

RADIO PERFORMANCE TEST REPORT

Test Report No. : OT-24O-RWD-021

Reception No. : 2409003267

Applicant : gninth Co. Ltd.

Address : 2120, 122, Jomaru-ro 385beon-gil, Wonmi-gu, Bucheon-si, Gyeonggi-do, South Korea

Manufacturer : gninth Co. Ltd.

Address : 2120, 122, Jomaru-ro 385beon-gil, Wonmi-gu, Bucheon-si, Gyeonggi-do, South Korea

Type of Equipment : SMART DOORLOCK

FCC ID : 2BLBY-DELOCK-R20

Model Name : DELOCK-R20

Multiple Model Name : DELOCK-R10, DELOCK-R101, DELOCK-R201

Serial number : N/A

Total page of Report : 20 pages (including this page)

Date of Incoming : September 09, 2024

Date of Issuing : October 08, 2024

SUMMARY

The equipment complies with the requirements of **FCC CFR 47 PART 15 SUBPART C Section 15.225**

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.

한동연



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CONTENTS

Page

1. VERIFICATION OF COMPLIANCE	5
2. GENERAL INFORMATION	6
2.1 TEST ITEMS AND RESULTS	6
2.2 PRODUCT DESCRIPTION.....	6
2.3 MODEL DIFFERENCES.....	6
2.4 RELATED SUBMITTAL(S) / GRANT(S)	7
2.5 PURPOSE OF THE TEST	7
2.6 TEST METHODOLOGY.....	7
2.7 TEST FACILITY.....	8
3. SYSTEM TEST CONFIGURATION	9
3.1 JUSTIFICATION.....	9
3.2 PERIPHERAL EQUIPMENT	9
3.3 MODE OF OPERATION DURING THE TEST	9
3.4 EQUIPMENT MODIFICATIONS.....	9
3.5 CONFIGURATION OF TEST SYSTEM.....	10
3.6 ANTENNA REQUIREMENT	10
4. PRELIMINARY TEST	10
4.1 AC POWER LINE CONDUCTED EMISSIONS TESTS.....	10
4.2 RADIATED EMISSIONS TESTS.....	10
5. FINAL RESULT OF MEASUREMENT.....	11
5.1 RADIATED EMISSION TEST.....	11
5.1.1 Operation frequency band: (13.553 ~ 13.567) MHz.....	11
5.1.2 Operation frequency band: Below 13.553 MHz and above 13.567 MHz.....	12
5.2 SPURIOUS EMISSION TEST.....	13
5.2.1 Spurious Radiated Emission Below 30 MHz	13
5.2.2 Spurious Radiated Emission below 1 GHz.....	14
5.3 20 dB BANDWIDTH	15
5.3.1 Operating environment.....	15
5.3.2 Test set-up	15
5.3.3 Test date	15
5.3.4 Test data	16

5.4 FREQUENCY STABILITY WITH TEMPERATURE VARIATION.....	17
5.4.1 <i>Operating environment</i>	17
5.4.2 <i>Test set-up</i>	17
5.4.3 <i>Test date</i>	17
5.4.4 <i>Test data</i>	17
5.5 FREQUENCY STABILITY WITH VOLTAGE VARIATION.....	18
5.5.1 <i>Operating environment</i>	18
5.5.2 <i>Test set-up</i>	18
5.5.3 <i>Test date</i>	18
5.5.4 <i>Test data</i>	18
6. FIELD STRENGTH CALCULATION	19
7. LIST OF TEST EQUIPMENT	20

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-24O-RWD-021	October 08, 2024	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : gninth Co. Ltd.

Address : 2120, 122, Jomaru-ro 385beon-gil, Wonmi-gu, Bucheon-si, Gyeonggi-do, South Korea

Contact Person : Lee Ho Sub / Manager

Telephone No. : +82-10-2325-9990

FCC ID : 2BLBY-DELOCK-R20

Model Name : DELOCK-R20

Brand Name : -

Serial Number : N/A

Date : October 08, 2024

DEVICE TYPE	DXX – Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	SMART DOORLOCK
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC CFR47 Part 15 Subpart C Section 15.225
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	3 m Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.225 (a) (b) (c)	Field Strength of Fundamental Emissions	Met the Limit / PASS
15.225 (d) & 15.209	Radiated Emission Limits	Met the Limit / PASS
2.1049	20 dB Bandwidth	Met the Limit / PASS
15.225(e)	FREQUENCY STABILITY WITH TEMPERATURE VARIATION / FREQUENCY STABILITY WITH VOLTAGE VARIATION	Met the Limit / PASS
15.207	Conducted Limits	N/A (See Note)
15.203	Antenna Requirement	Met requirement / PASS

Note: As this product is only using DC power, AC conducted emission test has not been performed.

2.2 Product Description

The g ninth Co. Ltd., Model DELOCK-R20 (referred to as the EUT in this report) is a SMART DOORLOCK. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	SMART DOORLOCK
OPERATING FREQUENCY	13.56 MHz
MODULATION TYPE	ASK
ANTENNA TYPE	PCB Antenna
POWER REQUIREMENT	DC 6.0 V
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	26 MHz, 27.12 MHz

2.3 Model Differences

-. The following lists consist of the added model and their differences.

Model Name	Differences	Tested
DELOCK-R20	Basic Model	☒
DELOCK-R10, DELOCK-R101, DELOCK-R201	The model is identical to basic model except for the model name only.	☐

Note: 1. Applicant consigns only basic model to test. Therefore this test report just guarantees the units, which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

2.4 Related Submittal(s) / Grant(s)

Original submittal only

2.5 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.225.

2.6 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013.

Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.7 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-20122/ C-14617/ G-10666/ T-11842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	gninth Co. Ltd.	DELOCK-R-MAIN_V1.0	N/A
Antenna Board	N/A	N/A	N/A

3.2 Peripheral equipment

-. None

3.3 Mode of operation during the test

-. The EUT has 13.56 MHz RF board and program was used for making continuous transmission mode during the test.

3.4 Equipment Modifications

-. None

3.5 Configuration of Test System

Line Conducted Test: -

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. The radiated emissions measurements were performed on the 10 m Semi Anechoic Chamber.

For frequencies from 150 kHz to 30 MHz measurements were made of the magnetic H field. The measuring antenna is an electrically screened loop antenna.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and maximum emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

3.6 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The transmitter antenna of the EUT is a PCB Antenna so there is no consideration of replacement by the user.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emissions Tests

As this product is only using DC power, AC conducted emission test has not been performed.

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

5. FINAL RESULT OF MEASUREMENT

5.1 RADIATED EMISSION TEST

5.1.1 Operation frequency band: (13.553 ~ 13.567) MHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 56 % R.H. Temperature: 23 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225
Type of Test : Low Power Communication Device Transmitter
Result : PASSED

EUT : SMART DOORLOCK Date: September 10, 2024 ~ September 23, 2024
Operating Condition : Transmitting Mode
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)
Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Ant. Factor (dB/m)	Cable Loss	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
13.56	14.41	H	1	19.6	0.87	34.88	124	89.12
13.56	12.1	V	1	19.6	0.87	32.57	124	91.43

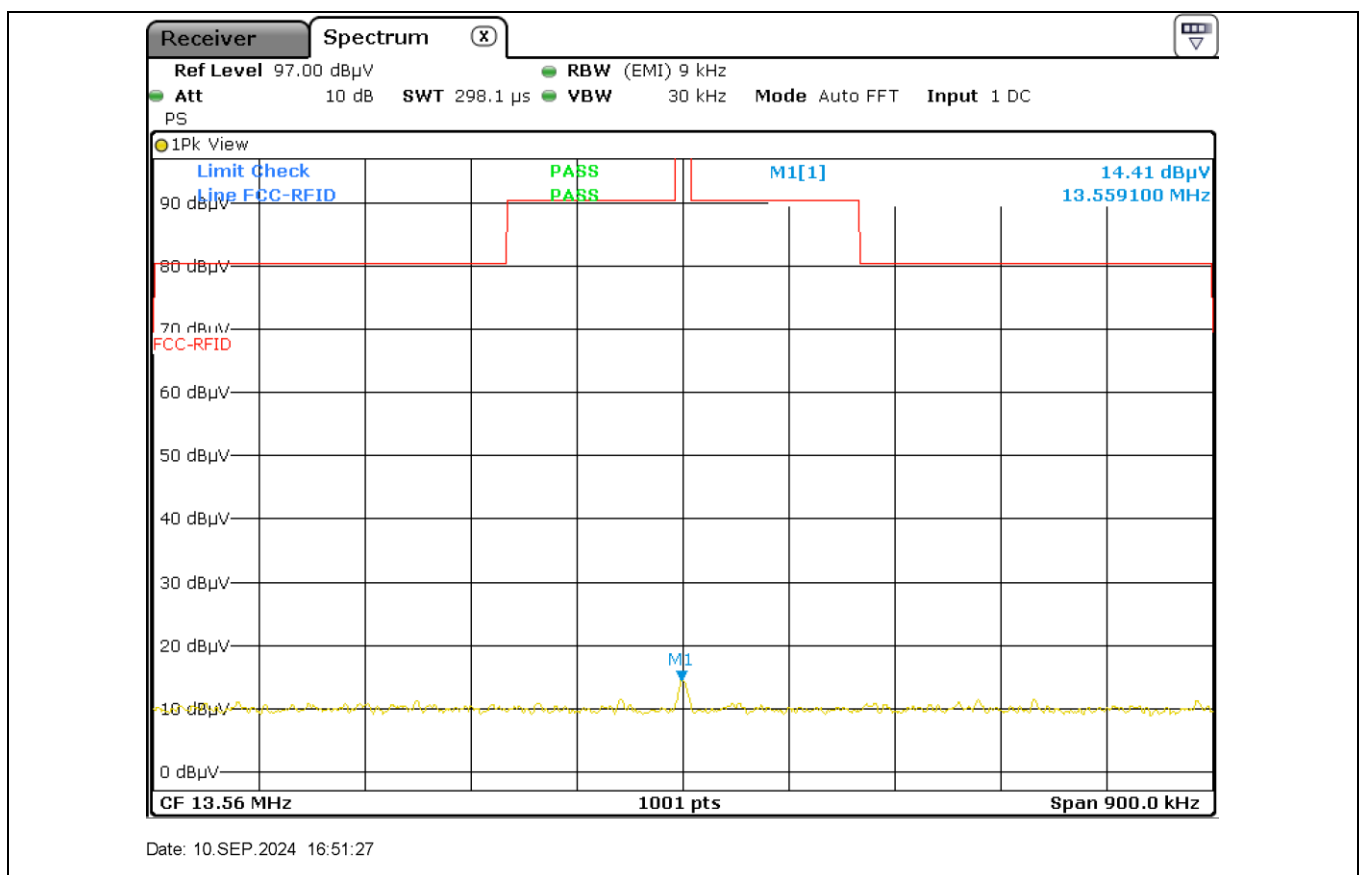
Remark. The EUT was tested at 3 m, so conversation factor was included at above limit.

5.1.2 Operation frequency band: Below 13.553 MHz and above 13.567 MHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 56 % R.H. Temperature: 23 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225
 Type of Test : Low Power Communication Device Transmitter
 Result : PASSED

EUT : SMART DOORLOCK Date: September 10, 2024 ~ September 23, 2024
 Operating Condition : Transmitting Mode



cc. to above test data, the field strength level of 13.56 MHz is 14.41 dBuV/m and the worst limit subject to 15.225 (b) and (c) is 80.5 dBuV/m, so the EUT meets the requirement.

5.2 SPURIOUS EMISSION TEST

5.2.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 56 % R.H. Temperature: 23 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209
Type of Test : Low Power Communication Device Transmitter
Frequency Range : 9 kHz ~ 30 MHz
Result : PASSED

EUT : SMART DOORLOCK Date: September 10, 2024 ~ September 23, 2024
Operating Condition : Transmitting Mode
Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									

5.2.2 Spurious Radiated Emission below 1 GHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 56 % R.H. Temperature: 23 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209
 Type of Test : Low Power Communication Device Transmitter
 Result : PASSED

EUT : SMART DOORLOCK Date: September 10, 2024 ~ September 23, 2024
 Operating Condition : Transmitting Mode
 Distance : 3 m



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	QP	FACTOR	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	81.410	30.6	13.1	1.2	33.0	11.9	40.0	28.1	100	359
2	183.260	29.2	16.3	1.7	33.0	14.2	43.5	29.3	300	359
3	786.592	31.1	26.7	3.6	33.1	28.3	46.0	17.7	100	359
----- Vertical -----										
4	82.380	31.2	13.2	1.2	33.0	12.6	40.0	27.4	400	359
5	179.380	29.7	16.5	1.7	33.0	14.9	43.5	28.6	100	123
6	984.466	26.6	28.3	4.1	31.5	27.5	54.0	26.5	100	0

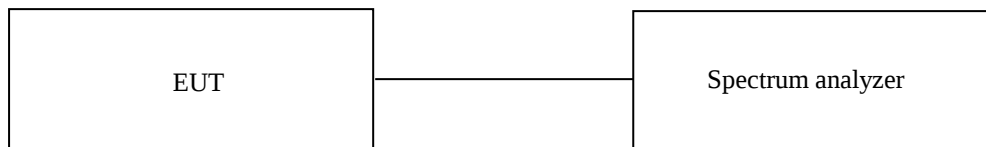
5.3 20 dB BANDWIDTH

5.3.1 Operating environment

Temperature : 23 °C
Relative humidity : 56 % R.H.

5.3.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 % to 5 % of the OBW and video bandwidth (VBW) shall be approximately three times RBW. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.



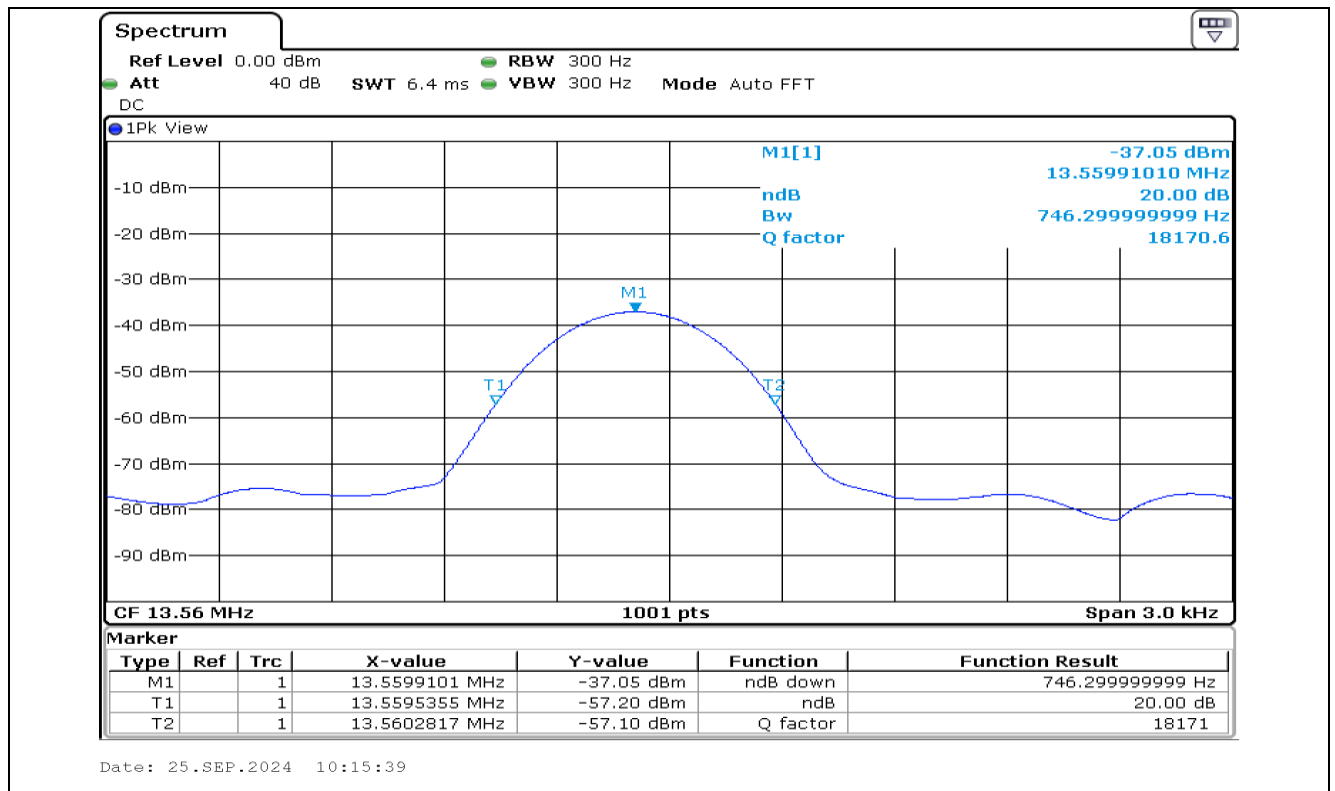
5.3.3 Test date

September 10, 2024 ~ September 23, 2024

5.3.4 Test data

-. Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.215

FREQUENCY (MHz)	MEASURED VALUE (kHz)	Result
13.560 0	0.746	PASS



5.4 FREQUENCY STABILITY WITH TEMPERATURE VARIATION

5.4.1 Operating environment

Temperature : 23 °C
Relative humidity : 56 % R.H.

5.4.2 Test set-up

Turn EUT off and set chamber temperature to -20 °C and then allow sufficient time (approximately 20 to 30 minutes after chamber reach the assigned temperature) for EUT to stabilize. Turn ON EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from -20 °C to +50°C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.

5.4.3 Test date

September 10, 2024 ~ September 23, 2024

5.4.4 Test data

-. Result : PASSED

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13,560,000	13,560,106	106	± 1 356.00
-10		13,559,791	-209	
0		13,560,059	59	
10		13,559,821	-179	
20		13,559,881	-119	
30		13,559,906	-94	
40		13,560,196	196	
50		13,559,995	-5	

5.5 FREQUENCY STABILITY WITH VOLTAGE VARIATION

5.5.1 Operating environment

Temperature : 23 °C
Relative humidity : 56 % R.H.

5.5.2 Test set-up

An external AC power supply was connected to the input of the EUT. The voltage of EUT set to 115 % of the nominal value and then was reduced to 85 % of nominal voltage. The output frequency was recorded at each step.

5.5.3 Test date

September 10, 2024 ~ September 23, 2024

5.5.4 Test data

-. Result : PASSED

Voltage (Vac)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
5.75(115 %)	13,560,000	13,559,889	-111	± 1 356.00
5.0(100 %)		13,560,087	87	
4.25(85 %)		13,559,839	-161	

6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses.

+	Meter reading	(dB μ V)
+	Cable Loss	(dB)
+	Antenna Factor	(dB/m)
=	Corrected Result	(dB μ V/m)
Margin (dB)		
	Specification Limit	(dB μ V/m)
-	Corrected Result	(dB μ V/m)
=	dB Relative to Spec	($\pm$ dB)

7. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
FSV40-N	Rohde & Schwarz	SPECTRUM ANALYZER	101457	Jul. 16, 2024 (1Y)
ESCI	Rohde & Schwarz	Test Receiver	101013	Mar. 12, 2024 (1Y)
310N	Sonoma Instrument	AMPLIFIER	312544	Mar. 11, 2024 (1Y)
HLP-2008	TDK	Hybrid Antenna	131313	Apr. 05, 2023 (2Y)
DT3000	Innco System	Turn Table	DT3000/093	N/A
CO3000	Innco Systems GmbH	Controller	CO3000/904	N/A
MA4000-EP	Innco Systems GmbH	Antenna Master	MA4000/332	N/A
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Apr. 15, 2024 (2Y)
SSE-43CI-A	Samkun Tech	Environmental Test chamber	60712	Jan. 16, 2024 (1Y)