FCC TEST REPORT

According to

FCC Rules and Regulations Part 15 Subpart C

Applicant	:	Olive Media Inc.
Address	:	One Letterman Drive, Building D Promenade, San Francisco, CA 94129, USA
Equipment	:	Digital Audio Player
Model No.	:	O1-S, O1-1S, O1-2S
Trade Name	:	Olive
FCC ID	:	2AB8O-O1-001

- The test result refers exclusively to the test presented test model / sample.,
- Without written approval of **Cerpass Technology Corp.,** the test report shall not be reproduced except in full.

Laboratory Accreditation

TAF Testing Laboratory 1439

NVLAP LAB CODE: 200954-0

Contents

History of this test report

■ ORIGINAL.

☐ Additional attachment as following record:

Attachment No.	Issue Date	Description
TEFI1308027	Mar. 14, 2014	Original.

CERTIFICATE OF COMPLIANCE

According to

FCC Rules and Regulations Part 15 Subpart C

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Equipment	:	Digital Audio Player
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FCC ID	:	2AB8O-O1-001

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 2009, KDB558074 & KDB662911.** The equipment was ***passed*** the test performed according to **FCC Rules and Regulations Part 15 Subpart C (2010).**

The sample was received on Jun. 25, 2014 and the testing was carried out on Aug. 25, 2014 at Cerpass Technology Corp.

Approved by:

Hill Chen
EMC/RF B.U. Assistant Manager

Tested by:

Aiden Lu
Engineer

1. Report of Measurements and Examinations

1.1 List of Measurements and Examinations

FCC Rule	. Description of Test	Result
15.203	. Antenna Requirement	Pass
15.207	. Conducted Emission	Pass
15.209 15.247(d)	. Radiated Emission	Pass
15.247(a)(2)	. 6dB Bandwidth	Pass
15.247(b)	. Maximum Peak Output Power	Pass
15.247(d)	. 100kHz Bandwidth of Frequency Band Edges	Pass
15.247(e)	. Power Spectral Density	Pass
1.1307 1.1310 2.1091 2.1093	. RF Exposure Compliance	Pass

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Frequency range	802.11b/g/n: 2.412-2.462GHz Bluetooth: 2.402-2.480GHz
Channel spacing	802.11b/g/n: 5MHz Bluetooth: 1MHz
Channel List	802.11b/g/n:1-11 channels Bluetooth: 0-78 channels
Modulation type	802.11b/g/n: DSSS, OFDM Bluetooth: FHSS
Data Rate	802.11b/g/n: 802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS8, MCS9, MCS10, MCS11, MCS12, MCS13, MCS14, MCS15 Mbps Bluetooth: GFSK: 1Mbps π/4-QPSK: 2Mbps 8DPSK: 3Mbps
Antenna type & gain	WIFI: Antenna 1: Dipole/ 3 dBi Antenna 2: PIFA/ 1.65dBi BT: Printed/ 1.87dBi

2.2 Carrier Frequency of Channels

802.11b, 802.11g, 802.11n HT 20

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437	---	---

2.3 Test Mode and Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
b. The complete test system included Notebook and EUT for RF test.
c. An executive progam“WI command” under XP was executed to keep transmitting and receiving data via Wireless.
d. The following test modes were performed for test:
   - 802.11b/g/n HT20: CH01: 2412MHz, CH06: 2437MHz, CH11: 2462MHz

   * Power output of data rate:

mode	antenna TX1								
	rate	1M		2M		5.5M		11M	
802.11b	Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
	1	18.18	14.47	18.55	14.83	18.52	14.80	18.57	14.56
	6	18.17	14.43	18.58	14.86	18.57	14.86	18.60	14.57
	11	18.21	14.47	18.63	14.92	18.65	14.93	18.54	14.40
mode	rate	6M		9M		12M		18M	
802.11g	Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
	1	22.19	12.26	22.25	12.37	22.15	12.35	22.02	11.86
	6	22.25	12.34	22.15	12.25	22.06	12.17	22.08	11.97
	11	22.22	12.38	22.15	12.20	22.12	12.25	22.12	12.14
mode	rate	24M		36M		48M		54M	
802.11g	Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
	1	22.07	12.10	22.21	11.82	22.06	11.20	21.98	11.10
	6	22.03	11.96	22.05	11.67	22.12	11.45	22.15	11.37
	11	22.01	11.98	22.06	11.75	22.15	11.52	22.21	11.43
mode	rate	MCS8		MCS9		MCS10		MCS11	
802.11n HT20	Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
	1	22.02	11.86	21.97	11.80	22.14	11.27	21.95	11.12
	6	22.12	11.92	22.05	11.87	22.23	11.45	22.01	11.18
	11	21.96	11.83	22.01	11.75	22.24	11.49	22.02	11.21
mode	rate	MCS12		MCS13		MCS14		MCS15	
802.11n HT20	Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
	1	21.95	10.82	22.02	10.56	22.05	10.40	22.03	10.26
	6	22.05	10.90	22.06	10.68	22.01	10.15	22.01	10.08
	11	22.10	10.96	22.11	10.74	22.02	10.22	21.97	10.05

antenna TX2								
rate	1M		2M		5.5M		11M	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	18.62	14.75	18.75	14.92	18.91	15.09	18.83	14.68
6	18.50	14.66	18.89	15.03	18.85	14.96	18.82	14.67
11	18.49	14.63	18.82	14.97	18.82	14.90	18.81	14.66
rate	6M		9M		12M		18M	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	22.76	12.57	22.63	12.45	22.45	12.35	22.35	12.28
6	22.66	12.50	22.71	12.51	22.41	12.30	22.31	12.14
11	22.51	12.44	22.56	12.39	12.37	12.28	22.57	12.57
rate	24M		36M		48M		54M	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	22.45	12.30	22.43	11.94	22.43	11.73	22.38	11.63
6	22.35	12.25	22.51	12.05	22.50	11.78	22.35	11.57
11	22.41	12.27	22.47	11.91	22.32	11.71	22.36	11.60
rate	MCS8		MCS9		MCS10		MCS11	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	22.47	12.33	22.05	11.86	22.42	11.77	22.35	11.53
6	22.42	12.37	22.25	12.05	22.41	11.75	22.25	11.40
11	22.33	12.28	22.25	12.07	22.29	11.73	22.30	11.50
rate	MCS12		MCS13		MCS14		MCS15	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	22.03	11.21	22.00	10.80	22.03	10.71	22.12	10.63
6	22.01	11.16	22.06	10.85	22.10	10.75	22.10	10.58
11	22.00	11.14	21.97	10.72	22.00	10.62	22.05	10.55

TX1+TX2								
rate	1M		2M		5.5M		11M	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	21.42	17.62	21.66	17.89	21.73	17.96	21.71	17.63
6	21.35	17.56	21.75	17.96	21.72	17.92	21.72	17.63
11	21.36	17.56	21.74	17.96	21.75	17.93	21.69	17.54
rate	6M		9M		12M		18M	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	25.49	15.43	25.45	15.42	25.31	15.36	25.20	15.09
6	25.47	15.43	25.45	15.39	25.25	15.25	25.21	15.07
11	25.38	15.42	25.37	15.31	22.56	15.28	25.36	15.37
rate	24M		36M		48M		54M	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	25.27	15.21	25.33	14.89	25.26	14.48	25.19	14.38
6	25.20	15.12	25.30	14.87	25.32	14.63	25.26	14.48
11	25.22	15.14	25.28	14.84	25.25	14.63	25.30	14.53
rate	MCS8		MCS9		MCS10		MCS11	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	25.26	15.11	25.02	14.84	25.29	14.54	25.16	14.34
6	25.28	15.16	25.16	14.97	25.33	14.61	25.14	14.30
11	25.16	15.07	25.14	14.92	25.28	14.62	25.17	14.37
rate	MCS12		MCS13		MCS14		MCS15	
Channel	Peak	Average	Peak	Average	Peak	Average	Peak	Average
1	25.00	14.03	25.02	13.69	25.05	13.57	25.09	13.46
6	25.04	14.04	25.07	13.78	25.07	13.47	25.07	13.35
11	25.06	14.06	25.05	13.74	25.02	13.43	25.02	13.32

2.4 Description of Test System

Device	Manufacturer	Model No.	Description
Notebook	ASUS	A8J	Power Cable, Unshielding 1.8m

Used cable

Cable	Quantity	Description
USB	1	Unshielding, 1.8m

2.5 General Information of Test

Test Site :	Cerpass Technology Corporation Test Laboratory No.10, Lane 2, Lianfu Street, Luzhu Township, Taoyuan County 33848, Taiwan(R.O.C.)
Test Site Location :	2F-11, No. 3, Yuan Qu St., (Nankang Software Park), Taipei, Taiwan 115, R.O.C.
Test Site Location :	No.68-1, Shihbachongsi, Shihding Township, Taipei City 223, Taiwan, R.O.C.
FCC Registration Number :	TW1049, TW1061, 488071, 390316
IC Registration Number :	4934B-1, 4934D-1, 4934E-1, 4934E-2
VCCI Registration Number :	T-1173 for Telecommunication Test C-4139 for Conducted emission test R-3428 for Radiated emission test G-97 for radiated disturbance above 1GHz
Frequency Range Investigated:	Conducted: from 150kHz to 30MHz Radiation: from 30MHz to 40,000MHz
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.

2.6 Measurement Uncertainty

Measurement Item	**Uncertainty**
Radiated emission	±4.11dB
Peak Output Power(conducted)	±1.38dB
Peak Output Power(Radiated)	±1.70dB
Power Spectral Density	±1.39dB
Radiated emission(3m)	±4.11dB
Radiated emission(10m)	±3.89dB

3. Antenna Requirements

3.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

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

3.2 Antenna Construction and Directional Gain

Antenna 1
Antenna Type: Dipole Antenna
Antenna Gain: 3 dBi

Antenna 2
Antenna Type: PIFA Antenna
Antenna Gain: 1.65 dBi

Directional gain = $10 \log(10^{gain1/20} + 10^{gain2/20})$ dBi = 10log(0.444) = 4.44 (dBi)

4. Test of Conducted Emission

4.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-2009 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

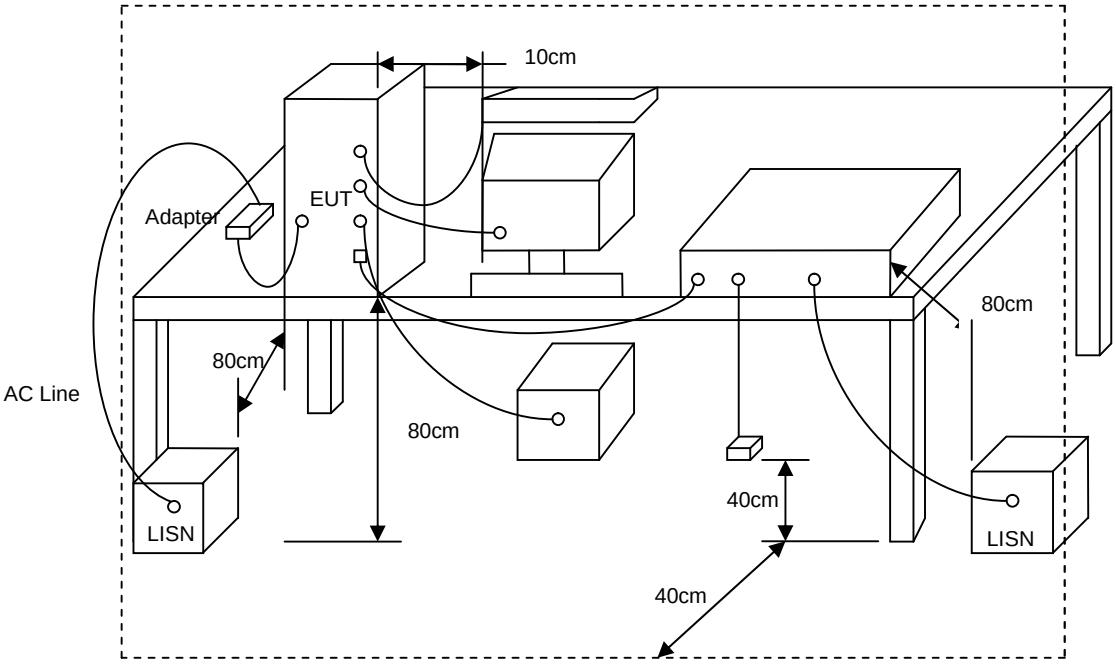
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

4.2 Test Procedures

a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connecting to the other LISN.
d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
e. The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150 kHz to 30 MHz was searched.
h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

4.3 Typical Test Setup

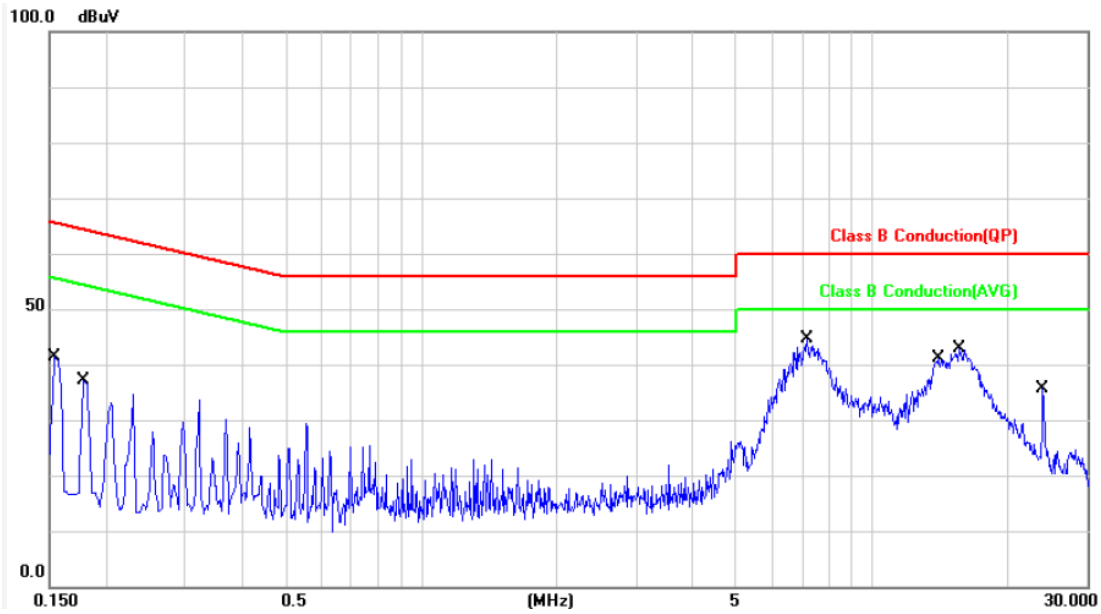


4.4 Measurement Equipment

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI	100821	2013/09/18	2014/09/17
LISN	Schwarzbeck	NSLK 8127	8127-740	2014/08/14	2015/08/13
LISN	Schwarzbeck	NSLK 8127	8127-516	2014/03/10	2015/03/09
Software	Farad	Ez-EMC	ver.ct3a1	N/A	N/A

4.5 Test Result and Data

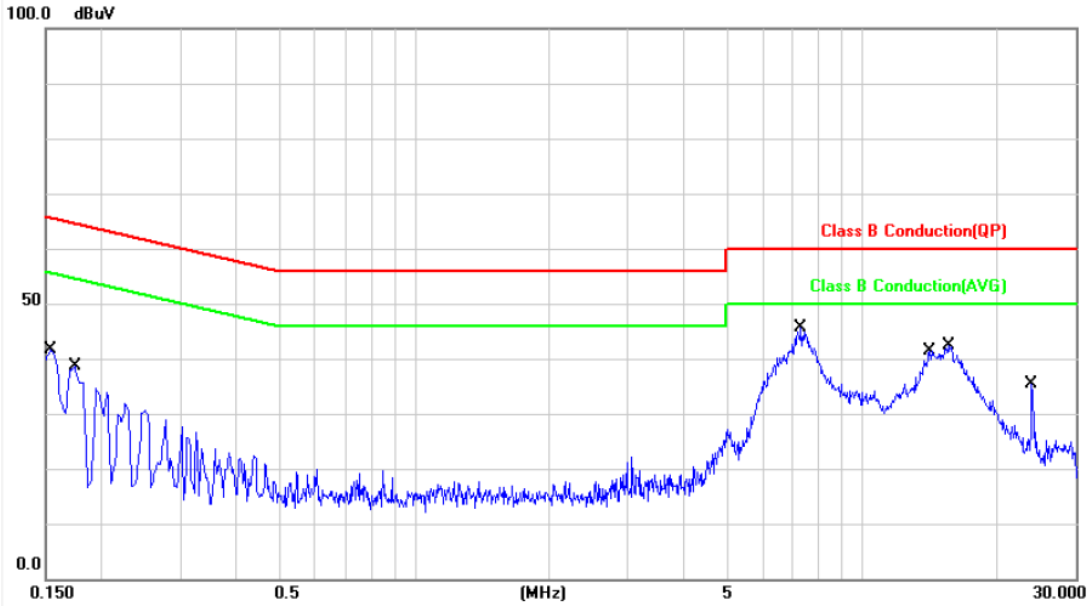
Power	:	AC 120V	Pol/Phase	:	LINE
Test Mode	:	802.11g, CH1	Temperature	:	23 °C
			Humidity	:	53 %
Test Date	:	Aug. 25, 2014	Atmospheric Pressure	:	1014 hpa



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1539	9.92	23.94	33.86	65.78	-31.92	QP	P
2	0.1539	9.92	4.74	14.66	55.78	-41.12	AVG	P
3	0.1780	9.92	20.66	30.58	64.57	-33.99	QP	P
4	0.1780	9.92	3.24	13.16	54.57	-41.41	AVG	P
5	7.2059	10.18	28.31	38.49	60.00	-21.51	QP	P
6	7.2059	10.18	19.55	29.73	50.00	-20.27	AVG	P
7	14.0299	10.35	23.23	33.58	60.00	-26.42	QP	P
8	14.0299	10.35	15.47	25.82	50.00	-24.18	AVG	P
9	15.5859	10.39	27.13	37.52	60.00	-22.48	QP	P
10	15.5859	10.39	16.07	26.46	50.00	-23.54	AVG	P
11	24.0140	10.52	23.58	34.10	60.00	-25.90	QP	P
12	24.0140	10.52	23.15	33.67	50.00	-16.33	AVG	P

Note: Level = Reading + Factor
Margin = Level – Limit
Factor= (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator

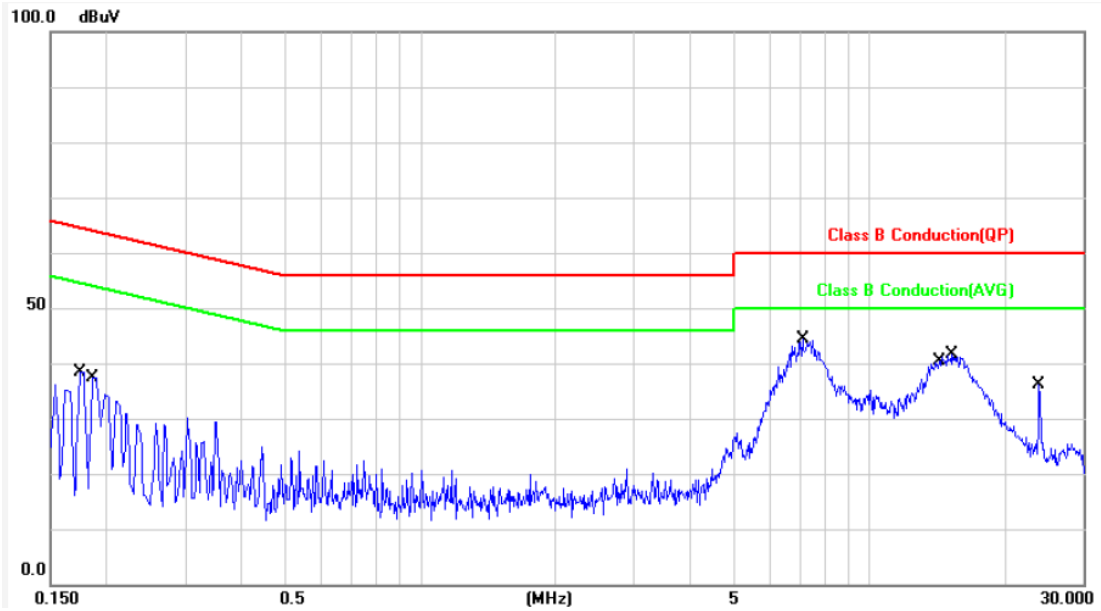
Power	:	AC 120V	Pol/Phase	:	NEUTRAL
Test Mode	:	802.11g, CH1	Temperature	:	23 °C
			Humidity	:	53 %
Test Date	:	Aug. 25, 2014	Atmospheric Pressure	:	1014 hpa



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1539	9.92	33.46	43.38	65.78	-22.40	QP	P
2	0.1539	9.92	9.05	18.97	55.78	-36.81	AVG	P
3	0.1740	9.92	21.52	31.44	64.76	-33.32	QP	P
4	0.1740	9.92	3.16	13.08	54.76	-41.68	AVG	P
5	7.3060	10.18	28.85	39.03	60.00	-20.97	QP	P
6	7.3060	10.18	20.25	30.43	50.00	-19.57	AVG	P
7	14.1740	10.33	24.20	34.53	60.00	-25.47	QP	P
8	14.1740	10.33	16.77	27.10	50.00	-22.90	AVG	P
9	15.5900	10.36	27.15	37.51	60.00	-22.49	QP	P
10	15.5900	10.36	17.56	27.92	50.00	-22.08	AVG	P
11	24.0140	10.50	23.35	33.85	60.00	-26.15	QP	P
12	24.0140	10.50	22.94	33.44	50.00	-16.56	AVG	P

Note: Level = Reading + Factor
Margin = Level – Limit
Factor= (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator

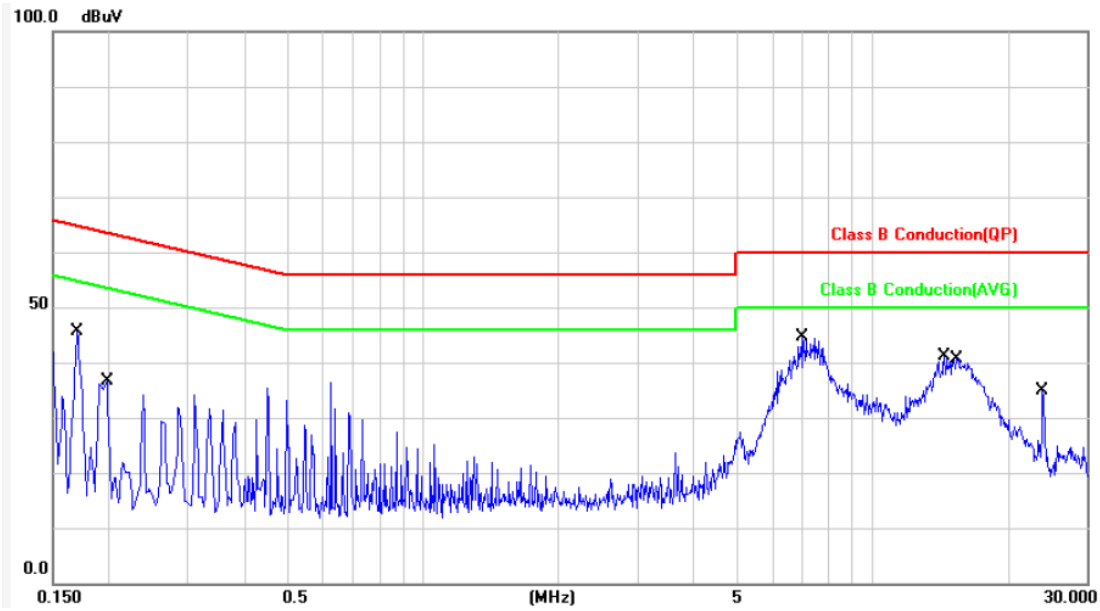
Power	:	AC 120V	Pol/Phase	:	LINE
Test Mode	:	802.11n HT20, CH1	Temperature	:	23 °C
			Humidity	:	53 %
Test Date	:	Aug. 25, 2014	Atmospheric Pressure	:	1014 hpa



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1740	9.92	20.79	30.71	64.76	-34.05	QP	P
2	0.1740	9.92	2.41	12.33	54.76	-42.43	AVG	P
3	0.1860	9.92	19.29	29.21	64.21	-35.00	QP	P
4	0.1860	9.92	1.64	11.56	54.21	-42.65	AVG	P
5	7.1100	10.18	28.21	38.39	60.00	-21.61	QP	P
6	7.1100	10.18	19.07	29.25	50.00	-20.75	AVG	P
7	14.0740	10.35	24.61	34.96	60.00	-25.04	QP	P
8	14.0740	10.35	17.12	27.47	50.00	-22.53	AVG	P
9	15.2980	10.38	27.03	37.41	60.00	-22.59	QP	P
10	15.2980	10.38	16.87	27.25	50.00	-22.75	AVG	P
11	24.0140	10.52	23.60	34.12	60.00	-25.88	QP	P
12	24.0140	10.52	23.15	33.67	50.00	-16.33	AVG	P

Note: Level = Reading + Factor
Margin = Level – Limit
Factor= (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator

Power	:	AC 120V	Pol/Phase	:	NEUTRAL
Test Mode	:	802.11n HT20, CH1	Temperature	:	23 °C
			Humidity	:	53 %
Test Date	:	Aug. 25, 2014	Atmospheric Pressure	:	1014 hpa



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1700	9.92	23.42	33.34	64.96	-31.62	QP	P
2	0.1700	9.92	3.14	13.06	54.96	-41.90	AVG	P
3	0.1980	9.91	17.91	27.82	63.69	-35.87	QP	P
4	0.1980	9.91	1.09	11.00	53.69	-42.69	AVG	P
5	7.0179	10.18	27.71	37.89	60.00	-22.11	QP	P
6	7.0179	10.18	18.53	28.71	50.00	-21.29	AVG	P
7	14.4539	10.36	25.91	36.27	60.00	-23.73	QP	P
8	14.4539	10.36	16.81	27.17	50.00	-22.83	AVG	P
9	15.4259	10.36	26.78	37.14	60.00	-22.86	QP	P
10	15.4259	10.36	16.35	26.71	50.00	-23.29	AVG	P
11	24.0140	10.50	23.34	33.84	60.00	-26.16	QP	P
12	24.0140	10.50	22.93	33.43	50.00	-16.57	AVG	P

Note: Level = Reading + Factor
Margin = Level – Limit
Factor= (LISN or ISN or PLC or Current Probe) Factor + Cable Loss + Attenuator

5. Test of Radiated Emission

5.1 Test Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

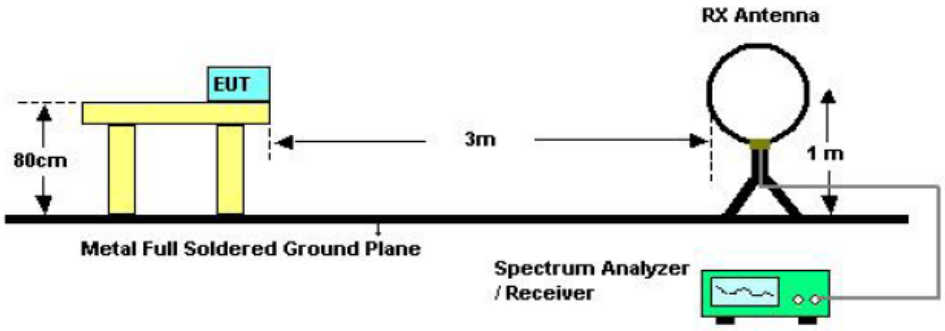
Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

5.2 Test Procedures

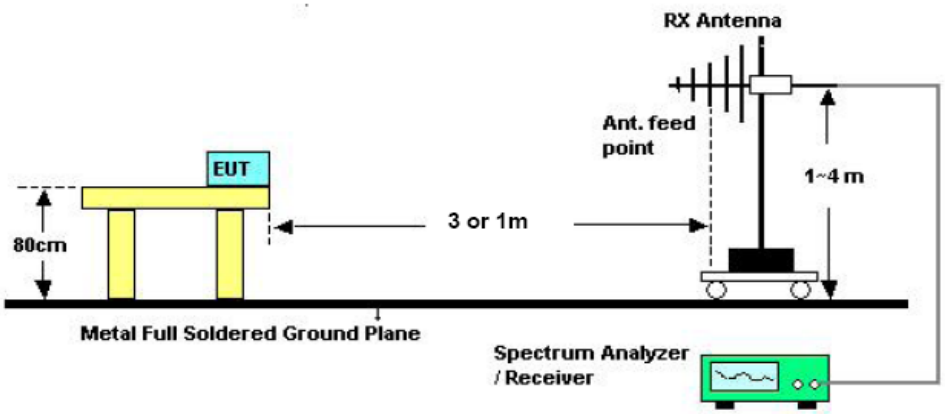
a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
i. “Cone of radiation” has been considered to be 3dB bandwidth of the measurement antenna.

5.3 Typical Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

5.4 Measurement Equipment

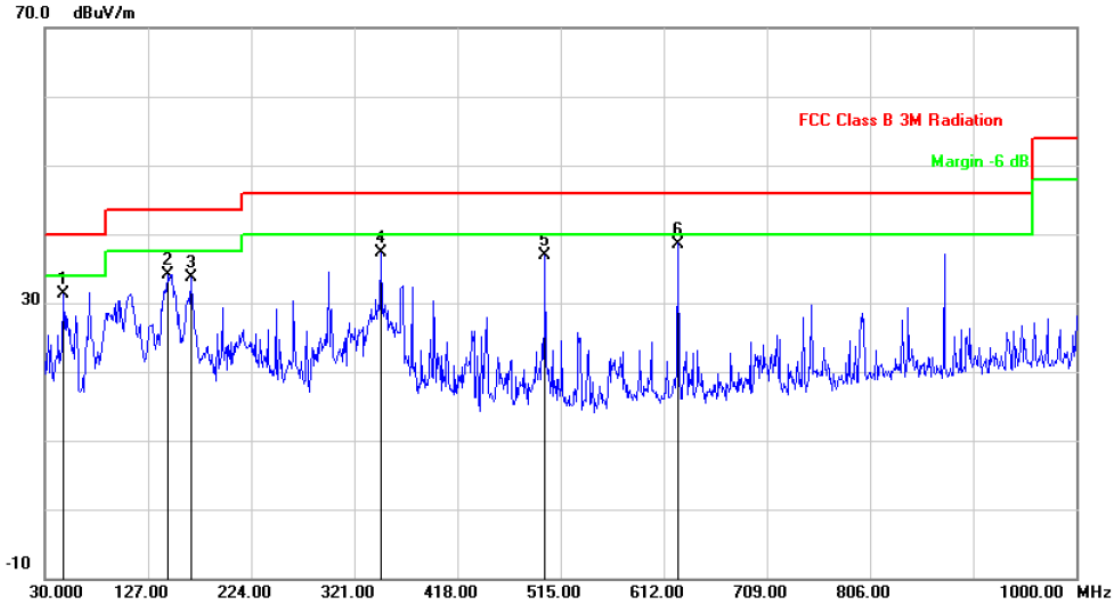
Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Receiver	R&S	ESCI	100443	2014/04/09	2015/04/08
Bilog Antenna	Schwarzbeck	VULB 9168	275	2013/10/01	2014/09/30
Amplifier	QuieTek	AP/0100A	CHM0906075	2013/09/30	2014/09/29
SPECTRUM ANALYZER	R&S	FSP40	100219	2013/09/14	2014/09/13
HORN ANTENNA	EMCO	3115	31601	2013/09/18	2014/09/17
PREAMPLIFIER	AGILENT	8449B	3008A01954	2014/03/28	2015/03/27

5.5 Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

5.6 Test Result and Data (30MHz ~ 1GHz)

Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode	:	802.11g, CH1	Temperature	:	25 °C
			Humidity	:	54 %
Test Date	:	Jun. 27, 2014	Atmospheric Pressure	:	1100 hpa

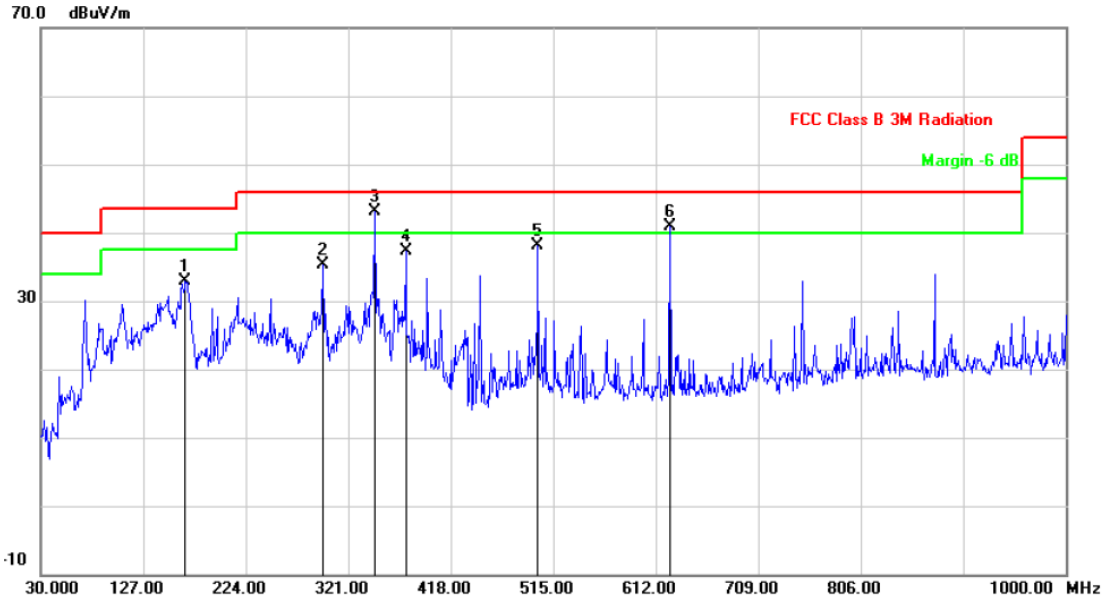


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	47.4600	-18.06	49.32	31.26	40.00	-8.74	peak	100	192
2	145.4300	-18.91	53.05	34.14	43.50	-9.36	peak	100	192
3	167.7400	-18.94	52.72	33.78	43.50	-9.72	peak	100	192
4	346.2200	-16.57	53.94	37.37	46.00	-8.63	peak	100	192
5	500.4500	-12.74	49.64	36.90	46.00	-9.10	peak	100	192
6	625.5800	-10.01	48.61	38.60	46.00	-7.40	peak	100	192

Note: Level = Reading + Factor

Margin = Level – Limit

Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode	:	802.11g, CH1	Temperature	:	25 °C
			Humidity	:	54 %
Test Date	:	Jun. 27, 2014	Atmospheric Pressure	:	1100 hpa

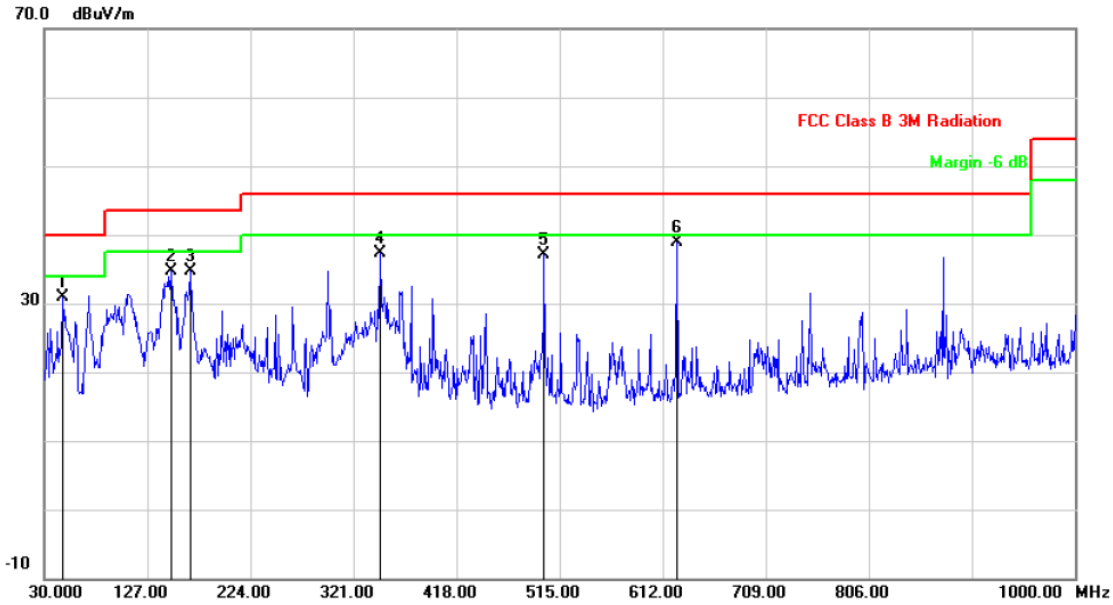


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	166.7700	-18.90	51.89	32.99	43.50	-10.51	peak	100	190
2	296.7500	-17.89	53.22	35.33	46.00	-10.67	peak	100	190
3	346.2200	-16.57	59.62	43.05	46.00	-2.95	peak	100	190
4	375.3200	-15.71	53.01	37.30	46.00	-8.70	peak	100	190
5	500.4500	-12.74	50.80	38.06	46.00	-7.94	peak	100	190
6	625.5800	-10.01	50.98	40.97	46.00	-5.03	peak	100	190

Note: Level = Reading + Factor

Margin = Level – Limit

Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode	:	802.11n HT20, CH1	Temperature	:	25 °C
			Humidity	:	54 %
Test Date	:	Jun. 27, 2014	Atmospheric Pressure	:	1100 hpa

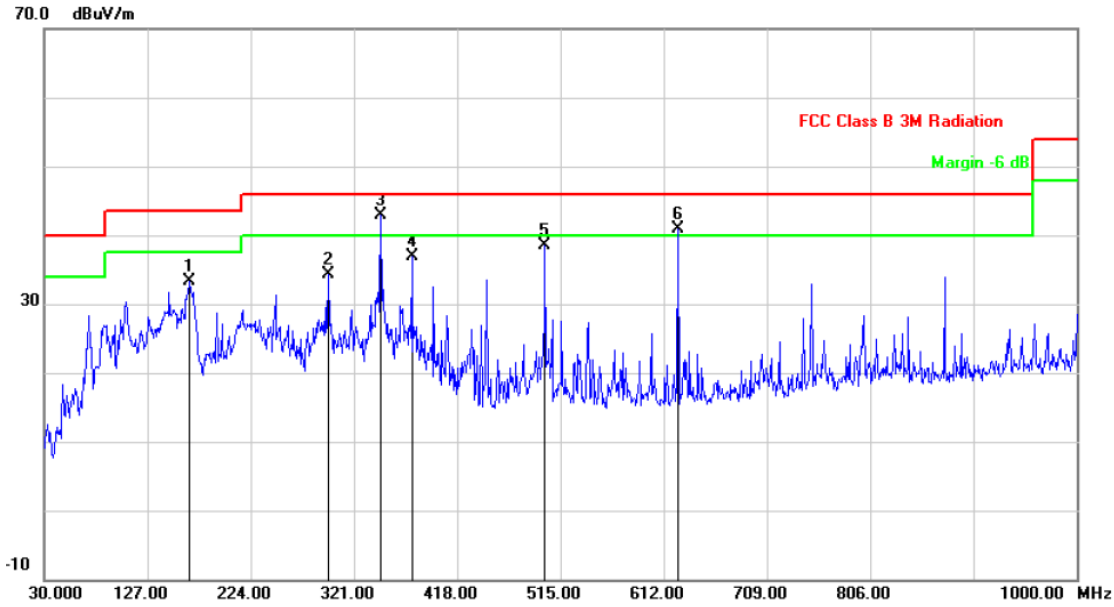


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	47.4600	-18.06	48.99	30.93	40.00	-9.07	peak	100	195
2	149.3100	-18.75	53.51	34.76	43.50	-8.74	peak	100	195
3	167.7400	-18.94	53.73	34.79	43.50	-8.71	peak	100	195
4	346.2200	-16.57	53.90	37.33	46.00	-8.67	peak	100	195
5	500.4500	-12.74	49.80	37.06	46.00	-8.94	peak	100	195
6	625.5800	-10.01	48.95	38.94	46.00	-7.06	peak	100	195

Note: Level = Reading + Factor

Margin = Level – Limit

Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode	:	802.11n HT20, CH1	Temperature	:	25 °C
			Humidity	:	54 %
Test Date	:	Jun. 27, 2014	Atmospheric Pressure	:	1100 hpa



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	166.7700	-18.90	52.13	33.23	43.50	-10.27	peak	100	188
2	296.7500	-17.89	52.13	34.24	46.00	-11.76	peak	100	188
3	346.2200	-16.57	59.41	42.84	46.00	-3.16	peak	100	188
4	375.3200	-15.71	52.66	36.95	46.00	-9.05	peak	100	188
5	500.4500	-12.74	51.27	38.53	46.00	-7.47	peak	100	188
6	625.5800	-10.01	50.97	40.96	46.00	-5.04	peak	100	188

Note: Level = Reading + Factor

Margin = Level – Limit

5.7 Test Result and Data (Above 1GHz)

The 9kHz-30MHz spurious emission is under limit 20dB more.

6. 6dB Bandwidth Measurement Data

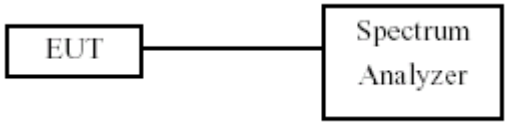
6.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

6.2 Test Procedures

a. The transmitter output was connected to the spectrum analyzer.
b. Set RBW of spectrum analyzer to 1~5% of the emission bandwidth and VBW ≥ 3x RBW.
c. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.
d. The 6dB Bandwidth was measured and recorded.

6.3 Test Setup Layout



6.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	R&S	FSP40	100047	2014/03/27	2015/03/26

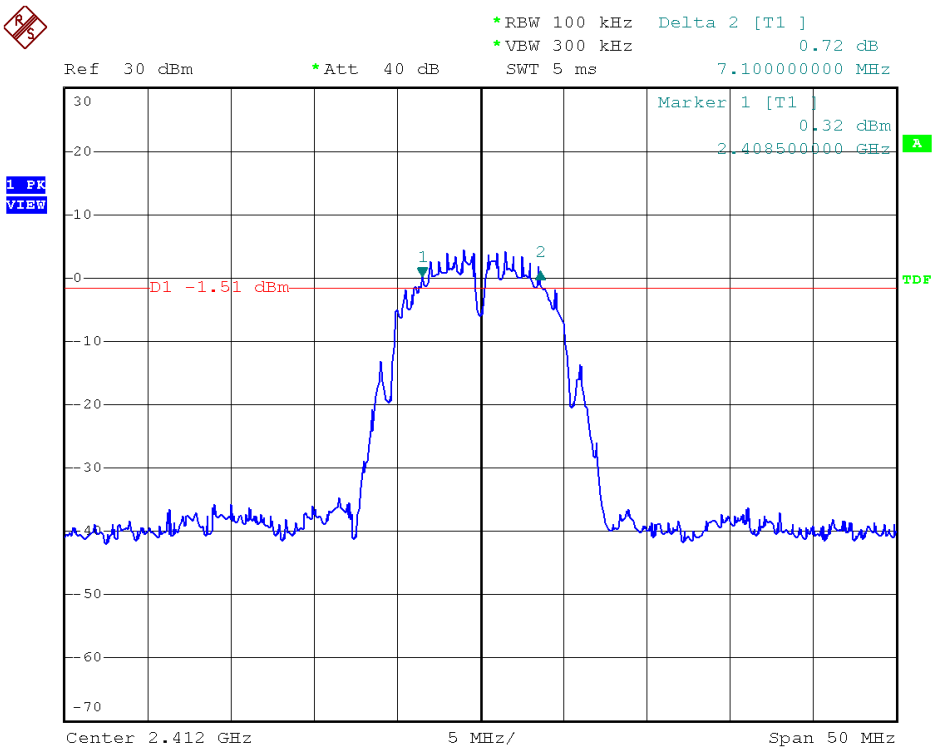
6.5 Test Result and Data

Test Date: Jun. 25, 2014 Temperature: 24℃

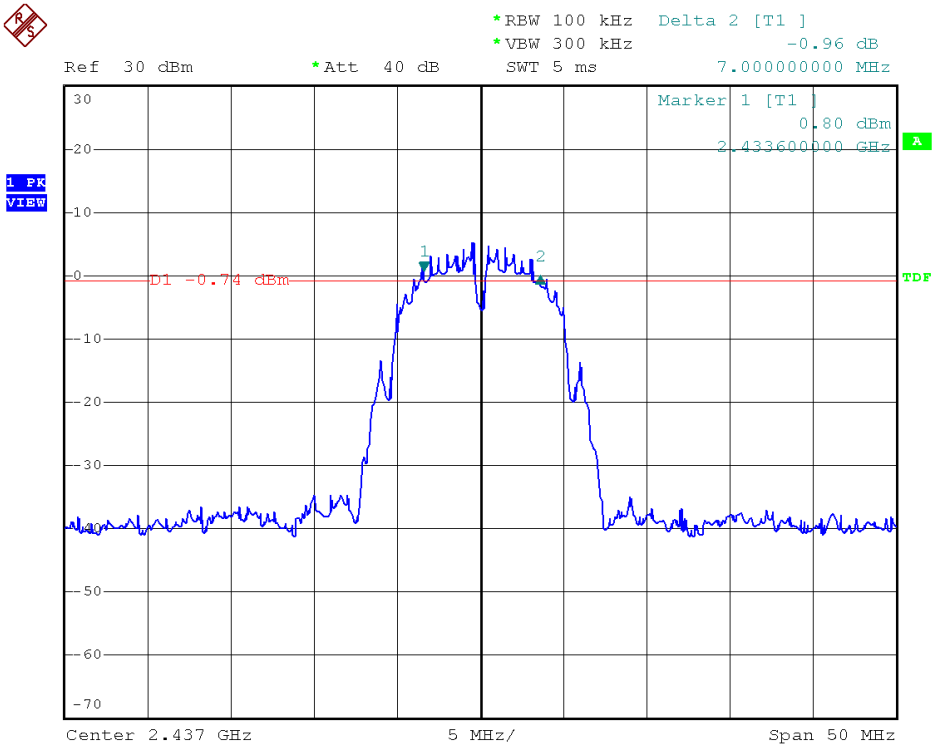
Atmospheric pressure: 1040 hPa Humidity: 53%

Modulation Standard	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	
			ANT 1	ANT 2
802.11b (5.5Mbps)	01	2412	7.1	8.0
	06	2437	7.0	8.0
	11	2462	8.2	8.1
802.11g (6Mbps)	01	2412	13.3	15.4
	06	2437	13.9	15.4
	11	2462	13.5	15.4
802.11n HT20 (MCS8Mbps)	01	2412	15.0	15.4
	06	2437	15.1	15.4
	11	2462	15.1	15.0

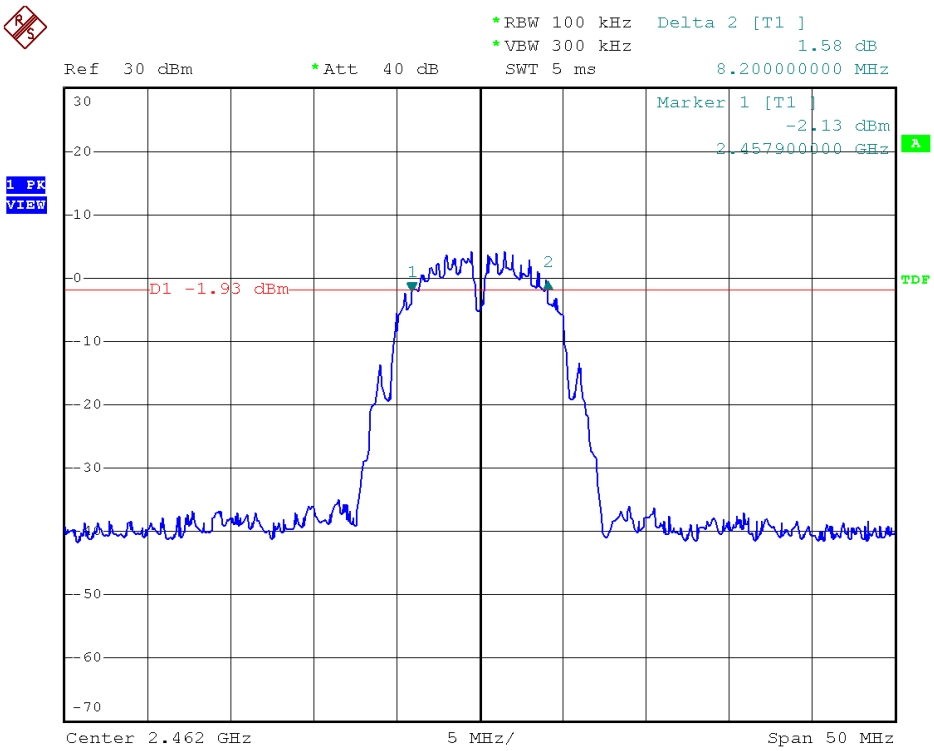
Modulation Standard: 802.11b (5.5Mbps), Antenna 1
Channel: 01



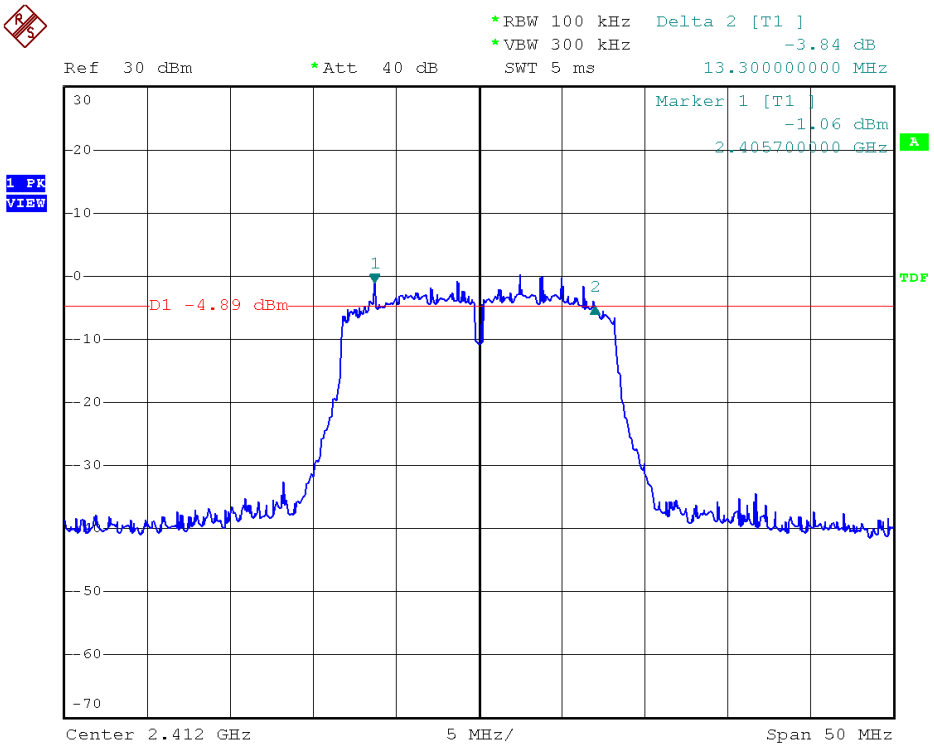
Modulation Standard: 802.11b (5.5Mbps), Antenna 1
Channel: 06



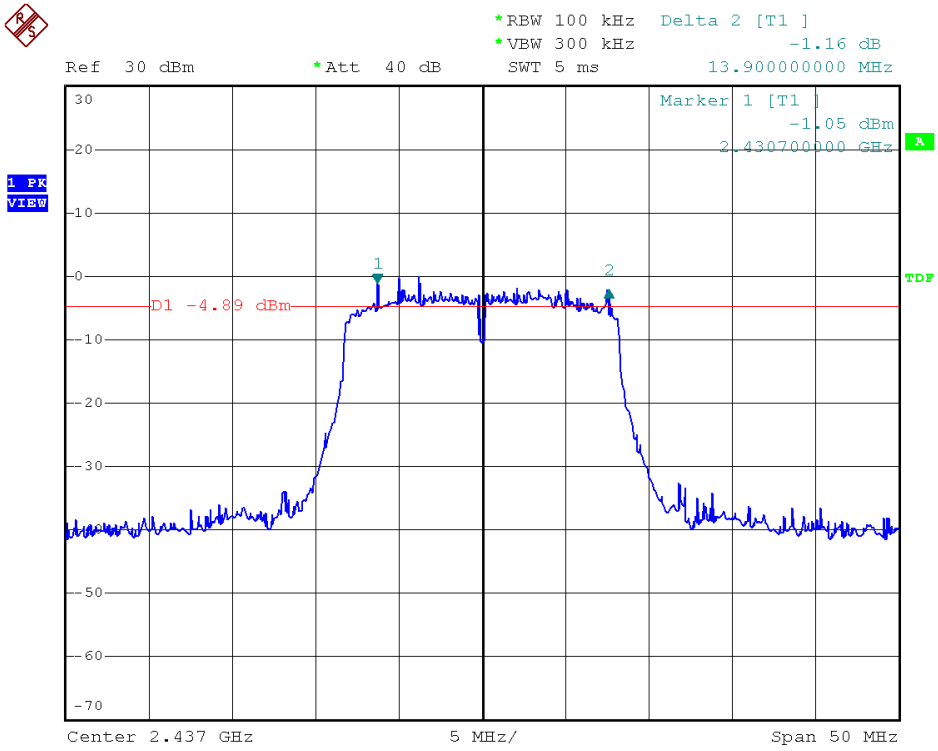
Modulation Standard: 802.11b (5.5Mbps), Antenna 1
Channel: 11



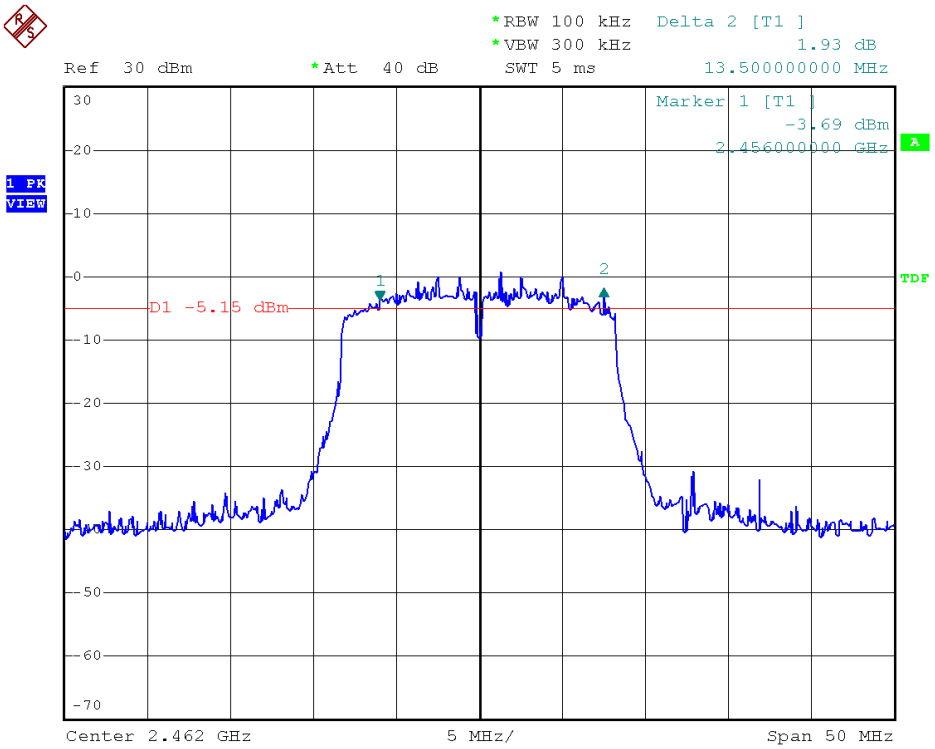
Modulation Standard: 802.11g (6Mbps), Antenna 1
Channel: 01



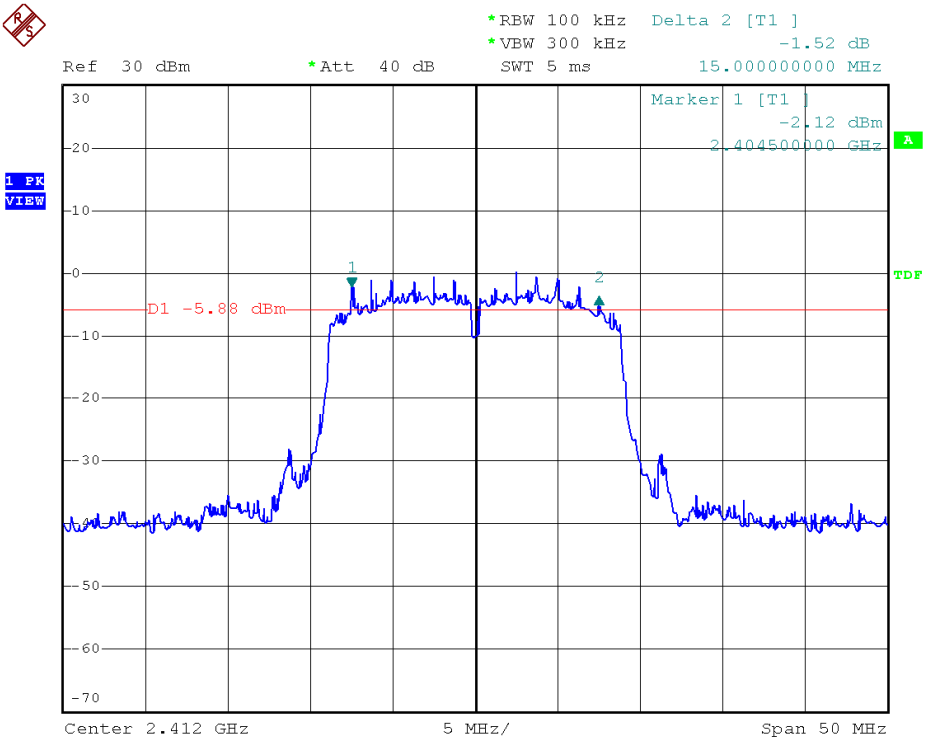
Modulation Standard: 802.11g (6Mbps), Antenna 1
Channel: 06



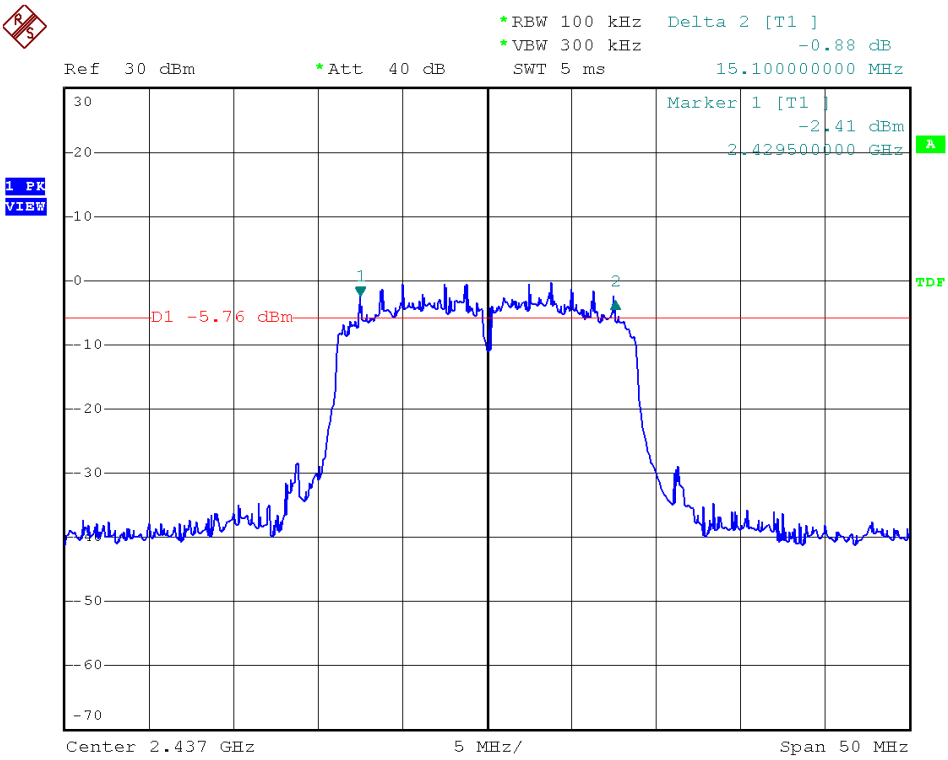
Modulation Standard: 802.11g (6Mbps), Antenna 1
Channel: 11



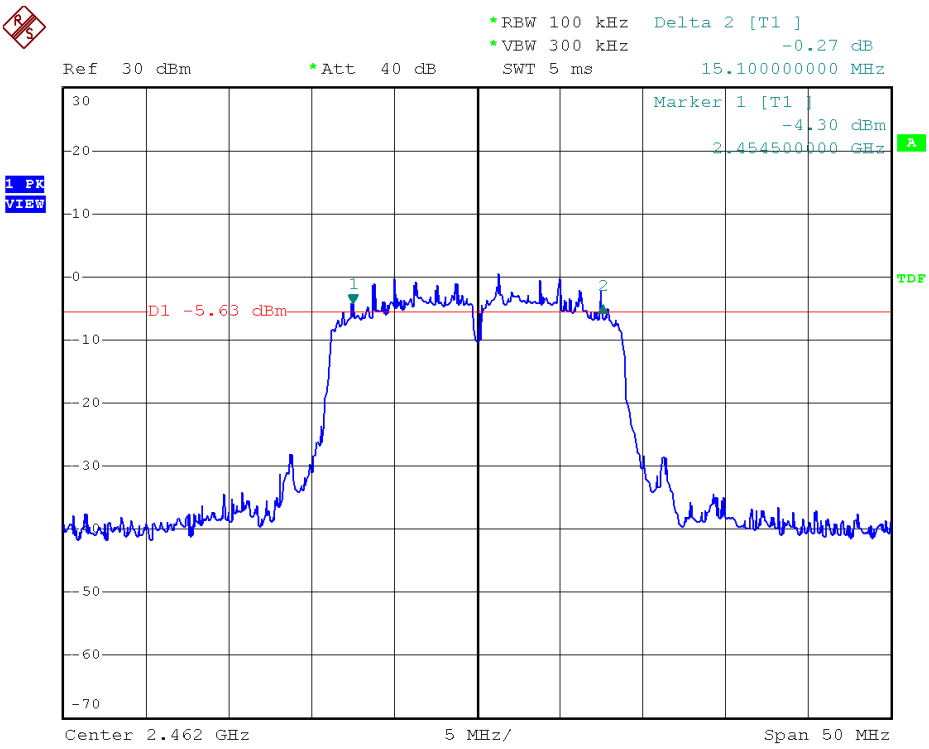
Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 1
Channel: 01



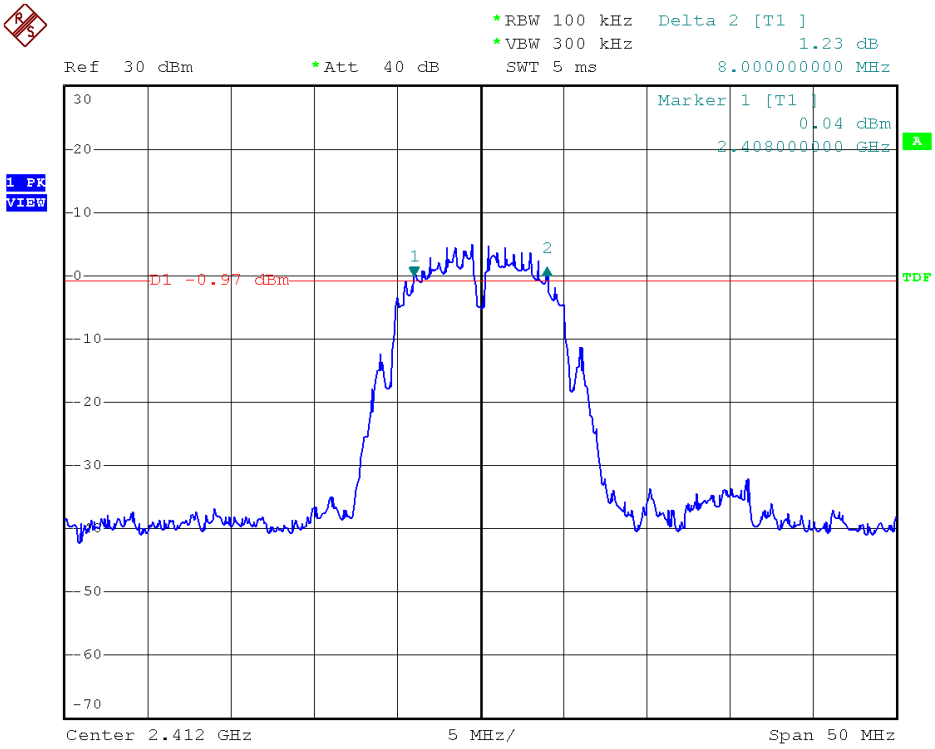
Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 1
Channel: 06



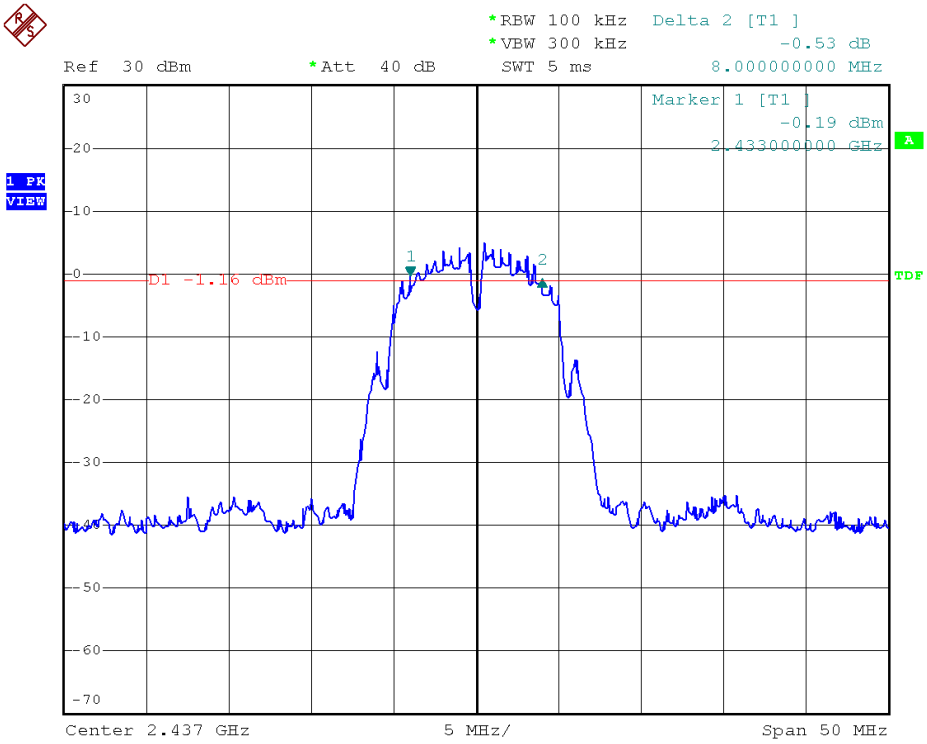
Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 1
Channel: 11



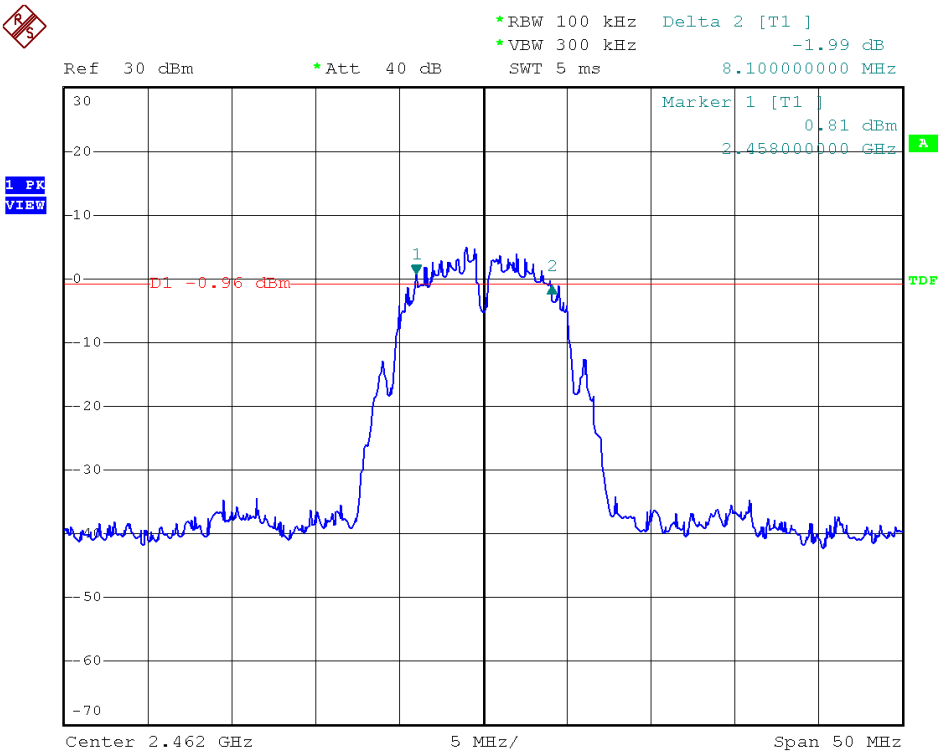
Modulation Standard: 802.11b (5.5Mbps), Antenna 2
Channel: 01



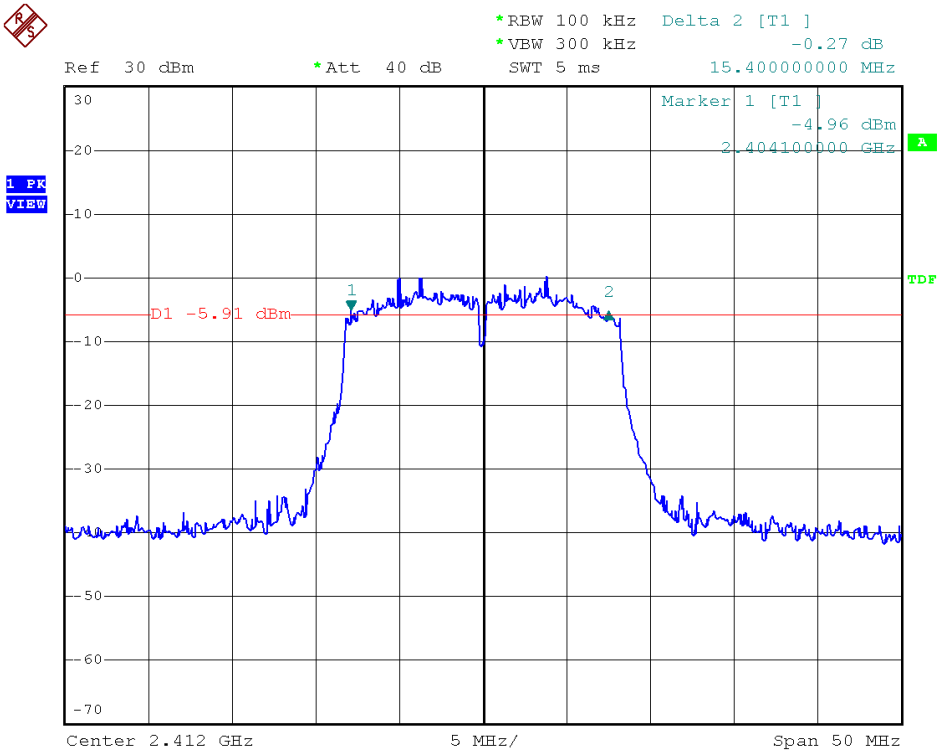
Modulation Standard: 802.11b (5.5Mbps), Antenna 2
Channel: 06



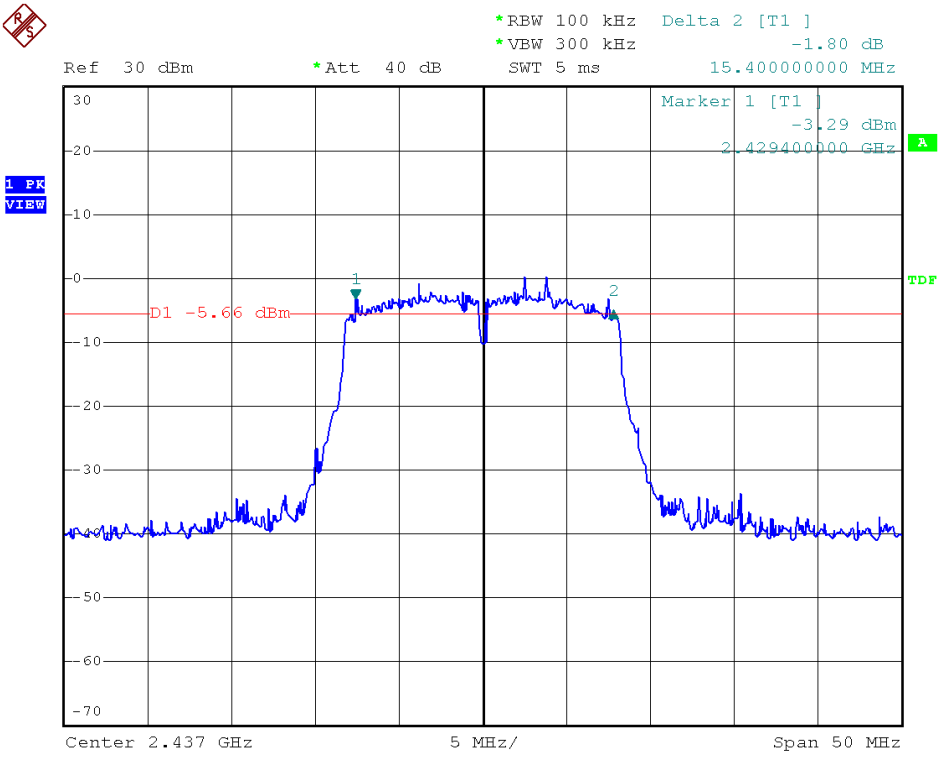
Modulation Standard: 802.11b (5.5Mbps), Antenna 2
Channel: 11



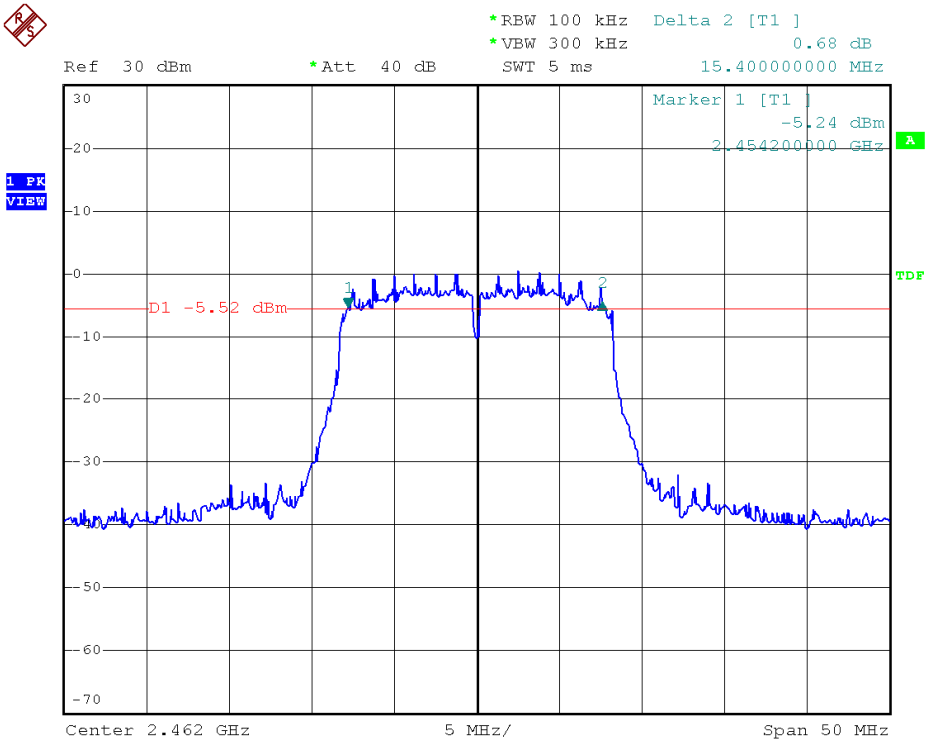
Modulation Standard: 802.11g (6Mbps), Antenna 2
Channel: 01



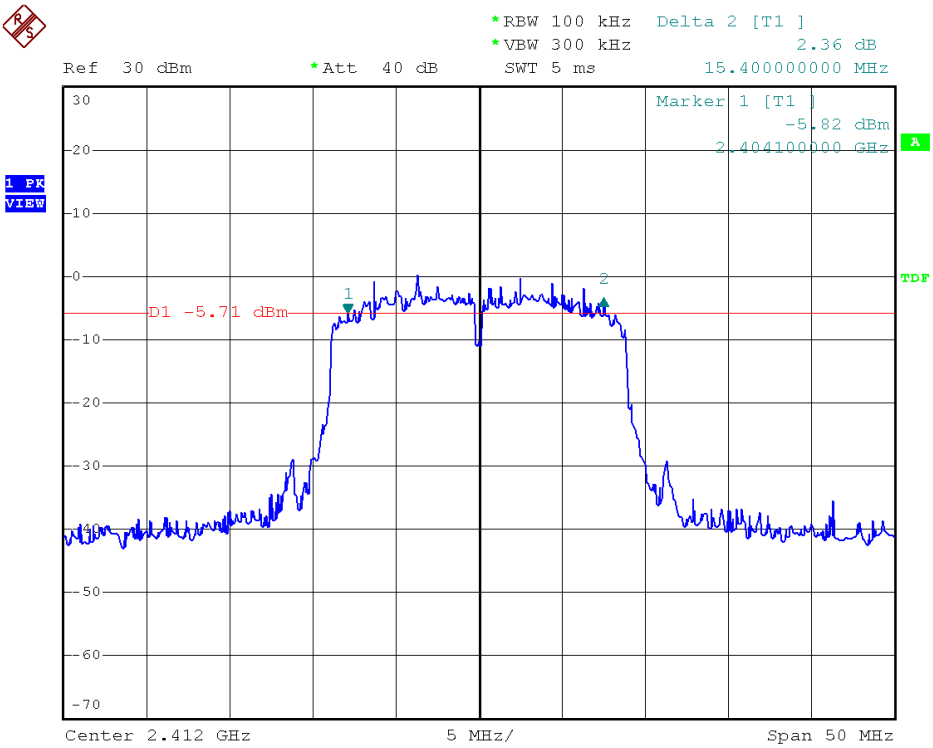
Modulation Standard: 802.11g (6Mbps), Antenna 2
Channel: 06



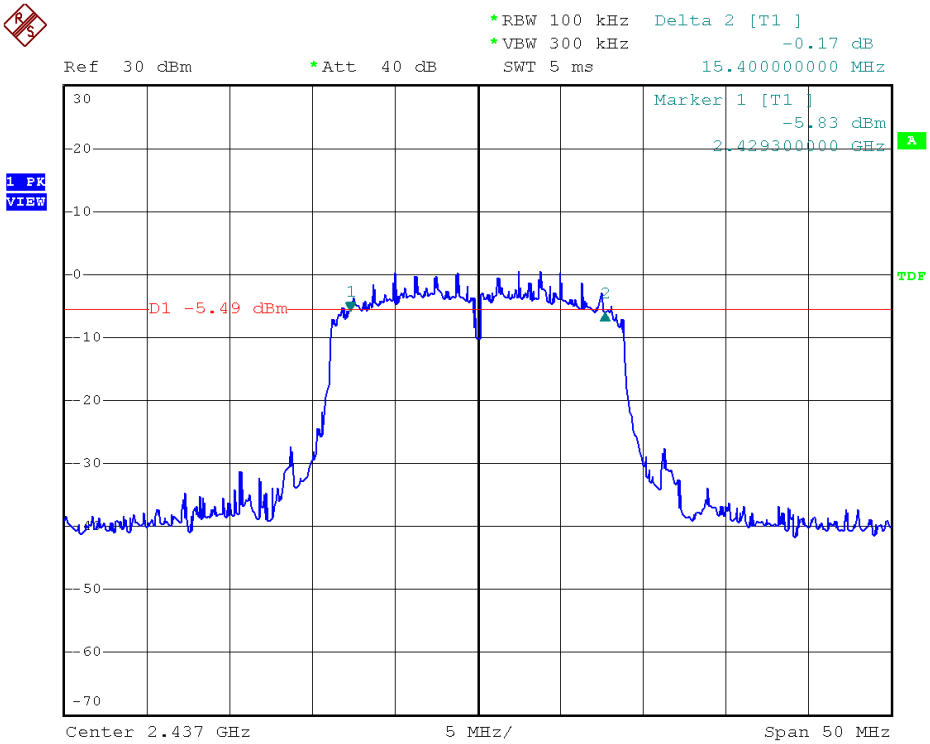
Modulation Standard: 802.11g (6Mbps), Antenna 2
Channel: 11



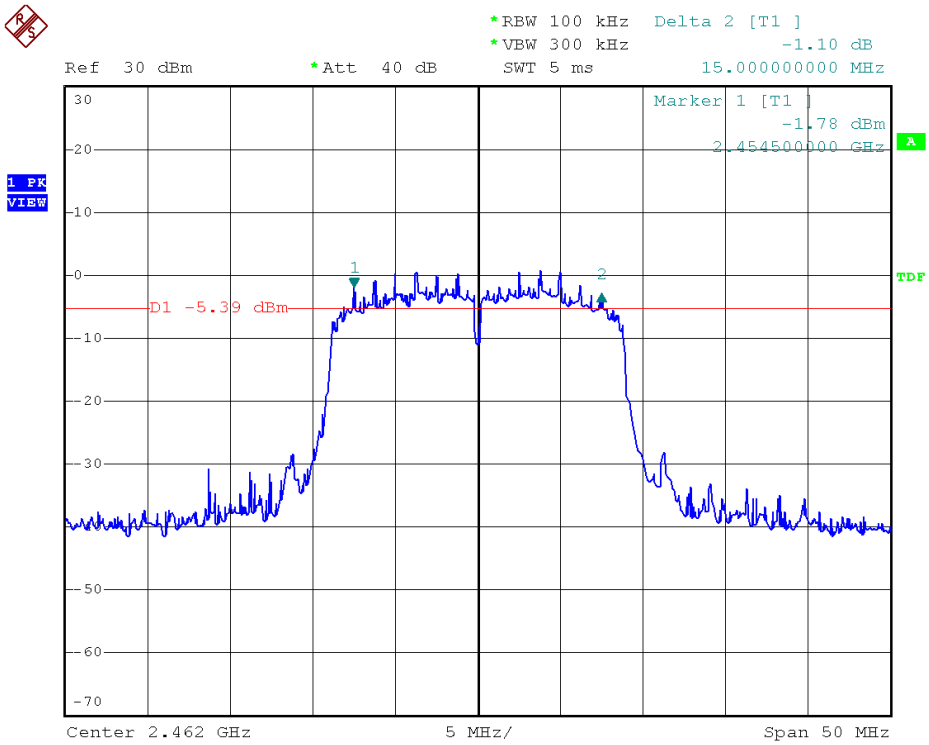
Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 2
Channel: 01



Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 2
Channel: 06



Modulation Standard: 802.11n HT20 (MCS8Mbps), Antenna 2
Channel: 11



7. Maximum Peak and Average Output Power

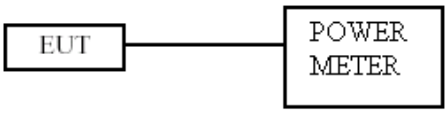
7.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

7.2 Test Procedures

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

7.3 Test Setup Layout



7.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	R&S	FSP40	100047	2014/03/27	2015/03/26
SERIES POWER METER	ANRITSU	ML2495A	1224005	2014/03/27	2015/03/26
POWER SENSOR	ANRITSU	MA2411B	1207295	2014/03/27	2015/03/26

7.5 Test Result and Data

Test Date: Jun. 25, 2014 Temperature: 24℃

Atmospheric pressure: 1040 hPa Humidity: 53%

Modulation Standard	Channel	Frequency (MHz)	Peak Power Output (dBm)		
			ANT 1	ANT 2	ANT 1+2
802.11b (5.5Mbps)	01	2412	18.52	18.91	21.73
	06	2437	18.57	18.85	21.72
	11	2462	18.65	18.82	21.75
802.11g (6Mbps)	01	2412	22.19	22.76	25.49
	06	2437	22.25	22.66	25.47
	11	2462	22.22	22.51	25.38
802.11n HT20 (MCS8Mbps)	01	2412	22.02	22.47	25.26
	06	2437	22.12	22.42	25.28
	11	2462	21.96	22.33	25.16

Modulation Standard	Channel	Frequency (MHz)	Peak Power Output (mW)		
			ANT 1	ANT 2	ANT 1+2
802.11b (5.5Mbps)	01	2412	71.12	77.80	148.93
	06	2437	71.94	76.74	148.68
	11	2462	73.28	76.21	149.49
802.11g (6Mbps)	01	2412	165.58	188.80	354.38
	06	2437	167.88	184.50	352.38
	11	2462	166.72	178.24	344.96
802.11n HT20 (MCS8Mbps)	01	2412	159.22	176.60	335.82
	06	2437	162.93	174.58	337.51
	11	2462	157.04	171.00	328.04

8. Power Spectral Density

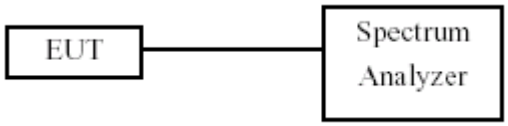
8.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm.

8.2 Test Procedures

a. The transmitter output was connected to spectrum analyzer.
b. The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.
c. The power spectral density was measured and recorded.

8.3 Test Setup Layout



8.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	R&S	FSP40	100047	2014/03/27	2015/03/26

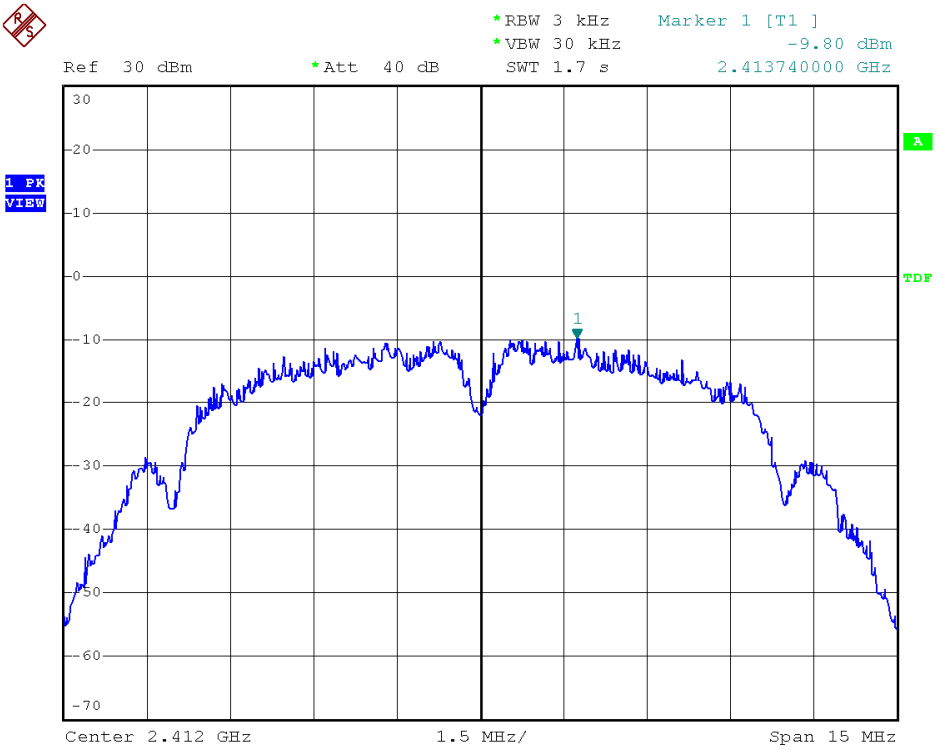
8.5 Test Result and Data

Test Date: Jun. 25, 2014 Temperature: 24℃

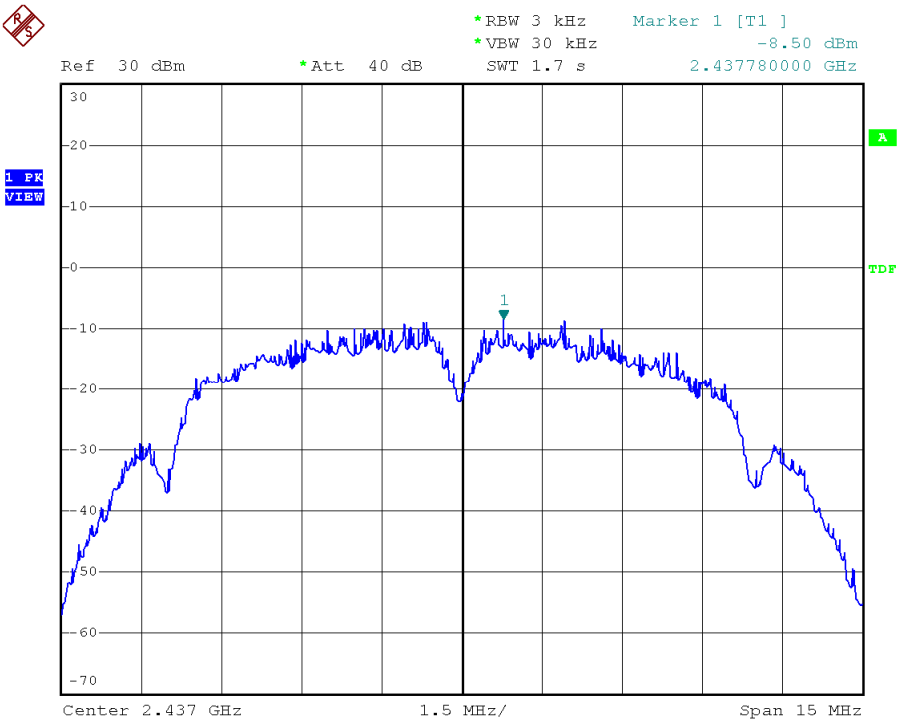
Atmospheric pressure: 1040 hPa Humidity: 53%

Modulation Standard	Channel	Frequency (MHz)	Maximum Power Density of 3 kHz Bandwidth (dBm)		
			ANT 1	ANT 2	ANT 1+2
802.11b (5.5Mbps)	01	2412	-9.80	-8.74	-6.23
	06	2437	-8.50	-9.83	-6.10
	11	2462	-8.03	-8.30	-5.15
802.11g (6Mbps)	01	2412	-13.21	-13.42	-10.30
	06	2437	-14.28	-13.24	-10.72
	11	2462	-12.83	-13.23	-10.02
802.11n HT20 (MCS8 Mbps)	01	2412	-11.82	-12.88	-9.31
	06	2437	-13.09	-13.26	-10.16
	11	2462	-13.49	-13.95	-10.70

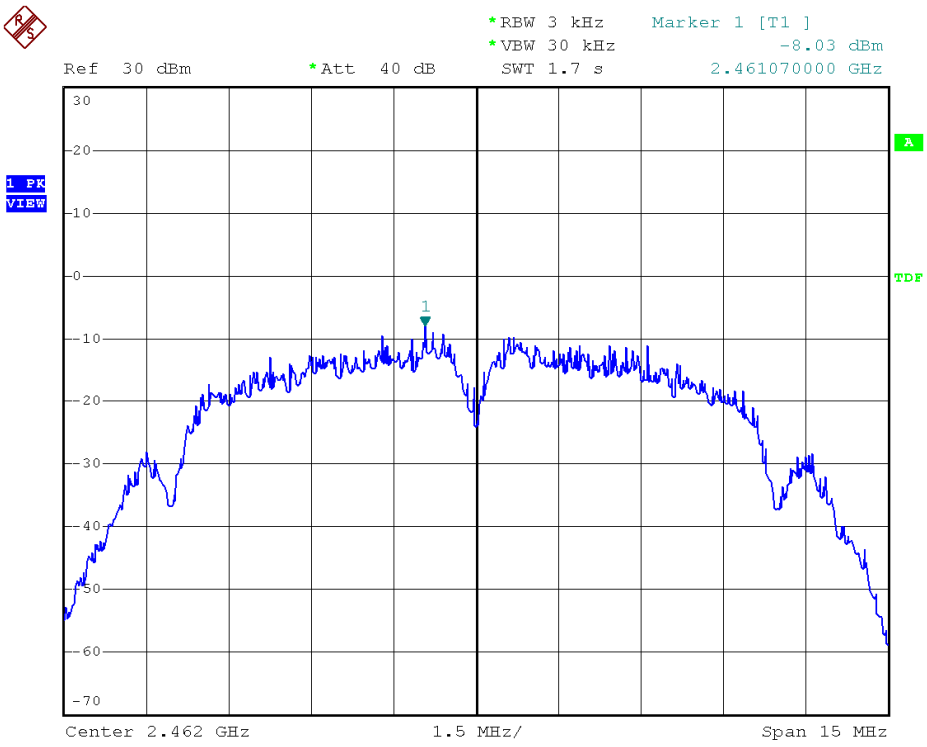
Modulation Standard: 802.11b (5.5Mbps), Antenna 1
Channel: 01



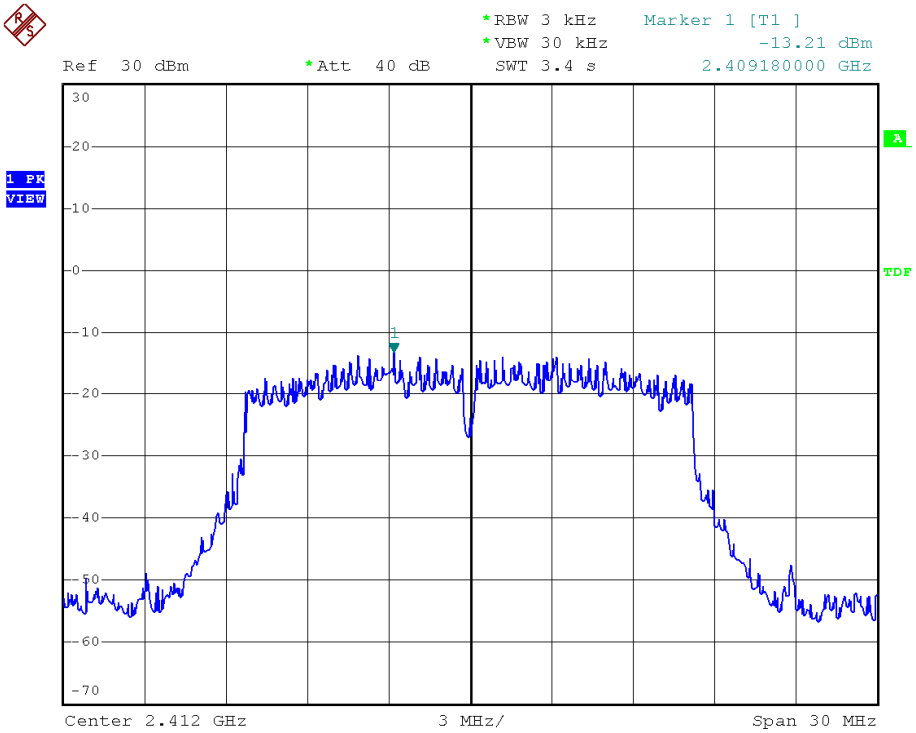
Modulation Standard: 802.11b (5.5Mbps), Antenna 1
Channel: 06



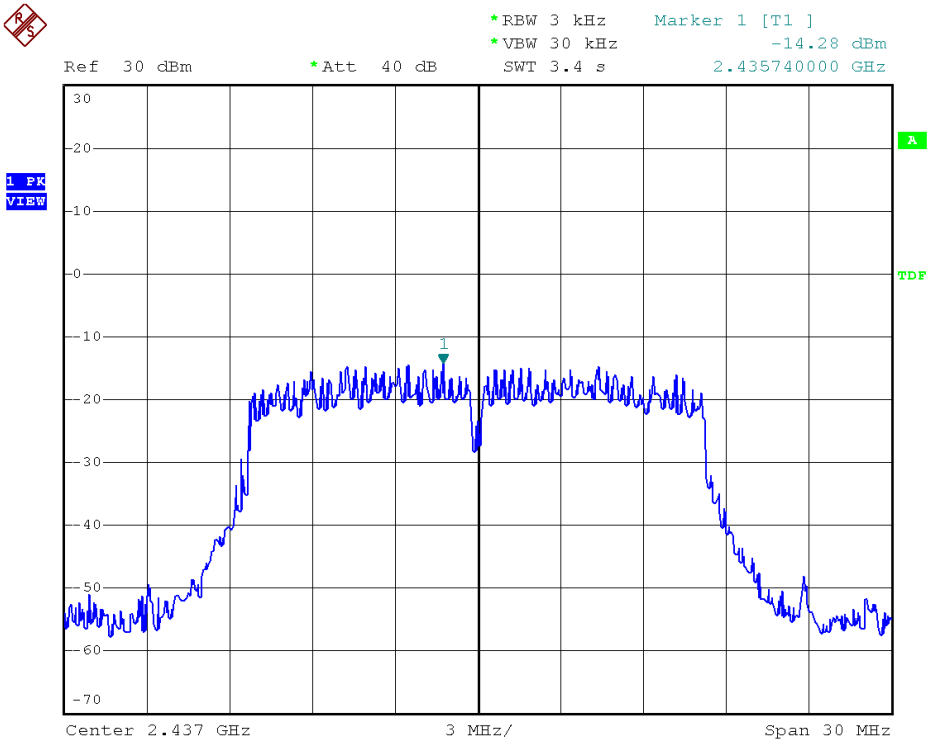
Modulation Standard: 802.11b (5.5Mbps), Antenna 1
Channel: 11



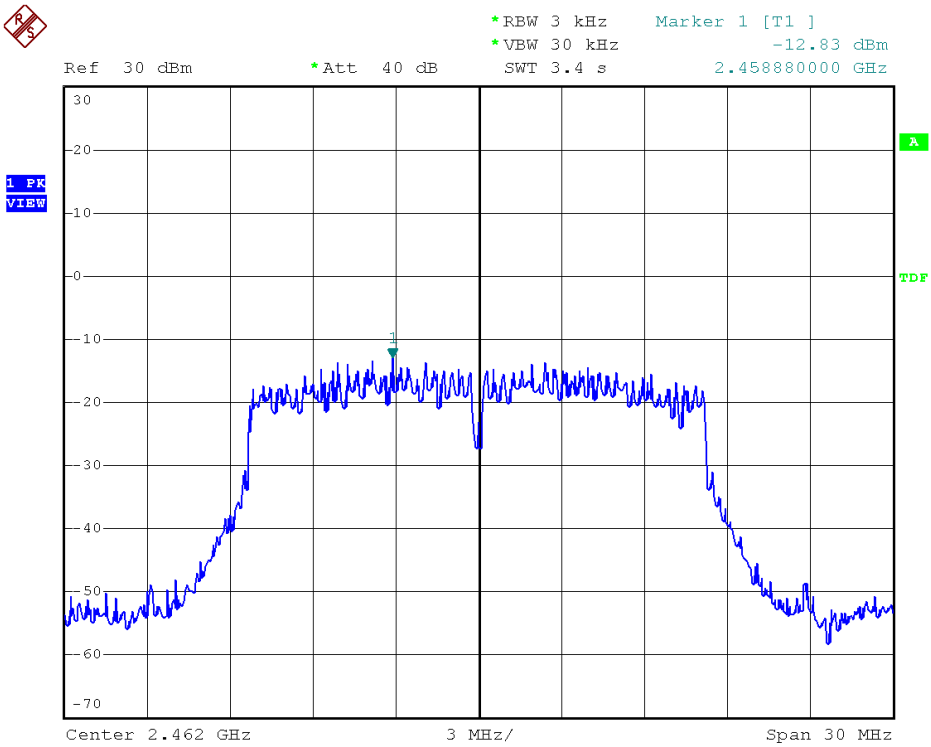
Modulation Standard: 802.11g (6Mbps), Antenna 1
Channel: 01



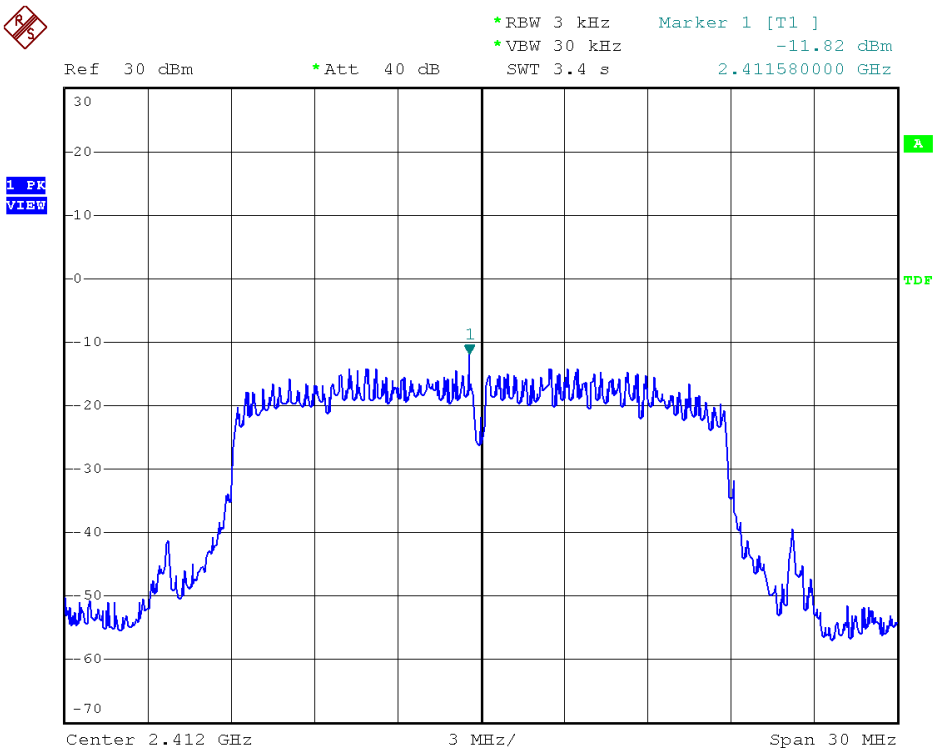
Modulation Standard: 802.11g (6Mbps), Antenna 1
Channel: 06



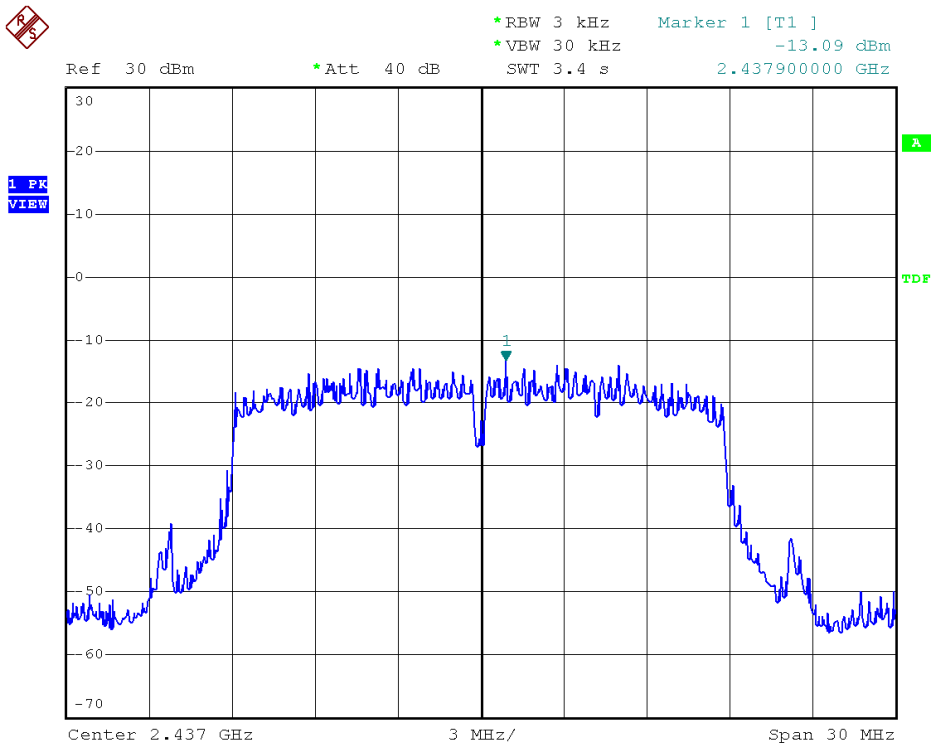
Modulation Standard: 802.11g (6Mbps), Antenna 1
Channel: 11



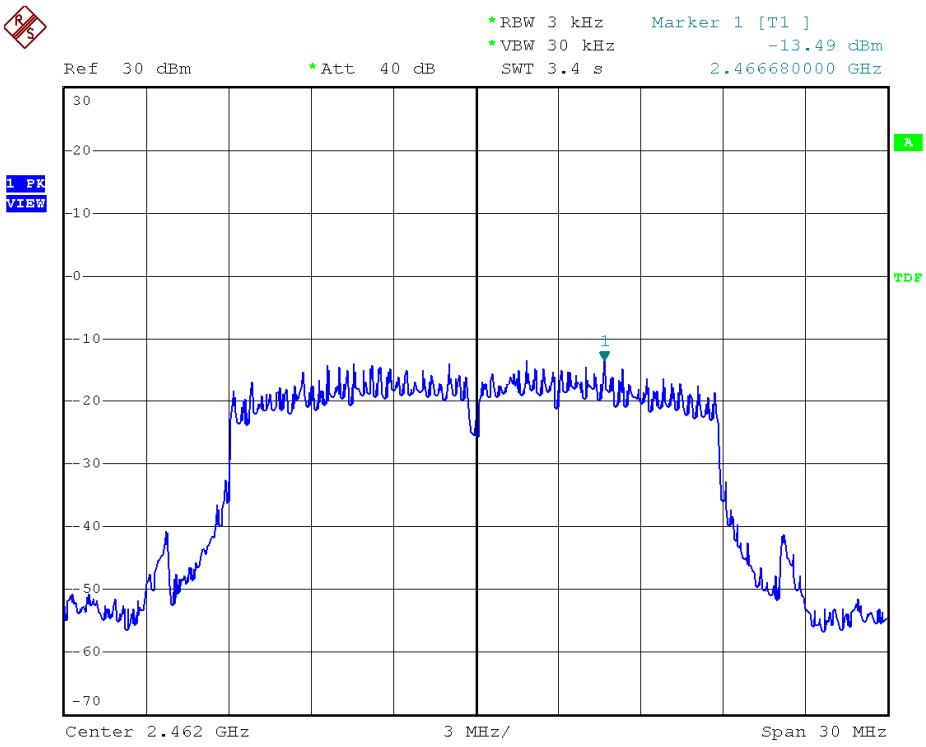
Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1
Channel: 01



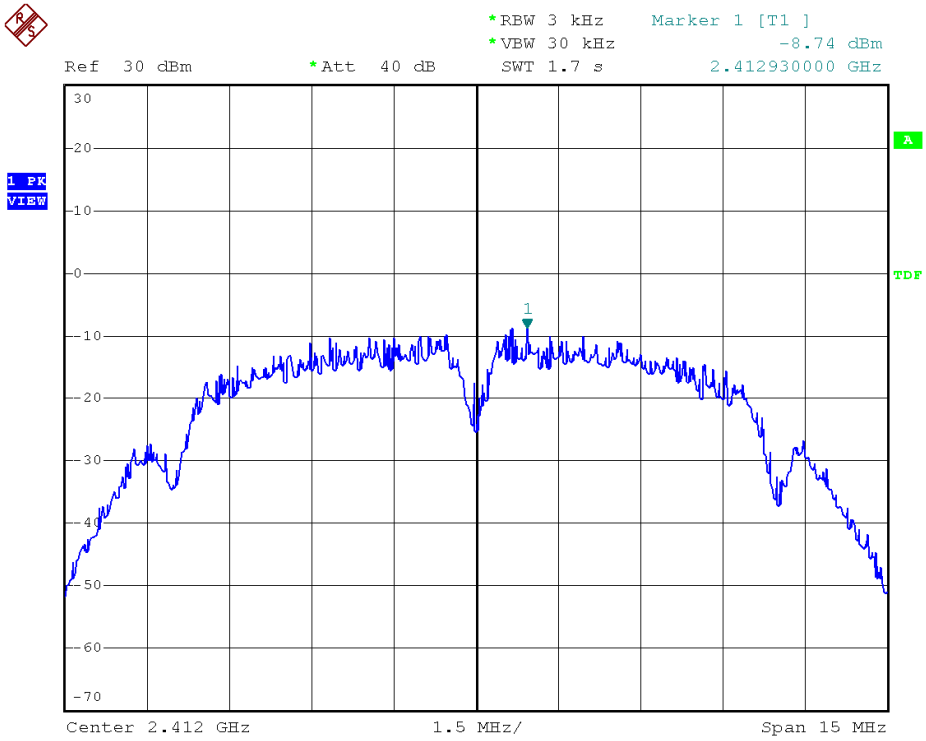
Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1
Channel: 06



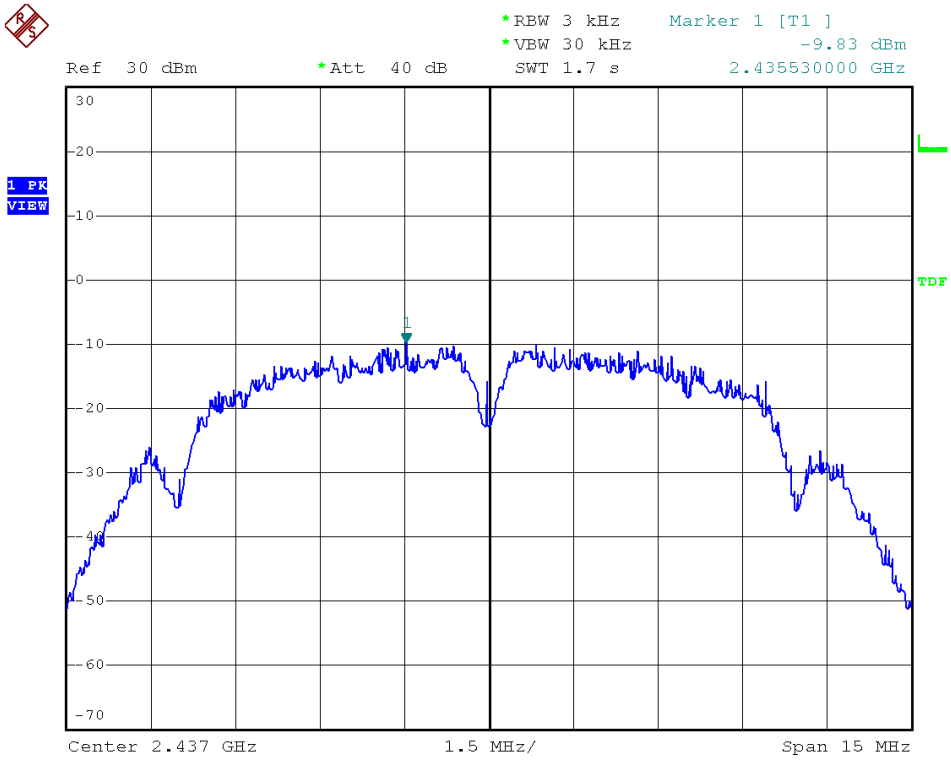
Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1
Channel: 11



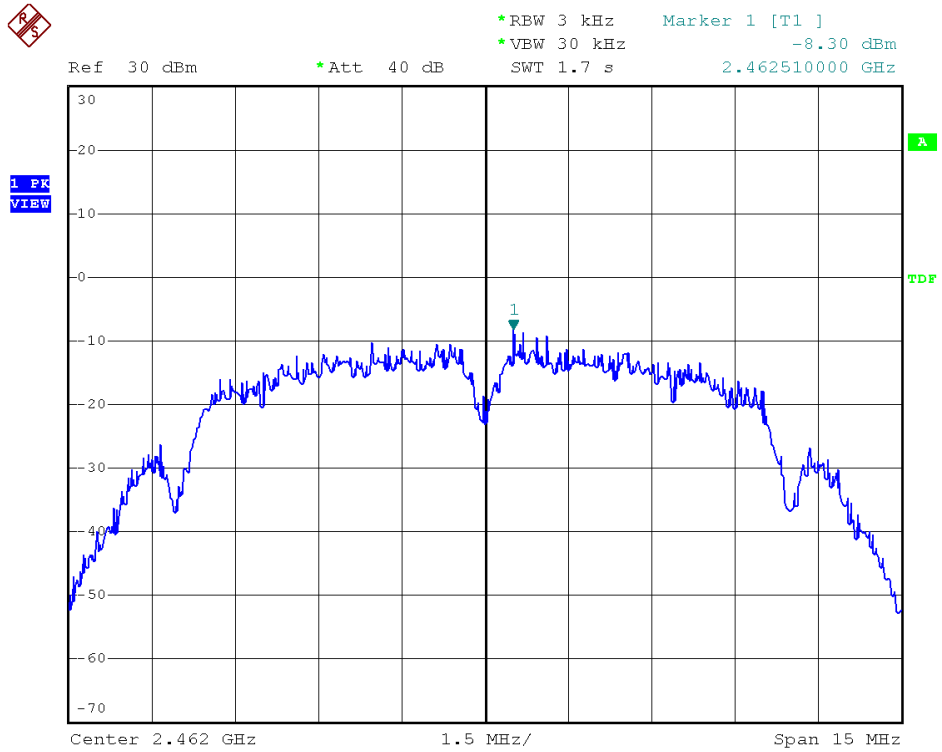
Modulation Standard: 802.11b (5.5Mbps), Antenna 2
Channel: 01



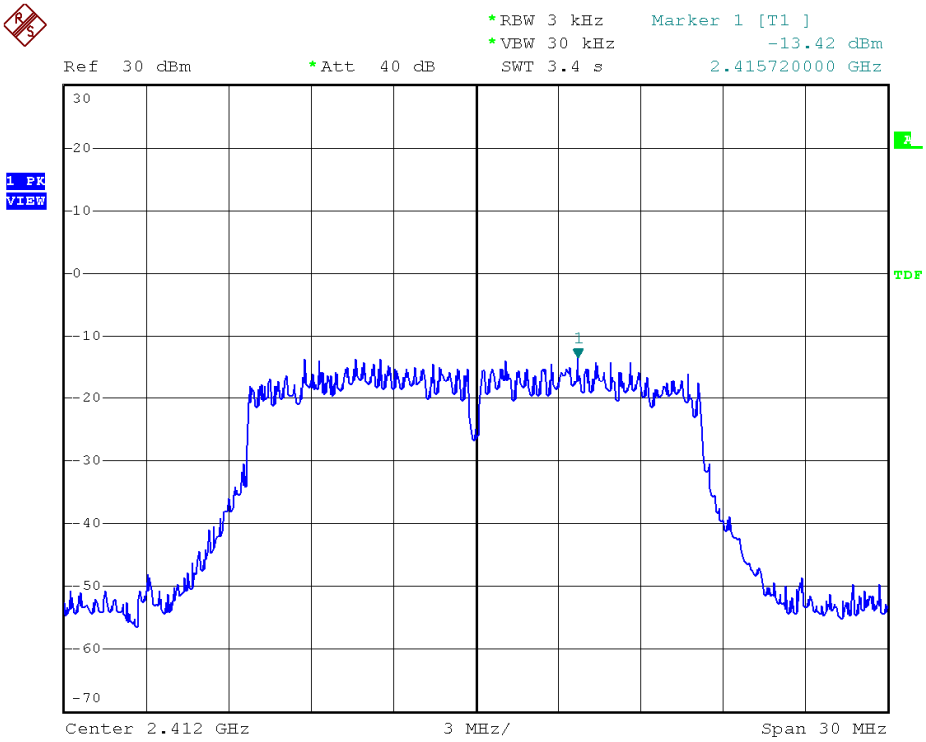
Modulation Standard: 802.11b (5.5Mbps), Antenna 2
Channel: 06



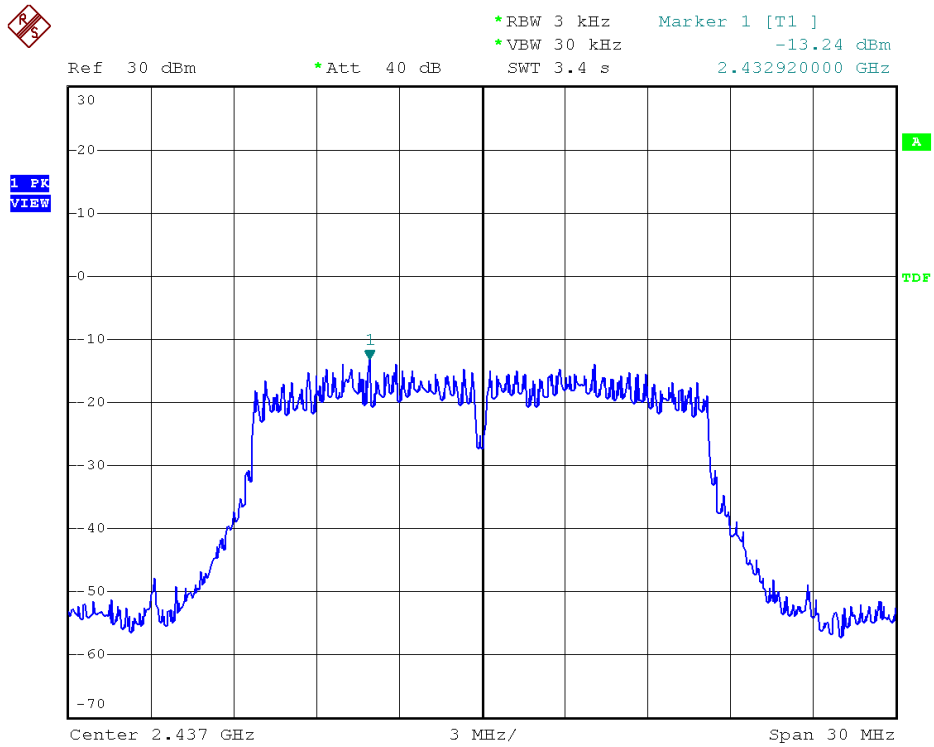
Modulation Standard: 802.11b (5.5Mbps), Antenna 2
Channel: 11



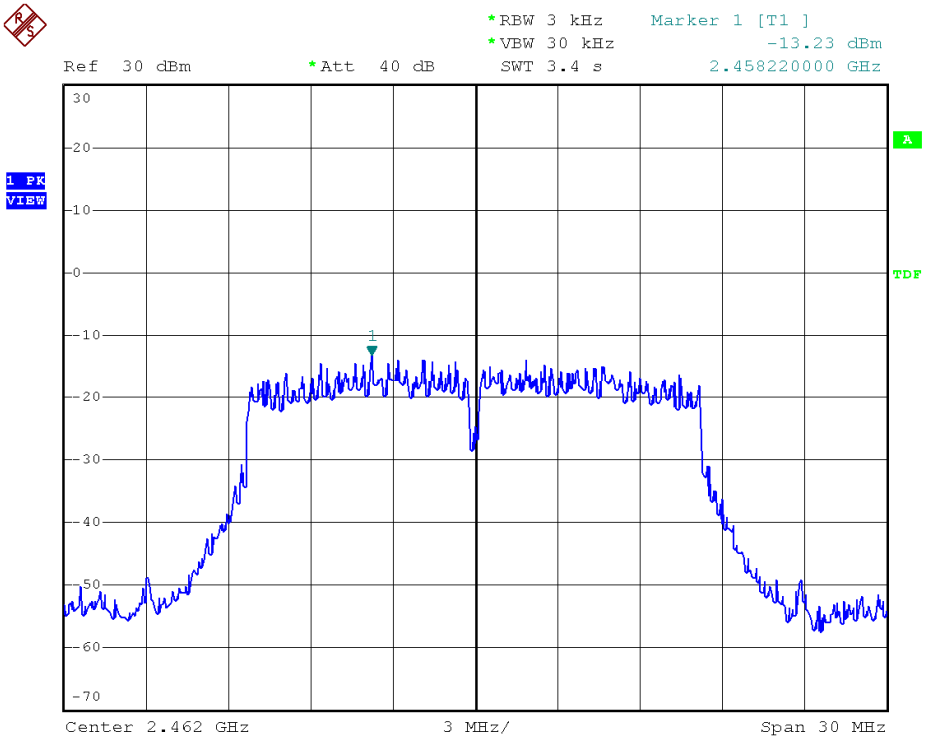
Modulation Standard: 802.11g (6Mbps), Antenna 2
Channel: 01



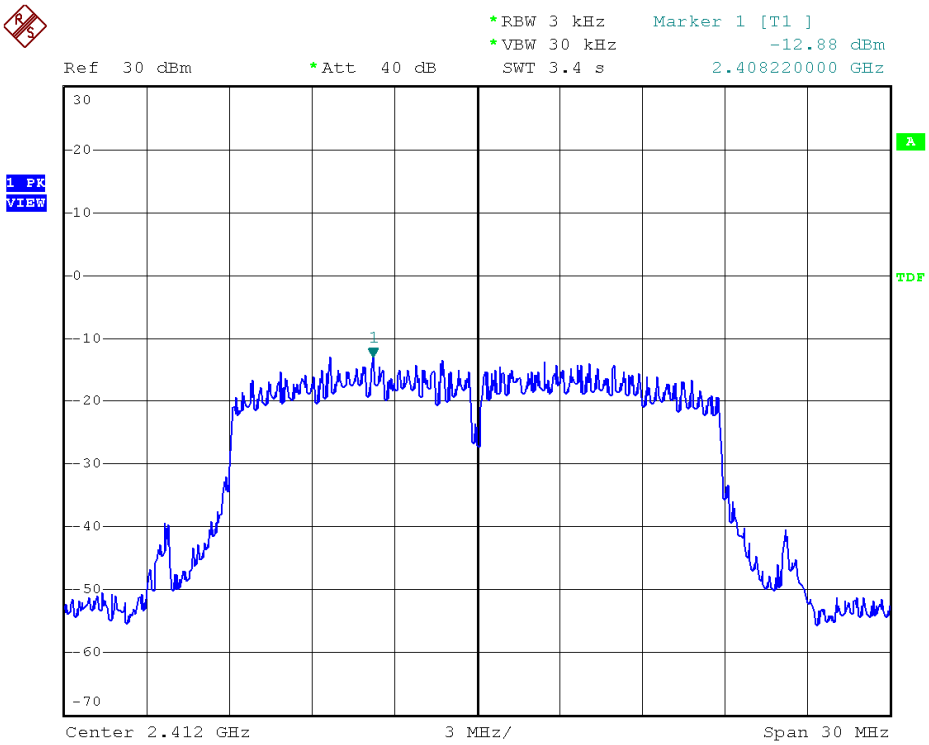
Modulation Standard: 802.11g (6Mbps), Antenna 2
Channel: 06



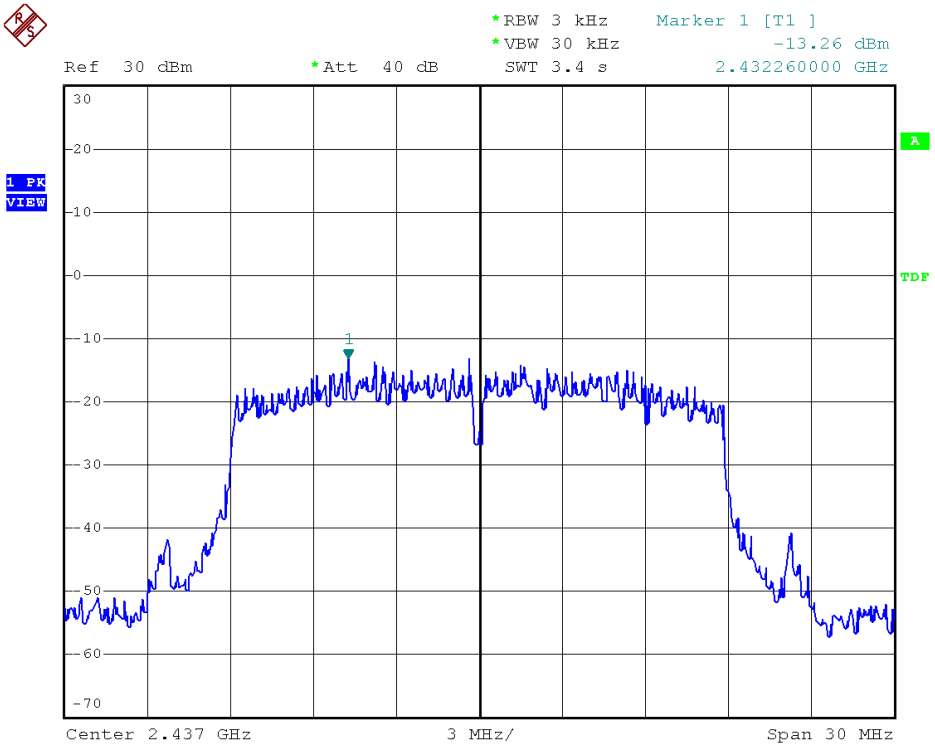
Modulation Standard: 802.11g (6Mbps), Antenna 2
Channel: 11



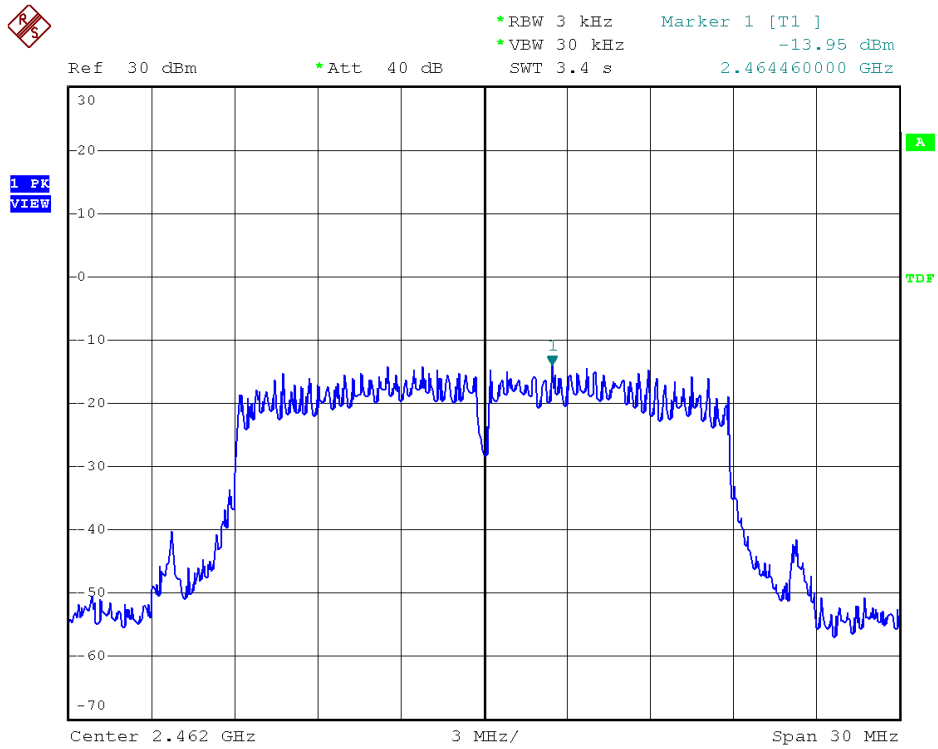
Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2
Channel: 01



Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2
Channel: 06



Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2
Channel: 11



9. Band Edges Measurement

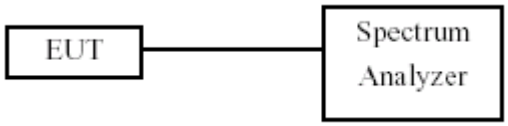
9.1 Test Limit

Below –20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

9.2 Test Procedure

a. The transmitter output was connected to the spectrum analyzer via a low lose cable.
b. Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
c. Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
d. The band edges was measured and recorded.

9.3 Test Setup Layout



9.4 Measurement Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	R&S	FSP40	100047	2014/03/27	2015/03/26

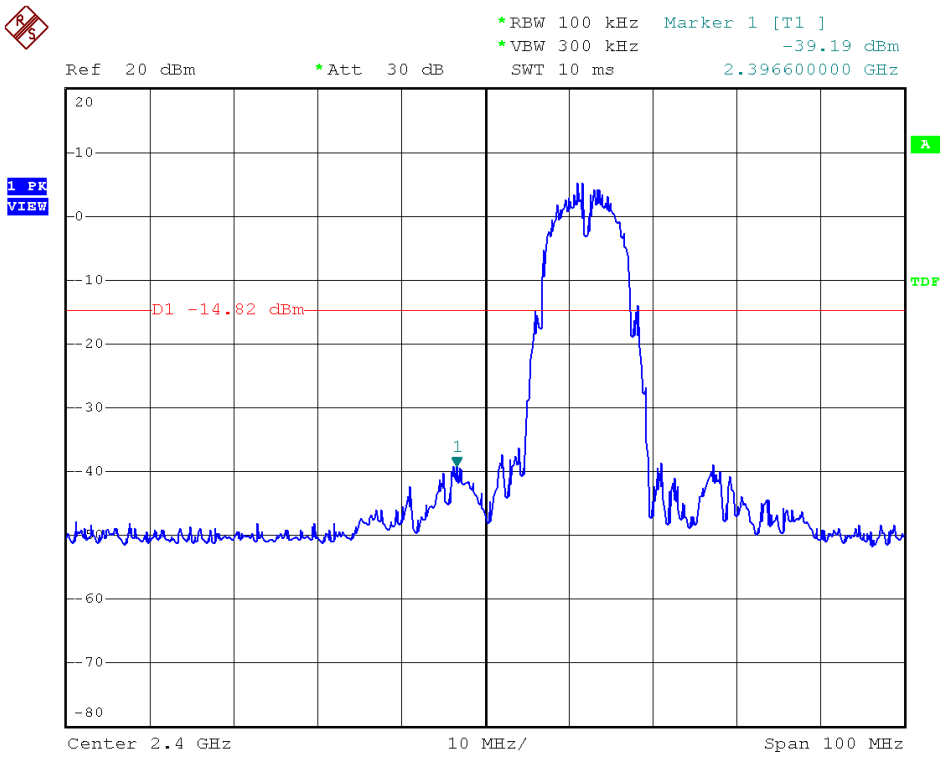
9.5 Test Result and Data

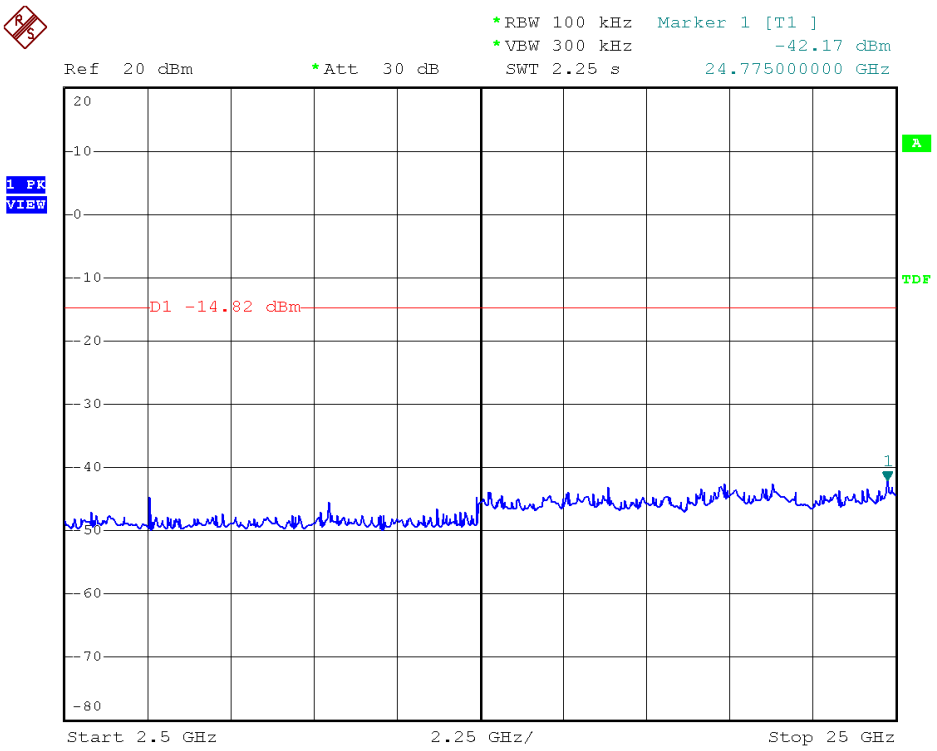
Test Date: Jun. 25, 2014 Temperature: 24℃

Atmospheric pressure: 1040 hPa Humidity: 53%

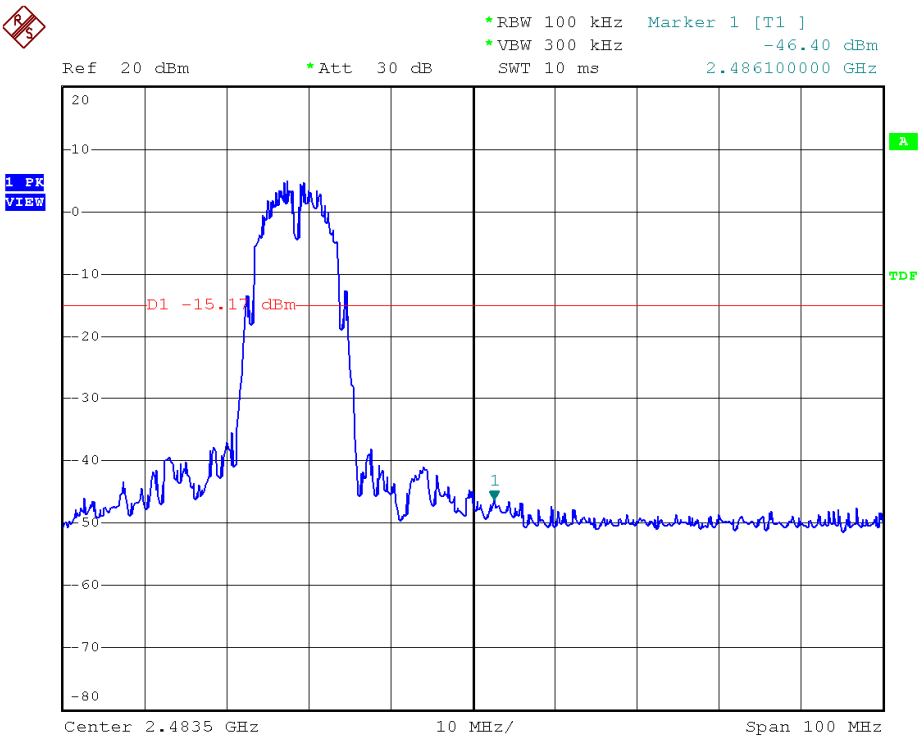
Modulation Standard	Channel	Frequency (MHz)	maximum value in frequency(MHz)		maximum value (dBm)		Limit (dBm)
			ANT 1	ANT 2	ANT 1	ANT 2	
802.11b (5.5Mbps)	01	2412	2396.6	2396.0	-39.19	-39.88	-24.69
	11	2462	20320.0	2014.0	-40.84	-42.42	-17.38
802.11g (6Mbps)	01	2412	2397.2	2399.0	-37.13	-36.45	-32.11
	11	2462	2484.9	2185.0	-41.54	-42.08	-21.49
802.11n HT20 (MCS8 Mbps)	01	2412	2397.0	2399.6	-36.53	-35.72	-30.95
	11	2462	20230.0	20230.0	-42.51	-42.43	-21.54

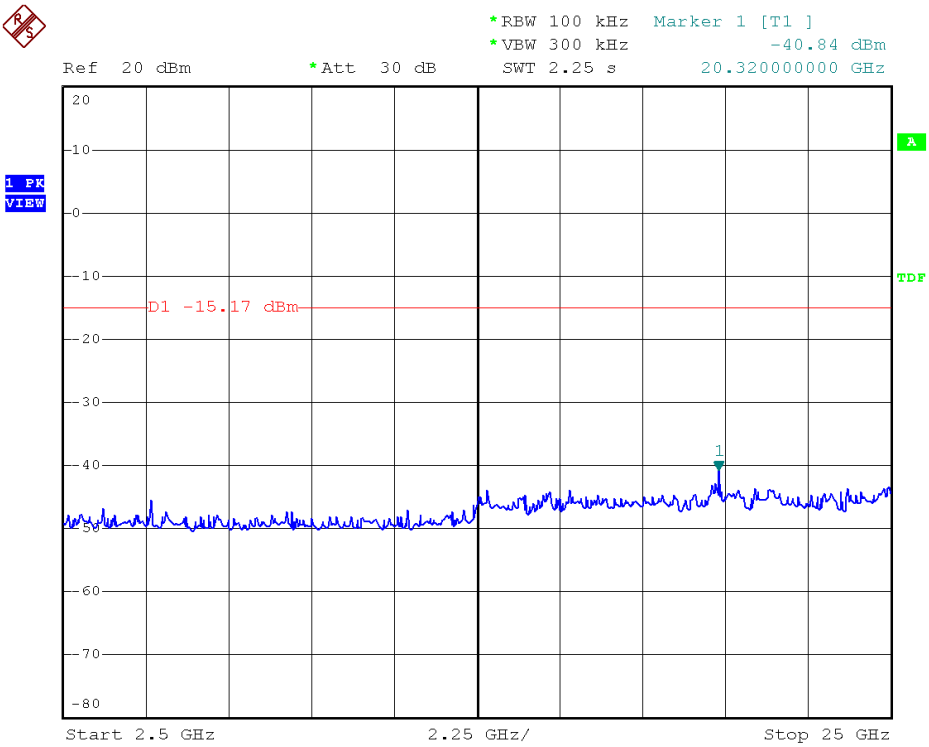
Modulation Standard: 802.11b (5.5Mbps), Antenna 1
Channel: 01



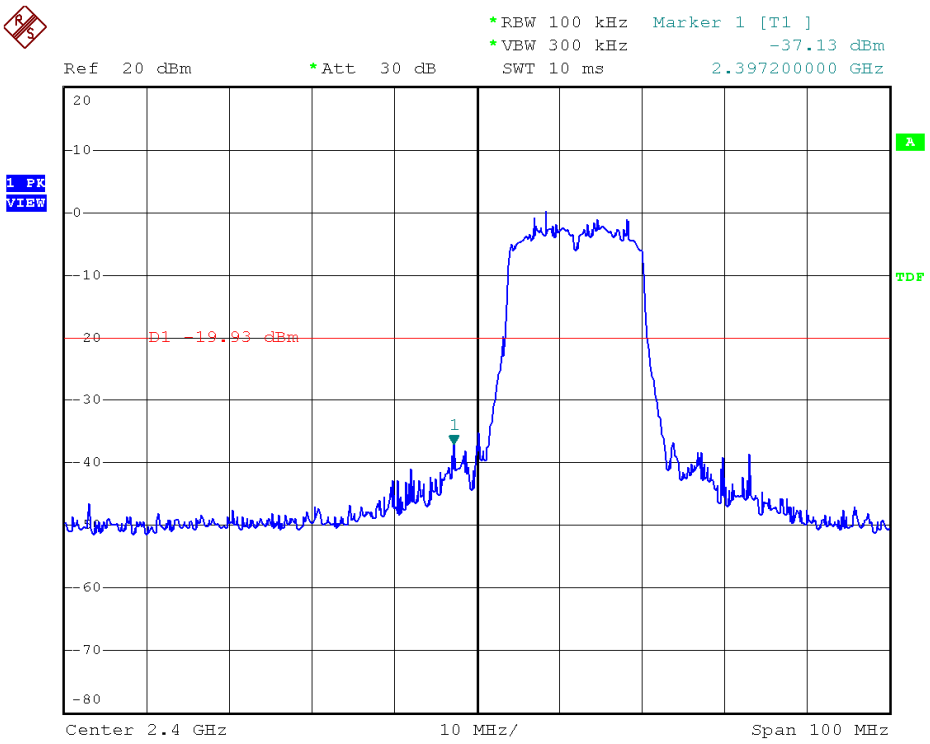


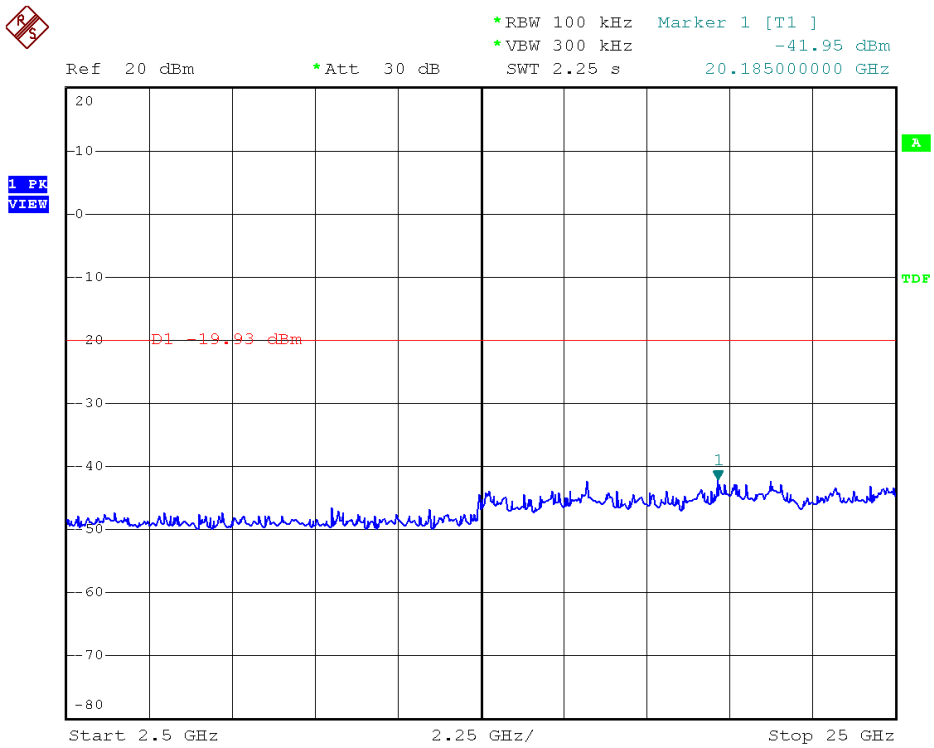
Modulation Standard: 802.11b (5.5Mbps), Antenna 1
Channel: 11



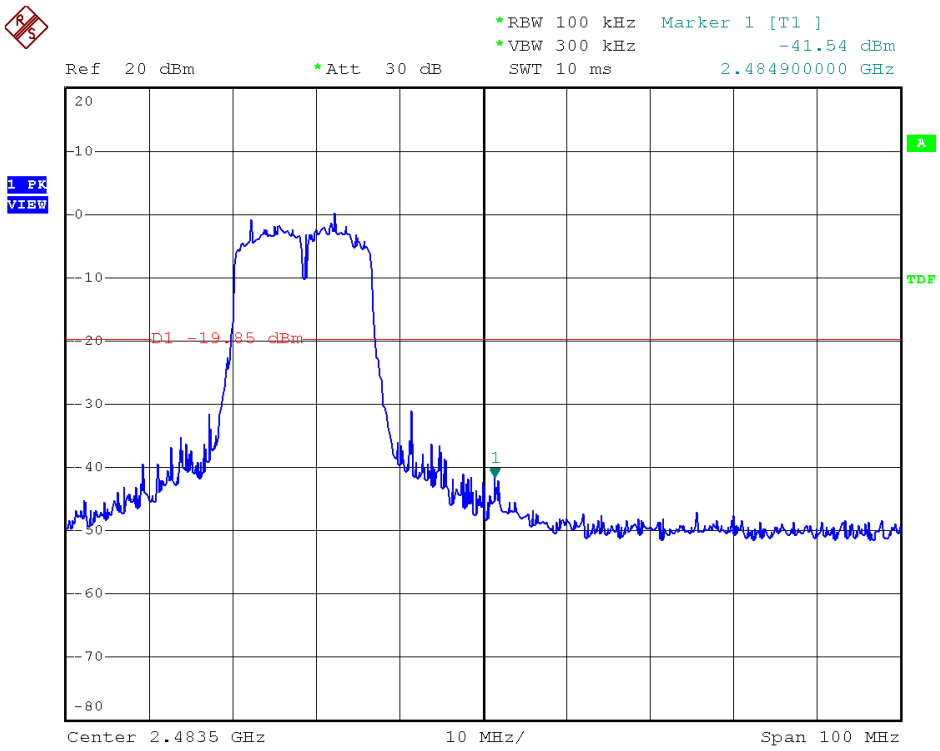


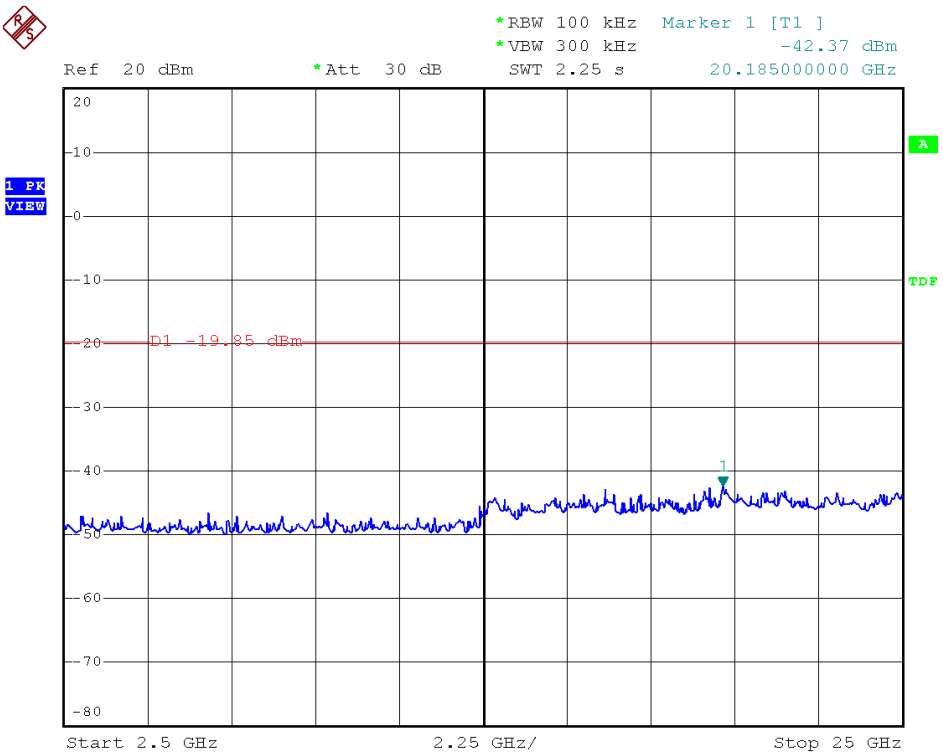
Modulation Standard: 802.11g (6Mbps), Antenna 1
Channel: 01



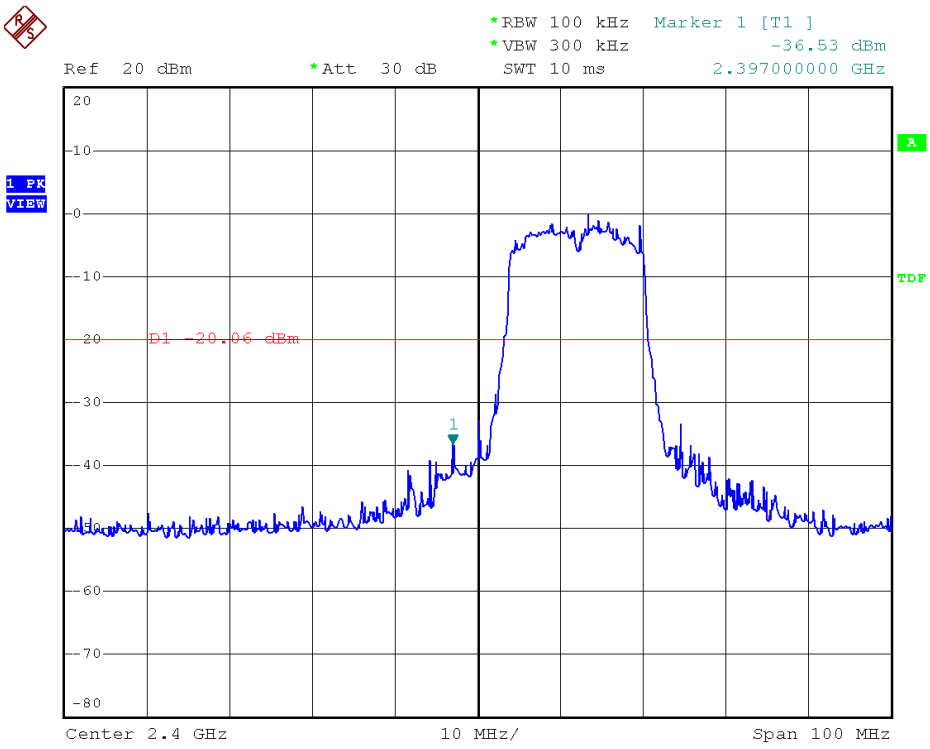


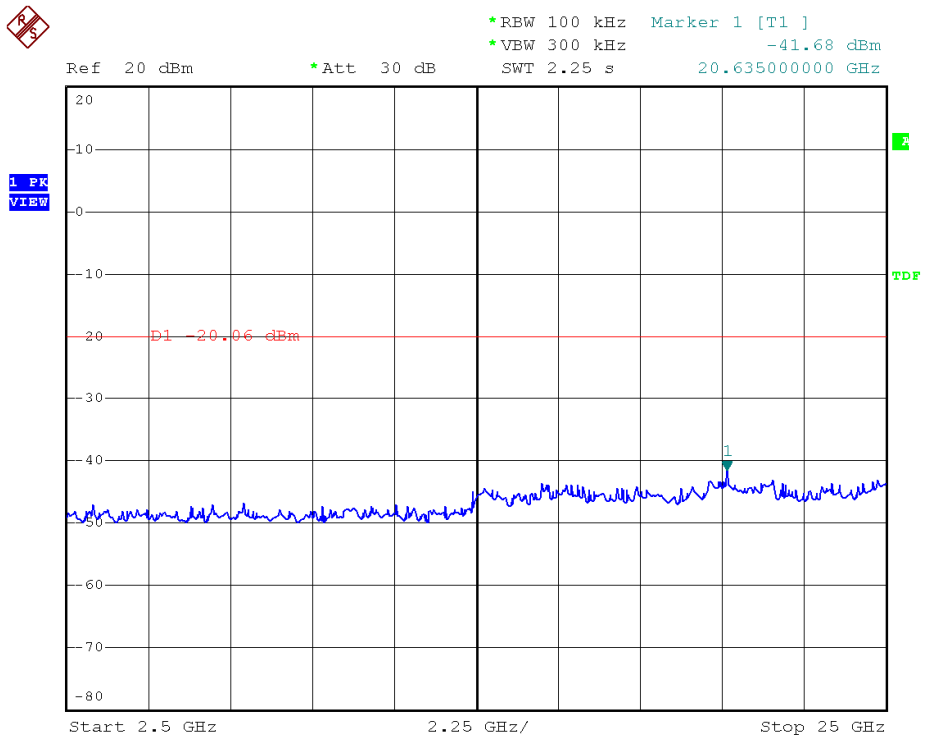
Modulation Standard: 802.11g (6Mbps), Antenna 1
Channel: 11



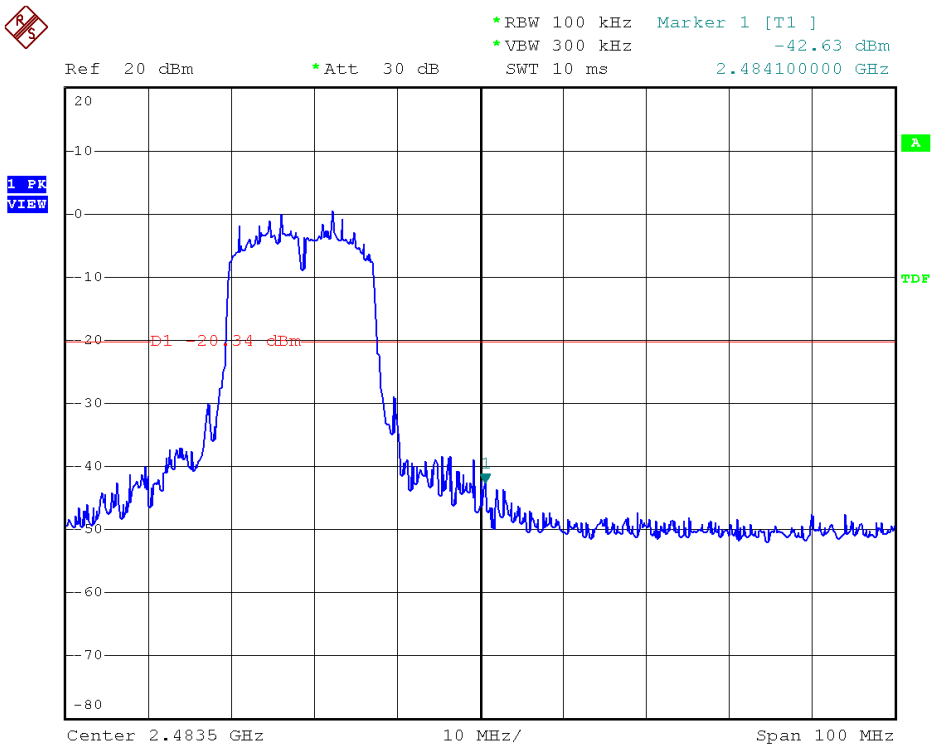


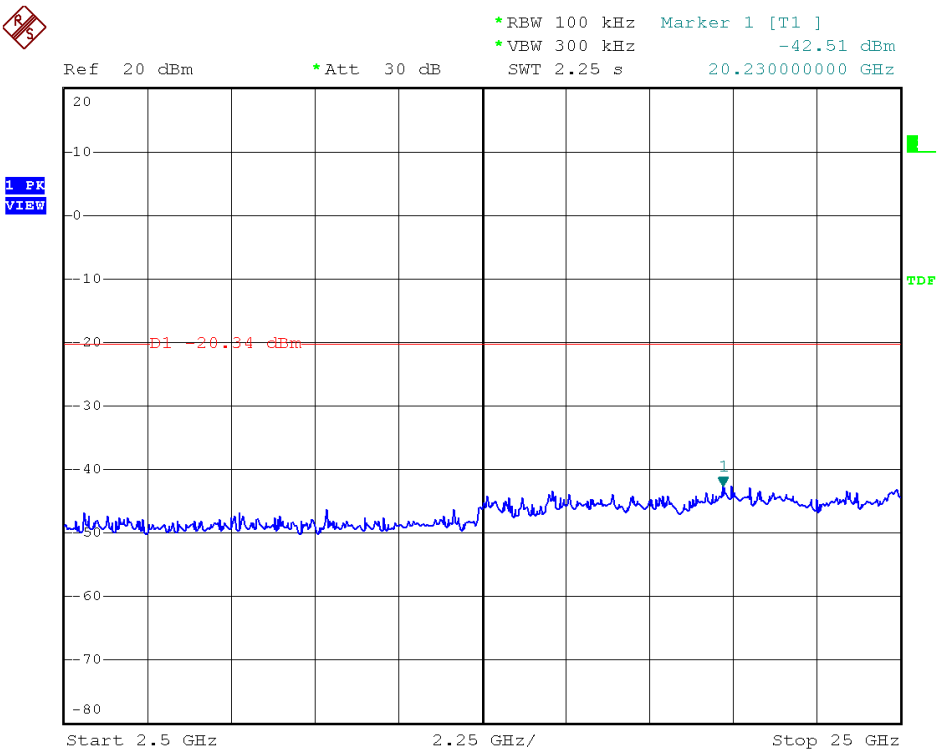
Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1
Channel: 01



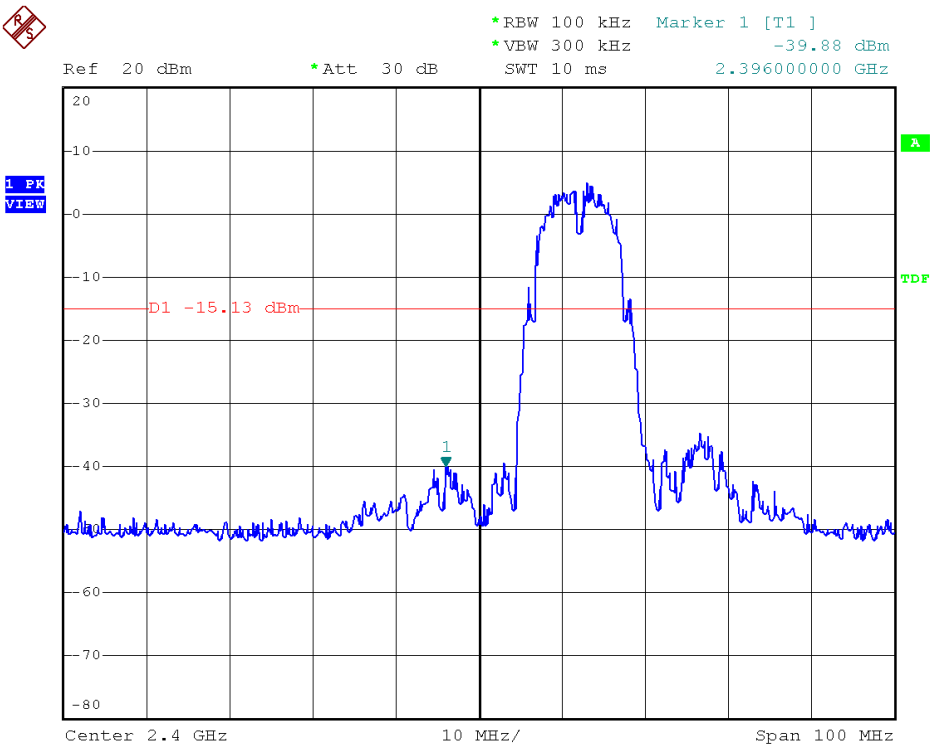


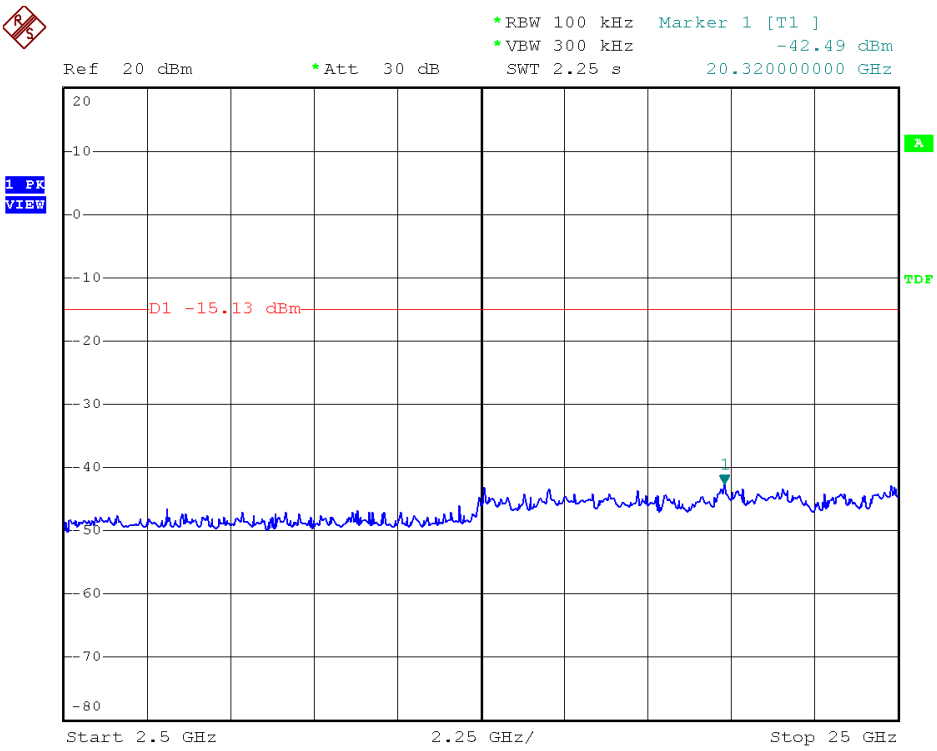
Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 1
Channel: 11



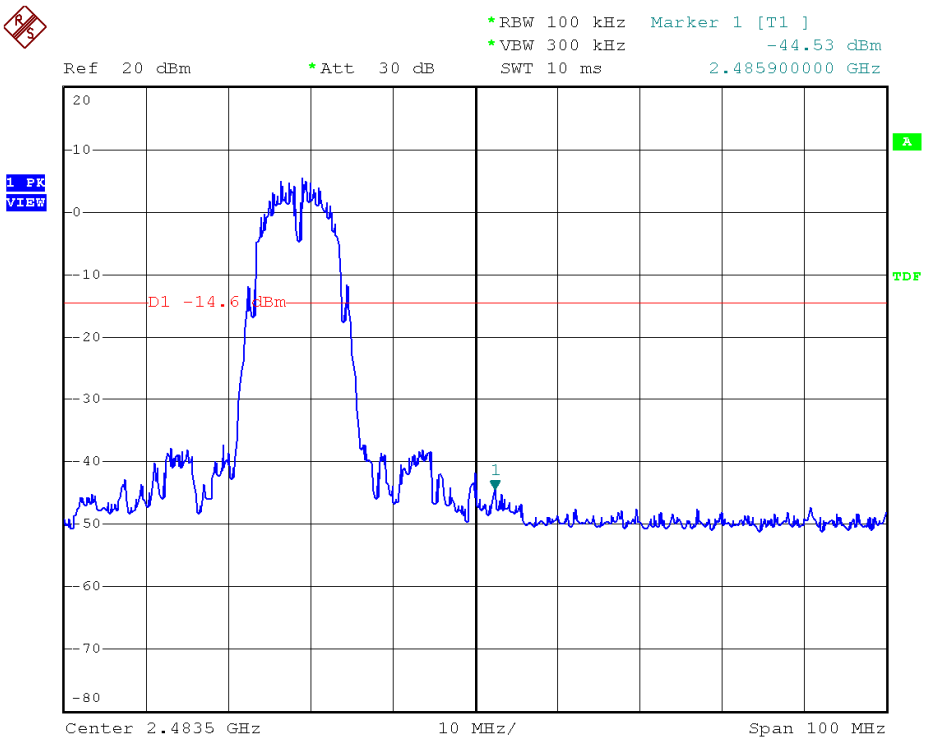


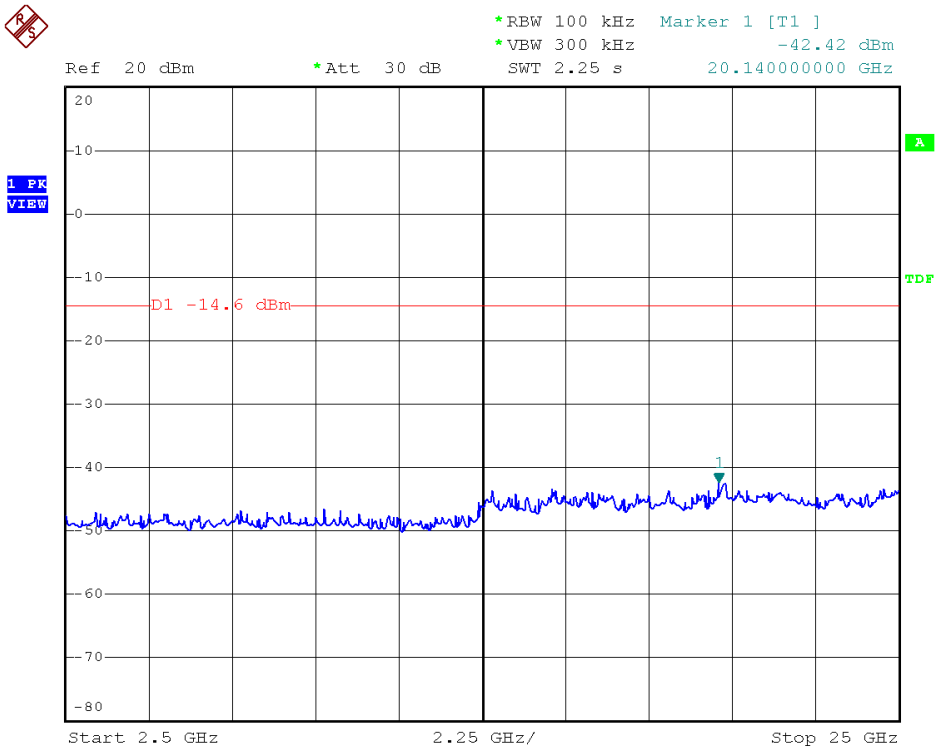
Modulation Standard: 802.11b (5.5Mbps), Antenna 2
Channel: 01



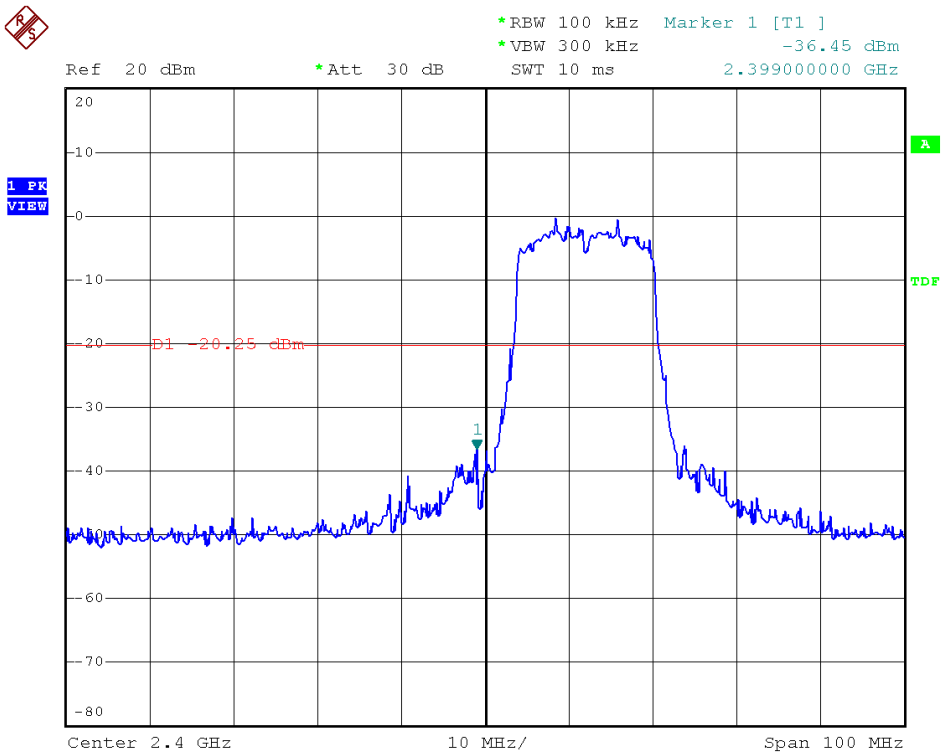


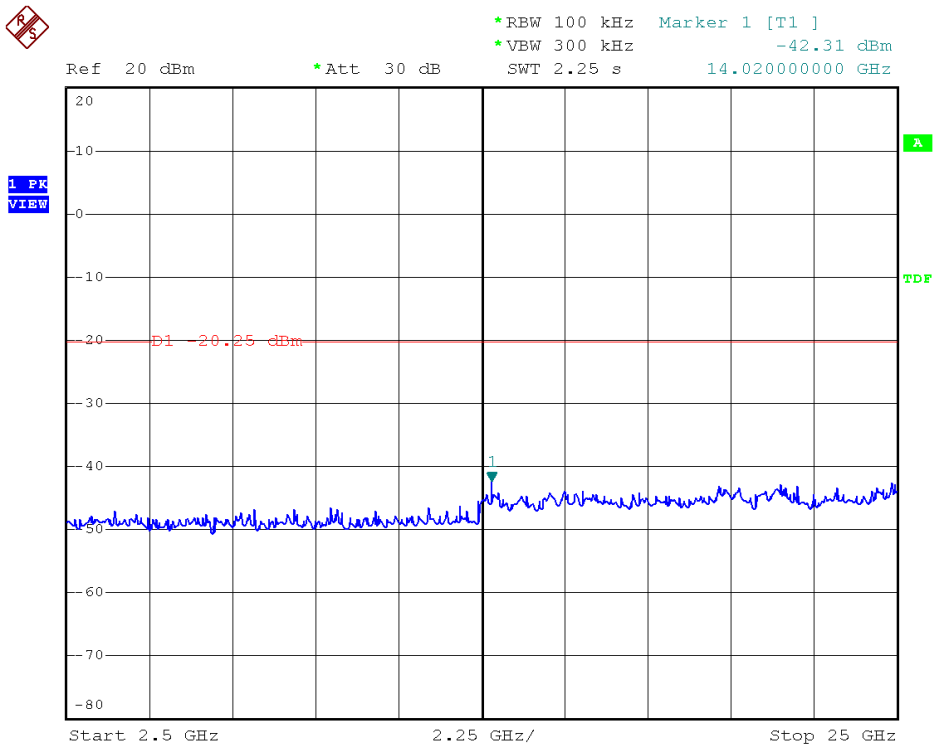
Modulation Standard: 802.11b (5.5Mbps), Antenna 2
Channel: 11



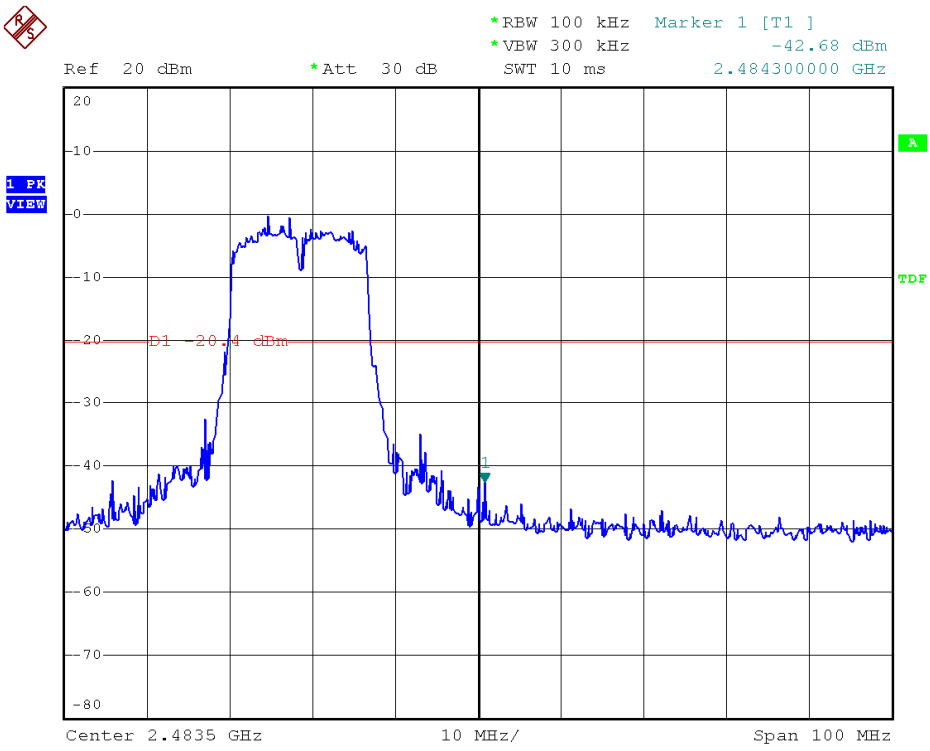


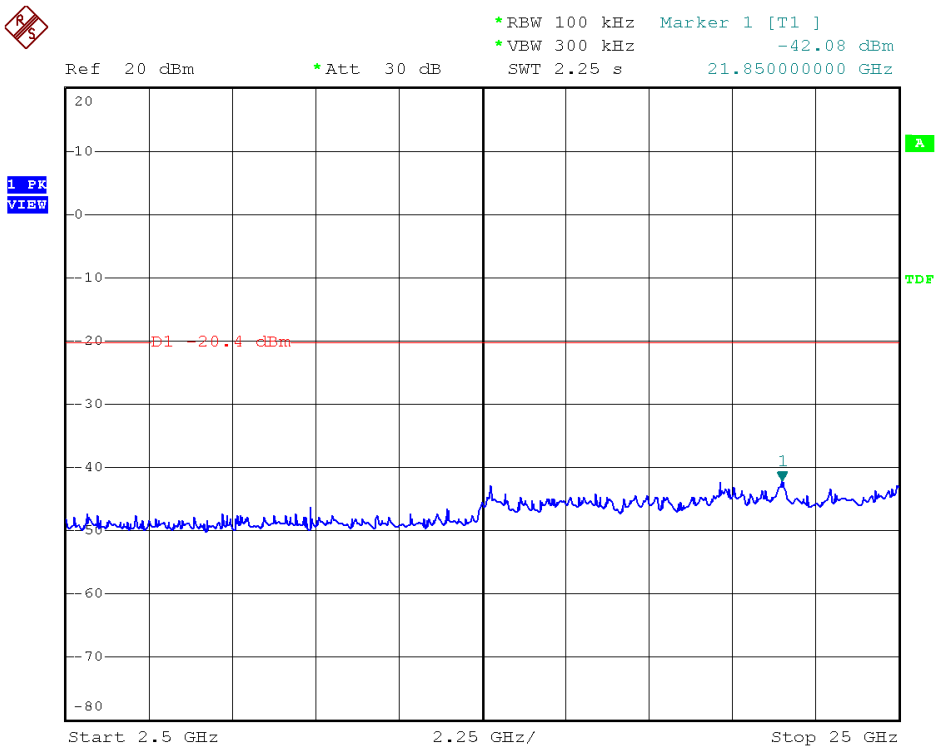
Modulation Standard: 802.11g (6Mbps), Antenna 2
Channel: 01



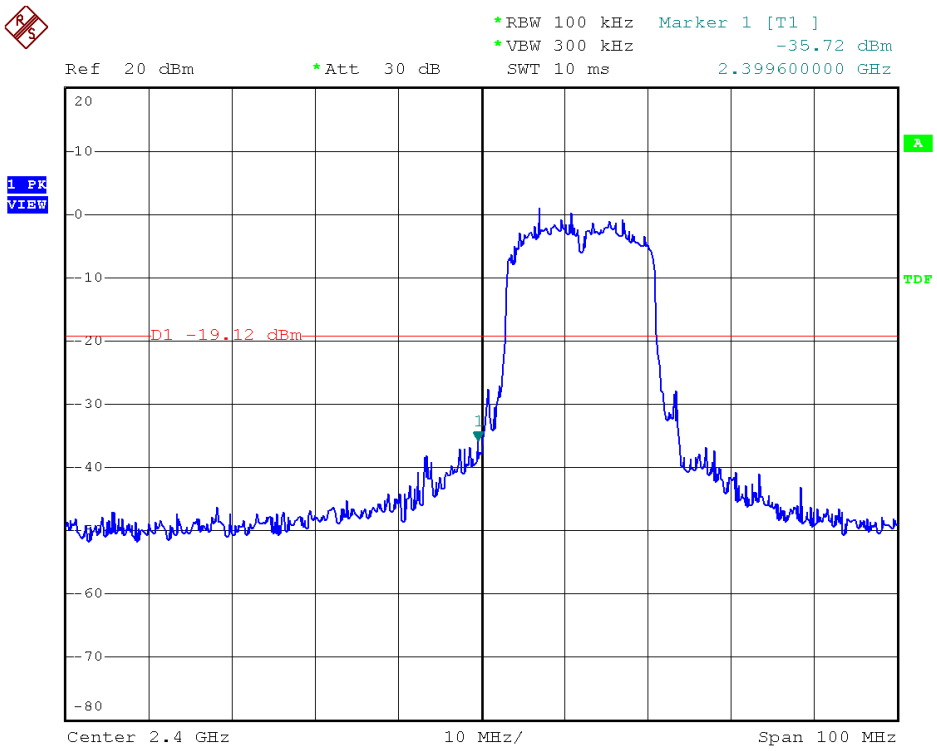


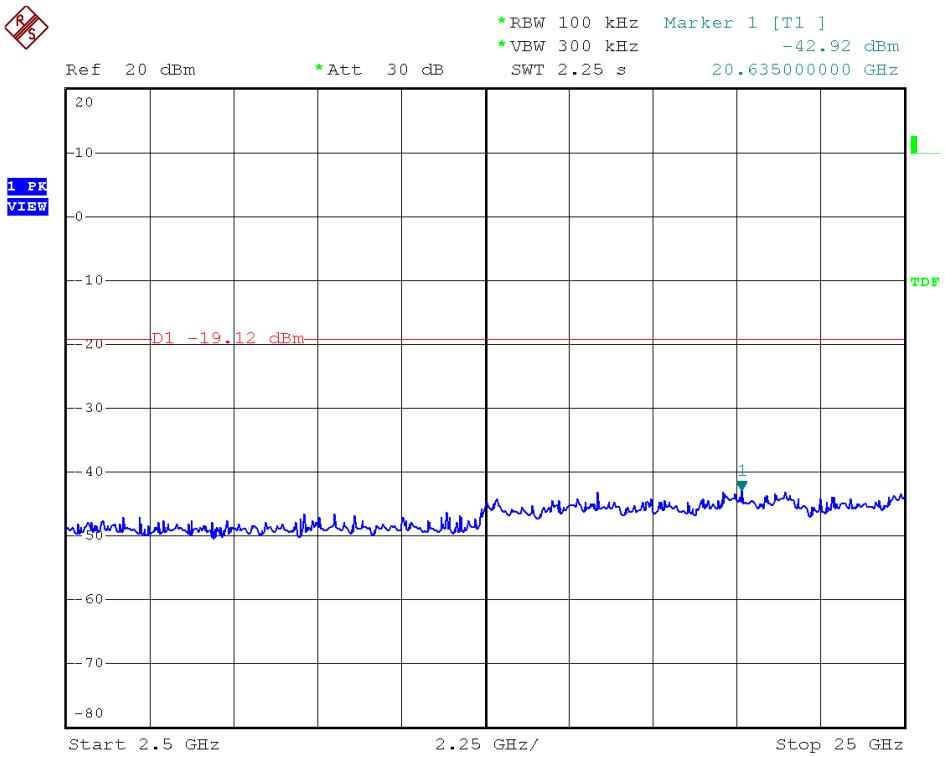
Modulation Standard: 802.11g (6Mbps), Antenna 2
Channel: 11



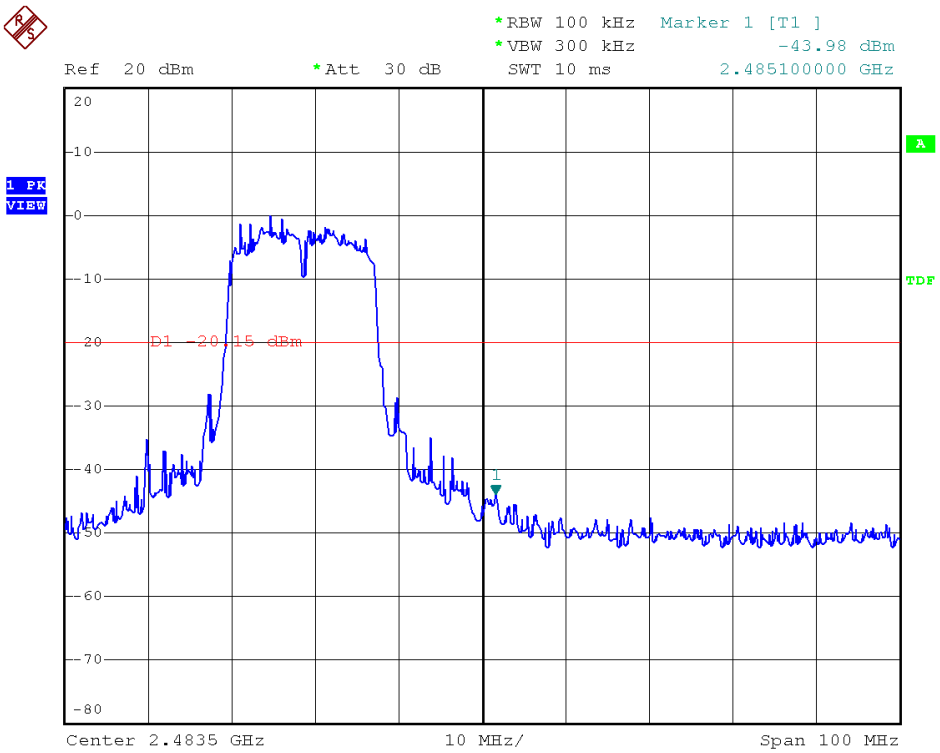


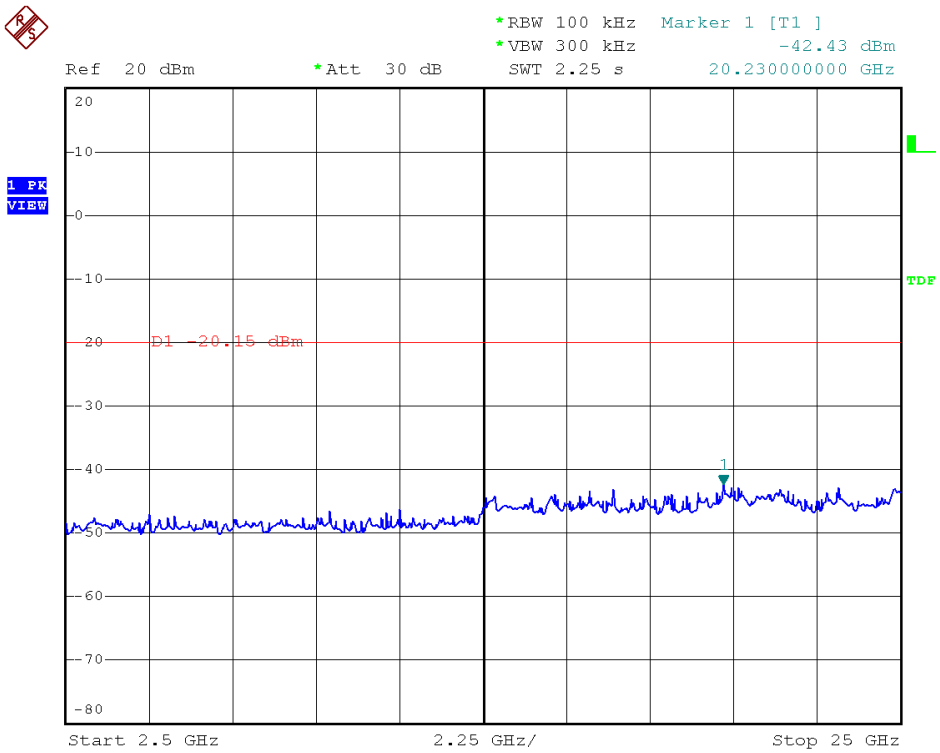
Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2
Channel: 01





Modulation Standard: 802.11n HT20 (MCS8 Mbps), Antenna 2
Channel: 11





9.6 Restrict Band Emission Measurement Data

Test Date: Jun. 27, 2014 Temperature: 25 ℃

Atmospheric pressure: 1100 hPa Humidity: 54 %

Modulation Standard: IEEE 802.11b (5.5Mbps)

Channel 1										Fundamental Frequency: 2412 MHz
Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result (dBuV/m)	Remark	Limit (dBuV/m)		Margin (dB)	Table Deg.	Ant High (m)
						Peak	Ave			
2389.660	V	53.33	6.50	59.83	Peak	74	54	-14.17	177	1.00
2389.660	V	42.83	6.50	49.33	Ave	74	54	-4.67	177	1.00
2389.866	H	54.06	6.50	60.56	Peak	74	54	-13.44	182	1.00
2389.866	H	43.68	6.50	50.18	Ave	74	54	-3.82	182	1.00
Channel 11										Fundamental Frequency: 2462 MHz
Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result (dBuV/m)	Remark	Limit (dBuV/m)		Margin (dB)	Table Deg.	Ant High (m)
						Peak	Ave			
2484.194	V	53.66	6.64	60.30	Peak	74	54	-13.70	178	1.00
2484.194	V	42.10	6.64	48.74	Ave	74	54	-5.26	178	1.00
2484.192	H	53.46	6.64	60.10	Peak	74	54	-13.90	182	1.00
2484.192	H	35.54	6.64	42.18	Ave	74	54	-11.82	182	1.00

Modulation Standard: IEEE 802.11g (6Mbps)

Channel 1										Fundamental Frequency: 2412 MHz
Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result (dBuV/m)	Remark	Limit (dBuV/m)		Margin (dB)	Table Deg.	Ant High (m)
						Peak	Ave			
2389.560	V	64.52	6.50	71.02	Peak	74	54	-2.98	177	1.00
2389.560	V	42.02	6.50	48.52	Ave	74	54	-5.48	177	1.00
2389.968	H	64.47	6.50	70.97	Peak	74	54	-3.03	182	1.00
2389.968	H	41.55	6.50	48.05	Ave	74	54	-5.95	182	1.00
Channel 11										Fundamental Frequency: 2462 MHz
Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result (dBuV/m)	Remark	Limit (dBuV/m)		Margin (dB)	Table Deg.	Ant High (m)
						Peak	Ave			
2486.130	V	65.00	6.64	71.64	Peak	74	54	-2.36	175	1.00
2486.130	V	35.54	6.64	42.18	Ave	74	54	-11.82	175	1.00
2484.002	H	64.40	6.64	71.04	Peak	74	54	-2.96	185	1.00
2484.002	H	40.24	6.64	46.88	Ave	74	54	-7.12	185	1.00

Modulation Standard: IEEE 802.11n HT20 (MCS8 Mbps)

Channel 1						Fundamental Frequency: 2412 MHz				
Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result (dBuV/m)	Remark	Limit (dBuV/m)		Margin (dB)	Table Deg.	Ant High (m)
						Peak	Ave			
2389.458	V	51.23	6.50	57.73	Peak	74	54	-16.27	195	1.00
2389.458	V	35.94	6.50	42.44	Ave	74	54	-1156	195	1.00
2337.742	H	50.61	6.50	57.04	Peak	74	54	-16.96	186	1.00
2337.744	H	35.82	6.50	42.25	Ave	74	54	-11.75	186	1.00
Channel 11						Fundamental Frequency: 2462 MHz				
Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result (dBuV/m)	Remark	Limit (dBuV/m)		Margin (dB)	Table Deg.	Ant High (m)
						Peak	Ave			
2484.382	V	63.67	6.64	70.31	Peak	74	54	-3.69	182	1.00
2484.382	V	35.51	6.64	42.15	Ave	74	54	-11.85	182	1.00
2483.584	H	54.86	6.64	61.50	Peak	74	54	-12.50	177	1.00
2483.584	H	35.41	6.64	42.05	Ave	74	54	-11.95	177	1.00

Notes:

1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector peak mode) for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz (detector sample mode) for Average detection at frequency above 1GHz.

10. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

**: Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

10.1 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.