TEST REPORT

KOSTEC Co., Ltd. 28(175-20, Annyeong-dong) 406-gil sejaro, Hwaseong-si, Gyeonggi-do, Korea Tel:031-222-4251, Fax:031-222-4252	Report No.: KST-FCR-230006	KOSTEC

1. Applicant

   • Name : Dogtra Co., Ltd.

   • Address : 35, Namdongdong-ro 33beon-gil, Namdong-gu, Incheon 21694 Rep. of KOREA

2. Test Item

   • Product Name: Pathfinder2 MINI

   • Model Name: PM20C

   • Brand: None

   • FCC ID: SWN-PM20C

3. Manufacturer

   • Name : Dogtra Co., Ltd.

   • Address : 35, Namdongdong-ro 33beon-gil, Namdong-gu, Incheon 21694 Rep. of KOREA

4. Date of Test : 2023. 06. 28. ~ 2023. 06. 29.

5. Test Method Used : FCC CFR 47, Part 15. Subpart C-15.247
   558074 D01 15.247 Meas Guidance v05r02
   ANSI C 63.10-2013

6. Test Result : Compliance

7. Note: Family model names: PM 20C, PM-20C, PATHFINDER2 MINI, PATHFINDER2 MINI TRX

Supplementary Information

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with measurement procedures specified in ANSI C 63.10-2013.

We attest to the accuracy of data and all measurements reported herein were performed by KOSTEC Co., Ltd. and were made under Chief Engineer's supervision. We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KOLAS accreditation.

Affirmation	Tested by Name : Choo, Kwang-Yeol (Signature)	Technical Manager Name : Park, Gyeong-Hyeon (Signature)

2023. 07. 03.

KOSTEC Co., Ltd.

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1. GENERAL INFORMATION

1.1 Test Facility

Test laboratory and address

KOSTEC Co., Ltd.
28(175-20,Annyeong-dong)406-gil sejaro, Hwaseong-si Gyeonggi-do, Korea
Telephone Number: 82-31-222-4251
Facsimile Number: 82-31-222-4252

Registration information

KOLAS No.: KT232
RRA (National Radio Research Agency): KR0041
FCC Designation No.: KR0041
IC Designation No.: KR0041
VCCI Membership No.: 2005

1.2 Location

1.3 Revision History of test report

Rev.	Revisions	Effect page	Reviewed	Date
-	Initial issue	All	Gyeong Hyeon, Park	2023. 07. 03.

2. EQUIPMENT DESCRIPTION

The product specification described herein was declared by manufacturer. And refer to user's manual for the details.

Equipment Name	Pathfinder2 MINI
Model No	PM20C (Family model names: PM 20C, PM-20C, PATHFINDER2 MINI, PATHFINDER2 MINI TRX)
Usage	Dog training device
Serial Number	Proto type
Modulation technology	FHSS
Modulation type	GFSK
Emission Type	F1D
Maximum output power	28.94 dBm
Operated Frequency	915.25 MHz ~ 927.75 MHz
Channel Number	51
Operation temperature	-20 ℃ ~ 50 ℃
Power Source	DC 3.7 V
Antenna Description	Whip antenna fixed on PCB by special screw bolt, gain : 0 dBi
Remark	1. The device was operating at its maximum output power for all measurements. 2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case (X) is shown in the report. 3. The above DUT's information was declared by manufacturer. Please refer to the specifications or user manual for more detailed description.
FCC ID	SWN-PM20C

3. SYSTEM CONFIGURATION FOR TEST

3.1 Characteristics of equipment

The Equipment Under Test (EUT) contains the following capabilities: This equipment is Dog training device. The detailed explanation is refer as user manual.

3.2 Used peripherals list

Description	Model No.	Serial No.	Manufacture	Remark
-	-	-	-	-

3.3 Product Modification

N/A

3.4 Operating Mode

Constantly transmitting with a modulated carrier at maximum power on the low, middle and high channels.

3.5 Test Setup of EUT

The measurements were taken in continuous transmit / receive mode using the TEST MODE.

For controlling the EUT as TEST MODE, the test program and the test cables were provided by the applicant.

EUT
(Standalone)

3.6 Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

▣ TX Power setting value during test

Band	TX Power setting value		
	Low CH	Middle CH	High CH
900 MHz band	Default	Default	Default

3.7 Table for Test condition

Test Items	Channel No	Frequency (㎒)	Operated Condition
Channel Separation	24, 25	921.25, 921.5	Hopping on and continuous modulation setting mode
Number of Hopping Channels	0 ~ 50	915.25 ~ 927.75	Hopping on mode
Time of occupancy	38	921.5	Hopping on mode
Peak Output Power	0	915.25	Hopping off and continuous modulation setting mode
	25	921.5	
	50	927.75	
Band-edge Compliance	0	915.25	Hopping off and continuous modulation setting mode
	50	927.75	
Spurious RF conducted emissions	-	-	Frequency band setting by required standard (FCC Rules)*
Spurious radiated emissions	-	-	

*Note: Channel number is selected lowest, middle, highest channel and also hopping on/off mode operation

3.8 Used Test Equipment List

No.	Instrument	Model	S/N	Manufacturer	Next Cal Date	Cal interval	used
1	T & H Chamber	PL-3J	15003623	ESPEC CORP	2023.11.03	1 year	☐
2	T & H Chamber	SH-662	93000067	ESPEC CORP	2023.08.24	1 year	☐
3	T & H Chamber	SH-642	93011406	ESPEC CORP	2023.09.21	1 year	☐
4	Spectrum Analyzer	8563EC	3046A00527	Agilent Technology	2024.01.11	1 year	☐
5	Spectrum Analyzer	FSV30	104029	Rohde & Schwarz	2023.08.24	1 year	☒
6	Spectrum Analyzer	FSV30	20-353063	Rohde & Schwarz	2024.01.11	1 year	☐
7	Spectrum Analyzer	FSV40	101727	Rohde & Schwarz	2023.08.26	1 year	☐
8	Signal Analyzer	FSW43	101294	Rohde & Schwarz	2024.01.13	1 year	☐
9	Signal Analyzer	FSW85	101602	Rohde & Schwarz	2024.06.27	1 year	☐
10	EMI Test Receiver	ESCI7	100823	Rohde & Schwarz	2024.01.11	1 year	☐
11	EMI Test Receiver	ESPI	100488	Rohde & Schwarz	2024.01.10	1 year	☐
12	EMI Test Receiver	ESI	837514/004	Rohde & Schwarz	2023.09.28	1 year	☒
13	Vector Signal Analyzer	89441A	3416A02620	Agilent Technology	2024.01.13	1 year	☐
14	Network Analyzer	8753ES	US39170869	AGILENT	2023.08.24	1 year	☐
15	EPM Series Power meter	E4418B	GB39512547	Agilent Technology	2024.01.12	1 year	☐
16	RF Power Sensor	E9300A	MY41496631	Agilent Technology	2024.01.12	1 year	☐
17	Microwave Frequency Counter	5352B	2908A00480	Agilent Technology	2024.01.11	1 year	☐
18	Audio Analyzer	8903B	3514A16919	Agilent Technology	2024.01.11	1 year	☐
19	Audio Telephone Analyzer	DD-5601CID	520010281	CREDIX	2024.01.10	1 year	☐
20	Modulation Analyzer	8901A	3041A05716	H.P	2024.01.10	1 year	☐
21	Digital storage Oscilloscope	TDS3052	B015962	Tektronix	2023.08.25	1 year	☐
22	ESG-D Series Signal Generator	E4436B	US39260458	Agilent Technology	2024.01.12	1 year	☐
23	Vector Signal Generator	SMBV100A	257557	Rohde & Schwarz	2024.01.12	1 year	☐
24	GNSS Signal Generator	TC-2800A	2800A000494	TESCOM CO., LTD.	2024.01.11	1 year	☐
25	Signal Generator	SMB100A	179628	Rohde & Schwarz	2024.01.27	1 year	☒
26	Signal Generator	N5173B	MY57280148	KEYSIGHT	2023.06.14	1 year	☐
27	SLIDAC	None	0207-4	Myoung sung Ele.	2024.01.10	1 year	☐
28	DC Power supply	DDPS-3K	U03-109	Digitech Power	2024.01.18	1 year	☐
29	DC Power supply	E3610A	KR24104505	Agilent Technology	2024.01.10	1 year	☐
30	DC Power supply	UP-3005T	68	Unicon Co.,Ltd	2024.01.10	1 year	☐
31	DC Power Supply	SM 3400-D	114701000117	DELTA ELEKTRONIKA	2024.01.10	1 year	☐
32	DC Power supply	6632B	MY43004005	Agilent Technology	2024.01.11	1 year	☒
33	DC Power Supply	6632B	MY43004137	Agilent Technology	2024.01.11	1 year	☐
34	Termination	1433-3	LM718	WEINSCHEL	2024.01.12	1 year	☐
35	Termination	1432-3	QR946	AEROFLEX/WEINSCHEL	2024.01.12	1 year	☐
36	Attenuator	8498A	3318A09485	HP	2024.01.11	1 year	☒
37	Step Attenuator	8494B	3308A32809	HP	2024.01.12	1 year	☐
38	RF Step Attenuator	RSP	100091	Rohde & Schwarz	2024.01.13	1 year	☐
39	Attenuator	18B50W-20F	64671	INMET	2024.01.12	1 year	☐
40	Attenuator	10 dB	1	Rohde & Schwarz	2024.01.12	1 year	☐
41	Attenuator	54A-10	74564	WEINSCHEL	2023.08.26	1 year	☐
42	Attenuator	56-10	66920	WEINSCHEL	2024.01.12	1 year	☐
43	Attenuator	48-40-33	BL5992	Weinschel Corp.	2023.12.27	1 year	☐
44	Attenuator	SA18N100-20	001	FAIRVIEW MICROWAVE	2023.09.22	1 year	☐
45	Attenuator	SA26B-10	33464/2134	FAIRVIEW MICROWAVE	2023.09.22	1 year	☒
46	Attenuator	SA4018-10	DC 2126	FAIRVIEW MICROWAVE	2023.09.22	1 year	☒
47	Power divider	11636B	51212	HP	2024.01.13	1 year	☐
48	3Way Power divider	KPDSU3W	00070365	KMW	2023.08.25	1 year	☐
49	4Way Power divider	70052651	173834	KRYTAR	2024.01.12	1 year	☐
50	3Way Power divider	1580	SQ361	WEINSCHEL	2024.01.13	1 year	☐
51	OSP	OSP120	101577	Rohde & Schwarz	2024.01.13	1 year	☐

No.	Instrument	Model	S/N	Manufacturer	Next Cal Date	Cal interval	used
52	White noise audio filter	ST31EQ	101902	SoundTech	2023.08.25	1 year	☐
53	Dual directional coupler	778D	17693	HEWLETT PACKARD	2024.01.11	1 year	☐
54	Dual directional coupler	772D	2839A00924	HEWLETT PACKARD	2024.01.11	1 year	☐
55	Band rejection filter	3TNF-0006	26	DOVER Tech	2024.01.11	1 year	☐
56	Band rejection filter	3TNF-0007	311	DOVER Tech	2024.01.11	1 year	☒
57	Band rejection filter	WTR-BRF2442-84NN	09020001	WAVE TECH Co.,LTD	2024.01.11	1 year	☐
58	Band rejection filter	WRCJV12-5695-5725-5825-5855-50SS	1	Wainwright Instruments GmbH	2024.01.11	1 year	☐
59	Band rejection filter	WRCJV12-5120-5150-5350-5380-40SS	4	Wainwright Instruments GmbH	2024.01.11	1 year	☐
60	Band rejection filter	WRCGV10-2360-2400-2500-2540-50SS	2	Wainwright Instruments GmbH	2024.01.11	1 year	☐
61	Band rejection filter	CTF-155M-S1	001	RF One Electronics	2023.08.24	1 year	☐
62	Band rejection filter	CTF-435M-S1	001	RF One Electronics	2023.08.24	1 year	☐
63	Band rejection filter	CTF-5890M-70MS1	1	RF One Electronics	2024.01.11	1 year	☐
64	Highpass Filter	WHJS1100-10EF	1	WAINWRIGHT	2024.01.12	1 year	☒
65	Highpass Filter	WHJS3000-10EF	1	WAINWRIGHT	2024.01.11	1 year	☐
66	Highpass Filter	WHNX6-5530-7000-26500-40CC	2	Wainwright Instruments GmbH	2024.01.12	1 year	☐
67	Highpass Filter	WHNX6-2370-3000-26500-40CC	4	Wainwright Instruments GmbH	2024.01.12	1 year	☐
68	WideBand Radio Communication Tester	CMW500	102276	Rohde & Schwarz	2024.01.10	1 year	☐
69	WideBand Radio Communication Tester	CMW500	117235	Rohde & Schwarz	2024.01.10	1 year	☐
70	WideBand Radio Communication Tester	MT8000A	6261987920	Anritsu	2024.01.13	1 year	☐
71	WideBand Radio Communication Tester	MT8821C	6262287695	Anritsu	2024.01.13	1 year	☐
72	Bluetooth Tester	TC-3000B	3000B6A0166	TESCOM CO., LTD.	2024.01.10	1 year	☐
73	Loop Antenna	6502	9203-0493	EMCO	2025.05.23	2 year	☐
74	Loop Antenna	FMZB1513	#374	Schwarzbeck	2025.02.21	2 year	☒
75	BiconiLog Antenna(R)	3142C	35880	ETS-LINDGREN	2024.10.13	2 year	☒
76	Biconical Antenna(T)	VUBA9117	9117-342	Schwarz beck	2024.01.24	2 year	☐
77	Horn Antenna	3115	9605-4834	EMCO	2024.03.06	1 year	☐
78	Horn Antenna	QMS-00208	21909	STEATITE ANTENNA	2023.05.04	1 year	☐
79	Horn Antenna(R)	3117	00135191	ETS-LINDGREN	2024.04.03	1 year	☐
80	Horn Antenna(T)	3115	2996	EMCO	2024.01.12	1 year	☒
81	Horn Antenna(R)	BBHA 9170	9170-722	SCHWARZBECK	2024.01.12	1 year	☒
82	Horn Antenna(T)	BBHA 9170	743	SCHWARZBECK	2024.01.18	1 year	☐
83	AMPLIFIER(A_10)	TK-PA01S	220109-L	TESTEK	2024.01.11	1 year	☐
84	AMPLIFIER(C_3)	TK-PA01S	200141-L	TESTEK	2023.08.24	1 year	☒
85	PREAMPLIFIER(C_3)	8449B	3008A02577	Agilent	2024.01.10	1 year	☒
86	RF PRE AMPLIFIER	SCU08F2	100762	Rohde & Schwarz	2023.11.29	1 year	☐
87	AMPLIFIER	TK-PA18	150003	TESTEK	2024.01.10	1 year	☐
88	AMPLIFIER	TK-PA1840H	160010-L	TESTEK	2024.01.12	1 year	☒
89	Horn Antenna	M19RH	T01	OML, Inc.	2024.04.05	1 year	☐
90	Horn Antenna	M12RH	T02	OML, Inc.	2024.04.07	1 year	☐
91	Horn Antenna	M08RH	T03	OML, Inc.	2024.04.07	1 year	☐
92	Horn Antenna	M05RH	T04	OML, Inc.	2024.04.06	1 year	☐
93	Horn Antenna	M03RH	T05	OML, Inc.	2024.04.06	1 year	☐
94	Harmonic Mixer	M12HWD	200529-1	OML, Inc.	2024.04.14	1 year	☐
95	Harmonic Mixer	M08HWD	200529-1	OML, Inc.	2024.04.17	1 year	☐
96	Harmonic Mixer	M05HWD	200529-1	OML, Inc.	2024.04.14	1 year	☐
97	Harmonic Mixer	M03HWD	200529-1	OML, Inc.	2024.04.14	1 year	☐
98	Source Module	S19MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐
99	Source Module	S12MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐
100	Source Module	S08MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐
101	Source Module	S05MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐
102	Source Module	S03MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐

4. SUMMARY TEST RESULTS

Description of Test	FCC Rule	Reference Clause	Used	Test Result
Peak Output Power	§ 15.247(b)(2)	Clause 5.1	☒	Compliance
20 dB Bandwidth	§ 15.247(a)(1)	Clause 5.2	☒	Compliance
Channel Separation	§ 15.247(a)(1)	Clause 5.3	☒	Compliance
Number of Hopping Channels	§ 15.247(a)(1)	Clause 5.4	☒	Compliance
Time of Occupancy	§ 15.247(a)(1)	Clause 5.5	☒	Compliance
Conducted Spurious Emissions	§ 15.247(d)	Clause 5.6	☒	Compliance
Radiated Spurious Emissions	§ 15.247(d), § 15.209 and § 15.205	Clause 5.7	☒	Compliance
Antenna Requirement	§ 15.203	Clause 5.8	☒	Compliance
AC Power Conducted emissions	§ 15.207	Clause 5.9	☒	Compliance
Compliance: The EUT complies with the essential requirements in the standard. Not Compliance : The EUT does not comply with the essential requirements in the standard. N/A : The test was not applicable in the standard.				

Procedure Reference

FCC CFR 47, Part 15. Subpart C-15.247

558074 D01 15.247 Meas Guidance v05r02

ANSI C 63.10-2013

5. MEASUREMENT RESULTS

5.1 Peak Output Power

5.1.1 Standard Applicable [FCC §15.247(b)(2)]

For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

5.1.2 Test Environment conditions

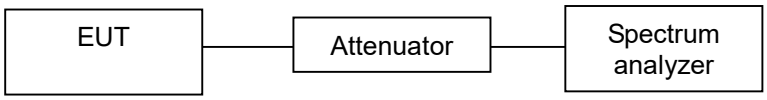
• Ambient temperature : (22 ~ 23) ℃ • Relative Humidity : (43 ~ 45) % R.H.

5.1.3 Measurement Procedure

ANSI C63.10 (2013) : Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. The peak output power was measured using the marker to peak function of the spectrum analyzer.

The spectrum analyzer is set to the as follows :
• Span : approximately 5 times the 20 dB bandwidth
• RBW : > 20 dB bandwidth of the emission being measured
• VBW ≥ RBW.
• Sweep time = auto
• Detector = peak.
• Trace mode = max hold.
• Allow trace to fully stabilize.
• Use the peak marker function to determine the maximum amplitude level.

5.1.4 Test setup

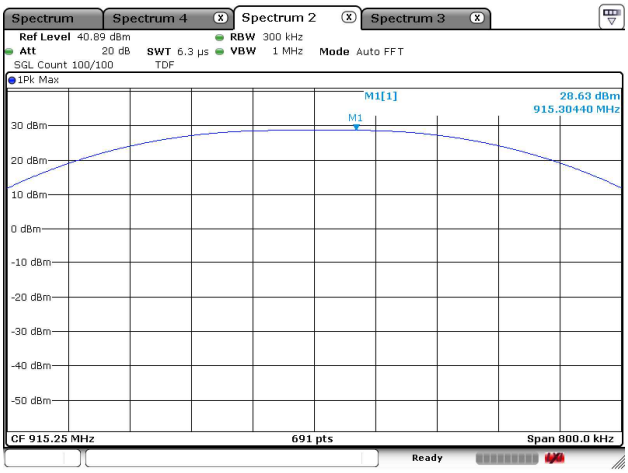


5.1.5 Measurement Result

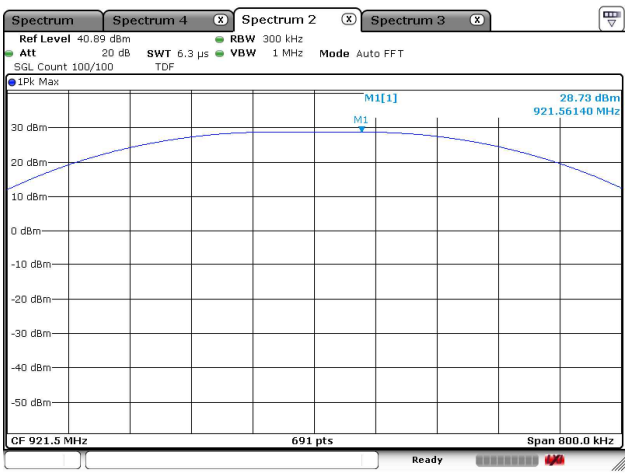
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Test Results
0	915.25	28.63	30	Compliance
25	921.5	28.73	30	Compliance
50	927.75	28.94	30	Compliance

5.1.6 Test Plot

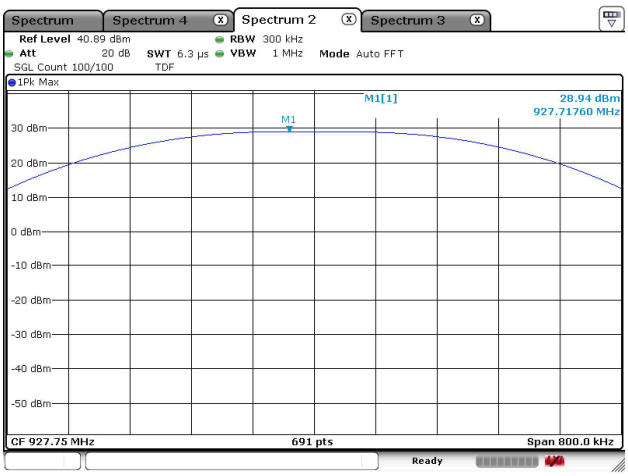
CH Low



CH Middle



CH High



5.2 20 dB Bandwidth

5.2.1 Standard Applicable [FCC §15.247(a)(1)]

Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(1) (i) For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

5.2.2 Test Environment conditions

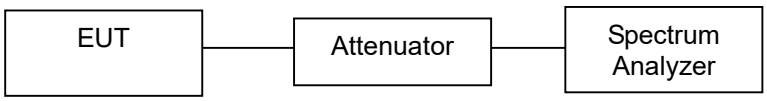
• Ambient temperature : (22 ~ 23) ℃ • Relative Humidity : (43 ~ 45) % R.H.

5.2.3 Measurement Procedure

ANSI C63.10 (2013): Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW ≥ 1 % of the 20 dB bandwidth and VBW ≥ RBW.
3. Measured the spectrum width with power higher than 20 dB below carrier.

5.2.4 Test setup



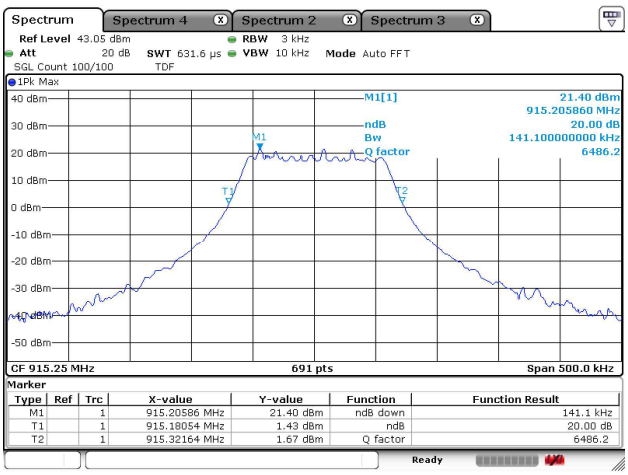
5.2.5 Measurement Result

Modulation Type	Channel	Frequency [MHz]	20 dB Bandwidth [kHz]	99 % Bandwidth [kHz]	Limit [kHz]	Test Results
GFSK	0	915.25	141.10	126.63	500	Compliance
	25	921.5	143.27	125.18	500	Compliance
	50	927.75	137.48	127.35	500	Compliance

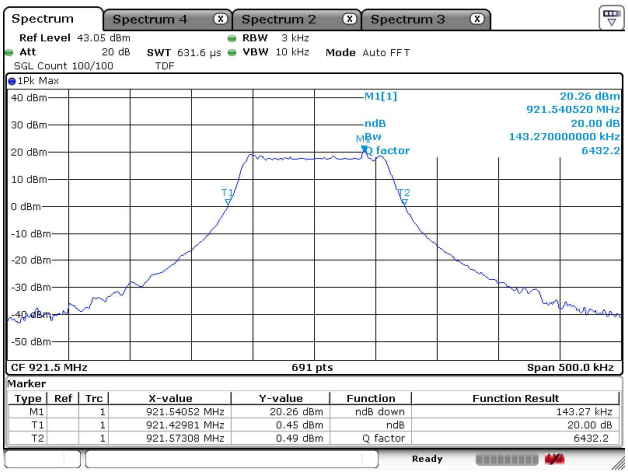
5.2.6 Test Plot

20 dB Bandwidth

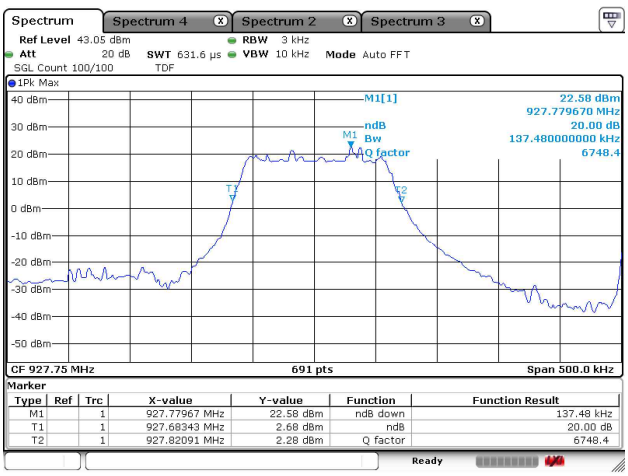
CH Low



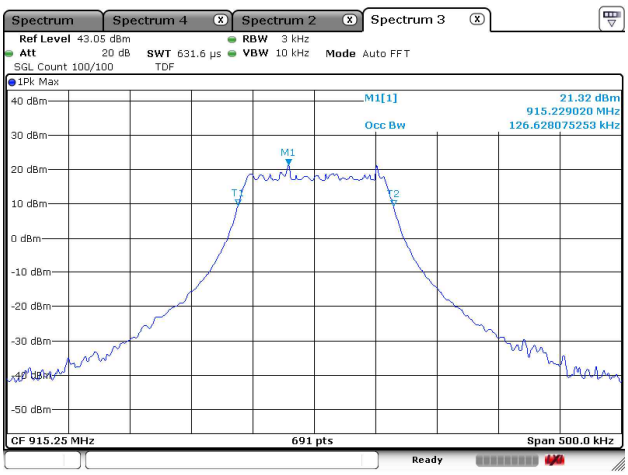
CH Middle

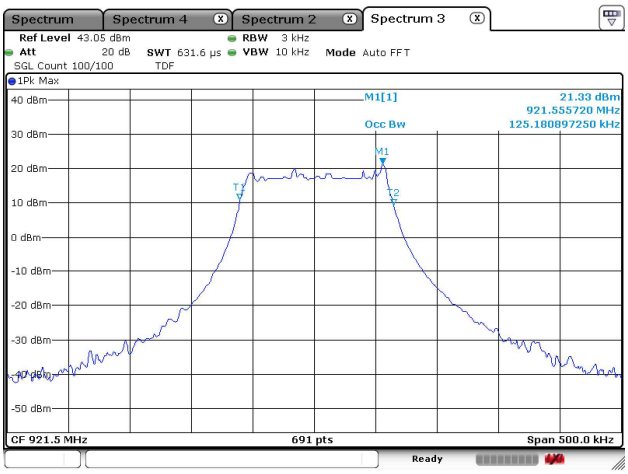


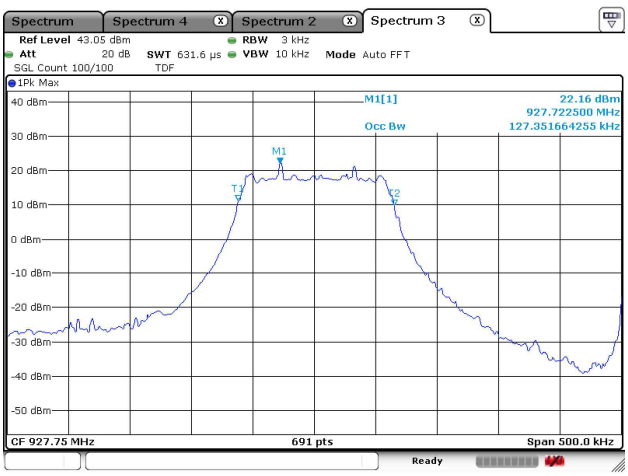
CH High



99 % Bandwidth







5.3 Channel Separation

5.3.1 Standard Applicable [FCC §15.247(a)(1)]

Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

5.3.2 Test Environment conditions

• Ambient temperature : (22 ~ 23) ℃ • Relative Humidity : (43 ~ 45) % R.H.

5.3.3 Measurement Procedure

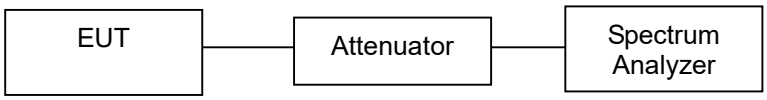
ANSI C63.10 (2013) : Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were used.
3. After the trace being stable, the reading value between the peak of the adjacent channels using the marker- Delta function was recorded as the measurement results.

The spectrum analyzer is set to the as follows :

• Span : wide enough to capture the peak of two adjacent channels
• RBW : ≥ 1% of the span
• VBW : ≥ RBW
• Sweep : auto
• Detector function : peak
• Trace : max hold

5.3.4 Test setup



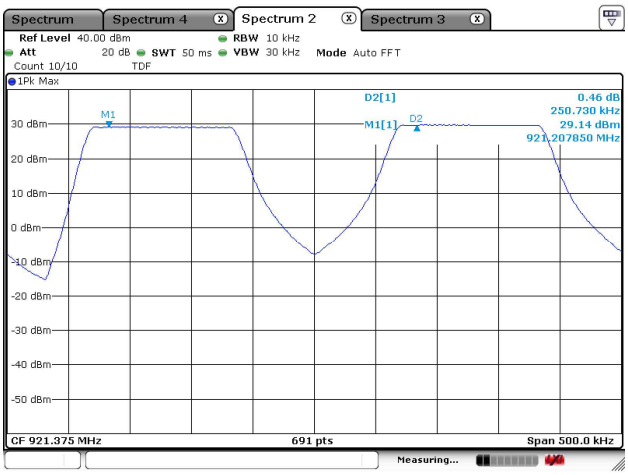
5.3.5 Measurement Result

Modulation Type	Channel	Frequency[MHz]	Channel Separation(MHz)	Limit(MHz)	Test Results
GFSK	25	921.5	0.251	≥0.096	Compliance

* Limit : ≥ 25 kHz or two-thirds of the 20 dB bandwidth

5.3.6 Test plot

Channel Middle



5.4 Number of Hopping Channels

5.4.1 Standard Applicable [FCC §15.247(a)(1)]

Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(1)(i) For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

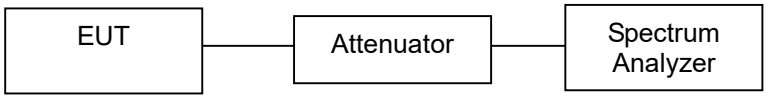
5.4.2 Test Environment conditions

• Ambient temperature : (22 ~ 23) ℃ • Relative Humidity : (43 ~ 45) % R.H.

5.4.3 Measurement Procedure

ANSI C63.10: 2013 and FCC Public Notice DA 00-705 Released March 30, 2000: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

5.4.4 Test setup

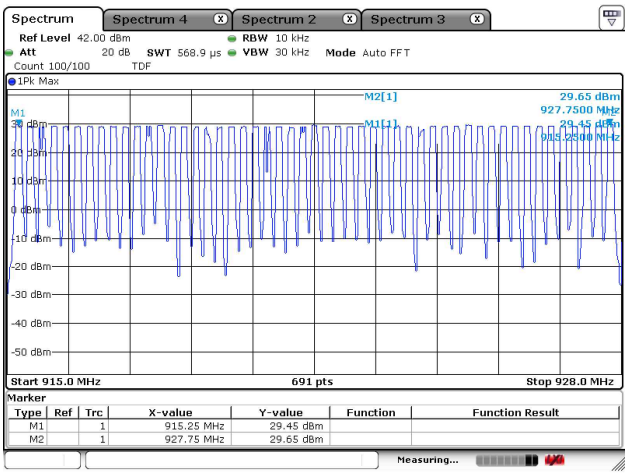


5.4.5 Measurement Result

Modulation Type	Hopping channels number	Limit	Test Results
GFSK	51	≥50	Compliance

5.4.6 Test plot

■ GFSK



5.5 Time of Occupancy

5.5.1 Standard Applicable [FCC §15.247(a)(1)]

(1)(iii) For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

5.5.2 Test Environment conditions

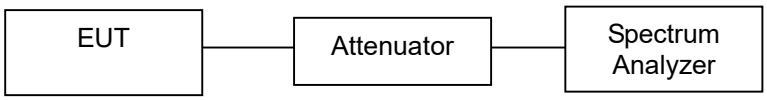
• Ambient temperature : (22 ~ 23) ℃ • Relative Humidity : (43 ~ 45) % R.H.

5.5.3 Measurement Procedure

ANSI C63.10 (2013) : Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled. After used the marker-delta function to determine the dwell time.

5.5.4 Test setup

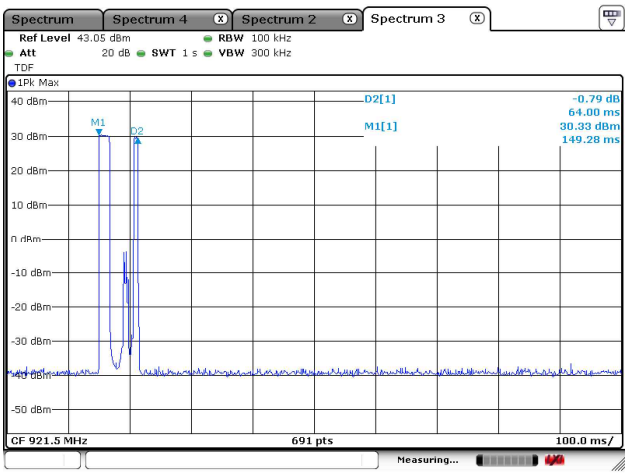


5.5.5 Measurement Result

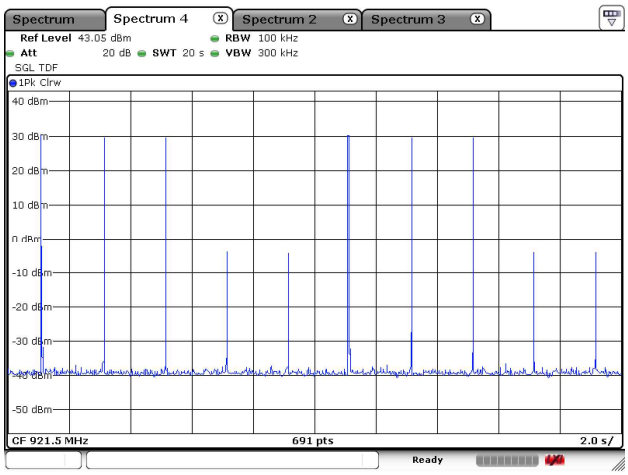
Frequency (MHz)	Burst width per one hop (ms)	Burst Count	Dwell time (ms)	Limit (ms)	Result
921.5	64	6	384	≤ 400	Compliance

5.5.6 Test plot

One Burst



Accumulated



5.6 Conducted Spurious Emissions (Band-edge)

5.6.1 Standard Applicable [FCC §15.247(d)]

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band that contains the highest level of the desired power, based on RF conducted.

5.6.2 Test Environment conditions

• Ambient temperature : (22 ~ 23) ℃ • Relative Humidity : (43 ~ 45) % R.H.

5.6.3 Measurement Procedure

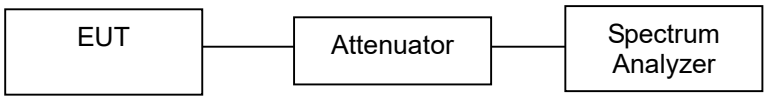
ANSI C63.10 (2013) : Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

(1) The transmitter output was connected to the spectrum analyzer through an attenuator.

(2) Conducted spurious emission the bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz.

(3) Below -20dB of the highest emission level in operating band.

5.6.4 Test setup



5.6.5 Measurement Result

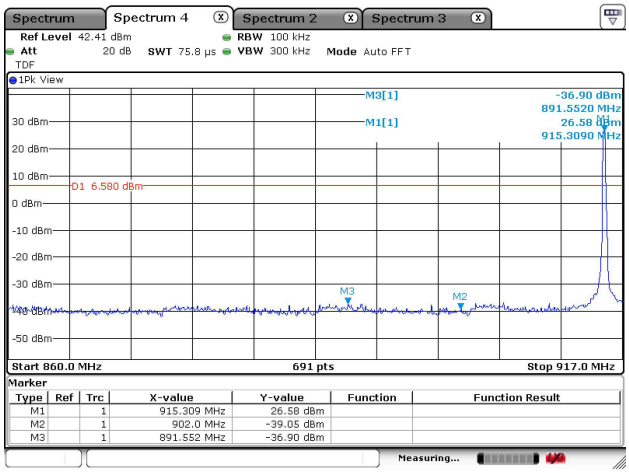
Setting Channel		Test Results			
		Measured value [dB]		Limit [dB]	Result
		Hop on	Hop off		
GFSK	CH 0	-66.00	-63.48	≤ 20 than PSD level	Compliance
	CH 50	-37.56	-27.79		Compliance

Note: The following plots show that there are no conducted spurious emissions exceeding the 20dB down criteria. Plots are also presented showing the band edge compliance.

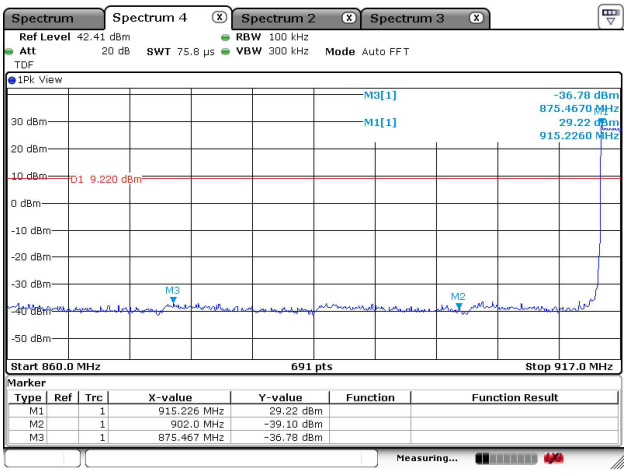
5.6.6 Test Plot (Band-edge)

CH Low

Hop off

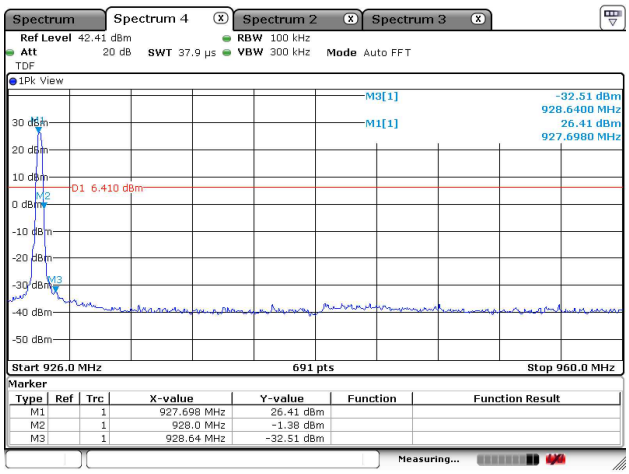


Hop on

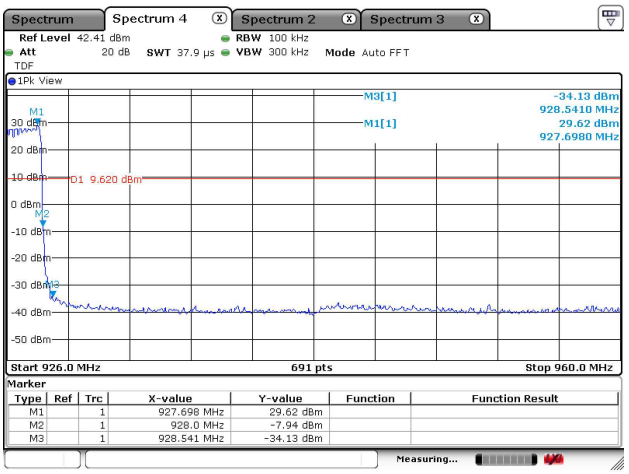


CH High

Hop off

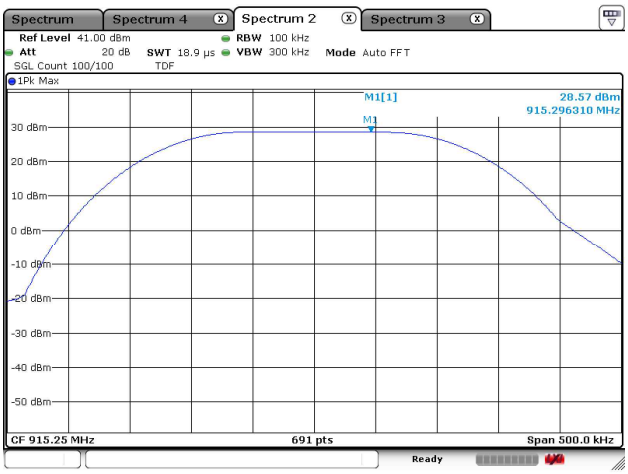


Hop on

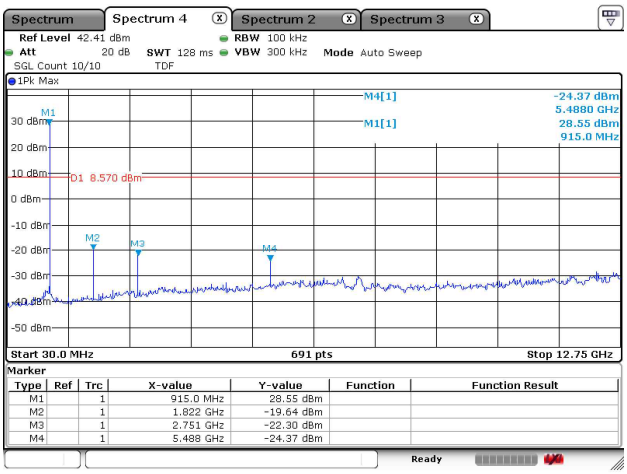


Test Plot (Conducted spurious emissions)

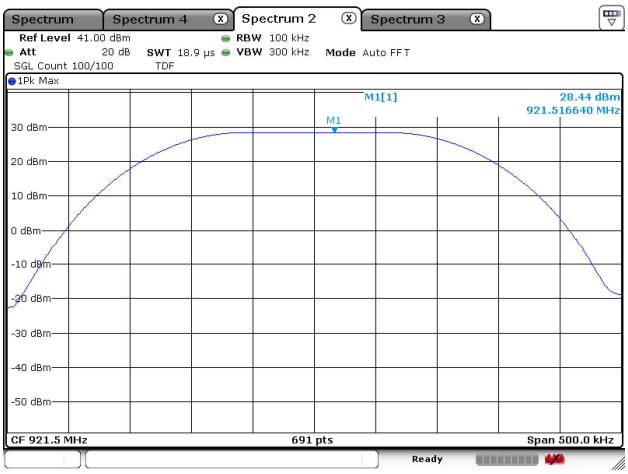
CH Low (Reference)



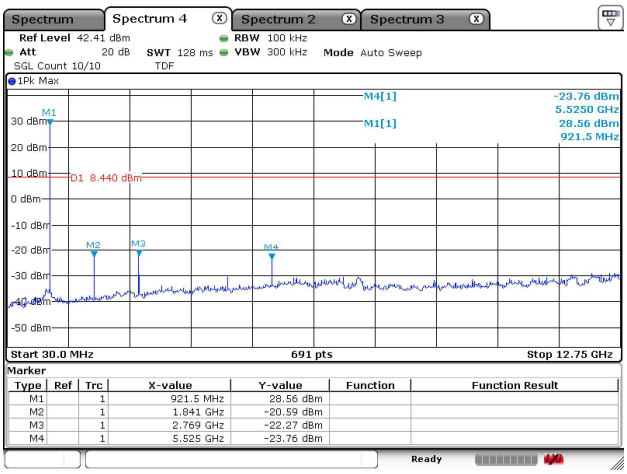
CH Low (Emission)



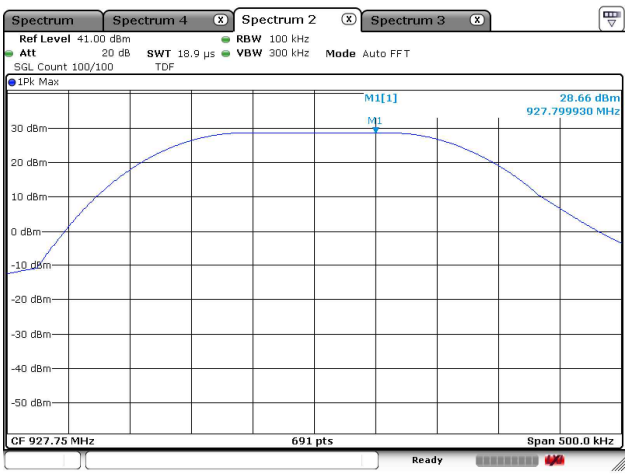
CH Middle (Reference)



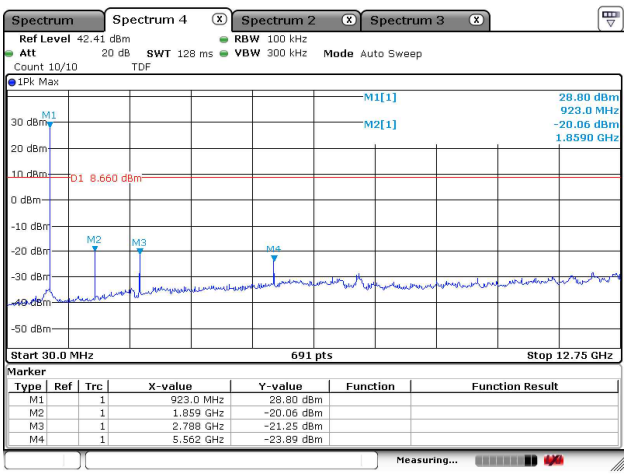
CH Middle (Emission)



CH High (Reference)



CH High (Emission)



Note: It is not recorded on the report that the reading of emissions are attenuated more than 20 dB below the permissible limits

5.7 Spurious RF Radiated emissions

5.7.1 Standard Applicable [FCC §15.247(d)]

FCC

All other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10 GHz, the frequency Range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, Whichever is lower. In addition, radiated emissions which fall in the restricted bands, as defined in Sec.15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a)

§15.209 and RSS-Gen limits for radiated emissions measurements (distance at 3 m)

Frequency Band [MHz]	DISTANCE [Meters]	Limit [㎶/m]	Limit [dB㎶/m]	Detector
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)	Peak
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(F)	Peak
1.705 ~ 30.0	30	30	29.54	Peak
30 - 88	3	100 **	40.00	Quasi peak
88 - 216	3	150 **	43.52	Quasi peak
216 - 960	3	200 **	46.02	Quasi peak
Above 960	3	500	54.00	Average
Above 1000	3	74.0 dB㎶/m (Peak), 54.0 dB㎶/m (Average)		

** fundamental emissions from intentional radiators operation 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 Section 15.231 and 15.241

§15.205. Restrict Band of Operation for FCC

[MHz]	[MHz]	[MHz]	[GHz]
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505**	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.
4.177 25 - 4.177 75	37.5 -38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 -1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.38 6 75	156.7 - 156.9	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 – 4 400	Above 38.6
13.36 - 13.41			

** Until February 1, 1999, this restricted band shall be 0.490-0.510

5.7.2 Test Environment conditions

• Ambient temperature : (22 ~ 23) ℃ • Relative Humidity : (42 ~ 43) % R.H.

5.7.3 Measurement Procedure

The measurements procedure of the Spurious RF Radiated emissions is as following describe method.

1. The EUT was placed on the top of a rotating table (0.8 meters for below 1 GHz and 1.5 meters for above 1 GHz) above the ground at a 3 meter camber. The table was rotated 360 degree to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna master.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both Horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotating table was turned from 0 - 360 degrees to find the maximum reading.
5. The measuring receiver was set to peak detector and specified bandwidth with max hold function.
6. Low, Middle and high channels were measured, and radiation measurements are performed in X, Y, Z axis positioning. And found the worst axis position and only the test worst case mode is recorded in the report.

• The measurement results are obtained as described below:
Result(dBμV/m) = Reading(dBμV) + Antenna factor(dB/m)+ CL(dB) + other applicable factor (dB)

• The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS Average (Duty cycle < 98 %) for Average detection (AV) at frequency above 1 GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).

• The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.

• According to §15.33 (a)(1), Frequency range of radiated measurement is performed the tenth harmonic.

Above test was performed in accordance with ANSI C63.10-2013 Section 6.10.5 & 6.4, 6.5, 6.6

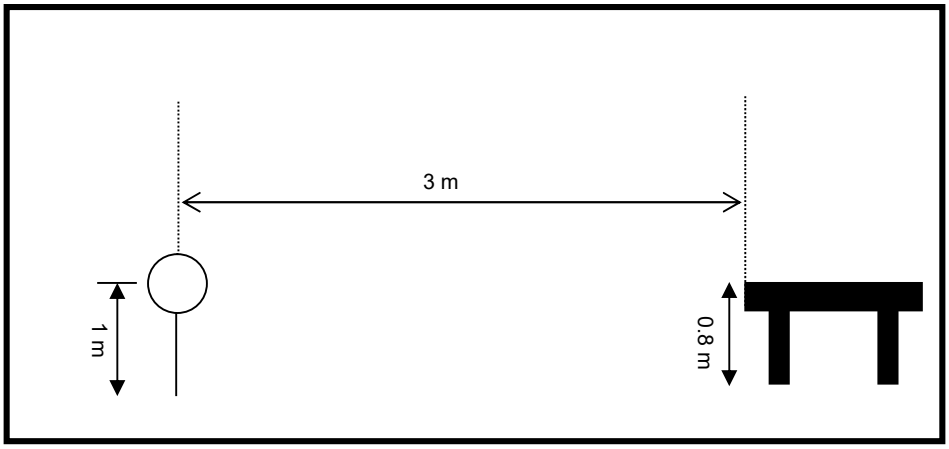
5.7.4 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the UCISPR measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

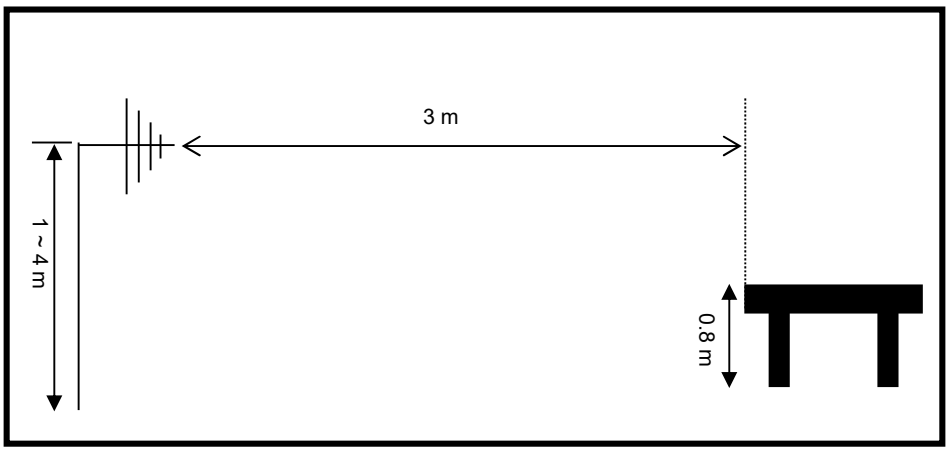
Radiated Emission measurement: Below 1 GHz: 3.80 dB (CL: Approx 95 %, k=2)
Above 1 GHz: 3.42 dB (CL: Approx 95 %, k=2)

5.7.5 Test Configuration

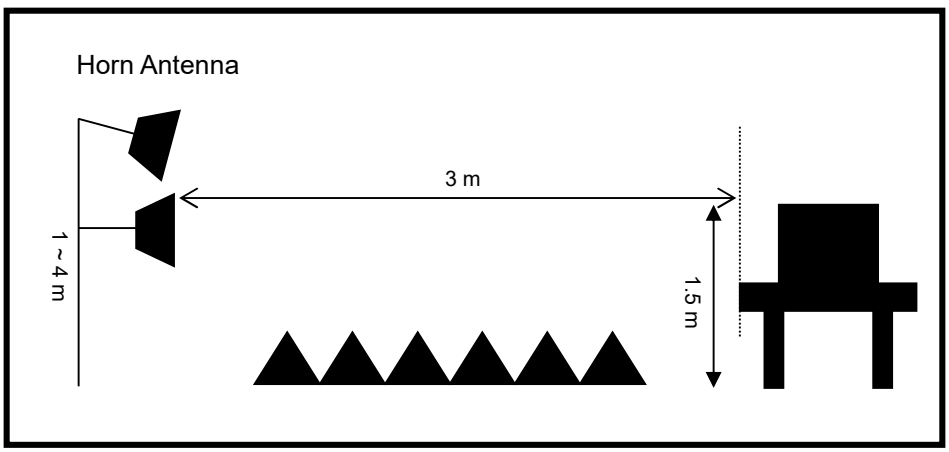
Radiated emission setup, below 30 MHz



Radiated emission setup, below 1 000 MHz



Radiated emission setup, above 1 GHz



5.7.6 Measurement Result

▣ Above 1 GHz

CH Low (915.25 MHz)

Freq. (GHz)	Reading (dBμV/m)		Antenna			CL (dB)	AMP (dB)	Meas Result (dBμV/m)		Limit (dBμV/m)		Mgn. (dB)		Result
	PK	AV	Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
1.830	66.43	48.16	1.5	H	27.18	6.42	31.63	66.43	48.16	74	54	7.57	5.84	Compliance
2.747	57.87	37.75	1.5	H	29.21	7.97	30.80	57.87	37.75	74	54	16.13	16.25	Compliance
1.830	52.60	35.62	2.0	V	27.18	6.42	31.63	52.60	35.62	74	54	21.40	18.38	Compliance
2.747	57.37	37.43	2.0	V	29.21	7.97	30.80	57.37	37.43	74	54	16.63	16.57	Compliance

CH Middle (921.5 MHz)

Freq. (GHz)	Reading (dBμV/m)		Antenna			CL (dB)	AMP (dB)	Meas Result (dBμV/m)		Limit (dBμV/m)		Mgn. (dB)		Result
	PK	AV	Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
1.839	63.62	45.62	1.5	H	27.24	6.44	31.62	63.62	45.62	74	54	10.38	8.38	Compliance
2.760	61.73	41.55	1.5	H	29.18	7.98	30.79	61.73	41.55	74	54	12.27	12.45	Compliance
1.839	56.53	38.29	2.0	V	27.24	6.44	31.62	56.53	38.29	74	54	17.47	15.71	Compliance
2.760	56.52	37.18	2.0	V	29.18	7.98	30.79	56.52	37.18	74	54	17.48	16.82	Compliance

CH High (927.75 MHz)

Freq. (GHz)	Reading (dBμV/m)		Antenna			CL (dB)	AMP (dB)	Meas Result (dBμV/m)		Limit (dBμV/m)		Mgn. (dB)		Result
	PK	AV	Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
1.847	63.19	45.33	1.5	H	27.29	6.45	31.61	63.19	45.33	74	54	10.81	8.67	Compliance
2.785	62.28	41.90	1.5	H	29.13	7.99	30.75	62.28	41.90	74	54	11.72	12.10	Compliance
1.847	51.18	34.90	2.0	V	27.29	6.45	31.61	51.18	34.90	74	54	22.82	19.10	Compliance
2.785	61.07	41.07	2.0	V	29.13	7.99	30.75	61.07	41.07	74	54	12.93	12.93	Compliance

※Note

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dBμV/m(Average), 74 dBμV/m(Peak), Attenuated more than 20 dB below the permissible value.
- It is not recorded on the report that the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to measured.
- For the below 30 MHz and above 2.785 GHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 26.5 GHz.
- The reading includes values for Antenna factor, Cable loss, and Amp gain.

▣ Below 1 GHz

CH Low (915.25 MHz)

Freq. (MHz)	Reading (dBμV/m)	Antenna			CL (dB)	AMP (dB)	Meas Result (dBμV/m)	Limit (dBμV/m)	Mgn (dB)	Result
		Height (m)	Pol. (H/V)	Fctr. (dB/m)						
217.64	31.47	1.5	H	16.78	2.10	46.37	31.47	46.00	14.53	Compliance
231.85	34.01	1.5	H	17.52	2.19	46.37	34.01	46.00	11.99	Compliance
708.69	37.26	1.5	H	27.61	3.75	45.81	37.26	46.00	8.74	Compliance
723.79	37.58	1.5	H	27.79	3.80	45.81	37.58	46.00	8.42	Compliance
217.64	22.72	2.0	V	16.78	2.10	46.37	22.72	46.00	23.28	Compliance
231.85	23.51	2.0	V	17.52	2.19	46.37	23.51	46.00	22.49	Compliance
881.18	36.51	2.0	V	29.32	4.26	45.60	36.51	46.00	9.49	Compliance

Freq.(㎒) : Measurement frequency, Reading(dBμV/m) : includes values for Antenna factor, Cable loss, and Amp gain, Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB), Meas Result (dBμV/m) :Reading(dBμV/m)+ Antenna factor.(dB/m)+ CL(dB) - Pre AMP(dB)
Limit(dBμV/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dBμV/m) – Meas Result(dBμV/m)

CH Middle (921.5 MHz)

Freq. (MHz)	Reading (dBμV/m)	Antenna			CL (dB)	AMP (dB)	Meas Result (dBμV/m)	Limit (dBμV/m)	Mgn (dB)	Result
		Height (m)	Pol. (H/V)	Fctr. (dB/m)						
217.64	30.73	1.5	H	16.78	2.10	46.37	30.73	46.00	15.27	Compliance
233.49	34.31	1.5	H	17.60	2.20	46.37	34.31	46.00	11.69	Compliance
856.76	36.99	1.5	H	29.07	4.21	45.67	36.99	46.00	9.01	Compliance
231.85	23.28	2.0	V	17.52	2.19	46.37	23.28	46.00	22.72	Compliance
637.79	34.99	2.0	V	26.46	3.54	45.92	34.99	46.00	11.01	Compliance
875.01	36.81	2.0	V	29.25	4.25	45.61	36.81	46.00	9.19	Compliance

Freq.(㎒) : Measurement frequency, Reading(dBμV/m) : includes values for Antenna factor, Cable loss, and Amp gain, Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB), Meas Result (dBμV/m) :Reading(dBμV/m)+ Antenna factor.(dB/m)+ CL(dB) - Pre AMP(dB)
Limit(dBμV/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dBμV/m) – Meas Result(dBμV/m)

CH High (927.75 MHz)

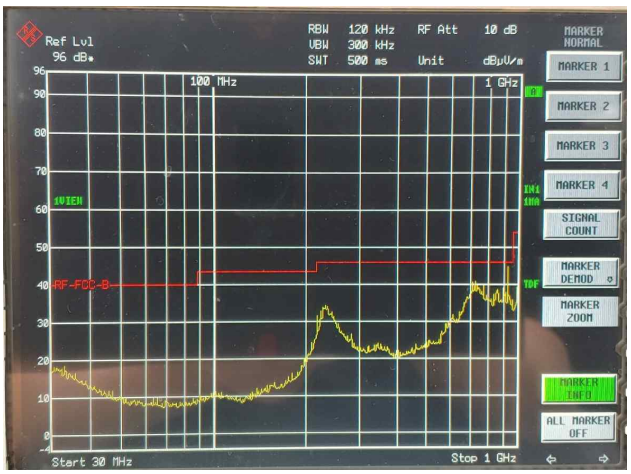
Freq. (MHz)	Reading (dBμV/m)	Antenna			CL (dB)	AMP (dB)	Meas Result (dBμV/m)	Limit (dBμV/m)	Mgn (dB)	Result
		Height (m)	Pol. (H/V)	Fctr. (dB/m)						
233.49	34.98	1.5	H	17.60	2.20	46.37	34.98	46.00	11.02	Compliance
703.69	37.19	1.5	H	27.55	3.73	45.82	37.19	46.00	8.81	Compliance
754.96	37.50	1.5	H	28.10	3.90	45.78	37.50	46.00	8.50	Compliance
856.76	36.73	1.5	H	29.07	4.21	45.67	36.73	46.00	9.27	Compliance
235.13	28.59	2.0	V	17.69	2.21	46.37	28.59	46.00	17.41	Compliance
708.69	34.75	2.0	V	27.61	3.75	45.81	34.75	46.00	11.25	Compliance
881.18	37.32	2.0	V	29.32	4.26	45.60	37.32	46.00	8.68	Compliance

Freq.(㎒) : Measurement frequency, Reading(dBμV/m) : includes values for Antenna factor, Cable loss, and Amp gain, Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB), Meas Result (dBμV/m) :Reading(dBμV/m)+ Antenna factor.(dB/m)+ CL(dB) - Pre AMP(dB)
Limit(dBμV/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dBμV/m) – Meas Result(dBμV/m)

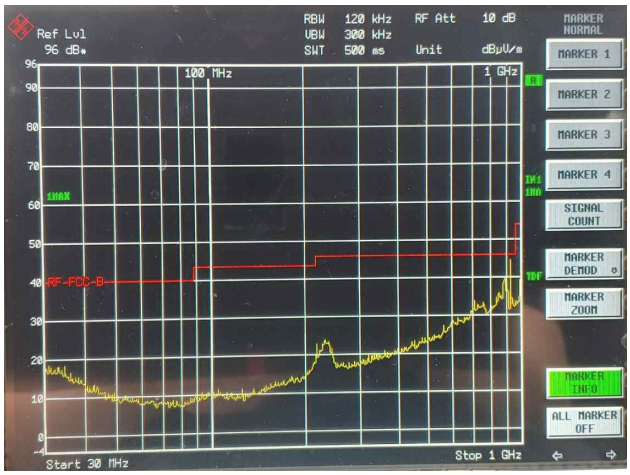
5.7.7 Plots

▪ Below 1 GHz

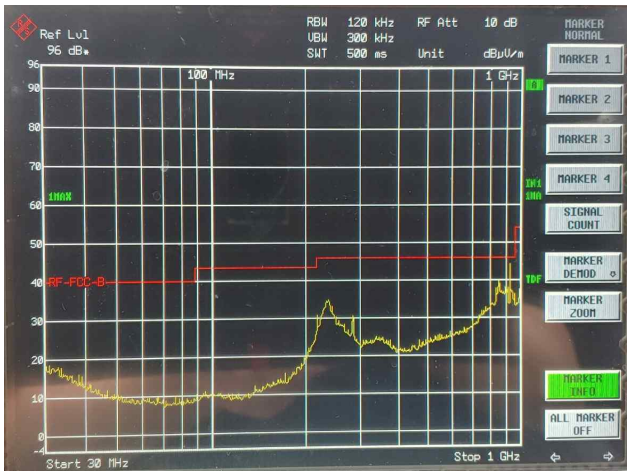
Low CH_Horizontal



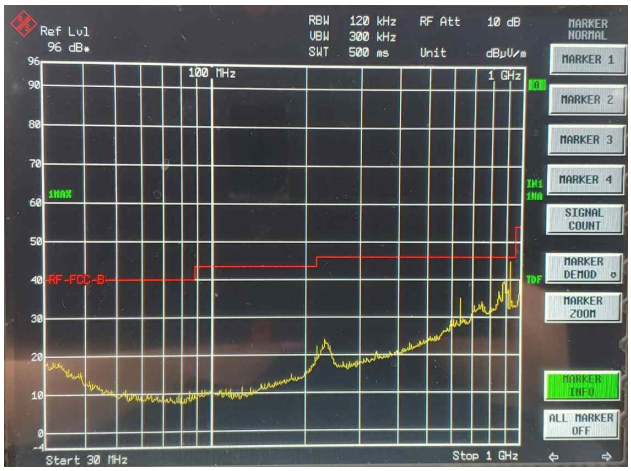
Low CH_Vertical



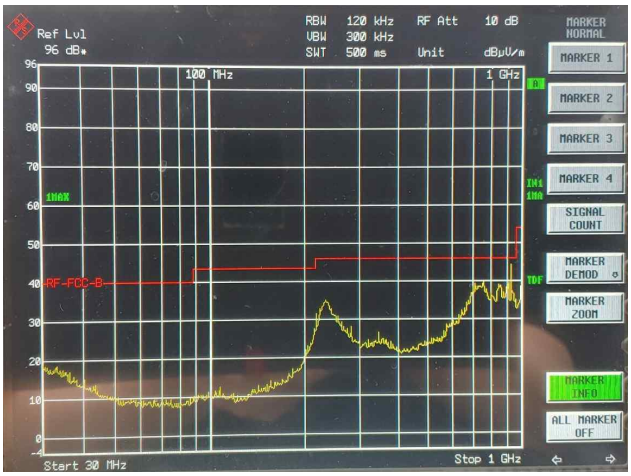
Mid CH_Horizontal



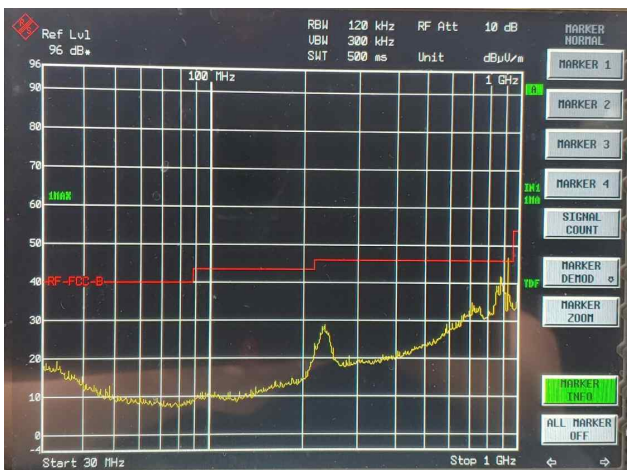
Mid CH_Vertical



High CH_Horizontal

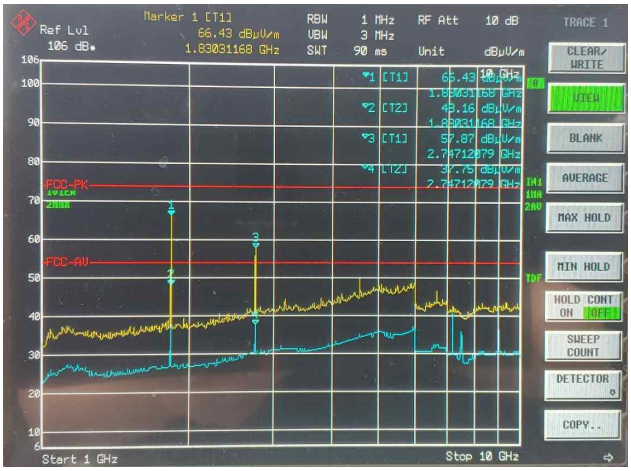


High CH_Vertical

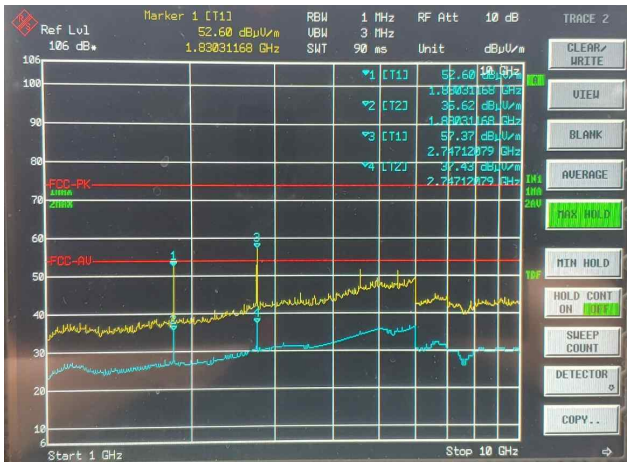


▪ Above 1 GHz

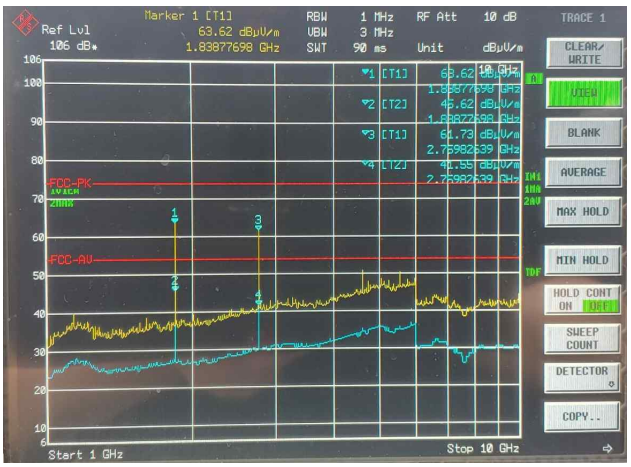
Low CH_Horizontal



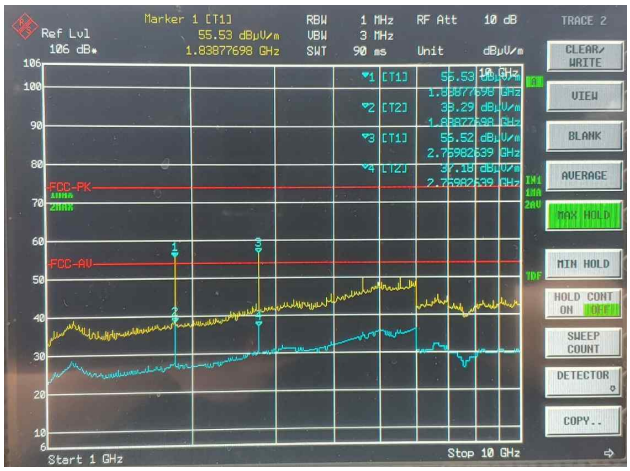
Low CH_Vertical



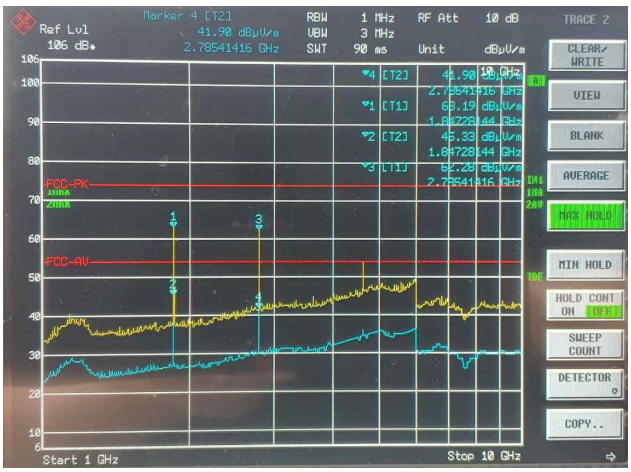
Mid CH_Horizontal



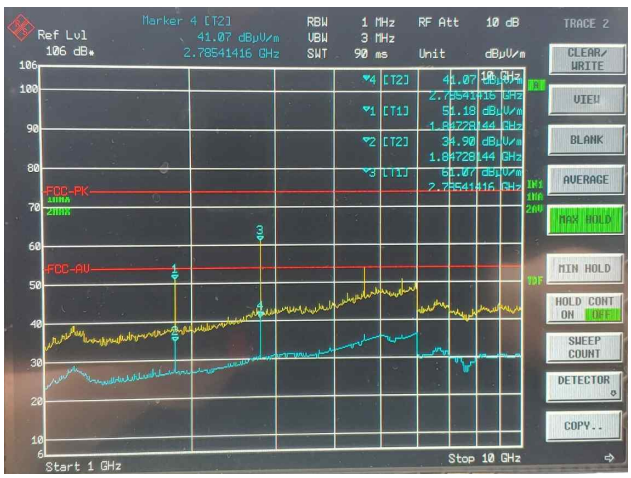
Mid CH_Vertical



High CH_Horizontal



High CH_Vertical



5.8 Antenna requirement

5.8.1 Standard applicable [FCC §15.203]

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

The use of a permanently attached antenna or of an antenna that user a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The manufacturer may design the unit so that broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

5.8.2 Antenna details

Frequency Band	Antenna Type	Gain [dBi]	Results
900 MHz	Whip antenna fixed on PCB by special screw bolt	0 dBi	Compliance

5.9 AC Power Conducted emissions

5.9.1 Standard Applicable [FCC §15.207(a)]

For intentional radiator that is designed to be connected to the public utility(AC)power line, the radio frequency. Voltage that is conducted back onto the AC power line on any frequencies hopping mode within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line Impedance stabilization network(LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

§15.207 limits for AC line conducted emissions;

Frequency of Emission(㎒)	Conducted Limit (dBμV)	
	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

5.9.2 Test Environment conditions

• Ambient temperature : (22 ~ 23) ℃ • Relative Humidity : (42 ~ 43) % R.H.

5.9.3 Measurement Procedure

EUT was placed on a non- metallic table height of 0.8 m above the reference ground plane. Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the Maximum signal strength.

5.9.4 Used equipment

Equipment	Model No.	Serial No.	Manufacturer	Next cal date	Cal interval	Used
Test receiver	ESCS30	100111	Rohde & Schwarz	2024. 01. 10.	1 year	☒
Pulse Limiter	ESH3-Z2	100097	Rohde & Schwarz	2024. 01. 10.	1 year	☒
LISN	ESH2-Z5	100044	R&S	2024. 01. 10.	1 year	☐
	ESH3-Z5	100147	R&S	2024. 01. 10.	1 year	☒

*Test Program: “ ESXS-K1 V2.2”

Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the UCISPR measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

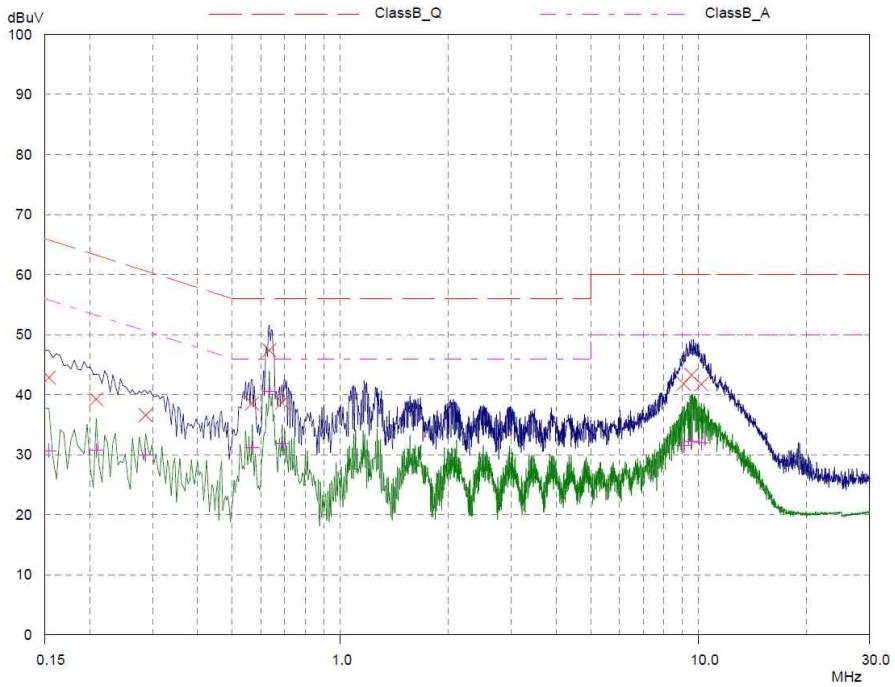
0.009 kHz ~ 30 MHz(L) : 3.94 dB(CL: Approx 95 %, *k*=2)
0.009 kHz ~ 30 MHz(N) : 3.32 dB(CL: Approx 95 %, *k*=2)

5.9.5 Measurement Result

Freq.	Factor [dB]		POL	QP			CISPR AV		
				Limit	Reading	Result	Limit	Reading	Result
[㎒]	LISN	CABLE +P/L		[dB㎶]	[dB㎶]	[dB㎶]	[dB㎶]	[dB㎶]	[dB㎶]
0.154	0.14	9.89	L	65.79	42.85	42.99	55.79	30.12	30.26
0.209	0.13	9.90	L	63.26	39.24	39.37	53.26	30.25	30.38
0.287	0.13	9.91	L	60.62	36.60	36.73	50.62	29.41	29.54
0.568	0.15	9.92	L	56.00	38.55	38.70	46.00	30.64	30.79
0.634	0.16	9.93	L	56.00	47.40	47.56	46.00	40.02	40.18
0.689	0.16	9.93	L	56.00	38.71	38.87	46.00	31.21	31.37
9.064	0.42	10.21	L	60.00	41.82	42.24	50.00	31.02	31.44
9.541	0.43	10.22	L	60.00	43.28	43.71	50.00	31.83	32.26
10.170	0.45	10.23	L	60.00	41.76	42.21	50.00	31.42	31.87
0.170	0.11	9.89	N	64.98	43.69	43.80	54.98	29.58	29.69
0.181	0.11	9.90	N	64.43	42.82	42.93	54.43	28.92	29.03
0.224	0.11	9.90	N	62.66	39.59	39.70	52.66	26.80	26.91
0.642	0.14	9.93	N	56.00	43.78	43.92	46.00	34.30	34.44
1.076	0.17	9.97	N	56.00	35.50	35.67	46.00	26.15	26.32
1.584	0.20	9.98	N	56.00	34.09	34.29	46.00	25.04	25.24
9.400	0.40	10.22	N	60.00	40.85	41.25	50.00	28.43	28.83
9.974	0.41	10.23	N	60.00	39.70	40.11	50.00	28.92	29.33
10.377	0.43	10.24	N	60.00	38.60	39.03	50.00	28.61	29.04

* LISN: LISN insertion Loss, Cable: Cable Loss, P/L:pulse limiter factor
* L: Line. Live, N: Line. Neutral
* Reading: test receiver reading value (with cable loss & pulse limiter factor)
* Result = LISN + Reading

Line. Live



Line. Neutral