unshielded	-
8	LAN	3.0	Unshielded	-
9	DC	1.8	Unshielded	-
10	AC	0.9	Unshielded	-
11	AC	1.0	Unshielded	-
12	Earth	1.0	Unshielded	-
13	Earth	2.0	Unshielded	-
14	AC	2.0	Unshielded	-
15	DC	2.0	Unshielded	-
16	AC	2.0	Unshielded	-

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Section 5: Conducted emission

5.1 Operating environment

Test room : Refer to data
 Temperature : Refer to data
 Humidity : Refer to data

5.2 Test configuration

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 0.3 m to 0.4 m long. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through an 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 set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 MHz - 30 MHz
 EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in shielded room.

The EUT was connected to a LISN. 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).

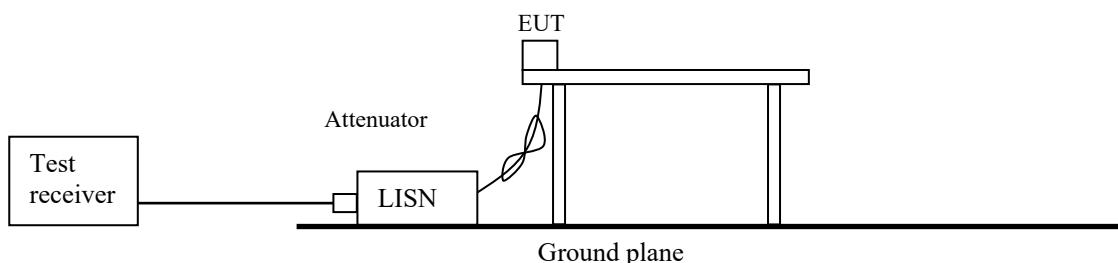
The conducted emission measurements were made with the following detector function of the test receiver.

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

5.5 Results

Summary of the test results : Pass

Figure 1. Test setup



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Section 6 : Radiated emission

6.1 Operating environment

Test room : Refer to data
Temperature : Refer to data
Humidity : Refer to data

6.2 Test configuration

The EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol 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 set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 30 MHz – 1000 MHz
EUT position : Table top

6.4 Test procedure

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

* Measuring distance

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. Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

30 MHz -1000 MHz (Test receiver)

Detector Type : QP
IF Band width : 120 kHz

6.5 Results

Summary of the test results : Pass

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Figure 2. Antenna angle

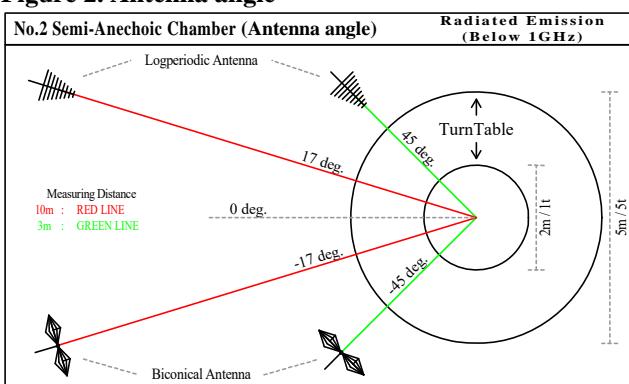
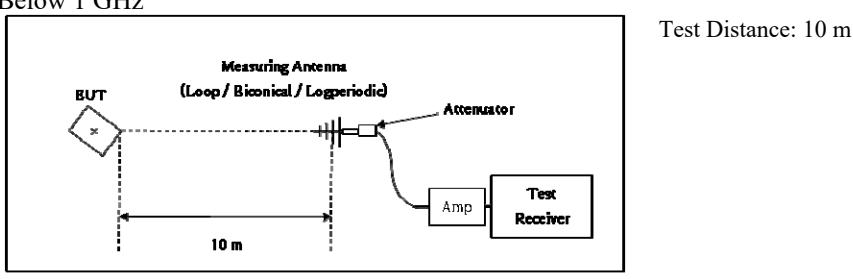


Figure 3. Test setup

Below 1 GHz



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