FCC REPORT

Applicant:	LigoWave LLC
Address of Applicant:	138 Mountain Brook Dr Canton, GA 30115 United States
Equipment Under Test (EUT)	
Product Name:	Broadband Digital Transmission System
Model No.:	LigoDLB 5-15
FCC ID:	V2V-DLB515
Applicable standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407
Date of sample receipt:	18 Jun., 2014
Date of Test:	18 Jun., 2014 to 04 Mar., 2015
Date of report issued:	04 Mar., 2015
Test Result:	PASS*

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*04 Mar., 2015*	*Original*

Prepared by: Sera Xiang ***Date:*** *04 Mar., 2015*

Report Clerk

Reviewed by: Winer Zhang ***Date:*** *04 Mar., 2015*

Project Engineer

3 Contents

Page

4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.407 (g)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.407 (a)	Pass
26dB Occupied Bandwidth	15.407 (a)	Pass
6dB Emission Bandwidth	15.407(e)	Pass
Power Spectral Density	15.407 (a)	Pass
Band Edge	15.407(b)	Pass
Spurious Emission	15.205/15.209	Pass
Frequency Stability	15.407(g)	Pass

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

5 General Information

5.1 Client Information

Applicant:	LigoWave LLC
Address of Applicant:	138 Mountain Brook Dr Canton, GA 30115 United States
Manufacturer/Factory:	LigoWave LLC
Address of Manufacturer/ Factory:	138 Mountain Brook Dr Canton, GA 30115 United States

5.2 General Description of E.U.T.

Product Name:	Broadband Digital Transmission System
Model No.:	LigoDLB 5-15
Operation Frequency:	Band 1: 5180MHz-5240MHz Band 4: 5745MHz-5825MHz
Operation mode:	Fixed point-to-point operation
Channel numbers:	Band 1: 802.11a/802.11n20: 4, 802.11n40: 2 Band 4: 802.11a/802.11n20: 5, 802.11n40: 2
Channel separation:	802.11a/802.11n20: 20MHz, 802.11n40: 40MHz
Modulation technology: (IEEE 802.11a)	BPSK, QPSK,16-QAM, 64-QAM
Modulation technology: (IEEE 802.11n)	BPSK, QPSK, 16-QAM, 64-QAM
Data speed(IEEE 802.11a)	6Mbps, 9Mbps,12Mbps,18Mbps, 24Mbps,36Mbps,48Mbps, 54Mbps
Data speed (IEEE 802.11n20):	MCS0: 6.5Mbps, MCS1:13Mbps, MCS2:19.5Mbps, MCS3:26Mbps, MCS4:39Mbps, MCS5:52Mbps, MCS6:58.5Mbps, MCS7:65Mbps
Data speed (IEEE 802.11n40):	MCS0:15Mbps, MCS1:30Mbps, MCS2:45Mbps, MCS3:60Mbps, MCS4:90Mbps, MCS5:120Mbps, MCS6:135Mbps, MCS7:150Mbps
Antenna Type:	Panel
Antenna gain:	15 dBi
Power supply:	Adapter 1: Model: GRT-240050 Input:100-240V AC,50/60Hz 0.5A Output:24V DC MAX0.5A Adapter 2: Model: AY012E-ZF243 Input:100-240V AC,50/60Hz 0.5A Output:24V DC MAX0.5A

Operation Frequency each of channel

Band 1			
802.11a/802.11n20		802.11n40	
Channel	Frequency	Channel	Frequency
36	5180MHz	39	5190MHz
40	5200MHz	45	5230MHz
44	5220MHz		
48	5240MHz		
Band 4			
802.11a/802.11n20		802.11n40	
Channel	Frequency	Channel	Frequency
149	5745MHz	151	5755MHz
153	5765MHz	159	5795MHz
157	5785MHz		
161	5805MHz		
165	5825MHz		

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:

Band 1			
802.11a/802.11n20		802.11n40	
Channel	Frequency	Channel	Frequency
The lowest channel	5180MHz	The lowest channel	5190MHz
The middle channel	5200MHz	The highest channel	5230MHz
The highest channel	5240MHz		
Band 4			
802.11a/802.11n20		802.11n40	
Channel	Frequency	Channel	Frequency
The lowest channel	5745MHz	The lowest channel	5755MHz
The middle channel	5785MHz	The highest channel	5795MHz
The highest channel	5825MHz		

5.3 Test environment and mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Continuously transmitting mode	Keep the EUT in 100% duty cycle transmitting with modulation in MIMO mode.

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
802.11a	6 Mbps
802.11n20	6.5 Mbps
802.11n40	13 Mbps

Final Test Mode:

According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup” 6 Mbps for 802.11a, 6.5 Mbps for 802.11n20 and 13 Mbps for 802.11n40. All test items for 802.11a and 802.11n were performed in MIMO mode and duty cycle all above 98%, meet the requirements of KDB789033.

5.4 Laboratory Facility

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

● **FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. EMC Laboratory 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 out files. Registration 817957, February 27, 2012.

● **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.5 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao’an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282
Fax: +86-755-23116366

5.6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	Aug. 23 2014	Aug. 23 2017
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	CCIS0002	N/A	N/A
3	Loop antenna	Laplace instrument	RF300	EMC0701	Aug. 11 2014	Aug. 10 2015
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	CCIS0005	May 25 2014	May 24 2015
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	CCIS0006	May 25 2014	May 24 2015
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 30 2014	Mar. 29 2015
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	Apr. 01 2014	Mar. 31 2015
9	Amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	June 09 2014	June 08 2015
10	Pre-amplifier (18-40GHz)	A.H System	PAM-1840	GTS219	Apr. 01 2014	Mar. 31 2015
11	Spectrum analyzer (9k-30GHz)	Rohde & Schwarz	FSP	CCIS0023	May. 25 2014	May. 24 2015
12	EMI Test Receiver	Rohde & Schwarz	ESPI	CCIS0022	Apr 01 2014	Mar. 31 2015
13	Spectrum Analyzer	HP	8564E	CCIS0150	May 24 2014	May 23 2015

Conducted Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	June 09 2014	June 08 2015
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	May 25 2014	May 24 2015
3	LISN	CHASE	MN2050D	CCIS0074	Apr 01 2014	Mar. 31 2015
4	Coaxial Cable	CCIS	N/A	CCIS0086	Apr. 01 2014	Mar. 31 2015
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

6 Test results and Measurement Data

6.1 Justification

According to section 5.2 of this report, the EUT have 1 type of antenna, so all radiated method test items was performed with the 15 dBi panel antenna.

6.2 Antenna requirement

Standard requirement:	FCC Part15 E Section 15.203 /407(a)

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.

This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

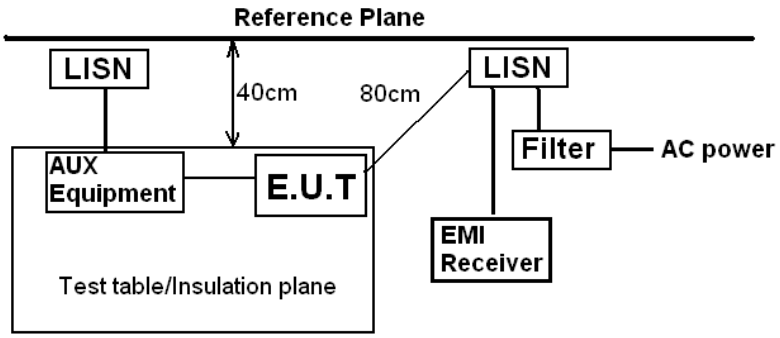
E.U.T Antenna:	

The product is a professionally installed device which has one type of antenna for the application. The antenna information as below table:

Antenna No.	Antenna Type	Antenna Gain (dBi)
Antenna	Panel	15

According to above information, the antennas meet the requirements of this section.

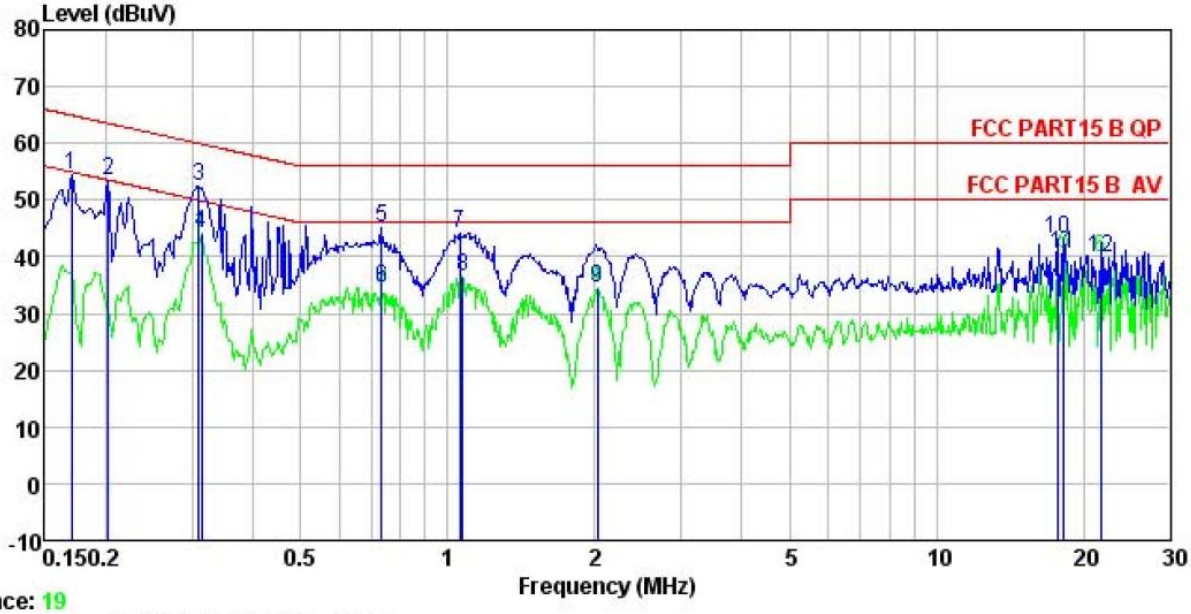
6.3 Conducted Emission

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.4: 2003
Test Frequency Range:	150 kHz to 30 MHz
Class / Severity:	Class B
Receiver setup:	RBW=9 kHz, VBW=30 kHz
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	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). It 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 C63.4: 2003 on conducted measurement.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details.
Test results:	Passed

Measurement Data

Adapter 1: GRT-240050

Line:

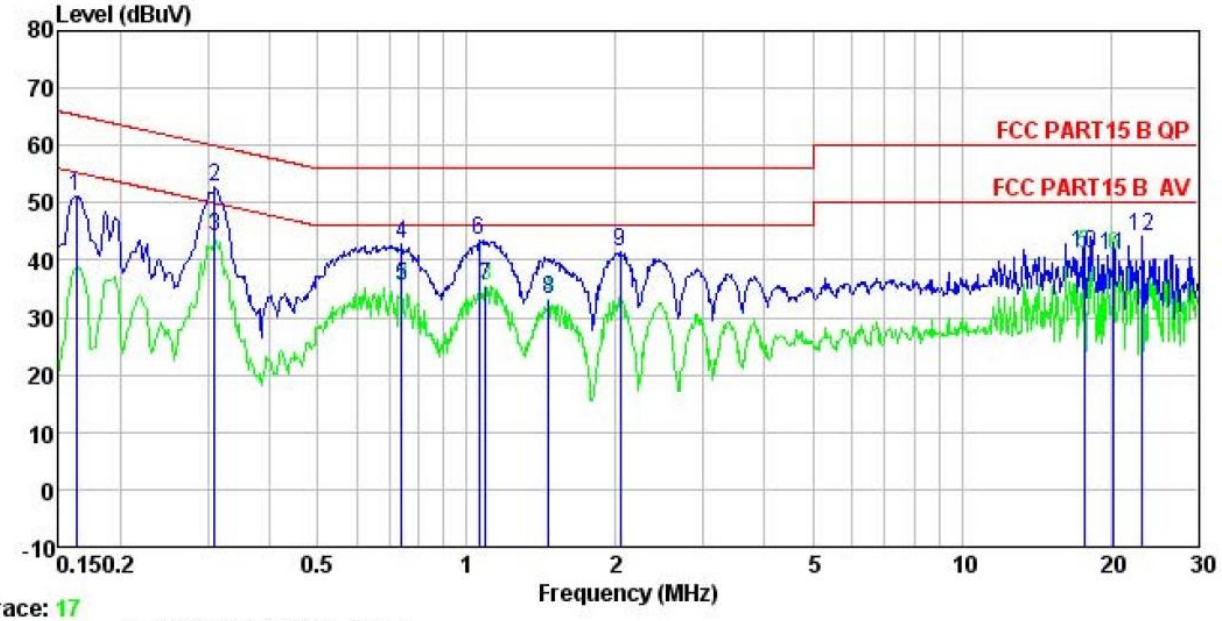


Trace: 19

Site : CCIS Shielding Room
Condition : ICES-003 QP LISN LINE
EUT : Broadband Digital Transmission System
Model : DLB 5-15
Test Mode : WIFI TX mode
Power Rating : AC 120V/60Hz
Environment : Temp: 23 'C Huni:56% Atmos:101KPa
Test Engineer: Winner
Remark : POE: GRT-240050

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.170	43.48	0.27	10.77	54.52	64.94	-10.42	QP
2	0.202	42.29	0.28	10.76	53.33	63.54	-10.21	QP
3	0.310	41.51	0.26	10.74	52.51	59.97	-7.46	QP
4	0.313	33.00	0.26	10.74	44.00	49.88	-5.88	Average
5	0.731	34.23	0.22	10.78	45.23	56.00	-10.77	QP
6	0.731	23.62	0.22	10.78	34.62	46.00	-11.38	Average
7	1.060	32.90	0.25	10.88	44.03	56.00	-11.97	QP
8	1.071	25.46	0.25	10.88	36.59	46.00	-9.41	Average
9	2.023	23.40	0.26	10.96	34.62	46.00	-11.38	Average
10	17.661	31.89	0.33	10.90	43.12	60.00	-16.88	QP
11	18.232	29.18	0.33	10.91	40.42	50.00	-9.58	Average
12	21.715	28.64	0.40	10.91	39.95	50.00	-10.05	Average

Neutral:



Trace: 17

```
Site          : CCIS Shielding Room
Condition     : ICES-003 QP LISN NEUTRAL
EUT           : Broadband Digital Transmission System
Model         : DLB 5-15
Test Mode     : WIFI TX mode
Power Rating  : AC 120V/60Hz
Environment   : Temp: 23 'C Huni:56%  Atmos:101KPa
Test Engineer: Winner
Remark        : POE: GRT-240050
```

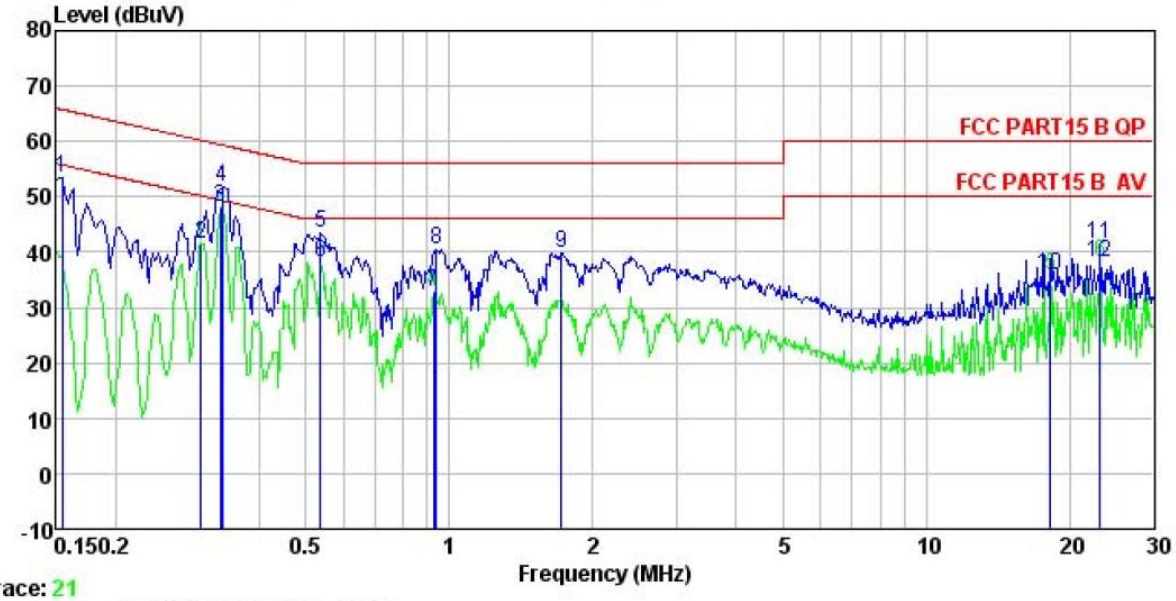
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.162	40.24	0.25	10.77	51.26	65.34	-14.08	QP
2	0.310	41.69	0.26	10.74	52.69	59.97	-7.28	QP
3	0.310	33.16	0.26	10.74	44.16	49.97	-5.81	Average
4	0.739	31.86	0.19	10.79	42.84	56.00	-13.16	QP
5	0.739	24.66	0.19	10.79	35.64	46.00	-10.36	Average
6	1.060	32.34	0.23	10.88	43.45	56.00	-12.55	QP
7	1.094	24.38	0.23	10.88	35.49	46.00	-10.51	Average
8	1.464	22.04	0.26	10.92	33.22	46.00	-12.78	Average
9	2.044	30.09	0.29	10.96	41.34	56.00	-14.66	QP
10	17.661	30.10	0.26	10.90	41.26	50.00	-8.74	Average
11	20.270	29.61	0.22	10.93	40.76	50.00	-9.24	Average
12	23.140	32.82	0.42	10.89	44.13	60.00	-15.87	QP

Notes:

1. An initial pre-scan was performed on the live 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

Adapter 2: AY012E-ZF243

Line:

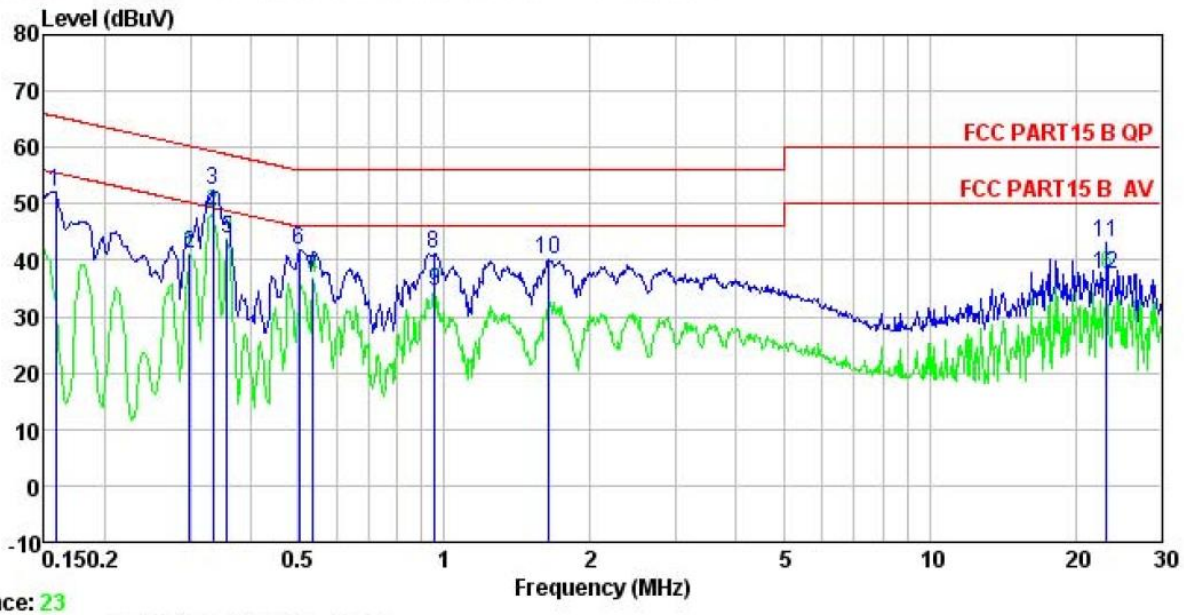


Trace: 21

Site : CCIS Shielding Room
Condition : ICES-003 QP LISN LINE
EUT : Broadband Digital Transmission System
Model : DLB 5-15
Test Mode : WIFI TX mode
Power Rating : AC 120V/60Hz
Environment : Temp: 23 ℃ Huni:56% Atmos:101KPa
Test Engineer: Winner
Remark : POE: AY012E-ZF243

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.154	42.40	0.27	10.78	53.45	65.78	-12.33	QP
2	0.302	30.59	0.26	10.74	41.59	50.19	-8.60	Average
3	0.330	37.11	0.27	10.73	48.11	49.44	-1.33	Average
4	0.334	40.79	0.27	10.73	51.79	59.35	-7.56	QP
5	0.538	32.27	0.28	10.76	43.31	56.00	-12.69	QP
6	0.538	27.04	0.28	10.76	38.08	46.00	-7.92	Average
7	0.928	21.89	0.24	10.85	32.98	46.00	-13.02	Average
8	0.938	29.29	0.24	10.85	40.38	56.00	-15.62	QP
9	1.716	28.60	0.26	10.94	39.80	56.00	-16.20	QP
10	18.232	24.54	0.33	10.91	35.78	50.00	-14.22	Average
11	23.140	30.09	0.46	10.89	41.44	60.00	-18.56	QP
12	23.140	26.68	0.46	10.89	38.03	50.00	-11.97	Average

Neutral:



Trace: 23

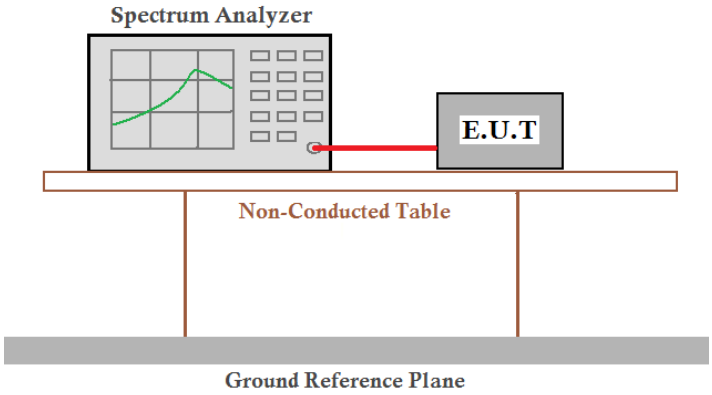
Site : CCIS Shielding Room
Condition : ICES-003 QP LISN NEUTRAL
EUT : Broadband Digital Transmission System
Model : DLB 5-15
Test Mode : WIFI TX mode
Power Rating : AC 120V/60Hz
Environment : Temp: 23 ℃ Huni:56% Atmos:101KPa
Test Engineer: Winner
Remark : POE: AY012E-ZF243

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.158	41.09	0.25	10.78	52.12	65.56	-13.44	QP
2	0.299	30.14	0.26	10.74	41.14	50.28	-9.14	Average
3	0.334	41.33	0.26	10.73	52.32	59.35	-7.03	QP
4	0.334	37.25	0.26	10.73	48.24	49.35	-1.11	Average
5	0.358	32.83	0.25	10.73	43.81	48.78	-4.97	Average
6	0.502	30.86	0.29	10.76	41.91	56.00	-14.09	QP
7	0.538	25.73	0.27	10.76	36.76	46.00	-9.24	Average
8	0.953	30.21	0.21	10.86	41.28	56.00	-14.72	QP
9	0.958	23.35	0.21	10.86	34.42	46.00	-11.58	Average
10	1.636	28.95	0.27	10.93	40.15	56.00	-15.85	QP
11	23.140	31.77	0.42	10.89	43.08	60.00	-16.92	QP
12	23.140	26.02	0.42	10.89	37.33	50.00	-12.67	Average

Notes:

1. An initial pre-scan was performed on the live 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

6.4 Conducted Output Power

Test Requirement:	FCC Part15 E Section 15.407 (a)
Test Method:	ANSI C63.4:2003, KDB 789033
Limit:	**Band 1:** 1 W (For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi); **Band 4:** 1W (For fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power).
Test setup:	
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Band 1:

Mode	Test CH	Ant. Port	Conducted Output power (dBm)	Total power (dBm)	Limit (dBm)	Result
802.11a	Lowest	TX0	19.49	22.29	30.00	Pass
		TX1	19.06			
	Middle	TX0	26.21	29.28	30.00	Pass
		TX1	26.32			
	Highest	TX0	19.72	23.04	30.00	Pass
		TX1	20.32			
802.11n20	Lowest	TX0	19.53	22.43	30.00	Pass
		TX1	19.31			
	Middle	TX0	26.65	29.66	30.00	Pass
		TX1	26.65			
	Highest	TX0	19.19	22.38	30.00	Pass
		TX1	19.54			
802.11n40	Lowest	TX0	14.21	17.08	30.00	Pass
		TX1	13.93			
	Highest	TX0	19.92	22.99	30.00	Pass
		TX1	20.03			
Remark: 1. Because the transmit signals are completely uncorrelated, so the Directional gain = G_{ANT}. 2. The directional Gain of antenna is less than 23 dBi, so the limit of power is 30 dBm.						

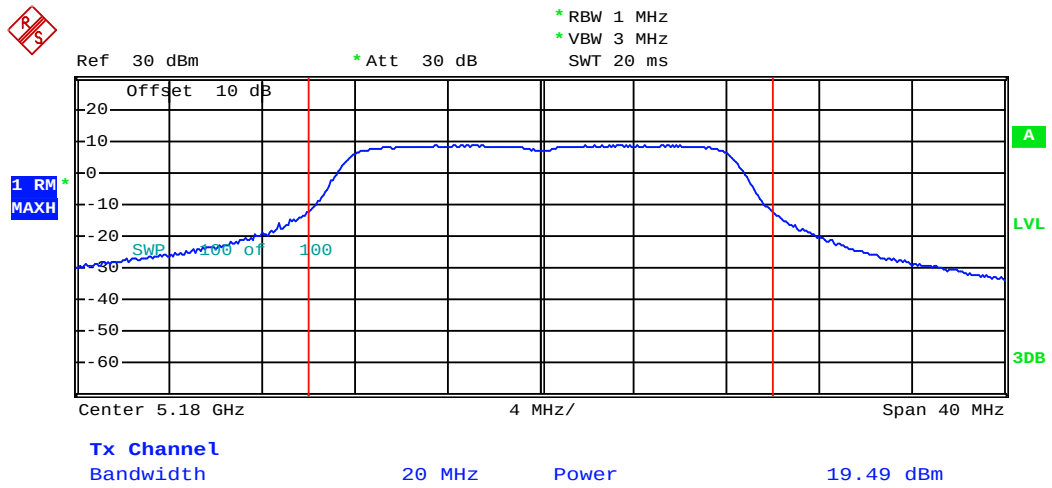
Band 4:

Mode	Test CH	Ant. Port	Conducted Output power (dBm)	Total power (dBm)	Limit (dBm)	Result
802.11a	Lowest	TX0	18.97	21.21	30.00	Pass
		TX1	17.26			
	Middle	TX0	26.82	29.76	30.00	Pass
		TX1	26.68			
	Highest	TX0	20.89	24.22	30.00	Pass
		TX1	21.51			
802.11n20	Lowest	TX0	19.37	22.47	30.00	Pass
		TX1	19.54			
	Middle	TX0	26.46	29.60	30.00	Pass
		TX1	26.72			
	Highest	TX0	22.94	25.92	30.00	Pass
		TX1	22.88			
802.11n40	Lowest	TX0	16.45	19.31	30.00	Pass
		TX1	16.14			
	Highest	TX0	23.69	26.80	30.00	Pass
		TX1	23.89			
Remark: 1. Because the transmit signals are completely uncorrelated, so the Directional gain = G_{ANT}.						

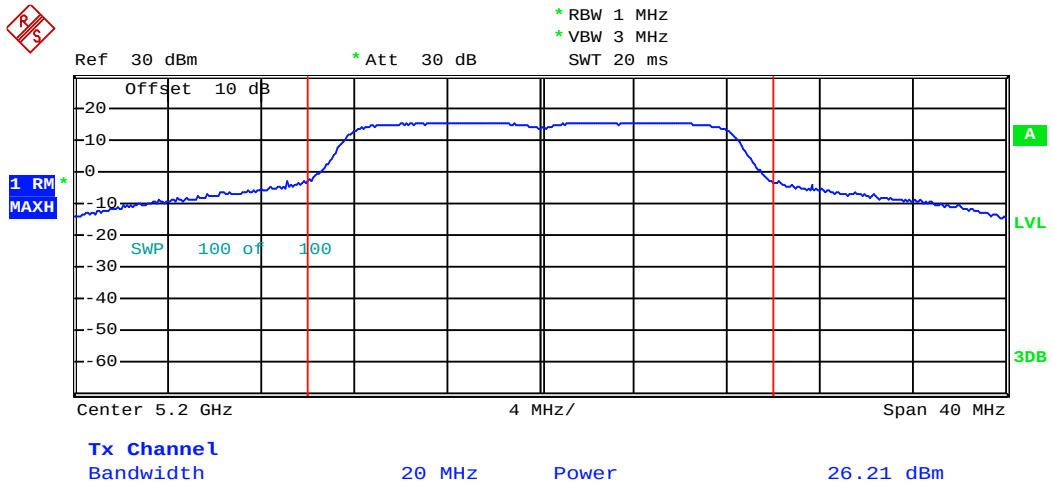
Test plot as follows:

TX0 - Band 1

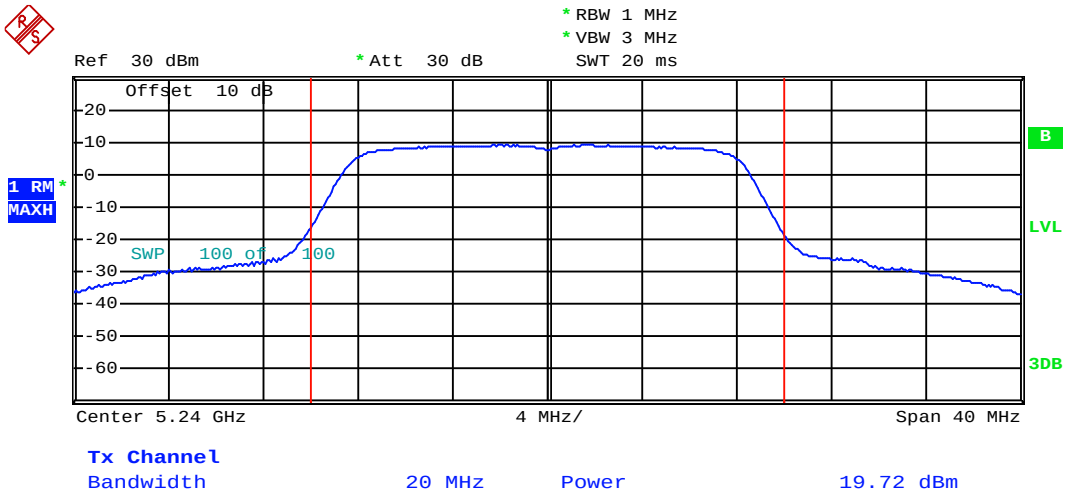
802.11a



Lowest channel

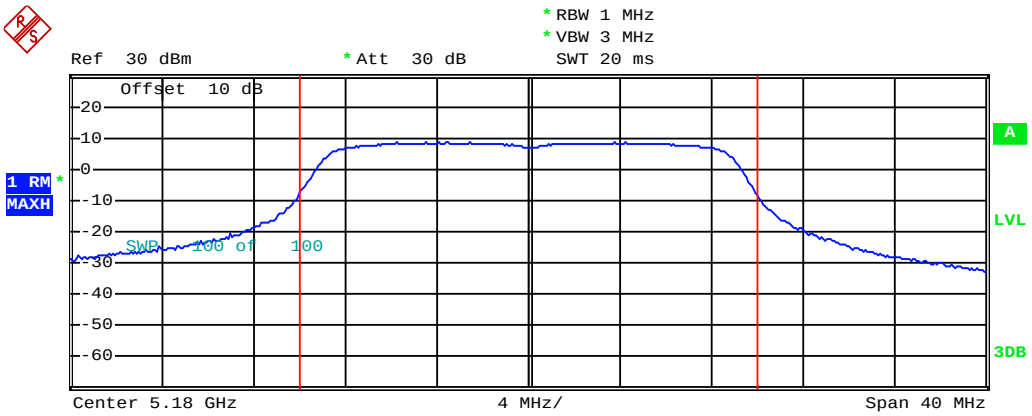


Middle channel



Highest channel

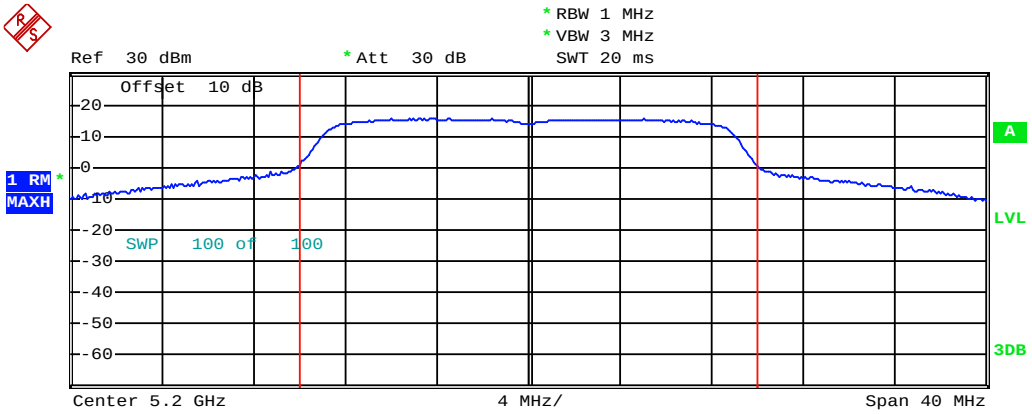
802.11n20



Tx Channel

Bandwidth	20 MHz	Power	19.53 dBm

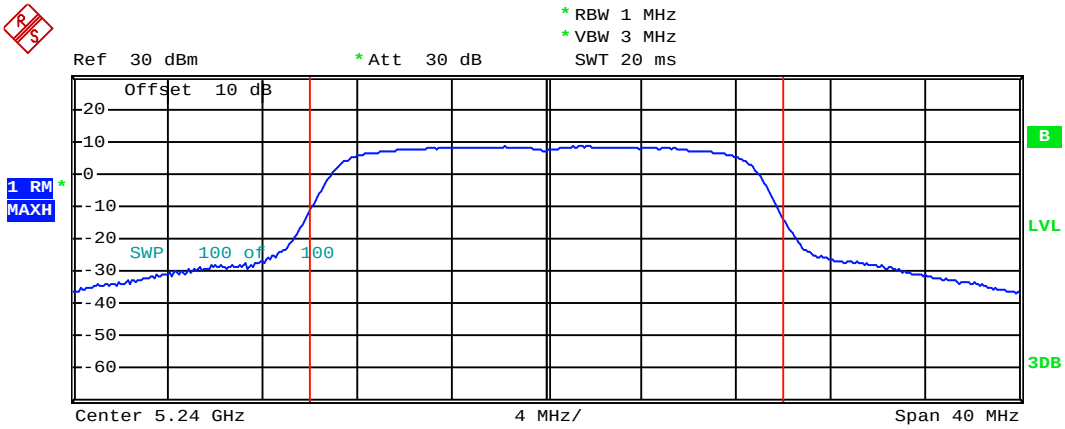
Lowest channel



Tx Channel

Bandwidth	20 MHz	Power	26.65 dBm

Middle channel

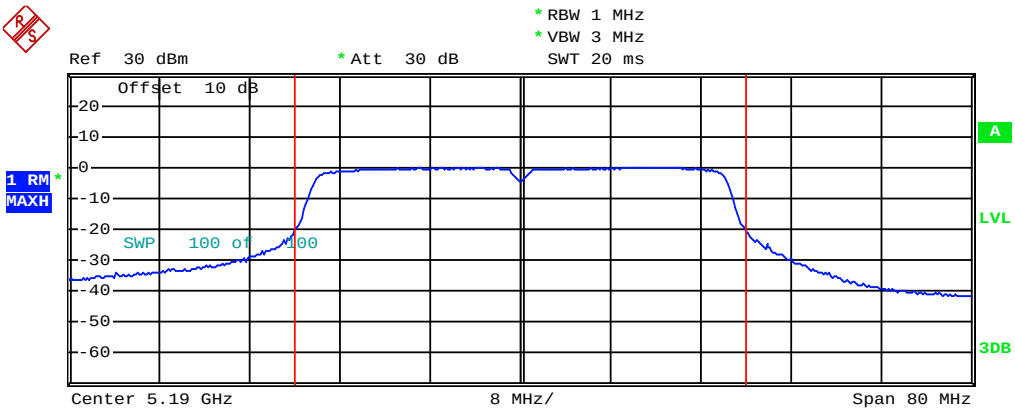


Tx Channel

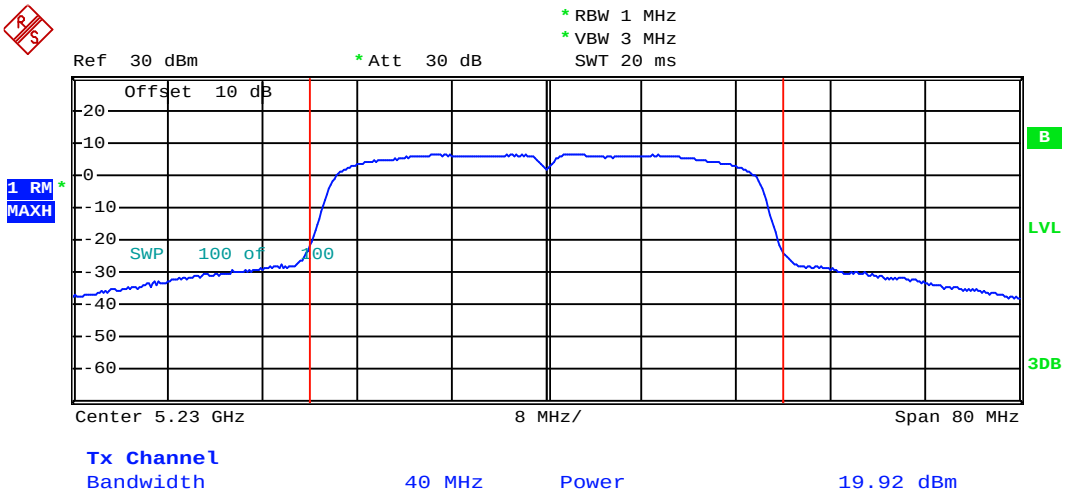
Bandwidth	20 MHz	Power	19.19 dBm

Highest channel

802.11n40



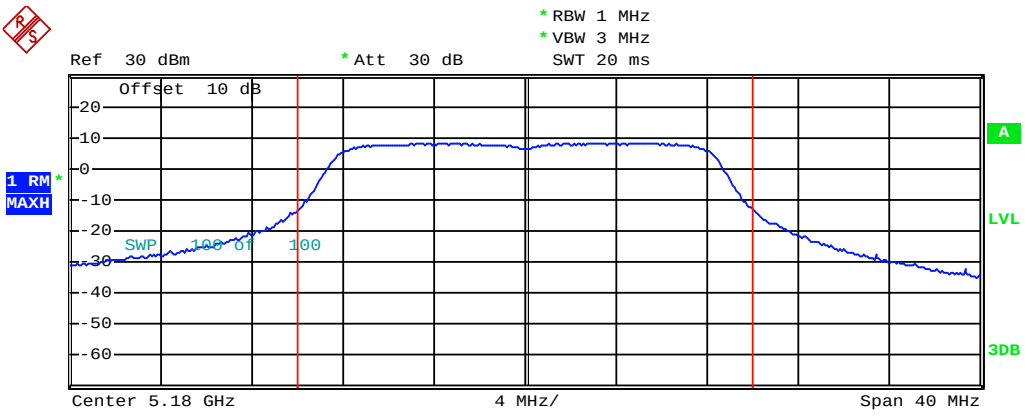
Lowest channel



Highest channel

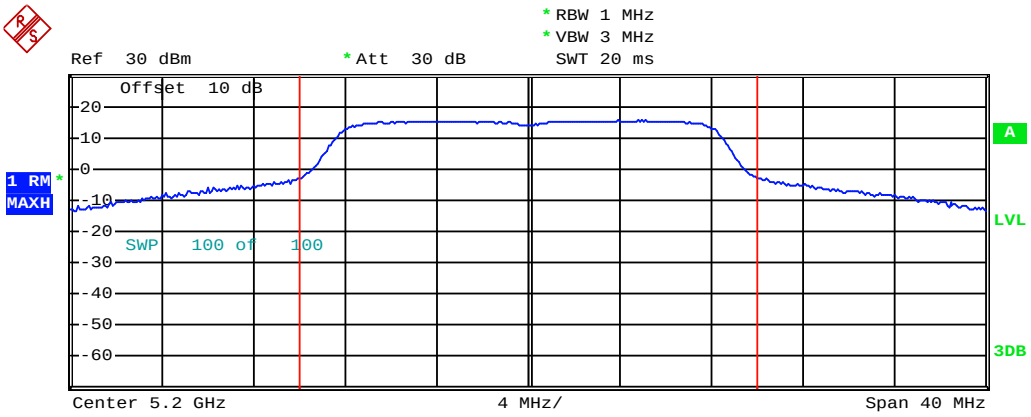
TX1 - Band 1

802.11a



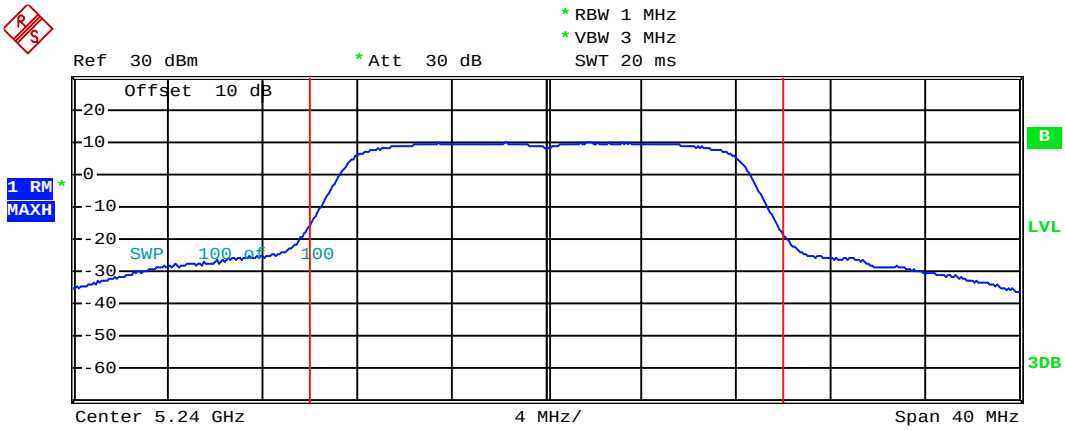
Tx Channel
Bandwidth 20 MHz Power 19.06 dBm

Lowest channel



Tx Channel
Bandwidth 20 MHz Power 26.32 dBm

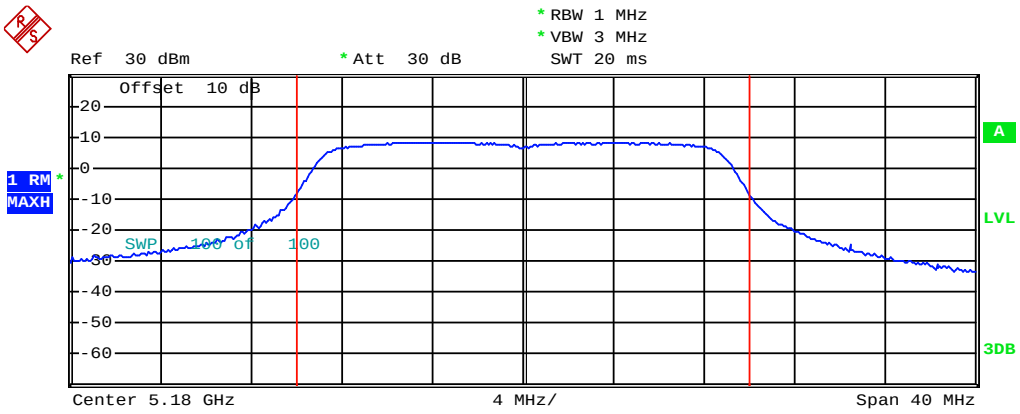
Middle channel



Tx Channel
Bandwidth 20 MHz Power 20.32 dBm

Highest channel

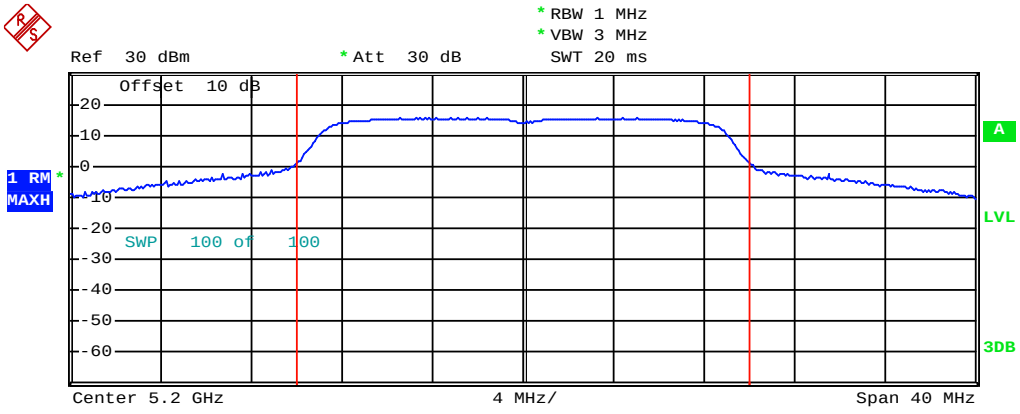
802.11n20



Tx Channel

Bandwidth	20 MHz	Power	19.31 dBm

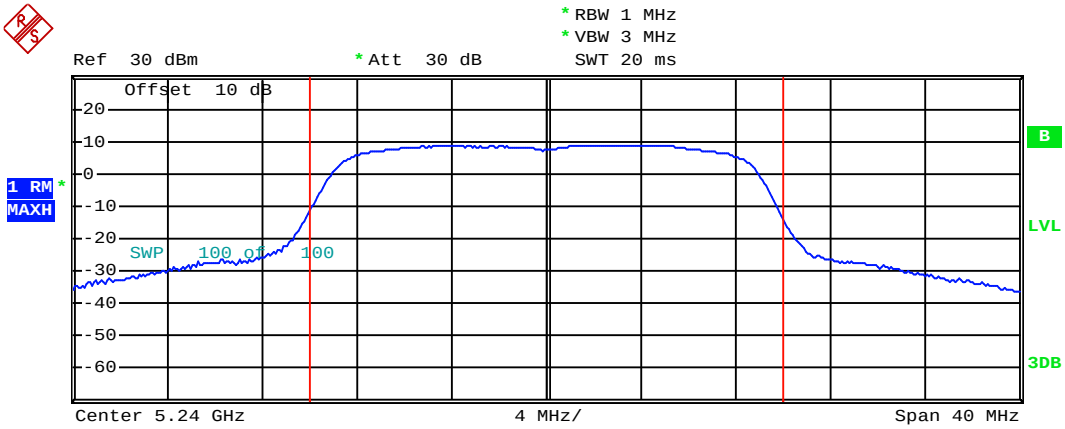
Lowest channel



Tx Channel

Bandwidth	20 MHz	Power	26.65 dBm

Middle channel

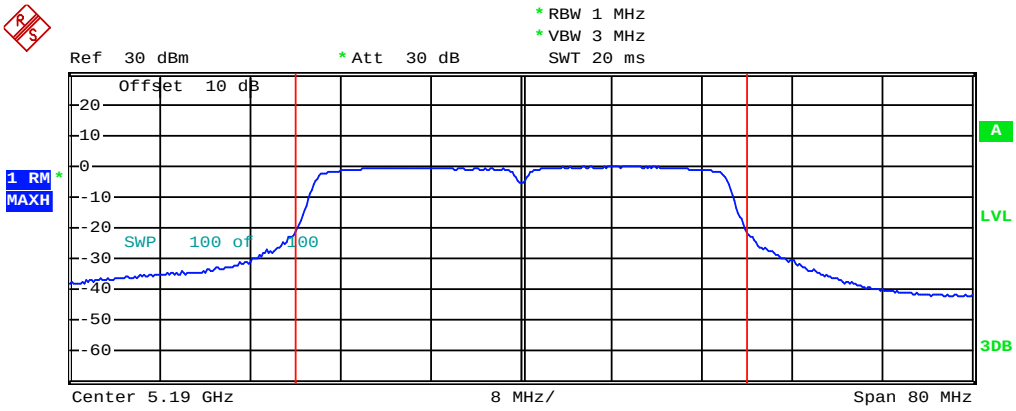


Tx Channel

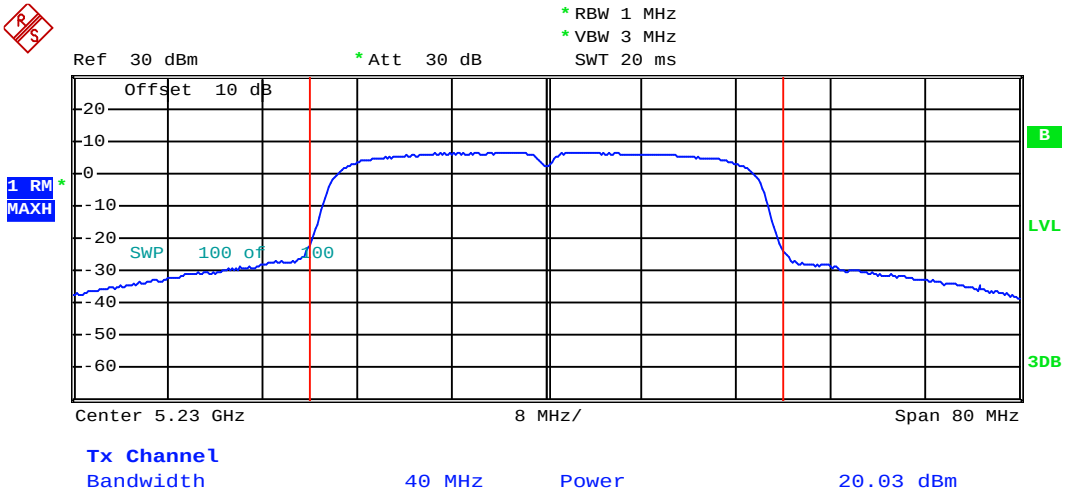
Bandwidth	20 MHz	Power	19.54 dBm

Highest channel

Test mode: 802.11n40



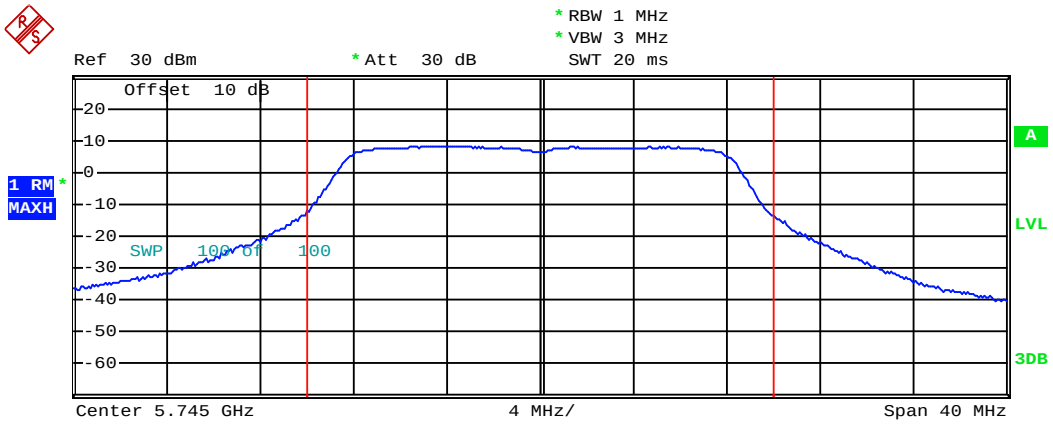
Lowest channel



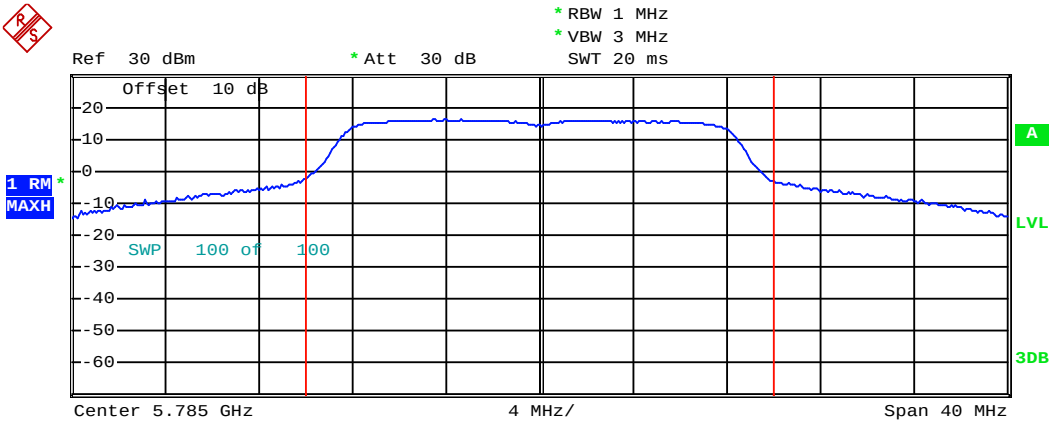
Highest channel

TX0 - Band 4:

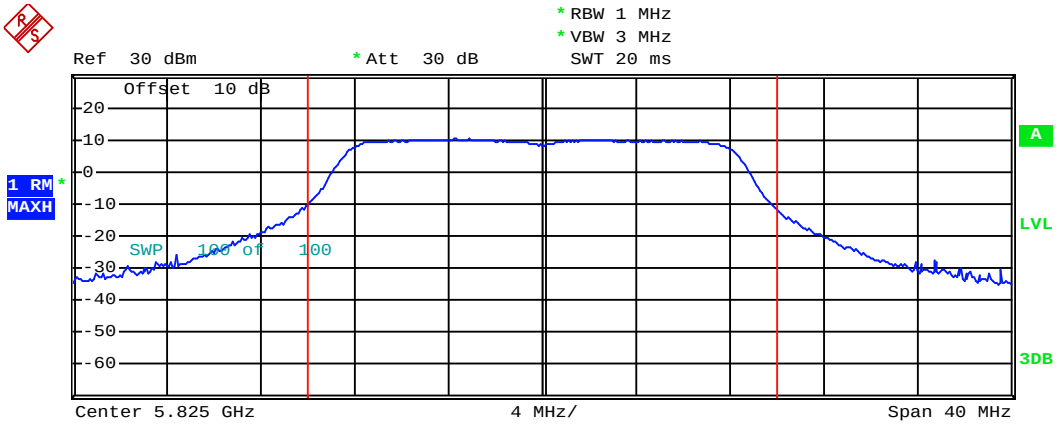
802.11a



Lowest channel

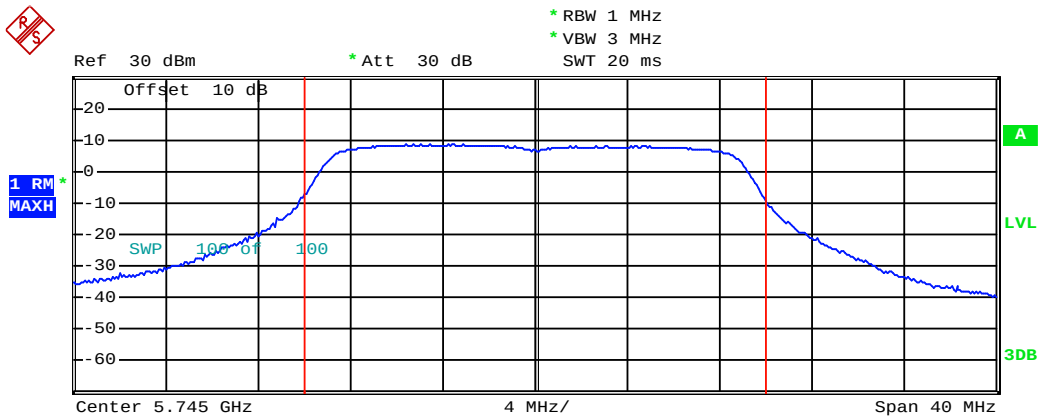


Middle channel



Highest channel

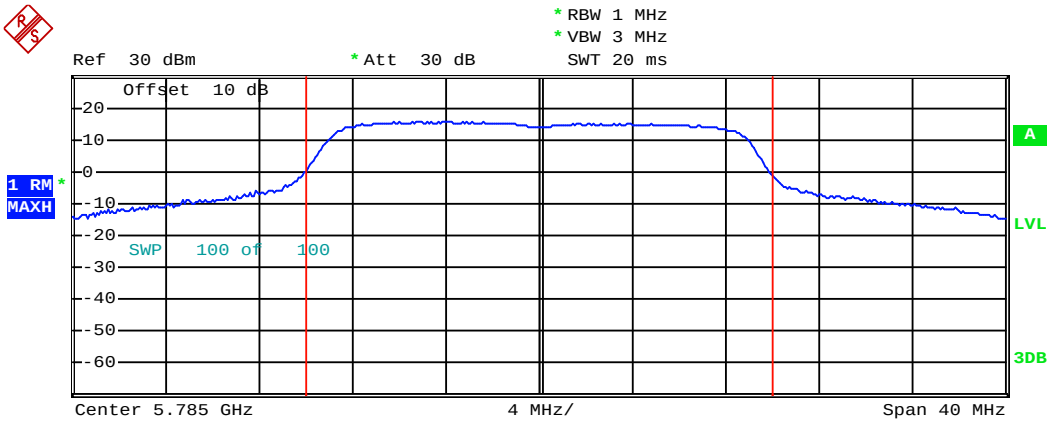
802.11n20



Tx Channel

Bandwidth	20 MHz	Power	19.37 dBm

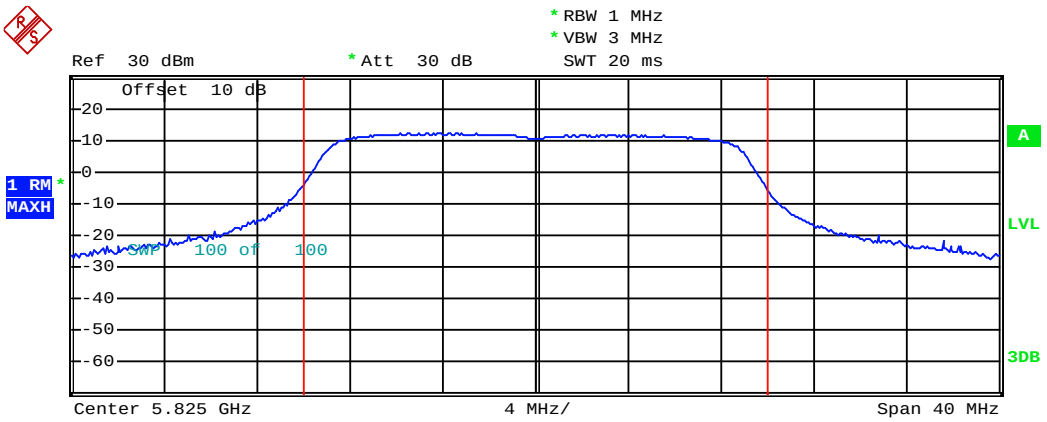
Lowest channel



Tx Channel

Bandwidth	20 MHz	Power	26.46 dBm

Middle channel

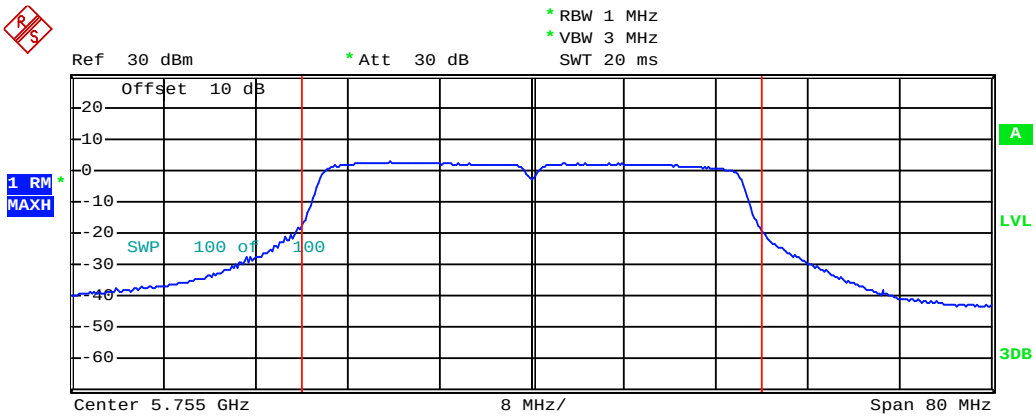


Tx Channel

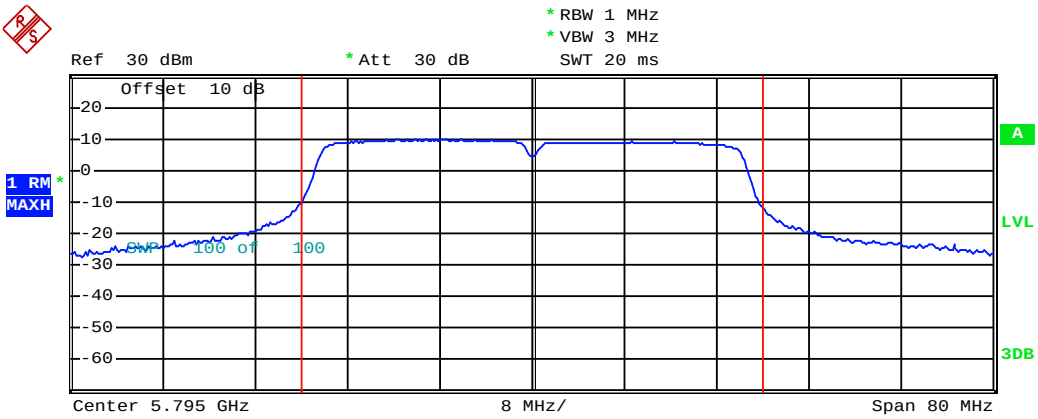
Bandwidth	20 MHz	Power	22.94 dBm

Highest channel

802.11n40



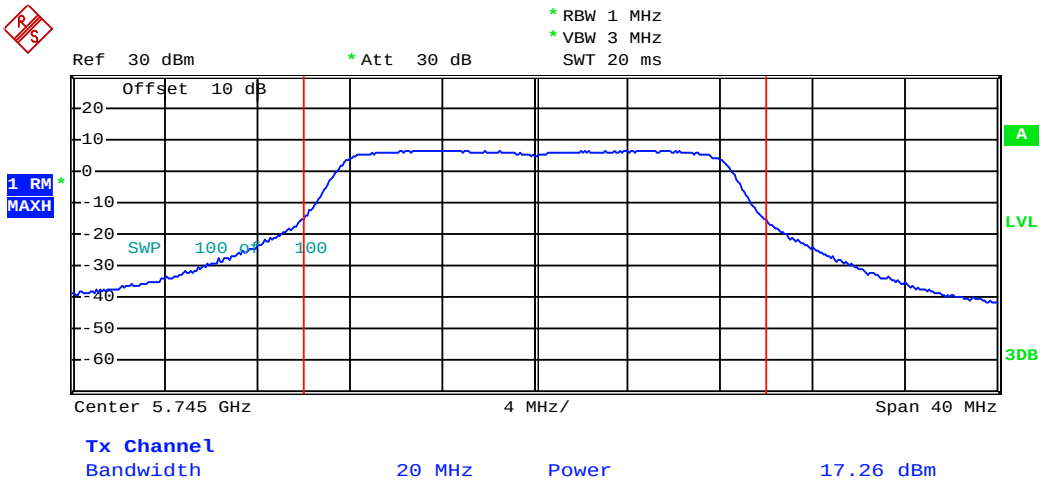
Lowest channel



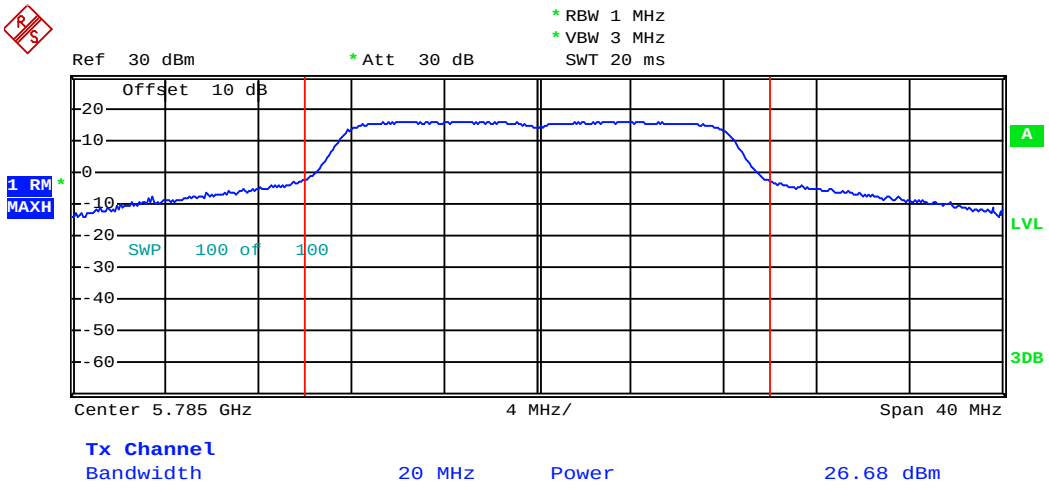
Highest channel

TX1 - Band 4

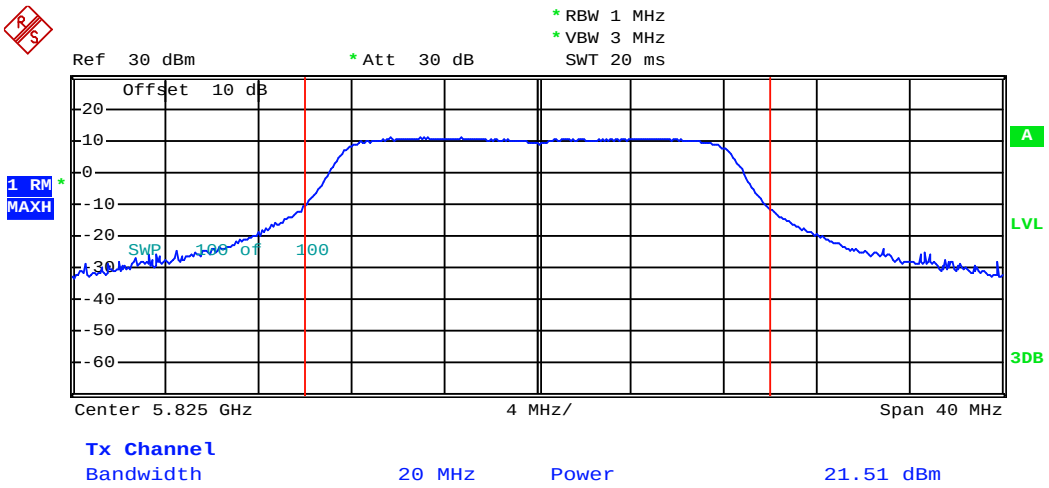
802.11a



Lowest channel

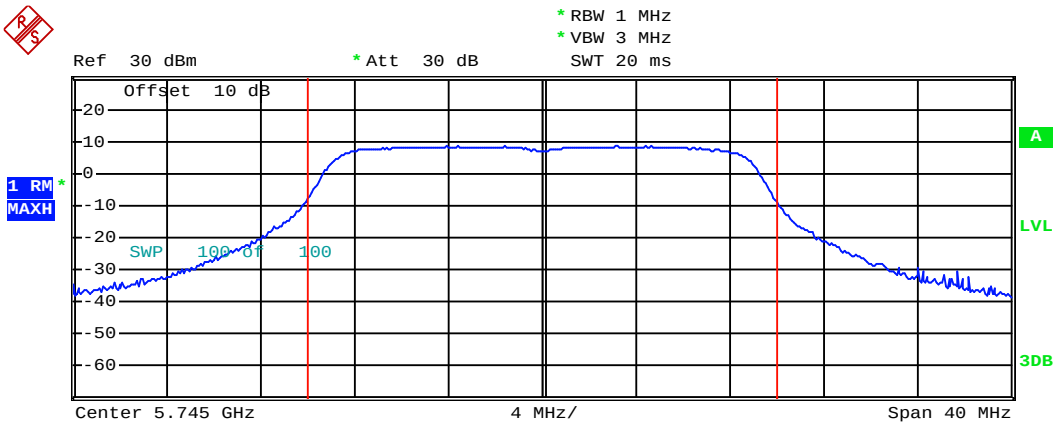


Middle channel



Highest channel

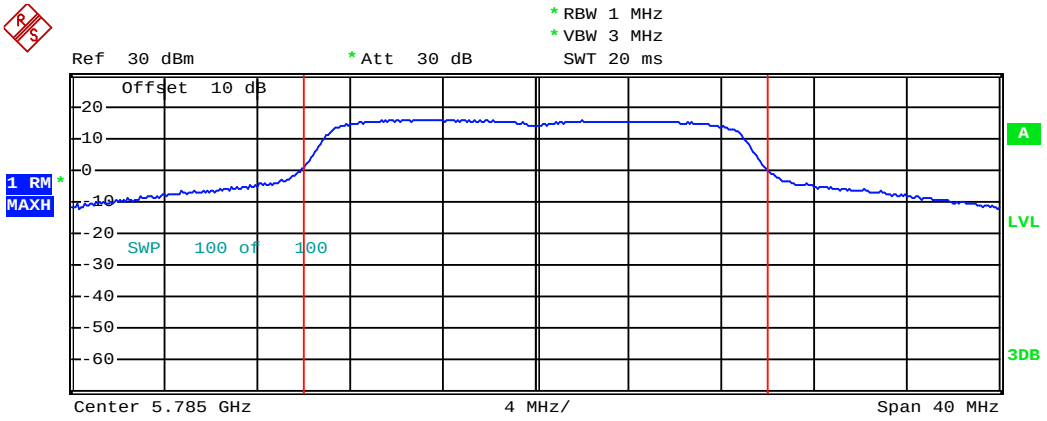
802.11n20



Tx Channel

Bandwidth	20 MHz	Power	19.54 dBm

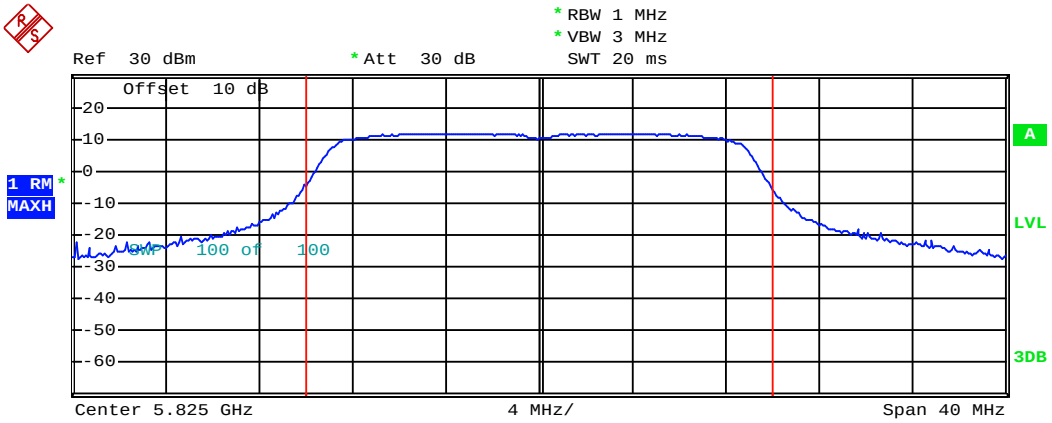
Lowest channel



Tx Channel

Bandwidth	20 MHz	Power	26.72 dBm

Middle channel

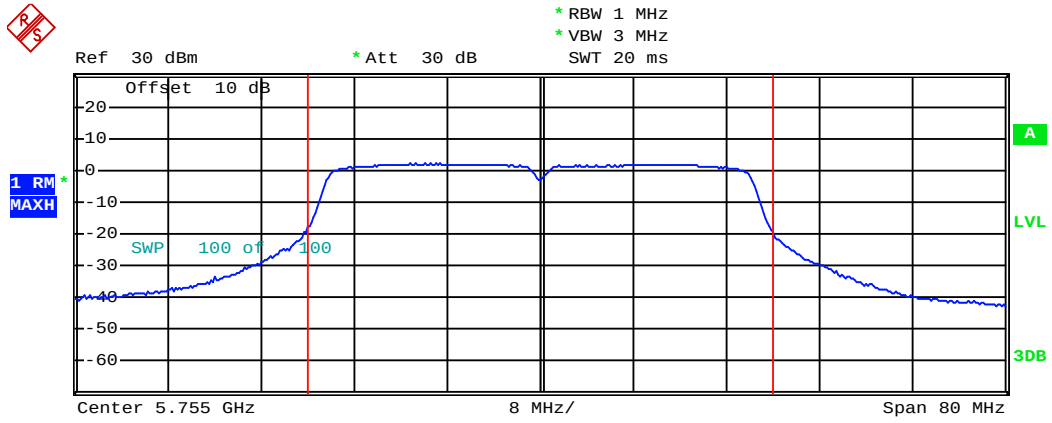


Tx Channel

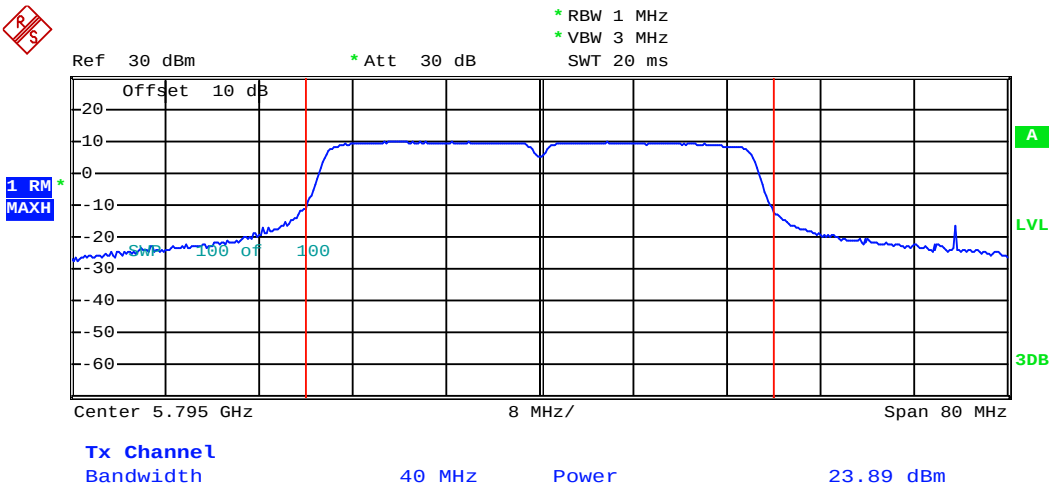
Bandwidth	20 MHz	Power	22.88 dBm

Highest channel

802.11n40

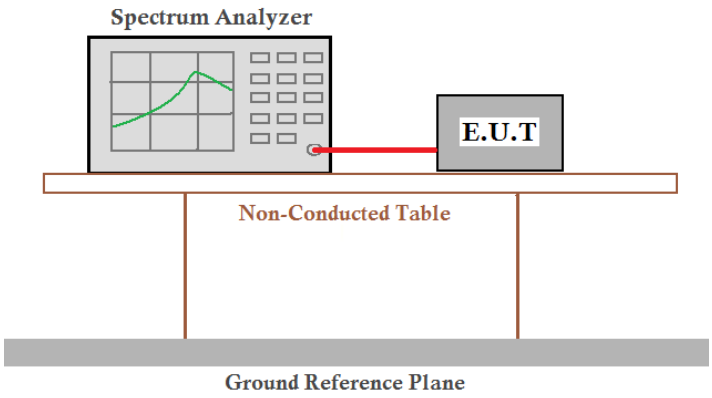


Lowest channel



Highest channel

6.5 Occupy Bandwidth

Test Requirement:	FCC Part15 E Section 15.407 (a) and Section 15.407 (e)
Test Method:	ANSI C63.4:2003 and KDB 789033
Limit:	Band 1: N/A(26dB Emission Bandwidth and 99% Occupy Bandwidth) Band 4: N/A(26dB Emission Bandwidth and 99% Occupy Bandwidth) Band 4: >500kHz(6dB Bandwidth)
Test setup:	
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Band 1:

Test Channel	26dB Emission Bandwidth (MHz)			Limit	Result
	802.11a	802.11n20	802.11n40		
Lowest	22.00	24.16	44.16	N/A	N/A
Middle	28.88	29.44	---		
Highest	19.12	19.84	38.72		

Test Channel	99% Occupy Bandwidth (MHz)			Limit	Result
	802.11a	802.11n20	802.11n40		
Lowest	16.80	18.24	36.48	N/A	N/A
Middle	17.92	18.64	---		
Highest	16.48	17.36	35.20		

Band 4:

Test Channel	26dB Emission Bandwidth (MHz)			Limit	Result
	802.11a	802.11n20	802.11n40		
Lowest	22.64	23.68	45.92	N/A	N/A
Middle	28.24	26.88	---		
Highest	20.80	23.84	45.60		

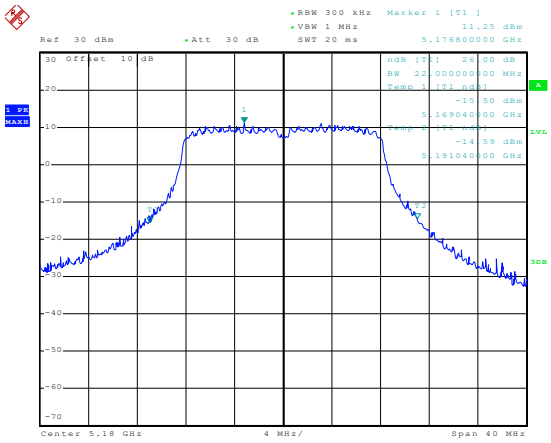
Test Channel	99% Occupy Bandwidth (MHz)			Limit	Result
	802.11a	802.11n20	802.11n40		
Lowest	17.12	18.00	36.48	N/A	N/A
Middle	17.76	18.48	---		
Highest	16.56	18.16	36.48		

Test Channel	6dB Emission Bandwidth (MHz)			Limit	Result
	802.11a	802.11n20	802.11n40		
Lowest	16.64	17.84	36.80	>500kHz	N/A
Middle	16.72	17.84	---		
Highest	16.56	17.76	36.80		

Test plot as follows:

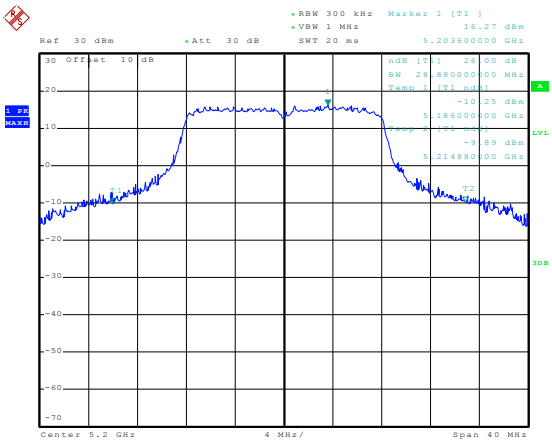
Band 1:

26 dB EBW - 802.11a



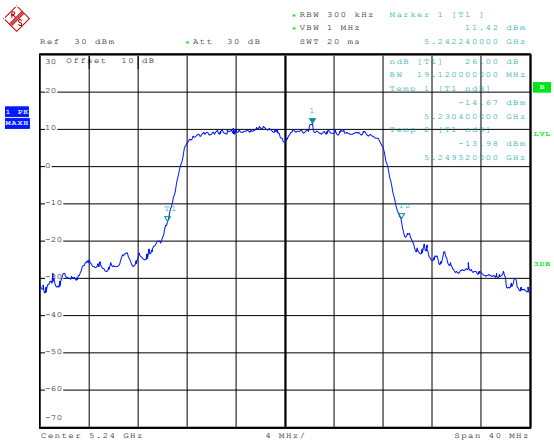
Date: 25.AUG.2014 10:17:43

Lowest channel



Date: 25.AUG.2014 09:49:02

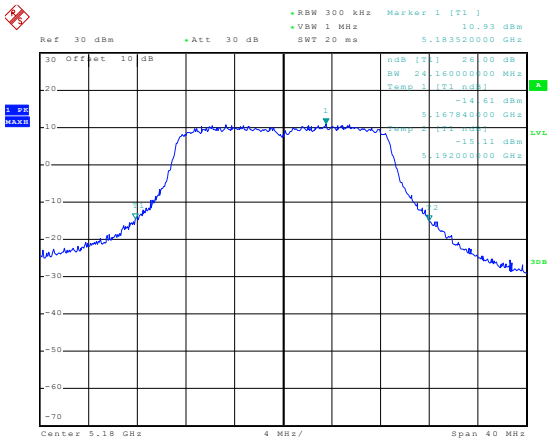
Middle channel



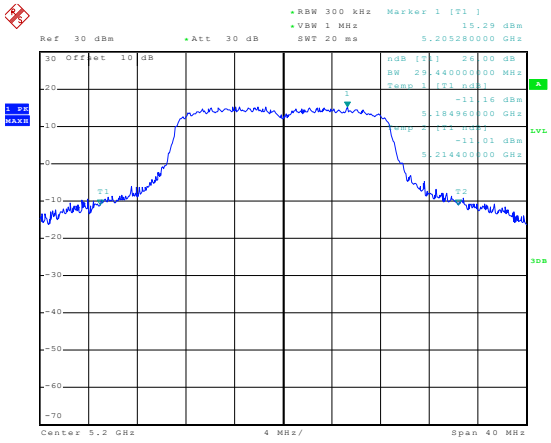
Date: 3.MAR.2015 16:30:18

Highest channel

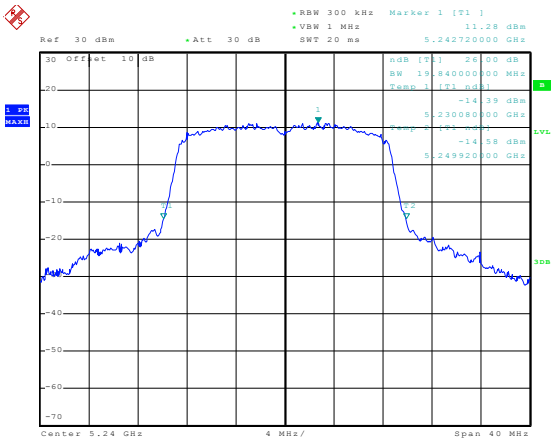
802.11n20



Lowest channel

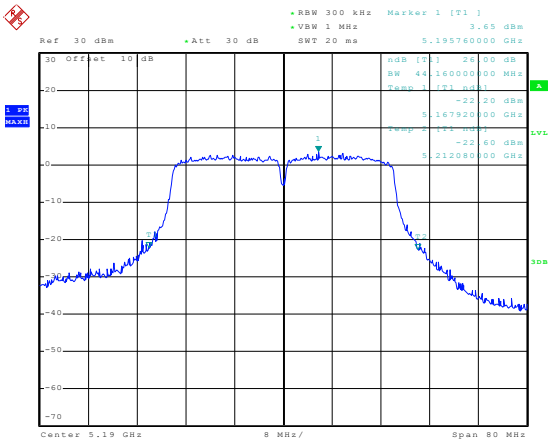


Middle channel

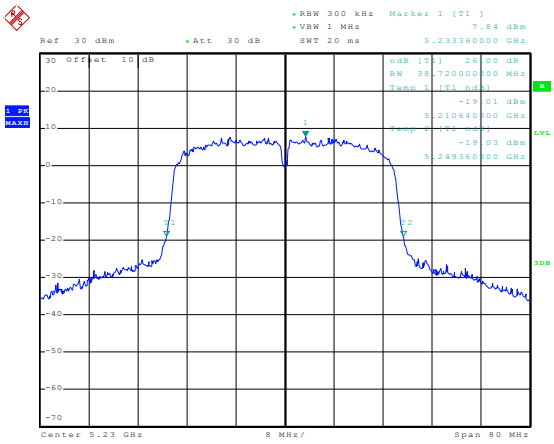


Highest channel

802.11n40

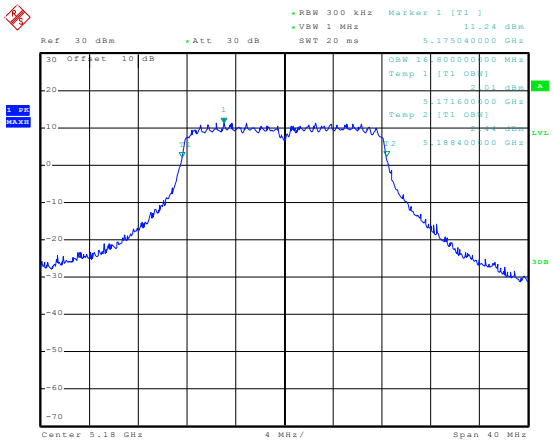


Lowest channel

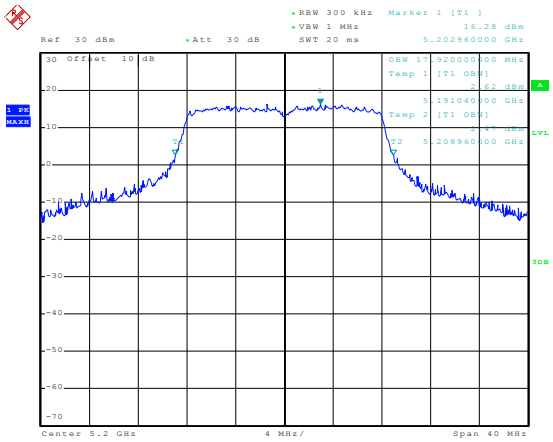


Highest channel

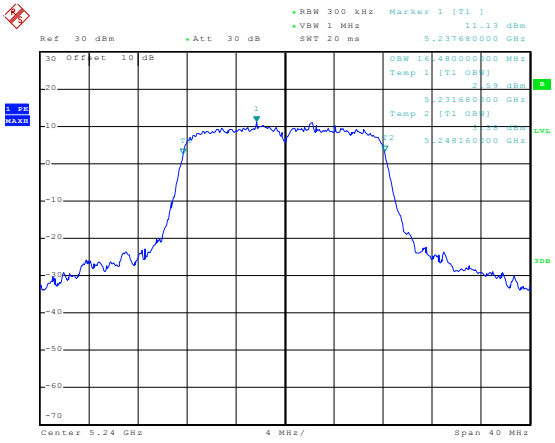
99% OBW - 802.11a



Lowest channel

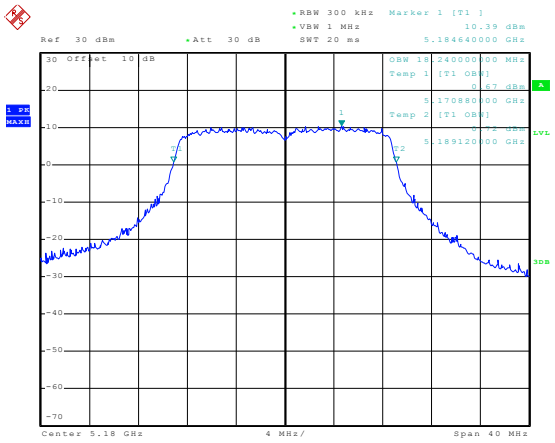


Middle channel

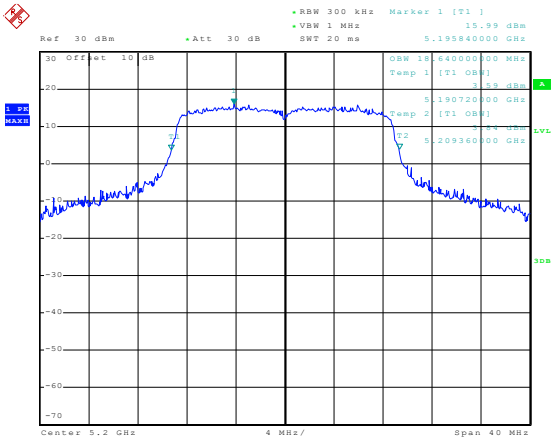


Highest channel

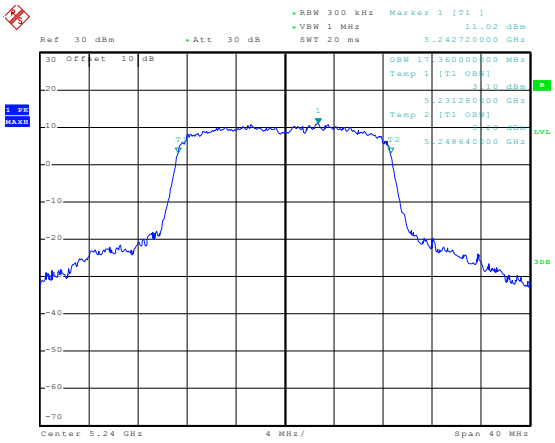
802.11n20



Lowest channel

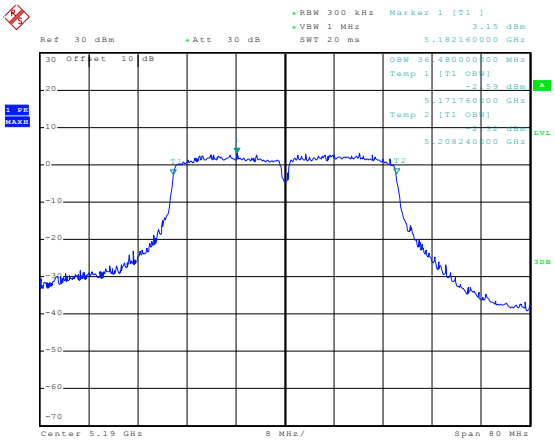


Middle channel

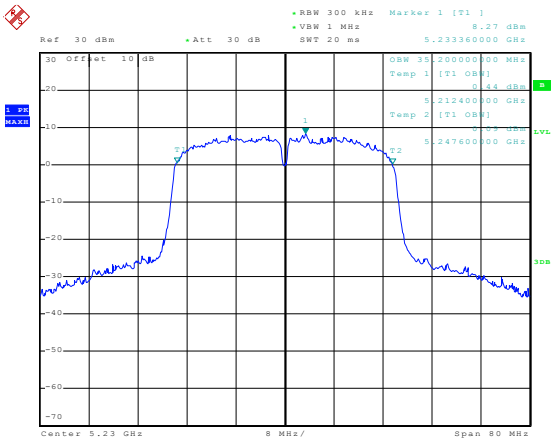


Highest channel

802.11n40



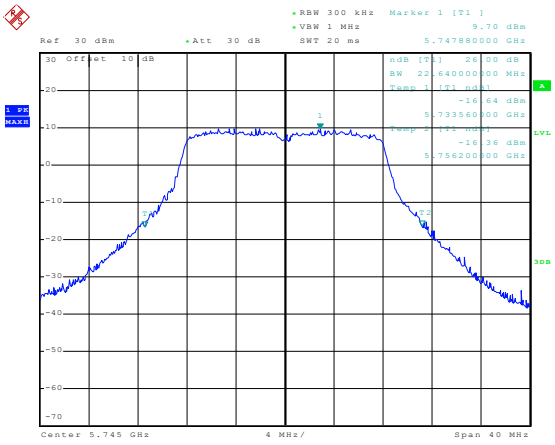
Lowest channel



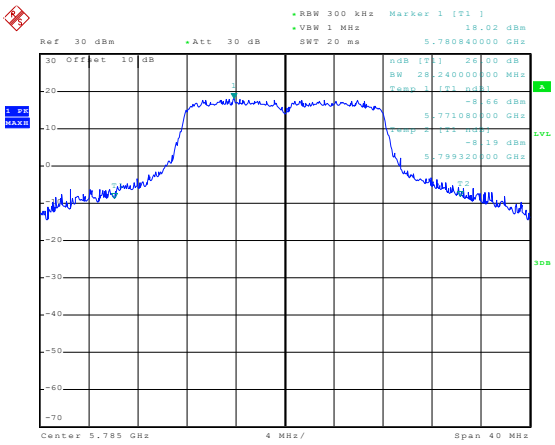
Highest channel

Band 4:

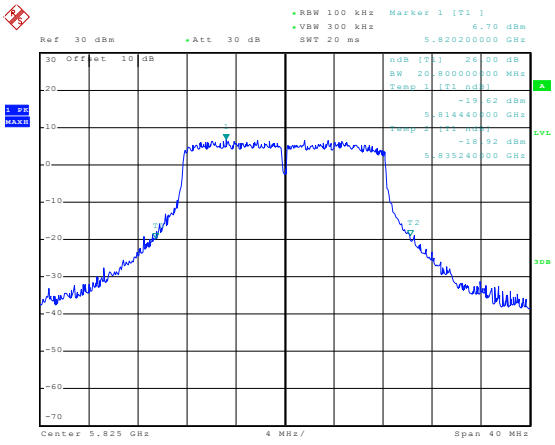
26 dB EBW - 802.11a



Lowest channel

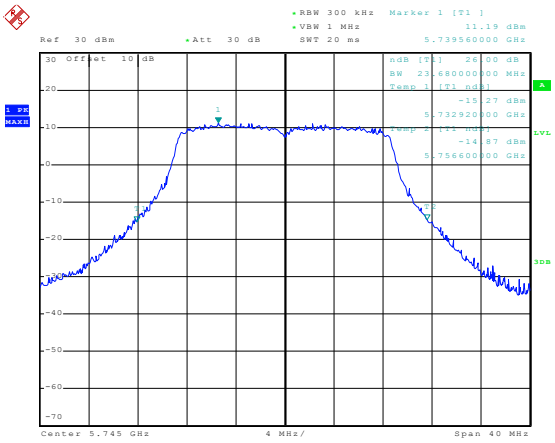


Middle channel



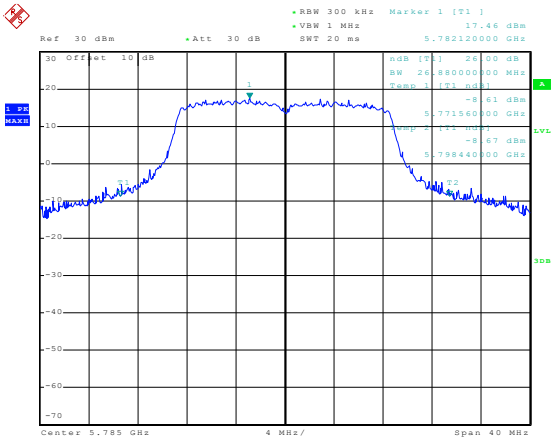
Highest channel

802.11n20



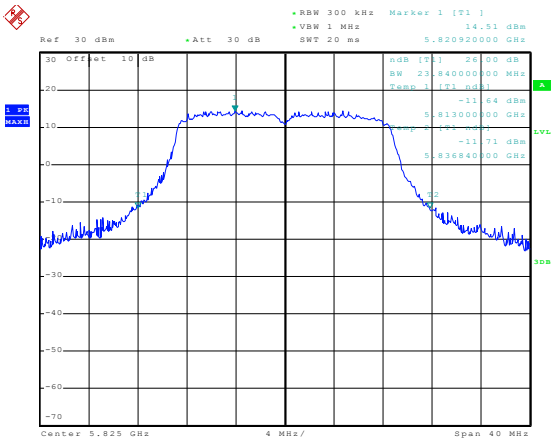
Date: 31.OCT.2014 14:09:52

Lowest channel



Date: 6.NOV.2014 09:25:49

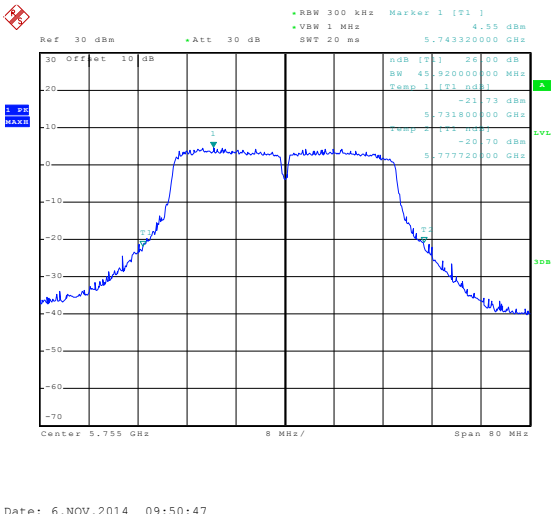
Middle channel



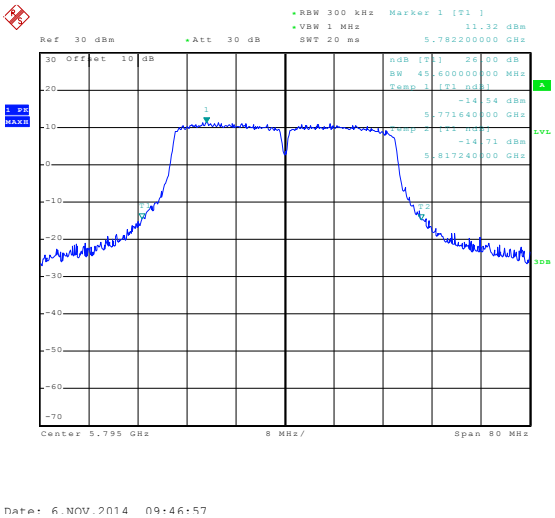
Date: 6.NOV.2014 09:33:18

Highest channel

802.11n40

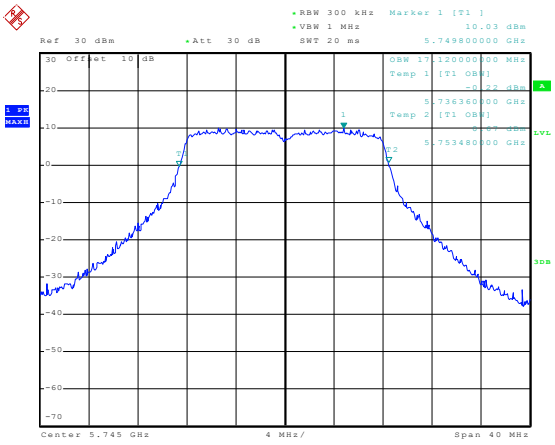


Lowest channel



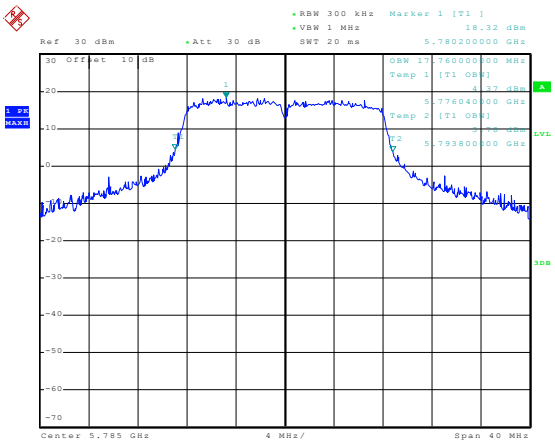
Highest channel

99% OBW - 802.11a



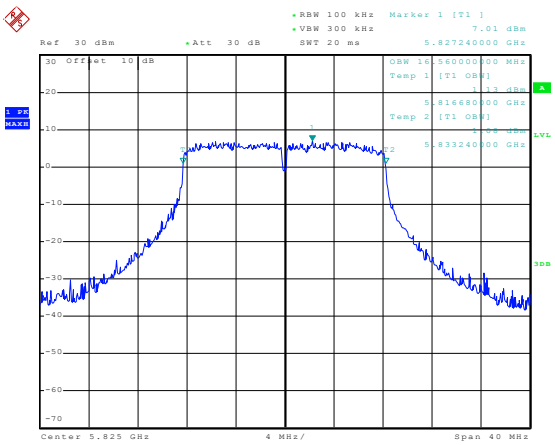
Date: 31.OCT.2014 12:45:41

Lowest channel



Date: 31.OCT.2014 13:19:38

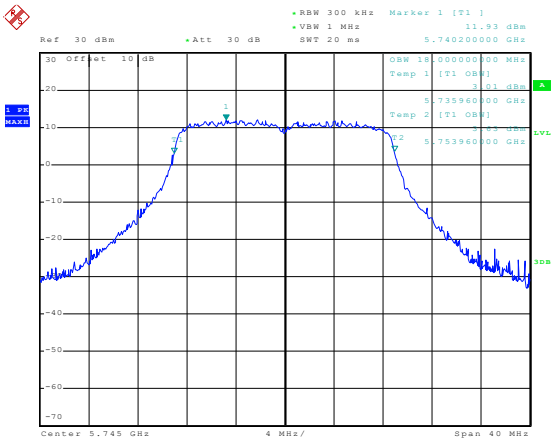
Middle channel



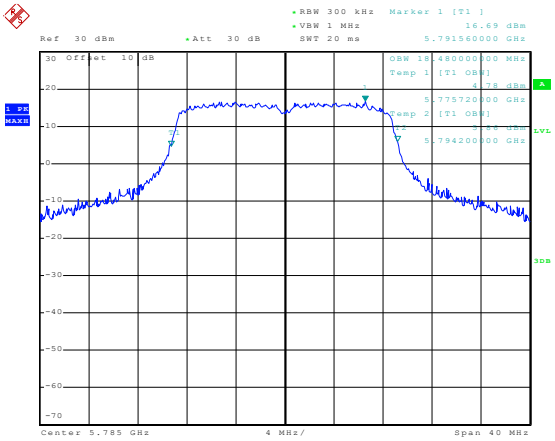
Date: 31.OCT.2014 13:59:32

Highest channel

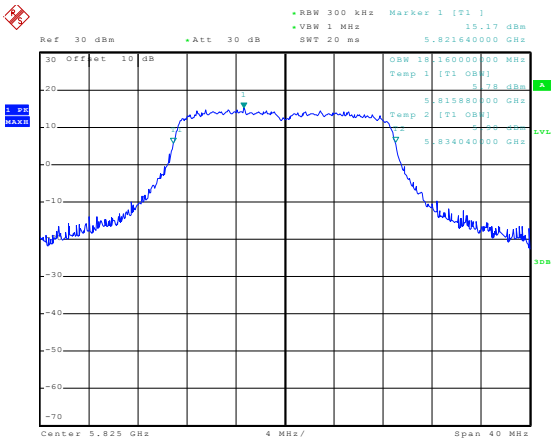
802.11n20



Lowest channel

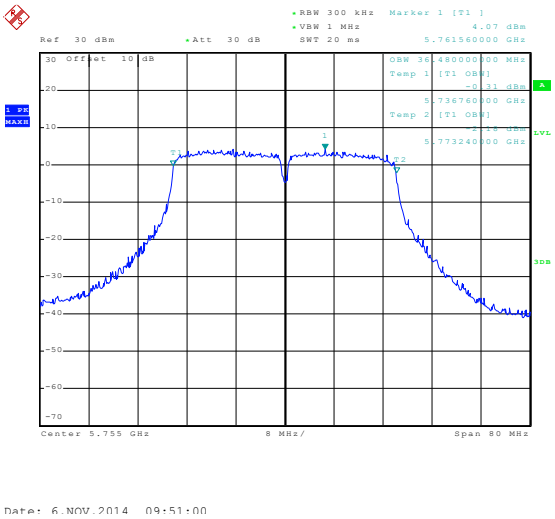


Middle channel

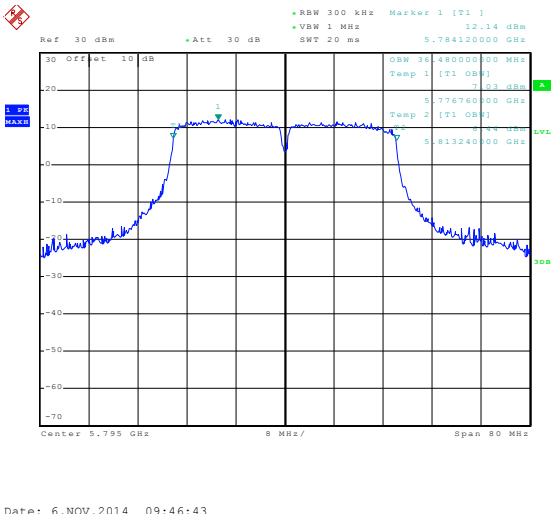


Highest channel

802.11n40

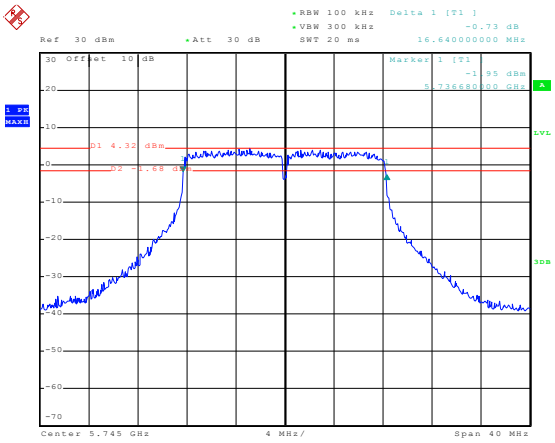


Lowest channel

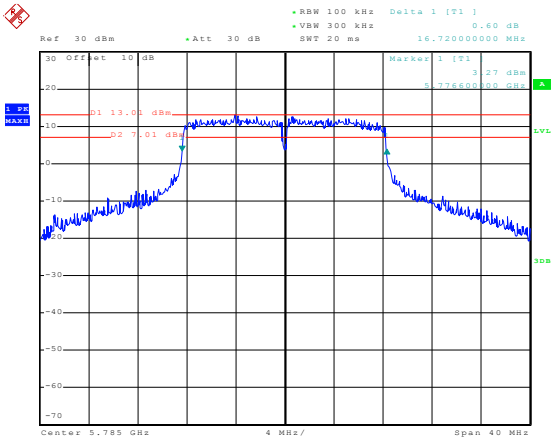


Highest channel

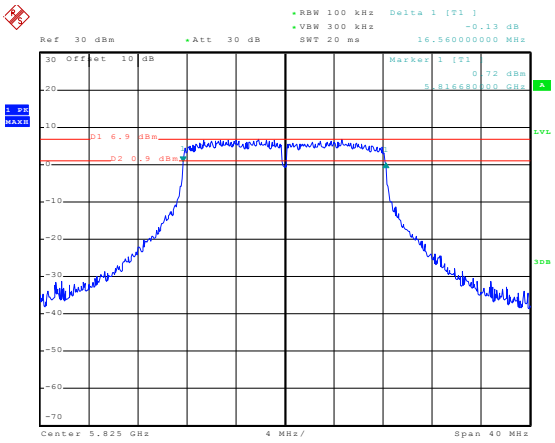
6 dB BW - 802.11a



Lowest channel

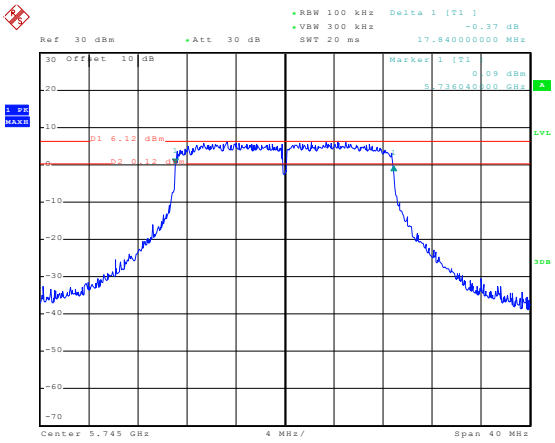


Middle channel



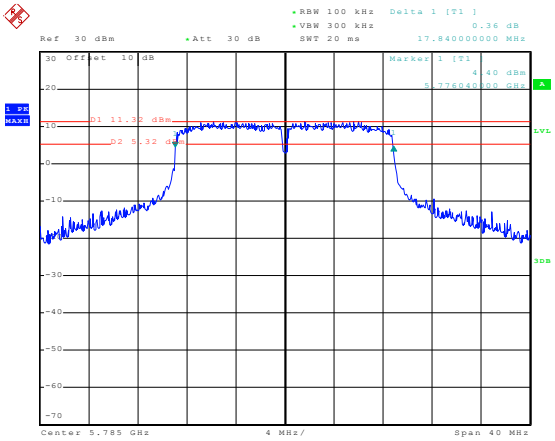
Highest channel

802.11n20



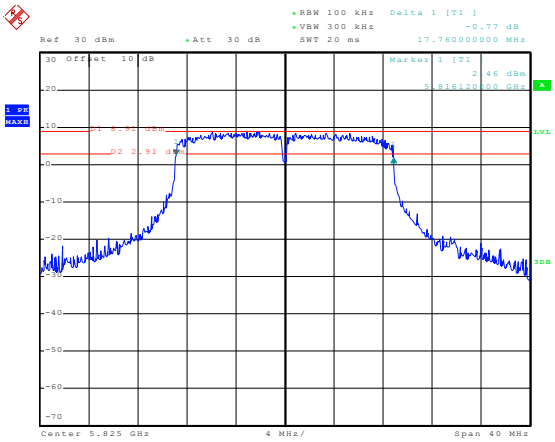
Date: 31.OCT.2014 14:08:56

Lowest channel



Date: 6.NOV.2014 09:24:53

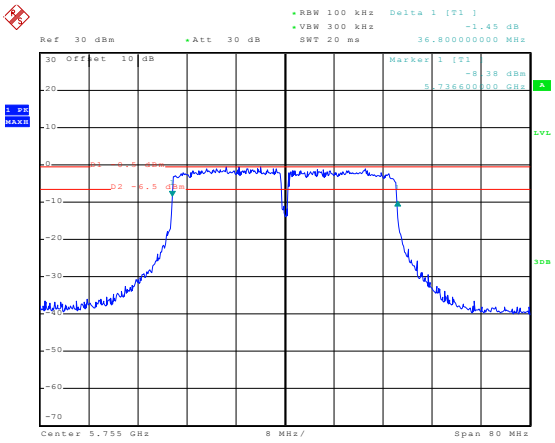
Middle channel



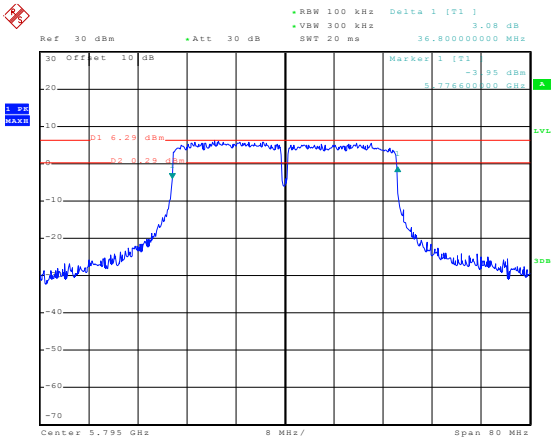
Date: 6.NOV.2014 09:31:36

Highest channel

802.11n40

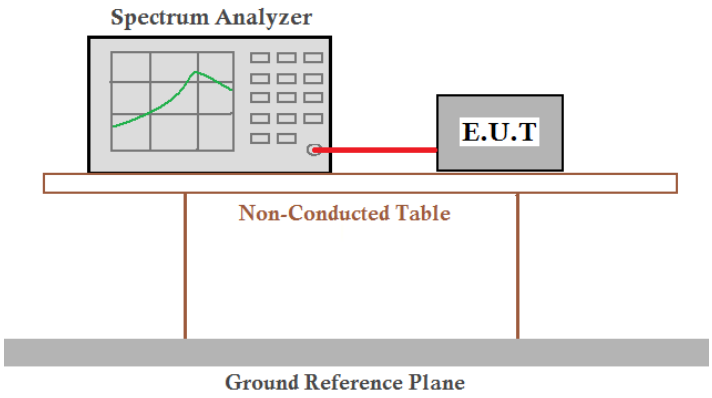


Lowest channel



Highest channel

6.6 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407 (e)
Test Method:	ANSI C63.4:2003, KDB 789033
Limit:	**Band 1:** 17 dBm/MHz (For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi); **Band 4:** 30dBm/500kHz(For fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power).
Test setup:	
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

Band 1:

Mode	Test CH	Ant. Port	PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Result
802.11a	Lowest	TX0	8.18	11.40	17.00	Pass
		TX1	8.59			
	Middle	TX0	13.30	16.31	17.00	Pass
		TX1	13.30			
	Highest	TX0	8.88	11.82	17.00	Pass
		TX1	8.73			
802.11n20	Lowest	TX0	8.70	11.45	17.00	Pass
		TX1	8.16			
	Middle	TX0	13.38	16.36	17.00	Pass
		TX1	13.32			
	Highest	TX0	8.29	11.52	17.00	Pass
		TX1	8.72			
802.11n40	Lowest	TX0	-0.36	2.72	17.00	Pass
		TX1	-0.23			
	Highest	TX0	5.77	8.75	17.00	Pass
		TX1	5.71			

Remark:
1. Because the transmit signals are completely uncorrelated, so the Directional gain = G_{ANT}.
2. The directional Gain of antenna is less than 23 dBi, so the limit of power spectral density is 17 dBm.

Band 4:

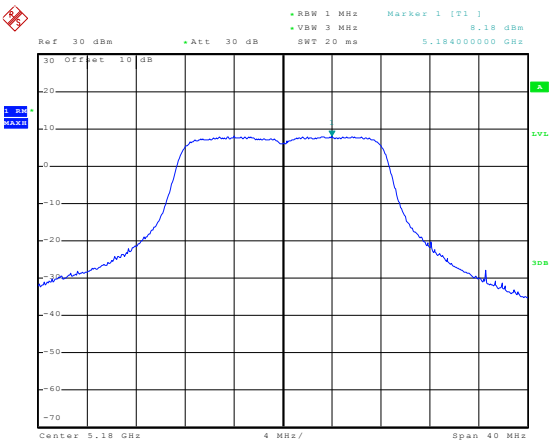
Mode	Test CH	Ant. Port	PSD (dBm)	Total PSD (dBm)	Limit (dBm)	Result
802.11a	Lowest	TX0	8.95	12.51	30.00	Pass
		TX1	9.99			
	Middle	TX0	16.61	19.72	30.00	Pass
		TX1	16.81			
	Highest	TX0	10.77	14.20	3.000	Pass
		TX1	11.58			
802.11n20	Lowest	TX0	9.74	13.08	30.00	Pass
		TX1	10.37			
	Middle	TX0	15.86	18.78	30.00	Pass
		TX1	15.67			
	Highest	TX0	12.65	15.54	30.00	Pass
		TX1	12.40			
802.11n40	Lowest	TX0	2.19	5.28	30.00	Pass
		TX1	2.35			
	Highest	TX0	9.73	12.49	30.00	Pass
		TX1	9.21			

Remark:
1. Factor=10log(500kHz/RBW)=7, RBW=100kHz.
2. Because the transmit signals are completely uncorrelated, so the Directional gain = G_{ANT}.

Test plot as follows:

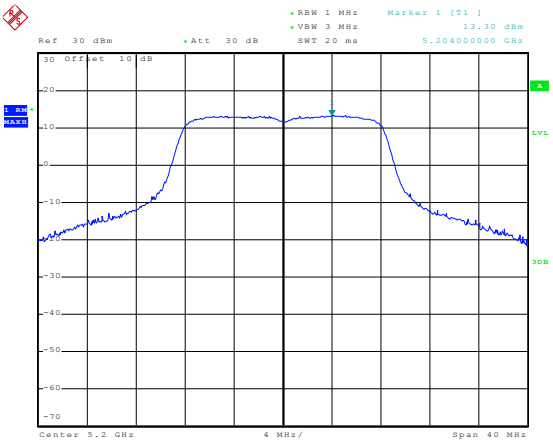
TX0 - Band 1:

Test mode: 802.11a



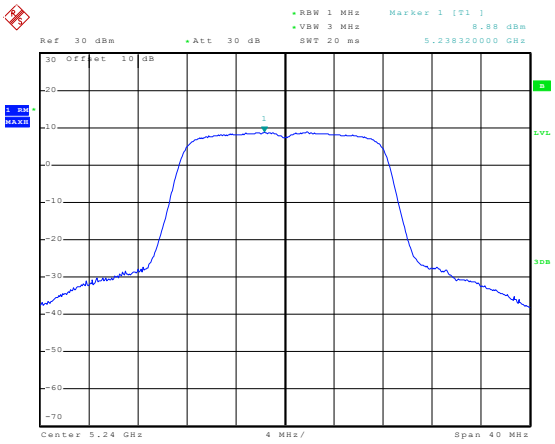
Date: 25.AUG.2014 10:16:03

Lowest channel



Date: 25.AUG.2014 09:36:03

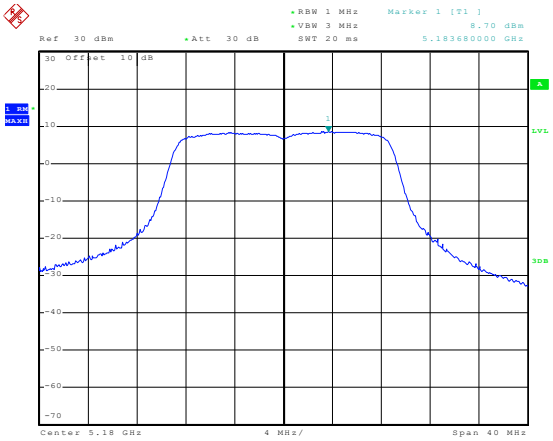
Middle channel



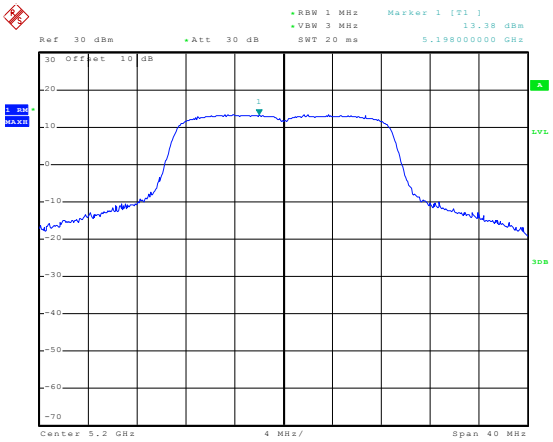
Date: 3.MAR.2015 16:33:50

Highest channel

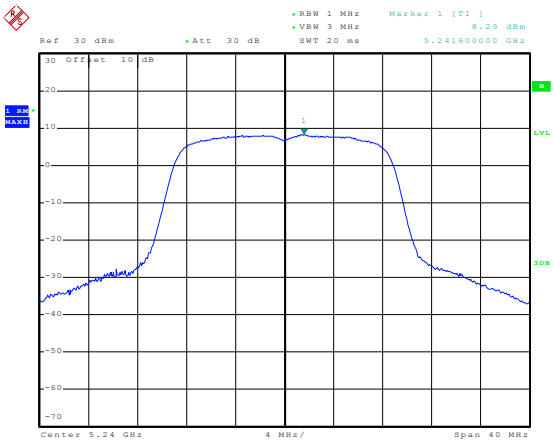
Test mode: 802.11n20



Lowest channel

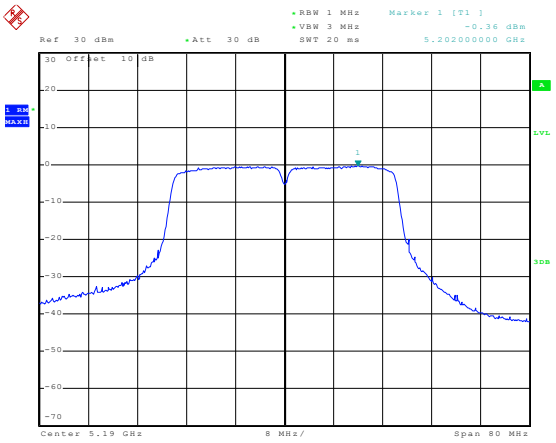


Middle channel

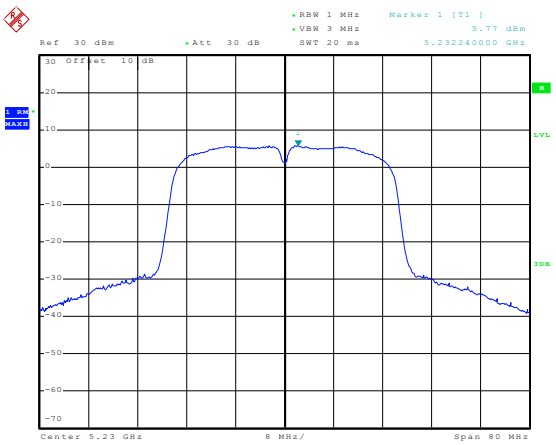


Highest channel

Test mode: 802.11n40



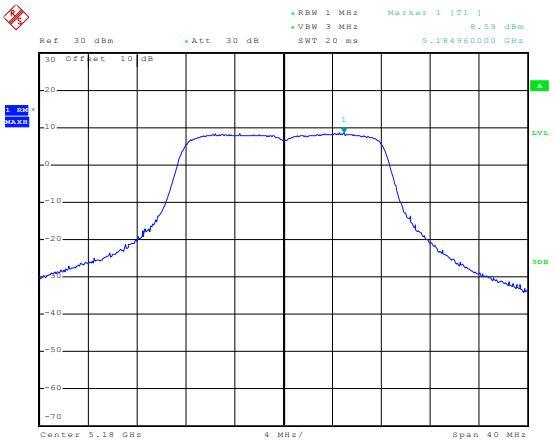
Lowest channel



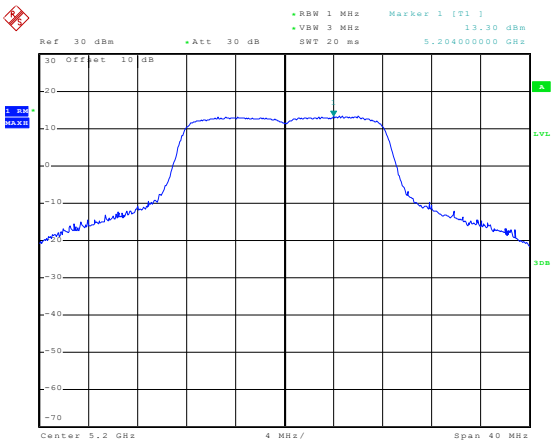
Highest channel

TX1 - Band 1

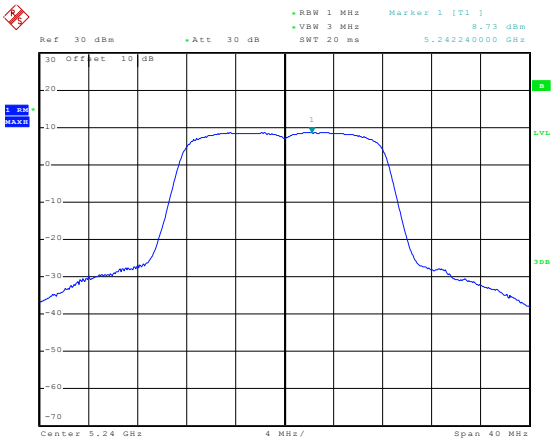
Test mode: 802.11a



Lowest channel

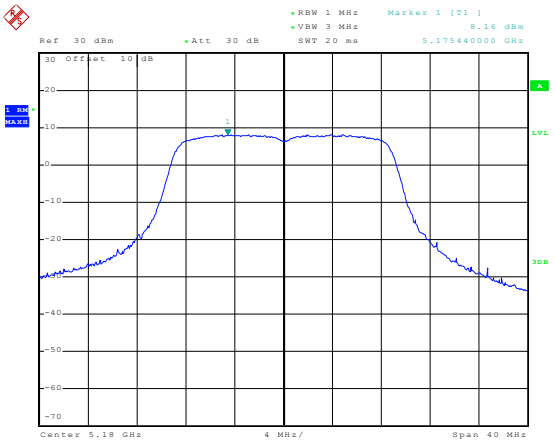


Middle channel



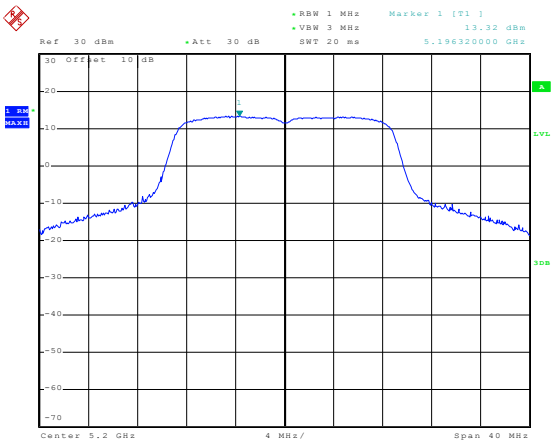
Highest channel

Test mode: 802.11n20



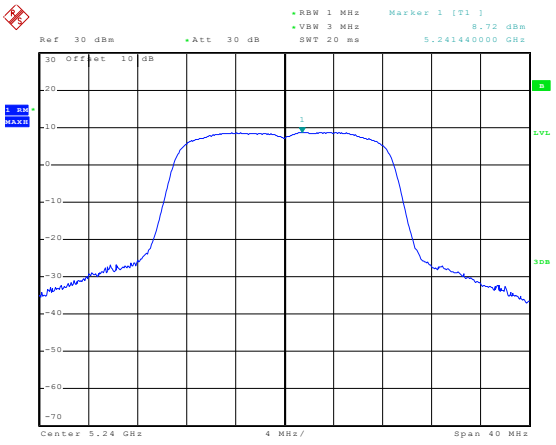
Date: 26.AUG.2014 13:58:53

Lowest channel



Date: 26.AUG.2014 14:01:14

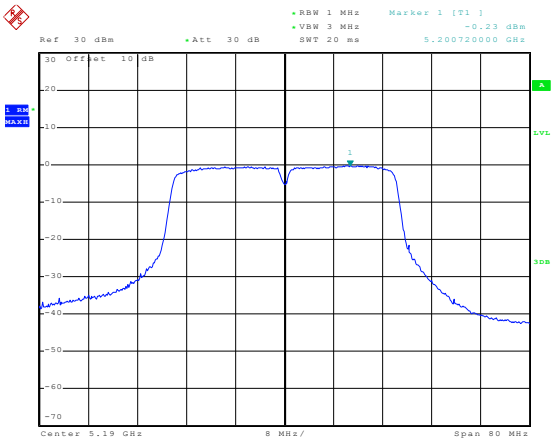
Middle channel



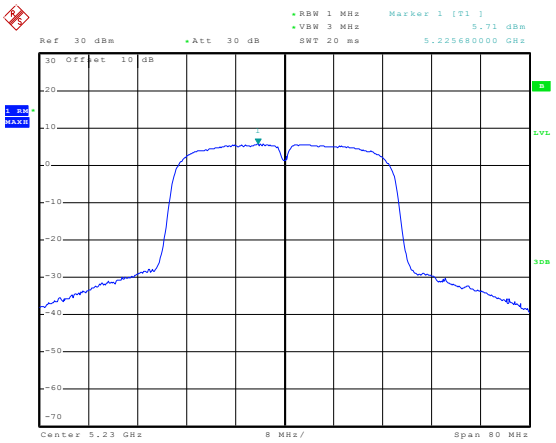
Date: 3.MAR.2015 16:40:20

Highest channel

Test mode: 802.11n40



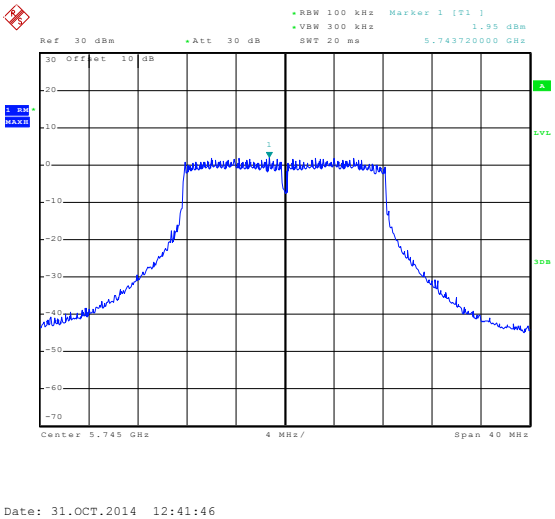
Lowest channel



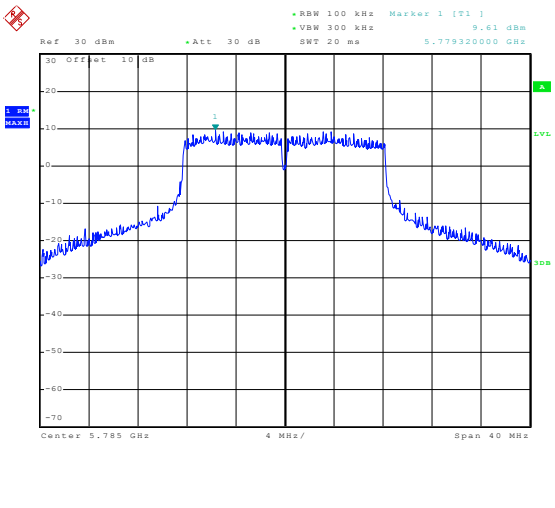
Highest channel

TX0 - Band 4:

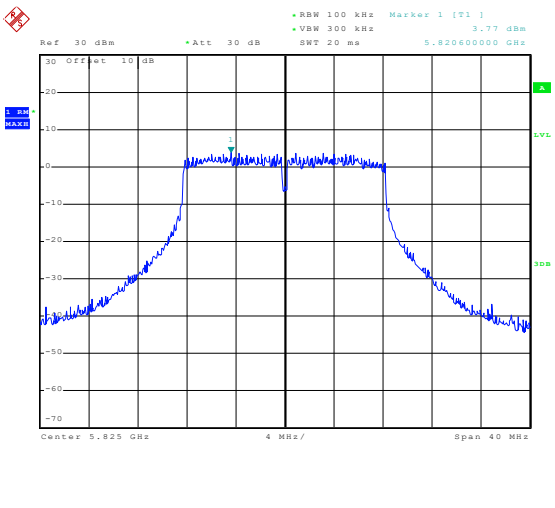
Test mode: 802.11a



Lowest channel

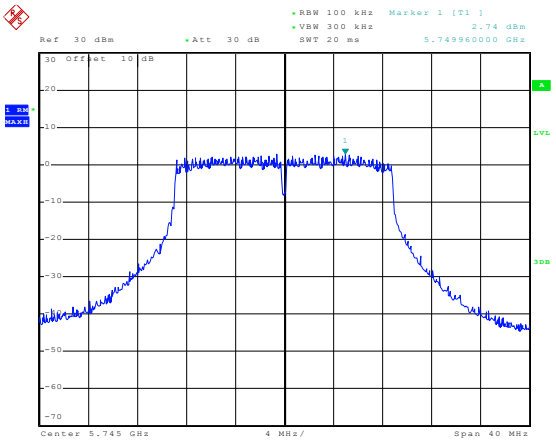


Middle channel



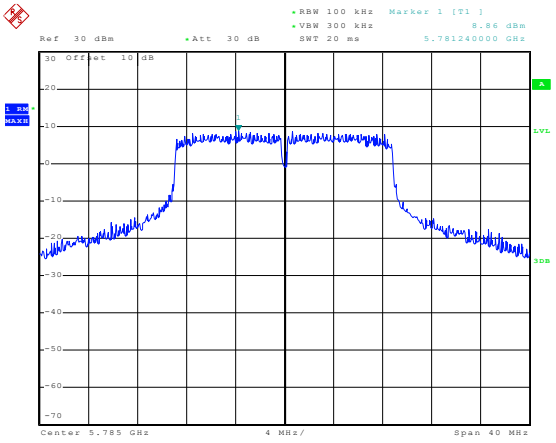
Highest channel

Test mode: 802.11n20



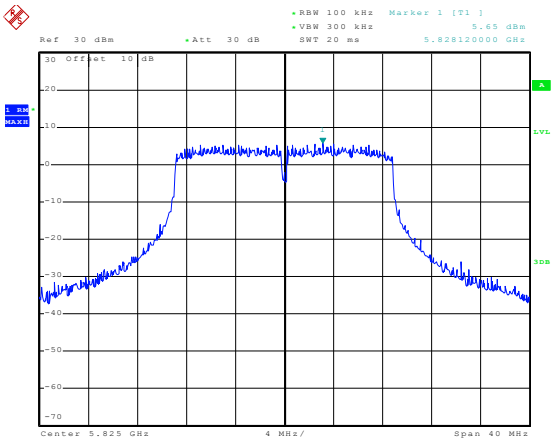
Date: 31.OCT.2014 14:06:29

Lowest channel



Date: 6.NOV.2014 09:22:22

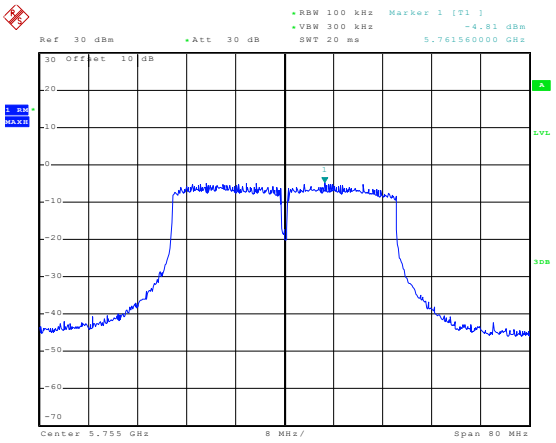
Middle channel



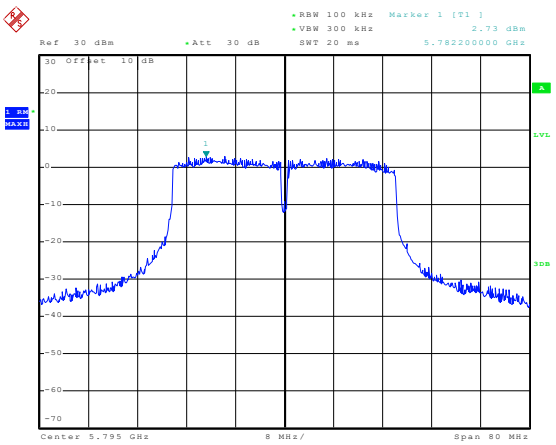
Date: 6.NOV.2014 09:28:56

Highest channel

Test mode: 802.11n40



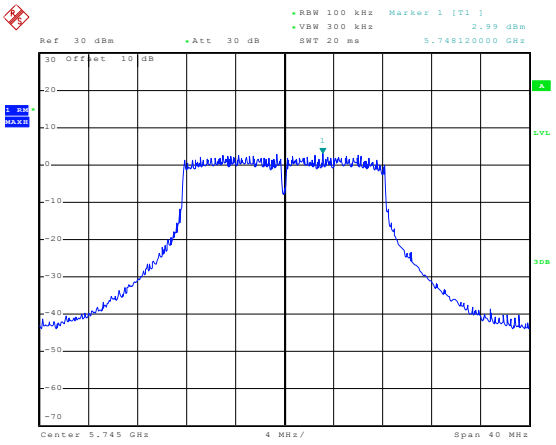
Lowest channel



Highest channel

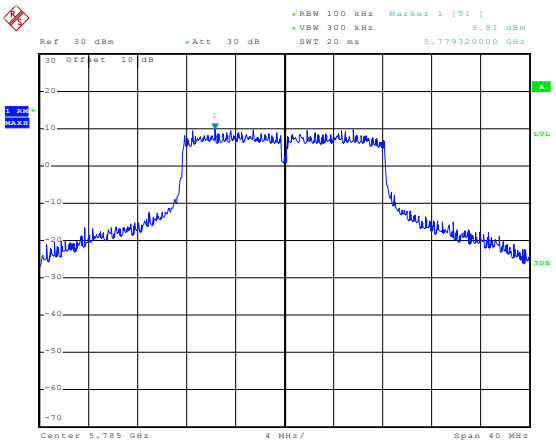
TX1 - Band 4

Test mode: 802.11a



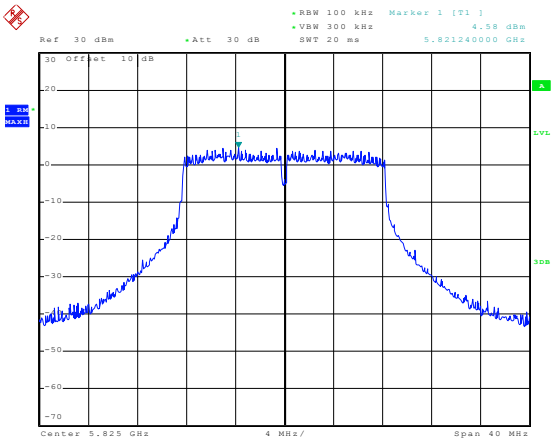
Date: 31.OCT.2014 12:41:15

Lowest channel



Date: 31.OCT.2014 13:15:07

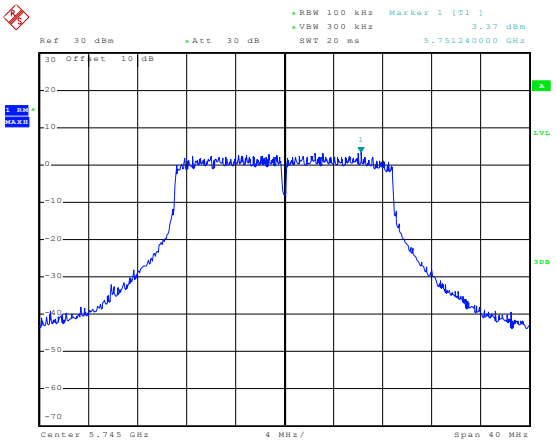
Middle channel



Date: 31.OCT.2014 13:50:48

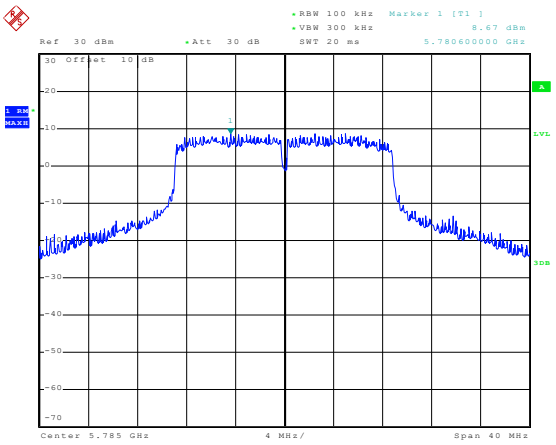
Highest channel

Test mode: 802.11n20



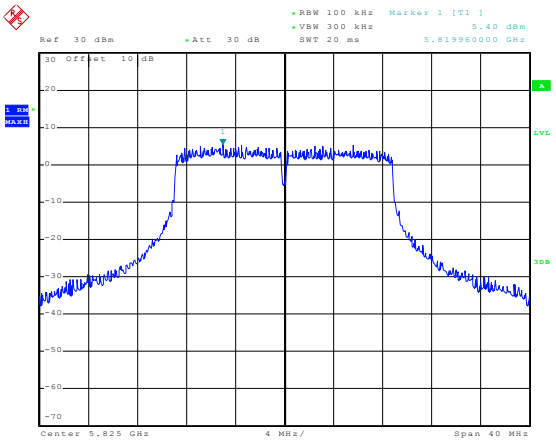
Date: 31.OCT.2014 14:06:55

Lowest channel



Date: 6.NOV.2014 09:22:54

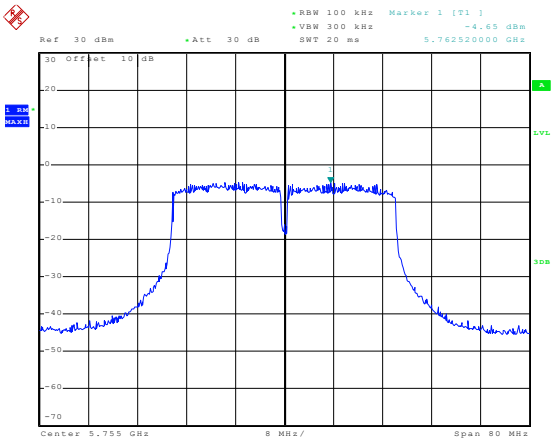
Middle channel



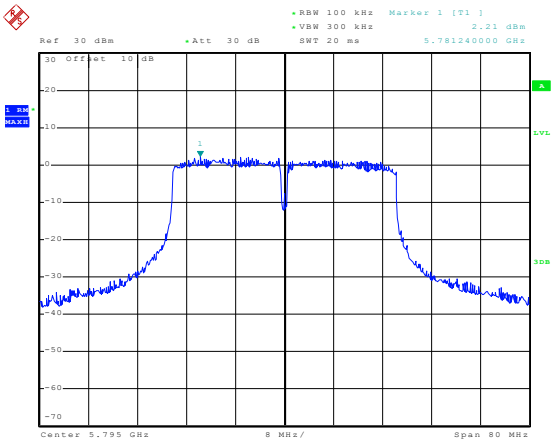
Date: 6.NOV.2014 09:29:20

Highest channel

Test mode: 802.11n40

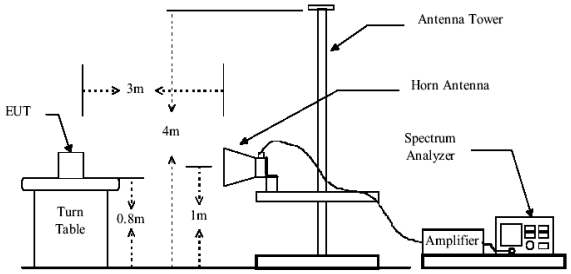


Lowest channel



Highest channel

6.7 Band Edge

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407 (b)</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4:2003 , KDB 789033</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>Quasi-peak</td><td>100kHz</td><td>300kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td></td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td rowspan="2">Band 1</td><td>68.20</td><td>Peak Value</td></tr>
<tr><td>54.00</td><td>Average Value</td></tr>
<tr><td rowspan="2">Band 4</td><td>78.20</td><td>Peak Value</td></tr>
<tr><td>54.00</td><td>Average Value</td></tr>
<tr><td colspan="3">Remark:
1. Band 1 limit:
E[dBμV/m] = EIRP[dBm] + 95.2=68.2 dBuV/m, for EIPR[dBm]= -27dBm.
2. Band 4 limit:
E[dBμV/m] = EIRP[dBm] + 95.2=78.2 dBuV/m, for EIPR[dBm]= -17dBm.</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table 0.8 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.</td></tr>
<tr><td>Test setup:</td><td> 
</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 5.6 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td>Passed</td></tr>
</table>

Band 1:

802.11a								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	45.63	32.07	9.13	40.06	46.77	68.20	-21.43	Horizontal
5150.00	46.25	32.07	9.13	40.06	47.39	68.20	-20.81	Vertical
802.11a								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	34.25	32.07	9.13	40.06	35.39	54.00	-18.61	Horizontal
5150.00	35.65	32.07	9.13	40.06	36.79	54.00	-17.21	Vertical
802.11a								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	45.25	31.78	9.15	40.18	46.00	68.20	-22.20	Horizontal
5350.00	46.85	31.78	9.15	40.18	47.60	68.20	-20.60	Vertical
802.11a								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	35.65	31.78	9.15	40.18	36.40	54.00	-17.60	Horizontal
5350.00	34.58	31.78	9.15	40.18	35.33	54.00	-18.67	Vertical

802.11n-HT20								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	46.52	32.07	9.13	40.06	47.66	68.20	-20.54	Horizontal
5150.00	45.21	32.07	9.13	40.06	46.35	68.20	-21.85	Vertical
802.11n-HT20								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	35.25	32.07	9.13	40.06	36.39	54.00	-17.61	Horizontal
5150.00	35.65	32.07	9.13	40.06	36.79	54.00	-17.21	Vertical
802.11n-HT20								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	46.25	31.78	9.15	40.18	47.00	68.20	-21.20	Horizontal
5350.00	46.32	31.78	9.15	40.18	47.07	68.20	-21.13	Vertical
802.11n-HT20								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	35.21	31.78	9.15	40.18	35.96	54.00	-18.04	Horizontal
5350.00	35.74	31.78	9.15	40.18	36.49	54.00	-17.51	Vertical

802.11n-HT40								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	45.22	32.07	9.13	40.06	46.36	68.20	-21.84	Horizontal
5150.00	44.21	32.07	9.13	40.06	45.35	68.20	-22.85	Vertical
802.11n-HT40								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5150.00	35.36	32.07	9.13	40.06	36.50	54.00	-17.50	Horizontal
5150.00	34.25	32.07	9.13	40.06	35.39	54.00	-18.61	Vertical
802.11n-HT40								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	44.25	31.78	9.15	40.18	45.00	68.20	-23.20	Horizontal
5350.00	45.22	31.78	9.15	40.18	45.97	68.20	-22.23	Vertical
802.11n-HT40								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	34.55	31.78	9.15	40.18	35.30	54.00	-18.70	Horizontal
5350.00	35.69	31.78	9.15	40.18	36.44	54.00	-17.56	Vertical

Remark:

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

Band 4:

802.11a								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	49.32	32.27	9.30	40.54	50.35	78.20	-27.85	Horizontal
5725.00	48.57	32.27	9.30	40.54	49.60	78.20	-28.60	Vertical
802.11a								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	36.32	32.27	9.30	40.54	37.35	54.00	-16.65	Horizontal
5725.00	37.25	32.27	9.30	40.54	38.28	54.00	-15.72	Vertical
802.11a								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	49.50	32.71	9.37	40.69	50.89	78.20	-27.31	Horizontal
5850.00	50.25	32.71	9.37	40.69	51.64	78.20	-26.56	Vertical
802.11a								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	37.52	32.71	9.37	40.69	38.91	54.00	-15.09	Horizontal
5850.00	36.87	32.71	9.37	40.69	38.26	54.00	-15.74	Vertical

802.11n-HT20								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	49.65	32.27	9.30	40.54	50.68	78.20	-27.52	Horizontal
5725.00	50.02	32.27	9.30	40.54	51.05	78.20	-27.15	Vertical
802.11n-HT20								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	37.51	32.27	9.30	40.54	38.54	54.00	-15.46	Horizontal
5725.00	36.58	32.27	9.30	40.54	37.61	54.00	-16.39	Vertical
802.11n-HT20								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	49.58	32.71	9.37	40.69	50.97	78.20	-27.23	Horizontal
5850.00	49.36	32.71	9.37	40.69	50.75	78.20	-27.45	Vertical
802.11n-HT20								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	37.65	32.71	9.37	40.69	39.04	54.00	-14.96	Horizontal
5850.00	37.52	32.71	9.37	40.69	38.91	54.00	-15.09	Vertical

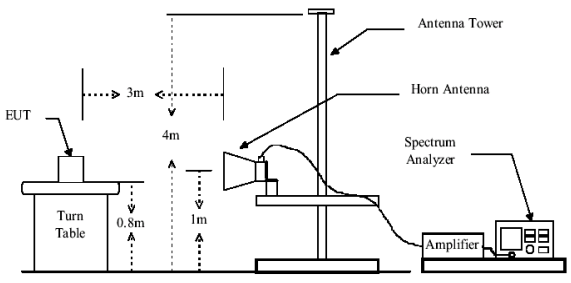
802.11n-HT40								
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	49.35	32.27	9.30	40.54	50.38	78.20	-27.82	Horizontal
5725.00	50.21	32.27	9.30	40.54	51.24	78.20	-26.96	Vertical
802.11n-HT40								
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	37.54	32.27	9.30	40.54	38.57	54.00	-15.43	Horizontal
5725.00	38.56	32.27	9.30	40.54	39.59	54.00	-14.41	Vertical
802.11n-HT40								
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	48.65	32.71	9.37	40.69	50.04	78.20	-28.16	Horizontal
5850.00	49.39	32.71	9.37	40.69	50.78	78.20	-27.42	Vertical
802.11n-HT40								
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	37.33	32.71	9.37	40.69	38.72	54.00	-15.29	Horizontal
5850.00	38.25	32.71	9.37	40.69	39.64	54.00	-14.36	Vertical

Remark:

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

6.8 Spurious Emission

6.8.1 Restricted Band

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407(b)</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4: 2003</td></tr>
<tr><td>Test Frequency Range:</td><td>Band 1: 4.5 GHz to 5.15 GHz and 5.35GHz to 5.46GHz
Band 4: 5.35 GHz to 5.46 GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>RMS</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td rowspan="2">Above 1GHz</td><td>74.00</td><td>Peak Value</td></tr>
<tr><td>54.00</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>7. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
8. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
9. 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.
10. 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.
11. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
12. 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.</td></tr>
<tr><td>Test setup:</td><td> 
</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 5.6 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td>Passed</td></tr>
</table>

Band 1:

802.11a

Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	50.25	30.72	8.54	40.67	48.84	74.00	-25.16	Horizontal
5150.00	49.65	32.07	9.13	40.06	50.79	74.00	-23.21	Horizontal
4500.00	50.24	30.72	8.54	40.67	48.83	74.00	-25.17	Vertical
5150.00	50.28	32.07	9.13	40.06	51.42	74.00	-22.58	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	32.25	30.72	8.54	40.67	30.84	54.00	-23.16	Horizontal
5150.00	33.65	32.07	9.13	40.06	34.79	54.00	-19.21	Horizontal
4500.00	32.35	30.72	8.54	40.67	30.94	54.00	-23.06	Vertical
5150.00	32.21	32.07	9.13	40.06	33.35	54.00	-20.65	Vertical
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	49.65	31.78	9.15	40.18	50.40	74.00	-23.60	Horizontal
5460.00	49.58	31.99	9.16	40.23	50.50	74.00	-23.50	Horizontal
5350.00	50.26	31.78	9.15	40.18	51.01	74.00	-22.99	Vertical
5460.00	49.66	31.99	9.16	40.23	50.58	74.00	-23.42	Vertical
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	32.65	31.78	9.15	40.18	33.40	54.00	-20.60	Horizontal
5460.00	33.21	31.99	9.16	40.23	34.13	54.00	-19.87	Horizontal
5350.00	33.20	31.78	9.15	40.18	33.95	54.00	-20.05	Vertical
5460.00	32.98	31.99	9.16	40.23	33.90	54.00	-20.10	Vertical

Remark:

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

802.11n-HT20

Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	49.65	30.72	8.54	40.67	48.24	74.00	-25.76	Horizontal
5150.00	50.54	32.07	9.13	40.06	51.68	74.00	-22.32	Horizontal
4500.00	50.35	30.72	8.54	40.67	48.94	74.00	-25.06	Vertical
5150.00	49.35	32.07	9.13	40.06	50.49	74.00	-23.51	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	34.35	30.72	8.54	40.67	32.94	54.00	-21.06	Horizontal
5150.00	33.65	32.07	9.13	40.06	34.79	54.00	-19.21	Horizontal
4500.00	35.21	30.72	8.54	40.67	33.80	54.00	-20.20	Vertical
5150.00	33.21	32.07	9.13	40.06	34.35	54.00	-19.65	Vertical
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	48.32	31.78	9.15	40.18	49.07	74.00	-24.93	Horizontal
5460.00	49.32	31.99	9.16	40.23	50.24	74.00	-23.76	Horizontal
5350.00	49.32	31.78	9.15	40.18	50.07	74.00	-23.93	Vertical
5460.00	48.65	31.99	9.16	40.23	49.57	74.00	-24.43	Vertical
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	34.21	31.78	9.15	40.18	34.96	54.00	-19.04	Horizontal
5460.00	33.65	31.99	9.16	40.23	34.57	54.00	-19.43	Horizontal
5350.00	33.36	31.78	9.15	40.18	34.11	54.00	-19.89	Vertical
5460.00	32.54	31.99	9.16	40.23	33.46	54.00	-20.54	Vertical

Remark:

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

802.11n-HT40

Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	49.64	30.72	8.54	40.67	48.23	74.00	-25.77	Horizontal
5150.00	49.65	32.07	9.13	40.06	50.79	74.00	-23.21	Horizontal
4500.00	50.89	30.72	8.54	40.67	49.48	74.00	-24.52	Vertical
5150.00	49.85	32.07	9.13	40.06	50.99	74.00	-23.01	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4500.00	33.65	30.72	8.54	40.67	32.24	54.00	-21.76	Horizontal
5150.00	32.35	32.07	9.13	40.06	33.49	54.00	-20.51	Horizontal
4500.00	34.21	30.72	8.54	40.67	32.80	54.00	-21.20	Vertical
5150.00	33.36	32.07	9.13	40.06	34.50	54.00	-19.50	Vertical
Test channel		Highest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	50.25	31.78	9.15	40.18	51.00	74.00	-23.00	Horizontal
5460.00	50.11	31.99	9.16	40.23	51.03	74.00	-22.97	Horizontal
5350.00	49.37	31.78	9.15	40.18	50.12	74.00	-23.89	Vertical
5460.00	50.10	31.99	9.16	40.23	51.02	74.00	-22.98	Vertical
Test channel		Highest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	32.36	31.78	9.15	40.18	33.11	54.00	-20.89	Horizontal
5460.00	33.60	31.99	9.16	40.23	34.52	54.00	-19.48	Horizontal
5350.00	33.32	31.78	9.15	40.18	34.07	54.00	-19.93	Vertical
5460.00	33.10	31.99	9.16	40.23	34.02	54.00	-19.98	Vertical

Remark:

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

Band 4:

802.11a

Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	48.36	31.78	9.15	40.18	49.11	74.00	-24.89	Horizontal
5460.00	49.35	31.99	9.16	40.23	50.27	74.00	-23.73	Horizontal
5350.00	49.65	31.78	9.15	40.18	50.40	74.00	-23.60	Vertical
5460.00	50.12	31.99	9.16	40.23	51.04	74.00	-22.96	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	34.12	31.78	9.15	40.18	34.87	54.00	-19.13	Horizontal
5460.00	33.65	31.99	9.16	40.23	34.57	54.00	-19.43	Horizontal
5350.00	33.69	31.78	9.15	40.18	34.44	54.00	-19.56	Vertical
5460.00	34.12	31.99	9.16	40.23	35.04	54.00	-18.96	Vertical

802.11n-HT20

Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	49.65	31.78	9.15	40.18	50.40	74.00	-23.60	Horizontal
5460.00	49.66	31.99	9.16	40.23	50.58	74.00	-23.42	Horizontal
5350.00	50.12	31.78	9.15	40.18	50.87	74.00	-23.13	Vertical
5460.00	49.75	31.99	9.16	40.23	50.67	74.00	-23.33	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	34.25	31.78	9.15	40.18	35.00	54.00	-19.00	Horizontal
5460.00	33.65	31.99	9.16	40.23	34.57	54.00	-19.43	Horizontal
5350.00	33.14	31.78	9.15	40.18	33.89	54.00	-20.11	Vertical
5460.00	34.56	31.99	9.16	40.23	35.48	54.00	-18.52	Vertical

Remark:

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

802.11n-HT40

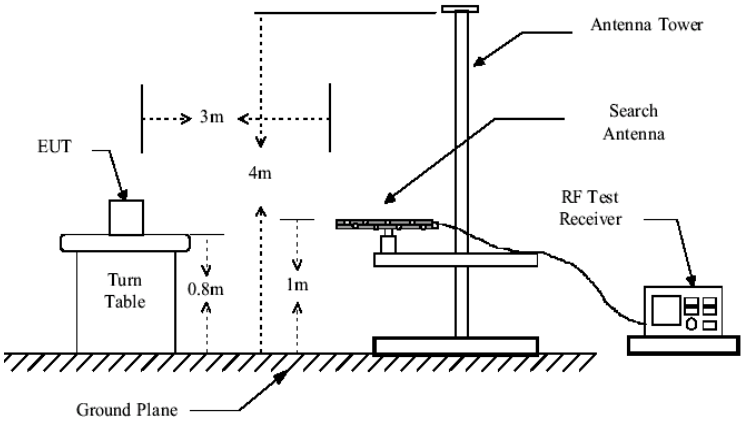
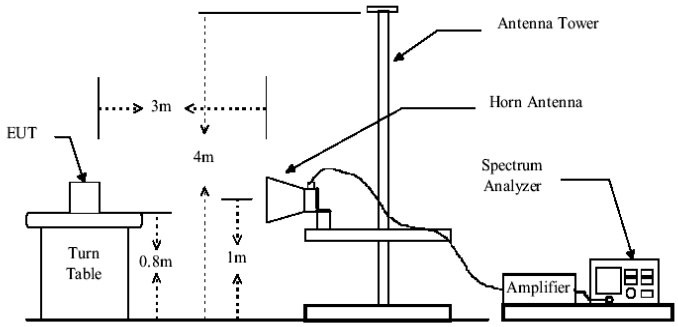
Test channel		Lowest			Level		Peak	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	49.65	31.78	9.15	40.18	50.40	74.00	-23.60	Horizontal
5460.00	49.68	31.99	9.16	40.23	50.60	74.00	-23.40	Horizontal
5350.00	50.12	31.78	9.15	40.18	50.87	74.00	-23.13	Vertical
5460.00	49.87	31.99	9.16	40.23	50.79	74.00	-23.21	Vertical
Test channel		Lowest			Level		Average	
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5350.00	34.25	31.78	9.15	40.18	35.00	54.00	-19.00	Horizontal
5460.00	34.14	31.99	9.16	40.23	35.06	54.00	-18.94	Horizontal
5350.00	33.35	31.78	9.15	40.18	34.10	54.00	-19.90	Vertical
5460.00	34.18	31.99	9.16	40.23	35.10	54.00	-18.90	Vertical

Remark:

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

6.8.2 Unwanted Emissions in the Restricted Bands

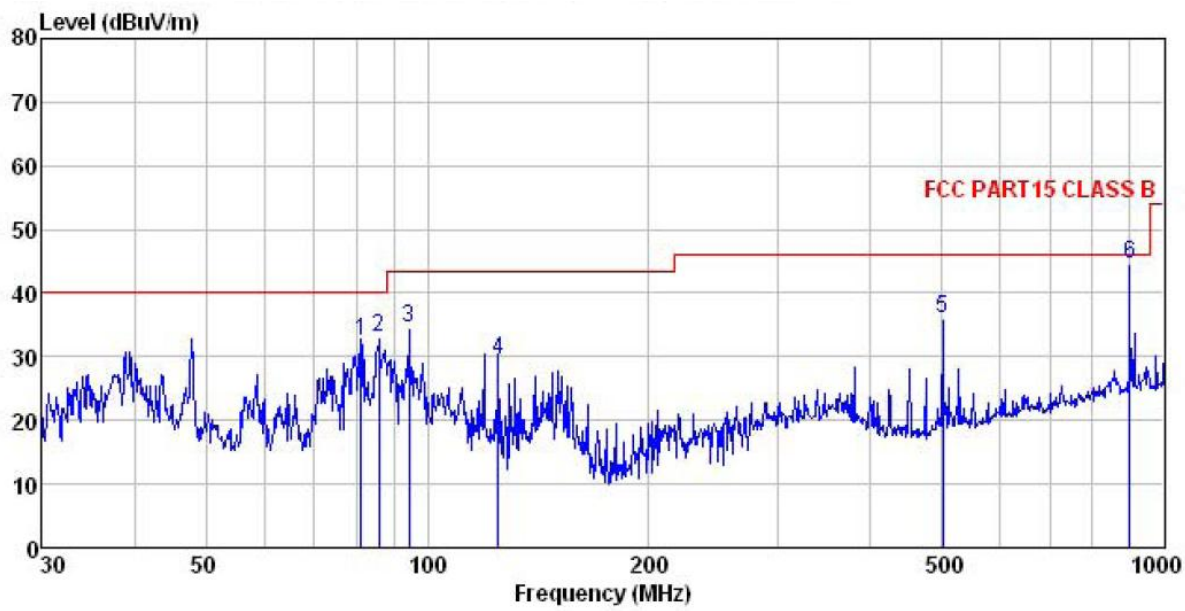
<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4:2003</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 40GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100kHz</td><td>300kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
</table>
<table>
<tr><th>Frequency</th><th>Limit (dBm/MHz)</th><th>Remark</th></tr>
<tr><td rowspan="2">Above 1GHz</td><td>68.20</td><td>Peak Value</td></tr>
<tr><td>54.00</td><td>Average Value</td></tr>
<tr><td colspan="3">Remark:
1. Above 1GHz limit:
E[dBμV/m] = EIRP[dBm] + 95.2=68.2 dBuV/m, for EIPR[dBm]=-27dBm.</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table 0.8 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.</td></tr>
</table>

Test setup:	Below 1GHz  Above 1GHz 
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Below 1GHz

Adapter 1: GRT-240050

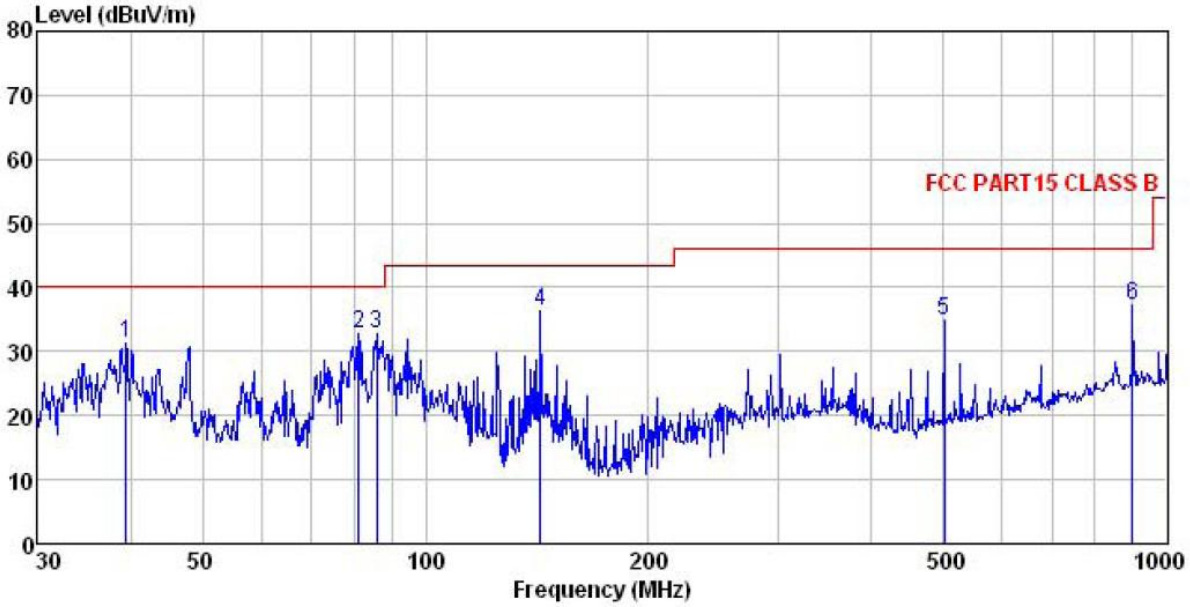
Horizontal:



Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) HORIZONTAL
Job No. : 479RF
EUT : Broadband Digital Transmission System
Model : DLB 5-15
Test mode : WIFI TX mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Winner
Remark : POE: GRT-240050

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	81.212	52.33	8.98	0.86	29.63	32.54	40.00	-7.46	QP
2	85.898	51.26	10.60	0.89	29.59	33.16	40.00	-6.84	QP
3	94.428	50.39	12.75	0.93	29.55	34.52	43.50	-8.98	QP
4	125.007	48.09	9.70	1.16	29.36	29.59	43.50	-13.91	QP
5	501.179	45.97	16.63	2.41	28.96	36.05	46.00	-9.95	QP
6	900.147	47.87	21.09	3.35	27.88	44.43	46.00	-1.57	QP

Vertical:

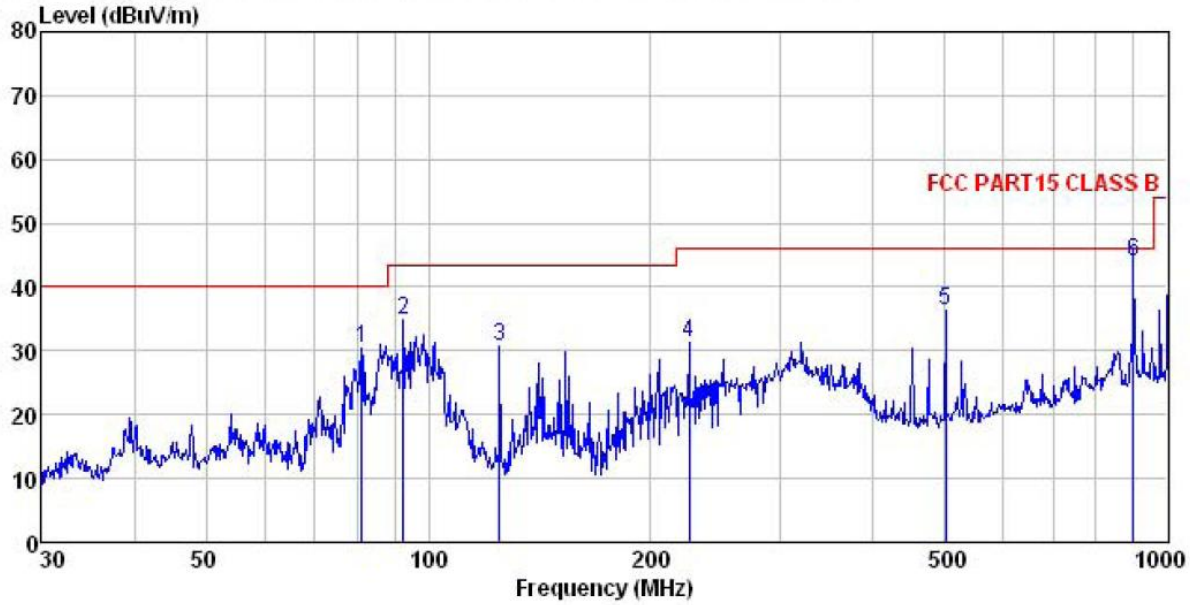


Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) VERTICAL
Job No. : 479RF
EUT : Broadband Digital Transmission System
Model : DLB 5-15
Test mode : WIFI TX mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Winner
Remark : POE: GRT-240050

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	39.437	47.18	13.44	0.52	29.91	31.23	40.00	-8.77	QP
2	81.212	52.62	8.98	0.86	29.63	32.83	40.00	-7.17	QP
3	85.898	50.84	10.60	0.89	29.59	32.74	40.00	-7.26	QP
4	142.824	56.14	8.21	1.28	29.26	36.37	43.50	-7.13	QP
5	501.179	44.77	16.63	2.41	28.96	34.85	46.00	-11.15	QP
6	900.147	40.54	21.09	3.35	27.88	37.10	46.00	-8.90	QP

Adapter 2: AY012E-ZF243

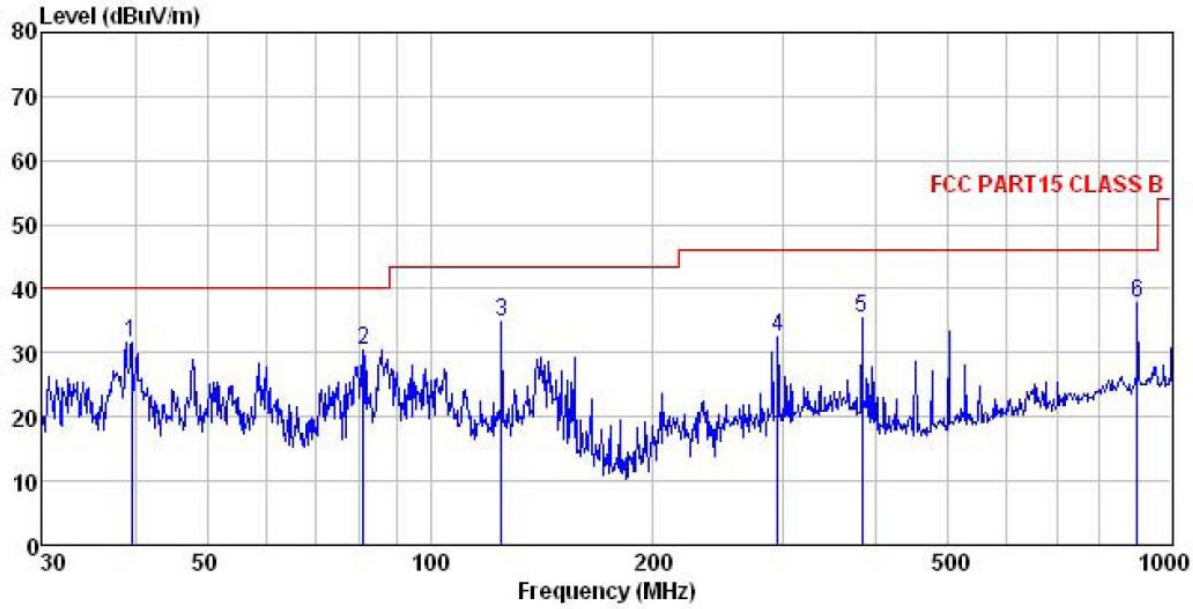
Horizontal:



Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) HORIZONTAL
Job No. : 479RF
EUT : Broadband Digital Transmission System
Model : DLB 5-15
Test mode : WIFI TX mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Winner
Remark : POE: AY012E-ZF243

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	81.212	50.34	8.98	0.86	29.63	30.55	40.00	-9.45	QP
2	92.462	51.08	12.41	0.92	29.56	34.85	43.50	-8.65	QP
3	125.007	49.07	9.70	1.16	29.36	30.57	43.50	-12.93	QP
4	225.308	47.06	11.41	1.51	28.68	31.30	46.00	-14.70	QP
5	501.179	46.28	16.63	2.41	28.96	36.36	46.00	-9.64	QP
6	900.147	47.46	21.09	3.35	27.88	44.02	46.00	-1.98	QP

Vertical:



Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) VERTICAL
Job No. : 479RF
EUT : Broadband Digital Transmission System
Model : DLB 5-15
Test mode : WIFI TX mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Winner
Remark : POE: AY012E-ZF243

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	39.576	47.57	13.49	0.52	29.90	31.68	40.00	-8.32	QP
2	81.212	50.07	8.98	0.86	29.63	30.28	40.00	-9.72	QP
3	125.007	53.32	9.70	1.16	29.36	34.82	43.50	-8.68	QP
4	294.114	46.18	12.95	1.75	28.46	32.42	46.00	-13.58	QP
5	382.588	47.48	14.68	2.06	28.70	35.52	46.00	-10.48	QP
6	900.147	41.11	21.09	3.35	27.88	37.67	46.00	-8.33	QP

Above 1GHz:

Band 1:

802.11a mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	44.25	39.23	13.84	41.34	55.98	68.20	-12.22	Vertical
10360.00	43.65	39.23	13.84	41.34	55.38	68.20	-12.82	Horizontal
802.11a mode Lowest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	31.25	39.23	13.84	41.34	42.98	54.00	-11.02	Vertical
10360.00	32.25	39.23	13.84	41.34	43.98	54.00	-10.02	Horizontal

802.11a mode Middle channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	42.59	39.36	13.85	41.27	54.53	68.20	-13.67	Vertical
10400.00	43.36	39.36	13.85	41.27	55.30	68.20	-12.90	Horizontal
802.11a mode Middle channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	31.25	39.36	13.85	41.27	43.19	54.00	-10.81	Vertical
10400.00	30.24	39.36	13.85	41.27	42.18	54.00	-11.82	Horizontal

802.11a mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	43.65	39.56	13.90	41.06	56.05	68.20	-12.15	Vertical
10480.00	44.25	39.56	13.90	41.06	56.65	68.20	-11.55	Horizontal
802.11a mode Highest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	30.25	39.56	13.90	41.06	42.65	54.00	-11.35	Vertical
10480.00	30.17	39.56	13.90	41.06	42.57	54.00	-11.43	Horizontal

Remark:

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

802.11n20 mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	43.66	39.23	13.84	41.34	55.39	68.20	-12.81	Vertical
10360.00	42.58	39.23	13.84	41.34	54.31	68.20	-13.89	Horizontal
802.11n20 mode Lowest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	30.25	39.23	13.84	41.34	41.98	54.00	-12.02	Vertical
10360.00	31.25	39.23	13.84	41.34	42.98	54.00	-11.02	Horizontal

802.11n20 mode Middle channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	43.25	39.36	13.85	41.27	55.19	68.20	-13.01	Vertical
10400.00	43.98	39.36	13.85	41.27	55.92	68.20	-12.28	Horizontal
802.11n20 mode Middle channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	30.21	39.36	13.85	41.27	42.15	54.00	-11.85	Vertical
10400.00	31.09	39.36	13.85	41.27	43.03	54.00	-10.98	Horizontal

802.11n20 mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	43.65	39.56	13.90	41.06	56.05	68.20	-12.15	Vertical
10480.00	44.54	39.56	13.90	41.06	56.94	68.20	-11.26	Horizontal
802.11n20 mode Highest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	30.24	39.56	13.90	41.06	42.64	54.00	-11.36	Vertical
10480.00	30.41	39.56	13.90	41.06	42.81	54.00	-11.19	Horizontal

Remark:

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

802.11n40 mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10380.00	43.66	39.29	13.84	41.31	55.48	68.20	-12.72	Vertical
10380.00	44.14	39.29	13.84	41.31	55.96	68.20	-12.24	Horizontal
802.11n40 mode Lowest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10380.00	30.25	39.29	13.84	41.31	42.07	54.00	-11.93	Vertical
10380.00	30.18	39.29	13.84	41.31	42.00	54.00	-12.00	Horizontal

802.11n40 mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10460.00	43.66	39.54	13.88	41.17	55.91	68.20	-12.29	Vertical
10460.00	44.35	39.54	13.88	41.17	56.60	68.20	-11.60	Horizontal
802.11n40 mode Highest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10460.00	31.02	39.54	13.88	41.17	43.27	54.00	-10.73	Vertical
10460.00	30.98	39.54	13.88	41.17	43.23	54.00	-10.77	Horizontal

Remark:

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

Band 4:

802.11a mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11490.00	42.36	40.25	13.82	40.75	55.68	68.20	-12.52	Vertical
11490.00	42.98	40.25	13.82	40.75	56.30	68.20	-11.90	Horizontal
802.11a mode Lowest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11490.00	30.25	40.25	13.82	40.75	43.57	54.00	-10.43	Vertical
11490.00	30.12	40.25	13.82	40.75	43.44	54.00	-10.56	Horizontal

802.11a mode Middle channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11570.00	43.25	40.17	13.78	40.91	56.29	68.20	-11.91	Vertical
11570.00	42.98	40.17	13.78	40.91	56.02	68.20	-12.18	Horizontal
802.11a mode Middle channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11570.00	30.12	40.17	13.78	40.91	43.16	54.00	-10.84	Vertical
11570.00	30.47	40.17	13.78	40.91	43.51	54.00	-10.49	Horizontal

802.11a mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11650.00	43.69	39.89	13.74	41.06	56.26	68.20	-11.94	Vertical
11650.00	44.32	39.89	13.74	41.06	56.89	68.20	-11.31	Horizontal
802.11a mode Highest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11650.00	30.12	39.89	13.74	41.06	42.69	54.00	-11.31	Vertical
11650.00	30.52	39.89	13.74	41.06	43.09	54.00	-10.91	Horizontal

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

802.11n20 mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11490.00	43.25	40.25	13.82	40.75	56.57	68.20	-11.63	Vertical
11490.00	42.36	40.25	13.82	40.75	55.68	68.20	-12.52	Horizontal
802.11n20 mode Lowest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11490.00	30.12	40.25	13.82	40.75	43.44	54.00	-10.56	Vertical
11490.00	29.66	40.25	13.82	40.75	42.98	54.00	-11.02	Horizontal

802.11n20 mode Middle channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11570.00	42.36	40.17	13.78	40.91	55.40	68.20	-12.80	Vertical
11570.00	43.68	40.17	13.78	40.91	56.72	68.20	-11.48	Horizontal
802.11n20 mode Middle channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11570.00	30.12	40.17	13.78	40.91	43.16	54.00	-10.84	Vertical
11570.00	29.98	40.17	13.78	40.91	43.02	54.00	-10.98	Horizontal

802.11n20 mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11650.00	44.25	39.89	13.74	41.06	56.82	68.20	-11.38	Vertical
11650.00	43.21	39.89	13.74	41.06	55.78	68.20	-12.42	Horizontal
802.11n20 mode Highest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11650.00	30.24	39.89	13.74	41.06	42.81	54.00	-11.19	Vertical
11650.00	29.77	39.89	13.74	41.06	42.34	54.00	-11.66	Horizontal

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

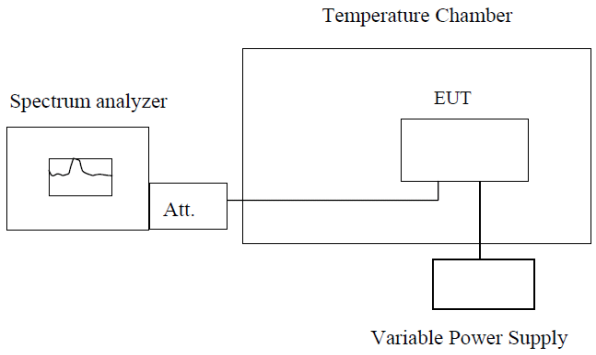
802.11n40 mode Lowest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11510.00	43.65	40.26	13.83	40.77	56.97	68.20	-11.23	Vertical
11510.00	43.11	40.26	13.83	40.77	56.43	68.20	-11.77	Horizontal
802.11n40 mode Lowest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11510.00	30.25	40.26	13.83	40.77	43.57	54.00	-10.43	Vertical
11510.00	29.84	40.26	13.83	40.77	43.16	54.00	-10.84	Horizontal

802.11n40 mode Highest channel (Peak Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11590.00	42.36	40.08	13.77	40.95	55.26	68.20	-12.94	Vertical
11590.00	43.32	40.08	13.77	40.95	56.22	68.20	-11.98	Horizontal
802.11n40 mode Highest channel (Average Value)								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
11590.00	30.12	40.08	13.77	40.95	43.02	54.00	-10.98	Vertical
11590.00	29.36	40.08	13.77	40.95	42.26	54.00	-11.74	Horizontal

Remark:

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

6.9 Frequency stability

Test Requirement:	FCC Part15 E Section 15.407 (g)
Limit:	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test procedure:	1. The EUT is installed in an environment test chamber with external power source. 2. Set the chamber to operate at 50 centigrade and external power source to output at nominal voltage of EUT. 3. A sufficient stabilization period at each temperature is used prior to each frequency measurement. 4. When temperature is stabled, measure the frequency stability. 5. The test shall be performed under -30 to 50 centigrade and 85 to 115 percent of the nominal voltage. Change setting of chamber and external power source to complete all conditions.
Test Instruments:	Refer to section 5.6 for details
Test mode:	Refer to section 5.3 for details, and all channels have been tested, only shows the worst channel data in this report.
Test results:	Passed

Measurement Data (the worst channel):

Band 1:

Voltage vs. Frequency Stability (Lowest channel=5180MHz)

Test conditions		Frequency(MHz)	Max. Deviation (ppm)
Temp(℃)	Voltage(AC /60Hz)		
20	138	5179.984500	2.99
	120	5179.987800	2.36
	102	5179.987400	2.43

Temperature vs. Frequency Stability (Lowest channel=5180MHz)

Test conditions		Frequency(MHz)	Max. Deviation (ppm)
Voltage(AC /60Hz)	Temp(℃)		
120	-20	5179.985100	2.88
	-10	5179.987400	2.43
	0	5179.988200	2.28
	10	5179.988400	2.24
	20	5179.988700	2.18
	30	5179.986800	2.55
	40	5179.984700	2.95
	50	5179.983500	3.19

Band 4:

Voltage vs. Frequency Stability (Lowest channel=5745MHz)

Test conditions		Frequency(MHz)	Max. Deviation (ppm)
Temp(℃)	Voltage(AC /60Hz)		
20	138	5744.986584	2.34
	120	5744.988745	1.96
	102	5744.987548	2.17

Temperature vs. Frequency Stability (Lowest channel=5745MHz)

Test conditions		Frequency(MHz)	Max. Deviation (ppm)
Voltage(AC /60Hz)	Temp(℃)		
120	-20	5744.993550	1.12
	-10	5744.998471	0.27
	0	5744.989878	1.76
	10	5744.997884	0.37
	20	5744.988875	1.94
	30	5744.998541	0.25
	40	5744.986784	2.30
	50	5744.990247	1.70