TEST REPORT

MANUFACTURER	:	Hot Pepper, Inc.
PRODUCT NAME	:	4G Smart Phone
MODEL NAME	:	HPP-L55
BRAND NAME	:	Hot Pepper
FCC ID	:	2APD4-A95C
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2019-10-10
TEST DATE	:	2019-11-26 to 2019-11-30
ISSUE DATE	:	2019-12-05

Edited by : Bowers Zeng

Bowers Zeng(Test engineer)

Review by: Elvis

Elvis Wang(Auditor)

Approved by: Anne

Anne Liu (Supervisor)

NOTE: 1.The report is invalid when there is no the approver signature and the special stamp for test report. 2.The test report shall not be reproduced except in full without prior written permission of the company. 3.The report copy is invalid when there is no the special stamp for test repor. 4.The altered report is invalid. 5.The entrust test is responsibility for the received sample only

DIRECTORY

1. Technical Information 3
1.1. Applicant and Manufacturer Information 3
1.2. Equipment Under Test (EUT) Description 3
1.3. Test Standards and Results 5
1.4. Environmental Conditions 5
2. 47 CFR Part 15C Requirements 6
2.1. Antenna requirement 6
2.2. Peak Output Power 7
2.3. 6dB Bandwidth 10
2.4. Conducted Spurious Emissions and Band Edge 13
2.5. Power spectral density (PSD) 19
2.6. Restricted Frequency Bands 22
2.7. Conducted Emission 29
2.8. Radiated Emission 33
Annex A Test Uncertainty 55
Annex B Testing Laboratory Information 56

Change History		
Version	Date	Reason for change
1.0	2019-12-05	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Hot Pepper, Inc.
Applicant Address:	5151 California Ave., Suite 100, Irvine 92617, USA
Manufacturer:	Hot Pepper, Inc.
Manufacturer Address:	5151 California Ave., Suite 100, Irvine 92617, USA

1.2. Equipment Under Test (EUT) Description

Product Name:	4G Smart Phone	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	A95C_MAINBOARD_P3	
Software Version:	HPP-L55-C1.0.0	
Modulation Type:	GFSK	
Operating Frequency Range:	2402MHz - 2480MHz (40 channels, at intervals of 2MHz);	
Bluetooth Version:	Bluetooth 4.2 LE	
Antenna Type:	PIFA Antenna	
Antenna Gain:	0.3dBi	
Accessory Information:	Battery	
	Manufacturer:	Shenzhen HUATIANTONG TECHNOLOGY CO.LTD
	Brand Name:	Hot Pepper
	Model No.:	H2019A95C
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	2200mAh
	Rated Voltage:	3.80V
	Charge Limit:	4.35V
	AC Adapter	
	Manufacturer:	Shenzhen Tianyin Electronics Co.,Ltd.
	Brand Name:	Hot Pepper
	Model No.:	TPA-46B050100UU
	Serial No.:	(N/A, marked #1 by test site)
	Rated Input:	100-240V ~ 50/60Hz 0.2A

	Rated Output:	5V⎓1.0A

Note 1: The EUT contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies is F(MHz)=2402+2*n (0<=n<=39). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 19 (2440MHz) and 39 (2480MHz).

Note 2: The EUT connected to the serial port of the computer with a serial communication cable, we use the dedicated software to control the EUT continuous transmission.

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15 (10-1-15 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result
1	15.203	Antenna Requirement	N/A	N/A	PASS
2	15.247(b)	Peak Output Power	Nov 27, 2019	Lai Huihuang	PASS
3	15.247(a)	Bandwidth	Nov 27, 2019	Lai Huihuang	PASS
4	15.247(d)	Conducted Spurious Emission and Band Edge	Nov 27, 2019	Lai Huihuang	PASS
5	15.247(e)	Power spectral density (PSD)	Nov 27, 2019	Lai Huihuang	PASS
6	15.247(d)	Restricted Frequency Bands	Nov 27, 2019	Yaming Luo	PASS
7	15.207	Conducted Emission	Nov 27, 2019	Yaming Luo	PASS
8	15.209, 15.247(d)	Radiated Emission	Nov 27, 2019	Yaming Luo	PASS

Note: The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013 and KDB558074 D01 15.247 Meas Guidance v05r02.

1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 - 60
Atmospheric Pressure (kPa):	86 - 106

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 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. 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.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Peak Output Power

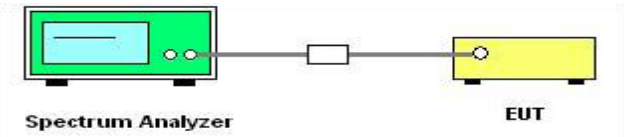
2.2.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

2.2.2. Test Description

The measured output power was calculated by the reading of the spectrum analyzer and calibration.

A. Test Setup:



The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

B. Equipments List:

Please refer ANNEX B (4).

2.2.3. Test procedure

The measured output power was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for Peak Output Power test on the spectrum analyzer：

a) Set analyzer center frequency to channel center frequency.

b) Set the RBW to 3MHz
c) Set VBW to 8MHz
d) Set span to 6MHz
e) Sweep time to auto couple.
f) Detector = peak.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use peak marker function to determine the peak amplitude level.

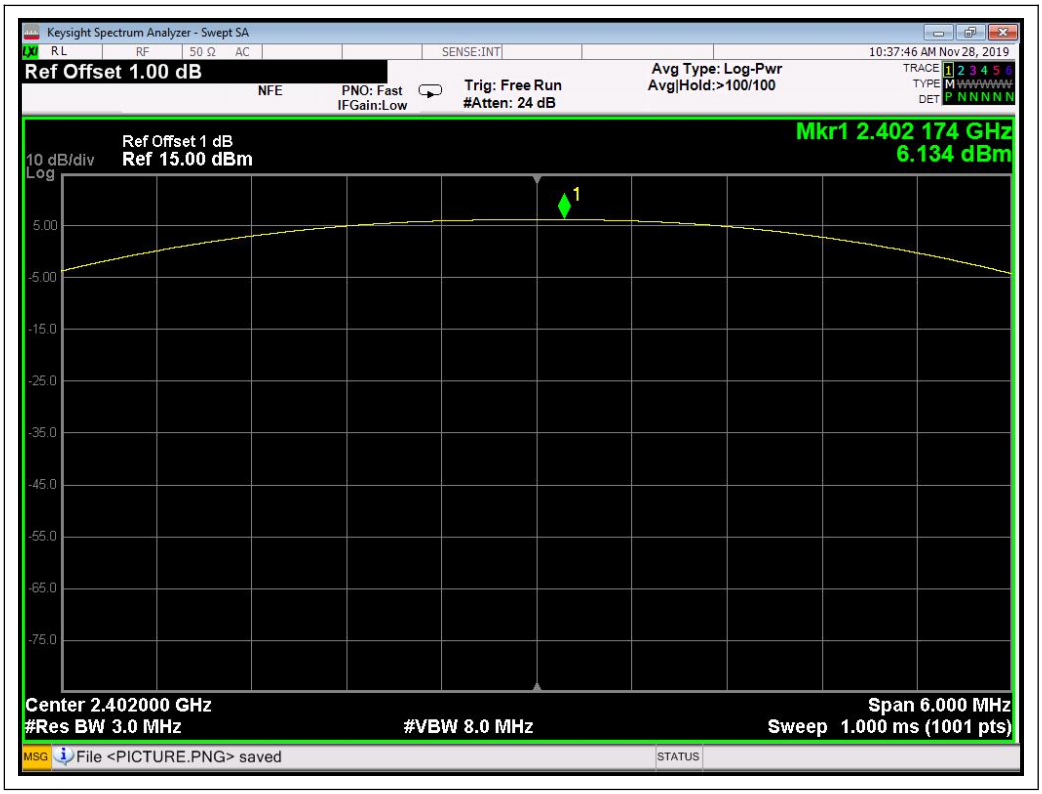
2.2.4. Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

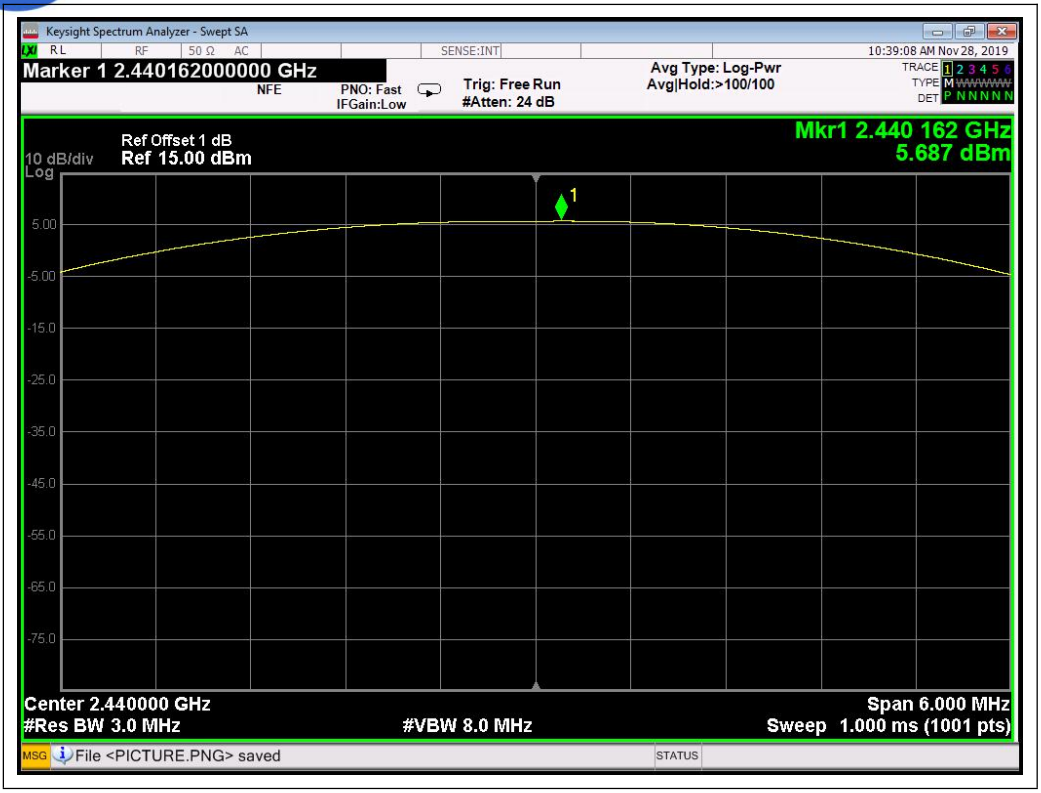
A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	6.134	0.004	30	1	PASS
19	2440	5.687	0.004			PASS
39	2480	5.528	0.004			PASS

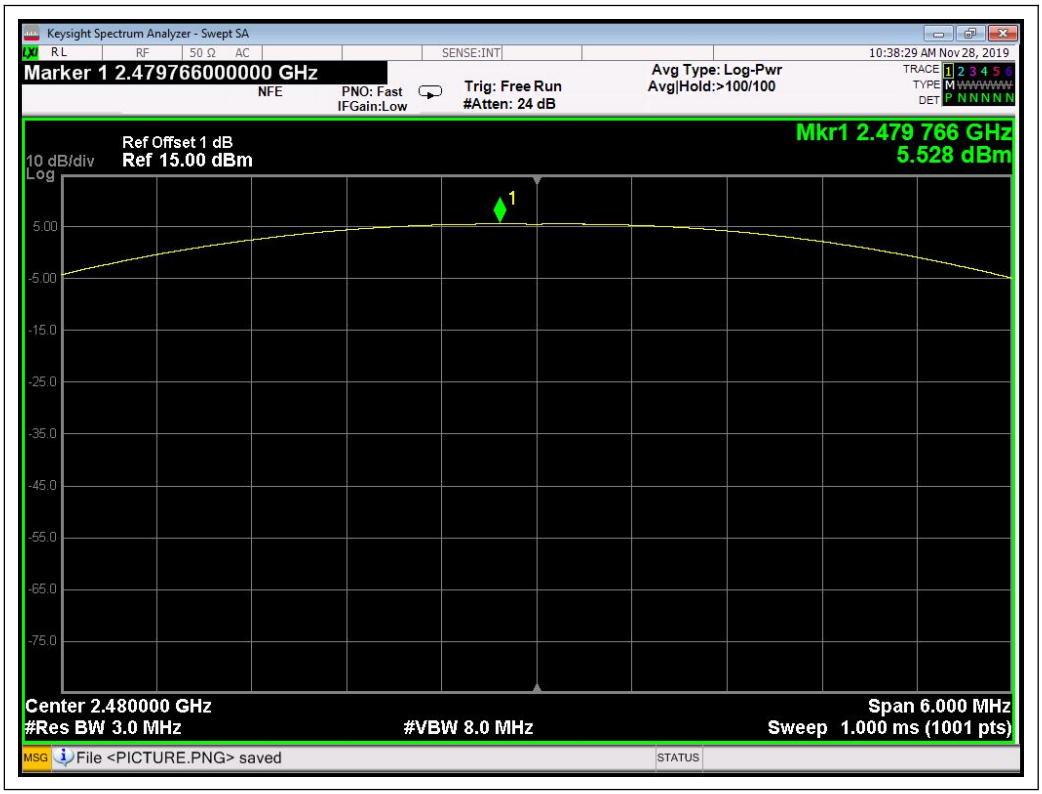
B. Test Plots:



(Channel 0, 2402MHz)



(Channel 19, 2440MHz)



(Channel 39, 2480MHz)

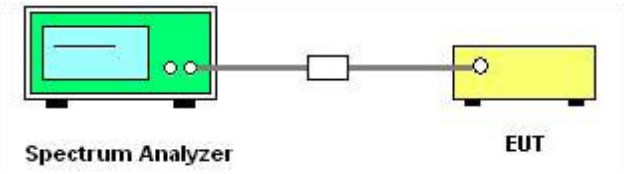
2.3. 6dB Bandwidth

2.3.1. Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.3.2. Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

Please refer ANNEX B(4).

2.3.3. Test procedure

The steps for the first option are as follows:
（1）Set analyzer center frequency to channel center frequency.
a) Set RBW = 100 kHz.
b) Set the VBW=300 kHz.
c) Detector = peak.
d) Trace mode = max hold.
e) Sweep = auto couple
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

（2）The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz,VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥6 dB.

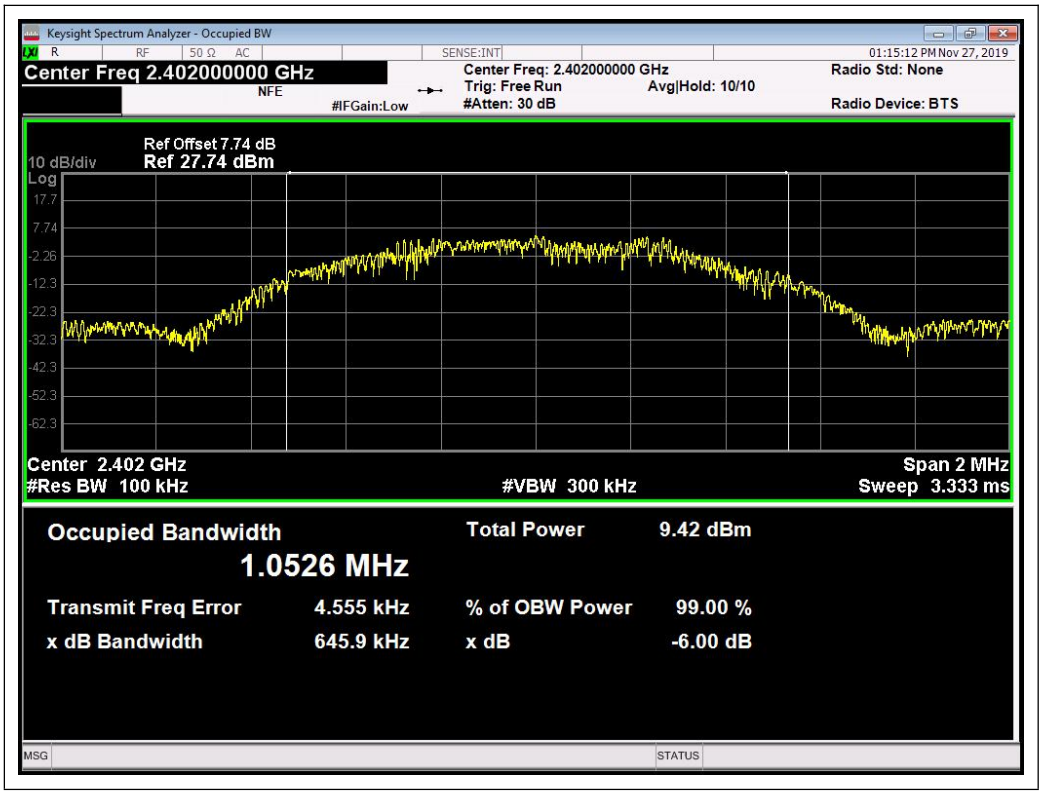
2.3.4. Test Result

The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the module.

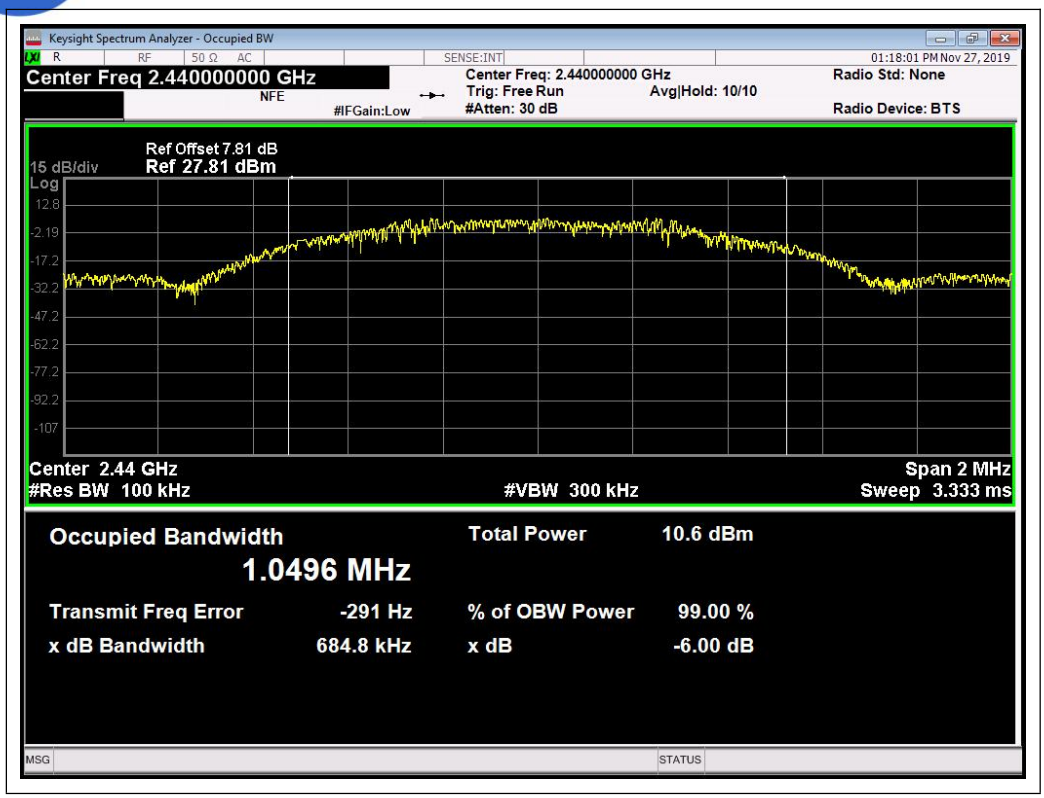
A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
0	2402	0.646	≥500	PASS
19	2440	0.685	≥500	PASS
39	2480	0.677	≥500	PASS

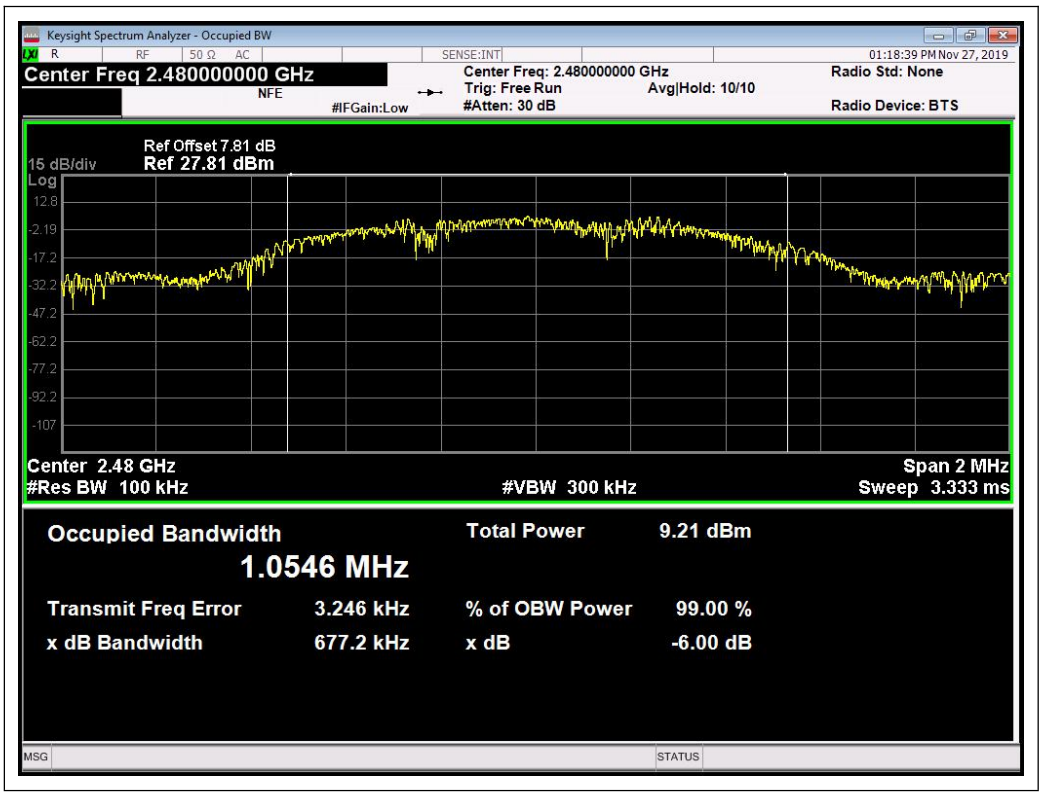
B. Test Plots:



(Channel 0: 2402MHz)



(Channel 19: 2440 MHz)



(Channel 39: 2480MHz)

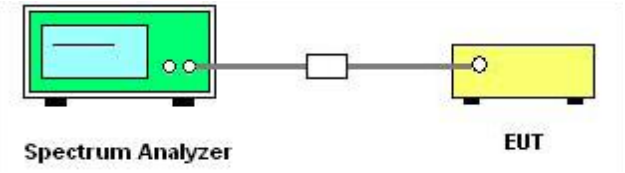
2.4. Conducted Spurious Emissions and Band Edge

2.4.1. Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.4.2. Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

Please refer ANNEX B (4).

2.4.3. Test Procedure

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100kHz and 300kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

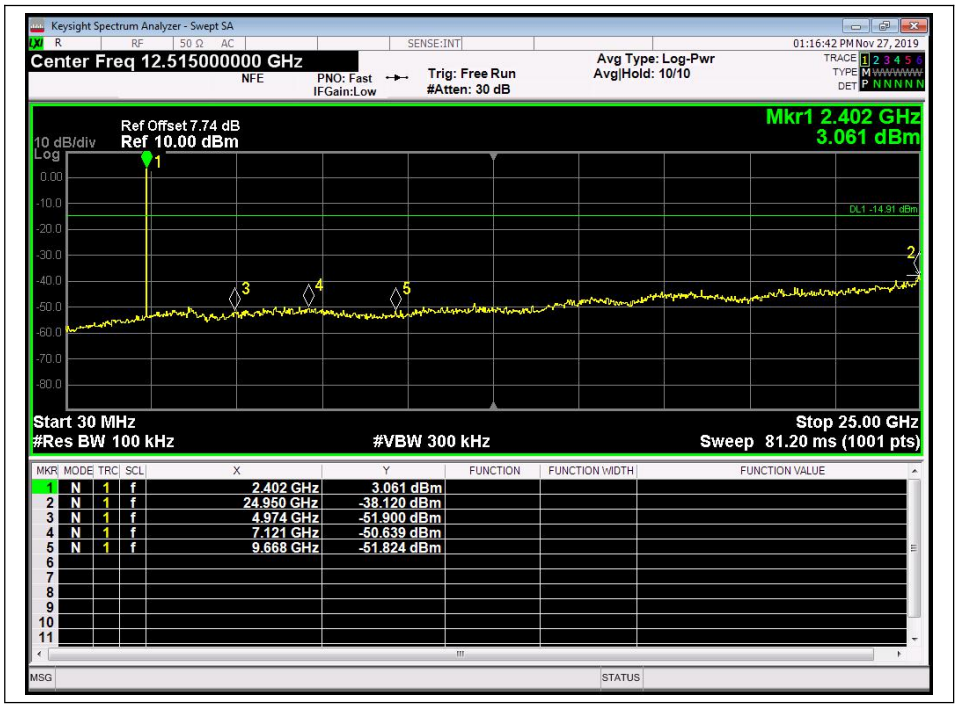
2.4.4. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

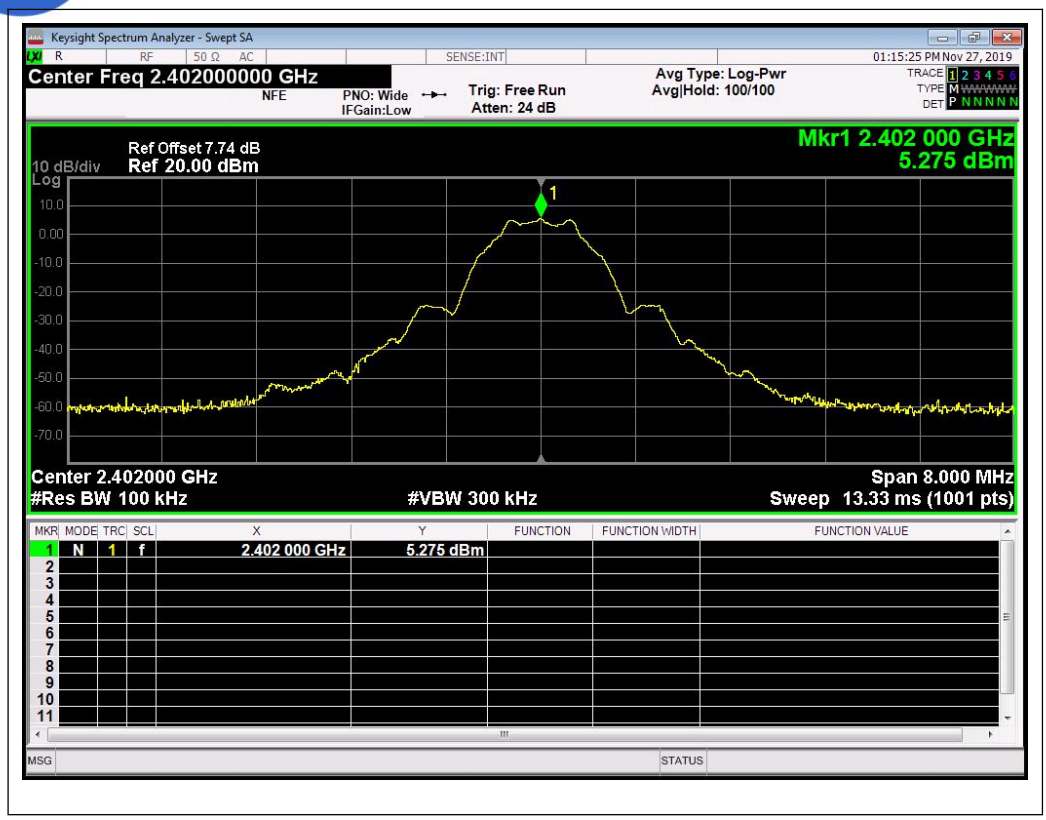
A. Test Plots:

Note: the power of the Module transmitting frequency should be ignored.

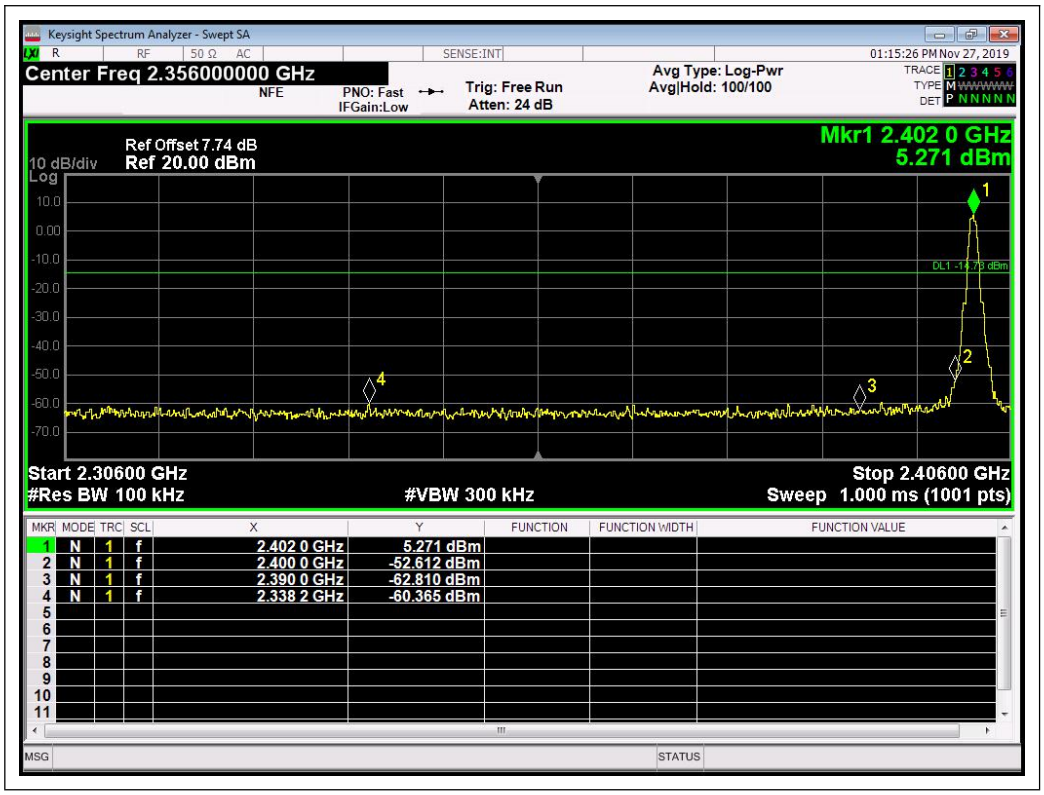
(Channel = 0, 30MHz to 25GHz peak power)



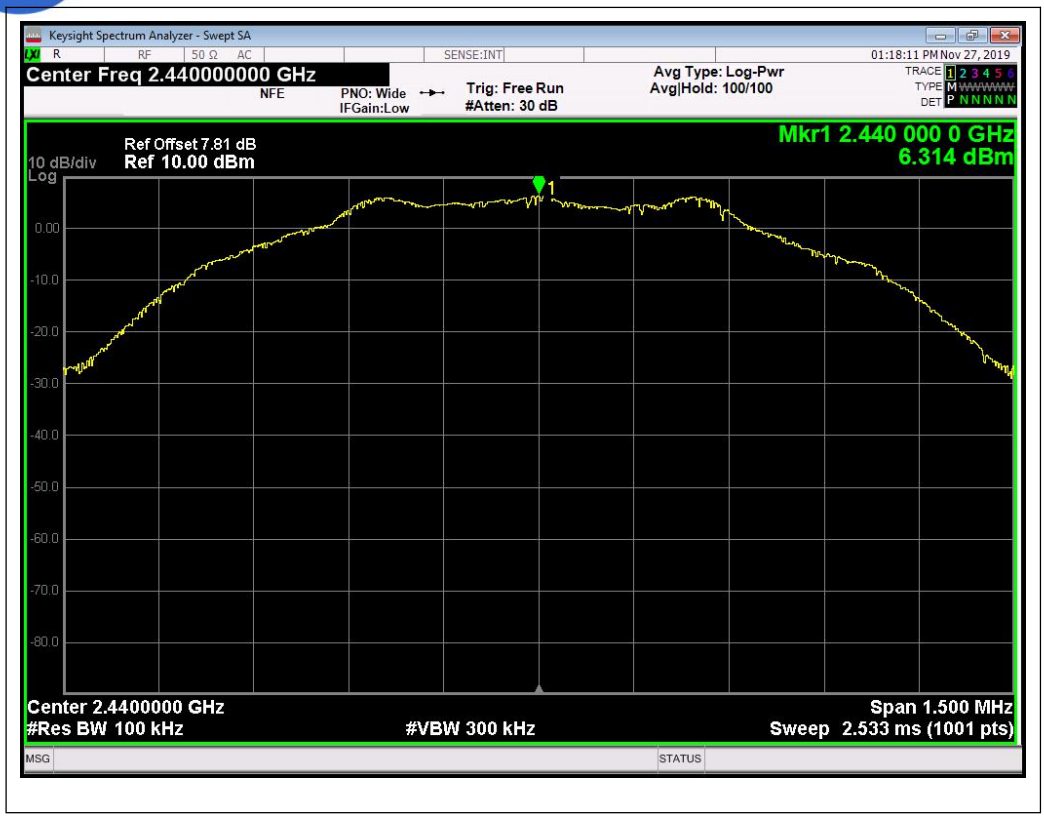
(Channel = 0, 30MHz to 25GHz)



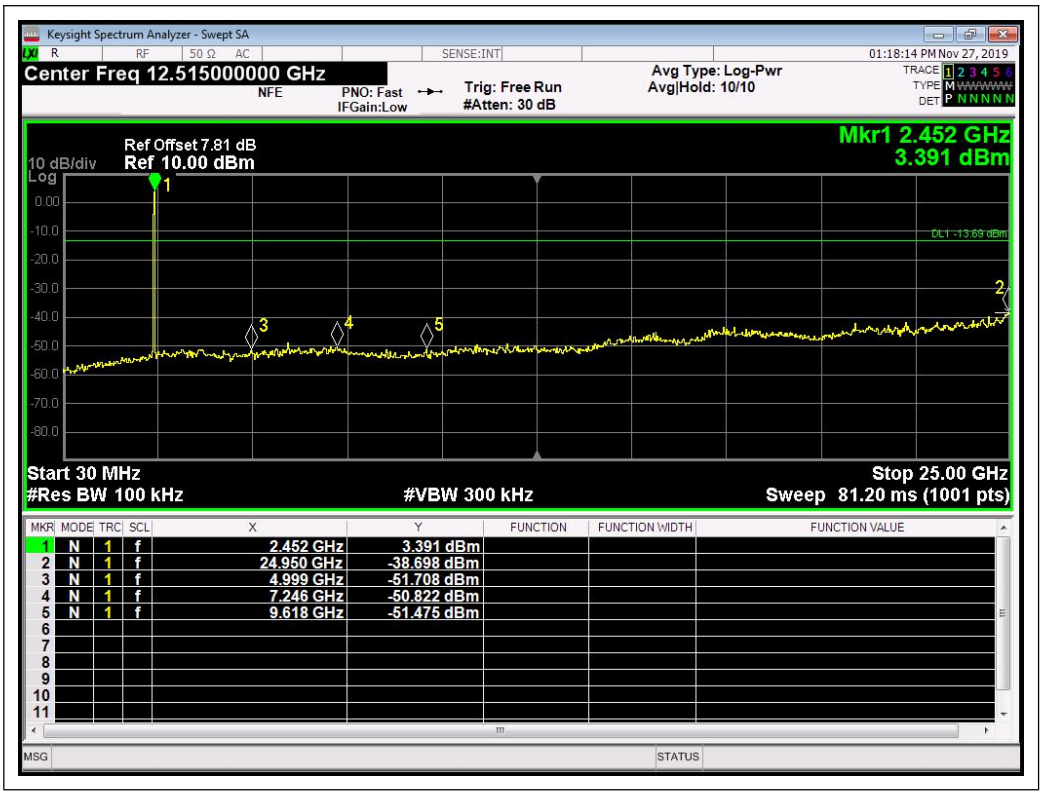
(Band Edge, Channel = 0 peak power)



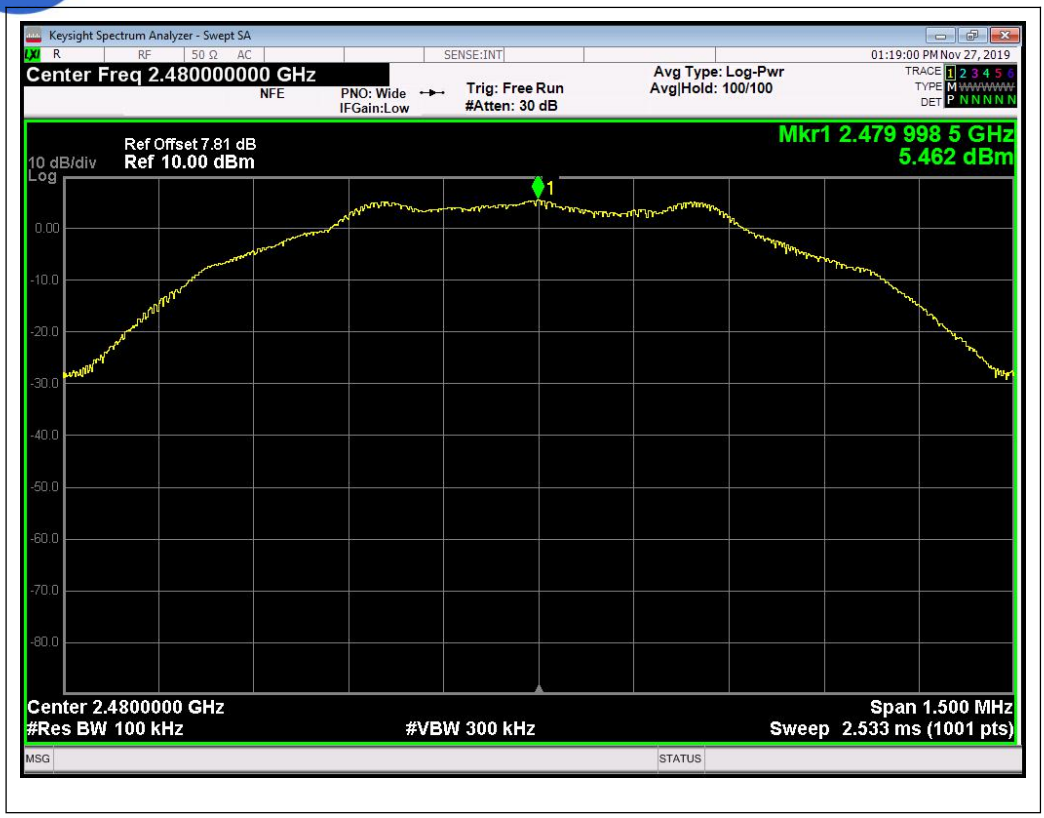
(Band Edge, Channel = 0)



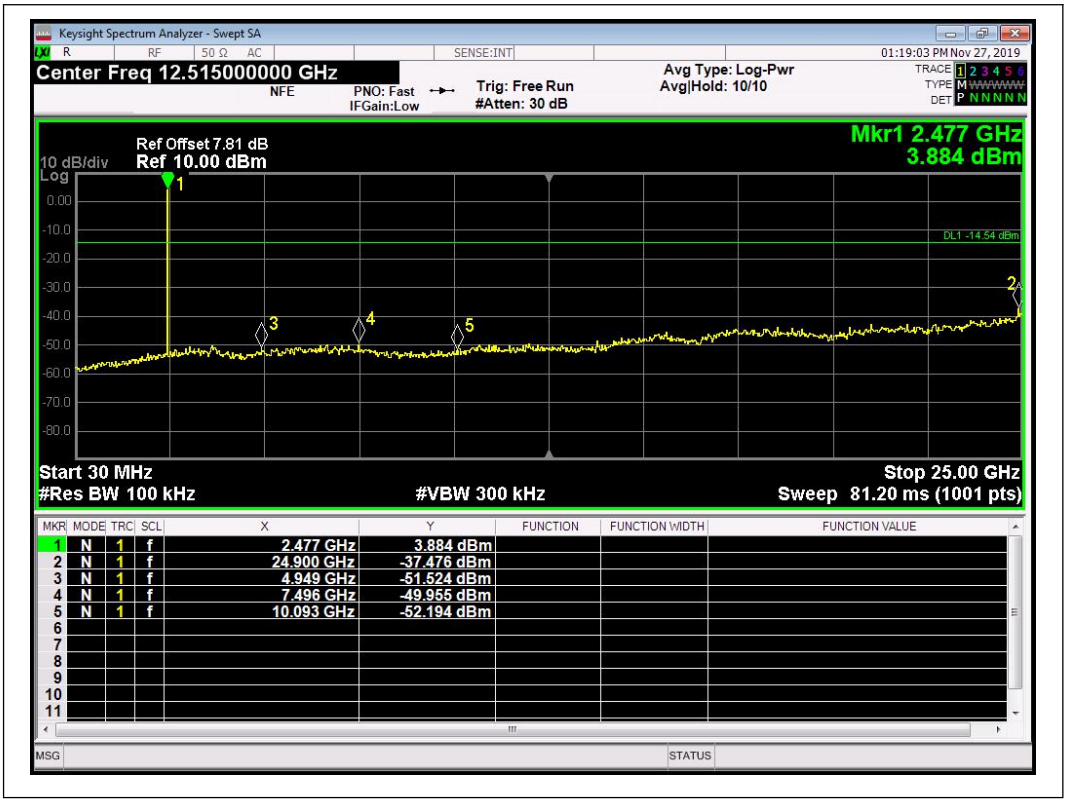
(Channel = 19, 30MHz to 25GHz peak power)



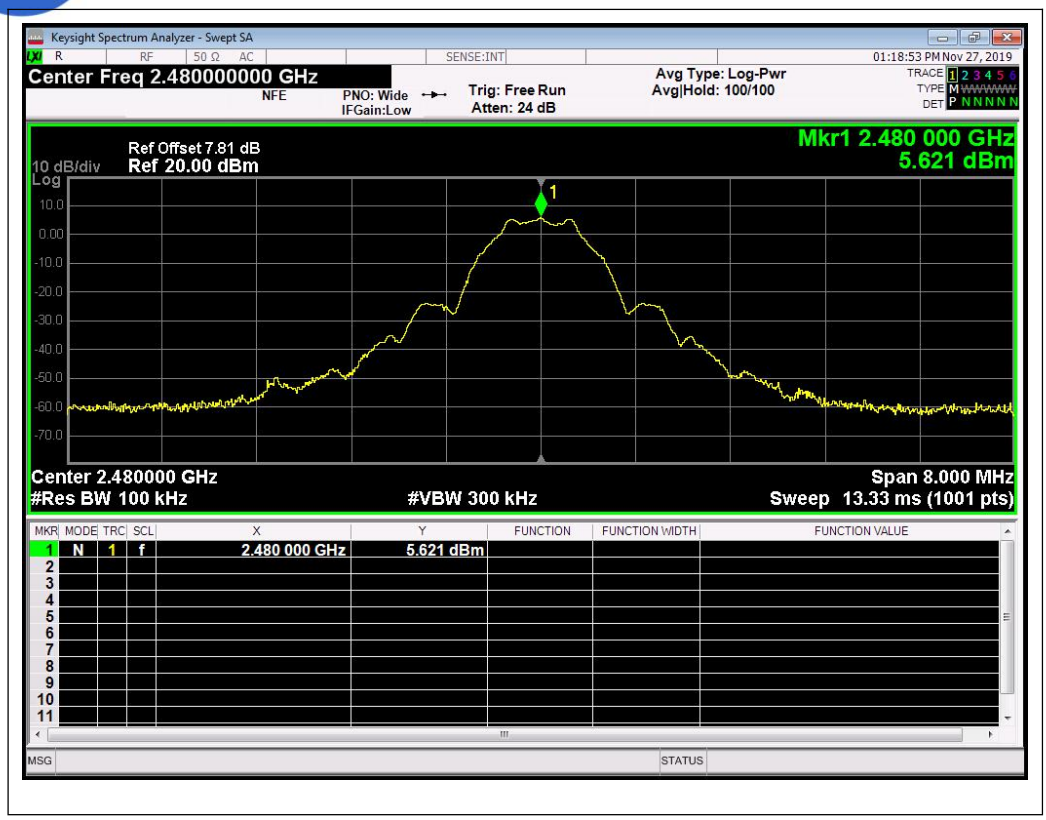
(Channel = 19, 30MHz to 25GHz)



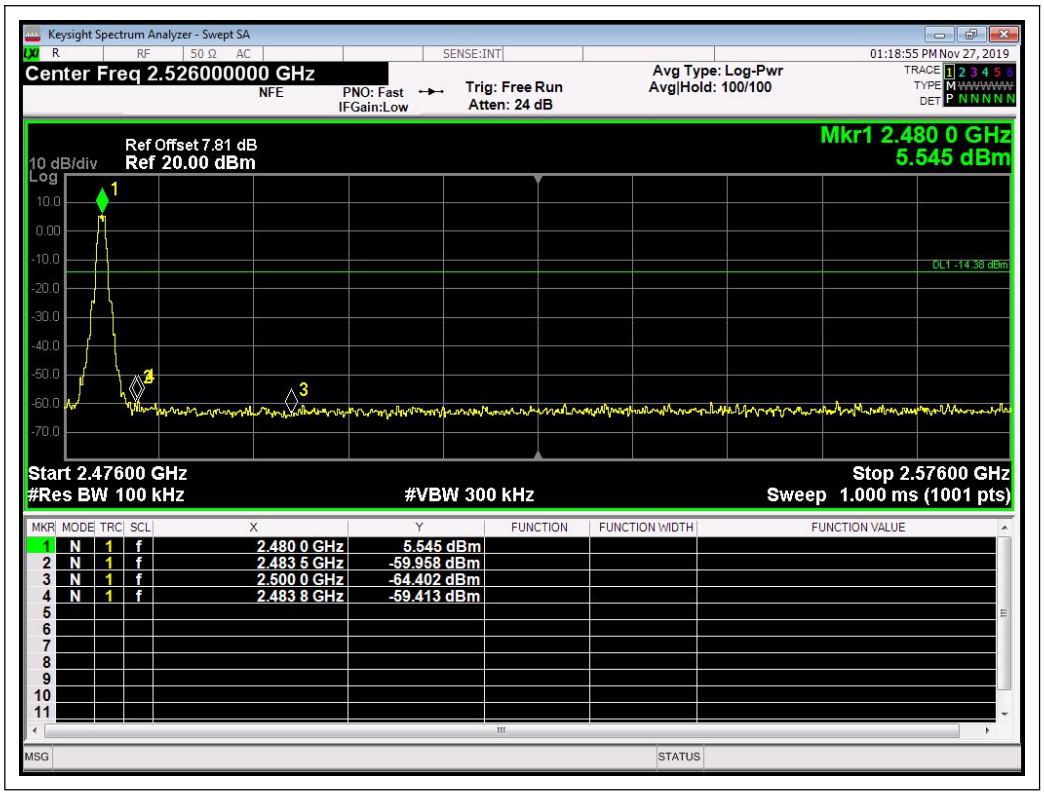
(Channel = 39, 30MHz to 25GHz peak power)



(Channel = 39, 30MHz to 25GHz)



(Band Edge, Channel = 39 peak power)



(Band Edge, Channel = 39)

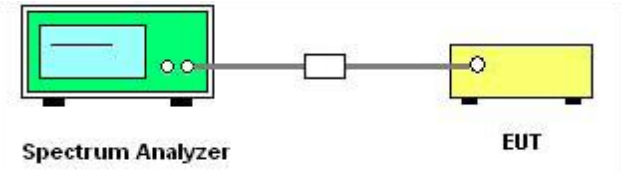
2.5. Power spectral density (PSD)

2.5.1. Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

2.5.2. Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

B. Equipments List:

Please refer ANNEX B (4).

2.5.3. Test procedure

The measured power spectral density was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for PSD test:

a) Set analyzer center frequency to channel center frequency.
b) Set the span to 1.5 times DTS
c) Set the RBW to 3 kHz
d) Set the VBW to 10 kHz
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.

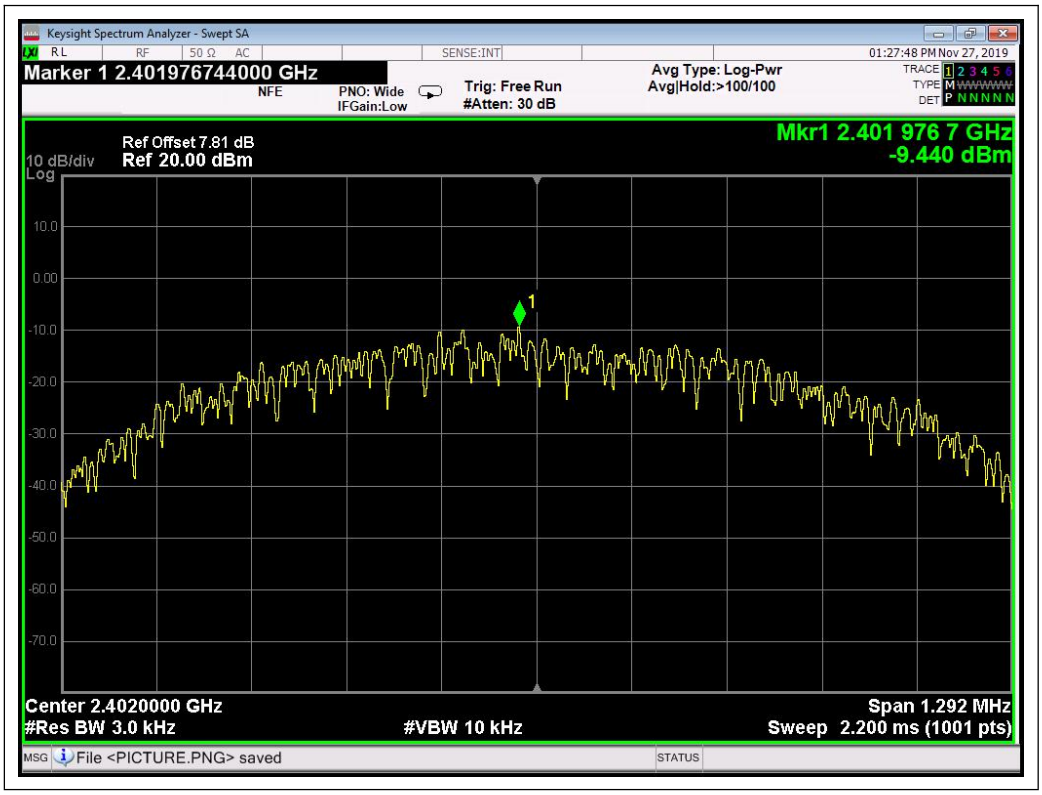
2.5.4. Test Result

The lowest, middle and highest channels are tested.

A. Test Verdict:

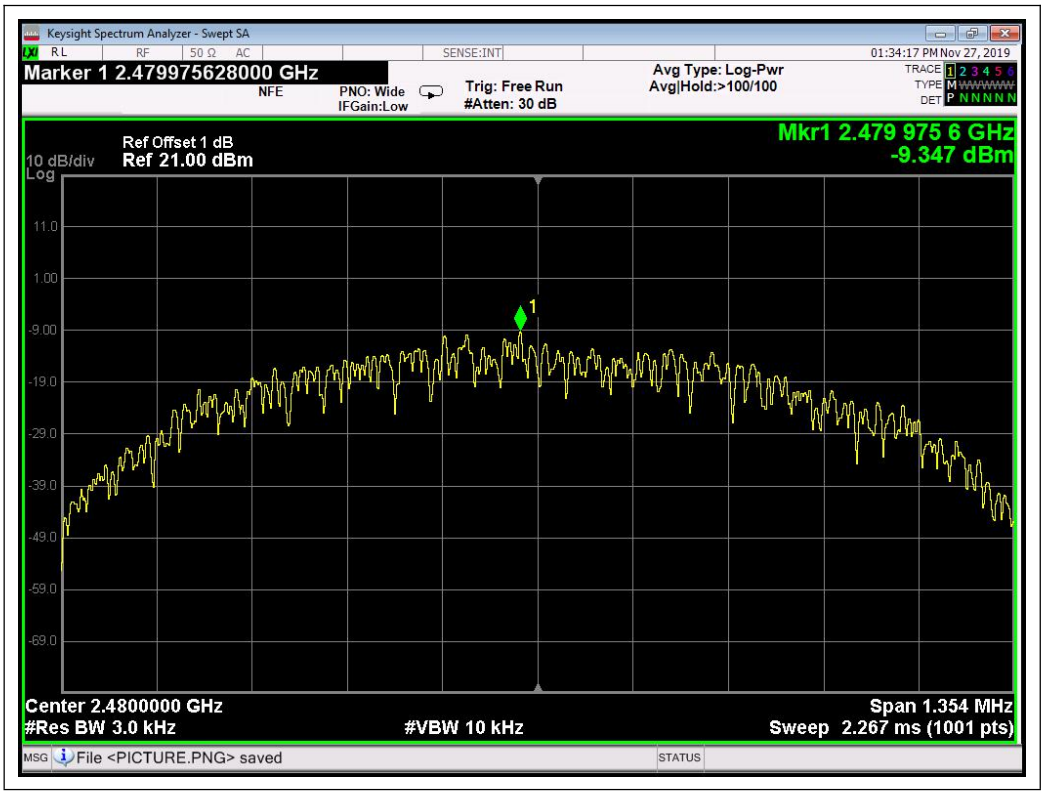
Spectral power density (dBm/3kHz)				
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
0	2402	-9.440	8	PASS
19	2440	-8.927	8	PASS
39	2480	-9.347	8	PASS
Measurement uncertainty: ±1.3dB				

B. Test Plots:



(Channel = 0, 2402MHz)

(Channel = 19, 2440MHz)



(Channel = 39, 2480MHz)

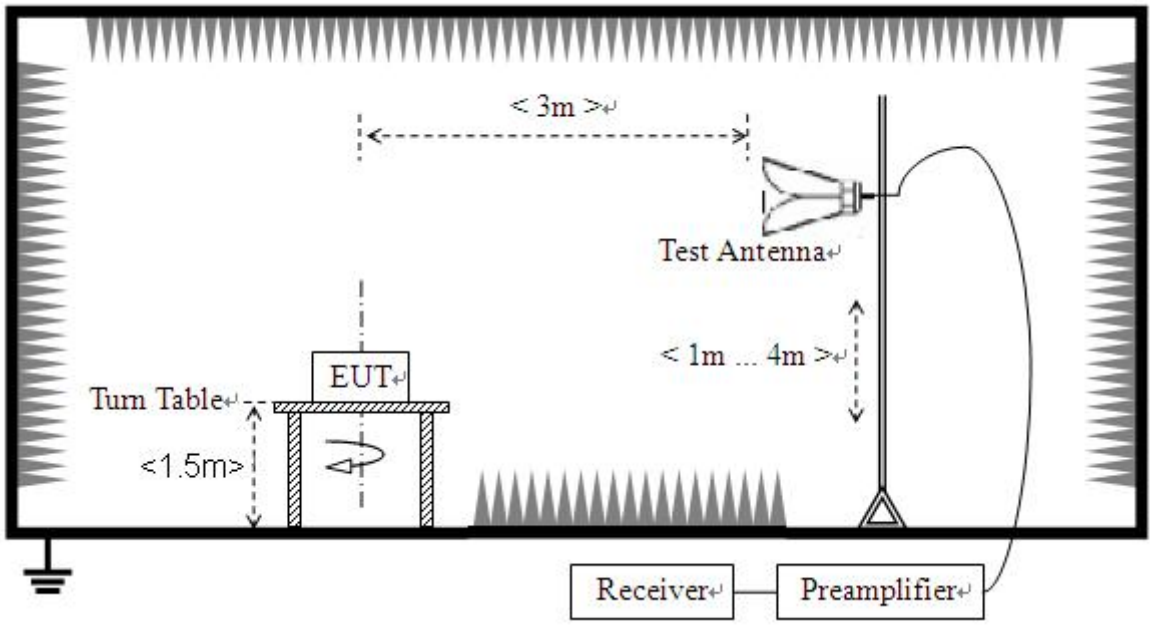
2.6. Restricted Frequency Bands

2.6.1. Requirement[i]

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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).

2.6.2. Test Description

A. Test Setup



a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. 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 height of antenna 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 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.
Note:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasipeak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

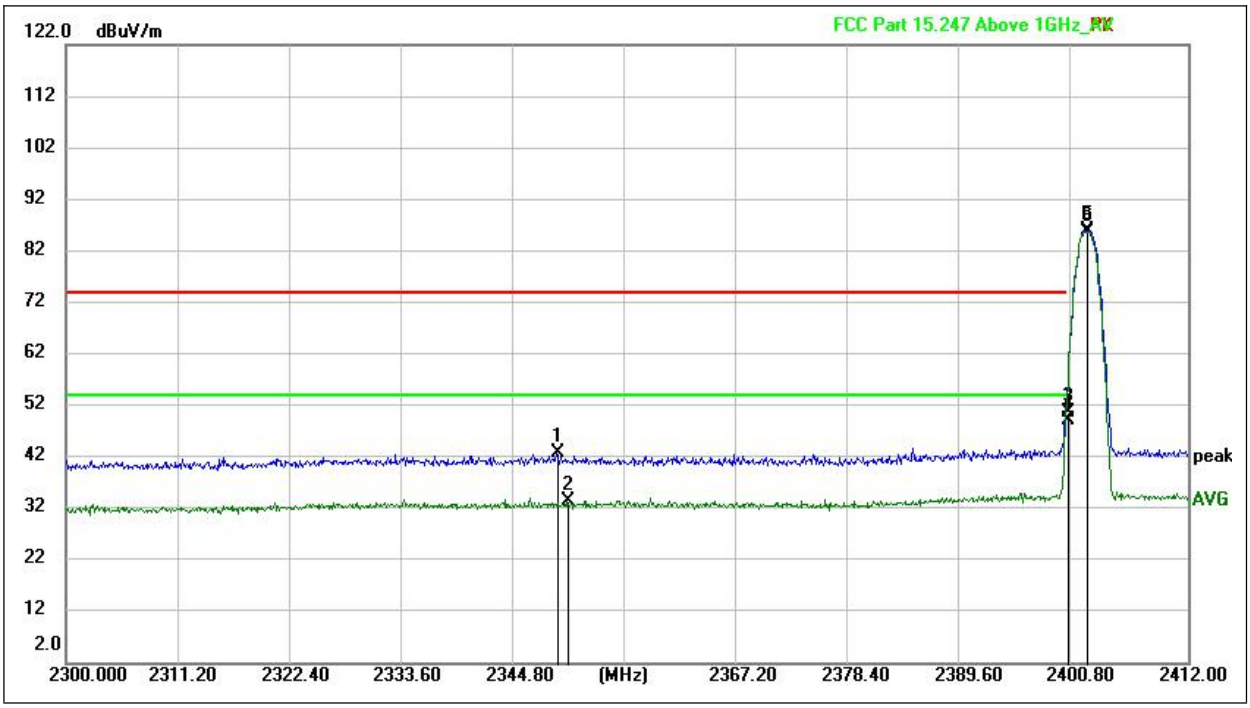
B. Equipments List:

Please refer ANNEX B(4).

2.6.3. Test Result

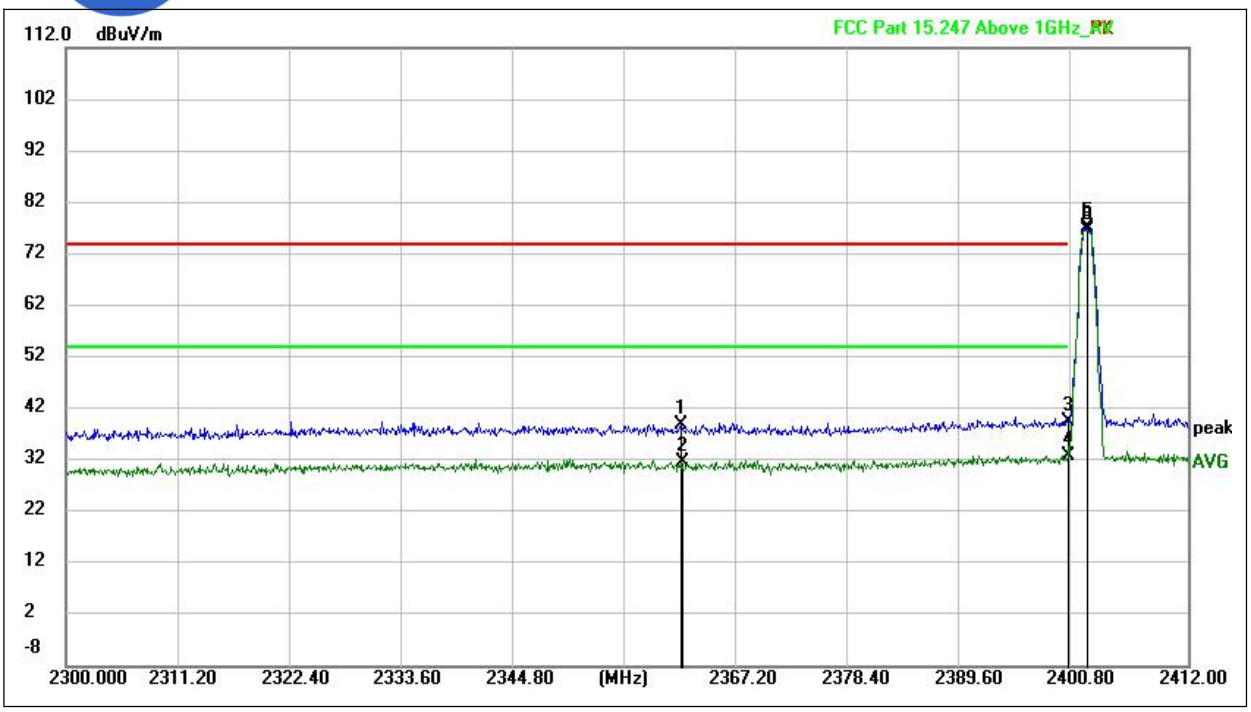
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =U_R + A_T + A_{Factor} [dB]; AT =$L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
A_T: Total correction Factor except Antenna
U_R: Receiver Reading
G_{preamp}: Preamplifier Gain
A_{Factor}: Antenna Factor at 3m

Test Plots:



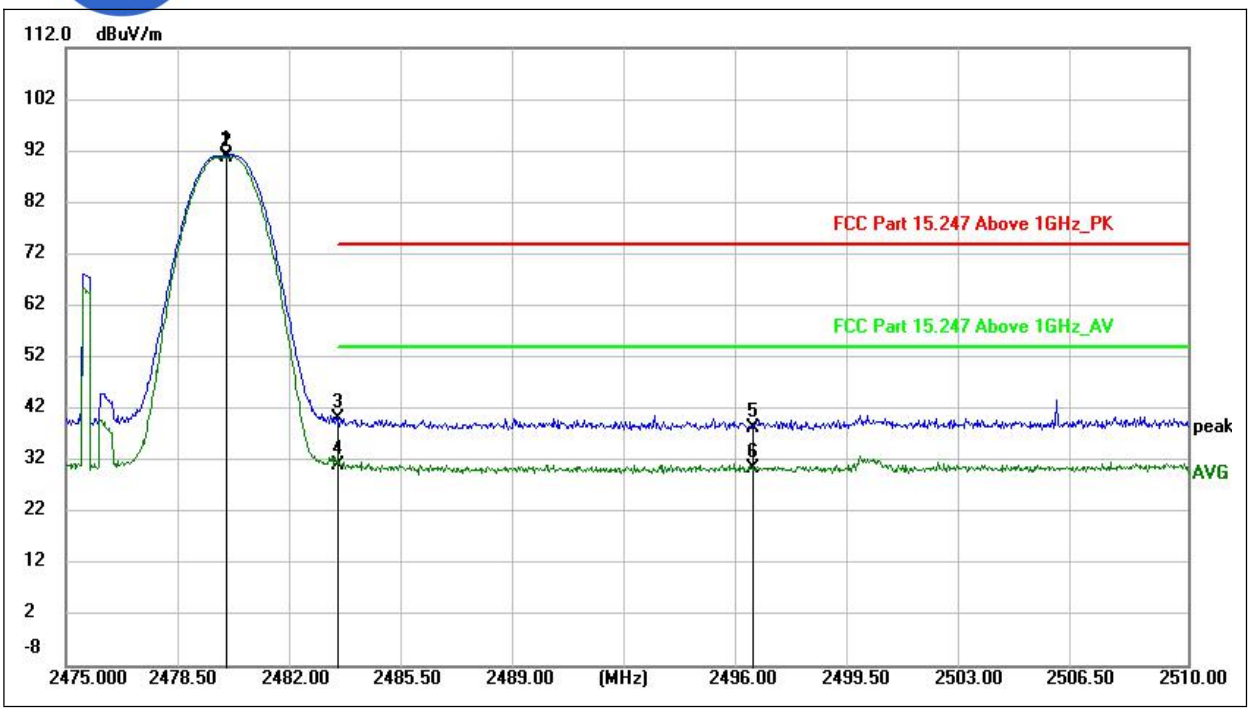
(BLE 1M PHY_2402MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
2349.056	42.82	---	74.00	31.18	H	7.71	PASS
2350.092	---	33.50	54.00	20.50	H	7.73	PASS
2400.000	50.59	---	74.00	23.41	H	8.70	PASS
2400.000	---	49.11	54.00	4.89	H	8.70	PASS
2402.000	85.96	---	---	---	H	8.68	PASS
2402.000	---	85.75	---	---	H	8.68	PASS



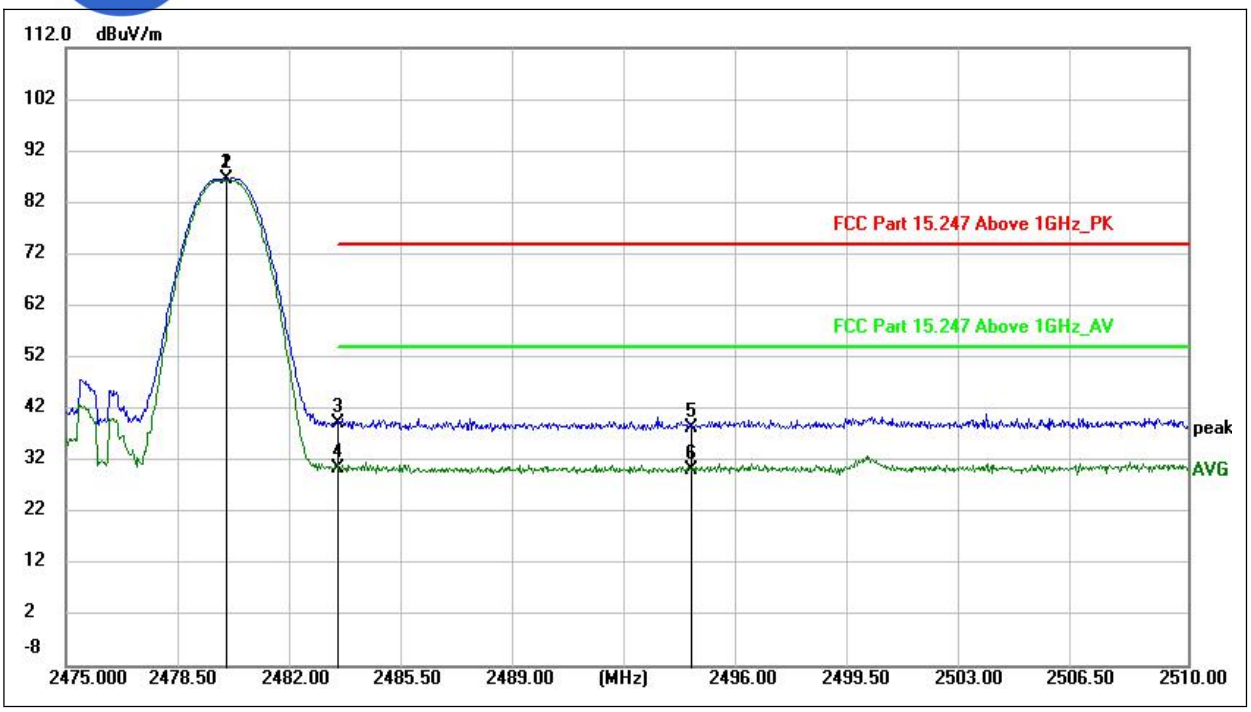
(LE 1M PHY_2402MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
2361.482	38.77	---	74.00	35.23	V	7.51	PASS
2361.533	---	31.72	54.00	22.28	V	7.51	PASS
2400.000	39.35	---	74.00	34.65	V	8.70	PASS
2400.000	---	32.92	54.00	21.08	V	8.70	PASS
2402.000	---	77.18	---	---	V	8.68	PASS
2402.000	76.60	---	---	---	V	8.68	PASS



(LE 1M PHY_2480MHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
2480.000	91.08	---	---	---	H	8.26	PASS
2480.000	---	90.79	---	---	H	8.26	PASS
2483.500	40.13	---	74.00	33.87	H	8.36	PASS
2483.500	---	30.96	54.00	23.04	H	8.36	PASS
2496.423	38.30	---	74.00	35.70	H	8.33	PASS
2496.423	---	30.52	54.00	23.48	H	8.33	PASS



(LE 1M PHY_2480MHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
2480.000	86.61	---	---	---	V	8.26	PASS
2480.000	---	86.38	---	---	V	8.26	PASS
2483.500	39.24	30.66	74.00	34.76	V	8.36	PASS
2483.500	---	---	54.00	23.58	V	8.36	PASS
2494.526	38.20	30.61	74.00	35.80	V	8.34	PASS
2494.526	---	---	54.00	23.82	V	8.34	PASS

2.7. Conducted Emission

2.7.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

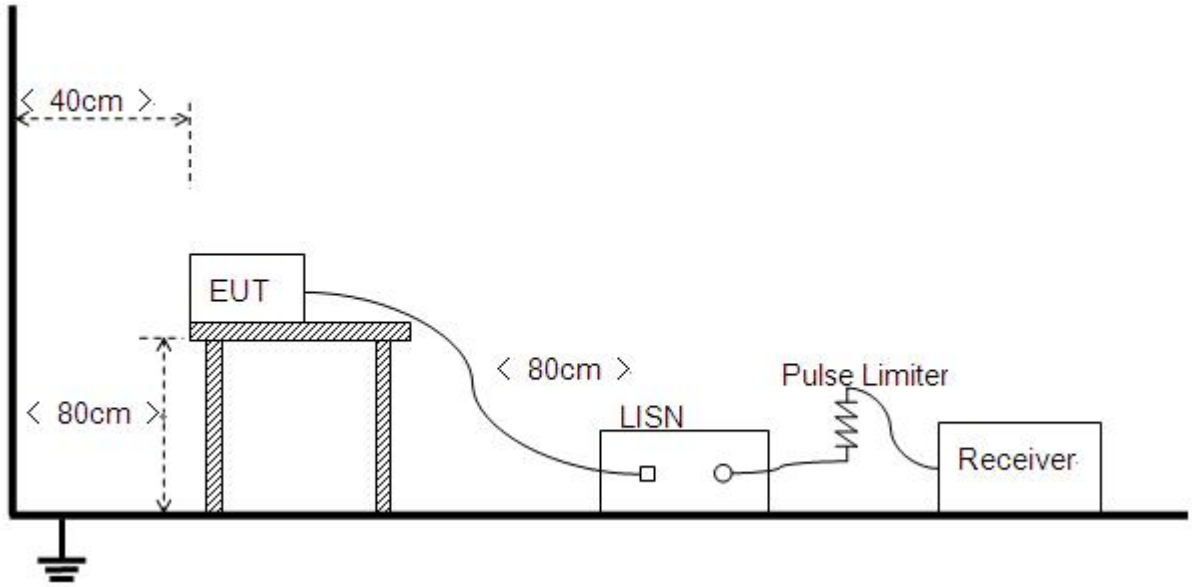
NOTE:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

B. Equipments List:

Please refer ANNEX A(1.5).

2.7.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

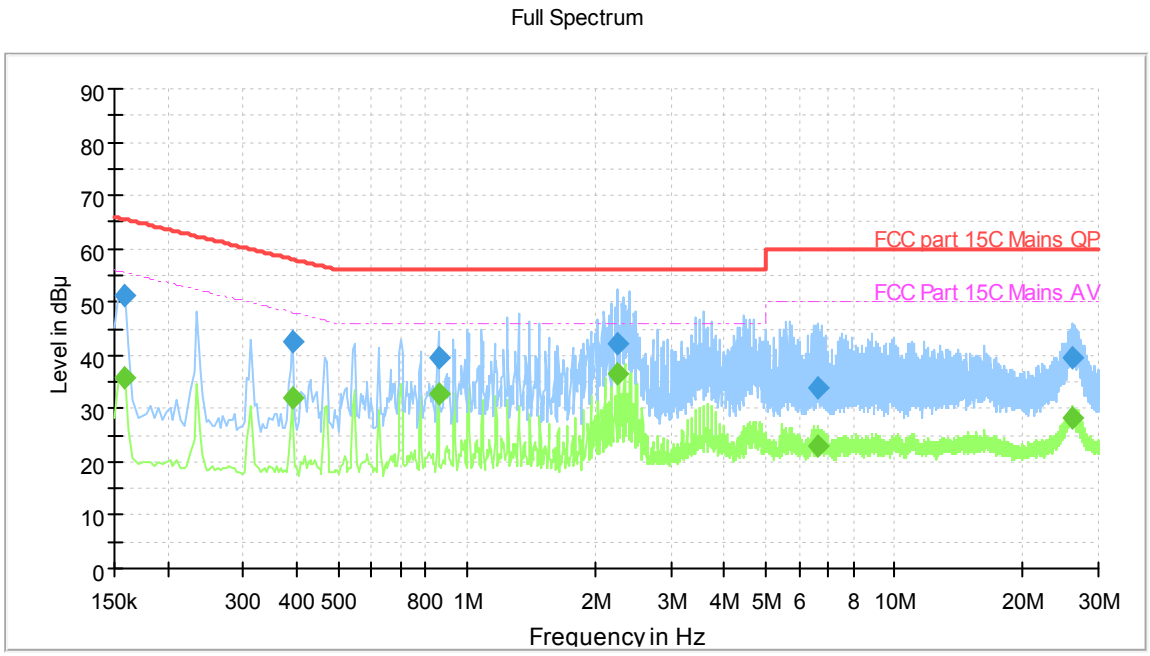
Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test setup:

The EUT configuration of the emission tests is EUT + Link.

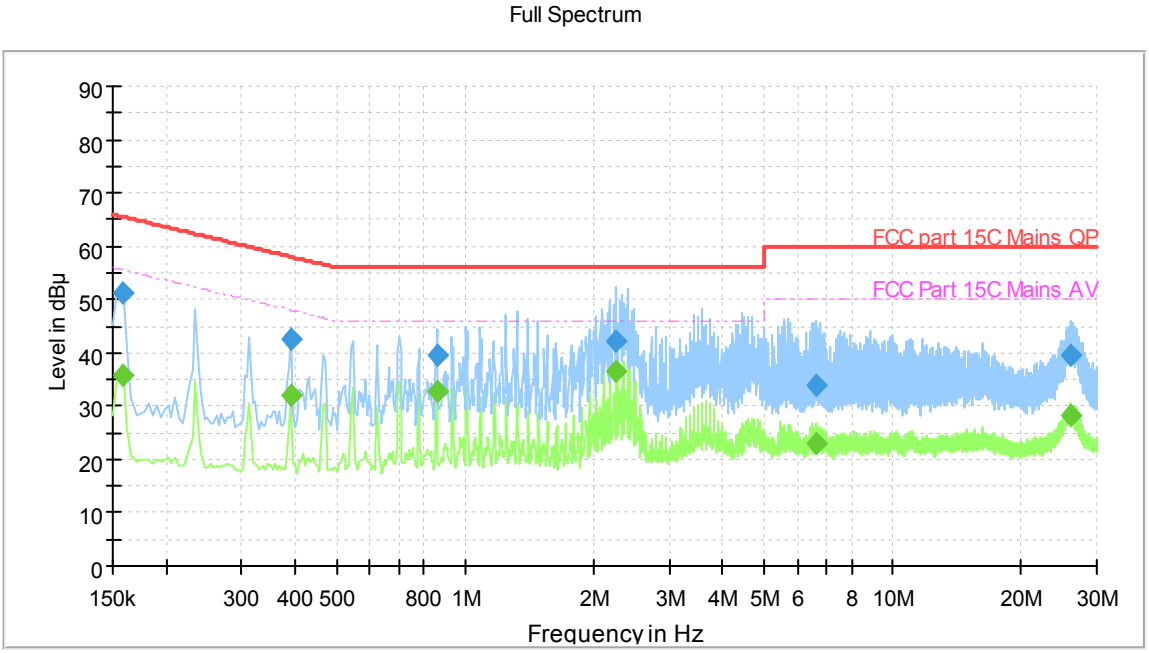
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(Plot A: L Phase)

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Verdict
0.158000	51.31	---	65.57	14.26	L	10.2	PASS
0.158000	---	40.28	55.57	15.28	L	10.2	PASS
0.546000	43.81	---	56.00	12.19	L	10.2	PASS
0.546000	---	41.45	46.00	4.55	L	10.2	PASS
2.186000	42.49	---	56.00	13.51	L	10.3	PASS
2.190000	---	34.30	46.00	11.70	L	10.3	PASS
4.462000	---	30.30	46.00	15.70	L	10.4	PASS
4.470000	42.81	---	56.00	13.19	L	10.4	PASS
9.910000	28.94	---	60.00	31.06	L	10.7	PASS
9.914000	---	23.27	50.00	26.73	L	10.7	PASS
26.278000	37.48	---	60.00	22.52	L	10.6	PASS
26.326000	---	28.09	50.00	21.91	L	10.6	PASS



(Plot A: N Phase)

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	**Verdict**
0.158000	---	35.71	55.57	19.86	N	10.2	PASS
0.158000	51.20	---	65.57	14.37	N	10.2	PASS
0.390000	---	32.04	48.06	16.03	N	10.2	PASS
0.390000	42.73	---	58.06	15.33	N	10.2	PASS
0.858000	---	32.80	46.00	13.20	N	10.3	PASS
0.858000	39.46	---	56.00	16.54	N	10.3	PASS
2.254000	42.15	---	56.00	13.85	N	10.3	PASS
2.262000	---	36.39	46.00	9.61	N	10.3	PASS
6.614000	33.78	---	60.00	26.22	N	10.5	PASS
6.614000	---	22.97	50.00	27.03	N	10.5	PASS
26.022000	---	28.26	50.00	21.74	N	10.5	PASS
26.190000	39.67	---	60.00	20.33	N	10.5	PASS

2.8. Radiated Emission

2.8.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

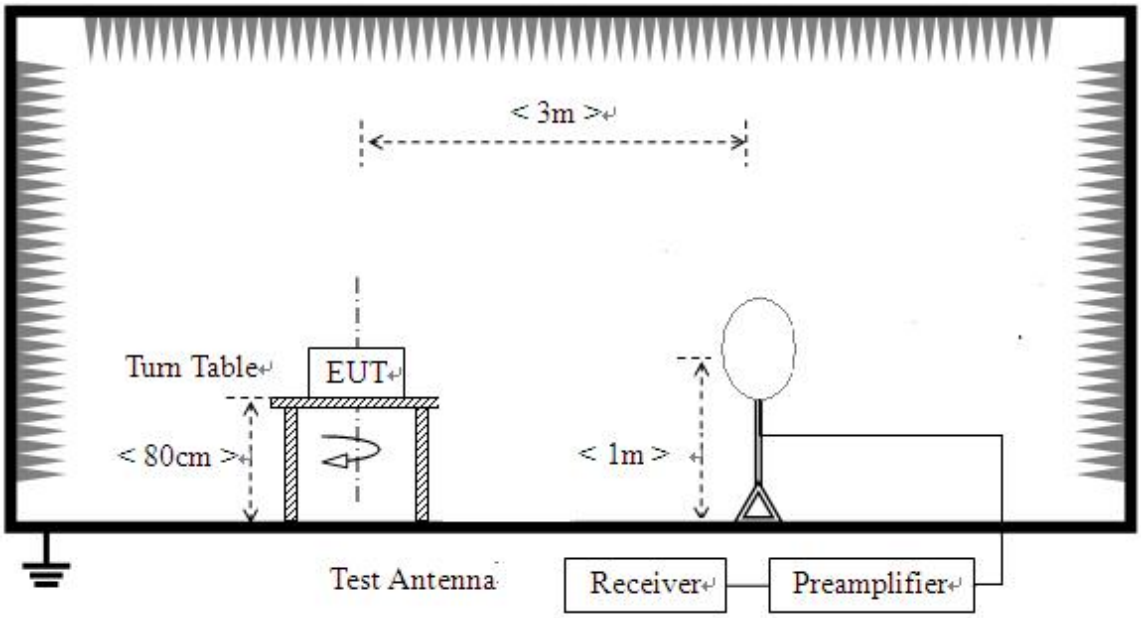
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

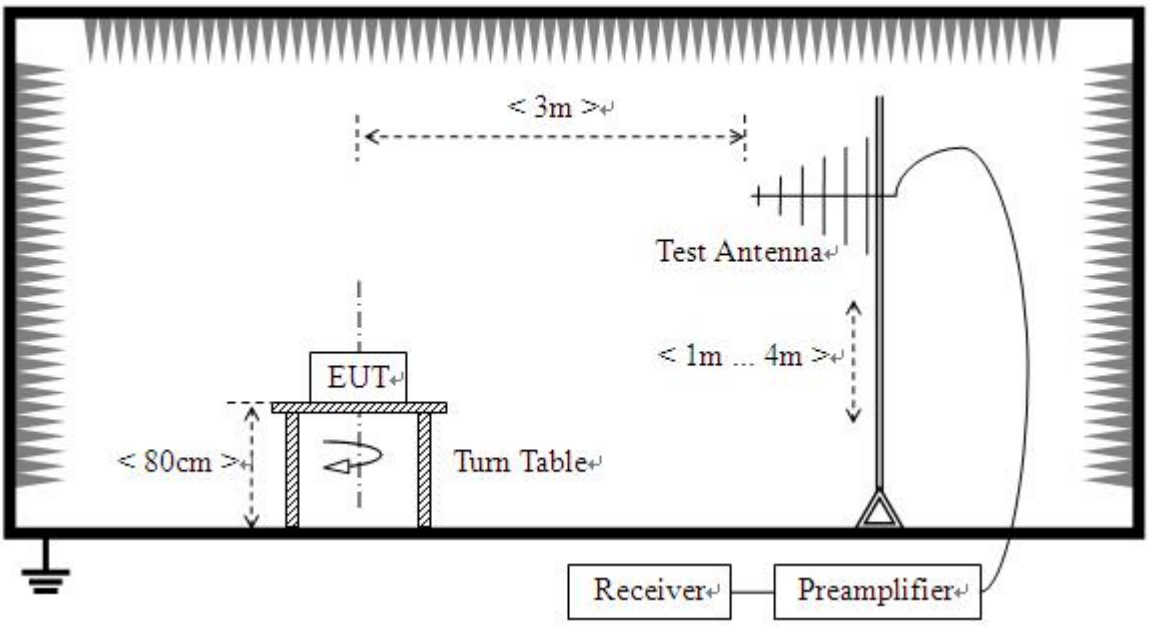
2.8.2. Test Description

A. Test Setup:

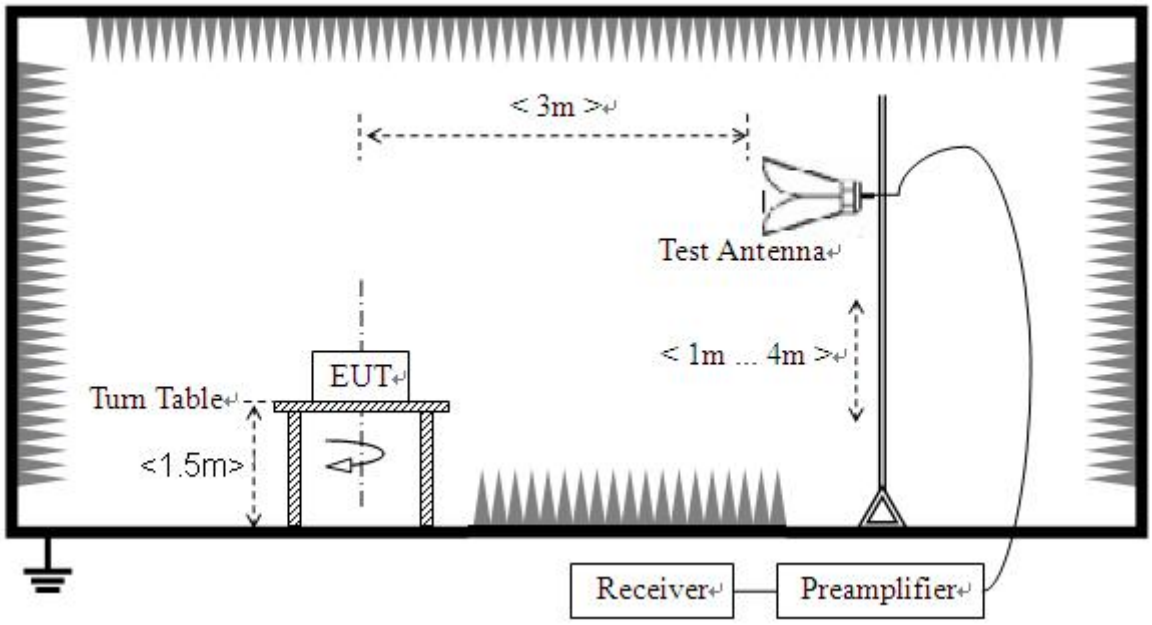
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The RF absorbing material used on the reference ground plane and on the turntable have a maximum height (thickness) of 30 cm (12 in) and have a minimum-rated attenuation of 20 dB at all frequencies from 1 GHz to 18 GHz. Test site have a minimum area of the ground plane covered with RF absorbing material as specified in Figure 6 of ANSI C63.4: 2014.

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10:2013. For radiated emissions below or equal to 1GHz, The EUT was set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10:2013.

For Radiated emission below 30MHz:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case 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 Quasi-Peak Detect Function and Specified Bandwidth with

Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz:

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. 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 height of antenna 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 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasipeak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geqslant$ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle $\geqslant$ 98%) for Average detection (AV) at frequency above 1GHz.

4. All modes of operation were investigated and the worst-case emissions are reported.

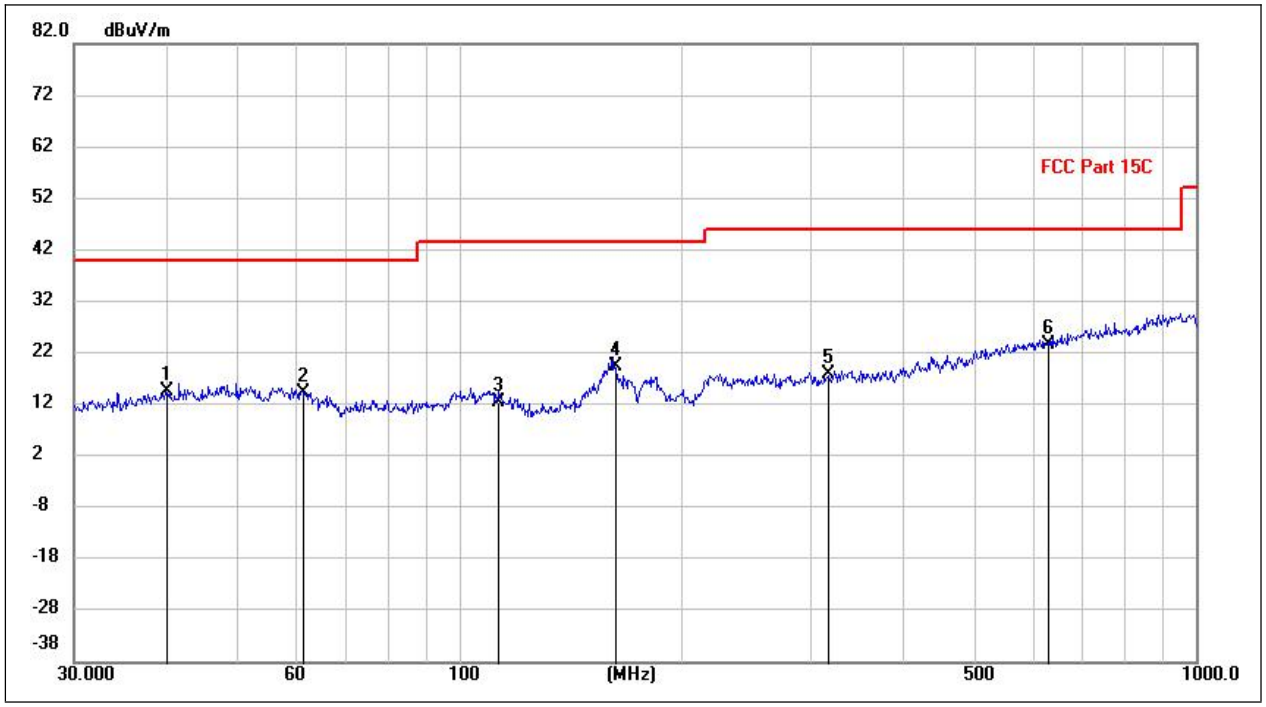
B. Equipments List:

Please refer ANNEX B(4).

2.8.3. Test Result

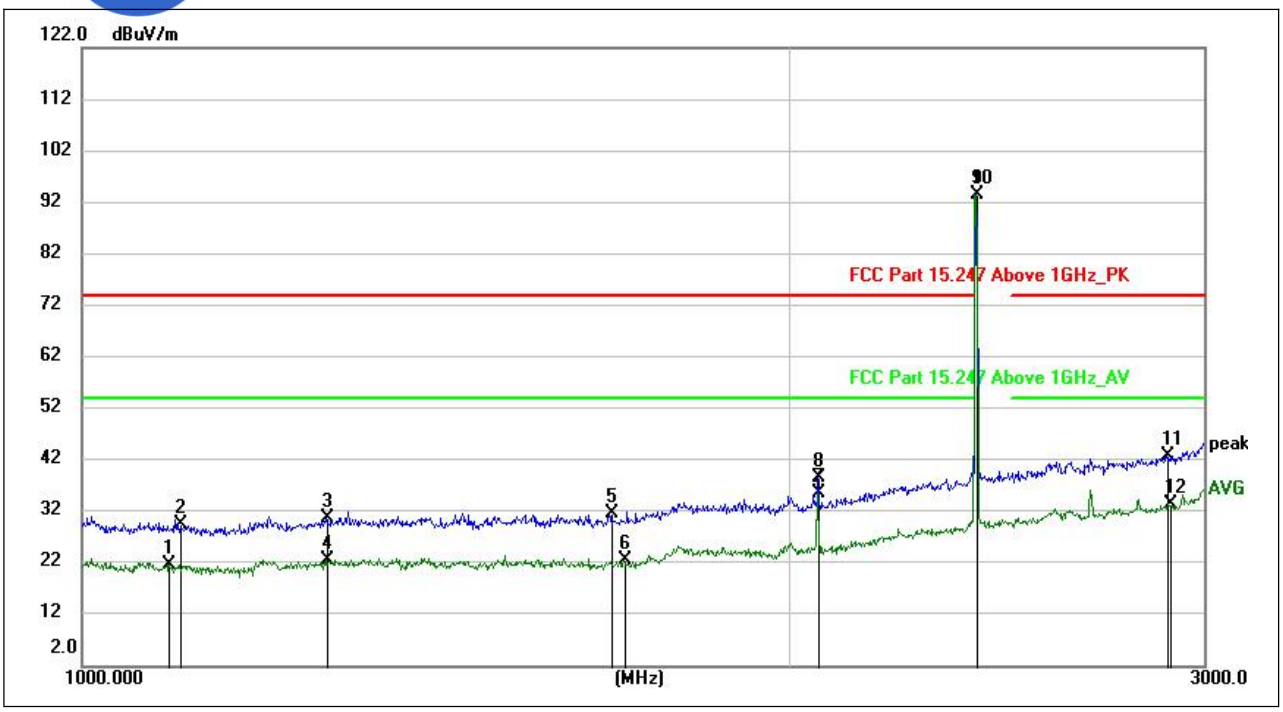
Note1: For the frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Note2: For the frequency, which started from 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.



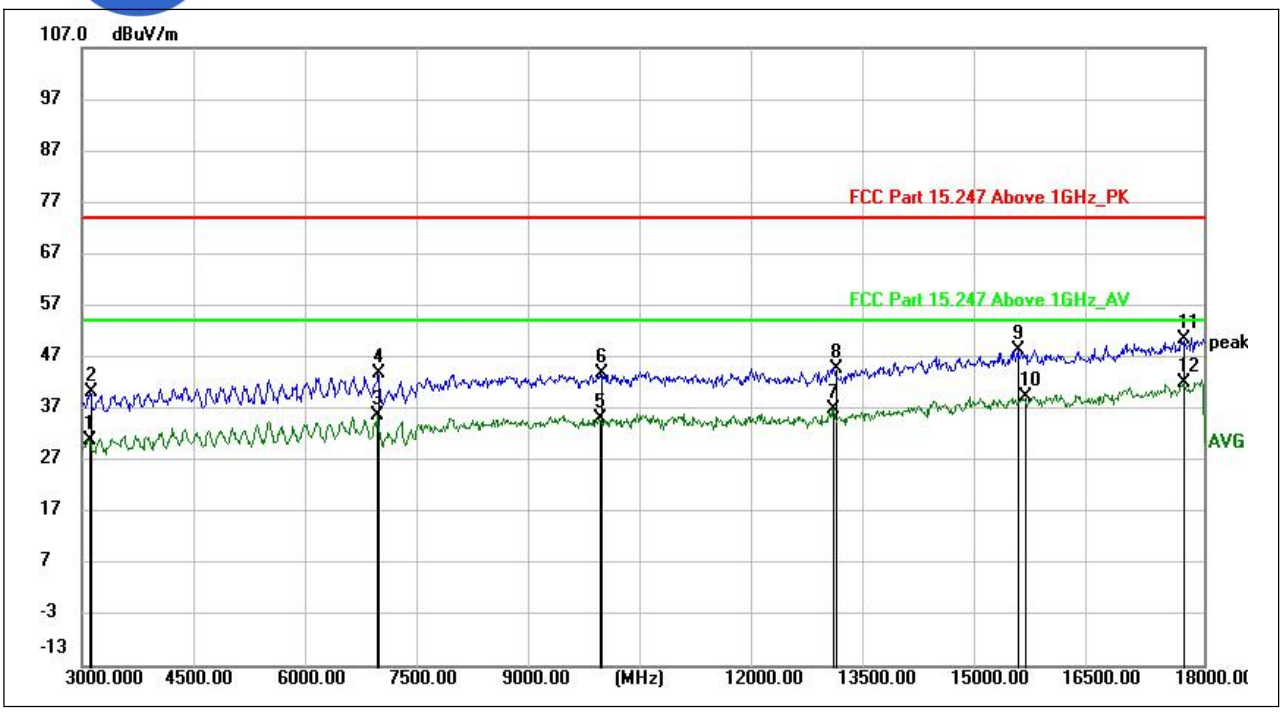
(LE 1M PHY_2402MHz, Antenna Horizontal, 30MHz to 1GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
40.0785	14.74	40.00	25.26	H	15.62	PASS
61.5294	14.21	40.00	25.79	H	13.91	PASS
112.5638	12.54	43.50	30.96	H	13.96	PASS
162.9531	19.29	43.50	24.21	H	11.53	PASS
317.0333	17.78	46.00	28.22	H	17.49	PASS
628.4847	23.58	46.00	22.42	H	23.93	PASS



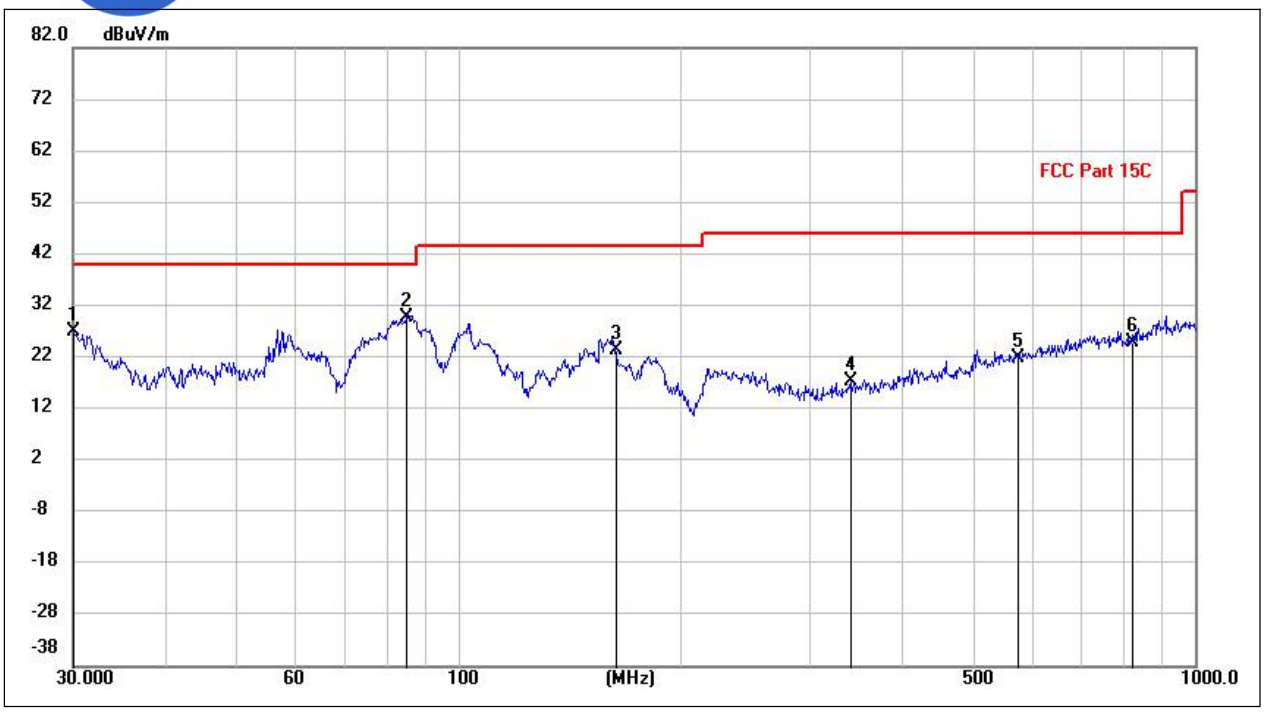
(LE 1M PHY _2402MHz, Antenna Horizontal, 1GHz to 3GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
1088.394	---	21.85	54.00	32.15	H	-4.18	PASS
1100.417	29.44	---	74.00	44.56	H	-3.75	PASS
1271.448	30.89	---	74.00	43.11	H	-2.39	PASS
1271.448	---	22.66	54.00	31.34	H	-2.39	PASS
1678.660	31.58	---	74.00	42.42	H	0.38	PASS
1701.591	---	22.74	54.00	31.26	H	0.64	PASS
2056.980	---	35.71	54.00	18.29	H	3.74	PASS
2057.771	38.60	---	74.00	35.40	H	3.73	PASS
2402.015	---	93.55	---	---	H	8.69	PASS
2402.279	93.64	---	---	---	H	8.69	PASS
2895.729	42.91	---	74.00	31.09	H	11.90	PASS
2899.868	---	33.40	54.00	20.60	H	11.78	PASS



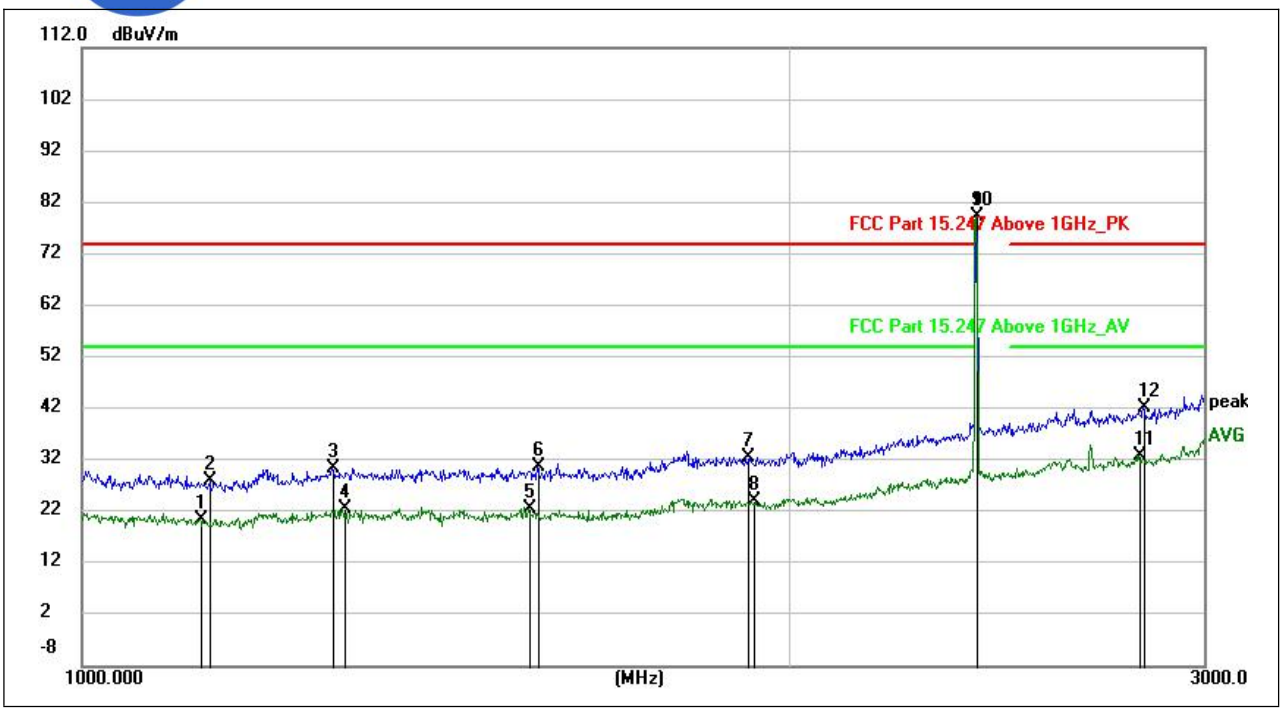
(LE 1M PHY _2402MHz, Antenna Horizontal, 3GHz to 18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
3105.000	---	30.91	54.00	23.09	H	-5.74	PASS
3112.500	40.11	---	74.00	33.89	H	-5.75	PASS
6959.250	---	35.80	54.00	18.20	H	-0.60	PASS
6963.750	43.93	---	74.00	30.07	H	-0.63	PASS
9921.750	---	35.19	54.00	18.81	H	2.13	PASS
9941.250	43.84	---	74.00	30.16	H	2.08	PASS
13038.750	---	36.90	54.00	17.10	H	6.40	PASS
13070.250	44.69	---	74.00	29.31	H	6.49	PASS
15513.000	48.32	---	74.00	25.68	H	11.26	PASS
15610.500	---	39.26	54.00	14.74	H	10.25	PASS
17716.500	50.41	---	74.00	23.59	H	14.63	PASS
17741.250	---	41.96	54.00	12.04	H	15.16	PASS



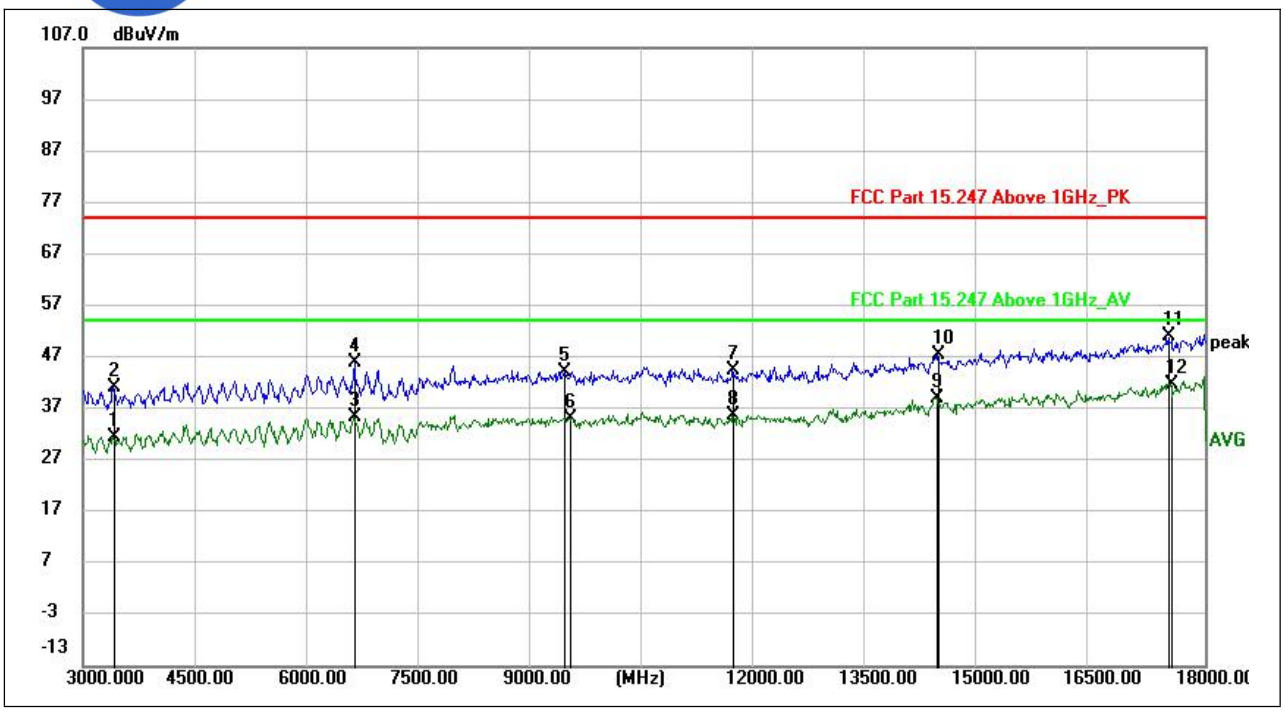
(LE 1M PHY _2402MHz, Antenna Vertical, 30MHz to 1GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
30.0000	27.09	40.00	12.91	V	13.90	PASS
85.2831	29.57	40.00	10.43	V	10.75	PASS
163.3249	23.32	43.50	20.18	V	11.42	PASS
341.9188	17.20	46.00	28.80	V	18.24	PASS
575.5333	21.74	46.00	24.26	V	22.98	PASS
821.5664	24.93	46.00	21.07	V	26.27	PASS



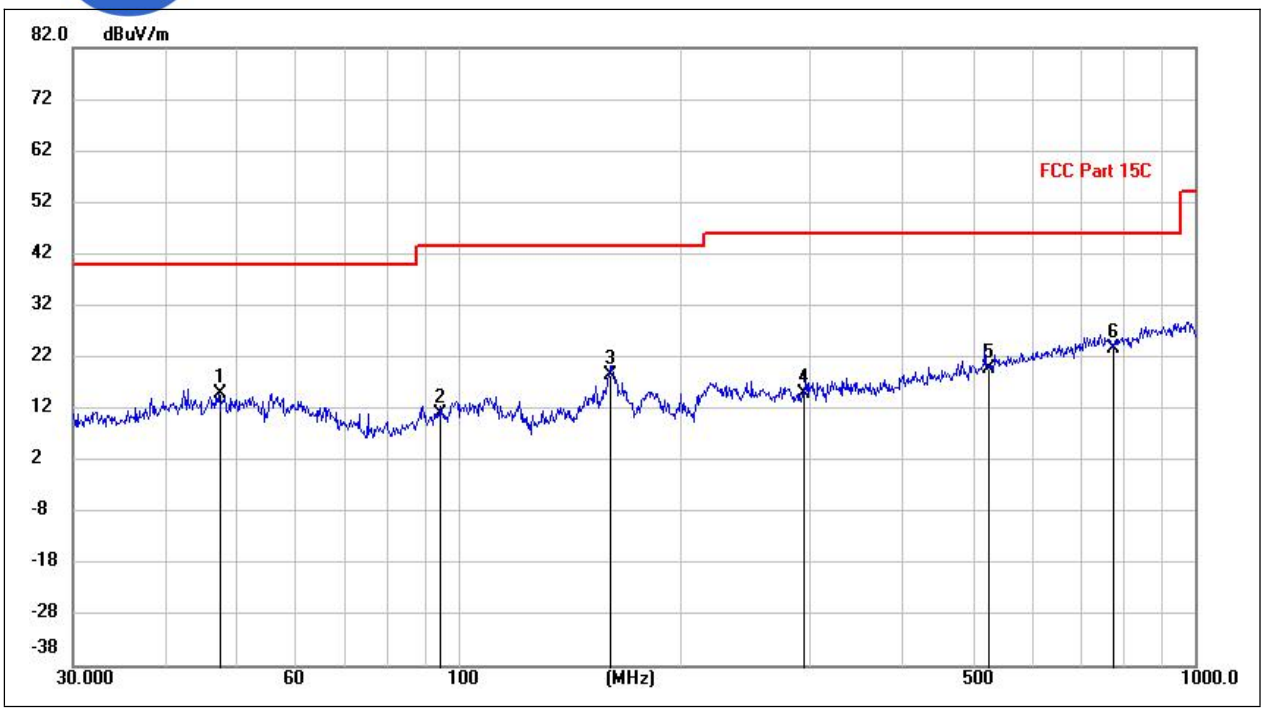
(LE 1M PHY _2402MHz, Antenna Vertical , 1GHz to 3GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
1123.258	---	20.53	54.00	33.47	V	-4.07	PASS
1134.481	28.13	---	74.00	45.87	V	-4.31	PASS
1278.733	30.41	---	74.00	43.59	V	-2.26	PASS
1291.794	---	22.52	54.00	31.48	V	-2.43	PASS
1549.971	---	22.57	54.00	31.43	V	0.31	PASS
1563.310	30.73	---	74.00	43.27	V	0.29	PASS
1919.110	32.60	---	74.00	41.40	V	2.41	PASS
1929.681	---	24.06	54.00	29.94	V	2.49	PASS
2401.883	79.38	---	---	---	V	8.69	PASS
2401.883	---	79.16	---	---	V	8.69	PASS
2815.887	---	32.90	54.00	21.10	V	10.89	PASS
2829.842	42.22	---	74.00	31.78	V	10.72	PASS



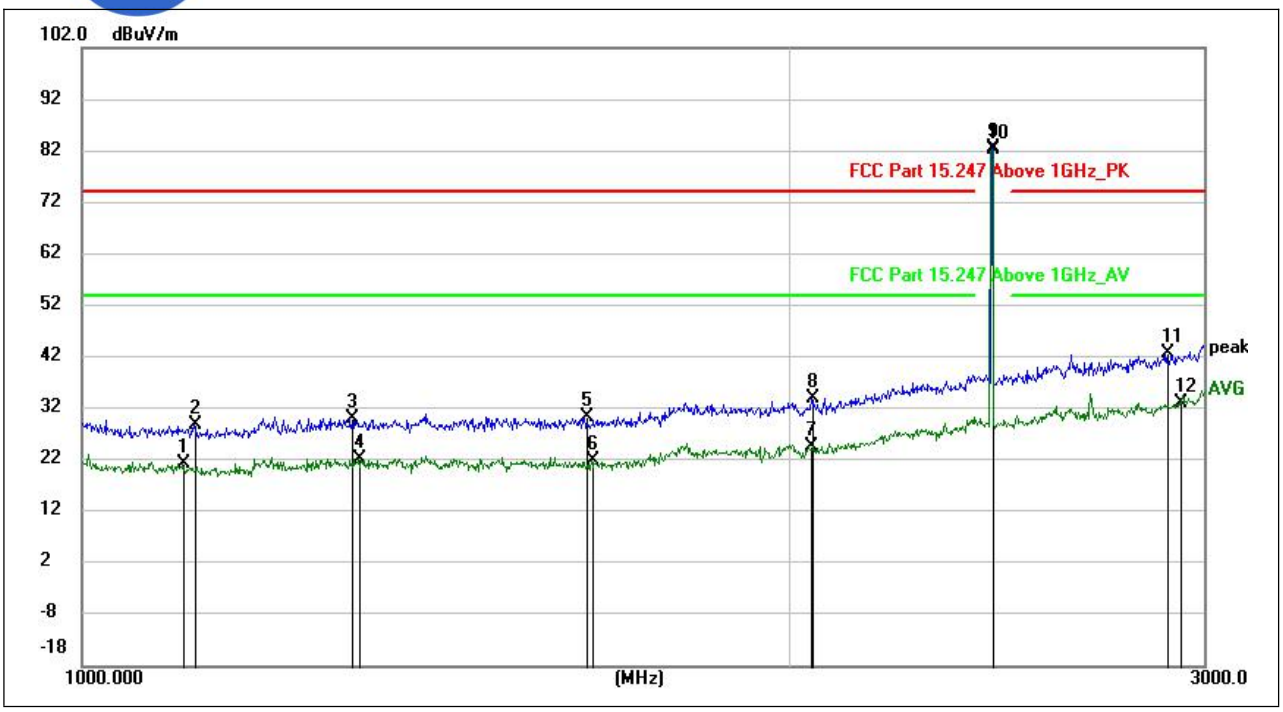
(LE 1M PHY _2402MHz, Antenna Vertical, 3GHz to 18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
3408.000	---	31.61	54.00	22.39	V	-5.96	PASS
3414.750	41.04	---	74.00	32.96	V	-5.91	PASS
6633.000	---	35.26	54.00	18.74	V	-0.55	PASS
6644.250	45.97	---	74.00	28.03	V	-0.39	PASS
9447.000	44.24	---	74.00	29.76	V	2.10	PASS
9509.250	---	35.22	54.00	18.78	V	2.02	PASS
11688.750	44.29	---	74.00	29.71	V	3.95	PASS
11688.750	---	35.71	54.00	18.29	V	3.95	PASS
14403.750	---	39.12	54.00	14.88	V	9.43	PASS
14433.750	47.51	---	74.00	26.49	V	9.43	PASS
17511.000	50.99	---	74.00	23.01	V	14.96	PASS
17537.250	---	41.87	54.00	12.13	V	14.31	PASS



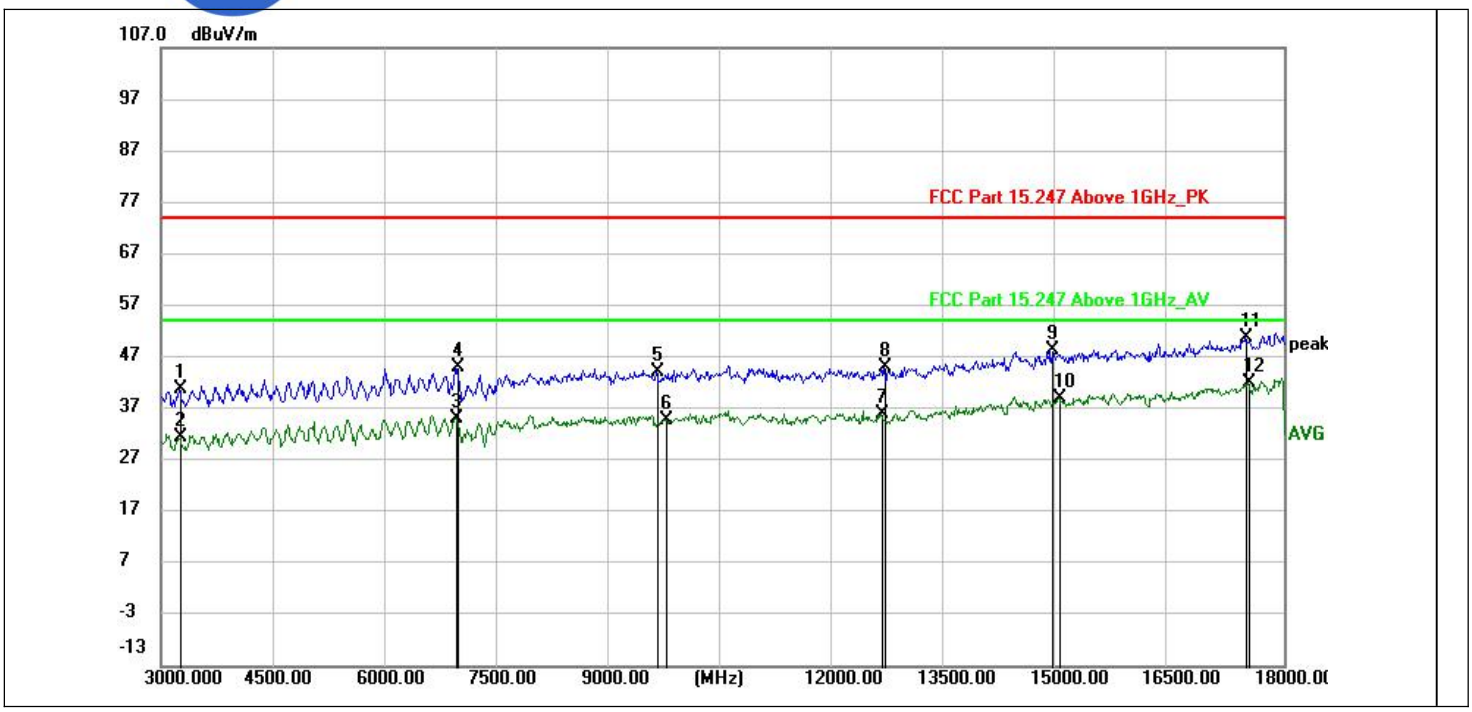
(LE 1M PHY _2440MHz, Antenna Horizontal, 30MHz to 1GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
47.4668	14.95	40.00	25.05	H	15.49	PASS
94.1144	11.09	43.50	32.41	H	12.93	PASS
160.8243	18.51	43.50	24.99	H	12.06	PASS
293.3413	14.84	46.00	31.16	H	15.86	PASS
523.0847	19.66	46.00	26.34	H	22.13	PASS
776.7416	23.75	46.00	22.25	H	26.05	PASS



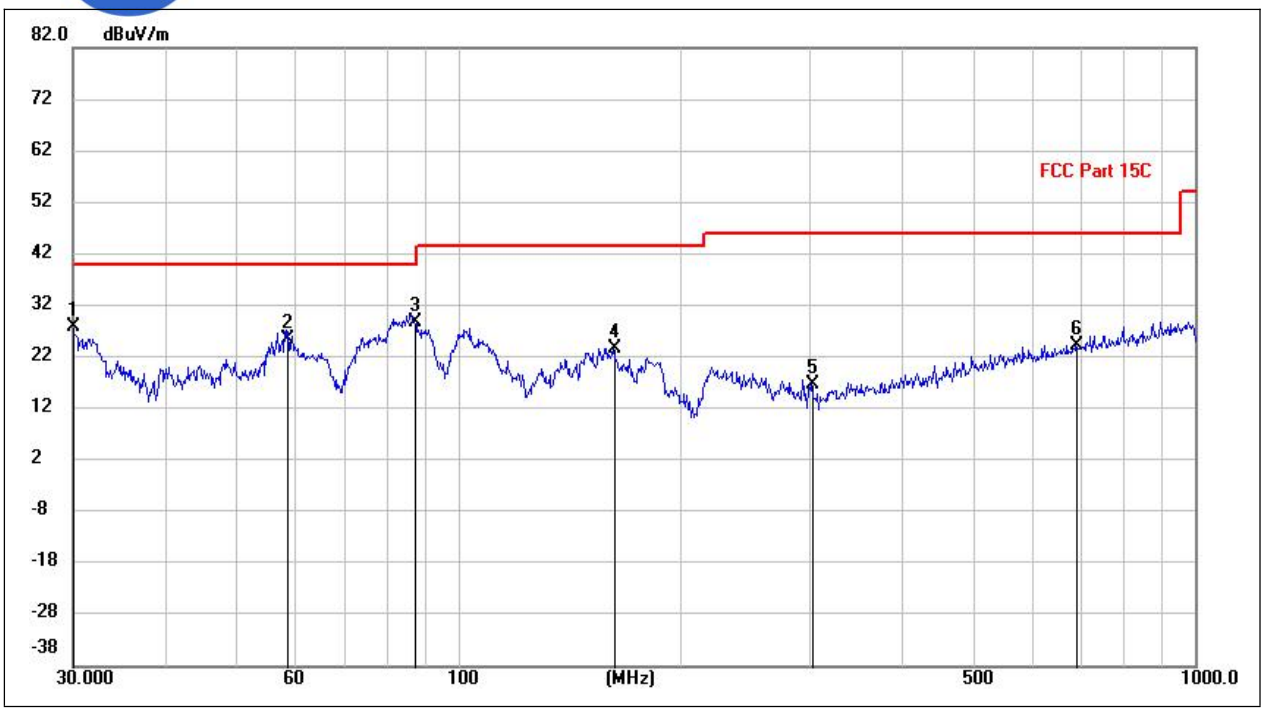
(LE 1M PHY _2440MHz, Antenna Horizontal, 1GHz to 3GHz)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
1104.656	---	21.28	54.00	32.72	H	-3.69	PASS
1116.798	28.95	---	74.00	45.05	H	-3.98	PASS
1301.838	29.96	---	74.00	44.04	H	-2.43	PASS
1312.681	---	22.32	54.00	31.68	H	-2.32	PASS
1638.034	30.34	---	74.00	43.66	H	0.34	PASS
1649.682	---	21.93	54.00	32.07	H	0.30	PASS
2041.446	---	24.73	54.00	29.27	H	3.94	PASS
2044.926	33.89	---	74.00	40.11	H	3.98	PASS
2439.915	82.54	---	---	---	H	7.85	PASS
2439.915	---	82.28	---	---	H	7.85	PASS
2893.821	42.76	---	74.00	31.24	H	11.85	PASS
2933.513	---	32.98	54.00	21.02	H	11.43	PASS



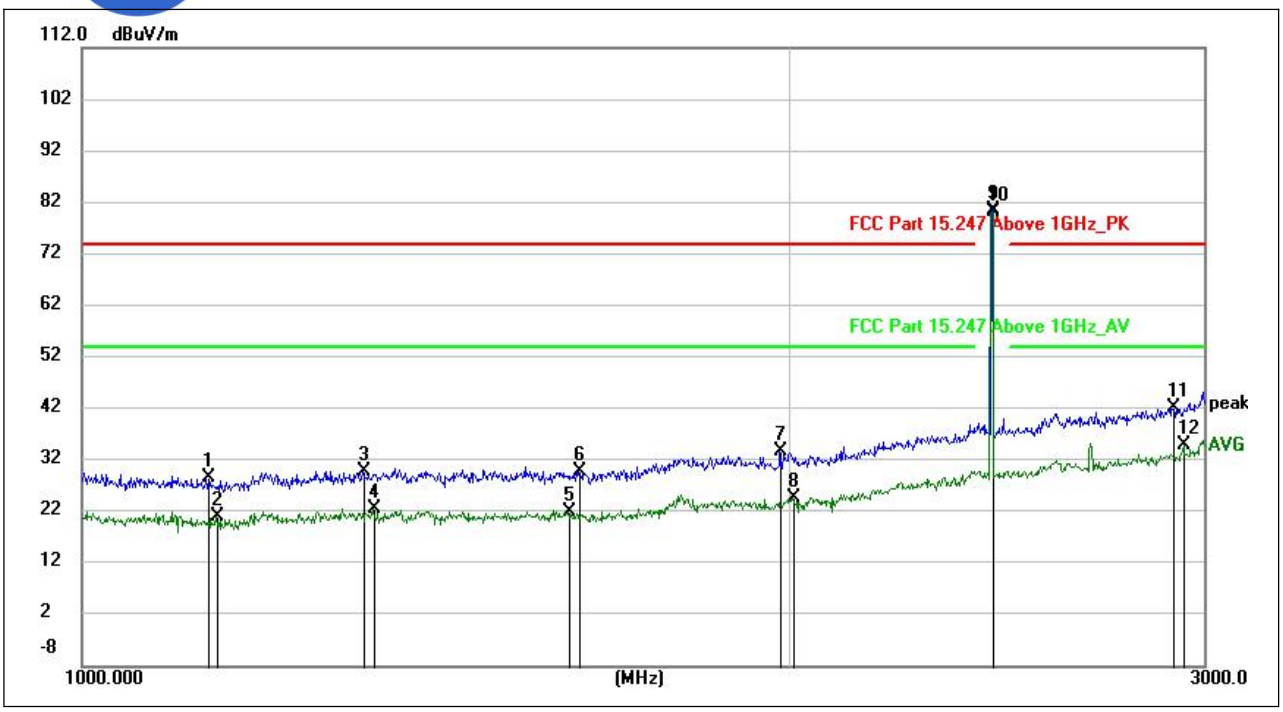
(LE 1M PHY _2440MHz, Antenna Horizontal, 3GHz to 18GHz)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
3248.250	40.90	---	74.00	33.10	H	-6.12	PASS
3259.500	---	31.59	54.00	22.41	H	-5.90	PASS
6954.000	---	35.16	54.00	18.84	H	-0.57	PASS
6963.750	44.89	---	74.00	29.11	H	-0.63	PASS
9629.250	44.15	---	74.00	29.85	H	1.78	PASS
9743.250	---	34.86	54.00	19.14	H	2.04	PASS
12630.750	---	35.92	54.00	18.08	H	4.77	PASS
12663.750	45.05	---	74.00	28.95	H	4.78	PASS
14901.000	48.23	---	74.00	25.77	H	9.26	PASS
15009.750	---	38.90	54.00	15.10	H	10.72	PASS
17501.250	50.64	---	74.00	23.36	H	13.97	PASS
17523.750	---	41.91	54.00	12.09	H	13.90	PASS



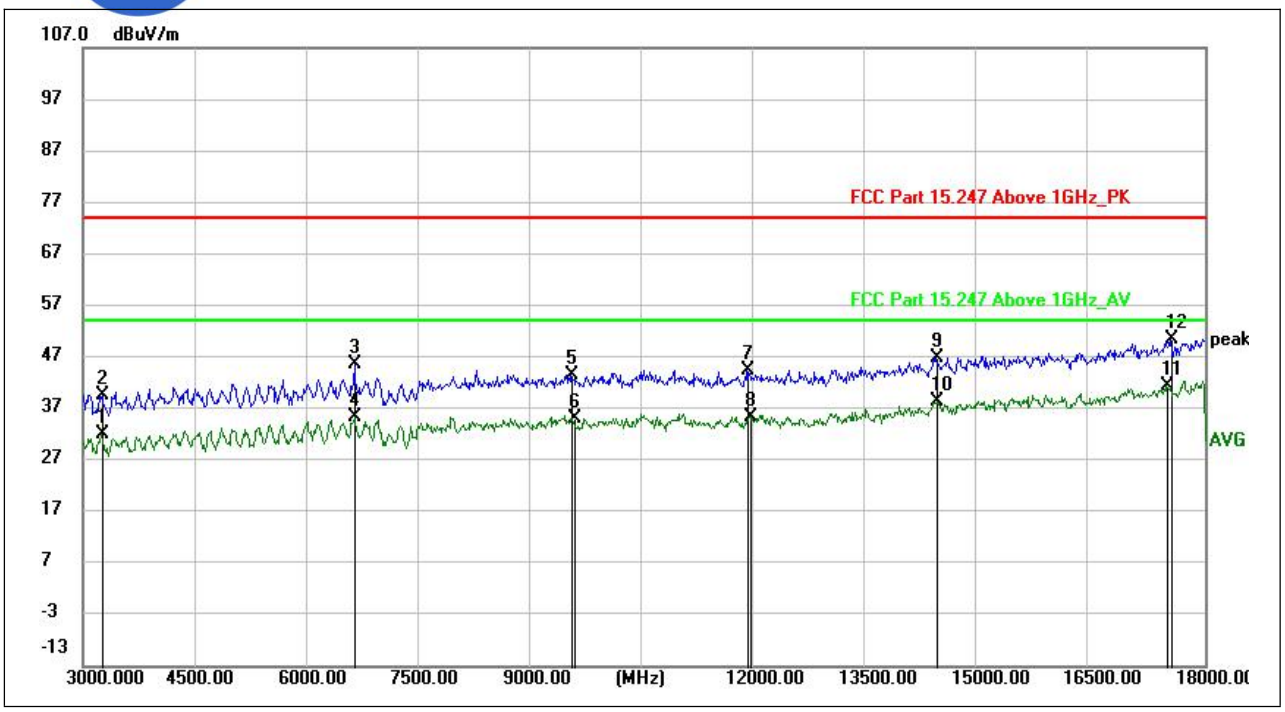
(LE 1M PHY _2440MHz, Antenna Vertical, 30MHz to 1GHz)

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
30.0000	27.87	40.00	12.13	V	13.90	PASS
58.6126	25.54	40.00	14.46	V	14.43	PASS
87.1728	28.74	40.00	11.26	V	11.31	PASS
162.8674	23.64	43.50	19.86	V	11.56	PASS
302.2161	16.86	46.00	29.14	V	17.21	PASS
691.3803	24.17	46.00	21.83	V	24.86	PASS



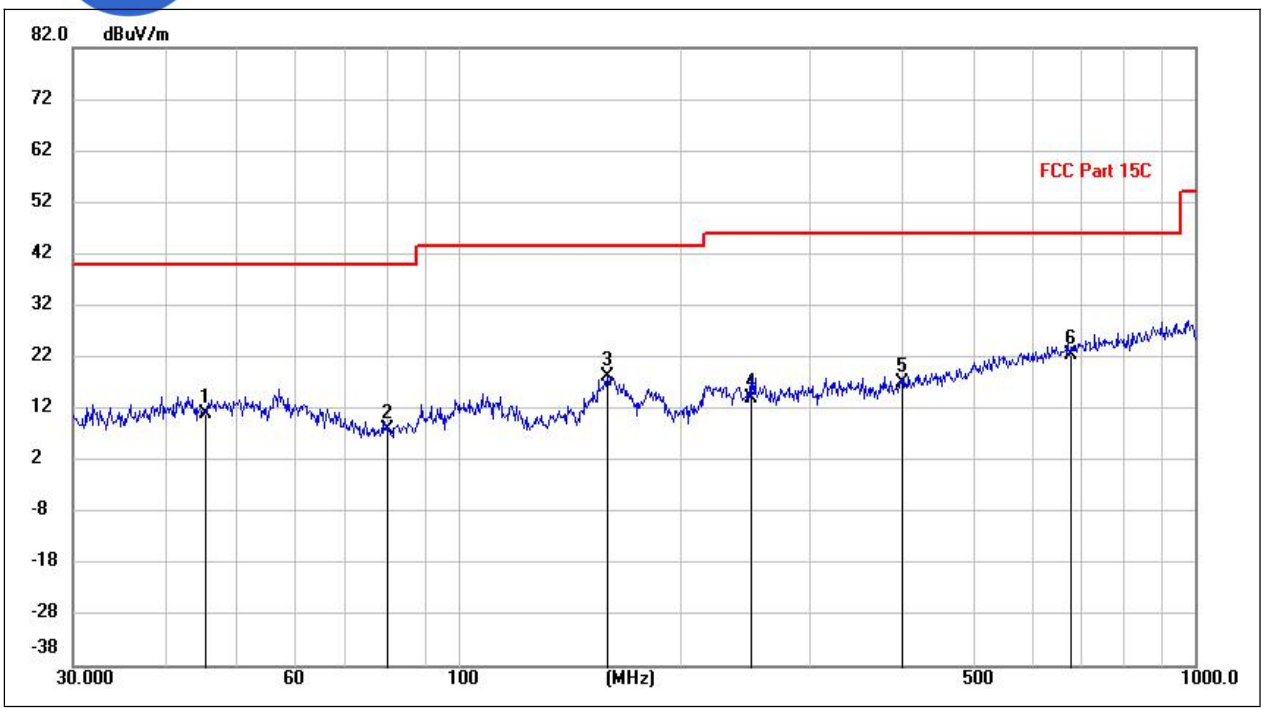
(LE 1M PHY _2440MHz, Antenna Vertical , 1GHz to 3GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
1130.997	28.53	---	74.00	45.47	V	-4.23	PASS
1141.420	---	21.12	54.00	32.88	V	-4.33	PASS
1317.231	29.74	---	74.00	44.26	V	-2.25	PASS
1331.563	---	22.65	54.00	31.35	V	-2.43	PASS
1611.881	---	21.86	54.00	32.14	V	0.54	PASS
1627.272	29.87	---	74.00	44.13	V	0.47	PASS
1981.999	33.75	---	74.00	40.25	V	2.64	PASS
2006.537	---	24.73	54.00	29.27	V	3.99	PASS
2439.915	80.61	---	---	---	V	7.85	PASS
2439.915	---	80.20	---	---	V	7.85	PASS
2910.880	42.09	---	74.00	31.91	V	11.44	PASS
2944.329	---	34.86	54.00	19.14	V	11.97	PASS



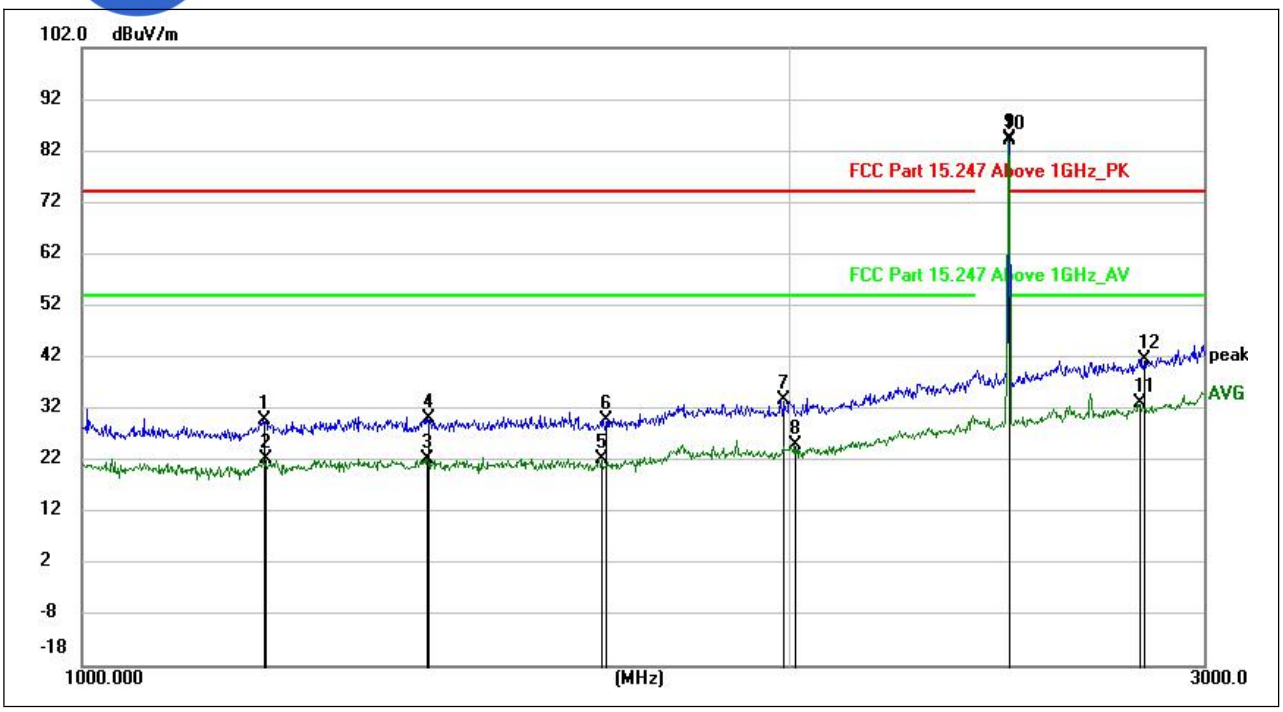
(LE 1M PHY _2440MHz, Antenna Vertical, 3GHz to 18GHz)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
3264.750	32.12	32.12	54.00	21.88	V	-5.79	PASS
3267.000	39.71	39.71	74.00	34.29	V	-5.75	PASS
6639.000	45.62	45.62	74.00	28.38	V	-0.47	PASS
6639.000	35.54	35.54	54.00	18.46	V	-0.47	PASS
9526.500	43.51	43.51	74.00	30.49	V	2.21	PASS
9555.750	35.21	35.21	54.00	18.79	V	2.51	PASS
11895.000	44.40	44.40	74.00	29.60	V	3.99	PASS
11918.250	35.48	35.48	54.00	18.52	V	4.18	PASS
14415.750	46.96	46.96	74.00	27.04	V	9.49	PASS
14418.000	38.45	38.45	54.00	15.55	V	9.50	PASS
17497.500	41.36	41.36	54.00	12.64	V	14.89	PASS
17543.250	50.51	50.51	74.00	23.49	V	14.15	PASS



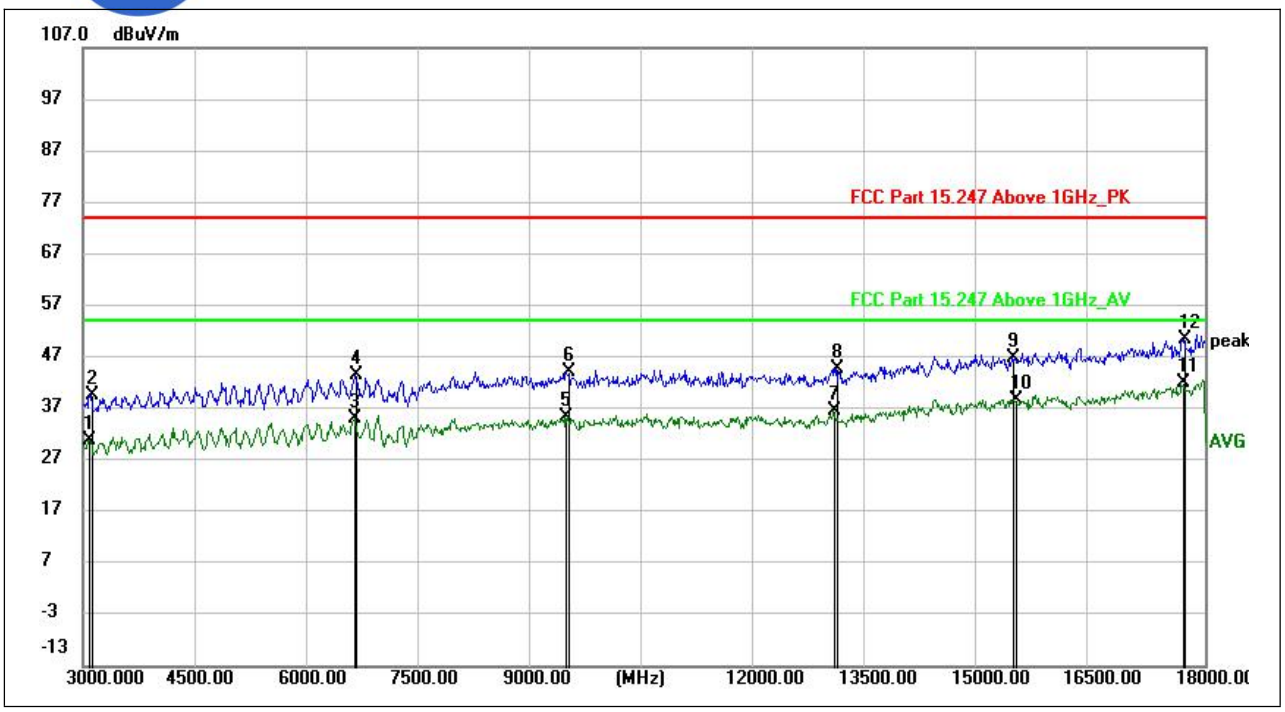
(LE 1M PHY _2480MHz, Antenna Horizontal, 30MHz to 1GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
45.3277	11.13	40.00	28.87	H	15.45	PASS
79.8143	7.83	40.00	32.17	H	10.85	PASS
159.6164	18.28	43.50	25.22	H	12.08	PASS
249.8189	13.89	46.00	32.11	H	14.89	PASS
399.6603	17.09	46.00	28.91	H	19.75	PASS
676.9861	22.38	46.00	23.62	H	24.65	PASS



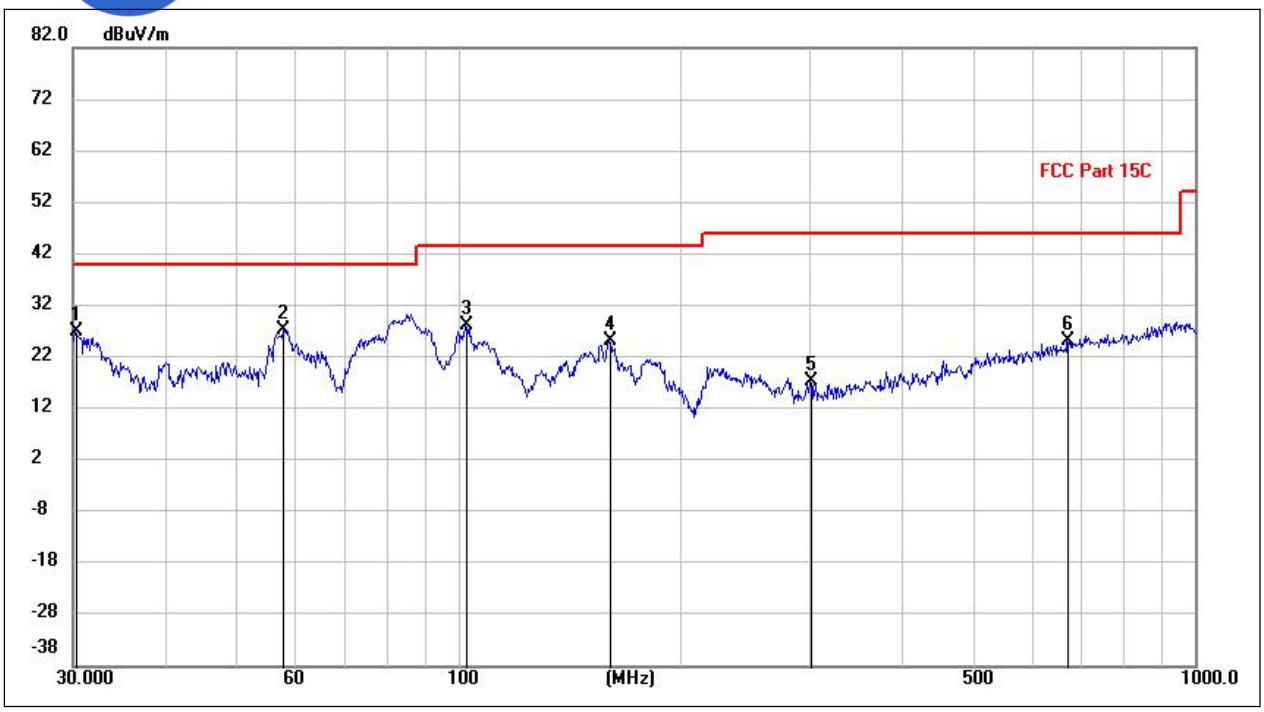
(LE 1M PHY _2480MHz, Antenna Horizontal, 1GHz to 3GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
1194.861	29.91	---	74.00	44.09	H	-2.08	PASS
1196.569	---	22.34	54.00	31.66	H	-2.02	PASS
1402.355	---	22.14	54.00	31.86	H	-1.14	PASS
1403.048	30.03	---	74.00	43.97	H	-1.18	PASS
1661.505	---	22.29	54.00	31.71	H	0.32	PASS
1668.639	29.68	---	74.00	44.32	H	0.34	PASS
1985.922	33.57	---	74.00	40.43	H	2.90	PASS
2009.846	---	25.01	54.00	28.99	H	3.88	PASS
2480.320	84.42	---	---	---	H	8.27	PASS
2480.320	---	83.91	---	---	H	8.27	PASS
2815.887	---	32.96	54.00	21.04	H	10.89	PASS
2828.288	41.59	---	74.00	32.41	H	10.70	PASS



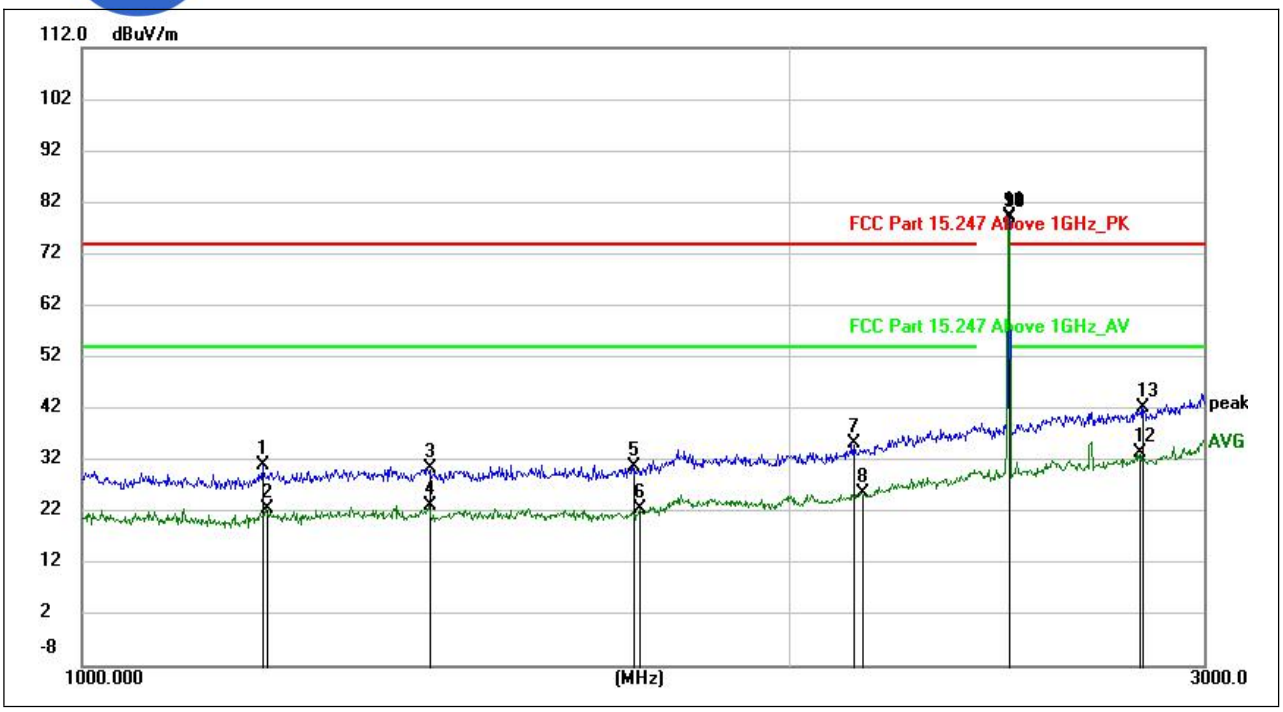
(LE 1M PHY _2480MHz, Antenna Horizontal, 3GHz to 18GHz)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
3077.250	30.86	30.86	54.00	23.14	H	-6.28	PASS
3117.000	39.59	39.59	74.00	34.41	H	-5.88	PASS
6642.750	35.16	35.16	54.00	18.84	H	-0.41	PASS
6651.000	43.42	43.42	74.00	30.58	H	-0.35	PASS
9453.000	35.36	35.36	54.00	18.64	H	1.87	PASS
9492.750	44.06	44.06	74.00	29.94	H	1.55	PASS
13046.250	36.48	36.48	54.00	17.52	H	6.50	PASS
13070.250	44.75	44.75	74.00	29.25	H	6.49	PASS
15426.000	46.98	46.98	74.00	27.02	H	10.58	PASS
15469.500	38.60	38.60	54.00	15.40	H	11.03	PASS
17703.750	42.09	42.09	54.00	11.91	H	14.37	PASS
17728.500	50.61	50.61	74.00	23.39	H	14.89	PASS



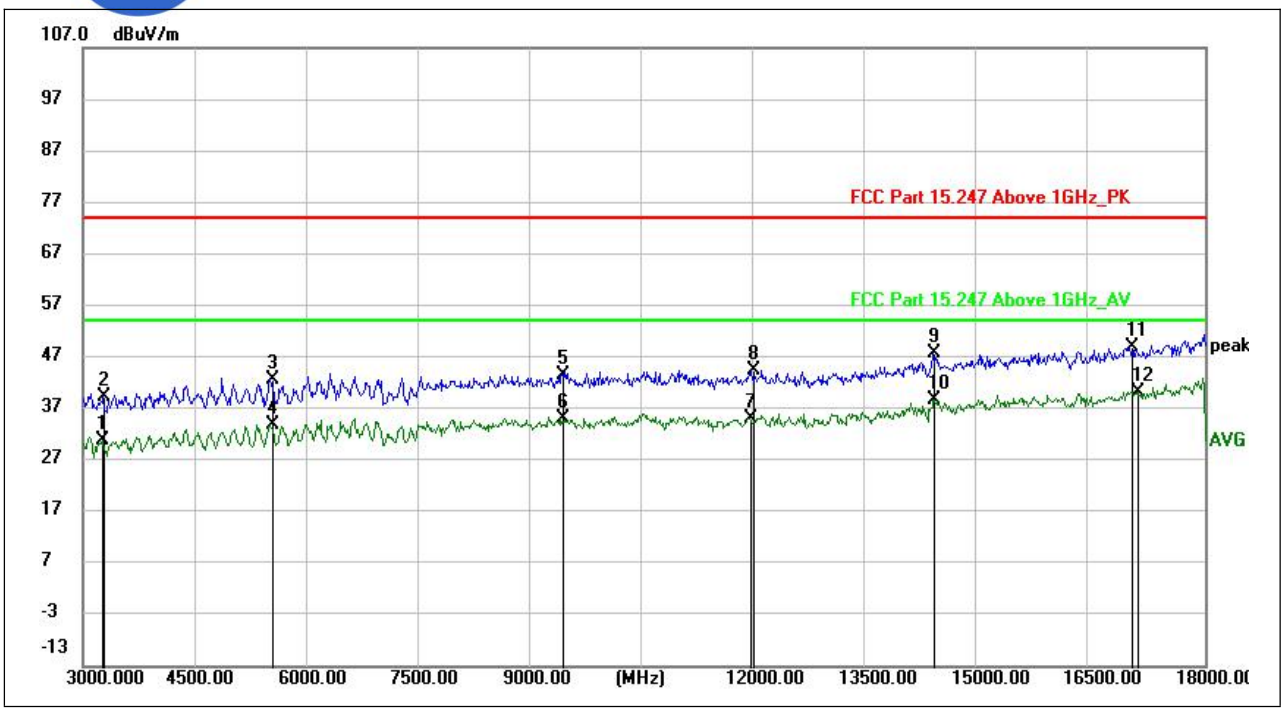
(LE 1M PHY _2480MHz, Antenna Vertical, 30MHz to 1GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
30.2535	26.86	40.00	13.14	V	13.45	PASS
57.9484	27.39	40.00	12.61	V	14.29	PASS
102.6832	28.14	43.50	15.36	V	14.52	PASS
160.4019	25.09	43.50	18.41	V	12.13	PASS
300.7889	17.29	46.00	28.71	V	17.40	PASS
672.4907	25.24	46.00	20.76	V	24.59	PASS



(LE 1M PHY _2480MHz, Antenna Vertical , 1GHz to 3GHz)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
1194.730	30.92	---	74.00	43.08	V	-2.09	PASS
1197.884	---	22.62	54.00	31.38	V	-1.96	PASS
1405.285	30.53	---	74.00	43.47	V	-1.33	PASS
1405.671	---	23.08	54.00	30.92	V	-1.35	PASS
1716.235	30.85	---	74.00	43.15	V	0.83	PASS
1728.059	---	22.51	54.00	31.49	V	1.07	PASS
2127.540	35.24	---	74.00	38.76	V	4.48	PASS
2146.793	---	25.73	54.00	28.27	V	4.28	PASS
2479.911	---	78.88	---	---	V	8.26	PASS
2479.911	---	78.88	---	---	V	8.26	PASS
2480.320	79.33	---	---	---	V	8.27	PASS
2815.887	---	33.59	54.00	20.41	V	10.89	PASS
2826.269	42.25	---	74.00	31.75	V	10.67	PASS



(LE 1M PHY _2480MHz, Antenna Vertical, 3GHz to 18GHz)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)	Verdict
3264.750	---	30.93	54.00	23.07	V	-5.79	PASS
3275.250	39.27	---	74.00	34.73	V	-5.84	PASS
5525.250	42.61	---	74.00	31.39	V	-2.05	PASS
5525.250	---	33.96	54.00	20.04	V	-2.05	PASS
9408.000	43.63	---	74.00	30.37	V	2.05	PASS
9408.000	---	34.97	54.00	19.03	V	2.05	PASS
11926.500	---	35.16	54.00	18.84	V	4.25	PASS
11967.750	44.31	---	74.00	29.69	V	4.33	PASS
14381.250	47.62	---	74.00	26.38	V	9.37	PASS
14381.250	---	38.68	54.00	15.32	V	9.37	PASS
17015.250	49.09	---	74.00	24.91	V	12.93	PASS
17103.750	---	40.32	54.00	13.68	V	12.66	PASS

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Peak Output Power	±2.22dB
Power spectral density (PSD)	±2.22dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77 dB
Restricted Frequency Bands	±5%
Radiated Emission	±3.1dB
Conducted Emission	±1.8dB

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

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Kehu-Morlab Test Laboratory
Laboratory Address:	Unit 101, No.1732 Gangzhong Road, Xiamen Area, Pilot Free Trade Zone (Fujian) P.R. China
Telephone:	+86 592 5612050
Facsimile:	+86 592 5612095

2. Identification of the Responsible Testing Location

Name:	Kehu-Morlab Test Laboratory
Address:	Unit 101, No.1732 Gangzhong Road, Xiamen Area, Pilot Free Trade Zone (Fujian) P.R. China

3. Accreditation Certificate

Accredited Testing Laboratory:	The FCC designation number is CN1249. (Kehu-Morlab Test Laboratory)

4. Test Equipments Utilized

4.1 Conducted Test Equipments

No.	Equipment Name	Serial No.	Model No.	Manufacturer	Cal.Date	Cal.Due Date
1	MXA Signal Analyzer	MY53421845	N9020A	Keysight	2019.01.05	2020.01.04
2	RF cable (30MHz-26.5GHz)	RF01	N/A	Morlab	2019.01.05	2020.01.04
3	Coaxial cable	RF02	N/A	Morlab	2019.01.05	2020.01.04
4	SMA connector	RF03	N/A	Xingbo	2019.01.05	2020.01.04
Software Version: MW 2.0.0.0						

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Receiver	101799	ESR7	R&S	2019.01.08	2020.01.07
LISN	101338	ENV432	R&S	2019.01.14	2020.01.13
Pulse Limiter (10dB)	317	VTSD 9561 F	Schwarzbeck	2019.01.14	2020.01.13

4.3Auxiliary Test Equipment

Equipment Name	Model No.	Brand Name	Manufacturer	Cal.Date	Cal. Due
Computer	E75	Think Pad	Lenovo	N/A	N/A

4.4 List of Software Used

Description	Manufacturer	Software Version
Test system	CAICT	Eagle 2.0
EMC32	R&S	V10.00.00

4.5 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Anechoic Chamber	N/A	9m*6m*6m	ETS-Lindgren	2017.07.21	2020.07.20
Signal Analyzer	101294	FSV40	R&S	2019.01.04	2020.01.03
Active Ring Antenna	FMZB 1513 #269	FMZB 1513	Schwarzbeck	2019.01.12	2020.01.11
Linear Log Periodic Broad Band Antenna	949	VULB 9163	Schwarzbeck	2018.09.25	2021.09.24
Ultra-Wideband Horn Antenna	102615	HF907	R&S	2019.01.19	2020.01.18
Steatite Antennas	17868	QSH-SL-18-26-S-20	Seibersdorf	2019.01.12	2020.01.11
Ultra-Wideband Horn Antenna	17989	QSH-26-40	Schwarzbeck	2019.01.12	2020.01.11
RF Switch and	N/A	RSC	CDSI	N/A	N/A

Control Platform					
Coaxial cable (N male) (9kHz -3GHz)	EMC02	N/A	Morlab	2019.01.04	2020.01.03
Coaxial cable (N male) (9kHz -3GHz)	EMC03	N/A	Morlab	2019.01.04	2020.01.03
Coaxial cable (N male) (1GHz-26.5GHz)	EMC04	N/A	Morlab	2019.01.04	2020.01.03
Coaxial cable (N male) (1GHz-26.5GHz)	EMC05	N/A	Morlab	2019.01.04	2020.01.03
Pre-amplifier (1GHz-18GHz)	8810011	PAP-1G18	CDSI	2019.01.04	2020.01.03
Pre-amplifier (18GHz-40GHz)	17021-17024	PAP-1840	CDSI	2019.07.05	2020.07.04
High Pass Filter	EMC21	HFP-1.0/18G -60	CDSI	2019.01.04	2020.01.03
High Pass Filter	EMC22	HFP-3.0/18G -60	CDSI	2019.01.04	2020.01.03
NOTE: Coaxial cable and Filter, annual internal calibration.					

END OF REPORT