TEST REPORT

FCC ID: 2AOKDSDU0070

Product: SDU-0070

Model No.: SDU-0070-001

Additional Model No: SDU-0070-002 (xxx=002-999)

Trade Mark: ad notam ®

Report No.: FCC18010018A-WiFi

Issued Date: February 26, 2018

Issued for:

ad notam AG

Obere Giesswiesen 11-13, 78247 Hilzingen, Germany

Issued By:

World Standardization Certification & Testing Group Co.,Ltd.
Building A-B, Baoshi Science & Technology Park, Baoshi Road,
Bao'an District, Shenzhen, Guangdong, China
TEL: +86-755-26996192
FAX: +86-755-86376605

TABLE OF CONTENTS

1. Test Certification 3
2. Test Result Summary 4
3. EUT Description 5
4. Genera Information 7
4.1. Test environment and mode 7
4.2. Description of Support Units 8
5. Facilities and Accreditations 9
5.1. Facilities 9
5.2. ACCREDITATIONS 9
5.3 Measurement Uncertainty 10
5.4 MEASUREMENT INSTRUMENTS 11
6. Test Results and Measurement Data 12
6.1. Antenna requirement 12
6.2. Conducted Emission 13
6.3. Emission Bandwidth 24
6.4. Power Spectral Density 32
6.5. Conducted Band Edge and Spurious Emission Measurement 40
6.6. Radiated Spurious Emission Measurement 50
7. Appendix A: Photographs of Test Setup 59
8. Appendix B: Photographs of EUT 61

1. Test Certification

Product:	SDU-0070
Model No.:	SDU-0070-001
Additional Model No.:	SDU-0070-002(xxx=002-999)
Trade Mark:	ad notam ®
Applicant:	ad notam AG
Address:	Obere Giesswiesen 11-13, 78247 Hilzingen, Germany
Manufacturer:	Shenzhen KOHO Technology Co., Ltd
Address:	F4, Building 3, Fubilun Dingfeng Hi-Tech Industrial Park, Songgang Blvd, Bao'an District, Shenzhen, China 518105
Date of Test:	February 10, 2018 to February 25, 2018
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 KDB 558074 D01 DTS Meas Guidance v04

The above equipment has been tested by World Standardization Certification & Testing Group Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By: Wen Quan **Date:** 2018.02.26
(Wen Quan)

Check By: LiHuaibi **Date:** 2018.02.26
(Li Huaibi)

Approved By: Wang Fengbing **Date:** 2018.02.26
(Wang Fengbing)

2. Test Result Summary

Requirement	CFR 47 Section	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) §2.1046	PASS
6dB Emission Bandwidth	§15.247 (a)(2) §2.1049	PASS
Power Spectral Density	§15.247 (e)	PASS
Band Edge	1§5.247(d) §2.1051, §2.1057	PASS
Spurious Emission	§15.205/§15.209 §2.1053, §2.1057	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

3. EUT Description

Product:	SDU-0070
Model No.:	SDU-0070-001
Additional Model No.:	SDU-0070-xxx(xxx=002-999)
Trade Mark:	ad notam ®
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20))
Channel Separation:	5MHz
Number of Channel:	11 for 802.11b/802.11g/802.11n(HT20)
Modulation Technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Modulation Technology: (IEEE 802.11g/802.11n)	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 72Mbps
Antenna Type:	External antenna
Antenna Gain	3dBi
Power supply:	Adapter: LS-PAB90AL-E Input: 100-240V 50/60Hz 1.5A Output: 12V-7A
Remark:	Only the model name, the others are the same, so the test data is executed at SDU-0070-001.

Operation Frequency each of channel For 802.11b/g/n(HT20)

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:

802.11b/802.11g/802.11n (HT20)

Channel	Frequency
The lowest channel	2412MHz
The middle channel	2437MHz
The Highest channel	2462MHz

4. Genera Information

4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 98.46%)
The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. For the full battery state and The output power to the maximum state.	

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:	
Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.	
Mode	Data rate
802.11b	1Mbps
802.11g	6Mbps
802.11n(H20)	6.5Mbps
Final Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation
1. For WIFI function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.2.According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup” 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(H20).Duty cycle setting during the transmission is 98.5% with maximum power setting for all modulations.	

4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Adapter	LS-PAB90AL-E	/	/	ADAPTER

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

5. Facilities and Accreditations

5.1.Facilities

All measurement facilities used to collect the measurement data are located at **Building A-B, Baoshi Science & Technology Park, Baoshi Road, Bao'an District, Shenzhen, Guangdong, China of the World Standardization Certification & Testing Group CO., LTD**

Registration Number: 366353

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	**NVLAP (The certificate registration number is NVLAP LAB CODE:600142-0)**
Japan	**VCCI (The certificate registration number is C-4790, R-3684, G-837)**
Canada	**INDUSTRY CANADA (The certificated registration number is 7700A-1)**
China	**CNAS (The certificated registration number is L3732)**

Copies of granted accreditation certificates are available for downloading from our web site, http://www.wsct-cert.com

5.3 Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission Test	±3.2dB
2	RF power, conducted	±0.16dB
3	Spurious emissions, conducted	±0.21dB
4	All emissions, radiated(<1G)	±4.7dB
5	All emissions, radiated(>1G)	±4.7dB
6	Temperature	±0.5°C
7	Humidity	±2.0%

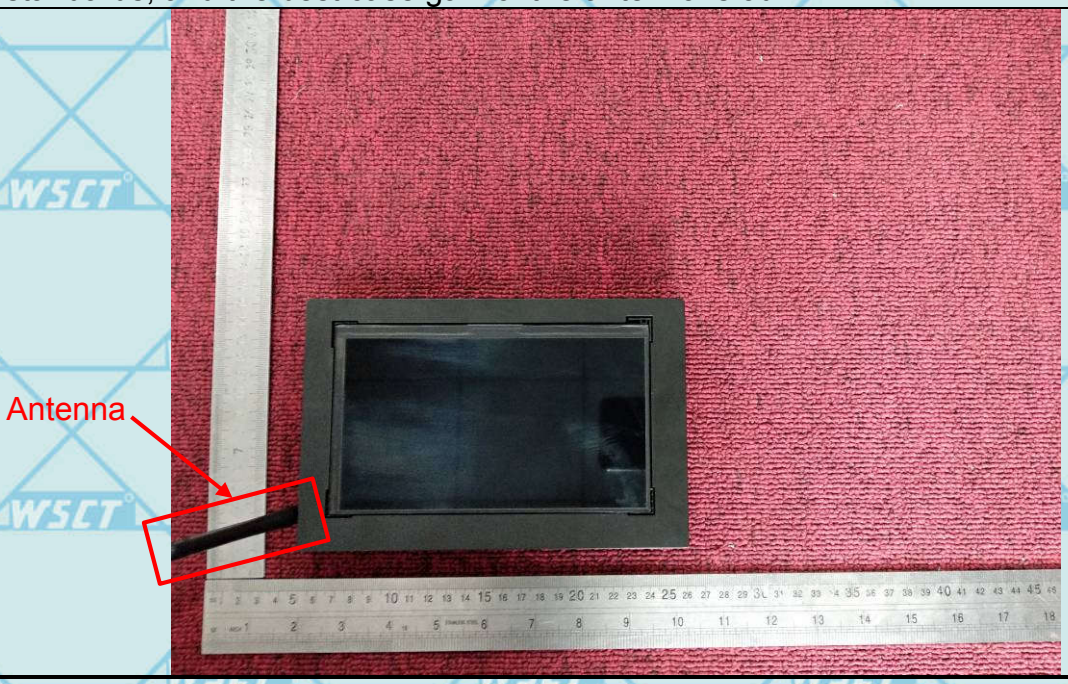
5.4 MEASUREMENT INSTRUMENTS

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	Calibration Date	Calibration Due.
EMI Test Receiver	R&S	ESCI	100005	08/19/2017	08/18/2018
LISN	AFJ	LS16	16010222119	08/19/2017	08/18/2018
LISN(EUT)	Mestec	AN3016	04/10040	08/19/2017	08/18/2018
Universal Radio Communication Tester	R&S	CMU 200	1100.0008.02	08/19/2017	08/18/2018
Coaxial cable	Megalon	LMR400	N/A	08/12/2017	08/11/2018
GPIB cable	Megalon	GPIB	N/A	08/12/2017	08/11/2018
Spectrum Analyzer	R&S	FSU	100114	08/19/2017	08/18/2018
Pre Amplifier	H.P.	HP8447E	2945A02715	10/13/2017	10/12/2018
Pre-Amplifier	CDSI	PAP-1G18-38	--	10/13/2017	10/12/2018
Bi-log Antenna	SUNOL Sciences	JB3	A021907	09/13/2017	09/12/2018
9*6*6 Anechoic	--	--	--	08/21/2017	08/20/2018
Horn Antenna	COMPLIANCE ENGINEERING	CE18000	--	09/13/2017	09/12/2018
Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-631	08/23/2017	08/22/2018
Cable	TIME MICROWAVE	LMR-400	N-TYPE04	04/25/2017	04/24/2018
System-Controller	CCS	N/A	N/A	N.C.R	N.C.R
Turn Table	CCS	N/A	N/A	N.C.R	N.C.R
Antenna Tower	CCS	N/A	N/A	N.C.R	N.C.R
RF cable	Murata	MXHQ87WA3000	-	08/21/2017	08/20/2018
Loop Antenna	EMCO	6502	00042960	08/22/2017	08/21/2018
Horn Antenna	SCHWARZBECK	BBHA 9170	1123	08/19/2017	08/18/2018
Power meter	Anritsu	ML2487A	6K00003613	08/23/2017	08/22/2018
Power sensor	Anritsu	MX248XD	--	08/19/2017	08/18/2018

6. Test Results and Measurement Data

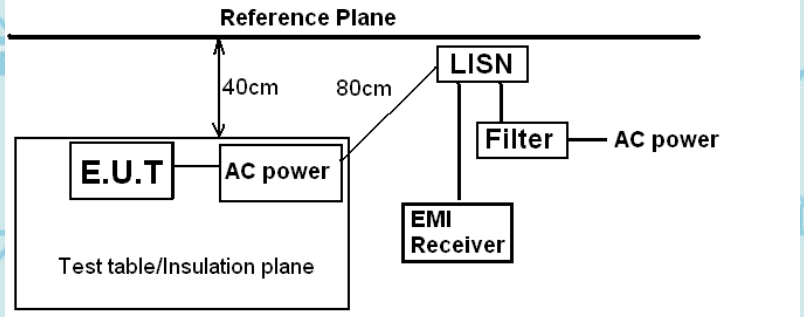
6.1. Antenna requirement

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 WIFI antenna is a External antenna with the RP SMA Connecter. it meets the standards, and the best case gain of the antenna is 3dBi.	



6.2. Conducted Emission

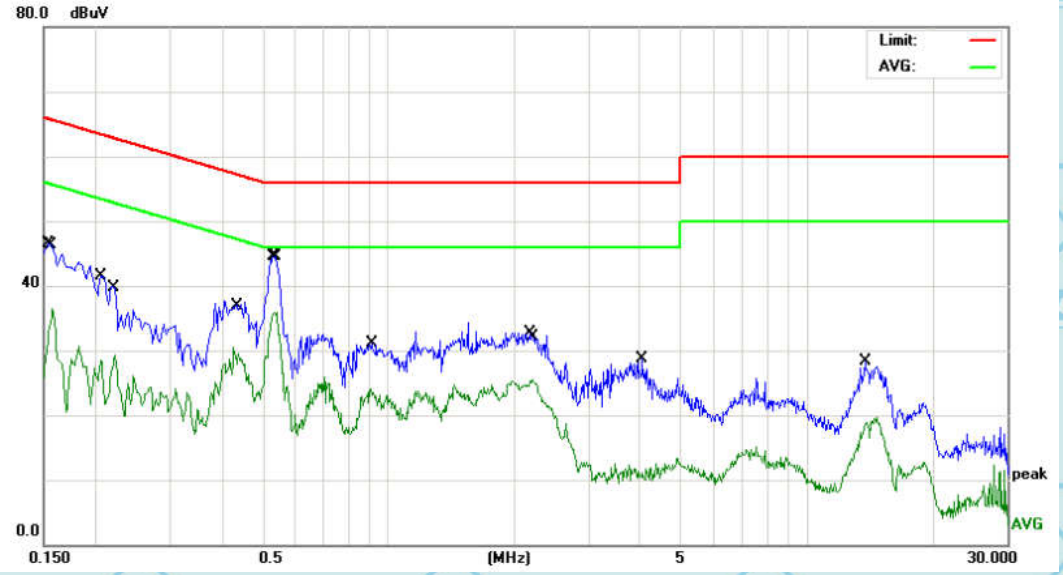
6.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Frequency Range:	150 kHz to 30 MHz
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto
Limits:	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:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Mode:	Charging + transmitting with modulation
Test Procedure:	1. The E.U.T is 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 Result:	PASS

6.2.2. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)

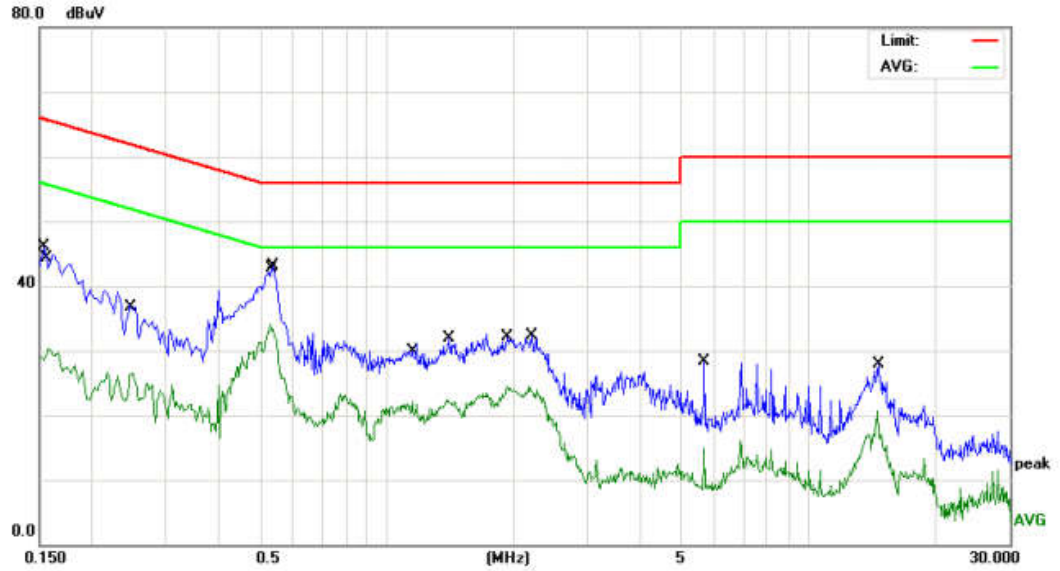


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1539	36.01	10.44	46.45	65.78	-19.33	QP
2		0.1580	26.08	10.44	36.52	55.56	-19.04	AVG
3		0.2060	31.16	10.43	41.59	63.36	-21.77	QP
4		0.2220	18.87	10.43	29.30	52.74	-23.44	AVG
5		0.4260	20.00	10.41	30.41	47.33	-16.92	AVG
6		0.5299	34.16	10.40	44.56	56.00	-11.44	QP
7	*	0.5420	25.59	10.39	35.98	46.00	-10.02	AVG
8		0.9060	13.69	10.35	24.04	46.00	-21.96	AVG
9		2.1740	22.45	10.29	32.74	56.00	-23.26	QP
10		2.2020	15.23	10.29	25.52	46.00	-20.48	AVG
11		4.0420	18.38	10.25	28.63	56.00	-27.37	QP
12		13.7180	18.12	10.16	28.28	60.00	-31.72	QP

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 + LISN Factor + Cable Loss*
4. *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.*

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1539	35.58	10.44	46.02	65.78	-19.76	QP
2		0.1580	19.81	10.44	30.25	55.56	-25.31	AVG
3		0.2500	15.98	10.43	26.41	51.75	-25.34	AVG
4	*	0.5299	23.61	10.40	34.01	46.00	-11.99	AVG
5		0.5380	32.64	10.40	43.04	56.00	-12.96	QP
6		1.1500	11.78	10.33	22.11	46.00	-23.89	AVG
7		1.4060	21.51	10.32	31.83	56.00	-24.17	QP
8		1.9300	14.22	10.29	24.51	46.00	-21.49	AVG
9		2.2100	22.00	10.29	32.29	56.00	-23.71	QP
10		5.6540	18.02	10.22	28.24	60.00	-31.76	QP
11		14.5300	10.57	10.15	20.72	50.00	-29.28	AVG
12		14.6180	17.68	10.15	27.83	60.00	-32.17	QP

Notes:

1.An initial pre-scan was performed on the line and neutral lines with peak detector.

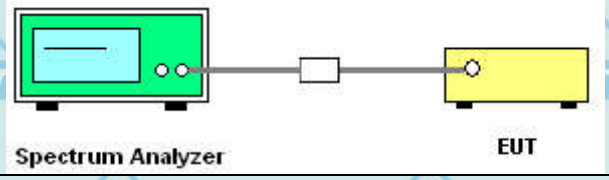
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

3.Final Level =Receiver Read level + LISN Factor + Cable Loss

4.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.

6.2.3. Maximum Conducted (Average) Output Power

6.2.4. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	KDB 558074
Limit:	30dBm
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04. 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Measure the conducted output power and record the results in the test report.
Test Result:	PASS

6.2.5. Test Data

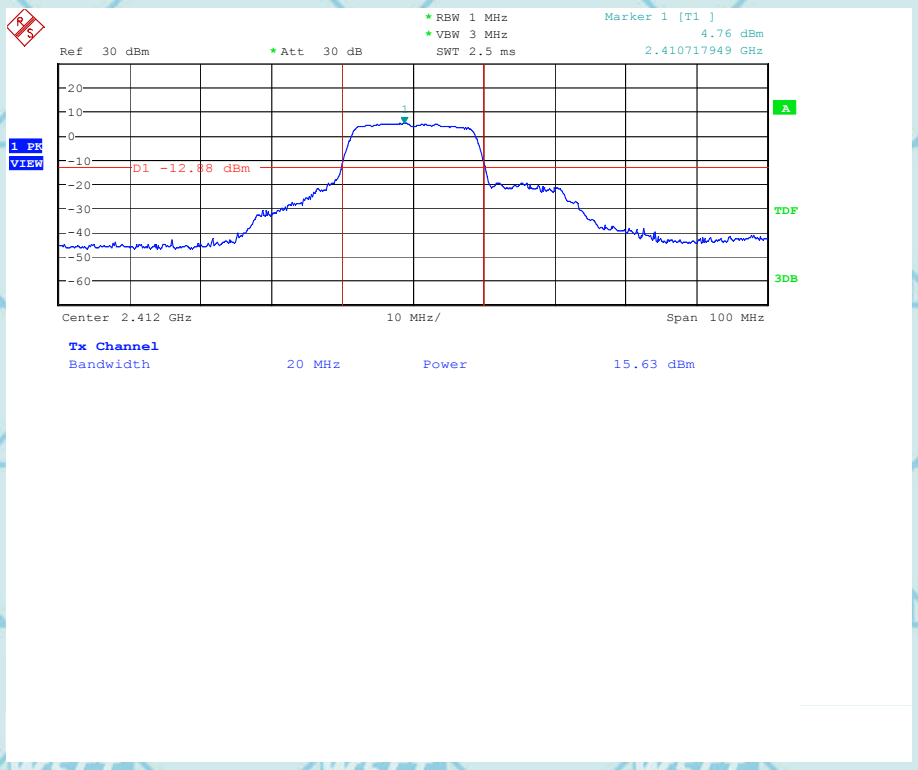
802.11b mode			
Test channel	Maximum Conducted Output Power (dBm)	Limit (dBm)	Result
Lowest	15.63	30.00	PASS
Middle	16.64	30.00	PASS
Highest	16.53	30.00	PASS

802.11g mode			
Test channel	Maximum Conducted Output Power (dBm)	Limit (dBm)	Result
Lowest	15.59	30.00	PASS
Middle	16.37	30.00	PASS
Highest	16.50	30.00	PASS

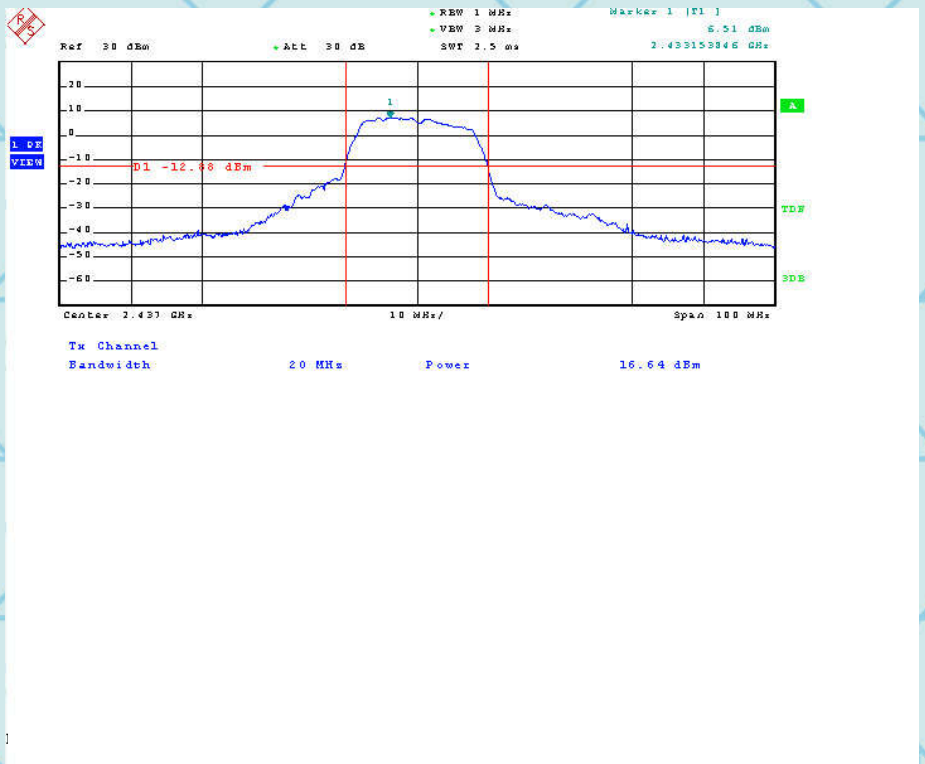
802.11n(H20) mode			
Test channel	Maximum Conducted Output Power (dBm)	Limit (dBm)	Result
Lowest	13.45	30.00	PASS
Middle	14.58	30.00	PASS
Highest	14.29	30.00	PASS

Test plots as follows:
802.11b Modulation

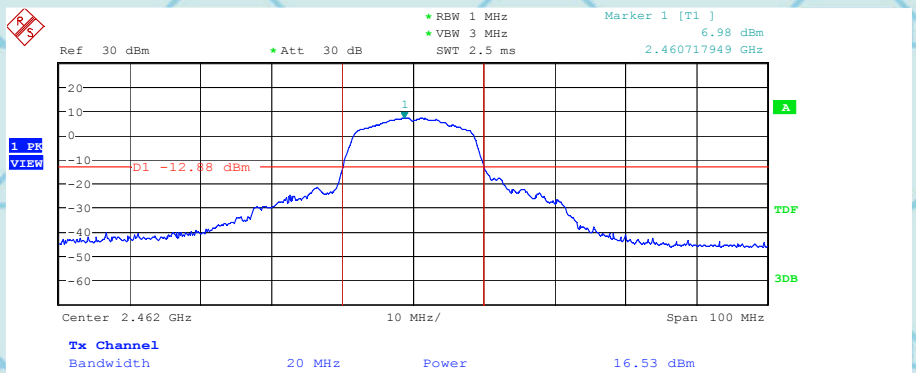
Lowest channel



Middle channel

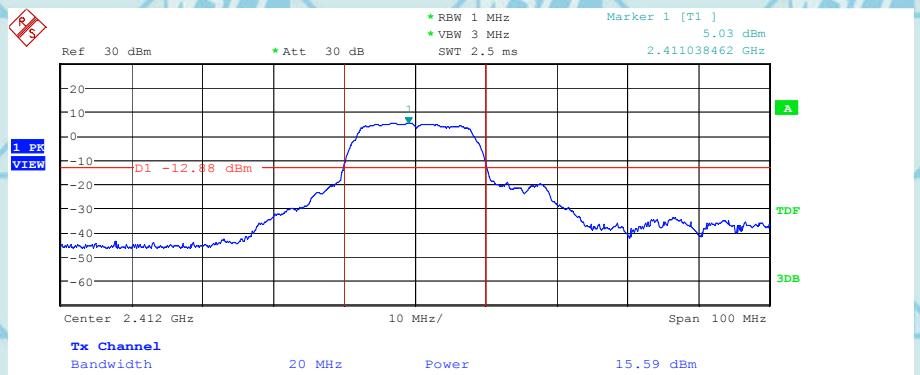


Highest channel

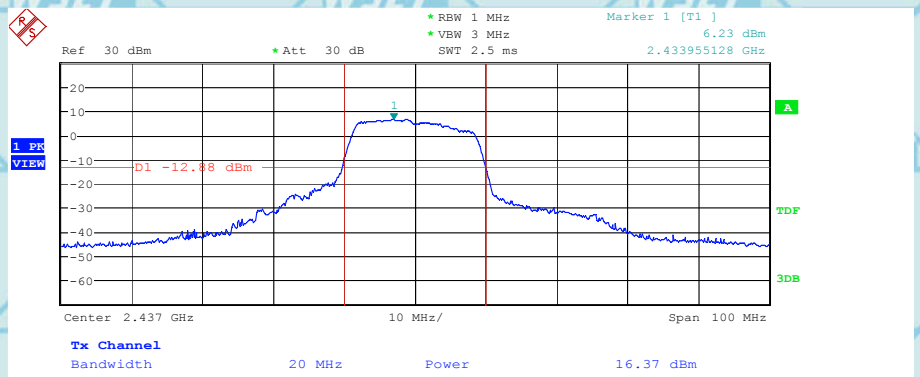


802.11g Modulation

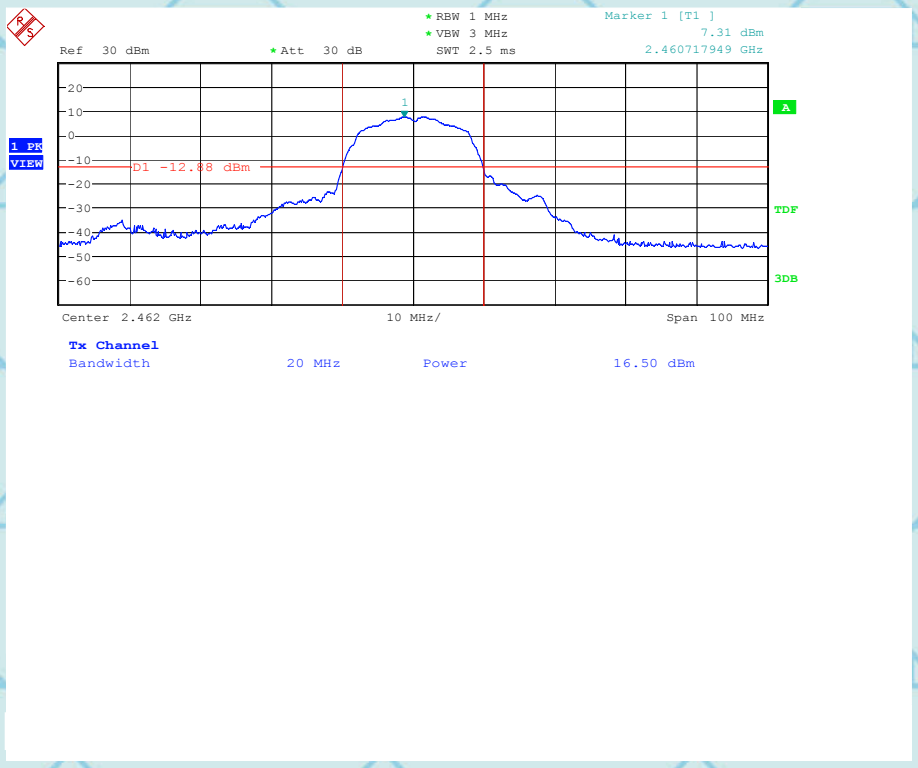
Lowest channel



Middle channel

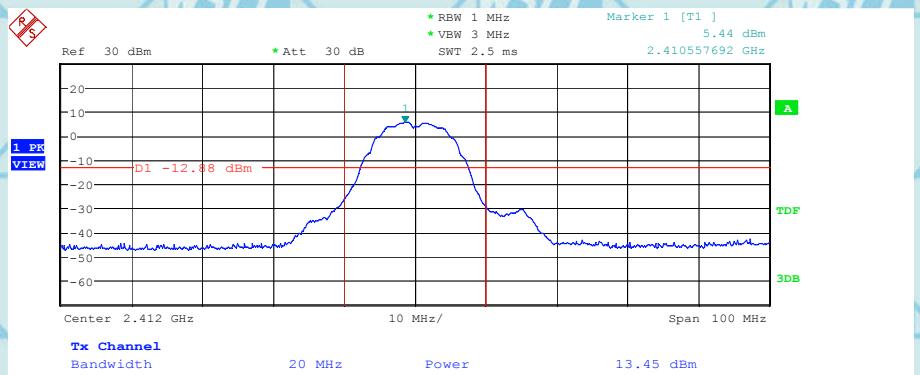


Highest channel

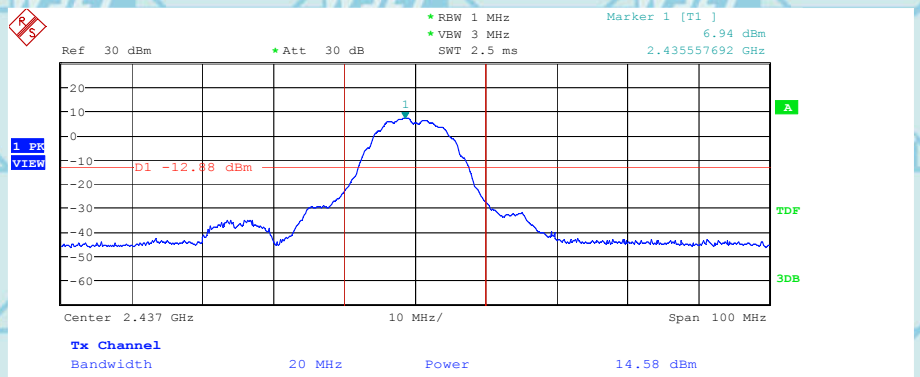


802.11n (HT20) Modulation

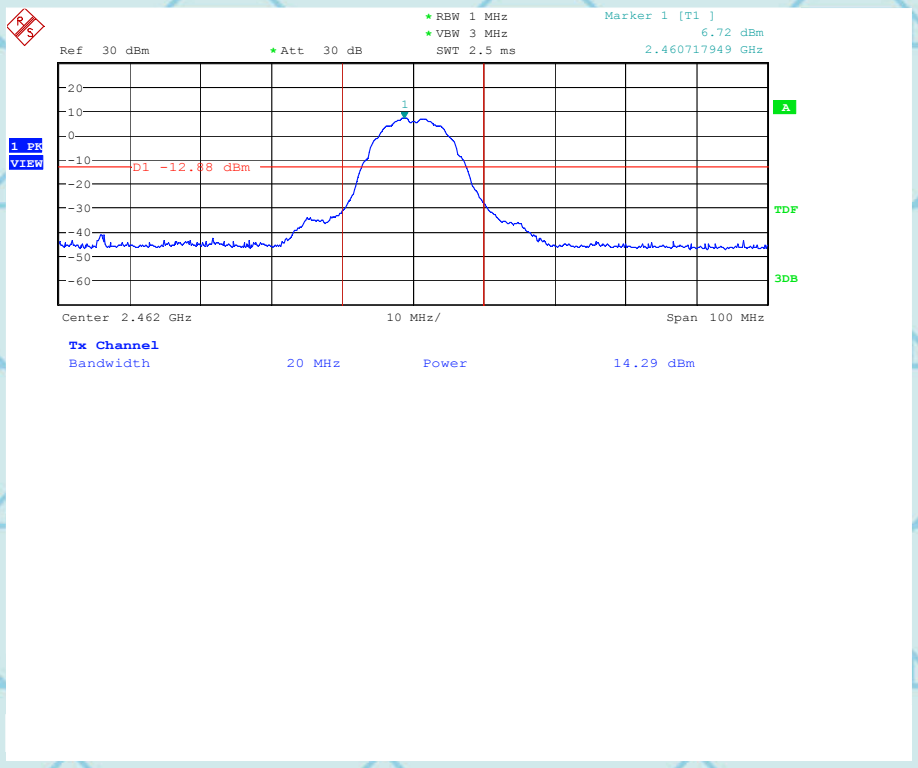
Lowest channel



Middle channel

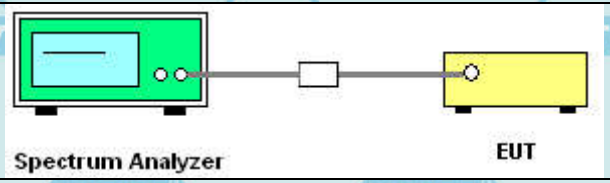


Highest channel



6.3. Emission Bandwidth

6.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	KDB 558074
Limit:	>500kHz
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v04. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz. 4. Measure and record the results in the test report.
Test Result:	PASS

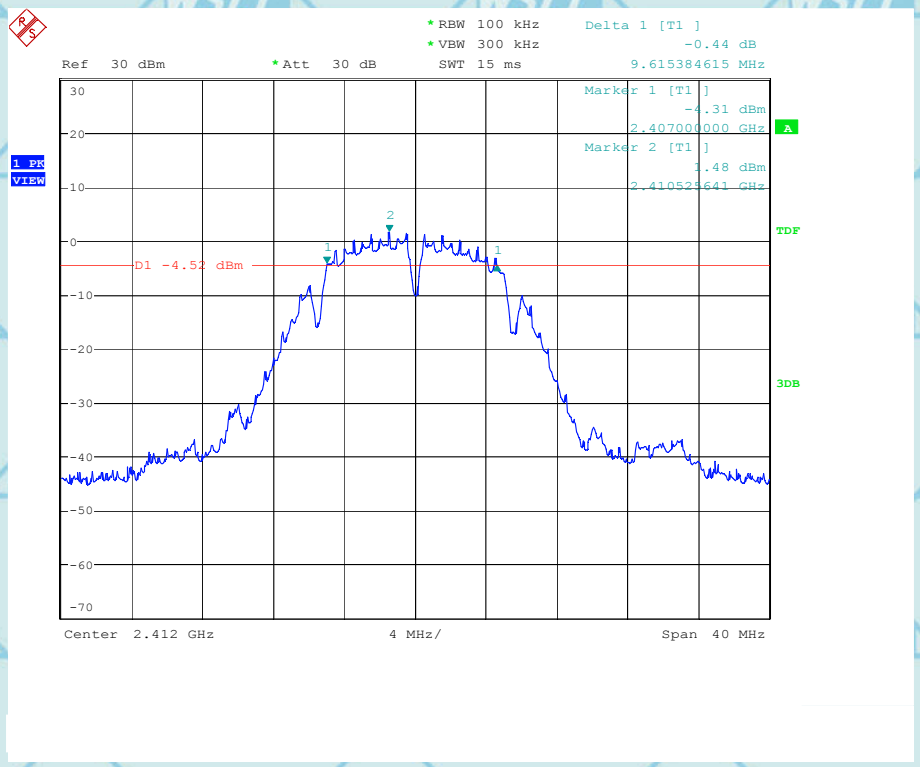
6.3.2. Test data

Test channel	6dB Emission Bandwidth (MHz)		
	802.11b	802.11g	802.11n(H20)
Lowest	9.615	16.533	17.436
Middle	9.437	15.962	17.179
Highest	9.167	15.641	16.859
Limit:	>500k		
Test Result:	PASS		

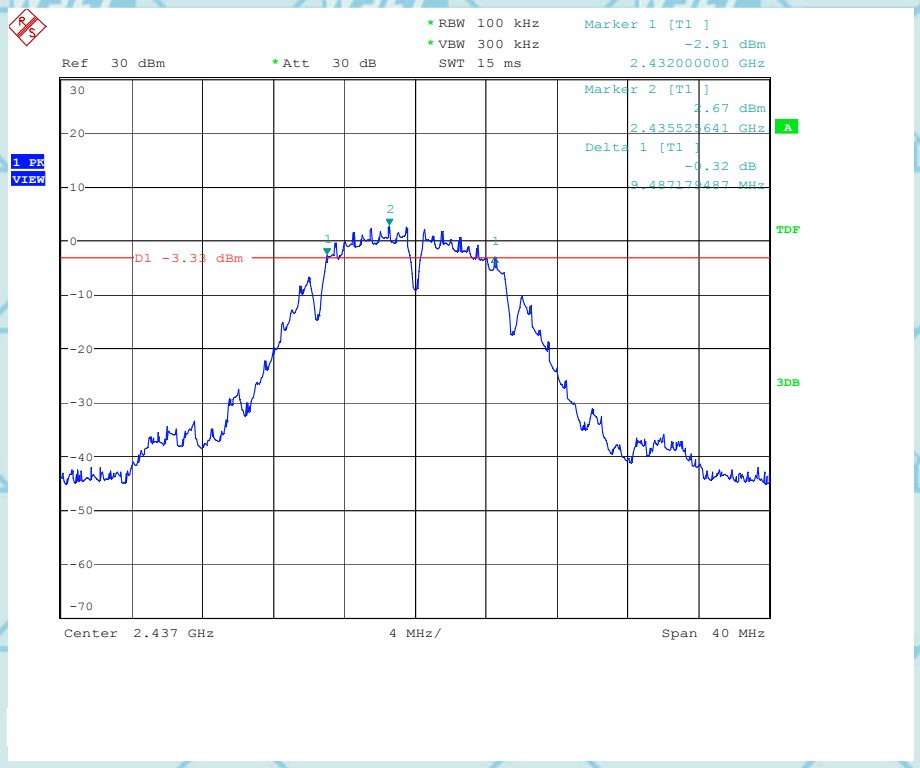
Test plots as follows:

802.11b Modulation

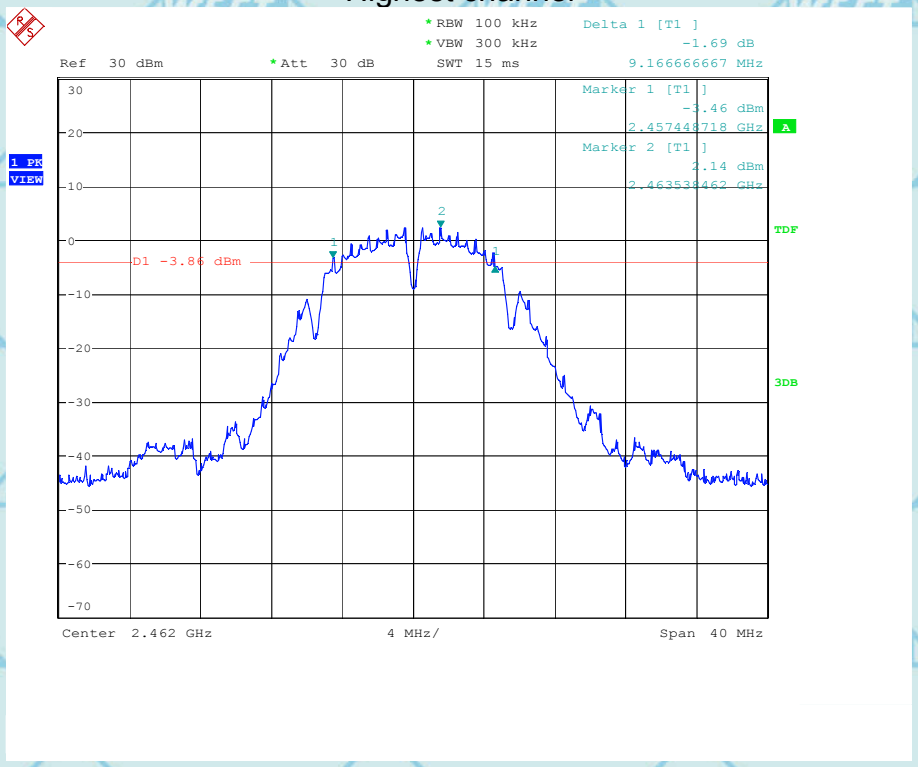
Lowest channel



Middle channel

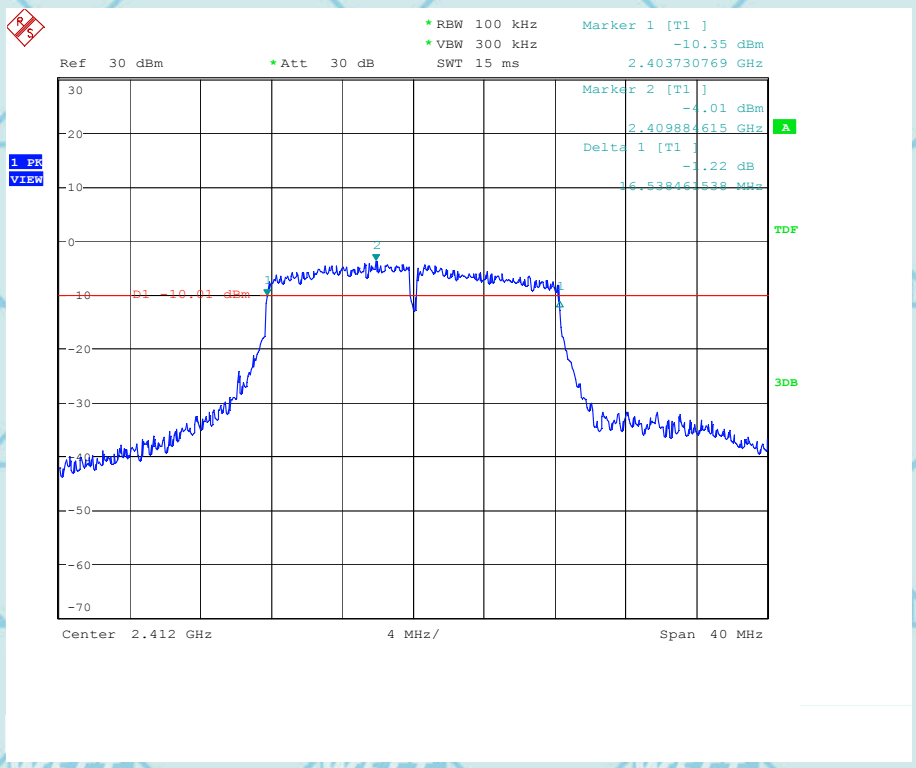


Highest channel

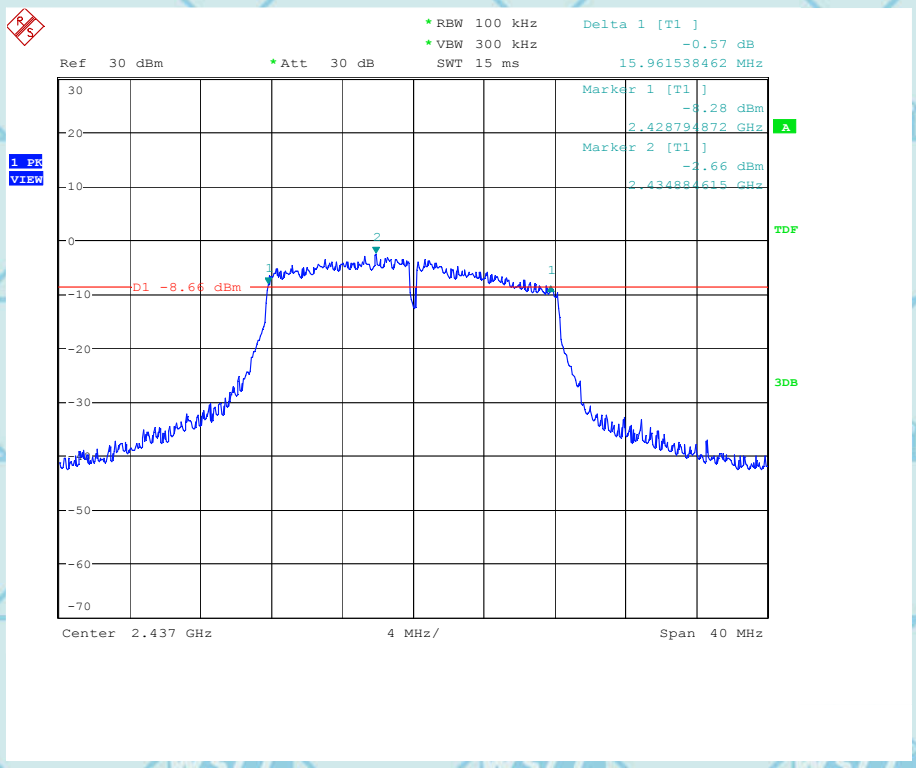


802.11g Modulation

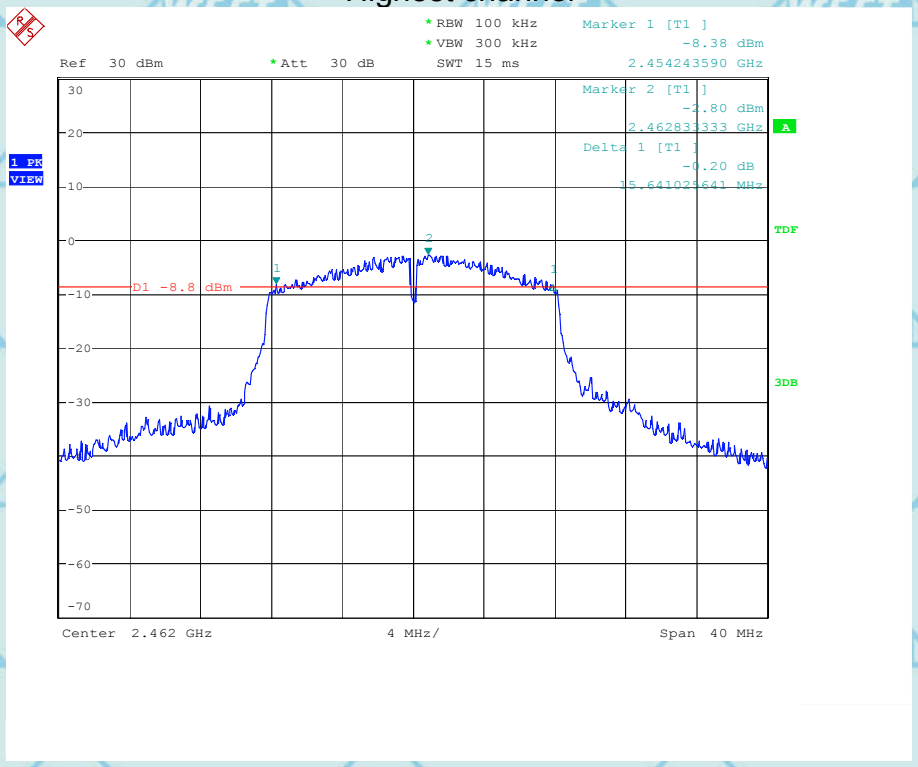
Lowest channel



Middle channel

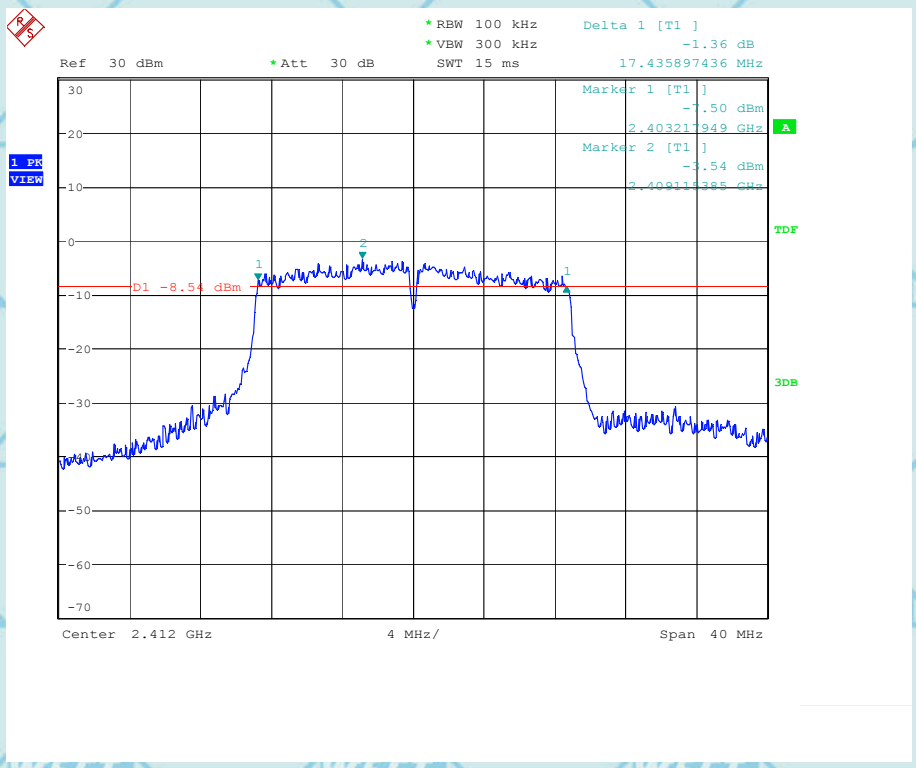


Highest channel

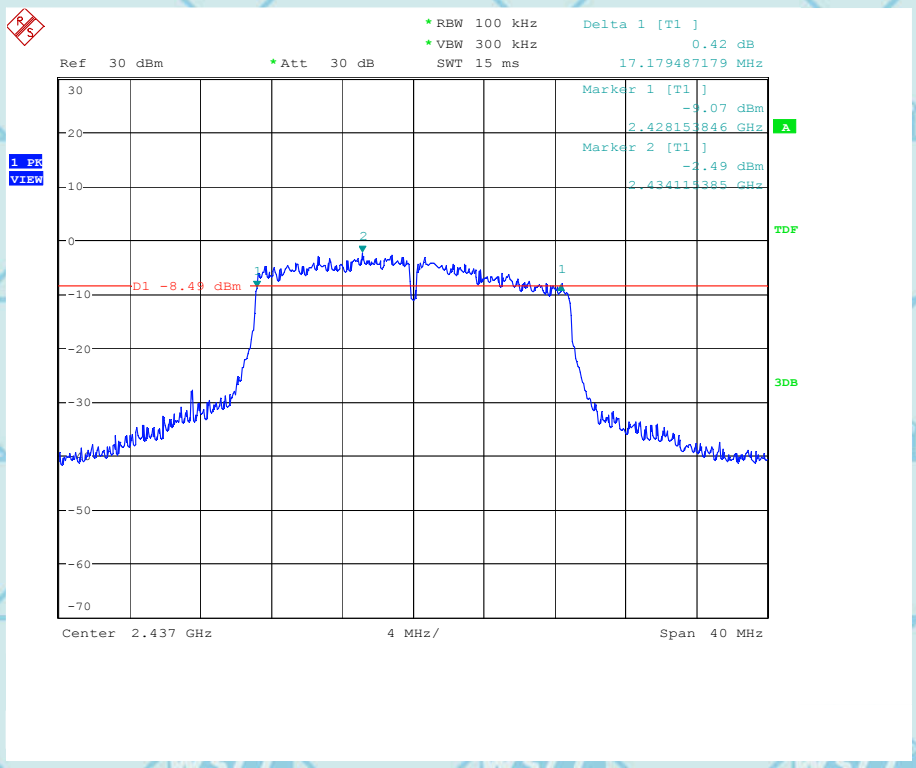


802.11n (HT20) Modulation

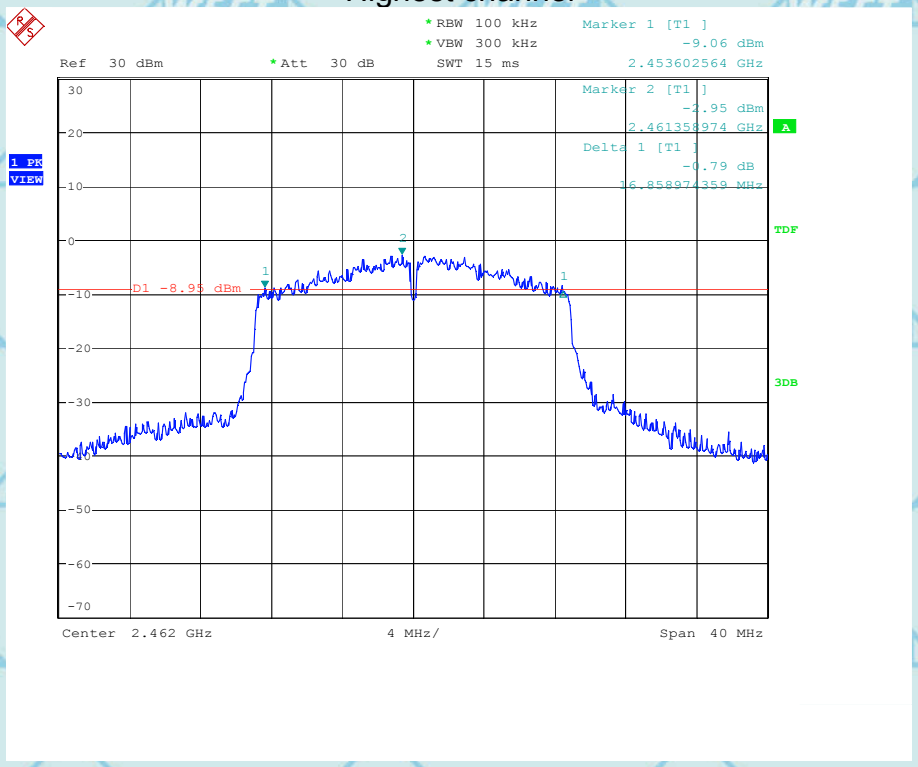
Lowest channel



Middle channel

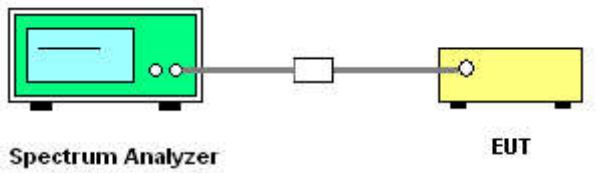


Highest channel



6.4. Power Spectral Density

6.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	KDB 558074
Limit:	The average power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows Measurement Procedure 10.3 Method AVGPSD of FCC KDB Publication No.558074 D01 DTS Meas. Guidance v04 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): 3 kHz ≤ RBW ≤ 100 kHz. Video bandwidth VBW ≥ 3 x RBW. Set the span to at least 1.5 times the OBW. 5. Detector = RMS, Sweep time = auto couple. 6. Employ trace averaging (RMS) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level. 6. Measure and record the results in the test report.
Test Result:	PASS

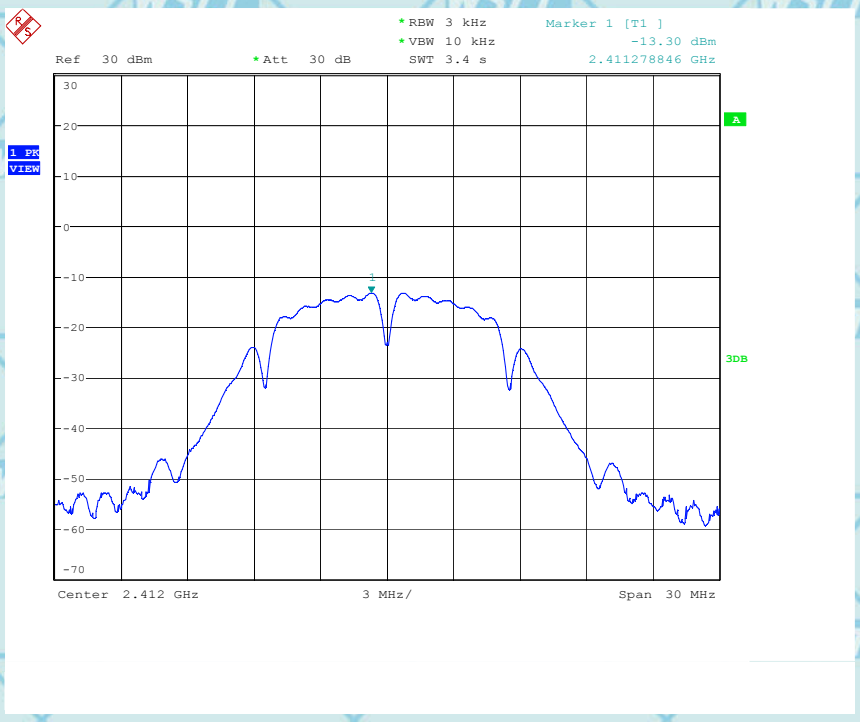
6.4.2. Test data

Test channel	AVG Power Spectral Density (dBm/3kHz)		
	802.11b	802.11g	802.11n(H20)
Lowest	-13.30	-12.32	-13.12
Middle	-13.29	-10.66	-12.71
Highest	-13.42	-10.69	-14.87
Limit:	8dBm/3kHz		
Test Result:	PASS		

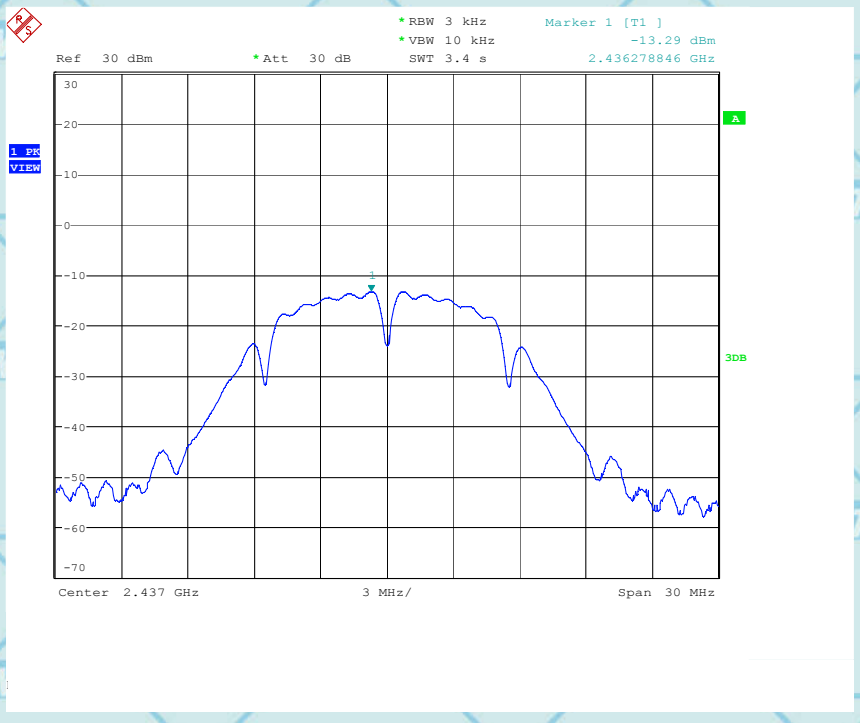
Test plots as follows:

802.11b Modulation

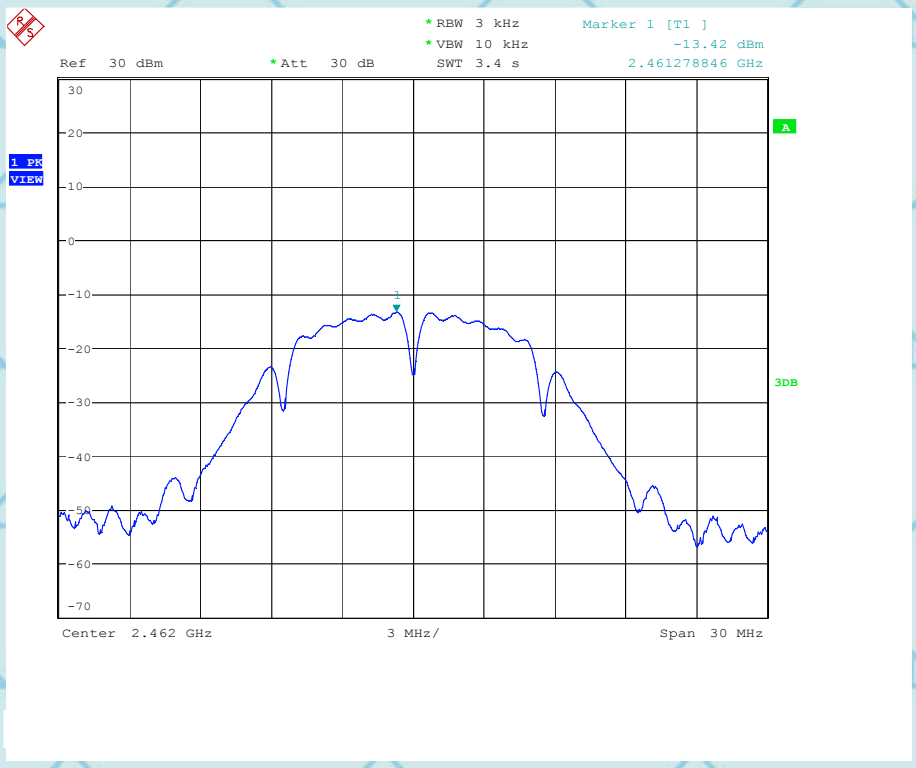
Lowest channel



Middle channel

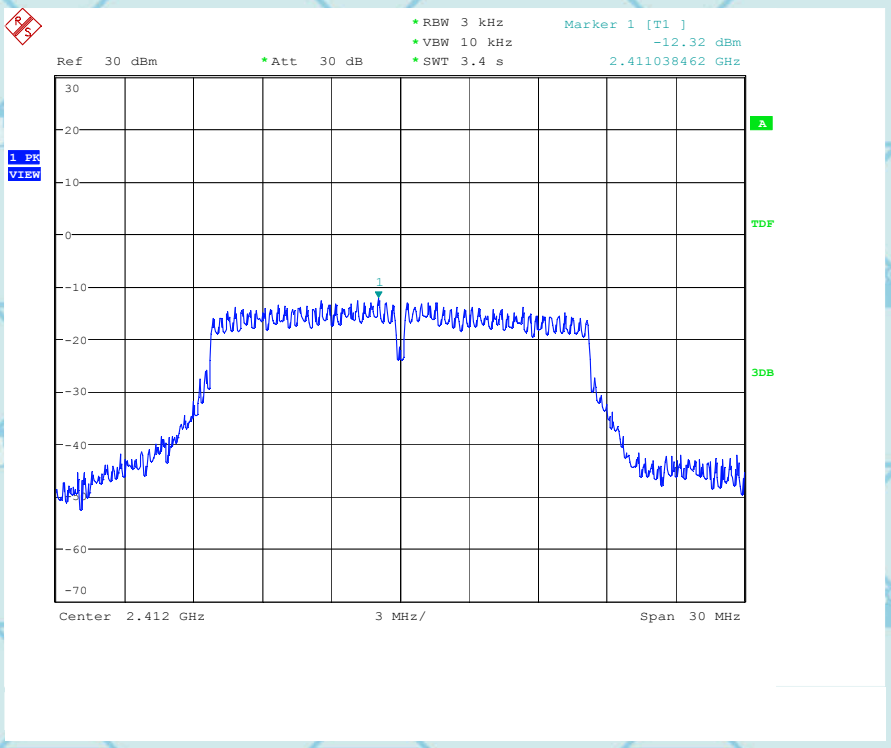


Highest channel

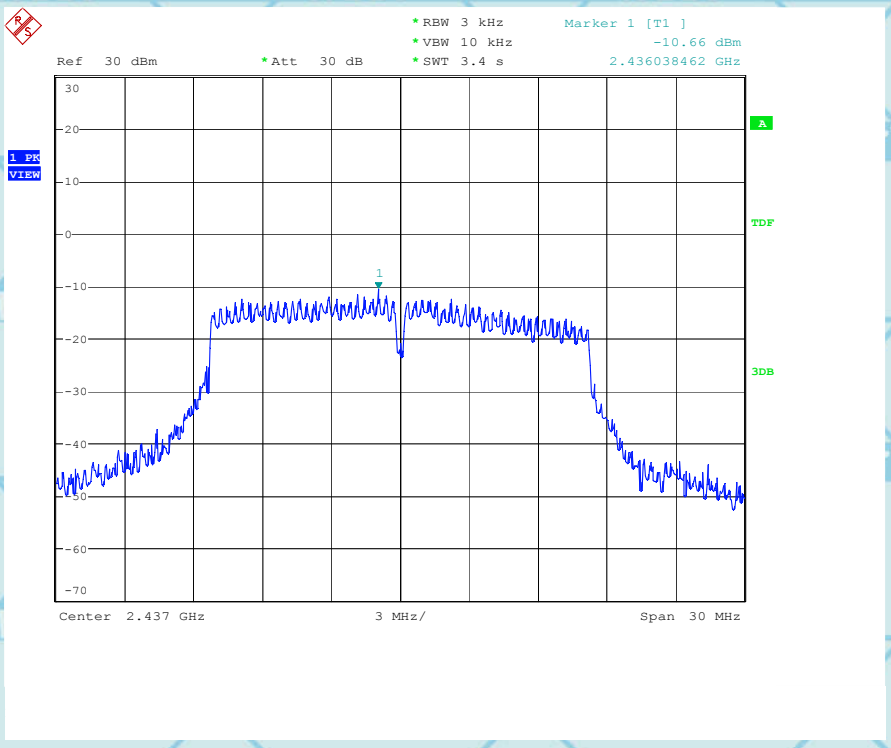


802.11g Modulation

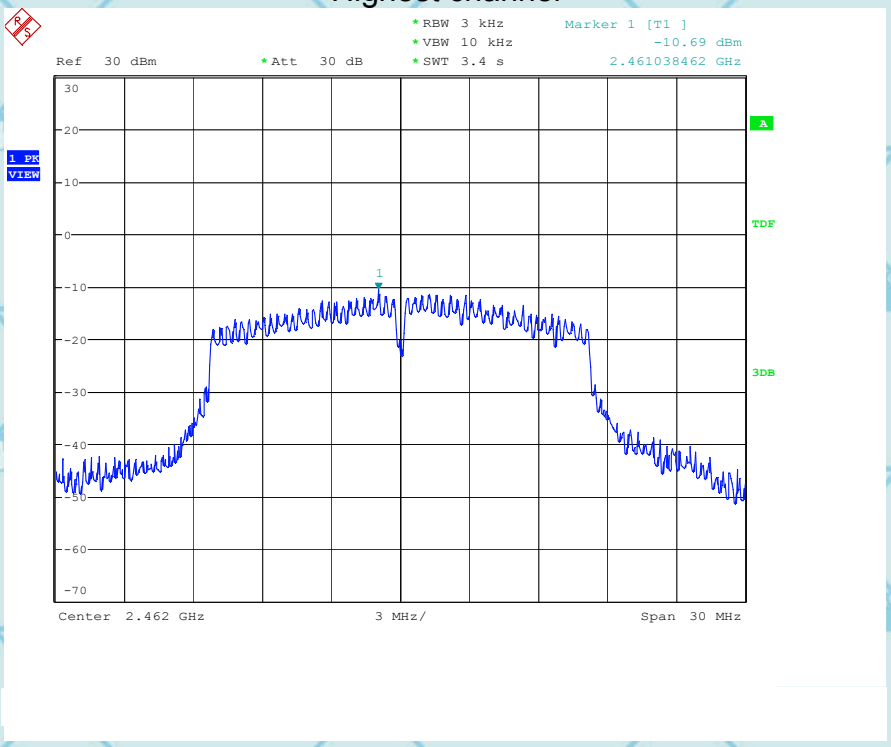
Lowest channel



Middle channel

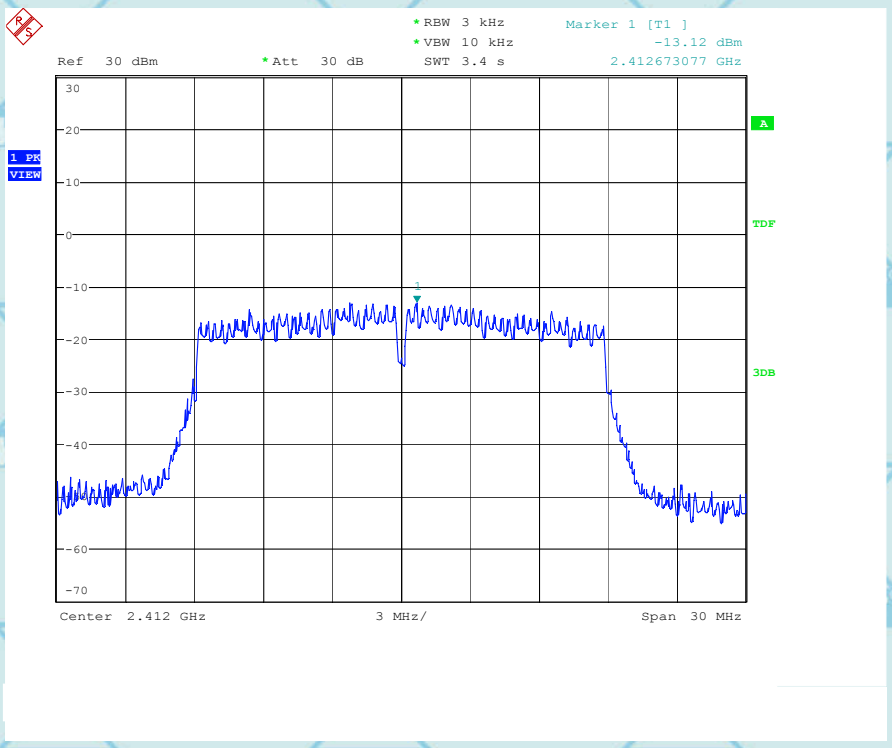


Highest channel

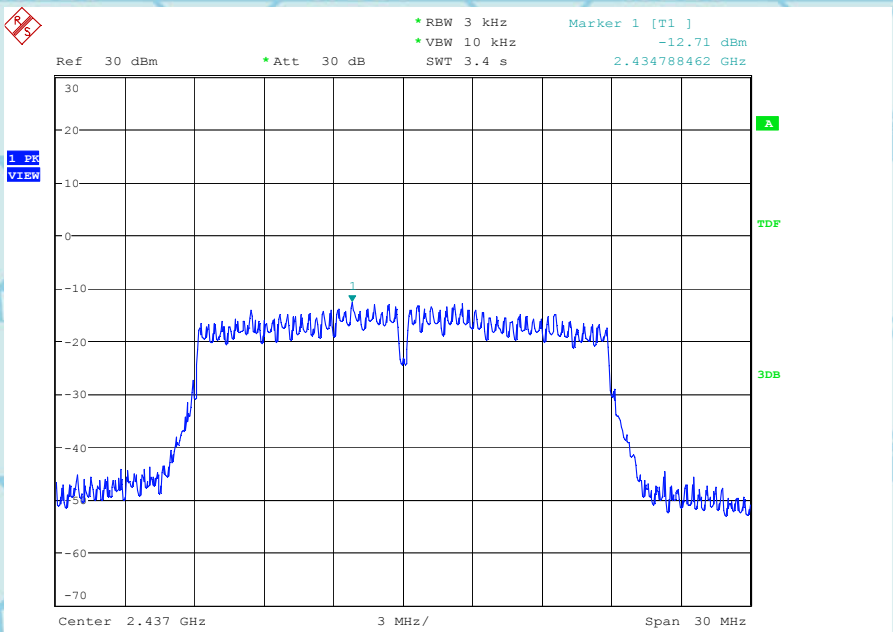


802.11n (HT20) Modulation

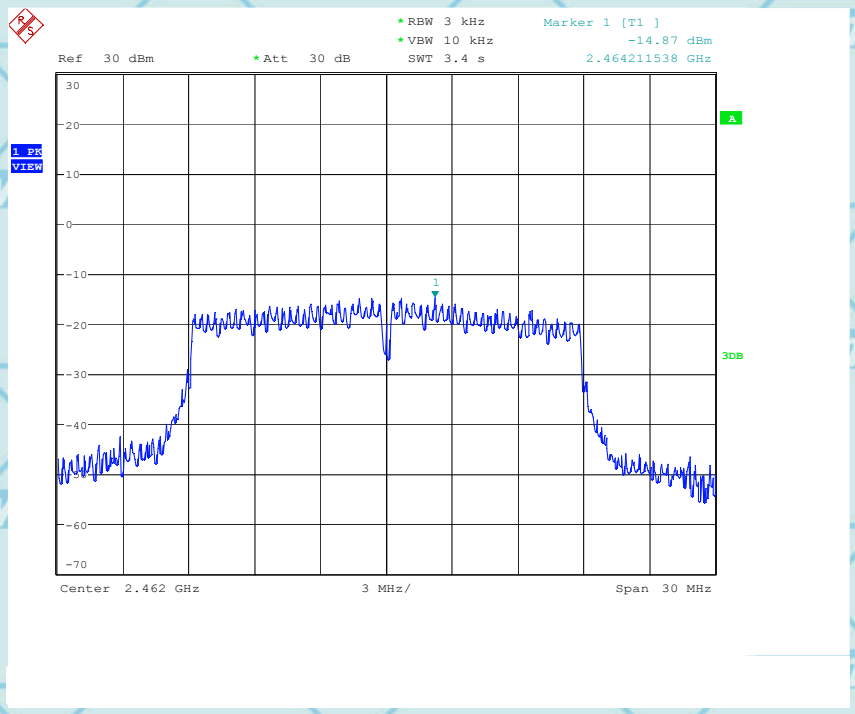
Lowest channel



Middle channel

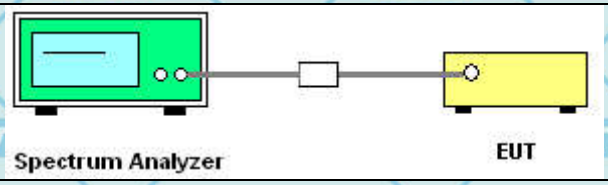


Highest channel



6.5. Conducted Band Edge and Spurious Emission Measurement

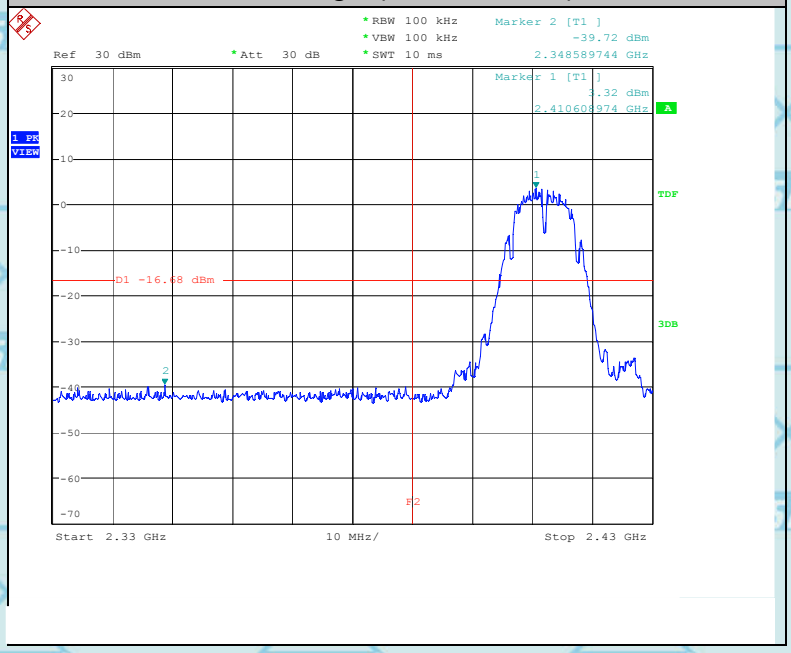
6.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB558074
Limit:	In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04. 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d). 5. Measure and record the results in the test report. 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
Test Result:	PASS

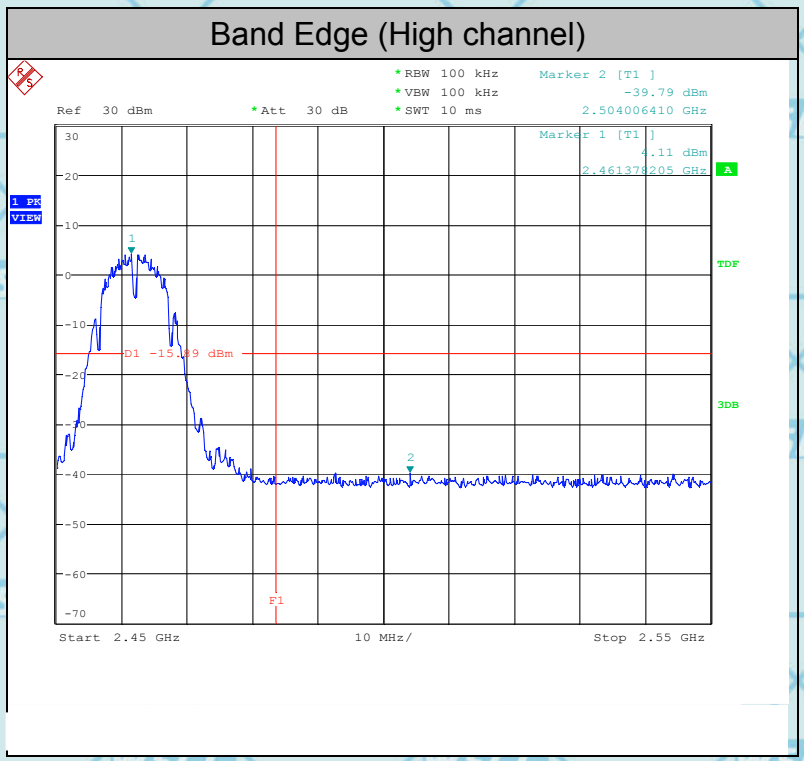
6.5.2. Test Data

802.11b Modulation

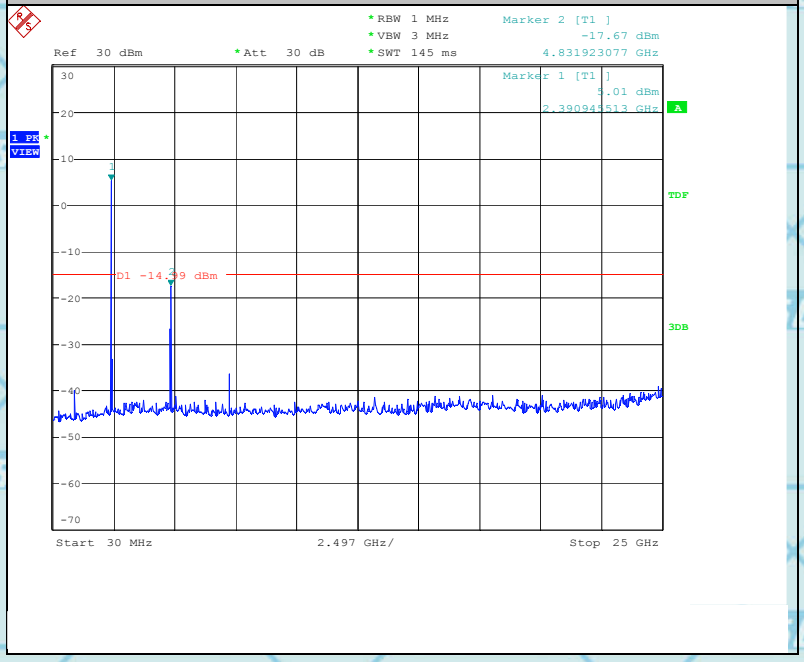
Band Edge (Low channel)



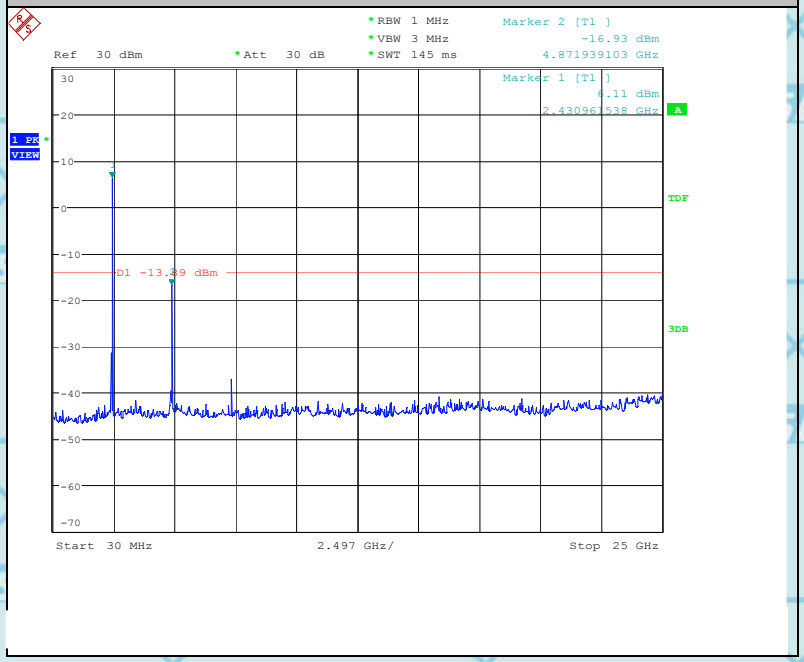
Band Edge (High channel)



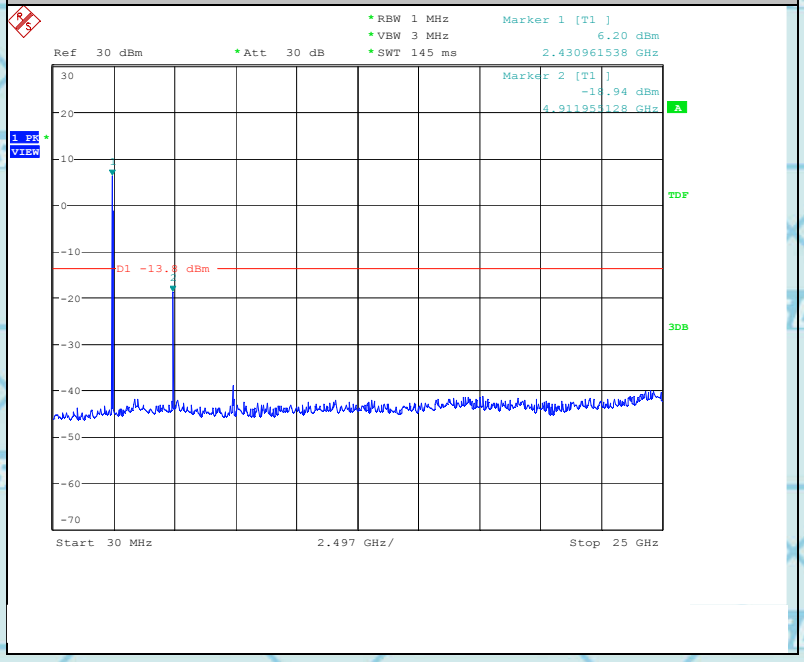
Spurious Emission (Low channel)



Spurious Emission (Mid channel)

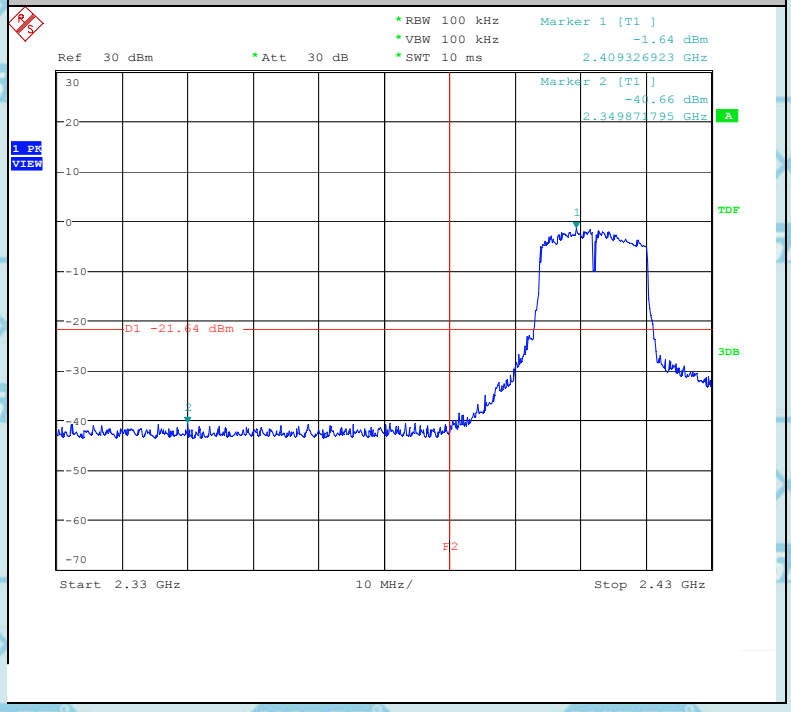


Spurious Emission (High channel)

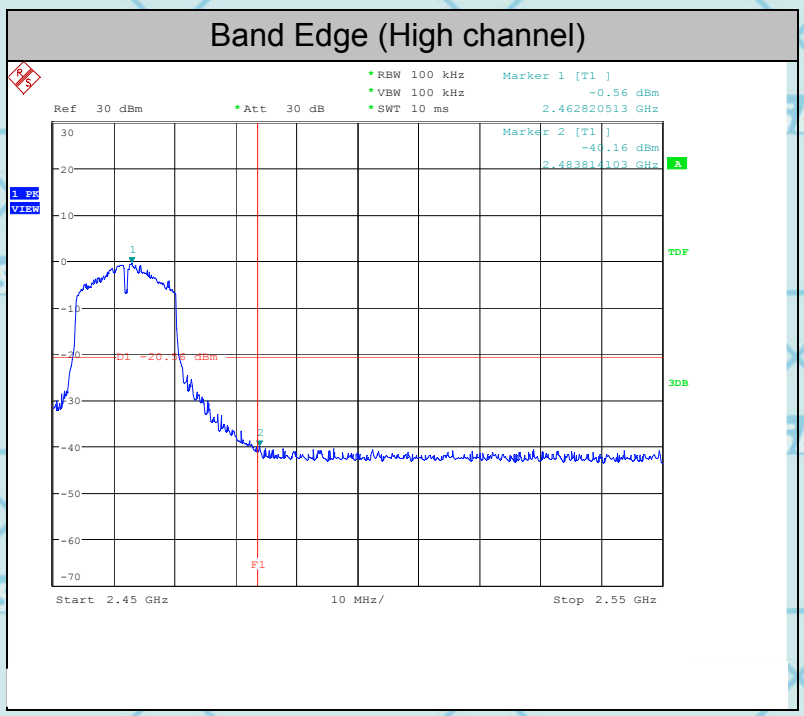


802.11g Modulation

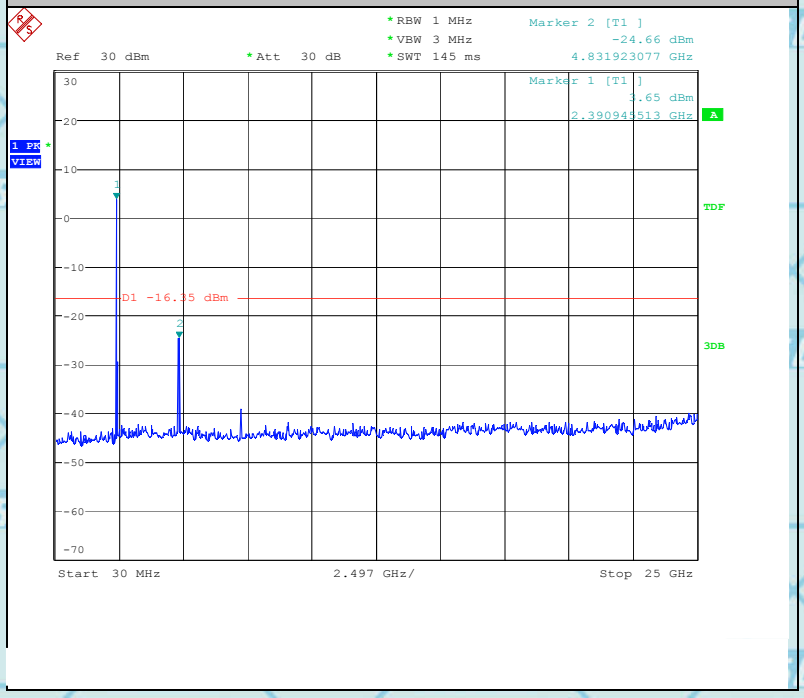
Band Edge (Low channel)



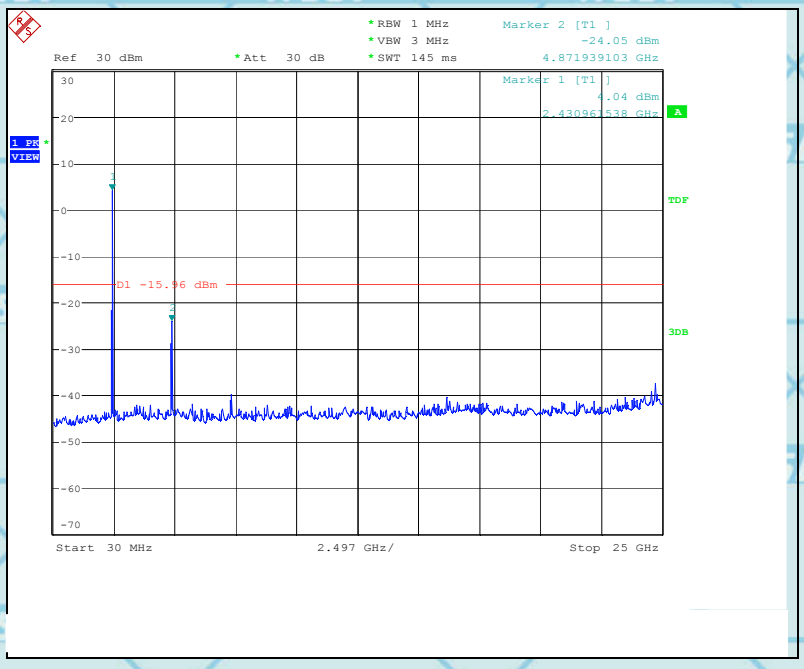
Band Edge (High channel)



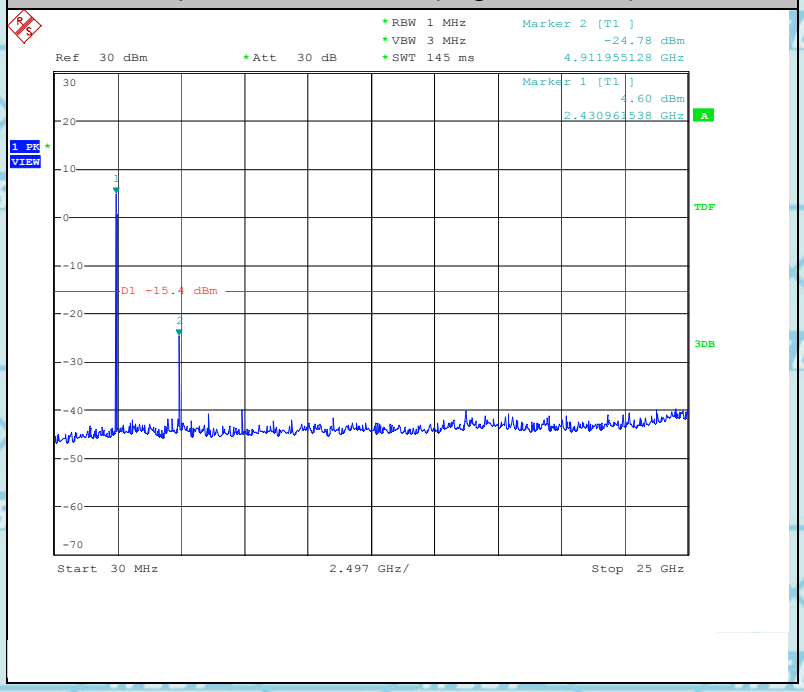
Spurious Emission (Low channel)



Spurious Emission (Mid channel)

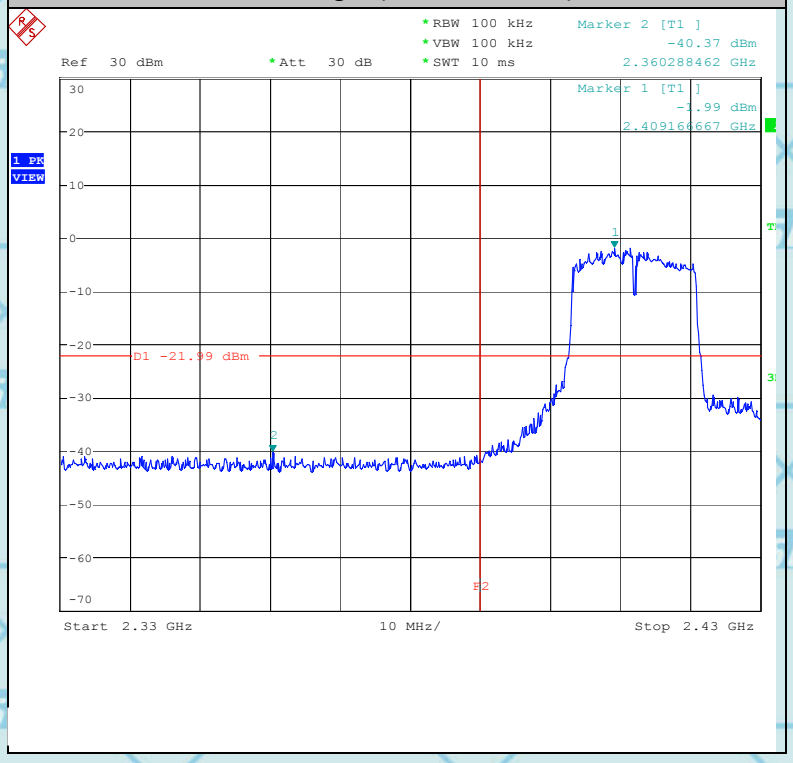


Spurious Emission (High channel)

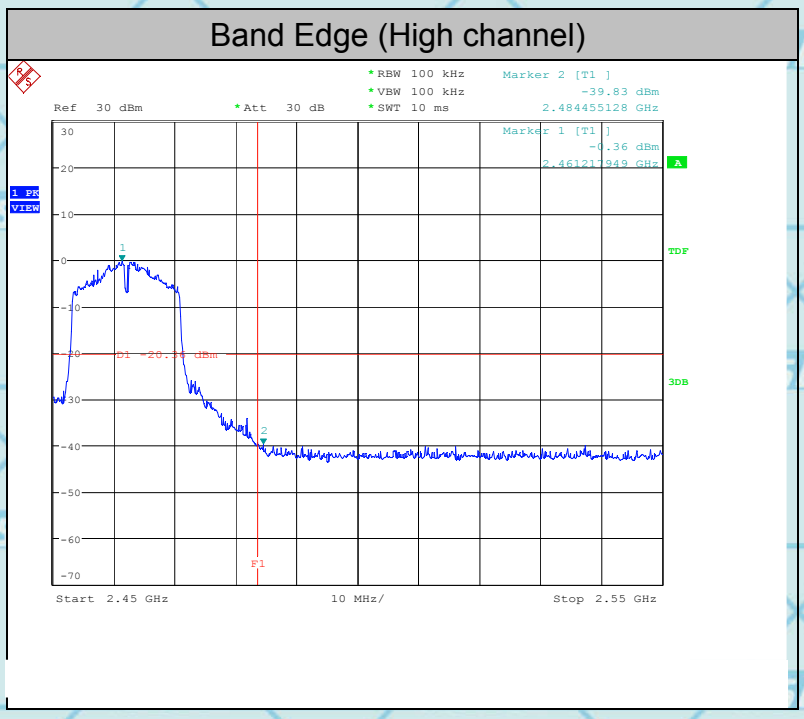


802.11n (HT20) Modulation

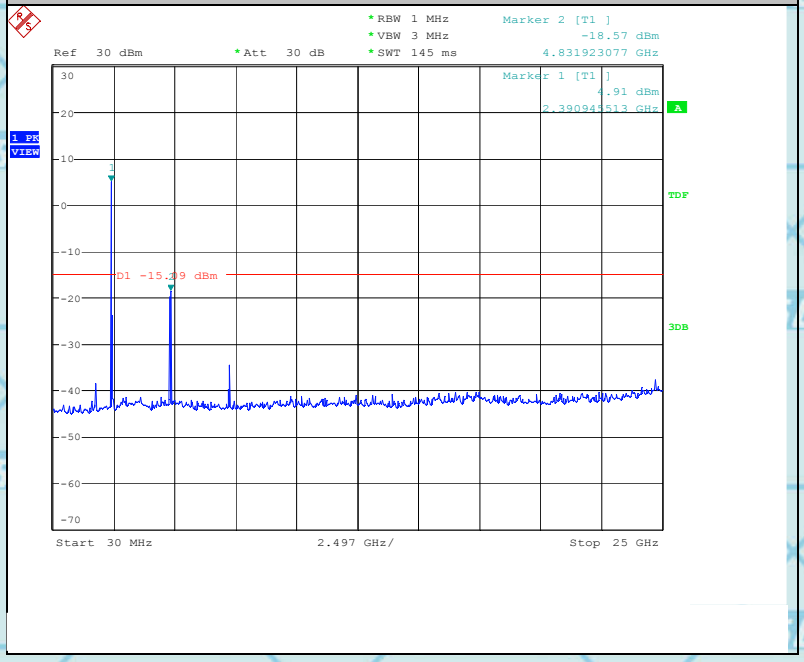
Band Edge (Low channel)



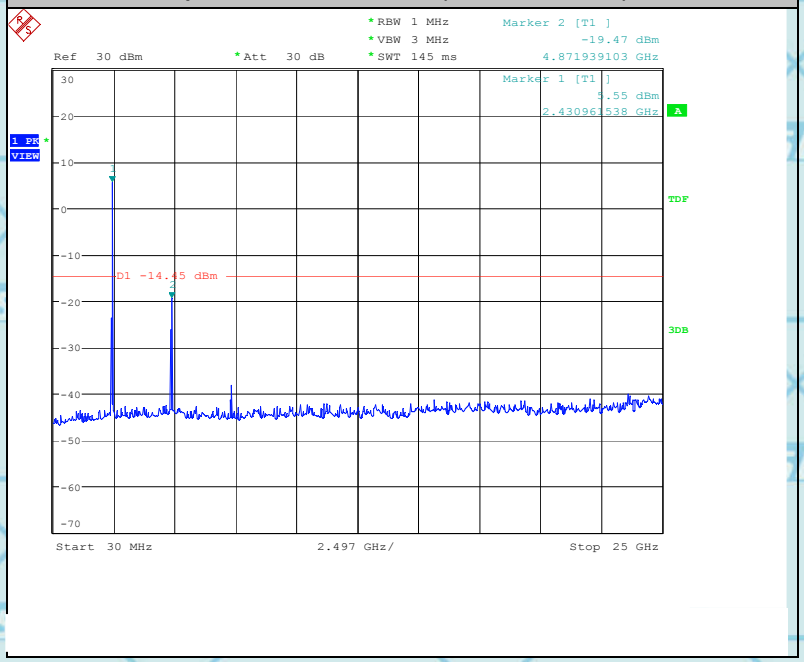
Band Edge (High channel)



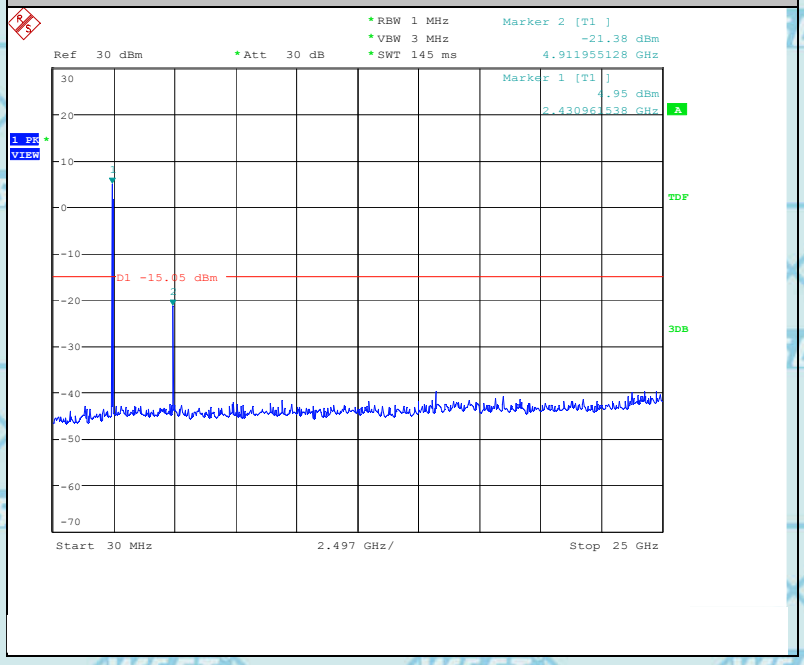
Spurious Emission (Low channel)



Spurious Emission (Mid channel)



Spurious Emission (High channel)



6.6. Radiated Spurious Emission Measurement

6.6.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10: 2013
Frequency Range:	9 kHz to 25 GHz
Measurement Distance:	3 m
Antenna Polarization:	Horizontal & Vertical
Operation mode:	Transmitting mode with modulation

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

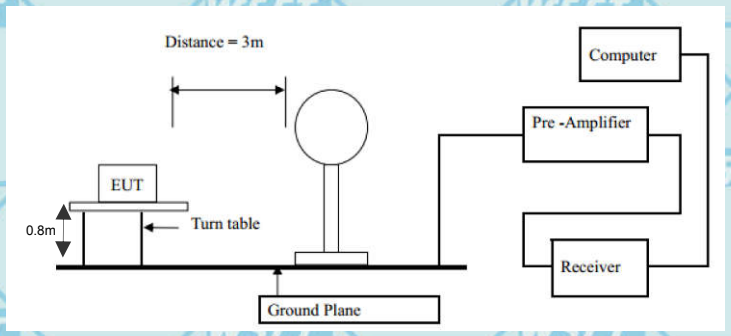
Limit:

Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

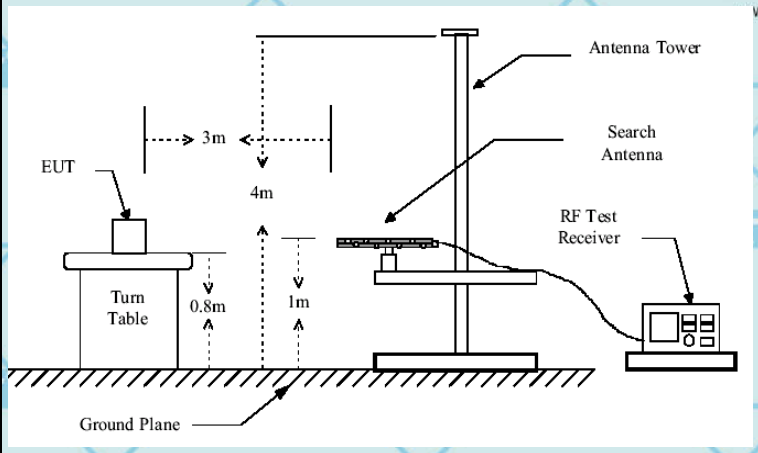
Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector
Above 1GHz	500	3	Average
	5000	3	Peak

Test setup:

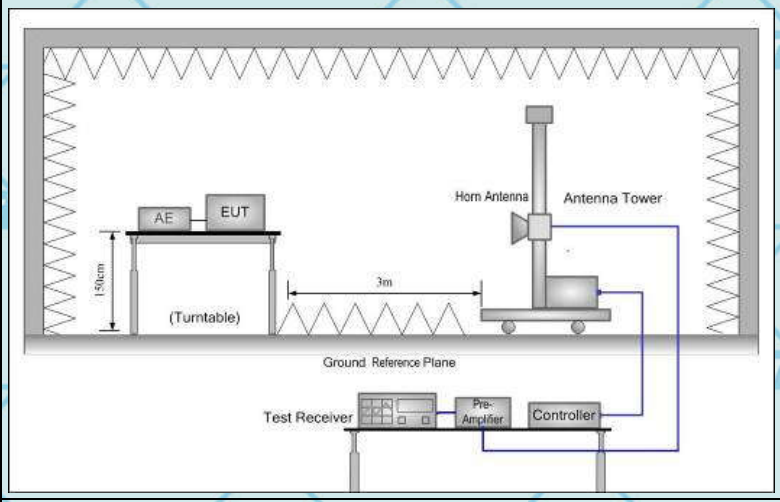
For radiated emissions below 30MHz



30MHz to 1GHz



Above 1GHz



Test Procedure:

1. For the radiated emission test below 1GHz:
The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.
For the radiated emission test above 1GHz:
Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for

	receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. 3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level 4. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. 5. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥RBW; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for f 1 GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test results:	PASS

6.6.2. Test Data

Please refer to following diagram for individual
Below 1GHz

Horizontal:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	!	30.8535	30.53	4.47	35.00	40.00	-5.00	QP
2		46.6664	35.94	-3.03	32.91	40.00	-7.09	QP
3		112.1304	33.43	-2.07	31.36	43.50	-12.14	QP
4		185.1379	43.53	-7.11	36.42	43.50	-7.08	QP
5		550.9479	36.66	0.22	36.88	46.00	-9.12	QP
6	*	851.0353	37.76	4.75	42.51	46.00	-3.49	QP

Vertical:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	64.4330	43.44	-6.56	36.88	40.00	-3.12	QP
2	!	110.9570	40.58	-1.96	38.62	43.50	-4.88	QP
3	!	183.2005	46.43	-7.08	39.35	43.50	-4.15	QP
4		274.1938	43.36	-3.49	39.87	46.00	-6.13	QP
5	!	356.6757	42.23	-1.50	40.73	46.00	-5.27	QP
6	!	714.1734	37.96	2.48	40.44	46.00	-5.56	QP

Above 1GHz

802.11b Modulation

Freq. (MHz)	Low channel: 2412MHz						
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4824	V	59.91	39.48	74	54	-14.09	-14.52
7236	V	58.28	39.86	74	54	-15.72	-14.14
4824	H	58.44	39.39	74	54	-15.56	-14.61
7236	H	59.32	40.32	74	54	-14.68	-13.68

Freq. (MHz)	Middle channel: 2437MHz						
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4874	V	59.33	39.68	74	54	-14.67	-14.32
7311	V	59.88	40.75	74	54	-14.12	-13.25
4874	H	59.95	39.56	74	54	-14.05	-14.44
7311	H	58.10	39.10	74	54	-15.90	-14.90

Freq. (MHz)	High channel: 2462MHz						
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4924	V	59.32	41.85	74	54	-14.68	-12.15
7386	V	58.10	39.05	74	54	-15.90	-14.95
4924	H	59.36	40.86	74	54	-14.64	-13.14
7386	H	58.69	39.69	74	54	-15.31	-14.31

802.11g Modulation

Freq. (MHz)	Low channel: 2412MHz						
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4824	V	58.52	40.19	74	54	-15.48	-13.81
7236	V	59.45	39.19	74	54	-14.55	-14.81
4824	H	59.78	39.85	74	54	-14.22	-14.15
7236	H	58.32	39.32	74	54	-15.68	-14.68

Freq. (MHz)	Middle channel: 2437MHz						
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4874	V	59.77	41.58	74	54	-14.23	-12.42
7311	V	58.99	40.36	74	54	-15.01	-13.64
4874	H	58.62	40.92	74	54	-15.38	-13.08
7311	H	58.51	39.51	74	54	-15.49	-14.49

Freq. (MHz)	High channel: 2462MHz						
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4924	V	59.85	40.58	74	54	-14.15	-13.42
7386	V	58.83	39.61	74	54	-15.17	-14.39
4924	H	58.03	39.02	74	54	-15.97	-14.98
7386	H	58.70	39.70	74	54	-15.30	-14.30

802.11n (HT20) Modulation

Freq. (MHz)	Low channel: 2412MHz						
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4824	V	58.72	39.22	74	54	-15.28	-14.78
7236	V	59.34	40.78	74	54	-14.66	-13.22
4824	H	59.28	40.30	74	54	-14.72	-13.70
7236	H	59.48	40.48	74	54	-14.52	-13.52

Freq. (MHz)	Middle channel: 2437MHz						
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4874	V	58.26	39.10	74	54	-15.74	-14.90
7311	V	58.54	39.95	74	54	-15.46	-14.05
4874	H	59.29	40.99	74	54	-14.71	-13.01
7311	H	58.67	39.67	74	54	-15.33	-14.33

Freq. (MHz)	High channel: 2462MHz						
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
	H/V	PK	AV	PK	AV	PK	AV
4924	V	59.67	40.88	74	54	-14.33	-13.12
7386	V	59.37	40.11	74	54	-14.63	-13.89
4924	H	58.95	40.59	74	54	-15.05	-13.41
7386	H	58.75	39.75	74	54	-15.25	-14.25

Note:

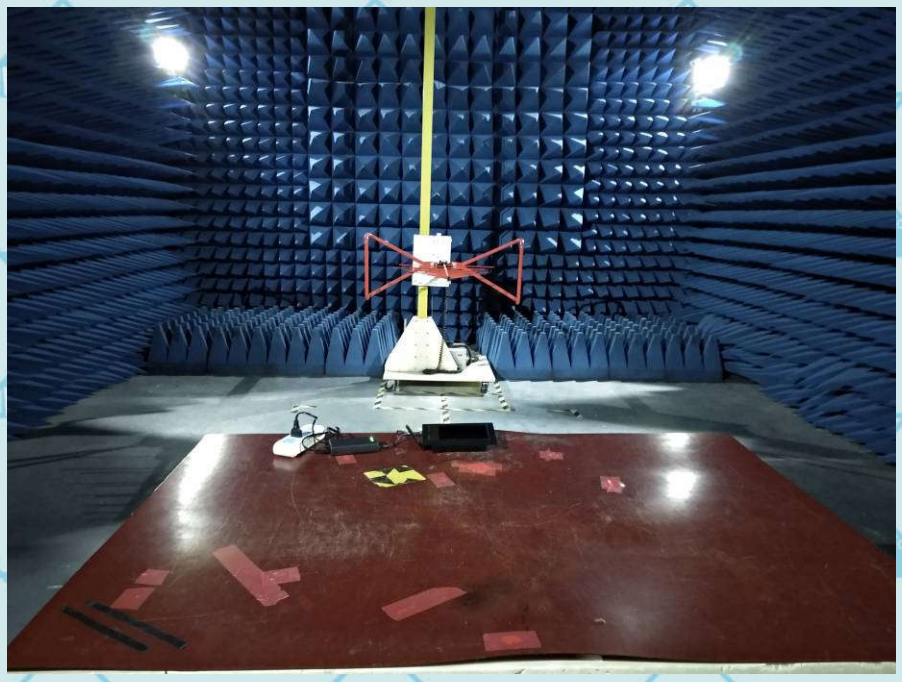
1. *All emissions not reported were more than 20dB below the specified limit or in the noise floor.*
2. *Emission Level= Reading Level+Probe Factor +Cable Loss.*
3. *Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

Restricted Bands Requirements

Test result for 802.11b Mode (the worst case)

Frequency	Reading	Correct Factor	Emission Level	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel							
2390	66.47	-8.73	57.74	74	-16.26	H	PK
2390	51.38	-8.73	42.65	54	-11.35	H	AV
2390	65.12	-8.73	56.39	74	-17.61	V	PK
2390	49.68	-8.73	40.95	54	-13.05	V	AV
High Channel							
2483.5	65.02	-8.17	56.85	74	-17.15	H	PK
2483.5	46.43	-8.17	38.26	54	-15.74	H	AV
2483.5	66.73	-8.17	58.56	74	-15.44	V	PK
2483.5	46.77	-8.17	38.60	54	-15.40	V	AV

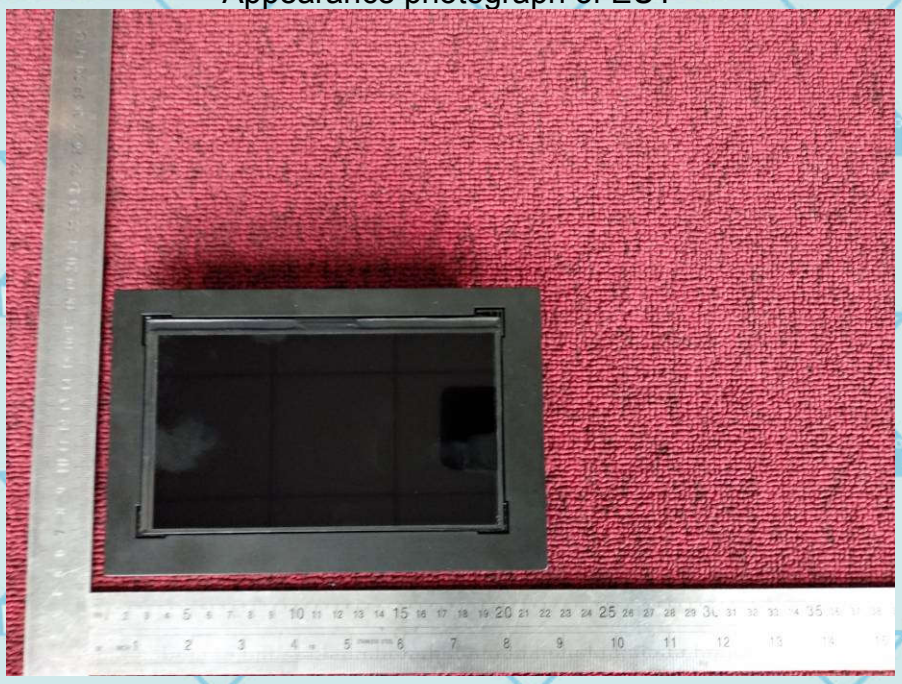
7. Appendix A: Photographs of Test Setup



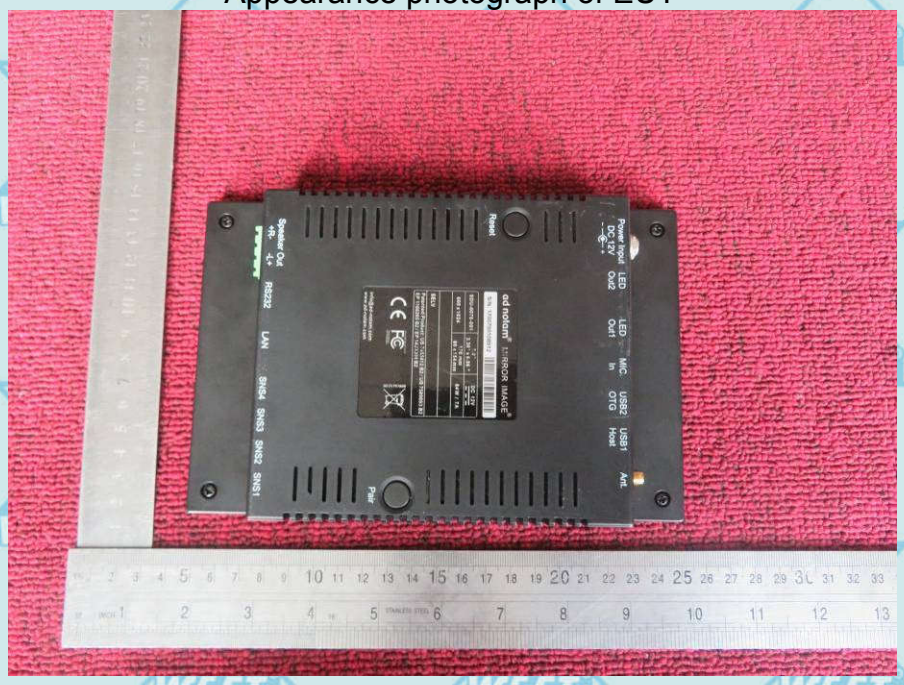
8. Appendix B: Photographs of EUT

Appearance photograph of EUT

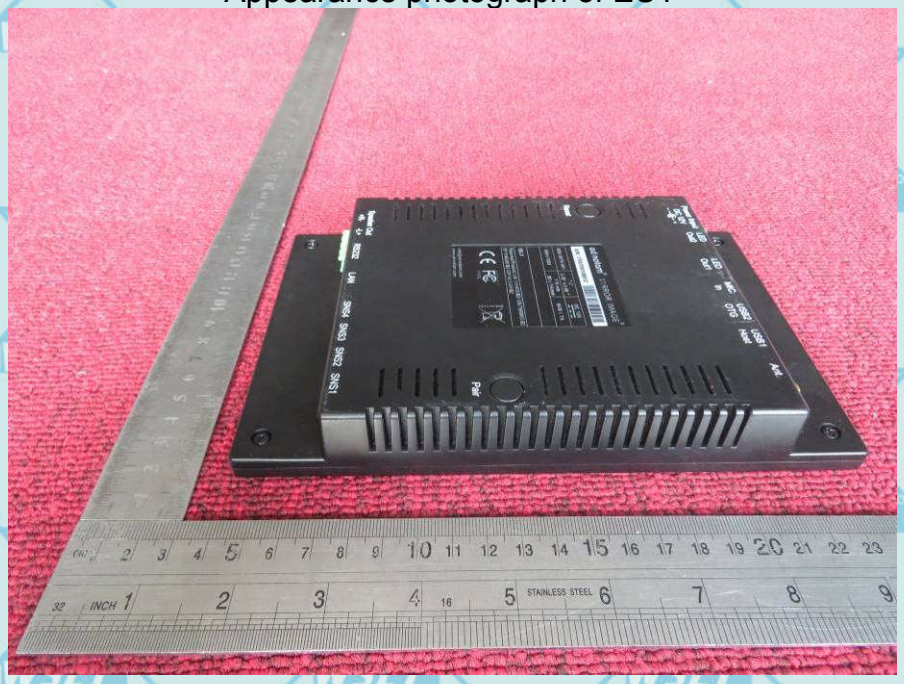
Appearance photograph of EUT



Appearance photograph of EUT

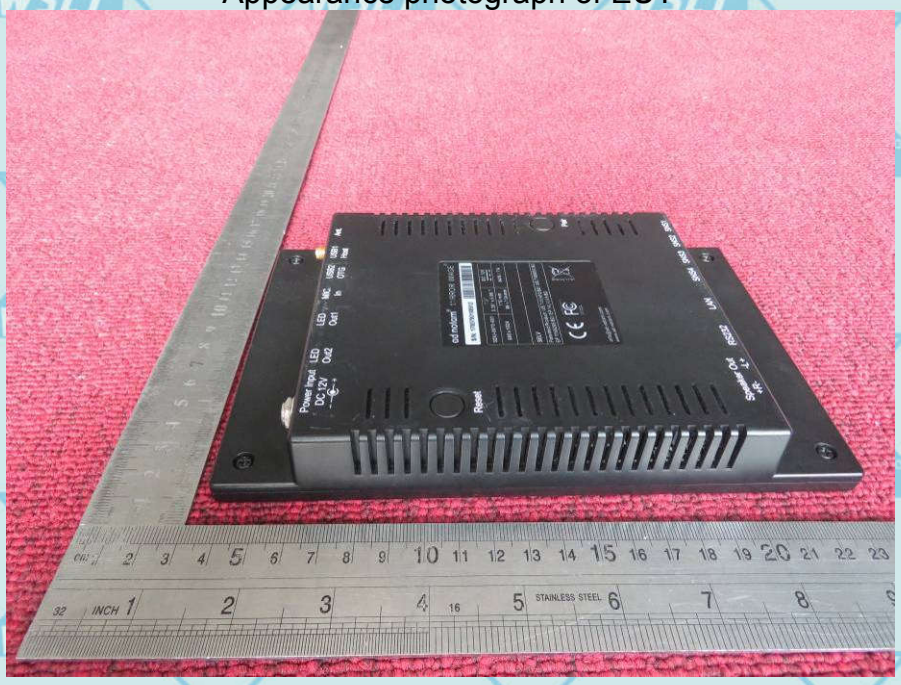


Appearance photograph of EUT



Appearance photograph of EUT

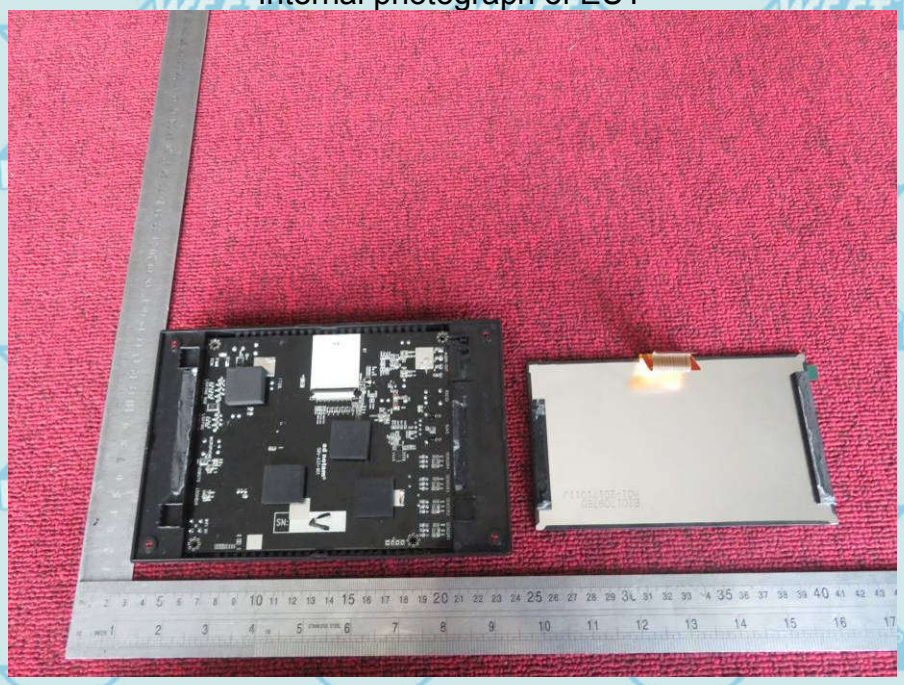
Appearance photograph of EUT



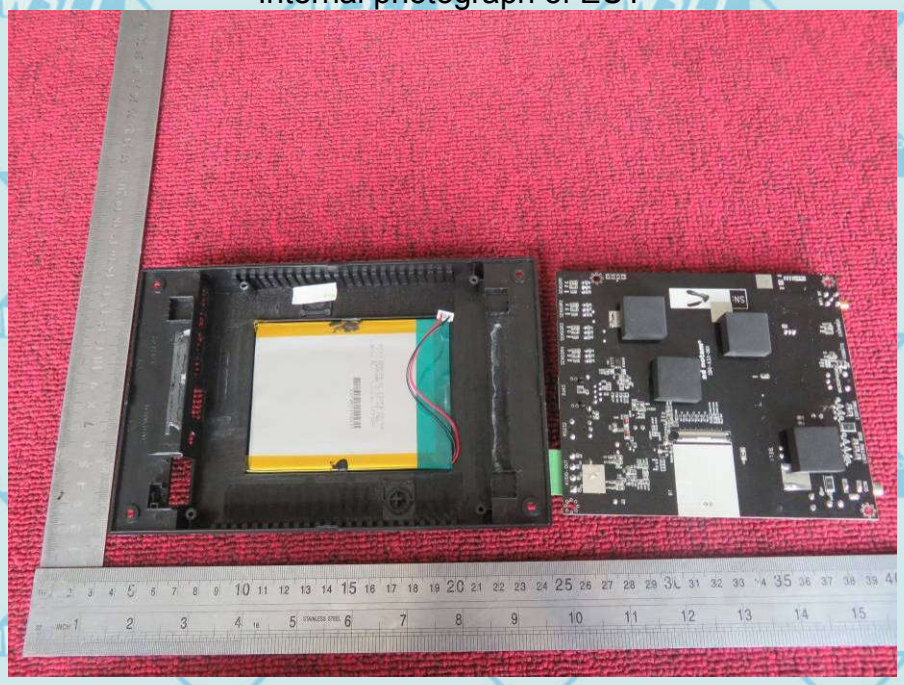
Appearance photograph of EUT

Internal photograph of EUT

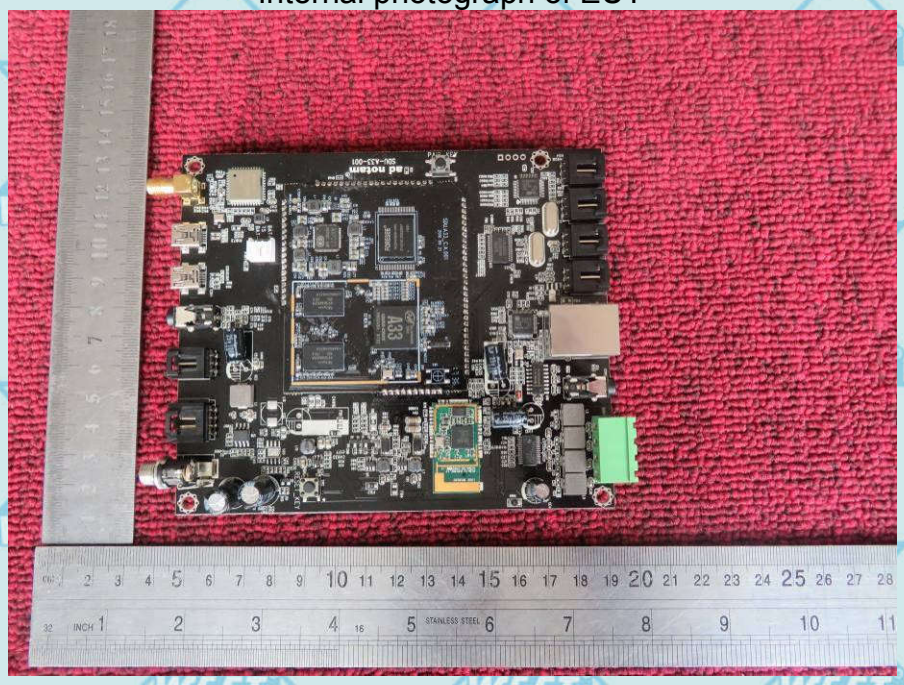
Internal photograph of EUT



Internal photograph of EUT



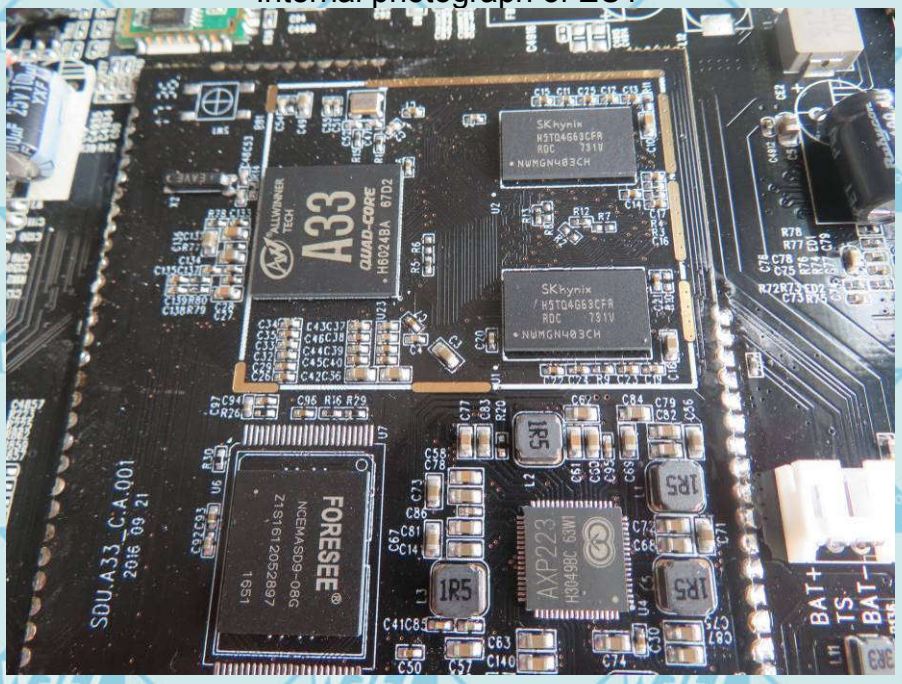
Internal photograph of EUT



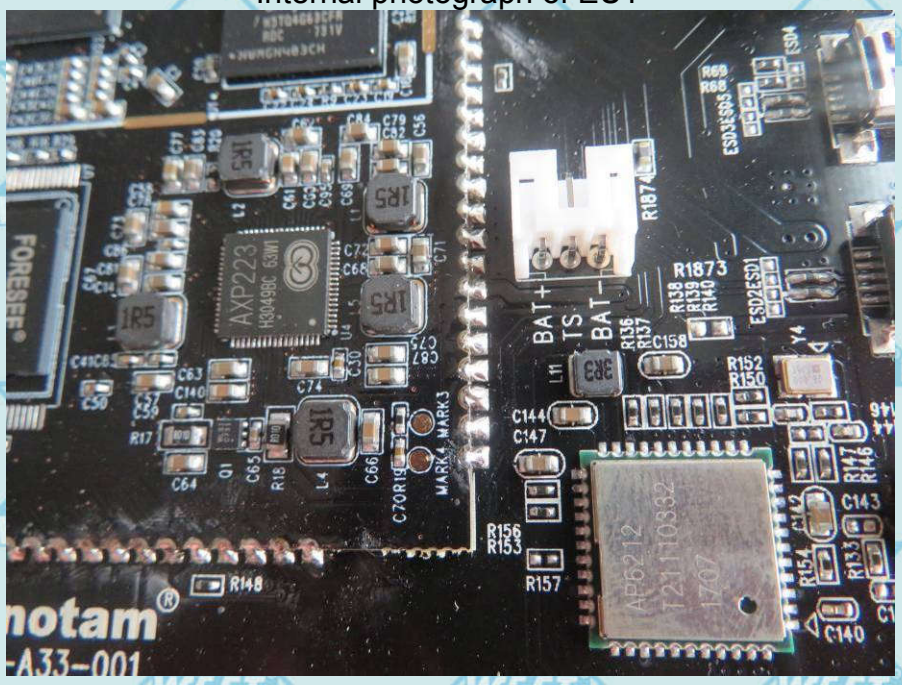
Internal photograph of EUT

Internal photograph of EUT

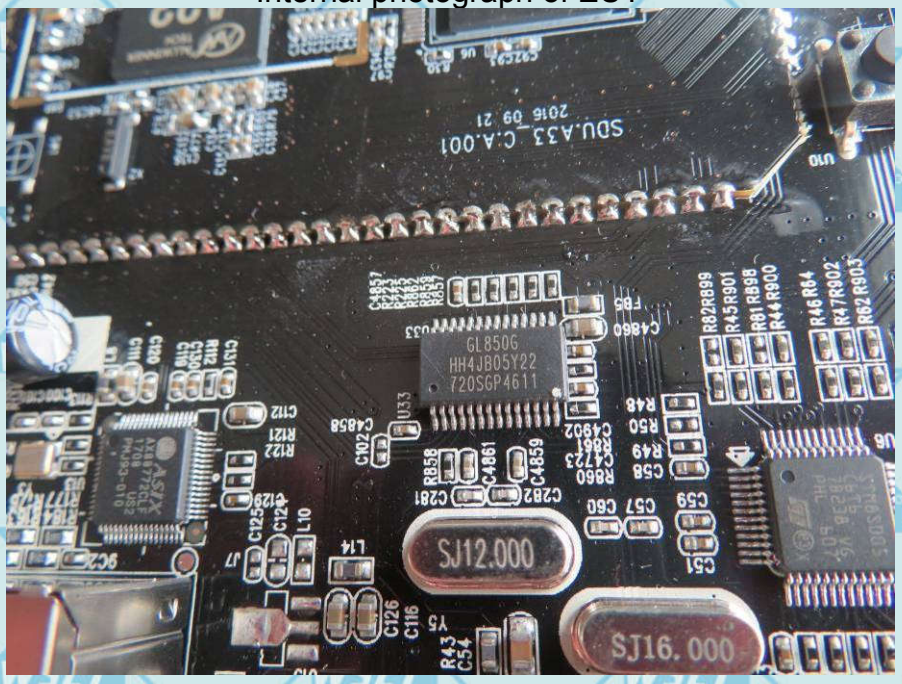
Internal photograph of EUT



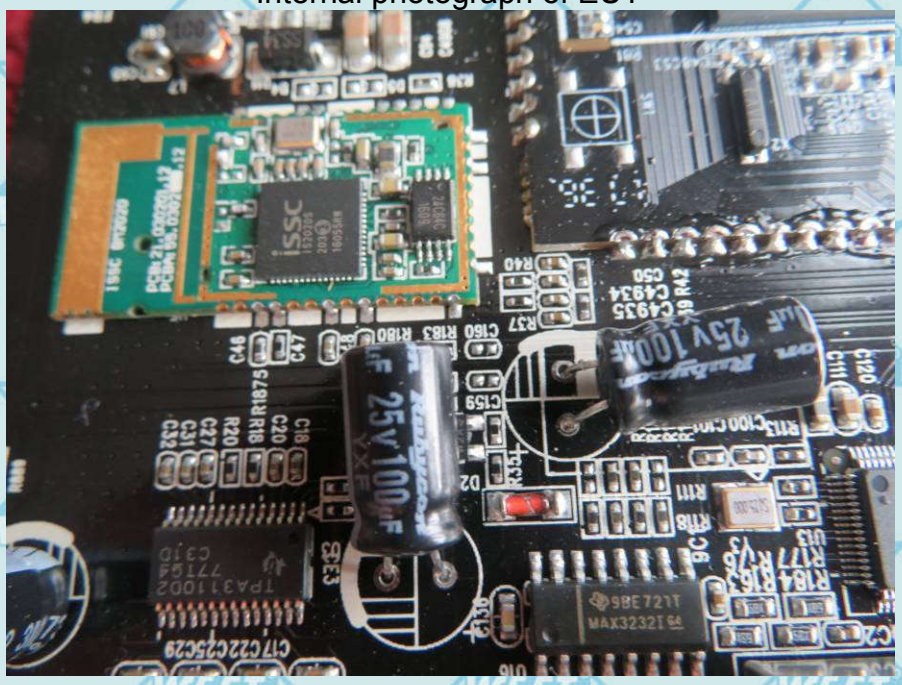
Internal photograph of EUT



Internal photograph of EUT



Internal photograph of EUT



*****END OF REPORT*****