

FCC Report (Bluetooth)

Product Name : IEEE 802.11a/b/g/n/ac(2T2R) USB WLAN and BT Module
Trade mark : LB-LINK
Model No. : BL-R8822BU1-A
FCC ID : 2AL6K- R8822BU1-A
Report Number : BLA-EMC-201910-A52-04
Date of sample receipt : October 31, 2019
Date of Test : October 31, 2019 –November 15, 2019
Date of Issue : November 18, 2019
Test standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247
Test result : PASS

Prepared for:

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Date: November 18, 2019



2 Version

Version No.	Date	Description
00	November 18, 2019	Original

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Output Power	15.247 (b)(3)	Pass
Channel Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark: Test according to ANSI C63.10:2013.

Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 26.5GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

5 General Information

5.1 General Description of EUT

Product Name:	IEEE 802.11a/b/g/n/ac(2T2R) USB WLAN and BT Module
Model No.:	BL-R8822BU1-A
Test Model No.:	BL-R8822BU1-A
Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are model name for commercial purpose.	
Serial No.:	N/A
Sample(s) Status	Engineer sample
Hardware:	1.0
Software:	1.0
Operation Frequency:	2402MHz-2480MHz
Channel Numbers:	40
Channel Separation:	2MHz
Modulation Type:	GFSK
Antenna Type:	External Antenna
Antenna Gain:	2.0dBi
Power Supply:	DC 3.3V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2442MHz
The Highest channel	2480MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
Lenovo	Notebook computer	E470C	PF-10FB5C

5.4 Test Facility

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

• **FCC — Designation No.: CN1252**

BlueAsia of Technical Services(Shenzhen) Co., Ltd has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Designation CN1252.

• **ISED — CAB identifier No.: CN0028**

BlueAsia of Technical Services(Shenzhen) Co., Ltd has been registered by Certification and Engineering Bureau of ISED for radio equipment testing with CAB identifier CN0028

5.5 Test Location

All tests were performed at:

All tests were performed at:

BlueAsia of Technical Services(Shenzhen) Co., Ltd.

IOT Test Centre of BlueAsia

No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen, China

Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673

No tests were sub-contracted.

6 Test Instruments list

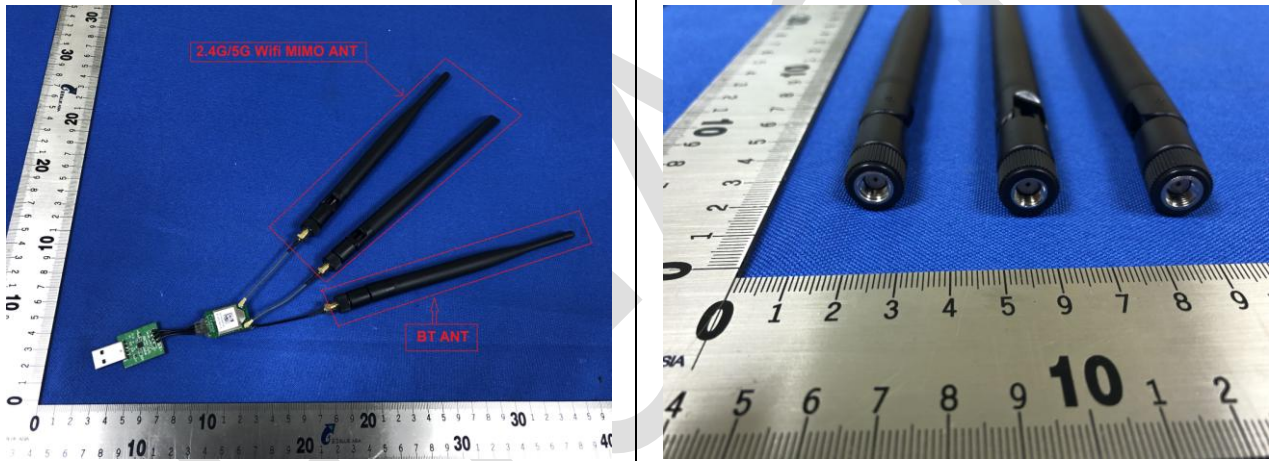
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m SAC	SKET	9m*6 m*6m	966	06-10-2018	06-09-2023
2	Broadband Antenna	SCHWARZBECK	VULB9168	00836 P:00227	07-14-2019	07-13-2020
3	Horn Antenna	SCHWARZBECK	9120D	01892 P:00331	07-14-2019	07-13-2020
4	EMI Test Software	EZ	EZ	N/A	N/A	N/A
5	Pre-amplifier	SKET	N/A	N/A	07-19-2019	07-18-2020
6	Spectrum analyzer	Rohde & Schwarz	FSP40	100817	05-24-2019	05-23-2020
7	EMI Test Receiver	Rohde & Schwarz	ESR7	101199	03-21-2019	03-20-2020
8	Controller	SKET	N/A	N/A	N/A	N/A
9	Vector Signal Generator	Agilent	E4438C	MY45092582	05-24-2019	05-23-2020
10	Signal Generator	Agilent	E8257D	MY44320250	05-24-2019	05-23-2020
11	Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
12	Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
13	Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	EMI Test Receiver	Rohde & Schwarz	ESPI3	101082	06-10-2019	06-09-2020
2	LISN	CHASE	MN2050D	1447	12-18-2018	12-17-2019
3	LISN	Rohde & Schwarz	ENV216	3560.6550.15	07-19-2019	07-18-2020
4	EMI Test Software	EZ	EZ	N/A	N/A	N/A
5	Temperature Humidity Chamber	Mingle	TH101B	N/A	07-19-2019	07-18-2020
6	Coaxial Cable	BlueAsia	BLA-XC-05	N/A	N/A	N/A

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Spectrum Analyzer	Agilent	N9030A	MY50510123	05-24-2019	05-23-2020
2	Spectrum analyzer	Rohde & Schwarz	FSP40	100817	05-24-2019	05-23-2020
3	Vector Signal Generator	Agilent	E4438C	MY45092582	05-24-2019	05-23-2020
4	Signal Generator	Agilent	E8257D	MY44320250	05-24-2019	05-23-2020
5	Power Sensor	D.A.R.E	RPR3006W	17I00015SNO27	05-24-2019	05-23-2020
6	Power Sensor	D.A.R.E	RPR3006W	17I00015SNO28	05-24-2019	05-23-2020
7	DC Power Supply	LODESTAR	LP305DE	N/A	07-19-2019	07-18-2020
8	Temperature Humidity Chamber	Mingle	TH101B	N/A	07-19-2019	07-18-2020

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: 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, 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.	
15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
E.U.T Antenna:	
The antenna is External antenna, the best case gain of the antenna is 2.0dBi	
	

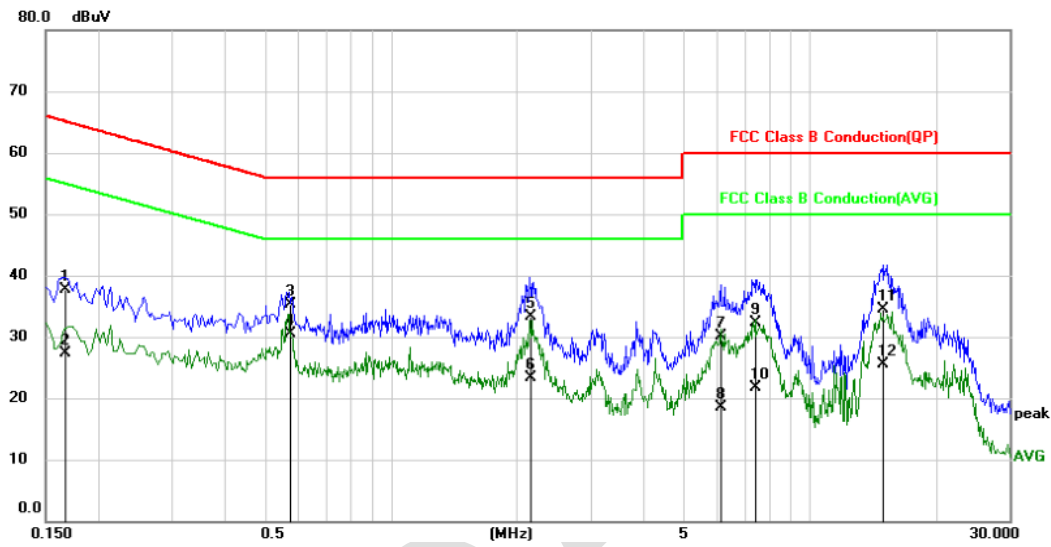
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Test Frequency Range:	150KHz to 30MHz														
Class / Severity:	Class B														
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto														
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> * Decreases with the logarithm of the frequency.	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test setup:	Reference Plane Test table/Insulation plane <i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i>														
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.														
Test Instruments:	Refer to section 6.0 for details														
Test mode:	Refer to section 5.2 for details														
Test results:	Pass														

Measurement data

Line:

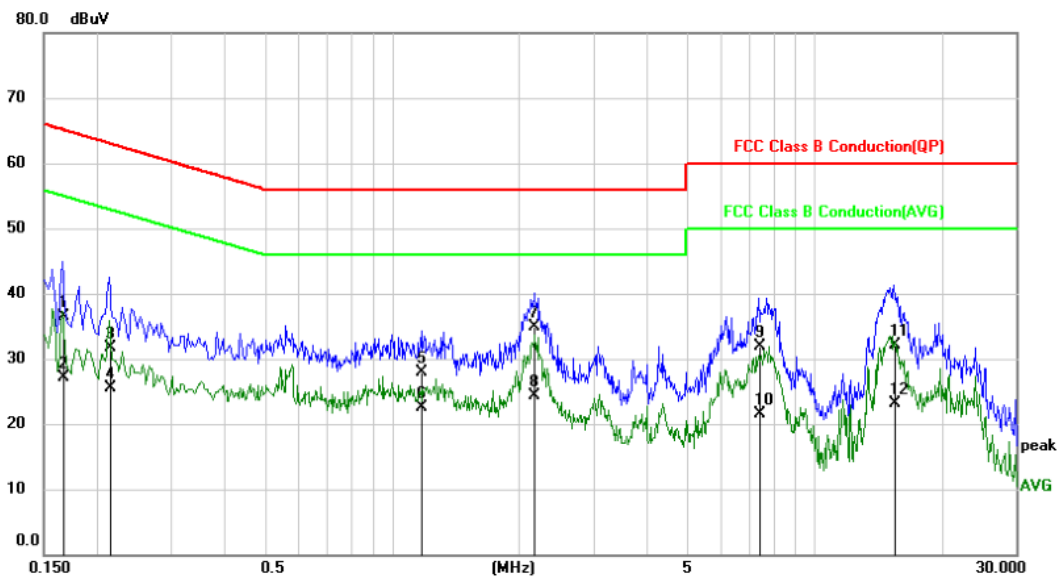
EUT:	IEEE 802.11a/b/g/n/ac(2T2R) USB WLAN and BT Module	Probe:	L1
Model:	BL-R8822BU1-A	Power Source:	AC120V/60Hz
Mode:	BLE mode	Test by:	Eason
Temp./Hum.(%H):	26°C/60%RH		



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	dBuV	Factor	ment	dBuV	dB	Detector
1		0.1660	27.71	9.90	37.61	65.16	-27.55	QP
2		0.1660	17.34	9.90	27.24	55.16	-27.92	AVG
3		0.5740	25.56	9.74	35.30	56.00	-20.70	QP
4	*	0.5740	20.68	9.74	30.42	46.00	-15.58	AVG
5		2.1500	23.45	9.82	33.27	56.00	-22.73	QP
6		2.1500	13.51	9.82	23.33	46.00	-22.67	AVG
7		6.1420	20.15	9.87	30.02	60.00	-29.98	QP
8		6.1420	8.70	9.87	18.57	50.00	-31.43	AVG
9		7.4100	22.53	9.87	32.40	60.00	-27.60	QP
10		7.4100	11.82	9.87	21.69	50.00	-28.31	AVG
11		14.9460	24.49	9.98	34.47	60.00	-25.53	QP
12		14.9460	15.52	9.98	25.50	50.00	-24.50	AVG

Neutral:

EUT:	IEEE 802.11a/b/g/n/ac(2T2R) USB WLAN and BT Module	Probe:	N
Model:	BL-R8822BU1-A	Power Source:	AC120V/60Hz
Mode:	BLE mode	Test by:	Eason
Temp./Hum.(%RH):	26℃/60%RH		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1660	26.59	9.87	36.46	65.16	-28.70	QP
2		0.1660	17.21	9.87	27.08	55.16	-28.08	AVG
3		0.2140	21.78	9.88	31.66	63.05	-31.39	QP
4		0.2140	15.70	9.88	25.58	53.05	-27.47	AVG
5		1.1780	18.06	9.82	27.88	56.00	-28.12	QP
6		1.1780	12.71	9.82	22.53	46.00	-23.47	AVG
7	*	2.1780	24.97	9.86	34.83	56.00	-21.17	QP
8		2.1780	14.52	9.86	24.38	46.00	-21.62	AVG
9		7.4060	21.95	9.86	31.81	60.00	-28.19	QP
10		7.4060	11.62	9.86	21.48	50.00	-28.52	AVG
11		15.4180	22.08	10.01	32.09	60.00	-27.91	QP
12		15.4180	13.08	10.01	23.09	50.00	-26.91	AVG

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. *Final Level = Receiver Read level + Correct factor*
4. *Correct factor = LISN Factor + Cable Loss*
5. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

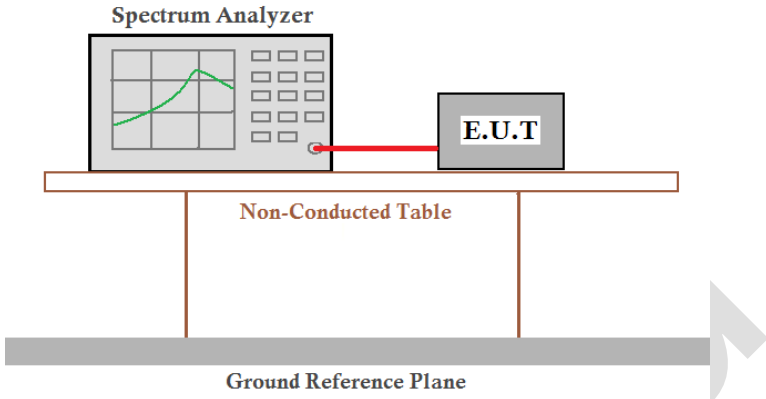
BlueAsia of Technical Services(Shenzhen) Co., Ltd.

IOT Test Centre of BlueAsia,

No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen, China

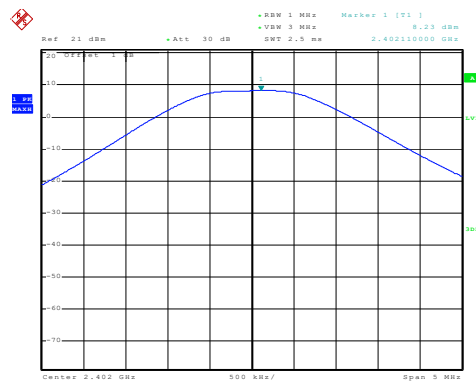
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673

7.3 Conducted Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

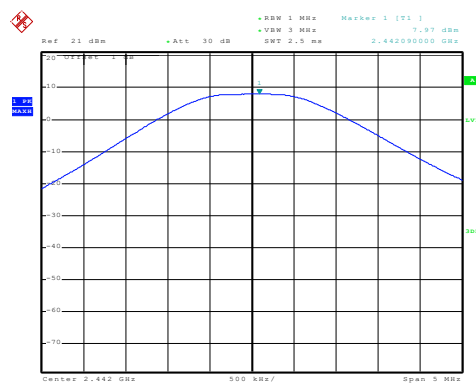
Measurement Data

Test channel	Peak Output Power (dBm)	Limit(dBm)	Result
Lowest	8.23	30.00	Pass
Middle	7.97		
Highest	6.78		



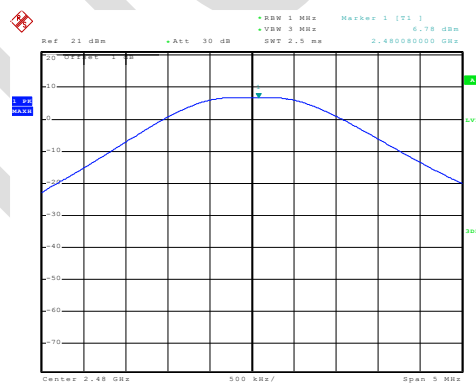
Date: 14.NOV.2019 17:30:57

Lowest channel



Date: 14.NOV.2019 17:31:46

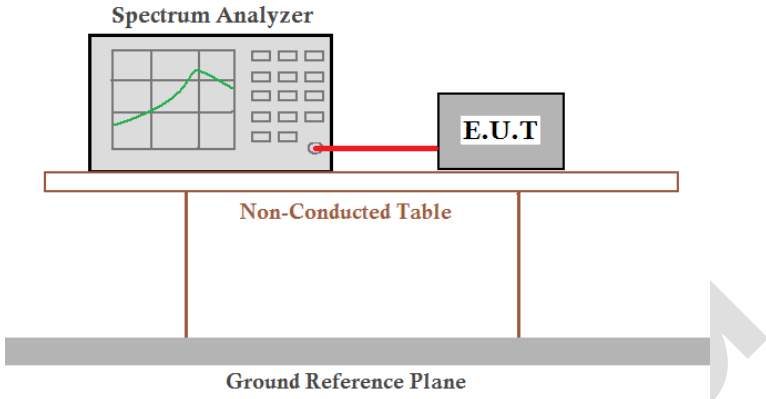
Middle channel



Date: 14.NOV.2019 17:32:19

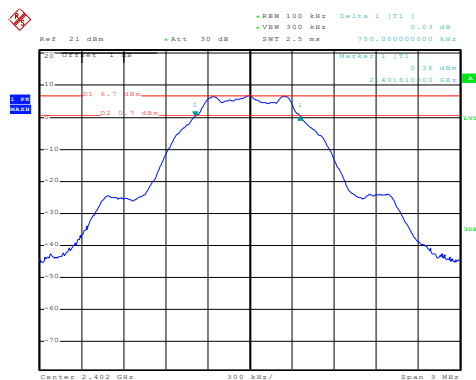
Highest channel

7.4 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

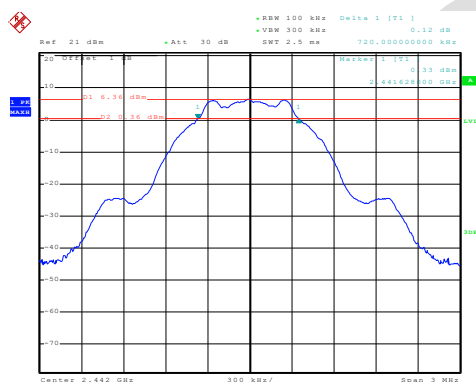
Measurement Data

Test channel	Channel Bandwidth (MHz)	Limit(KHz)	Result
Lowest	0.750	>500	Pass
Middle	0.720		
Highest	0.744		



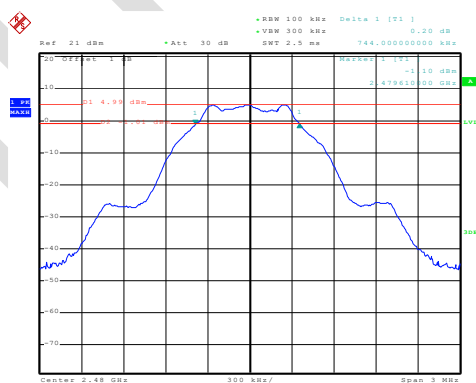
Date: 14.NOV.2019 17:10:50

Lowest channel



Date: 14.NOV.2019 17:12:43

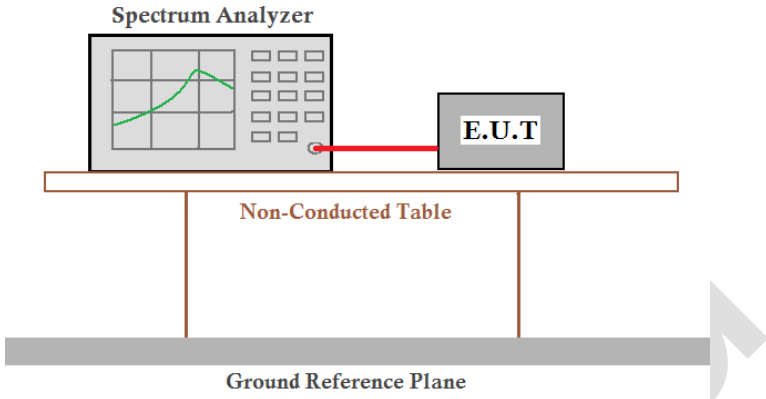
Middle channel



Date: 14.NOV.2019 17:13:57

Highest channel

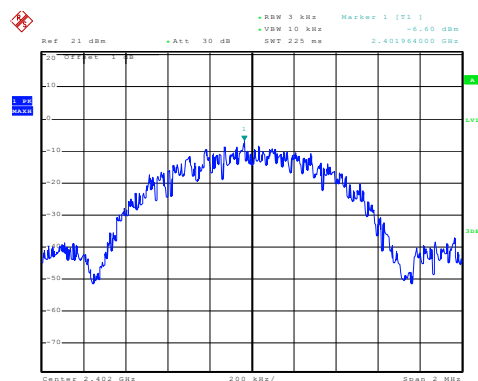
7.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	8dBm/3kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

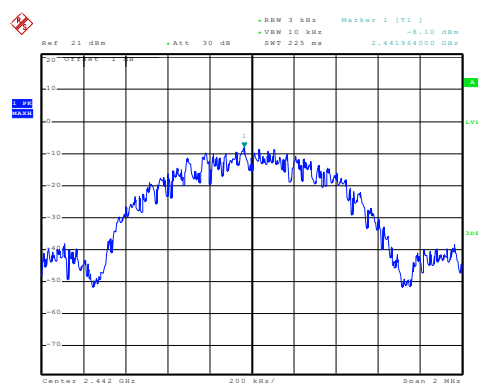
Test channel	Power Spectral Density (dBm/3KHz)	Limit(dBm/3kHz)	Result
Lowest	-6.60	8.00	Pass
Middle	-8.10		
Highest	-9.08		

Test plot as follows:



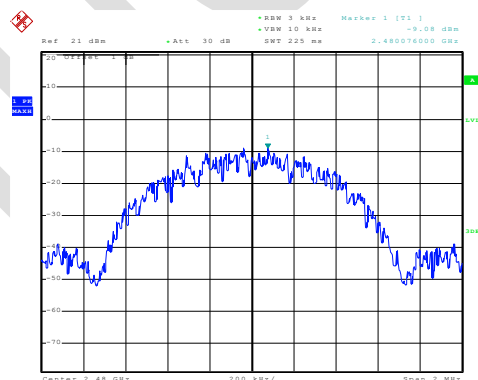
Date: 14.NOV.2019 17:36:44

Lowest channel



Date: 14.NOV.2019 17:37:37

Middle channel

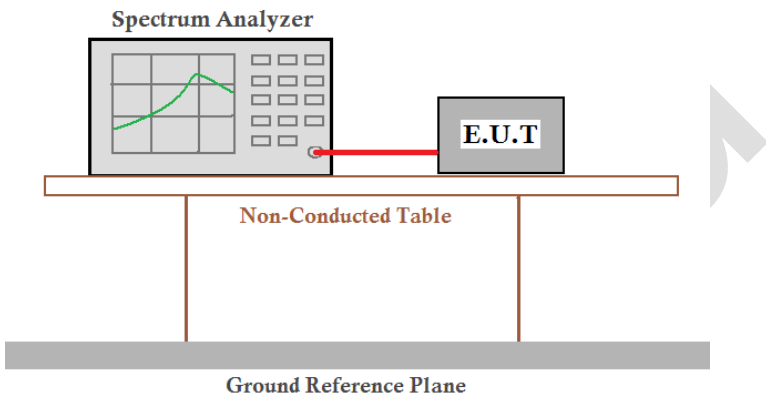


Date: 14.NOV.2019 17:39:19

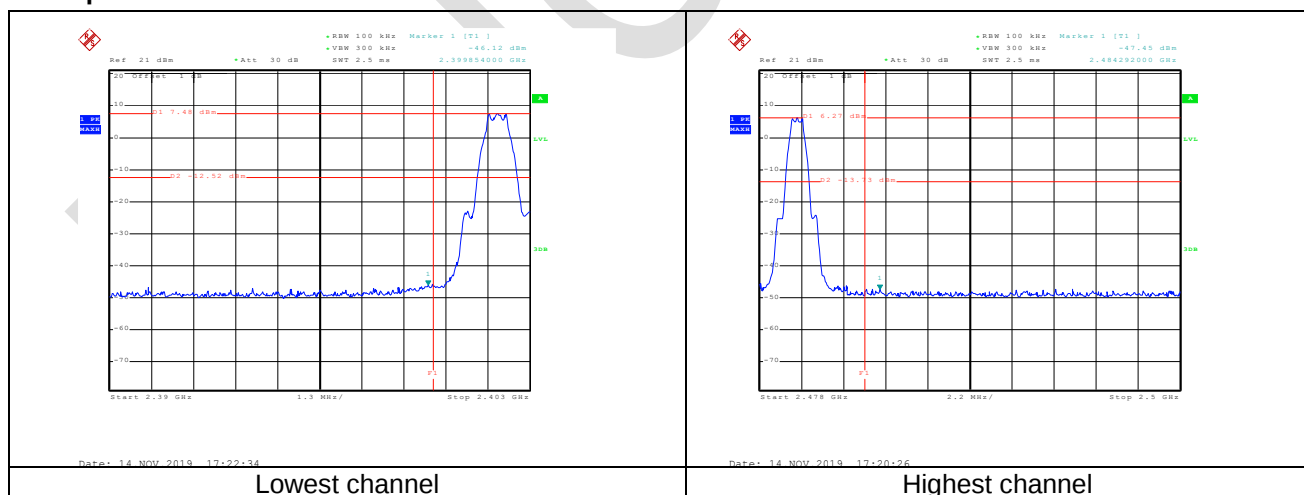
Highest channel

7.6 Band edges

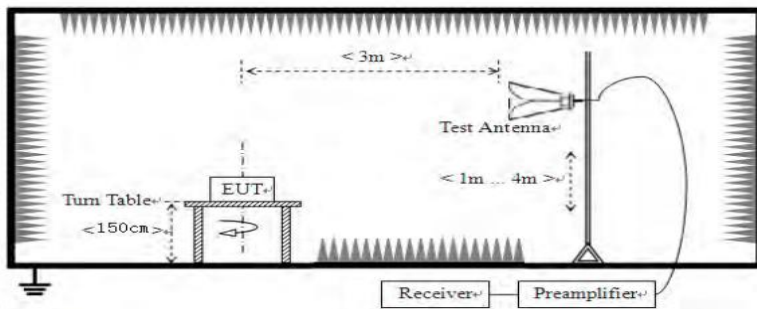
7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test plot as follows:



7.6.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2390MHz, 2483.5MHz to 2500MHz) data was showed.				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		RMS	1MHz	3MHz	Average
Limit:	Frequency		Limit (dBuV/m @3m)		Value
	Above 1GHz		54.00		Average
			74.00		Peak
Test setup:					
Test Procedure:	1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.				
Test Instruments:	Refer to section 6.0 for details				
Test mode:	Refer to section 5.2 for details				
Test results:	Pass				

Measurement data:

Remark: The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.

Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	56.02	-14.42	41.60	74.00	-32.40	Horizontal
2390.00	56.66	-14.11	42.55	74.00	-31.45	Horizontal
2310.00	56.37	-14.71	41.66	74.00	-32.34	Vertical
2390.00	59.85	-14.44	45.41	74.00	-28.59	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	44.00	-14.42	29.58	54.00	-24.42	Horizontal
2390.00	44.58	-14.11	30.47	54.00	-23.53	Horizontal
2310.00	44.56	-14.71	29.85	54.00	-24.15	Vertical
2390.00	45.87	-14.44	31.43	54.00	-22.57	Vertical

Test channel:	Highest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	56.61	-13.61	43.00	74.00	-31.00	Horizontal
2500.00	56.48	-13.53	42.95	74.00	-31.05	Horizontal
2483.50	57.79	-14.00	43.79	74.00	-30.21	Vertical
2500.00	57.35	-13.93	43.42	74.00	-30.58	Vertical

Average value:

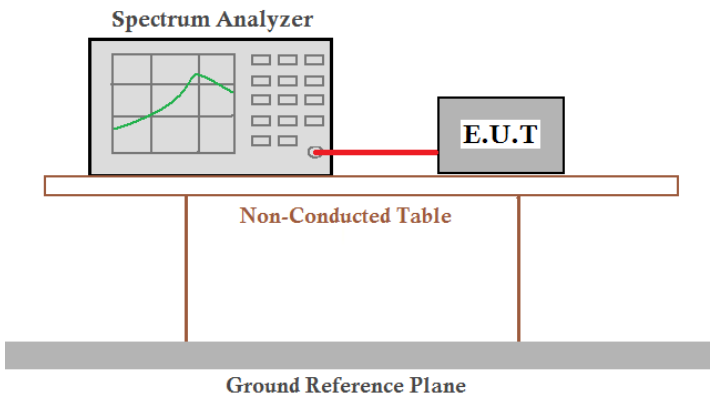
Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	45.68	-13.61	32.07	54.00	-21.93	Horizontal
2500.00	45.08	-13.53	31.55	54.00	-22.45	Horizontal
2483.50	46.09	-14.00	32.09	54.00	-21.91	Vertical
2500.00	44.17	-13.93	30.24	54.00	-23.76	Vertical

Remark:

1. Final Level = Receiver Read level + Correct factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor

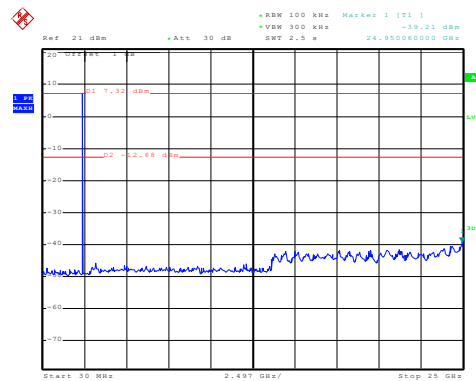
7.7 Spurious Emission

7.7.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	 The diagram illustrates the test setup for conducted emission measurement. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is positioned above a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test plot as follows:

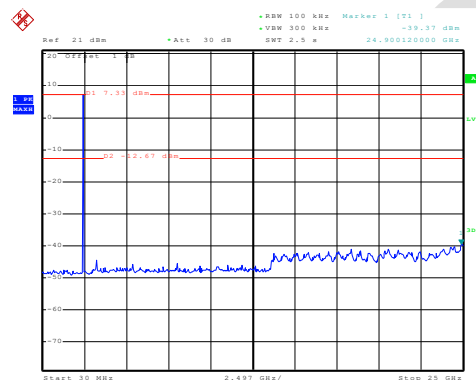
Lowest channel



Date: 14.NOV.2019 17:24:17

30MHz~25GHz

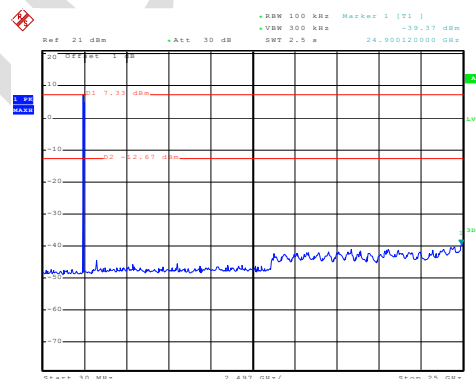
Middle channel



Date: 14.NOV.2019 17:28:04

30MHz~25GHz

Highest channel

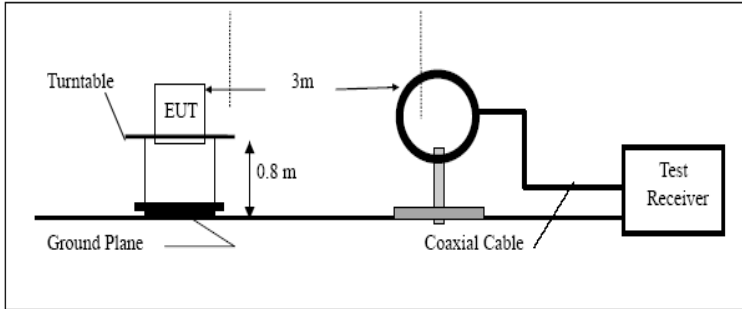
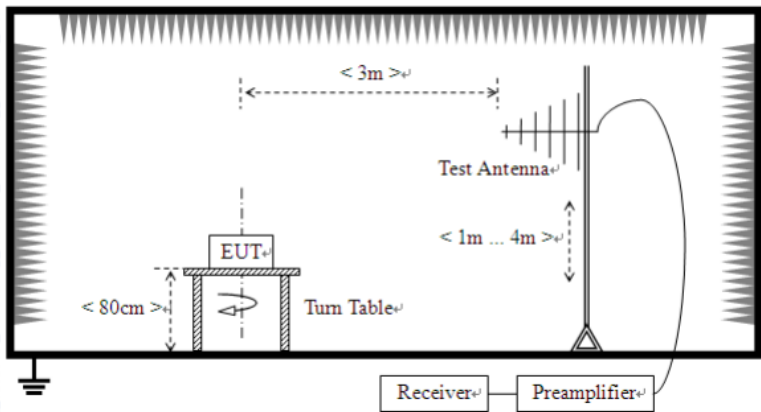
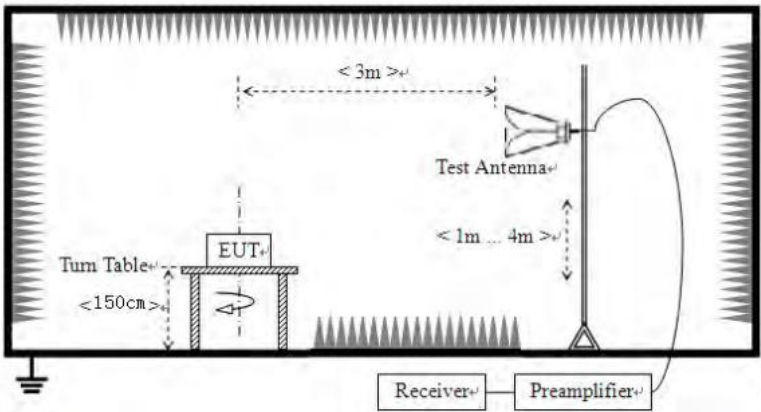


Date: 14.NOV.2019 17:29:32

30MHz~25GHz

7.7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit: (Spurious Emissions)	Frequency	Limit (uV/m)	Value	Measurement Distance	
	0.009MHz-0.490MHz	2400/F(KHz)	QP	300m	
	0.490MHz-1.705MHz	24000/F(KHz)	QP	30m	
	1.705MHz-30MHz	30	QP	30m	
	30MHz-88MHz	100	QP	3m	
	88MHz-216MHz	150	QP		
	216MHz-960MHz	200	QP		
	960MHz-1GHz	500	QP		
	Above 1GHz	500	Average		
		5000	Peak		
Limit: (band edge)	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.				

Test setup:	Below 30MHz  Below 1GHz  Above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the

	measurement. 4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark:

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

Measurement Data

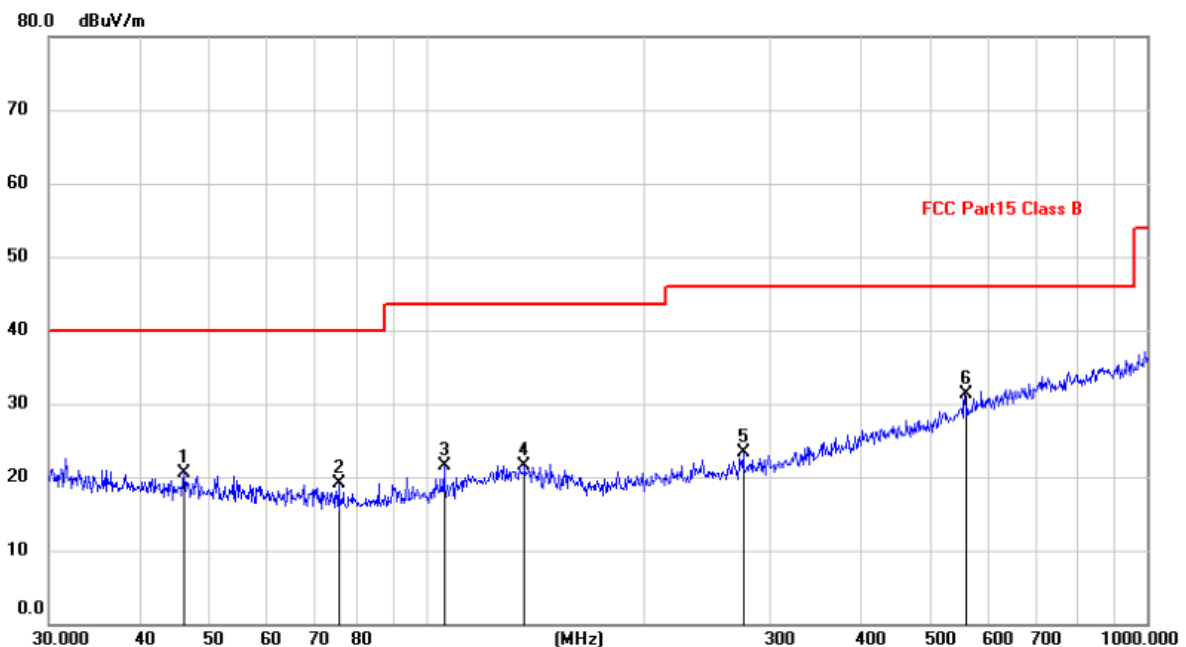
■ **9 kHz ~ 30 MHz**

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Below 1GHz

Horizontal:

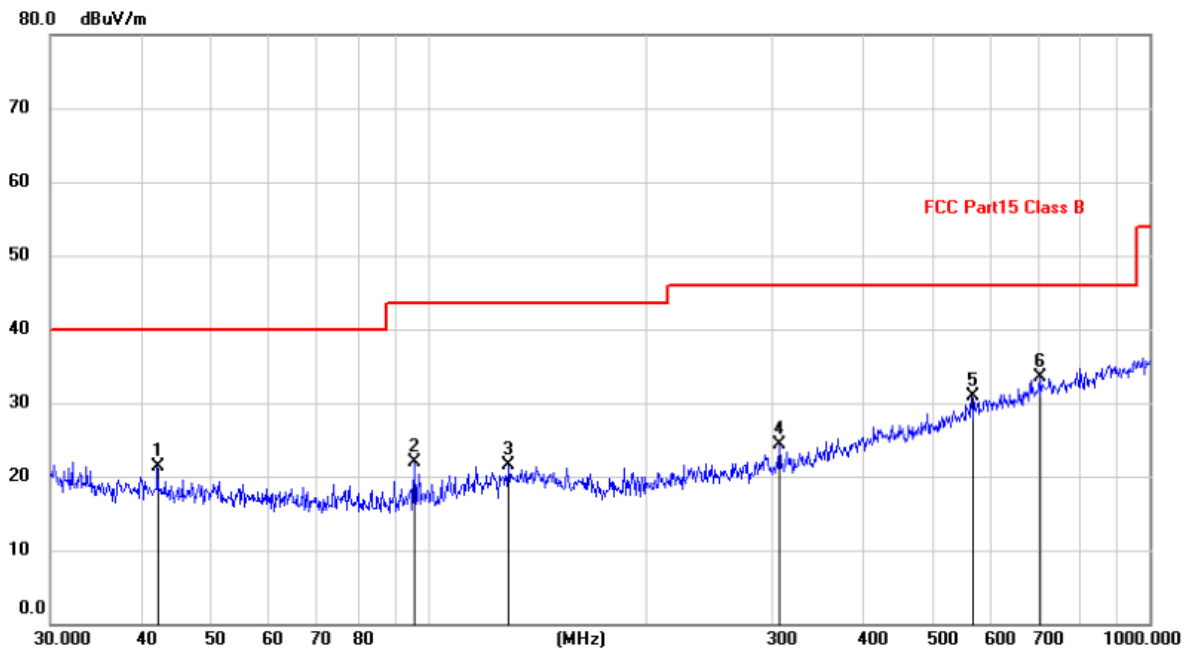
EUT:	IEEE 802.11a/b/g/n/ac(2T2R) USB WLAN and BT Module	Polarization:	Horizontal
Model:	BL-R8822BU1-A	Power Source:	AC120V/60Hz
Mode:	BLE mode	Test by:	Eason
Temp./Hum.(%RH):	26°C/60%RH		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		46.1779	6.31	14.29	20.60	40.00	-19.40	QP
2		75.7114	9.20	9.87	19.07	40.00	-20.93	QP
3		106.0126	10.34	11.17	21.51	43.50	-21.99	QP
4		136.9391	8.37	13.09	21.46	43.50	-22.04	QP
5		275.1570	10.15	13.09	23.24	46.00	-22.76	QP
6	*	558.7302	11.24	20.16	31.40	46.00	-14.60	QP

Vertical:

EUT:	IEEE 802.11a/b/g/n/ac(2T2R) USB WLAN and BT Module	Polarization:	Vertical
Model:	BL-R8822BU1-A	Power Source:	AC120V/60Hz
Mode:	BLE mode	Test by:	Eason
Temp./Hum.(%H):	26°C/60%RH		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		42.1542	7.15	14.21	21.36	40.00	-18.64	QP
2		95.7622	11.86	10.10	21.96	43.50	-21.54	QP
3		129.4677	8.69	12.85	21.54	43.50	-21.96	QP
4		306.7537	10.34	13.87	24.21	46.00	-21.79	QP
5		566.6223	10.54	20.33	30.87	46.00	-15.13	QP
6	*	704.2261	10.89	22.61	33.50	46.00	-12.50	QP

■ Above 1GHz

Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	54.17	-7.87	46.30	74.00	-27.70	Vertical
7206.00	55.91	-2.42	53.49	74.00	-20.51	Vertical
9608.00	55.24	-2.38	52.86	74.00	-21.14	Vertical
12010.00	*			74.00		Vertical
14412.00	*			74.00		Vertical
4804.00	53.38	-7.87	45.51	74.00	-28.49	Horizontal
7206.00	56.07	-2.42	53.65	74.00	-20.35	Horizontal
9608.00	55.13	-2.38	52.75	74.00	-21.25	Horizontal
12010.00	*			74.00		Horizontal
14412.00	*			74.00		Horizontal

Test channel:	Middle
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.00	52.31	-10.06	42.35	74.00	-31.75	Vertical
7326.00	56.17	-2.40	53.77	74.00	-20.23	Vertical
9768.00	55.42	-2.38	53.04	74.00	-20.96	Vertical
12210.00	*			74.00		Vertical
14652.00	*			74.00		Vertical
4884.00	52.66	-10.06	42.60	74.00	-31.40	Horizontal
7326.00	55.89	-2.40	53.49	74.00	-20.51	Horizontal
9768.00	55.31	-2.38	52.93	74.00	-21.07	Horizontal
12210.00	*			74.00		Horizontal
14652.00	*			74.00		Horizontal

Test channel:	Highest
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Peak value:

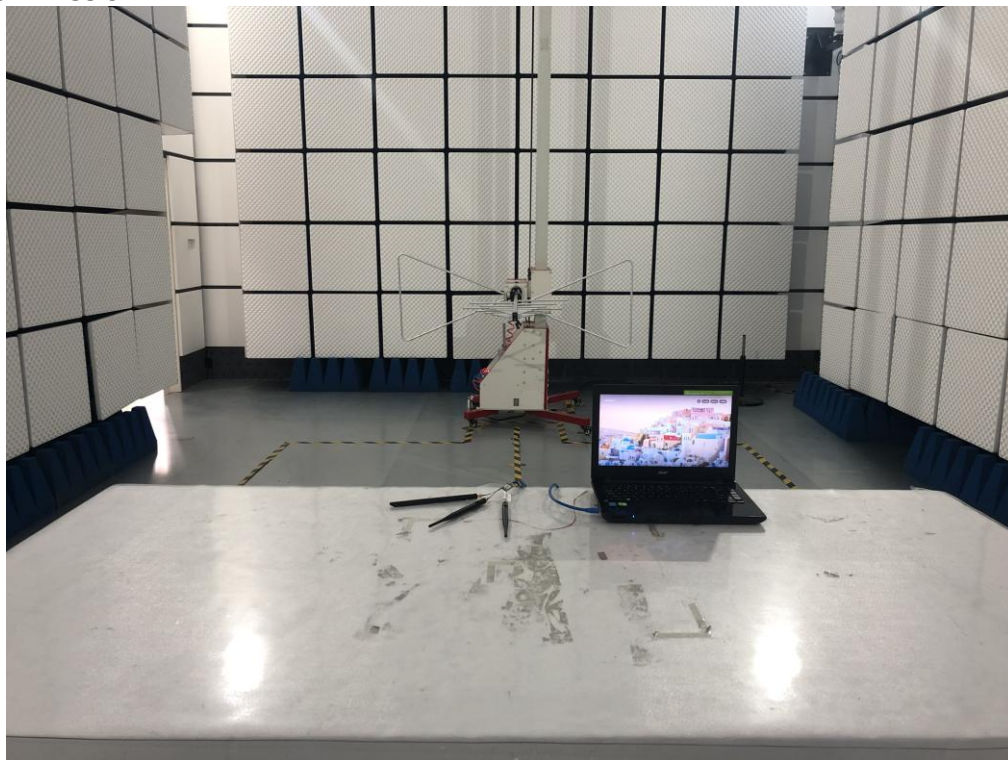
Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	51.93	-9.19	42.74	74.00	-31.26	Vertical
7440.00	55.78	-2.45	53.33	74.00	-20.67	Vertical
9920.00	55.16	-2.37	52.79	74.00	-21.21	Vertical
12400.00	*			74.00		Vertical
14880.00	*			74.00		Vertical
4960.00	50.70	-9.19	41.51	74.00	-32.49	Horizontal
7440.00	56.14	-2.45	53.69	74.00	-20.31	Horizontal
9920.00	55.88	-2.37	53.51	74.00	-20.49	Horizontal
12400.00	*			74.00		Horizontal
14880.00	*			74.00		Horizontal

Remark:

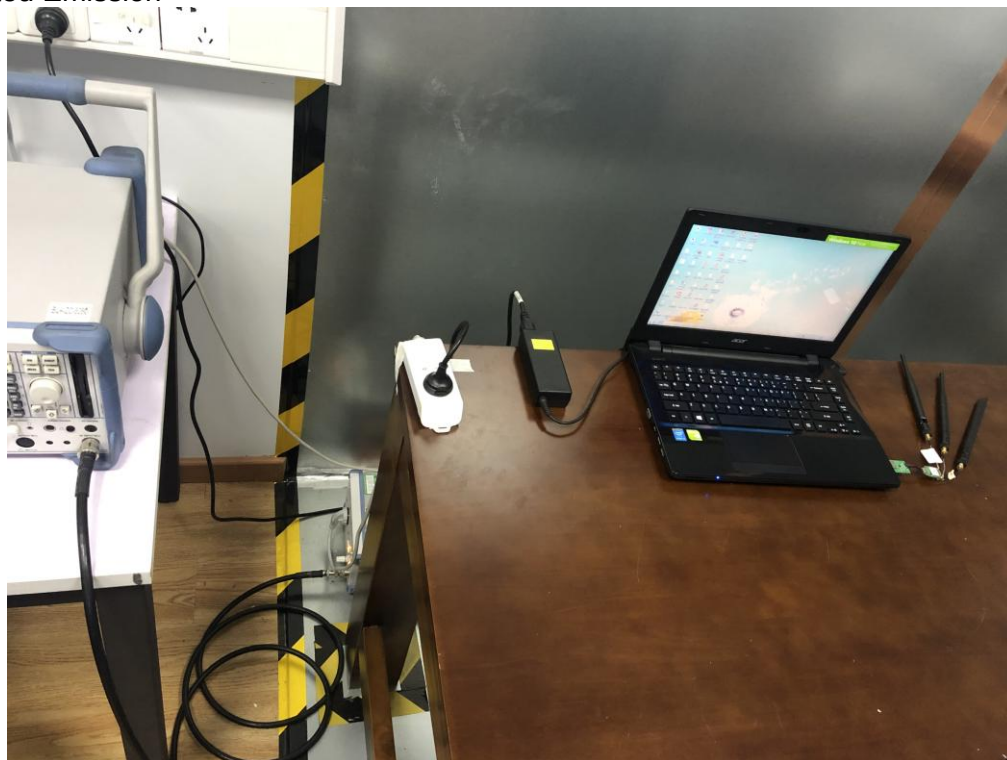
1. Final Level = Receiver Read level + Correct factor
2. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
3. “*”, means this data is the too weak instrument of signal is unable to test.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

8 Test Setup Photo

Radiated Emission



Conducted Emission



9 EUT Constructional Details

Reference to the test report No. BLA-EMC-201910-A52-01

*** End of Report ***

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