

FCC Report (WIFI)

Product Name : Wifi Module
Trade mark : N/A
Model No. : F12ASUM13
FCC ID : 2AATL-F12ASUM13
Report Number : BLA-EMC-201911A53-01
Date of sample receipt : November 26, 2019
Date of Test : November 26, 2019–December 16, 2019
Date of Issue : December 27, 2019
Test standard : FCC CFR Title 47 Part 15 Subpart C
Section 15.247
Test result : PASS

Prepared for:

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Date: December 27, 2019



2 Version

Version No.	Date	Description
00	December 27, 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 Peak 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

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

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

N/A: Not applicable.

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:	Wifi Module
Model No.:	F12ASUM13
Serial No.:	N/A
Sample(s) Status	Engineer sample
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(H20)) 2422MHz~2452MHz (802.11n(H40))
Channel numbers:	802.11b/802.11g /802.11n(HT20): 11; 802.11n(H40): 7
Channel separation:	5MHz
Modulation technology:	802.11b: Direct Sequence Spread Spectrum (DSSS) 802.11g/802.11n(H20)/ 802.11n(H40) Orthogonal Frequency Division Multiplexing (OFDM)
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps
Data speed (IEEE 802.11n):	Up to 300 Mbps
Antenna Type:	External Antenna
Antenna gain:	2dBi antenna gain per antenna
Power supply:	DC 3.3V

Note:

Antenna number : 2

External antenna (reversed polarity unique non standard external antenna)

SISO mode: 802.11b/802.11g

MIMO mode: 802.11n(HT20)/ 802.11n(HT40)

Directional gain of MIMO mode: $2+10\log 2=5.01\text{dBi}$

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

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:

Test channel	Frequency (MHz)
	802.11b/802.11g/802.11n(HT20)
Lowest channel	2412MHz
Middle channel	2437MHz
Highest channel	2462MHz
Test channel	Frequency (MHz)
	802.11n(HT40)
Lowest channel	2422MHz
Middle channel	2437MHz
Highest channel	2452MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>Remark: During the test, the dutycycle >98%, 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.</i>	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:				
Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.				
Mode	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)
Data rate	1Mbps	6Mbps	6.5Mbps	13.5Mbps

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
DELL	MONITOR	S2817Q	N/A
DELL	KEYBOARD	KB216d	05HDWJ
Lenovo	MOUSE	SM-8823	SM50L24506
DELL	PC	Vostro3668	B070NR2
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 Qianhai 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 Qianhai 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

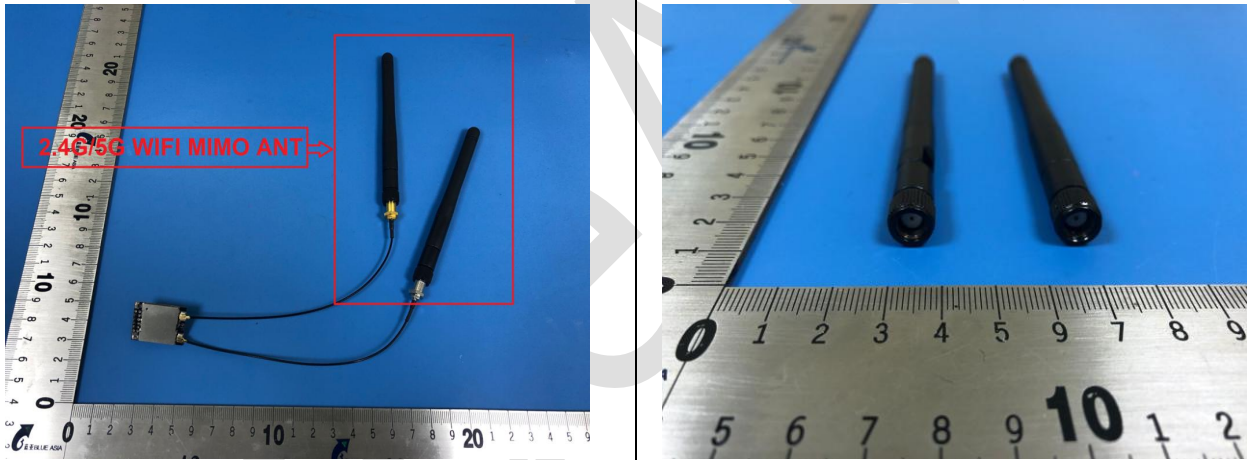
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m SAC	SKET	9m*6m*6m	966	06-10-2018	06-09-2023
2	Broadband Antenna	SCHWARZBECK	VULB9168	00836 P:00227	07-14-2019	07-13-2020
3	Horn Antenna	SCHWARZBECK	9120D	01892 P:00331	07-14-2019	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	MY4509258 2	05-24-2019	05-23-2020
10	Signal Generator	Agilent	E8257D	MY4432025 0	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

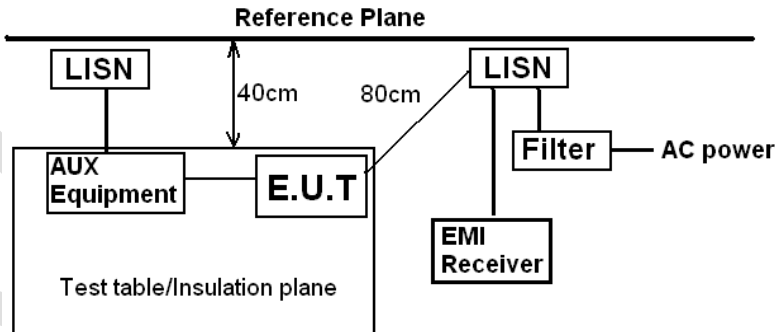
RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Spectrum Analyzer	Agilent	N9030A	MY50510123	05-24-2019	05-23-2020
2	Spectrum analyzer	Rohde & Schwarz	FSP40	100817	05-24-2019	05-23-2020
3	Vector Signal Generator	Agilent	E4438C	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	17I00015SNO 27	05-24-2019	05-23-2020
6	Power Sensor	D.A.R.E	RPR3006W	17I00015SNO 28	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.	
EUT Antenna:	
The antenna is External Antenna, the Directional gain of the antenna is 5.01dBi	
	

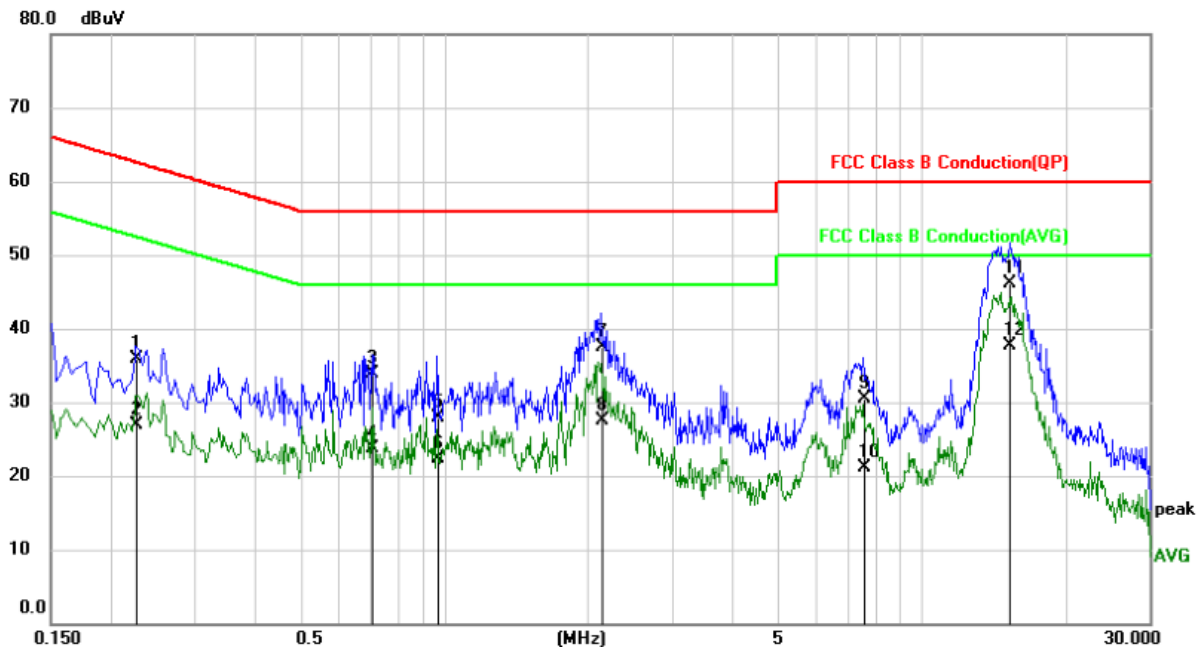
7.2 Conducted Emission

Test Requirement:	FCC Part15 C Section 15.207		
Test Method:	ANSI C63.10: 2013		
TestFrequencyRange:	150kHz to 30MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9kHz, VBW=30kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test procedure	- The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment. - 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). - 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 C63.4: 2014 on conducted measurement.		
Test setup:	 Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m		
Test Instruments:	Refer to section 6.0 for details		
Test mode:	Refer to section 5.2 for details		
Test results:	Pass		

Measurement data

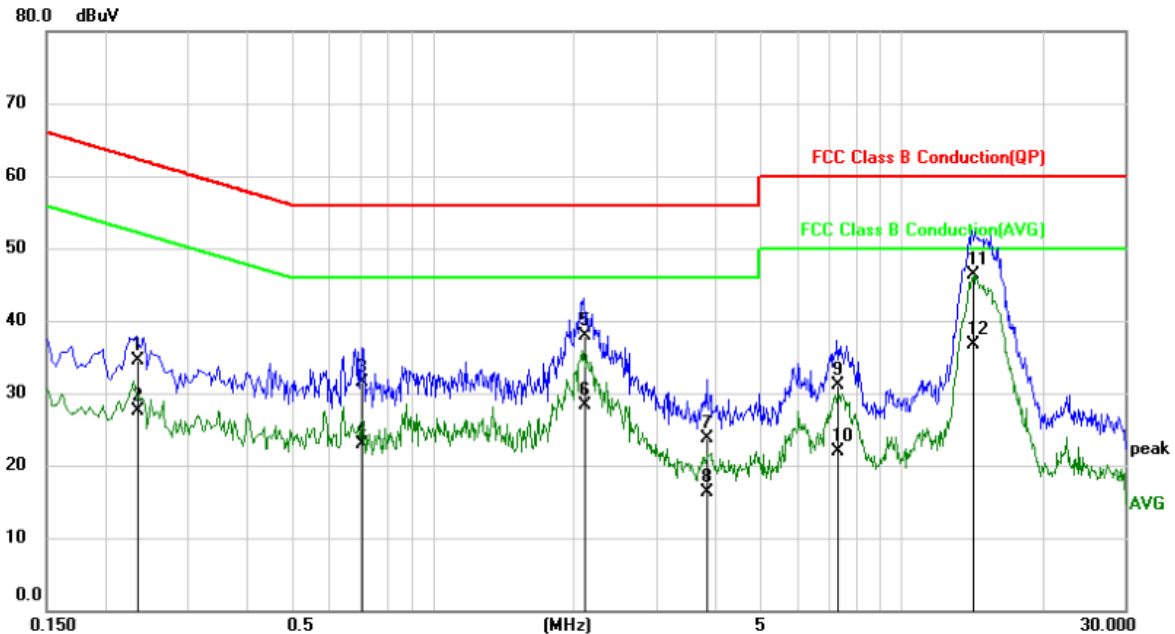
Line:

EUT:	Wifi Module	Probe:	L1
Model:	F12ASUM13	Power Source:	AC120V/60Hz
Mode:	Wifi mode	Test by:	Eason
Temp./Hum.(%RH):	26°C/60%RH		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2260	26.00	9.91	35.91	62.60	-26.69	QP	
2		0.2260	17.07	9.91	26.98	52.60	-25.62	AVG	
3		0.7060	24.25	9.67	33.92	56.00	-22.08	QP	
4		0.7060	14.11	9.67	23.78	46.00	-22.22	AVG	
5		0.9660	18.14	9.84	27.98	56.00	-28.02	QP	
6		0.9660	12.48	9.84	22.32	46.00	-23.68	AVG	
7		2.1340	27.59	9.82	37.41	56.00	-18.59	QP	
8		2.1340	17.70	9.82	27.52	46.00	-18.48	AVG	
9		7.5500	20.64	9.86	30.50	60.00	-29.50	QP	
10		7.5500	11.23	9.86	21.09	50.00	-28.91	AVG	
11		15.2740	36.09	9.97	46.06	60.00	-13.94	QP	
12	*	15.2740	27.67	9.97	37.64	50.00	-12.36	AVG	

EUT:	Wifi Module	Probe:	N
Model:	F12ASUM13	Power Source:	AC120V/60Hz
Mode:	Wifi mode	Test by:	Eason
Temp./Hum.(%RH):	26°C/60%RH		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2340	24.61	9.86	34.47	62.31	-27.84	QP	
2		0.2340	17.61	9.86	27.47	52.31	-24.84	AVG	
3		0.7060	21.72	9.74	31.46	56.00	-24.54	QP	
4		0.7060	13.10	9.74	22.84	46.00	-23.16	AVG	
5		2.1060	28.10	9.86	37.96	56.00	-18.04	QP	
6		2.1060	18.40	9.86	28.26	46.00	-17.74	AVG	
7		3.8540	13.90	9.84	23.74	56.00	-32.26	QP	
8		3.8540	6.53	9.84	16.37	46.00	-29.63	AVG	
9		7.3060	21.21	9.85	31.06	60.00	-28.94	QP	
10		7.3060	12.00	9.85	21.85	50.00	-28.15	AVG	
11		14.2100	36.33	10.00	46.33	60.00	-13.67	QP	
12	*	14.2100	26.75	10.00	36.75	50.00	-13.25	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.

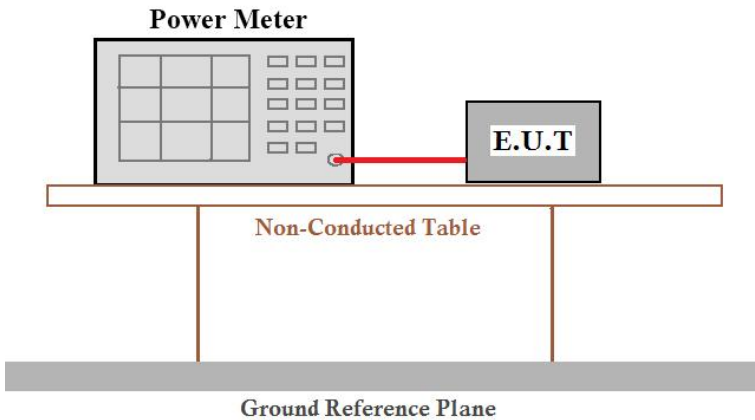
3. *Final Level = Receiver Read level + Correct factor*

4. *Correct factor = LISN Factor + Cable Loss*

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.

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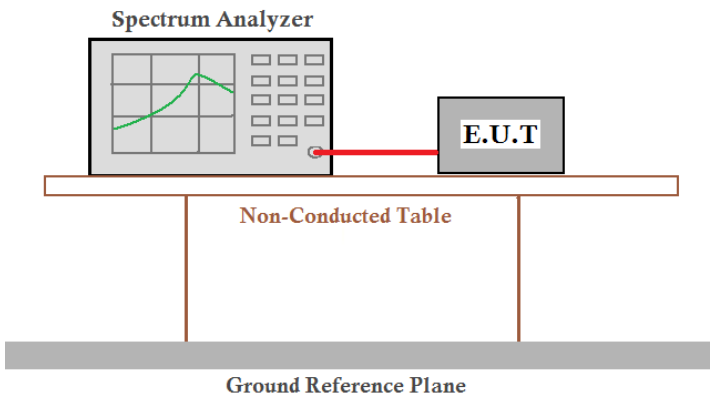
7.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	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 Mode	Frequency MHz	Power of ANT1 dBm	Power of ANT2 dBm	Total Power dBm	Limit dBm
802.11b	2412	13.17	15.08	N/A	30
	2437	13.69	15.03	N/A	30
	2462	13.74	15.20	N/A	30
802.11g	2412	13.98	15.43	N/A	30
	2437	14.50	15.65	N/A	30
	2462	14.41	15.95	N/A	30
802.11n (HT20) MIMO	2412	14.27	15.07	17.70	30
	2437	14.61	15.49	18.08	30
	2462	14.59	15.70	18.19	30
802.11n (HT40) MIMO	2422	13.60	14.75	17.22	30
	2437	13.89	14.73	17.34	30
	2452	13.64	15.51	17.69	30

7.4 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	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

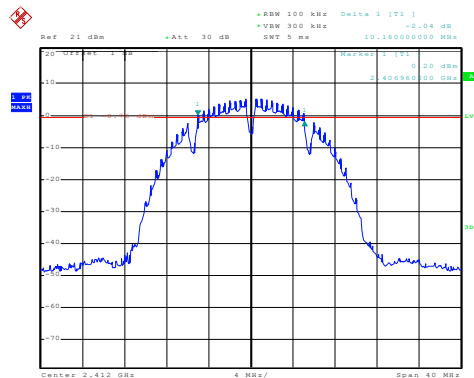
Test CH	6dB Emission Bandwidth (MHz)				Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)	802.11n(H40)		
Lowest	10.16	16.48	17.76	36.32	>500	Pass
Middle	10.16	16.56	17.68	36.48		
Highest	10.16	16.48	17.68	36.00		

Remark:

During the test, found the ANT2 port, which it is worse case.

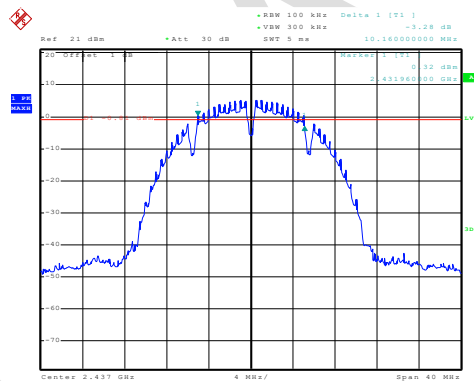
Test plot as follows:

Test mode:802.11b
6dBEBW



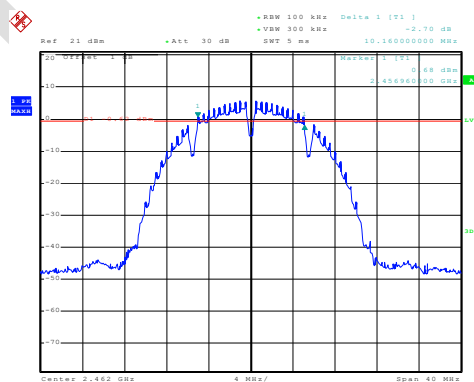
Date: 2.DEC.2019 17:08:59

Lowest channel



Date: 2.DEC.2019 17:07:38

Middle channel

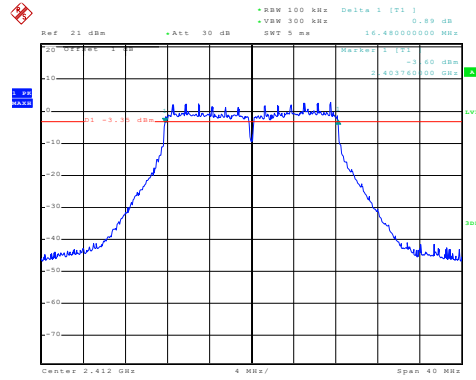


Date: 2.DEC.2019 17:05:50

Highest channel

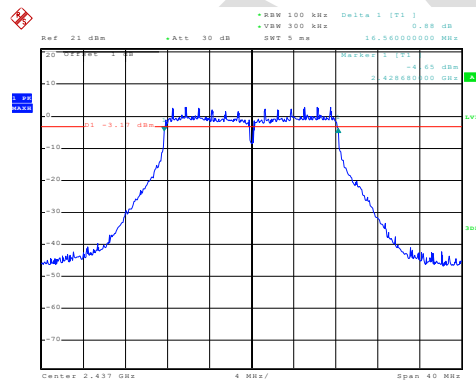
Test mode:802.11g

6dBEBW



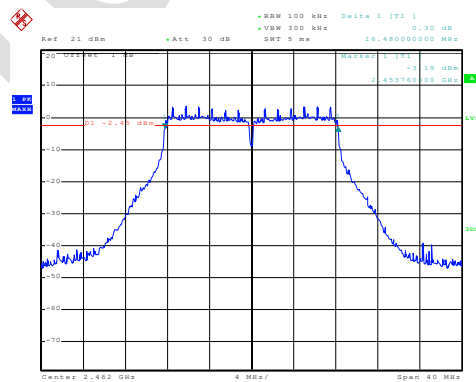
Date: 2.DEC.2019 17:03:36

Lowest channel



Date: 2.DEC.2019 17:01:27

Middle channel

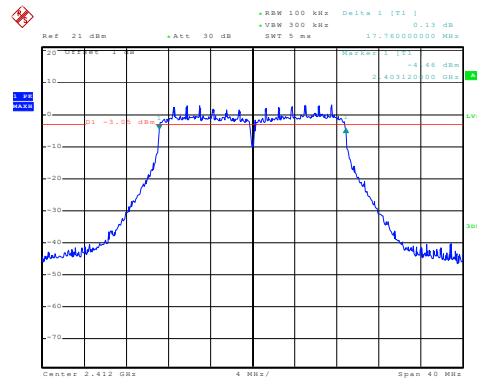


Date: 2 DEC 2019 16:59:47

Highest channel

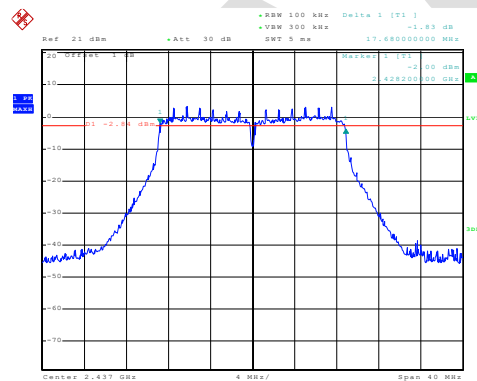
Test mode:802.11n(HT20)

6dBEBW



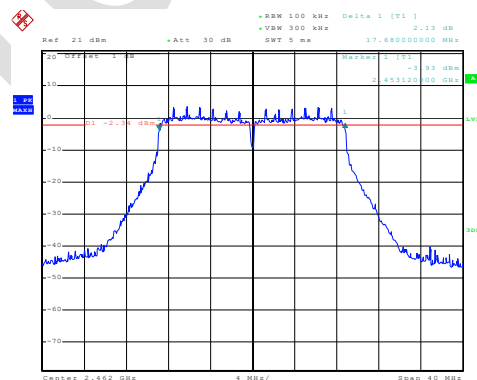
Date: 2 DEC. 2019 16:55:29

Lowest channel



Date: 2 DEC. 2019 16:52:38

Middle channel

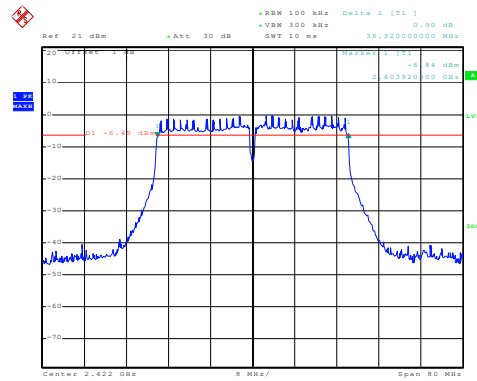


Date: 2 DEC. 2019 16:50:49

Highest channel

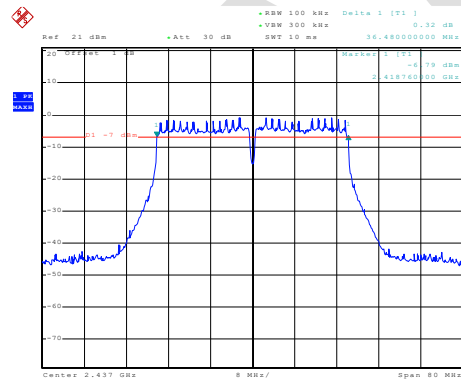
Test mode:802.11n(HT40)

6dBEBW



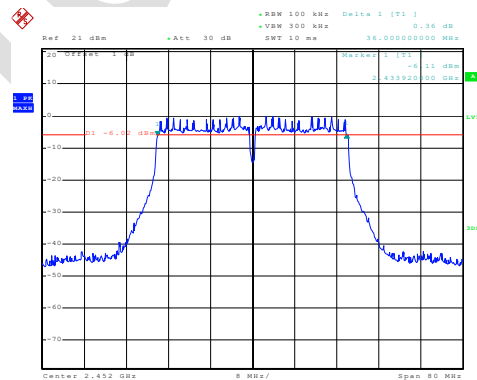
Date: 2 DEC 2019 16:48:56

Lowest channel



Date: 2 DEC 2019 16:46:52

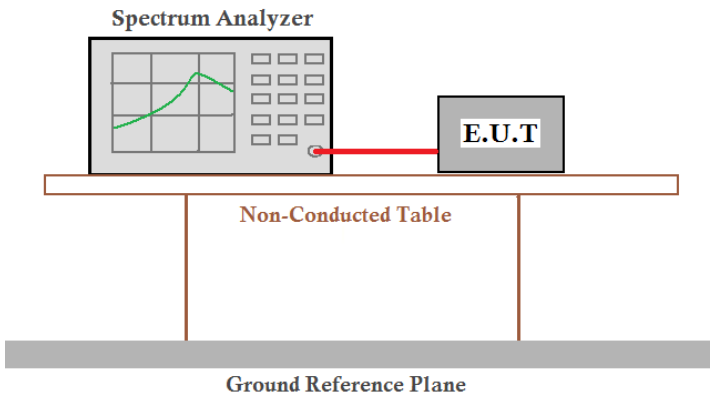
Middle channel



Date: 2 DEC 2019 16:42:51

Highest channel

7.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	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 Mode	Test Channel MHz	Power Spectral Density dBm			Limit dBm/3kHz
		ANT 1	ANT 2	Total	
802.11b	2412	-9.31	-7.37	N/A	8
	2437	-9.18	-7.92	N/A	8
	2462	-8.89	-8.34	N/A	8
802.11g	2412	-11.65	-10.95	N/A	8
	2437	-10.92	-10.27	N/A	8
	2462	-10.91	-10.45	N/A	8
802.11n HT20MIMO	2412	-11.66	-10.40	-7.97	8
	2437	-12.01	-11.31	-8.64	8
	2462	-10.98	-10.68	-7.82	8
802.11n HT40MIMO	2422	-15.34	-14.35	-11.81	8
	2437	-14.49	-14.60	-11.53	8

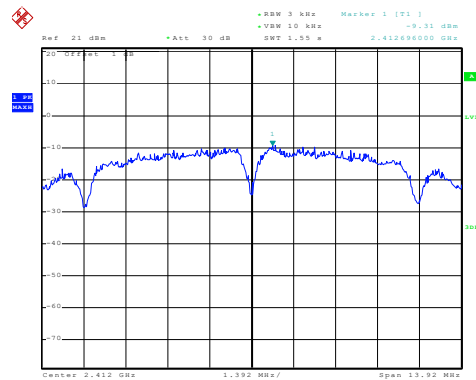
	2452	-14.36	-15.04	-11.68	8
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BlueAsia

Test plot as follows:

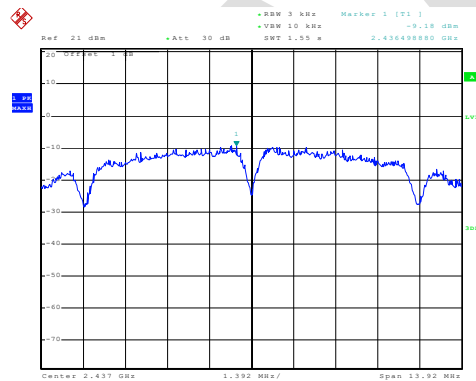
ANT1:

Test mode:	802.11b
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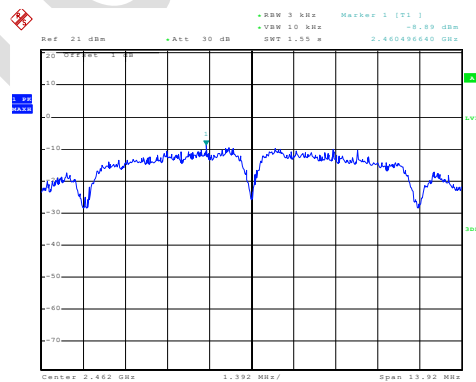
Date: 2.DEC.2019 15:09:16

Lowest channel



Date: 2.DEC.2019 15:11:45

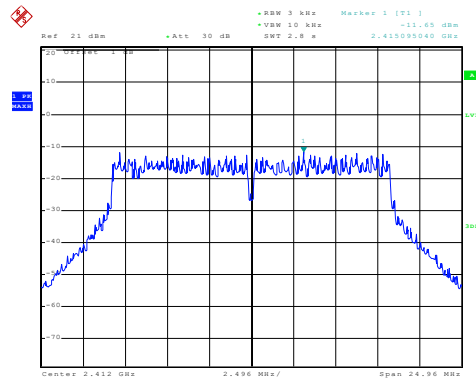
Middle channel



Date: 2.DEC.2019 15:13:01

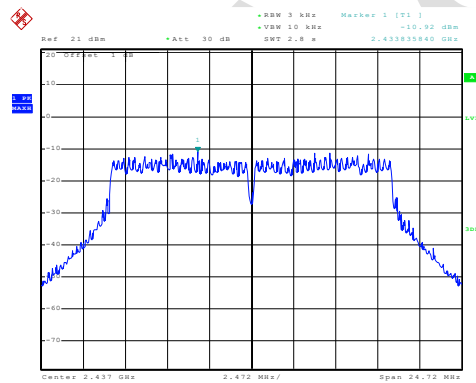
Highest channel

Test mode:	802.11g
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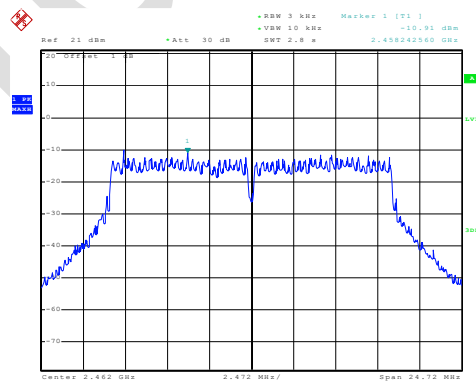
Date: 2.DEC.2019 15:06:30

Lowest channel



Date: 2.DEC.2019 15:05:15

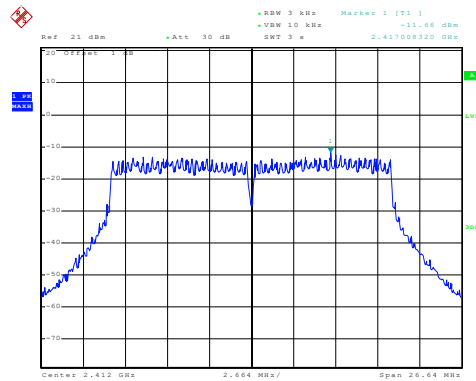
Middle channel



Date: 2.DEC.2019 15:04:07

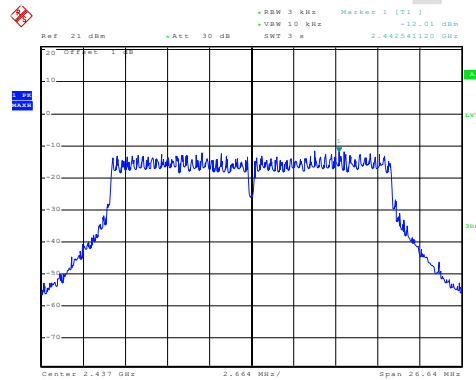
Highest channel

Test mode:	802.11n(HT20)
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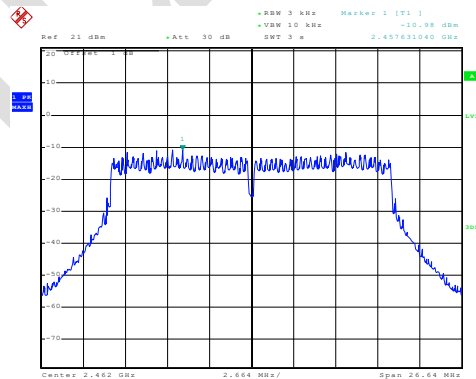
Date: 2.DEC.2019 14:59:59

Lowest channel



Date: 2.DEC.2019 15:00:45

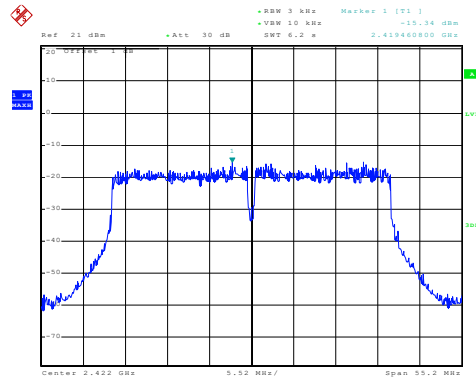
Middle channel



Date: 2.DEC.2019 15:02:42

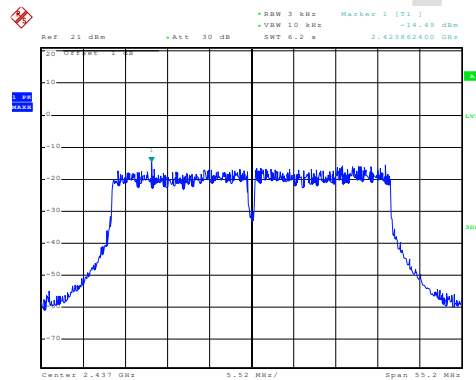
Highest channel

Test mode:	802.11n(HT40)
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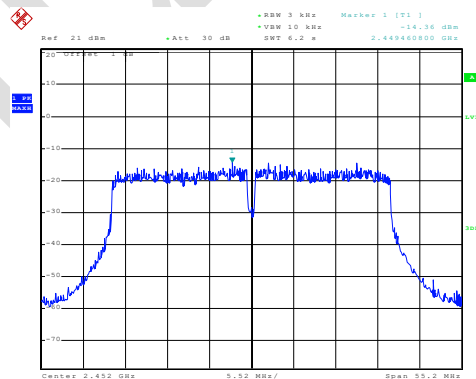
Date: 2.DEC.2019 14:58:26

Lowest channel



Date: 2.DEC.2019 14:57:28

Middle channel

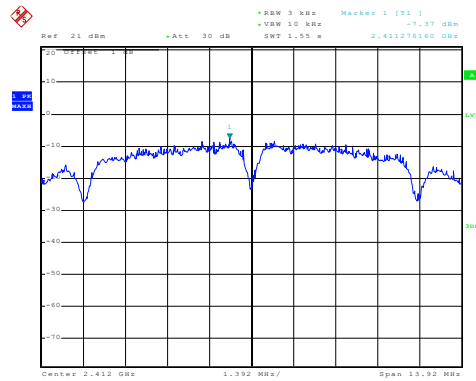


Date: 2.DEC.2019 14:56:45

Highest channel

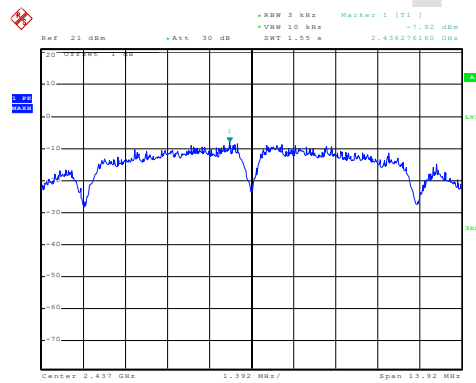
ANT2:

Test mode:	802.11b
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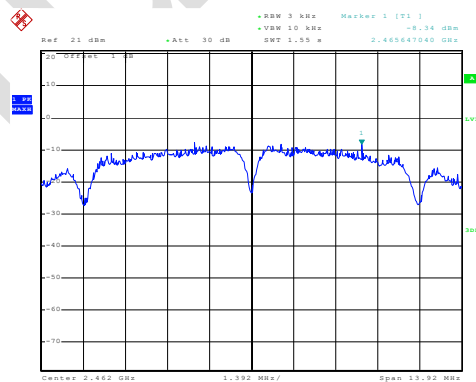
Date: 2.DEC.2019 15:17:21

Lowest channel



Date: 2.DEC.2019 15:15:45

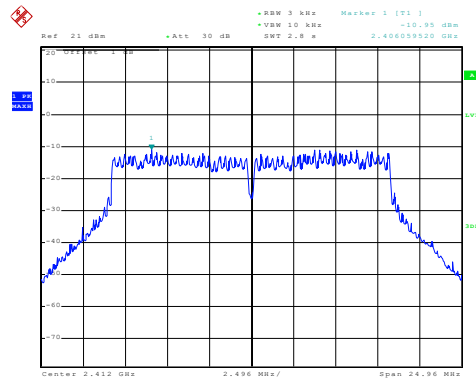
Middle channel



Date: 2.DEC.2019 15:14:28

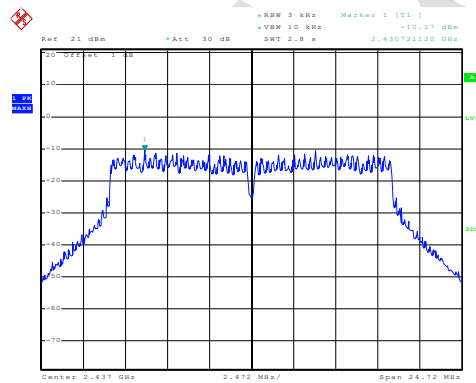
Highest channel

Test mode:	802.11g
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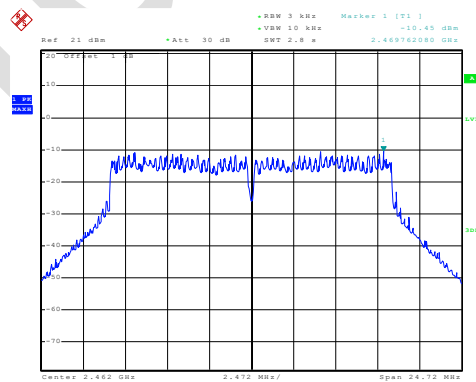
Date: 2.DEC.2019 14:36:06

Lowest channel



Date: 2.DEC.2019 14:34:15

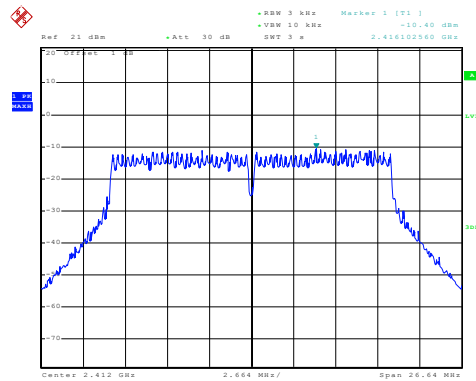
Middle channel



Date: 2.DEC.2019 14:32:59

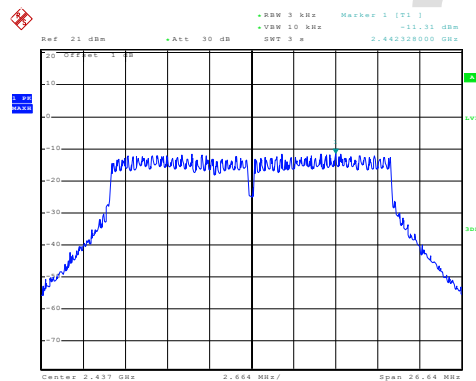
Highest channel

Test mode:	802.11n(HT20)
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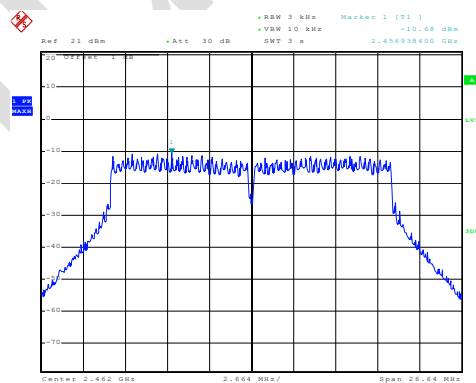
Date: 2.DEC.2019 14:45:10

Lowest channel



Date: 2.DEC.2019 14:46:51

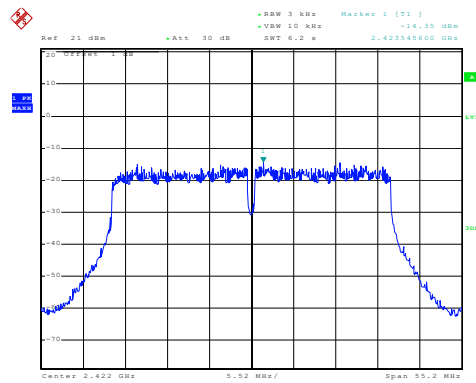
Middle channel



Date: 2.DEC.2019 14:48:18

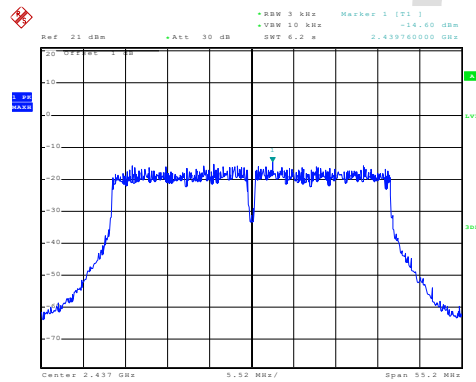
Highest channel

Test mode:	802.11n(HT40)
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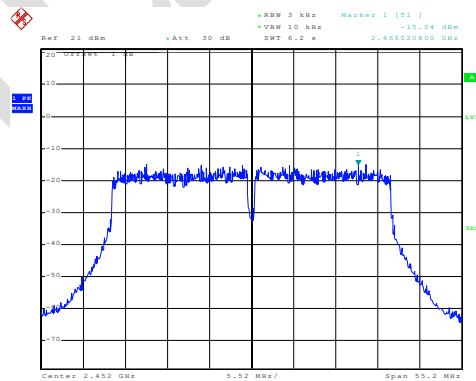
Date: 2.DEC.2019 14:50:04

Lowest channel



Date: 2.DEC.2019 14:51:08

Middle channel

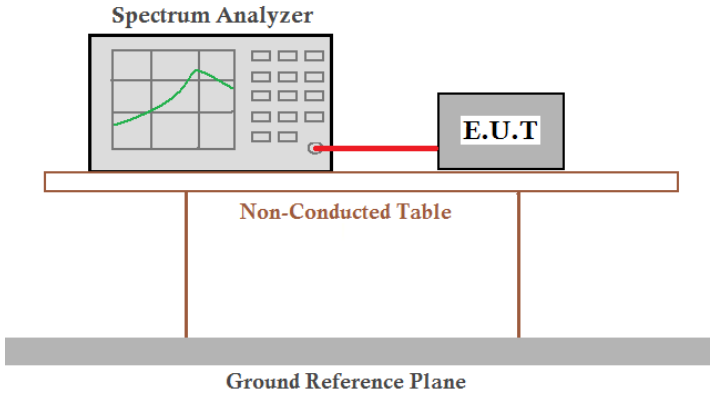


Date: 2.DEC.2019 14:52:17

Highest channel

7.6 Band edges

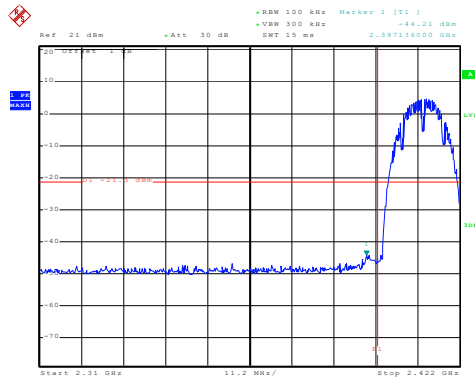
7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	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 30 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. A 'Spectrum Analyzer' is connected to an 'E.U.T.' (Equipment Under Test) by a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a 'Non-Conducted Table'. Below the table is 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:

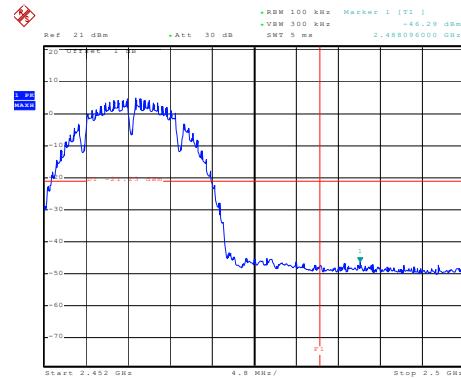
ANT1:

Test mode:	802.11b
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Date: 2 DEC. 2019 18:32:44

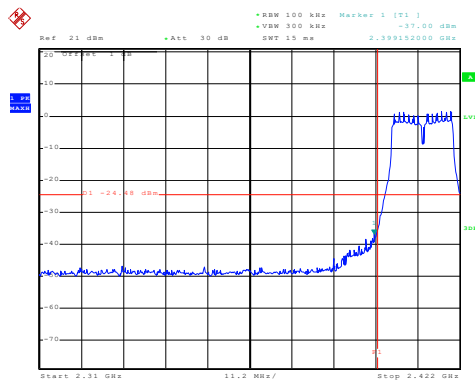
Lowest channel



Date: 2 DEC. 2019 18:34:02

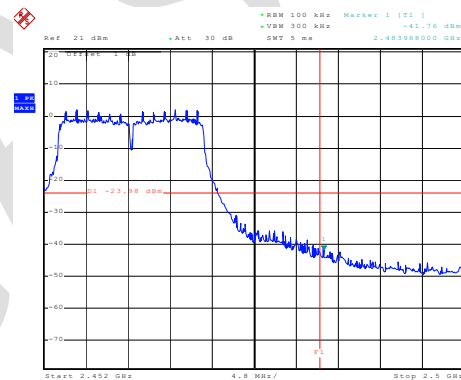
Highest channel

Test mode:	802.11g
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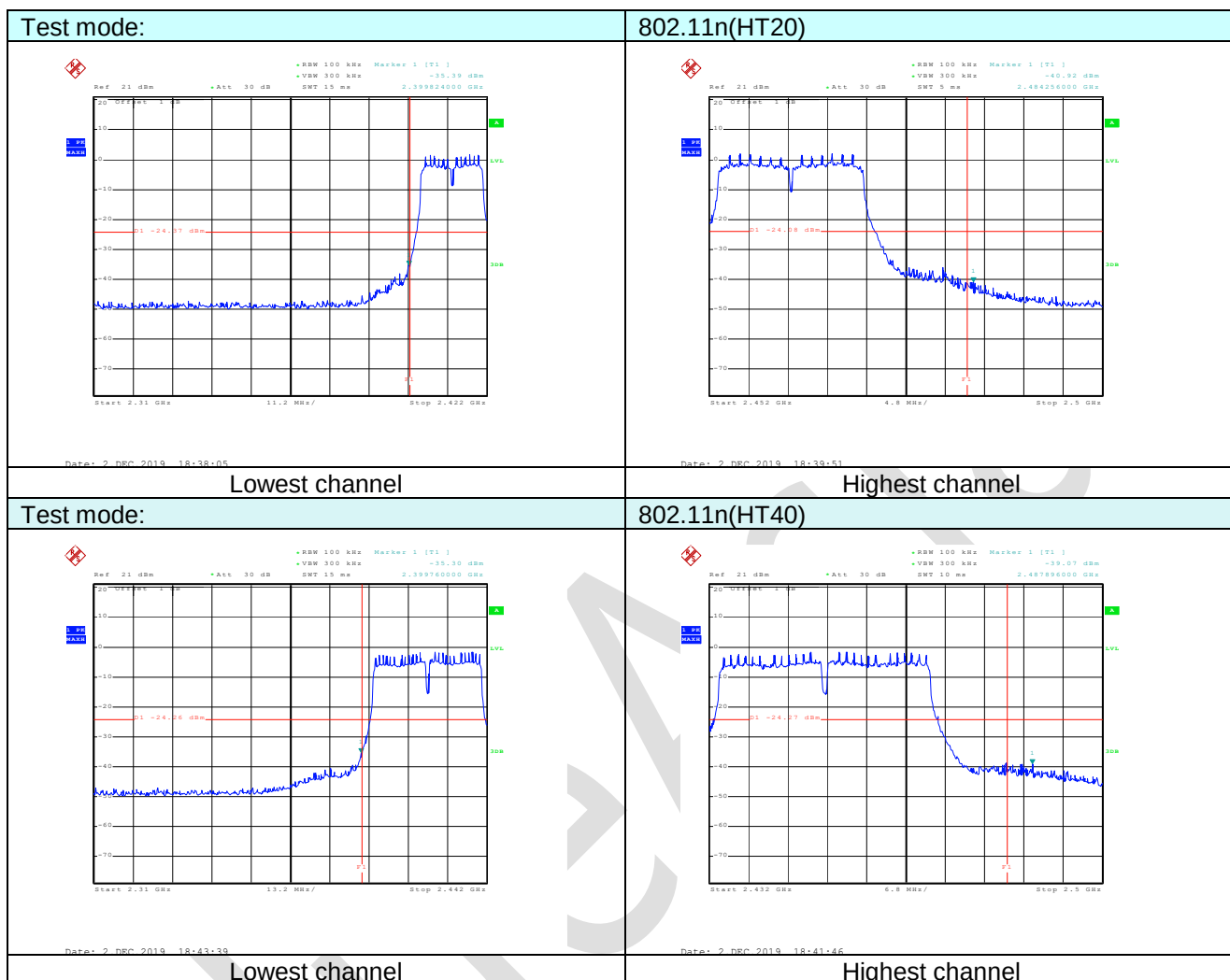
Date: 2 DEC. 2019 18:36:58

Lowest channel



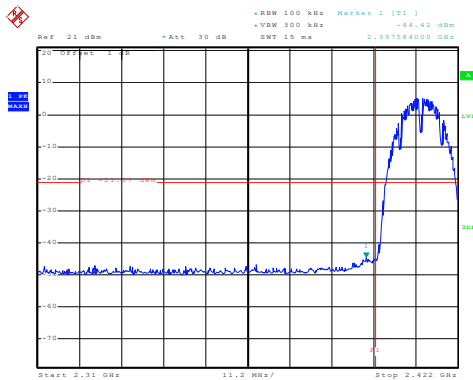
Date: 2 DEC. 2019 18:35:32

Highest channel



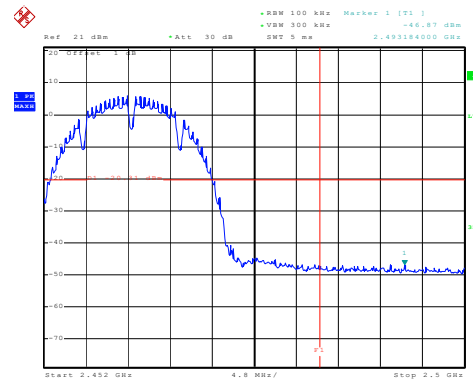
ANT2:

Test mode:	802.11b
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Date: 2 DEC 2019 18:31:06

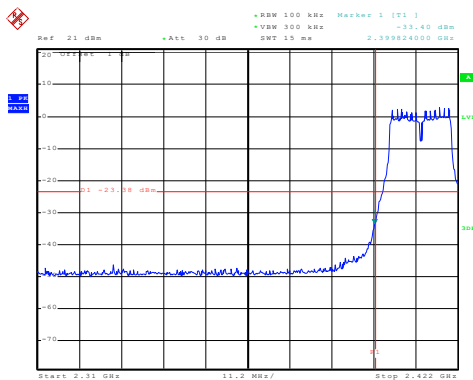
Lowest channel



Date: 2 DEC 2019 18:29:53

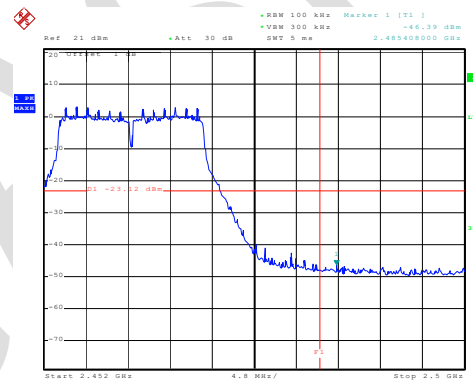
Highest channel

Test mode:	802.11g
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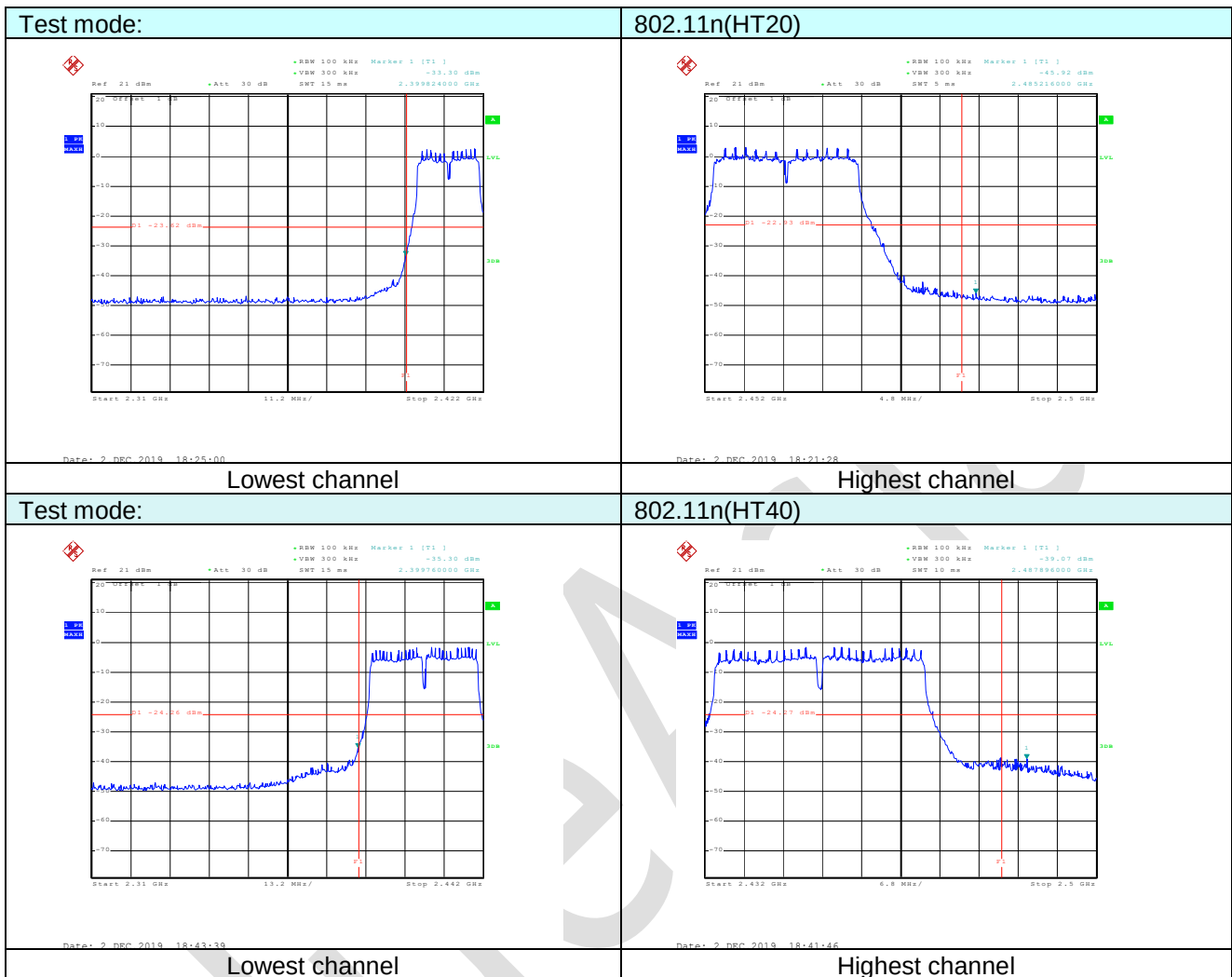
Date: 2 DEC 2019 18:26:38

Lowest channel

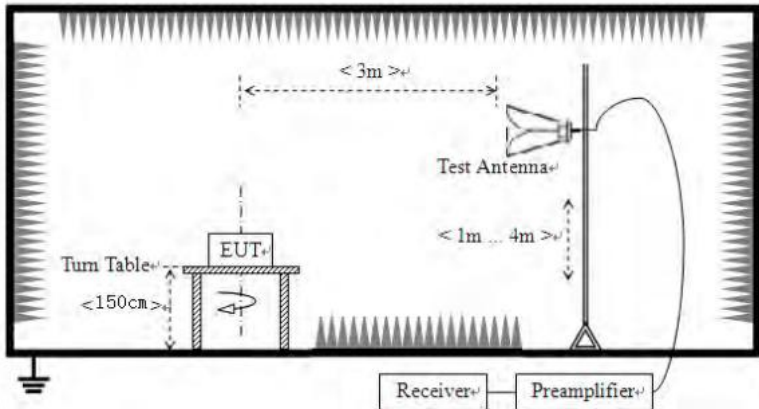


Date: 2 DEC 2019 18:28:10

Highest channel



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 Y 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
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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.

ANT1:

Test mode:	802.11b	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	56.46	-14.42	42.04	74.00	-31.96	Horizontal
2390.00	59.38	-14.11	45.27	74.00	-28.73	Horizontal
2310.00	58.90	-14.71	44.19	74.00	-29.81	Vertical
2390.00	61.42	-14.44	46.98	74.00	-27.02	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	45.94	-14.42	31.52	54.00	-22.48	Horizontal
2390.00	46.89	-14.11	32.78	54.00	-21.22	Horizontal
2310.00	47.40	-14.71	32.69	54.00	-21.31	Vertical
2390.00	48.62	-14.44	34.18	54.00	-19.82	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	58.89	-13.61	44.98	74.00	-29.20	Horizontal
2500.00	58.91	-13.53	45.38	74.00	-28.62	Horizontal
2483.50	56.79	-14.00	42.79	74.00	-31.21	Vertical
2500.00	69.37	-13.93	55.44	74.00	-18.56	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	46.76	-13.61	33.15	54.00	-20.85	Horizontal
2500.00	47.61	-13.53	34.08	54.00	-19.92	Horizontal
2483.50	45.64	-14.00	31.64	54.00	-22.36	Vertical
2500.00	58.46	-13.93	44.53	54.00	-9.47	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

Test mode:	802.11g	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	59.62	-14.42	45.20	74.00	-28.80	Horizontal
2390.00	74.02	-14.11	59.91	74.00	-14.09	Horizontal
2310.00	62.19	-14.71	47.48	74.00	-26.52	Vertical
2390.00	64.48	-14.44	50.04	74.00	-23.96	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	47.33	-14.42	32.91	54.00	-21.09	Horizontal
2390.00	58.96	-14.11	44.85	54.00	-9.15	Horizontal
2310.00	50.32	-14.71	35.61	54.00	-18.39	Vertical
2390.00	52.50	-14.44	38.06	54.00	-15.94	Vertical

Test mode:	802.11g	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	77.63	-13.61	64.02	74.00	-9.98	Horizontal
2500.00	63.48	-13.53	49.95	74.00	-24.05	Horizontal
2483.50	66.47	-14.00	52.47	74.00	-21.53	Vertical
2500.00	69.38	-13.93	55.45	74.00	-18.55	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	59.41	-13.61	45.80	54.00	-8.20	Horizontal
2500.00	49.50	-13.53	35.97	54.00	-18.03	Horizontal
2483.50	55.84	-14.00	41.84	54.00	-12.16	Vertical
2500.00	57.32	-13.93	43.39	54.00	-10.61	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

ANT2:

Test mode:	802.11b	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	60.24	-14.42	45.82	74.00	-28.18	Horizontal
2390.00	72.85	-14.11	58.74	74.00	-15.26	Horizontal
2310.00	61.29	-14.71	46.58	74.00	-27.42	Vertical
2390.00	62.39	-14.44	47.95	74.00	-26.05	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	46.42	-14.42	32.00	54.00	-22.00	Horizontal
2390.00	57.04	-14.11	42.93	54.00	-11.07	Horizontal
2310.00	51.10	-14.71	36.39	54.00	-17.61	Vertical
2390.00	51.58	-14.44	37.14	54.00	-16.86	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	75.35	-13.61	61.74	74.00	-12.26	Horizontal
2500.00	64.41	-13.53	50.88	74.00	-23.12	Horizontal
2483.50	65.26	-14.00	51.26	74.00	-22.74	Vertical
2500.00	67.43	-13.93	53.50	74.00	-20.50	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	58.81	-13.61	45.20	54.00	-8.80	Horizontal
2500.00	50.06	-13.53	36.53	54.00	-17.47	Horizontal
2483.50	54.23	-14.00	40.23	54.00	-13.77	Vertical
2500.00	56.03	-13.93	42.10	54.00	-11.90	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

Test mode:	802.11g	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	58.36	-14.42	43.94	74.00	-30.06	Horizontal
2390.00	71.25	-14.11	57.14	74.00	-16.86	Horizontal
2310.00	60.36	-14.71	45.65	74.00	-28.35	Vertical
2390.00	59.75	-14.44	45.31	74.00	-28.69	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	52.36	-14.42	37.94	54.00	-16.06	Horizontal
2390.00	54.48	-14.11	40.37	54.00	-13.63	Horizontal
2310.00	52.51	-14.71	37.80	54.00	-16.20	Vertical
2390.00	53.36	-14.44	38.92	54.00	-15.08	Vertical

Test mode:	802.11g	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	74.52	-13.61	60.91	74.00	-13.09	Horizontal
2500.00	63.58	-13.53	50.05	74.00	-23.95	Horizontal
2483.50	65.14	-14.00	51.14	74.00	-22.86	Vertical
2500.00	66.27	-13.93	52.34	74.00	-21.66	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	52.64	-13.61	39.03	54.00	-14.97	Horizontal
2500.00	55.13	-13.53	41.60	54.00	-12.40	Horizontal
2483.50	54.07	-14.00	40.07	54.00	-13.93	Vertical
2500.00	53.58	-13.93	39.65	54.00	-14.35	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 – Pre-amplifier Factor

MIMO:

Test mode:	802.11n(HT20)	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	59.59	-14.42	45.17	74.00	-28.83	Horizontal
2390.00	74.06	-14.11	59.95	74.00	-14.05	Horizontal
2310.00	60.63	-14.71	45.92	74.00	-28.08	Vertical
2390.00	64.45	-14.44	50.01	74.00	-23.99	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	47.08	-14.42	32.66	54.00	-21.34	Horizontal
2390.00	59.95	-14.11	45.84	54.00	-8.16	Horizontal
2310.00	48.30	-14.71	33.59	54.00	-20.41	Vertical
2390.00	51.56	-14.44	37.12	54.00	-16.88	Vertical

Test mode:	802.11n(HT20)	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	77.01	-13.61	63.40	74.00	-10.60	Horizontal
2500.00	63.44	-13.53	49.91	74.00	-24.09	Horizontal
2483.50	63.28	-14.00	49.28	74.00	-24.72	Vertical
2500.00	69.94	-13.93	56.01	74.00	-17.99	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	60.35	-13.61	46.74	54.00	-7.26	Horizontal
2500.00	48.15	-13.53	34.62	54.00	-19.38	Horizontal
2483.50	49.89	-14.00	35.89	54.00	-18.11	Vertical
2500.00	56.90	-13.93	42.97	54.00	-11.03	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

MIMO:

Test mode:	802.11n(HT40)	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	59.31	-14.42	44.89	74.00	-29.11	Horizontal
2390.00	72.69	-14.11	58.58	74.00	-15.42	Horizontal
2310.00	60.07	-14.71	45.36	74.00	-28.64	Vertical
2390.00	64.88	-14.44	50.44	74.00	-23.56	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	46.24	-14.42	31.82	54.00	-22.18	Horizontal
2390.00	59.83	-14.11	45.72	54.00	-8.28	Horizontal
2310.00	46.16	-14.71	31.45	54.00	-22.55	Vertical
2390.00	52.96	-14.44	38.52	54.00	-15.48	Vertical

Test mode:	802.11n(HT40)	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	76.16	-13.61	62.55	74.00	-11.45	Horizontal
2500.00	68.19	-13.53	54.66	74.00	-19.34	Horizontal
2483.50	64.26	-14.00	50.26	74.00	-23.74	Vertical
2500.00	69.33	-13.93	55.40	74.00	-18.60	Vertical

Average value:

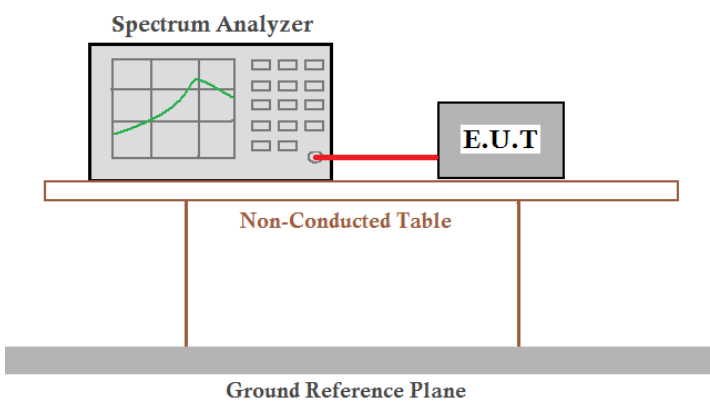
Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	63.00	-13.61	49.39	54.00	-4.61	Horizontal
2500.00	52.60	-13.53	39.07	54.00	-14.93	Horizontal
2483.50	48.88	-14.00	34.88	54.00	-19.12	Vertical
2500.00	54.88	-13.93	40.95	54.00	-13.05	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

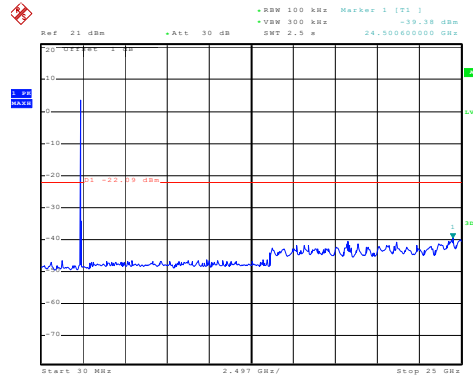
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB558074 D01 DTS Meas Guidance V05
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 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 via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table, which is supported by 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:

ANT1:

Test mode:	802.11b
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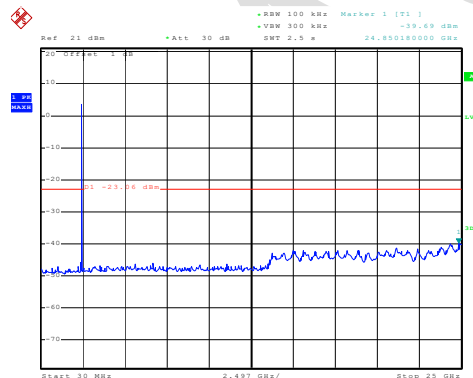
Lowest channel



Date: 2.DEC.2019 16:24:00

30MHz~25GHz

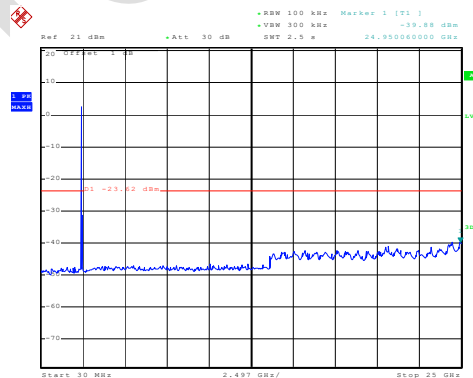
Middle channel



Date: 2.DEC.2019 16:21:48

30MHz~25GHz

Highest channel



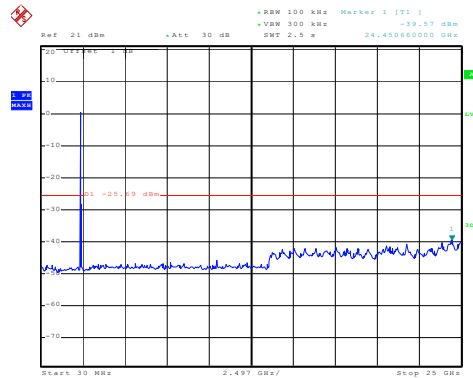
Date: 2.DEC.2019 16:19:59

30MHz~25GHz

Test mode:

802.11g

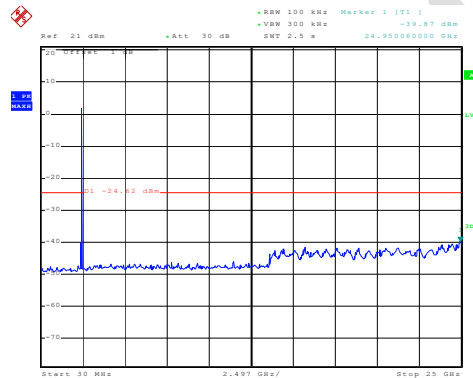
Lowest channel



Date: 2 DEC 2019 16:14:22

30MHz~25GHz

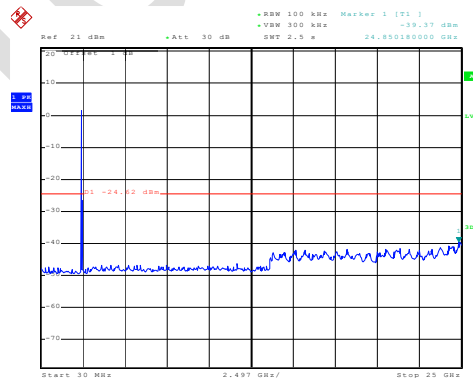
Middle channel



Date: 2 DEC 2019 16:17:04

30MHz~25GHz

Highest channel

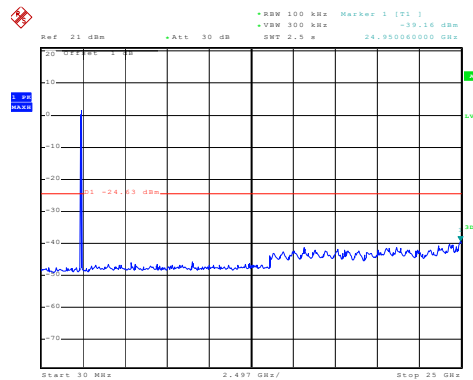


Date: 2 DEC 2019 16:18:19

30MHz~25GHz

Test mode: 802.11n(HT20)

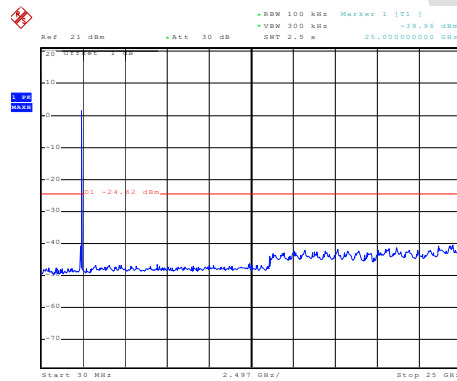
Lowest channel



Date: 2.DEC.2019 16:12:19

30MHz~25GHz

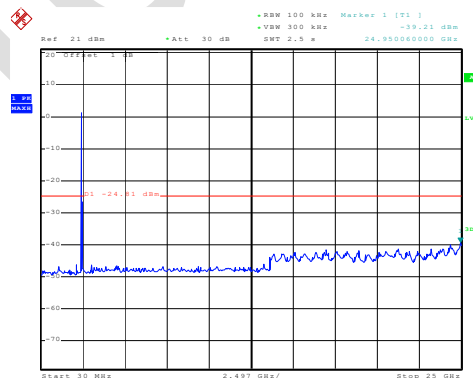
Middle channel



Date: 2.DEC.2019 16:11:17

30MHz~25GHz

Highest channel

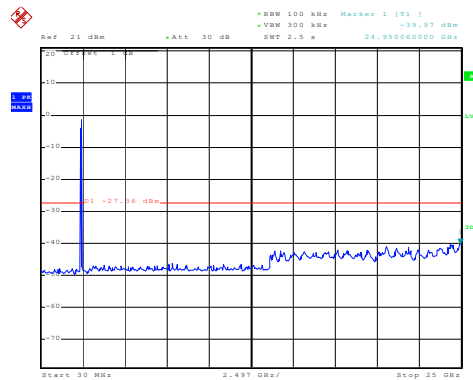


Date: 2.DEC.2019 16:09:37

30MHz~25GHz

Test mode: 802.11n(HT40)

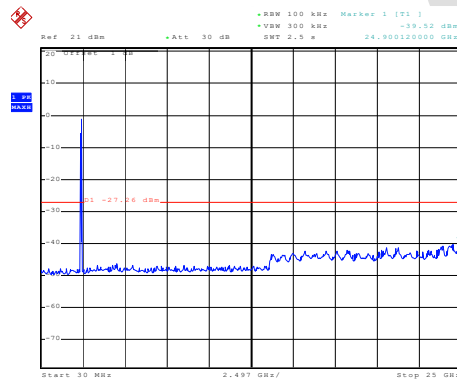
Lowest channel



Date: 2,DEC,2019 16:07:29

30MHz~25GHz

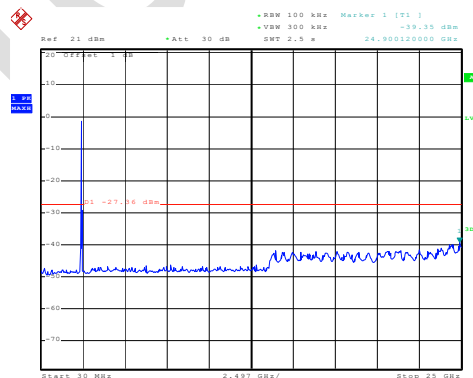
Middle channel



Date: 2,DEC,2019 16:05:54

30MHz~25GHz

Highest channel



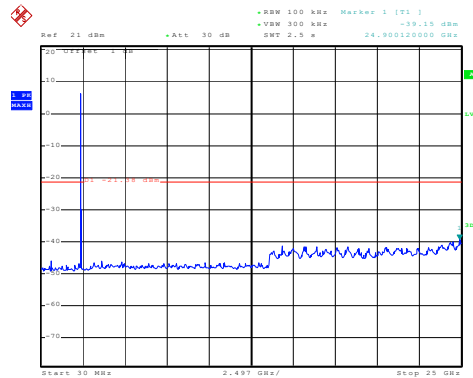
Date: 2,DEC,2019 16:04:45

30MHz~25GHz

ANT2:

Test mode:	802.11b
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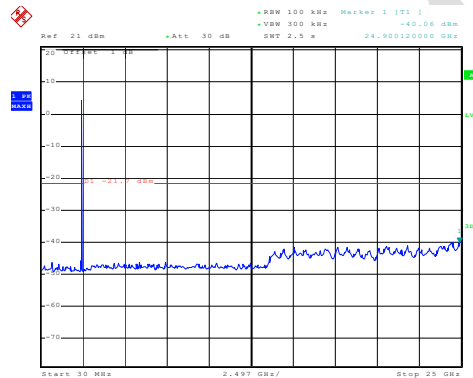
Lowest channel



Date: 2 DEC 2019 15:14:58

30MHz~25GHz

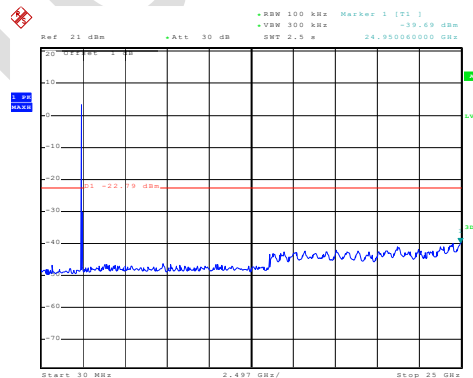
Middle channel



Date: 2 DEC 2019 15:37:47

30MHz~25GHz

Highest channel



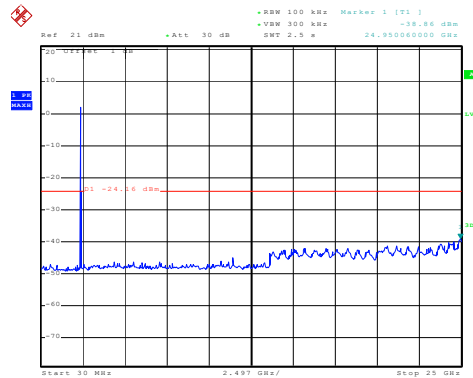
Date: 2 DEC 2019 15:39:19

30MHz~25GHz

Test mode:

802.11g

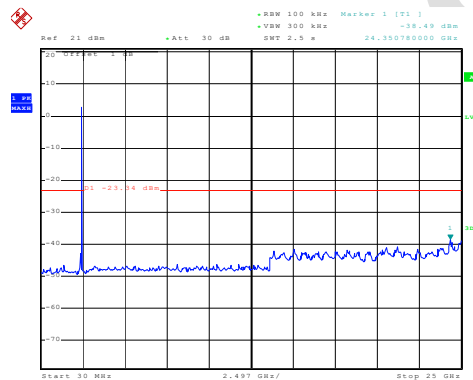
Lowest channel



Date: 2 DEC 2019 15:46:03

30MHz~25GHz

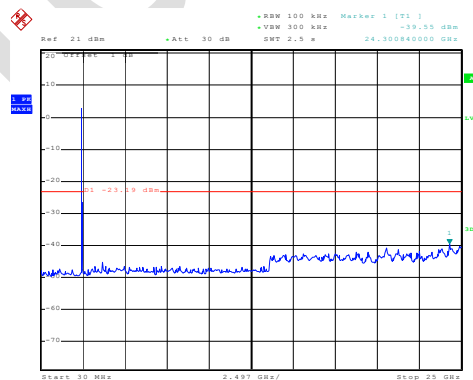
Middle channel



Date: 2 DEC 2019 15:43:51

30MHz~25GHz

Highest channel



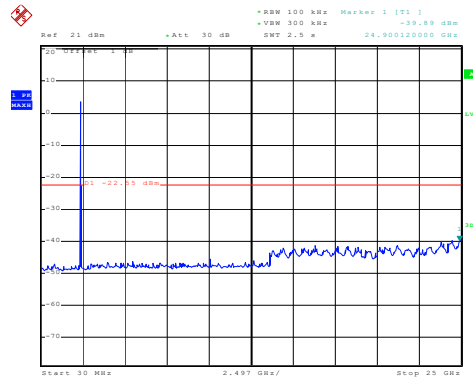
Date: 2 DEC 2019 15:40:57

30MHz~25GHz

Test mode:

802.11n(HT20)

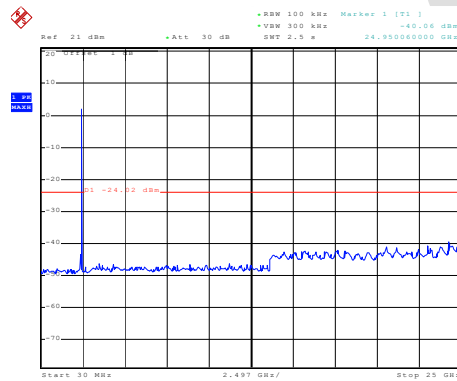
Lowest channel



Date: 2,DEC,2019 15:56:58

30MHz~25GHz

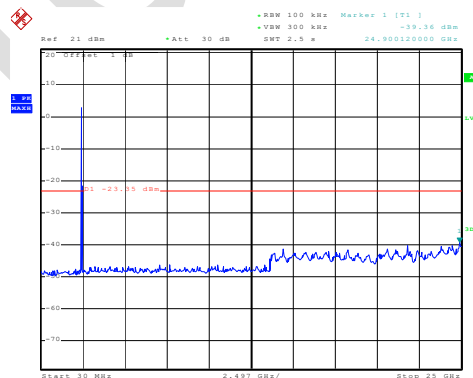
Middle channel



Date: 2,DEC,2019 15:51:06

30MHz~25GHz

Highest channel

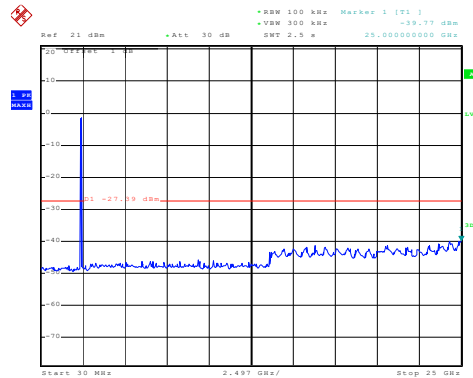


Date: 2,DEC,2019 15:52:47

30MHz~25GHz

Test mode: 802.11n(HT40)

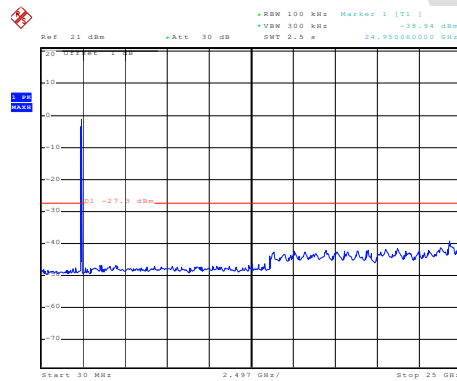
Lowest channel



Date: 2,DEC,2019 15:59:22

30MHz~25GHz

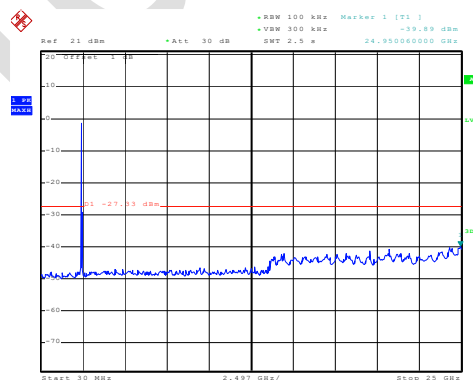
Middle channel



Date: 2,DEC,2019 16:00:53

30MHz~25GHz

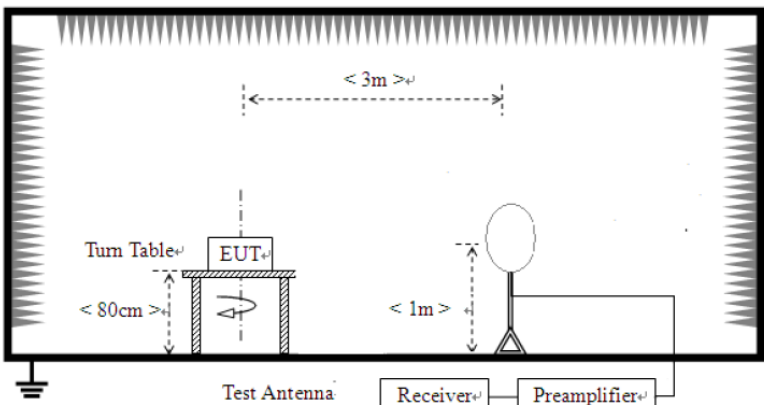
Highest channel

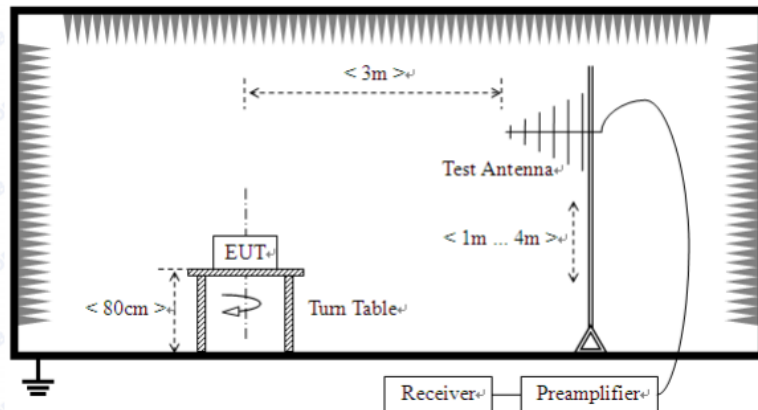


Date: 2,DEC,2019 16:02:04

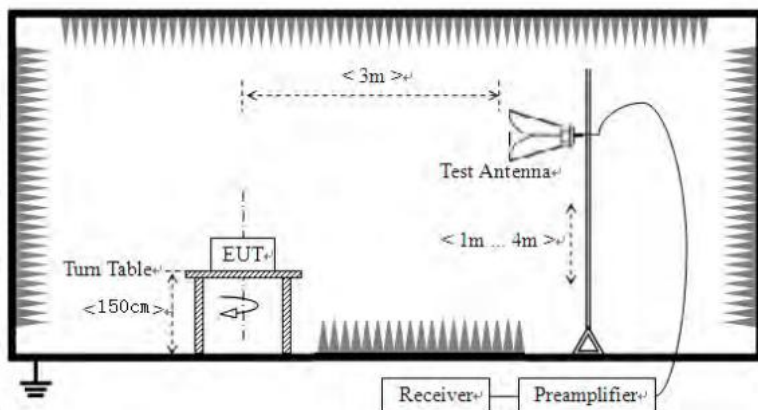
30MHz~25GHz

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:	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		
Test setup:	For radiated emissions from 9kHz to 30MHz				
					
For radiated emissions from 30MHz to1GHz					



For radiated emissions 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
Test voltage:	AC120V 60Hz

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.

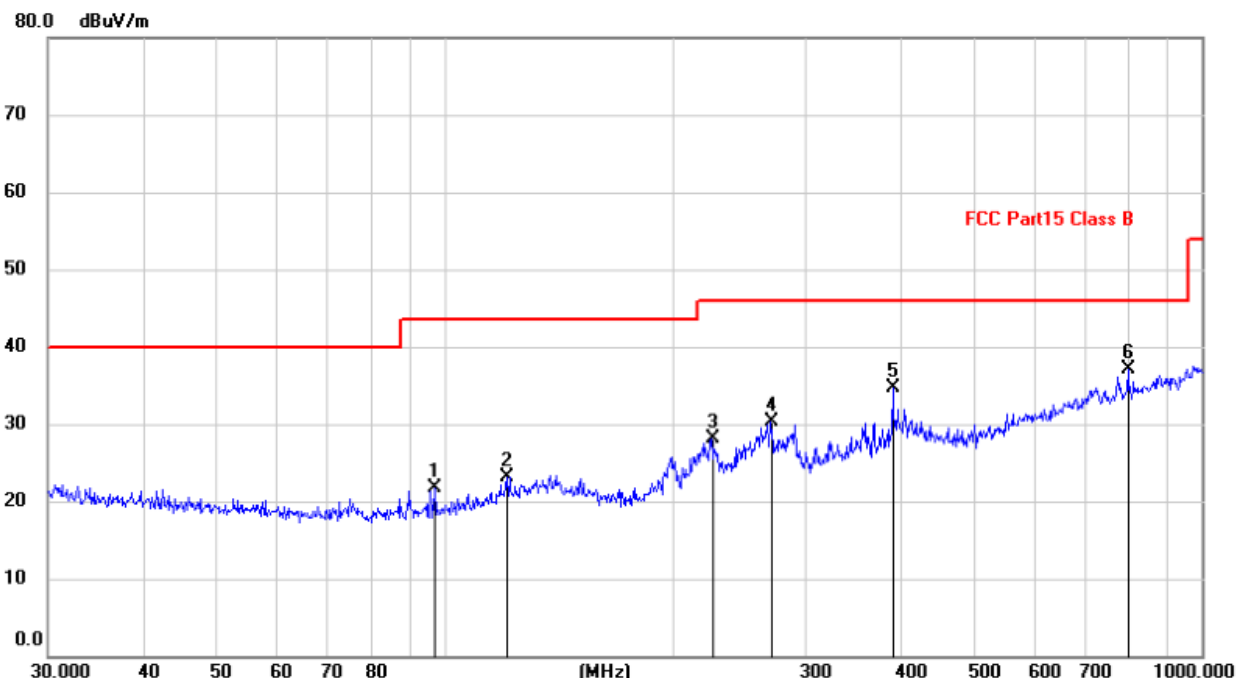
Measurement data:

■ 9kHz~30MHz

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.

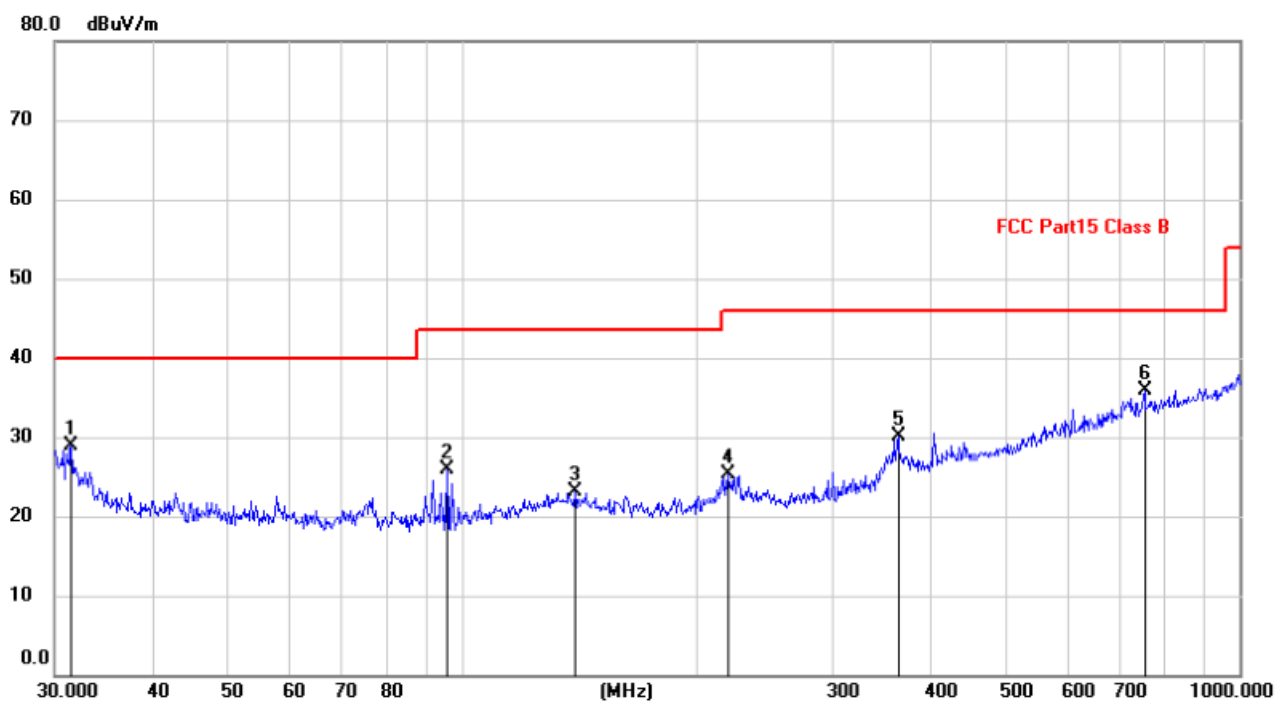
Below 1GHz

Mode:	Transmitting mode	Polarization:	Horizontal
Temp./Hum.(%RH):	26℃/56%RH		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		97.1148	11.42	10.25	21.67	43.50	-21.83	QP
2		121.1231	10.55	12.60	23.15	43.50	-20.35	QP
3		225.3080	16.22	11.83	28.05	46.00	-17.95	QP
4		269.4284	17.34	12.99	30.33	46.00	-15.67	QP
5		390.7226	18.09	16.59	34.68	46.00	-11.32	QP
6	*	798.9797	13.07	24.10	37.17	46.00	-8.83	QP

Mode:	Transmitting mode	Polarization:	Vertical
Temp./Hum.(%RH):	26°C/56%RH		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		31.5095	16.24	12.58	28.82	40.00	-11.18	QP
2		95.7622	15.73	10.10	25.83	43.50	-17.67	QP
3		139.8508	9.87	13.18	23.05	43.50	-20.45	QP
4		219.8449	13.94	11.43	25.37	46.00	-20.63	QP
5		364.2595	14.25	15.76	30.01	46.00	-15.99	QP
6	*	755.3873	12.37	23.45	35.82	46.00	-10.18	QP

■ Above 1GHz

ANT1:

Test mode:	802.11b	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
4824.00	52.47	-8.42	44.05	74.00	-29.95	Vertical
7236.00	56.03	-3.23	52.80	74.00	-21.20	Vertical
9648.00	55.81	-3.18	52.63	74.00	-21.37	Vertical
12060.00	*			74.00		Vertical
14472.00	*			74.00		Vertical
4824.00	53.64	-8.42	45.22	74.00	-28.78	Horizontal
7236.00	56.17	-3.23	52.94	74.00	-21.06	Horizontal
9648.00	55.25	-3.18	52.07	74.00	-21.93	Horizontal
12060.00				74.00		Horizontal
14472.00	*			74.00		Horizontal

Test mode:	802.11b	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
4874.00	51.68	-9.77	41.91	74.00	-32.09	Vertical
7311.00	55.96	-3.21	52.75	74.00	-21.25	Vertical
9748.00	56.22	-3.17	53.05	74.00	-20.95	Vertical
12185.00	*			74.00		Vertical
14622.00	*			74.00		Vertical
4874.00	50.97	-9.77	41.20	74.00	-32.80	Horizontal
7311.00	55.63	-3.21	52.42	74.00	-21.58	Horizontal
9748.00	55.28	-3.17	52.11	74.00	-21.89	Horizontal
12185.00	*			74.00		Horizontal
14622.00	*			74.00		Horizontal

Test mode:	802.11b	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
4924.00	51.27	-10.03	41.24	74.00	-32.76	Vertical
7386.00	56.11	-3.20	52.91	74.00	-21.09	Vertical
9848.00	55.43	-3.16	52.27	74.00	-21.73	Vertical
12310.00	*			74.00		Vertical
14772.00	*			74.00		Vertical
4924.00	50.21	-10.03	40.18	74.00	-33.82	Horizontal
7386.00	55.42	-3.20	52.22	74.00	-21.78	Horizontal
9848.00	56.03	-3.16	52.87	74.00	-21.13	Horizontal
12310.00	*			74.00		Horizontal
14772.00	*			74.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Correct factor
2. "*", means this data is the too weak instrument of signal is unable to test.
3. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
4. 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.

Test mode:	802.11g	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
4824.00	52.40	-8.42	43.98	74.00	-30.02	Vertical
7236.00	56.25	-3.23	53.02	74.00	-20.98	Vertical
9648.00	55.47	-3.18	52.29	74.00	-21.71	Vertical
12060.00	*			74.00		Vertical
14472.00	*			74.00		Vertical
4824.00	52.22	-8.42	43.80	74.00	-30.20	Horizontal
7236.00	55.57	-3.23	52.34	74.00	-21.66	Horizontal
9648.00	56.36	-3.18	53.18	74.00	-20.82	Horizontal
12060.00	*			74.00		Horizontal
14472.00	*			74.00		Horizontal

Test mode:	802.11g	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
4874.00	51.39	-9.77	41.62	74.00	-32.38	Vertical
7311.00	56.68	-3.21	53.47	74.00	-20.58	Vertical
9748.00	55.34	-3.17	52.17	74.00	-21.83	Vertical
12185.00	*			74.00		Vertical
14622.00	*			74.00		Vertical
4874.00	50.47	-9.77	40.70	74.00	-33.30	Horizontal
7311.00	55.82	-3.21	52.61	74.00	-21.39	Horizontal
9748.00	55.39	-3.17	52.22	74.00	-21.78	Horizontal
12185.00	*			74.00		Horizontal
14622.00	*			74.00		Horizontal

Test mode:	802.11g	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
4924.00	50.25	-10.03	40.22	74.00	-33.78	Vertical
7386.00	56.01	-3.20	52.81	74.00	-21.19	Vertical
9848.00	55.87	-3.16	52.71	74.00	-21.29	Vertical
12310.00	*			74.00		Vertical
14772.00	*			74.00		Vertical
4924.00	49.77	-10.03	39.74	74.00	-34.26	Horizontal
7386.00	55.32	-3.20	52.12	74.00	-21.88	Horizontal
9848.00	55.04	-3.16	51.88	74.00	-22.12	Horizontal
12310.00	*			74.00		Horizontal
14772.00	*			74.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Correct factor
2. "*", means this data is the too weak instrument of signal is unable to test.
3. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
4. 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.

ANT2:

Test mode:	802.11b	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
4824.00	52.36	-8.42	43.94	74.00	-30.06	Vertical
7236.00	55.48	-3.23	52.25	74.00	-21.75	Vertical
9648.00	55.61	-3.18	52.43	74.00	-21.57	Vertical
12060.00	*			74.00		Vertical
14472.00	*			74.00		Vertical
4824.00	51.47	-8.42	43.05	74.00	-30.95	Horizontal
7236.00	55.36	-3.23	52.13	74.00	-21.87	Horizontal
9648.00	55.07	-3.18	51.89	74.00	-22.11	Horizontal
12060.00				74.00		Horizontal
14472.00	*			74.00		Horizontal

Test mode:	802.11b	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
4874.00	52.36	-9.77	42.59	74.00	-31.41	Vertical
7311.00	55.81	-3.21	52.60	74.00	-21.40	Vertical
9748.00	55.49	-3.17	52.32	74.00	-21.68	Vertical
12185.00	*			74.00		Vertical
14622.00	*			74.00		Vertical
4874.00	51.13	-9.77	41.36	74.00	-32.64	Horizontal
7311.00	54.89	-3.21	51.68	74.00	-22.32	Horizontal
9748.00	55.53	-3.17	52.36	74.00	-21.64	Horizontal
12185.00	*			74.00		Horizontal
14622.00	*			74.00		Horizontal

Test mode:	802.11b	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
4924.00	52.31	-10.03	42.28	74.00	-31.72	Vertical
7386.00	55.46	-3.20	52.26	74.00	-21.74	Vertical
9848.00	55.19	-3.16	52.03	74.00	-21.97	Vertical
12310.00	*			74.00		Vertical
14772.00	*			74.00		Vertical
4924.00	51.46	-10.03	41.43	74.00	-32.57	Horizontal
7386.00	56.03	-3.20	52.83	74.00	-21.17	Horizontal
9848.00	55.66	-3.16	52.50	74.00	-21.50	Horizontal
12310.00	*			74.00		Horizontal
14772.00	*			74.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Correct factor
2. "*", means this data is the too weak instrument of signal is unable to test.
3. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
4. 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.

Test mode:	802.11g	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
4824.00	50.24	-8.42	41.82	74.00	-32.18	Vertical
7236.00	55.43	-3.23	52.20	74.00	-21.80	Vertical
9648.00	54.88	-3.18	51.70	74.00	-22.30	Vertical
12060.00	*			74.00		Vertical
14472.00	*			74.00		Vertical
4824.00	51.16	-8.42	42.74	74.00	-31.26	Horizontal
7236.00	55.26	-3.23	52.03	74.00	-21.97	Horizontal
9648.00	54.71	-3.18	51.53	74.00	-22.47	Horizontal
12060.00	*			74.00		Horizontal
14472.00	*			74.00		Horizontal

Test mode:	802.11g	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
4874.00	52.03	-9.77	42.26	74.00	-31.74	Vertical
7311.00	55.22	-3.21	52.01	74.00	-21.99	Vertical
9748.00	55.07	-3.17	51.90	74.00	-22.10	Vertical
12185.00	*			74.00		Vertical
14622.00	*			74.00		Vertical
4874.00	51.16	-9.77	41.39	74.00	-32.61	Horizontal
7311.00	55.54	-3.21	52.33	74.00	-21.67	Horizontal
9748.00	54.82	-3.17	51.65	74.00	-22.35	Horizontal
12185.00	*			74.00		Horizontal
14622.00	*			74.00		Horizontal

Test mode:	802.11g	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
4924.00	51.27	-10.03	41.24	74.00	-32.76	Vertical
7386.00	55.23	-3.20	52.03	74.00	-21.97	Vertical
9848.00	55.56	-3.16	52.40	74.00	-21.60	Vertical
12310.00	*			74.00		Vertical
14772.00	*			74.00		Vertical
4924.00	52.28	-10.03	42.25	74.00	-31.75	Horizontal
7386.00	55.71	-3.20	52.51	74.00	-21.49	Horizontal
9848.00	54.46	-3.16	51.30	74.00	-22.70	Horizontal
12310.00	*			74.00		Horizontal
14772.00	*			74.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Correct factor
2. "*", means this data is the too weak instrument of signal is unable to test.
3. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
4. 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.

MIMO:

Test mode:	802.11n(HT20)	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
4824.00	52.11	-8.42	43.69	74.00	-30.31	Vertical
7236.00	55.95	-3.23	52.72	74.00	-21.28	Vertical
9648.00	54.23	-3.18	51.05	74.00	-22.95	Vertical
12060.00	*			74.00		Vertical
14472.00	*			74.00		Vertical
4824.00	53.63	-8.42	45.21	74.00	-28.79	Horizontal
7236.00	55.37	-3.23	52.14	74.00	-21.86	Horizontal
9648.00	54.81	-3.18	51.63	74.00	-22.37	Horizontal
12060.00	*			74.00		Horizontal
14472.00	*			74.00		Horizontal

Test mode:	802.11n(HT20)	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
4874.00	51.61	-9.77	41.84	74.00	-32.16	Vertical
7311.00	55.37	-3.21	52.16	74.00	-21.84	Vertical
9748.00	55.04	-3.17	51.87	74.00	-22.13	Vertical
12185.00				74.00		Vertical
14622.00	*			74.00		Vertical
4874.00	50.28	-9.77	40.51	74.00	-33.49	Horizontal
7311.00	55.37	-3.21	52.16	74.00	-21.84	Horizontal
9748.00	54.89	-3.17	51.72	74.00	-22.28	Horizontal
12185.00	*			74.00		Horizontal
14622.00	*			74.00		Horizontal

Test mode:	802.11n(HT20)	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
4924.00	50.92	-10.03	40.89	74.00	-33.11	Vertical
7386.00	55.47	-3.20	52.27	74.00	-21.73	Vertical
9848.00	54.82	-3.16	51.66	74.00	-22.34	Vertical
12310.00	*			74.00		Vertical
14772.00	*			74.00		Vertical
4924.00	50.28	-10.03	40.25	74.00	-33.75	Horizontal
7386.00	54.63	-3.20	51.43	74.00	-22.57	Horizontal
9848.00	54.27	-3.16	51.11	74.00	-22.89	Horizontal
12310.00	*			74.00		Horizontal
14772.00	*			74.00		Horizontal

Remark:

- 1 Final Level = Receiver Read level + Correct factor
- 2 "*", means this data is the too weak instrument of signal is unable to test.
- 3 Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
4. 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.

MIMO:

Test mode:	802.11n(HT40)	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
4844.00	52.31	-8.96	43.35	74.00	-30.65	Vertical
7266.00	55.24	-3.23	52.01	74.00	-21.99	Vertical
9688.00	54.52	-3.18	51.34	74.00	-22.66	Vertical
12110.00	*			74.00		Vertical
14532.00	*			74.00		Vertical
4844.00	52.60	-8.96	43.64	74.00	-30.36	Horizontal
7266.00	54.78	-3.23	51.55	74.00	-22.45	Horizontal
9688.00	54.63	-3.18	51.45	74.00	-22.55	Horizontal
12110.00	*			74.00		Horizontal
14532.00	*			74.00		Horizontal

Test mode:	802.11n(HT40)	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
4874.00	52.03	-9.77	42.26	74.00	-31.74	Vertical
7311.00	55.03	-3.21	51.82	74.00	-22.18	Vertical
9748.00	54.85	-3.17	51.68	74.00	-22.32	Vertical
12185.00	*			74.00		Vertical
14622.00	*			74.00		Vertical
4874.00	51.33	-9.77	41.56	74.00	-32.44	Horizontal
7311.00	54.74	-3.21	51.53	74.00	-22.47	Horizontal
9748.00	54.86	-3.17	51.69	74.00	-22.31	Horizontal
12185.00	*			74.00		Horizontal
14622.00	*			74.00		Horizontal

Test mode:	802.11n(HT40)	Test channel:	Highest
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Peak value:

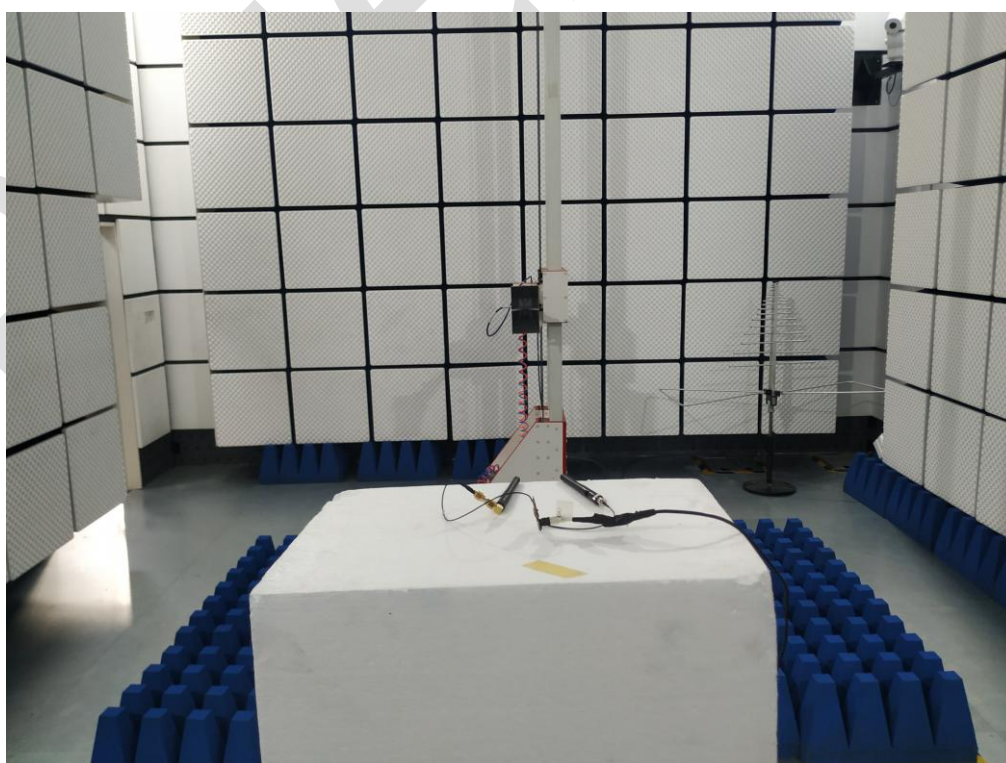
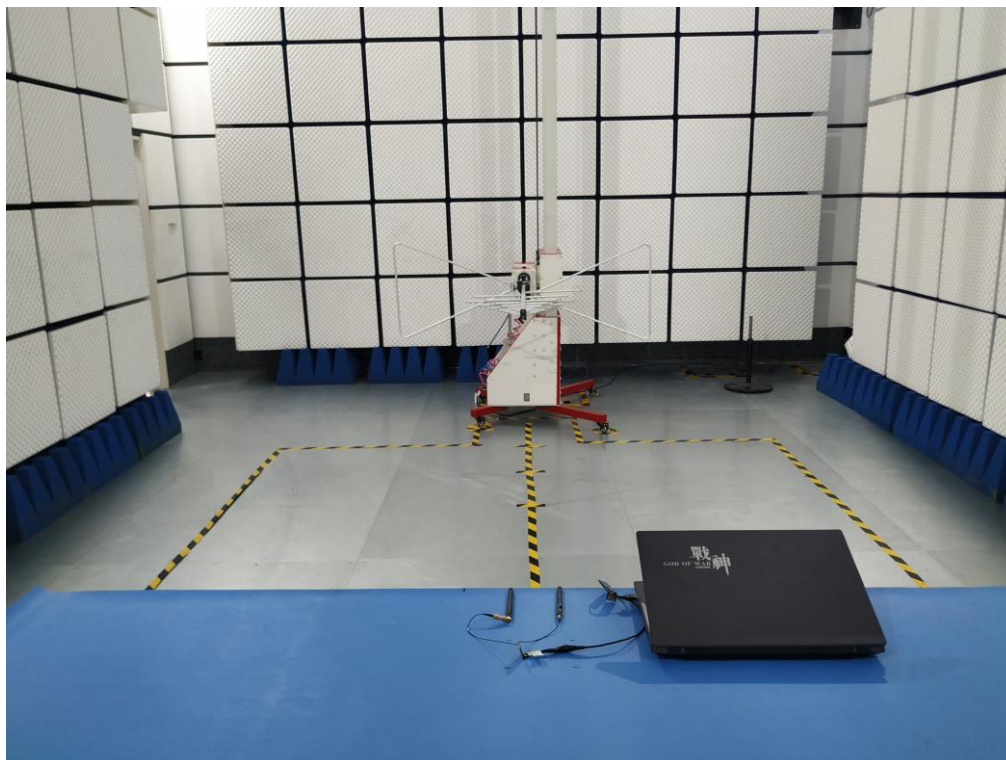
Frequency (MHz)	Read Level (dBuV)	Correct factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4844.00	50.69	-10.46	40.23	74.00	-33.77	Vertical
7386.00	55.24	-3.20	52.04	74.00	-21.96	Vertical
9848.00	55.01	-3.16	51.85	74.00	-22.15	Vertical
12310.00	*			74.00		Vertical
14772.00	*			74.00		Vertical
4924.00	50.61	-10.46	40.15	74.00	-33.85	Horizontal
7386.00	54.95	-3.20	51.75	74.00	-22.25	Horizontal
9848.00	54.51	-3.16	51.35	74.00	-22.65	Horizontal
12310.00	*			74.00		Horizontal
14772.00	*			74.00		Horizontal

Remark:

- 1 Final Level = Receiver Read level + Correct factor
- 2 "*", means this data is the too weak instrument of signal is unable to test.
- 3 Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
4. 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.

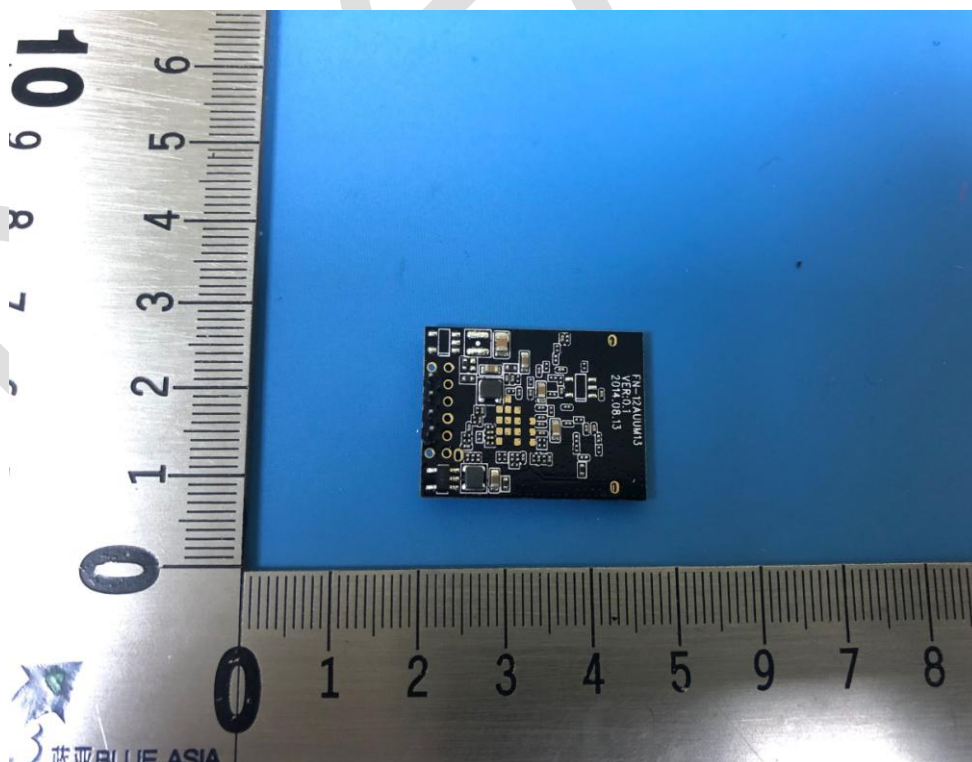
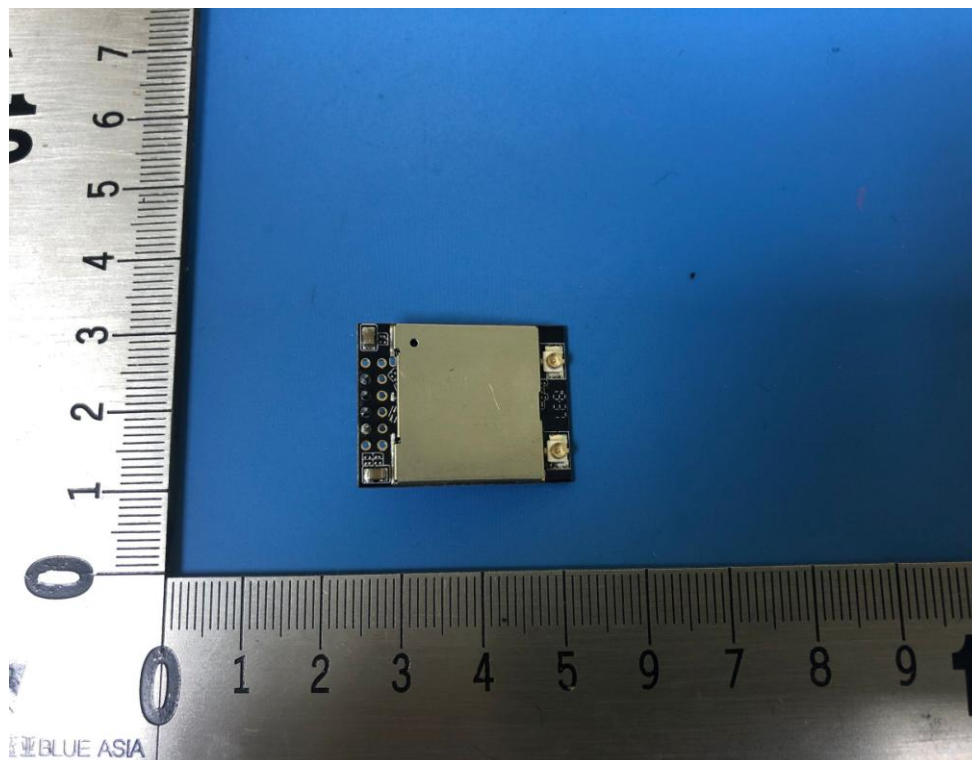
8 Test Setup Photo

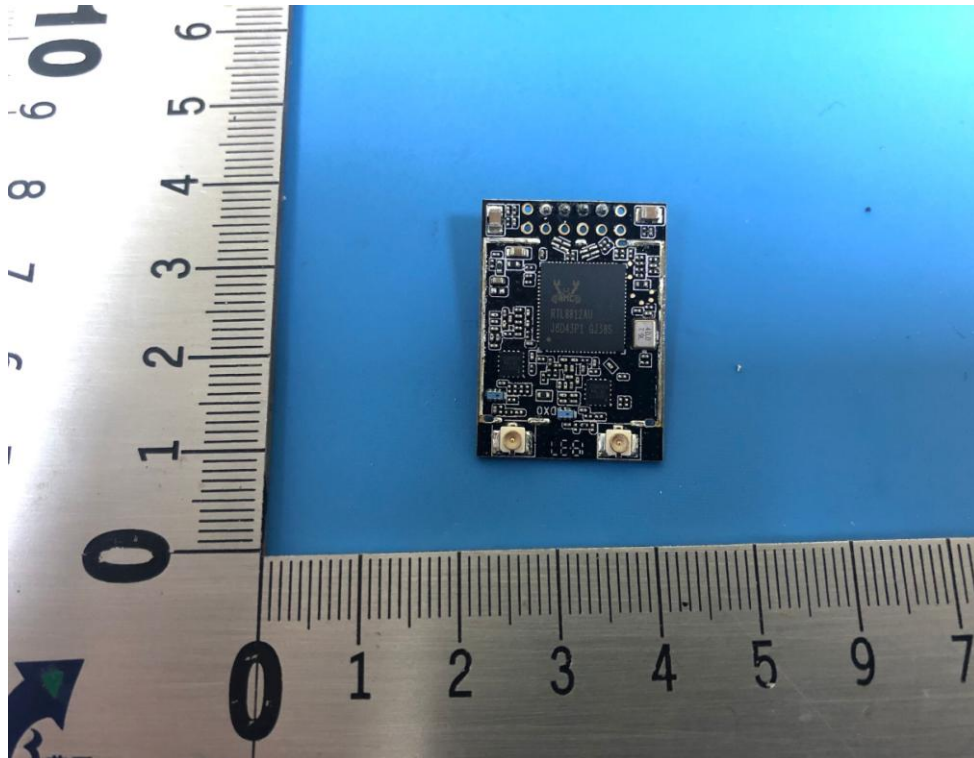
Radiated Emission





9 EUT Constructional Details





*** End of Report ***

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