TEST REPORT

Application No.:	DNT2501130199R0347-00422
Applicant:	Hexgears (Shenzhen) Technology Co.,Ltd
Address of Applicant:	No. 1407, 14th F, Bldg 4, Zhuoyue Meilin Center Plaza (North District), Zhongkang Road, Meilin Street, Futian District, Shenzhen China
EUT Description:	Keyboard
Model No.:	HK-K6,HK-K1,HK-K2,HK-K3,HK-K4,HK-K5,HK-K7,HK-K8,HK-K9,HK-K10,HK-K11,HK-K12,HK-K13,HK-K14,HK-K15,HK-K16,HK-K17,HK-K18,HK-K19,HK-K20,HK-K21,HK-K22,HK-K23,HK-K24,HK-K25,HK-K26,HK-K27,HK-K28,HK-K29,HK-K30,HK-K31,HK-K32,,HK-K33,HK-K34,HK-K35,HK-K36,HK-K37,HK-K38,HK-K39,HK-K40,HK-K41,HK-K42,HK-K43,HK-K44,HK-K45,HK-K46,HK-K47,HK-K48,HK-K49,HK-K50,HK-K51,HK-K52,HK-K53,HK-K54,HK-K55,HK-K56,HK-K57,HK-K58,HK-K59,HK-K60,HK-K61,HK-K62,HK-K63,HK-K64,HK-K65,HK-K66,HK-K67,HK-K68,HK-K69,HK-K70,HK-K71,HK-K72,HK-K73,HK-K74,HK-K75,HK-K76,HK-K77,HK-K78,HK-K79,HK-K80,HK-K81,HK-K82,HK-K83,HK-K84,HK-K85,HK-K86,HK-K87,HK-K88,HK-K89,HK-K90,HK-K91,HK-K92,HK-K93,HK-K94,HK-K95,HK-K96,HK-K97,HK-K98,HK-K99,HK-K100,HK-K101,HK-K102,HK-K103,HK-K104,HK-K105,HK-K106,HK-K107,HK-K108,HK-K109,HK-K110,HK-K111,HK-K112,HK-K113,HK-K114,HK-K115,HK-K116,HK-K117,HK-K118,HK-K119,HK-K120,HK-K121,HK-K122,HK-K123,HK-K124,HK-K125,HK-K126,HK-K127,HK-K128,HK-K129,HK-K130,HK-K131,HK-K132,HK-K133,HK-K134,HK-K135,HK-K136,HK-K137,HK-K138,HK-K139,HK-K140,HK-K141,HK-K142,HK-K143,HK-K144,HK-K145,HK-K146,HK-K147,HK-K148,HK-K149,HK-K150,HK-K151,HK-K152,HK-K153,HK-K154,HK-K155,HK-K156,HK-K157,HK-K158,HK-K159,HK-K160,HK-K161,HK-K162,HK-K163,HK-K164,HK-K165,HK-K166,HK-K167,HK-K168,HK-K169,HK-K170,HK-K171,HK-K172,HK-K173,HK-K174,HK-K175,HK-K176,HK-K177,HK-K178,HK-K179,HK-K180,HK-K181,HK-K182,HK-K183,HK-K184,HK-K185,HK-K186,HK-K187,HK-K188,HK-K189,HK-K190,HK-K191,HK-K192,HK-K193,HK-K194,HK-K195,HK-K196,HK-K197,HK-K198,HK-K199,HK-K200
FCC ID:	2BHVQ-HK-K6
Power Supply	Input:DC 5V; DC 3.7V From Rechargeable Lithium-ion Battery
Trade Mark:	/
Standards:	47 CFR FCC Part 2, Subpart J 47 CFR Part 15, Subpart C ANSI C63.10: 2013

Date of Receipt: 2025/01/13

Date of Test: 2025/01/13 to 2025/04/05

Date of Issue: 2025/04/08

Test Result: **PASS**

Prepared By: _____ (Testing Engineer)

Reviewed By: _____ (Project Engineer)

Approved By: _____ (Manager)

Note: If there is any objection to the results in this report, please submit a written inquiry to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp, and is issued by the company in accordance with the requirements of the "Conditions of Issuance of Test Reports" printed in the attached page. Unless otherwise stated, the results presented in this report only apply to the samples tested this time. Partial reproduction of this report is not allowed unless approved by the company in writing.

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V2.0	/	Apr .08, 2025	Valid	Original Report

1 Test Summary

Test Item	Standard Section	Test Result
Antenna Requirement	15.203	PASS
20dB Occupied Bandwidth	15.215	PASS
Duty Cycle	N/A	PASS
Field Strength	15.249(a)	PASS
Radiated Spurious Emissions And Band Edge	15.205, 15.209, 15.249(a)(c)(d)(e), 15.35(b)	PASS
AC Power Line Conducted Emissions	15.207	PASS

Contents

2 General Information

2.1 Test Location

Company:	Dongguan DN Testing Co., Ltd
Address:	No. 1, West Fourth Street, South Xinfa Road, Wusha Liwu, Chang ' an Town, Dongguan City, Guangdong P.R.China
Test engineer:	Wayne Lin

2.2 General Description of EUT

Manufacturer:	Hexgears (Shenzhen) Technology Co.,Ltd
Address of Manufacturer:	No. 1407, 14th F, Bldg 4, Zhuoyue Meilin Center Plaza (North District), Zhongkang Road, Meilin Street, Futian District, Shenzhen China
EUT Description:	Keyboard
Test Model No.:	HK-K6
Additional Model(s):	HK-K1,HK-K2,HK-K3,HK-K4,HK-K5,HK-K7,HK-K8,HK-K9,HK-K10,HK-K11,HK-K12,HK-K13,HK-K14,HK-K15,HK-K16,HK-K17,HK-K18,HK-K19,HK-K20,HK-K21,HK-K22,HK-K23,HK-K24,HK-K25,HK-K26,HK-K27,HK-K28,HK-K29,HK-K30,HK-K31,HK-K32,,HK-K33,HK-K34,HK-K35,HK-K36,HK-K37,HK-K38,HK-K39,HK-K40,HK-K41,HK-K42,HK-K43,HK-K44,HK-K45,HK-K46,HK-K47,HK-K48,HK-K49,HK-K50,HK-K51,HK-K52,HK-K53,HK-K54,HK-K55,HK-K56,HK-K57,HK-K58,HK-K59,HK-K60,HK-K61,HK-K62,HK-K63,HK-K64,HK-K65,HK-K66,HK-K67,HK-K68,HK-K69,HK-K70,HK-K71,HK-K72,HK-K73,HK-K74,HK-K75,HK-K76,HK-K77,HK-K78,HK-K79,HK-K80,HK-K81,HK-K82,HK-K83,HK-K84,HK-K85,HK-K86,HK-K87,HK-K88,HK-K89,HK-K90,HK-K91,HK-K92,HK-K93,HK-K94,HK-K95,HK-K96,HK-K97,HK-K98,HK-K99,HK-K100,HK-K101,HK-K102,HK-K103,HK-K104,HK-K105,HK-K106,HK-K107,HK-K108,HK-K109,HK-K110,HK-K111,HK-K112,HK-K113,HK-K114,HK-K115,HK-K116,HK-K117,HK-K118,HK-K119,HK-K120,HK-K121,HK-K122,HK-K123,HK-K124,HK-K125,HK-K126,HK-K127,HK-K128,HK-K129,HK-K130,HK-K131,HK-K132,HK-K133,HK-K134,HK-K135,HK-K136,HK-K137,HK-K138,HK-K139,HK-K140,HK-K141,HK-K142,HK-K143,HK-K144,HK-K145,HK-K146,HK-K147,HK-K148,HK-K149,HK-K150,HK-K151,HK-K152,HK-K153,HK-K154,HK-K155,HK-K156,HK-K157,HK-K158,HK-K159,HK-K160,HK-K161,HK-K162,HK-K163,HK-K164,HK-K165,HK-K166,HK-K167,HK-K168,HK-K169,HK-K170,HK-K171,HK-K172,HK-K173,HK-K174,HK-K175,HK-K176,HK-K177,HK-K178,HK-K179,HK-K180,HK-K181,HK-K182,HK-K183,HK-K184,HK-K185,HK-K186,HK-K187,HK-K188,HK-K189,HK-K190,HK-K191,HK-K192,HK-K193,HK-K194,HK-K195,HK-K196,HK-K197,HK-K198,HK-K199,HK-K200
Power Supply	Input:DC 5V; DC 3.7V From Rechargeable Lithium-ion Battery
Chip Type:	N32L406
Serial number:	PR2501130199R0347
Trade Mark:	/
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	2402MHz-2480MHz
Type of Modulation:	GFSK
Sample Type:	Prototype production
Antenna Type:	☐ External, ☒ Integrated
Antenna Ports	☒ Ant 1, ☐ Ant 2, ☐ Ant 3
Antenna Gain*:	☒ Provided by applicant
	3.22dBi
RF Cable*:	☒ Provided by applicant
	0.5dB(0.6~1GHz); 0.8dB(1.4~2GHz); 1.0dB(2.1~2.7GHz); 1.5dB(3~4GHz); 1.8dB(4.4~6GHz);

Remark:

*All models are just name differences, motherboard, PCB circuit board, chip, electronic components, appearance is all the same.

*Since the above data and/or information is provided by the applicant relevant results or conclusions of this report are only made for these data and/or information , DNT is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.

2.3 Power Setting of Test Software

Software Name	RF_Test Rev1.0.0.6		
Frequency(MHz)	2402	2440	2480
Setting	Default	Default	Default

2.4 Test Environment and Mode

Operating Environment:	
Temperature:	20~25.0 ˚C
Humidity:	45~56 % RH
Atmospheric Pressure:	101.0~101.30 KPa
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

2.5 Channel List

Operation Frequency of each channel							
Channel	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

2.6 Description of Support Units

The EUT has been tested independent unit.

2.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Lab A:

• FCC, USA

Designation Number: CN1348

• A2LA (Certificate No. 7050.01)

DONGGUAN DN TESTING CO., LTD.

• Innovation, Science and Economic Development Canada

DONGGUAN DN TESTING CO., LTD. EMC Laboratory has been recognized by ISED as an accredited testing laboratory. CAB identifier is CN0149.

IC#: 30755.

2.8 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.41dB
2	RF power density, conducted	±1.96dB

No.	Item	Measurement Uncertainty
1	Conduction Emission	± 3.0dB (150kHz to 30MHz)
2	Radiated Emission	± 4.8dB (Below 1GHz)
		± 4.8dB (1GHz to 6GHz)
		± 4.5dB (6GHz to 18GHz)
		± 5.02dB (Above 18GHz)

2.9 Equipment List

For Connect EUT Antenna Terminal Test					
Description	Manufacturer	Model	Serial Number	Cal date	Due date
Signal Generator	Keysight	N5181A-6G	MY48180415	2024-10-23	2025-10-22
Signal Generator	Keysight	N5182B	MY57300617	2024-10-23	2025-10-22
Power supply	Keysight	E3640A	ZB2022656	2024-10-23	2025-10-22
Spectrum Analyzer	Aglient	N9010A	MY52221458	2024-10-23	2025-10-22
BT/WIFI Test Software	Tonscend	JS1120 V3.1.83	NA	NA	NA
RF Control Unit	Tonscend	JS0806-2	22F8060581	NA	NA
temperature and humidity box	SCOTEK	SCD-C40-80PRO	6866682020008	2024-10-23	2025-10-22

Test Equipment for Conducted Emission					
Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Receiver	R&S	ESCI3	101152	2024-10-23	2025-10-22
LISN	R&S	ENV216	102874	2024-10-23	2025-10-22
ISN	R&S	ENY81-CA6	1309.8590.03	2024-10-23	2025-10-22

Test Equipment for Radiated Emission(below 1000MHz)					
Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Receiver	R&S	ESR7	102497	2024-10-23	2025-10-22
Test Software	ETS-LINDGREN	TiLE-FULL	NA	NA	NA
RF Cable	ETS-LINDGREN	RFC-NMS-100-NMS-350-IN	NA	2024-10-23	2025-10-22
Log periodic antenna	ETS-LINDGREN	VULB 9168	01475	2022-11-28	2025-11-27
Pre-amplifier	Schwarzbeck	BBV9743B	00423	2024-10-23	2025-10-22
Single ring magnetic field ring antenna	ETS-LINDGREN	6502	6502	2024-10-23	2025-10-22

Test Equipment for Radiated Emission(Above 1000MHz)					
Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Frequency analyser	Keysight	N9010A	MY52221458	2024-10-23	2025-10-22
RF Cable	ETS-LINDGREN	RFC-NMS-100-NMS-350-IN	NA	2024-10-23	2025-10-22
Horn Antenna	ETS-LINDGREN	3117	00252567	2022-11-28	2025-11-27
Double ridged waveguide antenna	ETS-LINDGREN	3116C	00251780	2022-11-28	2025-11-27
Test Software	ETS-LINDGREN	TiLE-FULL	NA	NA	NA
Pre-amplifier	ETS-LINDGREN	3117-PA	252567	2024-10-23	2025-10-22
Pre-amplifier	ETS-LINDGREN	3116C-PA	251780	2024-10-23	2025-10-22

2.10 Assistant equipment used for test

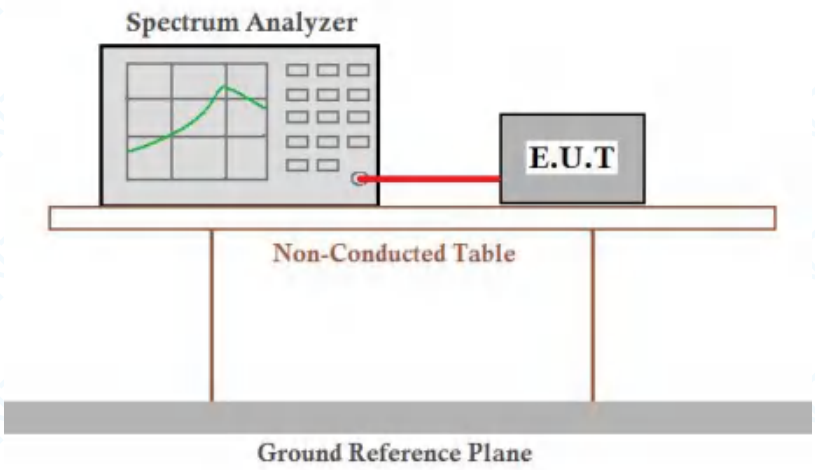
Code	Equipment	Manufacturer	Model No.	Equipment No.
1	Adapter	GaoFanDe	GFDQ3-0502000U	NA
2	Computer	acer	N22C8	EMC notebook01

3 Test results and Measurement Data

3.1 Antenna requirements

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	
The antenna is welded on the main PCB and no consideration of replacement. The best case gain of the antenna is 3.22dBi.	

3.2 20dB Occupied Bandwidth

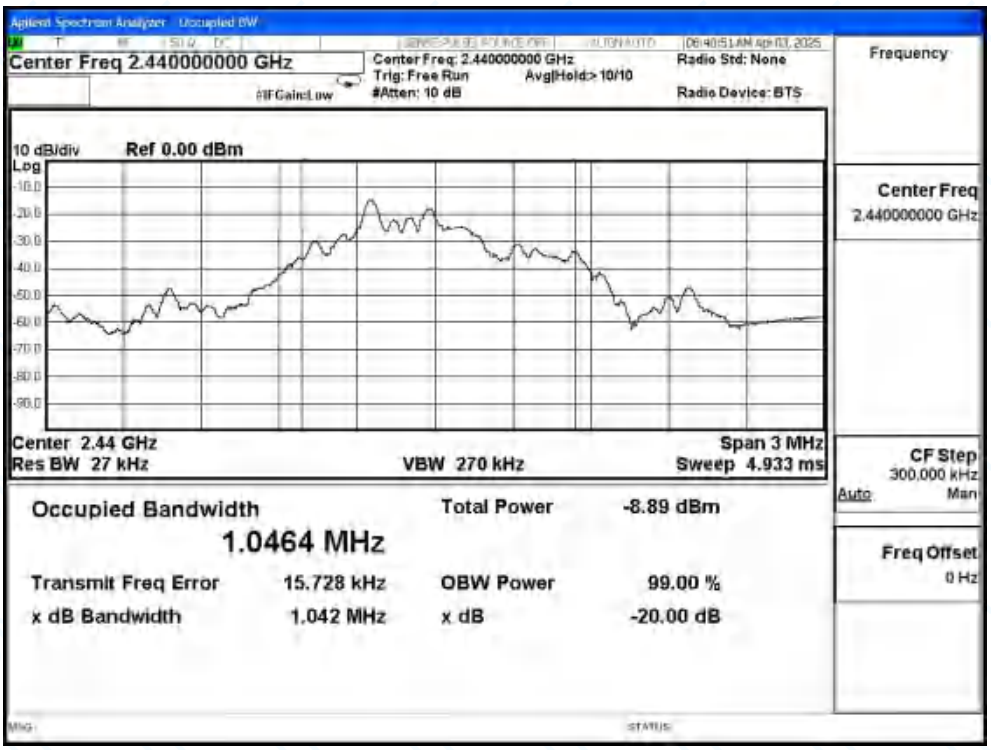
Test Requirement:	47 CFR Part 15C Section 15.215
Test Method:	ANSI C63.10:2013 Section 7.8.7
Test Setup:	
Instruments Used:	Refer to section 2.9 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the worst case
Limit:	no wider than 0.25% of the center frequency
Test Results:	Pass

Test Data:

Test Frequency (MHz)	20dB Bandwidth (MHz)	Result
2402	1.041	Pass
2440	1.042	Pass
2480	1.045	Pass

Test Graphs

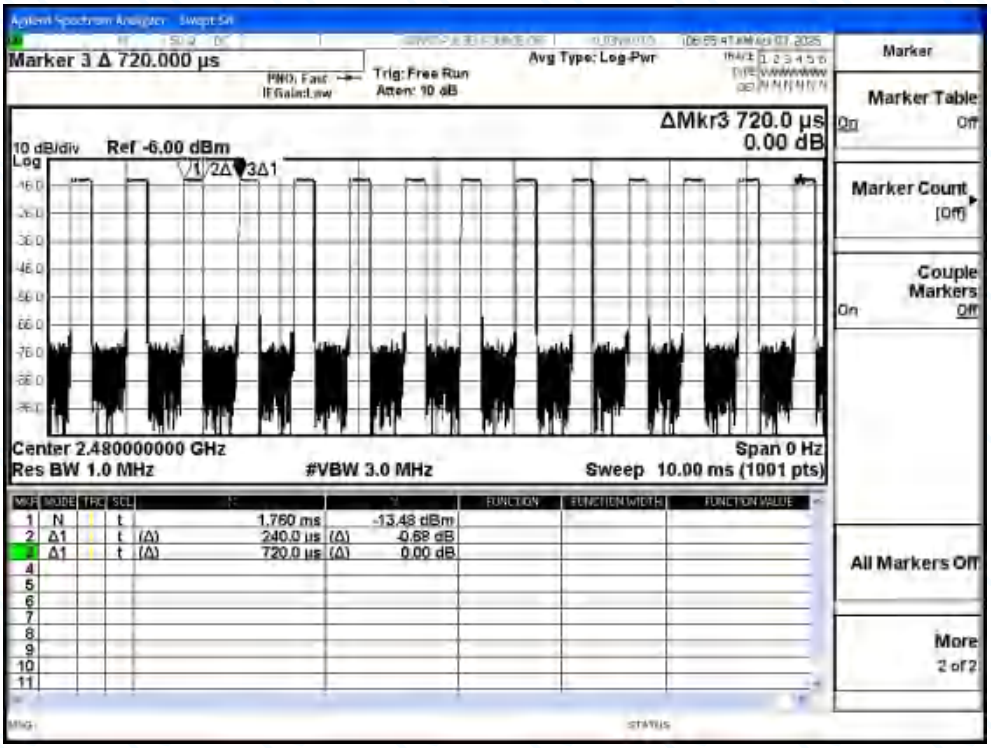

Agilent Spectrum Analyzer - Occupied BW
Span 3.0000 MHz
Center Freq: 2.402000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 0.00 dBm
Log
Center 2.402 GHz
Res BW 27 kHz
VBW 270 kHz
Span 3 MHz
Sweep 4.933 ms
Occupied Bandwidth
1.0372 MHz
Total Power
-8.56 dBm
Transmit Freq Error
17.261 kHz
OBW Power
99.00 %
x dB Bandwidth
1.041 MHz
x dB
-20.00 dB
Span
Span
3.0000 MHz
Full Span
Last Span


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.440000000 GHz
Center Freq: 2.440000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Ref 0.00 dBm
Log
Center 2.44 GHz
Res BW 27 kHz
VBW 270 kHz
Span 3 MHz
Sweep 4.933 ms
Occupied Bandwidth
1.0464 MHz
Total Power
-8.89 dBm
Transmit Freq Error
15.728 kHz
OBW Power
99.00 %
x dB Bandwidth
1.042 MHz
x dB
-20.00 dB
Frequency
Center Freq
2.440000000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Log
Ref 0.00 dBm
Center Freq
2.480000000 GHz
Center 2.48 GHz
Res BW 27 kHz
VBW 270 kHz
Span 3 MHz
Sweep 4.933 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.0359 MHz
Total Power
-9.73 dBm
Transmit Freq Error
19.519 kHz
OBW Power
99.00 %
x dB Bandwidth
1.046 MHz
x dB
-20.00 dB
Freq Offset
0 Hz
MSG
STATUS

3.3 Duty Cycle

Limit :N/A

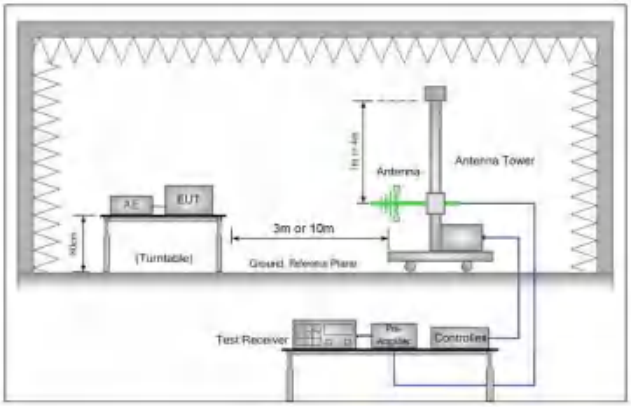


The average correction factor is computed by analyzing the on time less than or equal to 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle), where the duty factor is calculated from following formula:

20log (Duty cycle) =20log(240/720)= -9.54dB

Please refer to below plots for more details.

3.4 Field Strength of Fundamental

Test Requirement:	47 CFR Part 15C Section 15.249(a)
Test Method:	ANSI C63.10 :2020 Section 11.12
Test Setup:	
Test Instruments:	Refer to section 2.9 for details
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the worst case

Limit:

Fundamental frequency	Field strength of fundamental@3m (microvolts/meter)
902-928MHz	50
2400-2483.5MHz	50
5725-5875MHz	50
24.0-24.25	250

The EUT fundamental frequency is in 2400-2483.5MHz,So the Average Limit& Peak Limit is show in below table:

Fundamental frequency	Field strength of fundamental@3m (dBμV/m)	
	Average Limit	Peak Limit
2400-2483.5MHz	94	114

Note:

1. Average Limit (dBμV/m)=20×log[1000×Field Strength (mV/m)].
2. Peak Limit (dBμV/m)= Average Limit (dBμV/m)+20dB

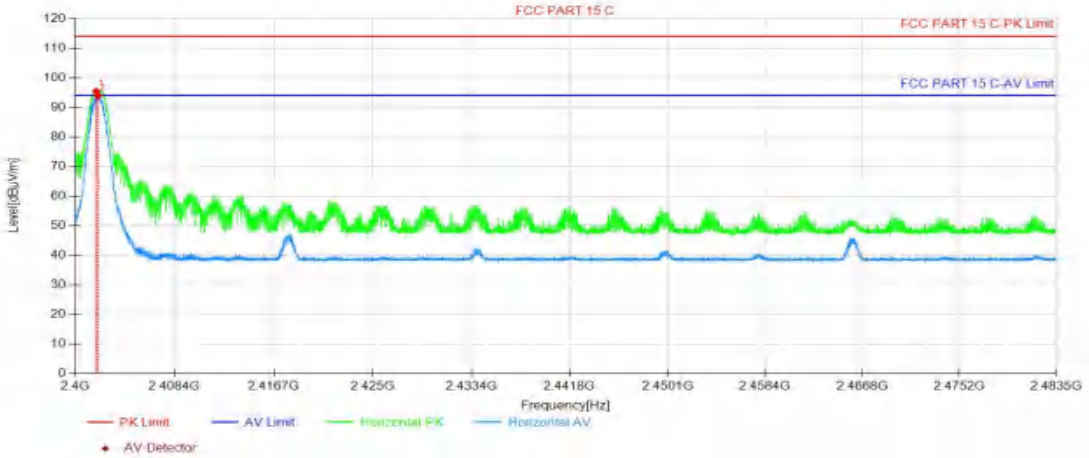
Test Configuration:	RBW: ⩾OBW VBW: 3XRBW Start frequency: 2400MHz Stop frequency: 2483.5MHz Sweep Time: Auto Detector: PEAK/AVG Trace Mode: Max Hold
Test Procedure:	a. the EUT was placed on the top of a rotating table 1 meters above the ground at

	a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. r. Repeat above procedures until all frequencies measured was complete.
Test Results:	Pass

Test Data

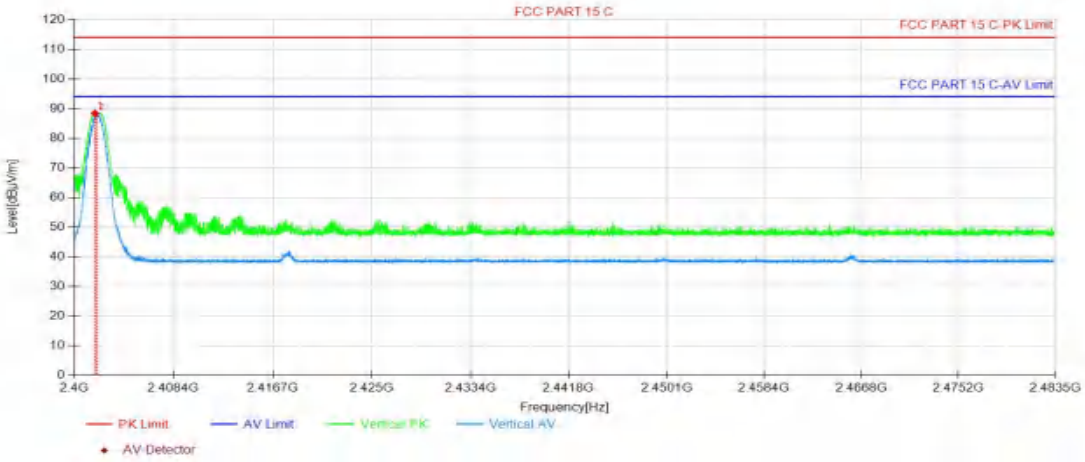
2402MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dB µ V/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2401.77	96.19	-0.73	95.46	114.00	18.54	150	15	PK
2	2401.93	94.59	-0.72	93.87	94.00	0.13	150	15	AV

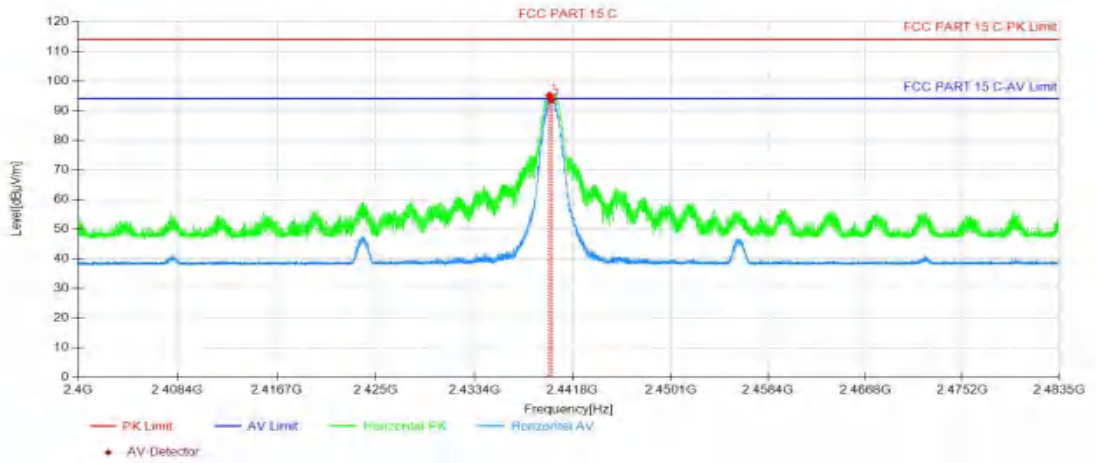
Vertical:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dB µ V/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2401.75	89.15	-0.73	88.42	114.00	25.58	150	13	PK
2	2401.91	88.53	-0.72	87.81	94.00	6.19	150	13	AV

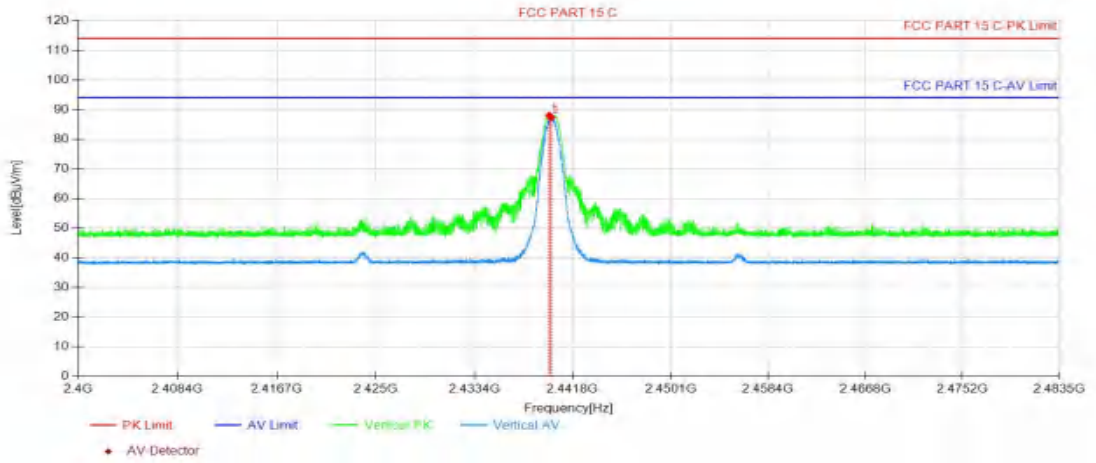
2440MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dB µ V/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2439.79	95.67	-0.47	95.20	114.00	18.80	150	17	PK
2	2439.95	93.98	-0.47	93.51	94.00	0.49	150	17	AV

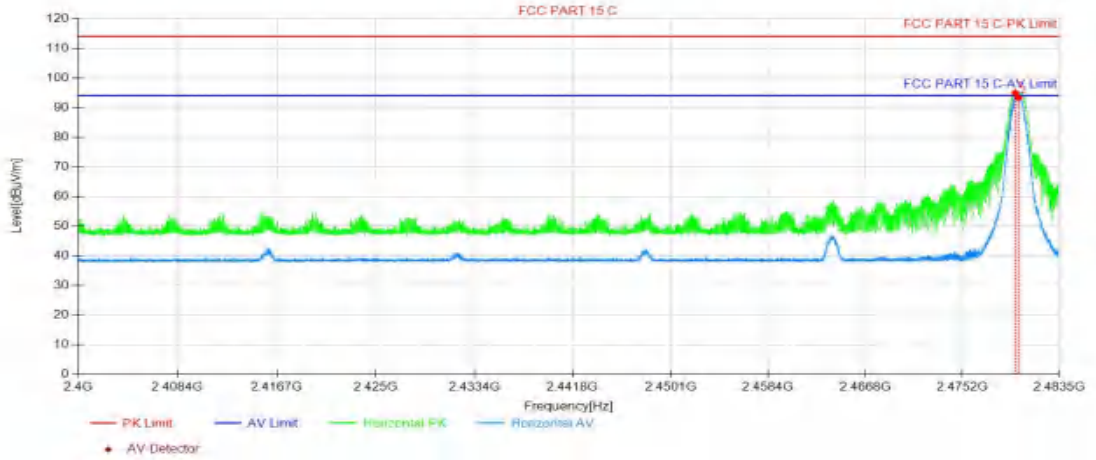
Vertical:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dB µ V/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2439.75	88.53	-0.47	88.06	114.00	25.94	150	8	PK
2	2439.91	87.75	-0.47	87.28	94.00	6.72	150	8	AV

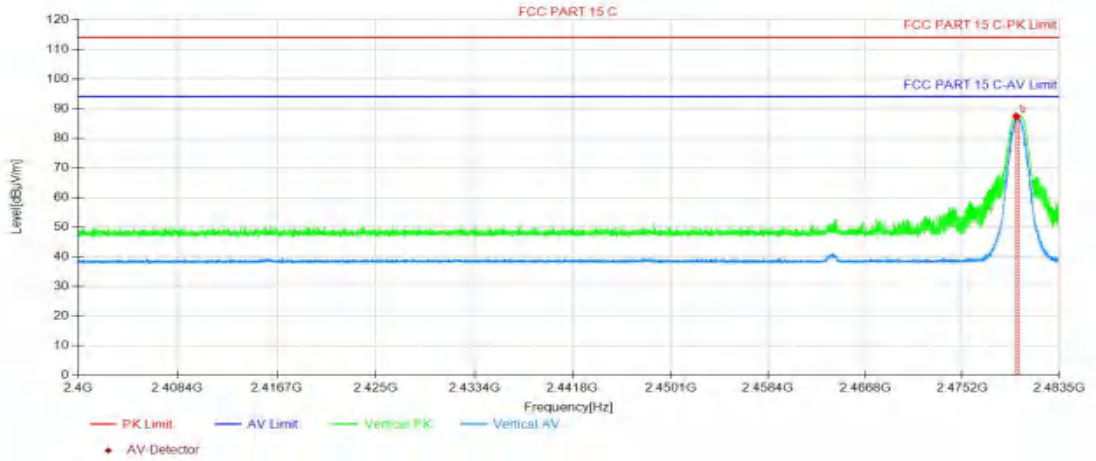
2480MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dB µ V/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2479.71	95.27	-0.31	94.96	114.00	19.04	150	15	PK
2	2479.99	93.58	-0.31	93.27	94.00	0.73	150	15	AV

Vertical:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dB µ V/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2477.41	86.49	-0.32	86.17	114.00	27.83	150	17	PK
2	2477.70	85.67	-0.32	85.35	94.00	8.65	150	112	AV

Note

1. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including LISN Factor and the Cable Factor etc.), The basic equation is as follows:

Result Level= Reading Level + Correct Factor(including Ant.Factor ,Cable Factor etc.)

2. Average Level=Peak Level + 20log(Duty cycle)

3.5 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.249(a) 47 CFR Part 15C Section 15.209 47 CFR Part 15C Section 15.205				
Test Method:	ANSI C63.10 :2020 Section 11.12				
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Limit:	15.209 Radiated emission limits				
	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Remark:Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device. The limits on the field strength of the spurious emissions in the below table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.				

Fundamental frequency	Field strength of harmonics@3m (microvolts/meter)
902-928MHz	500
2400-2483.5MHz	500
5725-5875MHz	500
24.0-24.25	2500

The EUT fundamental frequency is 2400-2483.5MHz,So the Average Limit& Peak Limit is show in below table:

Fundamental frequency (MHz)	Field strength of spurious emission@3m (dBμV/m)	
	Average Limit	Peak Limit
2400-2483.5	54	74

Note:

1.Average Limit (dBμV/m)=20×log[1000×Field Strength (mV/m)].

2.Peak Limit (dBμV/m)= Average Limit (dBμV/m)+20dB

15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

Test Setup:	

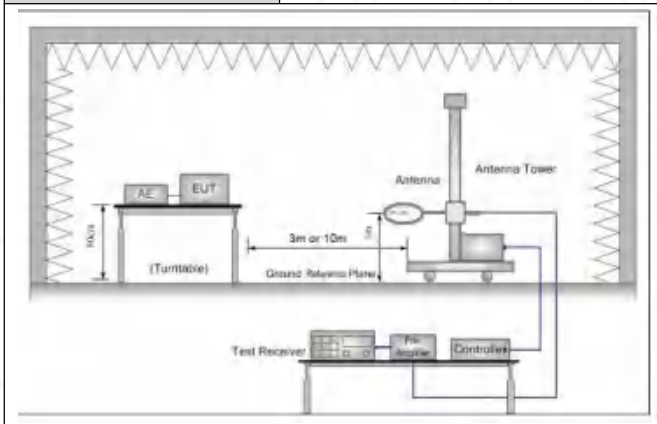


Figure 1. Below 30MHz

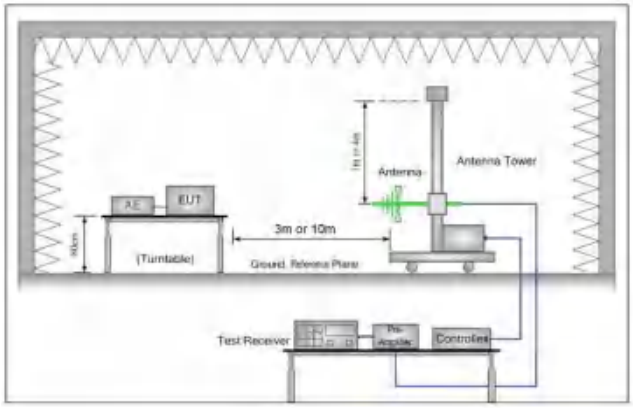


Figure 2. 30MHz to 1GHz

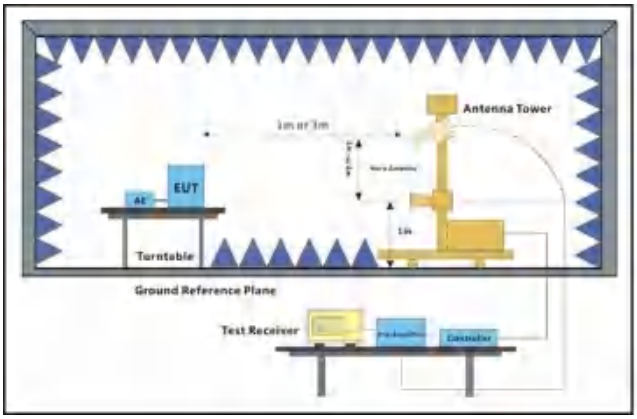


Figure 3. Above 1 GHz

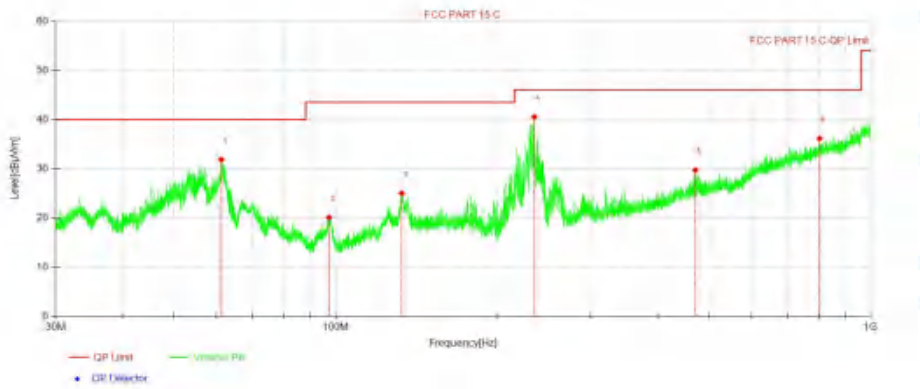
Test Procedure:	h. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. i. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation j. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. k. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. l. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. m. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. n. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. o. Test the EUT in the lowest channel, the middle channel ,the Highest channel. p. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. q. Repeat above procedures until all frequencies measured was complete.

Exploratory Test Mode:	Transmitting with all kind of modulations, data rates.Transmitting mode.
Final Test Mode:	Pretest the EUT at Transmitting mode. Through Pre-scan, find the worst case.
Instruments Used:	Refer to section 2.9 for details
Test Results:	Pass

Test data

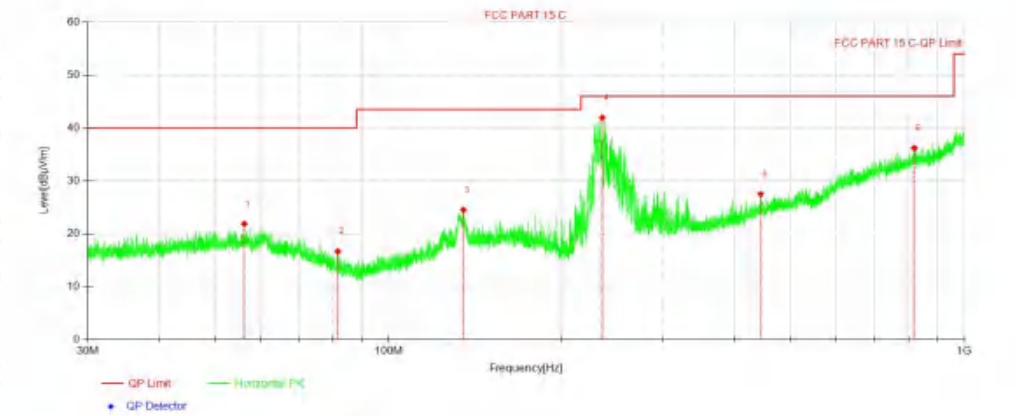
For 30-1000MHz TX

Vertical:



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	61.21	40.79	-8.90	31.89	40.00	8.11	100	161	Peak
2	97.28	33.13	-13.02	20.11	43.50	23.39	100	266	Peak
3	133.01	34.19	-9.15	25.04	43.50	18.46	100	53	Peak
4	235.23	50.27	-9.72	40.55	46.00	5.45	100	75	Peak
5	470.35	32.10	-2.32	29.78	46.00	16.22	100	79	Peak
6	802.91	31.80	4.37	36.17	46.00	9.83	100	331	Peak

Horizontal:

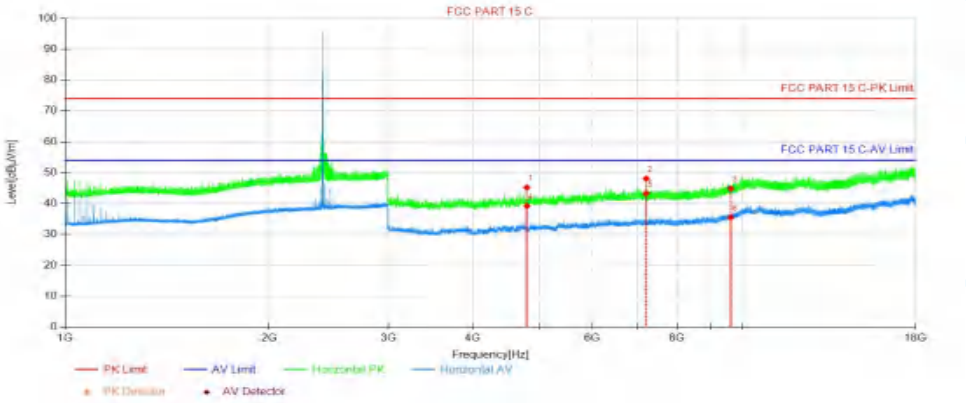


NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	56.15	30.26	-8.36	21.90	40.00	18.10	100	112	Peak
2	81.64	29.67	-12.97	16.70	40.00	23.30	100	359	Peak
3	134.88	33.51	-8.97	24.54	43.50	18.96	100	137	Peak
4	235.23	51.69	-9.72	41.97	46.00	4.03	100	360	Peak
5	443.29	30.48	-2.98	27.50	46.00	18.50	100	304	Peak
6	819.40	31.43	4.77	36.20	46.00	9.80	100	359	Peak

For above 1GHz TX

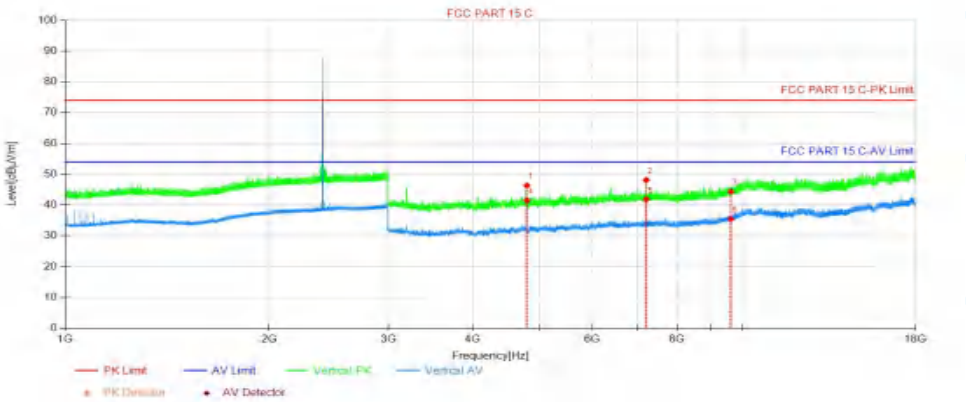
204MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4803.09	49.85	-4.61	45.24	74.00	28.76	150	288	PK
2	7205.46	49.88	-1.77	48.11	74.00	25.89	150	176	PK
3	9608.58	43.96	0.88	44.84	74.00	29.16	150	232	PK
4	4804.59	43.85	-4.61	39.24	54.00	14.76	150	189	AV
5	7206.21	45.08	-1.76	43.32	54.00	10.68	150	189	AV
6	9608.58	34.62	0.88	35.50	54.00	18.50	150	218	AV

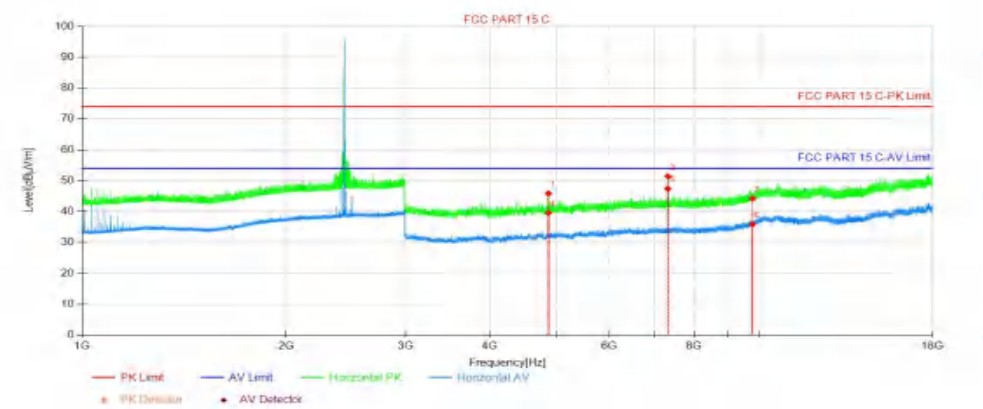
Vertical:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4804.59	50.98	-4.61	46.37	74.00	27.63	150	259	PK
2	7206.21	49.87	-1.76	48.11	74.00	25.89	150	343	PK
3	9608.58	43.52	0.88	44.40	74.00	29.60	150	356	PK
4	4804.59	46.15	-4.61	41.54	54.00	12.46	150	272	AV
5	7206.96	43.62	-1.76	41.86	54.00	12.14	150	343	AV
6	9608.58	34.59	0.88	35.47	54.00	18.53	150	229	AV

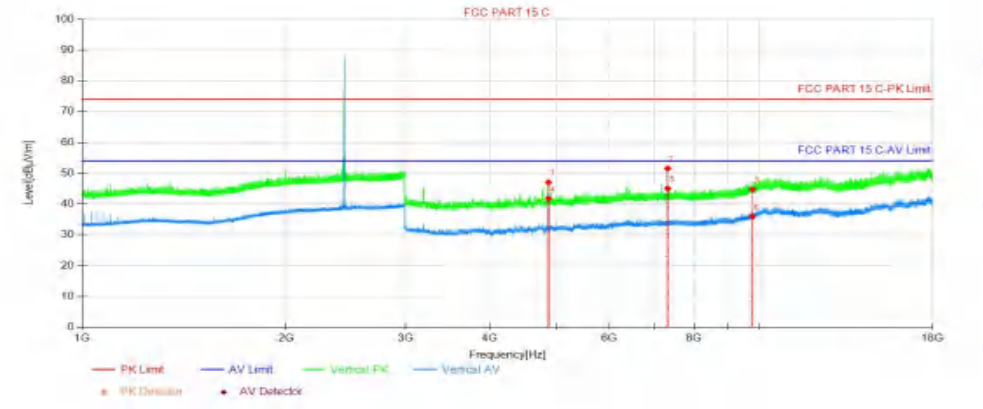
2440MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4879.59	50.57	-4.70	45.87	74.00	28.13	150	160	PK
2	7320.21	52.89	-1.49	51.40	74.00	22.60	150	188	PK
3	9760.08	42.63	1.62	44.25	74.00	29.75	150	146	PK
4	4880.34	44.28	-4.71	39.57	54.00	14.43	150	105	AV
5	7320.21	48.91	-1.49	47.42	54.00	6.58	150	215	AV
6	9760.08	34.23	1.62	35.85	54.00	18.15	150	20	AV

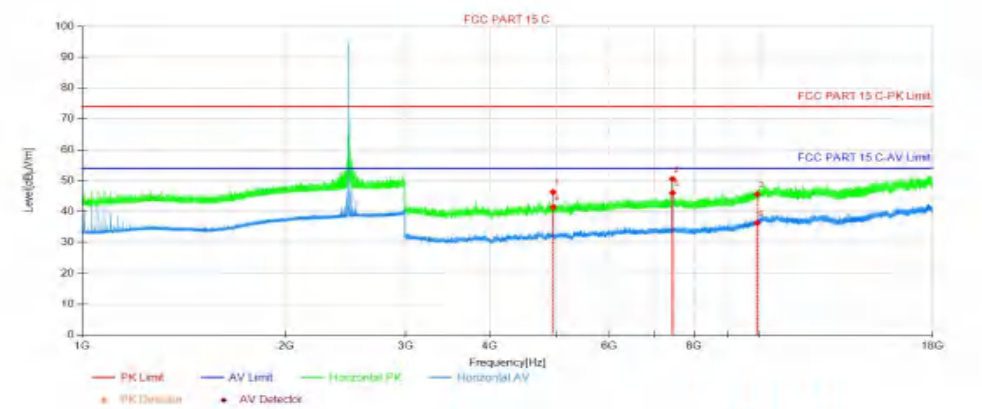
Vertical:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4879.59	51.75	-4.70	47.05	74.00	26.95	150	273	PK
2	7319.46	53.07	-1.50	51.57	74.00	22.43	150	217	PK
3	9760.08	43.16	1.62	44.78	74.00	29.22	150	64	PK
4	4880.34	46.50	-4.71	41.79	54.00	12.21	150	273	AV
5	7320.21	46.53	-1.49	45.04	54.00	8.96	150	258	AV
6	9760.08	34.32	1.62	35.94	54.00	18.06	150	301	AV

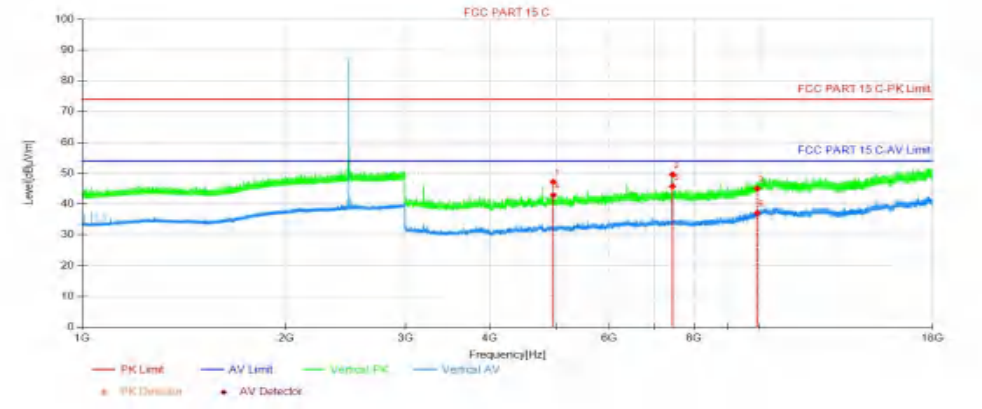
2480MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4959.09	51.20	-4.86	46.34	74.00	27.66	150	117	PK
2	7439.47	51.89	-1.34	50.55	74.00	23.45	150	187	PK
3	9920.59	43.32	2.27	45.59	74.00	28.41	150	187	PK
4	4960.59	46.30	-4.86	41.44	54.00	12.56	150	130	AV
5	7440.22	47.38	-1.34	46.04	54.00	7.96	150	344	AV
6	9920.59	34.05	2.27	36.32	54.00	17.68	150	76	AV

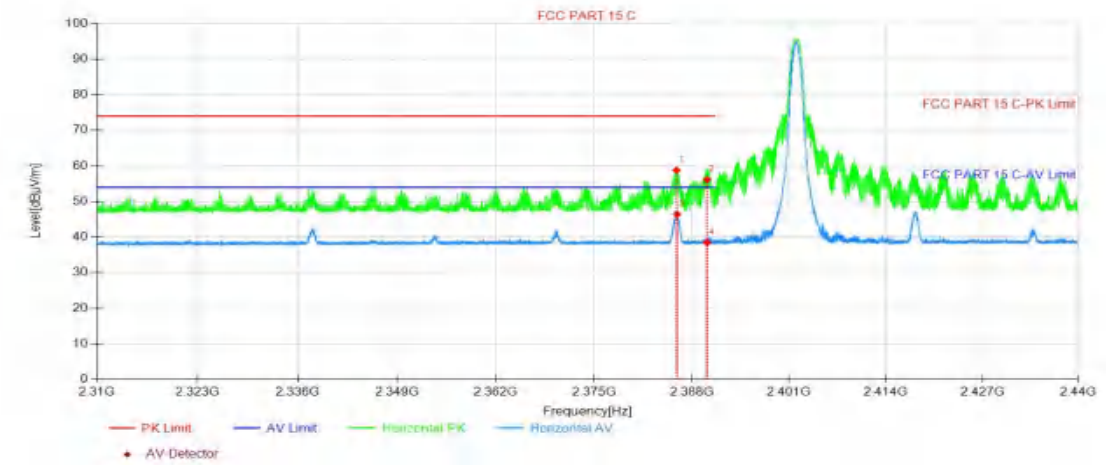
Vertical:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	4960.59	52.05	-4.86	47.19	74.00	26.81	150	271	PK
2	7440.97	50.92	-1.34	49.58	74.00	24.42	150	216	PK
3	9920.59	42.78	2.27	45.05	74.00	28.95	150	144	PK
4	4960.59	47.74	-4.86	42.88	54.00	11.12	150	271	AV
5	7440.22	47.07	-1.34	45.73	54.00	8.27	150	257	AV
6	9920.59	34.82	2.27	37.09	54.00	16.91	150	73	AV

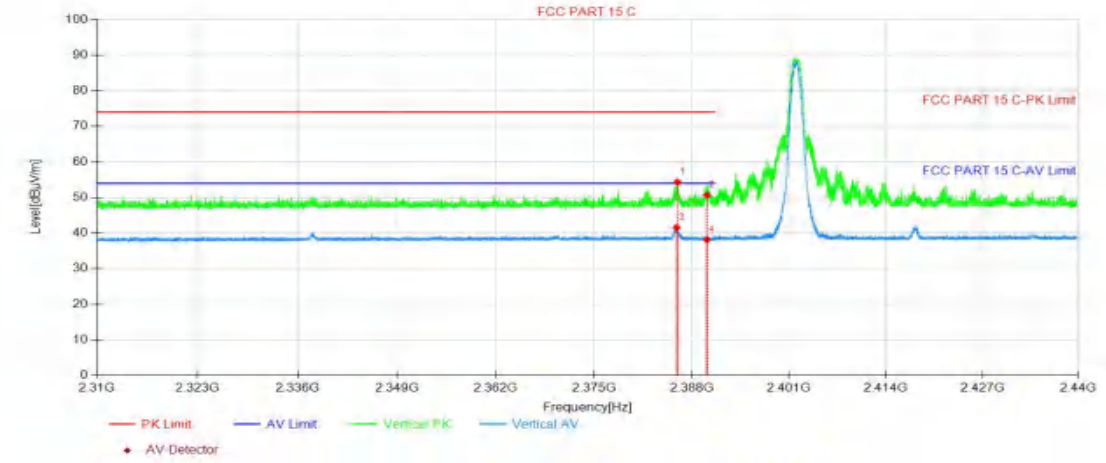
2402MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2385.94	59.62	-0.81	58.81	74.00	15.19	150	14	PK
2	2390.01	56.99	-0.80	56.19	74.00	17.81	150	3	PK
3	2386.01	47.25	-0.81	46.44	54.00	7.56	150	14	AV
4	2390.01	39.30	-0.80	38.50	54.00	15.50	150	85	AV

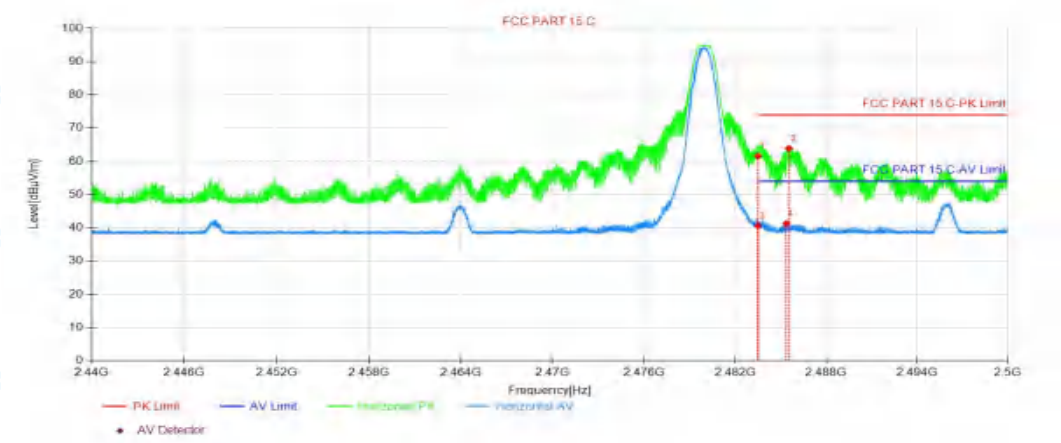
Vertical:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2386.05	55.12	-0.81	54.31	74.00	19.69	150	256	PK
2	2390.01	51.48	-0.80	50.68	74.00	23.32	150	96	PK
3	2385.95	42.37	-0.81	41.56	54.00	12.44	150	6	AV
4	2390.01	38.98	-0.80	38.18	54.00	15.82	150	197	AV

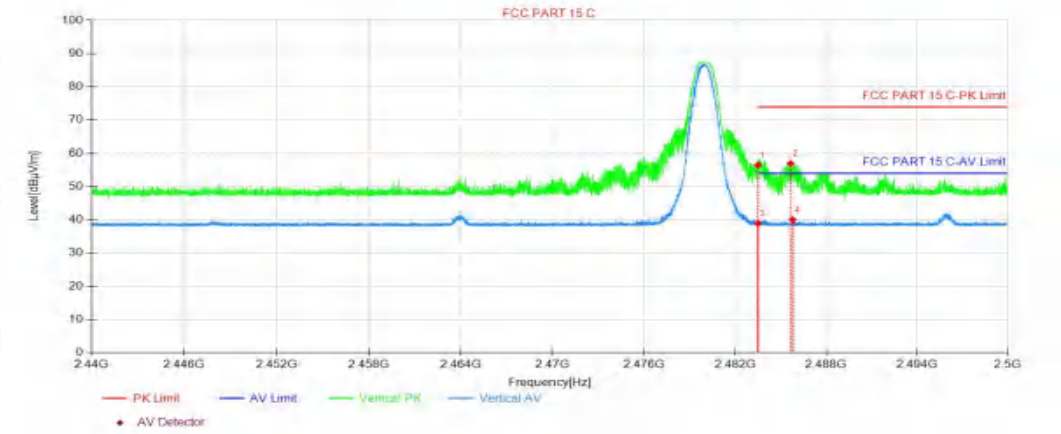
2480MHz

Horizontal:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2483.50	61.91	-0.29	61.62	74.00	12.38	150	357	PK
2	2485.53	64.20	-0.27	63.93	74.00	10.07	150	14	PK
3	2483.50	40.92	-0.29	40.63	54.00	13.37	150	3	AV
4	2485.37	41.57	-0.27	41.30	54.00	12.70	150	14	AV

Vertical:



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	2483.50	56.74	-0.29	56.45	74.00	17.55	150	97	PK
2	2485.64	57.23	-0.27	56.96	74.00	17.04	150	97	PK
3	2483.50	39.21	-0.29	38.92	54.00	15.08	150	97	AV
4	2485.79	40.31	-0.27	40.04	54.00	13.96	150	87	AV

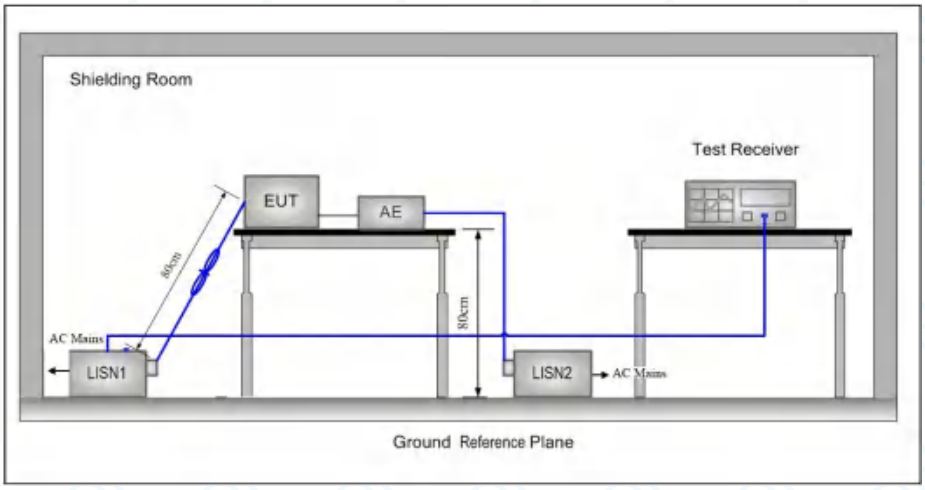
Note:

1. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including Ant.Factor and the Cable Factor etc.), The basic equation is as follows:

Measurement Level= Reading Level + Correct Factor(including LISN Factor ,Cable Factor etc.)

3. The amplitude of 9KHz to 30MHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

3.6 AC Power Line Conducted Emissions

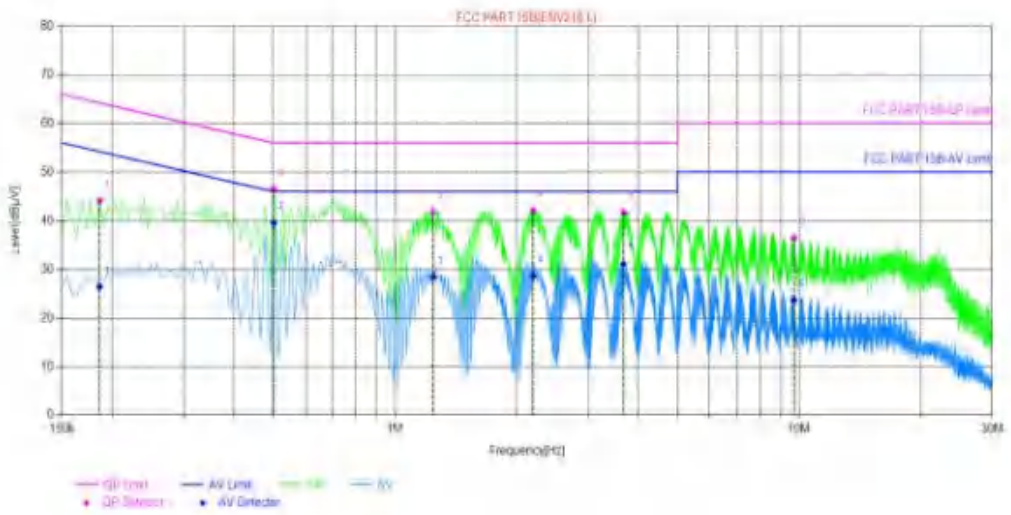
Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2020		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 2013 on conducted measurement.		
Test Setup:			
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.		

	Charge + Transmitting mode.
Final Test Mode:	Through Pre-scan, find the 6.5Mbps of rate of 802.11n(HT20) at lowest channel is the worst case. Charge + Transmitting mode. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 2.9 for details
Test Results:	PASS

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

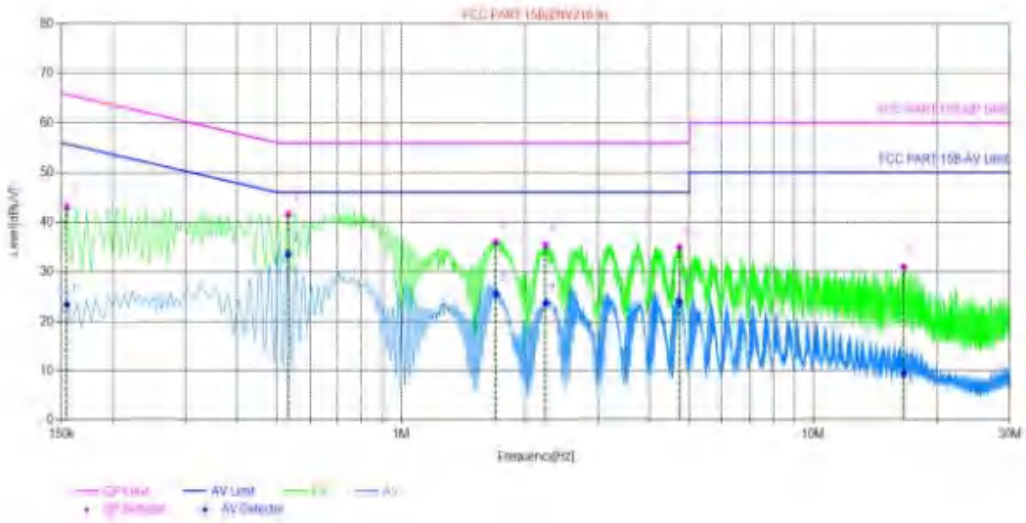
Live Line:



Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Value [dBuV]	QP Limit [dBuV]	QP Margin [dB]	AV Value [dBuV]	AV Limit [dBuV]	AV Margin [dB]	Verdict
1	0.186	9.84	44.11	64.21	20.10	26.44	54.21	27.77	PASS
2	0.501	9.71	46.48	56.00	9.52	39.60	46.00	6.40	PASS
3	1.2435	9.71	41.76	56.00	14.24	28.39	46.00	17.61	PASS
4	2.1975	9.79	42.09	56.00	13.91	28.60	46.00	17.40	PASS
5	3.6735	9.93	41.70	56.00	14.30	31.10	46.00	14.90	PASS
6	9.708	9.82	36.49	60.00	23.51	23.69	50.00	26.31	PASS

Neutral Line:



Final Data List									
NO	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1545	9.80	42.98	65.75	22.77	23.36	55.75	32.39	PASS
2	0.5325	9.73	41.56	56.00	14.44	33.43	46.00	12.57	PASS
3	1.698	9.75	35.91	56.00	20.09	25.41	46.00	20.59	PASS
4	2.2425	9.80	35.38	56.00	20.62	23.68	46.00	22.32	PASS
5	4.74	9.97	34.87	56.00	21.13	24.08	46.00	21.92	PASS
6	16.5885	9.98	31.00	60.00	29.00	9.25	50.00	40.75	PASS

Remark:

1. The BLE 1M is the worse case.

2. The following Quasi-Peak and Average measurements were performed on the EUT:

3. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including LISN Factor and the Cable Factor etc.), The basic equation is as follows:

Result Level= Reading Level + Correct Factor(including LISN Factor, Cable Factor etc

---END REPORT---