LTA
Laboratory for Test & Approval Co.,Ltd.

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Dates of Tests: September 12, 2023 ~ November 17, 2023
Test Report S/N: LR500112311E
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID. **2AQAV-ECU100-02W**

APPLICANT **SMART eLOCK Co., LTD.**

Equipment Class	**:**	**Digital Transmission System (DTS)**
Manufacturing Description	**:**	**Energy Control Unit**
Manufacturer	**:**	**SMART eLOCK Co., LTD.**
Model name	**:**	**ECU100-02W**
Contains	**:**	**2AU49-DA16200MC**
Test Device Serial No.:	**:**	**Identical prototype**
Rule Part(s)	**:**	**FCC Part 15.247 Subpart C ; ANSI C63.10 - 2013**
Frequency Range	**:**	**2412 MHz ~ 2462 MHz**
Max. Output Power	**:**	**0.064 W**
Data of issue	**:**	**November 17, 2023**

This test report is issued under the authority of:

JaBeom.Koo

Ja-Beom Koo, Manager

The test was supervised by:

Jae-hum Yun, Test Engineer

TABLE OF CONTENTS

1. General information

1-1 Test Performed

Company name	:	LTA Co., Ltd.
Address	:	243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 17159
Web site	:	http://www.ltalab.com
E-mail	:	chahn@ltalab.com
Telephone	:	+82-31-323-6008
Facsimile		+82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
RRA	KOREA	KR0049	-	RRA accredited Lab.
	U.S.A		2025-03-29	
	CANADA		2024-08-15	
VCCI	JAPAN	C-14948	2026-09-10	VCCI registration
		T-12416	2026-09-10	
		R-14483	2026-10-15	
		G-10847	2024-12-13	
KOLAS	KOREA	KT551	2025-10-12	KOLAS accredited Lab.

2. Information about test item

2-1 Client & Manufacturer

Client Company name	:	SMART eLOCK Co., LTD.
Address	:	B402, Geumgang Penterium IT Tower, 215, Galmachiro, Jungwon gu, Seongnam-si, Gyeonggi-do South Korea 13217
Tel / Fax	:	TEL No : +82-010-3673-7884/ FAX No : +82-031-743-7276
Manufacturer		SMART eLOCK Co., LTD.
Address		B402, Geumgang Penterium IT Tower, 215, Galmachiro, Jungwon gu, Seongnam-si, Gyeonggi-do South Korea 13217
Tel / Fax		TEL No : +82-010-3673-7884/ FAX No : +82-031-743-7276

2-2 Equipment Under Test (EUT)

Model name	:	ECU100-02W
Serial number	:	Identical prototype
Date of receipt	:	September 12, 2023
EUT condition	:	Pre-production, not damaged
Antenna type	:	Chip Antenna (Max Gain : 3.5 dBi)
Frequency Range	:	2412 MHz ~ 2462 MHz - 802.11b/g/n20
Type of Modulation	:	DSSS, OFDM
Power Source	:	AC 120 V
Test condition	:	This report measures the capabilities of the product's 2.4 GHz modules at once.

2-3Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
Notebook	-	MS-1736	MSI

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Test Condition	Status (note 1)
15.247(a)	6 dB Bandwidth	Conducted	N/A[1)]
15.247(b)	Transmitter Peak Output Power		N/A[1)]
15.247(e)	Transmitter Power Spectral Density		N/A[1)]
15.247(d)	Band Edge & Conducted Spurious emission		N/A[1)]
15.407(a)(3)	26 dB Bandwidth		N/A[1)]
15.407(a)(3)	Transmitter Peak Output Power		N/A[1)]
15.407(a)(3)	Peak power spectral density		N/A[1)]
15.407(b)(4)	Band Edge & Conducted Spurious emission		N/A[1)]
15.407(e)	6 dB Bandwidth		N/A[1)]
15.209	Transmitter emission	Radiated	C
15.207	AC Conducted Emissions	Conducted	N/A[1)]
15.203	Antenna requirement	-	C

N/A[1)] : The product replaces this test with a certificate using an authenticated module.
Contains Module : 2AU49-DA16200MC

The above equipment was tested by LTA Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10-2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.247 The test results of this report relate only to the tested sample identified in this report.
The tests were performed according to the method of measurements prescribed in KDB No.558074.

→ Antenna Requirement
SMART eLOCK Co., LTD. FCC ID: 2AQAV-ECU100-02W unit complies with the requirement of §15.203.
The antenna type is Chip Antenna

3.2 Technical Characteristics Test

3.2.1 Radiated Spurious Emissions

Procedure:

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defines in ANSI C63.10-2013. The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 9 kHz ~ 10^{th} harmonic.

RBW = 120 kHz (30 MHz ~ 1 GHz) VBW ≥ RBW

= 1 MHz (1 GHz ~ 10^{th} harmonic)

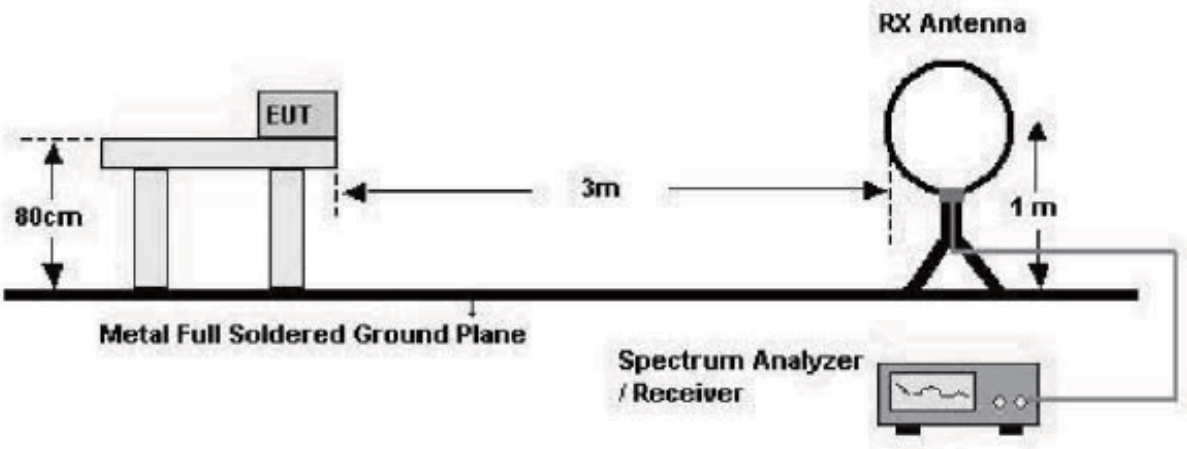
Trace = max hold Detector function = peak

Sweep = auto

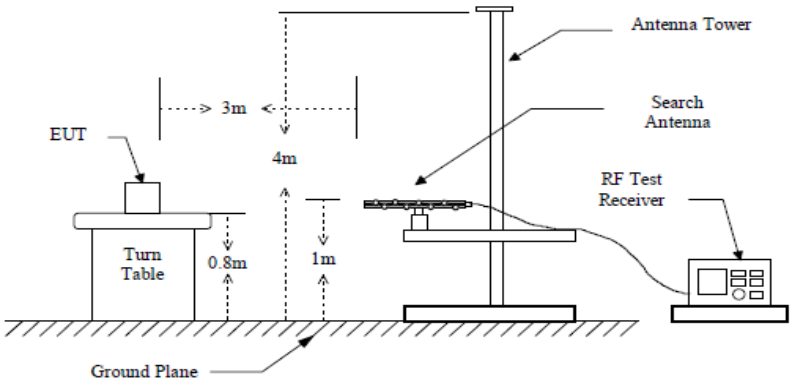
Duty cycle : 98.89 %

The EUT configureal to transmit continuously(D ≥ 98%)/ Duty Factor = 0

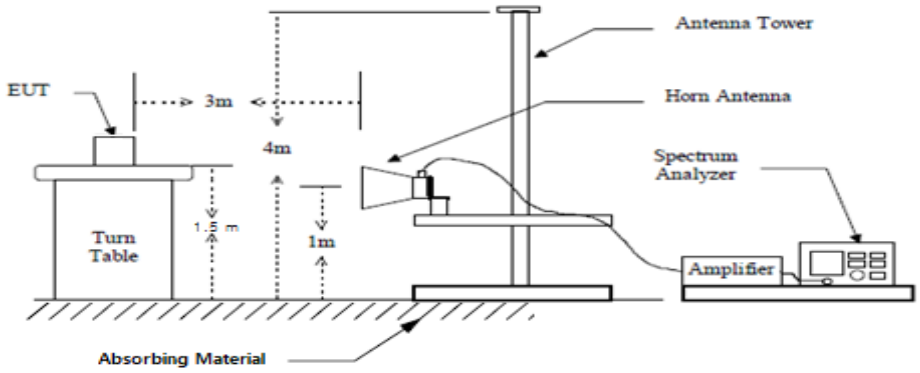
below 30 MHz



below 1 GHz (30 MHz to 1 GHz)



above 1 GHz



Measurement Data: Complies

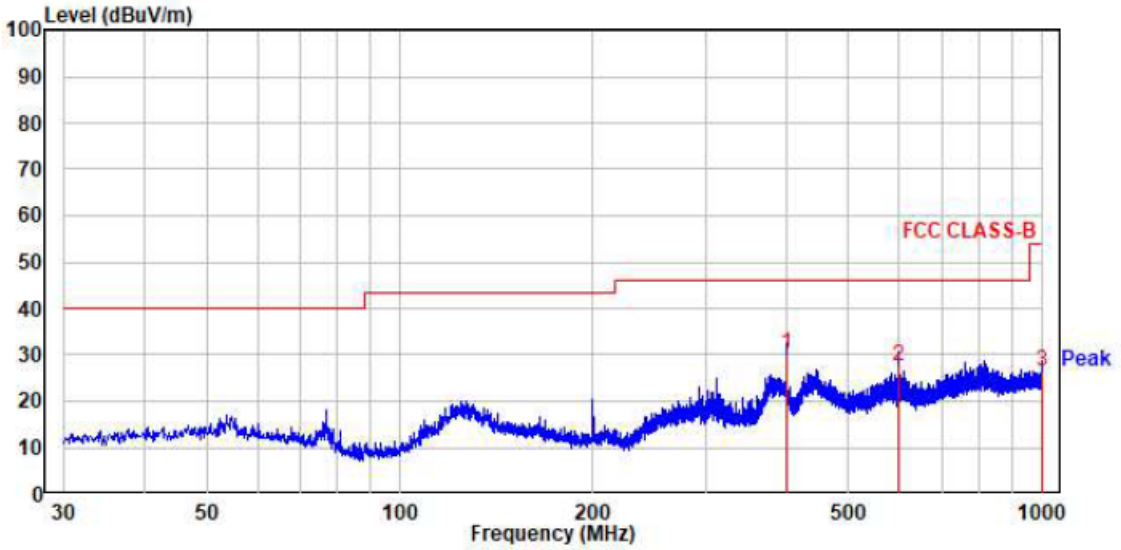
- See next pages for actual measured data.
- No other emissions were detected at a level greater than 20 dB below limit include from 9 kHz to 30MHz.
- The test results for the worst of the various operating modes are presented in accordance with 6.3.4 of ANSI C63.10.
- Checked with a red circle is the fundamental frequency.
- At the request of the applicant, measurements of derived model products are also attached.

Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3 m
0.009 ~ 0.490	2400/F(kHz) **(@ 300 m)**
0.490 ~ 1.705	24000/F(kHz) **(@ 30 m)**
1.705 ~ 30	30**(@ 30 m)**
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

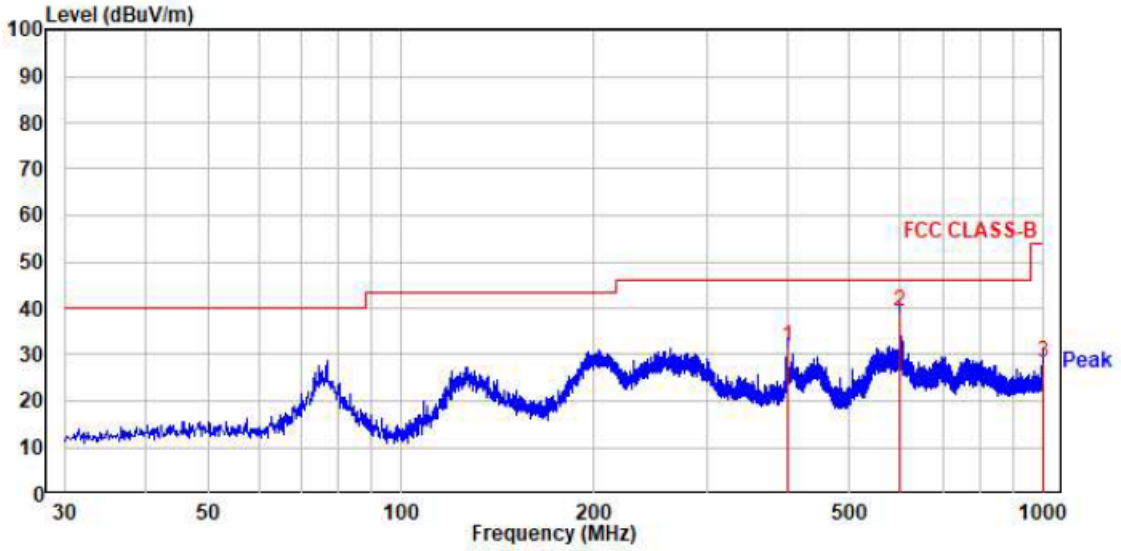
Radiated Emissions(WLAN 2.4 GHz)



Trace:

No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	400.06	41.88	-11.58	30.30	46.00	15.70	100	155	horizontal
2.	600.00	35.74	-8.29	27.45	46.00	18.55	100	113	horizontal
3.	1000.00	29.03	-2.79	26.24	54.00	27.76	100	320	horizontal

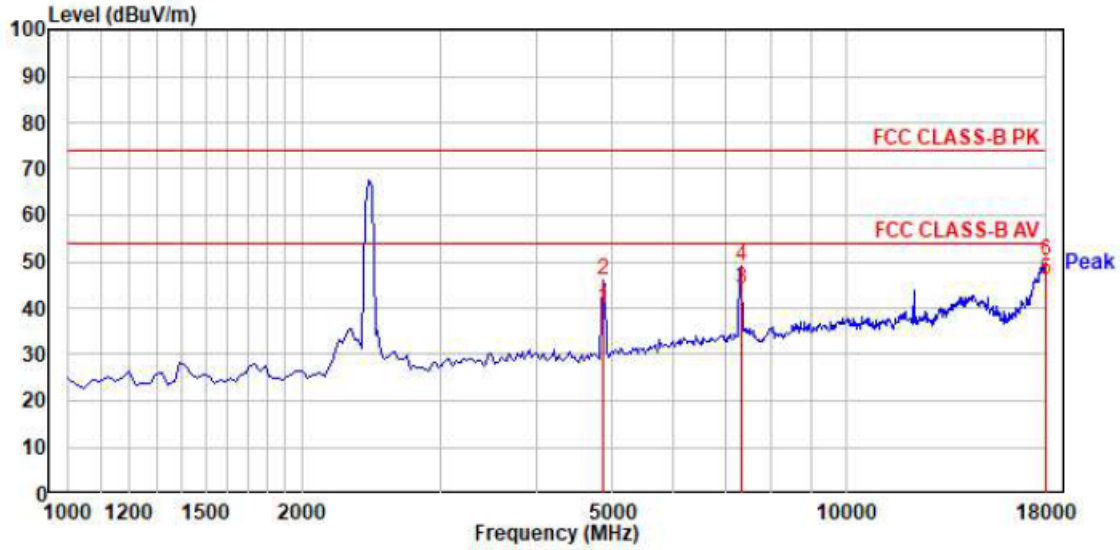
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



Trace:

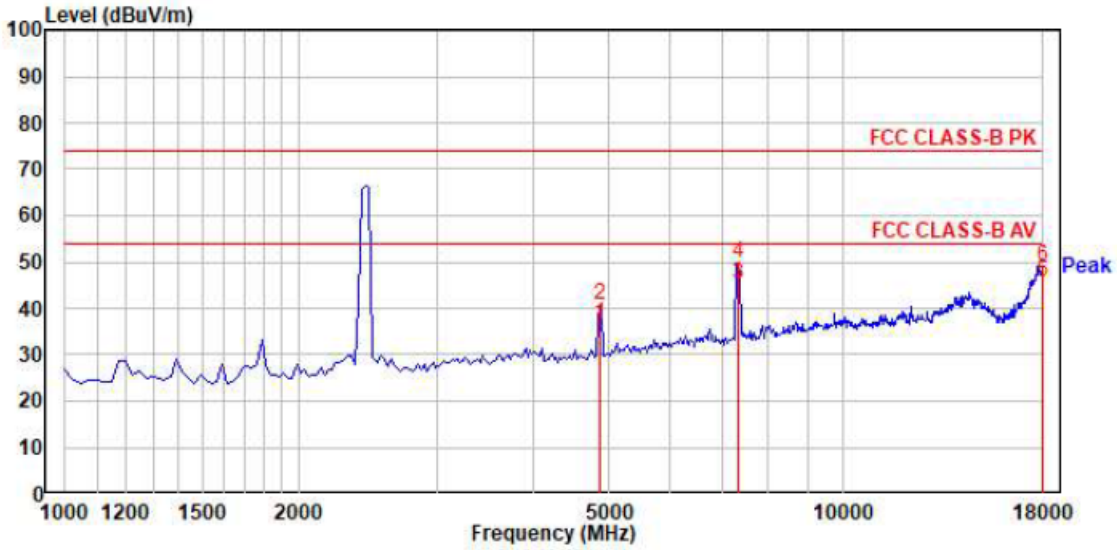
No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	400.06	43.46	-11.88	31.58	46.00	14.42	100	250	vertical
2.	600.00	48.28	-8.89	39.39	46.00	6.61	100	100	vertical
3.	999.64	31.54	-3.20	28.34	54.00	25.66	100	284	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



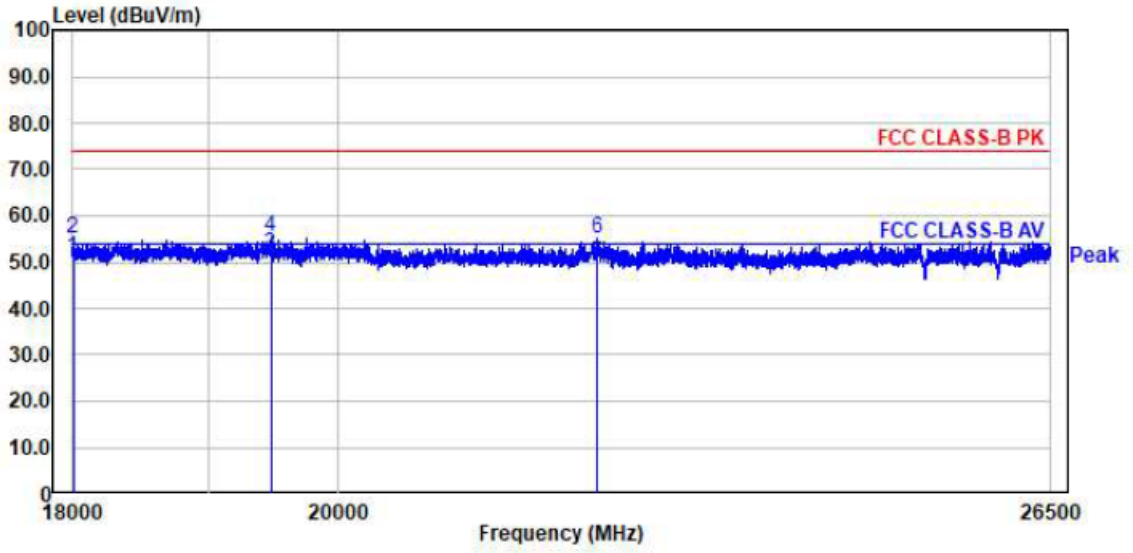
No.	Freq	RD PK	RD AV	C.F	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Polarity
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	cm	deg	
2.	4868.12	42.46	36.28	3.74	46.20	40.02	74.00	54.00	27.80	13.98	100	297	horizontal
4.	7307.25	40.54	35.73	8.52	49.06	44.25	74.00	54.00	24.94	9.75	100	59	horizontal
6.	18000.00	25.72	21.51	24.44	50.16	45.95	74.00	54.00	23.84	8.05	100	313	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



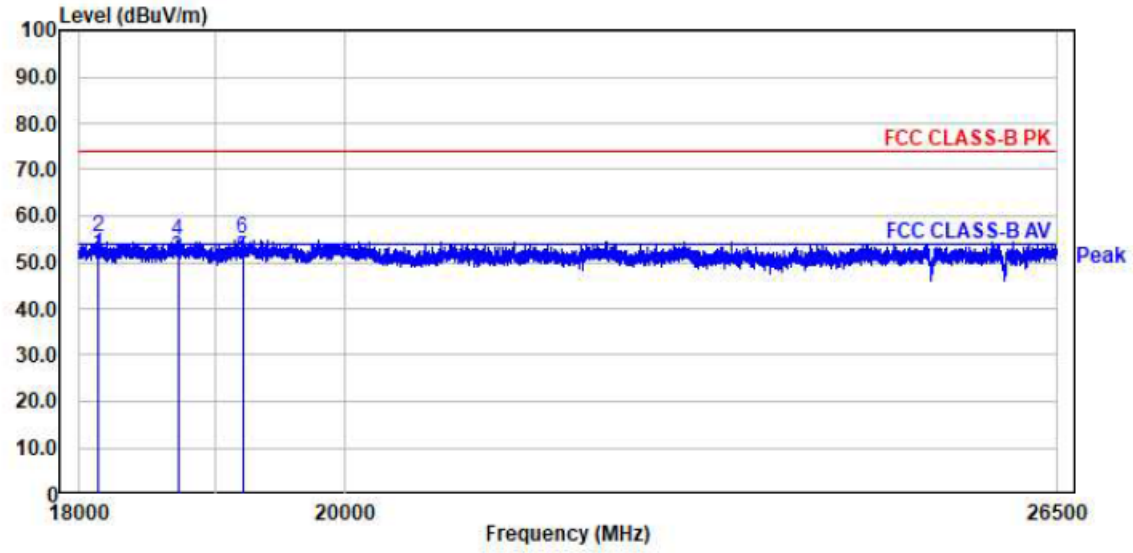
No.	Freq	RD PK	RD AV	C.F	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Polarity
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	cm	deg	
2.	4868.12	36.92	32.76	3.74	40.66	36.50	74.00	54.00	33.34	17.50	100	0	vertical
4.	7307.25	41.34	36.78	8.52	49.86	45.30	74.00	54.00	24.14	8.70	100	169	vertical
6.	18000.00	24.76	21.24	24.44	49.20	45.68	74.00	54.00	24.80	8.32	100	79	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



No.	Freq	RD PK	RD AV	C.F	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Polarity
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	cm	deg	
2.	18004.25	38.04	34.04	17.07	55.11	51.11	74.00	54.00	18.89	2.89	181	188	horizontal
4.	19469.44	39.45	35.45	16.12	55.57	51.57	74.00	54.00	18.43	2.43	322	330	horizontal
6.	22150.13	39.63	34.63	15.36	54.99	49.99	74.00	54.00	19.01	4.01	276	283	horizontal

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain



No.	Freq	RD PK	RD AV	C.F	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Polarity
	MHz	dBµV	dBµV	dB	dBµV	dBµV	dBµV	dBµV	dB	dB	cm	deg	
2.	18136.00	38.60	34.60	16.98	55.58	51.58	74.00	54.00	18.42	2.42	360	360	vertical
4.	18716.13	38.03	34.03	16.83	54.86	50.86	74.00	54.00	19.14	3.14	164	159	vertical
6.	19201.69	38.51	34.51	16.45	54.96	50.96	74.00	54.00	19.04	3.04	70	64	vertical

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Use	Description	Model No.	Serial No.	Manufacturer	Interval	Next Cal. Date
1	■	Signal Analyzer (9 kHz ~ 30 GHz)	FSV30	100757	R&S	1 year	2024-08-22
2	■	Signal Generator (~3.2 GHz)	8648C	3623A02597	HP	1 year	2024-03-14
3		SYNTHESIZED CW GENERATOR	83711B	US34490456	HP	1 year	2024-03-14
4		Attenuator (3 dB)	8491A	37822	HP	1 year	2024-04-03
5		Attenuator (10 dB)	8491A	63196	HP	1 year	2024-03-15
6	■	EMI Test Receiver (~7 GHz)	ESCI7	100722	R&S	1 year	2024-08-22
7		RF Amplifier (~1.3 GHz)	8447D OPT 010	2944A07684	HP	1 year	2024-08-22
8		RF Amplifier (1~26.5 GHz)	8449B	3008A02126	HP	1 year	2024-03-14
9	■	Horn Antenna (1~18 GHz)	3115	00114105	ETS	2 year	2024-08-22
10		DRG Horn (Small)	3116B	81109	ETS-Lindgren	2 year	2024-03-18
11		DRG Horn (Small)	3116B	133350	ETS-Lindgren	2 year	2024-03-18
12	■	TRILOG Antenna	VULB 9160	9160-3237	SCHWARZBECK	2 year	2024-03-14
13		Temp.Humidity Data Logger	SK-L200TH II A	00801	SATO	1 year	2024-03-14
14		Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
15	■	DC Power Supply	6674A	3637A01657	Agilent	-	-
17	■	Power Meter	EPM-441A	GB32481702	HP	1 year	2024-03-14
18	■	Power Sensor	8481A	3318A94972	HP	1 year	2024-08-22
19		Audio Analyzer	8903B	3729A18901	HP	1 year	2024-08-22
20		Moduleation Analyzer	8901B	3749A05878	HP	1 year	2024-08-22
21		TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2024-08-22
22		Stop Watch	HS-3	812Q08R	CASIO	1 year	2026-03-14
23		LISN	KNW-407	8-1430-1	Kyoritsu	1 year	2024-03-14
24		Two-Lime V-Network	ESH3-Z5	893045/017	R&S	1 year	2024-03-14
25		UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	1 year	2024-03-14
26		Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	1 year	2024-03-14
27		Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	1 year	2024-03-14
28		OSP120 BASE UNIT	OSP120	101230	R&S	1 year	2024-03-14
29		Signal Generator(100 kHz ~ 40 GHz)	SMB100A03	177621	R&S	1 year	2024-03-14
30		Signal Analyzer (10 Hz ~ 40 GHz)	FSV40	101367	R&S	1 year	2024-03-14
31	■	Active Loop Antenna	FMZB 1519	1519-031	SCHWARZBECK	2 year	2024-03-16