TEST REPORT
On behalf of

TRISPORT AG

Product Name:	HOI CROSS+	HOI RIDE+	HOI TOUR
Model No.:	CT1062-400US, CT1062-900US	EM1058-400US, EM1058-900US	EM1059-400US, EM1059-900US

FCC ID: 2BB2MCT1062-400US

Prepared For: TRISPORT AG
Boesch 67 CH-6331 Huenenberg

Prepared By: Audix Technology (Shanghai) Co., Ltd.
3F, Building 34, No. 680 Guiping Rd.,
Caohejing, Hi-Tech Park,
Shanghai 200233, China

Tel: +86-21-64955500

TESTING
NVLAP LAB CODE 200371-0

Report No. : ACI-F24039
Date of Test : 2024.01.23-02.04
Date of Report : 2024.03.06

The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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TEST REPORT

Applicant	:	TRISPORT AG
EUT Description	:	HOI CROSS+, HOI RIDE+, HOI TOUR
	(A) Model No.	: Refer to Sec.2.1
	(B) Power Supply	: AC 230V/50Hz
	(C) Test Voltage	: AC 230V/50Hz

Test Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C
AND ANSI C63.10-2013

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: Refer to Sec2.1), which was tested is technically compliance with the FCC limits.

This report applies to above tested Sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

Date of Test : 2024.01.23-02.04 Date of Report : 2024.03.06

Producer : _____
JAREY LU / Deputy Assistant Manager

Review : _____
LVY LV / Deputy Assistant Manager

AUDIX®
For and on behalf of
Audix Technology (Shanghai) Co., Ltd.

Signatory : _____
Authorized Signature(s) KAMP CHEN / Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The result is determined according to the decision rules of customer selection in the ASC-403 application service form.
1. According to IEC GUIDE 115 Procedure 2 and ILAC-G8, the uncertainties value is not used in determining the PASS/FAIL results.
2. If the required specification or standard already contains the decision rules, it will be carried out in accordance with the regulations or standard documents or the requirements of the competent units. If the required specification or standard does not contain a decision rule, the same paragraph 1.
3. If your company has a required decision rule, it will be implemented in accordance with the requirements and ISO/IEC Guide 98-4 specifications.

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
EMISSION			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.209(a) 15.205(a)(c)
6 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(a)(2)
Maximum Peak Output Power Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(b)(3)
Emission Limitations Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Band Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Power Spectral Density Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(e)
Antenna Requirement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.203
N/A is an abbreviation for Not Applicable.			

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Type of EUT : ☑ Production ☐ Pre-product ☐ Pro-type

Product Name	HOI CROSS	HOI RIDE+	HOI TOUR
Model Number	CT1062-400US, CT1062-900US	EM1058-400US, EM1058-900US	EM1059-400US, EM1059-900US

Note#1 : The difference between Models as below:

Model	CT1062-400US	CT1062-900US
Difference	Just the color is different.	

Model	EM1058-400US	EM1058-900US
Difference	Just the color is different.	

Model	EM1059-400US	EM1059-900US
Difference	Just the color is different.	

Model	CT1062-400US, CT1062-900US	EM1058-400US, EM1058-900US	EM1059-400US, EM1059-900US
Difference	The electronic part are all the same except the mechanical structures were different		

Note#2 : According to the differece as above, we selected Model CT1062-400US for main test and model EM1058-400US, EM1059-400US for differential test in current report.

Test Model : CT1062-400US, EM1058-400US, EM1059-400US

Note#3 : The EUT shipped with RF module that listed ad below:

Module	Radio Technology	Condition	Modular or not
WLT5283M	BLE	In use	N/A
ICT-M	BLE	In use	Single Modular
	Wifi2.4G	In use	
Note: The Module "ICT-M" is one Single Modular, which the FCC ID is "2AC7Z-ESPS3WROOM1".			

Note#4 : According to the information as above, we test module WLT5283M to report.

Test Module : WLT5283M

Radio Tech : BLE 5.0

Note : LE2M not support.

Channel Freq. : BLE: 2402MHz-2480MHz;

Modulation : BLE: GFSK;

Antenna Info.	:	Antenna Type: PCB Antenna Antenna Gain: 3 dBi
Applicant	:	TRISPORT AG Boesch 67 CH-6331 Huenenberg
Manufacturer	:	Same as Applicant.

2.2 EUT Specifications Assessed in Current Report

Mode	Modulation	Data Rate(Mbps)
BLE	GFSK	1

Channel List			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
…	…	…	…
…	…	…	…
…	…	…	…
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

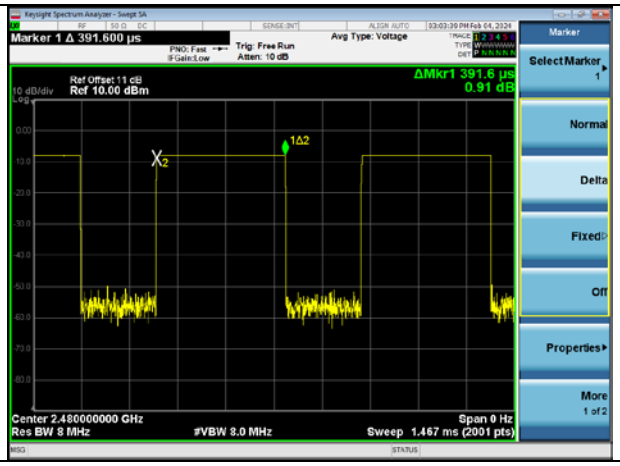
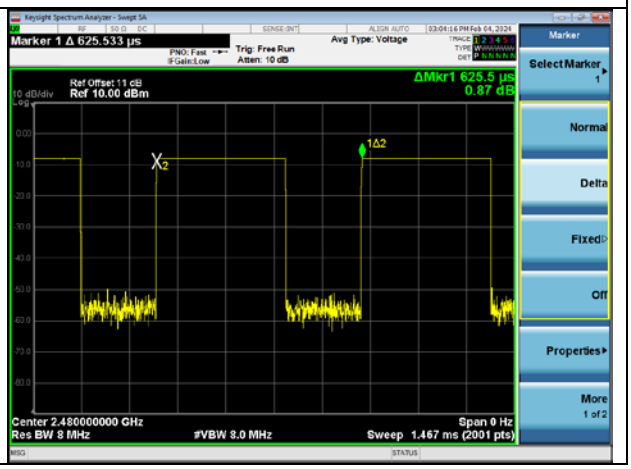
2.3 Test Information

The test software “nRF Connect for Desktop.exe” was used to control EUT work in TX mode, Power Setting and select test channel.

Mode	data rate (Mbps)	Power Setting	Test Channel		Frequency (MHz)
BLE	1	-4	Low:	00	2402
		-4	Middle:	20	2442
		-4	High:	39	2480

2.4 Duty Cycle Check

Mode	Transmission Duration (ms)	Transmission Period (ms)	Duty Cycle (%)
BLE	0.3916	0.6255	62.61

Mode	Ton	Ton+off
BLE		

2.5 Sample Description

Test Item	Model Number	Sample Number	Date of receipted
Conducted Emission	CT1062-400US	E20231017179-02/03	2023.10.17
	EM1058-400US	E20231017176-01/01	2023.10.17
	EM1059-400US	E20231017178-01/01	2023.10.17
Radiated Emission	CT1062-400US	E20231017179-02/03	2023.10.17
	EM1058-400US	E20231017176-01/01	2023.10.17
	EM1059-400US	E20231017178-01/01	2023.10.17
Conducted RF Test	CT1062-400US	E20231017179a-02/03	2023.10.17

2.6 Supported equipment

Brand : Acer
Product Name: : Notebook PC
Model Name : TravelMate P238 series
Model Number : N15W8

Product Name : Test Fixture
Product Function : USB to TTL

2.7 Description of Test Facility

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F, Building 34, No. 680 Guiping Rd.,
Caohejing, Hi-Tech Park,
Shanghai 200233, China

Accredited by NVLAP, Lab Code : 200371-0

FCC Designation Number : CN5027

Test Firm Registration Number : 954668

3 CONDUCTED EMISSION TEST

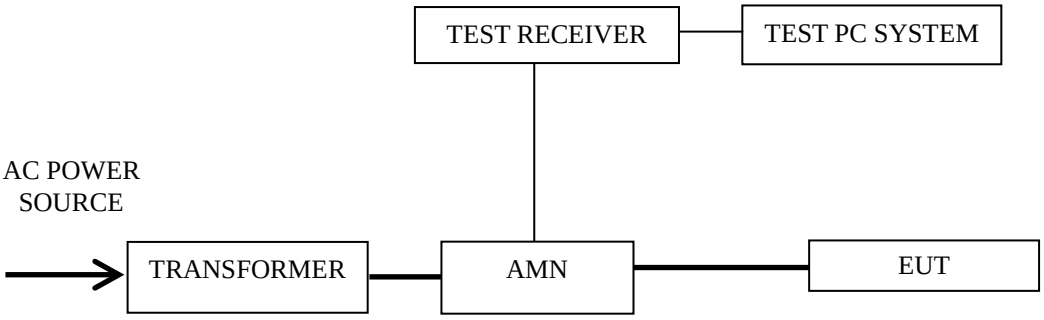
3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	101302	2023.02.22	1 Year
2.	Artificial Mains Network (AMN)	R&S	ESH2-Z5	843890/011	2023.02.22	1 Year
3.	Fixed Attenuator	SHYL	TTS-1	001	2023.02.22	1 Year
4.	50Ω Coaxial Switch	ANRITSU	MP59B	6200655086	2023.02.22	1 Year
5.	Coaxial Cable	HANWEI	RG223/U	KJ09052	2023.02.22	1 Year
6.	Software	Audix	e3	210616	--	--

3.2 Block Diagram of Test Setup

3.2.1 Conducted Disturbance Test Setup



—— : Signal Line
—— : Power Line

3.3 Conducted Emission Limits (§15.207)

Frequency Range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE 1 – The lower limit shall apply at the transition frequencies.

NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz

3.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner which tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT as shown in Sec. 3.2.

3.5.2 Turn on the power of all equipment.

3.5.3 Turn the EUT on the test mode, and then test.

3.6 Test Procedures

The EUT was placed upon a insulating support, which is 0.1 m above the horizontal conducting ground plane and 0.4 m from a vertical reference plane. The EUT was connected to the power mains through an Artificial Mains Network (AMN) to provide a 50 Ω coupling impedance for the measuring equipment. Both sides of AC line (Line & Neutral) were checked to find out the maximum conducted emission according to FCC Part 15 Subpart C and ANSI C63.10: 2013 requirements during conducted disturbance test.

The I.F. bandwidth of Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

Test with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. (According to KDB 174176 D01 Line Conducted FAQ)

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7

3.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Worst case emission:
(Test Model: CT1062-400US)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402MHz	P13-14

(Test Model: EM1058-400US)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402MHz	P15-16

(Test Model: EM1059-400US)

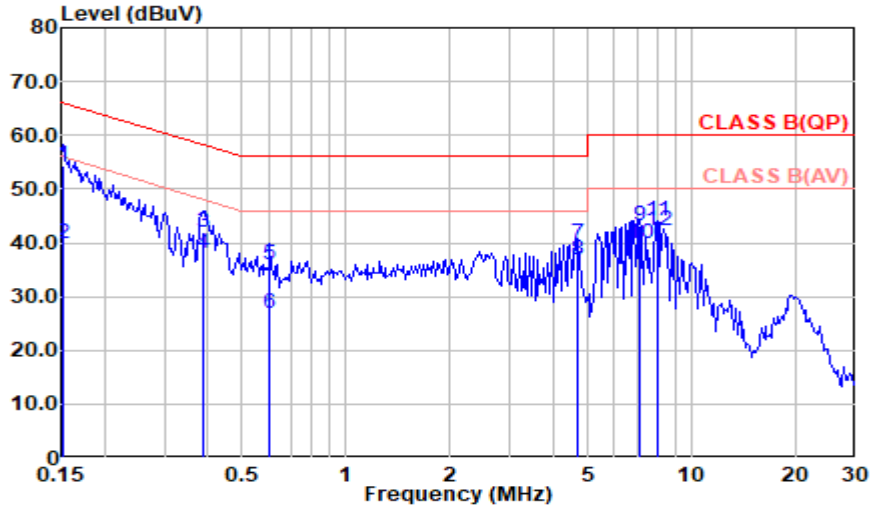
No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402MHz	P17-18

NOTE 1 – Emission Level = Read Level + AMN Factor +Aux Factor + Cable Loss Margin = Limits - Emission Level
NOTE 2 – “QP” means “Quasi-Peak” values
NOTE 3 – The emission levels which not reported are too low against the official limit.

Worst case emission

Test Date:	2023.11.28	Temp./Hum.:	22°C/51%RH	Test By:	Jarey

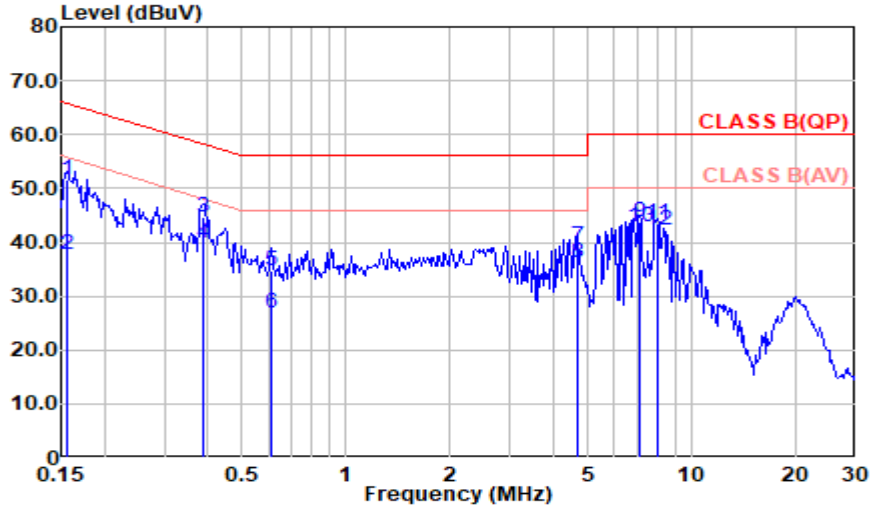
Mode: BLE CH2402MHz **Model: CT1062-400US**



Polarization at Line

Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.153	44.71	0.20	9.49	0.00	54.40	65.83	11.44	QP
0.153	30.28	0.20	9.49	0.00	39.97	55.83	15.86	Average
0.386	32.19	0.20	9.49	0.00	41.88	58.16	16.28	QP
0.386	28.30	0.20	9.49	0.00	37.99	48.16	10.17	Average
0.603	26.06	0.20	9.49	0.03	35.78	56.00	20.22	QP
0.603	17.30	0.20	9.49	0.03	27.02	46.00	18.98	Average
4.675	29.87	0.30	9.49	0.10	39.76	56.00	16.24	QP
4.675	26.87	0.30	9.49	0.10	36.76	46.00	9.24	Average
7.101	33.45	0.20	9.49	0.15	43.29	60.00	16.71	QP
7.101	30.11	0.20	9.49	0.15	39.95	50.00	10.05	Average
7.997	34.21	0.20	9.49	0.17	44.07	60.00	15.93	QP
7.997	32.40	0.20	9.49	0.17	42.26	50.00	7.74	Average

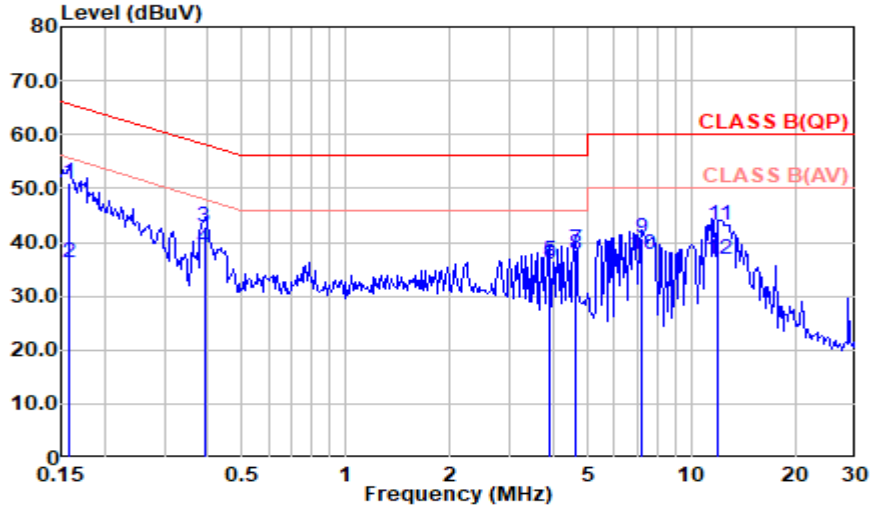
Mode: BLE CH2402MHz **Model: CT1062-400US**



Polarization at Neutral

Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.156	41.81	0.20	9.49	0.00	51.50	65.67	14.17	QP
0.156	27.96	0.20	9.49	0.00	37.65	55.67	18.02	Average
0.386	35.02	0.20	9.49	0.00	44.71	58.16	13.45	QP
0.386	30.11	0.20	9.49	0.00	39.79	48.16	8.36	Average
0.609	25.13	0.20	9.49	0.03	34.85	56.00	21.15	QP
0.609	17.30	0.20	9.49	0.03	27.02	46.00	18.98	Average
4.675	29.51	0.20	9.49	0.10	39.30	56.00	16.70	QP
4.675	26.40	0.20	9.49	0.10	36.19	46.00	9.81	Average
7.099	33.88	0.20	9.49	0.15	43.72	60.00	16.28	QP
7.099	33.06	0.20	9.49	0.15	42.90	50.00	7.10	Average
8.004	33.57	0.20	9.49	0.17	43.43	60.00	16.57	QP
8.004	32.34	0.20	9.49	0.17	42.20	50.00	7.80	Average

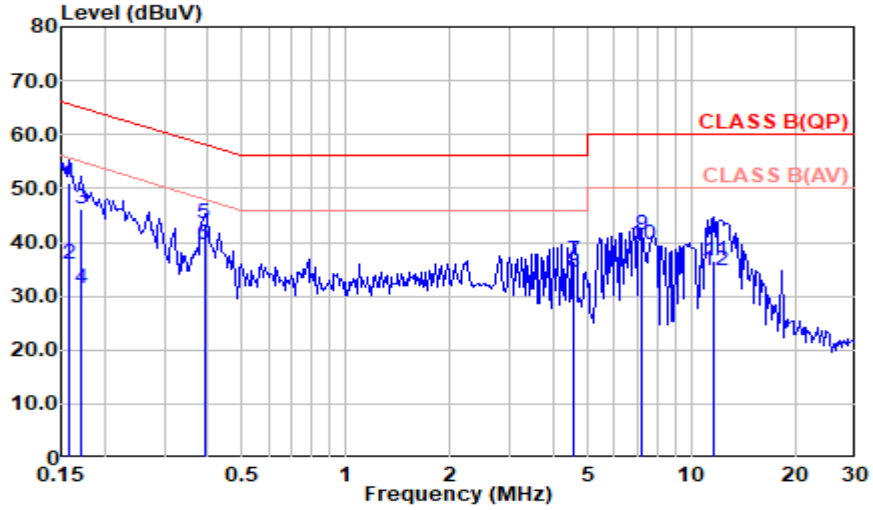
Mode: BLE CH2402MHz **Model: EM1058-400US**



Polarization at Line

Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.158	41.45	0.10	9.49	0.00	51.04	65.59	14.55	QP
0.158	26.66	0.10	9.49	0.00	36.25	55.59	19.34	Average
0.390	33.36	0.10	9.49	0.00	42.95	58.07	15.12	QP
0.390	29.49	0.10	9.49	0.00	39.08	48.07	8.99	Average
3.896	26.62	0.30	9.49	0.10	36.51	56.00	19.49	QP
3.896	25.96	0.30	9.49	0.10	35.85	46.00	10.15	Average
4.622	28.64	0.30	9.49	0.10	38.53	56.00	17.47	QP
4.622	27.92	0.30	9.49	0.10	37.81	46.00	8.19	Average
7.241	30.81	0.41	9.49	0.15	40.87	60.00	19.13	QP
7.241	27.81	0.41	9.49	0.15	37.86	50.00	12.14	Average
12.021	33.05	0.55	9.49	0.20	43.29	60.00	16.71	QP
12.021	26.70	0.55	9.49	0.20	36.94	50.00	13.06	Average

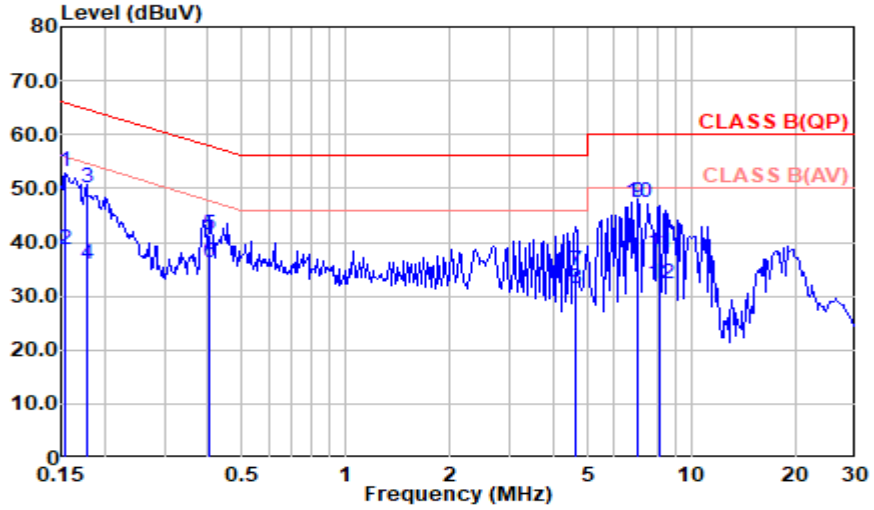
Mode: BLE CH2402MHz **Model: EM1058-400US**



Polarization at Neutral

Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.158	41.45	0.10	9.49	0.00	51.04	65.59	14.55	QP
0.158	26.39	0.10	9.49	0.00	35.98	55.59	19.61	Average
0.172	36.72	0.10	9.49	0.00	46.31	64.84	18.54	QP
0.172	21.92	0.10	9.49	0.00	31.51	54.84	23.33	Average
0.390	34.01	0.10	9.49	0.00	43.60	58.07	14.47	QP
0.390	29.82	0.10	9.49	0.00	39.41	48.07	8.66	Average
4.591	26.58	0.30	9.49	0.10	36.47	56.00	19.53	QP
4.591	24.64	0.30	9.49	0.10	34.53	46.00	11.47	Average
7.169	31.28	0.30	9.49	0.15	41.22	60.00	18.78	QP
7.169	29.60	0.30	9.49	0.15	39.55	50.00	10.45	Average
11.660	26.59	0.34	9.49	0.20	36.62	60.00	23.38	QP
11.660	24.66	0.34	9.49	0.20	34.69	50.00	15.31	Average

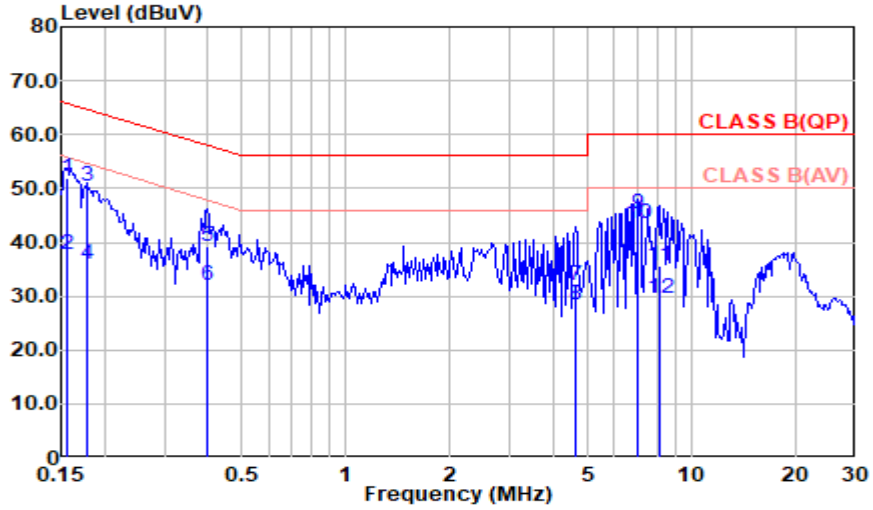
Mode: BLE CH2402MHz **Model: EM1059-400US**



Polarization at Line

Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.155	43.56	0.10	9.49	0.00	53.15	65.75	12.60	QP
0.155	29.02	0.10	9.49	0.00	38.61	55.75	17.14	Average
0.178	40.61	0.10	9.49	0.00	50.20	64.60	14.39	QP
0.178	26.30	0.10	9.49	0.00	35.89	54.60	18.71	Average
0.405	31.82	0.11	9.49	0.00	41.42	57.74	16.33	QP
0.405	26.68	0.11	9.49	0.00	36.28	47.74	11.46	Average
4.629	24.78	0.30	9.49	0.10	34.67	56.00	21.33	QP
4.629	21.51	0.30	9.49	0.10	31.40	46.00	14.60	Average
7.028	37.40	0.40	9.49	0.15	47.45	60.00	12.55	QP
7.028	36.31	0.40	9.49	0.15	46.35	50.00	3.65	Average
8.077	28.05	0.44	9.49	0.17	38.15	60.00	21.85	QP
8.077	22.32	0.44	9.49	0.17	32.42	50.00	17.58	Average

Mode: BLE CH2402MHz **Model: EM1059-400US**



Polarization at Neutral

Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.156	42.25	0.10	9.49	0.00	51.84	65.67	13.83	QP
0.156	28.24	0.10	9.49	0.00	37.83	55.67	17.84	Average
0.178	40.70	0.10	9.49	0.00	50.29	64.60	14.30	QP
0.178	26.47	0.10	9.49	0.00	36.06	54.60	18.54	Average
0.397	29.55	0.10	9.49	0.00	39.14	57.91	18.77	QP
0.397	22.32	0.10	9.49	0.00	31.91	47.91	16.00	Average
4.629	22.19	0.30	9.49	0.10	32.08	56.00	23.92	QP
4.629	18.40	0.30	9.49	0.10	28.29	46.00	17.71	Average
7.028	35.36	0.30	9.49	0.15	45.30	60.00	14.70	QP
7.028	33.59	0.30	9.49	0.15	43.53	50.00	6.47	Average
8.077	25.64	0.30	9.49	0.17	35.60	60.00	24.40	QP
8.077	19.53	0.30	9.49	0.17	29.49	50.00	20.51	Average

4 RADIATED EMISSION TEST

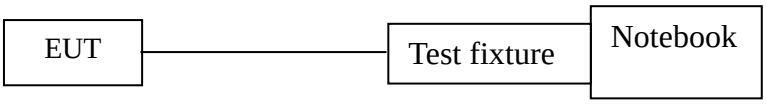
4.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

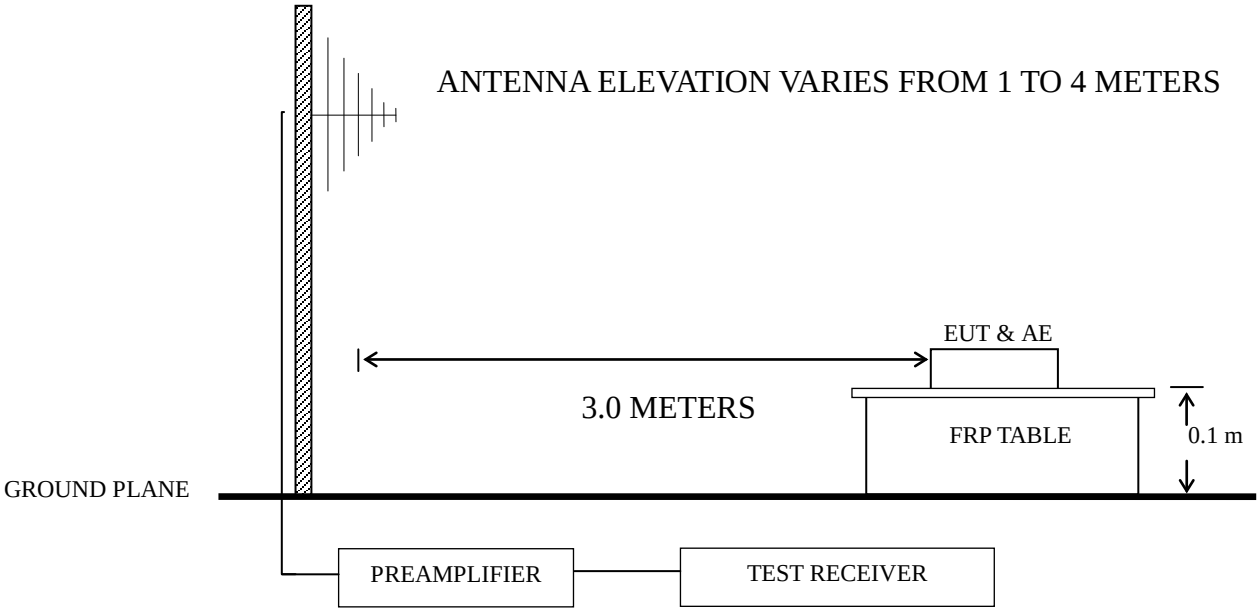
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Preamplifier	Agilent	8447D	2944A10548	2024.02.22	1 Year
2.	Preamplifier	HP	8449B	3008A00864	2024.02.22	1 Year
3.	EXA Signal Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
4.	Test Receiver	R&S	ESCI	101303	2024.02.22	1 Year
5.	Bilog Antenna+6dB Attenuator	Schwarzbeck	VULB 9168+EMCI-N-6-06	707+AT-N0637	2023.08.09	1 Year
6.	Horn Antenna	EMCO	3115	96074878	2023.08.02	1 Year
7.	Horn Antenna	EMCO	3116	00062643	2023.01.30	2 Year
8.	Cavity Band Rejection Filter	Microwave	WT-A3882-R 10	WT200312-1-1	2024.02.22	1 Year
9.	Coaxial Switch	Anritsu	MP59B	6200655086	2024.02.22	1 Year
10.	Coaxial Cable	SCHAFFNER	RG 212U-MIL C 17+N1K50-E W0630-N1K5 0-15m-1	RE-10m-001/ RE-15m-002	2024.02.22	1 Year
11.	Software	Audix	e3	v9.210616	--	--

4.2 Block Diagram of Test Setup

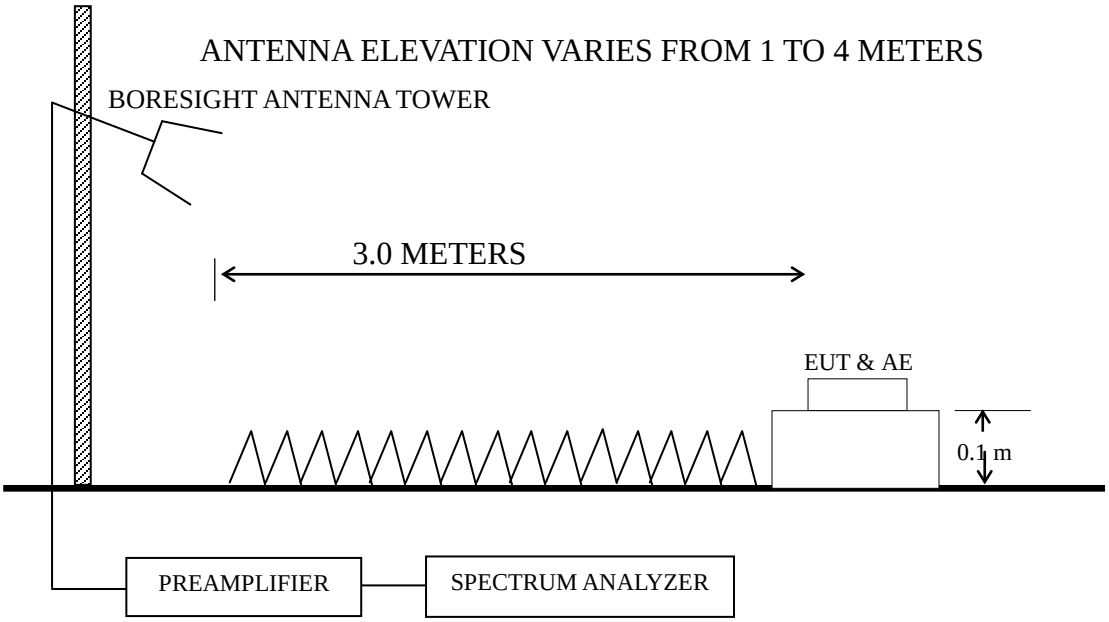
4.2.1 EUT & Peripherals



4.2.2 Below 1GHz



4.2.3 Above 1GHz



4.3 Radiated Emission Limit (§15.209)

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB(μV/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

NOTE 1 - Emission Level dB (μV/m) = 20 log Emission Level (μV/m)
NOTE 2 - The tighter limit applies at the band edges.
NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
NOTE 4 - The limits shown are based on Quasi-peak value detector below or equal to 1GHz and Average value detector above 1GHz.
NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

4.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.4.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

4.5 Operating Condition of EUT

4.5.1 Setup the EUT as shown in Sec. 3.2.

4.5.2 Turn the EUT on.

4.5.3 Connect the EUT and the TTL terminal of Test Fixture through three HCI cables of EUT, as follows (VCC to DC3V3, TX to RXD, RX to TXD, GND to GND). Plug the USB terminal of Test Fixture to the USB port of Notebook PC.

4.5.4 Use the software as section 2.3 to select the test mode, and then test.

4.5.5 Repeat step 3.5.3 and 3.5.4, until the test of all modes finished.

4.6 Test Procedures

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a 0.1m high insulating support on a turntable. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. Both horizontal and vertical polarizations of the antenna

were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.10: 2013 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz.

The bandwidth of Agilent N9010A was set at 1MHz for above 1GHz.

The frequency range from 30 MHz to 25 GHz (Up to 10^{th} harmonics from fundamental frequency) was checked.

All the test results are listed in Sec.3.7.

4.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Frequency range: below 1GHz (Worst case emission):
(Test Model: CT1062-400US)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402MHz	P25-26

(Test Model: EM1058-400US)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402MHz	P27-28

(Test Model: EM1059-400US)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402MHz	P29-30

Frequency range: above 1GHz:
(Test Model: CT1062-400US)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402 MHz	P31-32
2.			20	2442 MHz	P33-34
3.			39	2480 MHz	P35-36

(Test Model: EM1058-400US)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402 MHz	P37-38

(Test Model: EM1059-400US)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402MHz	P39-40

Band-Edge and Restricted bands:
(Test Model: CT1062-400US)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402 MHz	P41-42
2.			39	2480 MHz	P43-44

NOTE 1 – Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin = Limits - Emission Level.
NOTE 2 – “QP” means “Quasi-Peak” values.
NOTE 3 – 0°was the table front facing the antenna. Degree is calculated from 0°clockwise facing the antenna.
NOTE 4 – The emission levels which not reported are too low against the official limit.
NOTE 5 – The emission levels recorded below is data of EUT configured in Standing direction, for this direction was the maximum emission direction during the test. The Side & Lying direction are not a normal use and too low against the official limit to be reported.

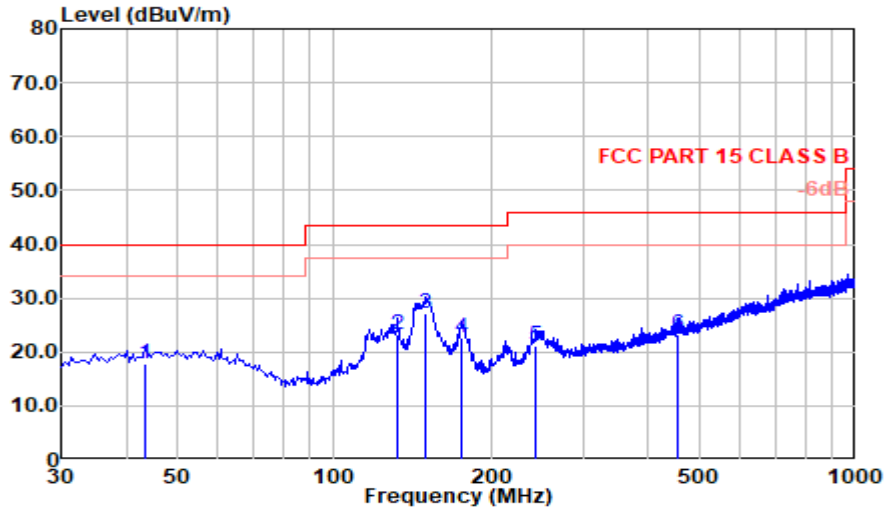
NOTE 6 – All reading are Quasi-Peak values below or equal to 1GHz, Peak and Average values above 1GHz.
For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

NOTE 7 – The frequency range 2310-2390MHz & 2483.5-2500MHz were tested for Restricted bands.

Radiated emission < 1GHz

Test Date:	2024.01.23	Temp./Hum.:	22℃/51%RH	Test By:	Jarey

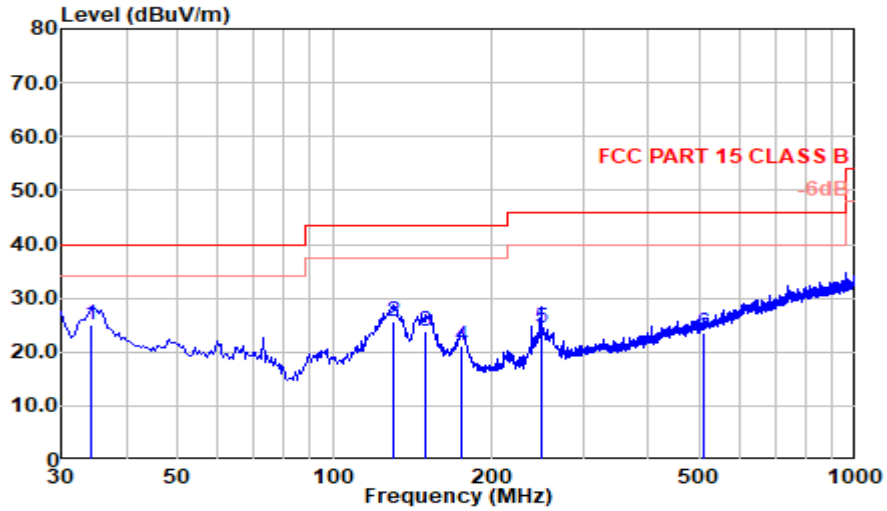
Mode: BLE CH2402MHz **Model: CT1062-400US**



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
43.580	27.11	19.84	0.72	29.90	17.77	40.00	22.23	QP
132.335	33.49	17.90	1.27	29.51	23.14	43.50	20.36	QP
149.795	35.90	19.28	1.34	29.40	27.12	43.50	16.38	QP
175.985	32.38	18.10	1.48	29.31	22.65	43.50	20.85	QP
242.915	31.14	17.52	1.72	29.18	21.18	46.00	24.82	QP
454.860	27.16	23.10	2.36	29.32	23.29	46.00	22.71	QP

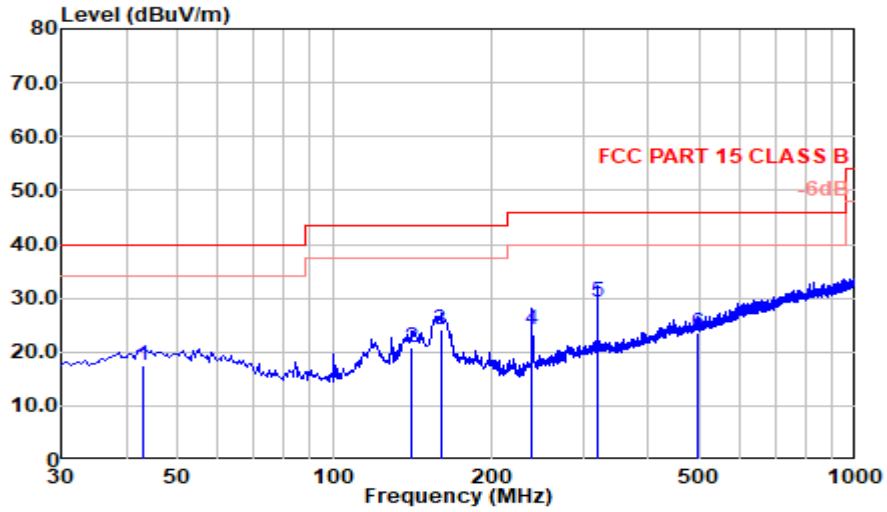
Mode: BLE CH2402MHz **Model: CT1062-400US**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
34.365	35.67	18.74	0.64	29.90	25.15	40.00	14.85	QP
129.910	36.35	17.59	1.26	29.53	25.67	43.50	17.83	QP
150.280	32.64	19.27	1.34	29.40	23.86	43.50	19.64	QP
175.500	30.86	18.10	1.48	29.31	21.12	43.50	22.38	QP
249.220	34.13	17.68	1.73	29.15	24.39	46.00	21.61	QP
509.665	26.53	23.79	2.52	29.44	23.41	46.00	22.59	QP

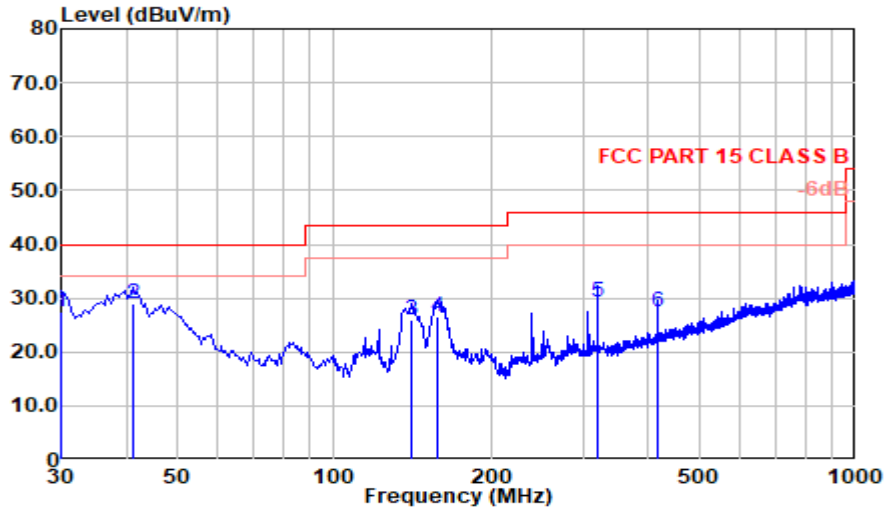
Mode: BLE 2402MHz **Model: EM1058-400US**



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
43.095	26.91	19.89	0.72	29.90	17.62	40.00	22.38	QP
141.065	30.32	18.81	1.30	29.46	20.98	43.50	22.52	QP
159.980	32.83	19.20	1.40	29.36	24.07	43.50	19.43	QP
240.005	34.11	17.40	1.71	29.20	24.02	46.00	21.98	QP
320.030	36.17	20.00	1.96	28.78	29.35	46.00	16.65	QP
496.570	26.94	23.53	2.49	29.49	23.47	46.00	22.53	QP

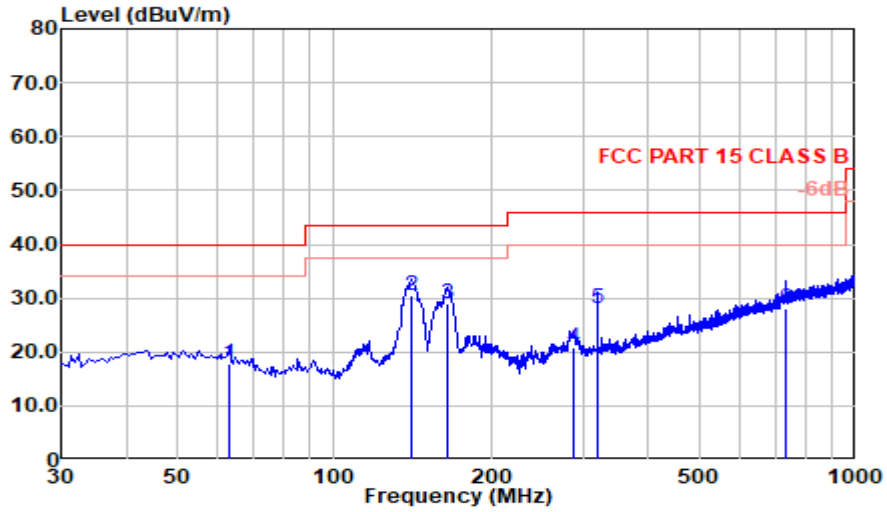
Mode: BLE 2402MHz **Model: EM1058-400US**



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
30.000	39.00	17.80	0.59	29.90	27.49	40.00	12.51	Peak
41.155	38.52	19.63	0.70	29.90	28.95	40.00	11.05	Peak
141.065	35.28	18.81	1.30	29.46	25.93	43.50	17.57	Peak
158.040	35.21	19.30	1.39	29.37	26.52	43.50	16.98	Peak
320.030	36.04	20.00	1.96	28.78	29.21	46.00	16.79	Peak
416.060	32.55	21.84	2.25	29.17	27.47	46.00	18.53	Peak

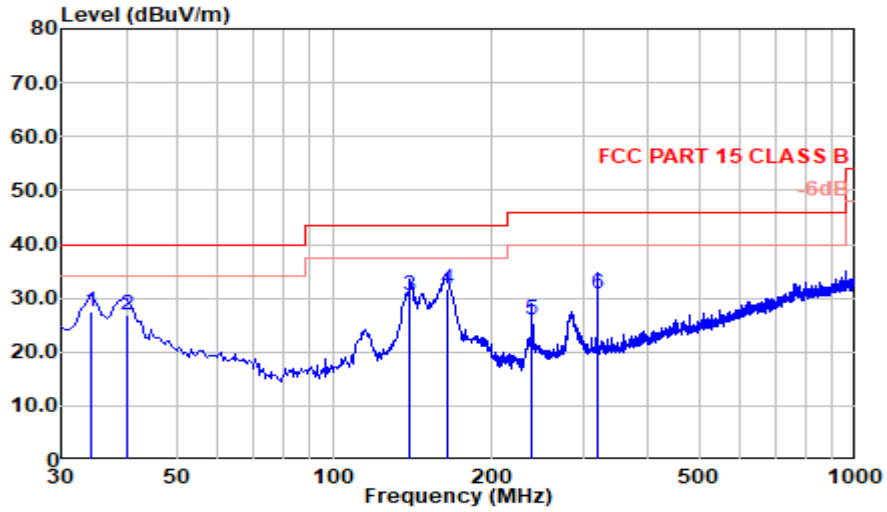
Mode: BLE 2402MHz **Model: EM1059-400US**



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
62.980	28.32	18.61	0.86	29.85	17.94	40.00	22.06	QP
140.580	39.83	18.80	1.30	29.46	30.48	43.50	13.02	QP
165.315	37.94	18.90	1.43	29.35	28.92	43.50	14.58	QP
287.535	28.70	18.95	1.90	28.76	20.79	46.00	25.21	QP
320.030	34.77	20.00	1.96	28.78	27.94	46.00	18.06	QP
734.220	25.89	27.58	2.97	28.36	28.09	46.00	17.91	QP

Mode: BLE 2402MHz **Model: EM1059-400US**



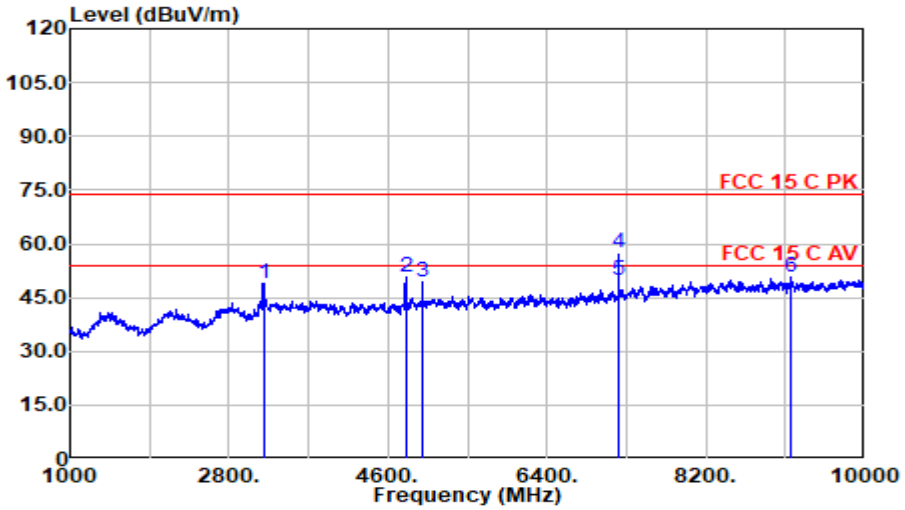
Polarization at Vertical

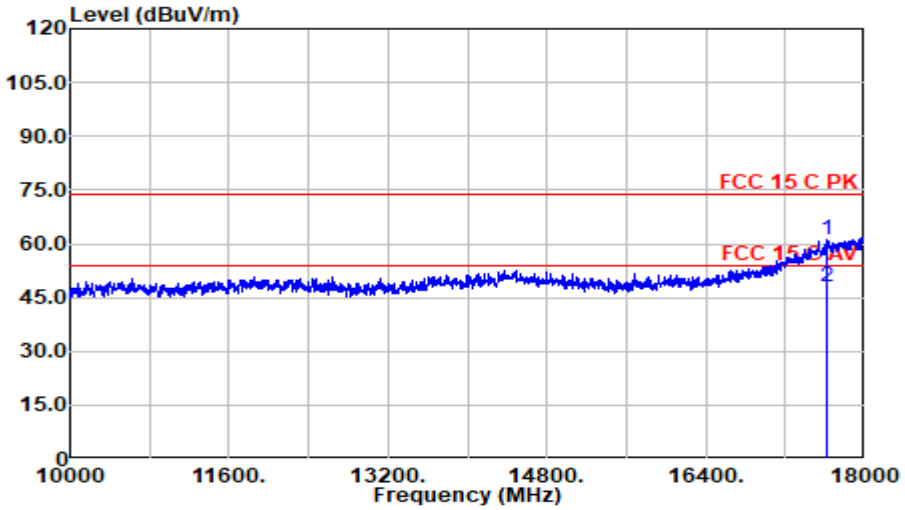
Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
34.365	37.89	18.74	0.64	29.90	27.36	40.00	12.64	QP
40.185	36.61	19.60	0.69	29.90	27.00	40.00	13.00	QP
140.095	39.73	18.80	1.30	29.46	30.36	43.50	13.14	QP
164.345	40.60	19.03	1.42	29.35	31.70	43.50	11.80	QP
240.005	36.03	17.40	1.71	29.20	25.94	46.00	20.06	QP
320.030	37.50	20.00	1.96	28.78	30.68	46.00	15.32	QP

Radiated Emission > 1GHz

Test Date:	2024.01.23	Temp./Hum.:	22℃/51%RH	Test By:	Jarey

Mode: BLE 2402MHz **Model: CT1062-400US**

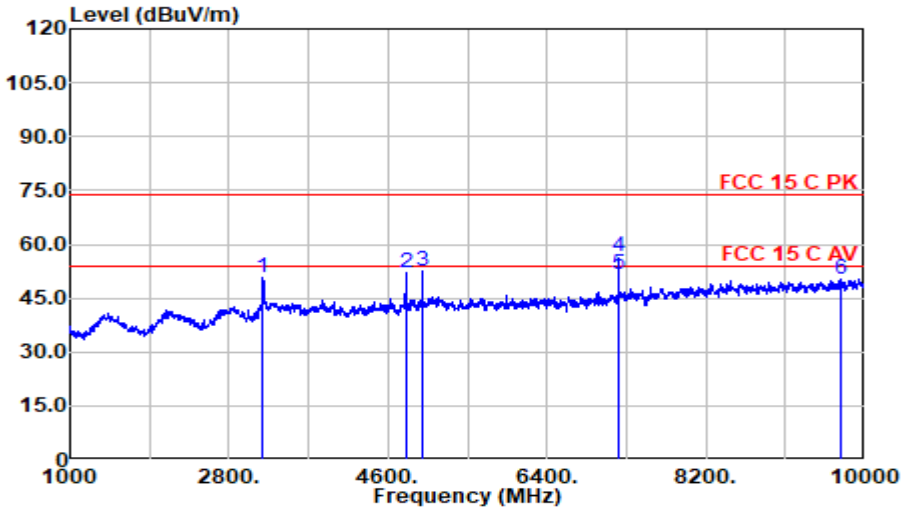


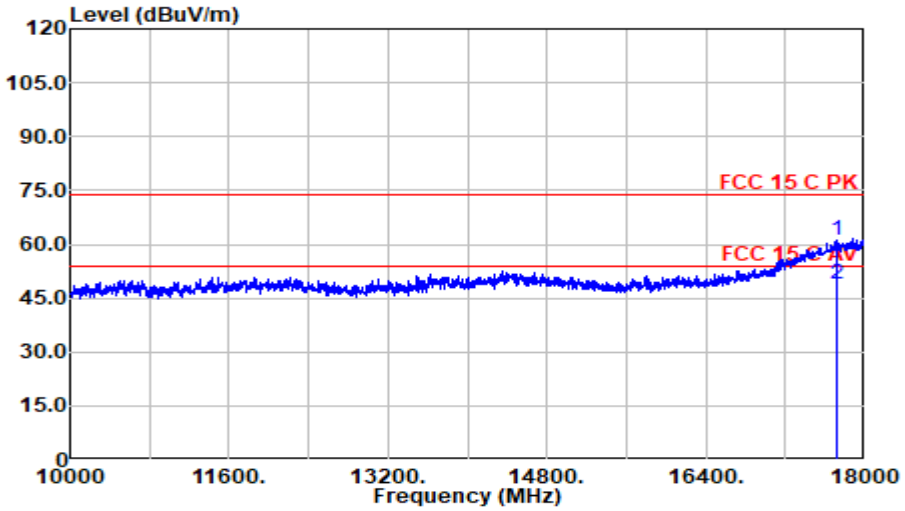


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3191.500	47.20	31.07	6.06	35.31	49.01	74.00	24.99	Peak
4802.500	44.82	32.92	7.62	34.67	50.68	74.00	23.32	Peak
4987.000	43.03	33.35	7.80	34.60	49.57	74.00	24.43	Peak
7205.500	46.72	36.16	9.48	34.67	57.69	74.00	16.31	Peak
7205.500	38.78	36.16	9.48	34.67	49.75	54.00	4.25	Average
9172.000	36.27	38.24	10.78	34.68	50.61	74.00	23.39	Peak
17620.000	31.21	46.42	15.73	32.31	61.05	74.00	12.95	Peak
17620.000	18.22	46.42	15.73	32.31	48.06	54.00	5.94	Average

Mode: BLE 2402MHz **Model: CT1062-400US**

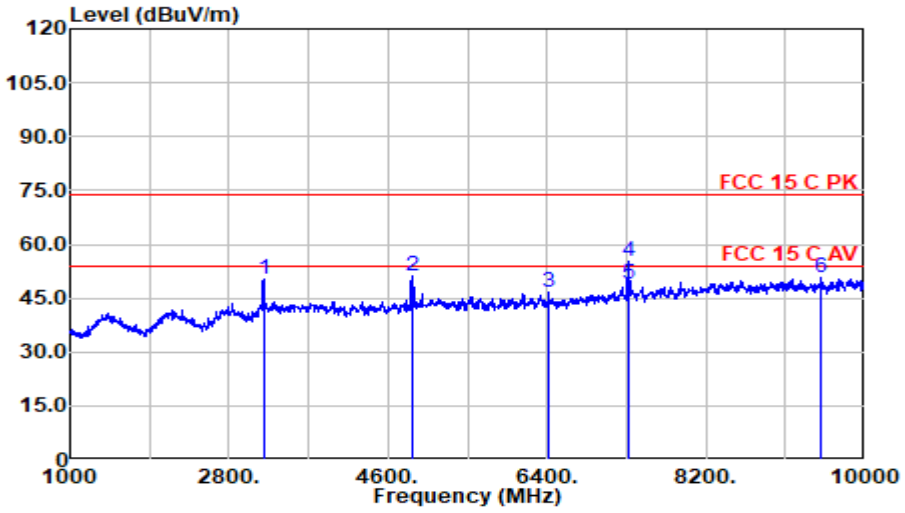


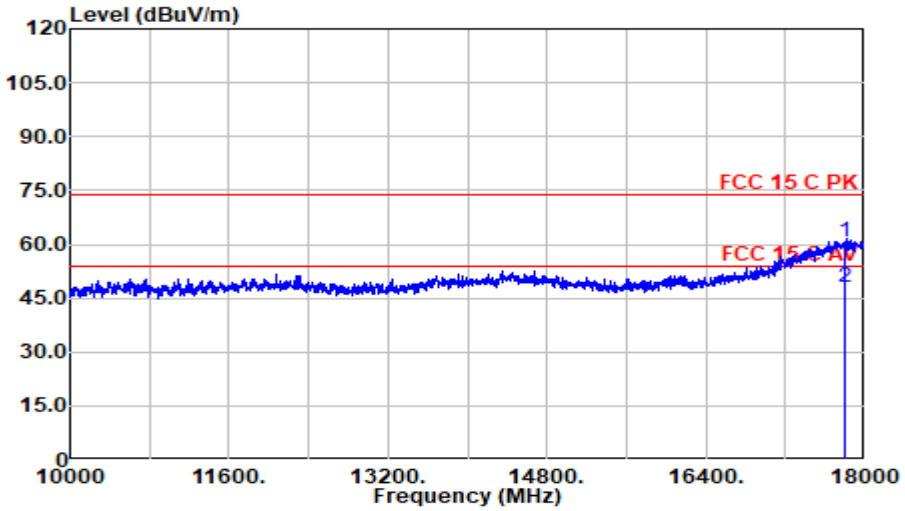


Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3187.000	49.15	31.05	6.05	35.32	50.94	74.00	23.06	Peak
4802.500	46.36	32.92	7.62	34.67	52.22	74.00	21.78	Peak
4996.000	45.75	33.38	7.81	34.60	52.34	74.00	21.66	Peak
7205.500	45.75	36.16	9.48	34.67	56.72	74.00	17.28	Peak
7205.500	40.70	36.16	9.48	34.67	51.67	54.00	2.33	Average
9721.000	35.48	38.10	11.23	34.63	50.19	74.00	23.81	Peak
17724.000	30.67	46.95	15.88	32.28	61.22	74.00	12.78	Peak
17724.000	18.24	46.95	15.88	32.28	48.79	54.00	5.21	Average

Mode: BLE 2440MHz **Model: CT1062-400US**

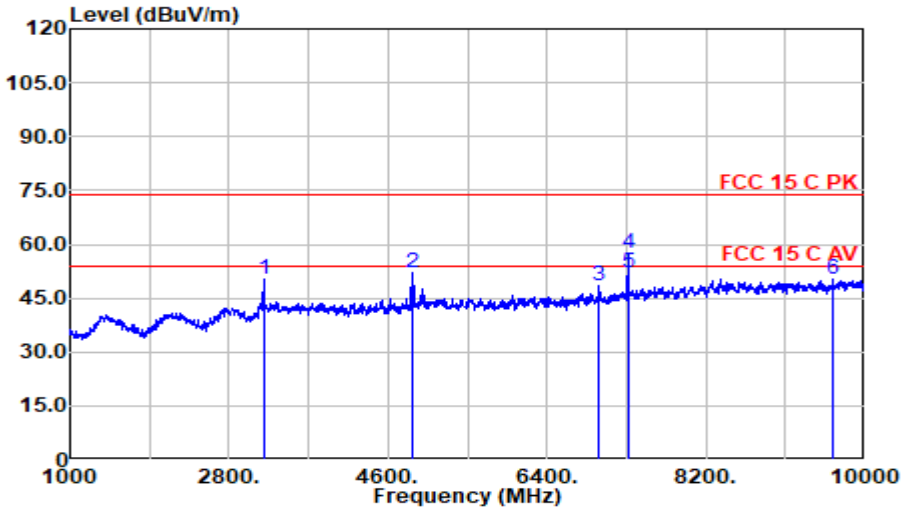


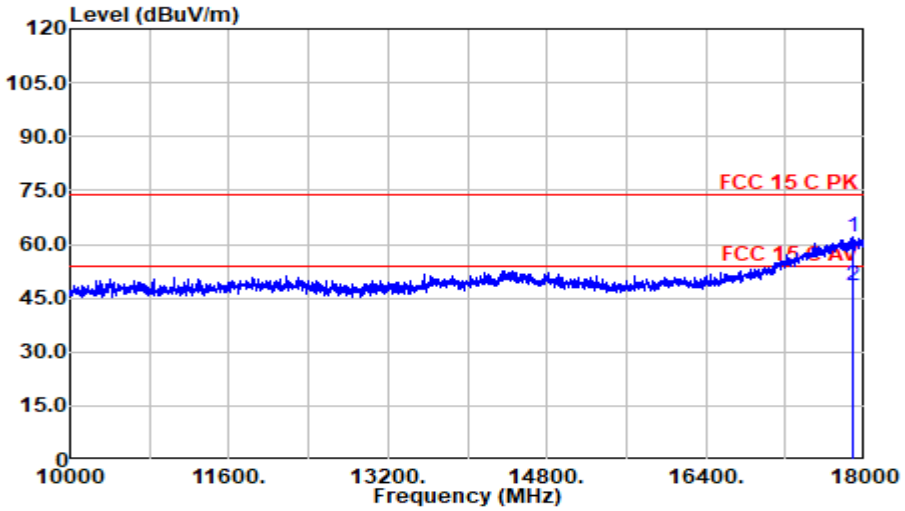


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3191.500	48.38	31.07	6.06	35.31	50.19	74.00	23.81	Peak
4879.000	44.62	33.37	7.69	34.64	51.04	74.00	22.96	Peak
6418.000	37.92	34.50	8.78	34.60	46.60	74.00	27.40	Peak
7318.000	43.64	36.71	9.60	34.70	55.25	74.00	18.75	Peak
7318.000	37.45	36.71	9.60	34.70	49.06	54.00	4.94	Average
9496.000	35.87	38.38	11.05	34.65	50.66	74.00	23.34	Peak
17796.000	30.03	47.09	15.99	32.26	60.85	74.00	13.15	Peak
17796.000	17.40	47.09	15.99	32.26	48.23	54.00	5.77	Average

Mode: BLE 2440MHz **Model: CT1062-400US**

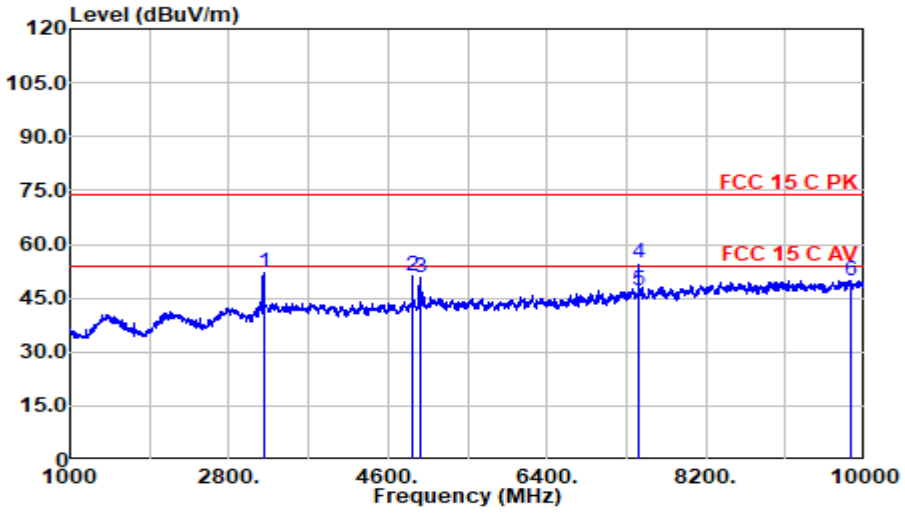


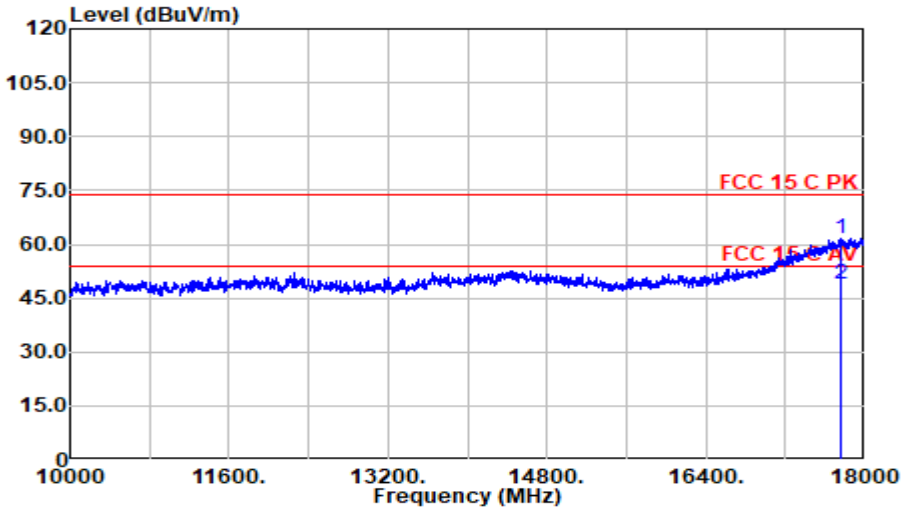


Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3200.500	48.39	31.10	6.07	35.31	50.24	74.00	23.76	Peak
4883.500	45.43	33.40	7.70	34.64	51.88	74.00	22.12	Peak
6994.000	38.20	35.60	9.25	34.60	48.45	74.00	25.55	Peak
7322.500	45.87	36.74	9.61	34.70	57.51	74.00	16.49	Peak
7322.500	40.38	36.74	9.61	34.70	52.02	54.00	1.98	Average
9631.000	35.33	38.20	11.16	34.64	50.05	74.00	23.95	Peak
17888.000	30.84	47.19	16.13	32.23	61.93	74.00	12.07	Peak
17888.000	17.48	47.19	16.13	32.23	48.57	54.00	5.43	Average

Mode: BLE 2480MHz **Model: CT1062-400US**

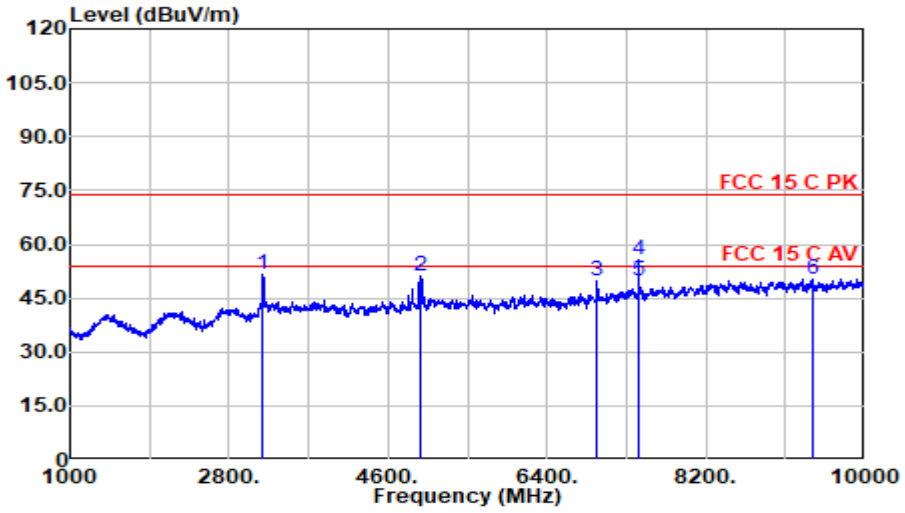


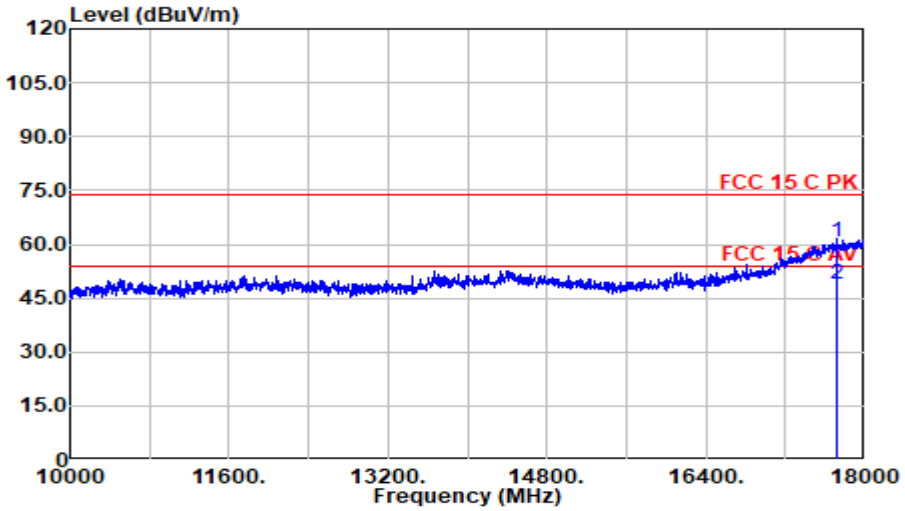


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3196.000	50.10	31.08	6.06	35.31	51.93	74.00	22.07	Peak
4874.500	44.67	33.35	7.69	34.65	51.06	74.00	22.94	Peak
4960.000	44.23	33.24	7.77	34.61	50.62	74.00	23.38	Peak
7439.500	42.71	36.90	9.73	34.74	54.61	74.00	19.39	Peak
7439.500	35.33	36.90	9.73	34.74	47.22	54.00	6.78	Average
9838.000	35.07	38.18	11.32	34.62	49.95	74.00	24.05	Peak
17764.000	30.77	47.03	15.94	32.27	61.48	74.00	12.52	Peak
17764.000	17.28	47.03	15.94	32.27	47.98	54.00	6.02	Average

Mode: BLE 2480MHz **Model: CT1062-400US**

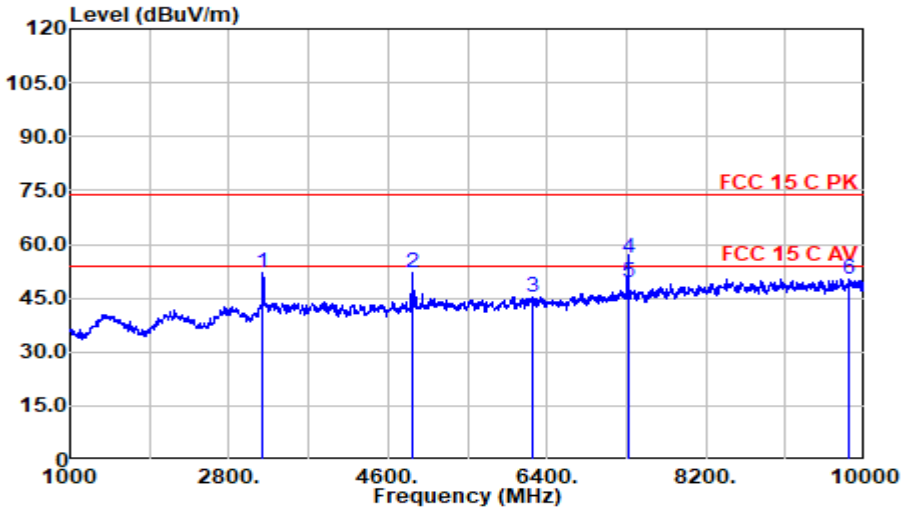


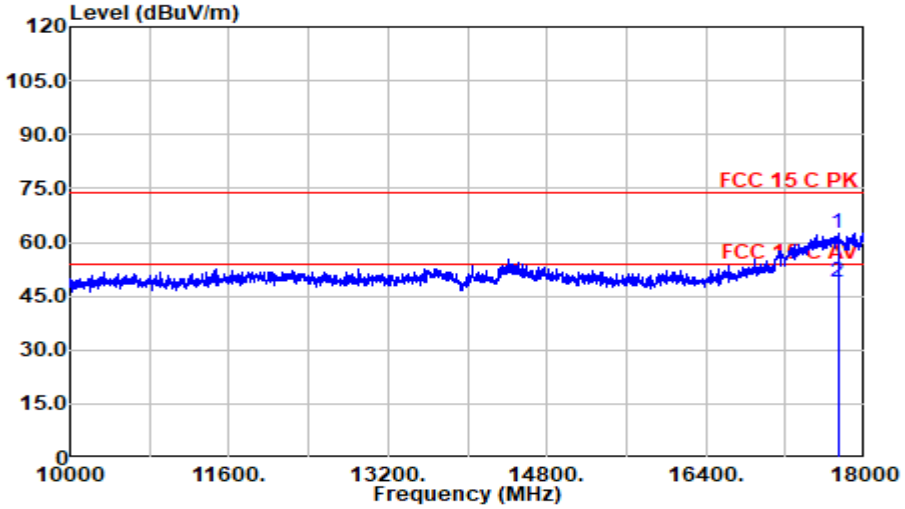


Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3187.000	49.63	31.05	6.05	35.32	51.42	74.00	22.58	Peak
4960.000	44.85	33.24	7.77	34.61	51.25	74.00	22.75	Peak
6971.500	39.71	35.60	9.23	34.60	49.94	74.00	24.06	Peak
7439.500	43.77	36.90	9.73	34.74	55.66	74.00	18.34	Peak
7439.500	38.09	36.90	9.73	34.74	49.98	54.00	4.02	Average
9406.000	35.67	38.20	10.97	34.66	50.19	74.00	23.81	Peak
17712.000	30.13	46.92	15.87	32.28	60.64	74.00	13.36	Peak
17712.000	18.31	46.92	15.87	32.28	48.82	54.00	5.18	Average

Mode: BLE 2440MHz **Model: EM1058-400US**

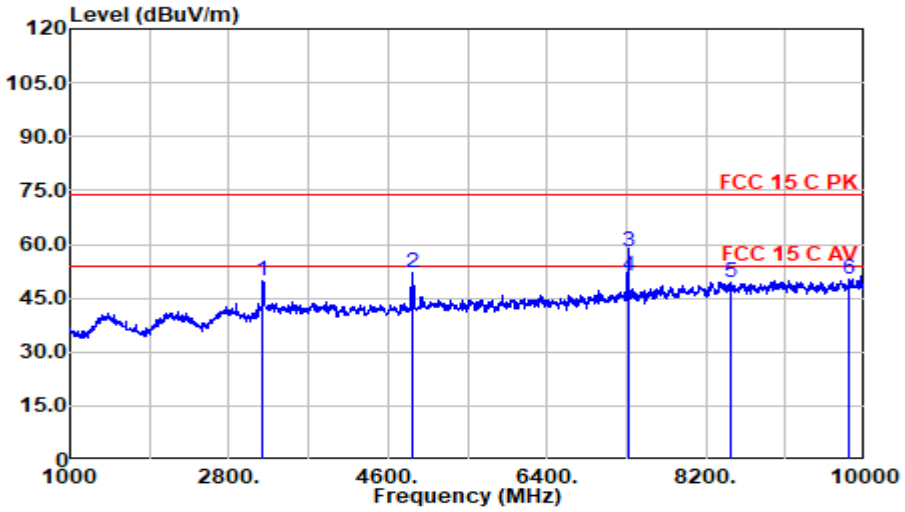


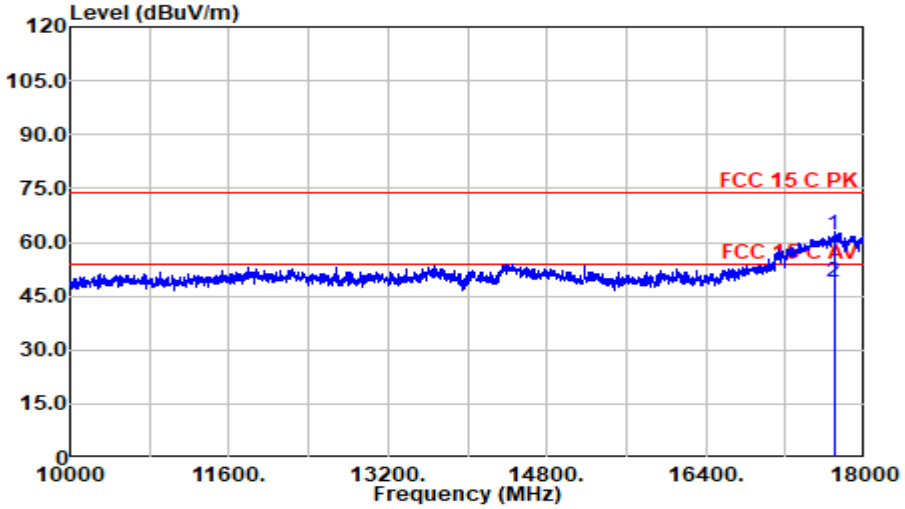


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3187.000	50.28	31.05	6.05	35.32	52.06	74.00	21.94	Peak
4879.000	45.72	33.37	7.69	34.64	52.15	74.00	21.85	Peak
6233.500	36.62	34.67	8.63	34.60	45.31	74.00	28.69	Peak
7318.000	44.58	36.71	9.60	34.70	56.20	74.00	17.80	Peak
7318.000	37.65	36.71	9.60	34.70	49.26	54.00	4.74	Average
9815.500	35.42	38.13	11.31	34.62	50.24	74.00	23.76	Peak
17728.000	32.12	46.96	15.89	32.28	62.68	74.00	11.32	Peak
17728.000	18.31	46.96	15.89	32.28	48.88	54.00	5.12	Average

Mode: BLE 2440MHz **Model: EM1058-400US**

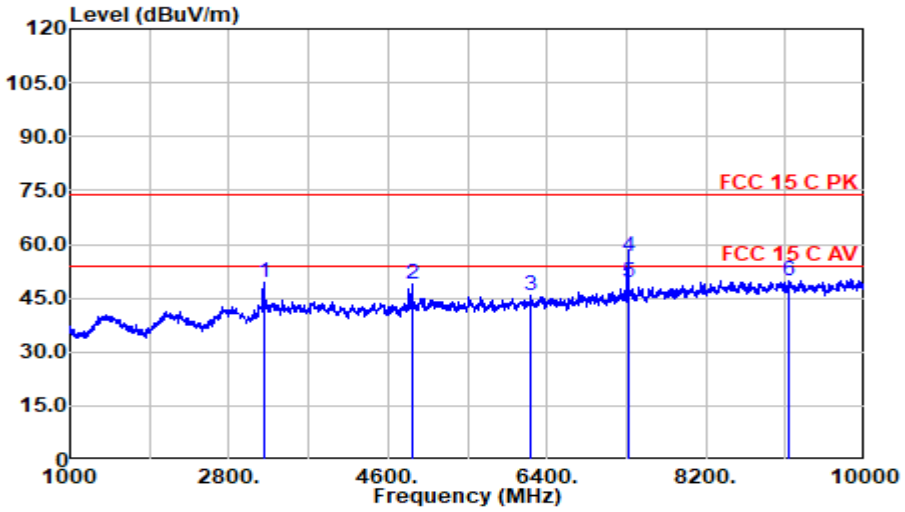


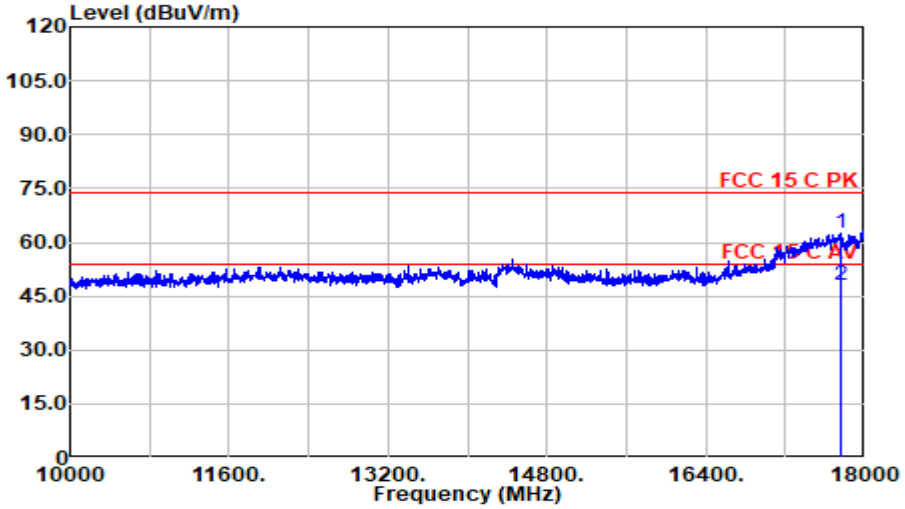


Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3187.000	48.11	31.05	6.05	35.32	49.89	74.00	24.11	Peak
4879.000	45.69	33.37	7.69	34.64	52.12	74.00	21.88	Peak
7318.000	46.27	36.71	9.60	34.70	57.88	74.00	16.12	Peak
7318.000	39.73	36.71	9.60	34.70	51.34	54.00	2.66	Average
8488.000	35.50	38.20	10.47	34.80	49.37	74.00	24.63	Peak
9820.000	35.37	38.14	11.31	34.62	50.20	74.00	23.80	Peak
17688.000	31.47	46.83	15.83	32.29	61.84	74.00	12.16	Peak
17688.000	18.35	46.83	15.83	32.29	48.71	54.00	5.29	Average

Mode: BLE 2440MHz **Model: EM1059-400US**

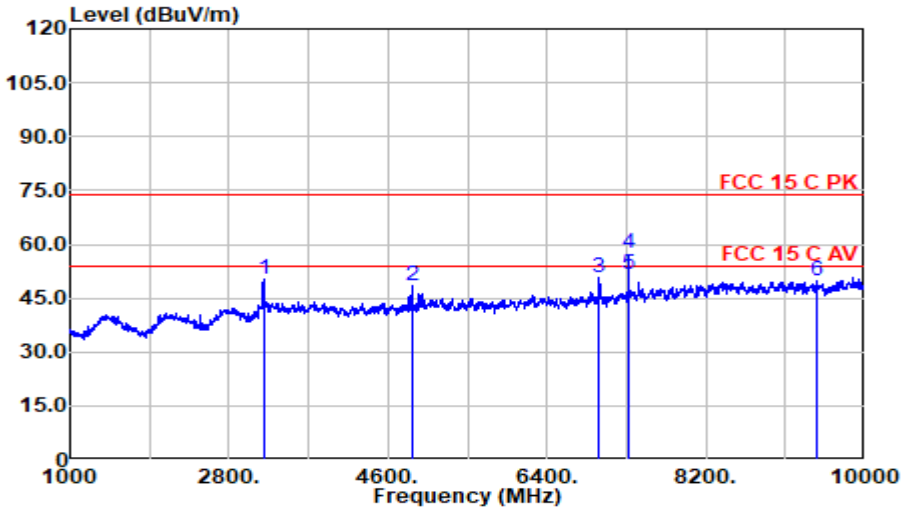


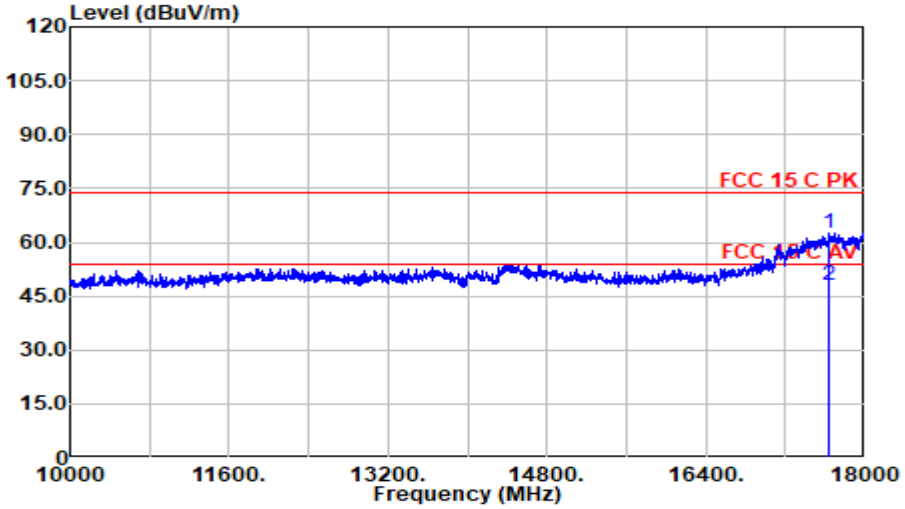


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3191.500	47.64	31.07	6.06	35.31	49.45	74.00	24.55	Peak
4879.000	42.36	33.37	7.69	34.64	48.78	74.00	25.22	Peak
6215.500	37.16	34.63	8.61	34.60	45.80	74.00	28.20	Peak
7318.000	44.90	36.71	9.60	34.70	56.51	74.00	17.49	Peak
7318.000	37.84	36.71	9.60	34.70	49.45	54.00	4.55	Average
9149.500	35.65	38.20	10.76	34.68	49.92	74.00	24.08	Peak
17760.000	31.71	47.02	15.94	32.27	62.39	74.00	11.61	Peak
17760.000	17.47	47.02	15.94	32.27	48.16	54.00	5.84	Average

Mode: BLE 2440MHz **Model: EM1059-400US**





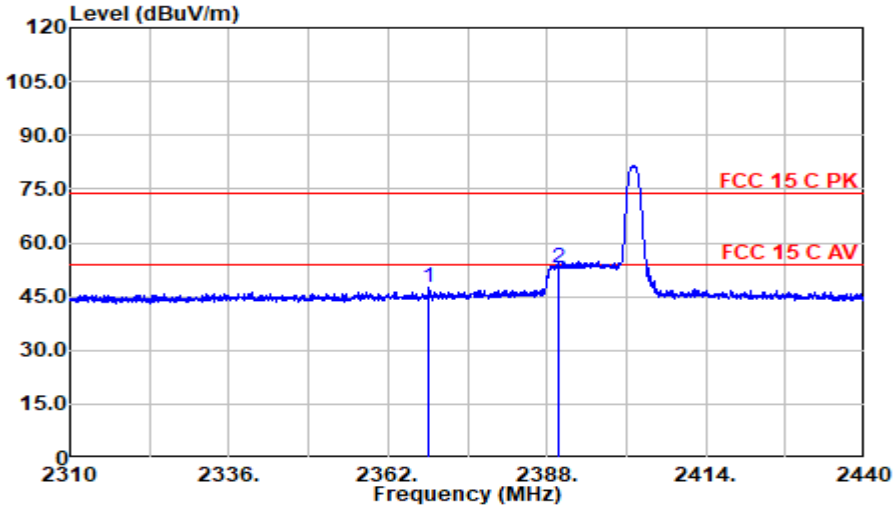
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3196.000	48.65	31.08	6.06	35.31	50.49	74.00	23.51	Peak
4870.000	42.26	33.32	7.68	34.65	48.62	74.00	25.38	Peak
6985.000	40.27	35.60	9.24	34.60	50.51	74.00	23.49	Peak
7322.500	46.08	36.74	9.61	34.70	57.72	74.00	16.28	Peak
7322.500	39.81	36.74	9.61	34.70	51.45	54.00	2.55	Average
9446.500	35.30	38.20	11.01	34.65	49.85	74.00	24.15	Peak
17644.000	32.49	46.56	15.77	32.30	62.52	74.00	11.48	Peak
17644.000	18.15	46.56	15.77	32.30	48.17	54.00	5.83	Average

Band-Edge and Restricted bands:

Test Date:	2024.02.04	Temp./Hum.:	22°C/51%RH	Test By:	Jarey

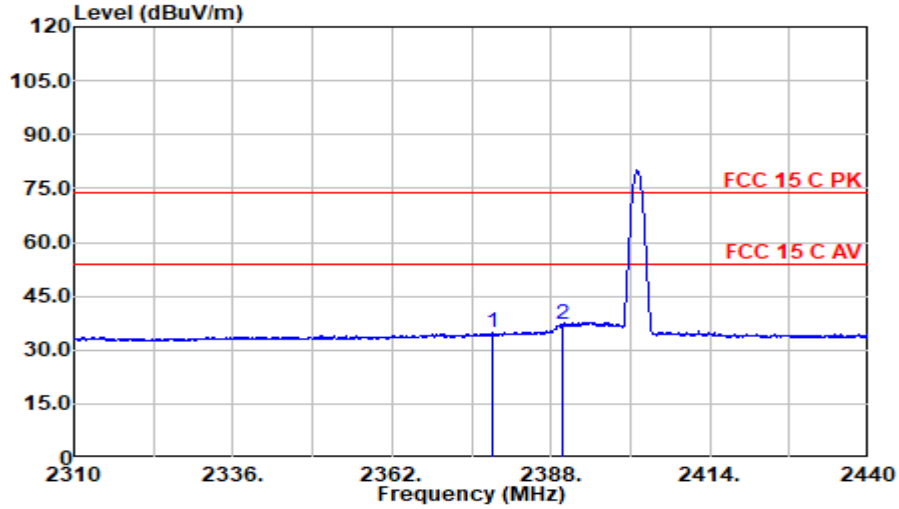
Mode: BLE 2402MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2368.565	49.84	28.47	5.37	36.04	47.64	74.00	26.36	Peak
2390.000	55.18	28.56	5.39	36.02	53.11	74.00	20.89	Peak

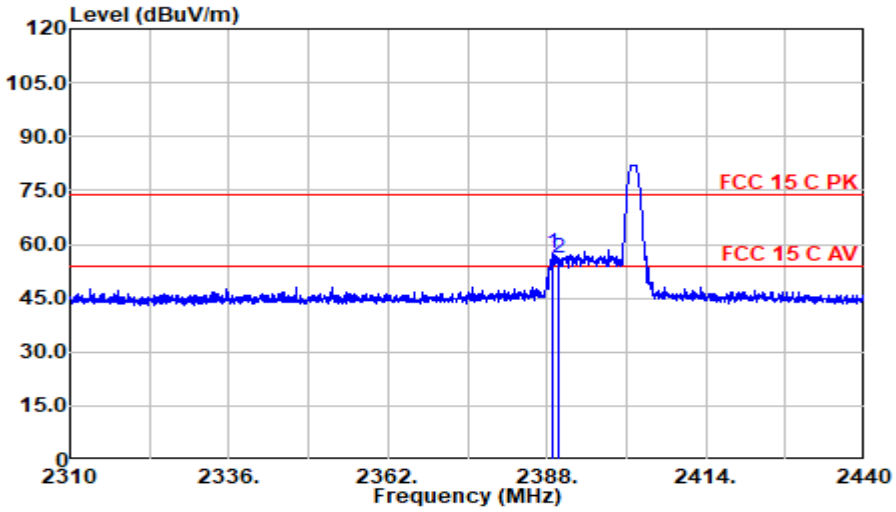
Mode: BLE 2402MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2378.510	36.95	28.51	5.38	36.03	34.82	54.00	19.18	Average
2390.000	38.98	28.56	5.39	36.02	36.91	54.00	17.09	Average

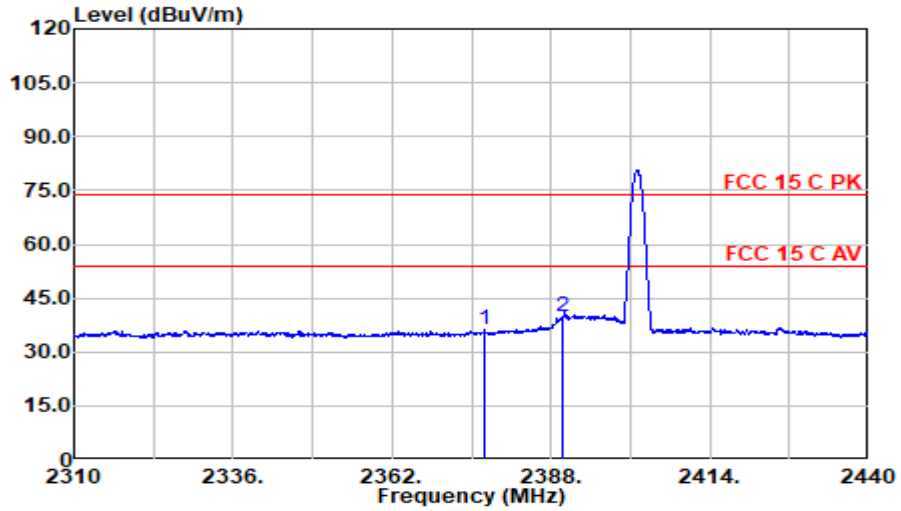
Mode: BLE 2402MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2388.975	59.55	28.56	5.39	36.02	57.47	74.00	16.53	Peak
2390.000	58.44	28.56	5.39	36.02	56.37	74.00	17.63	Peak

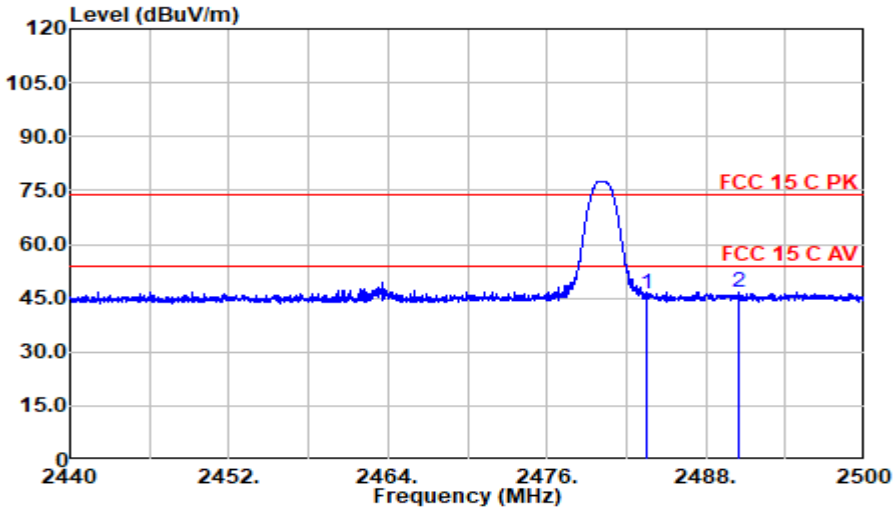
Mode: BLE 2402MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2377.145	38.26	28.51	5.38	36.03	36.11	54.00	17.89	Average
2390.000	42.13	28.56	5.39	36.02	40.07	54.00	13.93	Average

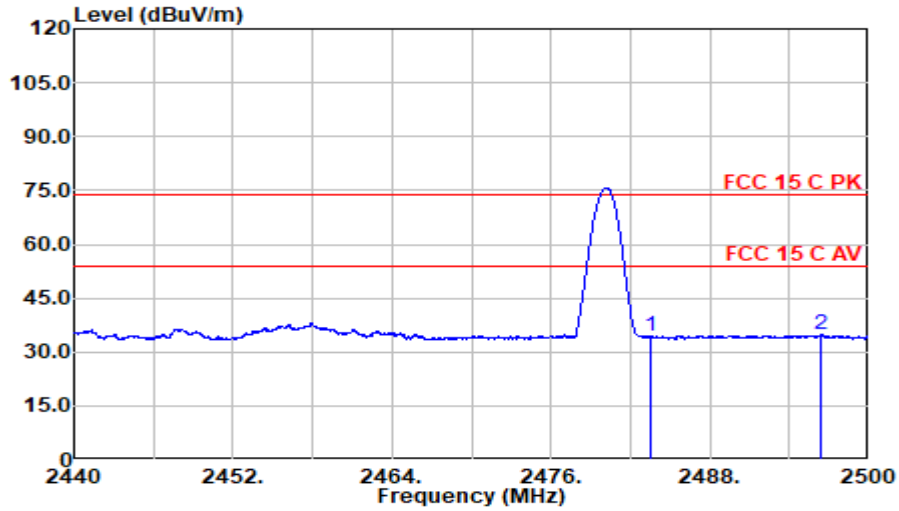
Mode: BLE 2480MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	48.03	28.63	5.47	35.91	46.22	74.00	27.78	Peak
2490.430	48.36	28.66	5.48	35.91	46.60	74.00	27.40	Peak

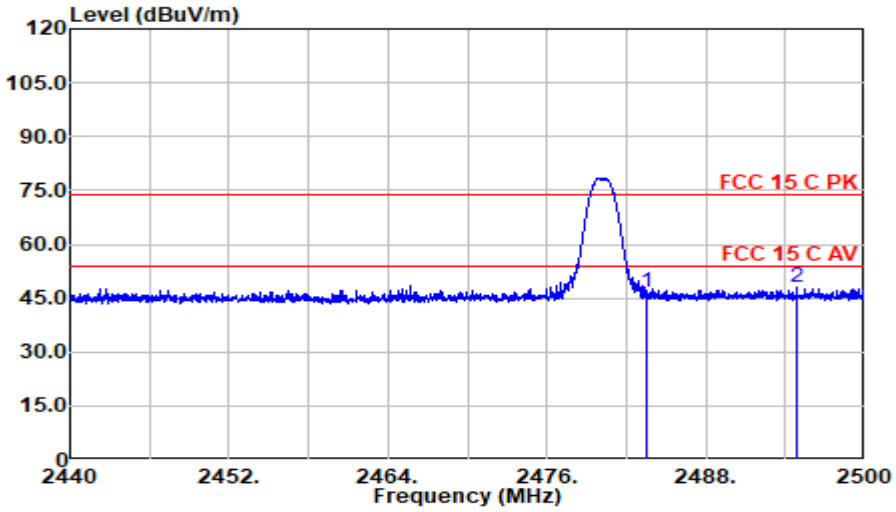
Mode: BLE 2480MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	36.22	28.63	5.47	35.91	34.41	54.00	19.59	Average
2496.430	36.48	28.69	5.48	35.90	34.75	54.00	19.25	Average

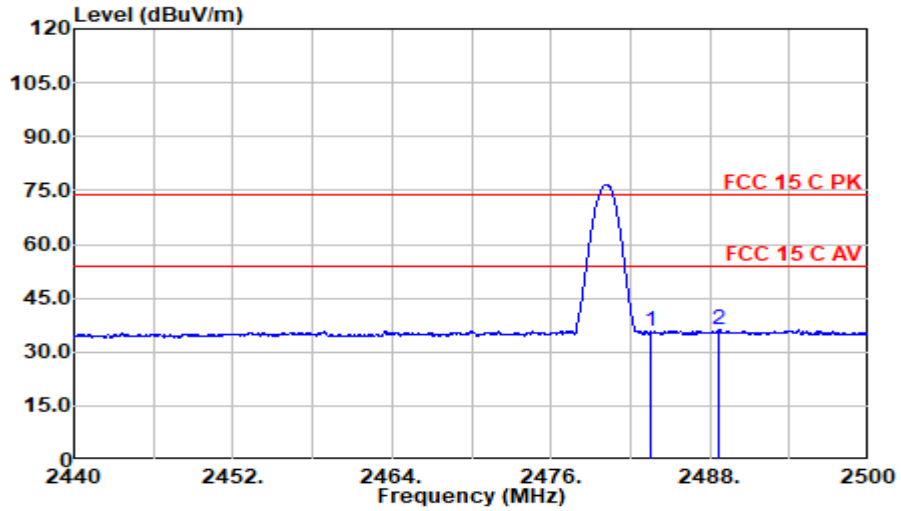
Mode: BLE 2480MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	48.51	28.63	5.47	35.91	46.70	74.00	27.30	Peak
2494.900	49.61	28.68	5.48	35.90	47.87	74.00	26.13	Peak

Mode: BLE 2480MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	37.37	28.63	5.47	35.91	35.56	54.00	18.44	Average
2488.690	38.07	28.66	5.47	35.91	36.29	54.00	17.71	Average

5 6 dB BANDWIDTH MEASUREMENT

5.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2023.08.09	1 Year
3.	10 dB Attenuator	Mini-Circuits	BW-S10W2+	001	2023.08.09	1 Year

5.2 Block Diagram of Test Setup

5.3 Specification Limits (§15.247(a)(2))

The minimum 6 dB bandwidth shall be at least 500 kHz.

5.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

5.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with settings: RBW = 100kHz, VBW ≥ 3 × RBW.

The 6 dB bandwidth is defined as the total spectrum the power of which is lower than peak power minus 6 dB .

The test procedure is defined in ANSI C63.10-2013 (the 11.8.2 Measurement Procedure “Option 2” was used).

5.6 Test Results

PASSED.

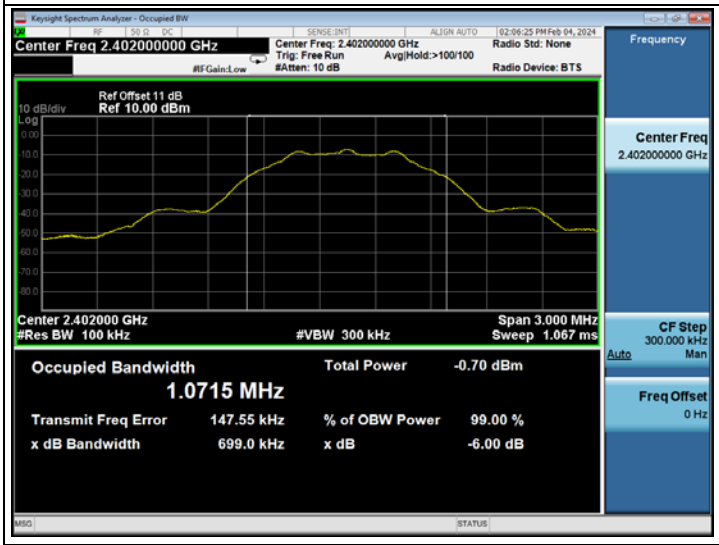
All the test results are attached in next pages.

(Test Date: 2024.02.04 Temperature: 23℃ Humidity: 51 %)

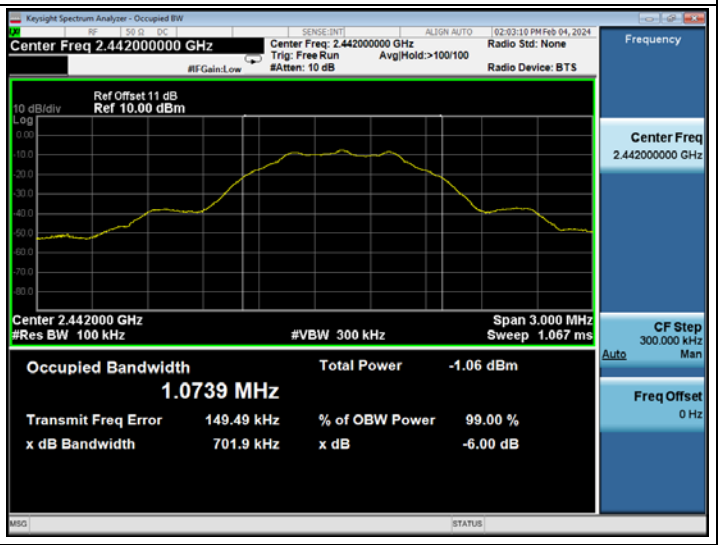
Mode	Channel	Frequency (MHz)	**6dB Bandwidth (kHz)**	Limit
BLE	00	2402	**699**	500 kHz
	20	2442	**701.9**	500 kHz
	39	2480	**709.9**	500 kHz

BLE

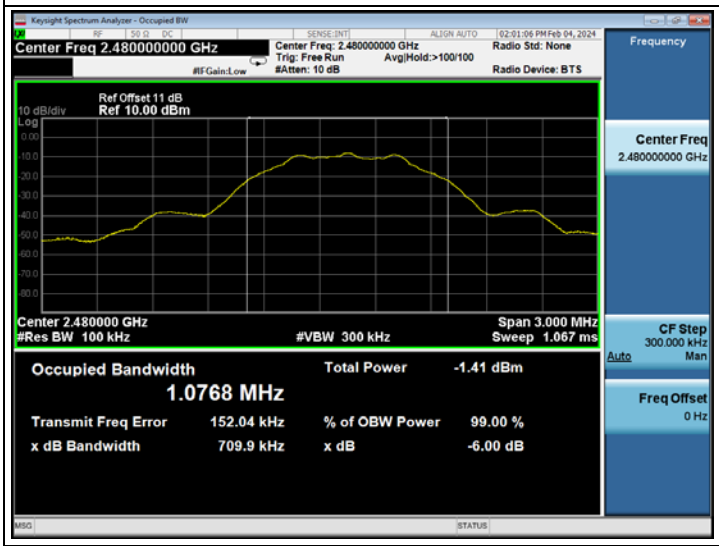
CH2402



CH2442



CH2480



6 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

6.1 Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2023.08.09	1 Year
3.	10 dB Attenuator	Mini-Circuits	BW-S10W2+	001	2023.08.09	1 Year

6.2 Block Diagram of Test Setup

The Same as Section. 5.2.

6.3 Specification Limits ((§15.247(b)(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5 MHz is: 1 Watt. (30 dBm)

6.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

6.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:
a) RBW ≥ DTS Bandwidth.
b) VBW ≥ [3 × RBW].
c) Span ≥ [3 × RBW].
d) Sweep time = auto.
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.

The test procedure is defined in ANSI C63.10-2013 (11.9.1.1 Measurement Procedure " RBW □ DTS bandwidth" was used).

6.6 Test Results

PASSED.

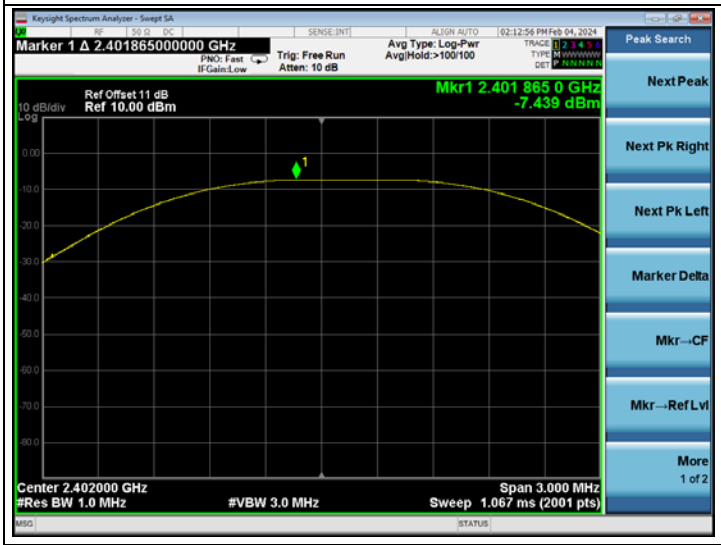
All the test results are listed below.

(Test Date: 2024.02.04 Temperature: 23℃ Humidity: 51 %)

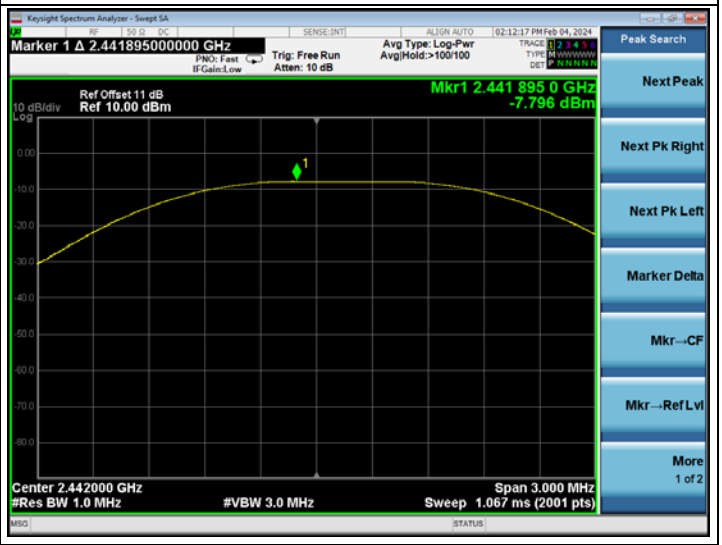
Mode	Channel	Frequency (MHz)	**Peak Output Power (dBm)**	Limit
BLE	00	2402	**-7.439**	30 dBm
	20	2442	**-7.796**	30 dBm
	39	2480	**-8.12**	30 dBm

BLE

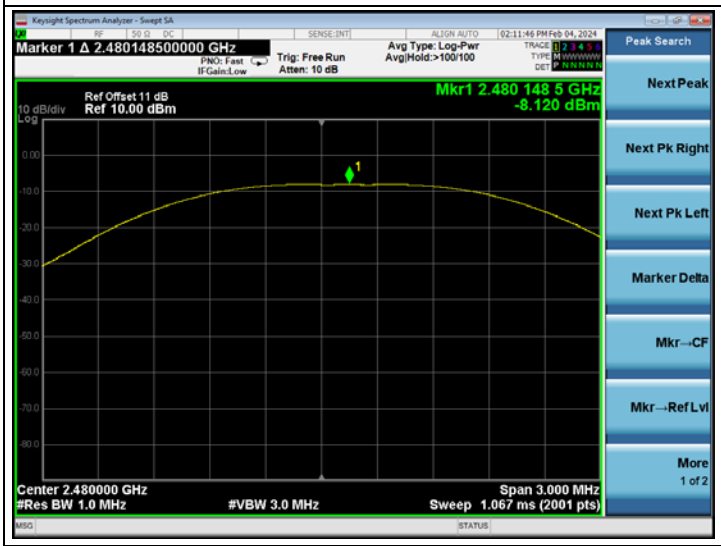
CH2402



CH2442



CH2480



7 EMISSION LIMITATIONS MEASUREMENT

7.1 Test Equipment

The following test equipment was used during the emission limitations test:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2023.08.09	1 Year
3.	10 dB Attenuator	Mini-Circuits	BW-S10W2+	001	2023.08.09	1 Year

7.2 Block Diagram of Test Setup

The Same as Section. 5.2.

7.3 Specification Limits (§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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). (※This test result attaching to Section. 3.7)

7.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

7.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.
Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Establish an emission level by using the following procedure:
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

Scan up through 10^{th} harmonic.

The test procedure is defined in ANSI C63.10-2013 (11.11.2 Reference level measurement and 11.11.3 Emission level measurement was used).

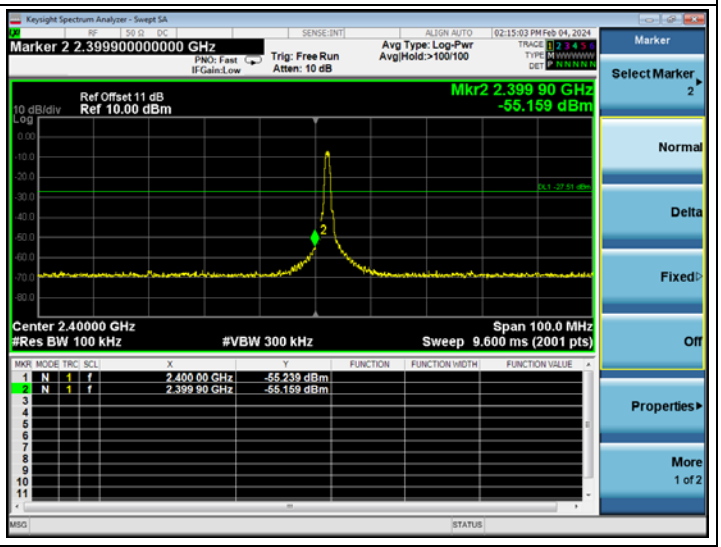
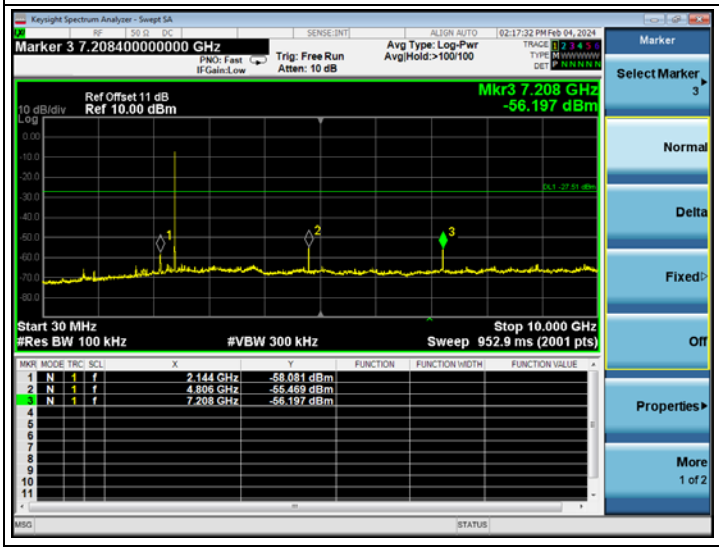
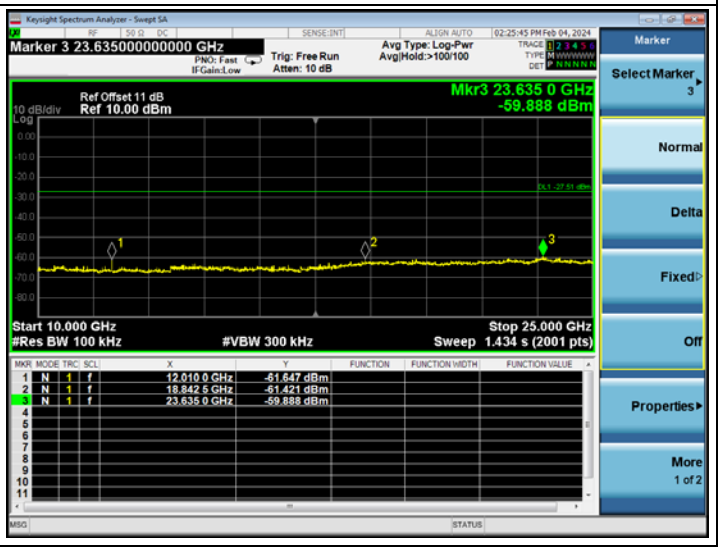
7.6 Test Results

PASSED.

The test data was attached in the next pages.

(Test Date: 2024.02.04 Temperature: 23℃ Humidity: 51 %)

Mode	Channel	Frequency (MHz)	Data Page
BLE	00	2402	P54
	20	2442	P55
	39	2480	P56

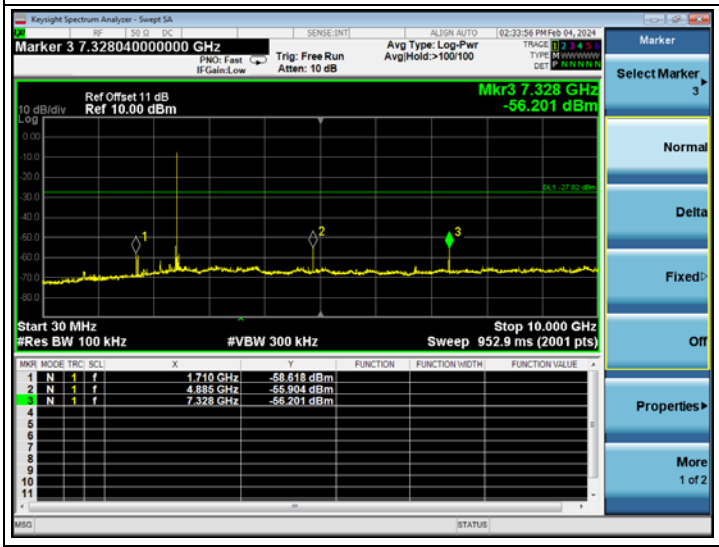
BLE	
CH2402	
Reference Level	Lower Edge
	
Emission Level	
	

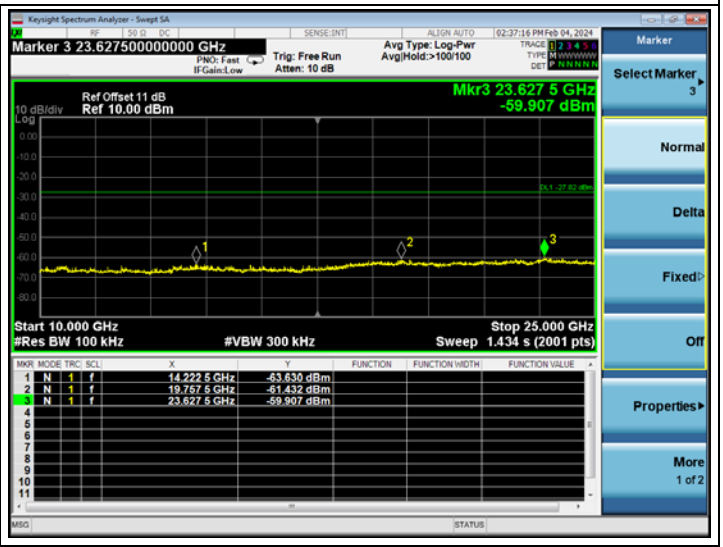
BLE

CH2442

Reference Level

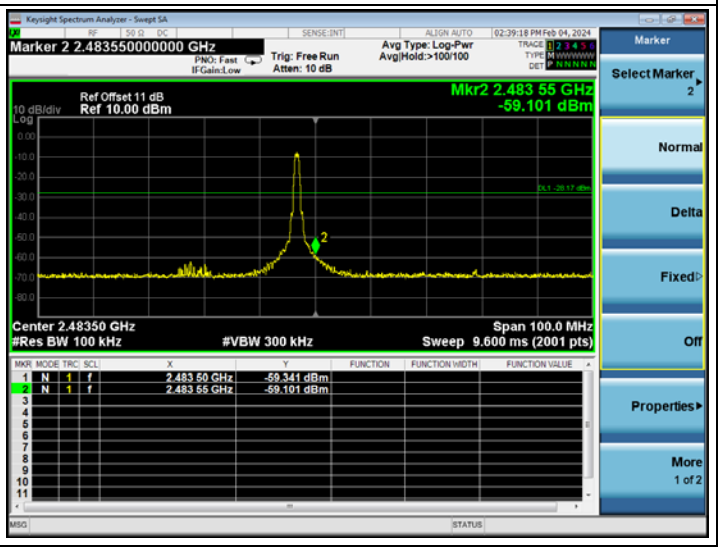
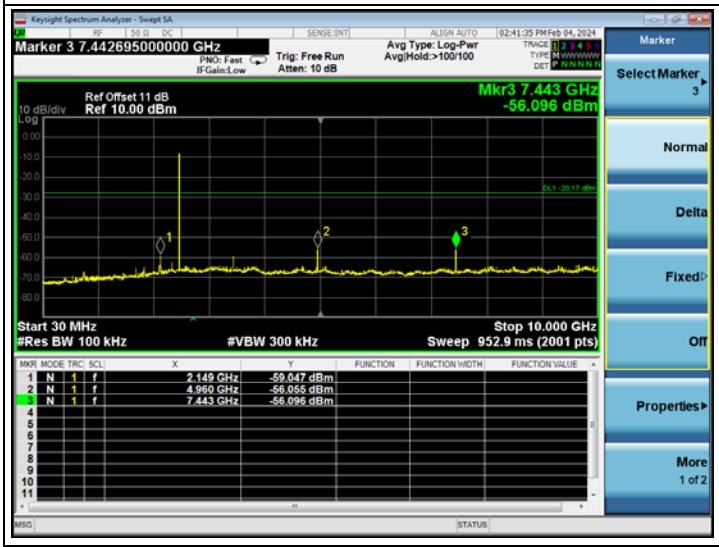
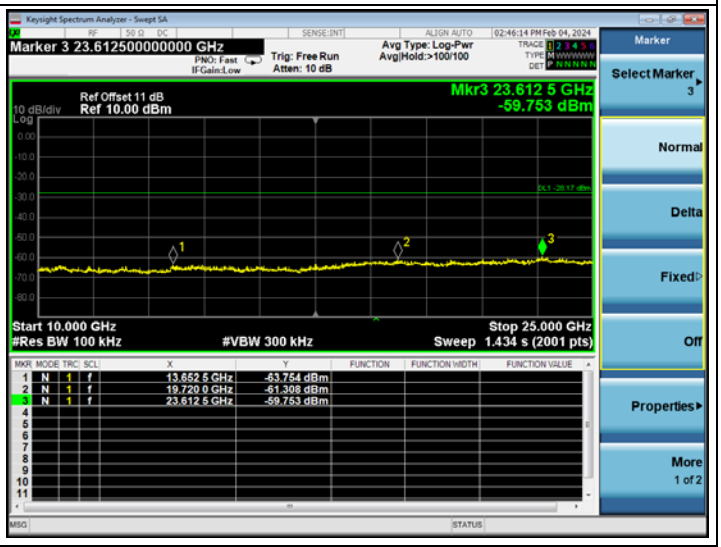
Emission Level





BLE

CH2480

Reference Level	Higher Edge
	
Emission Level	
	

8 POWER SPECTRAL DENSITY MEASUREMENT

8.1 Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2023.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2023.08.09	1 Year
3.	10 dB Attenuator	Mini-Circuits	BW-S10W2+	001	2023.08.09	1 Year

8.2 Block Diagram of Test Setup

The Same as section 5.2.

8.3 Specification Limits (§15.247(e))

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band.

8.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

8.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

The test procedure is defined in ANSI C63.10-2013 (11.10.2 Measurement Procedure “Method PKPSD (peak PSD)” was used).

8.6 Test Results

PASSED.

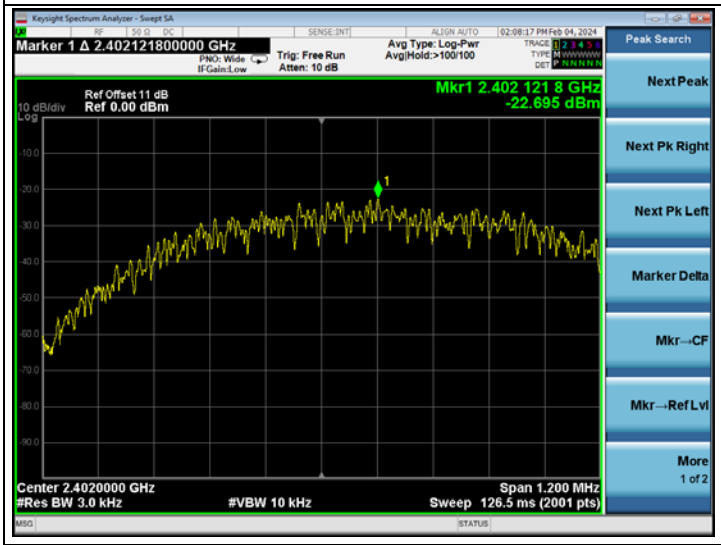
All the test results are attached in next pages.

(Test Date: 2024.02.04 Temperature: 23℃ Humidity: 51 %)

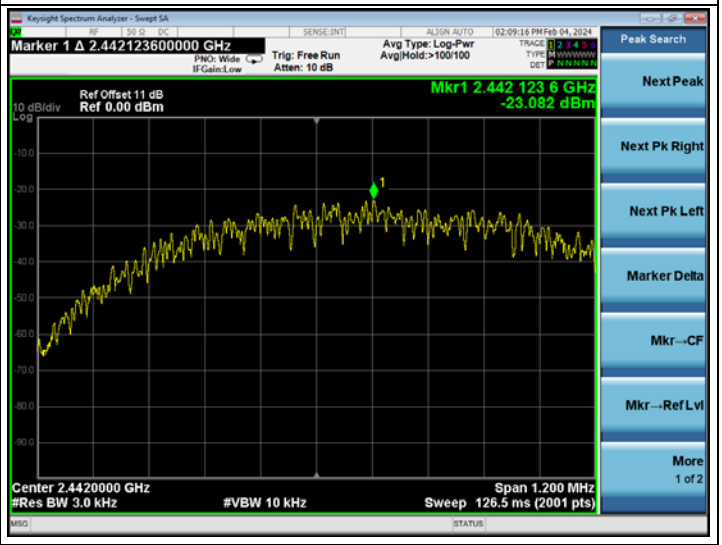
Mode	Channel	Frequency (MHz)	**Power Spectral Density (dBm)**	Limit
BLE	00	2402	**-22.695**	8 dBm
	20	2442	**-23.082**	8 dBm
	39	2480	**-23.461**	8 dBm

BLE

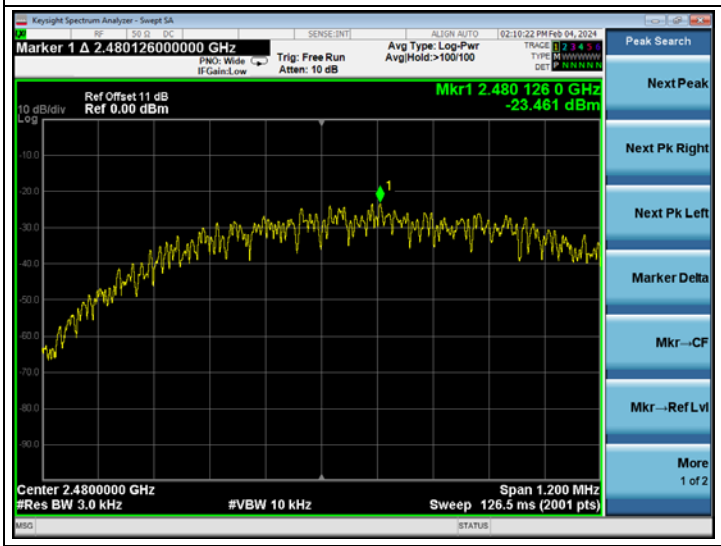
CH2402



CH2442



CH2480



9 ANTENNA REQUIREMENT

9.1 Specification Limits (§15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2 Result

According to KDB 353028 D1, the following describes the three ways that can be used to demonstrate compliance to Section 15.203: a) Antenna permanently attached. b) Unique (non-standard) antenna connector. c) Professional installation.
For this product, the antenna is: ☑ Antenna permanently attached ☐ Unique (non-standard) antenna connector ☐ Professional installation ☐ not meet any of ways list above that ☑ compliant ☐ not compliant with the requirement of Section 15.203.

10 DEVIATION TO TEST SPECIFICATIONS

None.

11 MEASUREMENT UNCERTAINTY LIST

The measurement uncertainty was estimated for test on the EUT according to CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage of K=2.
The uncertainties value is not used in determining the PASS/FAIL results.

Test Items/Facilities	Frequency/Equipment/Unit	Uncertainty
Conducted Emission No.1 Shielded Room	9kHz~150kHz	±3.1 dB
	150kHz~30MHz	±2.6 dB
Conducted Emission No.3 Shielded Room	9kHz~150kHz	±3.1 dB
	150kHz~30MHz	±2.6 dB
Radiated Emission	30MHz~200MHz, Horizontal	±3.8 dB
	30MHz~200MHz, Vertical	±4.1 dB
	200MHz~1000MHz, Horizontal	±3.6 dB
	200MHz~1000MHz, Vertical	±5.1 dB
	1GHz~6GHz	±5.3 dB
	6GHz~18GHz	±5.3 dB
	18GHz~40GHz	±3.5 dB
Output Power Test	50MHz~18GHz	0.77 dB
Power Density Test	9kHz~6GHz	1.08 dB
RF Frequency Test	9kHz~40GHz	$6*10^{-4}$
Bandwidth Test	9kHz~6GHz	$1.5*10^{-3}$
RF Radiated Power Test	30MHz~1000MHz	3.06 dB
Conducted Output Power Test	50MHz~18GHz	0.83 dB
AC Voltage(<10kHz) Test	120V~230V	0.04 %
DC Power Test	0V~30V	0.4 %
Temperature	-40℃~+100℃	0.52 ℃
Humidity	30%~95%	2.6 %