LTA
Laboratory for Test & Approval Co.,Ltd.

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Dates of Tests: June 10,2021 ~ June 22, 2021
Test Report S/N: LR500112106G
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID. **2A2CQUBT300F**

APPLICANT **UNIBINI Co., Ltd.**

Equipment Class	**:**	**Security/Remote Control Transmitter (DSC)**
Manufacturing Description	**:**	**Wireless Calling Transmitter**
Manufacturer	**:**	**UNIBINI Co., Ltd.**
Model name	**:**	**UBT300F**
Variant Model name	**:**	**UBT301F**
Test Device Serial No.:	**:**	**Identical prototype**
Rule Part(s)	**:**	**FCC Part 15 Subpart C ; ANSI C-63.10-2013**
Frequency Range	**:**	**433.42 MHz**
Max. Output Power	**:**	**Max 72.7 dBuV/m – Radiated**
Data of issue	**:**	**June 23, 2021**

This test report is issued under the authority of:

JaBeom.Koo

Ja-Beom Koo, Manager

The test was supervised by:

Eun-Hwan Jung, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

NVLAP LAB Code.: 200723-0

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1. General information

1-1 Test Performed

Company name : LTA Co., Ltd.

Address : 243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 17159

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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
NVLAP	U.S.A	200723-0	2021-09-30	ECT accredited Lab.
RRA	KOREA	KR0049	-	EMC accredited Lab.
FCC	U.S.A	649054	2023-01-25	FCC CAB
VCCI	JAPAN	C-4948,	2023-09-10	VCCI registration
VCCI	JAPAN	T-2416,	2023-09-10	VCCI registration
VCCI	JAPAN	R-4483(10 m),	2023-08-15	VCCI registration
VCCI	JAPAN	G-847	2021-12-13	VCCI registration
IC	CANADA	5799A-1	2022-10-18	IC filing
KOLAS	KOREA	NO.551	2021-08-20	KOLAS accredited Lab.

2. Information about test item

2-1 Client & Manufacturer

Client Company name	:	UNIBINI Co., Ltd.
Address	:	#205,JS TOWER , 74, Byeollae 2-ro, Namyangju-si Gyeonggi-do,12113, KOREA
Tel / Fax	:	+82-31-573-2108 / +82-502-989-9505
Manufacturer		UNIBINI Co., Ltd.
Address		#205,JS TOWER , 74, Byeollae 2-ro, Namyangju-si Gyeonggi-do,12113, KOREA
Tel / Fax		+82-31-573-2108 / +82-502-989-9505

2-2 Equipment Under Test (EUT)

Model name	:	UNIBINI Co., Ltd.
Serial number	:	Identical prototype
Date of receipt	:	June 10, 2021
Model name	:	UBT300F
Variant Model name	:	UBT301F
EUT condition	:	Pre-production, not damaged
Antenna type	:	PCB Antenna (Max Gain : -25.46 dBi)
Frequency Range	:	433.42 MHz
RF output power	:	Max 72.7 dBuV/m – Radiated
Type of Modulation	:	FSK
Power Source	:	DC 3 V

* Antenna gain information was provided by the manufactor. The laboratory is not responsible for the accuracy of any information regarding antenna gain.

***** Derivative products have the same electrical circuitry conditions and only waterproof function is added to the product finish.

2-3 Tested frequency

	LOW	MID	HIGH
Frequency (MHz)		433.42	

2-4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
-	-	-	-

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Test Condition	Status (note 1)
15.231(a)	Automatically Deactivate	Conducted	C
15.231(c)	20 dB Bandwidth		C
15.209, 15.231(b)	Transmitter emission	Radiated	C
15.207	AC Conducted Emissions	Conducted	N/A
15.203	Antenna requirement	-	C

N/A : This product is only operated with DC voltage.

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 15.231 The test results of this report relate only to the tested sample identified in this report.

→ Antenna Requirement
UNIBINI Co., Ltd. FCC ID: 2A2CQUBT300F unit complies with the requirement of §15.203.
The antenna type is PCB Antenna

3.2 Technical Characteristics Test

3.2.1 Automatically Deactivate

Procedure:

The transmitter output was conneted to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

Span = 0

VBW = 3 X RBW

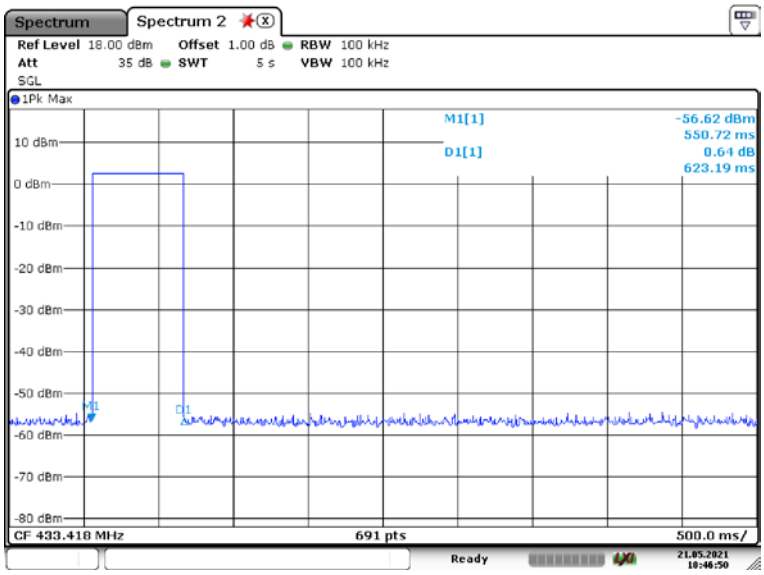
Sweep = auto

Trace = Single

Detector function = peak

Measurement Data : Complies

Time of Transmitting [sec]	Limit [sec]	Result
0.623	5.000	Pass



Minimum Standard:

not more than 5 seconds

Measurement Setup

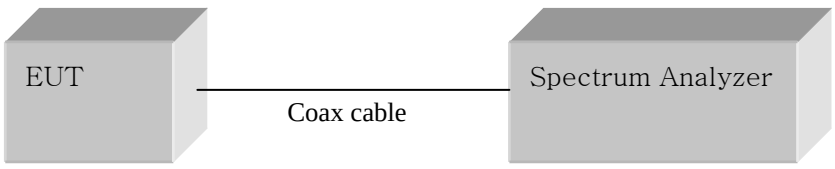


Figure 1: Measurement setup for the carrier frequency separation

3.2.2 20 dB Bandwidth

Procedure:

The transmitter ouput was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW ≥ 1 % of the 20 dB bandwidth

Span ≥ 3 X RBW

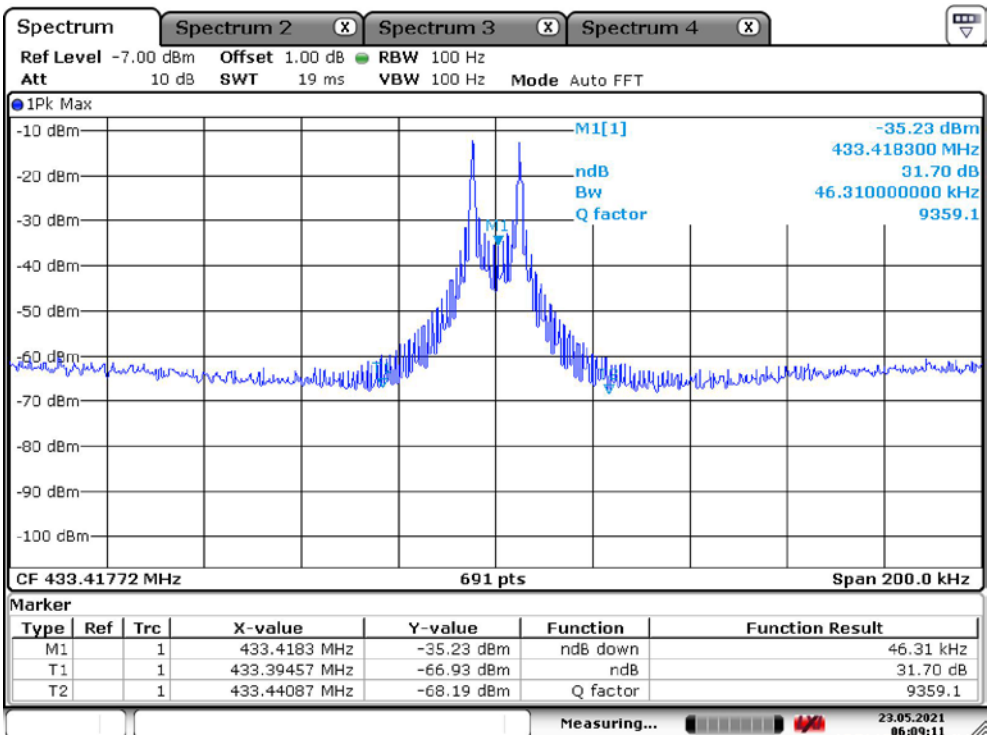
VBW ≥ RBW

Sweep = auto

Detector function = peak

Measurement Data : Complies

Frequency [MHz]	20 dB Bandwidth [kHz]	Limit [kHz]	Result
433.42	46.31	108.36	Pass



Minimum Standard:

The bandwidth of the emission shall be no wider than 0.25 % of the center frequency.

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

3.2.6 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)

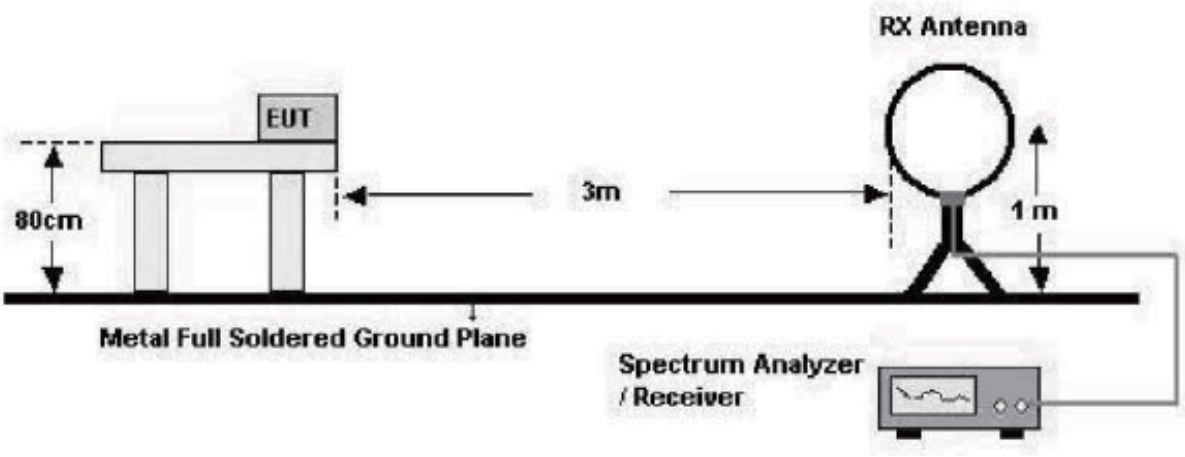
Trace = max hold Detector function = peak

Sweep = auto

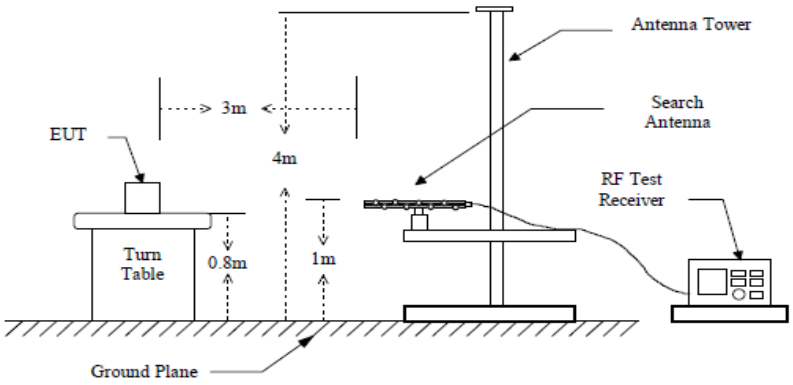
Duty cycle : 98.89 %

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

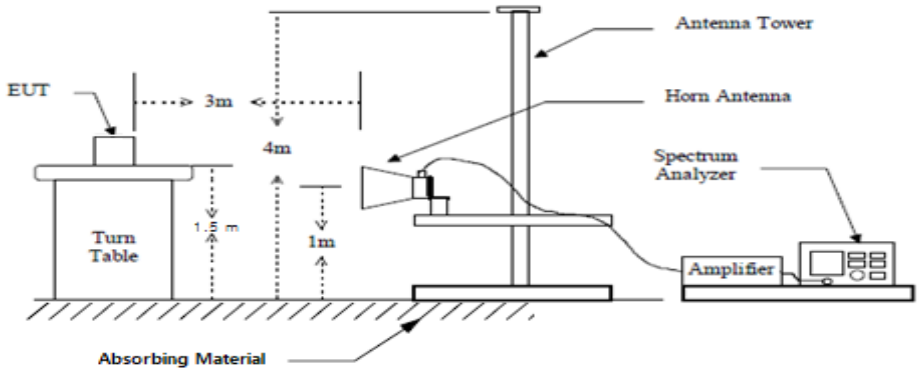
below 30 MHz



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.

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.

FCC §15.231(b)

Limits for radiated disturbance of an intentional radiator				
Fundamental frequency (MHz)	Field strength of fundamental		Field strength of spurious emissions	
	µV/m @ 3 m	dBµV/m @ 3 m	µV/m @ 3 m	dBµV/m @ 3 m
40.66-40.70	2,250	67.00	225	47.00
70-130	1,250	61.90	125	41.90
130-174	[1]1,250 to 3,750	61.90 to 71.50	[1]125 to 375	41.90 to 51.50
174-260	3,750	71.50	375	51.5
260-470	[1]3,750 to 12,500	71.50 to 81.94	[1]375 to 1,250	51.50 to 61.94
Above 470	12,500	81.94	1,250	61.94

- Fundamental Frequency: 433.40 MHz
- Fundamental Limit: Peak 80.12 dBuV/m
- Spurious Emissions Limit: Peak 60.12 dBuV/m

Sample calculation:

Limit = Fundamental frequency range positon (x-a) * Limit of Field strength(b-a) / Fundamental frequency(b-a) + Limit start position

= (433.42-260)*(81.94-71.50)/(470-260)+71.50 = 80.12 dBuV/m

Result of PK = Reading + Ant Factor + Loss {Cable + Attenuator + Filter (above 1GHz) +Distance factor (above 1 GHz)} - Gain (Amplifier)

Result of PK with Duty factor = Reading + Ant Factor + Loss {Cable + Attenuator + Filter (above 1 GHz) +Distance factor (above 1 GHz)} - Gain (Amplifier) + Duty factor (Refer to Duty factor data sheet)

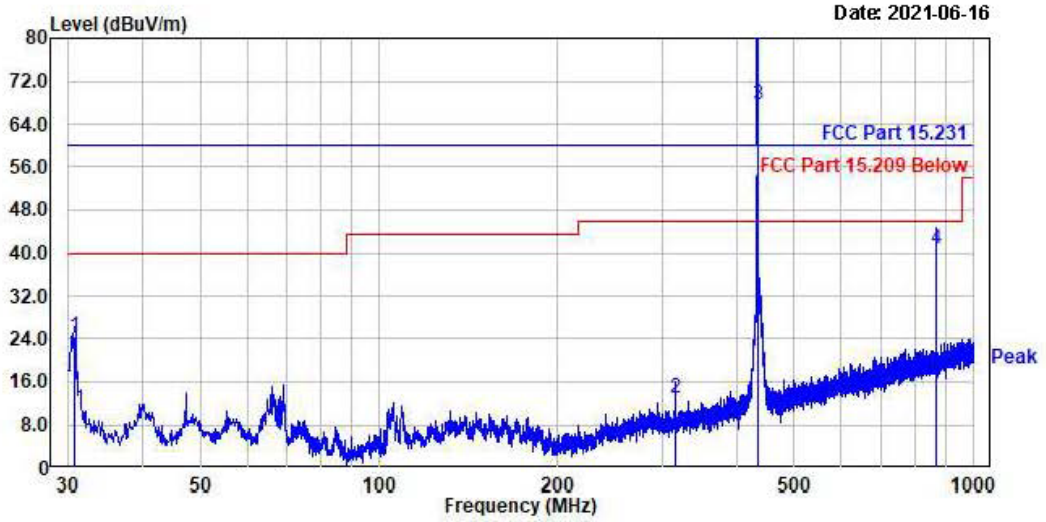
For above 1GHz : Distance Factor: 20 x log (4.0 m/3.0 m) = 2.50 dB

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

Average measurement : Average result = Peak result (dBuV/m) – Duty Correction Factor (dB)

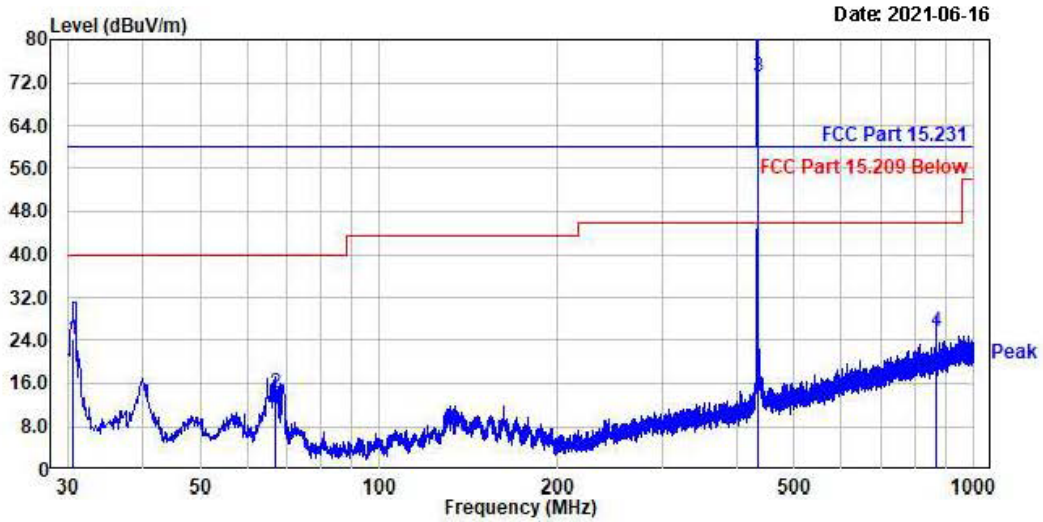
Duty Correction Factor (dB) = 20 x log (On time (in 0.1s)/0.1) = 20 x log (0.1/0.1) = 0 dB

Radiated Emissions



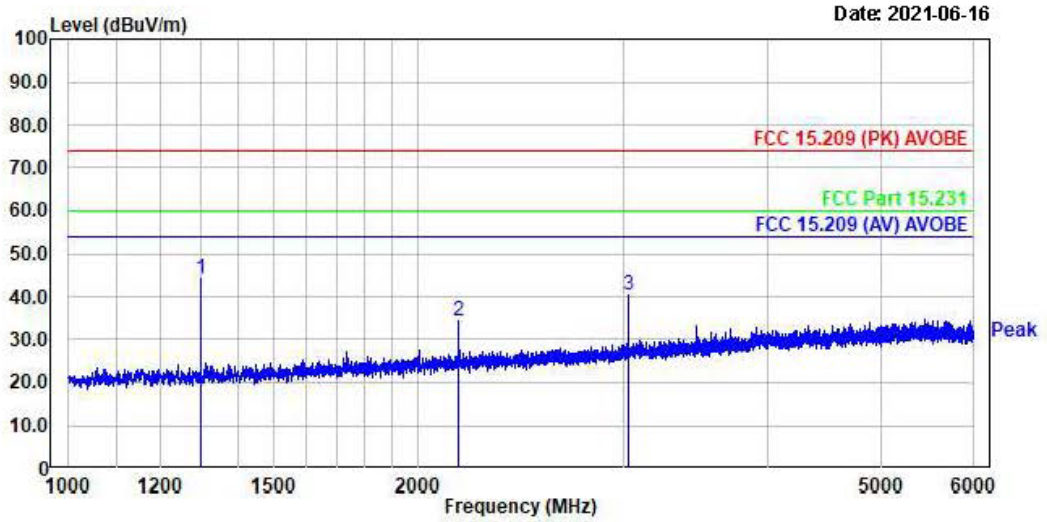
No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	30.73	43.75	-19.38	24.37	40.00	15.63	100	350	horizontal
2.	316.27	28.67	-15.77	12.90	46.02	33.12	100	3	horizontal
3.	433.40	80.16	-12.49	67.67	80.12	12.45	100	80	horizontal
4.	866.99	45.82	-5.04	40.78	46.02	5.24	100	284	horizontal

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



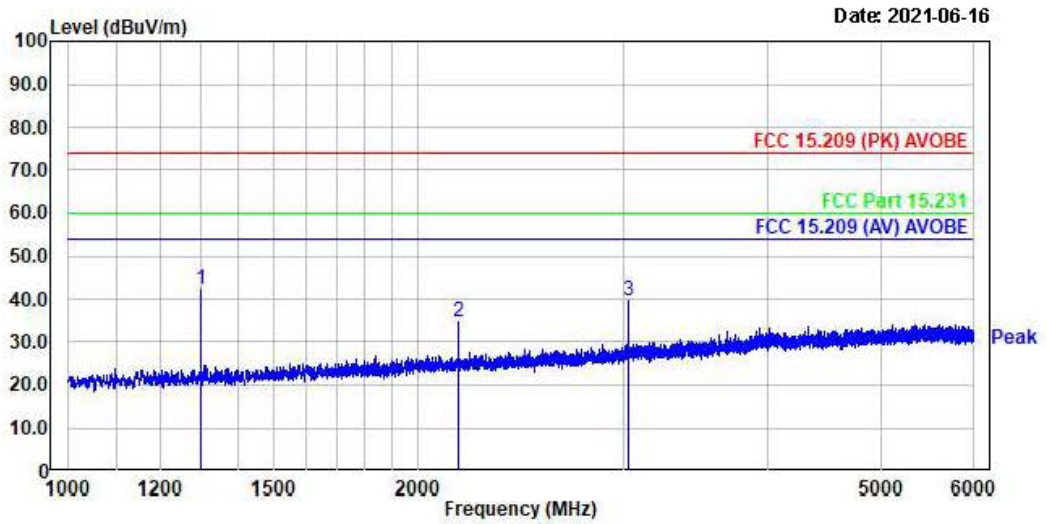
No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	30.61	42.77	-18.64	24.13	40.00	15.87	100	279	vertical
2.	66.74	32.84	-18.70	14.14	40.00	25.86	100	259	vertical
3.	433.40	85.21	-12.29	72.92	80.12	7.20	100	26	vertical
4.	866.87	30.40	-4.88	25.52	46.02	20.50	100	344	vertical

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



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	1300.00	54.52	-10.33	44.19	60.12	15.93	275	281	horizontal
2.	2166.88	39.42	-5.08	34.34	60.12	25.78	111	114	horizontal
3.	3034.38	41.84	-1.44	40.40	60.12	19.72	76	85	horizontal

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



No.	Freq	Reading	C.F	Result QP	Limit	Margin	Height	Angle	Polarity
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	
1.	1300.00	52.52	-10.33	42.19	60.12	17.93	252	244	vertical
2.	2166.88	39.90	-5.08	34.82	60.12	25.30	32	27	vertical
3.	3034.38	41.10	-1.44	39.66	60.12	20.46	64	58	vertical

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

3.2.7 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Minimum Standard: FCC Part 15.207(a) / EN 55022

Measurement Data: N/A

Class B

Frequency Range	quasi-peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

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	2021-09-06
2	■	Signal Generator (~3.2 GHz)	8648C	3623A02597	HP	1 year	2022-03-16
3		SYNTHESIZED CW GENERATOR	83711B	US34490456	HP	1 year	2022-03-16
4		Attenuator (3 dB)	8491A	37822	HP	1 year	2021-09-06
5		Attenuator (10 dB)	8491A	63196	HP	1 year	2021-09-06
6	■	EMI Test Receiver (~7 GHz)	ESCI7	100722	R&S	1 year	2021-09-06
7		RF Amplifier (~1.3 GHz)	8447D OPT 010	2944A07684	HP	1 year	2021-09-06
8		RF Amplifier (1~26.5 GHz)	8449B	3008A02126	HP	1 year	2022-03-16
9	■	Horn Antenna (1~18 GHz)	3115	00114105	ETS	2 year	2022-09-06
10		DRG Horn (Small)	3116B	81109	ETS-Lindgren	2 year	2022-03-18
11		DRG Horn (Small)	3116B	133350	ETS-Lindgren	2 year	2022-03-18
12	■	TRILOG Antenna	VULB 9160	9160-3237	SCHWARZBECK	2 year	2023-03-20
13		Temp.Humidity Data Logger	SK-L200TH II A	00801	SATO	1 year	2022-03-16
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	2022-03-16
18	■	Power Sensor	8481A	3318A94972	HP	1 year	2021-09-06
19		Audio Analyzer	8903B	3729A18901	HP	1 year	2021-09-06
20		Moduleation Analyzer	8901B	3749A05878	HP	1 year	2021-09-06
21		TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2021-09-06
22		Stop Watch	HS-3	812Q08R	CASIO	2 year	2022-03-18
23		LISN	KNW-407	8-1430-1	Kyoritsu	1 year	2021-09-06
24		Two-Lime V-Network	ESH3-Z5	893045/017	R&S	1 year	2022-03-16
25		UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	1 year	2022-03-16
26		Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	1 year	2022-03-16
27		Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	1 year	2022-03-16
28		OSP120 BASE UNIT	OSP120	101230	R&S	1 year	2022-03-16
29		Signal Generator(100 kHz ~ 40 GHz)	SMB100A03	177621	R&S	1 year	2022-03-16
30		Signal Analyzer (10 Hz ~ 40 GHz)	FSV40	101367	R&S	1 year	2022-03-16
31	■	Active Loop Antenna	FMZB 1519	1519-031	SCHWARZBECK	2 year	2023-02-26