

TEST REPORT

Report No.: SHE19080042-02FE

Date: 2019-10-31

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Applicant : Shenzhen UniStrong Science & Technology Co.,Ltd.
Address of Applicant : B,4-4Factory, Zhengcheng Road, Fuyong Baoan District, Shenzhen, China

Product Name : Rugged Tablet
Model No. : UT52
Sample No. : E19080042-01#08
FCC ID : 2AOPD-UT52
ISED Number : 11546A-UT52

Standards : FCC CFR47 Part 15, Subpart C
RSS-Gen (Issue 5, March 2019)
RSS-247 (Issue 2, February 2017)

Date of Receipt : 2019-09-09
Date of Test : 2019-09-09 ~ 2019-10-28
Date of Issue : 2019-10-31

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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Revision Record			
Version	Date	Revisions	Revised By
1.0	2019-10-31	Original	--

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1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Services (Shanghai) Co., Ltd.
Address	155 Pingbei Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Company Name	Shenzhen UniStrong Science & Technology Co.,Ltd.
Address	B,4-4Factory, Zhengcheng Road, Fuyong Baoan District, Shenzhen, China
Contact Person	Lili Zheng
Telephone	+86-21-54467182
Email	ll.zheng@unistrong.com

1.3 Details of EUT

Product Name	Rugged Tablet
Brand Name	Unistrong
Model No.	UT52
FCC ID	2AOPD-UT52
ISED Number	11546A-UT52
Mode of Operation	Bluetooth BLE
Frequency Range	2400MHz ~ 2483.5MHz
Number of Channels	40 (at intervals of 2 MHz)
Modulation Type	GFSK
Antenna Type	Internal Antenna
Antenna Gain	-3.63 dBi
Extreme Temperature Range	-10℃~ +55℃
Test Voltage	DC 3.8V

1.4 Test Methodology

47 CFR Part 15, Subpart C (10-1-16 Edition)	Miscellaneous Wireless Communications Services
KDB Publication 558074 D01 v05r02	DTS Meas Guidance.
RSS-Gen (Issue 5, March 2019)	General Requirements for Compliance of Radio Apparatus
RSS-247	Digital Transmission Systems (DTSS), Frequency Hopping Systems

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(Issue 2, February 2017)	(FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

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2 Test Condition

2.1 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Due Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2020-07-28
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2020-06-24
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2020-06-19
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2020-06-19
V-network	SCHWARZBECK	NSLK 8127	8127-902	2020-02-20
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	100687	2020-08-22
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2020-06-06
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2020-06-06
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2021-03-19
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2020-07-26
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2020-06-26
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2020-08-28
Test Software	BL	BL410_E	N/A	N/A

2.3 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	30 MHz – 1 GHz	± 3 dB
	> 1GHz	± 3 dB

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3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software was control EUT work in continuous transmitter and receiver mode. Select test channel as below:

Channel	Frequency
The lowest channel(CH0)	2402MHz
The middle channel(CH19)	2440MHz
The Highest channel(CH39)	2480MHz

The basic operation modes are:

- A. On
 - 1. BLE mode
 - a. Transmitting
 - i. Low Channel
 - ii. Middle Channel
 - iii. High Channel
 - b. Receiving
 - 2. Normal working with Bluetooth on
- B. Standby
- C. Off

3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	TP00083A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	Broadcom	Bluetool

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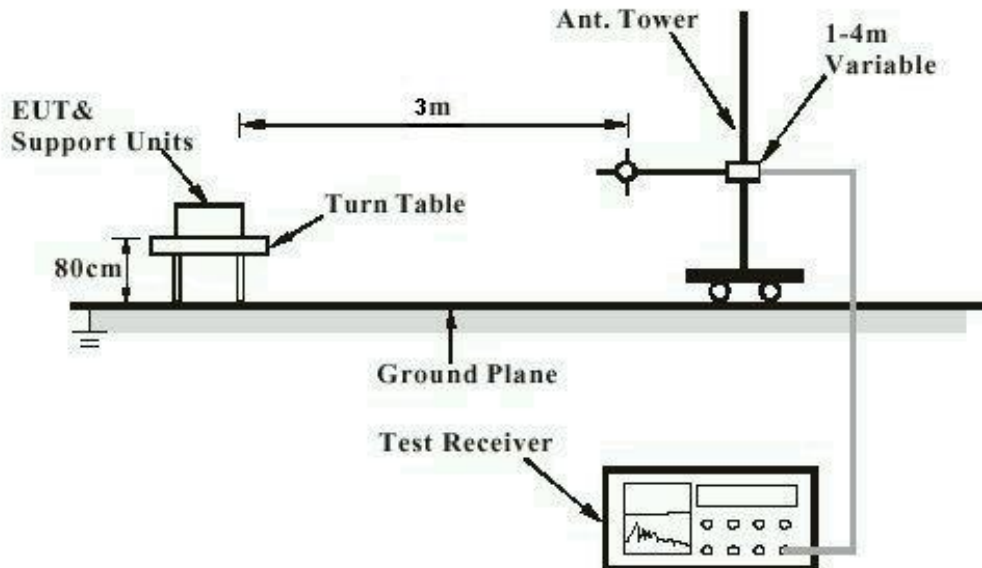
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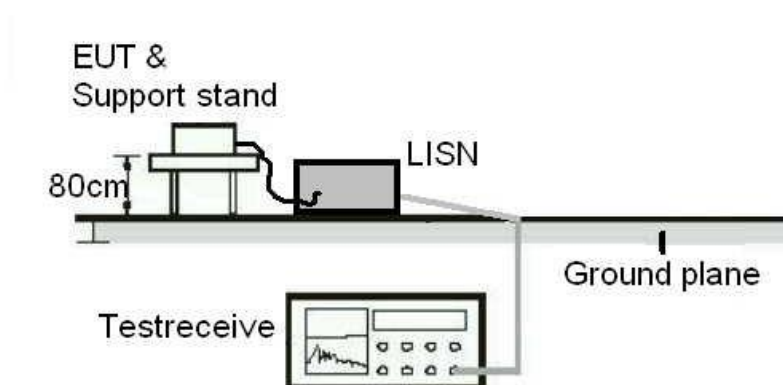
3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Conduction Measurement



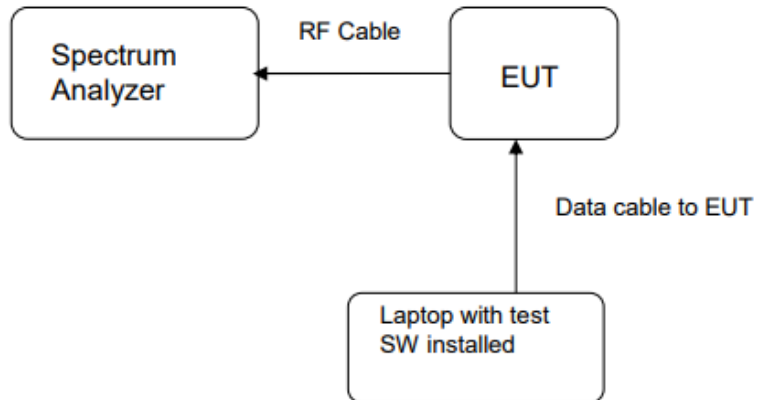
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Diagram of Measurement Equipment Configuration for Transmitter Measurement



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4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard	: FCC Part 15.247(b)(4), Part 15.203 RSS-247 5.4(6)
Requirement	: The use of approved antennas only with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of -3.63 dBi. The antenna is an internal antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

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4.1.2 Peak Output Power and E.I.R.P

RESULT:

PASS

Test standard : FCC Part 15.247(b)(3)
RSS-247 5.4(4)
Requirement : ANSI C63.10-2013, KDB 558074
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 1: Peak Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
BLE	2402	0.96	1.25	< 1
	2440	1.66	1.47	
	2480	1.42	1.39	

Table 2: E.I.R.P

Test Mode	Test Channel (MHz)	E.I.R.P		Limit (W)
		(dBm)	(mW)	
BLE	2402	-2.67	0.54	< 4
	2440	-1.97	0.64	
	2480	-2.21	0.60	

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Figure 1: Peak Output Power, 2402MHz

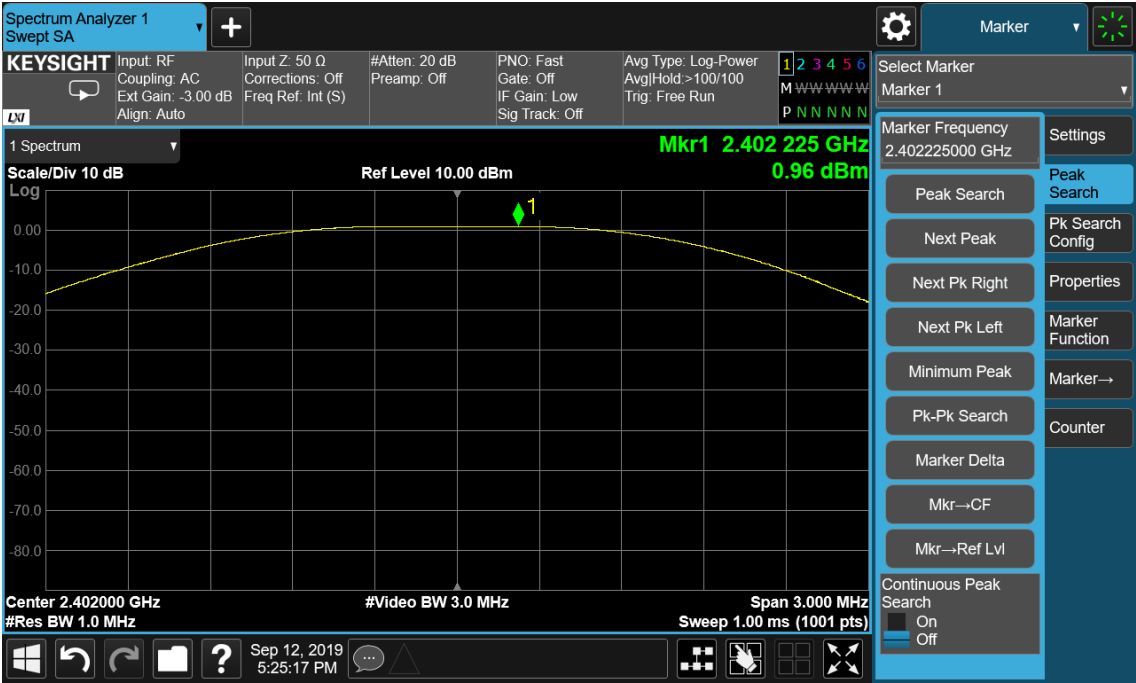
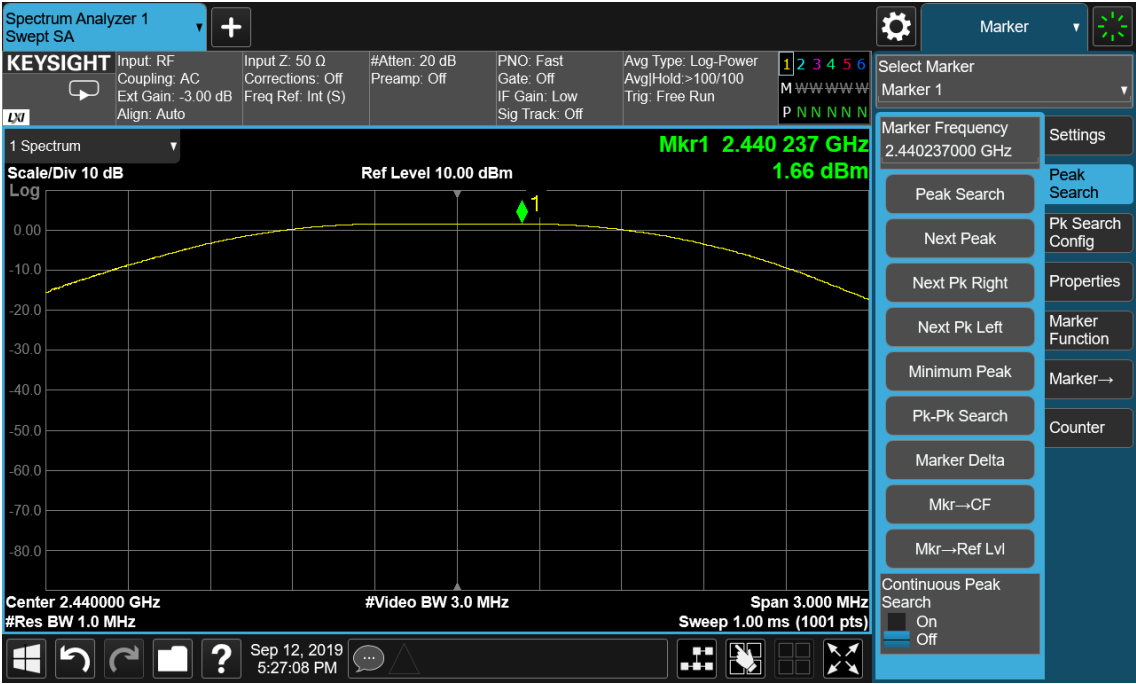


Figure 2: Peak Output Power, 2440MHz



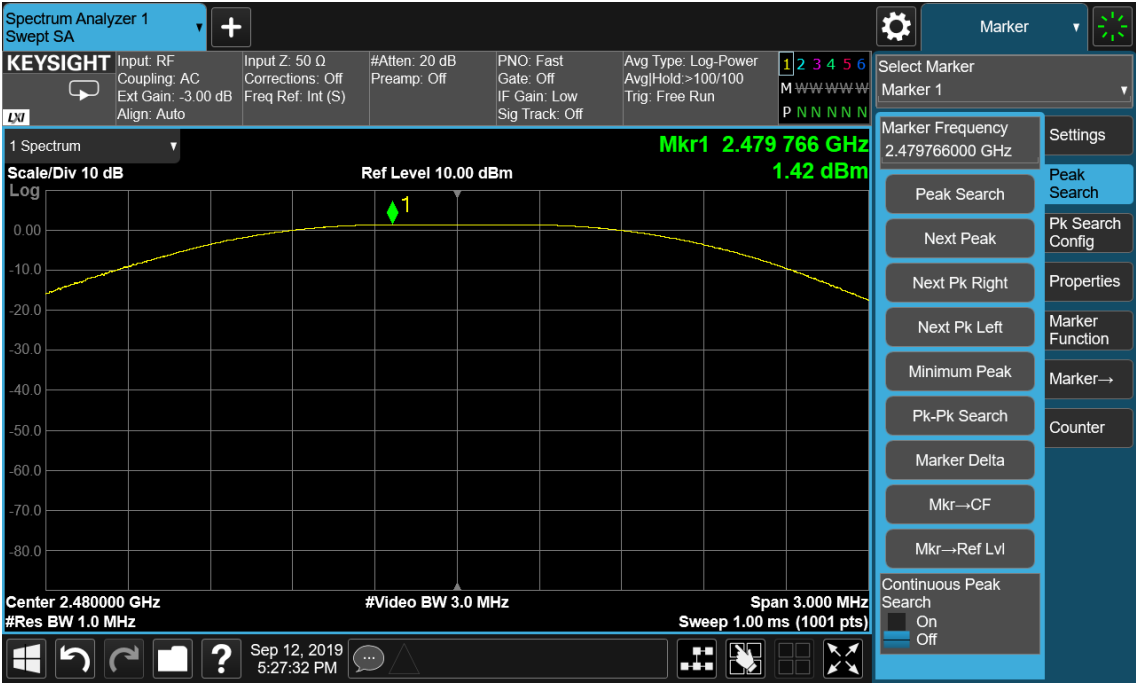
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Figure 3: Peak Output Power, 2480MHz



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4.1.3 6dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.247(a)(2)
RSS-247 5.2(1)
RSS-Gen 6.6
Requirement : ANSI C63.10-2013, KDB 558074
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 3: 6dB Bandwidth and 99% Bandwidth

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	6dB Bandwidth Limit
BLE	2402	518.5	1.1029	0.5 MHz
	2441	507.9	1,1024	
	2480	508.8	1.1023	

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Figure 4: 6dB Bandwidth and 99% Bandwidth, 2402MHz



Figure 5: 6dB Bandwidth and 99% Bandwidth, 2440MHz



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Figure 6: 6dB Bandwidth and 99% Bandwidth, 2480MHz



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4.1.4 Power Spectral Density

RESULT:

PASS

Test standard : FCC Part 15.247(e)
RSS-247 5.2(2)
Requirement : ANSI C63.10-2013, KDB 558074
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 4: Power Spectral Density

Test Mode	Test Channel (MHz)	Measured Result (dBm/3kHz)	Limit (dBm/3kHz)
BLE	2402	-15.79	8
	2441	-15.18	
	2480	-15.02	

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Figure 7: Power Spectral Density, 2402MHz

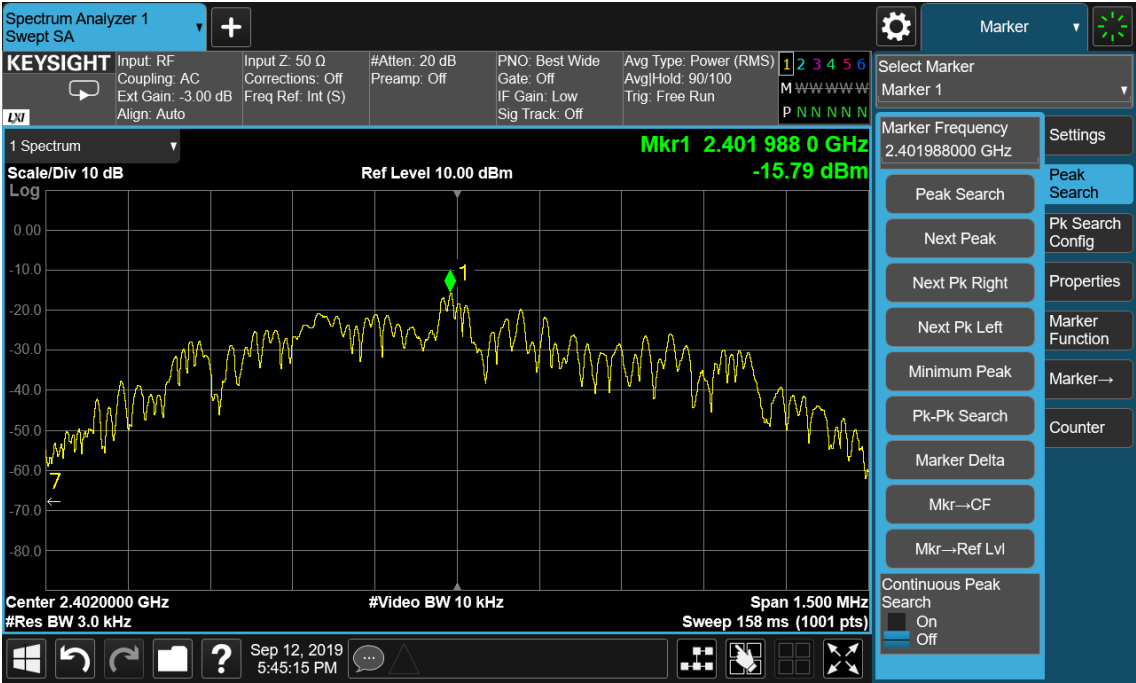


Figure 8: Power Spectral Density, 2440MHz



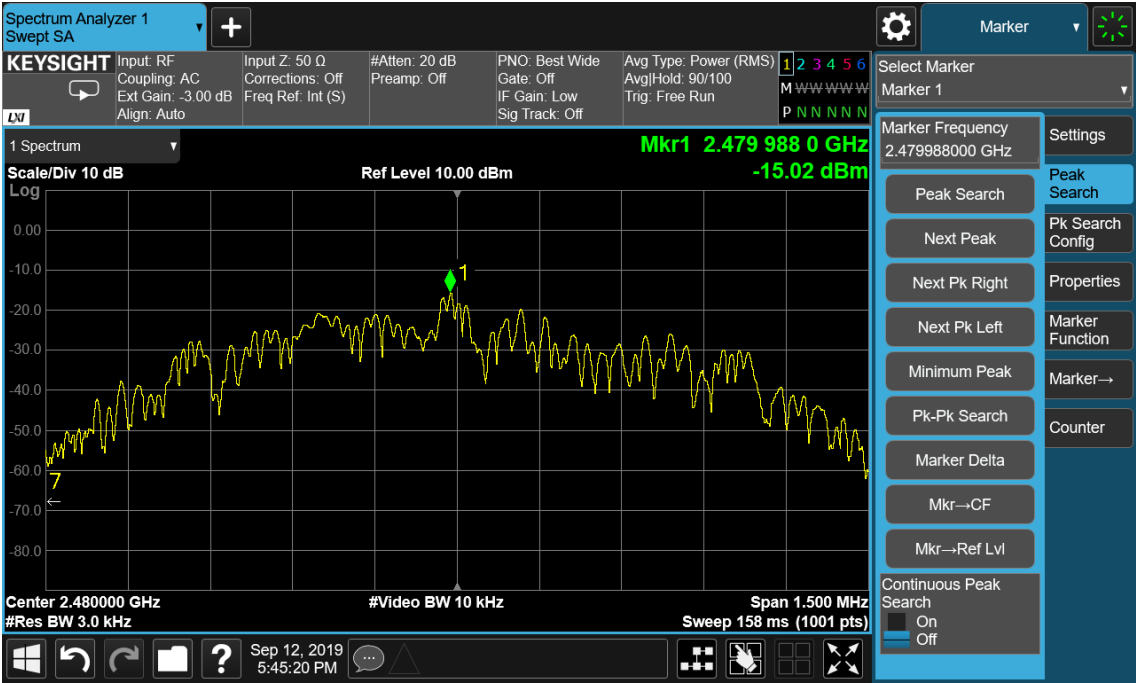
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Figure 9: Power Spectral Density, 2480MHz



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4.1.5 Conducted Spurious Emission & Authorized-band band-edge

RESULT:

PASS

Test standard	: FCC Part 15.247(d) RSS-247 5.5
Requirement	: ANSI C63.10-2013, KDB 558074
Kind of test site	: Shielded room

Test setup

Test Channel	: Low/Middle/High for spurious, Low/High for Band Edge
Operation Mode	: A.1.a
Ambient temperature	: 25°C
Relative humidity	: 52%

For details refer to following test plot.

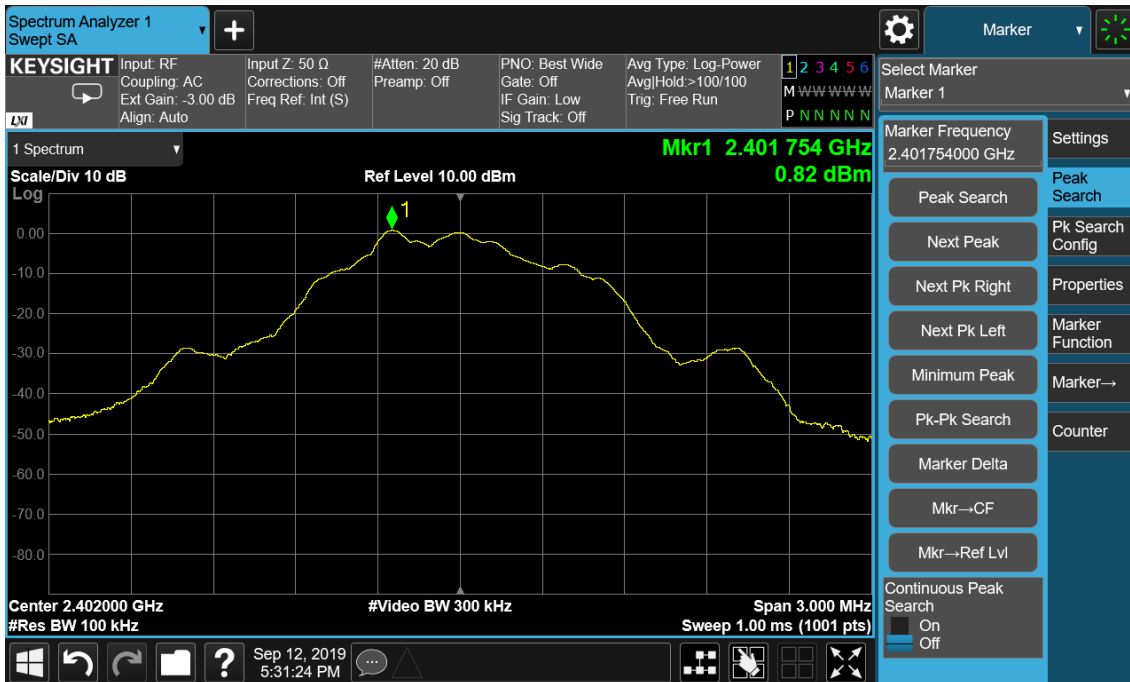
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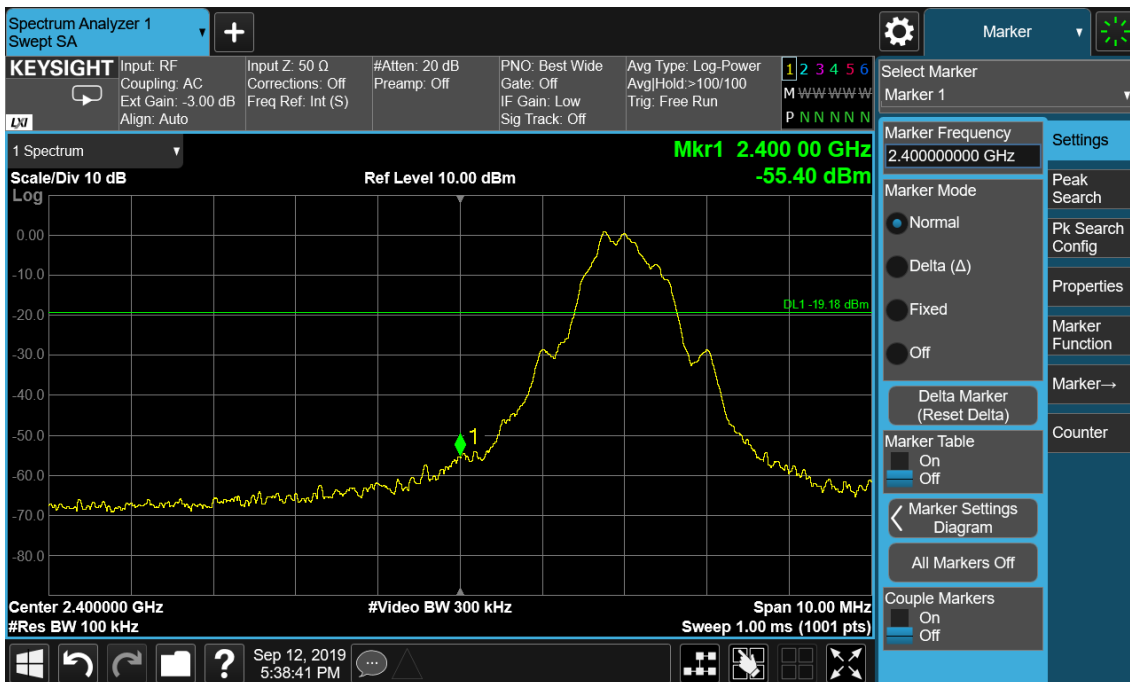
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Figure 10: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, BLE Carrier Level



Band Edge

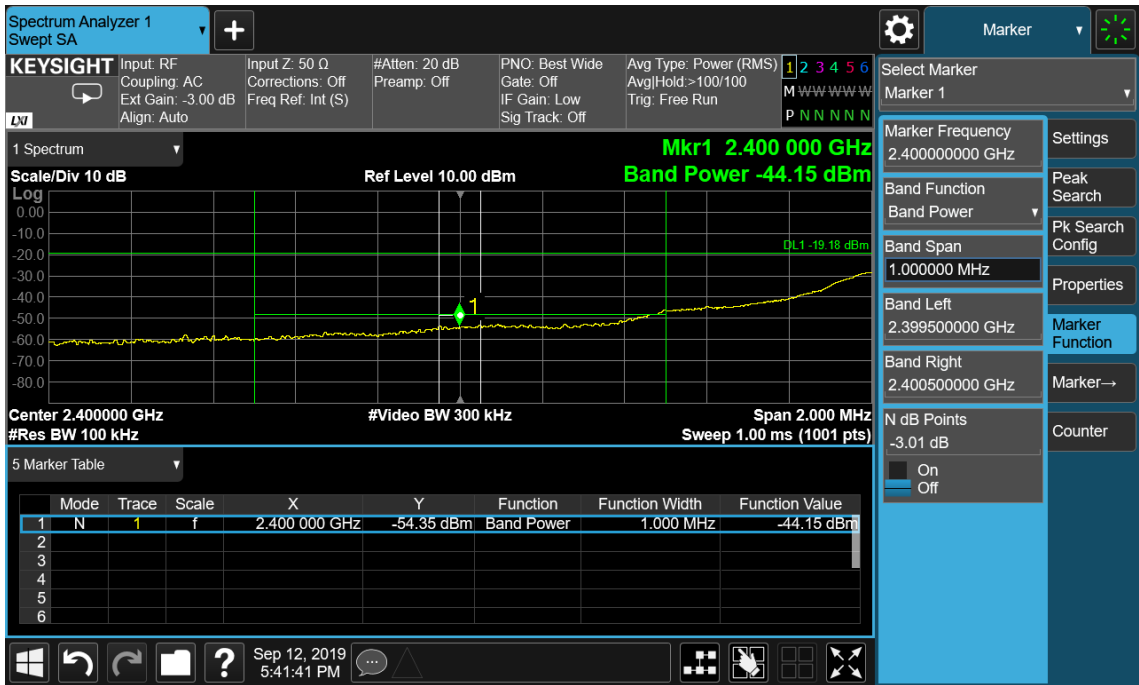


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Conducted spurious emissions 30MHz-25GHz



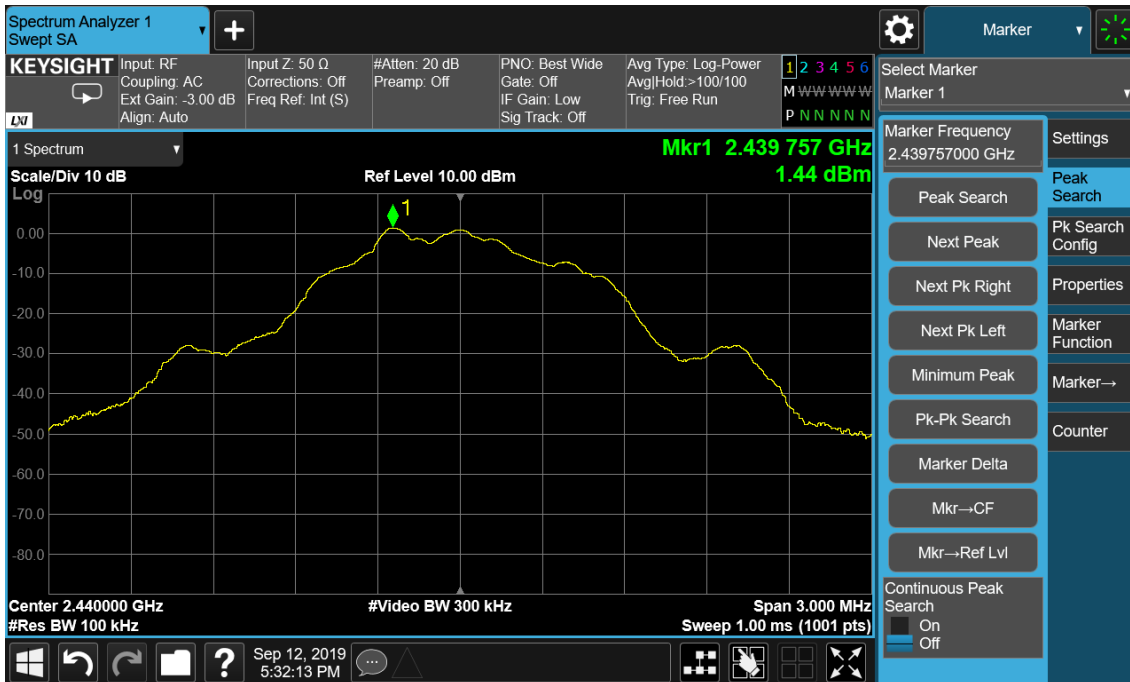
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Figure 11: Conducted Spurious Emission & Authorized-band band-edge, 2440MHz, BLE Carrier Level



Conducted spurious emissions 30MHz-25GHz



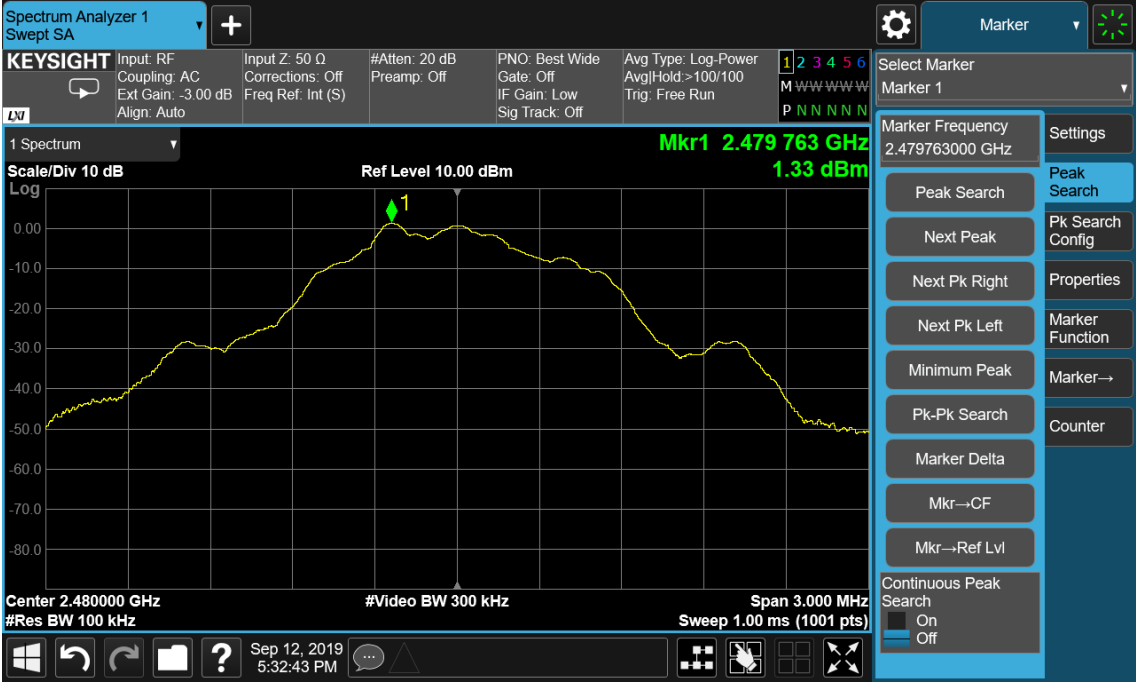
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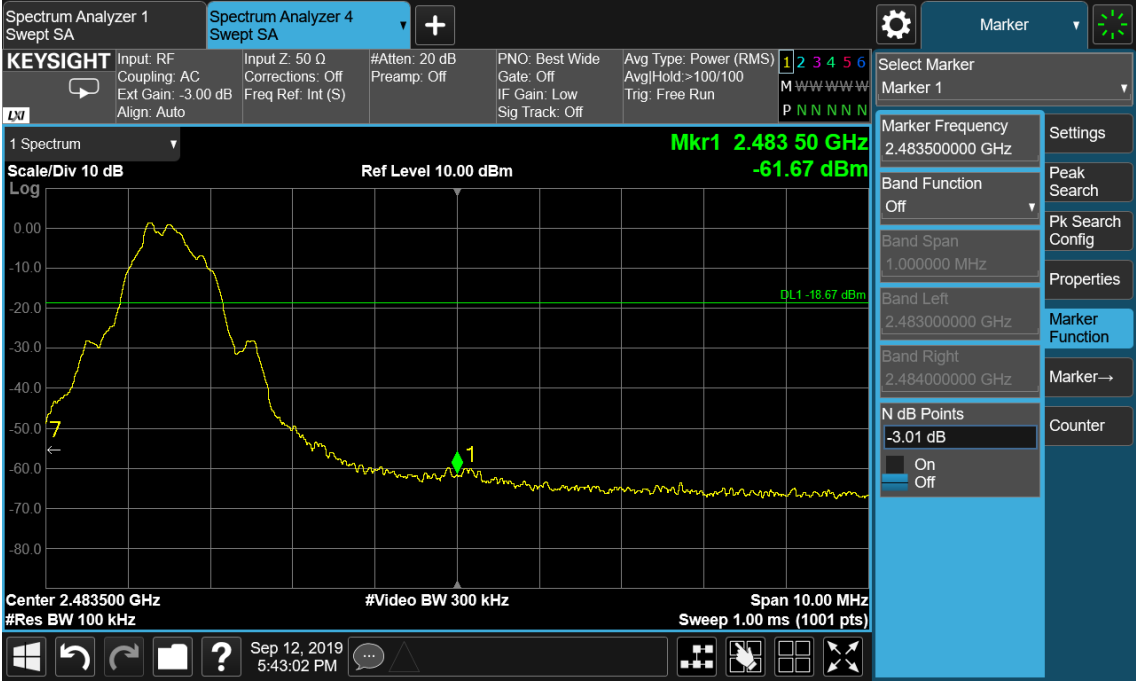
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Figure 12: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, BLE Carrier Level



Band Edge

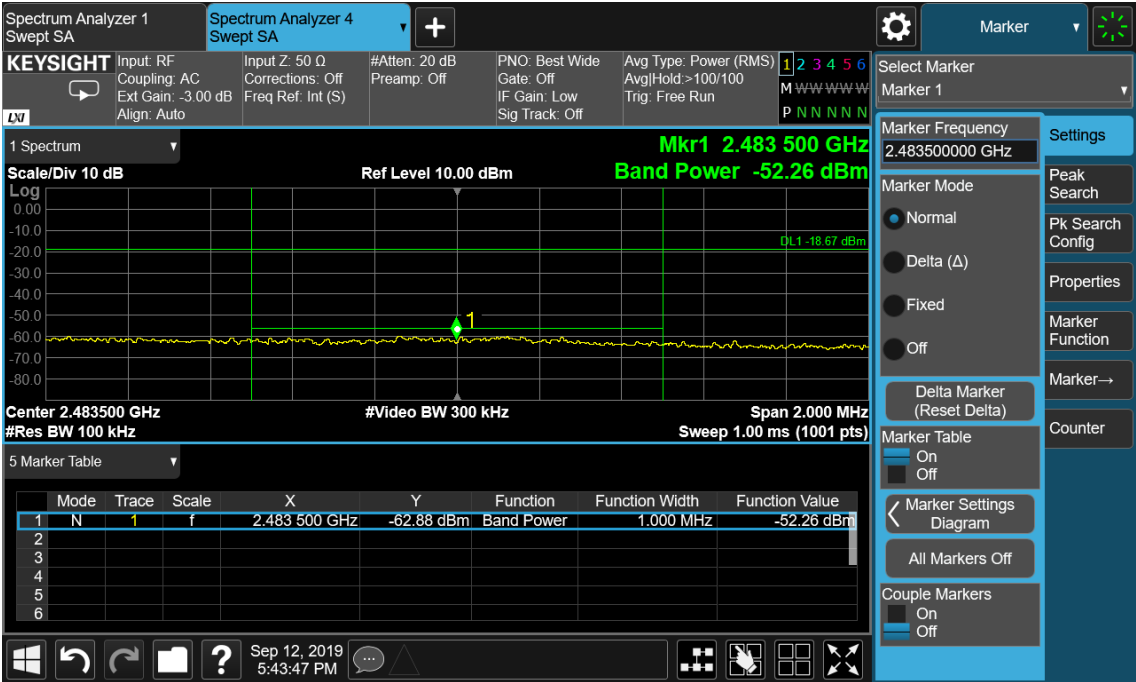


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Conducted spurious emissions 30MHz-25GHz



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4.1.6 Spurious Emission

RESULT:

PASS

Test standard	: FCC Part 15.247(d), 15.205, 15.209 RSS-247 5.5
Requirement	: ANSI C63.10-2013, KDB 558074
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A
Ambient temperature	: 25°C
Relative humidity	: 52%

For details refer to following test plot.

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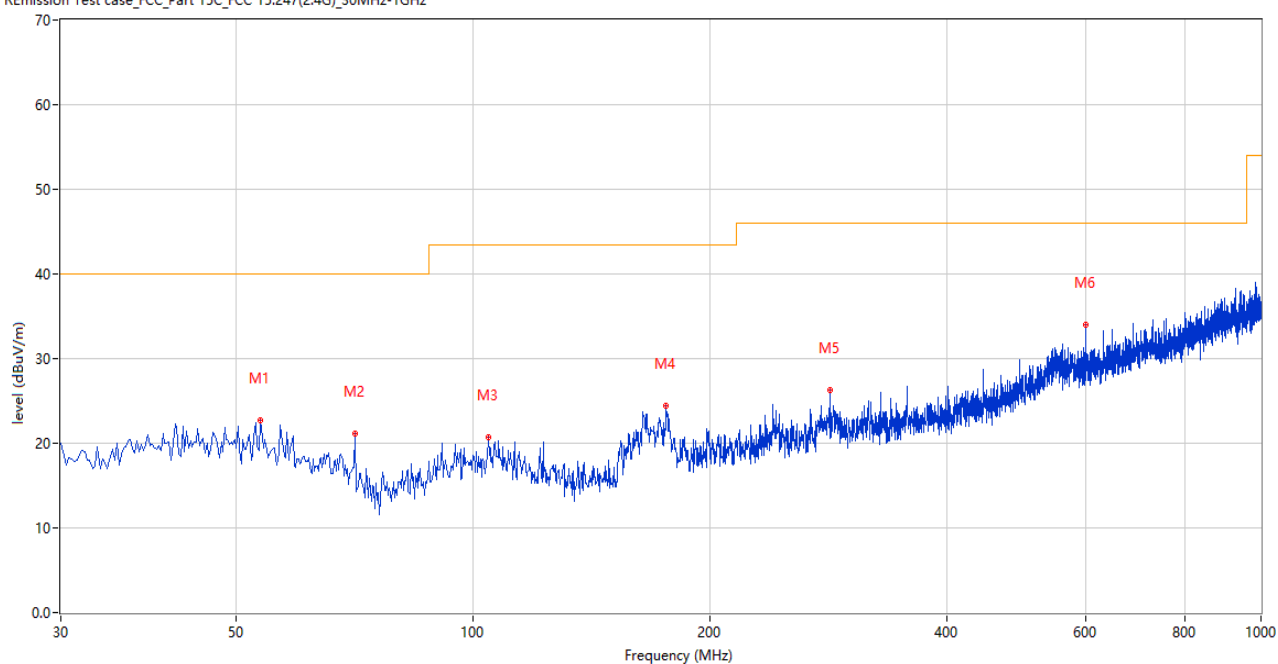
Notes:

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. The EUT is working in the Normal link mode below 1 GHz.

Figure 13: Spurious Emission, 30MHz – 1GHz, Normal Link Mode

30MHz-1GHz, Horizontal

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_30MHz-1GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
53.759	22.66	--	--	-25.88	--	40.0	--	-17.34	1.00	100	Horizontal	Pass
70.972	21.08	--	--	-30.42	--	40.0	--	-18.92	3.00	100	Horizontal	Pass
104.671	20.67	--	--	-27.77	--	43.5	--	-22.83	1.00	100	Horizontal	Pass
175.706	24.44	--	--	-29.86	--	43.5	--	-19.06	15.00	100	Horizontal	Pass
284.319	26.30	--	--	-25.80	--	46.0	--	-19.70	0.00	100	Horizontal	Pass
599.733	34.03	--	--	-18.01	--	46.0	--	-11.97	12.00	100	Horizontal	Pass

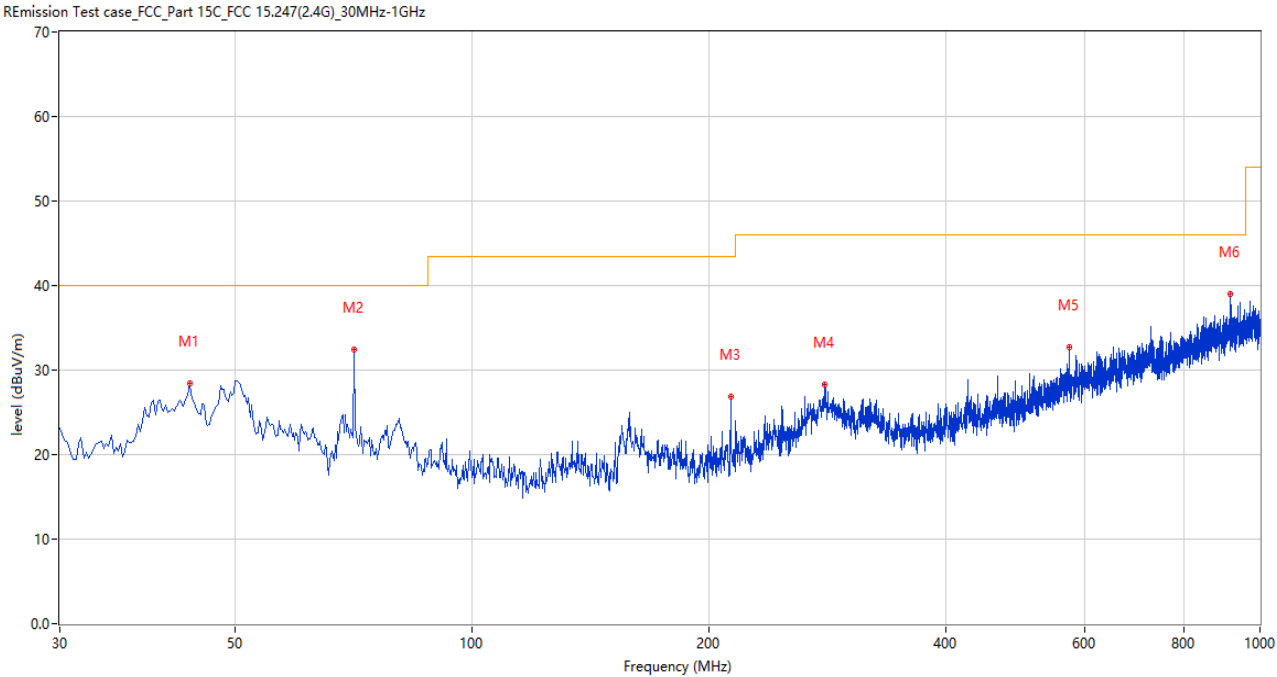
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30MHz-1GHz, Vertical



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
43.819	28.41	--	--	-25.60	--	40.0	--	-11.59	4.00	100	Vertical	Pass
70.972	32.44	--	--	-30.42	--	40.0	--	-7.56	7.00	100	Vertical	Pass
213.284	26.81	--	--	-27.48	--	43.5	--	-16.69	1.00	100	Vertical	Pass
280.197	28.27	--	--	-25.81	--	46.0	--	-17.73	1.00	100	Vertical	Pass
572.094	32.67	--	--	-18.99	--	46.0	--	-13.33	11.00	100	Vertical	Pass
917.571	39.00	--	--	-12.30	--	46.0	--	-7.00	14.00	100	Vertical	Pass

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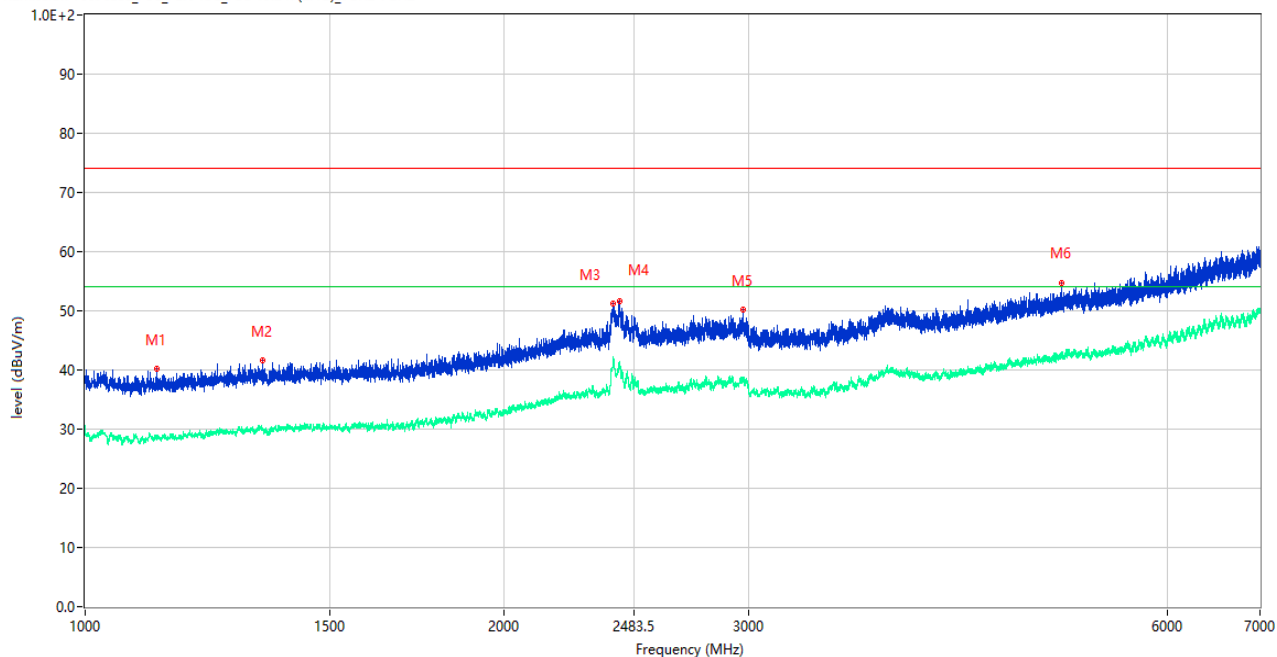
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Figure 14: Spurious Emission, 1GHz – 10th Harmonic, 2402MHz, GFSK
1GHz-7GHz, Horizontal

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_1GHz-7GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
1125.734	40.29	--	28.36	-10.62	74.0	--	54.0	-25.64	0.00	100	Horizontal	Pass
1341.207	41.65	--	29.95	-10.08	74.0	--	54.0	-24.05	0.00	100	Horizontal	Pass
2396.825	51.15	--	41.87	2.20	74.0	--	54.0	-12.13	2.00	100	Horizontal	Pass
2424.322	51.59	--	41.18	1.22	74.0	--	54.0	-12.82	14.00	100	Horizontal	Pass
2974.503	50.19	--	38.36	-0.32	74.0	--	54.0	-15.64	12.00	100	Horizontal	Pass
5038.995	54.73	--	42.82	4.08	74.0	--	54.0	-11.18	13.00	100	Horizontal	Pass

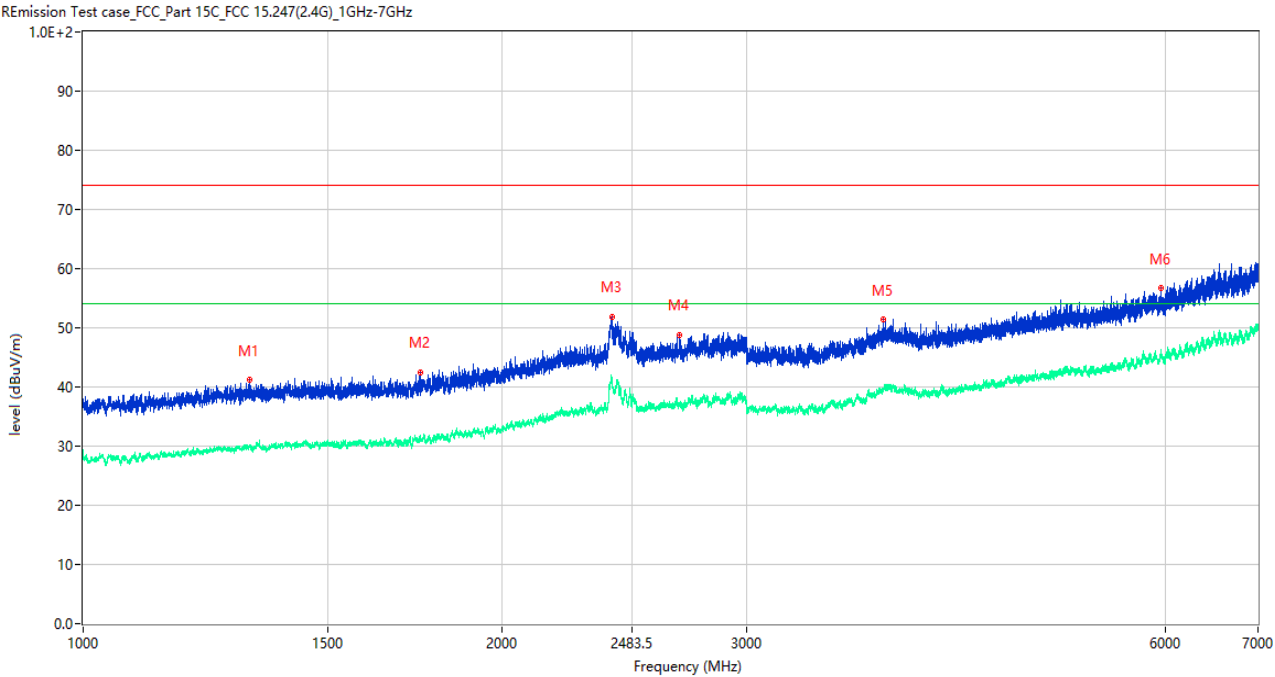
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1GHz-7GHz, Vertical



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
1317.710	41.18	--	30.10	-9.87	74.0	--	54.0	-23.90	0.00	100	Vertical	Pass
1746.907	42.51	--	31.73	-9.19	74.0	--	54.0	-22.27	1.00	100	Vertical	Pass
2400.075	51.84	--	41.46	2.08	74.0	--	54.0	-12.54	9.00	100	Vertical	Pass
2685.289	48.84	--	37.05	-2.13	74.0	--	54.0	-16.95	0.00	100	Vertical	Pass
3766.029	51.35	--	39.72	0.79	74.0	--	54.0	-14.28	0.00	100	Vertical	Pass
5958.380	56.71	--	45.35	7.99	74.0	--	54.0	-8.65	0.00	100	Vertical	Pass

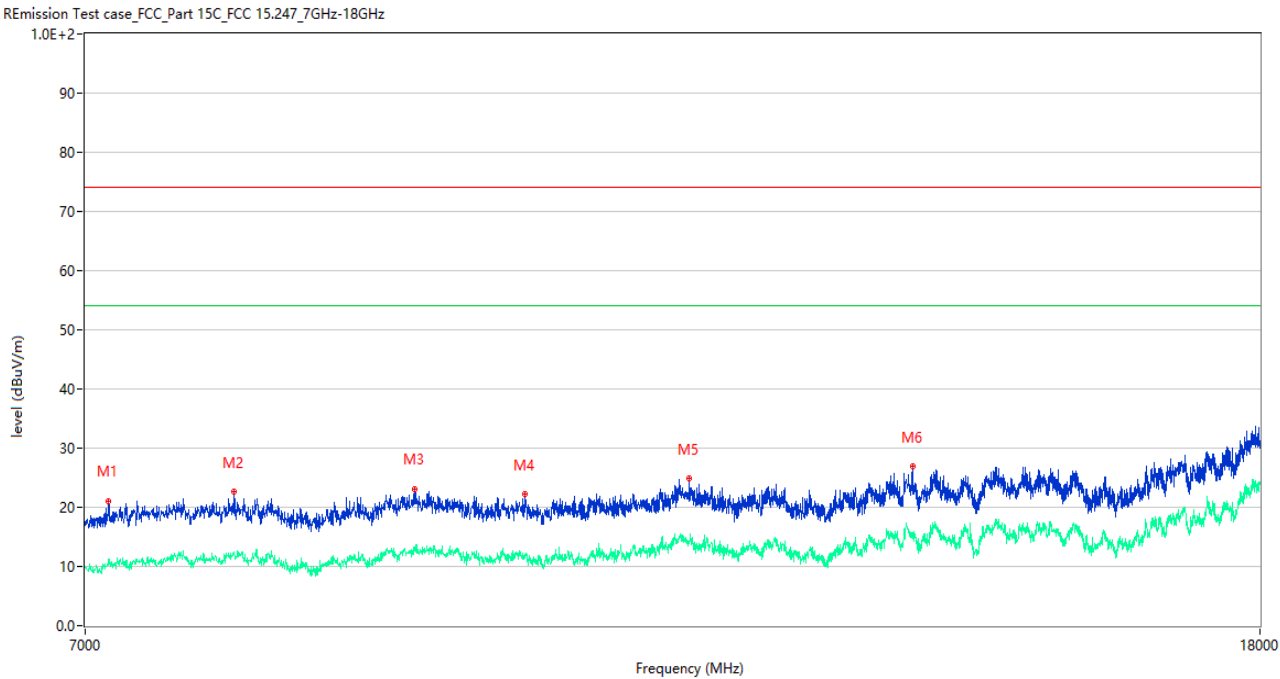
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7GHz-18GHz, Horizontal



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
7131.967	21.12	--	11.27	-26.34	74.0	--	54.0	-42.73	11.00	100	Horizontal	Pass
7890.777	22.60	--	12.18	-26.33	74.0	--	54.0	-41.82	6.00	100	Horizontal	Pass
9125.219	23.11	--	12.83	-24.99	74.0	--	54.0	-41.17	2.00	100	Horizontal	Pass
9969.258	22.20	--	11.46	-23.58	74.0	--	54.0	-42.54	2.00	100	Horizontal	Pass
11379.655	24.85	--	13.99	-19.17	74.0	--	54.0	-40.01	8.00	100	Horizontal	Pass
13612.097	26.89	--	15.63	-15.95	74.0	--	54.0	-38.37	4.00	100	Horizontal	Pass

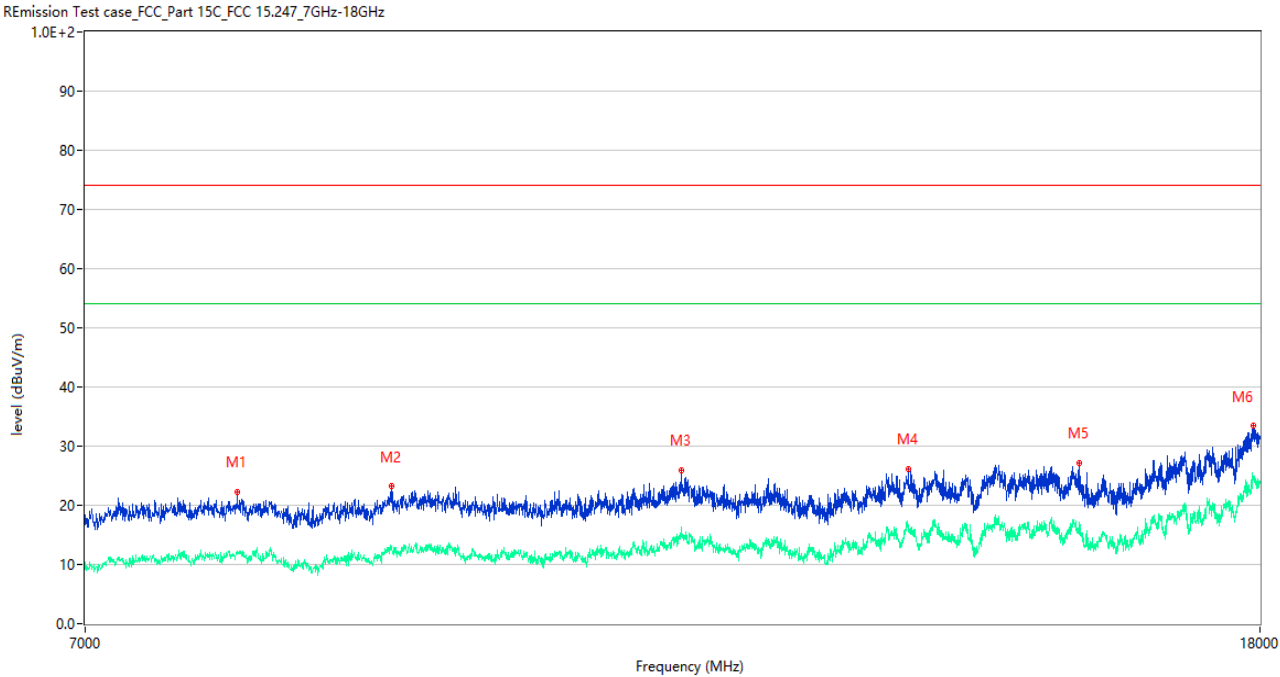
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7GHz-18GHz, Vertical



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
7910.022	22.30	--	12.22	-26.15	74.0	--	54.0	-41.78	0.00	100	Vertical	Pass
8957.511	23.19	--	12.63	-24.81	74.0	--	54.0	-41.37	0.00	100	Vertical	Pass
11299.925	25.97	--	16.33	-19.28	74.0	--	54.0	-37.67	8.00	100	Vertical	Pass
13568.108	26.18	--	16.37	-16.11	74.0	--	54.0	-37.63	9.00	100	Vertical	Pass
15569.608	27.16	--	17.16	-17.39	74.0	--	54.0	-36.84	5.00	100	Vertical	Pass
17912.022	33.54	--	24.98	-6.16	74.0	--	54.0	-29.02	15.00	100	Vertical	Pass

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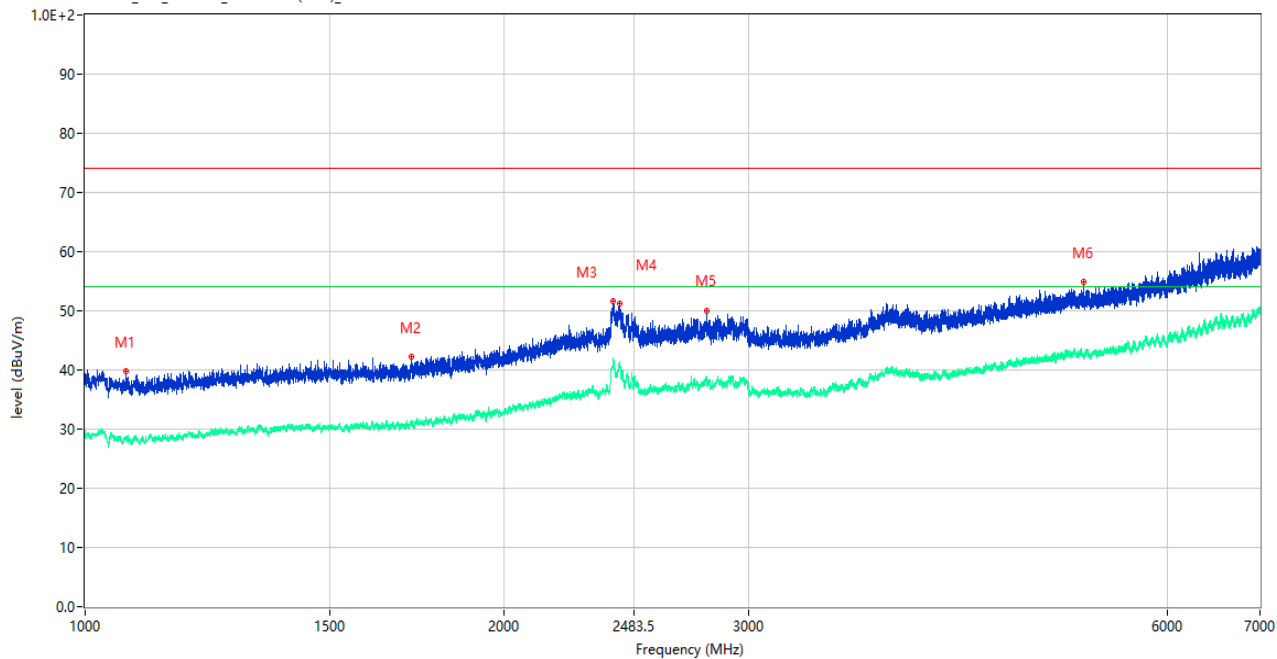
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Figure 15: Spurious Emission, 1GHz – 10th Harmonic, 2440MHz, GFSK
1GHz-7GHz, Horizontal

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_1GHz-7GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
1069.491	39.76	--	28.51	-10.21	74.0	--	54.0	-25.49	0.00	100	Horizontal	Pass
1716.660	42.16	--	31.22	-9.03	74.0	--	54.0	-22.78	13.00	100	Horizontal	Pass
2398.575	51.69	--	41.59	2.14	74.0	--	54.0	-12.41	9.00	100	Horizontal	Pass
2422.572	51.16	--	40.96	1.28	74.0	--	54.0	-13.04	9.00	100	Horizontal	Pass
2798.025	50.08	--	38.90	0.10	74.0	--	54.0	-15.10	12.00	100	Horizontal	Pass
5222.347	54.80	--	42.63	4.19	74.0	--	54.0	-11.37	2.00	100	Horizontal	Pass

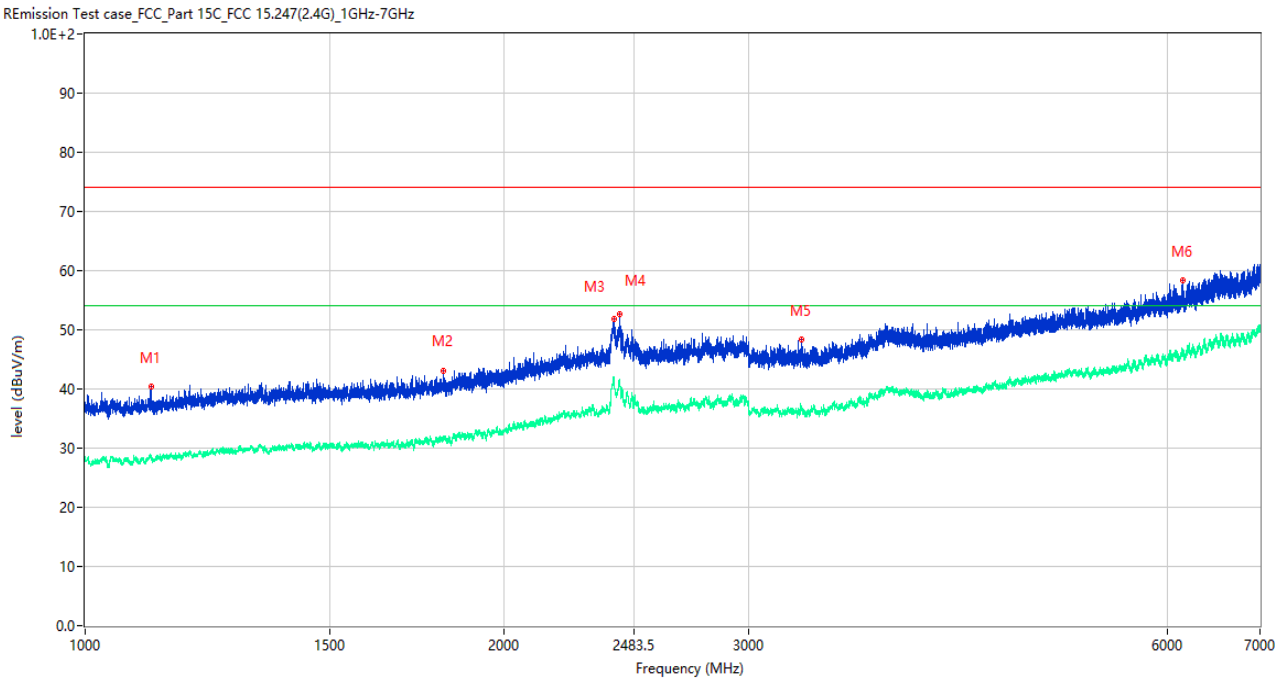
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1GHz-7GHz, Vertical



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
1116.485	40.32	--	28.12	-10.46	74.0	--	54.0	-25.88	10.00	100	Vertical	Pass
1808.899	42.99	--	31.68	-8.65	74.0	--	54.0	-22.32	13.00	100	Vertical	Pass
2399.825	51.90	--	41.72	2.09	74.0	--	54.0	-12.28	5.00	100	Vertical	Pass
2422.822	52.71	--	41.14	1.27	74.0	--	54.0	-12.86	0.00	100	Vertical	Pass
3278.590	48.33	--	36.67	-2.15	74.0	--	54.0	-17.33	13.00	100	Vertical	Pass
6157.105	58.36	--	46.32	9.01	74.0	--	54.0	-7.68	15.00	100	Vertical	Pass

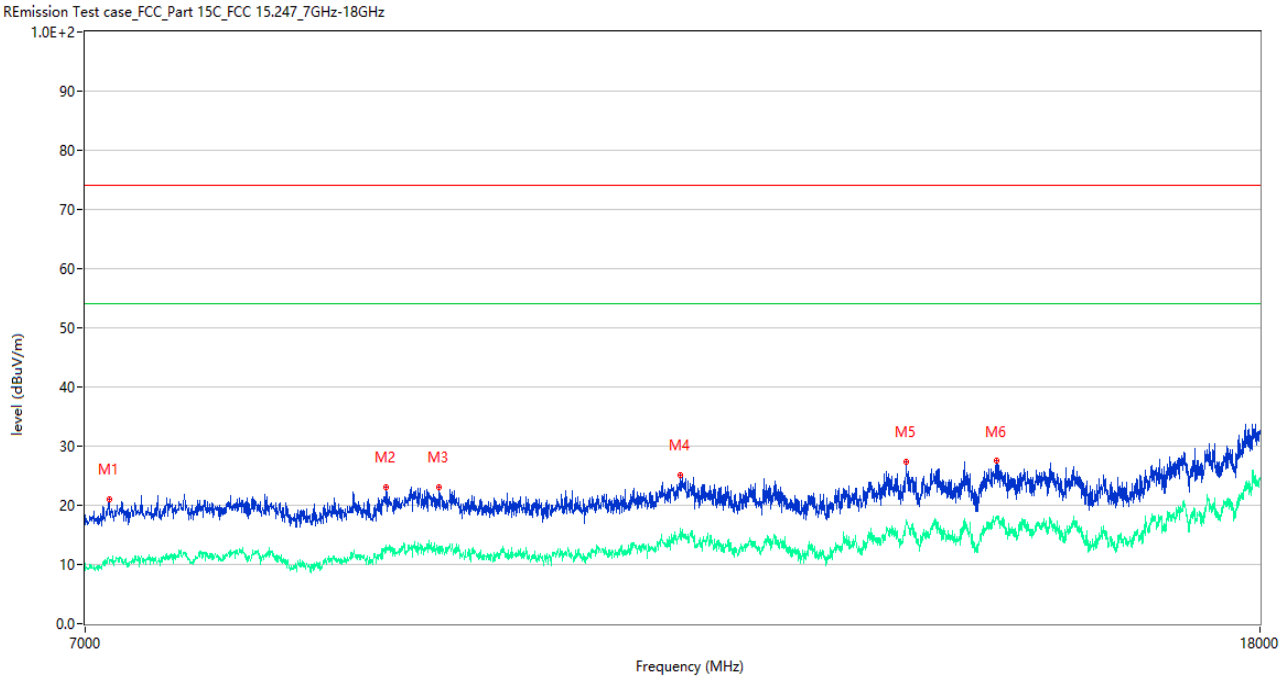
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7GHz-18GHz, Horizontal



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
7134.716	21.07	--	10.41	-26.41	74.0	--	54.0	-43.59	1.00	100	Horizontal	Pass
8919.020	23.09	--	13.15	-24.63	74.0	--	54.0	-40.85	12.00	100	Horizontal	Pass
9306.673	23.09	--	12.99	-24.91	74.0	--	54.0	-41.01	0.00	100	Horizontal	Pass
11297.176	25.18	--	16.17	-19.35	74.0	--	54.0	-37.83	13.00	100	Horizontal	Pass
13543.364	27.37	--	17.21	-16.19	74.0	--	54.0	-36.79	14.00	100	Horizontal	Pass
14560.610	27.45	--	18.22	-13.83	74.0	--	54.0	-35.78	9.00	100	Horizontal	Pass

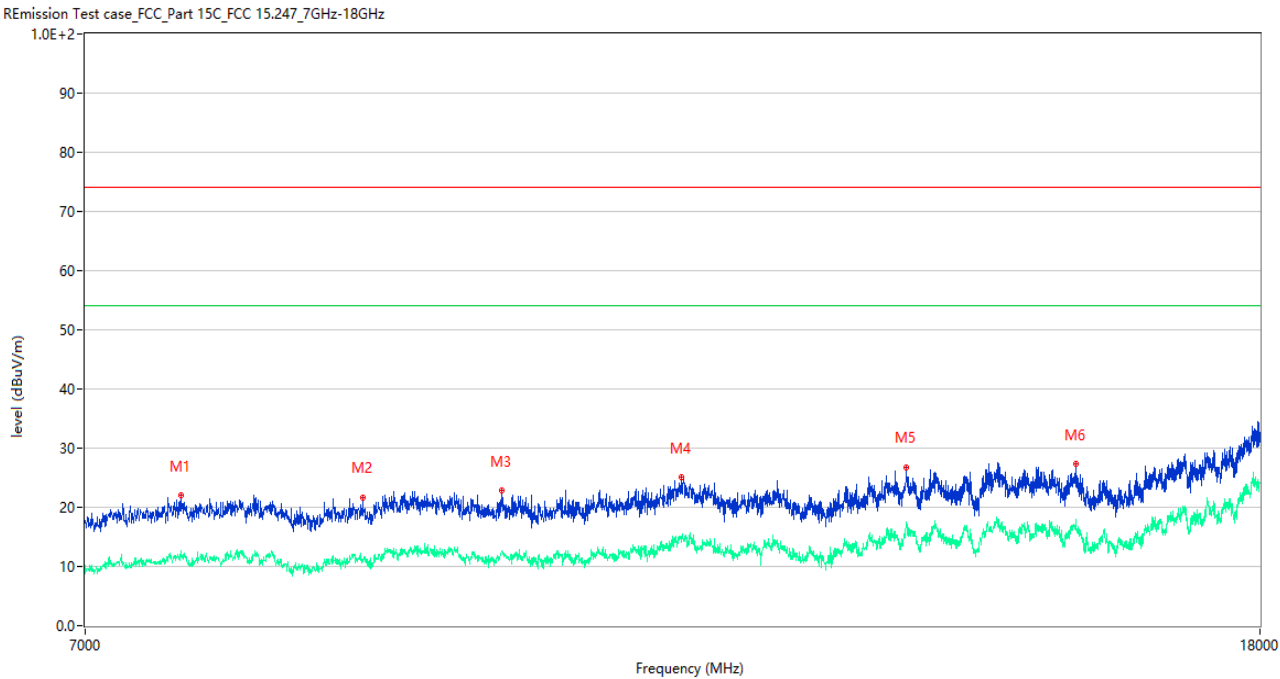
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7GHz-18GHz, Vertical



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
7558.110	21.95	--	12.43	-25.85	74.0	--	54.0	-41.57	15.00	100	Vertical	Pass
8751.312	21.64	--	10.81	-25.81	74.0	--	54.0	-43.19	0.00	100	Vertical	Pass
9787.803	22.83	--	12.75	-23.70	74.0	--	54.0	-41.25	2.00	100	Vertical	Pass
11302.674	25.07	--	15.04	-19.16	74.0	--	54.0	-38.96	0.00	100	Vertical	Pass
13548.863	26.75	--	16.73	-16.19	74.0	--	54.0	-37.27	4.00	100	Vertical	Pass
15522.869	27.26	--	17.91	-17.64	74.0	--	54.0	-36.09	4.00	100	Vertical	Pass

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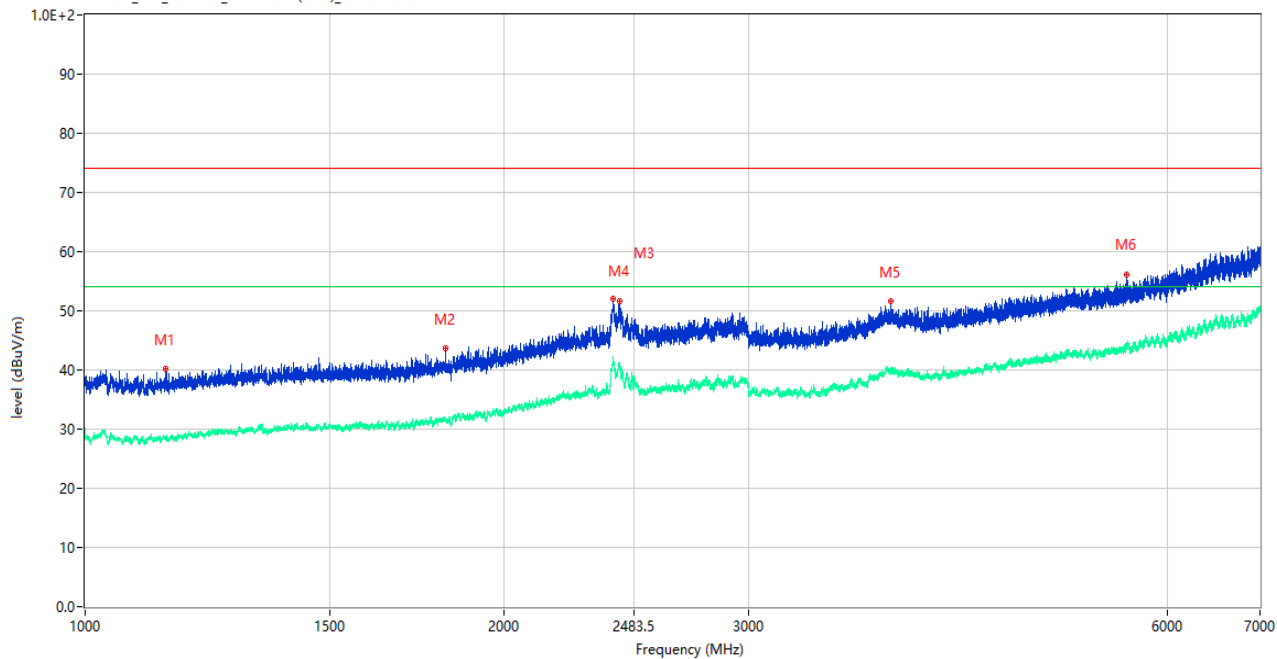
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Figure 16: Spurious Emission, 1GHz – 10th Harmonic, 2480MHz, GFSK
1GHz-7GHz, Horizontal

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_1GHz-7GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
1142.982	40.16	--	28.57	-10.40	74.0	--	54.0	-25.43	0.00	100	Horizontal	Pass
1815.898	43.61	--	31.71	-8.44	74.0	--	54.0	-22.29	15.00	100	Horizontal	Pass
2398.325	52.08	--	42.18	2.15	74.0	--	54.0	-11.82	12.00	100	Horizontal	Pass
2422.822	51.72	--	40.79	1.27	74.0	--	54.0	-13.21	7.00	100	Horizontal	Pass
3797.900	51.56	--	40.49	0.80	74.0	--	54.0	-13.51	12.00	100	Horizontal	Pass
5617.548	56.16	--	44.33	6.48	74.0	--	54.0	-9.67	11.00	100	Horizontal	Pass

TEST REPORT

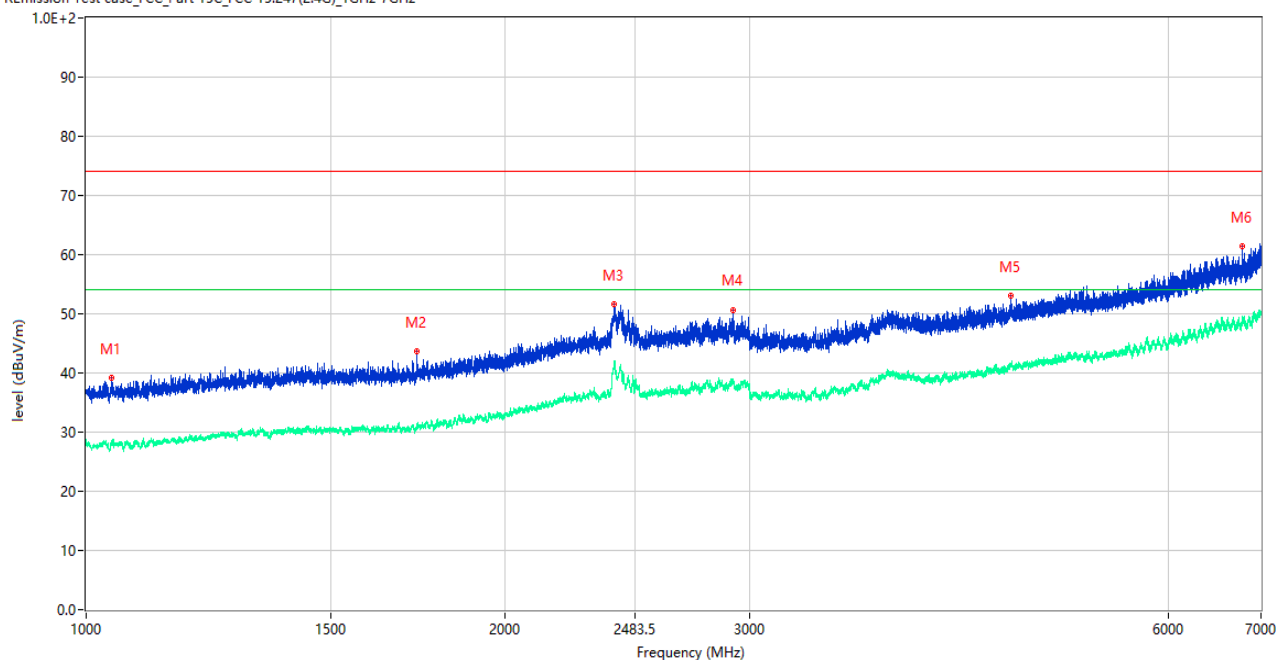
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1GHz-7GHz, Vertical

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_1GHz-7GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
1043.745	39.12	--	28.48	-9.61	74.0	--	54.0	-25.52	1.00	100	Vertical	Pass
1728.159	43.65	--	30.91	-9.12	74.0	--	54.0	-23.09	9.00	100	Vertical	Pass
2397.575	51.62	--	41.84	2.18	74.0	--	54.0	-12.16	12.00	100	Vertical	Pass
2922.260	50.66	--	38.99	-0.14	74.0	--	54.0	-15.01	5.00	100	Vertical	Pass
4622.047	52.98	--	41.05	3.07	74.0	--	54.0	-12.95	3.00	100	Vertical	Pass
6786.777	61.42	--	48.82	12.29	74.0	--	54.0	-5.18	0.00	100	Vertical	Pass

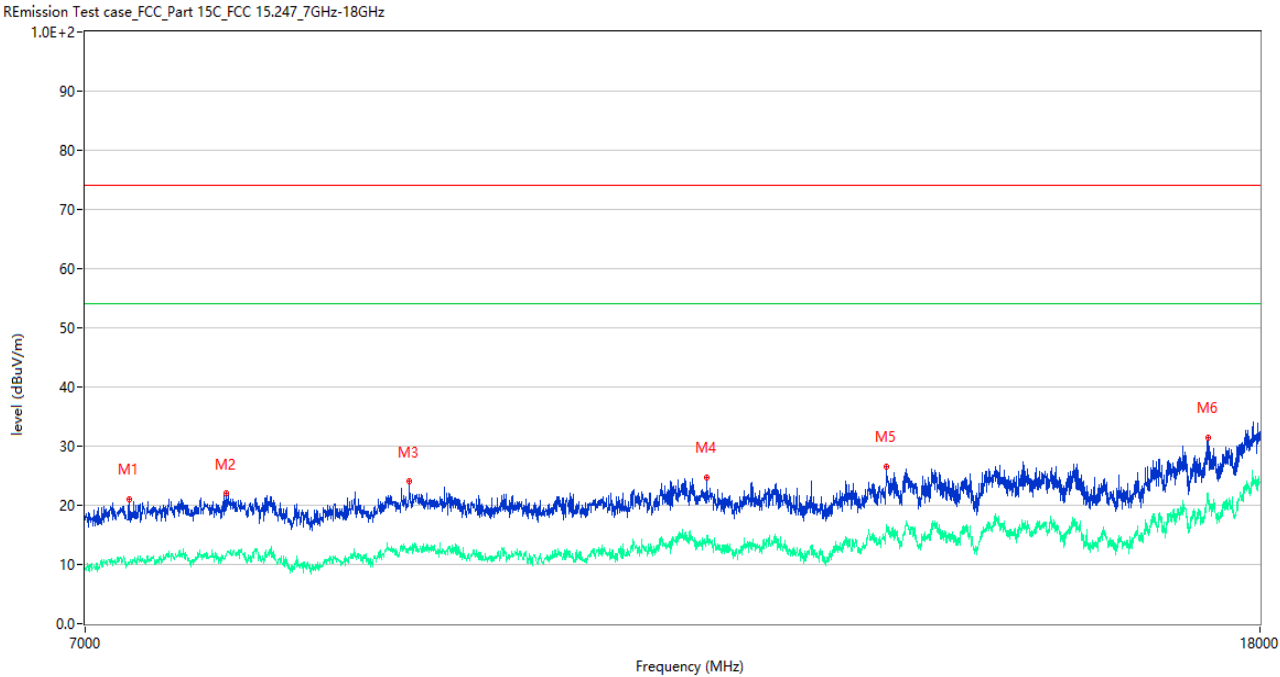
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7GHz-18GHz, Horizontal



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
7228.193	17.71	--	10.13	-27.05	74.0	--	54.0	-43.87	11.00	100	Horizontal	Pass
7838.540	21.96	--	11.81	-26.71	74.0	--	54.0	-42.19	1.00	100	Horizontal	Pass
9086.728	24.06	--	12.79	-25.03	74.0	--	54.0	-41.21	12.00	100	Horizontal	Pass
11539.115	24.76	--	15.00	-18.79	74.0	--	54.0	-39.00	8.00	100	Horizontal	Pass
13331.667	26.61	--	16.67	-17.17	74.0	--	54.0	-37.33	14.00	100	Horizontal	Pass
17268.683	31.48	--	22.10	-9.08	74.0	--	54.0	-31.90	5.00	100	Horizontal	Pass

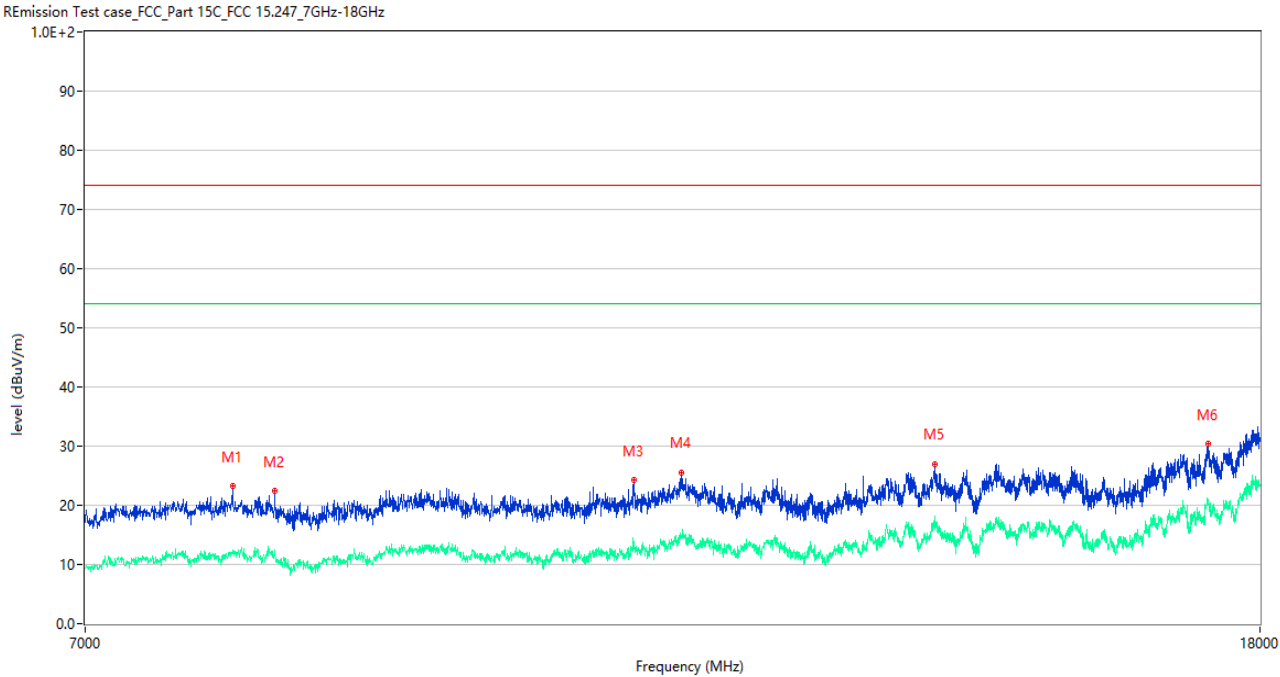
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7GHz-18GHz, Vertical



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	Table (o)	Height (cm)	ANT	Verdict
7879.780	23.17	--	12.48	-26.62	74.0	--	54.0	-41.52	11.00	100	Vertical	Pass
8151.962	22.38	--	12.36	-25.97	74.0	--	54.0	-41.64	1.00	100	Vertical	Pass
10884.779	24.24	--	13.27	-19.82	74.0	--	54.0	-40.73	13.00	100	Vertical	Pass
11299.925	25.59	--	14.98	-19.28	74.0	--	54.0	-39.02	8.00	100	Vertical	Pass
13862.284	27.04	--	16.72	-14.83	74.0	--	54.0	-37.28	9.00	100	Vertical	Pass
17265.934	30.34	--	20.76	-9.18	74.0	--	54.0	-33.24	10.00	100	Vertical	Pass

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4.1.7 Band Edge (Restricted-band band-edge)

RESULT:

PASS

Test standard	: FCC Part 15.247(d), 15.205, 15.209 RSS-247 5.5
Requirement	: ANSI C63.10-2013, KDB 558074
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A.1
Ambient temperature	: 25°C
Relative humidity	: 52%

For details refer to following test plot.

TEST REPORT

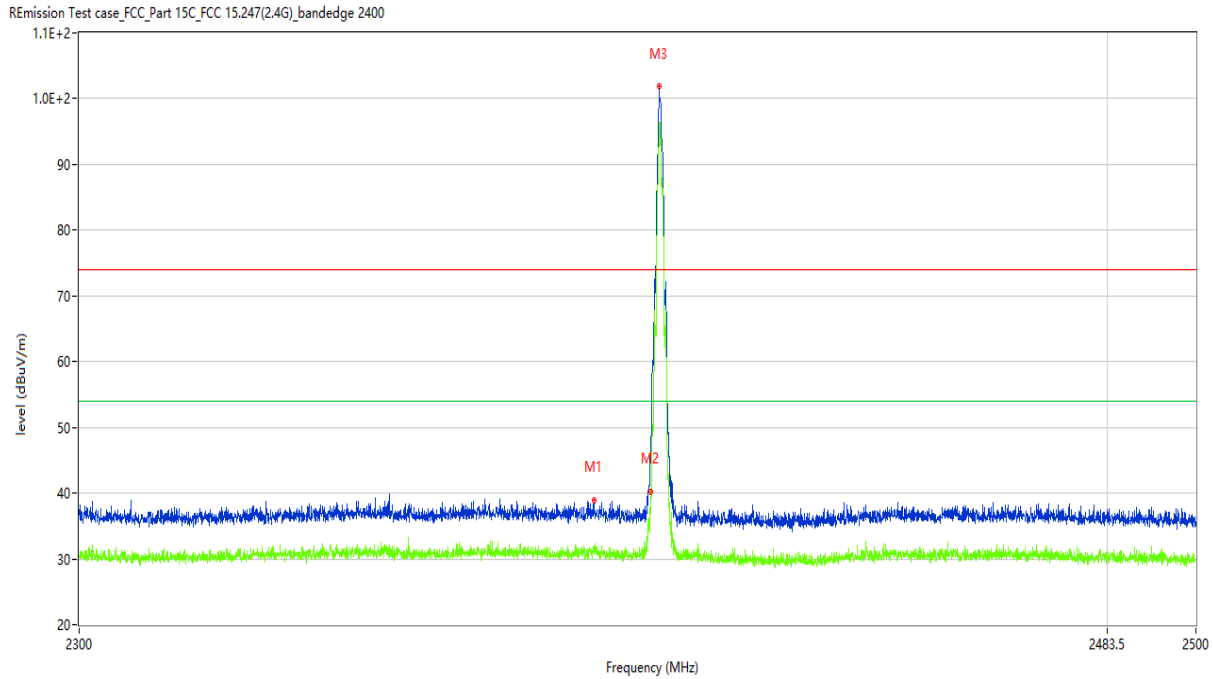
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Figure 17: Band Edge (Restricted-band band-edge), 2402MHz, GFSK

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2390.077	38.99	-3.76	74.0	-35.01	Peak	354.50	150	Horizontal	Pass
1**	2390.077	31.91	-3.76	54.0	-22.09	AV	354.50	150	Horizontal	Pass
2	2400.000	41.01	-4.18	74.0	-32.99	Peak	290.80	150	Horizontal	Pass
2**	2400.000	35.23	-4.18	54.0	-18.77	AV	290.80	150	Horizontal	Pass
3	2401.725	101.95	-4.17	74.0	27.95	Peak	285.10	150	Horizontal	N/A
3**	2401.725	96.39	-4.17	54.0	42.39	AV	285.10	150	Horizontal	N/A

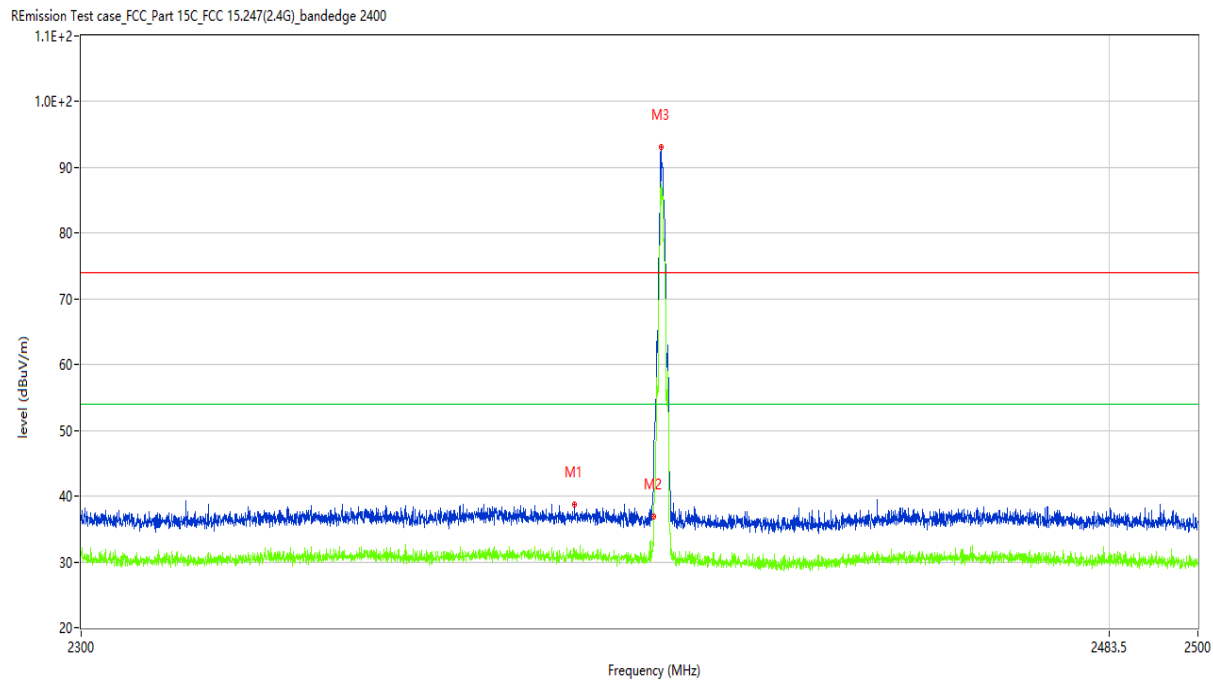
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Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2386.278	38.77	-3.78	74.0	-35.23	Peak	141.40	150	Vertical	Pass
1**	2386.278	30.97	-3.78	54.0	-23.03	AV	141.40	150	Vertical	Pass
2	2400.000	37.04	-4.18	74.0	-36.96	Peak	275.05	150	Vertical	Pass
2**	2400.000	30.82	-4.18	54.0	-23.18	AV	275.05	150	Vertical	Pass
3	2401.725	93.05	-4.17	74.0	19.05	Peak	0.00	150	Vertical	N/A
3**	2401.725	87.56	-4.17	54.0	33.56	AV	0.00	150	Vertical	N/A

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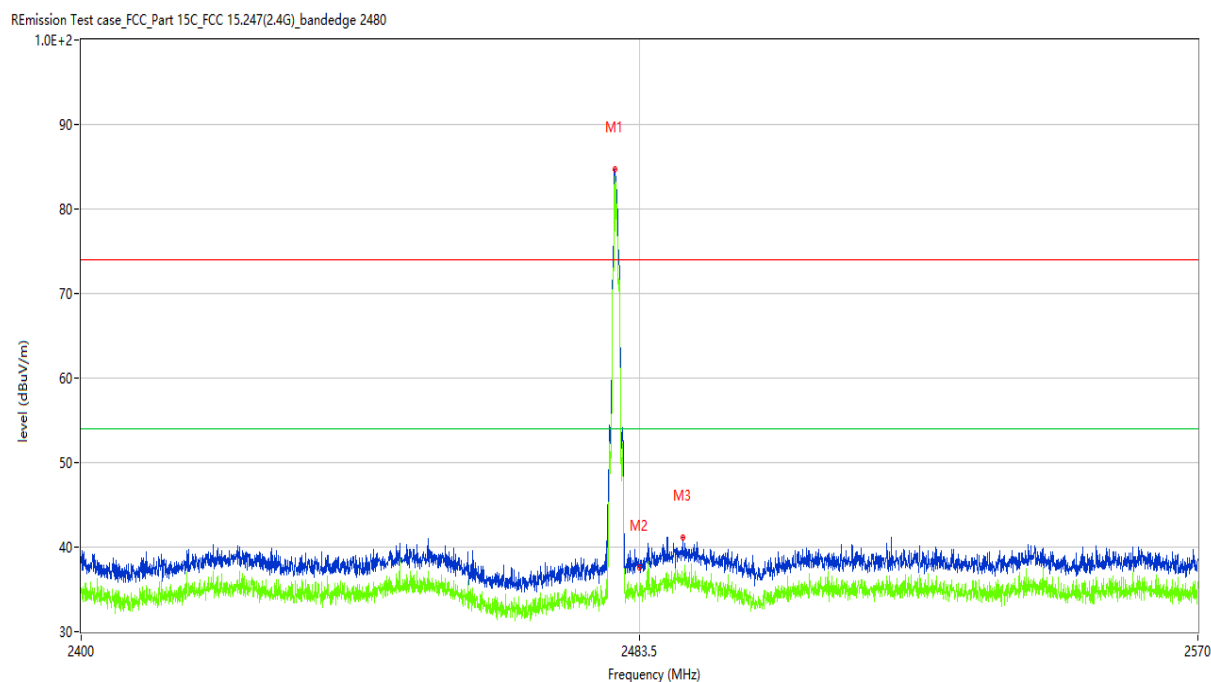
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Figure 18: Band Edge (Restricted-band band-edge), 2480MHz, GFSK

Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2479.753	84.74	7.47	74.0	10.74	Peak	253.80	150	Horizontal	N/A
1**	2479.753	83.79	7.47	54.0	29.79	AV	253.80	150	Horizontal	N/A
2	2483.500	37.57	8.01	74.0	-36.43	Peak	312.60	150	Horizontal	Pass
2**	2483.500	34.68	8.01	54.0	-19.32	AV	312.60	150	Horizontal	Pass
3	2490.162	41.21	9.40	74.0	-32.79	Peak	309.40	150	Horizontal	Pass
3**	2490.162	35.95	9.40	54.0	-18.05	AV	309.40	150	Horizontal	Pass

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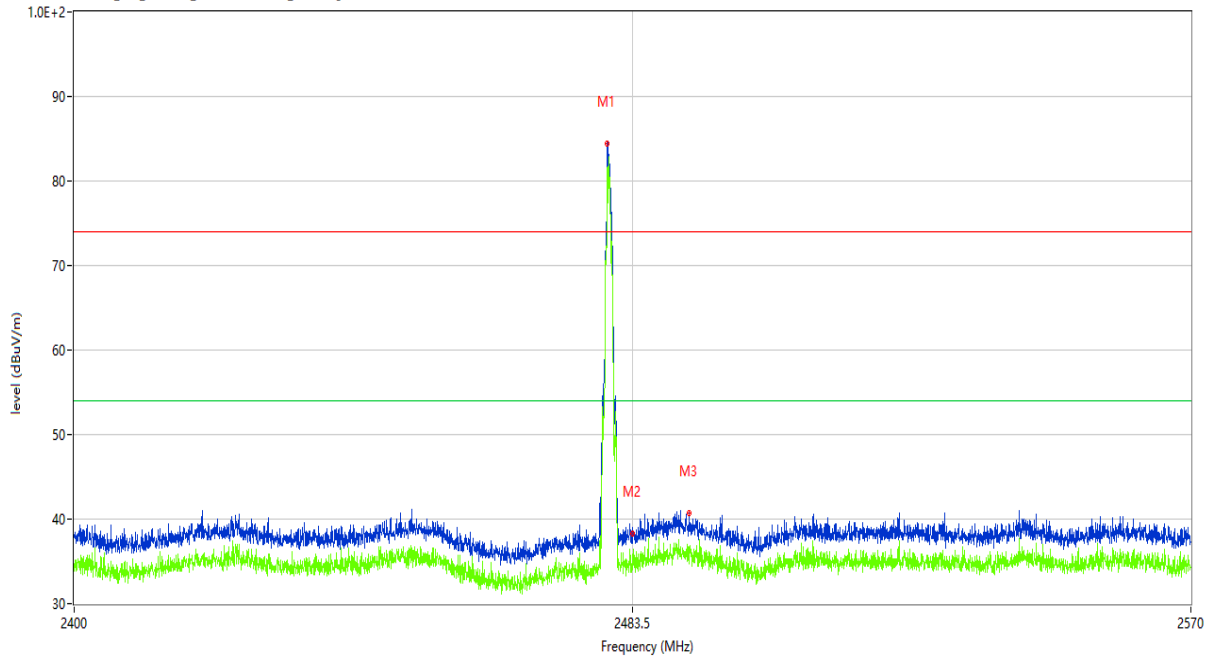
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Vertical

REmission Test case_FCC_Part 15C_FCC 15.247(2.4G)_bandedge 2480



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2479.710	84.46	7.46	74.0	10.46	Peak	256.10	150	Vertical	N/A
1**	2479.710	81.41	7.46	54.0	27.41	AV	256.10	150	Vertical	N/A
2	2483.500	38.12	8.01	74.0	-35.88	Peak	59.48	150	Vertical	Pass
2**	2483.500	34.90	8.01	54.0	-19.10	AV	59.48	150	Vertical	Pass
3	2492.159	40.66	8.99	74.0	-33.34	Peak	103.20	150	Vertical	Pass
3**	2492.159	36.65	8.99	54.0	-17.35	AV	103.20	150	Vertical	Pass

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4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT:

PASS

Test standard	:	FCC Part 15.207(a) RSS-Gen 8.8
Requirement	:	ANSI C63.10-2013
Kind of test site	:	Shielded room

Test setup

Input Voltage	:	AC 120V, 60Hz; AC 240V, 50Hz
Operation Mode	:	A.2
Earthing	:	Not Connected
Ambient temperature	:	25°C
Relative humidity	:	52%

For details refer to following test plot.

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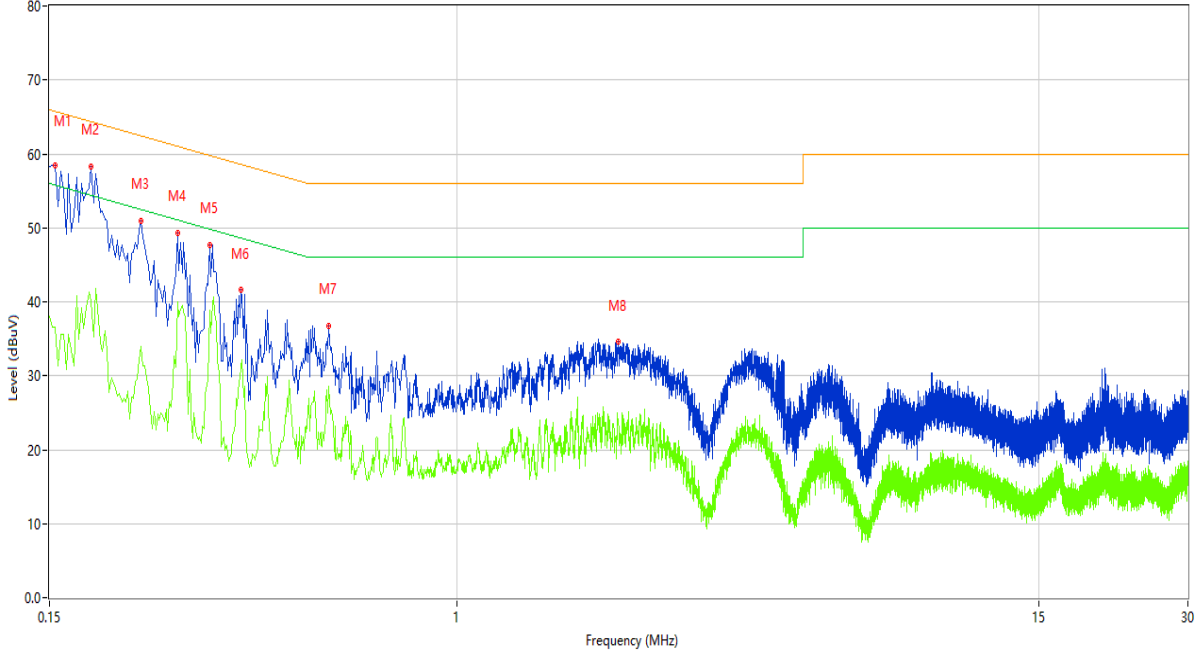
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Note: The all configurations were tested respectively, but only the worst configuration shown here.

Figure 19: Conducted Emission on AC Mains, L Phase

CEmission Test case_FCC_CE_FCC PART 15B_Class B



No.	Frequency(MHz)	Results (dBuV)	Factor(dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.154	58.80	10.15	65.78	-6.98	Peak	L	Pass
1*	0.154	53.16	10.15	65.78	-12.62	QP	L	Pass
1**	0.154	36.57	10.15	55.78	-19.21	AV	L	Pass
2	0.182	57.88	10.15	64.39	-6.51	Peak	L	Pass
2*	0.182	54.68	10.15	64.39	-9.71	QP	L	Pass
2**	0.182	40.13	10.15	54.39	-14.26	AV	L	Pass
3	0.230	51.17	10.14	62.45	-11.28	Peak	L	Pass
3*	0.230	47.37	10.14	62.45	-15.08	QP	L	Pass
3**	0.230	34.02	10.14	52.45	-18.43	AV	L	Pass
4	0.272	50.09	10.14	61.06	-10.97	Peak	L	Pass
4*	0.272	45.48	10.14	61.06	-15.58	QP	L	Pass
4**	0.272	40.05	10.14	51.06	-11.01	AV	L	Pass
5	0.316	48.44	10.14	59.81	-11.37	Peak	L	Pass
5*	0.316	44.04	10.14	59.81	-15.77	QP	L	Pass
5**	0.316	38.87	10.14	49.81	-10.94	AV	L	Pass
6	0.366	41.63	10.14	58.59	-16.96	Peak	L	Pass
6**	0.366	31.26	10.14	48.59	-17.33	AV	L	Pass
7	0.550	36.75	10.15	56.00	-19.25	Peak	L	Pass
7**	0.550	28.60	10.15	46.00	-17.40	AV	L	Pass
8	2.116	34.55	10.18	56.00	-21.45	Peak	L	Pass
8**	2.116	23.84	10.18	46.00	-22.16	AV	L	Pass

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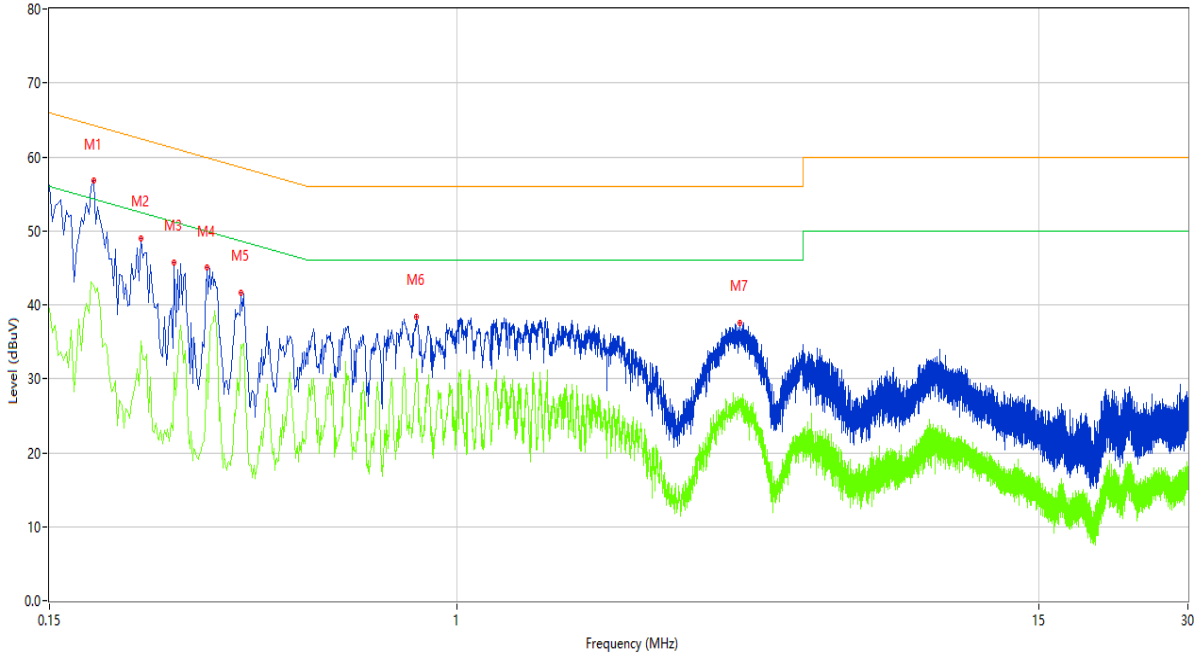
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Figure 20: Conducted Emission on AC Mains, N Phase

CEmission Test case_FCC_CE_FCC PART 15B_Class B



No.	Frequency(MHz)	Results (dBUV)	Factor(dB)	Limit (dBUV)	Over Limit (dB)	Detector	Line	Verdict
1	0.184	56.98	10.15	64.30	-7.32	Peak	N	Pass
1*	0.184	53.24	10.15	64.30	-11.06	QP	N	Pass
1**	0.184	42.69	10.15	54.30	-11.61	AV	N	Pass
2	0.230	49.92	10.14	62.45	-12.53	Peak	N	Pass
2*	0.230	45.62	10.14	62.45	-16.83	QP	N	Pass
2**	0.230	35.04	10.14	52.45	-17.41	AV	N	Pass
3	0.268	46.49	10.14	61.18	-14.69	Peak	N	Pass
3*	0.268	39.13	10.14	61.18	-22.05	QP	N	Pass
3**	0.268	30.91	10.14	51.18	-20.27	AV	N	Pass
4	0.312	44.85	10.14	59.92	-15.07	Peak	N	Pass
4*	0.312	40.10	10.14	59.92	-19.82	QP	N	Pass
4**	0.312	32.01	10.14	49.92	-17.91	AV	N	Pass
5	0.366	42.79	10.14	58.59	-15.80	Peak	N	Pass
5*	0.366	38.96	10.14	58.59	-19.63	QP	N	Pass
5**	0.366	34.65	10.14	48.59	-13.94	AV	N	Pass
6	0.828	38.38	10.15	56.00	-17.62	Peak	N	Pass
6**	0.828	32.60	10.15	46.00	-13.40	AV	N	Pass
7	3.730	37.53	10.24	56.00	-18.47	Peak	N	Pass
7**	3.730	27.28	10.24	46.00	-18.72	AV	N	Pass

TEST REPORT

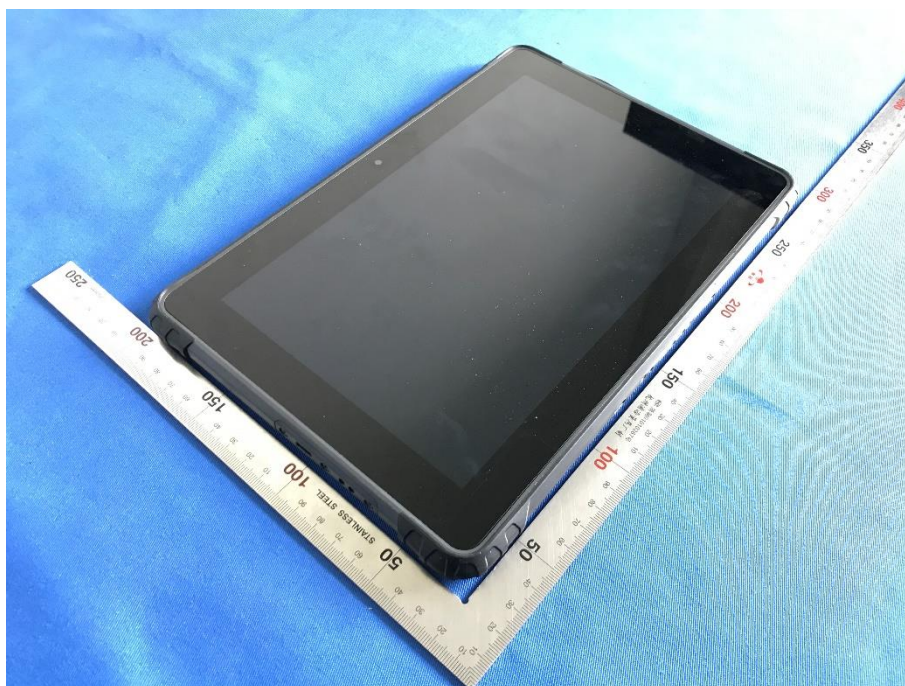
Report No.: SHE19080042-02FE

Date: 2019-10-31

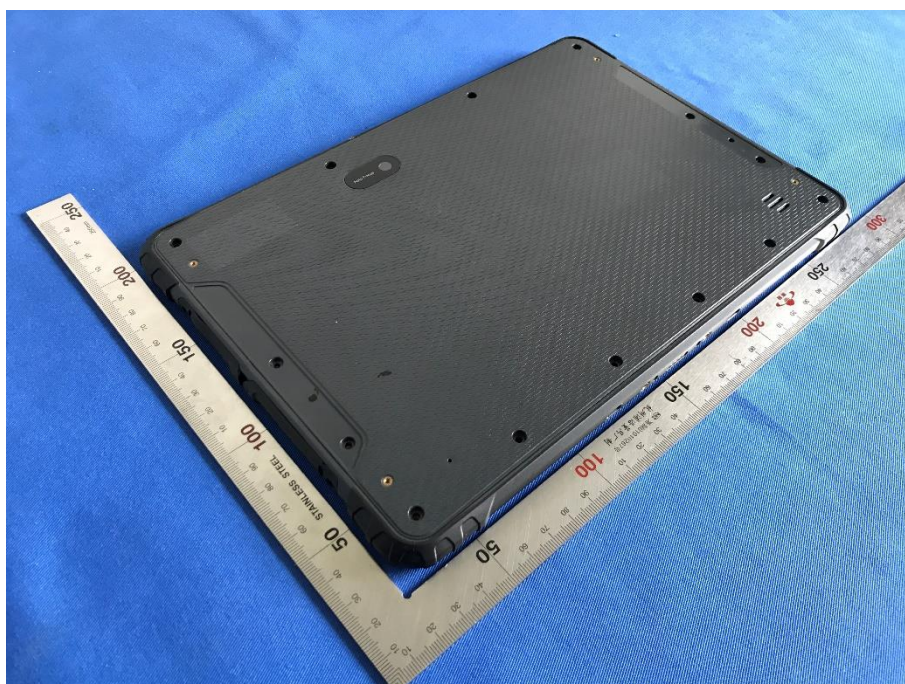
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5 Appendixes

5.1 Photographs of the Sample



Front of the sample



Rear of the sample

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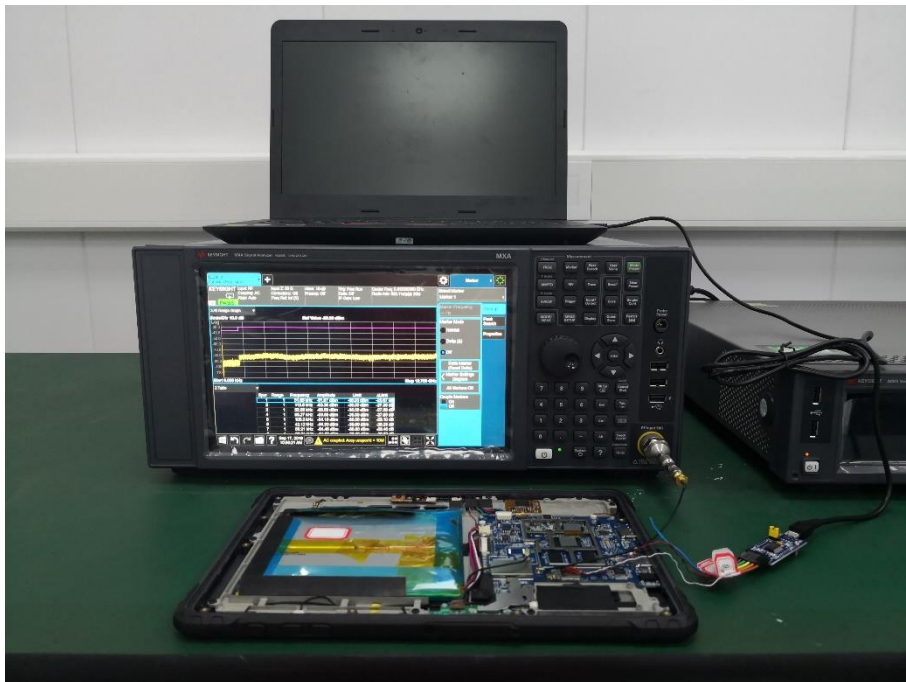
Date: 2019-10-31

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5.2 Set-up for Conducted Emissions



5.3 Set-up for Conducted RF test at Antenna Port



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5.4 Set-up for Spurious Emissions below 1GHz



Below 1 GHz

5.5 Set-up for Spurious Emissions above 1GHz



Above 1GHz

End of the report