

(FCC) TEST REPORT

Report No. : BVT-RH-FCR-250010

Applicant

• Name : Apulse Co.,Ltd
• Address : 3-508,509, 120, Gunpocheomdansaneop 2-ro, Gunpo-si, Gyeonggi-do, 15880,
Republic of Korea

Test Item

• Product Name : RFID Reader Module
• Model Name : Air12

Manufacturer

• Name : Apulse Co.,Ltd
• Address : 3-508,509, 120, Gunpocheomdansaneop 2-ro, Gunpo-si, Gyeonggi-do, 15880,
Republic of Korea

Date of Test : 2025.10.13. ~ 2025.10.17.

FCC CFR 47, Part 15. Subpart C-15.247

Test Method Used : 558074 D01 15.247 Meas Guidance v05r02
ANSI C 63.10-2020

Test Result : ☒ Pass ☐ Fail

Note : None

This test report is not related to KOLAS accreditation

Affirmation Tested by
Name : Lee, Heon-Ho (Signature)

Technical Manager
Name : Lee, Ha-Rim (Signature)

2025 . 11 . 3 .

Bureau Veritas CPS Korea Tech Limited



Revision History of test report

Date	Report No.	Revision Histoty
2025.11.3	BVT-RH-FCR-250010	Initial issue

Contents

1. INFORMATION OF TESTING LABORATORY	4
2 SUMMARY OF TEST RESULTS	5
2.1 DECISION RULES FOR STATEMENT OF CONFORMITY	6
2.2 MEASUREMENT UNCERTAINTY	6
3 GENERAL INFORMATION	7
3.1 GENERAL DESCRIPTION OF EUT	7
3.2 TESTED SAMPLE AND TESTED COMPANION DEVICE INFORMATION	7
3.3 DESCRIPTION OF TEST MODE	8
3.4 INSTRUMENT CALIBRATION	8
3.5 EUT CONFIGURATION	8
3.6 GENERAL DESCRIPTION OF APPLIED STANDARDS	8
3.7 TEST EQUIPMENT	9
3.8 USED TEST CABLE	9
4 TEST RESULTS	10
4.1 Peak Output Power	10
4.2 20 dB Bandwidth	14
4.3 Channel Separation	20
4.4 Number of Hopping Channels	23
4.5 Time of Occupancy	25
4.6 Conducted Spurious Emissions (Band-edge)	29
4.7 Spurious RF Radiated emissions	37
4.8 Antenna requirement	54



1. Information of Testing Laboratory

Legal Name and address

Bureau Veritas CPS Korea Tech Limited

(Annyeong-dong) 26, 28, 30, Seja-ro 406beon-gil, Hwaseong-si, Gyeonggi-do, 18326, Republic of Korea

Website: <http://www.bvcpskoreatech.co.kr>

Registration information

- KOLAS No.: KT232
- RRA No.: KR0041
- A2LA No.: 4068.02, 4068.03
- FCC Designation No.: KR0041
- ISED Designation No.: KR0041
- VCCI Membership No.: 2005

Test location and address

☒ Hwaseong

(Annyeong-dong) 26, 28, 30, Seja-ro 406beon-gil, Hwaseong-si, Gyeonggi-do, 18326, Republic of Korea

Tel: 82-31-222-4251

☐ Anyang

Heungan-daero 49, Dongan-gu, Anyang-si, Gyeonggi-do, 14119, Republic of Korea

Tel: +82-31-689-4110, Fax: +82-31-689-4120

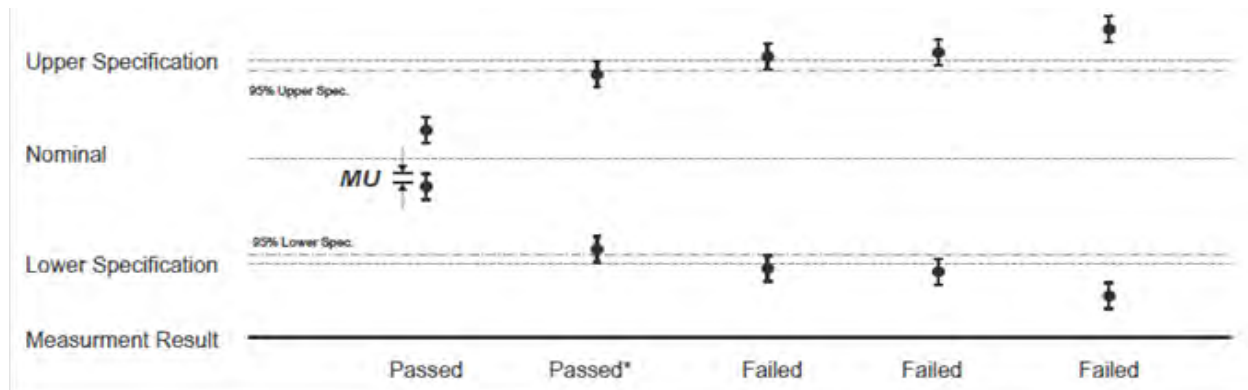
2 Summary of Test Results

The EUT has been tested according to the following specifications

Applied Standard : FCC Part 15, Subpart C 15.247					
FCC Part Section(s)	Test Description	Limit	Test Condition	Test Result	Reference
15.247(b)(2)	Peak Output Power	≤ 1 Watt (hop CH > 50) ≤ 0.25 Watt (hop CH < 50)	Conducted	PASS	Section 4.1
15.247(a)(1)	20 dB Bandwidth	≤ 500 kHz	Conducted	PASS	Section 4.2
-	Occupied Bandwidth (99 %)	N/A	Conducted	PASS	Section 4.2
15.247(a)(1)	Channel Separation	≥ 25 kHz or 20 dB BW, whichever is greater	Conducted	PASS	Section 4.3
15.247(a)(1)	Number of Hopping Channels	≥ 50 hops, if 20 dB BW < 250 kHz ≥ 25 hops, if 20 dB BW ≥ 250 kHz	Conducted	PASS	Section 4.4
15.247(a)(1)	Time of Occupancy	≤ 0.4 sec	Conducted	PASS	Section 4.5
15.247(d)	Conducted Spurious Emissions	20 dBc (at least 20 dB down from the highest emission level)	Conducted	PASS	Section 4.6
15.247(d), 15.209 and 15.205	Radiated Spurious Emissions	FCC 15.247(d)	Radiated	PASS	Section 4.7
15.203	Antenna Requirement	FCC 15.203	-	PASS	Section 4.8
15.207	AC Power Conducted emissions	FCC 15.207	-	-	-

- 1) The test is not applicable because the EUT will be installed in vehicles and will not be connected to the public utility (AC) power line

2.1 Decision Rules for Statement of Conformity



QUA-52 Decision Rule(QA Document) was applied.

Step 1) : Reference Check, Daily Check, Peripheral device Check

Step 2) : Re-test Procedure (Repeat the test maximum 3 times, Different Test Engineer)

- 1) If the original test results are subject to retesting and the judgement is unclear, the retest is carried out.
- 2) If the result of the first retest is the same as the initial test, the judgement is made based on the value.
- 3) If the result of the first retest differ from the results of the initial test, the second re-test is carried out.
- 4) After completion of the second retest, the average of the three test results is determined as the final result. However, if the deviation of the three test values is more than 5 % of the reference value, the technical manager should review the reproducibility of the test from the beginning.

2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2

Measurement Items	Frequency Range	Expanded Uncertainty $U = kU_c (k = 2)$
Radiated Spurious Emissions	1 GHz Below	5.06
	1 GHz Above	5.00
Measurement Items		Expanded Uncertainty $U = kU_c (k = 2)$
Conducted	0.009 MHz – 0.15 MHz	3.54
	0.15 MHz – 30 MHz	3.16

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k = 2$.

3 General Information

3.1 General Description of EUT

Equipment Class	RFID/USN Wireless
Product name	RFID Reader Module
FCC ID	2BR2ZAIR12
Model	Air12
Additional model name	-
Power Supply	DC 5 V
Modulation Type	ASK
Transfer Rate	-
Operating Frequency	902.75 MHz ~ 927.25 MHz
Output Power	29.04 dBm
Antenna Type	External PCB Patch Antenna
Antenna Gain	5.3 dBi
H/W Version	Ver01
S/W Version	V2.00.00.b01

3.2 Tested sample and Tested companion device information

Type	Model	Note
Notebook	LG15U47	S/N: 712QCKJ563509
Adapter	A13-040N3A	S/N: None



3.3 Description of Test Mode

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics.

Test Mode		Tested Frequency (MHz)		
TM 1	RFID	902.75	915.25	927.25

3.4 INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

3.5 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.6 General Description of Applied Standards

Generally the tests were performed according to the specifications of the standard, it must comply with the requirements of the following standards.

FCC CFR 47 Part 15, Subpart C (§15.247)
558074 D01 15.247 Meas Guidance v05r02
ANSI C63.10-2020

All test items in this test report have been performed and recorded as per the above standards.



3.7 Test Equipment

Test Equipment is traceable to the National Institute of Standards and Technology (NIST). Measurement antenna used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. D ate
Spectrum Analyzer	Rohde & Schwarz	FSV30	20-353063	2026.01.08
EMI Test Receiver	Rohde & Schwarz	ESI	837514/004	2026.08.06
Signal Generator	Rohde & Schwarz	SMB100A	179628	2026.01.09
DC Power supply	Unicon Co.,Ltd	UP-3005T	68	2026.01.06
Attenuator	WEINSCHEL	1850W-20F	64671	2026.08.11
BiconiLog Antenna(R)	ETS-LINDGREN	3142C	35880	2026.10.17
Horn Antenna	ETS-LINDGREN	3117	00135191	2026.03.24
Horn Antenna	SCHWARZBECK	BBHA 9170	9170-722	2026.01.13
AMPLIFIER(C_3)	TESTEK	TK-PA01S	200141-L	2026.08.12
AMPLIFIER	TESTEK	TK-PA18	150003	2026.01.07
AMPLIFIER	TESTEK	TK-PA1840H	160010-L	2026.01.06
Loop Antenna	EMCO	FMZB1513	#374	2027.02.11

3.8 Used Test Cable

Manufacturer	Model No.	Serial No.	Spec	Next Cal. D ate
SUHNER	SUCOFLEX 126E	MY2202/26E	9 kHz ~ 26.5 GHz(1 M)	2026.12.01
SUHNER	SUCOFLEX 126E	MY2203/26E	9 kHz ~ 26.5 GHz(1 M)	2026.12.01

4 Test Results

4.1 Peak Output Power

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

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt (30 dBm) for systems employing at least 50 hopping channels; and, 0.25 watts (24 dBm) for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

4.1.2 Test Environment conditions

- Ambient temperature : (20 ~ 21) °C • Relative Humidity : (38 ~ 41) % R.H.

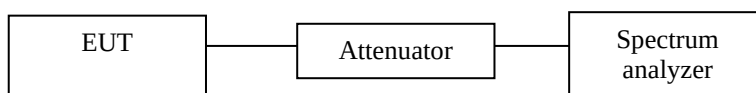
4.1.3 Measurement Procedure

ANSI C63.10 (2020) : The RF output power was measured with a spectrum analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A spectrum analyzer was used to record the shape of the transmit signal.

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.

4.1.4 Test setup



4.1.5 Measurement Result

■ Ant 1

Channel	Frequency [MHz]	Output Power	Limit [dBm]	Test Results
		[dBm]		
0	902.75	29.04	30	Compliance
25	915.25	28.80	30	Compliance
49	927.25	28.77	30	Compliance

■ Ant 2

Channel	Frequency [MHz]	Output Power	Limit [dBm]	Test Results
		[dBm]		
0	902.75	23.40	30	Compliance
25	915.25	24.79	30	Compliance
49	927.25	24.86	30	Compliance

■ Ant 3

Channel	Frequency [MHz]	Output Power	Limit [dBm]	Test Results
		[dBm]		
0	902.75	26.44	30	Compliance
25	915.25	26.26	30	Compliance
49	927.25	25.57	30	Compliance

■ Ant 4

Channel	Frequency [MHz]	Output Power	Limit [dBm]	Test Results
		[dBm]		
0	902.75	26.39	30	Compliance
25	915.25	26.32	30	Compliance
49	927.25	26.26	30	Compliance

4.1.6 Test Plot

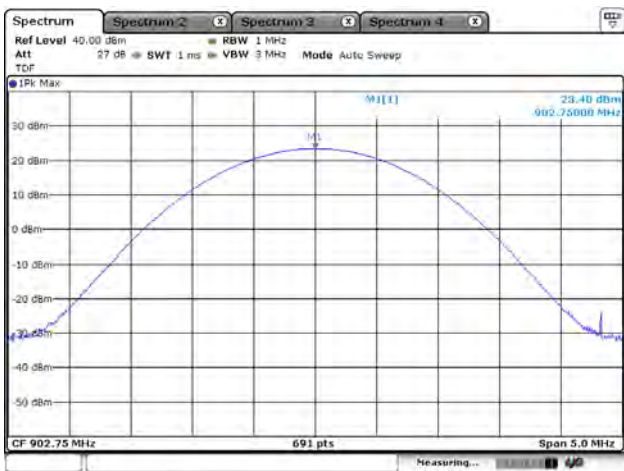
■ Ant 1

CH Low



■ Ant 2

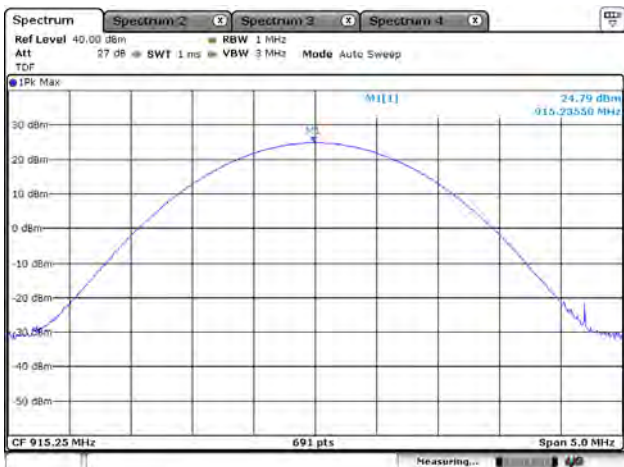
CH Low



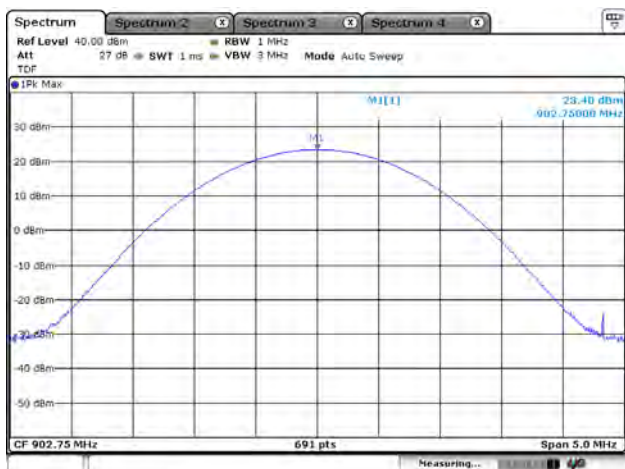
CH Middle



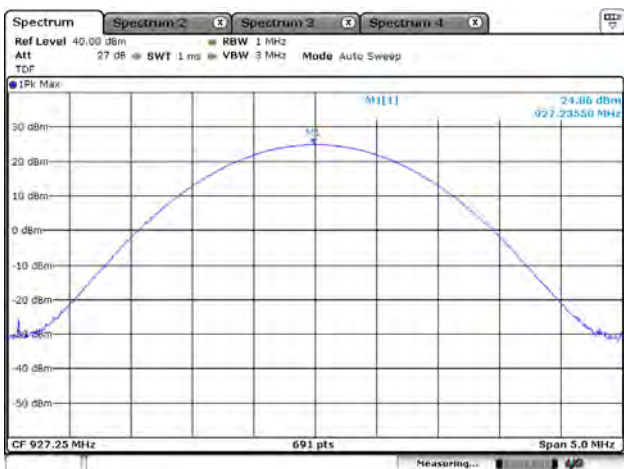
CH Middle



CH High



CH High



Ant 3

CH Low



Ant 4

CH Low



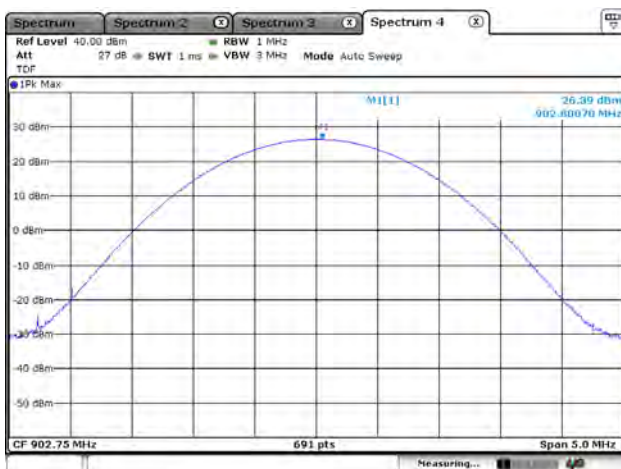
CH Middle



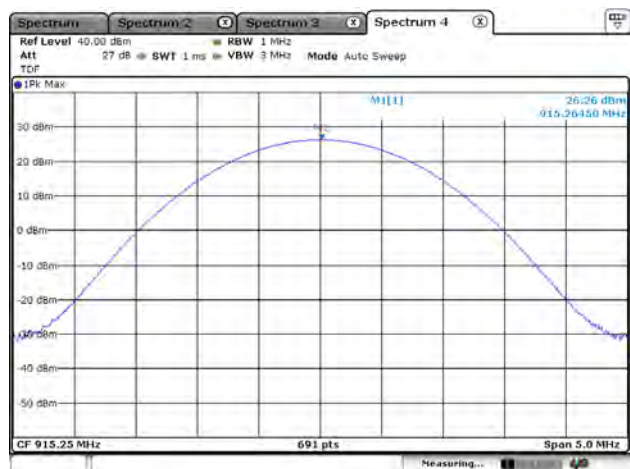
CH Middle



CH High



CH High



4.2 20 dB Bandwidth

4.2.1 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.

4.2.2 Test Environment conditions

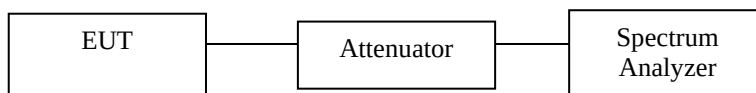
- Ambient temperature : (20 ~ 21) °C • Relative Humidity : (38 ~ 41) % R.H.

4.2.3 Measurement Procedure

ANSI C63.10 (20):

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 $\geq$ RBW.

4.2.4 Test setup



4.2.5 Measurement Result

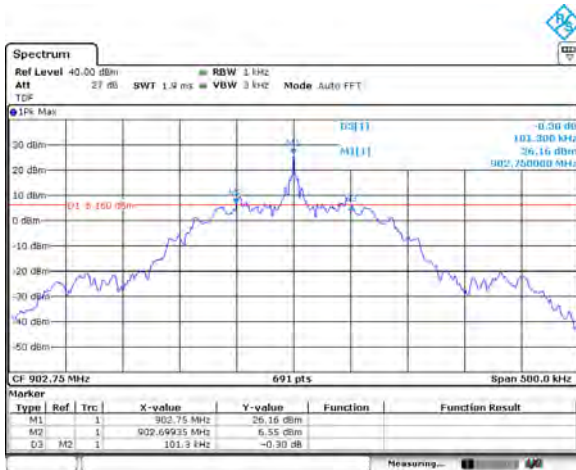
Antenna Port	Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99 % Bandwidth [MHz]	Limit [MHz]	Test Results
Ant 1	0	902.75	0.101	0.172	-	Compliance
	25	915.25	0.101	0.172	-	Compliance
	49	927.25	0.101	0.174	-	Compliance
Ant 2	0	902.75	0.101	0.173	-	Compliance
	25	915.25	0.101	0.173	-	Compliance
	49	927.25	0.111	0.172	-	Compliance
Ant 3	0	902.75	0.101	0.172	-	Compliance
	25	915.25	0.101	0.172	-	Compliance
	49	927.25	0.101	0.172	-	Compliance
Ant 4	0	902.75	0.101	0.171	-	Compliance
	25	915.25	0.101	0.171	-	Compliance
	49	927.25	0.101	0.173	-	Compliance

4.2.6 Test Plot

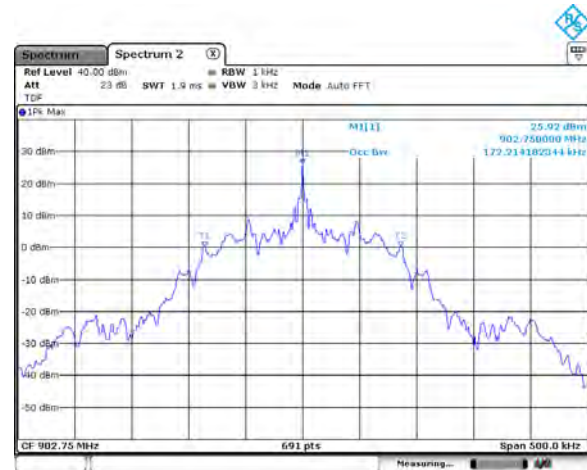
■ Ant 1

20 dB Bandwidth

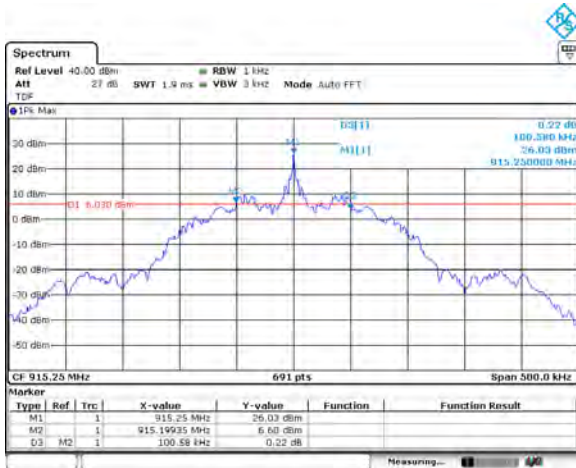
CH Low



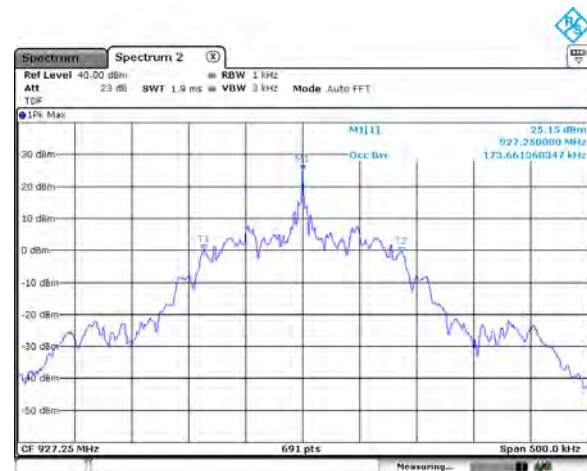
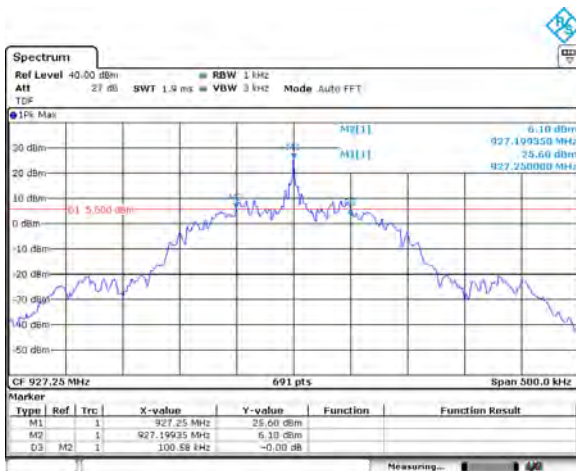
99 % Bandwidth



CH Middle



CH High



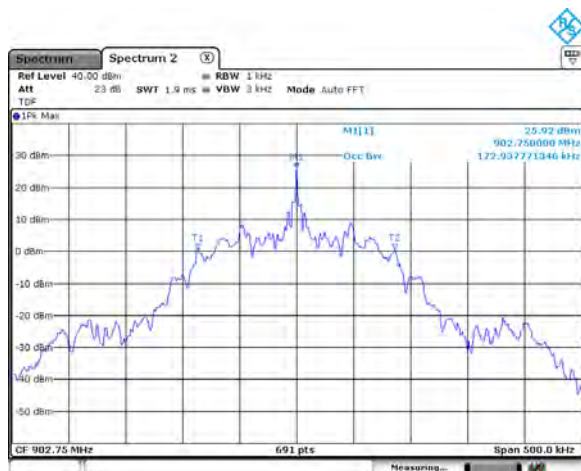
■ Ant 2

20 dB Bandwidth

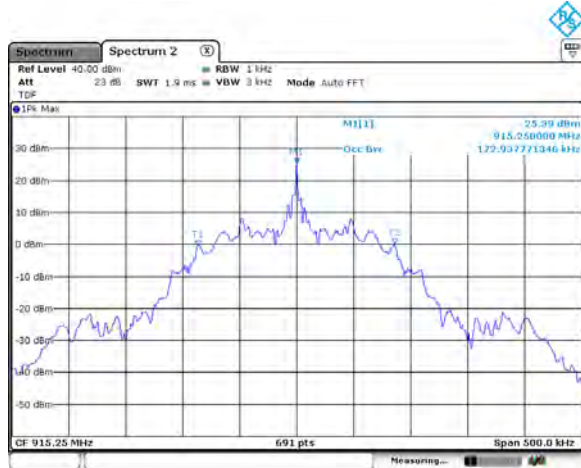
CH Low



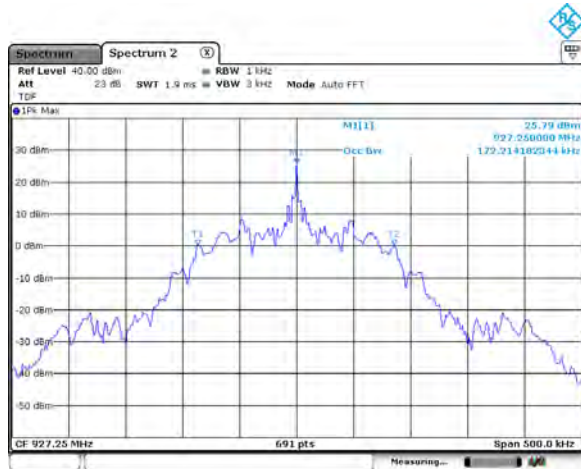
99 % Bandwidth



CH Middle



CH High



Ant 3

20 dB Bandwidth

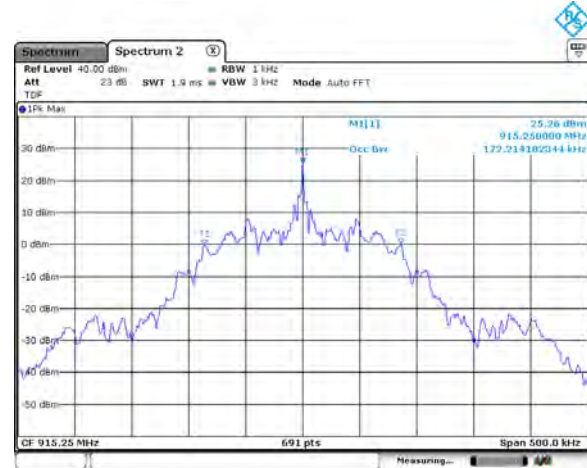
CH Low



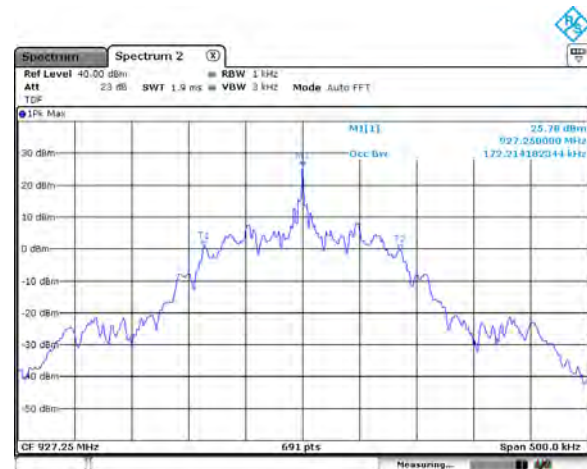
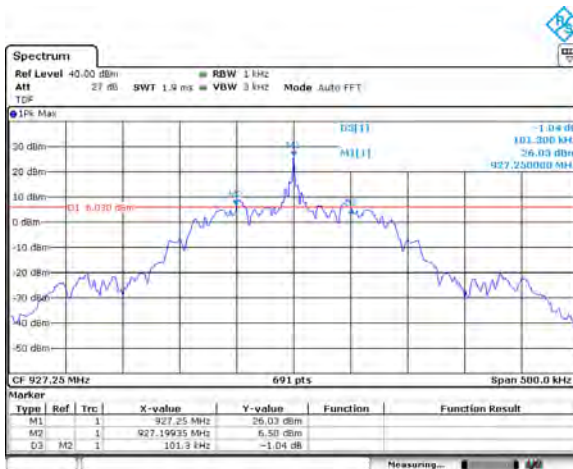
99 % Bandwidth



CH Middle



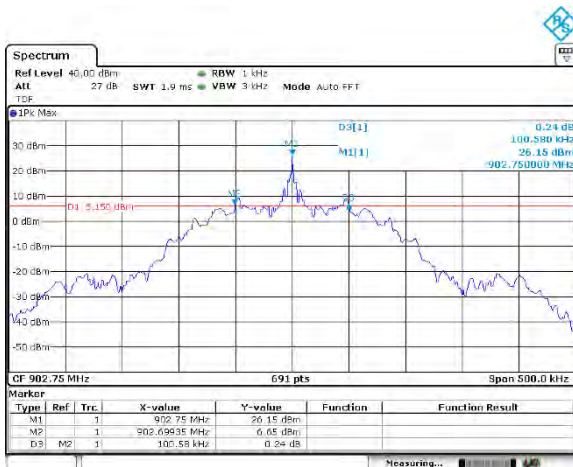
CH High



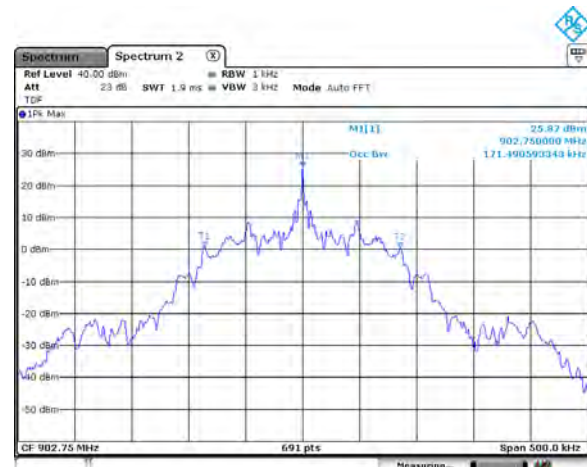
Ant 4

20 dB Bandwidth

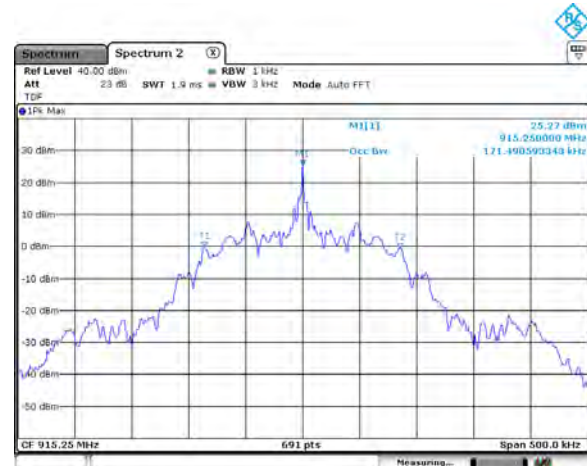
CH Low



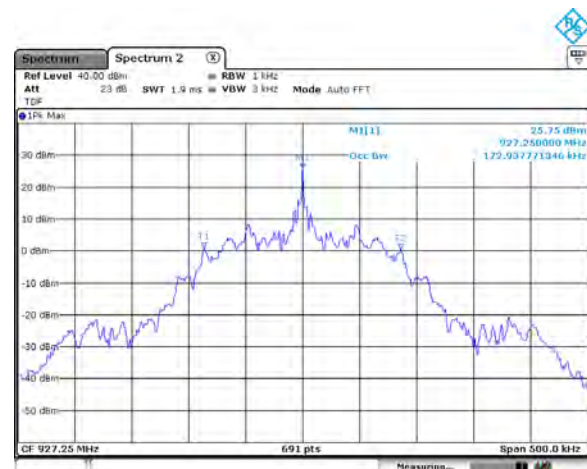
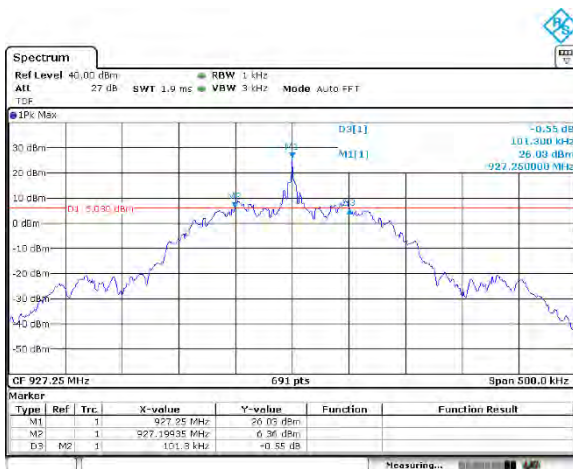
99 % Bandwidth



CH Middle



CH High



4.3 Channel Separation

4.3.1 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)(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.

4.3.2 Test Environment conditions

- Ambient temperature : (20 ~ 21) °C • Relative Humidity : (38 ~ 41) % R.H.

4.3.3 Measurement Procedure

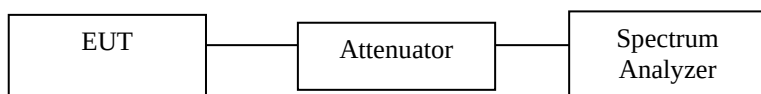
ANSI C63.10 (2020) : Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 200 kHz and the video bandwidth of 500 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 : $\geq 1\%$ of the span
- VBW : $\geq$ RBW
- Sweep : auto
- Detector function : peak
- Trace : max hold

4.3.4 Test setup





4.3.5 Measurement Result

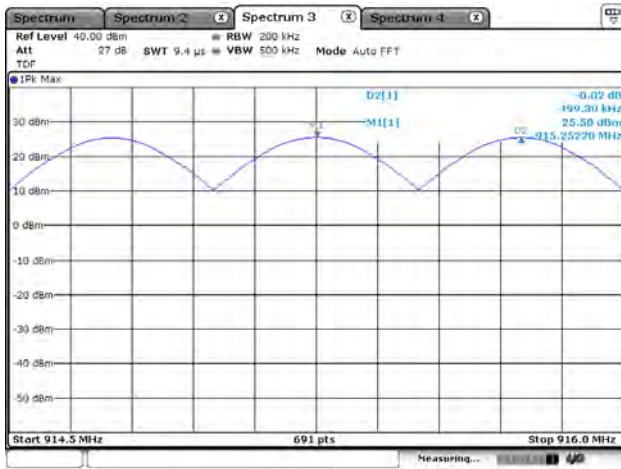
Antenna Port	Hopping Mode	Channel Separation(kHz)	Limit(kHz)	Test Results
Ant 1	Enable	499.30	≥ 25	Compliance
Ant 2	Enable	497.10	≥ 25	Compliance
Ant 3	Enable	501.40	≥ 25	Compliance
Ant 4	Enable	501.40	≥ 25	Compliance

* Limit : ≥ 25 kHz or 20 dB bandwidth

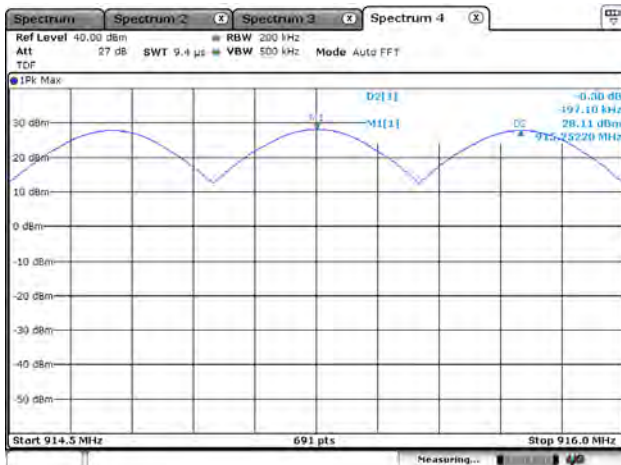
4.3.6 Test plot

■ Ant 1

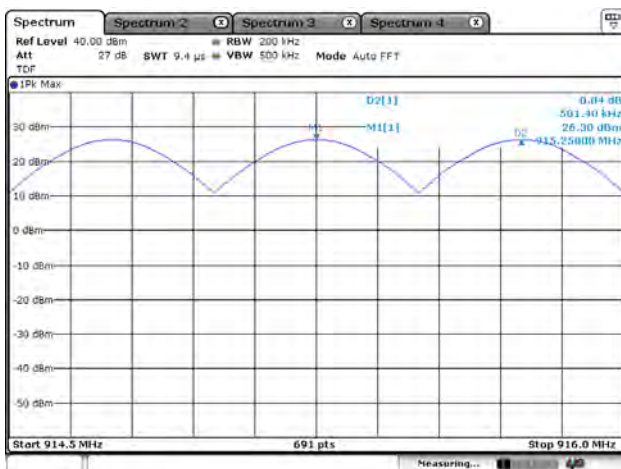
■ Ant 4



■ Ant 2



■ Ant 3



4.4 Number of Hopping Channels

4.4.1 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.

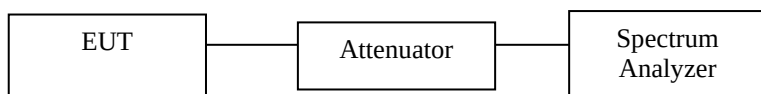
4.4.2 Test Environment conditions

- Ambient temperature : (20 ~ 21) °C • Relative Humidity : (38 ~ 41) % R.H.

4.4.3 Measurement Procedure

ANSI C63.10: 2020 and FCC Public Notice DA 00-705 Released March 30, 2000: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

4.4.4 Test setup

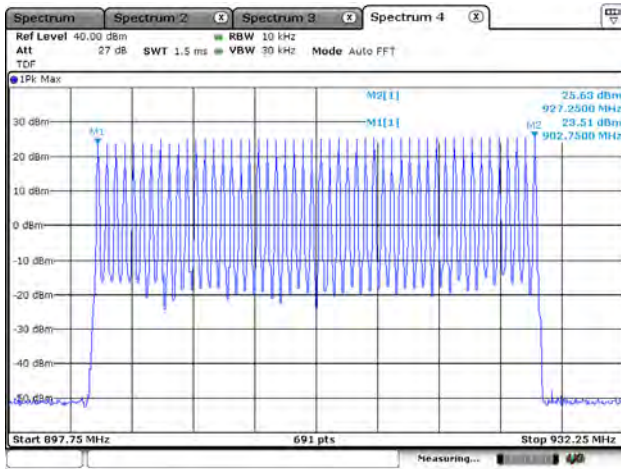


4.4.5 Measurement Result

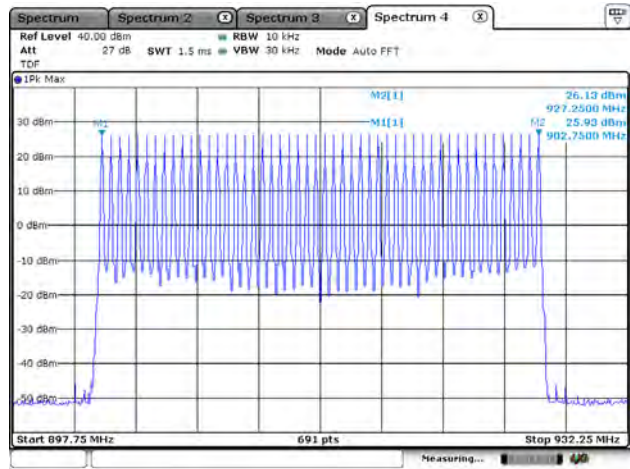
Antenna Port	Hopping channels number	Limit	Test Results
Ant 1	50	≥ 50	Compliance
Ant 2	50	≥ 50	Compliance
Ant 3	50	≥ 50	Compliance
Ant 4	50	≥ 50	Compliance

4.4.6 Test plot

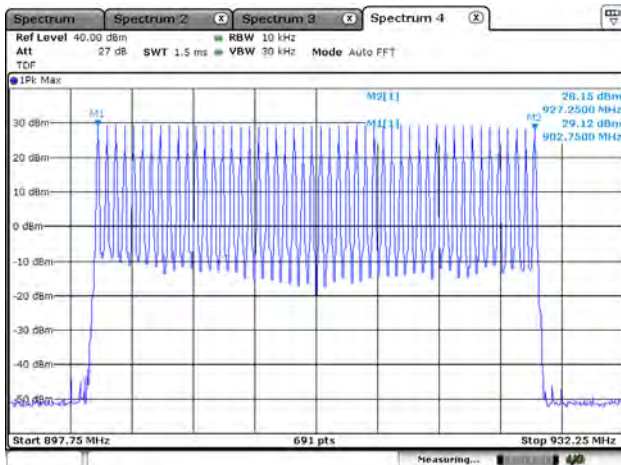
■ Ant 1



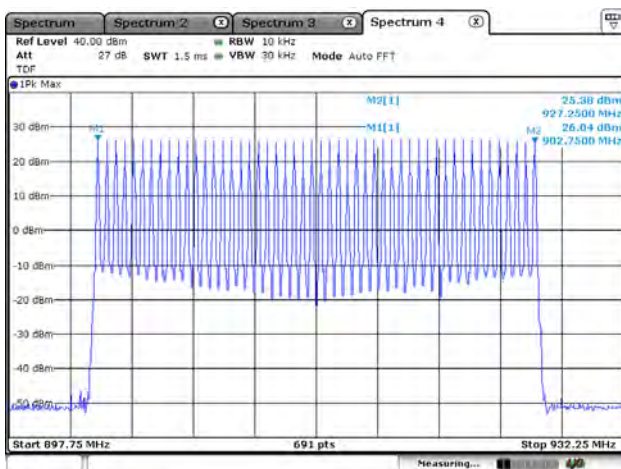
■ Ant 4



■ Ant 2



■ Ant 3



4.5 Time of Occupancy

4.5.1 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.

4.5.2 Test Environment conditions

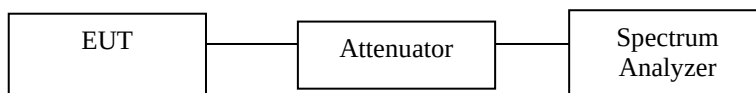
- Ambient temperature : (20 ~ 21) °C • Relative Humidity : (38 ~ 41) % R.H.

4.5.3 Measurement Procedure

ANSI C63.10 (2020) : 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.

4.5.4 Test setup





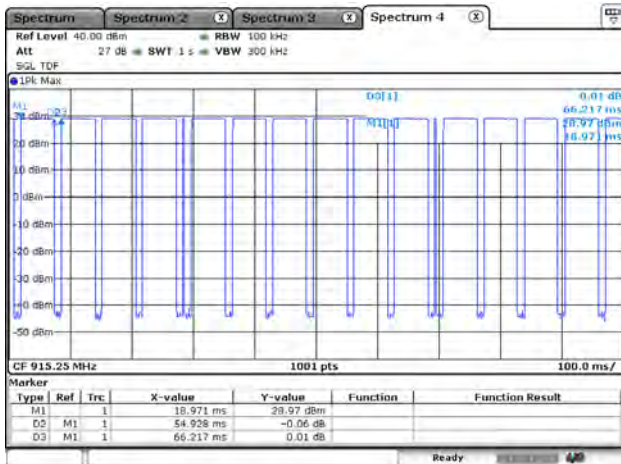
4.5.5 Measurement Result

Antenna Port	Burst width per one hop (ms)	Number of hops in 20 seconds	Test Results		
			Dwell time (ms)	Limit (ms)	Result
Ant 1	54.93	1	54.93	≤ 400	Compliance
Ant 2	54.93	1	54.93	≤ 400	Compliance
Ant 3	55.07	1	55.07	≤ 400	Compliance
Ant 4	55.07	1	55.07	≤ 400	Compliance

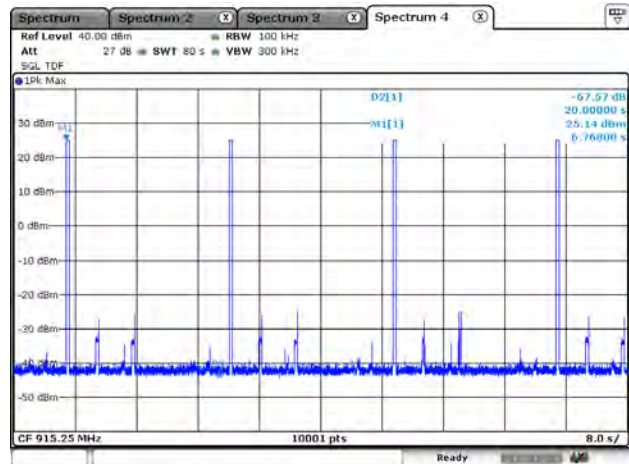
4.5.6 Test plot

■ Ant 1

Burst width per one hop

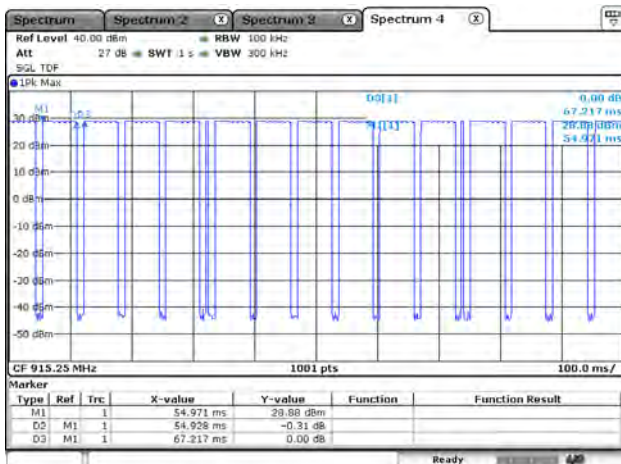


Number of hops in 20 seconds

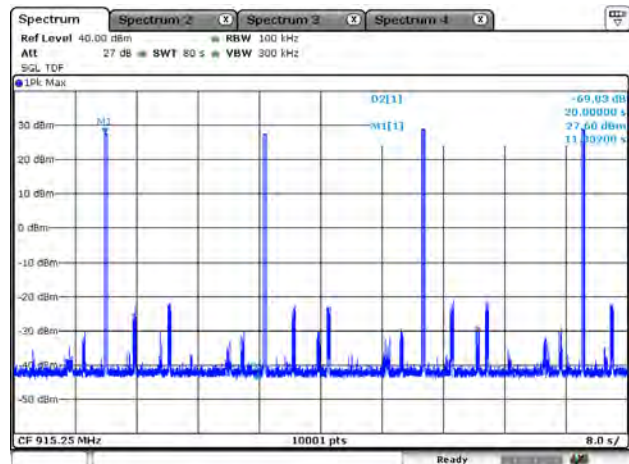


■ Ant 2

Burst width per one hop

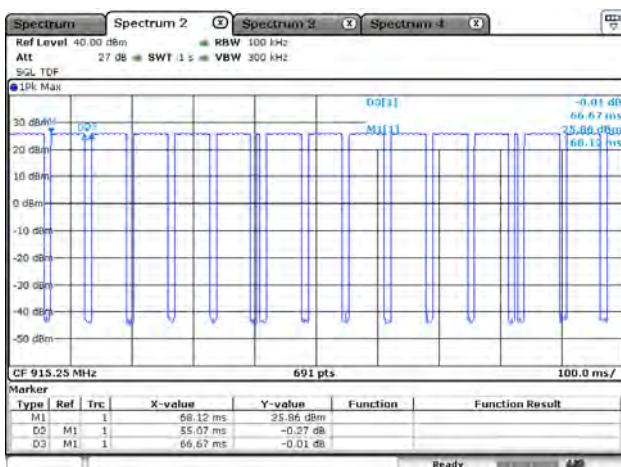


Number of hops in 20 seconds

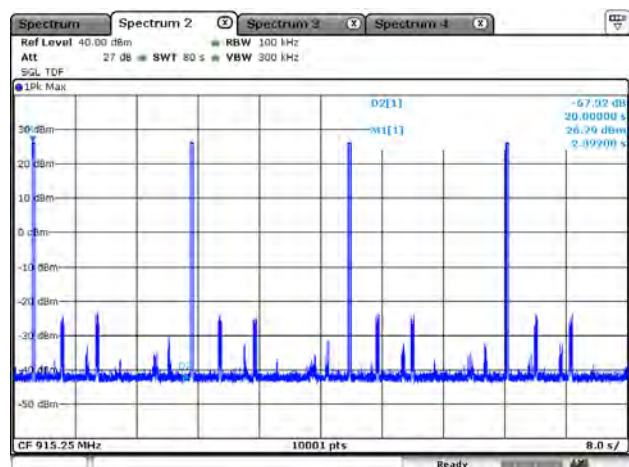


■ Ant 3

Burst width per one hop

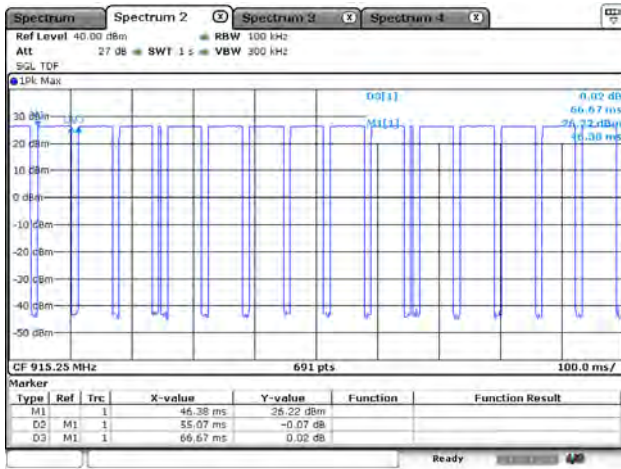


Number of hops in 20 seconds

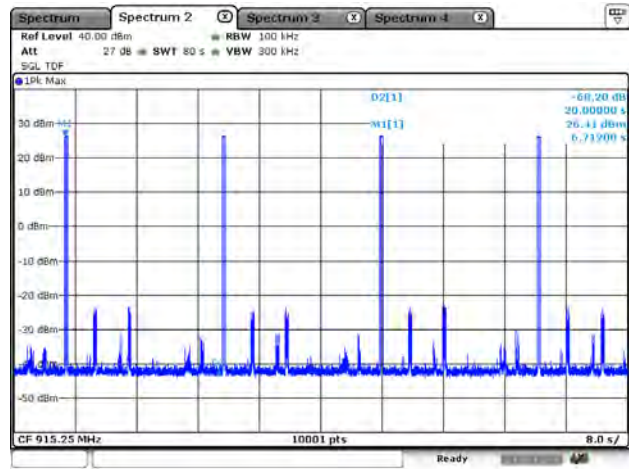


■ Ant 4

Burst width per one hop



Number of hops in 20 seconds



4.6 Conducted Spurious Emissions (Band-edge)

4.6.1 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 either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

4.6.2 Test Environment conditions

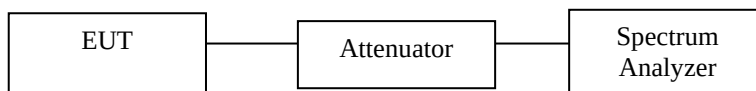
- Ambient temperature : (20 ~ 21) °C • Relative Humidity : (38 ~ 41) % R.H.

4.6.3 Measurement Procedure

ANSI C63.10 (2020) : 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.

4.6.4 Test setup



4.6.5 Measurement Result

Antenna Port	Setting Channel	Band-edge Test Results			
		Measured value [dB]		Limit [dB]	Result
		Hop off	Hop on		
Ant 1	CH Low	-63.52	-68.74	≤ 20 than PSD level	Compliance
	CH High	-64.07	-66.37		Compliance
Ant 2	CH Low	-67.78	-68.17		Compliance
	CH High	-65.56	-68.22		Compliance
Ant 3	CH Low	-65.78	-67.17		Compliance
	CH High	-65.43	-67.64		Compliance
Ant 4	CH Low	-65.13	-67.20		Compliance
	CH High	-63.89	-68.06		Compliance

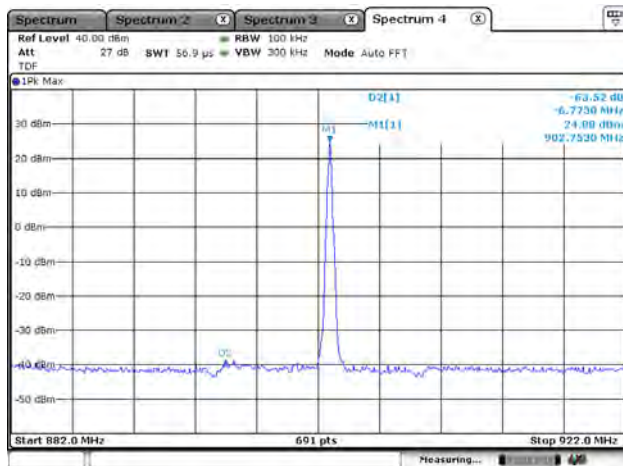
Antenna Port	Setting Channel	Conducted spurious emissions Test Results		
		Measured value [dB]	Limit [dB]	Result
Ant 1	CH Low	-46.76	≤ 20 than PSD level	Compliance
	CH Middle	-46.26		Compliance
	CH High	-46.77		Compliance
Ant 2	CH Low	-49.98		Compliance
	CH Middle	-50.00		Compliance
	CH High	-50.12		Compliance
Ant 3	CH Low	-49.47		Compliance
	CH Middle	-48.32		Compliance
	CH High	-49.37		Compliance
Ant 4	CH Low	-49.01		Compliance
	CH Middle	-48.21		Compliance
	CH High	-47.72		Compliance

4.6.6 Test Plot (Band-edge)

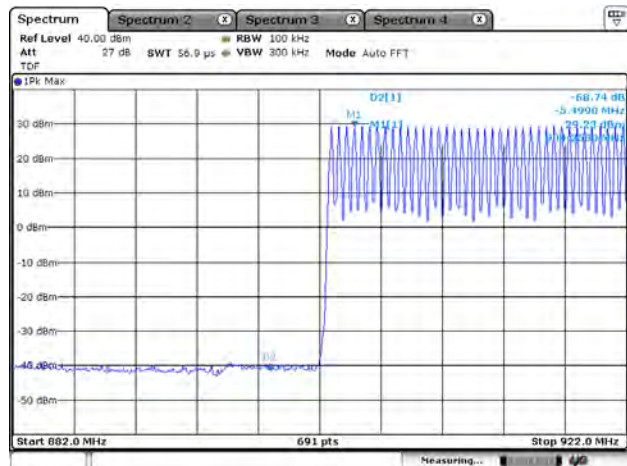
■ Ant 1

CH Low

Hop off

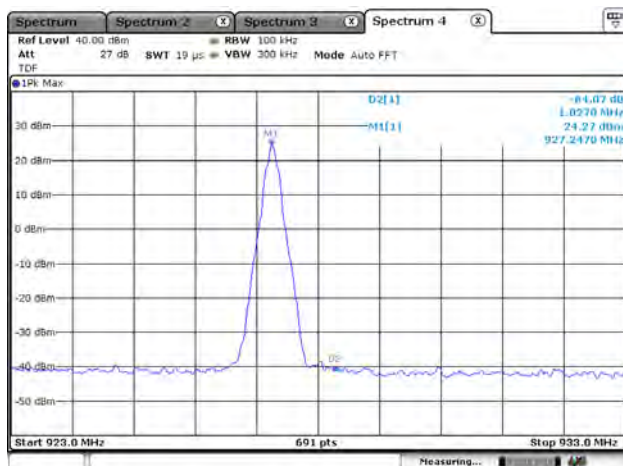


Hop on

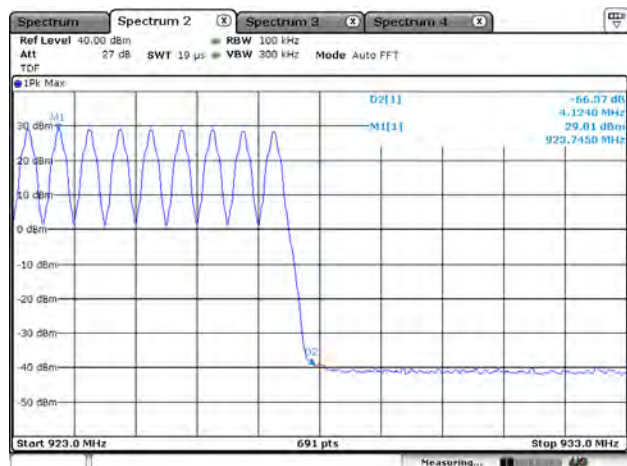


CH High

Hop off



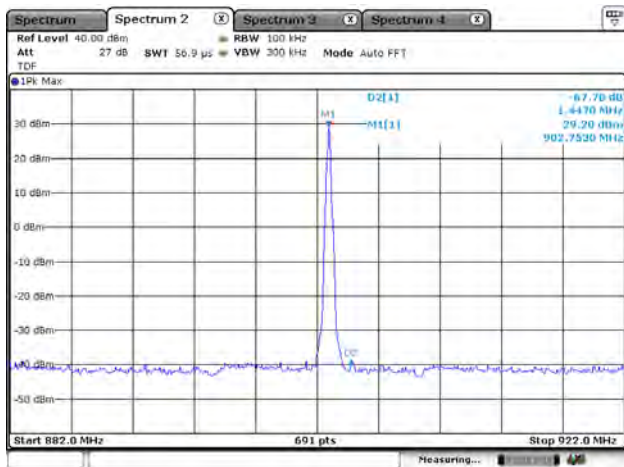
Hop on



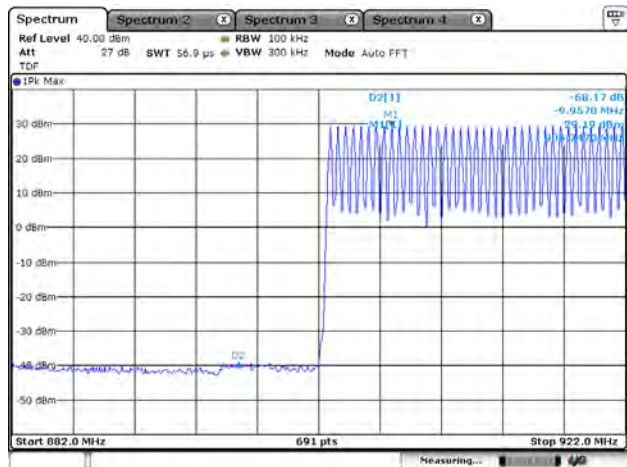
■ Ant 2

CH Low

Hop off

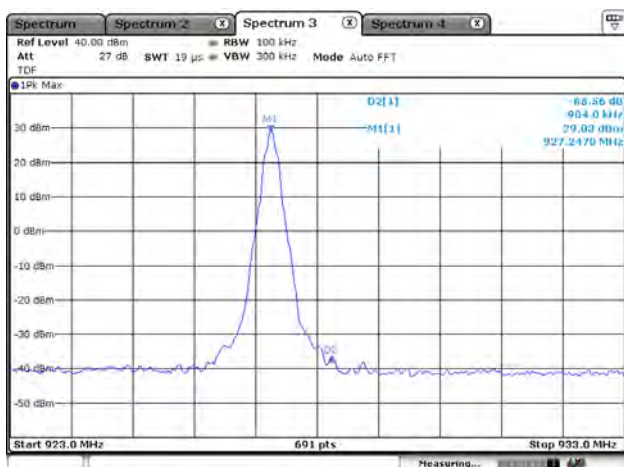


Hop on

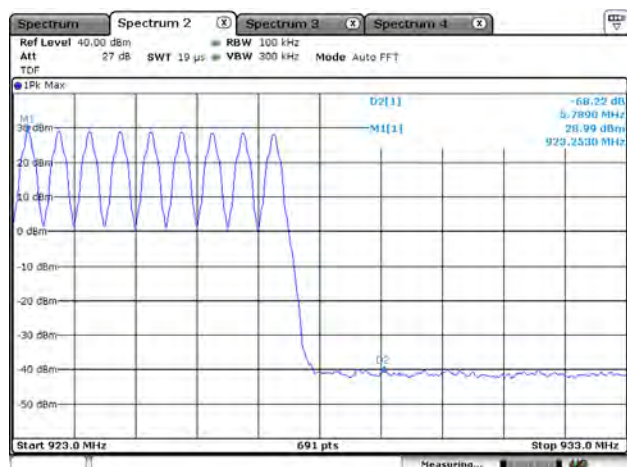


CH High

Hop off



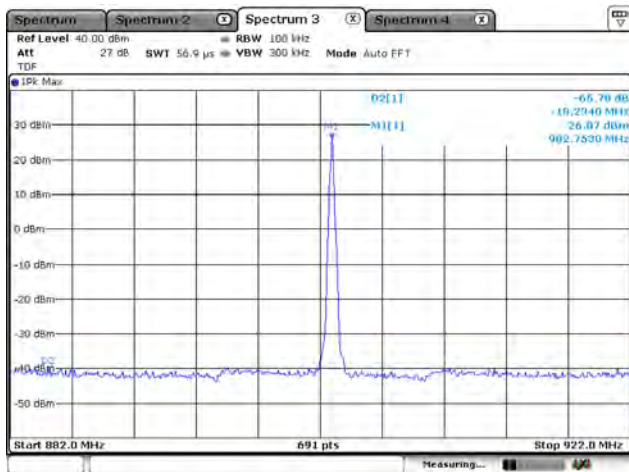
Hop on



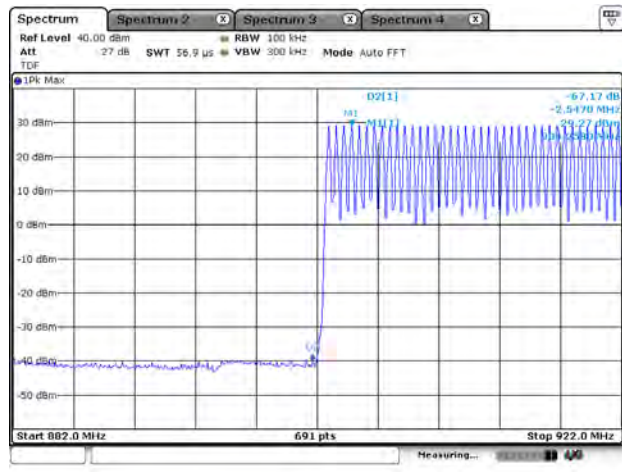
■ Ant 3

CH Low

Hop off

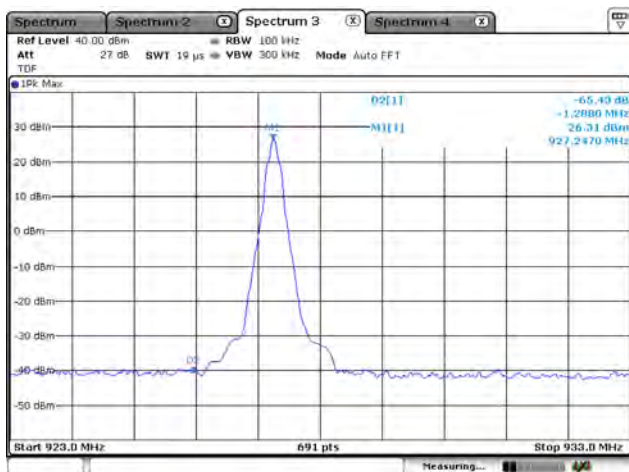


Hop on

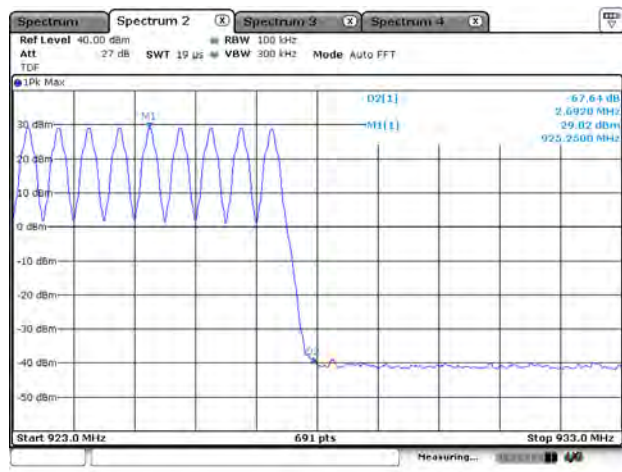


CH High

Hop off



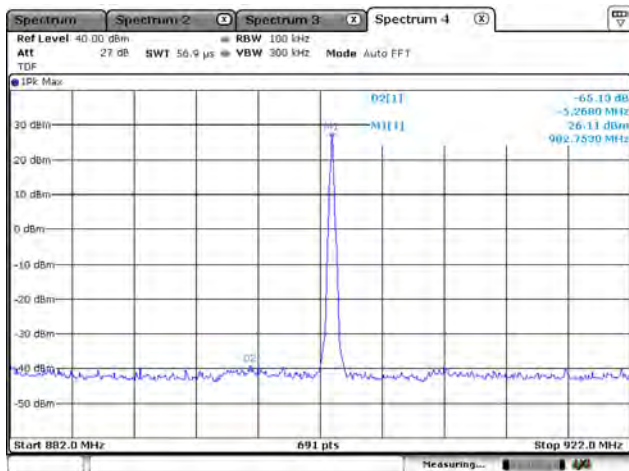
Hop on



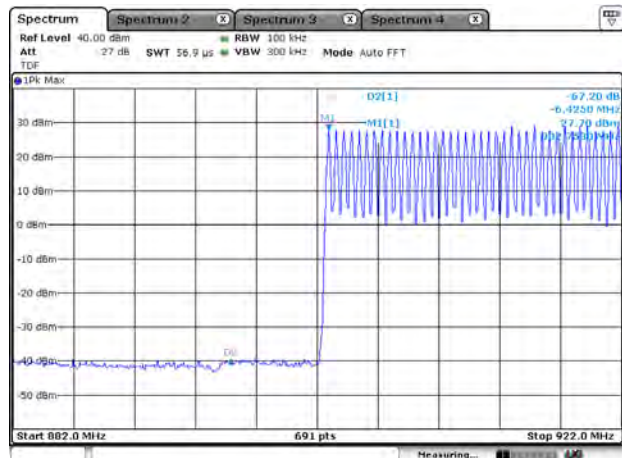
■ Ant 4

CH Low

Hop off

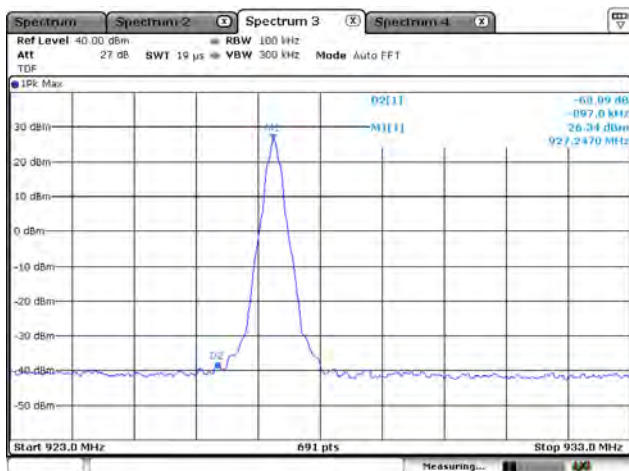


Hop on

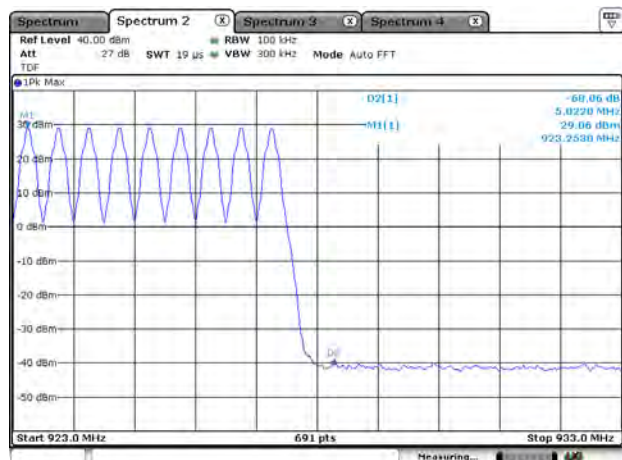


CH High

Hop off



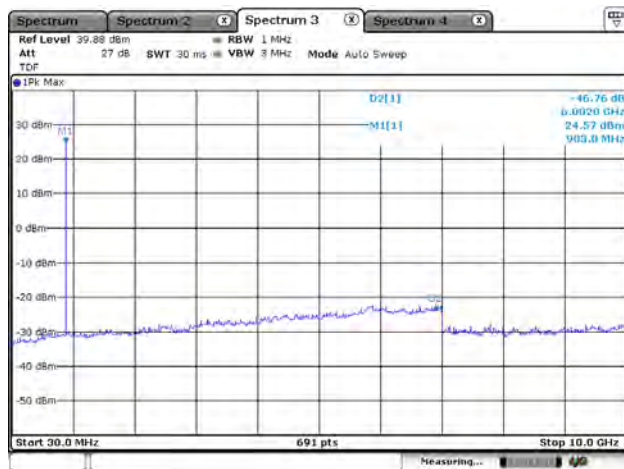
Hop on



Test Plot (Conducted spurious emissions)

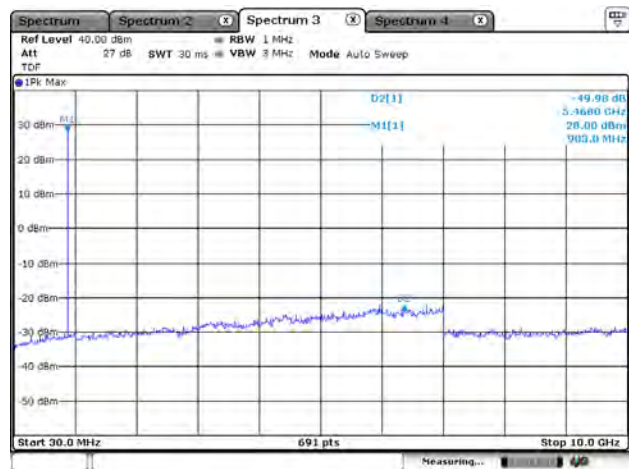
■ Ant 1

CH Low

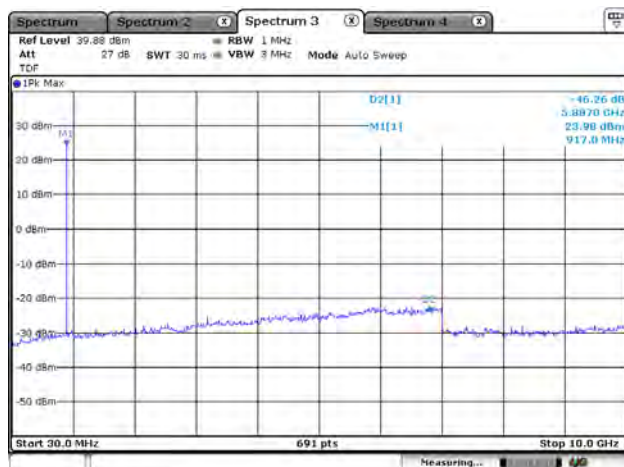


■ Ant 2

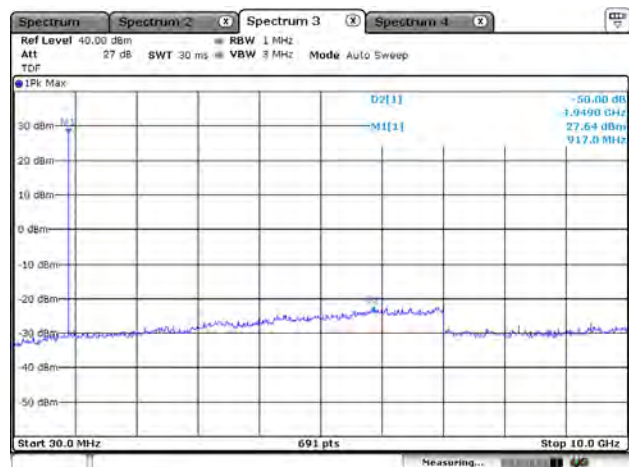
CH Low



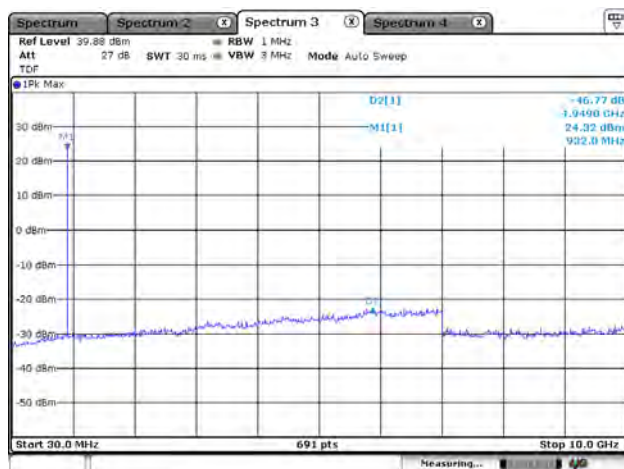
CH Middle



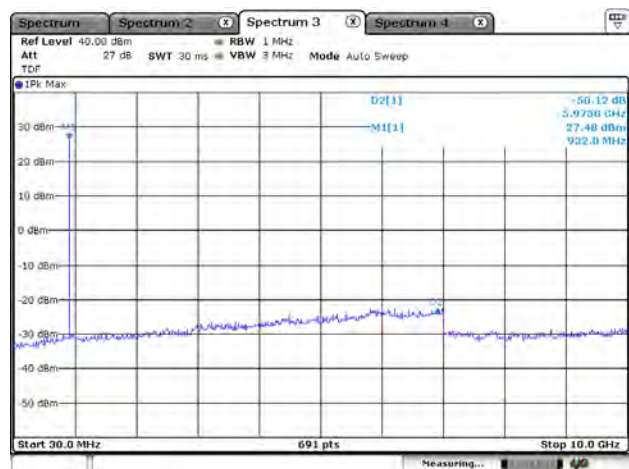
CH Middle



CH High



CH High

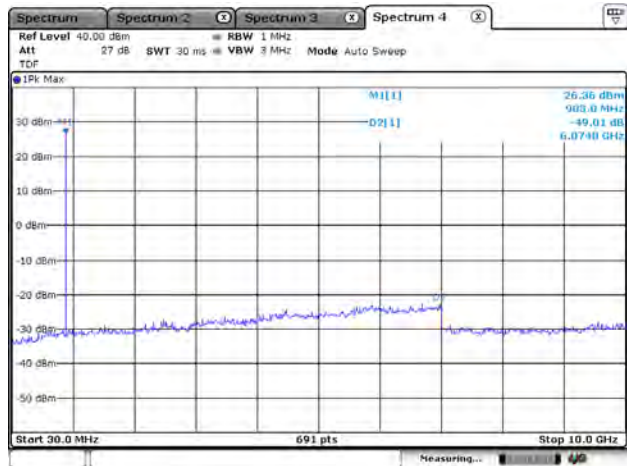
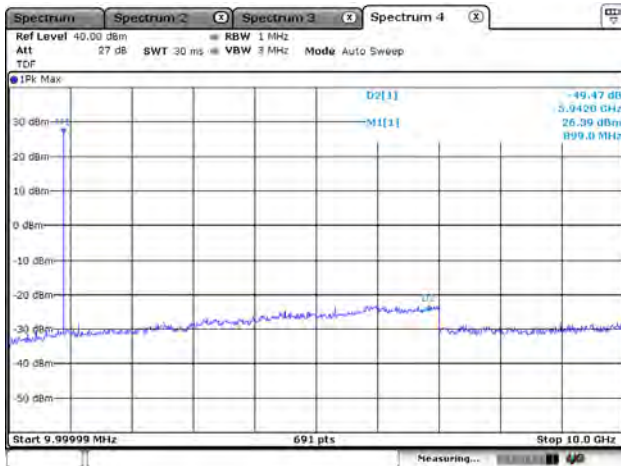


Note: It is not recorded on the report that the reading of emissions are attenuated more than 20 dB below the permissible limits

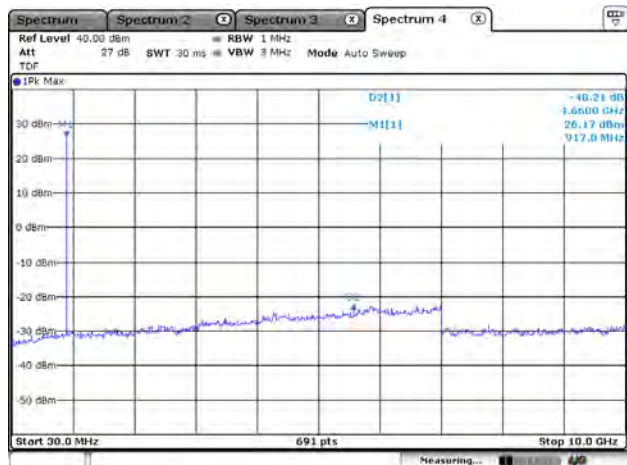
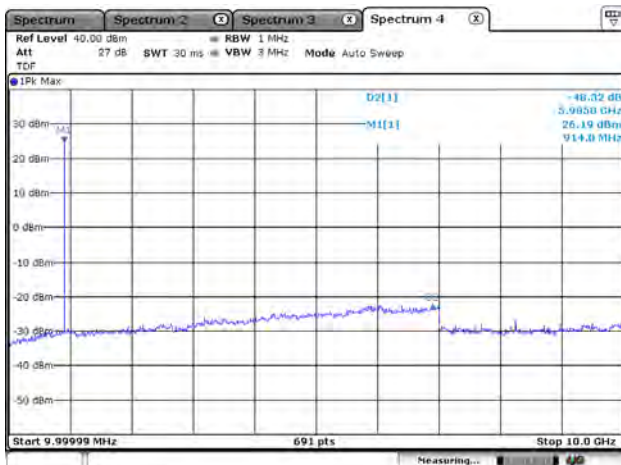
■ Ant 3

■ Ant 4

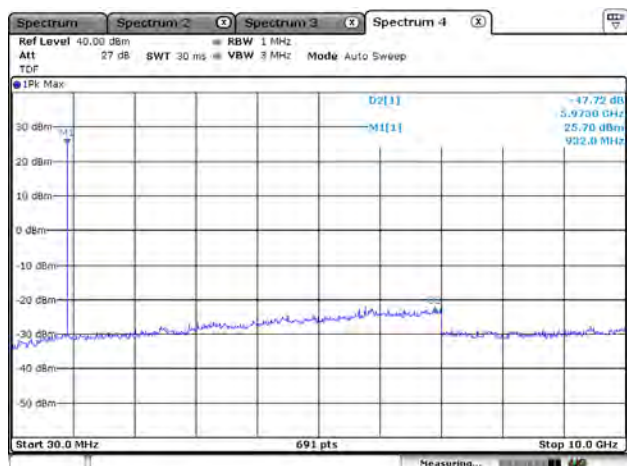
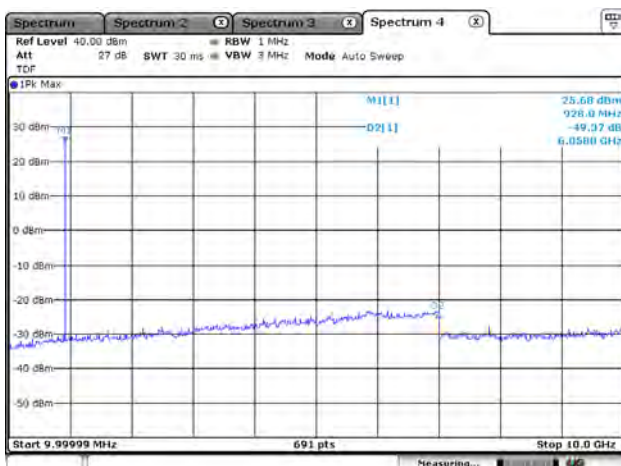
CH Low



CH Middle



CH High



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



4.7 Spurious RF Radiated emissions

4.7.1 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 [$\mu\text{V}/\text{m}$]	Limit [$\text{dB } \mu\text{V}/\text{m}$]	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 $\text{dB } \mu\text{V}/\text{m}$ (Peak), 54.0 $\text{dB } \mu\text{V}/\text{m}$ (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

4.7.2 Test Environment conditions

- Ambient temperature : (20 ~ 21) °C • Relative Humidity : (40 ~ 42) % R.H.

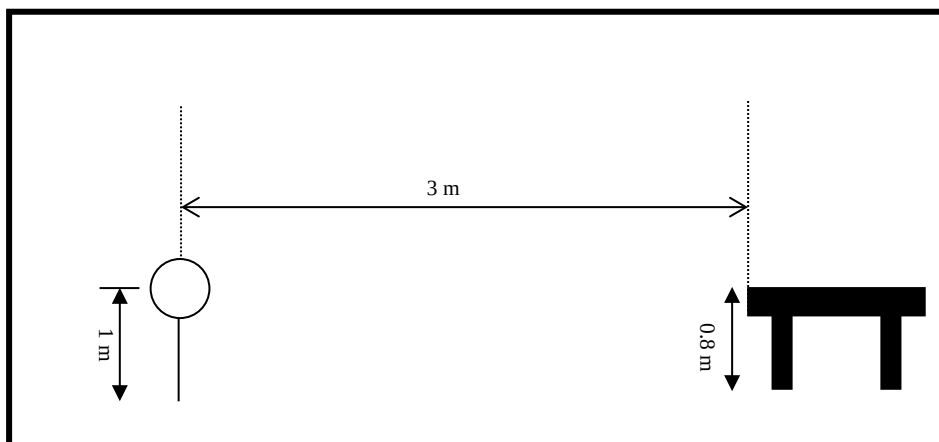
4.7.3 Measurement Procedure

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

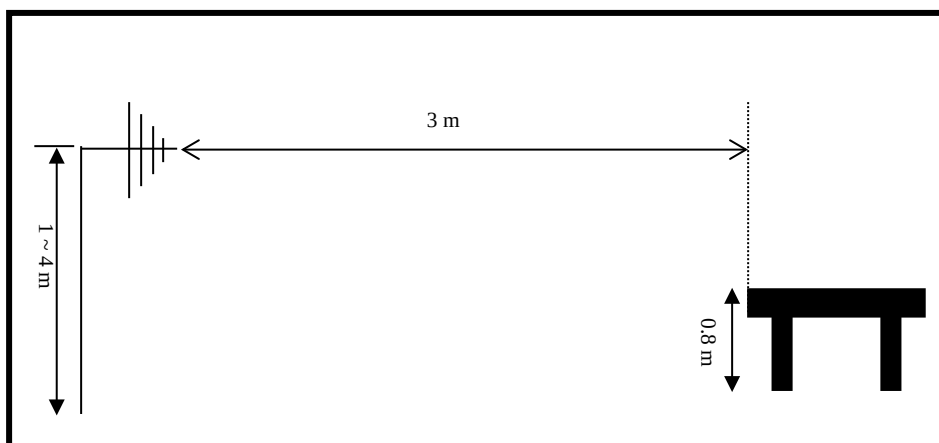
1. The EUT was placed on the top of a rotating table (0.8 meters for below 1 GHz and 1.5 meters for above 1 GHz) above the ground at a 3 meter camber. The table was rotated 360 degree to determine the position of the highest radiation.
 2. The EUT was set 3 meters away from the interference-receiving 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:
$$\text{Result(dB}\mu\text{V/m)} = \text{Reading(dB}\mu\text{V)} + \text{Antenna factor(dB/m)} + \text{CL(dB)} + \text{other applicable factor (dB)}$$
 - 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 ($10 \log(1/\text{duty cycle})$).
 - The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle $\geq$ 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 C63.10-2020

4.7.5 Test Configuration

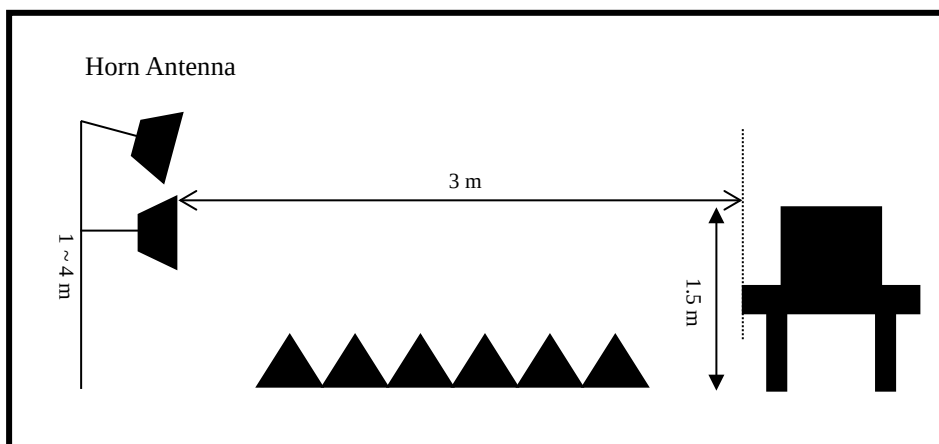
Radiated emission setup, below 30 MHz



Radiated emission setup, below 1 000 MHz



Radiated emission setup, above 1 GHz



4.7.6 Measurement Result

■ Ant 1

After having pre-scan all modulation mode, found the modulation which it was worst case, so only the worst case's data on the test report.

■ Above 1 GHz

CH Low (902.75 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Band-edge emissions.

CH Middle (915.25 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CH High (927.25 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Restrict band & Band-edge emissions.

※Note

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dB μ V/m(Average), 74 dB μ V/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 1 GHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 26 GHz.

■ Below 1 GHz

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
31.73	29.20	160	1.0	V	21.95	0.84	52.50	29.20	40.00	10.80	Compliance
141.77	29.45	160	1.1	V	13.64	1.67	52.21	29.45	43.50	14.05	Compliance
168.99	26.26	110	3.2	H	14.74	1.82	52.11	26.26	43.50	17.24	Compliance
252.25	28.02	110	2.5	H	18.12	2.30	52.11	28.02	46.00	17.98	Compliance
341.24	35.03	160	1.7	V	20.42	2.64	52.38	35.03	46.00	10.97	Compliance
348.51	35.16	110	1.7	H	20.74	2.65	52.40	35.16	46.00	10.84	Compliance
573.98	33.87	160	2.6	V	25.24	3.36	52.95	33.87	46.00	12.13	Compliance
646.82	38.82	110	1.1	H	26.45	3.54	53.19	38.82	46.00	7.18	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

CH Low (902.75 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
894.02*	27.93	110	1.9	H	28.78	4.32	51.66	27.93	46.00	18.07	Compliance
894.02*	27.73	160	1.9	V	28.78	4.32	51.66	27.73	46.00	18.27	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

* Band-edge emissions.

CH Middle (915.25 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
-	-	-	-	-	-	-	-	-	-	-	-
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

CH High (927.25 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
931.70	30.13	110	1.7	H	29.06	4.32	51.28	30.13	46.00	15.87	Compliance
929.91	28.22	160	1.9	V	29.04	4.33	51.30	28.22	46.00	17.78	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

* Restrict band & Band-edge emissions.



■ Ant 2

After having pre-scan all modulation mode, found the modulation which it was worst case, so only the worst case's data on the test report.

■ Above 1 GHz

CH Low (902.75 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Band-edge emissions.

CH Middle (915.25 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CH High (927.25 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Restrict band & Band-edge emissions.

✱Note

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dB μ V/m(Average), 74 dB μ V/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 1 GHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 26 GHz.

■ Below 1 GHz

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
43.85	30.71	160	1.0	V	15.94	0.93	52.50	30.71	40.00	9.29	Compliance
74.79	17.85	160	3.8	V	12.15	1.22	52.38	17.85	40.00	22.15	Compliance
163.16	19.06	110	3.2	H	14.58	1.78	52.14	19.06	43.50	24.44	Compliance
190.44	27.58	110	1.1	H	15.41	1.98	52.03	27.58	43.50	15.92	Compliance
288.28	31.42	160	1.3	V	18.41	2.51	52.26	31.42	46.00	14.58	Compliance
304.95	27.15	110	1.5	H	18.74	2.58	52.31	27.15	46.00	18.85	Compliance
348.51	28.27	160	1.6	V	20.74	2.65	52.40	28.27	46.00	17.73	Compliance
360.98	36.35	110	1.4	H	20.99	2.69	52.45	36.35	46.00	9.65	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

CH Low (902.75 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
348.51	28.27	110	1.6	H	20.74	4.33	51.65	27.81	46.00	18.19	Compliance
360.98	36.35	160	1.4	V	20.99	4.32	51.66	31.53	46.00	14.47	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

* Band-edge emissions.

CH Middle (915.25 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
-	-	-	-	-	-	-	-	-	-	-	-
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

CH High (927.25 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
930.01	30.05	110	1.8	H	29.04	4.33	51.30	30.05	46.00	15.95	Compliance
929.61	33.18	160	1.8	V	29.04	4.33	51.30	33.18	46.00	12.82	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

* Restrict band & Band-edge emissions.



■ Ant 3

After having pre-scan all modulation mode, found the modulation which it was worst case, so only the worst case's data on the test report.

■ Above 1 GHz

CH Low (902.75 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Band-edge emissions.

CH Middle (915.25 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CH High (927.25 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Restrict band & Band-edge emissions.

✱Note

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dB μ V/m(Average), 74 dB μ V/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 1 GHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 26 GHz.

■ Below 1 GHz

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
34.29	32.24	160	1.1	V	20.65	0.87	52.50	32.24	40.00	7.76	Compliance
75.32	17.58	110	3.6	H	12.13	1.23	52.38	17.58	40.00	22.42	Compliance
138.81	25.87	160	1.2	V	13.43	1.65	52.22	25.87	43.50	17.63	Compliance
163.16	17.16	110	3.1	H	14.58	1.78	52.14	17.16	43.50	26.34	Compliance
250.49	24.30	110	2.7	H	18.10	2.29	52.10	24.30	46.00	21.70	Compliance
288.28	31.60	160	1.4	V	18.41	2.51	52.26	31.60	46.00	14.40	Compliance
300.70	28.27	110	2.6	H	18.53	2.57	52.30	28.27	46.00	17.73	Compliance
366.09	36.87	160	1.7	V	21.07	2.70	52.47	36.87	46.00	9.13	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

CH Low (902.75 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
891.14	24.66	110	1.7	H	28.77	4.31	51.69	24.66	46.00	21.34	Compliance
891.14	29.35	160	1.8	V	28.77	4.31	51.69	29.35	46.00	16.65	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

* Band-edge emissions.

CH Middle (915.25 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
-	-	-	-	-	-	-	-	-	-	-	-
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

CH High (927.25 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
930.76	27.73	110	1.6	H	29.05	4.33	51.29	27.73	46.00	18.27	Compliance
931.96	27.46	160	1.9	V	29.06	4.32	51.28	27.46	46.00	18.54	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

* Restrict band & Band-edge emissions.



■ Ant 4

After having pre-scan all modulation mode, found the modulation which it was worst case, so only the worst case's data on the test report.

■ Above 1 GHz

CH Low (902.75 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Band-edge emissions.

CH Middle (915.25 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CH High (927.25 MHz)

Freq. (GHz)	Reading (dB μ V/m)		Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)		Limit (dB μ V/m)		Mgn. (dB)		Result
	PK	AV		Height (m)	Pol. (H/V)	Fctr. (dB/m)			PK	AV	PK	AV	PK	AV	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Restrict band & Band-edge emissions.

✱Note

- Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35
- Limit: 54 dB μ V/m(Average), 74 dB μ V/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 1 GHz, measured any other signal is not detected on test receiver
- The transmitter radiated spectrum was investigated from 9 kHz to 26 GHz.

■ Below 1 GHz

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
44.15	31.52	160	1.1	V	15.82	0.94	52.50	31.52	40.00	8.48	Compliance
75.85	17.25	110	3.5	H	12.10	1.23	52.38	17.25	40.00	22.75	Compliance
190.44	26.89	160	1.2	V	15.41	1.98	52.03	26.89	43.50	16.61	Compliance
252.25	25.55	110	2.8	H	18.12	2.30	52.11	25.55	43.50	20.45	Compliance
288.28	31.87	160	1.4	V	18.41	2.51	52.26	31.87	46.00	14.13	Compliance
300.70	28.00	110	2.6	H	18.53	2.57	52.30	28.00	46.00	18.00	Compliance
341.24	28.88	110	2.6	H	20.42	2.64	52.38	28.88	46.00	17.12	Compliance
348.51	36.84	160	1.6	V	20.74	2.65	52.40	36.84	46.00	9.16	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

CH Low (902.75 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
884.40	29.11	110	1.8	H	28.74	4.28	51.75	29.11	46.00	16.89	Compliance
890.82	29.93	160	1.8	V	28.76	4.31	51.69	29.93	46.00	16.07	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

* Band-edge emissions.

CH Middle (915.25 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
-	-	-	-	-	-	-	-	-	-	-	-
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

CH High (927.25 MHz)

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
			Height (m)	Pol. (H/V)	Fctr. (dB/m)						
931.24	29.42	110	1.9	H	29.05	4.32	51.28	29.42	46.00	16.58	Compliance
932.72	28.10	160	1.8	V	29.06	4.32	51.27	28.10	46.00	17.90	Compliance
Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB) Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB) Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)											

* Restrict band & Band-edge emissions.

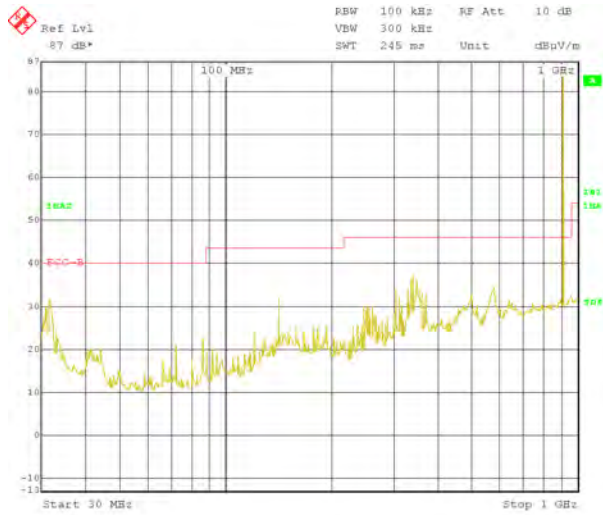
5.7.7 Plots

■ Ant 1

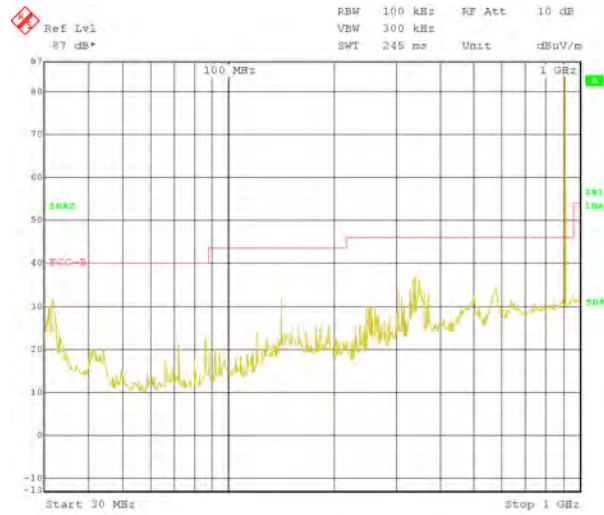
*The worst case only.

- Below 1 GHz

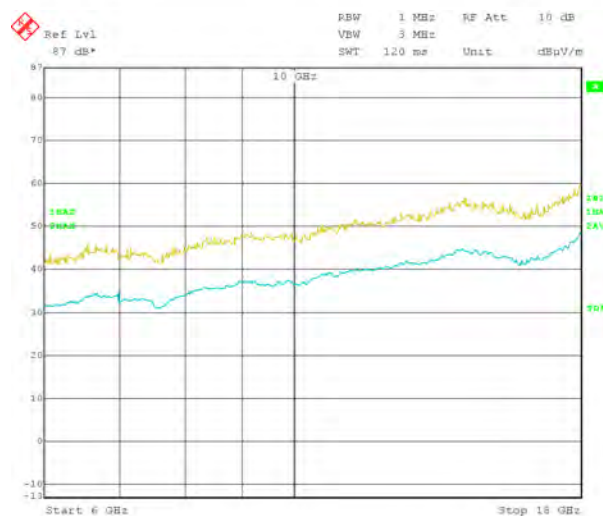
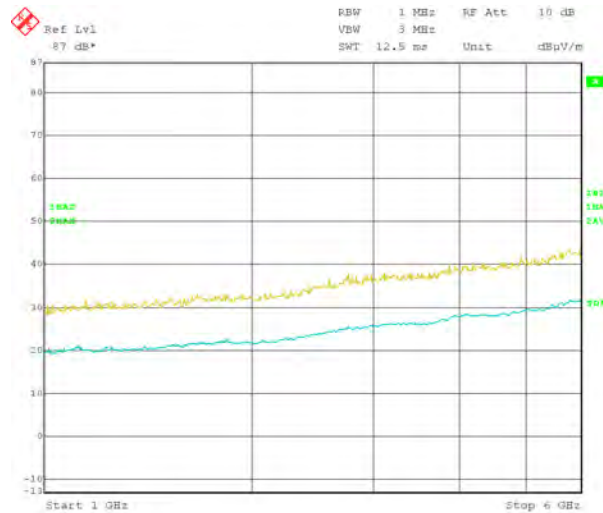
Horizontal



Vertical



- Above 1 GHz



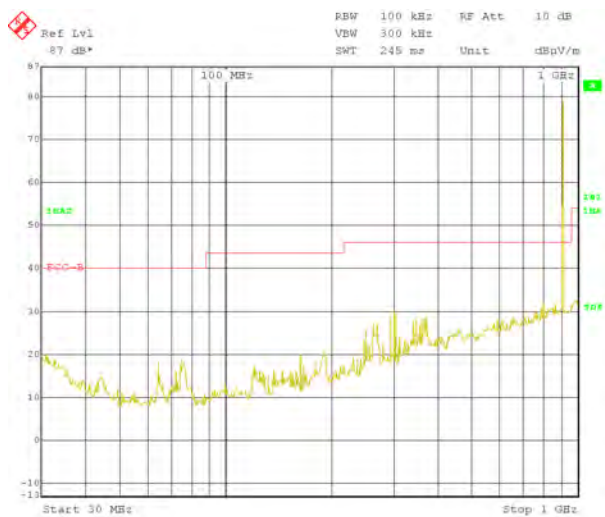


■ Ant 2

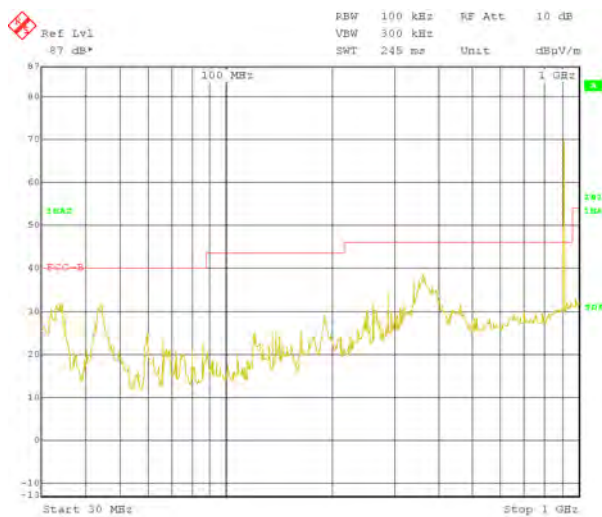
*The worst case only.

- Below 1 GHz

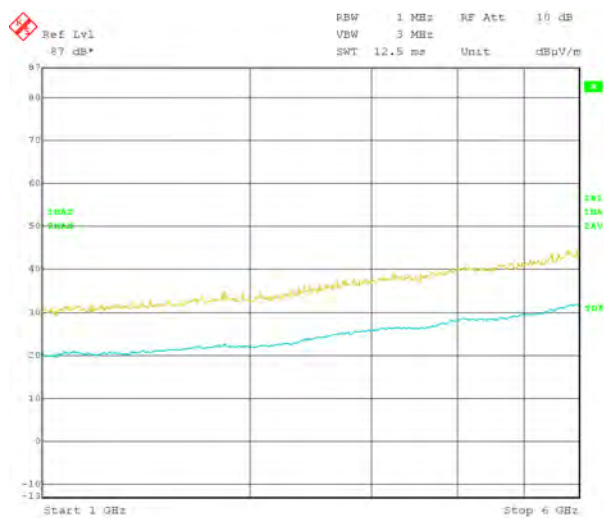
Horizontal

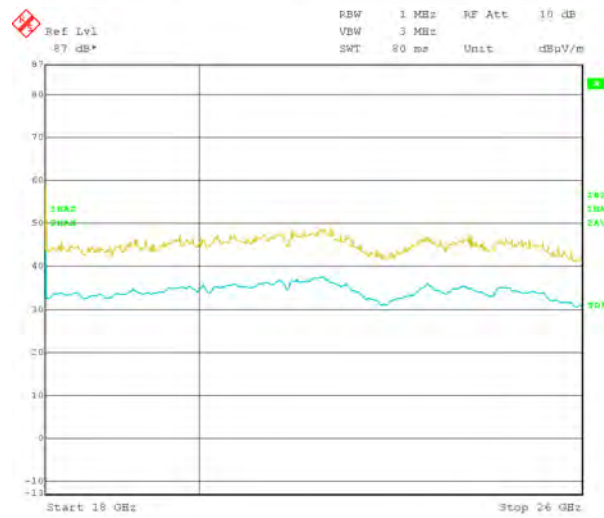
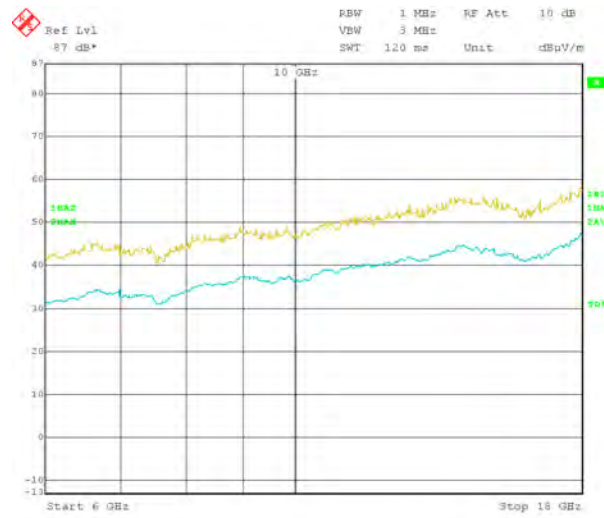


Vertical



- Above 1 GHz



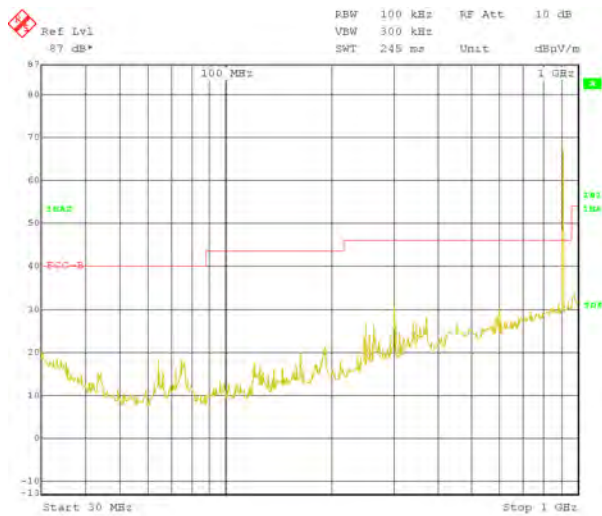


■ Ant 3

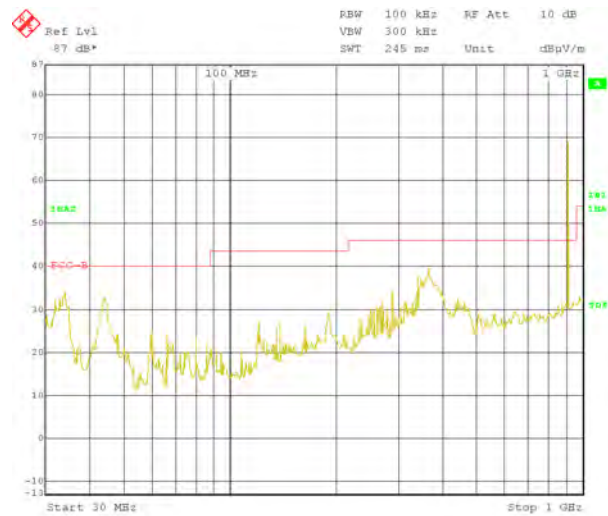
*The worst case only.

- Below 1 GHz

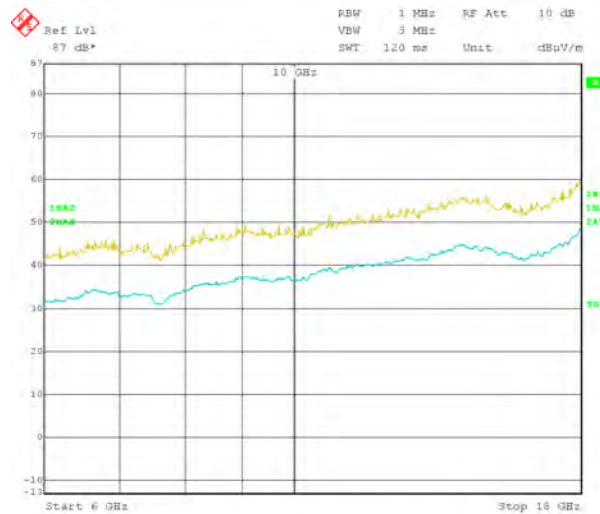
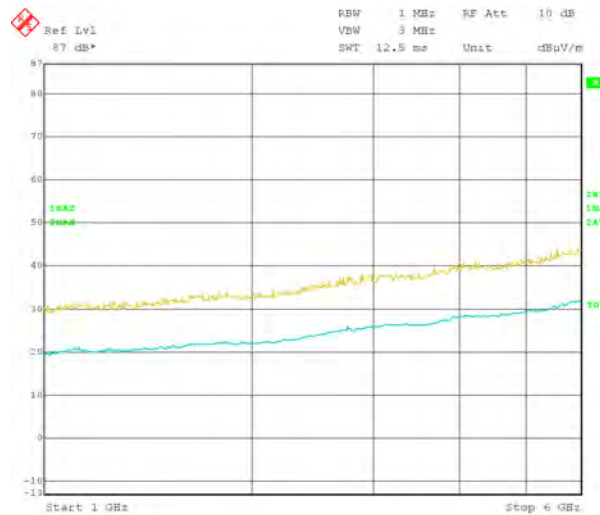
Horizontal

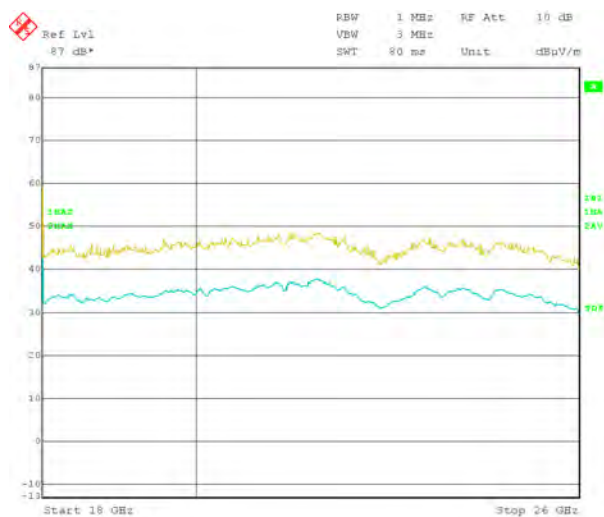


Vertical



- Above 1 GHz



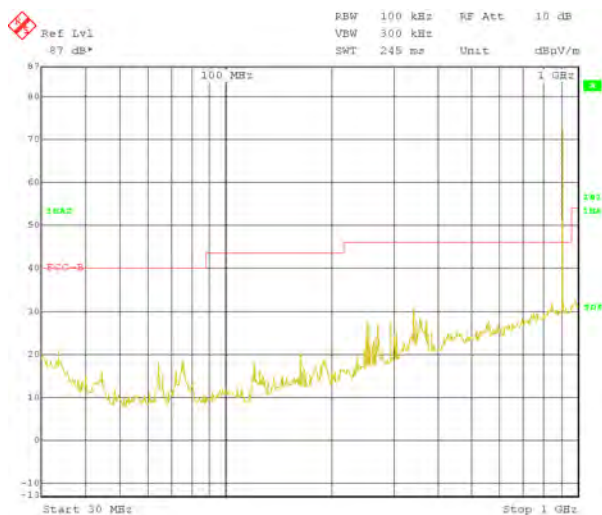


■ Ant 4

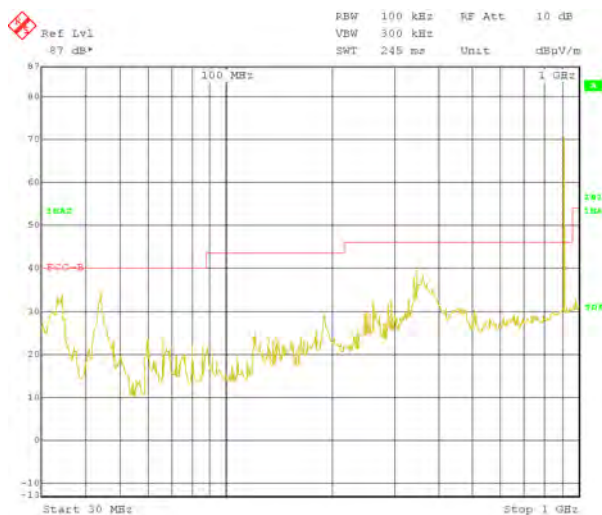
*The worst case only.

- Below 1 GHz

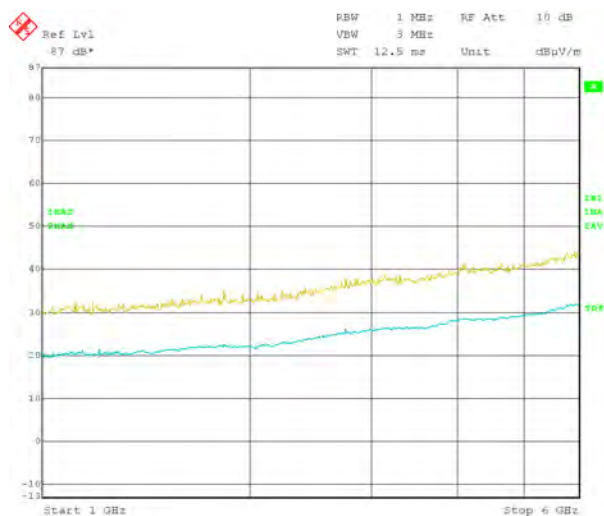
Horizontal

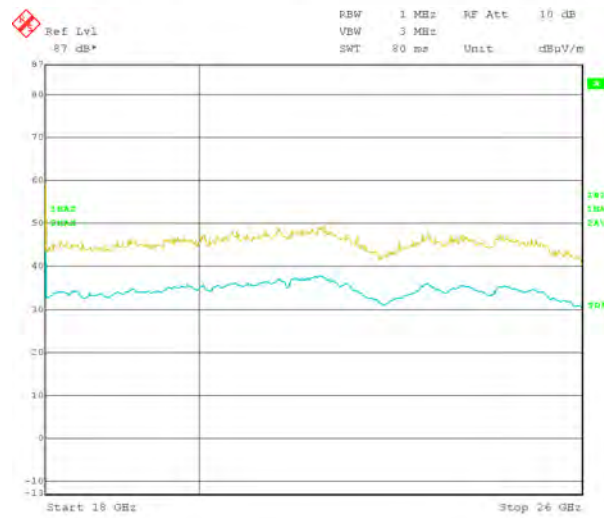
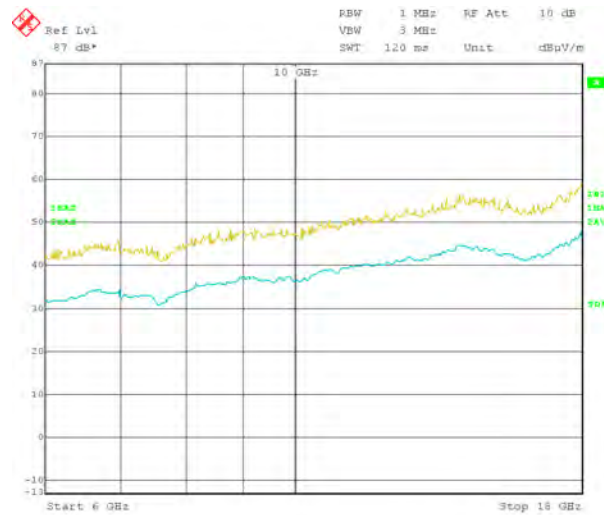


Vertical



- Above 1 GHz







4.8 Antenna requirement

4.8.1 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.

4.8.2 Antenna details

Frequency Band	Antenna Type	Gain [dBi]	Results
865 – 928 MHz	External PCB Patch	5.30 dBi	Compliance