

TEST REPORT



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
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Report No.:
CTK-2024-00740
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1. Applicant

- Name : WEARCOM INC
- Address : (13120) B204-B, Business Incubation Center, 1342, Seongnam-daero, Sujeong-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
- Date of Receipt : 2023-09-17

2. Manufacturer

- Name : WEARCOM INC
- Address : (13120) B204-B, Business Incubation Center, 1342, Seongnam-daero, Sujeong-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

3. Use of Report : For FCC

4. Test Sample / Model: cardiography and falling accident management machine / WEARCOM2301

5. Date of Test : 2023-10-10 to 2024-03-04

6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.247
ANSI C63.10-2013

7. Testing Environment: refer to 6 page

8. Test Results : Compliance

9. Location of Test : Permanent Testing Lab On Site Testing

(Address : (Unhak-Dong) 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This report cannot be reproduced or copied without the written consent of CTK.

Approval	Tested by Kun-Hui Park: (Signature)	Technical Manager Won-Jae, Hwang: (Signature)
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Remark. This report is not related to KOLAS accreditation and relevant regulation.

2024-03-13

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REPORT REVISION HISTORY

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1. General Product Description

1.1 Applicant Information

Company	WEARCOM INC
Contact Point	(13120) B204-B, Business Incubation Center, 1342, Seongnam-daero, Sujeong-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Contact Person	Name : KYOUNG WOO KIM E-mail : sales1@wearcom.net Tel : +82-31-754-5274 Fax : +82-50-8910-5274

1.2 Product Information

FCC ID	2BE9D-WEARCOM2301
Product Description	cardiography and falling accident management machine
Basic model	WEARCOM2301
Variant Model name	-
Operating Frequency	2 402 MHz - 2 480 MHz
RF Output Power	1.26 dBm (1.34 mW)
Antenna type	Chip Antenna
Antenna gain	0.5 dBi
Number of channels	40
Channel Spacing	2 MHz
Type of Modulation	GFSK
Power Source	DC 3.70 V (Battery)

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	Samsung	NT560XBV-AD2A	0Z8S91AM400511W
AC ADAPTER	Samsung	A13-040N2A	AD-4019A



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2. Accreditations

2.1 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	CN : 8737A CAB ID : KR0025
KOREA	NRRA	KR0025

2.2 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

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3. Test Specifications

3.1 Standards

Section in FCC	Requirement(s)	Status (Note 1)	Test Condition
15.247(a)	6 dB Bandwidth	C	Conducted
15.247(e)	Transmitter power spectral density	C	
15.247(b)	Maximum peak conducted output power	C	
15.247(d)	Unwanted emission	C	
15.209	Transmitter emission	C	Radiated
15.207(a)	AC Conducted Emission	C	Line Conducted
<i>Note 1:</i> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
<i>Note 2:</i> The data in this test report are traceable to the national or international standards.			
<i>Note 3:</i> The sample was tested according to the following specification: FCC Part 15.247			
<i>Note 4:</i> The tests were performed according to the method of measurements prescribed in KDB No.558074, ANSI C63.10-2013			

3.2 Testing Environment

Test Item	Test Date	Temperature (°C)	Relative Humidity (%)
6 dB Bandwidth			
Transmitter power spectral density	2023-10-10	21	51
Maximum peak conducted output power			
Unwanted emission (Conducted)			
Transmitter emission (Radiated)	1) 9 kHz to 30 MHz 2) 30 MHz to 1 GHz	2024-02-26	21
	3) 1 GHz to 18 GHz 4) 18 GHz to 26.5 GHz	2024-02-23 ~ 2024-03-04	21~23
	5) Restricted Frequency Bands		35~36
AC Conducted Emission	2024-02-26	21	34

3.3 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments.
 During at testing, system components were manipulated within the confines of typical usage to maximize each emission. All modulation modes were tests.
 The results are only attached worst cases.

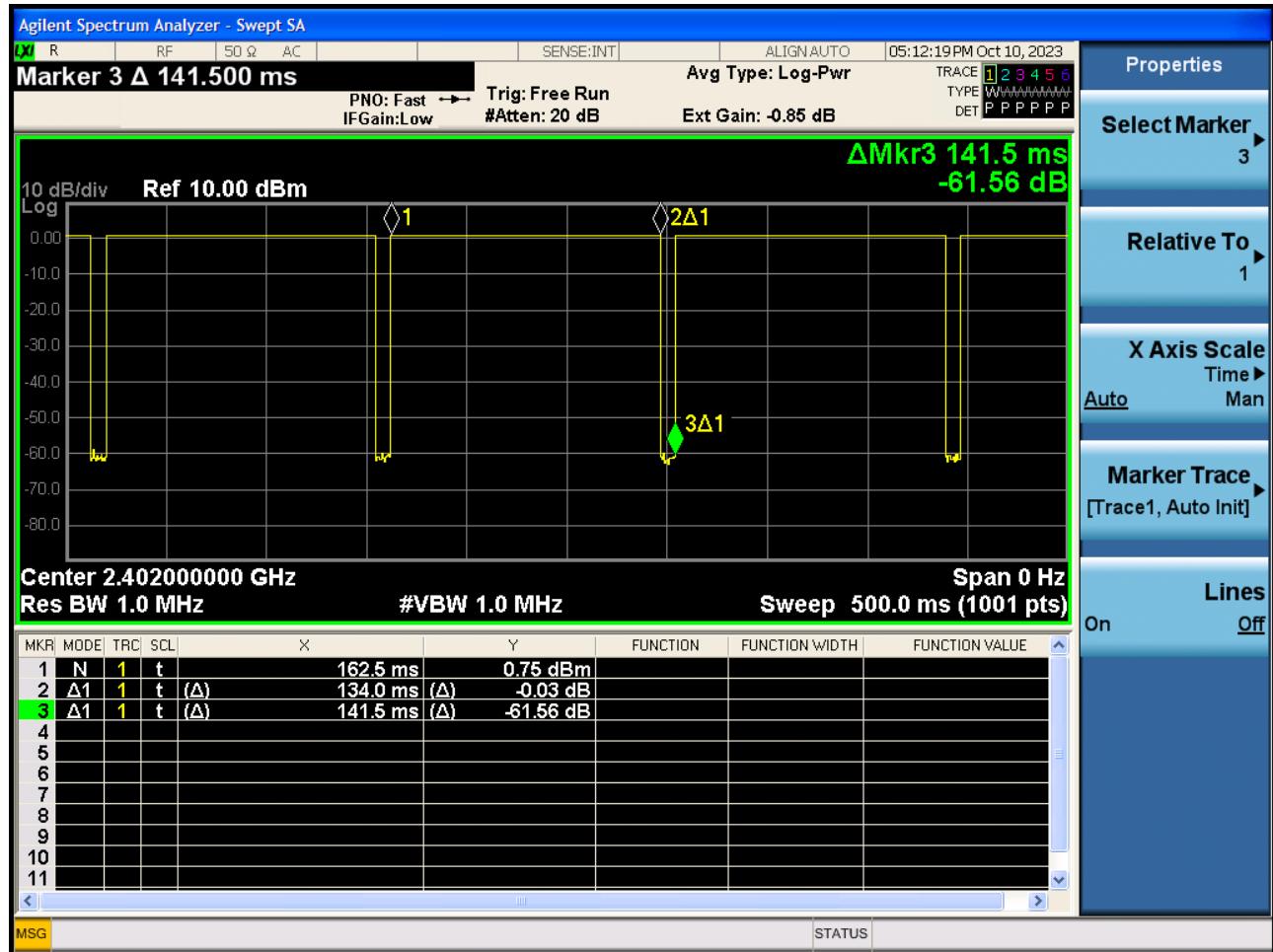
Test Frequency

Mode	Lowest channel	Middle channel	Highest channel
1 Mbps	2 402 MHz	2 440 MHz	2 480 MHz

Test mode Duty

Mode	Duty Cycle	Duty Cycle Factor
BLE 1 Mbps	95.0 %	0.22 dB

10 LOG(1/x), where x is the duty cycle.



3.4 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
 Coverage factor $k = 2$, Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	1.5 dB (C.L. : Approx. 95%, $k = 2$)
Power Spectral Density	1.5 dB (C.L. : Approx. 95%, $k = 2$)
Occupied Bandwidth	0.1 MHz (C.L. : Approx. 95%, $k = 2$)
Unwanted Emission(conducted)	3.0 dB (C.L. : Approx. 95%, $k = 2$)
Radiated Emissions ($f \leq 1$ GHz)	3.88 dB (C.L. : Approx. 95%, $k = 2$)
Radiated Emissions ($f > 1$ GHz)	4.50 dB (C.L. : Approx. 95%, $k = 2$)
AC Conducted Emission	2.08 dB (C.L. : Approx. 95%, $k = 2$)

3.5 Test Software

Conducted Test	Ics Pro Ver. 6.0.3
Radiated Test	EP5RE Ver. 6.0.1.0, ES10 Ver. 2022.04.000
Line Conducted Test	EMC32 Ver. 10.50.00

4. Technical Characteristic Test

4.1 6 dB Bandwidth and 99 % Bandwidth

Test Procedures

KDB 558074 – Section 8.2

ANSI C63.10-2013 – Section 6.9.2 / Section 11.8.2

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Procedures

ANSI C63.10-2013 - Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- | | |
|--|----------------------------|
| a) RBW = 100 kHz | b) VBW $\geq 3 \times$ RBW |
| c) Detector = peak | d) Trace mode = Max hold |
| e) Sweep = auto couple | |
| f) Allow trace to fully stabilize | |
| g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. | |

Limit : 6 dB Bandwidth

6 dB Bandwidth > 500 kHz

Limit : 99 % Bandwidth

N/A



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Test Data :

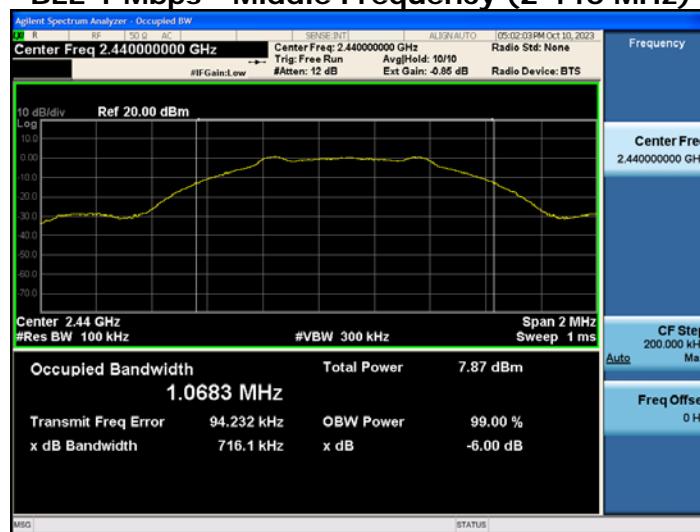
Mode	Frequency [MHz]	6 dB Bandwidth [MHz]	99 % Bandwidth [MHz]	Result
1 Mbps	2 402	0.709	1.064	Complies
	2 440	0.716	1.068	
	2 480	0.714	1.070	

See next pages for actual measured spectrum plots.

BLE 1 Mbps - Lowest Frequency (2.402 MHz)



BLE 1 Mbps - Middle Frequency (2.440 MHz)



BLE 1 Mbps - Highest Frequency (2.480 MHz)



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4.2 Maximum peak Conducted Output Power

Test Procedures

KDB 558074 - Section 8.3.1.1
 ANSI C63.10-2013 - Section 11.9.1.1

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- | | |
|--|-----------------------------|
| a) RBW \geq DTS bandwidth | b) VBW $\geq 3 \times$ RBW |
| c) span $\geq 3 \times$ RBW | d) Sweep time = auto couple |
| e) Detector = peak | f) Trace mode= max hold |
| g) Allow trace to fully stabilize | |
| h) Use peak marker function to determine the peak amplitude level. | |

Limit :

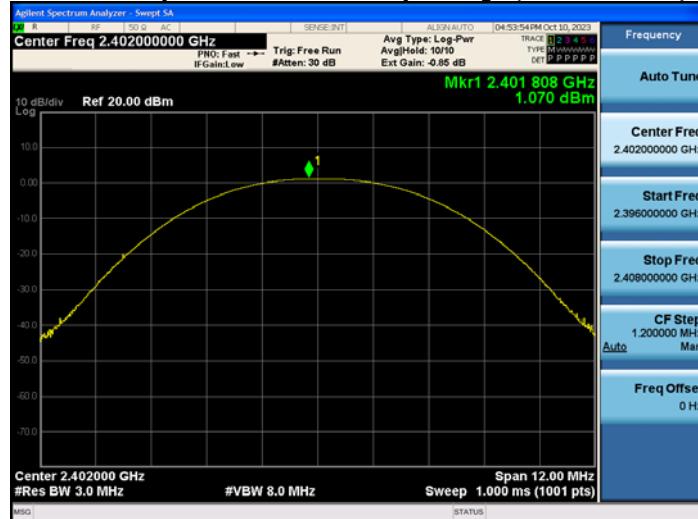
Maximum Output Power < 1 W (30 dBm)

Test Data :

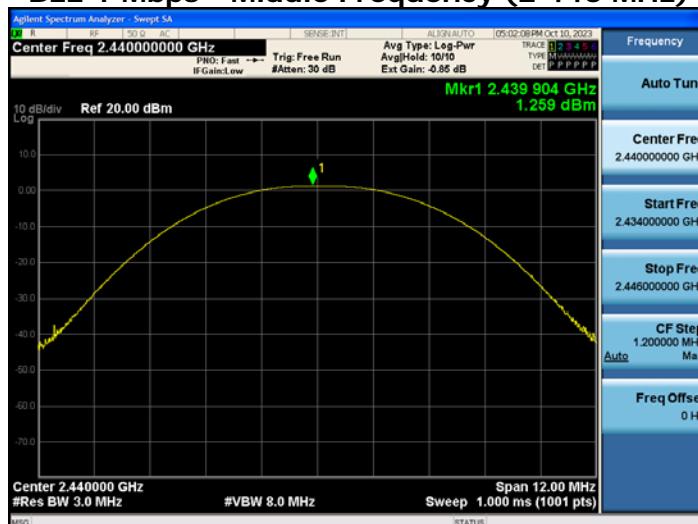
Mode	Frequency [MHz]	Measurement data		Limit [dBm]	Result
		[dBm]	[mW]		
1 Mbps	2 402	1.07	1.28	30	Complies
	2 440	1.26	1.34		
	2 480	0.96	1.25		

See next pages for actual measured spectrum plots.

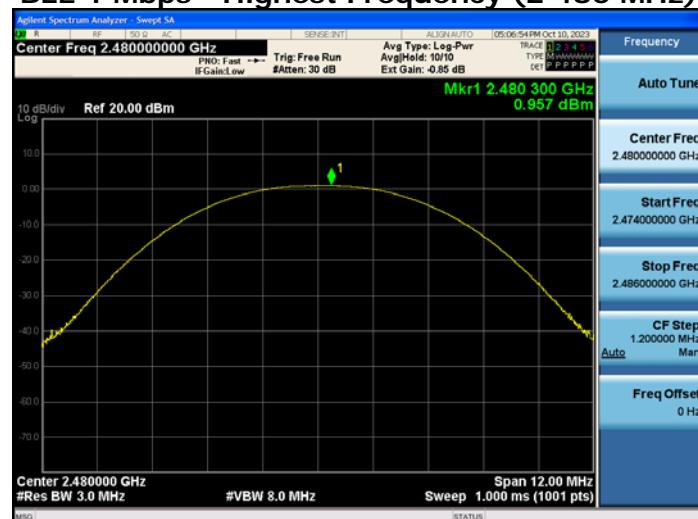
BLE 1 Mbps - Lowest Frequency (2.402 MHz)



BLE 1 Mbps - Middle Frequency (2.440 MHz)



BLE 1 Mbps - Highest Frequency (2.480 MHz)





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4.3 Transmitter Power Spectral Density

Test Procedures

KDB 558074 – Section 8.4

ANSI C63.10-2013 – Section 11.10.2

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- | | |
|--|-----------------------------------|
| a) RBW : $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ | b) VBW $\geq 3 \times \text{RBW}$ |
| c) span $\geq 1.5 \times \text{DTS bandwidth}$ | d) Sweep time = auto couple |
| e) Detector = peak | f) Trace mode= max hold |
| g) Allow trace to fully stabilize | |
| h) Use the peak marker function to determine the maximum amplitude level within the RBW. | |

Limit :

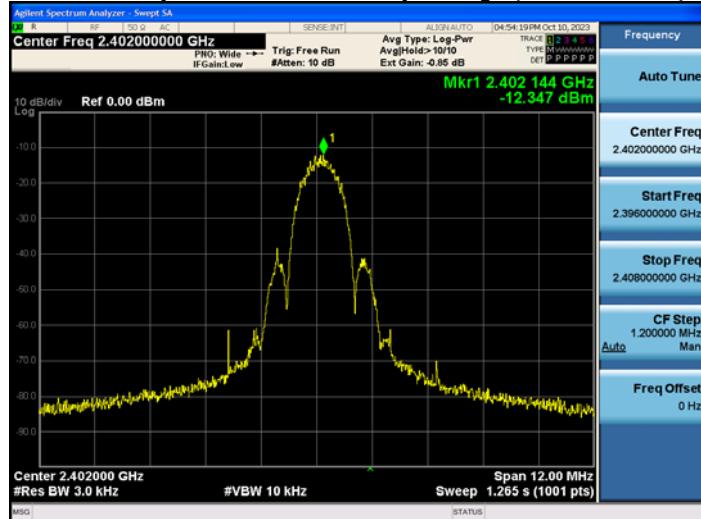
Power Spectral Density $< 8 \text{ dBm}$ @ 3 kHz BW

Test Data :

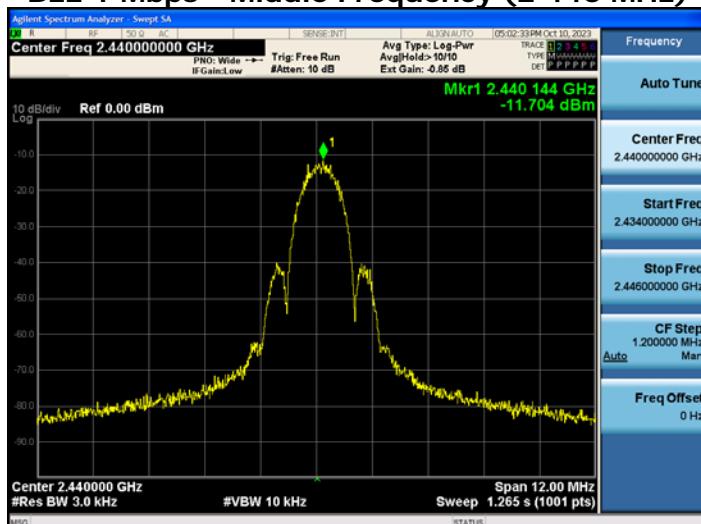
Mode	Frequency [MHz]	Measurement data [dBm]	Limit [dBm]	Result
1 Mbps	2 402	-12.347	8	Complies
	2 440	-11.704		
	2 480	-12.605		

See next pages for actual measured spectrum plots.

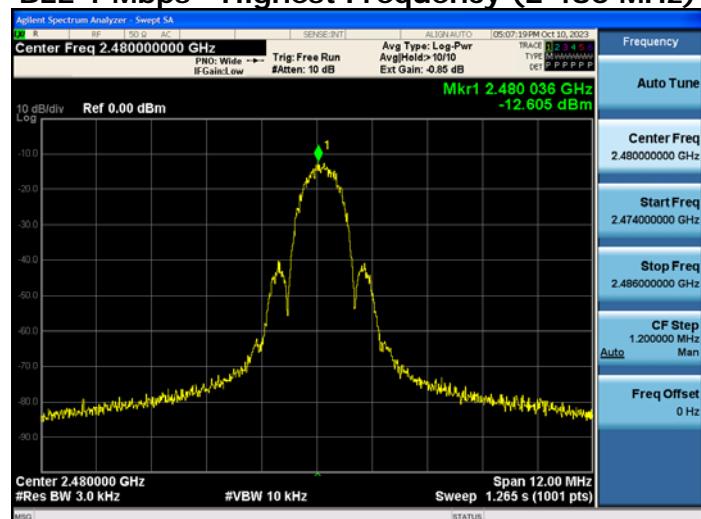
BLE 1 Mbps - Lowest Frequency (2 402 MHz)



BLE 1 Mbps - Middle Frequency (2 440 MHz)



BLE 1 Mbps - Highest Frequency (2 480 MHz)





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4.4 Conducted Spurious emission

Test Procedures

KDB 558074 – Section 8.5

ANSI C63.10-2013 – Section 11.11.3

The Unwanted emission from the EUT were measured according to the dictates PKPSD measurement procedure in section 11.11 of ANSI C63.10-2013.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- | | |
|---|-----------------------------|
| a) RBW = 100 kHz | b) VBW \geq 3 x RBW |
| c) Detector = peak | d) Sweep time = auto couple |
| e) Trace mode= max hold | |
| f) Allow trace to fully stabilize | |
| g) Use the peak marker function to determine the maximum amplitude level. | |

Limit :

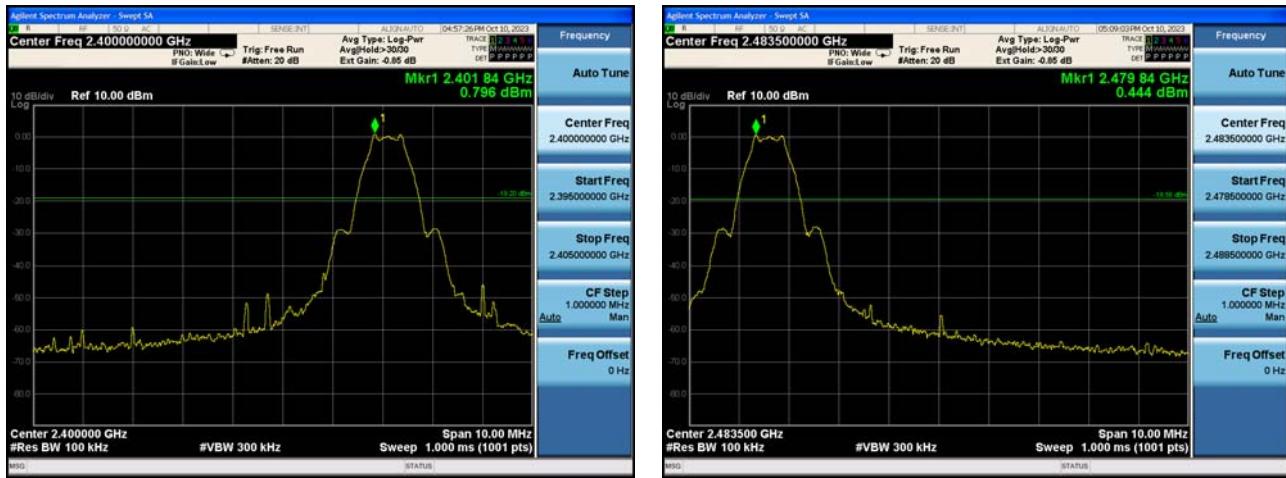
Emission level < 20 dBc

Test results : Complies

- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20 dB lower than the highest in-band spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.

Test Mode : BLE 1 Mbps





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4.5 Radiated Emission

Test Location

- 10 m SAC (test distance : 10 m, 3 m)
 3 m SAC (test distance : 3 m)

Test Procedures

KDB 558074 – Section 8.5, 8.6
ANSI C63.10-2013 – Section 11.11, 11.12

- 1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- 2) In the frequency range above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3 m away from the EUT. Test Antenna height is carried from 1 m to 4 m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

Test Settings :

Frequency Range = 9 kHz ~ 26.5 GHz (2.4 GHz 10th harmonic)

- a) RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz, 9 kHz for $f < 30$ MHz,
200 Hz for $f < 150$ kHz
- b) VBW \geq RBW
- c) Sweep time = auto couple



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Limit :

FCC Part 15 § 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Table 1. Restricted Frequency Bands

MHz	MHz	MHz	MHz	MHz	GHz
0.09-0.11	8.37626-8.38675	73-74.6	399.9-410	2690-2900	10.6-12.7
¹ 0.495-0.505	8.41425-8.41475	74.8-75.2	608-614	3260-3267	13.25-13.4
2.1735-2.1905	12.29-12.293	108-121.94	960-1240	3332-3339	14.47-14.5
4.125-4.128	12.51975-12.52025	123-138	1300-1427	3345.8-3358	15.35-16.2
4.17725-4.17775	12.57675-12.57725	149.9-150.05	1435-1626.5	3600-4400	17.7-21.4
4.20725-4.20775	13.36-13.41	156.52475- 156.52525	1645.5-1646.5	4500-5150	22.01-23.12
6.215-6.218	16.42-16.423	156.7-156.9	1660-1710	5350-5460	23.6-24
6.26775-6.26825	16.69475-16.69525	162.0125-167.17	1718.8-1722.2	7250-7750	31.2-31.8
6.31175-6.31225	16.80425-16.80475	167.72-173.2	2200-2300	8025-8500	36.43-36.5
8.291-8.294	25.5-25.67	240-285	2310-2390	9000-9200	² Above 38.6
8.362-8.366	37.5-38.25	322-335.4	2483.5-2500	9300-9500	

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

² Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



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FCC Part 15 § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table 2 :

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in table 2
Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

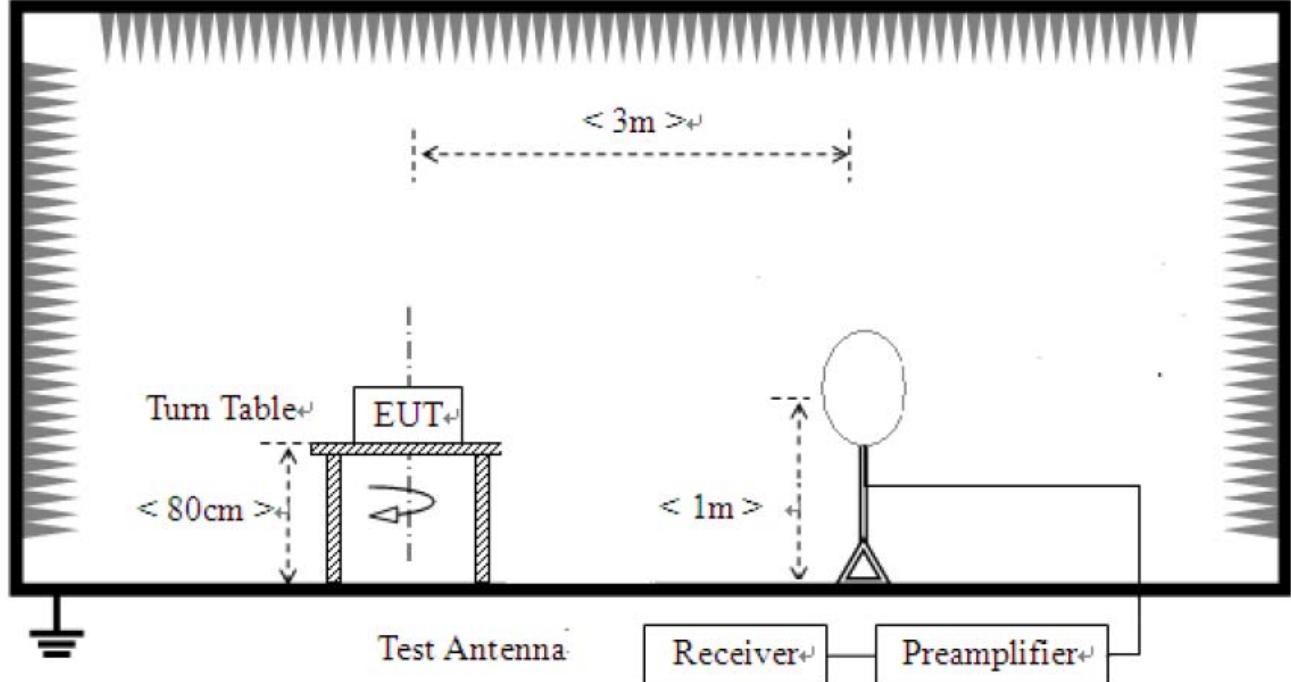
Table 2. General Field Strength Limits for Licence-Exempt Transmitters (FCC)

Frequency(MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Deasurement Distance (meters)
0.009-0.490	2400/F(kHz)	48.5 – 13.8	300
0.490-1.705	24000/F(kHz)	33.8 – 23	30
1.705-30	30	29.5	30
30-88	100**	40	3
88-216	150**	43.5	3
216-960	200**	46	3
Above 960	500	54	3

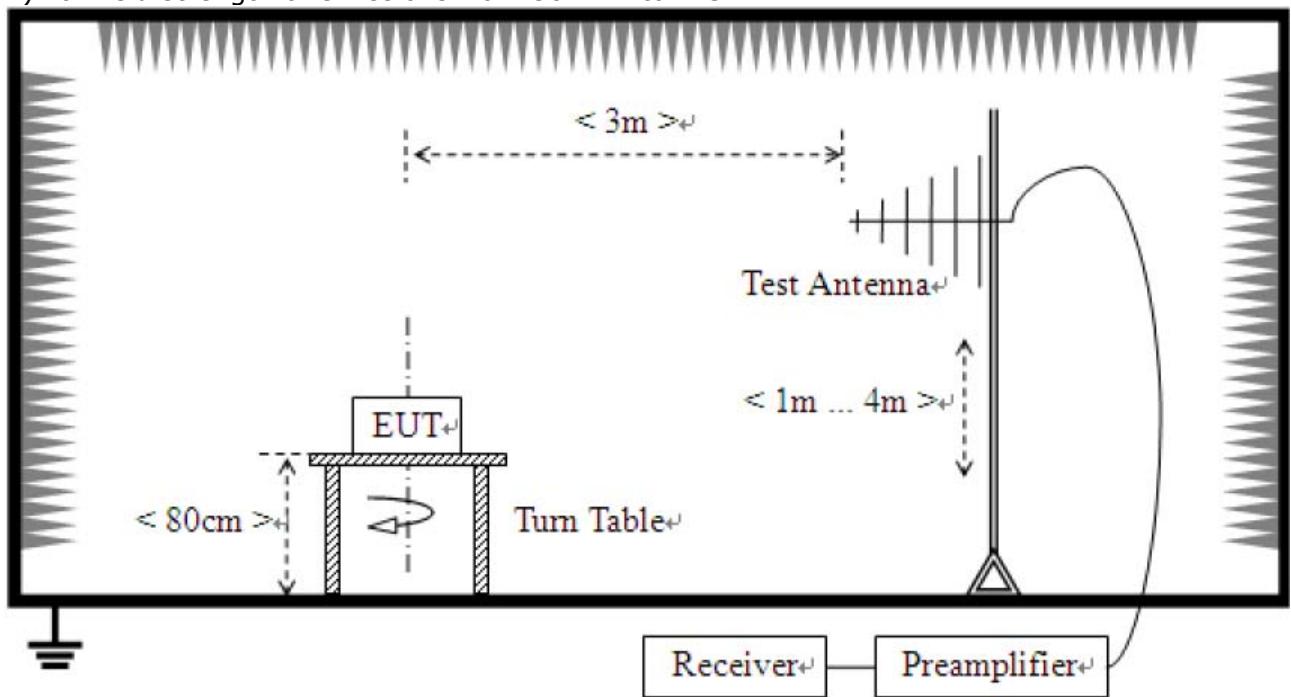
** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

Test Setup:

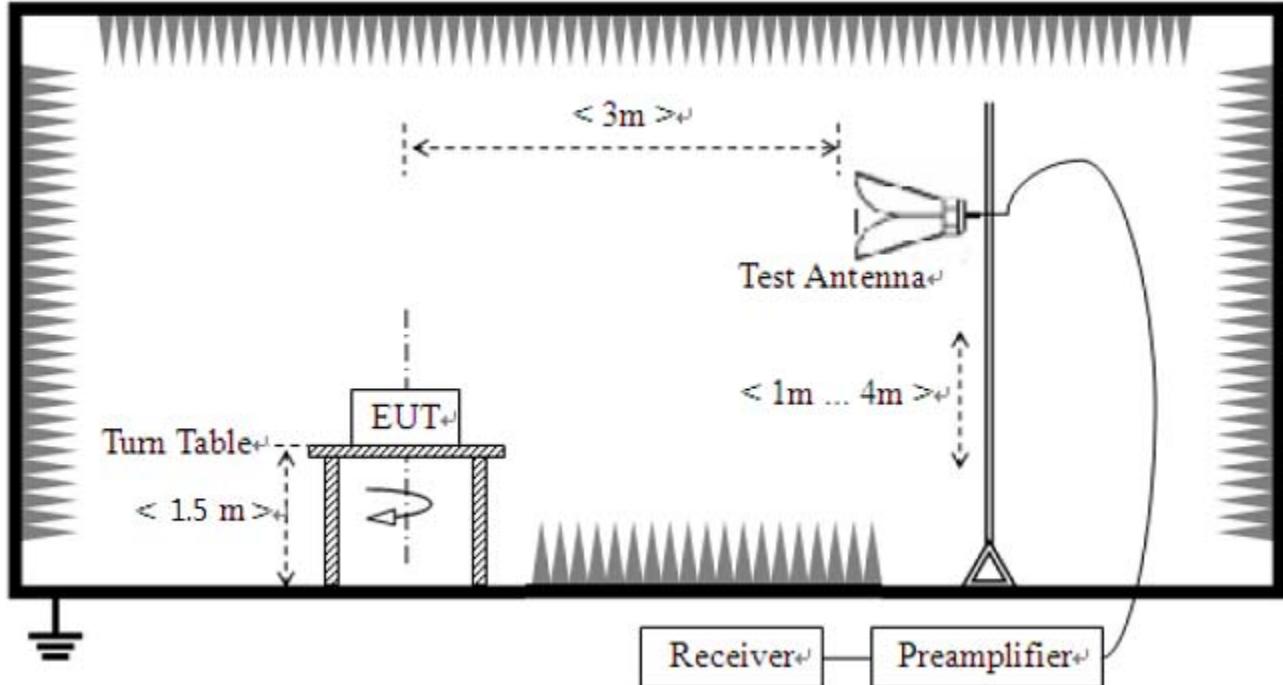
- 1) For field strength of emissions from 9 kHz to 30 MHz



- 2) For field strength of emissions from 30 MHz to 1 GHz



3) For field strength of emissions above 1 GHz

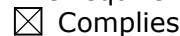


Test results

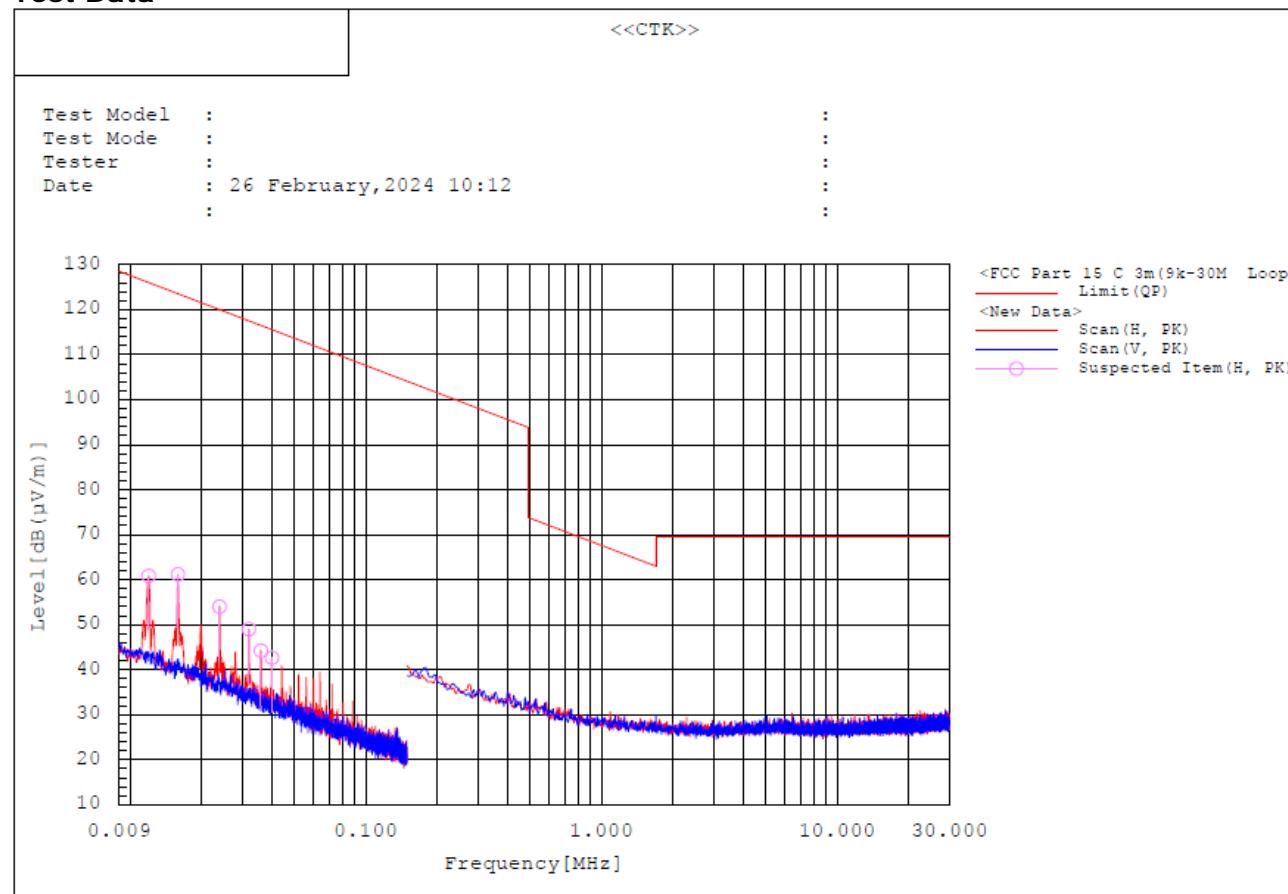
1) 9 kHz to 30 MHz

Test mode : BLE 1 Mbps - Transmission status (Worst case)

The requirements are:



Test Data



Spectrum Selection

No.	Frequency	Pol.	Reading	c.f.	Result	Limit	Margin	Height	Angle	Remark
			PK [MHz]		PK [dB (µV)]	PK [dB (1/m)]	PK [dB (µV/m)]	QP [dB (µV/m)]	QP-PK [dB]	[cm] [deg]
1	0.012	H	35.8	25.0	60.8	126.0	65.2	100.6	358.8	
2	0.016	H	36.2	25.0	61.2	123.5	62.3	100.6	6.7	
3	0.024	H	29.0	25.0	54.0	120.0	66.0	100.6	5.7	
4	0.032	H	24.0	25.0	49.0	117.5	68.5	100.6	4.7	
5	0.036	H	19.2	25.0	44.2	116.5	72.3	100.6	5.7	
6	0.040	H	17.7	25.0	42.7	115.6	72.9	100.6	1.4	

Remark :

- REMARK :

 1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
 2. Result = Reading + c.f(correction factor)
 3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
 4. This data is the Peak(PK) value.

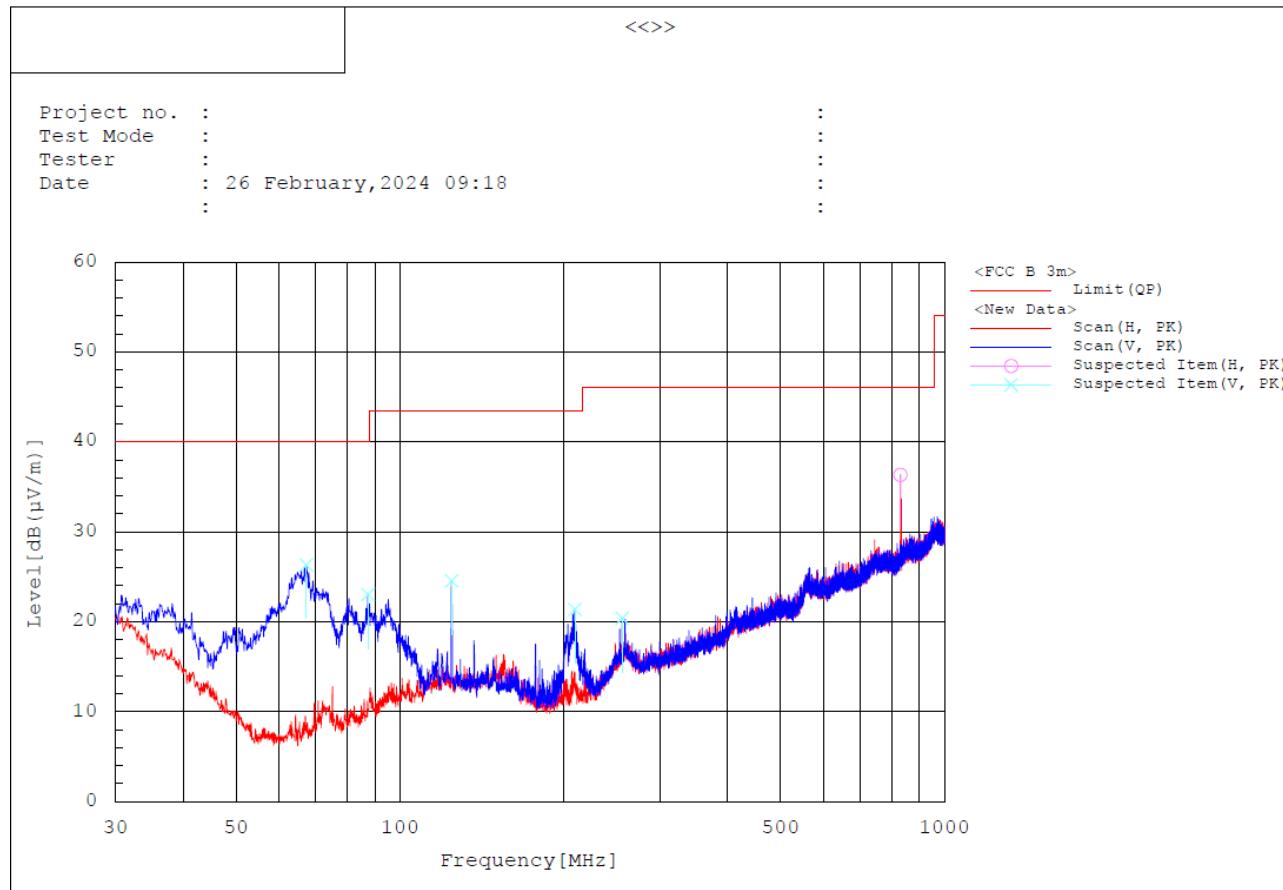
2) 30 MHz to 1 GHz

Test mode : BLE 1 Mbps - Transmission status (Worst case)

The requirements are:

Complies

Test Data



Spectrum Selection

No.	Frequency	Pol	Reading	c.f	Result	Limit	Margin	Height	Angle	Remark
	[MHz]		PK		PK	QP	QP-PK			
			[dB (μV)]	[dB (1/m)]	[dB (μV/m)]	[dB (μV/m)]	[dB]	[cm]	[deg]	
1	67.345	V	45.3	-19.0	26.3	40.0	13.7	100.0	291.4	
2	87.327	V	39.8	-16.8	23.0	40.0	17.0	100.0	0.9	
3	124.478	V	37.6	-13.0	24.6	43.5	18.9	100.0	359.6	
4	209.644	V	36.5	-15.1	21.4	43.5	22.1	100.0	257.6	
5	256.010	V	30.8	-10.4	20.4	46.0	25.6	100.0	359.6	
6	830.153	H	34.6	1.7	36.3	46.0	9.7	300.0	0.2	

Remark :

1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
4. This data is the Peak(PK) value.

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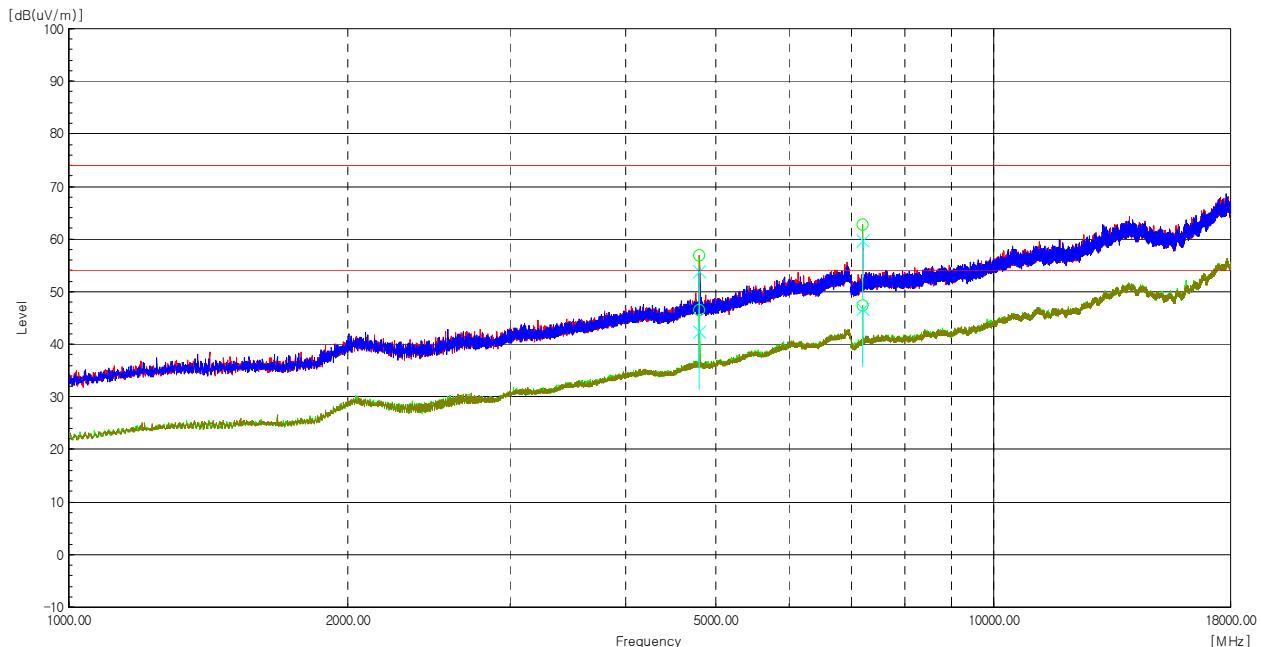
3) 1 GHz to 18 GHz

Test mode : BLE 1 Mbps - Transmission status (Lowest channel_2 402 MHz)

The requirements are:

Complies

Test Data



Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Duty Cycle Factor [dB]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Note
4 804.07	V	51.5	-----	2.3	-----	53.8	-----	74.0	-----	20.2	-----	Peak
4 804.75	H	54.5	-----	2.3	-----	56.8	-----	74.0	-----	17.2	-----	Peak
7 206.61	V	52.7	-----	7.1	-----	59.8	-----	74.0	-----	14.2	-----	Peak
7 207.29	H	55.7	-----	7.1	-----	62.8	-----	74.0	-----	11.2	-----	Peak
4 804.07	H	-----	44.2	2.3	0.22	-----	46.7	-----	54.0	-----	7.3	Average
4 804.07	V	-----	40.1	2.3	0.22	-----	42.6	-----	54.0	-----	11.4	Average
7 205.93	H	-----	40.2	7.1	0.22	-----	48.1	-----	54.0	-----	6.5	Average
7 206.61	V	-----	39.6	7.1	0.22	-----	46.9	-----	54.0	-----	7.1	Average

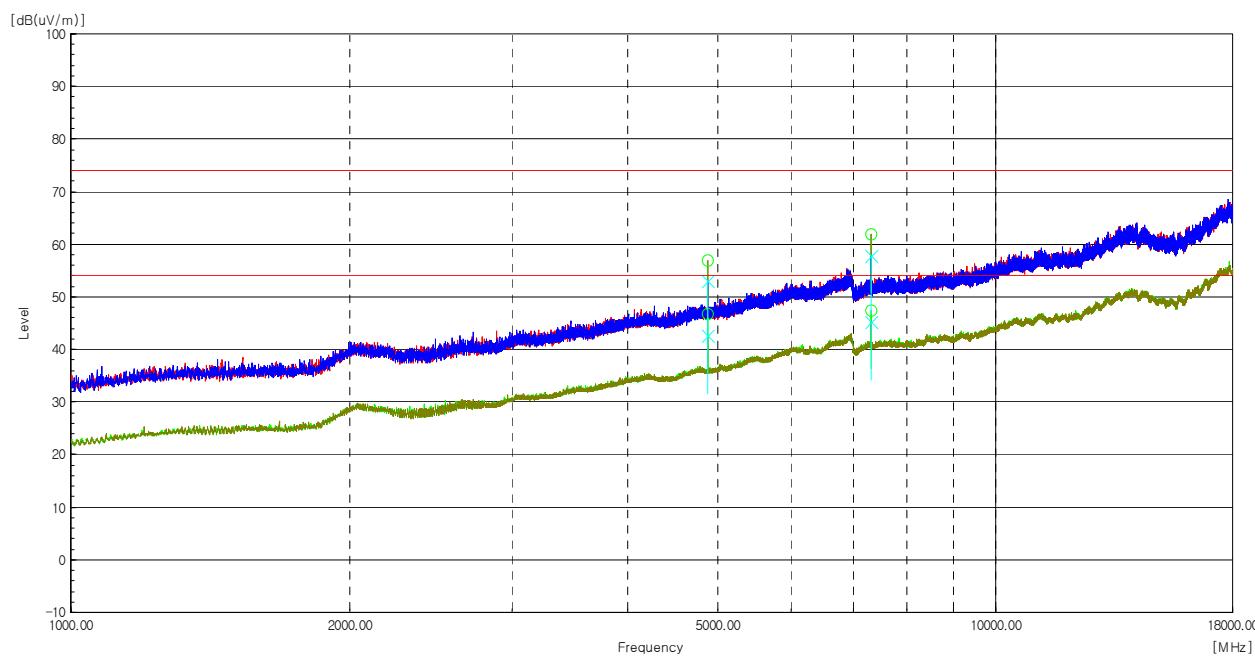
 CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501 <small>The Pioneer Leader of Global Regulatory Certification</small>	Report No.: CTK-2024-00740 Page (26) / (34) Pages	
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Test mode : BLE 1 Mbps - Transmission status (Middle channel _2 440 MHz)

The requirements are:

Complies

Test Data



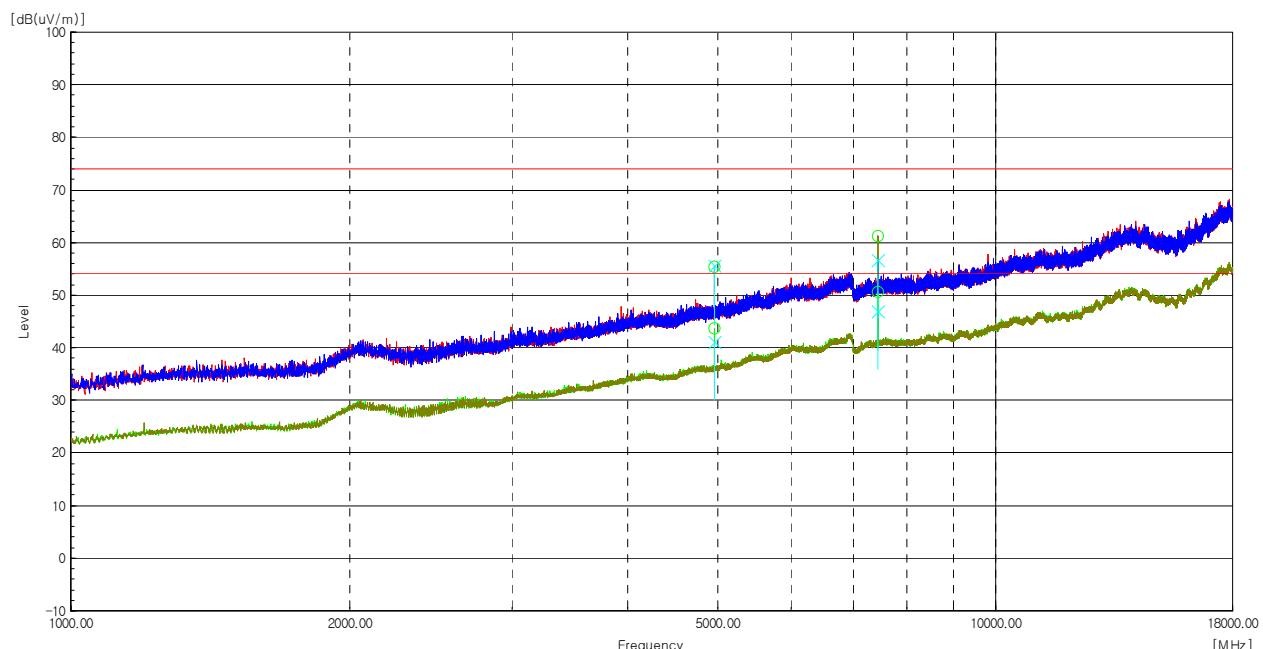
Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Duty Cycle Factor [dB]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Note
4 880.24	V	50.7	-----	2.4	-----	53.1	-----	74.0	-----	20.9	-----	Peak
4 880.92	H	54.4	-----	2.5	-----	56.9	-----	74.0	-----	17.1	-----	Peak
7 319.49	V	50.5	-----	7.3	-----	57.8	-----	74.0	-----	16.2	-----	Peak
7 320.17	H	54.6	-----	7.3	-----	61.9	-----	74.0	-----	12.1	-----	Peak
4 880.24	H	-----	44.3	2.4	0.22	-----	46.9	-----	54.0	-----	7.1	Average
4 880.24	V	-----	40.2	2.4	0.22	-----	42.8	-----	54.0	-----	11.2	Average
7 320.17	V	-----	37.8	7.3	0.22	-----	45.3	-----	54.0	-----	8.7	Average
7 320.17	H	-----	40.1	7.3	0.22	-----	47.6	-----	54.0	-----	6.4	Average

Test mode : BLE 1 Mbps - Transmission status (Highest channel _2 480 MHz)

The requirements are:

Complies

Test Data



Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Duty Cycle Factor [dB]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Note
4 959.80	H	52.6	-----	2.7	-----	55.3	-----	74.0	-----	18.7	-----	Peak
4 959.80	V	52.9	-----	2.7	-----	55.6	-----	74.0	-----	18.4	-----	Peak
7 439.86	V	49.3	-----	7.3	-----	56.6	-----	74.0	-----	17.4	-----	Peak
7 440.54	H	54.0	-----	7.3	-----	61.3	-----	74.0	-----	12.7	-----	Peak
4 959.80	V	-----	38.3	2.7	0.22	-----	41.2	-----	54.0	-----	12.8	Average
4 960.48	H	-----	41.0	2.7	0.22	-----	43.9	-----	54.0	-----	10.1	Average
7 439.86	V	-----	39.7	7.3	0.22	-----	47.2	-----	54.0	-----	6.8	Average
7 439.86	H	-----	43.3	7.3	0.22	-----	50.8	-----	54.0	-----	3.2	Average

Remarks

1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain
4. Band reject filter was used from 1 GHz to 18 GHz

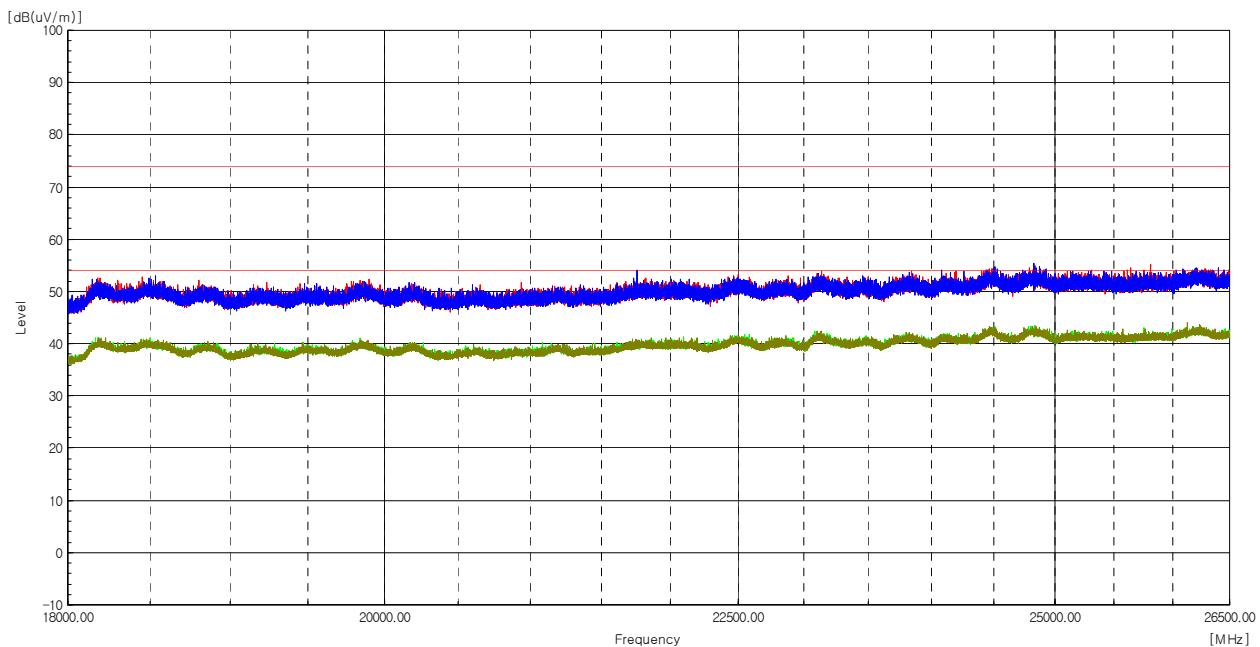
4) 18 GHz to 26.5 GHz

Test mode : BLE 1 Mbps - Transmission status (Worst case)

The requirements are:

Complies

Test Data



Result : No peak found

Remarks

1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

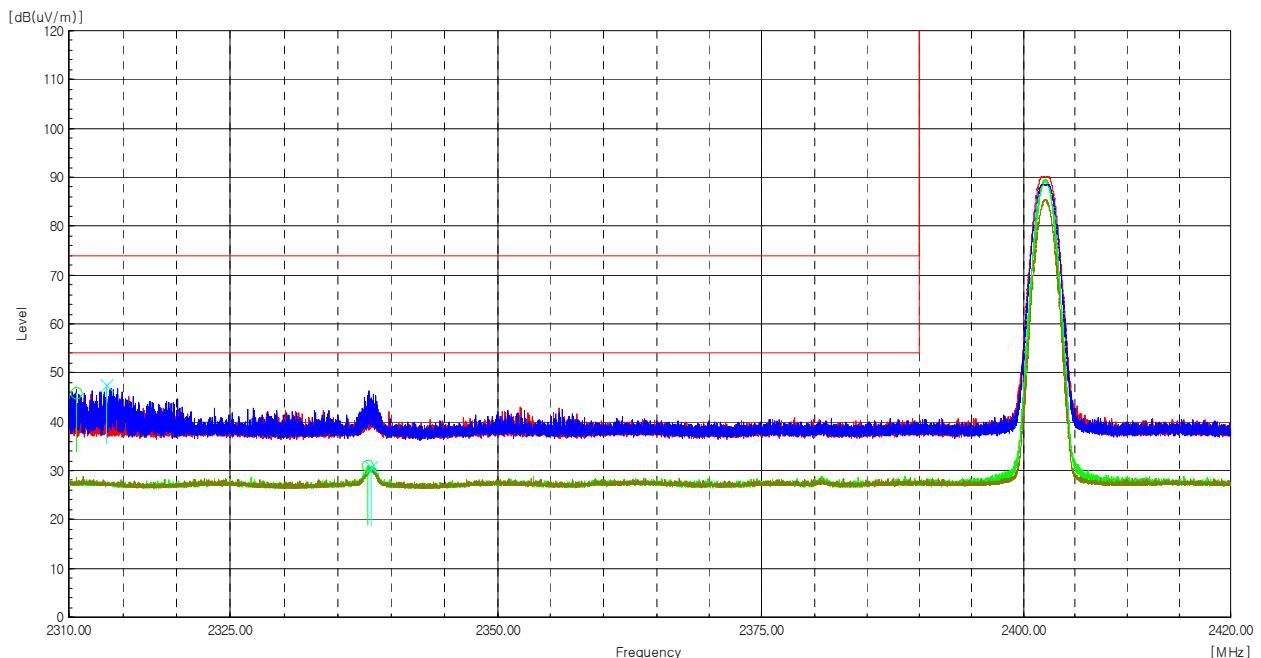
5) Restricted Frequency Bands

Test mode : BLE 1 Mbps - Transmission status Lowest channel
(Test frequency range : 2 310 MHz – 2 390 MHz)

The requirements are:

Complies

Test Data



Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Duty Cycle Factor [dB]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Note
2 310.68	H	51.7	-----	-6.0	-----	45.7	-----	74.0	-----	28.3	-----	Peak
2 313.46	V	53.4	-----	-6.0	-----	47.4	-----	74.0	-----	26.6	-----	Peak
2 337.81	H	-----	37.0	-6.0	0.22	-----	31.2	-----	54.0	-----	22.8	Average
2 338.14	V	-----	36.7	-6.0	0.22	-----	30.9	-----	54.0	-----	23.1	Average

Remarks

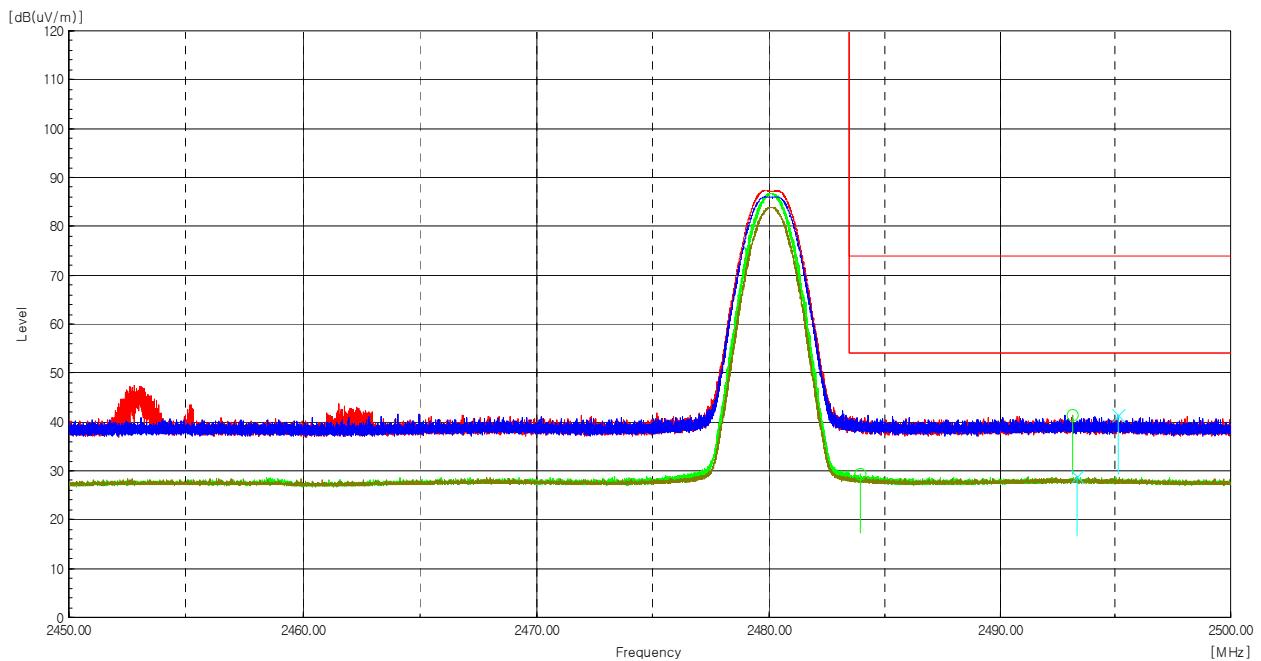
1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

Test mode : BLE 1 Mbps - Transmission status Highest channel
(Test frequency range : 2 483.5 MHz – 2 500 MHz)

The requirements are:

Complies

Test Data



Frequency [MHz]	(P)	Reading PK [dBuV]	Reading AV [dBuV]	c.f [dB(1/m)]	Duty Cycle Factor [dB]	Level PK [dB(uV/m)]	Level AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Note
2 493.16	H	46.5	-----	-5.2	-----	41.3	-----	74.0	-----	32.7	-----	Peak
2 495.11	V	46.6	-----	-5.2	-----	41.4	-----	74.0	-----	32.6	-----	Peak
2 483.95	H	-----	34.5	-5.3	0.22	-----	29.4	-----	54.0	-----	24.6	Average
2 493.33	V	-----	34.0	-5.2	0.22	-----	29.0	-----	54.0	-----	25.0	Average

Remarks

1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain



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4.6 AC Conducted Emissions

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits.

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

ANSI C63.10-2013 - Section 6.2.2

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- 15.207(a)

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average**
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* The level decreases linearly with the logarithm of the frequency.

** A linear average detector is required.

Test Results

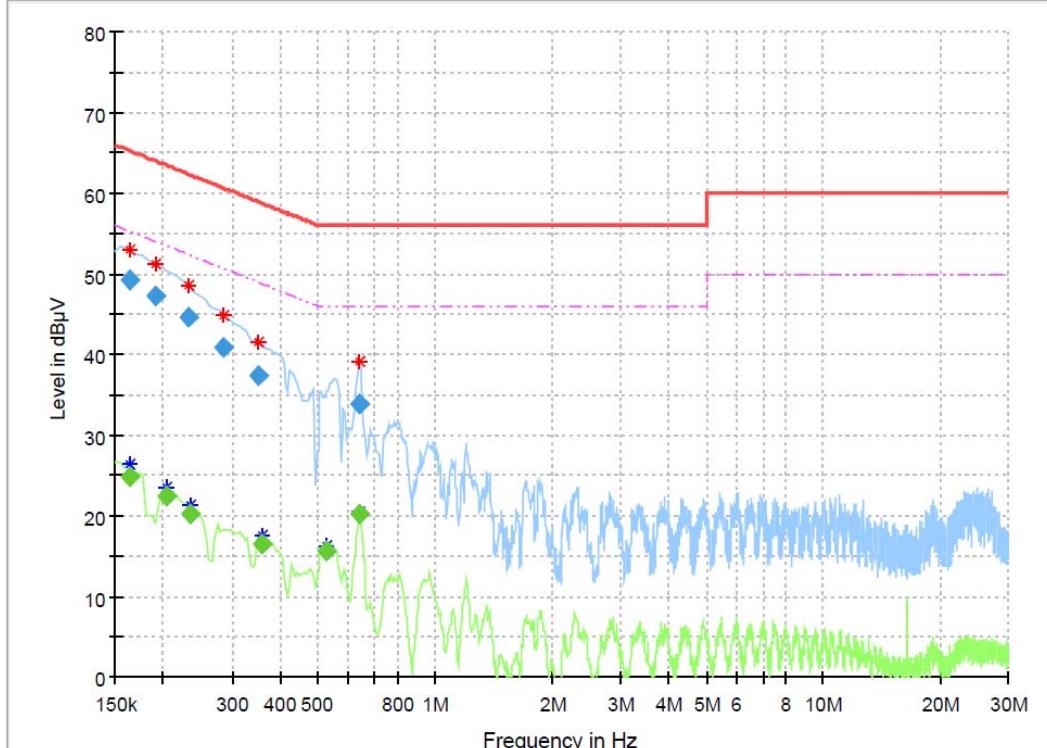
The requirements are:

Complies

Test Data

Test mode : BLE 1 Mbps

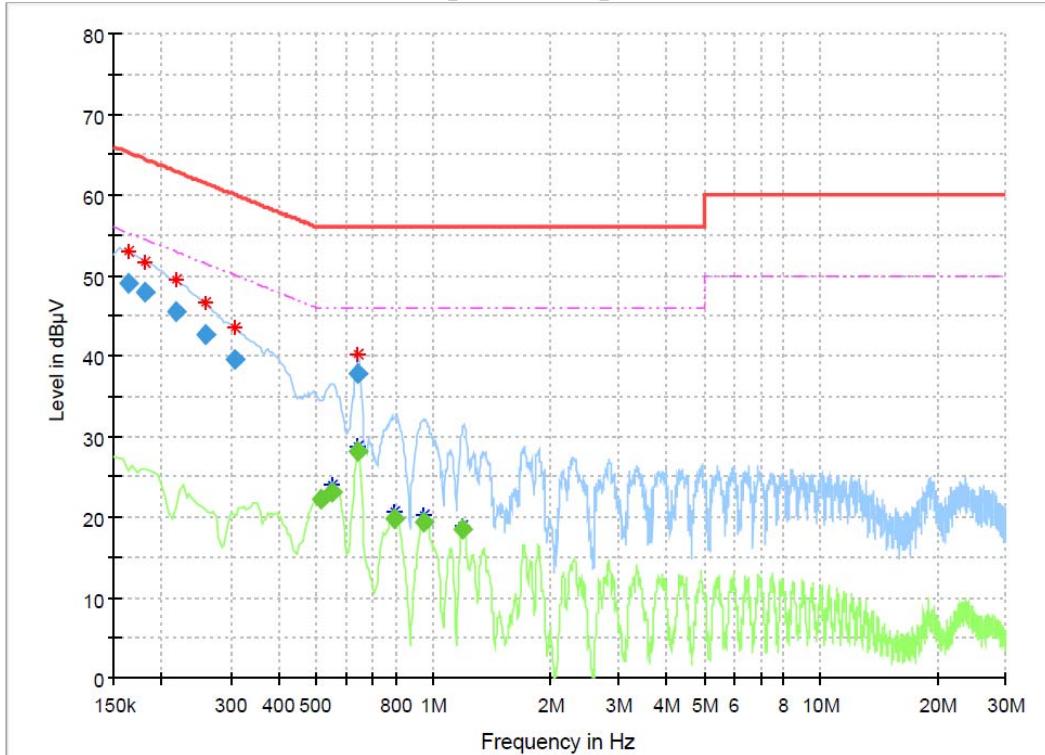
[LINE]



Final Result

Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.163500	---	24.81	55.28	30.47	15000.0	9.000	L1	ON	10.0
0.163500	49.13	---	65.28	16.15	15000.0	9.000	L1	ON	10.0
0.190500	47.35	---	64.02	16.66	15000.0	9.000	L1	ON	10.0
0.204000	---	22.46	53.45	30.99	15000.0	9.000	L1	ON	9.9
0.231000	44.61	---	62.41	17.80	15000.0	9.000	L1	ON	9.8
0.235500	---	20.28	52.25	31.97	15000.0	9.000	L1	ON	9.8
0.285000	40.98	---	60.67	19.69	15000.0	9.000	L1	ON	9.8
0.352500	37.46	---	58.90	21.45	15000.0	9.000	L1	ON	9.9
0.357000	---	16.49	48.80	32.31	15000.0	9.000	L1	ON	9.9
0.528000	---	15.71	46.00	30.29	15000.0	9.000	L1	ON	10.0
0.640500	---	20.32	46.00	25.68	15000.0	9.000	L1	ON	9.9
0.640500	33.92	---	56.00	22.08	15000.0	9.000	L1	ON	9.9

[NEUTRAL]



Final Result

Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.163500	49.10	---	65.28	16.18	15000.0	9.000	N	ON	10.0
0.181500	47.86	---	64.42	16.56	15000.0	9.000	N	ON	10.0
0.217500	45.50	---	62.91	17.42	15000.0	9.000	N	ON	9.9
0.258000	42.65	---	61.50	18.85	15000.0	9.000	N	ON	9.8
0.307500	39.55	---	60.04	20.49	15000.0	9.000	N	ON	9.9
0.514500	---	22.15	46.00	23.85	15000.0	9.000	N	ON	10.0
0.550500	---	23.02	46.00	22.98	15000.0	9.000	N	ON	10.0
0.640500	---	28.11	46.00	17.89	15000.0	9.000	N	ON	9.9
0.640500	37.84	---	56.00	18.16	15000.0	9.000	N	ON	9.9
0.793500	---	19.75	46.00	26.25	15000.0	9.000	N	ON	9.9
0.946500	---	19.36	46.00	26.64	15000.0	9.000	N	ON	9.8
1.194000	---	18.43	46.00	27.57	15000.0	9.000	N	ON	9.8

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5. APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Signal Analyzer	Agilent	N9020A	US46470483	2023-12-05	2024-12-05
2	Signal Generator	Rohde & Schwarz	SMB100A	175528	2023-03-22	2024-03-22
3	EMI TEST RECEIVER	Rohde & Schwarz	ESW44	102039	2023-05-03	2024-05-03
4	Bilog Antenna	TESEQ	CBL6111D	60654	2024-08-21	2025-08-21
5	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2022-04-15	2024-04-15
6	Attenuator	PASTERNACK	PE7AP006-06	L20210504000 023	2022-08-10	2023-08-10
7	AMPLIFIER	SONOMA	310N	411011	2023-08-04	2024-08-04
8	Spectrum Analyzer	Rohde & Schwarz	FSV40	101574	2023-01-11	2024-01-11
9	Preamplifier	Agilent	8449B	3008A00620	2023-04-21	2024-04-21
10	Double Ridged Guide Antenna	ETS-Lindgren	3115	00078895	2023-04-14	2024-04-13
11	Horn Antenna	SCHWARZBECK	BBHA9170	1153	2023-10-19	2024-10-19
12	Band Reject Filter	Micro Tronics	BRM50702	G444	2023-09-26	2024-09-26
13	Low Noise Amplifier	TESTEK	TK-PA1840H	210124-L	2023-10-23	2024-10-23
14	Dual-Tracking DC Power Supply	Topward Electric Instruments Co.,Ltd.	6303D	711196	2023-03-22	2024-03-22
15	DC POWER SUPPLY	Agilent	E3632A	MY40009327	2023-03-27	2024-03-27
16	EMI Test Receiver	R&S	ESR3	102826	2023-05-03	2024-05-03
17	LISN	R&S	ENV216	101236	2023-10-31	2024-10-31

	Cable	Manufacturer	Model No.	Serial No.	Check Date
1	RF Cable (Conducted)	Junkosha Inc.	MWX221	1512S151	2023-10-10
2	RF Cable (9 kHz-1 GHz Radiated)	Canare Corporation	L-5D2W	N/A	2024-03-05
3	RF Cable (9 kHz-1 GHz Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	2024-03-05
4	RF Cable (1 GHz-18 GHz Radiated)	Junkosha Inc.	MWX221	2008S246	2023-06-28
5	RF Cable (1 GHz-18 GHz Radiated)	Junkosha Inc.	MWX221	J0970749	2023-06-28
6	RF Cable (1 GHz-18 GHz Radiated)	Sensorview Co., LTD	9S18	TPC2204060007	2023-06-28
7	RF Cable (18 GHz-26.5 GHz Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY2372/2	2023-06-28
8	RF Cable (18 GHz-26.5 GHz Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY2371/2	2023-06-28
9	RF Cable (18 GHz-26.5 GHz Radiated)	Sensorview Co., LTD	9A40	TP210713-001	2023-06-28
10	RF Cable (Line Conducted)	Canare Corporation	L-5D2W	N/A	2024-03-05

-END-