

FCC TEST REPORT

for

SANHO ELECTRONICS TECHNOLOGY CO., LTD

Wireless Hard Drive Enclosure

Model Number: iUSBport HD, MC330

FCC ID: AXDMC330140217

Prepared for : SANHO ELECTRONICS TECHNOLOGY CO., LTD
Address : 1/F, BLOCK 1, #1177 LINGYUN ROAD, NINGBO, CHINA

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Report No. : 14KWE021169F
Date of Test : Feb. 11~17, 2014
Date of Report : Feb. 18, 2014

TABLE OF CONTENTS

Test Report Declaration	Page
1. GENERAL PRODUCT INFORMATION.....	4
1.1. Product Function.....	4
1.2. Description of Device (EUT)	4
1.3. Independent Operation Modes	4
2. TEST SITES	5
2.1. Test Facilities	5
2.2. List of Test and Measurement Instruments.....	6
3. TEST SET-UP AND OPERATION MODES	7
3.1. Principle of Configuration Selection	7
3.2. Block Diagram of Test Set-up	7
3.3. Test Operation Mode and Test Software	7
3.4. Special Accessories and Auxiliary Equipment	7
3.5. Countermeasures to Achieve EMC Compliance.....	7
4. EMISSION TEST RESULTS.....	8
4.1. Conducted Emission at the Mains Terminals Test.....	8
4.2. Radiated Emission Test.....	10
5. 6DB OCCUPY BANDWIDTH.....	27
5.1. Limits.....	27
6. BAND EDGE COMPLIANCE TEST	34
6.1. Limits.....	34
6.2. Test setup	34
7. OUTPUT POWER TEST	40
7.1. Limits.....	40
7.2. Test setup	40
7.3. Test result	40
8. POWER SPECTRAL DENSITY TEST.....	45
8.1. Limits.....	45
8.2. Test setup	45
8.3. Test result	45
9. ANTENNA REQUIREMENTS.....	52
9.1. Limits.....	52
9.2. Result.....	52
10. PHOTOGRAPHS OF TEST SET-UP	53
10.1. Set-up for Radiated Emission Test	53
10.2. Set-up for Radiated Emission Test	54
11. PHOTOGRAPHS OF THE EUT	55

Keyway Testing Technology Co., Ltd.

Applicant:	SANHO ELECTRONICS TECHNOLOGY CO., LTD		
Address:	1/F, Block 1, #1177 Lingyun Road, Ningbo,China		
Manufacturer:	SANHO ELECTRONICS TECHNOLOGY CO., LTD		
Address:	1/F, Block 1, #1177 Lingyun Road, Ningbo,China		
E.U.T:	Wireless Hard Drive Enclosure		
Model Number:	iUSBport HD, MC330		
Trade Name:	HYPER DRIVE	Serial No.:	-----
Date of Receipt:	Feb. 10, 2014	Date of Test:	Feb. 11~17, 2014
Test Specification:	FCC Part 15, Subpart C: Oct. 1, 2013 ANSI C63.4:2003 KDB558074		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		
		Issue Date: Feb. 18, 2014	
Tested by:	Reviewed by:	Approved by:	
			
Andy Gao / Engineer	Jade Yang/ Supervisor	Chris Du / Manager	
Other Aspects:	None.		
<i>Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested</i>			
<i>This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.</i>			

1. GENERAL PRODUCT INFORMATION

1.1. Product Function

Refer to Technical Construction Form and User Manual.

1.2. Description of Device (EUT)

Product Name:	Wireless Hard Drive Enclosure
Model No.:	iUSBport HD, MC330
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(H20)) 2422MHz~2452MHz (802.11n(H40))
Channel numbers:	11 for 802.11b/802.11g/802.11n(H20) ,7 for 802.11n(H40)
Channel separation:	5MHz
Modulation technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Modulation technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps
Data speed (IEEE 802.11n):	Up to 150Mbps
Antenna Type:	Integral
Antenna gain:	3.8dBi (declare by Applicant)
Power supply:	DC 5V from USB Port DC 3.7V

1.3. Independent Operation Modes

The basic operation modes are:

1.3.1. EUT work continues TX mode and frequency as below:

	Channel	Frequency
802.11b	Low	2412MHz
	Middle	2437MHz
	High	2462MHz
802.11g	Low	2412MHz
	Middle	2437MHz
	High	2462MHz
802.11n(HT20)	Low	2412MHz
	Middle	2437MHz
	High	2462MHz
802.11 n(HT40)	Low	2422MHz
	Middle	2437MHz
	High	2452MHz

Remark: According to ANSI C63.4 standards, the test results are both the "worst case" and "worst setup" 1MHz for 802.11b,54MHz for 802.11g, 6.5Mbps for 802.11n(H20), 13Mbps for 802.11n(H40).

2. TEST SITES

2.1. Test Facilities

Lab Qualifications : 944 Shielded Room built by ETS-Lindgren, USA
Date of completion: March 28, 2011

966 Chamber built by ETS-Lindgren, USA
Date of completion: March 28, 2011

Certificated by TUV Rheinland, Germany.
Registration No.: UA 50207153
Date of registration: July 13, 2011

Certificated by UL, USA
Registration No.: 100567-237
Date of registration: September 1, 2011

Certificated by Intertek
Registration No.: 2011-RTL-L1-31
Date of registration: October 11, 2011

Certificated by Industry Canada
Registration No.: 9868A
Date of registration: December 8, 2011

Certificated by FCC, USA
Registration No.: 370994
Date of registration: February 21, 2012

Certificated by CNAS China
Registration No.: CNAS L5783
Date of registration: August 8, 2012

Name of Firm : Keyway Testing Technology Co., Ltd.

Site Location : Baishun Industrial Zone, Zhangmutou Town,
Dongguan, Guangdong, China

2.2. List of Test and Measurement Instruments

2.2.1. For conducted emission at the mains terminals test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	May 9,13	May 9,14
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	May 9,13	May 9,14
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	May 9,13	May 9,14
RF Cable	FUJIKURA	3D-2W	944 Cable	May 9,13	May 9,14

2.2.2. For radiated emission test (Below 1GHz)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	May 9,13	May 9,14
Bilog Antenna	ETS-LINDGREEN	3142D	135452	May 20,13	May 20,14
Spectrum Analyzer	Agilent	E4411B	MY4511304	May 9,13	May 9,14
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	May 9,13	May 9,14
Signal Amplifier	SONOMA	310	187016	May 9,13	May 9,14
Signal Amplifier	Agilent	8449B	3008A00251	May 9,13	May 9,14
RF Cable	IMRO	IMRO-400	966 Cable 1#	N/A	N/A
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A

2.2.3. For above 1GHz radiated emission, output power,band edge, 6dB bandwidth test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Horn Antenna	DAZE	ZN30701	11003	May. 11,13	May. 11,14
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	May. 11,13	May. 11,14
Spectrum Analyzer	Agilent	8593E	3911A04271	May. 9,13	May. 9,14
Spectrum Analyzer	Agilent	E4408B	MY44211125	May. 9,13	May. 9,14
Spectrum Analyzer	Rohde&Schwarz	FSB 38	100427	May. 9,13	May. 9,14
3m Semi-anechoic Chamber	ETS-LINDGREN	966	KW01	May. 9,13	May. 9,14
Signal Amplifier	DAZE	ZN3380C	11001	May. 9,13	May. 9,14
Signal Amplifier	Agilent	8449B	3008A00251	May. 9,13	May. 9,14
High Pass filter	Micro	HPM50111	324216	May. 9,13	May. 9,14
RF Cable	IMRO	IMRO-400	966 Cable 1#	May. 9,13	May. 9,14
MULTI-DEVICE Controller	ETS-LINDGREN	2090	126913	N/A	N/A
Antenna Holder	ETS-LINDGREN	2070B	00109601	N/A	N/A

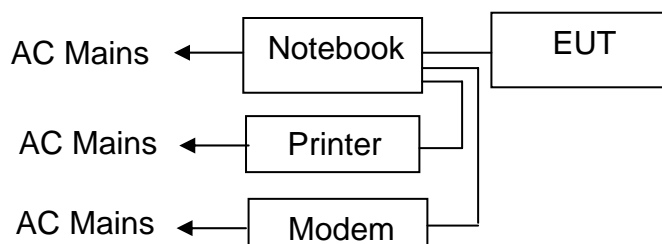
3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



(EUT: Wireless Hard Drive Enclosure)

3.3. Test Operation Mode and Test Software

None.

3.4. Special Accessories and Auxiliary Equipment

Notebook

Manufacturer: Lenovo
 M/N: Lenovo G475
 FCC Approver: FCC DOC

Printer

Manufacturer: Canon
 Model Number: LBP2900
 Power Cord: Unshielded, Detachable, 1.5m
 Data Cable: Unshielded, Detachable, 1.5m
 FCC Approver: FCC DOC

Modem

Manufacturer: Sanho
 Model Number: MS14
 Power Cord: Unshielded, Detachable, 1.2m
 Data Cable: Unshielded, Detachable, 1.0m
 FCC Approver: FCC DOC

3.5. Countermeasures to Achieve EMC Compliance

None.

4. EMISSION TEST RESULTS

4.1. Conducted Emission at the Mains Terminals Test

4.1.1. Limit 15.209 limits

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

4.1.2. Test Setup

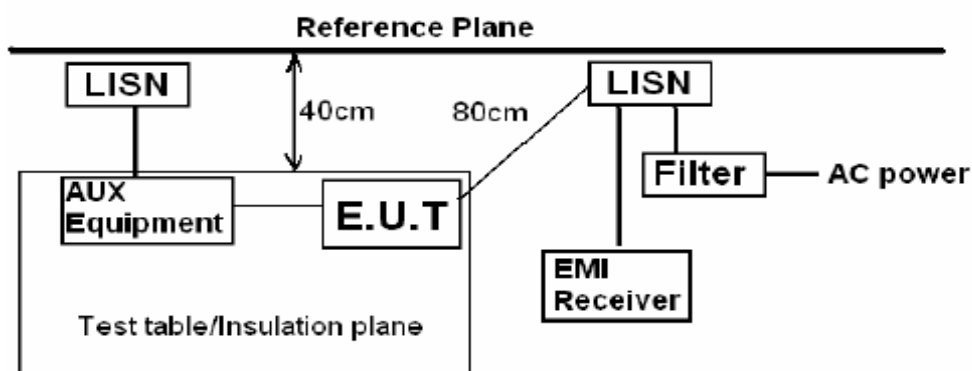
The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the centre so as to form a bundle no longer than 0.4 m.

The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.

The frequency range from 150 kHz to 30 MHz was investigated.

The bandwidth of the test receiver was set at 9 kHz.

Pretest for all mode, The test data of the worst case condition(s) was reported on the following page.



Remark:
 E.U.T: Equipment Under Test
 LISN: Line Impedance Stabilization Network
 Test table height=0.8m

4.1.3. Test Mode

Set EUT in TX mode.

Test Data**Line**

	Freq	Level	Limit	Over	Remark
	MHz	dBuV	Line	Limit	
1	0.180	41.28	54.50	-13.22	Average
2	0.180	54.26	64.50	-10.24	QP
3	0.239	32.39	52.13	-19.74	Average
4	0.239	45.64	62.13	-16.49	QP
5	0.315	28.65	49.84	-21.19	Average
6	0.315	41.06	59.84	-18.78	QP
7	0.471	30.07	46.49	-16.42	Average
8	0.471	42.15	56.49	-14.34	QP
9	0.647	28.28	46.00	-17.72	Average
10	0.647	37.15	56.00	-18.85	QP
11	4.269	23.89	46.00	-22.11	Average
12	4.269	36.26	56.00	-19.74	QP

Neutral

	Freq	Level	Limit	Over	Remark
	MHz	dBuV	Line	Limit	
1	0.173	42.16	54.81	-12.65	Average
2	0.173	54.13	64.81	-10.68	QP
3	0.239	33.55	52.13	-18.58	Average
4	0.239	46.12	62.13	-16.01	QP
5	0.365	29.83	48.61	-18.78	Average
6	0.365	38.13	58.61	-20.48	QP
7	0.481	36.39	46.32	-9.93	Average
8	0.481	44.20	56.32	-12.12	QP
9	1.242	26.57	46.00	-19.43	Average
10	1.242	37.15	56.00	-18.85	QP
11	4.202	23.88	46.00	-22.12	Average
12	4.202	36.15	56.00	-19.85	QP

4.2. Radiated Emission Test

4.2.1. Limit 15.209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

4.2.2. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

4.2.3. Test setup

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz.

The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

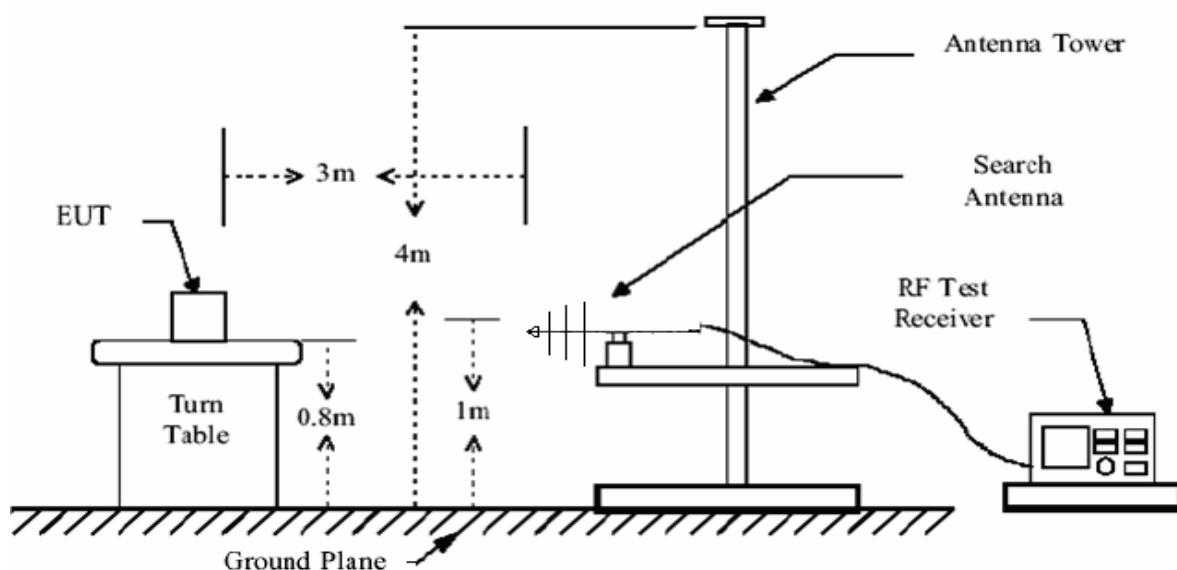
Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.

2. Measurement Uncertainty: ± 3.2 dB at a level of confidence of 95%.

3. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.

5. For Both PK and AV value above 1GHz , PK detector is used ◦



Test Data

Below 1GHz

WIFI Mode Horizontal polarizations

	Preamp Freq	Read Factor	CableAntenna Level	Loss Factor	Antenna Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	44.55	31.40	38.20	0.56	11.03	18.39	40.00	-21.61 QP
2	99.84	31.35	48.90	0.94	9.59	28.08	43.50	-15.42 QP
3	165.80	31.21	44.51	1.30	9.72	24.32	43.50	-19.18 QP
4	219.15	30.99	38.10	1.53	11.92	20.56	46.00	-25.44 QP
5	335.55	30.74	47.10	2.10	14.92	33.38	46.00	-12.62 QP
6	456.80	30.61	48.90	2.62	17.79	38.70	46.00	-7.30 QP

WIFI Mode Vertical polarizations

	Preamp Freq	Read Factor	CableAntenna Level	Loss Factor	Antenna Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1 !	31.94	31.40	47.80	0.56	17.66	34.62	40.00	-5.38 QP
2	44.55	31.40	51.50	0.56	11.03	31.69	40.00	-8.31 QP
3	99.84	31.35	52.20	0.94	9.59	31.38	43.50	-12.12 QP
4	136.70	31.20	52.10	1.12	8.37	30.39	43.50	-13.11 QP
5	235.64	30.94	40.90	1.61	12.50	24.07	46.00	-21.93 QP
6	587.75	30.71	42.10	3.29	20.21	34.89	46.00	-11.11 QP

Above 1GHz

802.11b 2412MHz Horizontal polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	31.47	12.01	32.99	48.97	74.00	-25.03	Peak
2	7236.00	27.95	22.13	16.61	37.30	48.09	74.00	-25.91	Peak
3	8701.00	28.31	20.32	16.81	37.04	45.86	74.00	-28.14	Peak
4	10197.00	28.82	22.52	17.00	38.72	49.42	74.00	-24.58	Peak
5	12407.00	29.08	16.88	17.71	39.48	44.99	74.00	-29.01	Peak
6	14583.00	29.49	15.98	19.73	40.25	46.47	74.00	-27.53	Peak

802.11b 2412MHz Vertical polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	31.41	12.01	32.99	48.91	74.00	-25.09	Peak
2	7236.00	27.95	21.63	16.61	37.30	47.59	74.00	-26.41	Peak
3	8599.00	28.28	24.11	16.79	36.92	49.54	74.00	-24.46	Peak
4	11608.00	28.96	19.24	17.29	39.80	47.37	74.00	-26.63	Peak
5	13189.00	29.24	17.66	18.42	41.57	48.41	74.00	-25.59	Peak
6	15603.00	29.64	19.02	20.39	38.79	48.56	74.00	-25.44	Peak

802.11b 2437MHz Horizontal polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	30.95	12.14	33.11	48.67	74.00	-25.33	Peak
2	7311.00	27.96	21.20	16.62	37.32	47.18	74.00	-26.82	Peak
3	9211.00	28.48	18.67	16.90	37.65	44.74	74.00	-29.26	Peak
4	10350.00	28.84	18.40	17.04	38.96	45.56	74.00	-28.44	Peak
5	12271.00	29.05	17.26	17.59	39.46	45.26	74.00	-28.74	Peak
6	15399.00	29.61	17.45	20.25	38.42	46.51	74.00	-27.49	Peak

802.11b 2437MHz Vertical polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	31.06	12.14	33.11	48.78	74.00	-25.22	Peak
2	7311.00	27.96	21.93	16.62	37.32	47.91	74.00	-26.09	Peak
3	9517.00	28.61	20.65	16.92	38.01	46.97	74.00	-27.03	Peak
4	12118.00	29.02	20.77	17.47	39.42	48.64	74.00	-25.36	Peak
5	13869.00	29.37	15.97	19.20	43.37	49.17	74.00	-24.83	Peak
6	16572.00	29.93	13.41	21.03	43.57	48.08	74.00	-25.92	Peak

802.11b 2462MHz Horizontal polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	31.10	12.28	33.23	49.05	74.00	-24.95	Peak
2	7386.00	27.98	22.07	16.62	37.36	48.07	74.00	-25.93	Peak
3	9211.00	28.48	20.39	16.90	37.65	46.46	74.00	-27.54	Peak
4	11115.00	28.91	19.79	17.19	39.59	47.66	74.00	-26.34	Peak
5	12645.00	29.13	19.08	17.91	39.86	47.72	74.00	-26.28	Peak
6	14447.00	29.47	15.79	19.64	40.90	46.86	74.00	-27.14	Peak

802.11b 2462MHz Vertical polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	30.77	12.28	33.23	48.72	74.00	-25.28	Peak
2	7386.00	27.98	22.14	16.62	37.36	48.14	74.00	-25.86	Peak
3	9364.00	28.54	16.45	16.91	37.83	42.65	74.00	-31.35	Peak
4	11115.00	28.91	16.79	17.19	39.59	44.66	74.00	-29.34	Peak
5	13036.00	29.21	14.95	18.26	40.86	44.86	74.00	-29.14	Peak
6	14226.00	29.43	13.31	19.51	42.20	45.59	74.00	-28.41	Peak

802.11g 2412MHz Horizontal polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	30.69	12.01	32.99	48.19	74.00	-25.81	Peak
2	7236.00	27.95	22.22	16.61	37.30	48.18	74.00	-25.82	Peak
3	8242.00	28.17	21.41	16.71	36.59	46.54	74.00	-27.46	Peak
4	10775.00	28.88	20.91	17.12	39.37	48.52	74.00	-25.48	Peak
5	13529.00	29.31	13.80	18.81	43.03	46.33	74.00	-27.67	Peak
6	15909.00	29.69	15.52	20.58	39.97	46.38	74.00	-27.62	Peak

802.11g 2412MHz Vertical polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	30.84	12.01	32.99	48.34	74.00	-25.66	Peak
2	7236.00	27.95	22.13	16.61	37.30	48.09	74.00	-25.91	Peak
3	9211.00	28.48	20.99	16.90	37.65	47.06	74.00	-26.94	Peak
4	10843.00	28.88	19.45	17.13	39.41	47.11	74.00	-26.89	Peak
5	12730.00	29.15	18.87	17.99	40.06	47.77	74.00	-26.23	Peak
6	14906.00	29.54	19.85	19.94	38.92	49.17	74.00	-24.83	Peak

802.11g 2437MHz Horizontal polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	30.59	12.14	33.11	48.31	74.00	-25.69	Peak
2	7311.00	27.96	22.07	16.62	37.32	48.05	74.00	-25.95	Peak
3	9551.00	28.62	20.71	16.93	38.04	47.06	74.00	-26.94	Peak
4	12373.00	29.07	19.42	17.68	39.48	47.51	74.00	-26.49	Peak
5	13155.00	29.23	18.63	18.40	41.41	49.21	74.00	-24.79	Peak
6	14719.00	29.51	18.21	19.83	39.69	48.22	74.00	-25.78	Peak

802.11g 2437MHz Vertical polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	29.56	12.14	33.11	47.28	74.00	-26.72	Peak
2	7311.00	27.96	21.71	16.62	37.32	47.69	74.00	-26.31	Peak
3	9704.00	28.68	20.32	16.94	38.17	46.75	74.00	-27.25	Peak
4	11727.00	28.97	19.22	17.31	39.68	47.24	74.00	-26.76	Peak
5	13325.00	29.26	15.27	18.59	42.21	46.81	74.00	-27.19	Peak
6	14107.00	29.42	15.07	19.43	42.90	47.98	74.00	-26.02	Peak

802.11g 2462MHz Horizontal polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	29.72	12.28	33.23	47.67	74.00	-26.33	Peak
2	7386.00	27.98	21.11	16.62	37.36	47.11	74.00	-26.89	Peak
3	9534.00	28.61	22.59	16.92	38.03	48.93	74.00	-25.07	Peak
4	10945.00	28.89	20.31	17.16	39.47	48.05	74.00	-25.95	Peak
5	11914.00	28.99	21.22	17.35	39.49	49.07	74.00	-24.93	Peak
6	14107.00	29.42	16.07	19.43	42.90	48.98	74.00	-25.02	Peak

802.11g 2462MHz Vertical polarizations

	Freq	Preamp Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	28.41	12.28	33.23	46.36	74.00	-27.64	Peak
2	7386.00	27.98	20.81	16.62	37.36	46.81	74.00	-27.19	Peak
3	8446.00	28.23	18.61	16.76	36.76	43.90	74.00	-30.10	Peak
4	10469.00	28.85	17.00	17.06	39.15	44.36	74.00	-29.64	Peak
5	13121.00	29.22	14.41	18.36	41.26	44.81	74.00	-29.19	Peak
6	14413.00	29.46	15.03	19.63	41.10	46.30	74.00	-27.70	Peak

802.11n(HT20) 2412MHz Horizontal polarizations

	Preamp Freq	Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	27.58	12.01	32.99	45.08	74.00	-28.92	Peak
2	7236.00	27.95	19.15	16.61	37.30	45.11	74.00	-28.89	Peak
3	8684.00	28.30	21.34	16.81	37.02	46.87	74.00	-27.13	Peak
4	11353.00	28.94	19.08	17.24	39.78	47.16	74.00	-26.84	Peak
5	13512.00	29.30	14.98	18.79	43.02	47.49	74.00	-26.51	Peak
6	14413.00	29.46	16.03	19.63	41.10	47.30	74.00	-26.70	Peak

802.11n(HT20) 2412MHz Vertical polarizations

	Preamp Freq	Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4824.00	27.50	28.34	12.01	32.99	45.84	74.00	-28.16	Peak
2	7236.00	27.95	20.12	16.61	37.30	46.08	74.00	-27.92	Peak
3	8293.00	28.19	21.10	16.72	36.63	46.26	74.00	-27.74	Peak
4	10316.00	28.83	19.57	17.03	38.91	46.68	74.00	-27.32	Peak
5	12917.00	29.18	16.43	18.14	40.50	45.89	74.00	-28.11	Peak
6	14787.00	29.52	16.98	19.86	39.41	46.73	74.00	-27.27	Peak

802.11n(HT20) 2437MHz Horizontal polarizations

	Preamp Freq	Factor	Read Level	CableAntenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	27.92	12.14	33.11	45.64	74.00	-28.36	Peak
2	7311.00	27.96	20.23	16.62	37.32	46.21	74.00	-27.79	Peak
3	9313.00	28.52	18.93	16.91	37.77	45.09	74.00	-28.91	Peak
4	11489.00	28.95	14.77	17.26	39.89	42.97	74.00	-31.03	Peak
5	15144.00	29.57	15.55	20.09	38.47	44.54	74.00	-29.46	Peak
6	16385.00	29.86	11.54	20.90	42.68	45.26	74.00	-28.74	Peak

802.11n(HT20)2437MHz Vertical polarizations

	Preamp Freq	Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	27.45	12.14	33.11	45.17	74.00	-28.83	Peak
2	7311.00	27.96	20.22	16.62	37.32	46.20	74.00	-27.80	Peak
3	9160.00	28.46	16.98	16.89	37.59	43.00	74.00	-31.00	Peak
4	11591.00	28.96	16.06	17.29	39.81	44.20	74.00	-29.80	Peak
5	13121.00	29.22	14.40	18.36	41.26	44.80	74.00	-29.20	Peak
6	14617.00	29.49	14.04	19.76	40.11	44.42	74.00	-29.58	Peak

802.11n(HT20) 2462MHz Horizontal polarizations

	Preamp Freq	Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	26.31	12.28	33.23	44.26	74.00	-29.74	Peak
2	7386.00	27.98	19.08	16.62	37.36	45.08	74.00	-28.92	Peak
3	8446.00	28.23	17.04	16.76	36.76	42.33	74.00	-31.67	Peak
4	10469.00	28.85	16.00	17.06	39.15	43.36	74.00	-30.64	Peak
5	13087.00	29.22	13.50	18.32	41.10	43.70	74.00	-30.30	Peak
6	14770.00	29.52	14.77	19.85	39.48	44.58	74.00	-29.42	Peak

802.11n(HT20) 2462MHz Vertical polarizations

	Preamp Freq	Factor	Read Level	CableAntenna Loss	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4924.00	27.56	26.36	12.28	33.23	44.31	74.00	-29.69	Peak
2	7386.00	27.98	19.21	16.62	37.36	45.21	74.00	-28.79	Peak
3	9024.00	28.41	15.14	16.88	37.42	41.03	74.00	-32.97	Peak
4	11353.00	28.94	15.27	17.24	39.78	43.35	74.00	-30.65	Peak
5	12900.00	29.18	13.22	18.12	40.46	42.62	74.00	-31.38	Peak
6	15076.00	29.56	14.26	20.04	38.49	43.23	74.00	-30.77	Peak

802.11n(HT40) 2422MHz Horizontal polarizations

	Preamp Freq	Preamp Factor	Read Level	Cable&Antenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4844.00	27.51	27.37	12.05	33.03	44.94	74.00	-29.06	Peak
2	7266.00	27.95	19.20	16.61	37.31	45.17	74.00	-28.83	Peak
3	8429.00	28.23	16.02	16.75	36.74	41.28	74.00	-32.72	Peak
4	10044.00	28.81	15.79	16.98	38.48	42.44	74.00	-31.56	Peak
5	12713.00	29.14	14.99	17.97	40.02	43.84	74.00	-30.16	Peak
6	13478.00	29.29	12.02	18.75	42.92	44.40	74.00	-29.60	Peak

802.11n(HT40) 2422MHz Vertical polarizations

	Preamp Freq	Preamp Factor	Read Level	Cable&Antenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4844.00	27.51	26.02	12.05	33.03	43.59	74.00	-30.41	Peak
2	7266.00	27.95	18.84	16.61	37.31	44.81	74.00	-29.19	Peak
3	9466.00	28.59	16.94	16.92	37.96	43.23	74.00	-30.77	Peak
4	11472.00	28.95	13.60	17.26	39.87	41.78	74.00	-32.22	Peak
5	12458.00	29.09	12.73	17.76	39.49	40.89	74.00	-33.11	Peak
6	14736.00	29.51	12.17	19.83	39.62	42.11	74.00	-31.89	Peak

802.11n(HT40) 2437MHz Horizontal polarizations

	Preamp Freq	Preamp Factor	Read Level	Cable&Antenna Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	26.89	12.14	33.11	44.61	74.00	-29.39	Peak
2	7311.00	27.96	18.80	16.62	37.32	44.78	74.00	-29.22	Peak
3	8752.00	28.32	16.64	16.83	37.10	42.25	74.00	-31.75	Peak
4	10724.00	28.87	13.18	17.11	39.33	40.75	74.00	-33.25	Peak
5	11506.00	28.95	12.40	17.27	39.90	40.62	74.00	-33.38	Peak
6	13835.00	29.37	7.87	19.16	43.33	40.99	74.00	-33.01	Peak

802.11n(HT40)2437MHz Vertical polarizations

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4874.00	27.53	25.60	12.14	33.11	43.32	74.00	-30.68	Peak
2	7311.00	27.96	18.18	16.62	37.32	44.16	74.00	-29.84	Peak
3	9041.00	28.41	14.54	16.88	37.44	40.45	74.00	-33.55	Peak
4	11472.00	28.95	14.60	17.26	39.87	42.78	74.00	-31.22	Peak
5	13903.00	29.38	8.55	19.24	43.40	41.81	74.00	-32.19	Peak
6	14787.00	29.52	13.42	19.86	39.41	43.17	74.00	-30.83	Peak

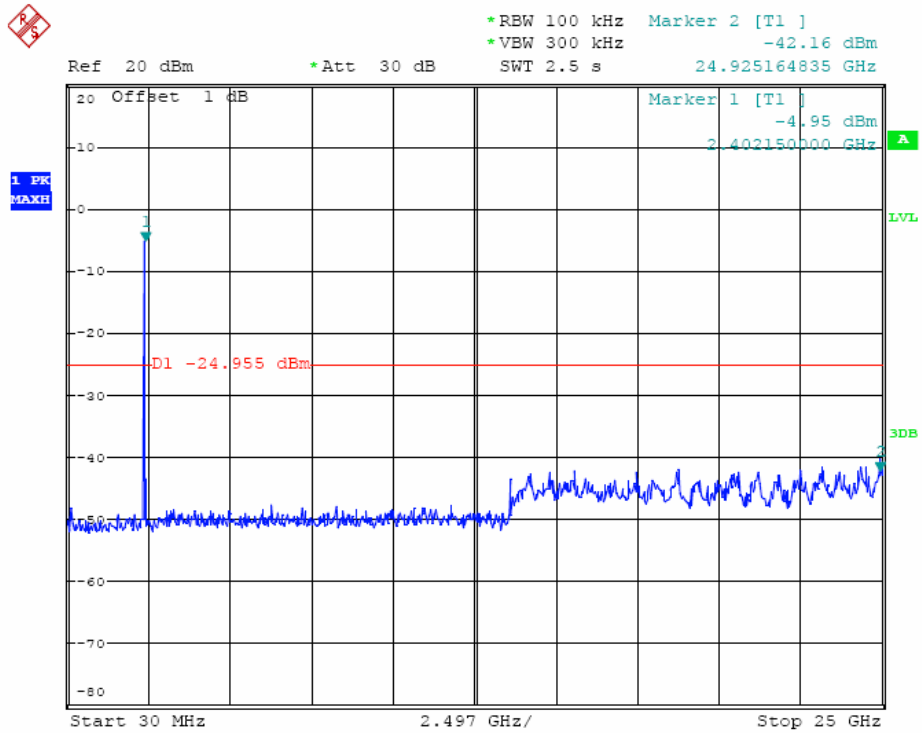
802.11n(HT40) 2452MHz Horizontal polarizations

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4904.00	27.55	27.31	12.23	33.19	45.18	74.00	-28.82	Peak
2	7356.00	27.97	18.34	16.62	37.34	44.33	74.00	-29.67	Peak
3	9415.00	28.57	13.41	16.91	37.90	39.65	74.00	-34.35	Peak
4	13104.00	29.22	11.57	18.34	41.18	41.87	74.00	-32.13	Peak
5	15229.00	29.58	16.50	20.15	38.46	45.53	74.00	-28.47	Peak
6	16521.00	29.91	7.71	21.00	43.44	42.24	74.00	-31.76	Peak

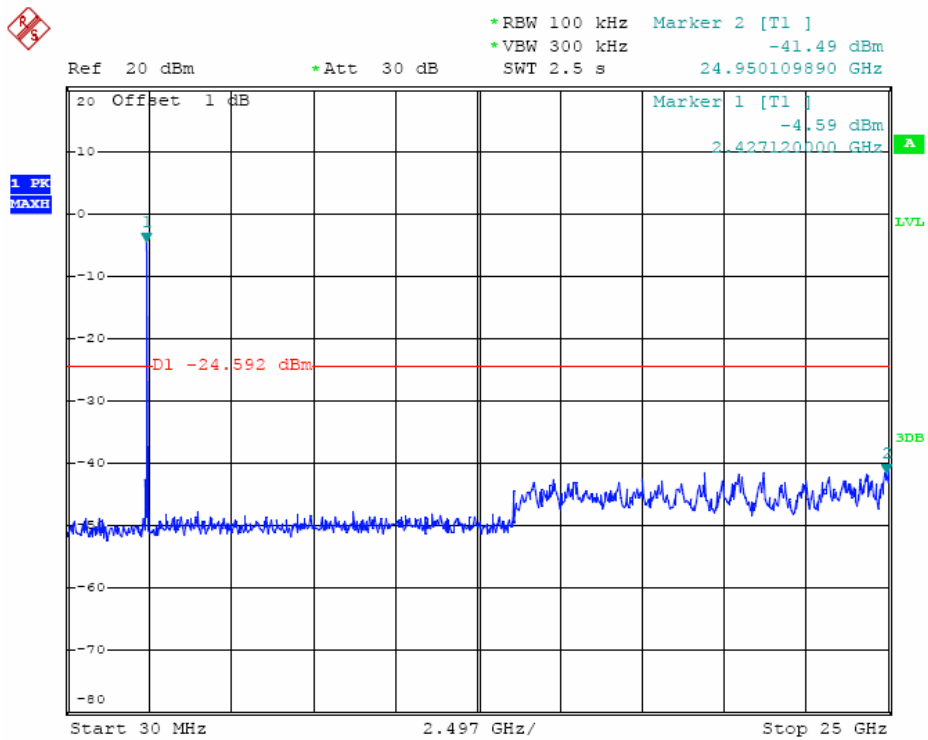
802.11n(HT40) 2452MHz Vertical polarizations

	Freq	Preamp Factor	Read Level	Cable Loss	Antenna Factor	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	4904.00	27.55	27.35	12.23	33.19	45.22	74.00	-28.78	Peak
2	7356.00	27.97	19.01	16.62	37.34	45.00	74.00	-29.00	Peak
3	8973.00	28.39	14.93	16.87	37.36	40.77	74.00	-33.23	Peak
4	11200.00	28.92	15.31	17.21	39.66	43.26	74.00	-30.74	Peak
5	13189.00	29.24	12.39	18.42	41.57	43.14	74.00	-30.86	Peak
6	14838.00	29.53	13.47	19.89	39.20	43.03	74.00	-30.97	Peak

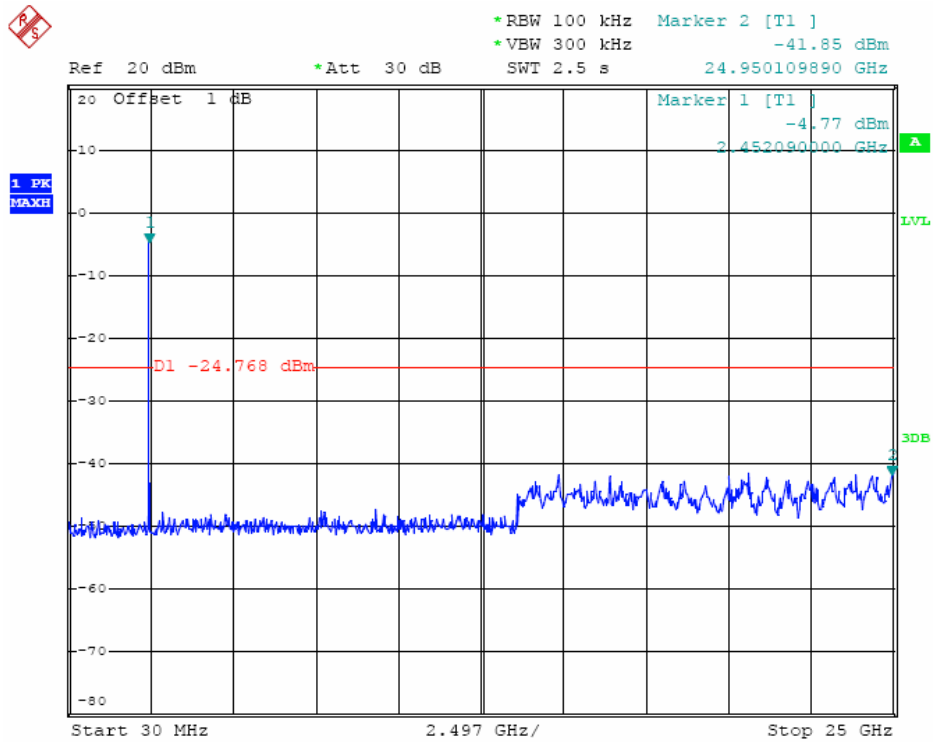
**For conducted test
802.11b 2412MHz**



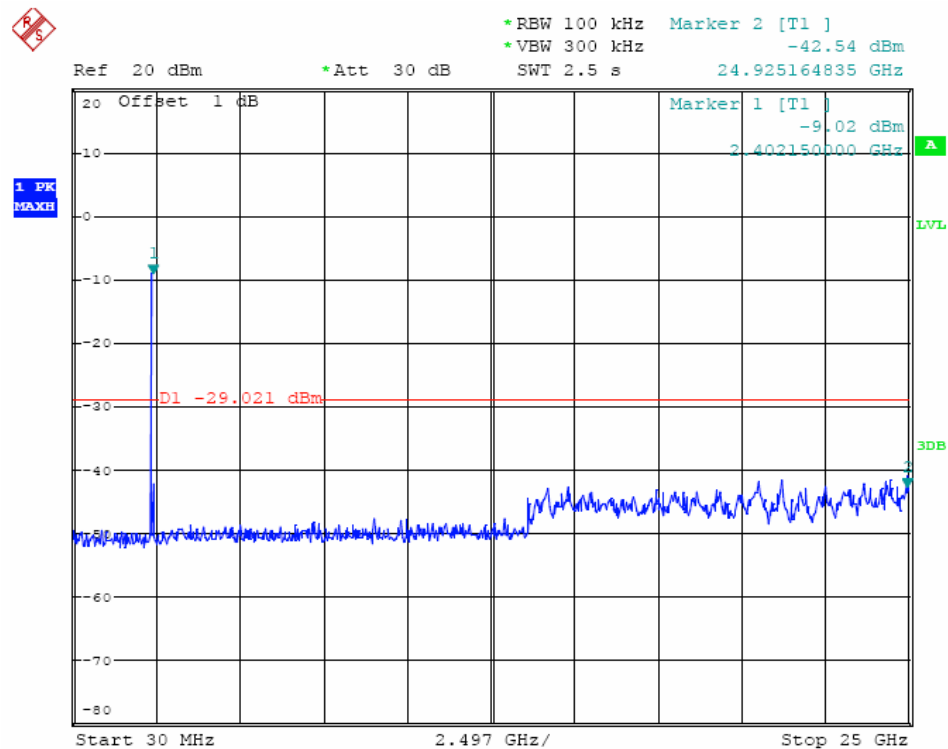
802.11b 2437MHz



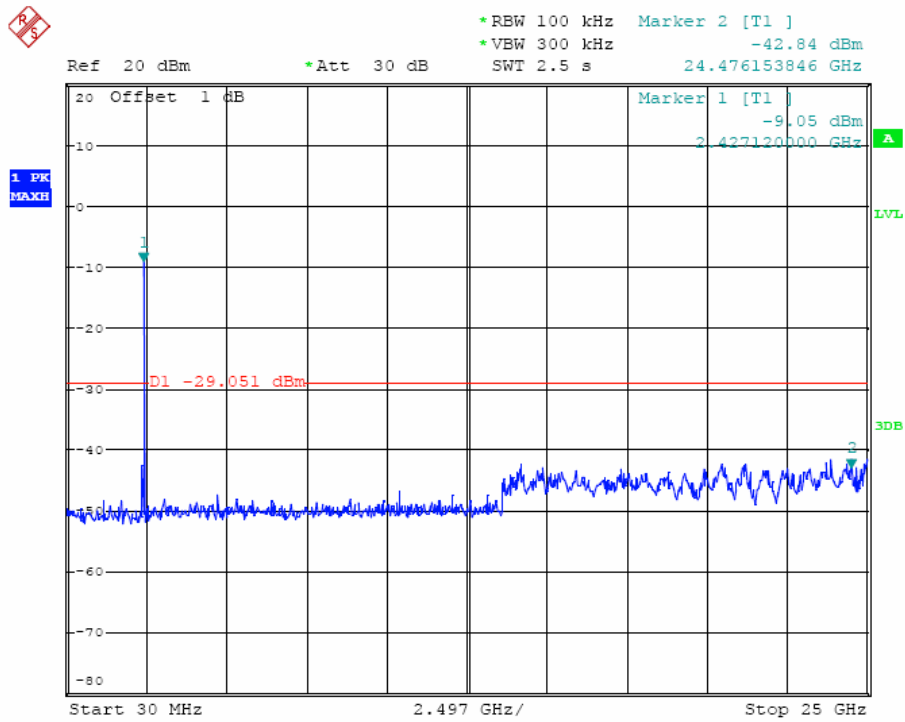
802.11b 2462MHz



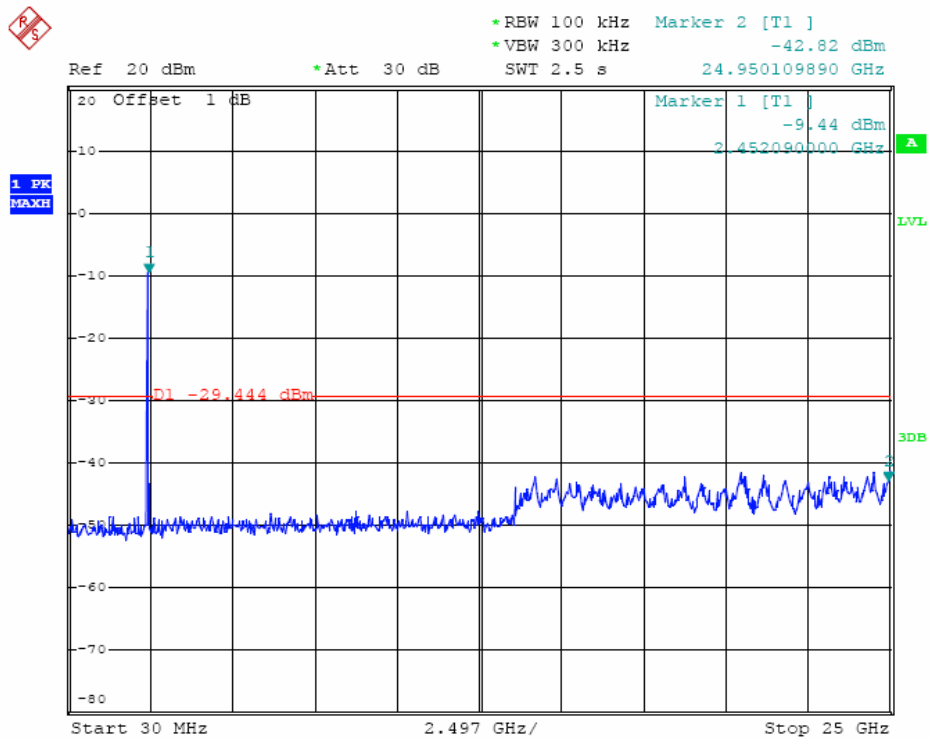
802.11g 2412MHz



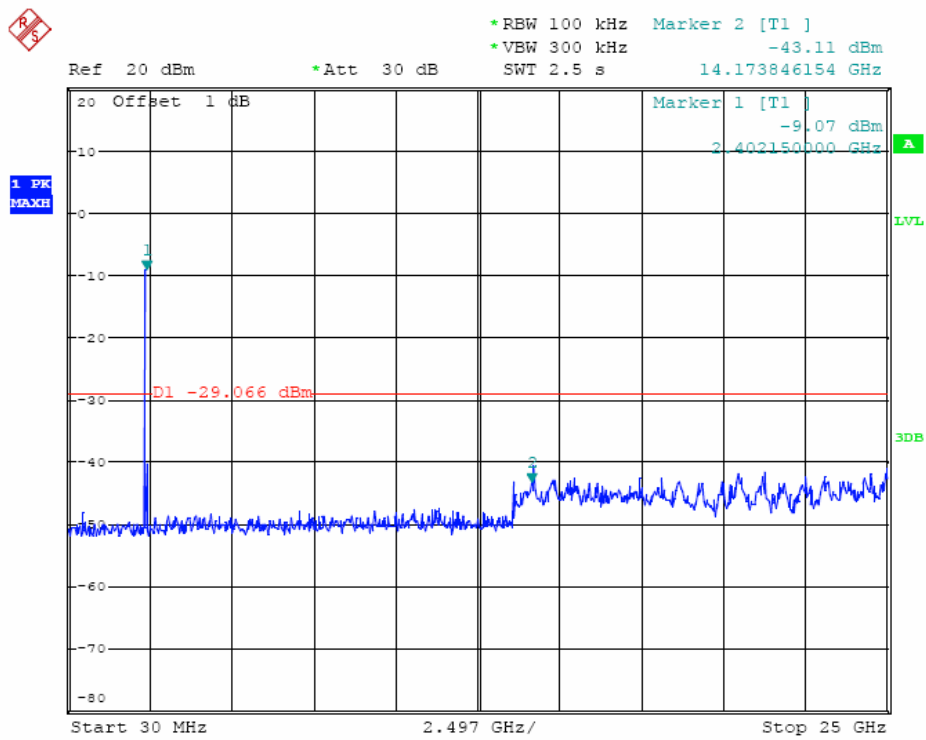
802.11g 2437MHz



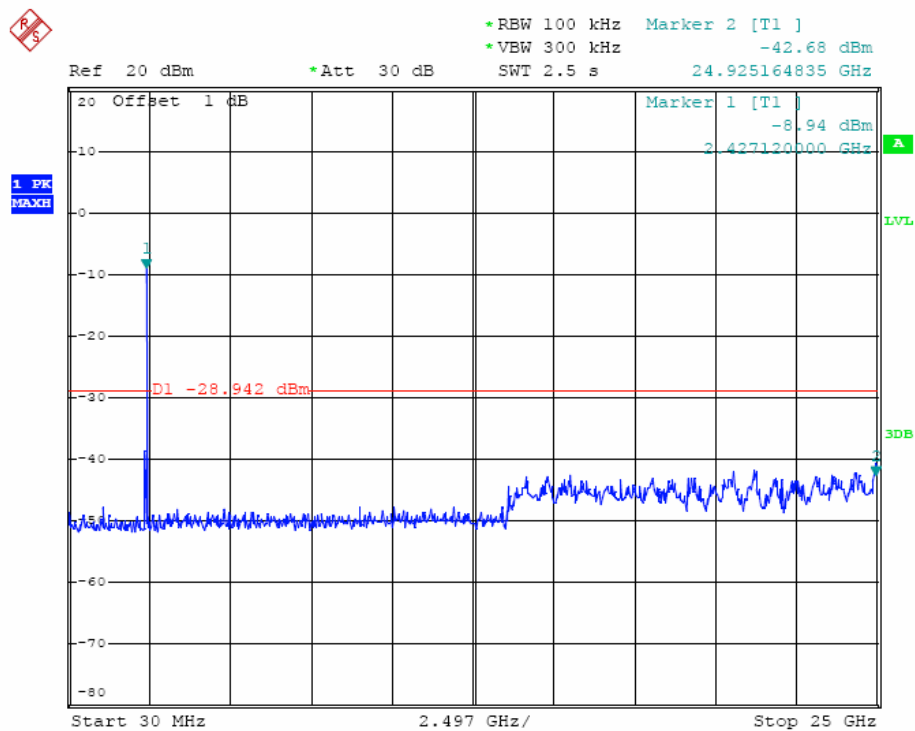
802.11g 2462MHz



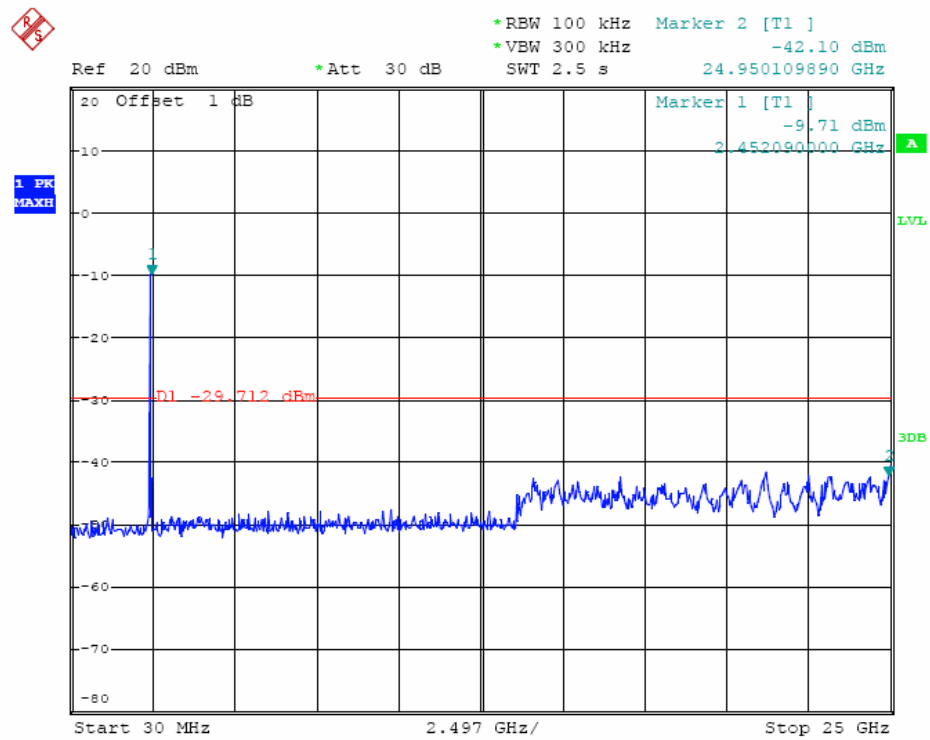
802.11n(HT20) 2412MHz



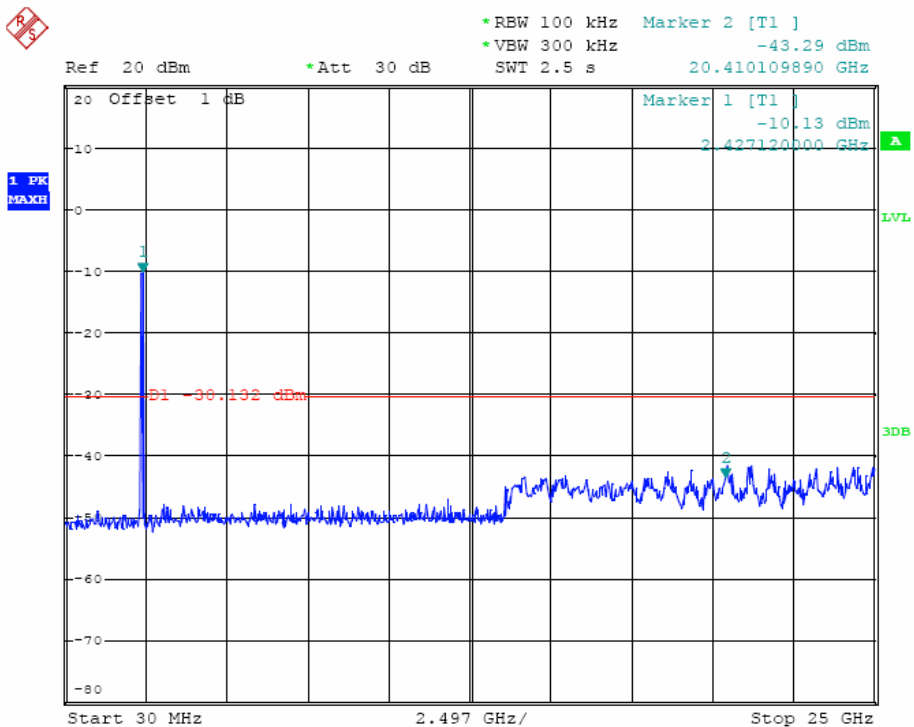
802.11n(HT20) 2437MHz



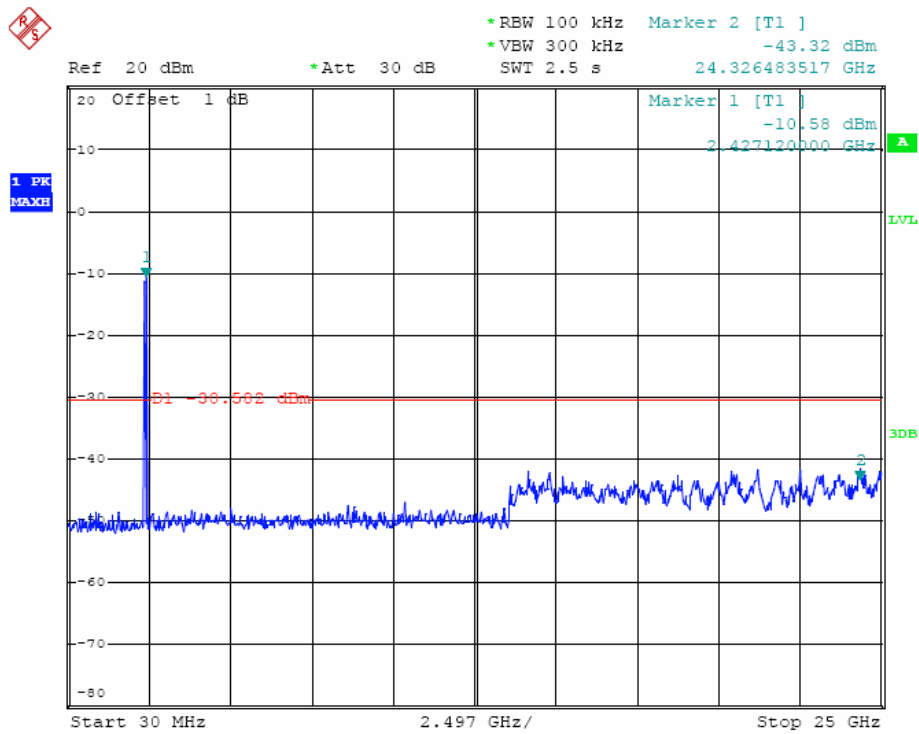
802.11n(HT20) 2462MHz



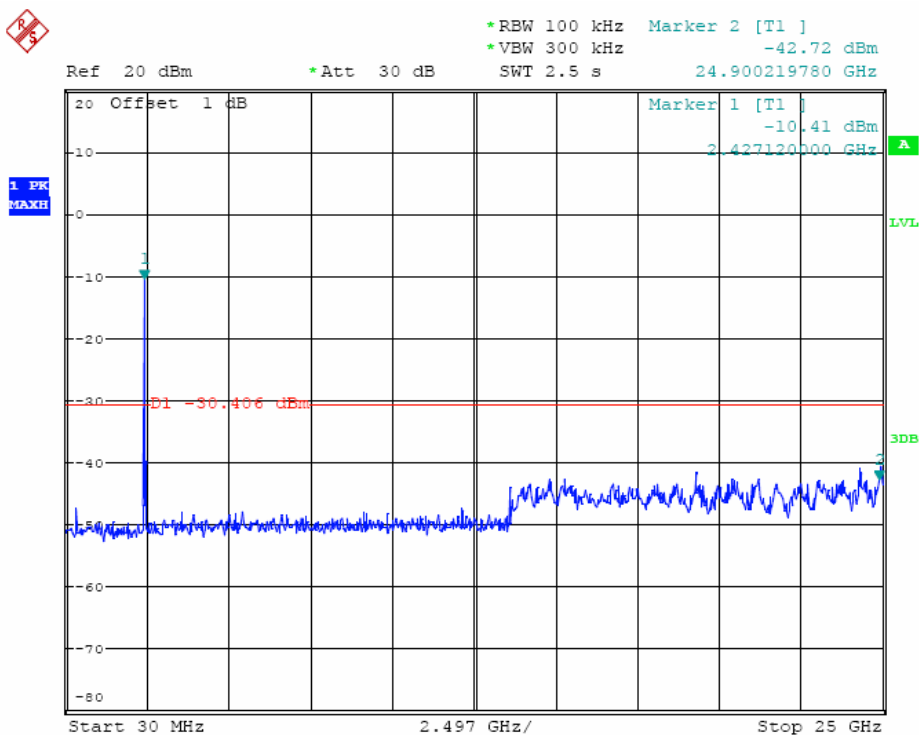
802.11n(HT40) 2422MHz



802.11n(HT40) 2437MHz



802.11n(HT40) 2452MHz



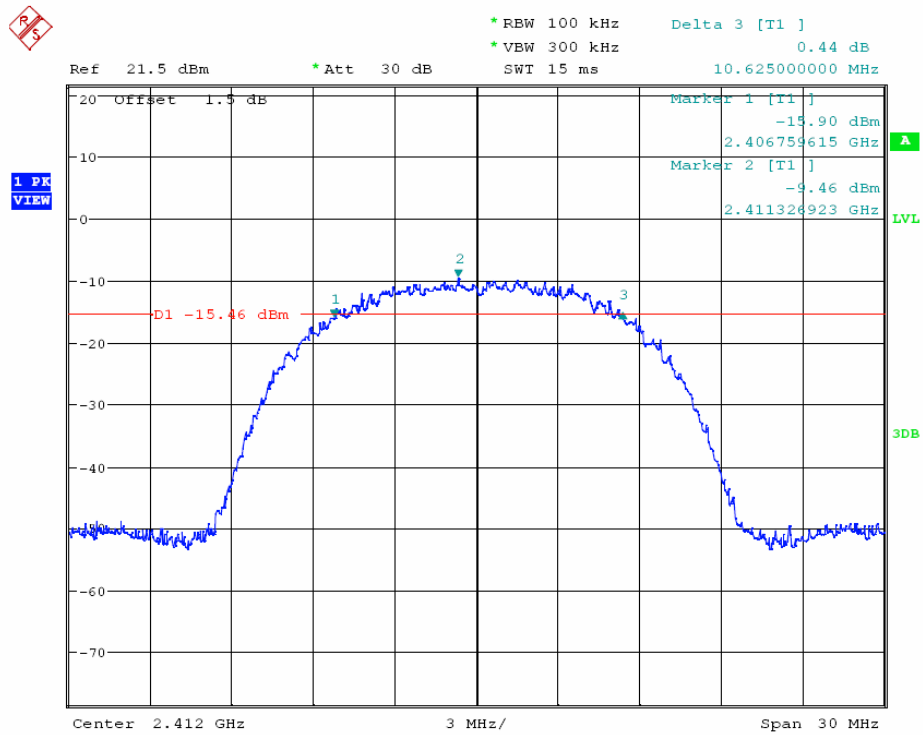
5. 6DB OCCUPY BANDWIDTH

5.1. Limits

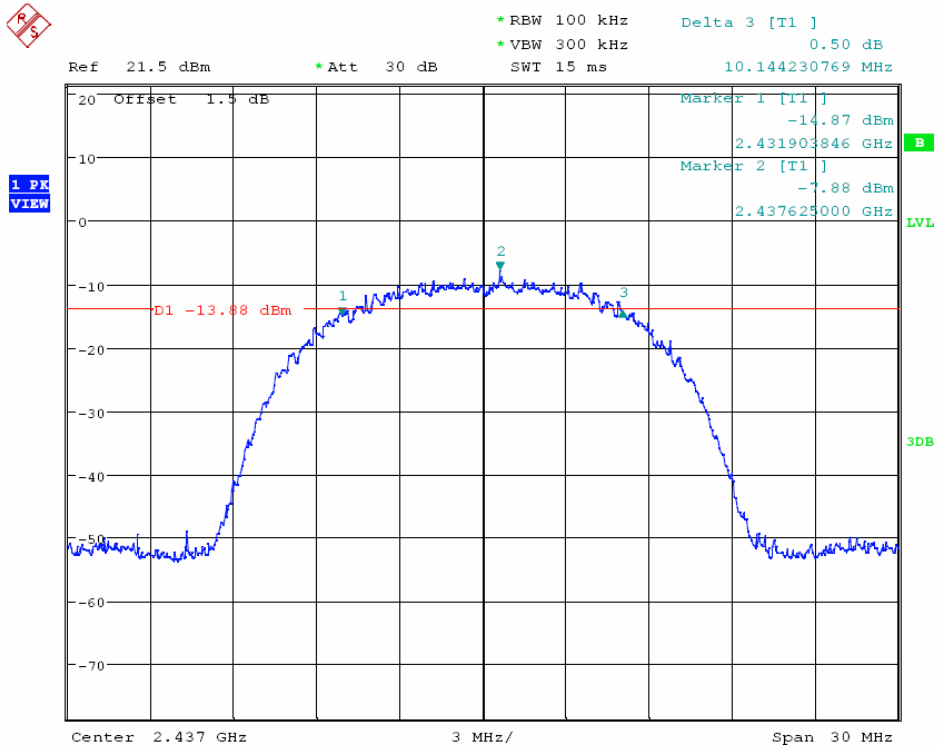
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz
Test data:

	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b	2412	10.63	>0.5	Pass
	2437	10.14	>0.5	Pass
	2462	10.10	>0.5	Pass
802.11g	2412	16.63	>0.5	Pass
	2437	16.59	>0.5	Pass
	2462	16.59	>0.5	Pass
802.11n(HT20)	2412	17.84	>0.5	Pass
	2437	17.88	>0.5	Pass
	2462	17.79	>0.5	Pass
802.11n(HT40)	2422	36.62	>0.5	Pass
	2437	36.62	>0.5	Pass
	2452	36.54	>0.5	Pass

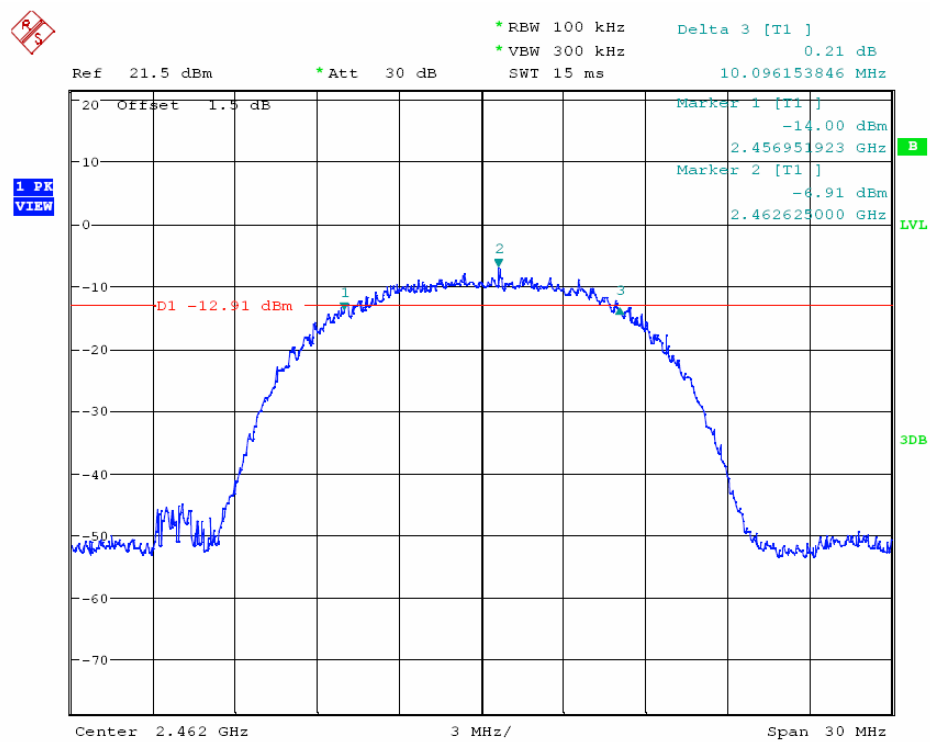
Test plot as follows:
802.11b 2412MHz



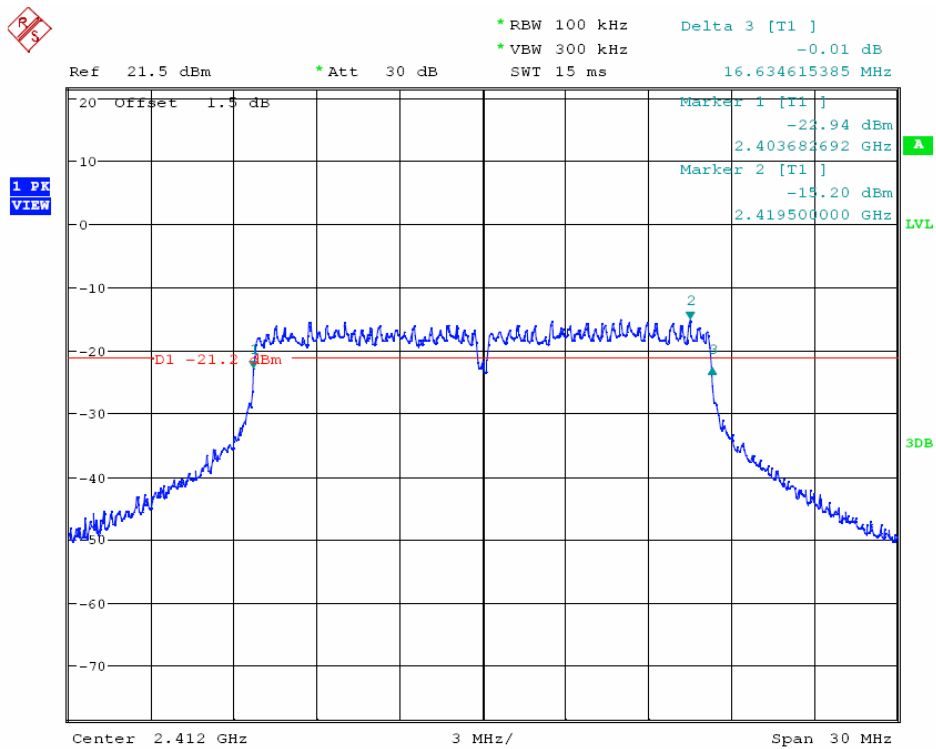
802.11b 2437MHz



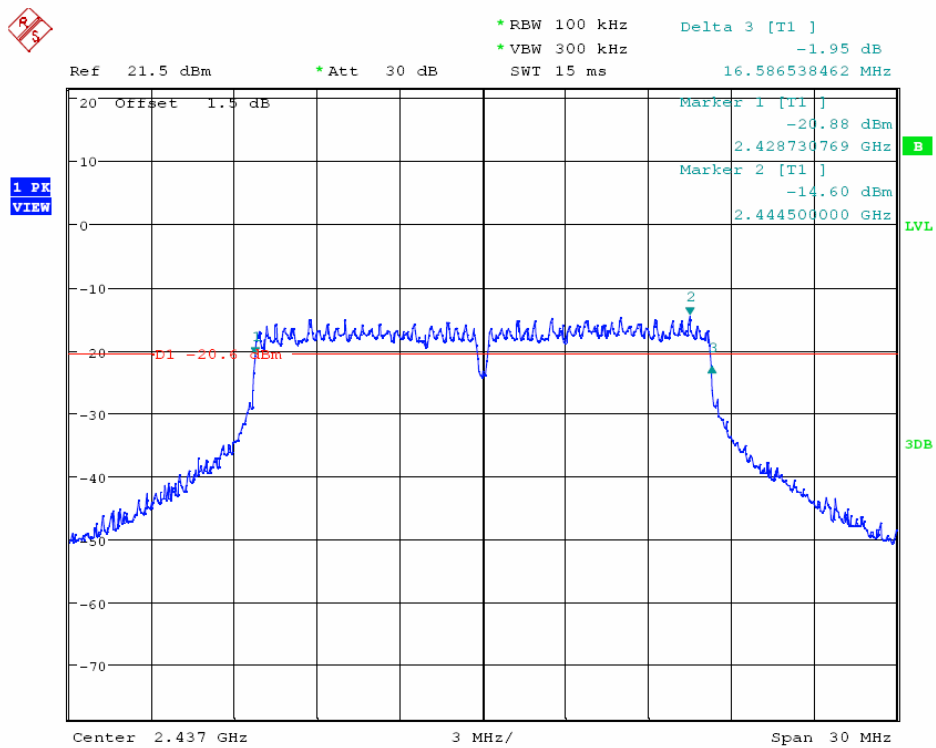
802.11b 2462MHz



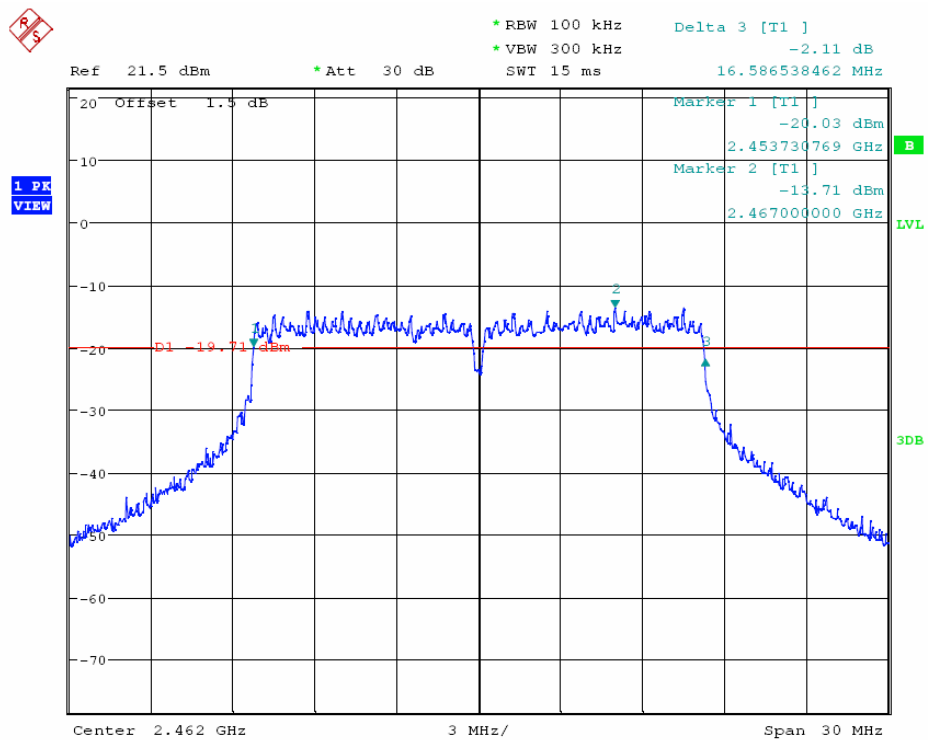
802.11g 2412MHz



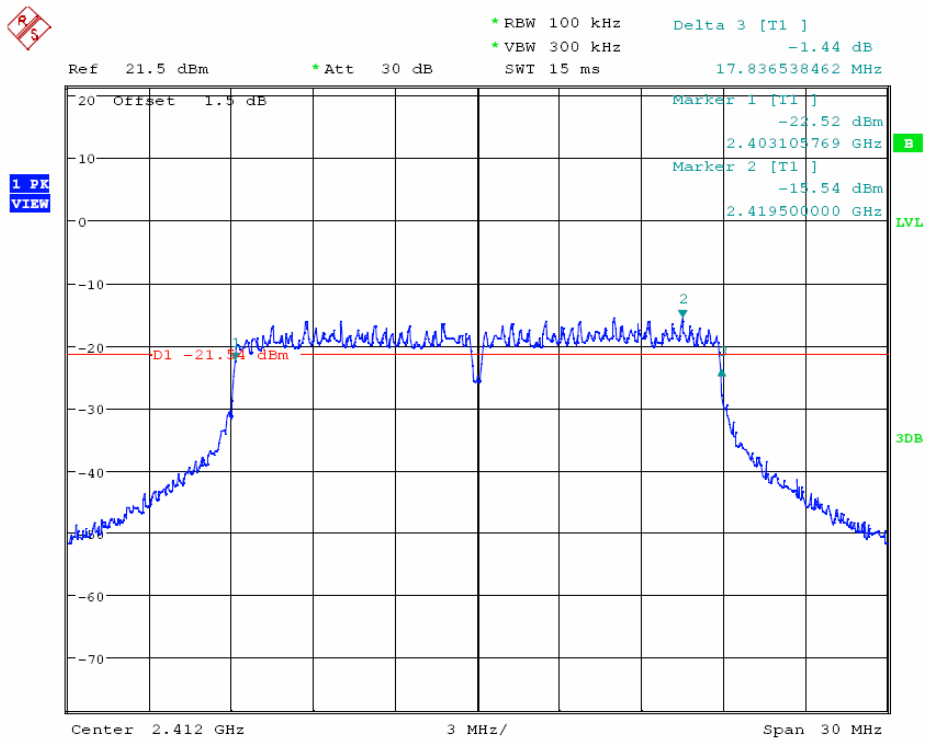
802.11g 2437MHz



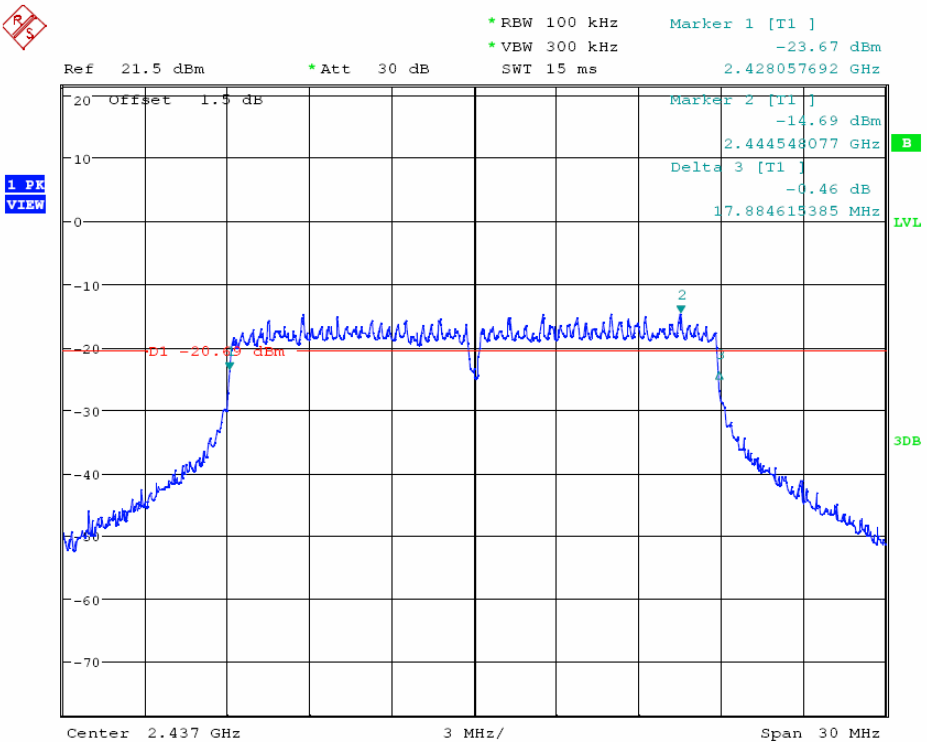
802.11g 2462MHz



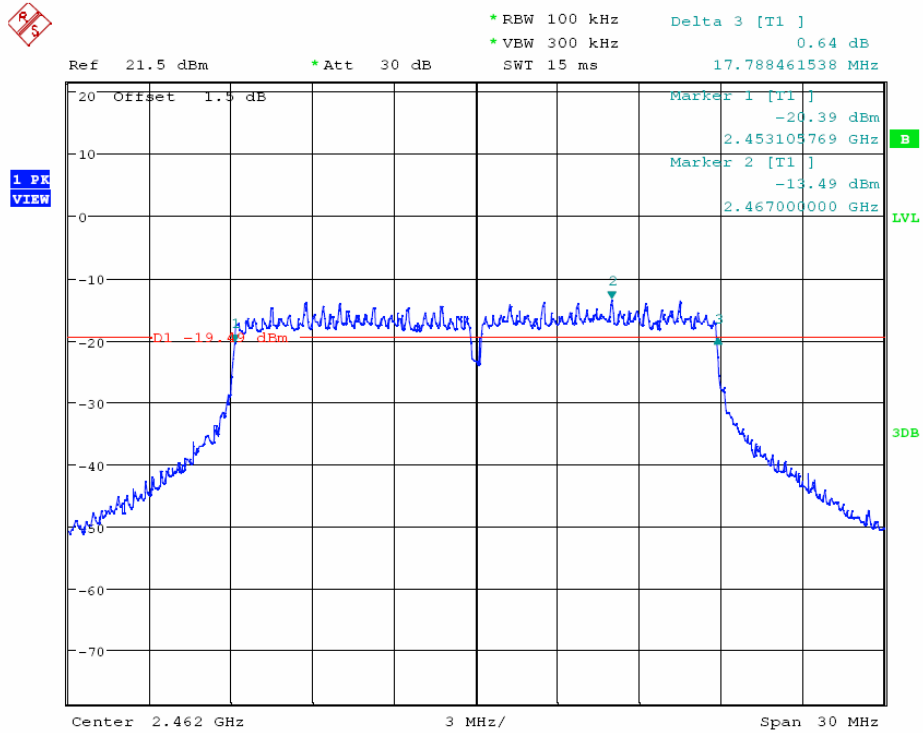
802.11n (HT20) 2412MHz



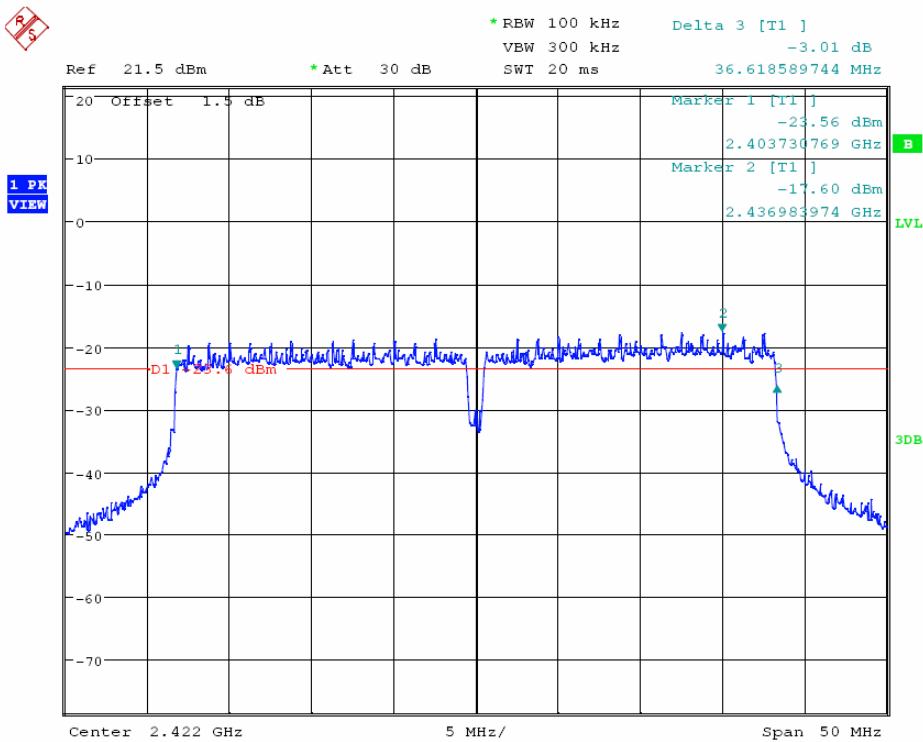
802.11n (HT20) 2437MHz



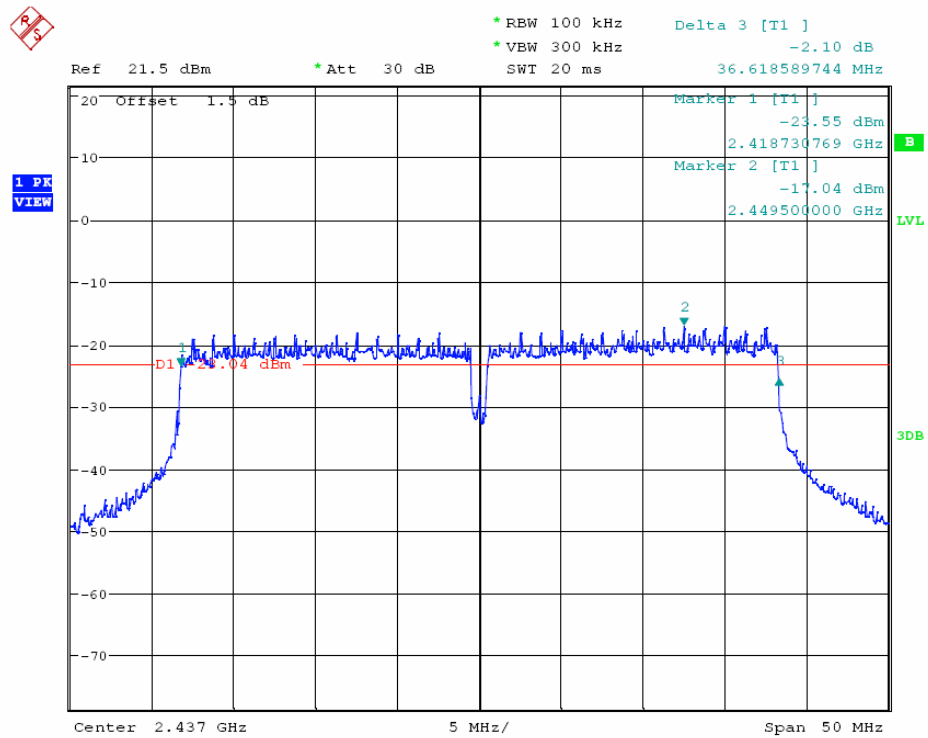
802.11n(HT20) 2462MHz



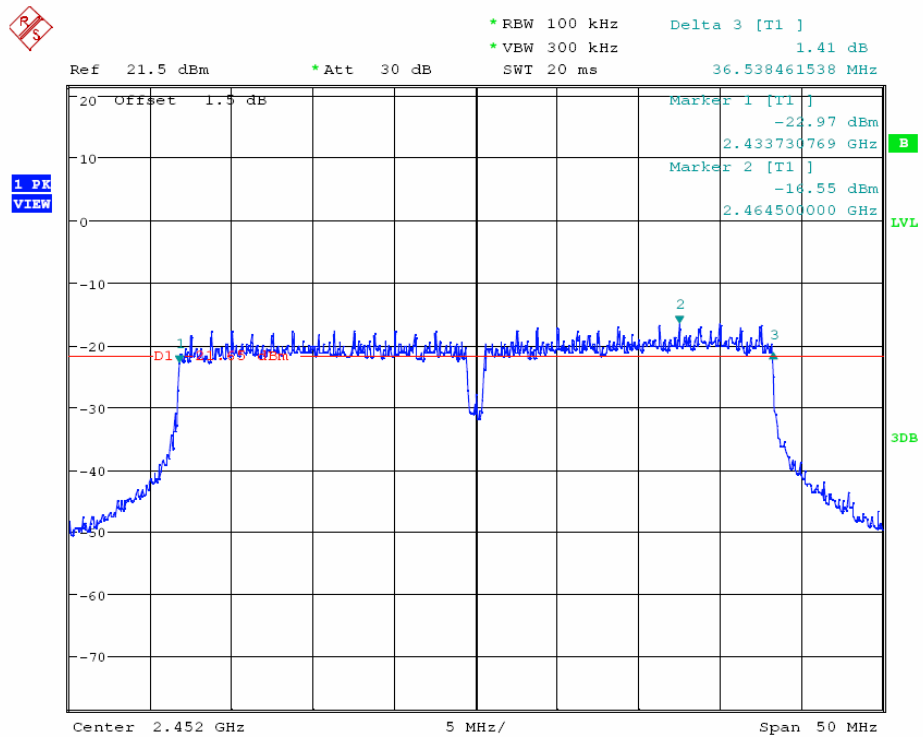
802.11n (HT40) 2422MHz



802.11n (HT40) 2437MHz



802.11n (HT40)2452MHz



6. BAND EDGE COMPLIANCE TEST

6.1. Limits

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

6.2. Test setup

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure.

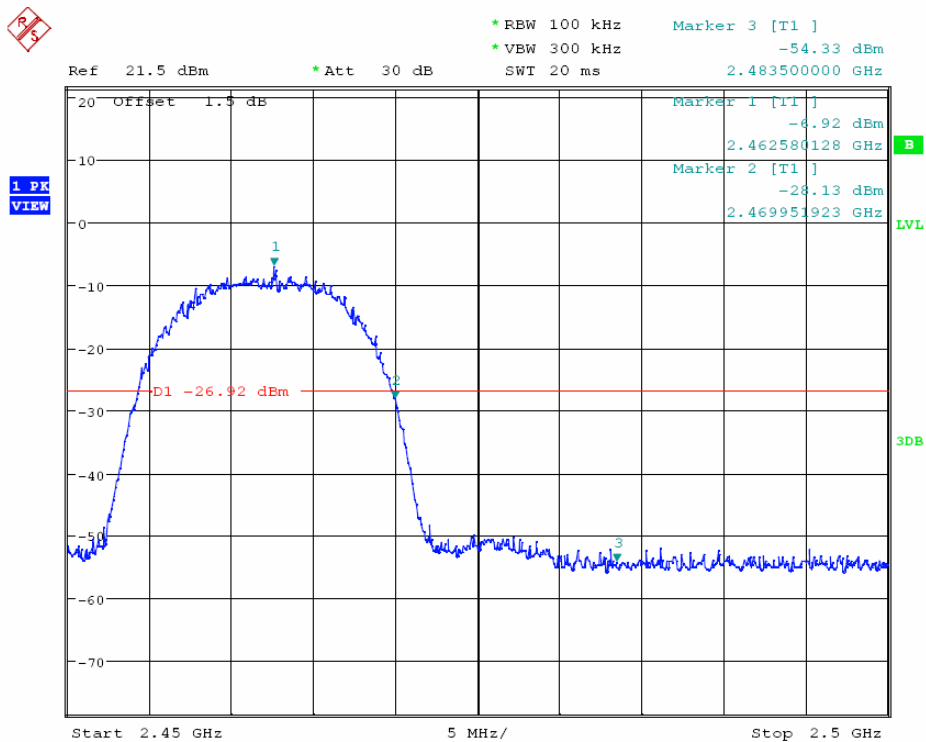
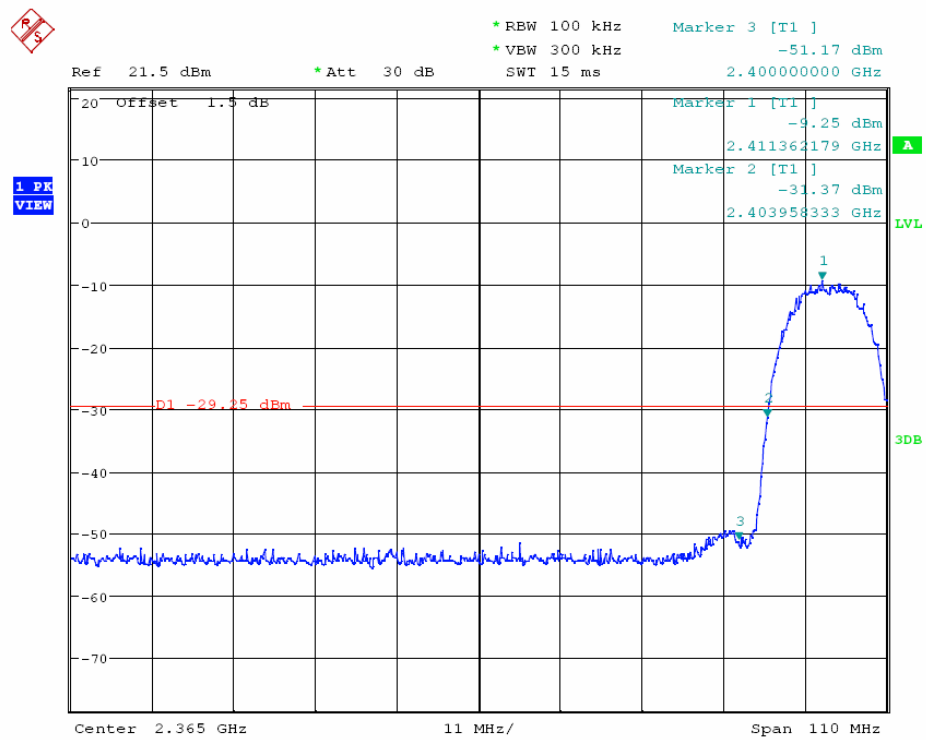
For conduct test, VBW is set at 300kHz and RBW is set at 100kHz for measurement.

Note: 1. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

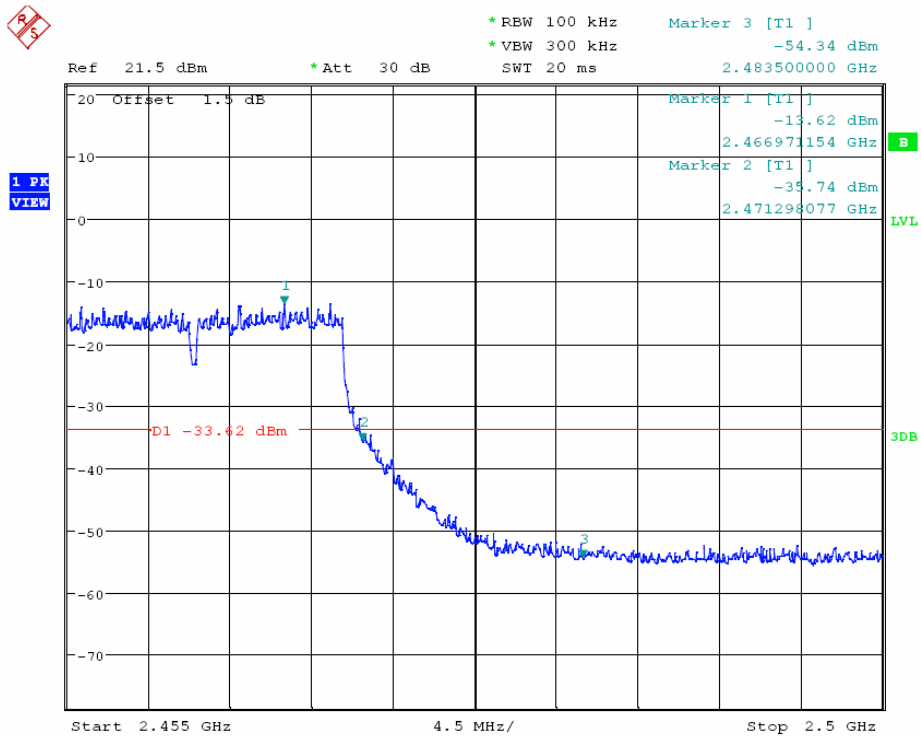
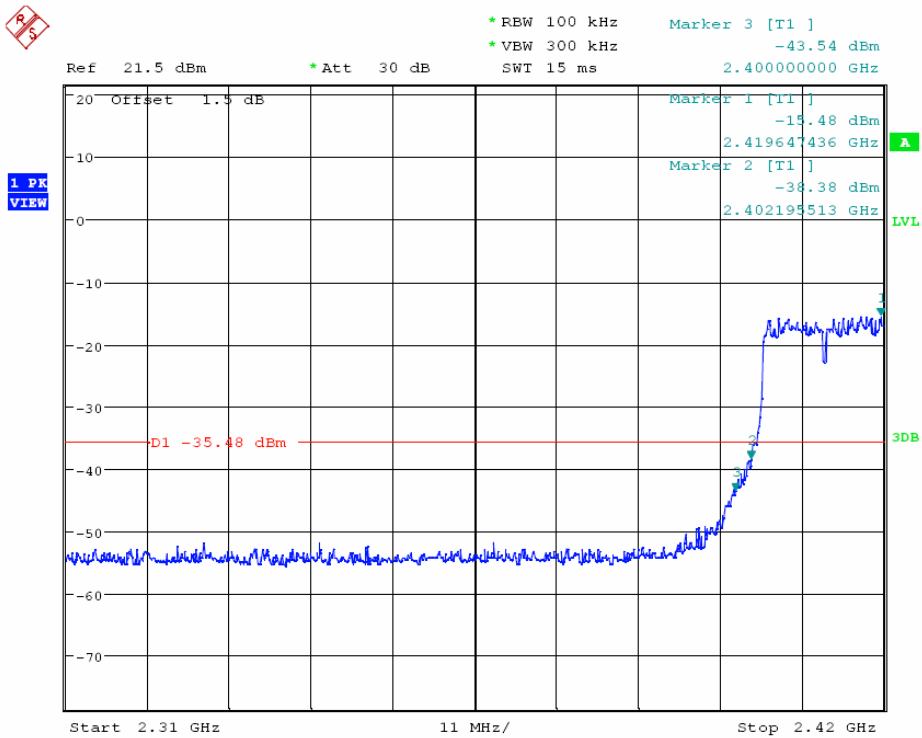
2. For Both PK and AV value above 1GHz, PK detector is used.

For radiated test as follows:

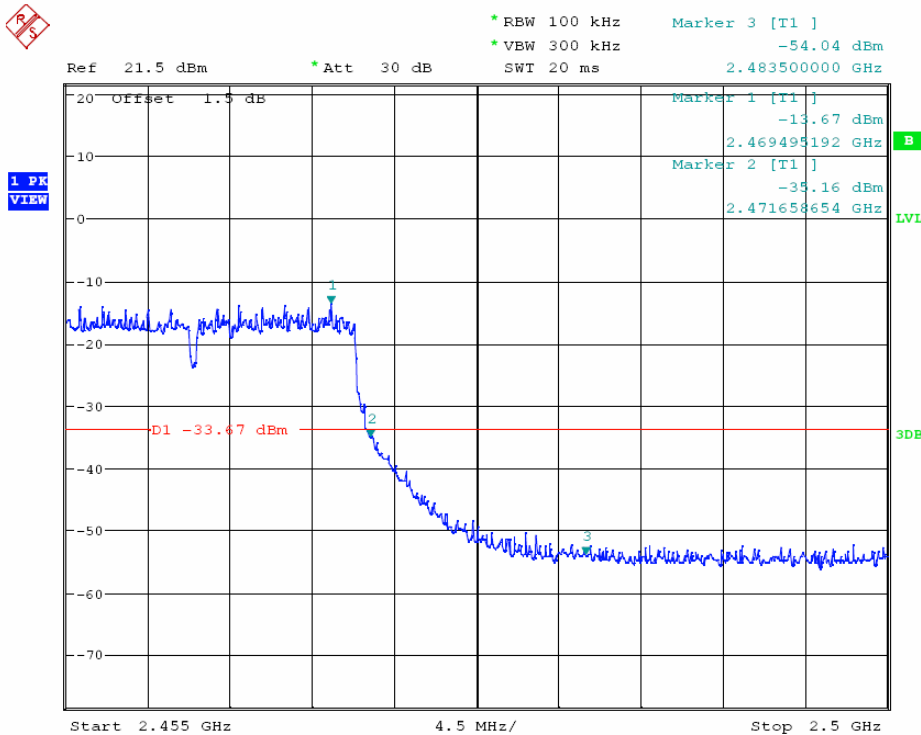
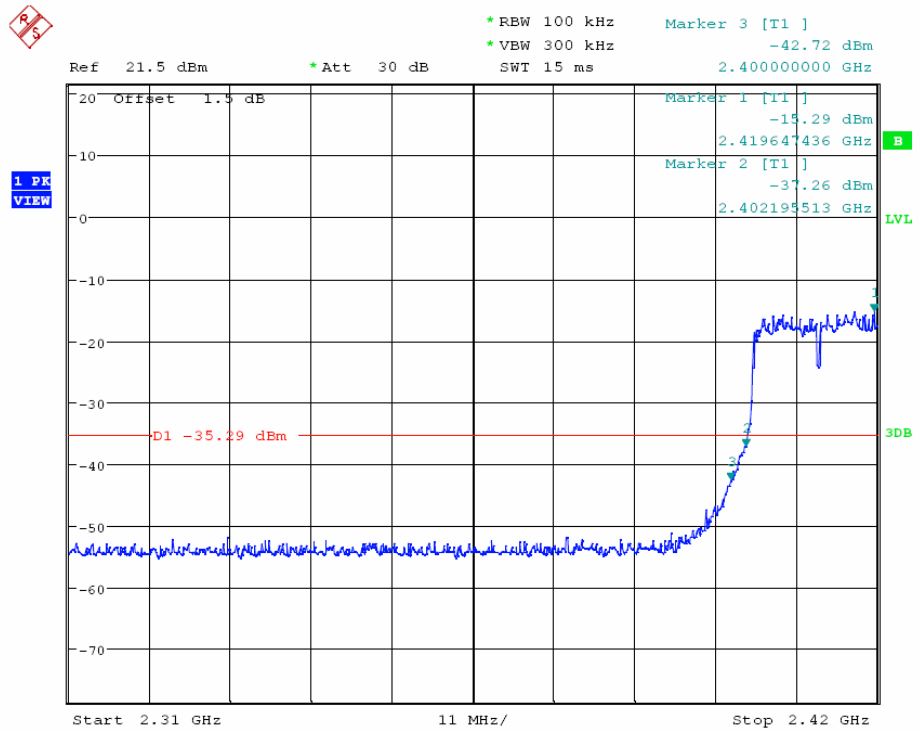
802.11b



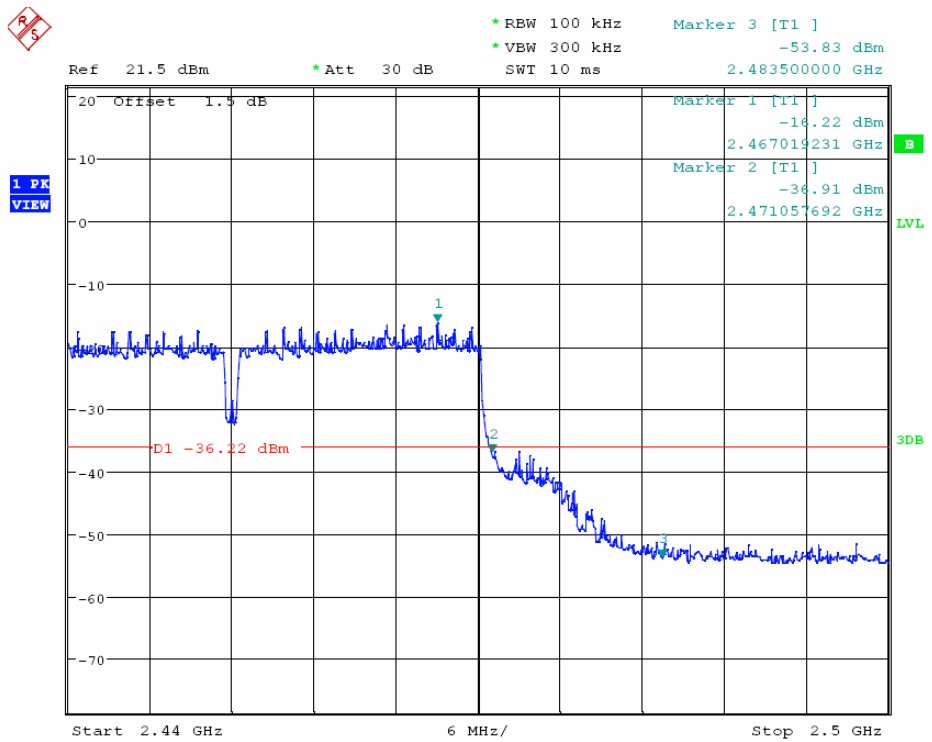
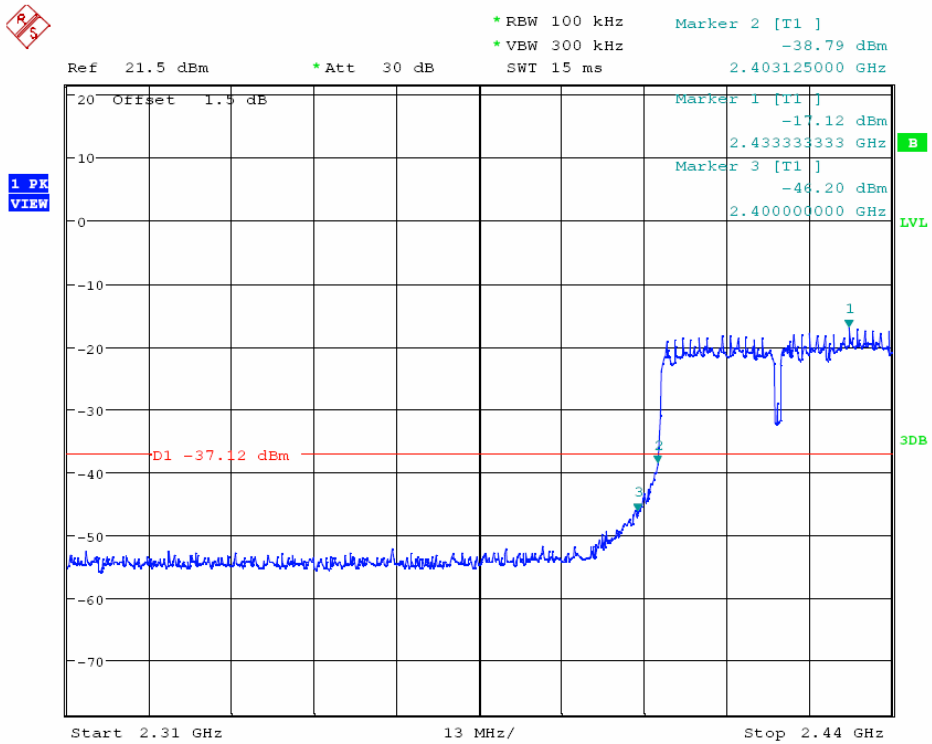
802.11g



802.11n(HT20)



802.11n(HT40)



For radiated test as follows:

	Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)	Band edge Limit (dBuV/m)		Result
			PK	PK	AV	
802.11b	<2400	H	45.34	74.00	54.00	Pass
	<2400	V	44.79	74.00	54.00	Pass
	>2483.5	H	44.92	74.00	54.00	Pass
	>2483.5	V	44.61	74.00	54.00	Pass
802.11g	<2400	H	45.71	74.00	54.00	Pass
	<2400	V	43.97	74.00	54.00	Pass
	>2483.5	H	42.78	74.00	54.00	Pass
	>2483.5	V	43.04	74.00	54.00	Pass
802.11n(HT20)	<2400	H	44.61	74.00	54.00	Pass
	<2400	V	43.76	74.00	54.00	Pass
	>2483.5	H	44.08	74.00	54.00	Pass
	>2483.5	V	43.42	74.00	54.00	Pass
802.11n(HT40)	<2400	H	43.42	74.00	54.00	Pass
	<2400	V	42.89	74.00	54.00	Pass
	>2483.5	H	43.49	74.00	54.00	Pass
	>2483.5	V	44.18	74.00	54.00	Pass

Note:

1: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

2: All restricted frequency bands have been tested , include 2310MHz to 2390MHz and 2483.5MHz to 2500MHz, only worse result is reported as above.

7. OUTPUT POWER TEST

7.1. Limits

For systems using digital modulation in the 2400~2483.5MHz, The Peak out put Power shall not exceed 1W (30dBm)

7.2. Test setup

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW =1MHz.
4. Set the VBW \geq 3 times RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

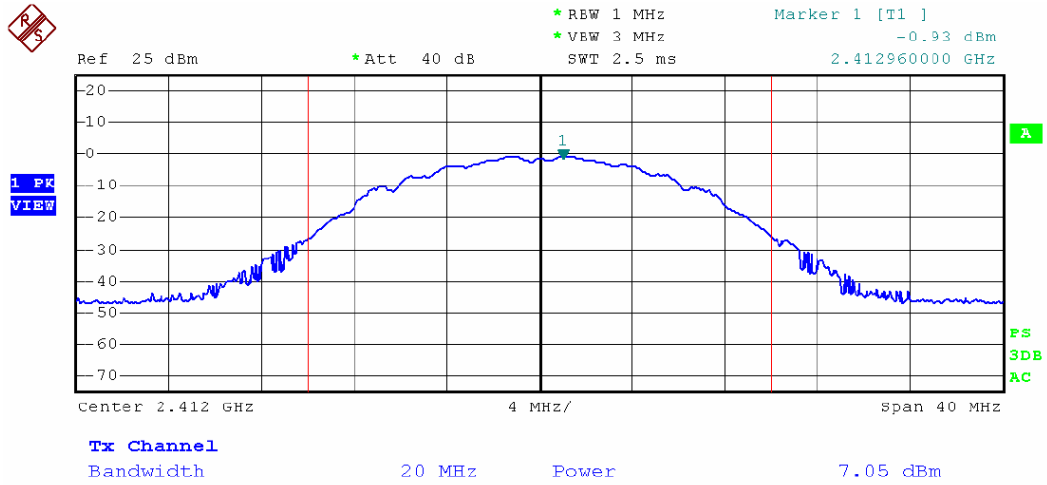
Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

7.3. Test result

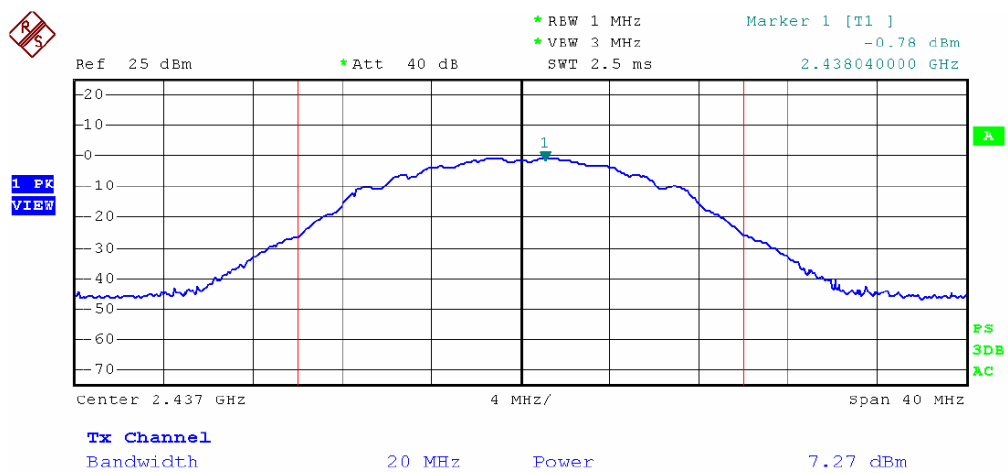
	Channel Frequency (MHz)	output Power(dBm)	Limit (dBm)	Result
802.11b	2412	7.05	30	Pass
	2437	7.27	30	Pass
	2462	7.20	30	Pass
802.11g	2412	5.90	30	Pass
	2437	6.08	30	Pass
	2462	6.09	30	Pass
802.11n(HT20)	2412	6.13	30	Pass
	2437	6.26	30	Pass
	2462	6.29	30	Pass
802.11n(HT40)	2422	6.03	30	Pass
	2437	5.41	30	Pass
	2452	5.50	30	Pass

Test plot as follows:

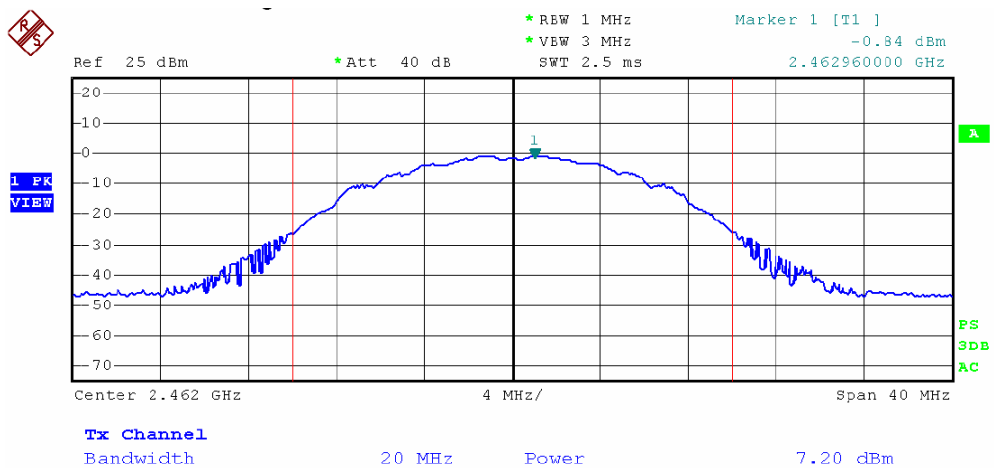
802.11b 2412MHz



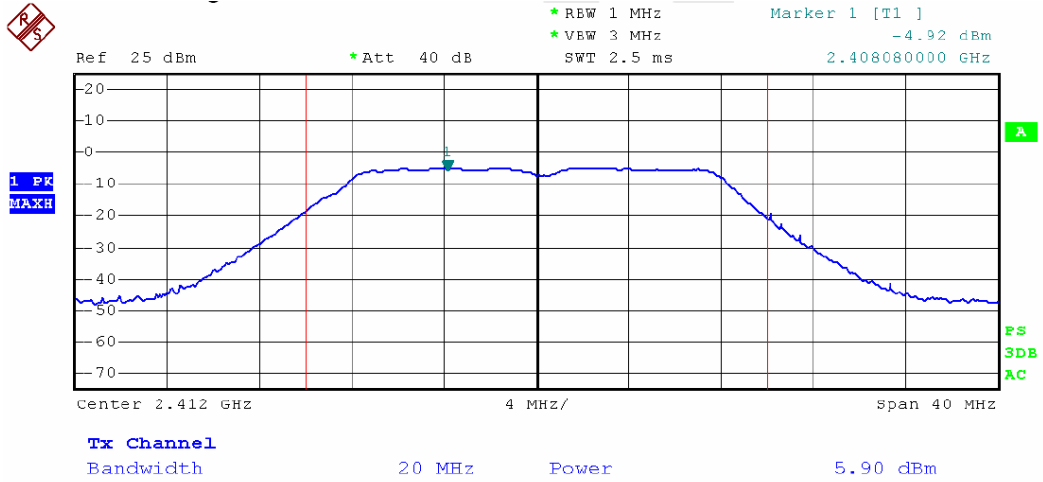
802.11b 2437MHz



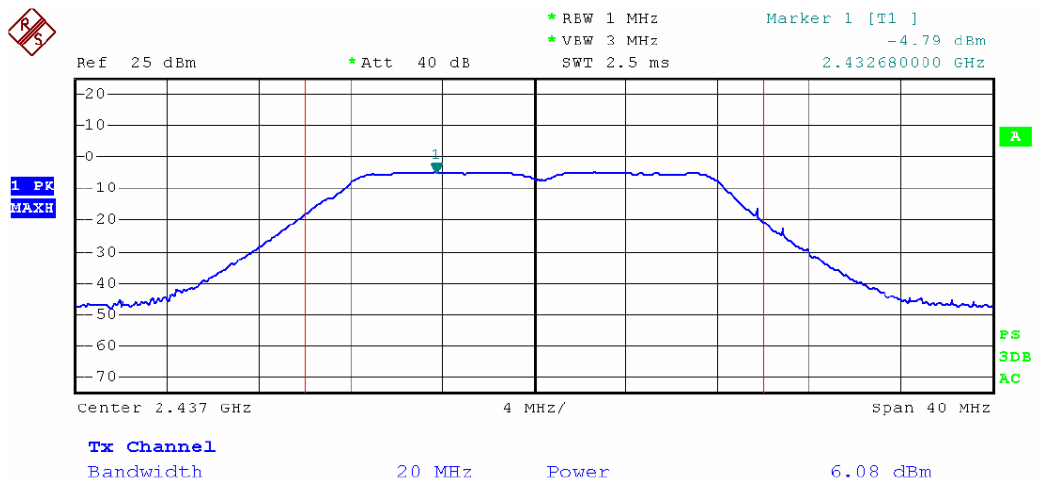
802.11b 2462MHz



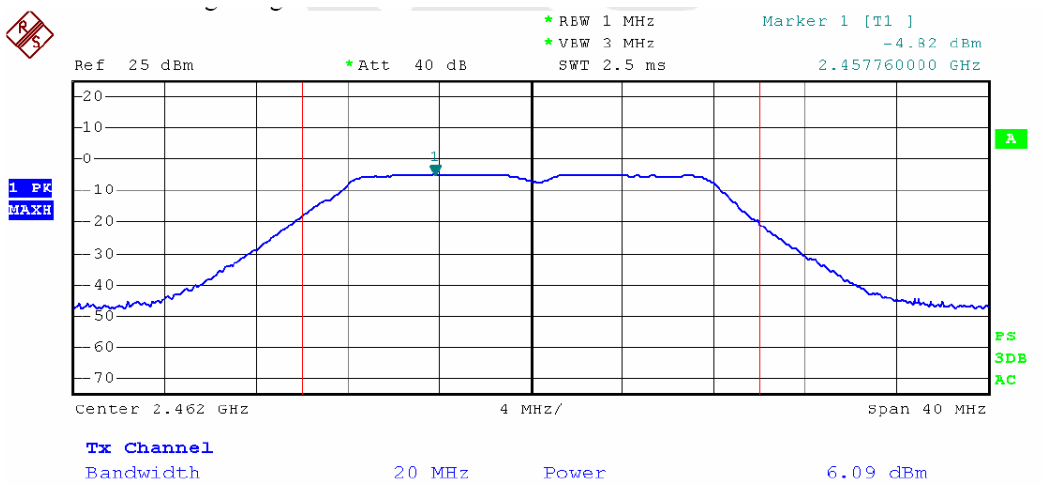
802.11g 2412MHz



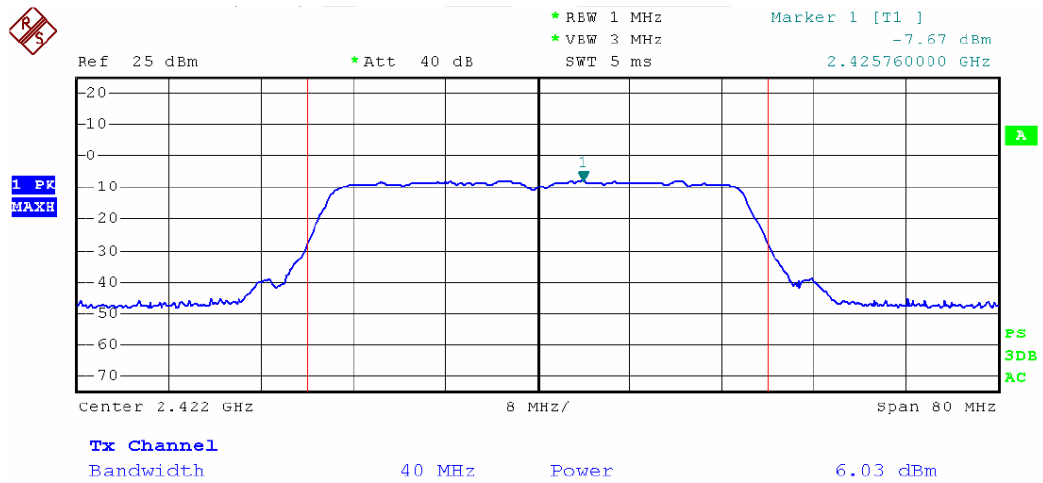
802.11g 2437MHz



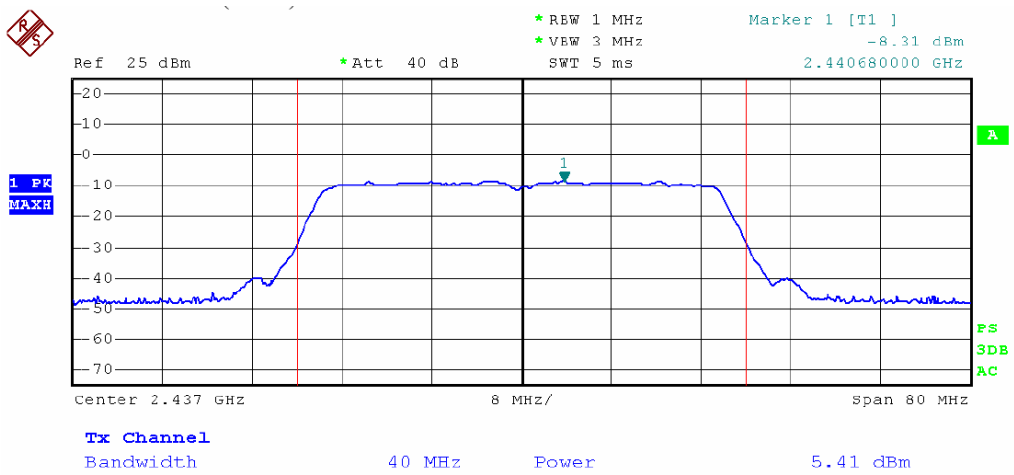
802.11g 2462MHz



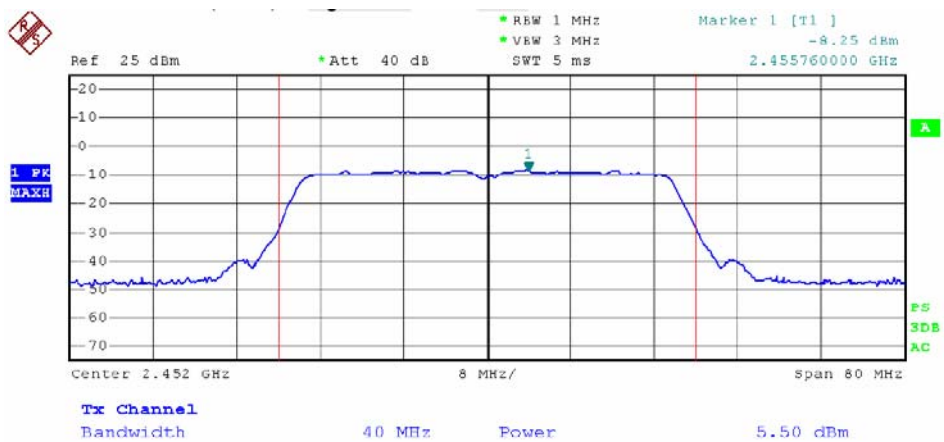
802.11n (HT40) 2422MHz



802.11n (HT40) 2437MHz



802.11n(HT40) 2452MHz



8. POWER SPECTRAL DENSITY TEST

8.1. Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

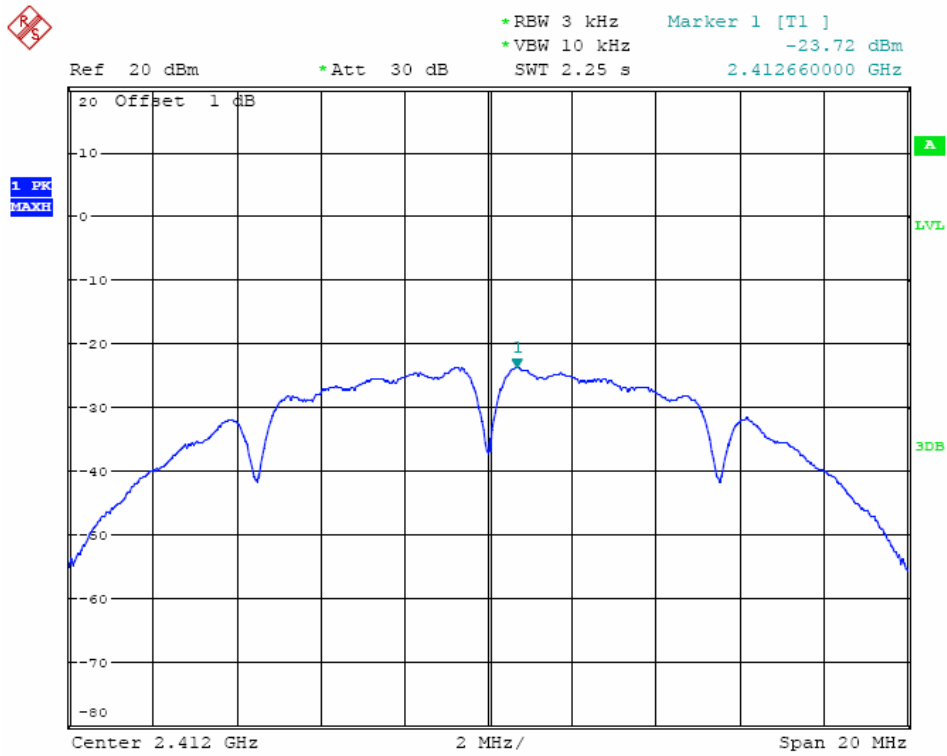
8.2. Test setup

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW =3kHz.
4. Set the VBW ≥ 3 times RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

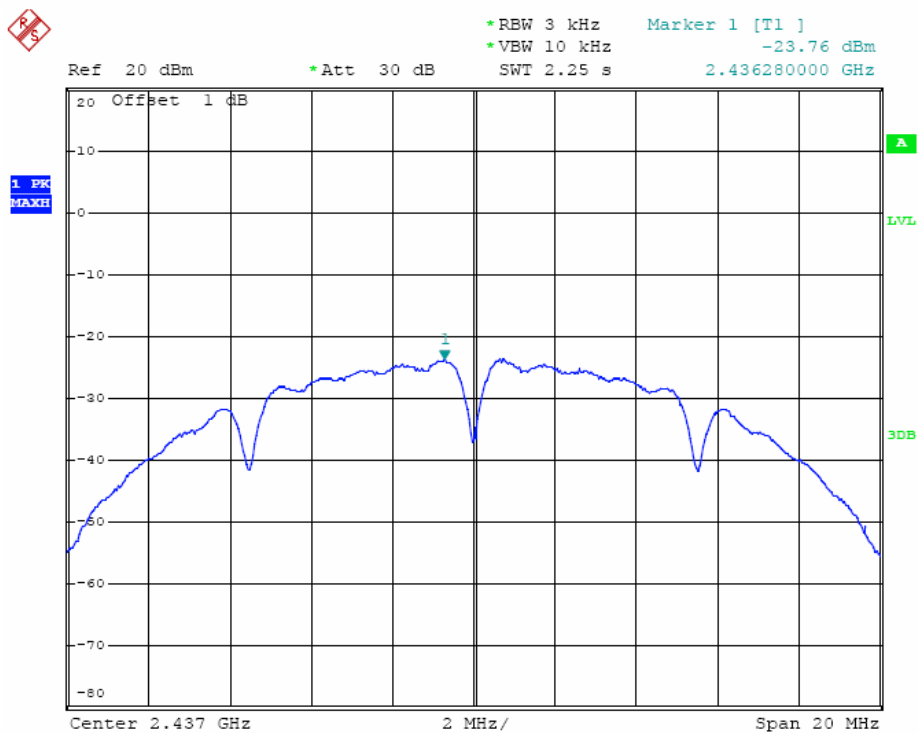
8.3. Test result

	Channel Frequency (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Result
802.11b	2412	-23.72	8	Pass
	2437	-23.76	8	Pass
	2462	-23.94	8	Pass
802.11g	2412	-22.72	8	Pass
	2437	-22.65	8	Pass
	2462	-23.00	8	Pass
802.11n (HT20)	2412	-21.79	8	Pass
	2437	-21.99	8	Pass
	2462	-22.32	8	Pass
802.11n (HT40)	2422	-22.40	8	Pass
	2437	-22.09	8	Pass
	2452	-19.96	8	Pass

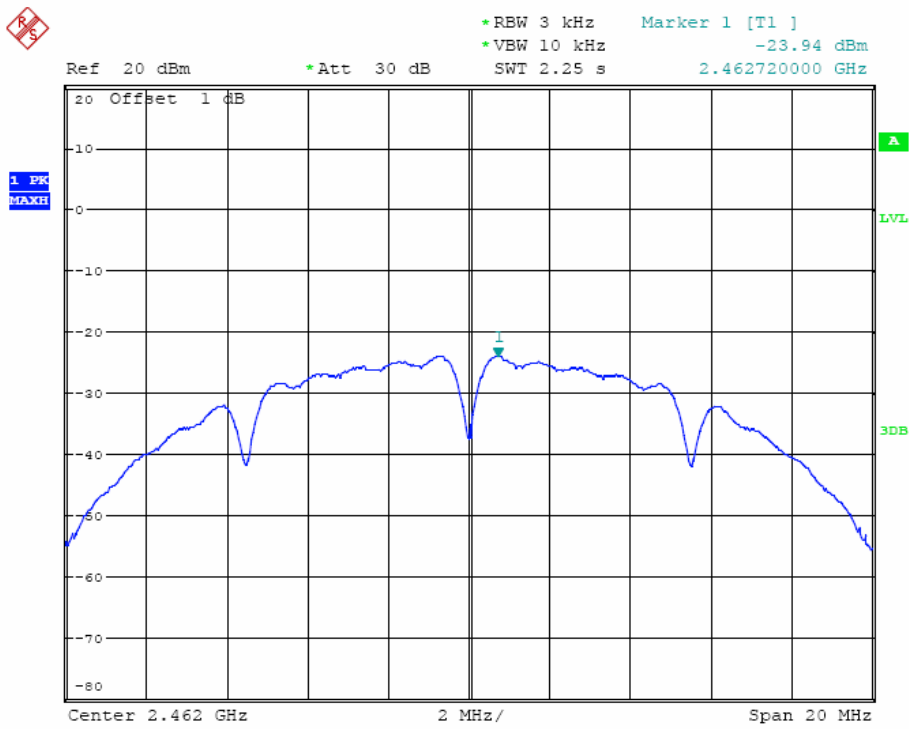
802.11b 2412MHz



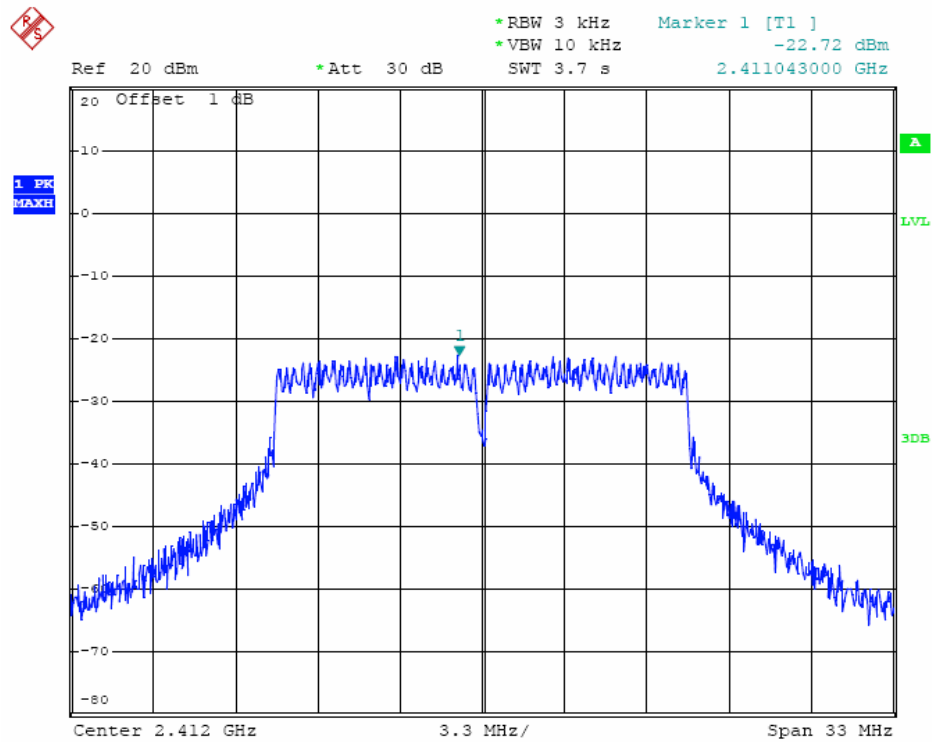
802.11b 2437MHz



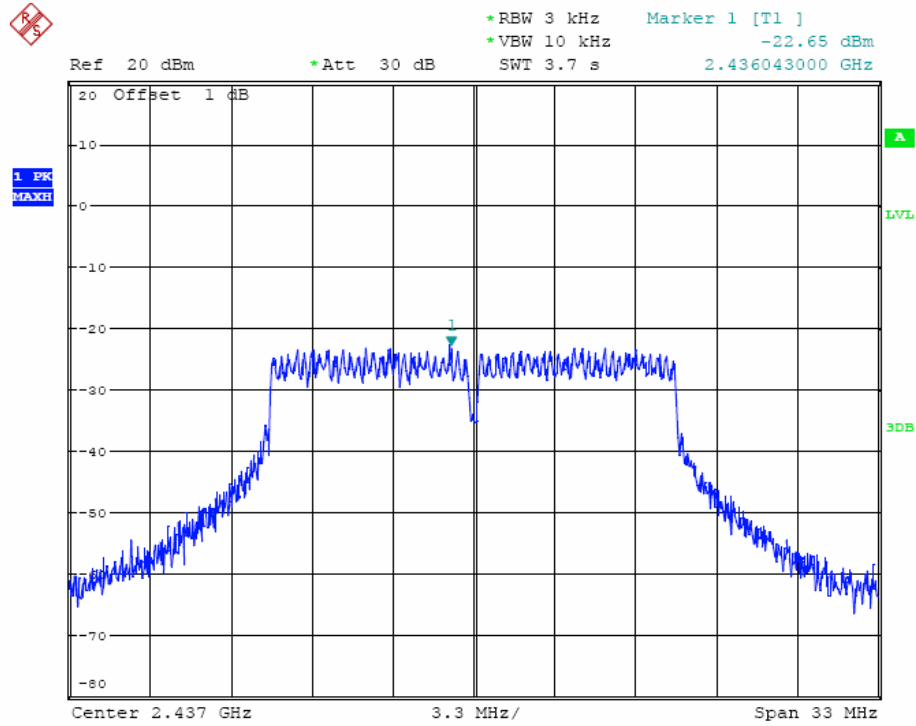
802.11b 2462MHz



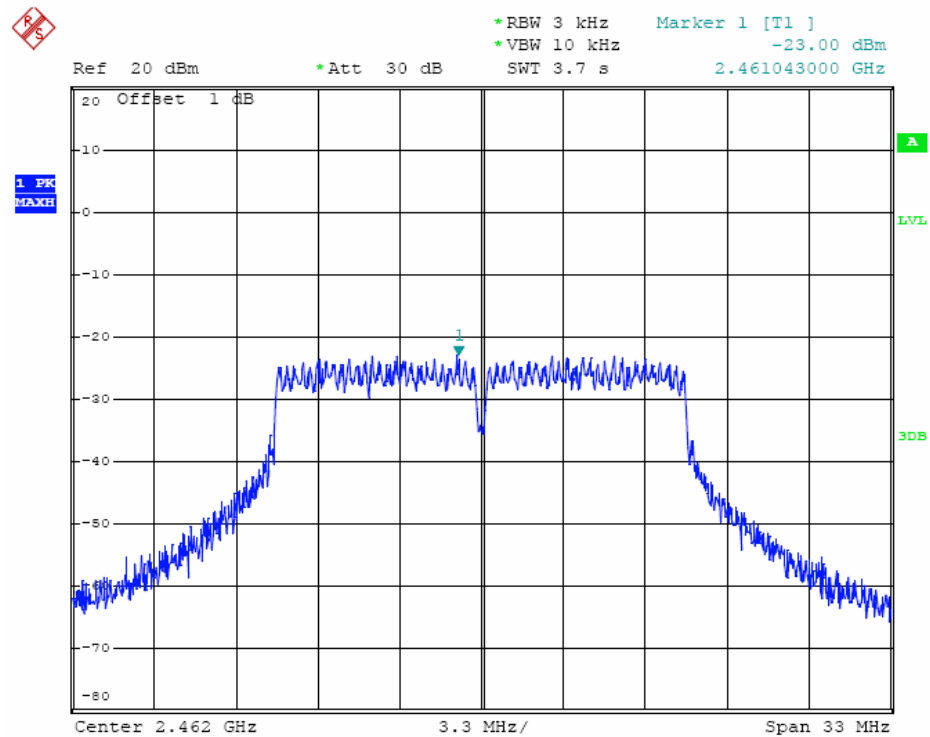
802.11g 2412MHz



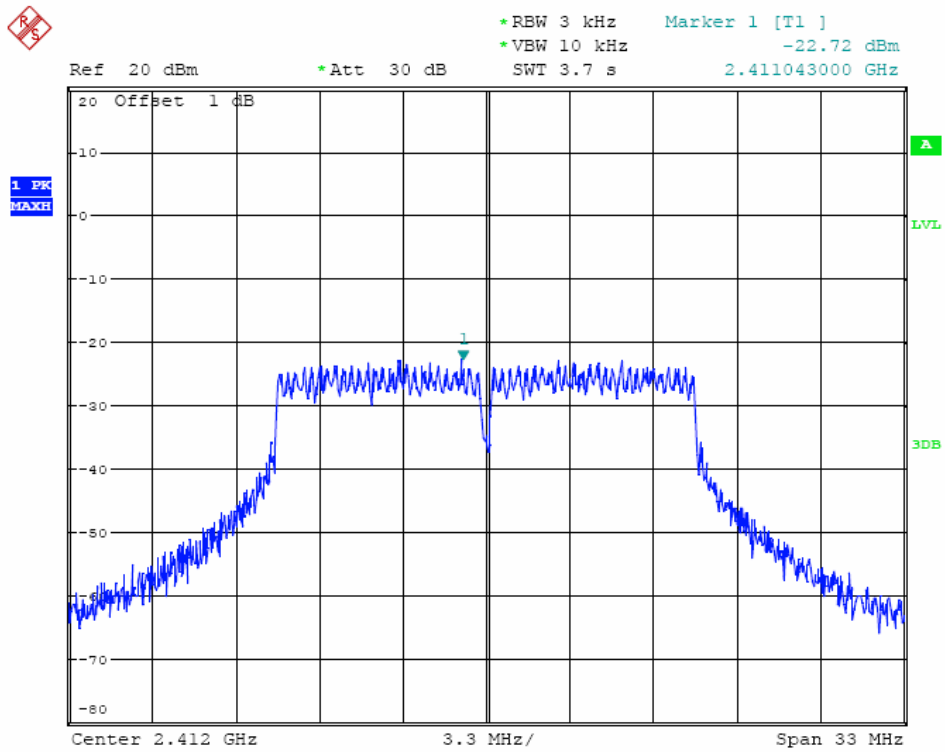
802.11g 2437MHz



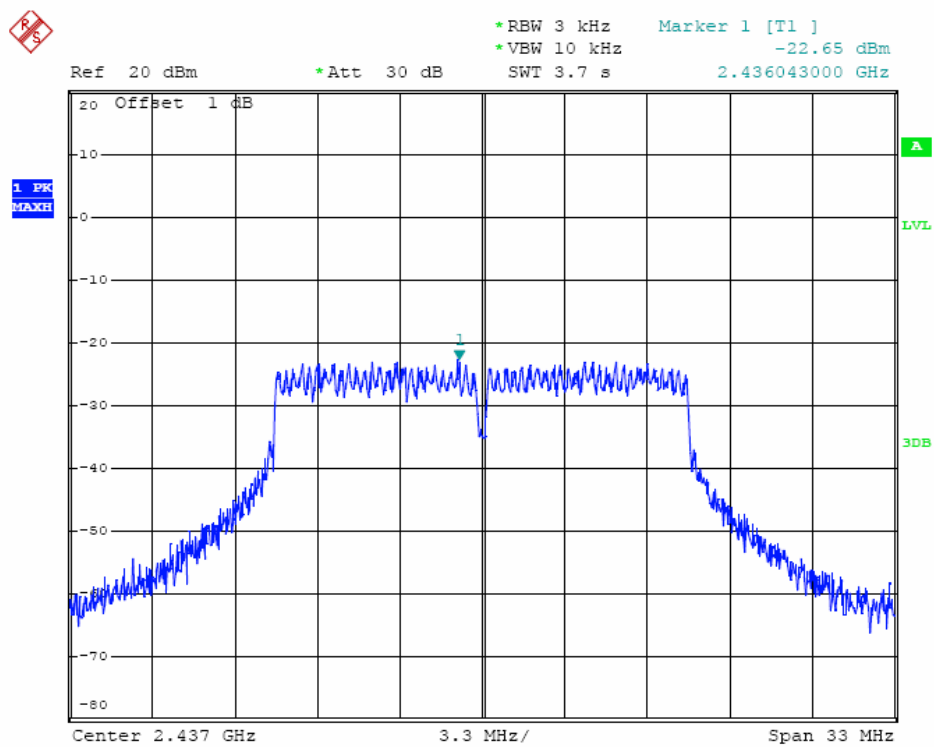
802.11g 2462MHz



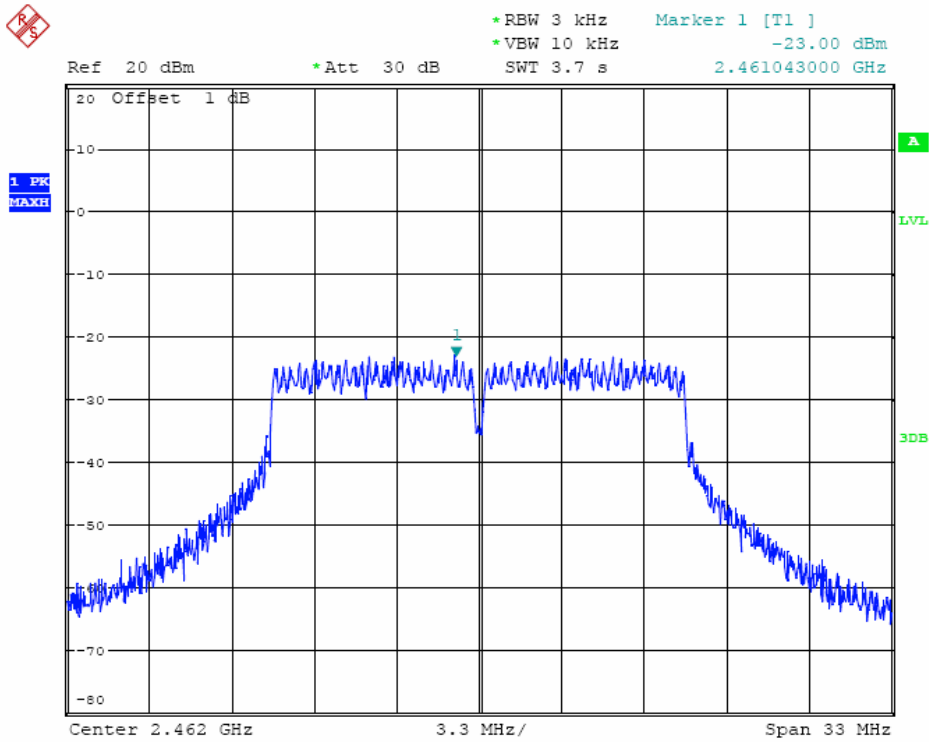
802.11n (HT20) 2412MHz



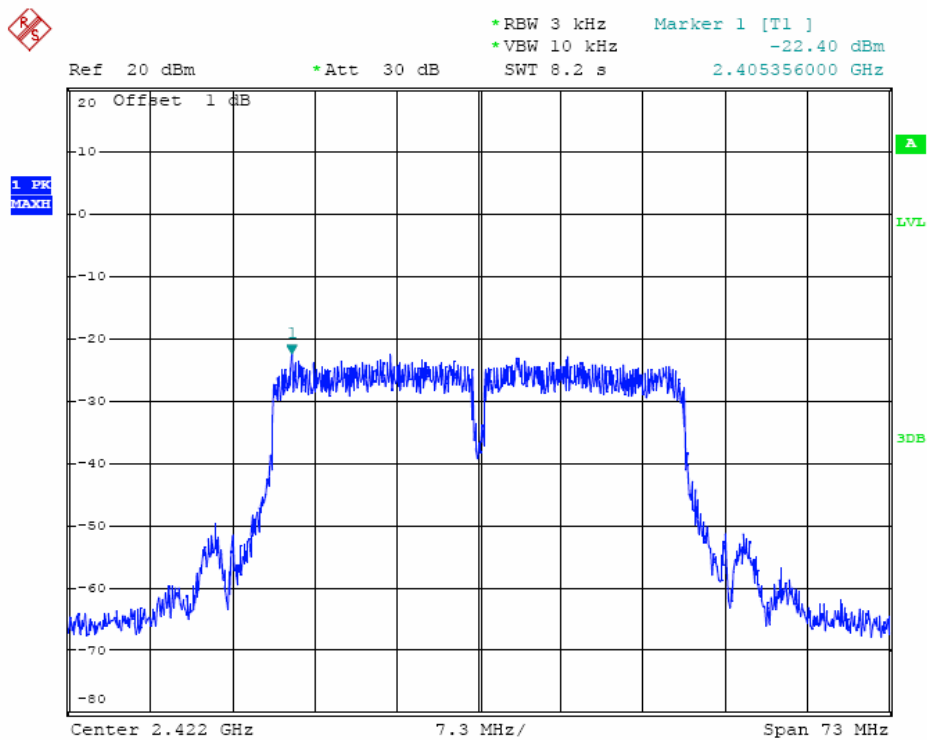
802.11n (HT20) 2437MHz



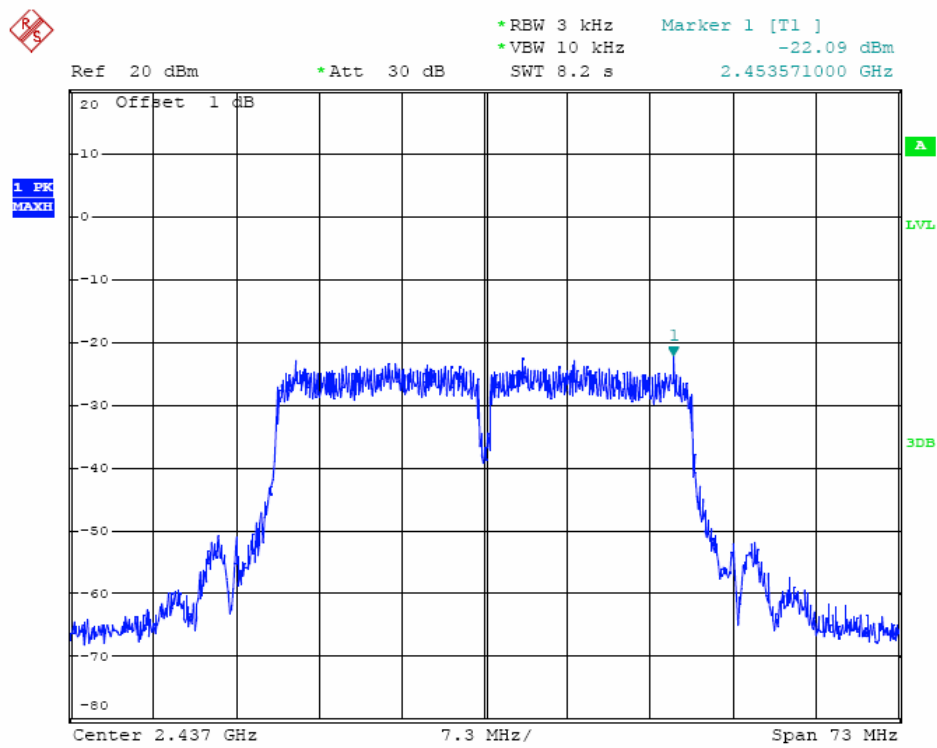
802.11n(HT20) 2462MHz



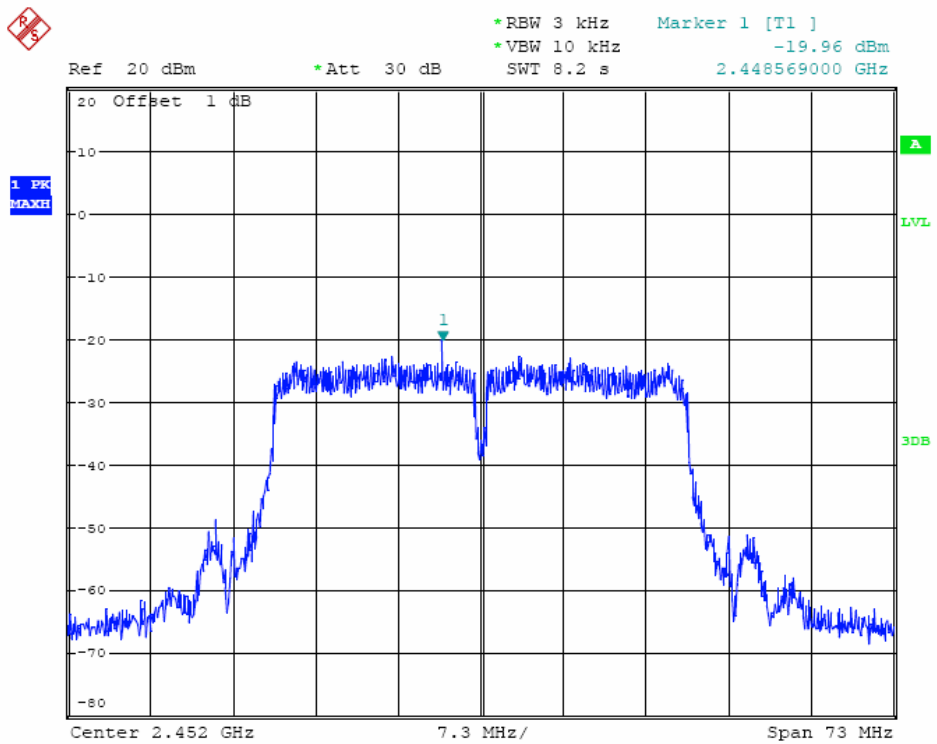
802.11 n (HT40) 2422MHz



802.11 n (HT40) 2437MHz



802.11 n (HT40) 2452MHz



9. ANTENNA REQUIREMENTS

9.1. Limits

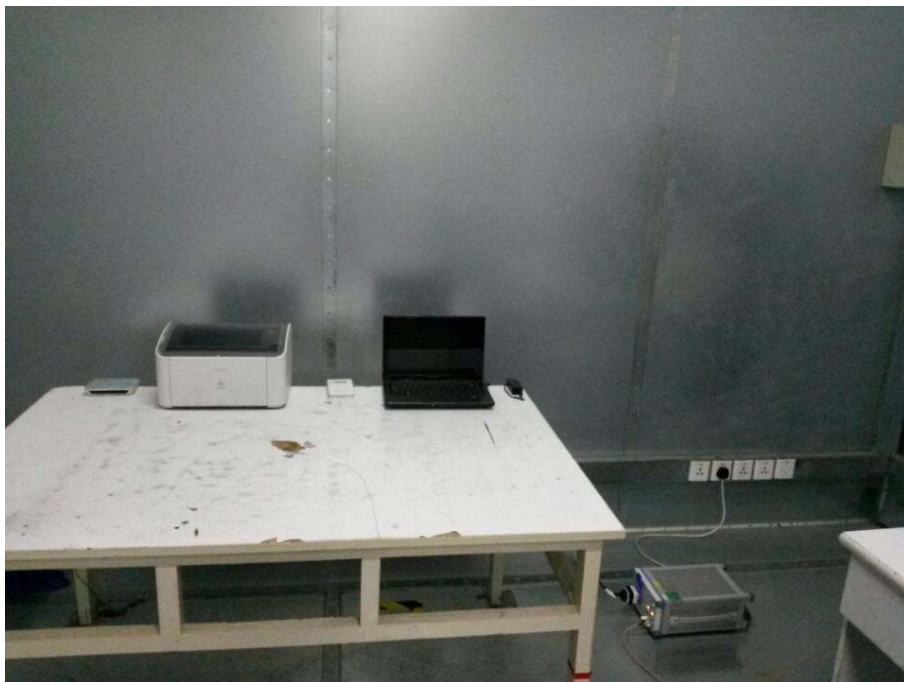
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional 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.

9.2. Result

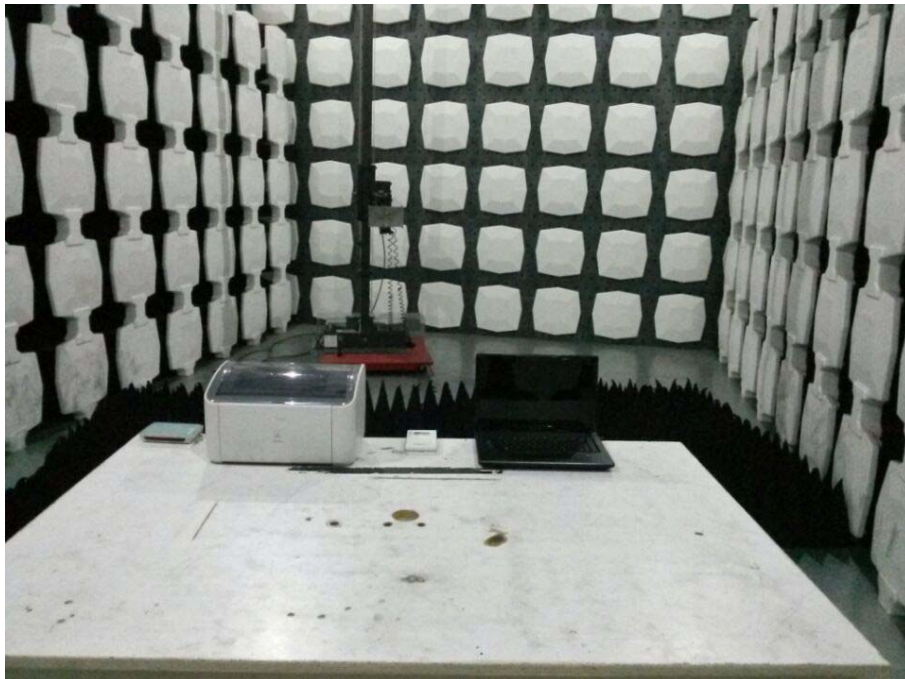
The antennas used for this product are integral Patch Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 3.8dBi.

10. PHOTOGRAPHS OF TEST SET-UP

10.1. Set-up for Radiated Emission Test



10.2. Set-up for Radiated Emission Test

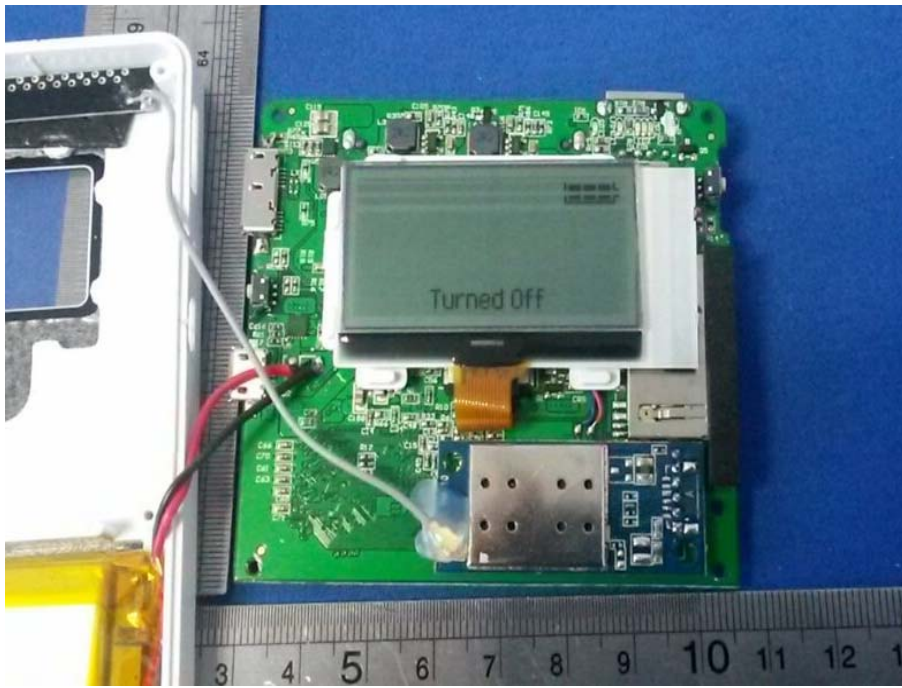


11. PHOTOGRAPHS OF THE EUT









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