

**FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS-247 ISSUE 2 February 2017**

**CERTIFICATION TEST REPORT**

*For*

Lenovo Premium Wireless Keyboard

MODEL No.: KBRF5C71

FCC ID: EMJKKBRF5C71

IC: 4251A-KKBRF5C71

HVIN: KBRF5C71

Trade Mark: Lenovo

REPORT NO: ES180917043W

ISSUE DATE: October 09, 2018

*Prepared for*

**PRIMAX ELECTRONICS LTD.**  
No. 669, Ruey Kuang Road, Neihu, Taipei, Taiwan, R.O.C.

*Prepared by*

**EMTEK(SHENZHEN) CO., LTD.**

Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen,  
Guangdong, China

TEL: 86-755-26954280

FAX: 86-755-26954282

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## 1 TEST RESULT CERTIFICATION

Applicant:	PRIMAX ELECTRONICS LTD. No. 669, Ruey Kuang Road, Neihu, Taipei, Taiwan, R.O.C.
Manufacturer:	PRIMAX ELECTRONICS LTD. No. 669, Ruey Kuang Road, Neihu, Taipei, Taiwan, R.O.C.
EUT Description:	Lenovo Premium Wireless Keyboard
Model Number:	KBRF5C71
Trade Mark:	Lenovo
File Number:	ES180917043W
Date of Test:	August 15, 2018 to October 09, 2018

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C IC RSS-GEN, Issue 5, April 2018 IC RSS-247 Issue 2 February 2017.	PASS

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.247, IC RSS-247 Issue 2 and IC RSS-GEN, Issue 5

The test results of this report relate only to the tested sample identified in this report

Date of Test : August 15, 2018 to October 09, 2018

Prepared by : *Yaping Shen*  
Yaping Shen /Editor

Reviewer : *Joe Xia*  
Joe Xia/Editor

Approve & Authorized Signer : *[Signature]*  
Lisa Wang/Manager



## 2 EUT TECHNICAL DESCRIPTION

Characteristics	Description
<b>Product:</b>	Lenovo Premium Wireless Keyboard
<b>Model Number:</b>	KBRF5C71
<b>Modulation:</b>	GFSK
<b>Operating Frequency Range(s):</b>	2402-2479MHz
<b>Number of Channels:</b>	78 channels
<b>EIRP:</b>	-1.97 dBm MAX
<b>Antenna Type:</b>	PCB Layout Antenna
<b>Gain:</b>	2 dBi
<b>Power supply:</b>	DC 3.7V by lithium battery or DC 5V by external power
<b>Temperature Range</b>	0°C ~ +40°C

*Note: for more details, please refer to the User's manual of the EUT.*

### 3 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.247(a)(2)	DTS (6dB) Bandwidth	PASS	
15.247(b)(3)	Maximum Peak Conducted Output Power	PASS	
15.247(e)	Maximum Power Spectral Density Level	PASS	
15.247(d)	Unwanted Emission Into Non-Restricted Frequency Bands	PASS	
15.247(d) 15.209	Unwanted Emission Into Restricted Frequency Bands (conducted)	PASS	
15.247(d) 15.209	Radiated Spurious Emission	PASS	
15.207	Conducted Emission Test	N/A	
15.247(b)	Antenna Application	PASS	
	NOTE1: N/A (Not Applicable) NOTE2: According to FCC OET KDB 558074, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.		

#### RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: EMJKKBRF5C71 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

This submittal(s) (test report) is intended for IC: 4251A-KKBRF5C71 filing to comply with IC RSS-247 Issue 2 and IC RSS-GEN, Issue 5

## 4 TEST METHODOLOGY

### 4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J  
 FCC 47 CFR Part 15, Subpart C  
 FCC KDB 558074 D01 DTS Meas Guidance v05  
 IC RSS-Gen, ISSUE 5  
 IC RSS-247 , ISSUE 2 February 2017

### 4.2 MEASUREMENT EQUIPMENT USED

#### 4.2.1 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 20, 2018	May 20, 2019
Pre-Amplifier	HP	8447F	2944A07999	May 20, 2018	May 20, 2019
Bilog Antenna	Schwarzbeck	VULB9163	142	May 20, 2018	May 20, 2019
Cable	Schwarzbeck	AK9513	ACRX1	May 20, 2018	May 20, 2019
Cable	Rosenberger	N/A	FP2RX2	May 20, 2018	May 20, 2019
Cable	Schwarzbeck	AK9513	CRPX1	May 20, 2018	May 20, 2019
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 20, 2018	May 20, 2019
Pre-Amplifier	A.H.	PAM-0126	1415261	May 20, 2018	May 20, 2019
Horn Antenna	Schwarzbeck	BBHA 9120	707	May 20, 2018	May 20, 2019
Loop Antenna	Laplace Instrument Ltd	RF300	8006	May 20, 2018	May 20, 2019
Cable	H+B	0.5M SF104-26.5	289147/4	May 20, 2018	May 20, 2019
Cable	H+B	3M SF104-26.5	295838/4	May 20, 2018	May 20, 2019
Cable	H+B	6M SF104-26.5	295840/4	May 20, 2018	May 20, 2019

#### 4.2.2 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Spectrum Analyzer	Agilent	E4407B	88156318	May 20, 2018	May 20, 2019
Signal Analyzer	Agilent	N9010A	My53470879	May 20, 2018	May 20, 2019
Power meter	Anritsu	ML2495A	0824006	May 20, 2018	May 20, 2019
Power sensor	Anritsu	MA2411B	0738172	May 20, 2018	May 20, 2019
Spectrum Analyzer	Rohde & Schwarz	FSV40	100967	May 20, 2018	May 20, 2019

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### 4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	40	2441	...	...
2	2403	41	2442	76	2477
3	2404	42	2443	77	2478
...	...	...	...	78	2479
Note: $f_c = 2402\text{MHz} + (k-1) \times 1\text{MHz}$ k=1 to 78					

Test Frequency and channel:

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	40	2441	78	2479

## 5 FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

### 5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

: Accredited by CNAS, 2016.10.24

The certificate is valid until 2022.10.28

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)

The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2016.5.19

The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Accredited by FCC, August 06, 2018

The certificate is valid until August 07, 2020

Designation Number: CN1204

Test Firm Registration Number: 882943

Accredited by Industry Canada, November 24, 2015

The Certificate Registration Number is 4480A.

Name of Firm

: EMTEK(SHENZHEN) CO., LTD.

Site Location

: Bldg 69, Majialong Industry Zone,  
Nanshan District, Shenzhen, Guangdong, China



## 6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

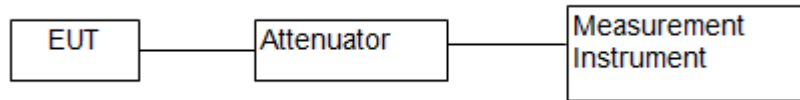
Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 3\%$

Measurement Uncertainty for a level of Confidence of 95%

## 7 SETUP OF EQUIPMENT UNDER TEST

### 7.1 RADIO FREQUENCY TEST SETUP 1

The product component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



### 7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

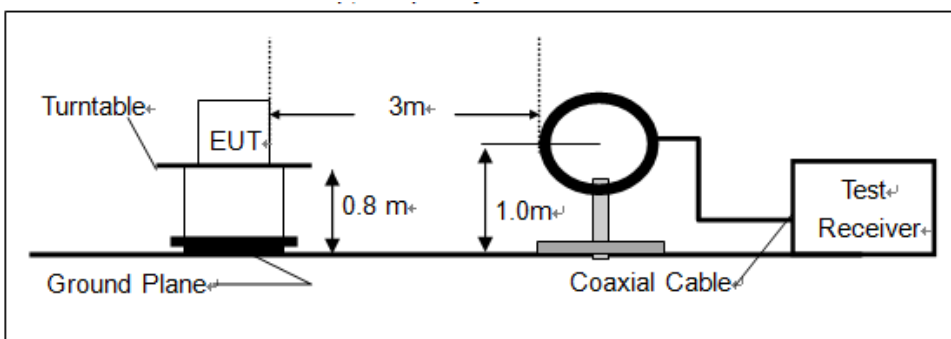
30MHz-1GHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

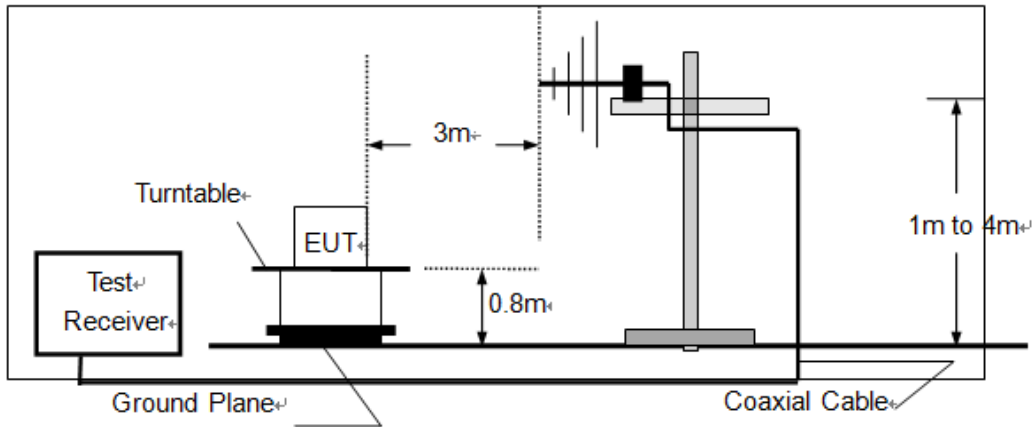
Above 1GHz:

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

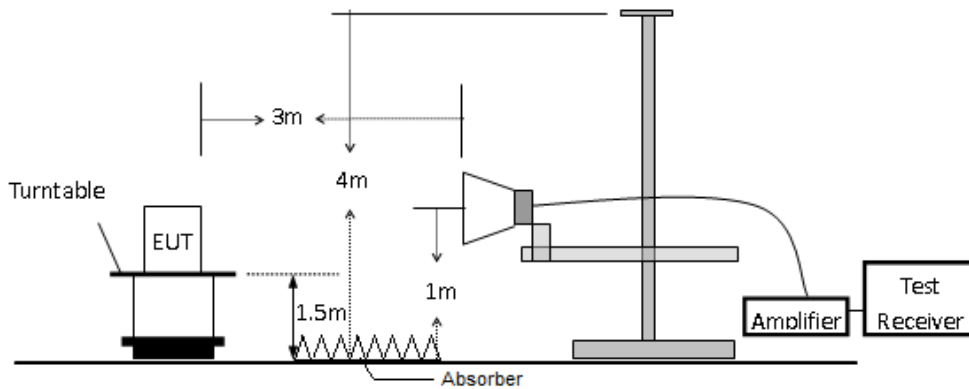
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz



**7.3 SUPPORT EQUIPMENT**

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1	Notebook	Lenovo	WB0205140E	WB06355728	N/A
2.	Adapter	TEKA	TEKA006-0501500UKU	N/A	Input: 100-240~ 50/60Hz 0.3A Max Output: DC 5V 1.5A

**Notes:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 8 TEST REQUIREMENTS

### 8.1 DTS 6DB BANDWIDTH

#### 8.1.1 Applicable Standard

According to FCC Part 15.247(a)(2) and KDB 558074 DTS 01 Meas. Guidance v05  
 According to RSS-247.5.2(a) and KDB 558074 DTS 01 Meas. Guidance v05

#### 8.1.2 Conformance Limit

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

#### 8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

#### 8.1.4 Test Procedure

The EUT was operating in Bluetooth 4.0DTS mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 100 kHz.

Set the video bandwidth (VBW) =300 kHz.

Set Span=2 times OBW

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

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.

Measure and record the results in the test report.

#### Test Results

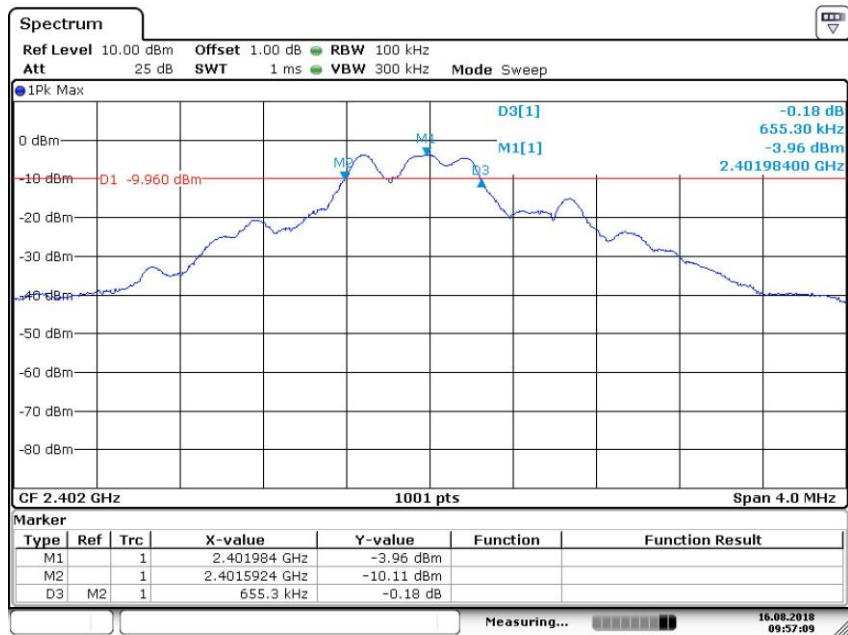
Temperature : 28°C                      Test Date : August 16, 2018  
 Humidity : 55 %                      Test By: KK

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (kHz)	Limit (kHz)	Verdict
GFSK	1	2402	655.3	>500	PASS
	40	2441	715.3	>500	PASS
	78	2479	687.3	>500	PASS

DTS (6dB) Bandwidth

Test Model

Channel 1: 2402MHz

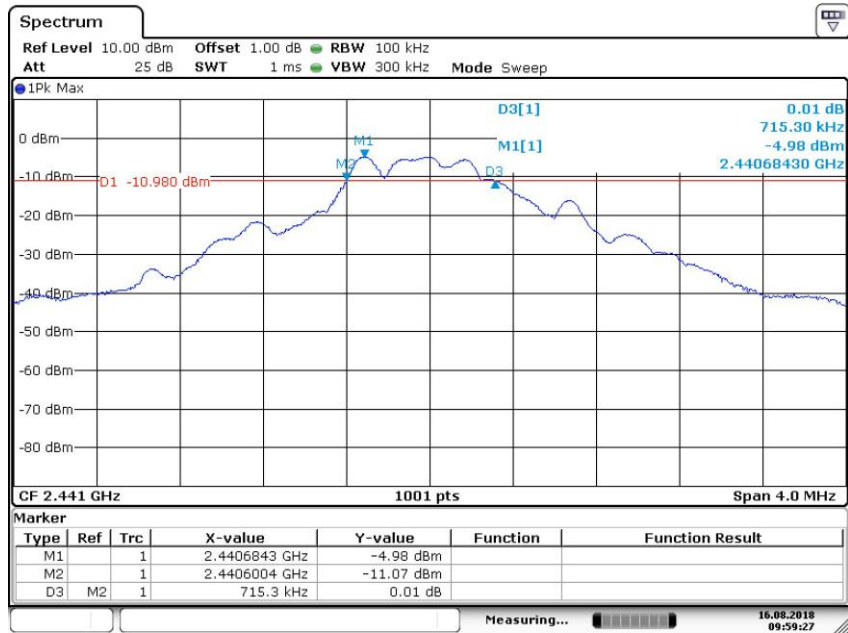


Date: 16.AUG.2018 09:57:08

DTS (6dB) Bandwidth

Test Model

Channel 40: 2441MHz

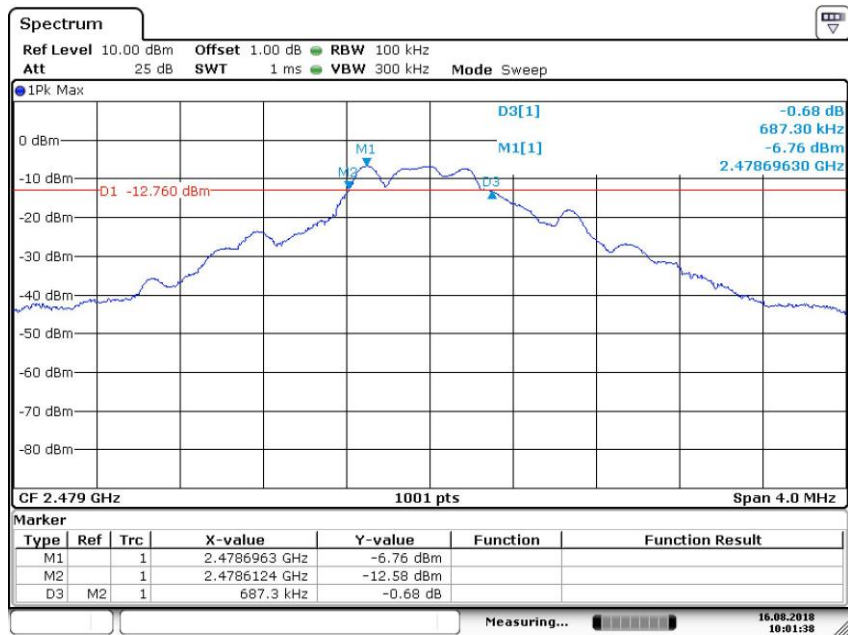


Date: 16.AUG.2018 09:59:27

DTS (6dB) Bandwidth

Test Model

Channel 78: 2479MHz



Date: 16.AUG.2018 10:01:38

**8.2 DTS 99% BANDWIDTH**

**8.2.1 Applicable Standard**

According to RSS-247 and KDB 558074 DTS 01 Meas. Guidance v05

**8.2.2 Test Configuration**

Test according to clause 7.1 radio frequency test setup 1

**8.2.3 Test Procedure**

The EUT was operating in and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1%-5% OBW.

Set the video bandwidth (VBW) =100 kHz.

Set Span=3MHz

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

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.

Measure and record the results in the test report.

**Test Results**

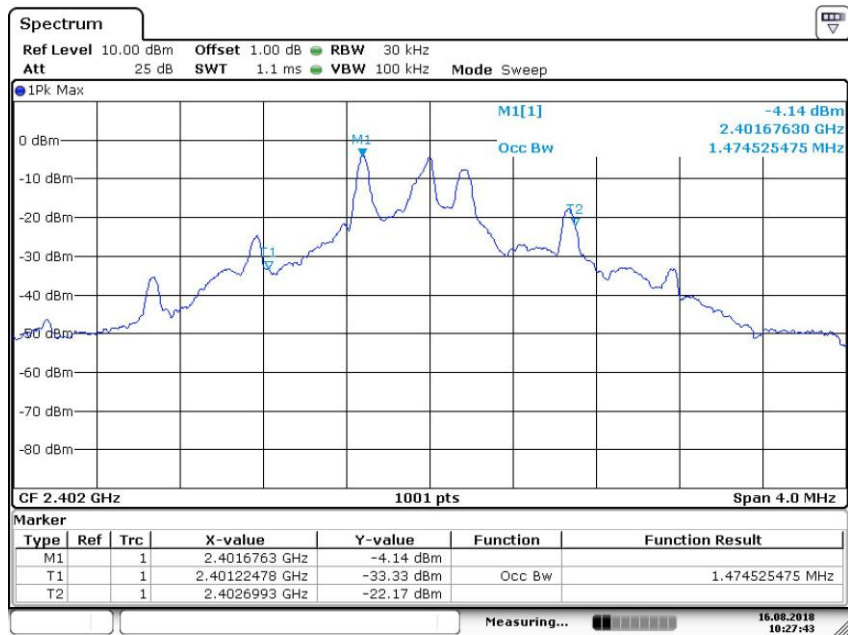
Temperature : 28°C      Test Date : August 16, 2018  
 Humidity : 55 %      Test By: KK

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (MHz)	Verdict
GFSK	1	2402	1.475	PASS
	40	2441	1.451	PASS
	78	2479	1.407	PASS

DTS 99% Bandwidth

Test Model

Channel 0: 2402MHz

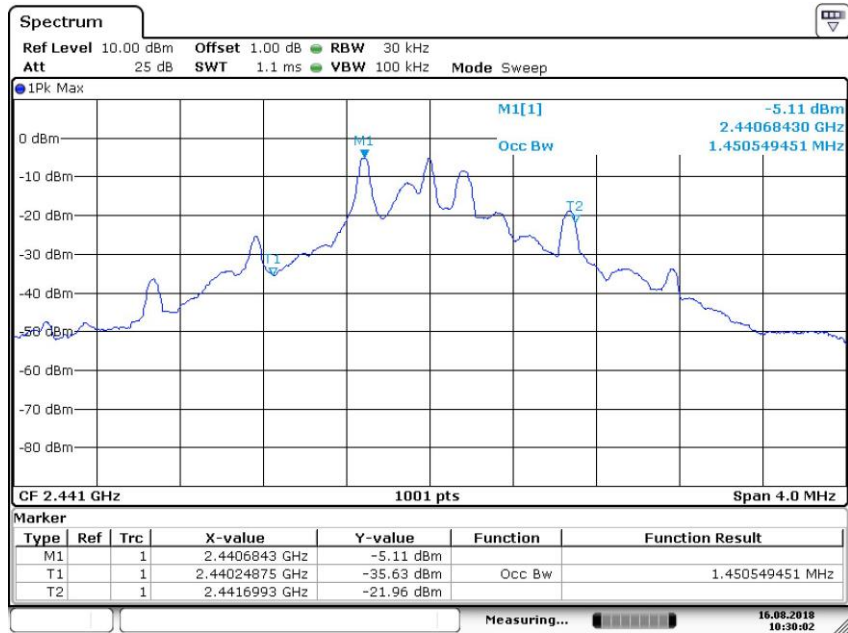


Date: 16.AUG.2018 10:27:42

DTS 99% Bandwidth

Test Model

Channel 19: 2440MHz

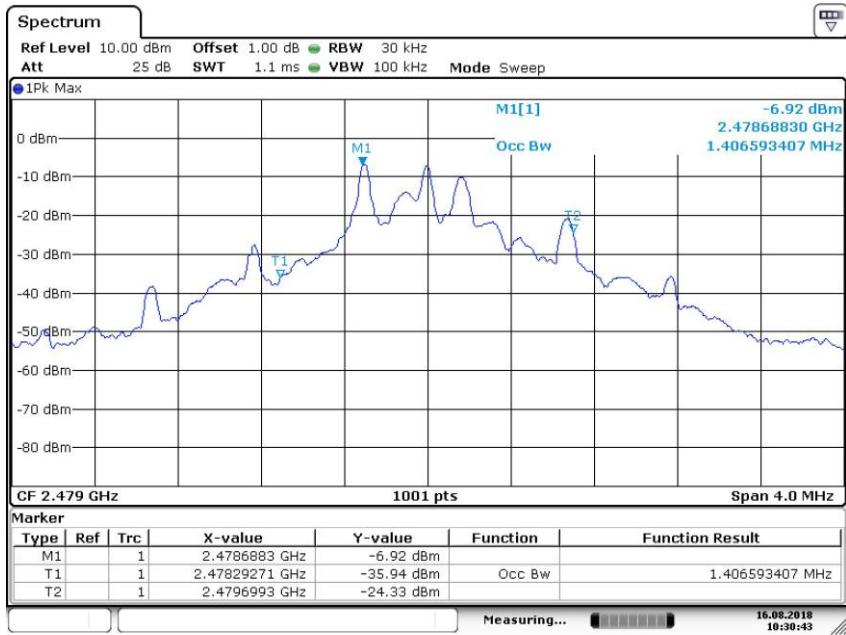


Date: 16.AUG.2018 10:30:02



DTS 99% Bandwidth

Test Model Channel 39: 2480MHz



Date: 16.AUG.2018 10:30:42

### 8.3 MAXIMUM PEAK CONDUCTED OUTPUT POWER

#### 8.3.1 Applicable Standard

According to FCC Part 15.247(b)(3) and KDB 558074 DTS 01 Meas. Guidance v05

According to RSS-247.5.4(d) and KDB 558074 DTS 01 Meas. Guidance v05

#### 8.3.2 Conformance Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm).

#### 8.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

#### 8.3.4 Test Procedure

■ According to FCC Part 15.247(b)(3)

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum output power setting and enable the EUT transmit continuously.

Measure the conducted output power with cable loss and record the results in the test report.

Measure and record the results in the report.

Conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note: If antenna Gain exceeds 6 dBi, then Output power Limit = 30 - (Gain - 6) exceeds 6 dBi.

#### Test Results

Temperature :	28°C	Test Date :	August 16, 2018
Humidity :	55 %	Test By:	KK

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	EIRP (dBm)	Limit for peak conducted output power (dBm)	Limit for EIRP (dBm)	Verdict
GFSK	1	2402	-3.97	-1.97	30	36	PASS
	40	2441	-4.96	-2.96	30	36	PASS
	78	2479	-6.74	-4.74	30	36	PASS

Note: The antenna gain is 2dBi

**8.4 MAXIMUM POWER SPECTRAL DENSITY**

**8.4.1 Applicable Standard**

According to FCC Part 15.247(e) and KDB 558074 DTS 01 Meas. Guidance v05  
According to RSS-247 A8.2(b) and KDB 558074 DTS 01 Meas. Guidance v05

**8.4.2 Conformance Limit**

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

**8.4.3 Test Configuration**

Test according to clause 7.1 radio frequency test setup 1

**8.4.4 Test Procedure**

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

The transmitter output (antenna port) was connected to the spectrum analyzer

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: 3 kHz

Set the VBW to: 10 kHz.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

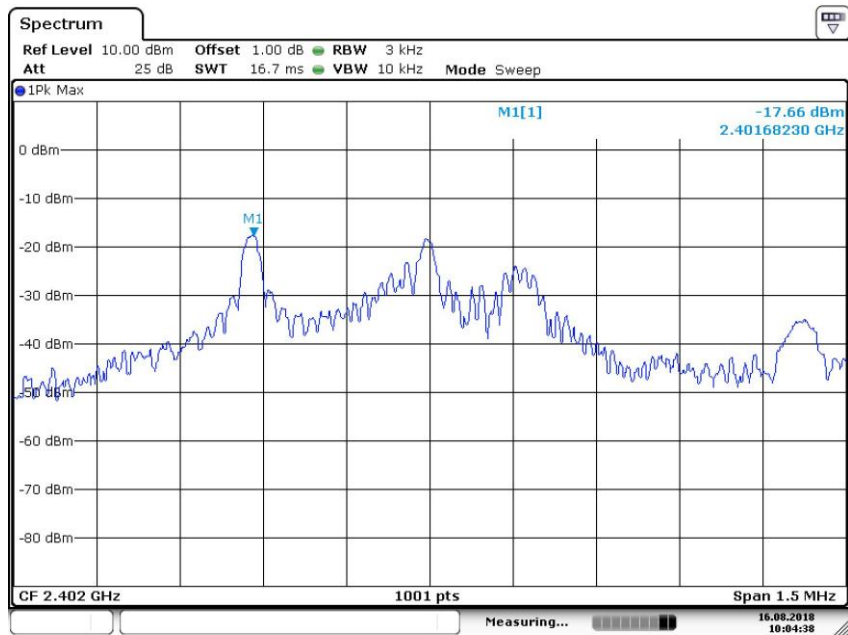
**8.4.5 Test Results**

Temperature : 28°C      Test Date : August 16, 2018  
Humidity : 55 %      Test By: KK

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
GFSK	1	2402	-17.66	<8	PASS
	40	2441	-18.70	<8	PASS
	78	2479	-20.45	<8	PASS
Note: N/A					

Test Model Power Spectral Density

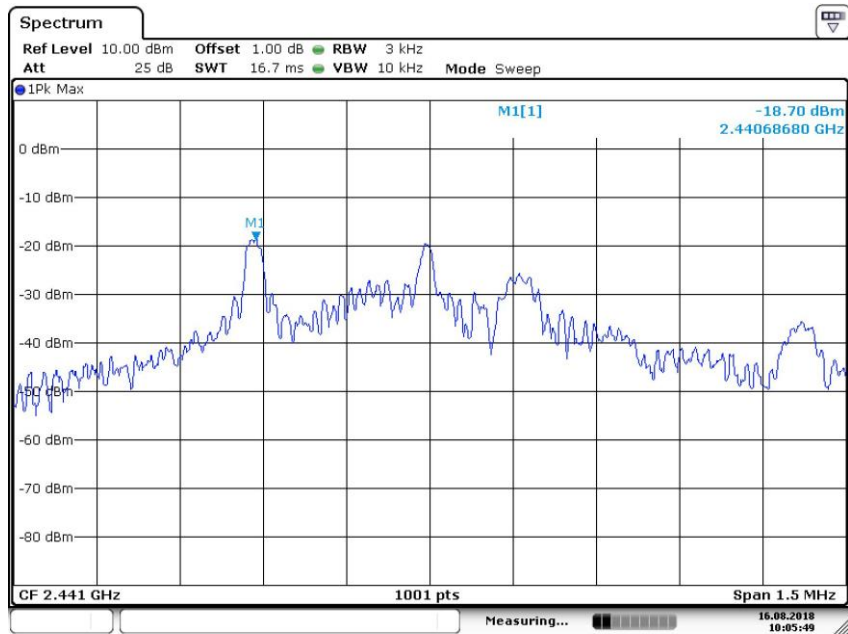
Channel 1: 2402MHz



Date: 16.AUG.2018 10:04:38

Test Model Power Spectral Density

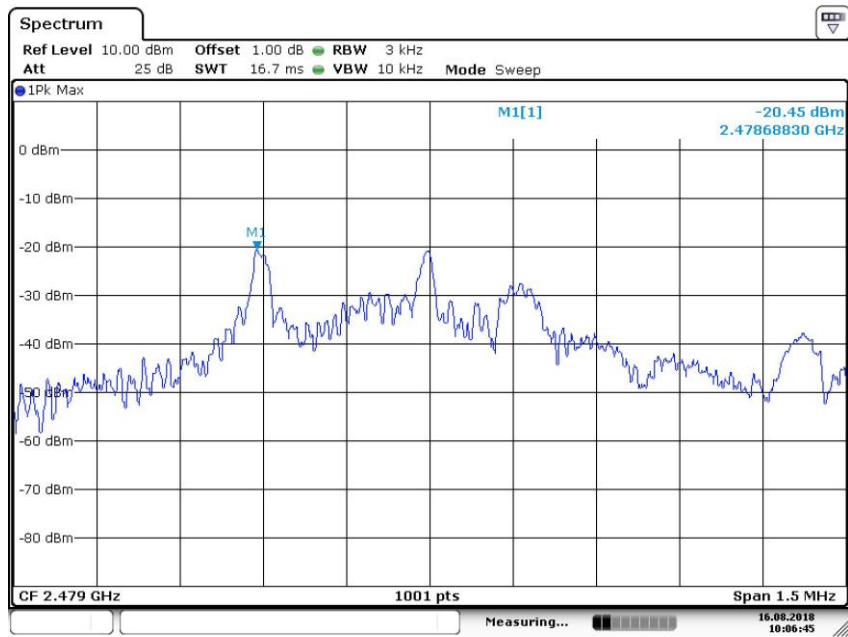
Channel 40: 2441MHz



Date: 16.AUG.2018 10:05:48

Test Model Power Spectral Density

Channel 78: 2479MHz



Date: 16.AUG.2018 10:06:45

## 8.5 UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

### 8.5.1 Applicable Standard

According to FCC Part 15.247(d) and KDB 558074 DTS 01 Meas. Guidance v05  
According to RSS-247, nd KDB 558074 DTS 01 Meas. Guidance v05

### 8.5.2 Conformance Limit

According to FCC Part 15.247(d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

### 8.5.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

### 8.5.4 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

#### ■ Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to = 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW  $\geq 3 \times$  RBW.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

#### ■ Emission level measurement

Set the center frequency and span to encompass frequency range to be measured.

Set the RBW = 100 kHz.

Set the VBW =300 kHz.

Set Detector = peak

Sweep time = auto couple.

Trace mode = max hold.

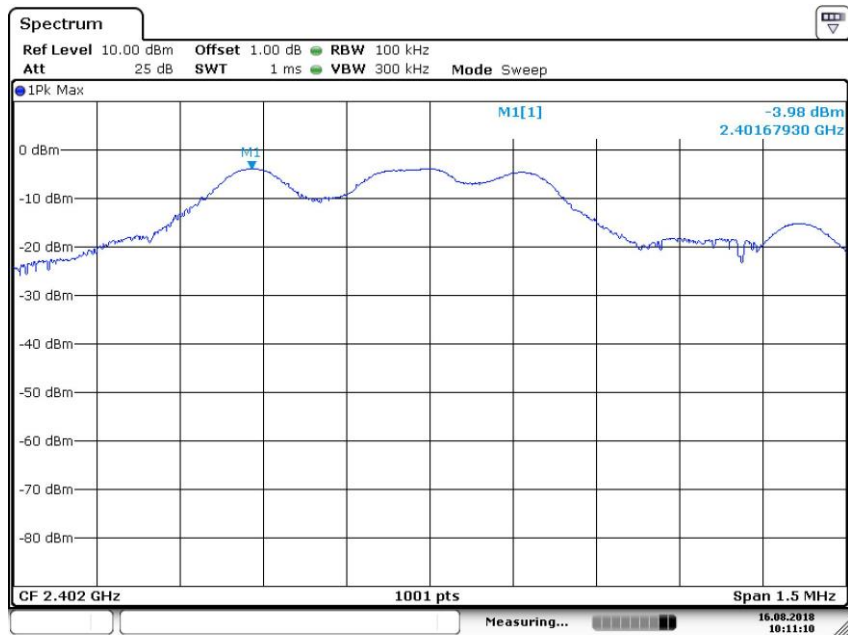
Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements . Report the three highest emissions relative to the limit.

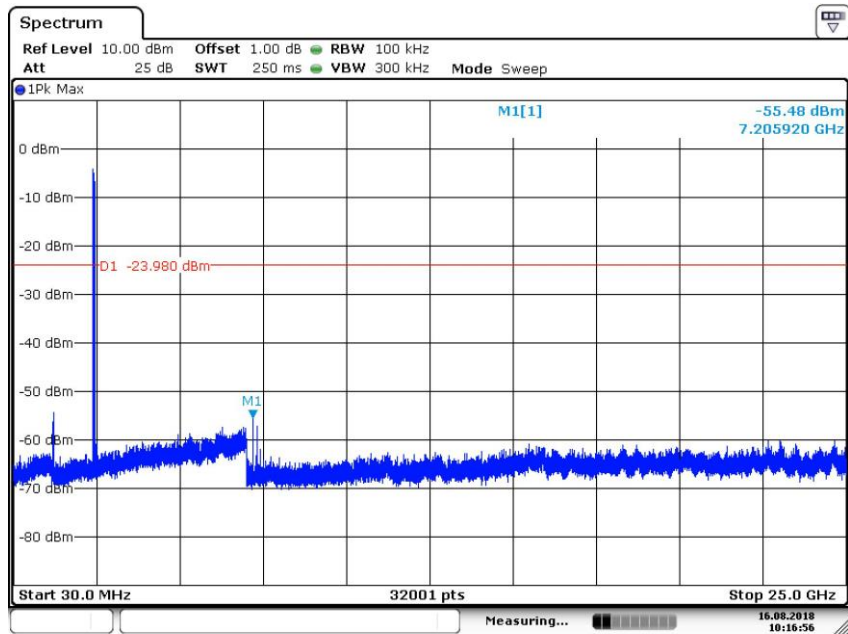
### 8.5.5 Test Results

Test Model PSD(Power Spectral Density ) RBW=100kHz  
Channel 1: 2402MHz



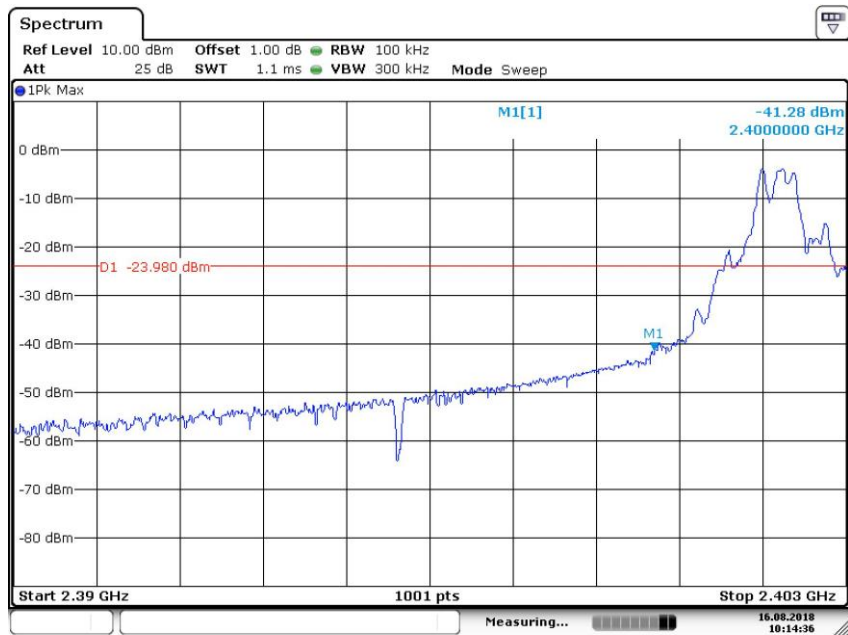
Date: 16.AUG.2018 10:11:10

Test Model Unwanted Emissions in non-restricted frequency bands  
Channel 1: 2402MHz



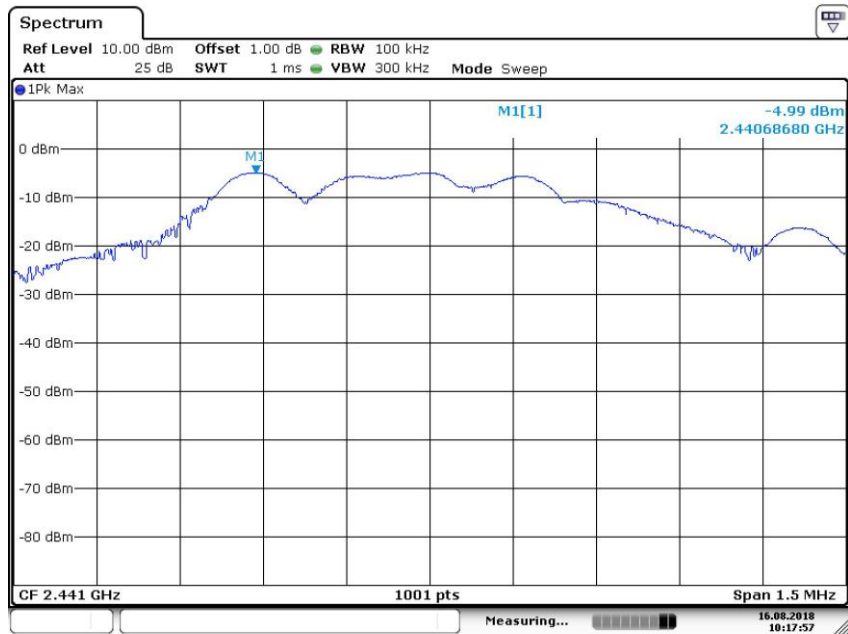
Date: 16.AUG.2018 10:16:56

Test Model Band edge  
Channel 1: 2402MHz



Date: 16.AUG.2018 10:14:36

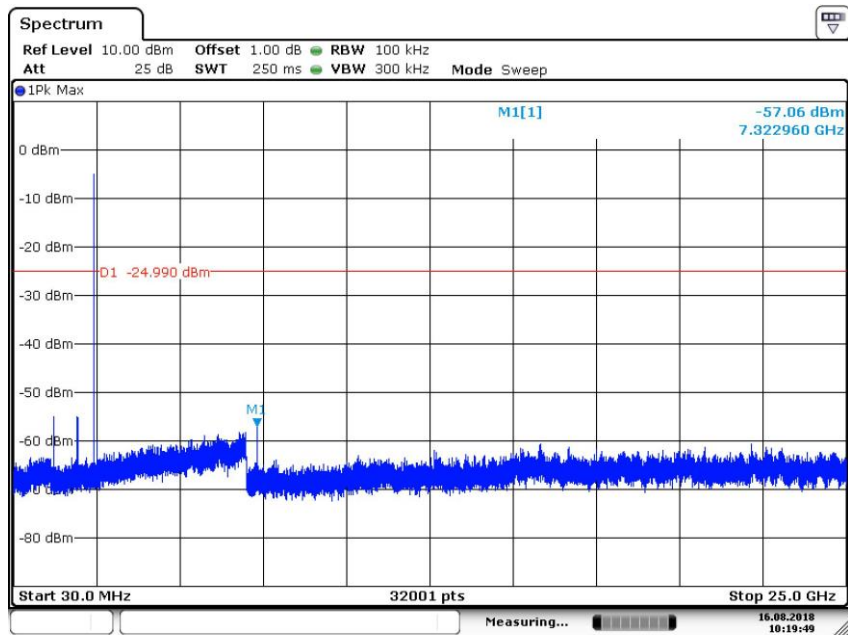
Test Model PSD(Power Spectral Density ) RBW=100kHz  
Channel 40: 2441MHz



Date: 16.AUG.2018 10:17:57

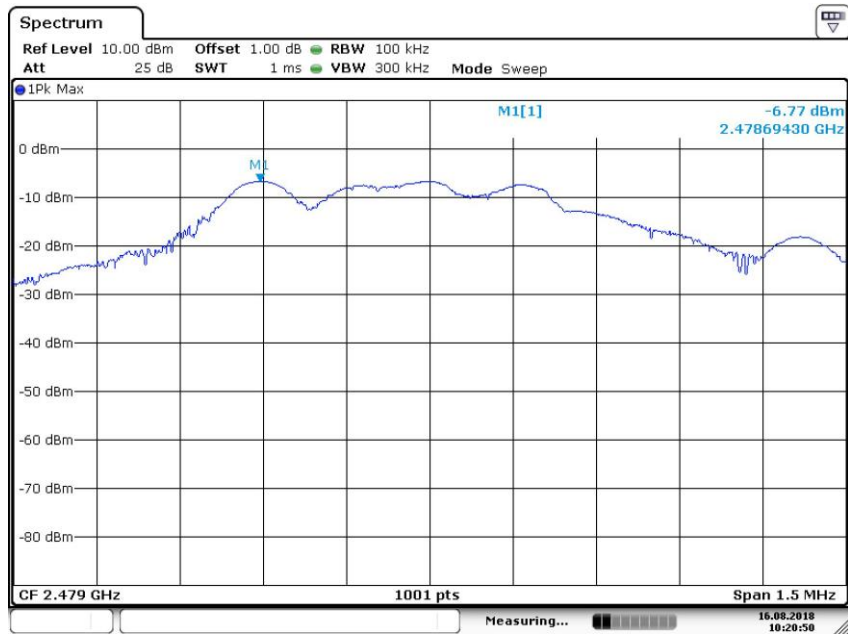


Test Model Unwanted Emissions In Non-Restricted Frequency Bands  
Channel 40: 2441MHz



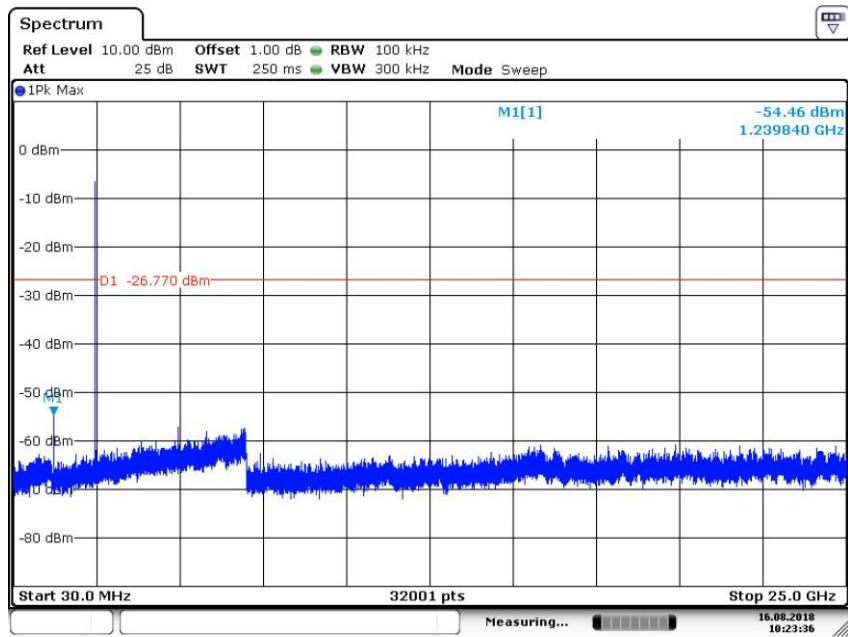
Date: 16.AUG.2018 10:19:48

Test Model PSD(Power Spectral Density ) RBW=100kHz  
Channel 78: 2479MHz



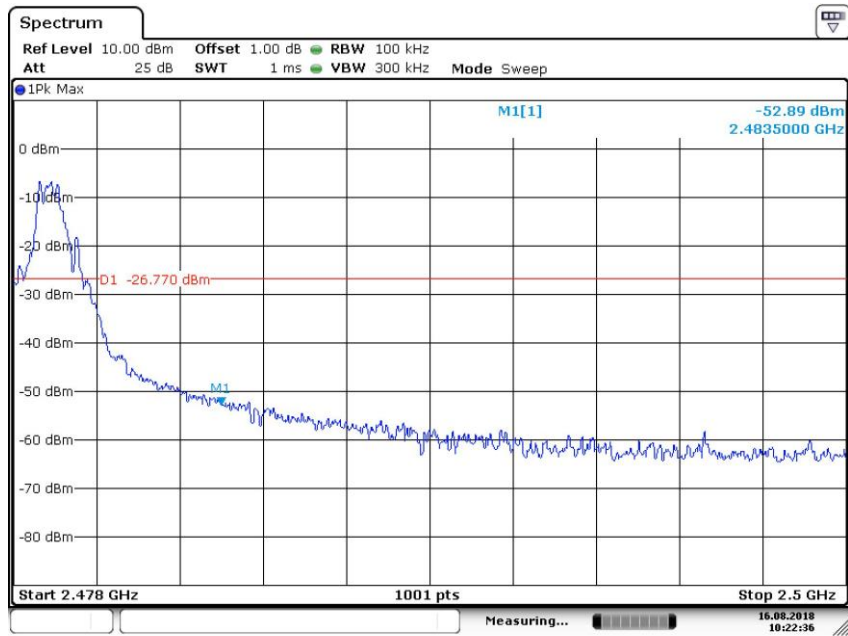
Date: 16.AUG.2018 10:20:50

Test Model Unwanted Emissions In Non-Restricted Frequency Bands  
Channel 78: 2479MHz



Date: 16.AUG.2018 10:23:36

Test Model Band edge  
Channel 78: 2479MHz



Date: 16.AUG.2018 10:22:35

## 8.6 RADIATED SPURIOUS EMISSION

### 8.6.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and KDB 558074 DTS 01 Meas. Guidance v05  
 According to KDB 558074 DTS 01 Meas. Guidance v05

### 8.6.2 Conformance Limit

According to FCC Part 15.247(d): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).  
 According to FCC Part 15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	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)
13.36-13.41			

According to FCC Part 15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	2400/F(KHz)	20 log (uV/m)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

### 8.6.3 Test Configuration

Test according to clause 7.2 radio frequency test setup 2

### 8.6.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for  $f \geq 1$  GHz(1GHz to 25GHz), 100 kHz for  $f < 1$  GHz(30MHz to 1GHz)

VBW  $\geq$  RBW

Sweep = auto



25862.5	H	52.01	38.10	74.00	54.00	-21.99	-15.90
---------	---	-------	-------	-------	-------	--------	--------

Temperature : 28°C Test Date : September 25, 2018  
 Humidity : 55 % Test By: KK  
 Frequency: Channel 78: 2479MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
12934	V	51.19	38.50	74.00	54.00	-22.81	-15.50
24902	V	52.04	33.60	74.00	54.00	-21.96	-20.40
14872	H	51.65	35.20	74.00	54.00	-22.35	-18.80
22275.5	H	49.30	34.70	74.00	54.00	-24.70	-18.80

- Note:** (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).  
 (2) Emission Level= Reading Level+Correct Factor +Cable Loss.  
 (3) Correct Factor= Ant\_F + Cab\_L - Preamp  
 (4)Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

Temperature : 28°C Test Date : September 25, 2018  
 Humidity : 55 % Test By: KK  
 Frequency: Channel 1: 2402MHz

Frequency (MHz)	Polarity	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	Margin (dB)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)	Margin (dB)
2384.96	H	51.98	74.00	-22.02	47.10	54.00	-6.90
2389.04	V	53.46	74.00	-20.54	46.50	54.00	-7.50

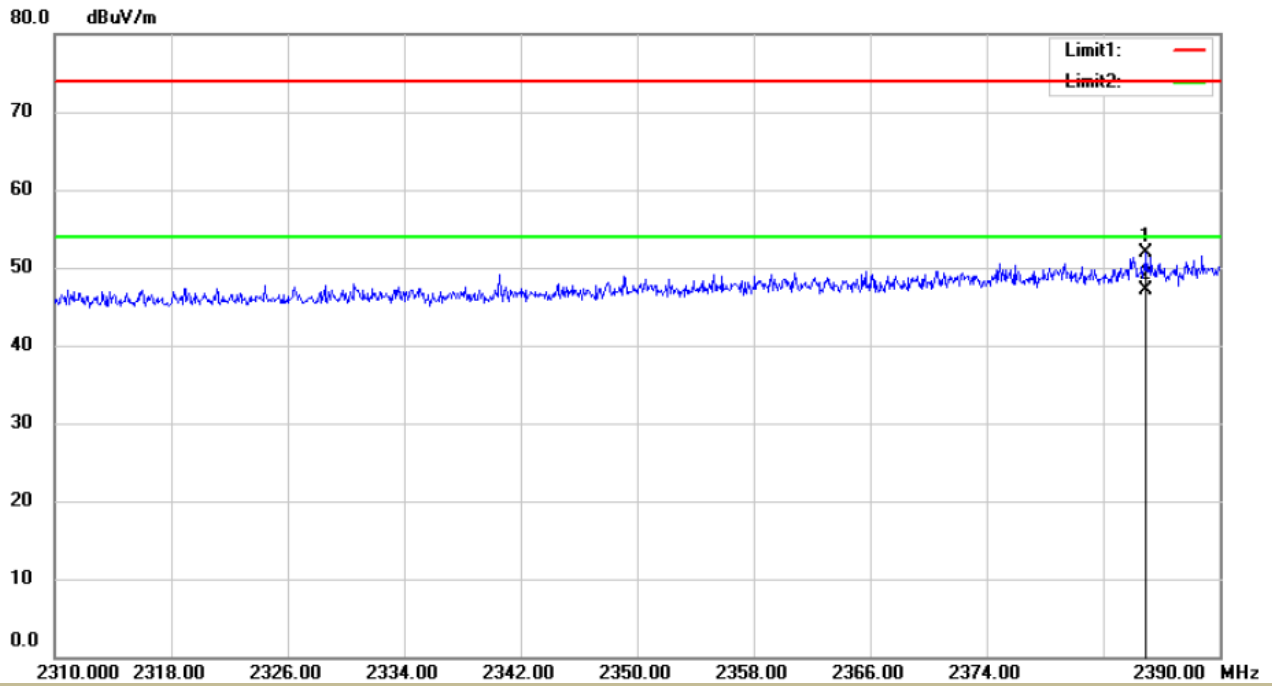
Temperature : 28°C Test Date : September 25, 2018  
 Humidity : 55 % Test By: KK  
 Frequency: Channel 78: 2479MHz

Frequency (MHz)	Polarity	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	Margin (dB)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)	Margin (dB)
2485.35	H	54.65	74.00	-18.23	44.90	54.00	-9.10
2485.08	V	55.71	74.00	-19.35	45.30	54.00	-8.70

- Note:** (1) All Readings are Peak Value (VBW=3MHz) and Peak Value (VBW=10Hz).  
 (2) Emission Level= Reading Level+Correct Factor +Cable Loss.  
 (3) Correct Factor= Ant\_F + Cab\_L - Preamp  
 (4)Data of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

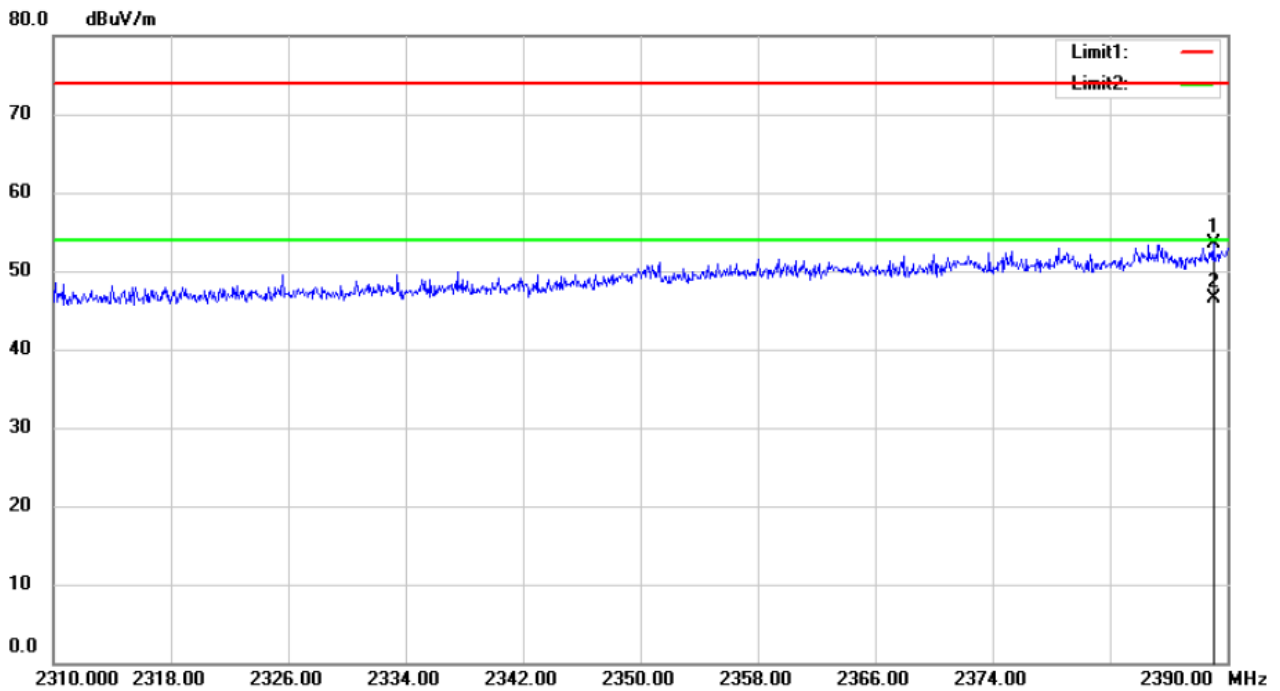
Spurious Emission in Restricted Band 2310-2390MHz

Test Model Channel 1: 2402MHz H

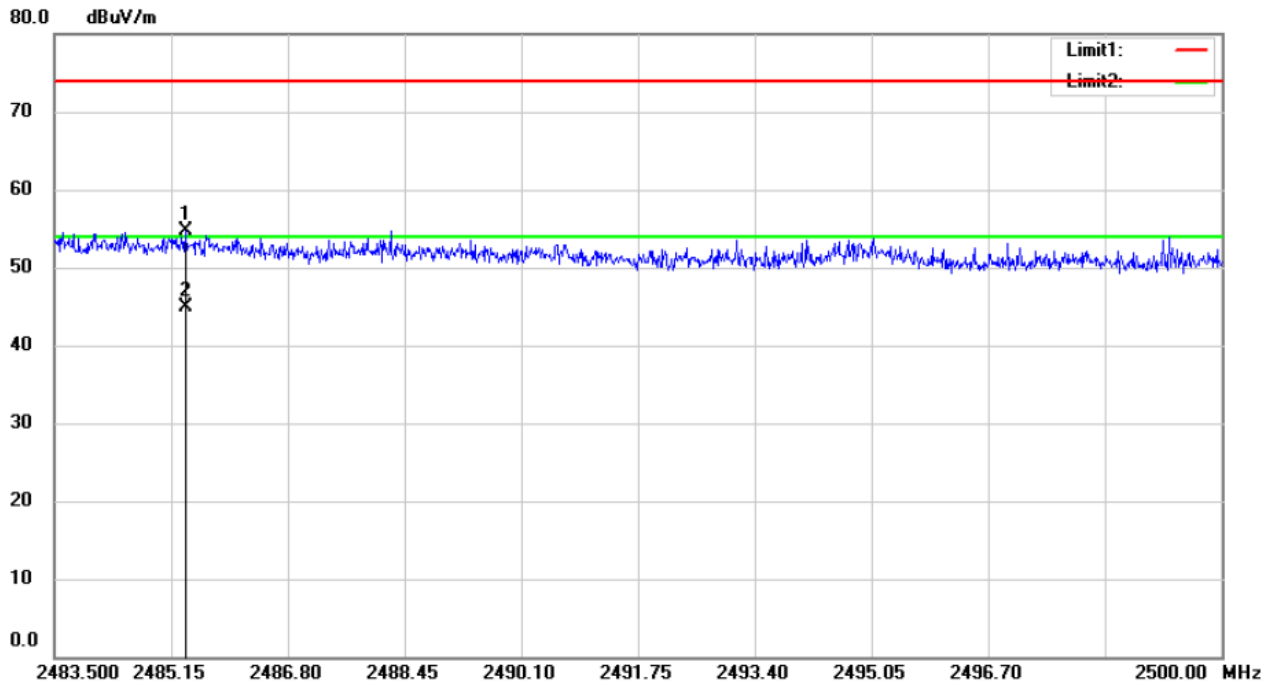


Spurious Emission in Restricted Band 2310-2390MHz

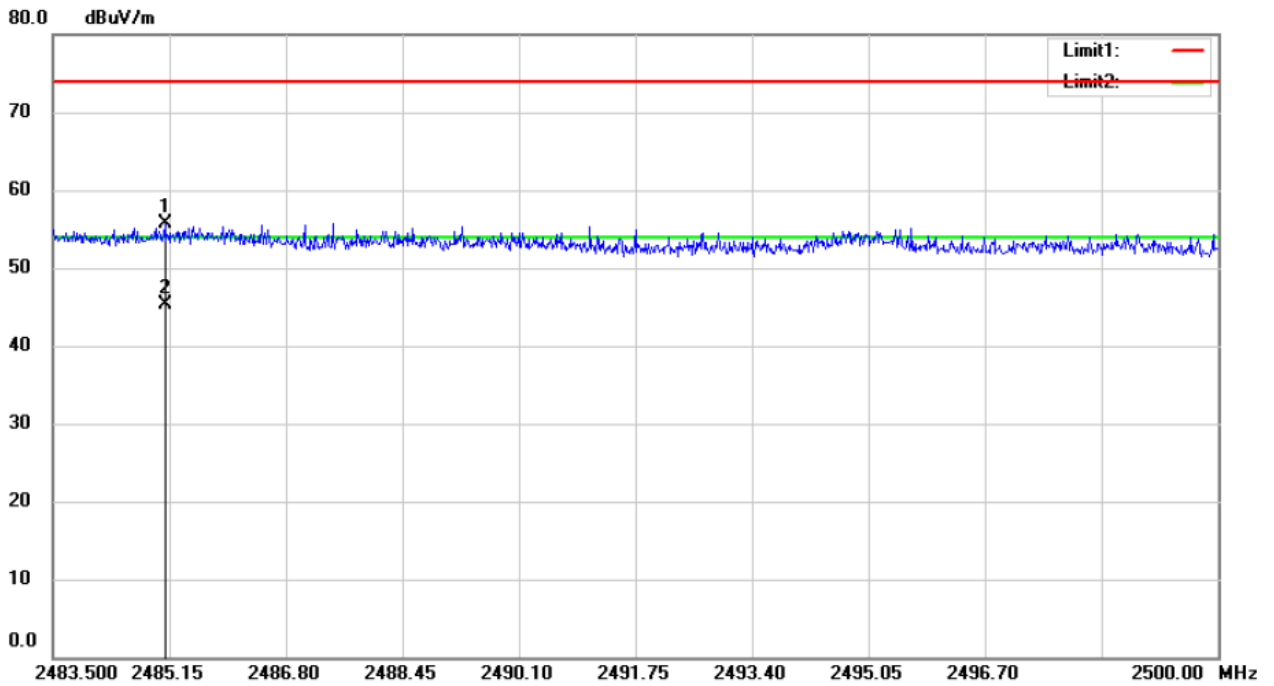
Test Model Channel 1: 2402MHz V



Spurious Emission in Restricted Band 2483.5-2500MHz  
 Test Model Channel 78: 2479MHz H



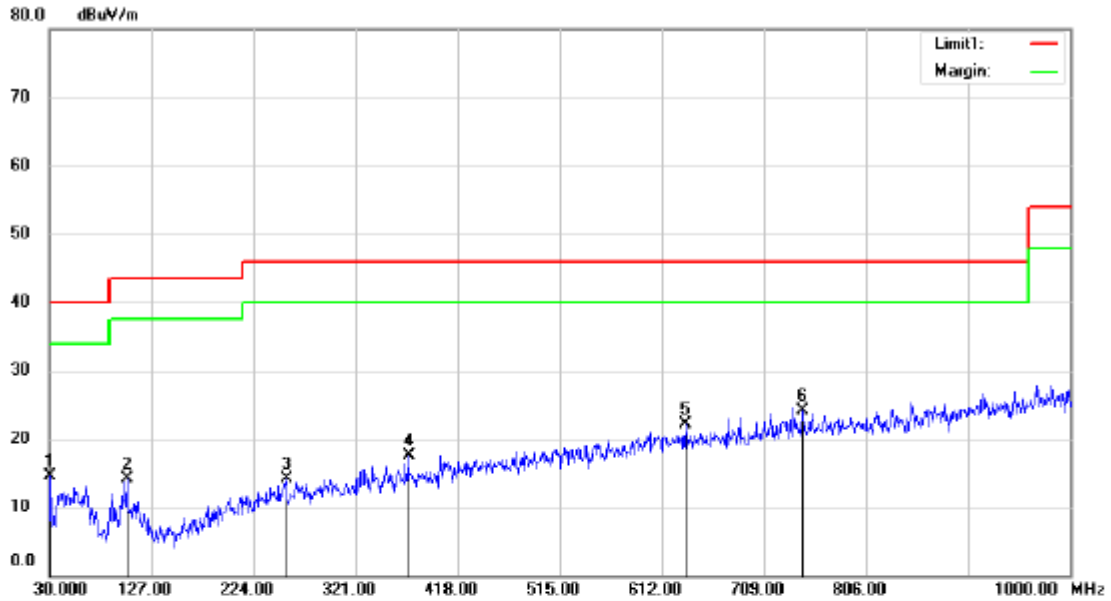
Spurious Emission in Restricted Band 2483.5-2500MHz  
 Test Model Channel 78: 2479MHz V





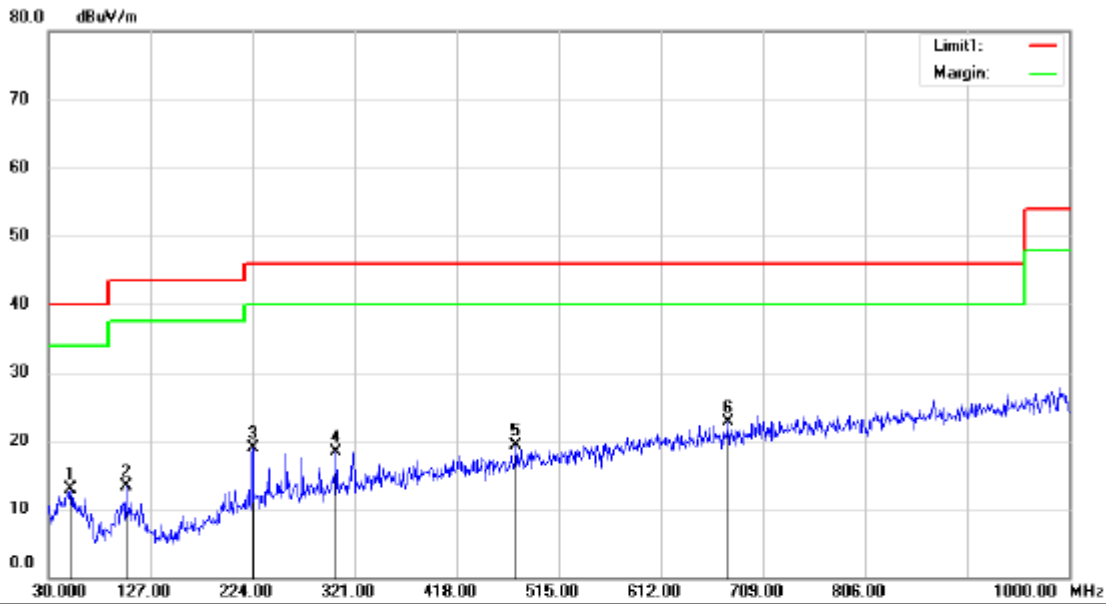
■ Spurious Emission below 1GHz (30MHz to 1GHz)

The power supply mode by PC and power supply mode by adapter have been tested, and the worst case(power supply mode by adapter) has been recorded in the report.



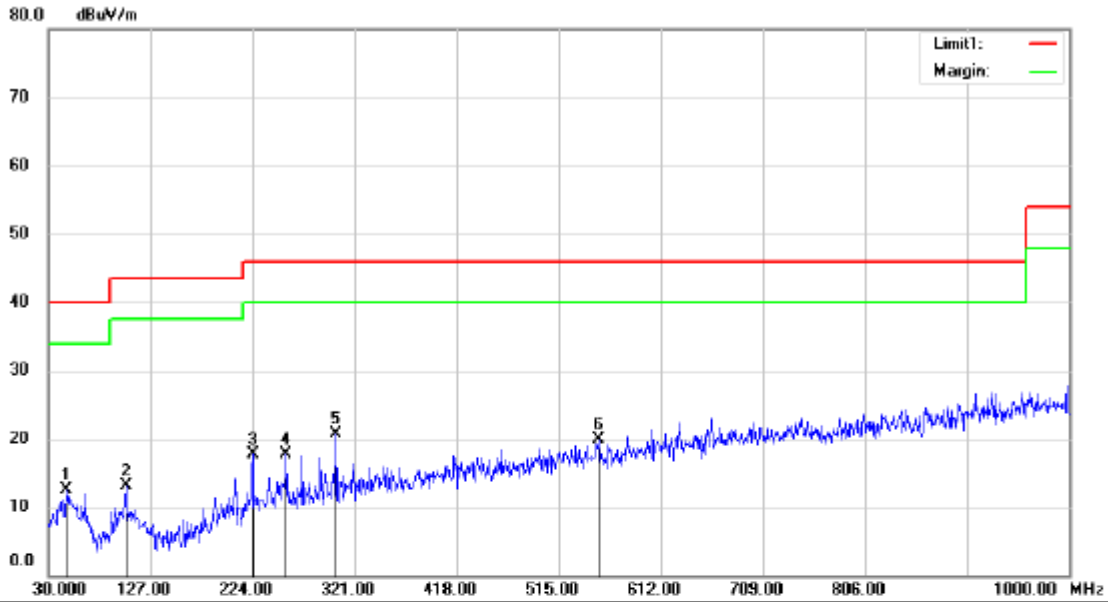
Site 3m Chamber #3 Polarization: *Vertical* Temperature: 23 C  
 Limit: (RE)FCC PART 15C Power: AC 120V/60Hz Humidity: 51 %  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode:Charging+TX 2402  
 Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1		31.8188	31.87	-17.32	14.55	40.00	-25.45	QP		
2		103.9625	30.20	-16.16	14.04	43.50	-29.46	QP		
3		255.8887	28.23	-14.13	14.10	46.00	-31.90	QP		
4		372.0462	28.93	-11.47	17.46	46.00	-28.54	QP		
5		634.7950	28.02	-5.89	22.13	46.00	-23.87	QP		
6	*	745.9813	28.17	-3.98	24.19	46.00	-21.81	QP		



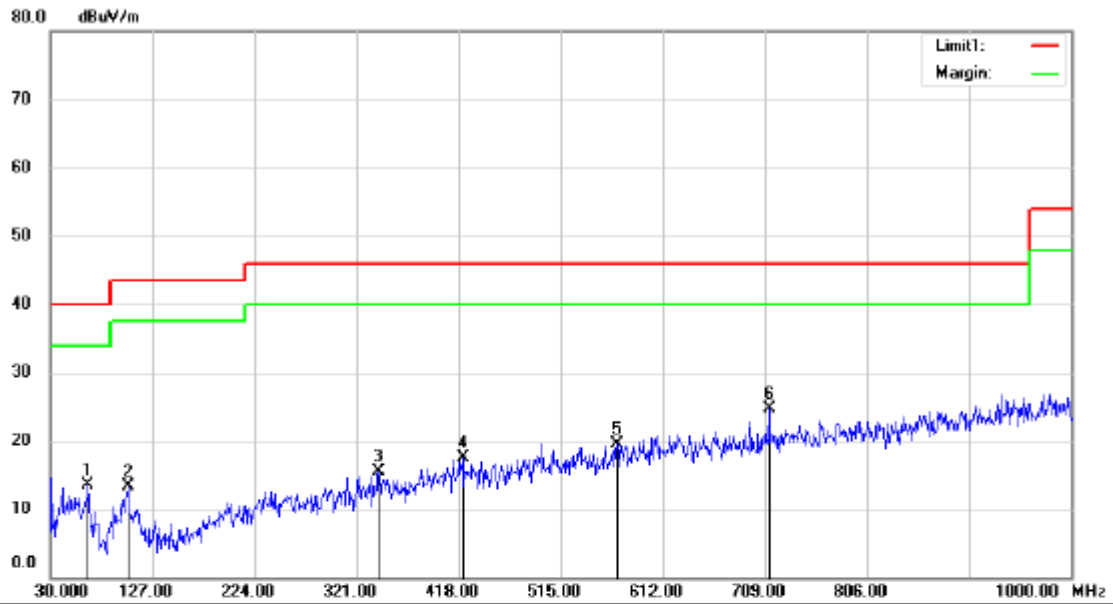
Site 3m Chamber #3      Polarization: *Horizontal*      Temperature: 23 C  
 Limit: (RE)FCC PART 15C      Power: AC 120V/60Hz      Humidity: 51 %  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode: Charging+TX 2402  
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Detector	Comment
1		51.7037	27.32	-14.45	12.87	40.00	-27.13			QP	
2		103.9625	29.44	-16.16	13.28	43.50	-30.22			QP	
3		224.0000	34.27	-15.43	18.84	46.00	-27.16			QP	
4		303.9037	31.47	-13.13	18.34	46.00	-27.66			QP	
5		474.5024	28.47	-9.20	19.27	46.00	-26.73			QP	
6	*	676.6262	28.13	-5.36	22.77	46.00	-23.23			QP	



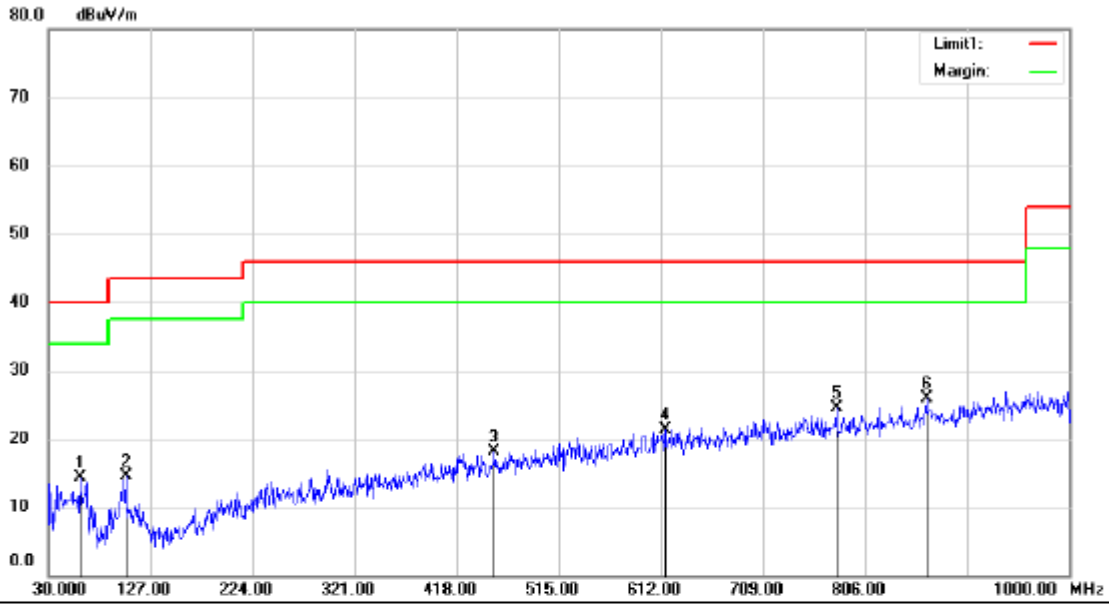
Site 3m Chamber #3 Polarization: *Horizontal* Temperature: 23 C  
 Limit: (RE)FCC PART 15C Power: AC 120V/60Hz Humidity: 51 %  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode:Charging+TX 2441  
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		47.7025	26.66	-14.20	12.46	40.00	-27.54	QP		
2		103.9625	29.27	-16.16	13.11	43.50	-30.39	QP		
3		224.0000	33.07	-15.43	17.64	46.00	-28.36	QP		
4		256.0100	31.86	-14.13	17.73	46.00	-28.27	QP		
5	*	304.0250	33.75	-13.13	20.62	46.00	-25.38	QP		
6		553.6788	27.58	-7.75	19.83	46.00	-26.17	QP		



Site 3m Chamber #3      Polarization: *Vertical*      Temperature: 23 C  
 Limit: (RE)FCC PART 15C      Power: AC 120V/60Hz      Humidity: 51 %  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode:Charging+TX 2441  
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		66.1325	30.64	-17.14	13.50	40.00	-26.50	QP		
2		103.9625	29.50	-16.16	13.34	43.50	-30.16	QP		
3		342.3400	27.00	-11.53	15.47	46.00	-30.53	QP		
4		422.2437	27.38	-9.89	17.49	46.00	-28.51	QP		
5		568.3500	26.92	-7.34	19.58	46.00	-26.42	QP		
6	*	713.6075	29.35	-4.65	24.70	46.00	-21.30	QP		

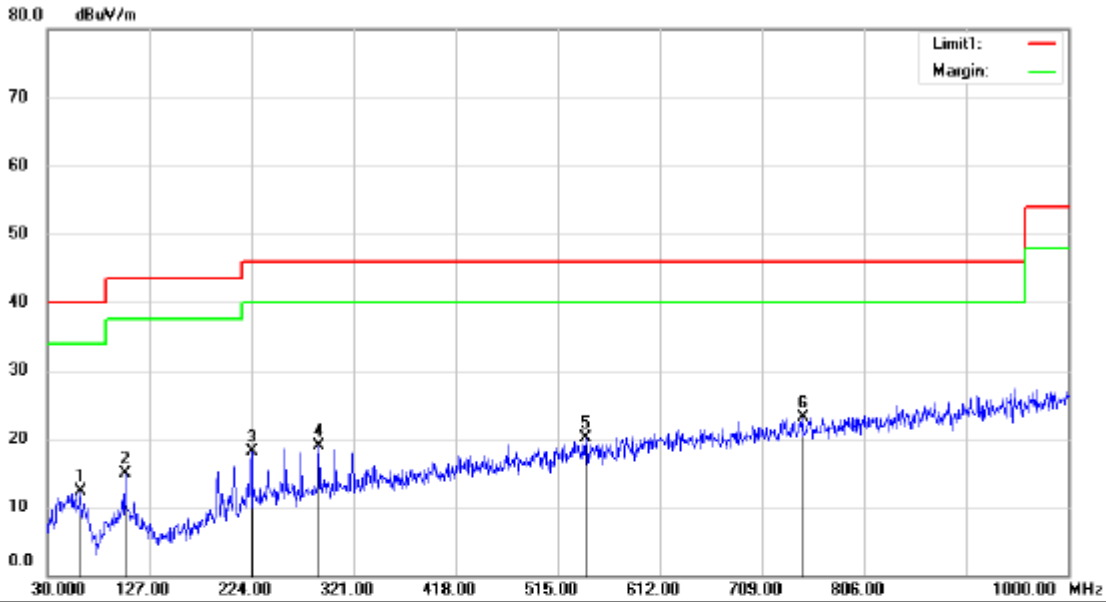


Site: 3m Chamber #3  
 Limit: (RE)FCC PART 15C  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode: Charging+TX 2479  
 Note:

Polarization: *Vertical*  
 Power: AC 120V/60Hz

Temperature: 23 C  
 Humidity: 51 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		60.7975	30.55	-16.18	14.37	40.00	-25.63			QP
2		103.9625	30.59	-16.16	14.43	43.50	-29.07			QP
3		454.3750	27.74	-9.58	18.16	46.00	-27.84			QP
4		616.4863	27.43	-6.08	21.35	46.00	-24.65			QP
5		779.2038	28.07	-3.66	24.41	46.00	-21.59			QP
6	*	864.4425	28.23	-2.28	25.95	46.00	-20.05			QP



Site: 3m Chamber #3      Polarization: *Horizontal*      Temperature: 23 C  
 Limit: (RE)FCC PART 15C      Power: AC 120V/60Hz      Humidity: 51 %  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode: Charging+TX 2479  
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1		61.6463	28.61	-16.27	12.34	40.00	-27.66	QP			
2		103.9625	31.12	-16.16	14.96	43.50	-28.54	QP			
3		224.0000	33.54	-15.43	18.11	46.00	-27.89	QP			
4		288.0200	32.30	-13.43	18.87	46.00	-27.13	QP			
5		541.4325	27.95	-7.94	20.01	46.00	-25.99	QP			
6	*	747.8000	27.08	-3.99	23.09	46.00	-22.91	QP			

**8.7 CONDUCTED EMISSIONS TEST**

**8.7.1 Applicable Standard**

According to FCC Part 15.207(a)

**8.7.2 Conformance Limit**

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies  
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

**8.7.3 Test Configuration**

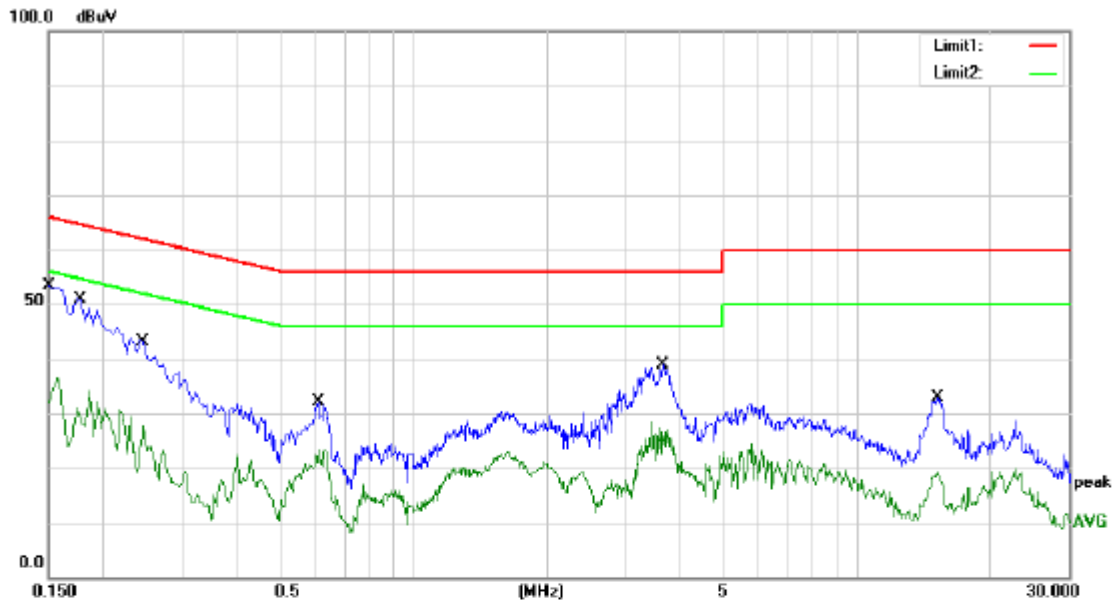
Test according to clause 7.3conducted emission test setup

**8.7.4 Test Procedure**

The EUT was placed on a table which is 0.8m above ground plane.  
 Maximum procedure was performed on the highest emissions to ensure EUT compliance.  
 Repeat above procedures until all frequency measured were complete.

**8.7.5 Test Results**

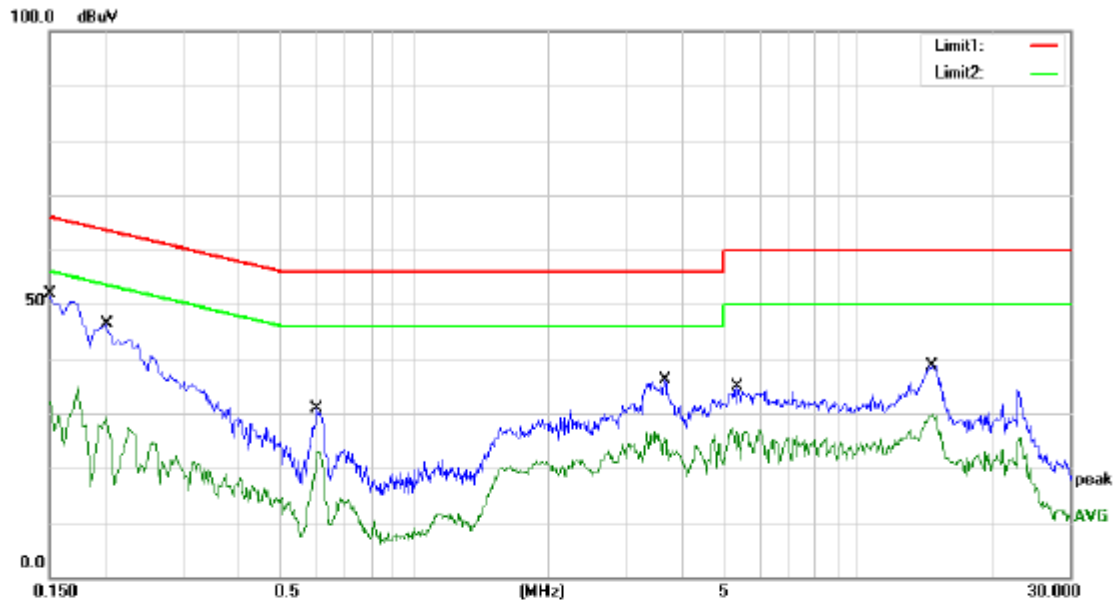
Pass



Site Conduction #1 Phase: **N** Temperature: 24.9  
 Limit: (CE)FCC PART 15C Power: DC 5V BY PC Humidity: 54 %  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode: Charging+ON  
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1500	43.76	9.56	53.32	66.00	-12.68	QP	
2		0.1500	27.02	9.56	36.58	56.00	-19.42	AVG	
3		0.1787	40.32	9.56	49.88	64.55	-14.67	QP	
4		0.1787	24.68	9.56	34.24	54.55	-20.31	AVG	
5		0.2468	32.50	9.56	42.06	61.86	-19.80	QP	
6		0.2468	13.51	9.56	23.07	51.86	-28.79	AVG	
7		0.6100	22.63	9.58	32.21	56.00	-23.79	QP	
8		0.6100	13.88	9.58	23.46	46.00	-22.54	AVG	
9		3.6460	29.28	9.64	38.92	56.00	-17.08	QP	
10		3.6460	18.65	9.64	28.29	46.00	-17.71	AVG	
11		15.1940	22.99	9.90	32.89	60.00	-27.11	QP	
12		15.1940	9.36	9.90	19.26	50.00	-30.74	AVG	

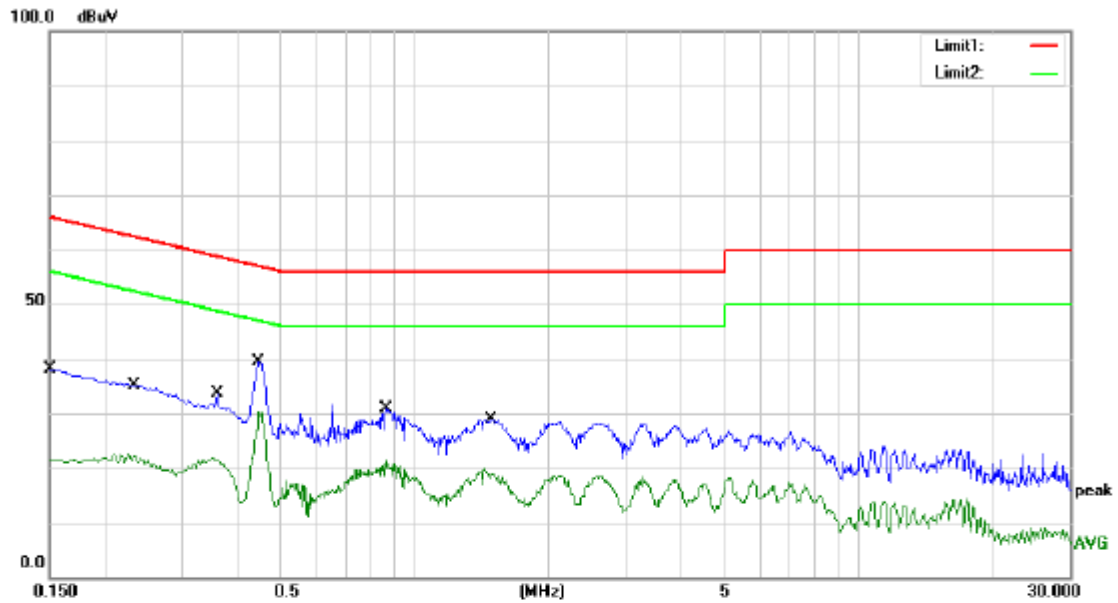




Site Conduction #1  
 Limit: (CE)FCC PART 15 C  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode: Charging+ON  
 Note:

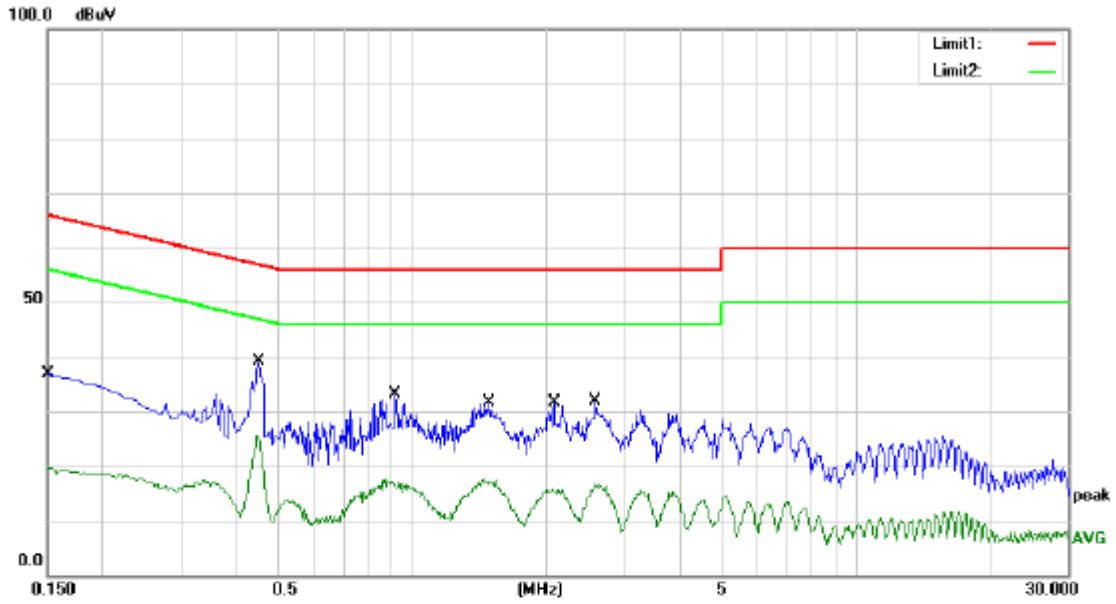
Phase: L1  
 Power: DC 5V BY PC  
 Temperature: 24.9  
 Humidity: 54 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1500	42.22	9.56	51.78	66.00	-14.22	QP	
2		0.1500	25.35	9.56	34.91	56.00	-21.09	AVG	
3		0.2020	36.71	9.56	46.27	63.53	-17.26	QP	
4		0.2020	17.87	9.56	27.43	53.53	-26.10	AVG	
5		0.6020	21.34	9.58	30.92	56.00	-25.08	QP	
6		0.6020	13.35	9.58	22.93	46.00	-23.07	AVG	
7		3.6620	26.40	9.64	36.04	56.00	-19.96	QP	
8		3.6620	16.92	9.64	26.56	46.00	-19.44	AVG	
9		5.3460	25.17	9.67	34.84	60.00	-25.16	QP	
10		5.3460	17.70	9.67	27.37	50.00	-22.63	AVG	
11		14.6500	28.79	9.89	38.68	60.00	-21.32	QP	
12		14.6500	19.94	9.89	29.83	50.00	-20.17	AVG	



Site Conduction #1 Phase: *L1* Temperature: 24.9  
 Limit: (CE)FCC PART 15 C Power: DC 5V by Adapter Humidity: 54 %  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode: Charging+ON  
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	28.51	9.56	38.07	66.00	-27.93	QP	
2		0.1500	12.23	9.56	21.79	56.00	-34.21	AVG	
3		0.2353	25.59	9.56	35.15	62.26	-27.11	QP	
4		0.2353	13.01	9.56	22.57	52.26	-29.69	AVG	
5		0.3580	23.98	9.57	33.55	58.77	-25.22	QP	
6		0.3580	12.26	9.57	21.83	48.77	-26.94	AVG	
7		0.4460	29.79	9.57	39.36	56.95	-17.59	QP	
8	*	0.4460	20.52	9.57	30.09	46.95	-16.86	AVG	
9		0.8620	21.29	9.59	30.88	56.00	-25.12	QP	
10		0.8620	11.68	9.59	21.27	46.00	-24.73	AVG	
11		1.4940	19.24	9.60	28.84	56.00	-27.16	QP	
12		1.4940	10.16	9.60	19.76	46.00	-26.24	AVG	



Site Conduction #1 Phase: **N** Temperature: 24.9  
 Limit: (CE)FCC PART 15 C Power: DC 5V by Adapter Humidity: 54 %  
 EUT: Lenovo Premium Wireless Keyboard  
 M/N: KBRF5C71  
 Mode: Charging+ON  
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1500	27.38	9.56	36.94	66.00	-29.06	QP	
2		0.1500	10.09	9.56	19.65	56.00	-36.35	AVG	
3	*	0.4500	29.59	9.57	39.16	56.88	-17.72	QP	
4		0.4500	16.12	9.57	25.69	46.88	-21.19	AVG	
5		0.9140	23.54	9.59	33.13	56.00	-22.87	QP	
6		0.9140	8.03	9.59	17.62	46.00	-28.38	AVG	
7		1.4940	22.03	9.60	31.63	56.00	-24.37	QP	
8		1.4940	8.06	9.60	17.66	46.00	-28.34	AVG	
9		2.0780	22.02	9.61	31.63	56.00	-24.37	QP	
10		2.0780	6.37	9.61	15.98	46.00	-30.02	AVG	
11		2.5820	22.23	9.62	31.85	56.00	-24.15	QP	
12		2.5820	7.04	9.62	16.66	46.00	-29.34	AVG	

## 8.8 ANTENNA APPLICATION

### 8.8.1 Antenna Requirement

Standard	Requirement
FCC CRF Part 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. 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, or §15.221. 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.

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 8.8.2 Result

PASS.

The EUT has one PCB layout antenna, and the gain is max 2dBi.

- Note:
- Antenna use a permanently attached antenna which is not replaceable.
  - Not using a standard antenna jack or electrical connector for antenna replacement
  - The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.