

# EMC TEST REPORT

**Report No. : TS13090050-EME**

**Model No. : WMTB-177N**

**Brand Name : *lenovo*  
ThinkPad**

**Issued Date : Dec. 23, 2013**

**Applicant:** Gemtek Technology Co., Ltd.  
No. 15-1 Zhonghua Road, Hsinchu Industrial Park,  
Hukou, Hsinchu, 30352, Taiwan

**Test Method/ Standard:** 47 CFR FCC Part 15.247 & ANSI C63.4:2009  
KDB 558074 D01 v03r01  
KDB 662911 D01 v02r01

**Test By:** Intertek Testing Services Taiwan Ltd.  
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**The test report was prepared by:** Sign on File  
Sunny Liu/ Senior Officer

**These measurements were taken by:** Sign on File  
Chester/ Engineer

**The test report was reviewed by:**

**Name** Rico Deng  
**Title** Senior Engineer

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## 1. Summary of Test Data

Test/Requirement Description	Applicable Rule	Result
Minimum 6 dB Bandwidth	15.247(a)(2)	Pass
Maximum Output Power	15.247(b)	Pass
Power Spectral Density	15.247(e)	Pass
RF Antenna Conducted Spurious	15.247(d)	Pass
Radiated Spurious Emission	15.247(d), 15.205, 15.209	Pass
Emission on the Band Edge	15.247(d)	Pass
AC Power Line Conducted Emission	15.207	Pass

## 2. General Information

### Identification of the EUT

Product:	ThinkPad Enterprise Wireless Display Adapter
Model No.:	WMTB-177N
FCC ID.:	MXF-WMTB-177N
Frequency Range:	<ol style="list-style-type: none"><li>1. 2412 MHz ~ 2462 MHz for 802.11b, 802.11g, 802.11n HT20</li><li>2. 2422 MHz ~ 2452 MHz for 802.11n HT40</li><li>3. 5745 MHz ~ 5825 MHz for 802.11a, 802.11n HT20</li><li>4. 5755 MHz ~ 5795 MHz for 802.11n HT40</li></ol>
Channel Number:	<ol style="list-style-type: none"><li>1. 11 channels for 2412 MHz ~ 2462 MHz</li><li>2. 7 channels for 2422 MHz ~ 2452 MHz</li><li>3. 4 channels for 5745 MHz ~ 5825 MHz for 802.11a, 802.11n HT20</li><li>4. 2 channels for 5755 MHz ~ 5795 MHz for 802.11n HT40</li></ol>
Frequency of Each Channel:	<ol style="list-style-type: none"><li>1. 2412+5 k, k=0~10 for 802.11b, 802.11g, 802.11n HT20</li><li>2. 2422+5 k, k=0~6 for 802.11n HT40</li><li>3. 5745+5 k, k=0~16 for 802.11a, 802.11n HT20</li><li>4. 5755+5 k, k=0~8 for 802.11n HT40</li></ol>
Access scheme:	DSSS, OFDM
Rated Power:	DC 5.2 V from adapter
Power Cord:	N/A
Sample Received:	Jul. 26, 2013
Sample condition:	Workable
Test Date(s):	Dec. 11, 2013 ~ Dec. 17, 2013
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

## Description of EUT

The EUT is a ThinkPad Enterprise Wireless Display Adapter, and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

## Antenna description

### 1. Antenna 0 (Chain 0)

The EUT uses a permanently connected antenna.

Antenna Gain : 0.87 dBi max  
Antenna Type : PIFA antenna  
Connector Type : I-PEX

### 2. Antenna 1 (Chain 1)

The EUT uses a permanently connected antenna.

Antenna Gain : 0.96 dBi max  
Antenna Type : PIFA antenna  
Connector Type : I-PEX

## Adapter information

The EUT will be supplied with a power supply from below list:

No.	Brand	Model no.	Specification
Adapter	lenovo	PA-1100-17IL	I/P: 100-240V~, 0.3A, 50-60Hz O/P: 5.2V, 2.0A

## Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	Toshiba	Protégé M800	N/A	USB Cable 1 meter
Notebook PC	DELL	TND-609	N/A	VGA Cable
Monitor	ViewSonic	VS11871-1E	QRE074990701	HDMI & VGA 1 meter
Headset	Philips	N/A	N/A	3.5mm audio line

## Operation mode

TX Mode: Based on “M Tool” to execute, and select different frequency and modulation.

With individual verifying, the maximum output power was found out 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n HT 20 mode and 13.5 Mbps data rate for 802.11n HT 40 mode.

The final tests were executed under these conditions recorded in this report individually.

Please refer the details below:

### 802.11b ch6 chain0

Data rate (Mbps)	AV (dBm)
1	15.89
2	15.83
5.5	15.81
11	15.78

### 802.11g ch6 chain0

Data rate(Mbps)	AV (dBm)
6	14.70
9	14.69
12	14.58
18	14.55
24	14.53
36	14.51
48	14.50
54	14.44

### 802.11n HT20 ch6 chain1

Data rate(Mbps)	AV (dBm)
6.5	9.64
13	9.62
19.5	9.60
26	9.57
39	9.50
52	9.47
58.5	9.40
65	9.35

### 802.11n HT40 ch6 chain1

Data rate(Mbps)	AV (dBm)
13.5	9.66
27	9.58
40.5	9.56
27	9.53
81	9.51
108	9.50
121.5	9.49
135	9.45

## 802.11b ch6 chain1

Data rate(Mbps)	AV (dBm)
1	15.45
2	15.41
5.5	15.37
11	15.32

## 802.11g ch6 chain1

Data rate(Mbps)	AV (dBm)
6	14.58
9	14.56
12	14.55
18	14.52
24	14.50
36	14.00
48	13.98
54	13.80

## 802.11n HT20 ch6 chain1+chain0

Data rate(Mbps)	AV (dBm)
6.5	12.17
13	12.15
19.5	12.13
26	12.12
39	12.1
52	12.08
58.5	12.05
65	12.04

## 802.11n HT20 ch6 chain1

Data rate(Mbps)	AV (dBm)
6.5	8.61
13	8.60
19.5	8.54
26	8.52
39	8.38
52	8.35
58.5	8.34
65	8.28

## 802.11n HT40 ch6 chain1

Data rate(Mbps)	AV (dBm)
13.5	8.78
27	8.76
40.5	8.74
27	8.73
81	8.72
108	8.71
121.5	8.69
135	8.67

## 802.11n HT40 ch6 chain1+chain0

Data rate(Mbps)	AV (dBm)
13.5	12.25
27	12.23
40.5	12.21
27	12.2
81	12.17
108	12.15
121.5	12.12
135	12.1

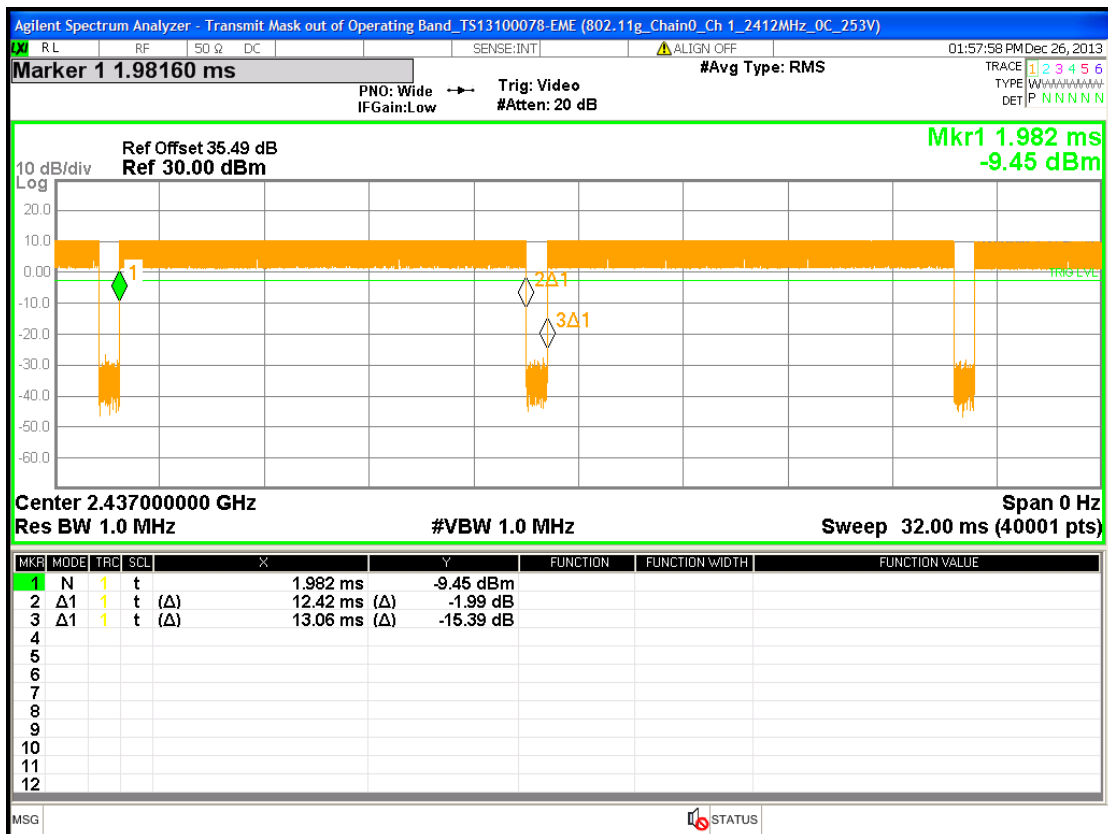
802.11a Ch157 chain0		802.11n HT20 Ch157 chain0		802.11n HT40 Ch151 chain0		802.11n HT20 Ch157 chain1+chain0	
Data rate (Mbps)	AV (dBm)	Data rate (Mbps)	AV (dBm)	Data rate (Mbps)	AV (dBm)	Data rate (Mbps)	AV (dBm)
6	12.18	6.5	9.19	13.5	8.47	6.5	12.43
9	12.15	13	9.18	27	8.45	13	12.41
12	12.13	19.5	9.15	40.5	8.41	19.5	12.38
18	12.10	26	9.14	27	8.40	26	12.35
24	12.08	39	9.12	81	8.37	39	12.33
36	12.05	52	9.10	108	8.35	52	12.30
48	12.03	58.5	9.08	121.5	8.32	58.5	12.27
54	12.00	65	9.07	135	8.30	65	12.24
802.11a Ch157 chain1		802.11n HT20 Ch157 chain1		802.11n HT40 Ch151 chain1		802.11n HT40 Ch151 chain1+chain0	
Data rate (Mbps)	AV (dBm)	Data rate (Mbps)	AV (dBm)	Data rate (Mbps)	AV (dBm)	Data rate (Mbps)	AV (dBm)
6	12.19	6.5	9.64	13.5	9.84	13.5	12.22
9	11.16	13	8.63	27	9.83	27	12.21
12	11.13	19.5	8.60	40.5	9.81	40.5	12.18
18	11.10	26	8.55	27	9.79	27	12.14
24	10.57	39	8.03	81	9.78	81	12.12
36	10.24	52	7.70	108	9.76	108	12.09
48	9.91	58.5	7.37	121.5	9.74	121.5	12.07
54	9.58	65	7.04	135	9.72	135	12.04



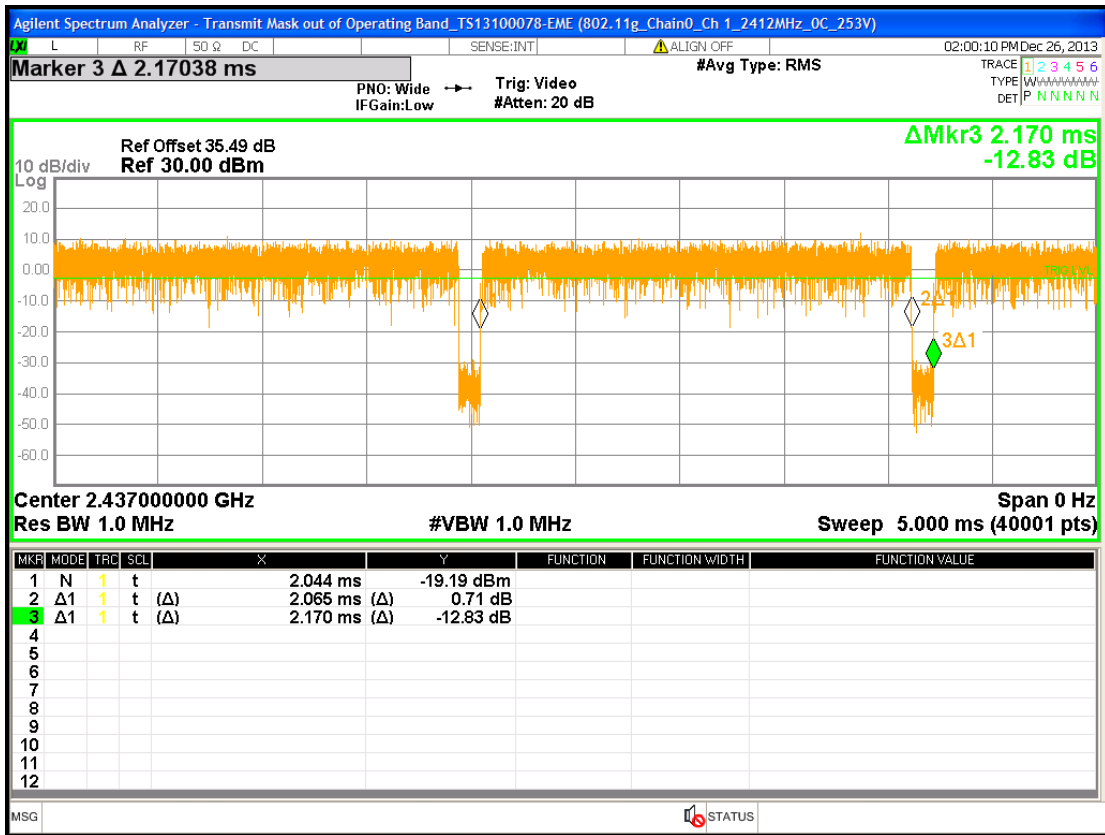
### Duty cycle of test signal

Mode	Channel	Frequency (MHz)	Data rate	Signal on time (ms)	Total signal transmit time (ms)	Duty cycle	Duty Cycle factor
802.11b	6	2437	1	12.42	13.06	0.95	0.22
802.11g	6	2437	6	2.066	2.17	0.95	0.21
802.11n (HT 20)	6	2437	6.5	1.909	2.007	0.95	0.22
802.11n (HT 40)	6	2437	13.5	0.937	1.031	0.90	0.41
802.11a	149	5745	1	2.07	2.17	0.952	0.21
802.11n (HT 20)	149	5745	6.5	1.91	2.00	0.952	0.21
802.11n (HT 40)	151	5755	13.5	0.93	1.03	0.907	0.43

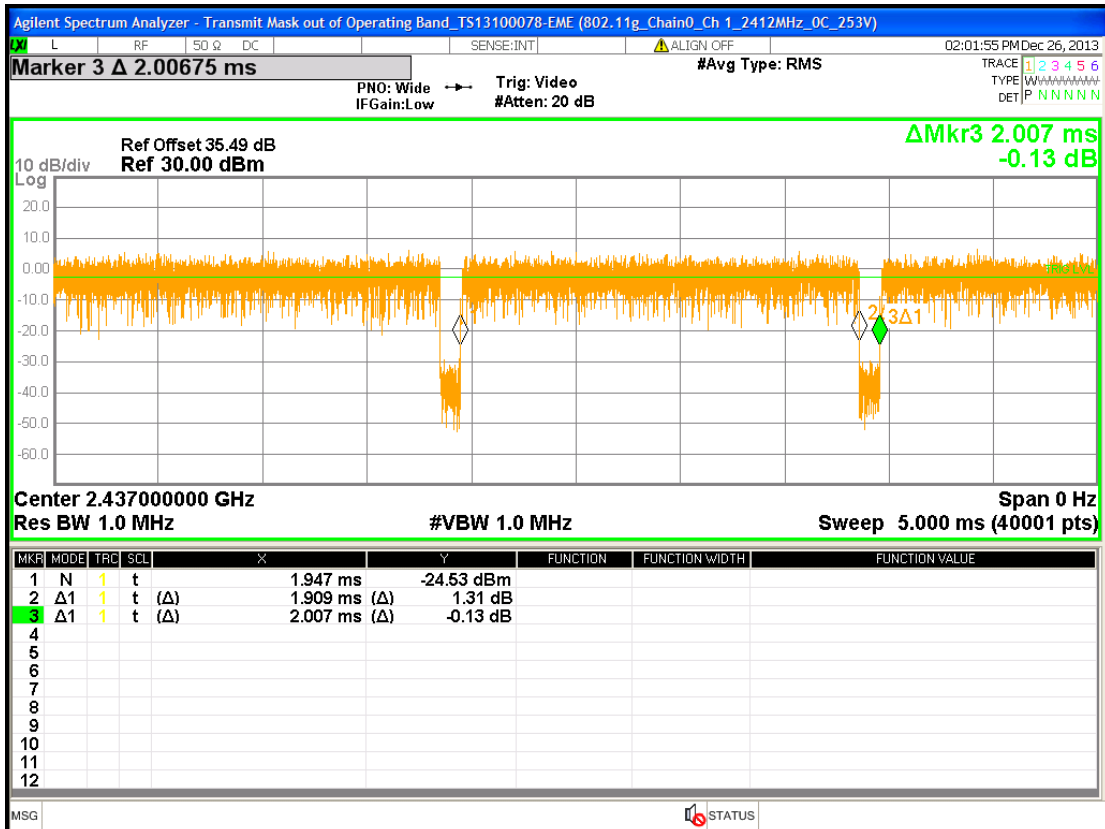
### Duty cycle @ 802.11b Mode Channel 06



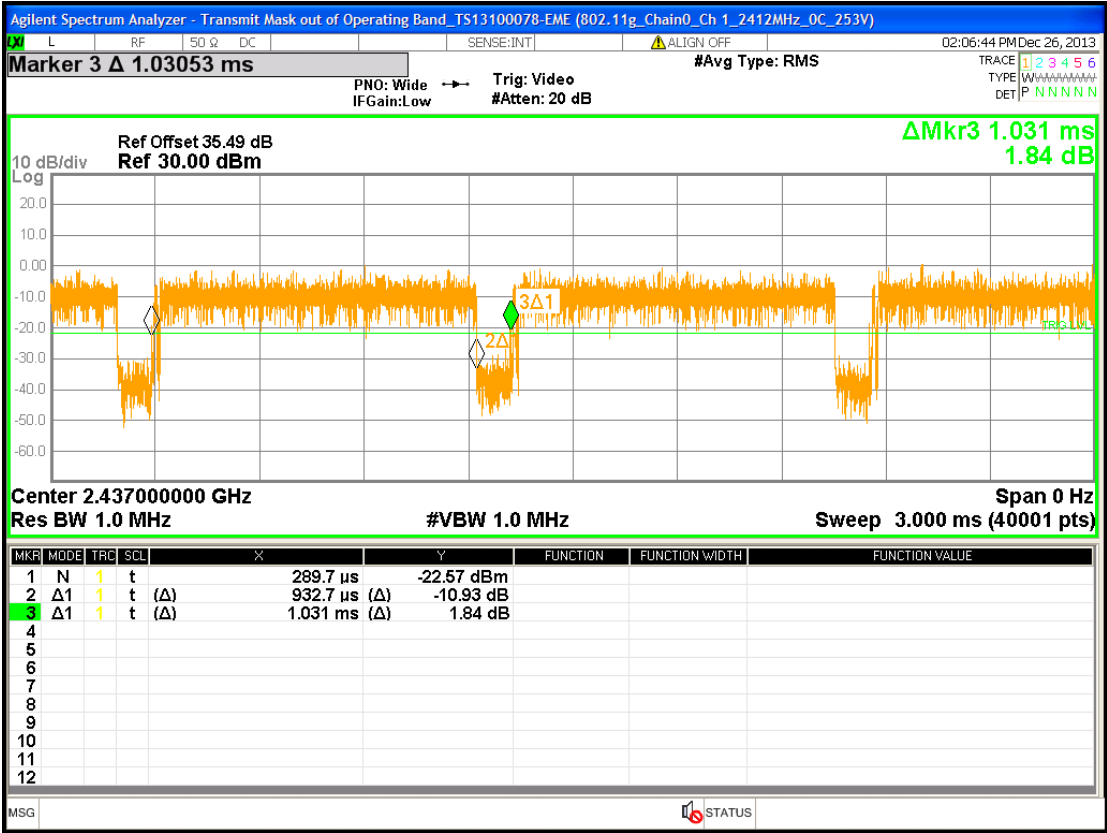
## Duty cycle @ 802.11g Mode Channel 06



## Duty cycle @ 802.11n(HT 20) Mode Channel 06



## Duty cycle @ 802.11n(HT 40) Mode Channel 06



### 3. Maximum 6 dB Bandwidth

<b>Name of Test</b>	Maximum 6 dB Bandwidth
<b>Base Standard</b>	FCC 15.247 (a)(2)

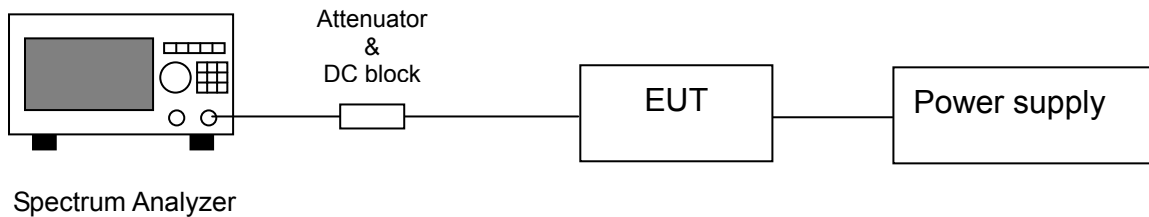
**Test Result:** Complies  
**Measurement Data:** plots as below

**Method of Measurement:**

**Reference FCC document: KDB 558074 D01 v03r01**

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz of the DTS channel bandwidth and not to exceed 100 kHz, video bandwidth (VBW) ≥ 3 x RBW. In order to make an accurate measurement, set the span greater than DTS channel bandwidth. The - 6dB bandwidth must be greater than 500 kHz.

**Test Diagram:**

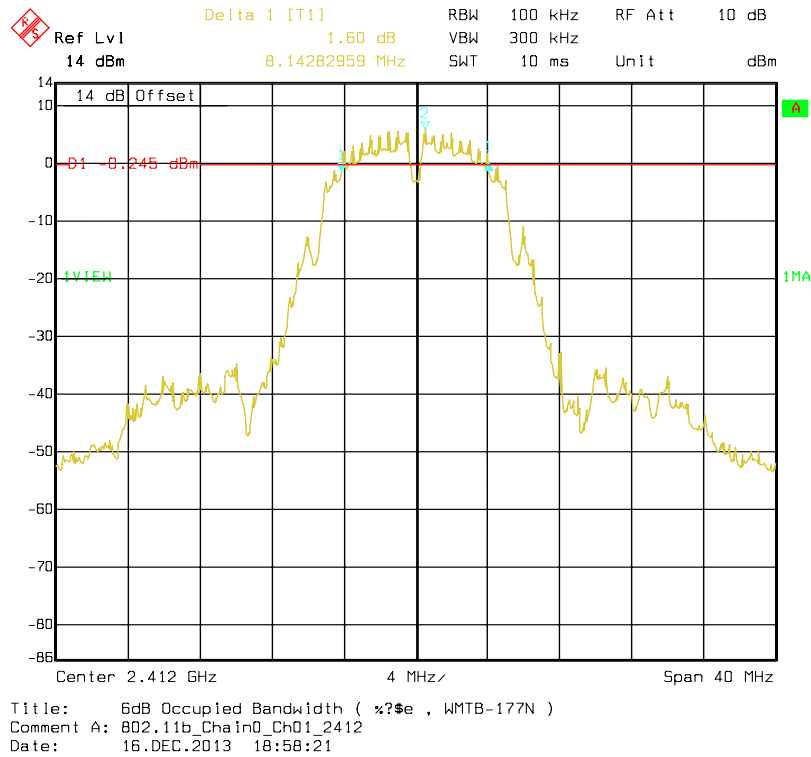


The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps for 802.11b , 6 Mbps for 802.11g , 6 Mbps for 802.11a , 6.5Mbps for 802.11n 20HT and 13.5Mbps 40HT. The EUT was tuned to a low, middle and high channel.

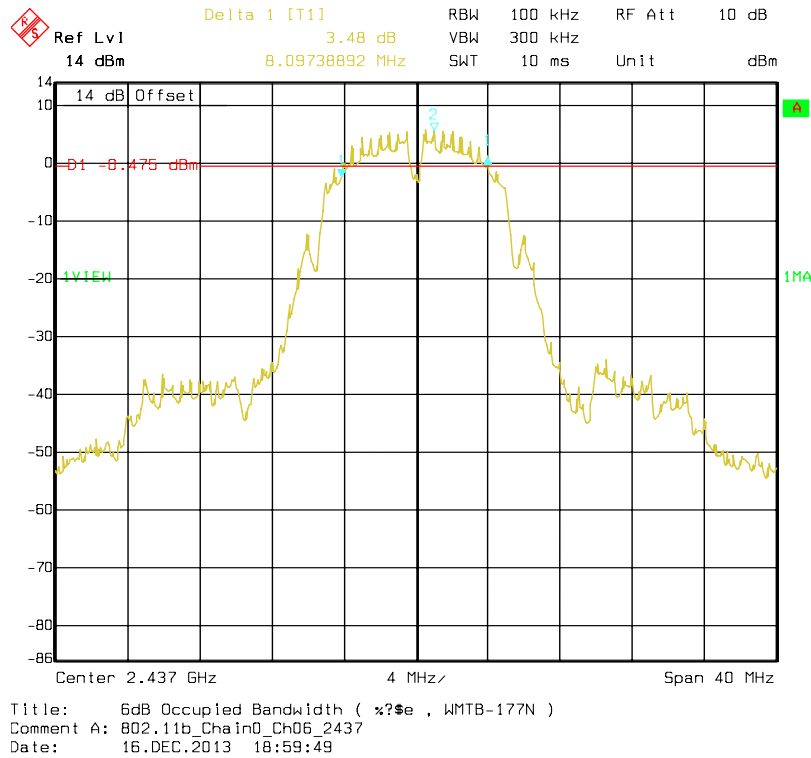
Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
802.11b (chain0)	1	2412	8.143	0.5	Pass
	6	2437	8.097	0.5	Pass
	11	2462	7.664	0.5	Pass
802.11b (chain1)	1	2412	8.031	0.5	Pass
	6	2437	8.112	0.5	Pass
	11	2462	8.094	0.5	Pass
802.11g (chain0)	1	2412	15.138	0.5	Pass
	6	2437	14.855	0.5	Pass
	11	2462	14.499	0.5	Pass
802.11g (chain1)	1	2412	15.073	0.5	Pass
	6	2437	14.767	0.5	Pass
	11	2462	15.082	0.5	Pass
802.11a (chain0)	149	5745	15.410	0.5	Pass
	157	5785	14.920	0.5	Pass
	165	5825	15.423	0.5	Pass
802.11a (chain1)	149	5745	15.349	0.5	Pass
	157	5785	15.004	0.5	Pass
	165	5825	14.896	0.5	Pass

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Limit (MHz)	Pass/Fail
			chain0	chain1		
802.11n (HT 20)	1	2412	16.151	15.131	0.5	Pass
	6	2437	15.12	16.072	0.5	Pass
	11	2462	14.89	14.712	0.5	Pass
	149	5745	15.889	16.083	0.5	Pass
	157	5785	15.754	15.914	0.5	Pass
	165	5825	15.320	15.217	0.5	Pass
802.11n (HT 40)	3	2422	36.449	36.468	0.5	Pass
	6	2437	36.124	36.333	0.5	Pass
	9	2452	36.466	36.386	0.5	Pass
	151	5755	36.080	36.398	0.5	Pass
	159	5795	36.078	36.383	0.5	Pass

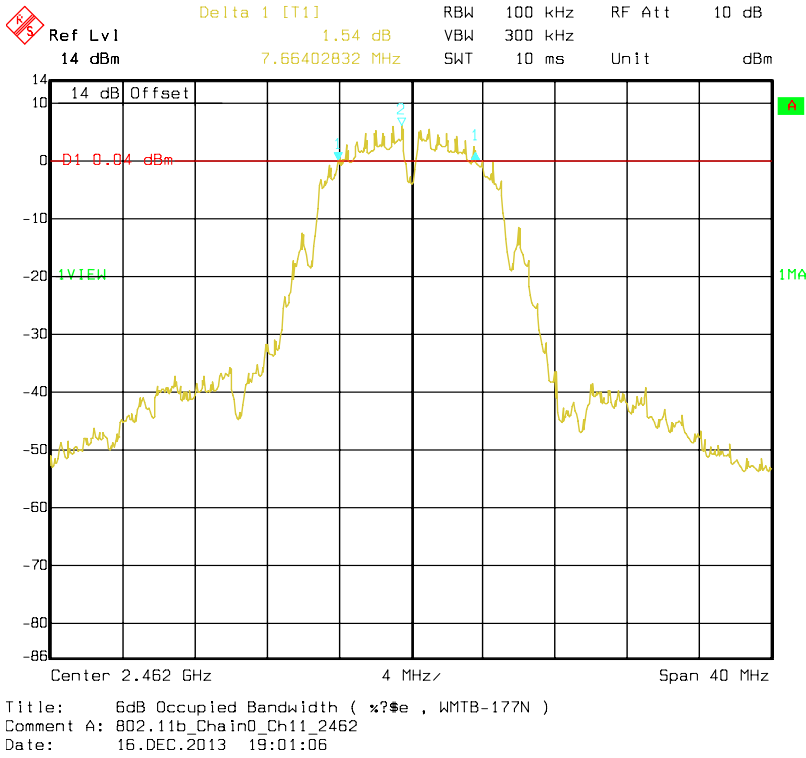
## Chain0 : 6dB Occupied Bandwidth @ 802.11b Mode Channel 01



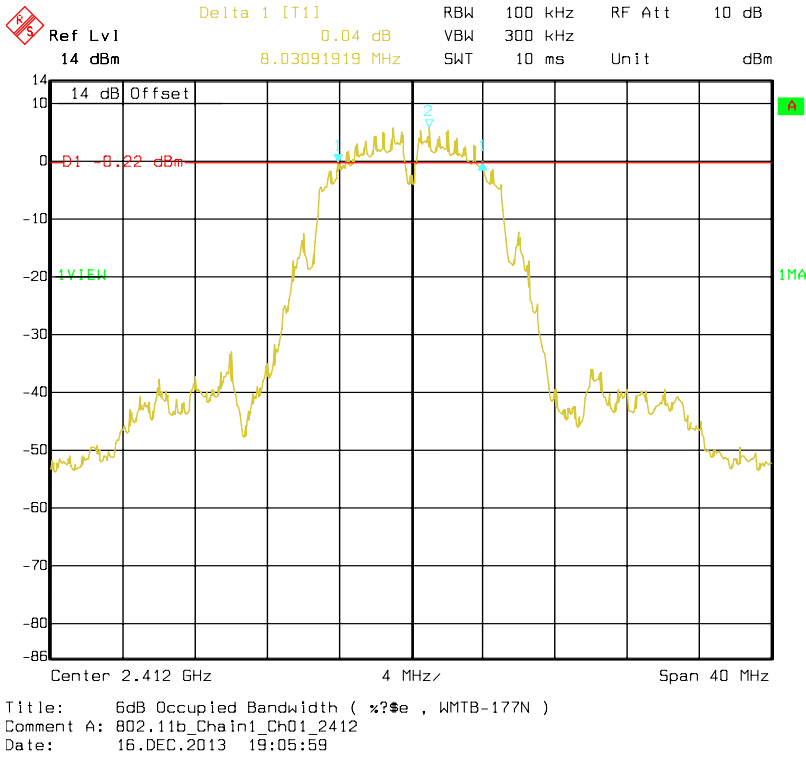
## Chain0 : 6dB Occupied Bandwidth @ 802.11b Mode Channel 06



### Chain0 : 6dB Occupied Bandwidth @ 802.11b Mode Channel 11

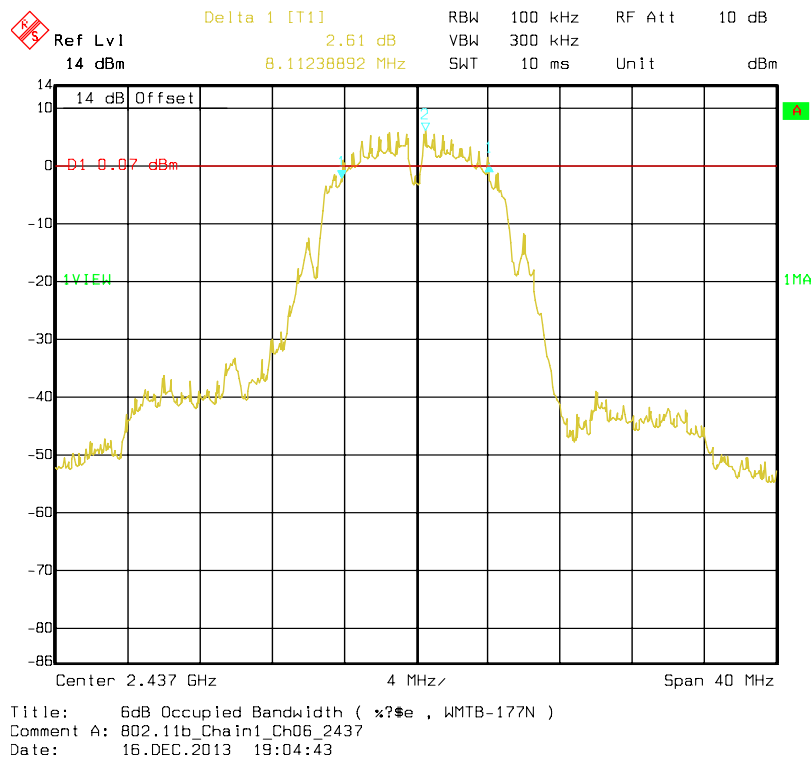


### Chain1 : 6dB Occupied Bandwidth @ 802.11b Mode Channel 01

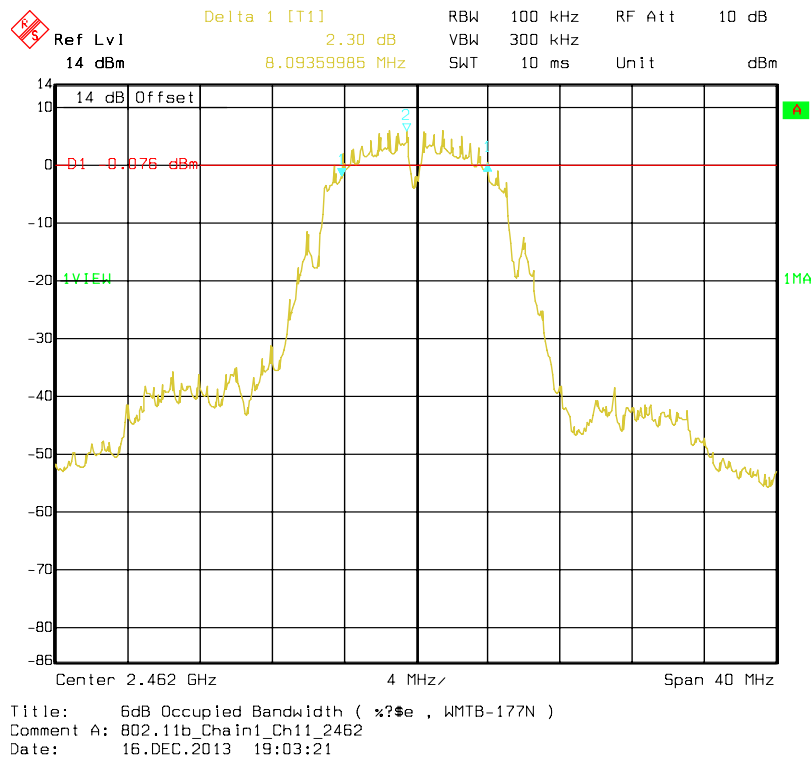




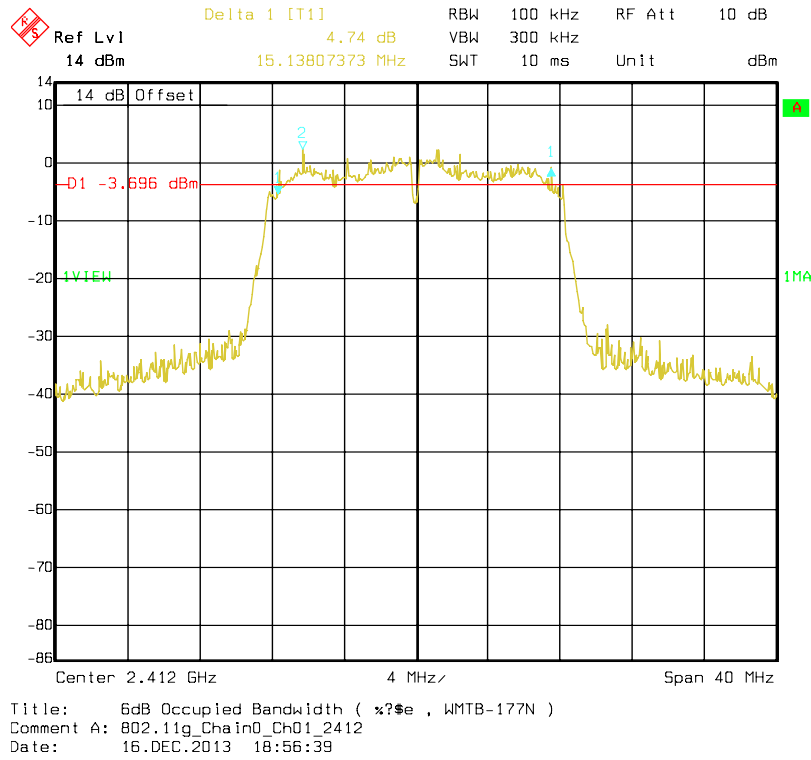
## Chain1 : 6dB Occupied Bandwidth @ 802.11b Mode Channel 06



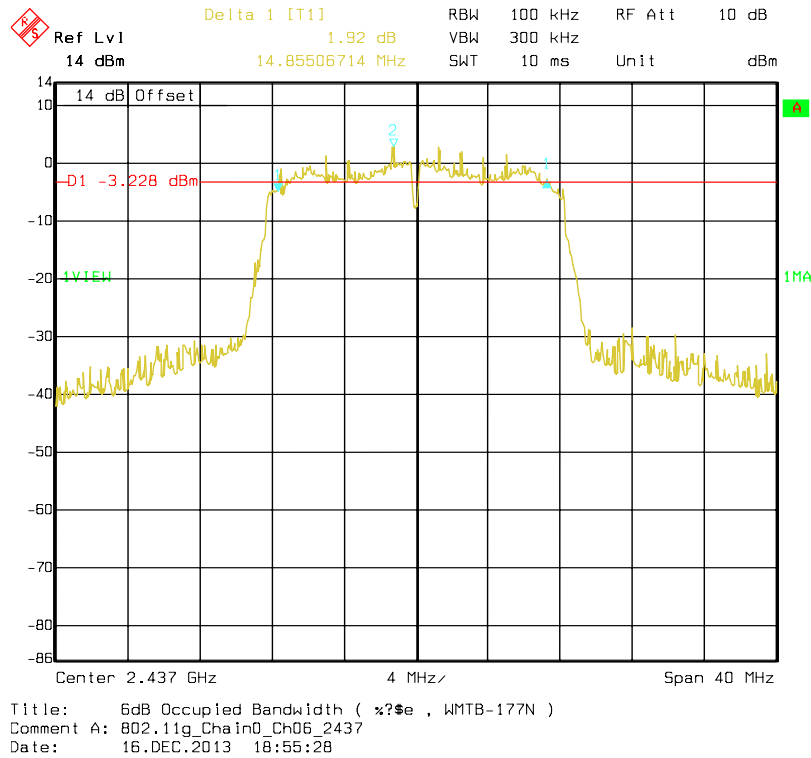
## Chain1 : 6dB Occupied Bandwidth @ 802.11b Mode Channel 11



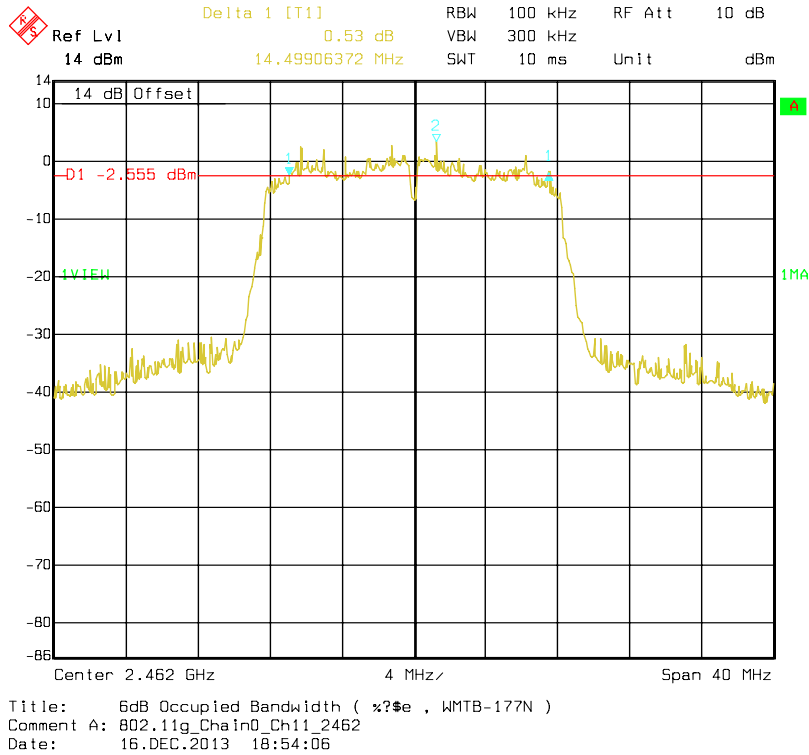
## Chain0 : 6dB Occupied Bandwidth @ 802.11g Mode Channel 01



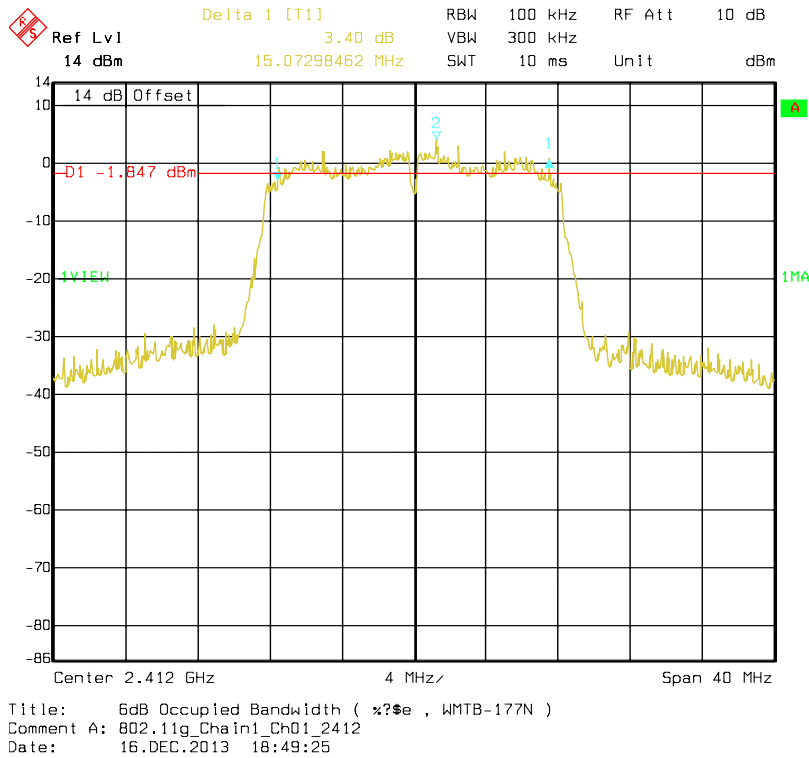
## Chain0 : 6dB Occupied Bandwidth @ 802.11g Mode Channel 06



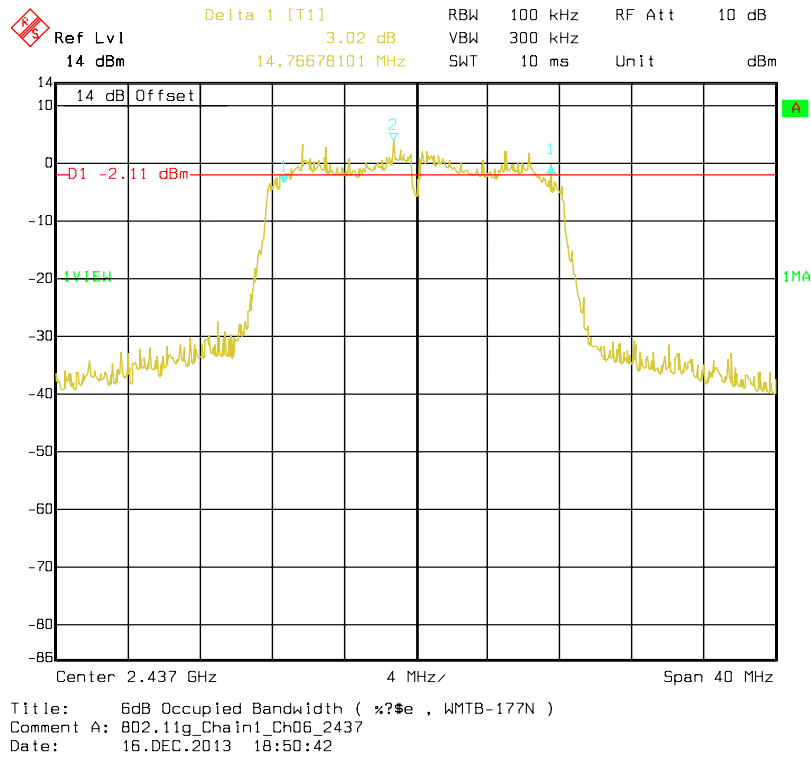
## Chain0 : 6dB Occupied Bandwidth @ 802.11g Mode Channel 11



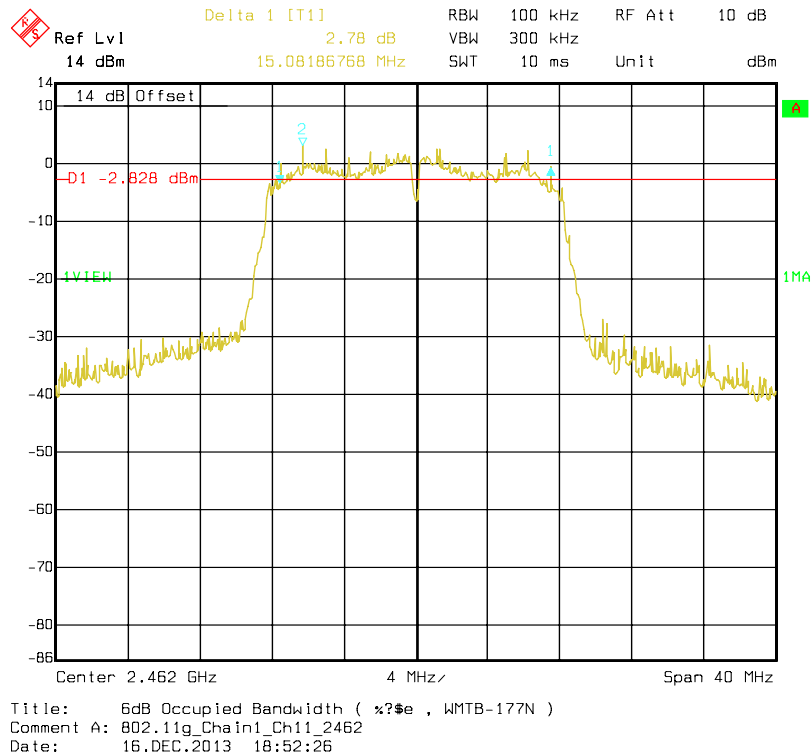
## Chain1 : 6dB Occupied Bandwidth @ 802.11g Mode Channel 01



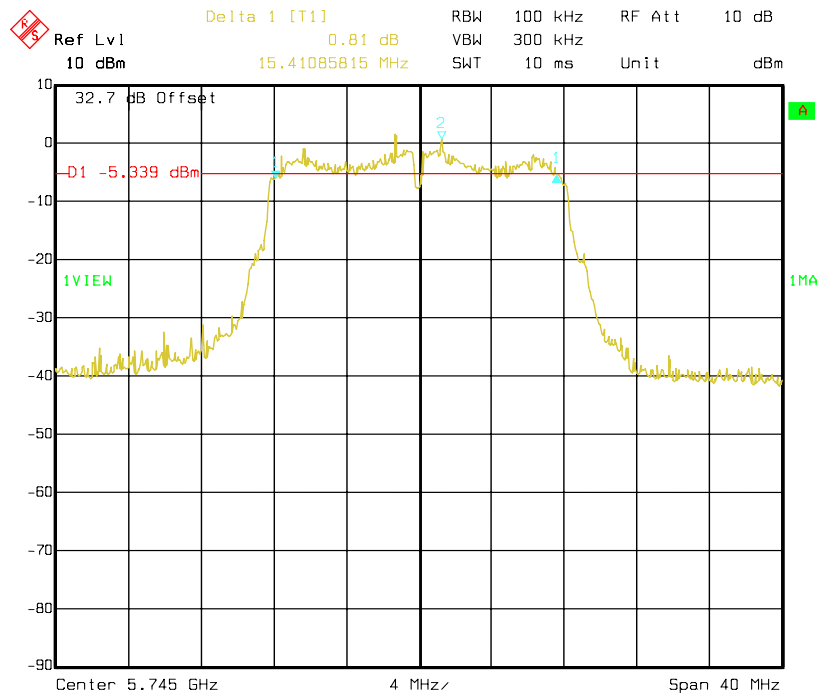
## Chain1 : 6dB Occupied Bandwidth @ 802.11g Mode Channel 06



## Chain1 : 6dB Occupied Bandwidth @ 802.11g Mode Channel 11

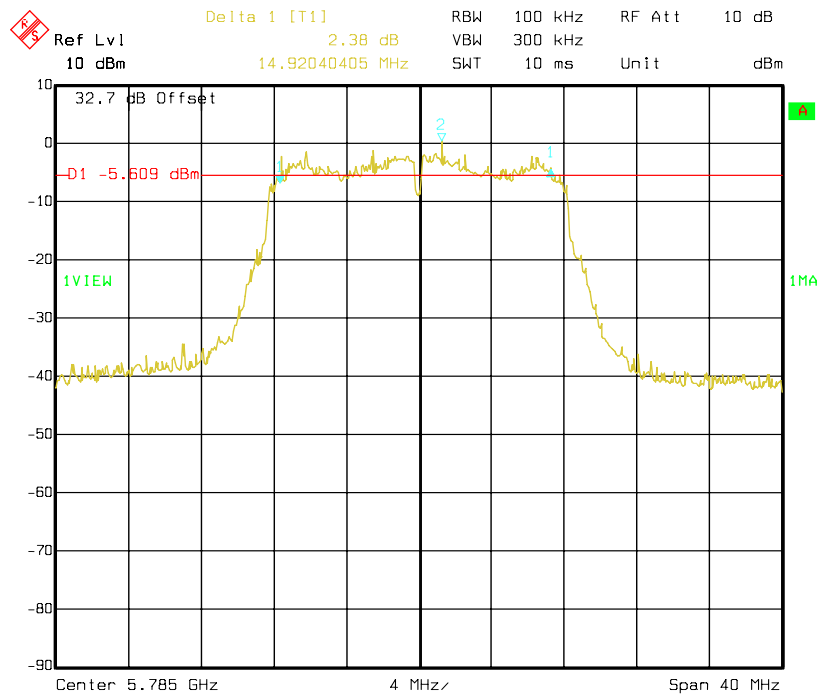


## Chain 0 : 6dB Occupied Bandwidth @ 802.11a Mode Channel 149



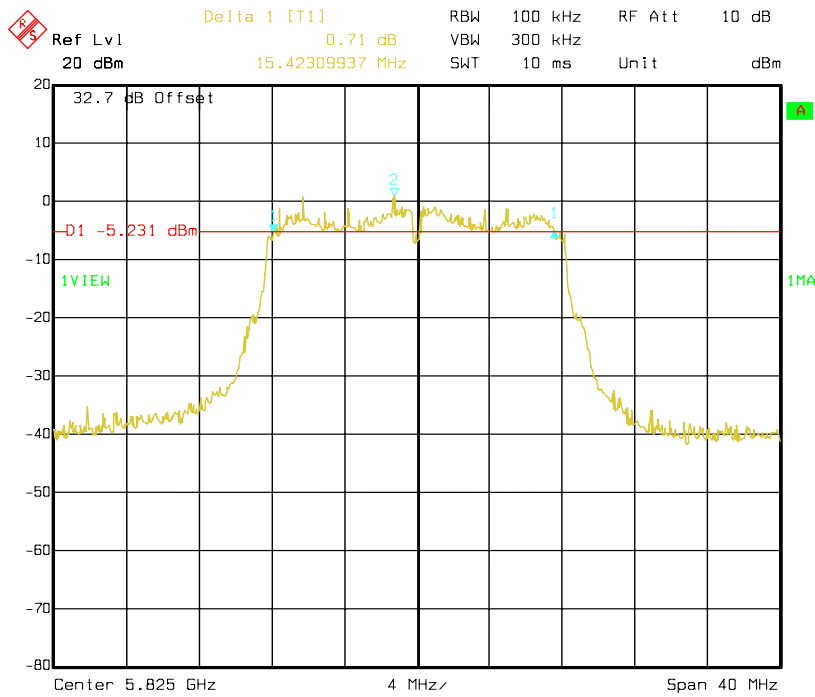
Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
Comment A: 802.11a\_Chain0\_Ch149\_5745  
Date: 10.MAR.2014 16:46:27

## Chain 0 : 6dB Occupied Bandwidth @ 802.11a Mode Channel 157



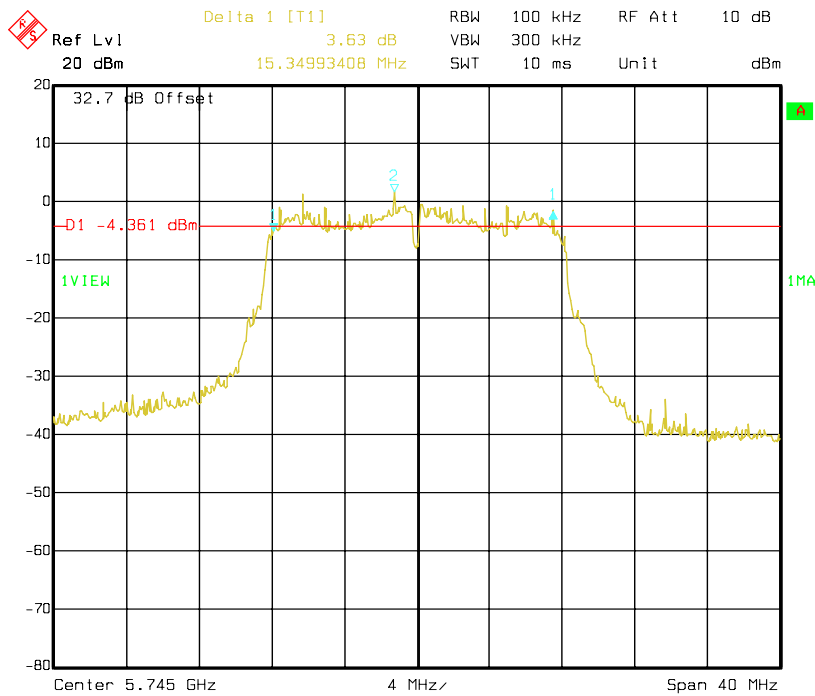
Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
Comment A: 802.11a\_Chain0\_Ch157\_5785  
Date: 10.MAR.2014 16:37:57

## Chain 0 : 6dB Occupied Bandwidth @ 802.11a Mode Channel 165



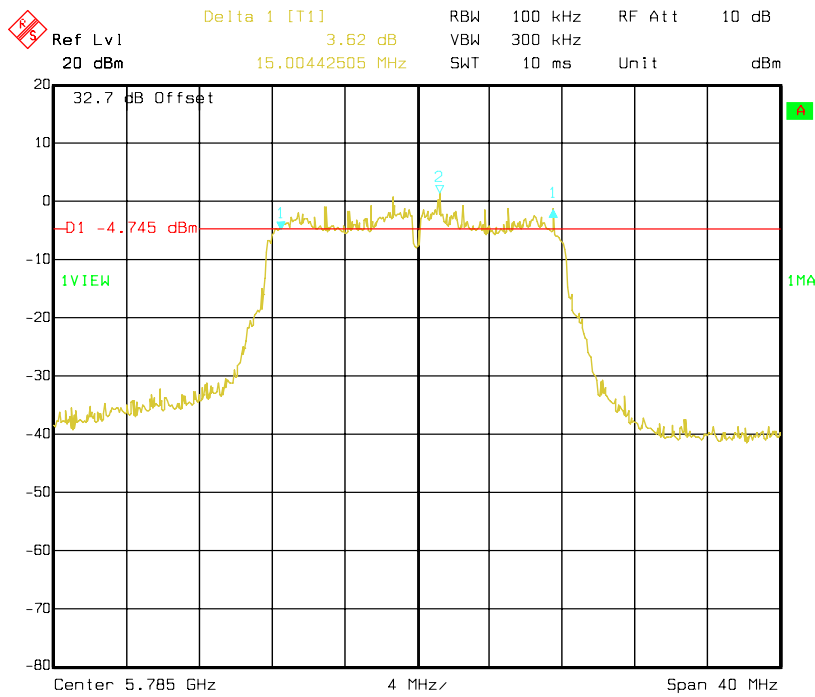
Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
 Comment A: 802.11a\_Chain0\_Ch165\_5825  
 Date: 10.MAR.2014 16:47:16

## Chain1 : 6dB Occupied Bandwidth @ 802.11a Mode Channel 149



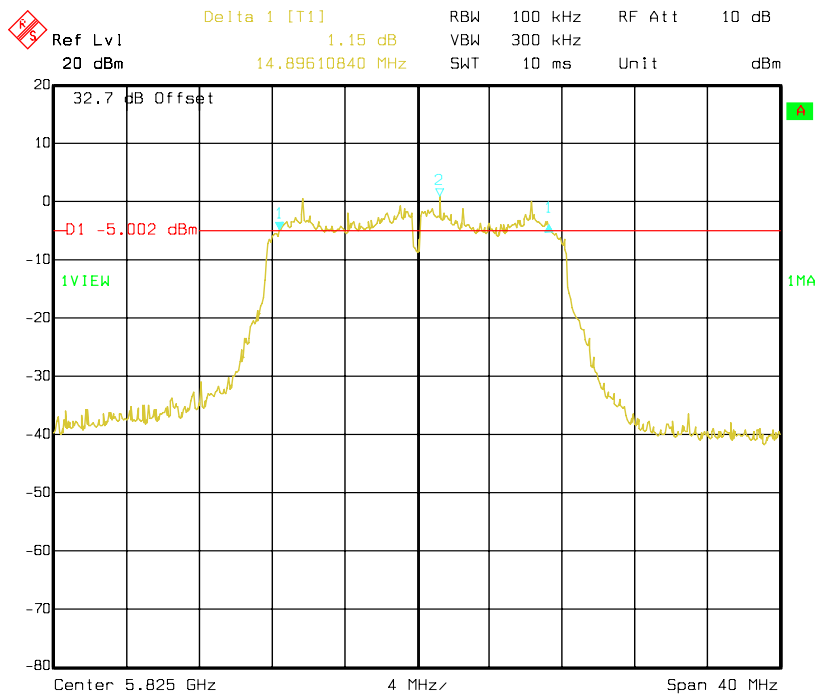
Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
 Comment A: 802.11a\_Chain1\_Ch149\_5745  
 Date: 10.MAR.2014 16:34:07

## Chain1 : 6dB Occupied Bandwidth @ 802.11a Mode Channel 157



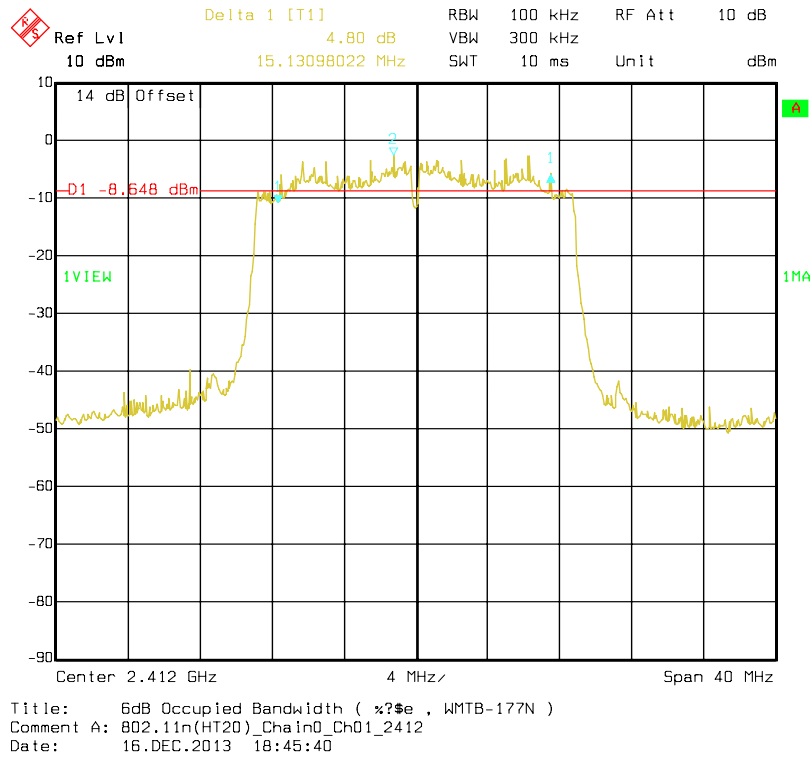
Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
 Comment A: 802.11a\_Chain1\_Ch157\_5785  
 Date: 10.MAR.2014 16:32:03

## Chain1 : 6dB Occupied Bandwidth @ 802.11a Mode Channel 165

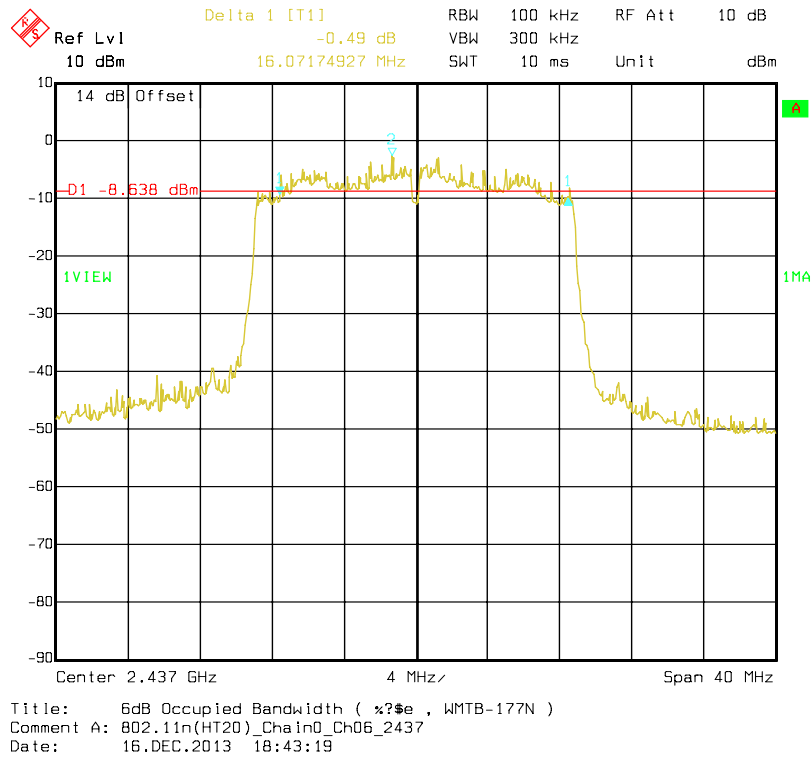


Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
 Comment A: 802.11a\_Chain1\_Ch165\_5825  
 Date: 10.MAR.2014 16:35:36

## Chain0 : 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 01

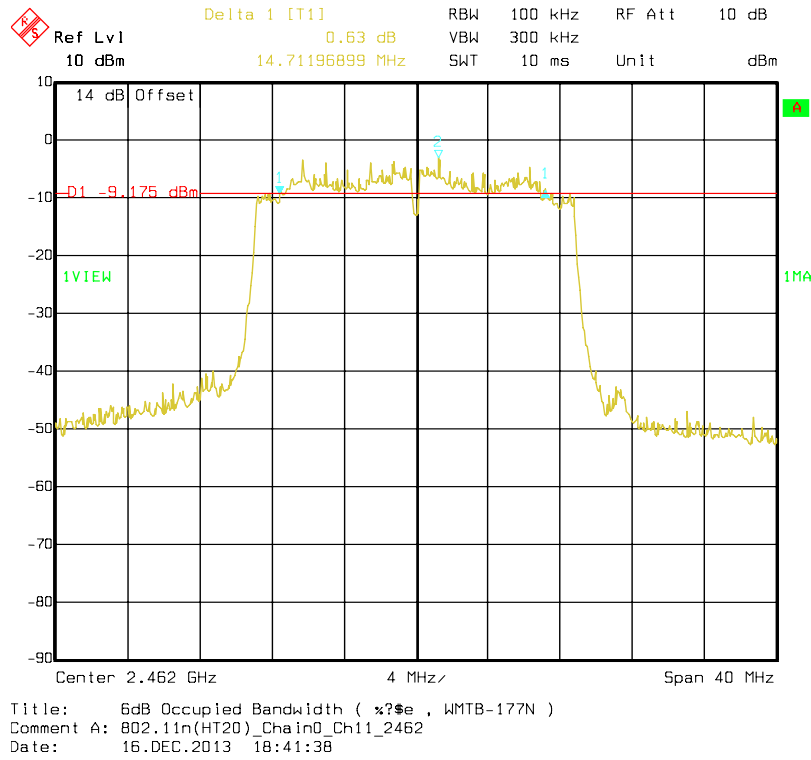


## Chain0 : 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 06

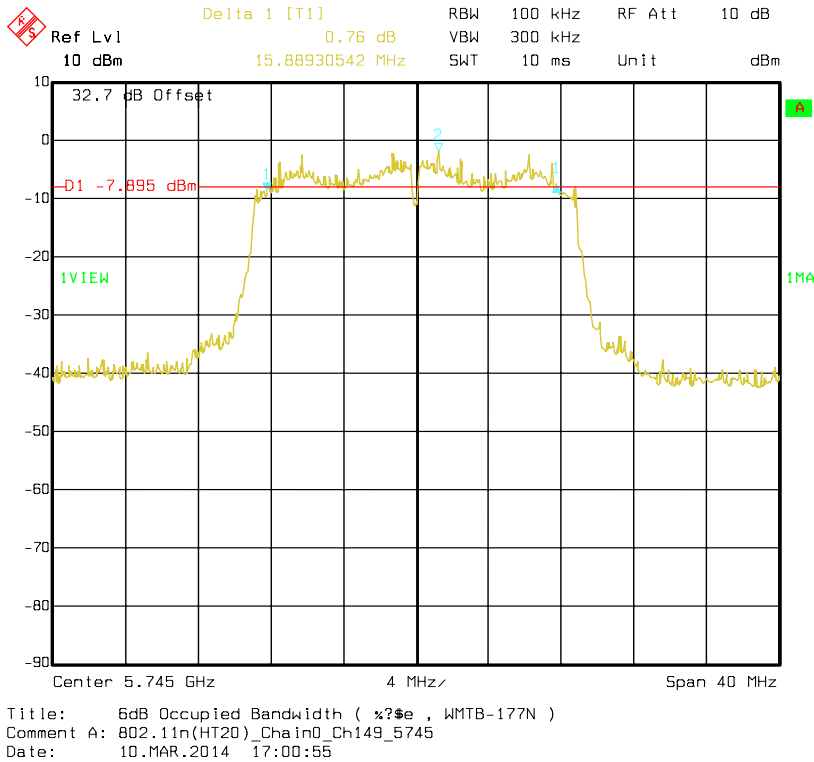




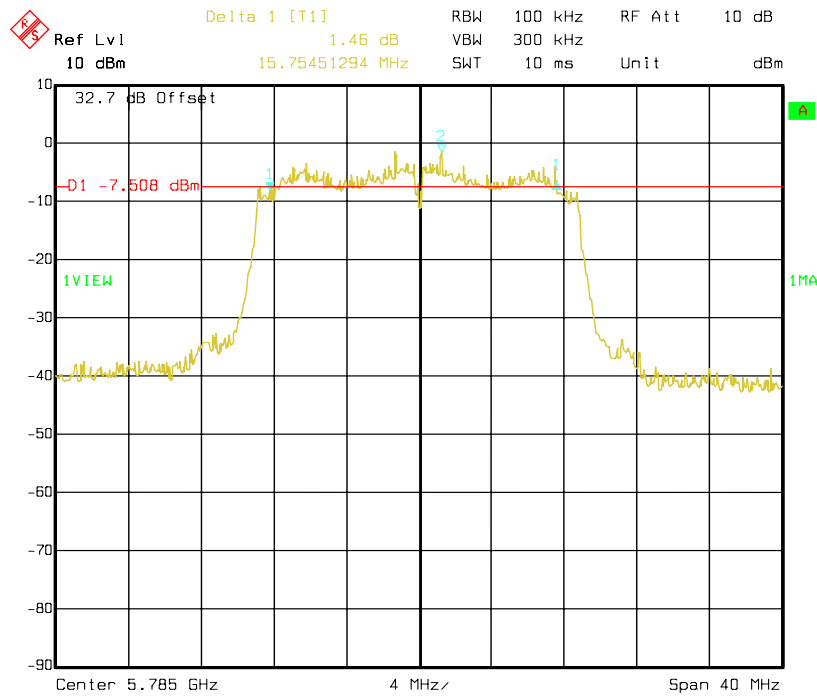
## Chain0: 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 11



## Chain0: 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 149

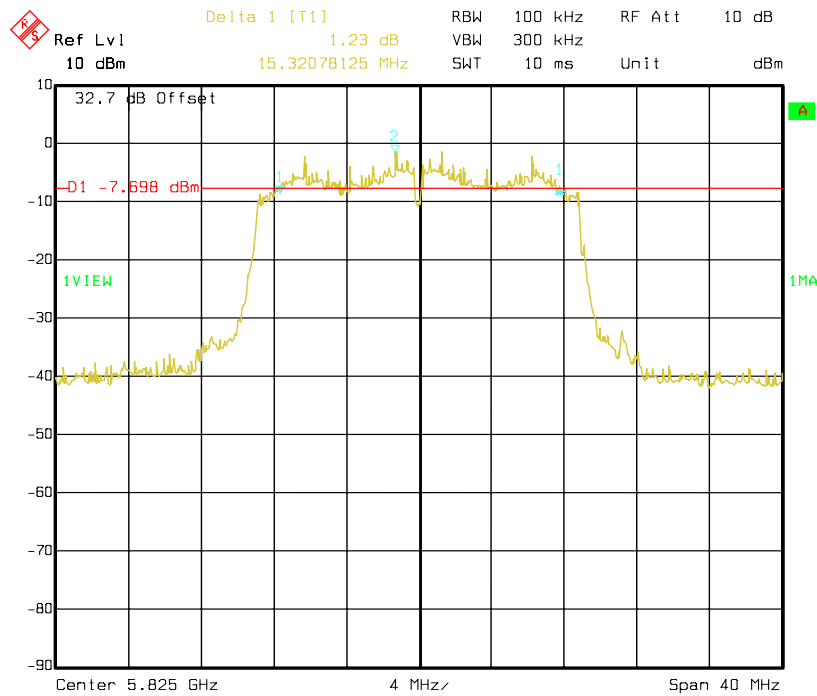


## Chain0: 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 157



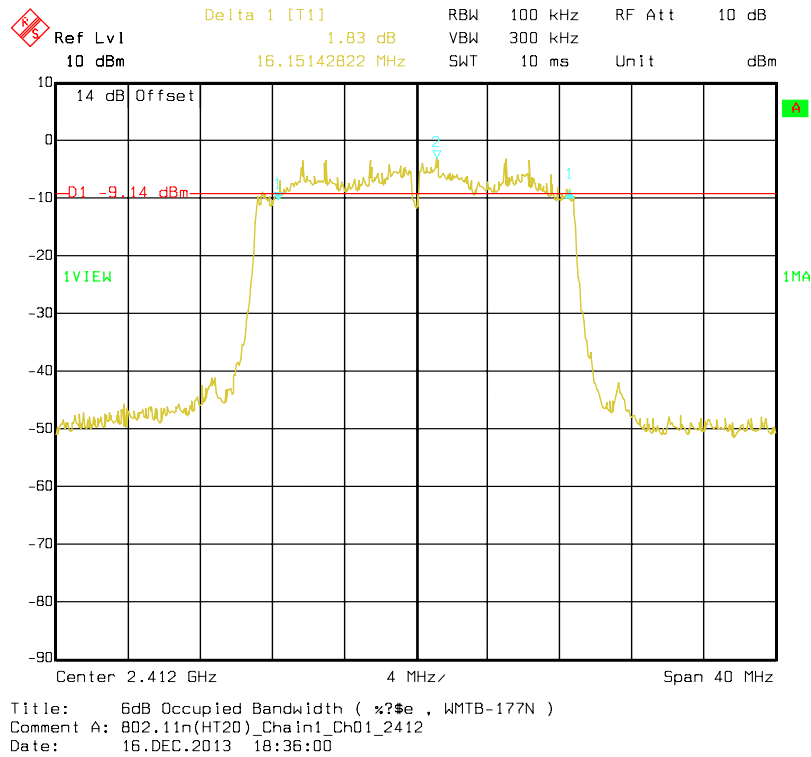
Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
 Comment A: 802.11n(HT20)\_Chain0\_Ch157\_5785  
 Date: 10.MAR.2014 17:02:07

## Chain0: 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 165

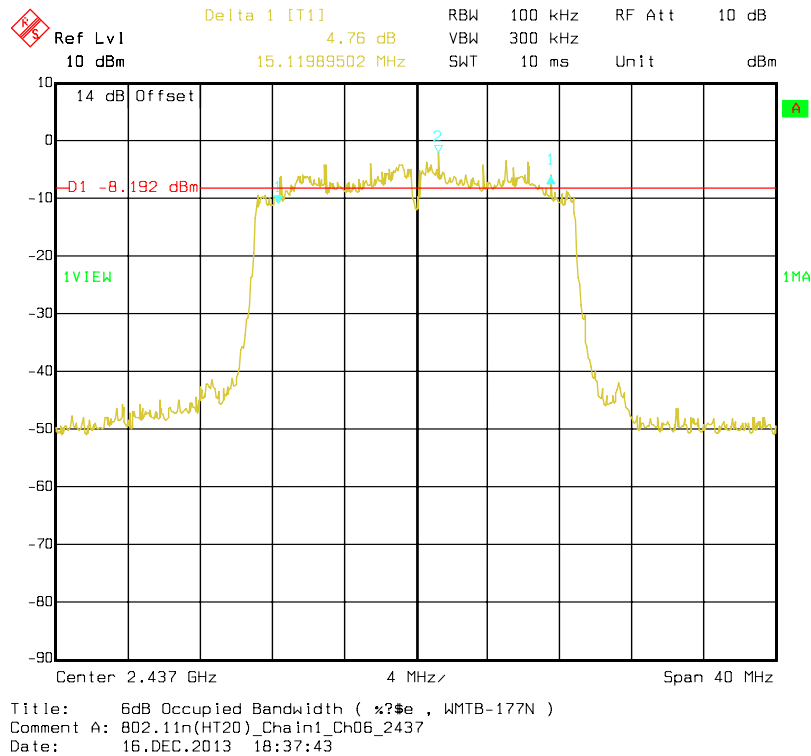


Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
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 Date: 10.MAR.2014 17:03:16

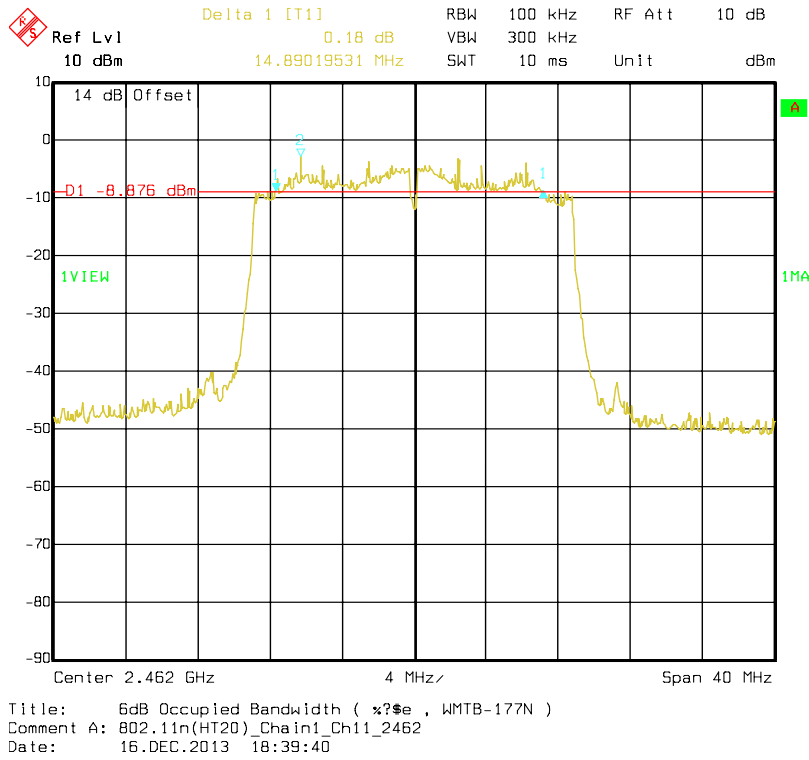
## Chain1 : 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 01



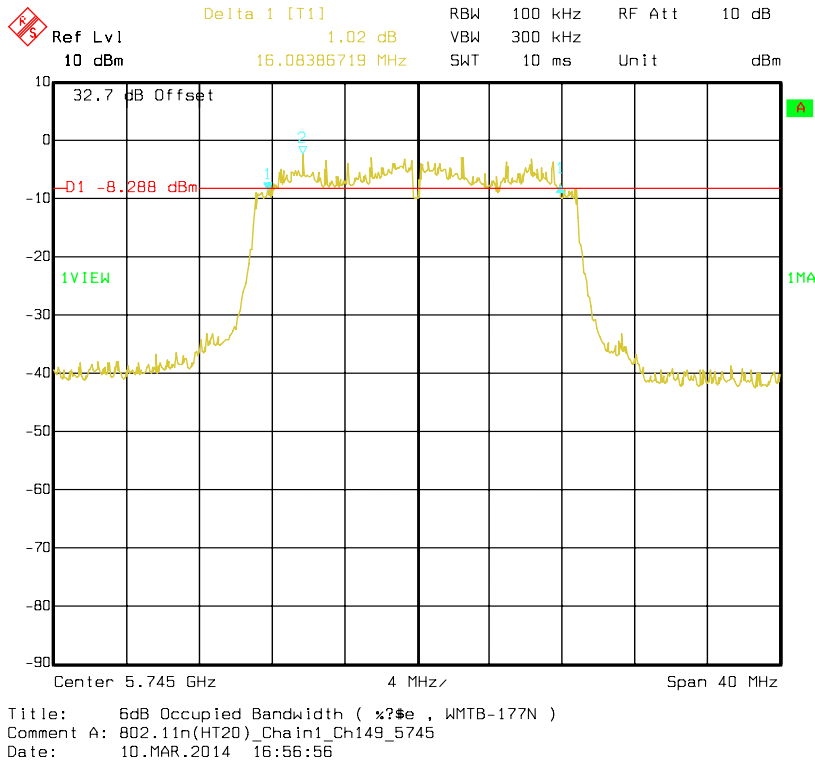
## Chain1 : 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 06



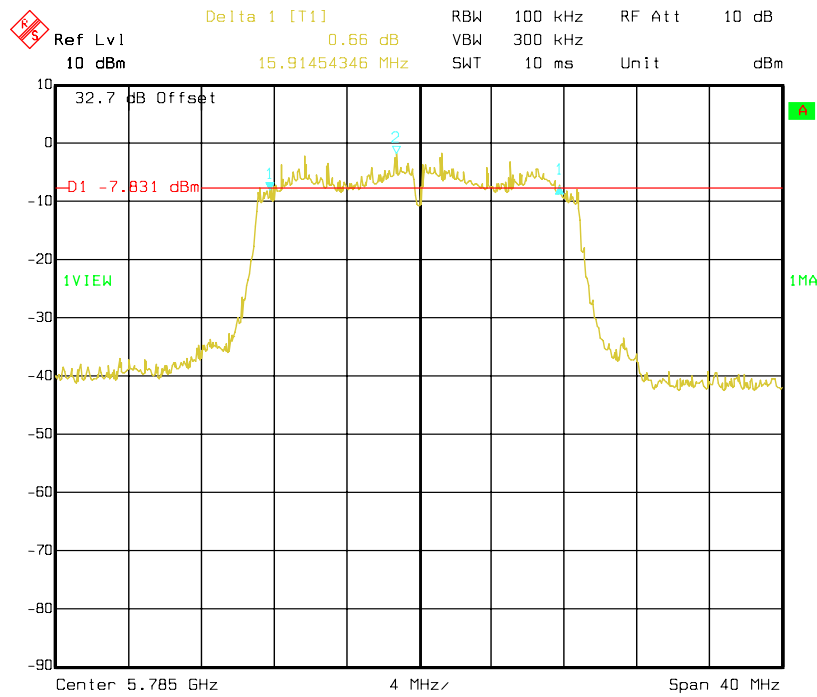
**Chain1: 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 11**



**Chain1: 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 149**

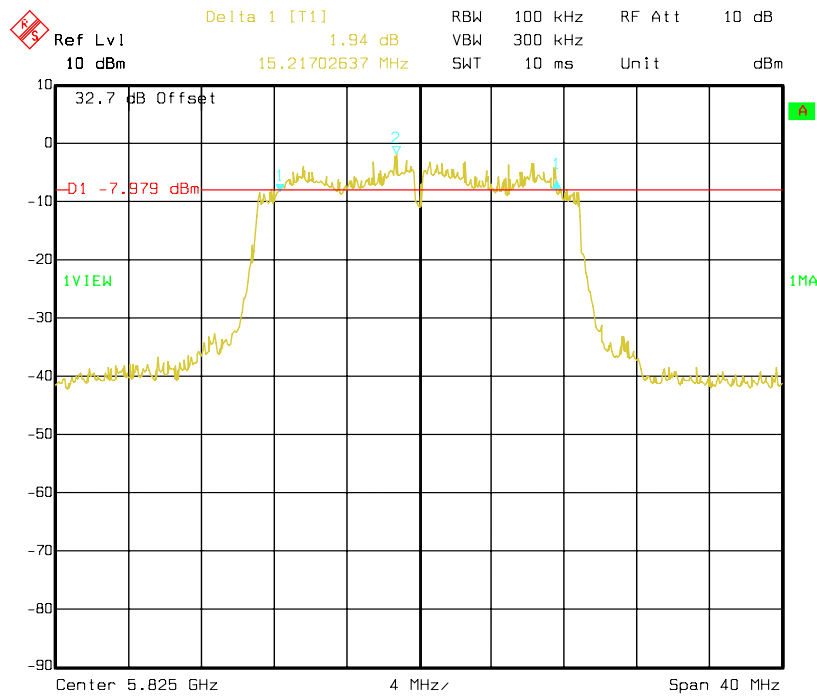


## Chain1: 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 157



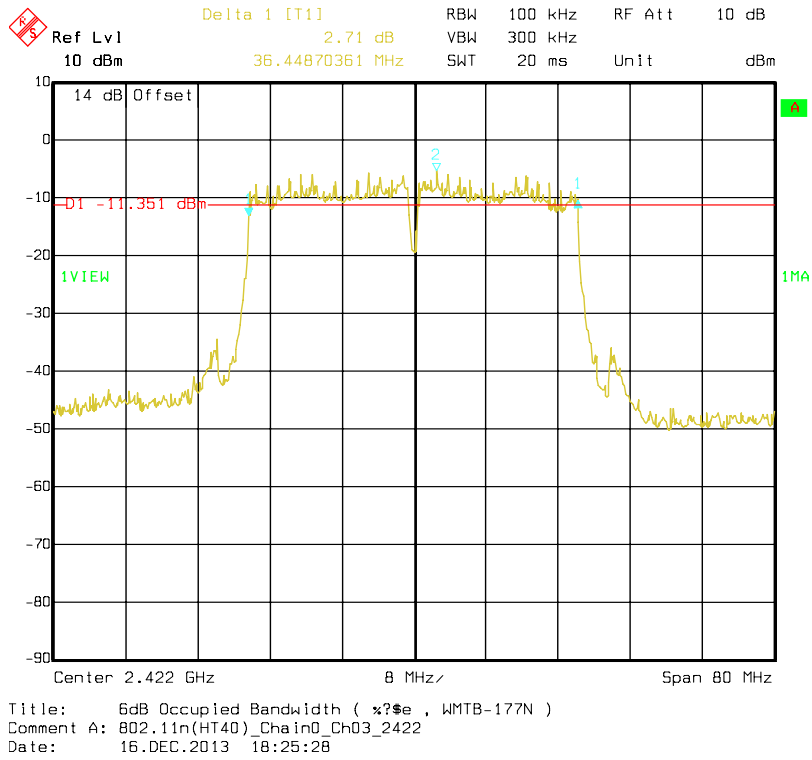
Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
 Comment A: 802.11n(HT20)\_Chain1\_Ch157\_5785  
 Date: 10.MAR.2014 16:58:07

## Chain1: 6dB Occupied Bandwidth @ 802.11n(HT 20) Mode Channel 165

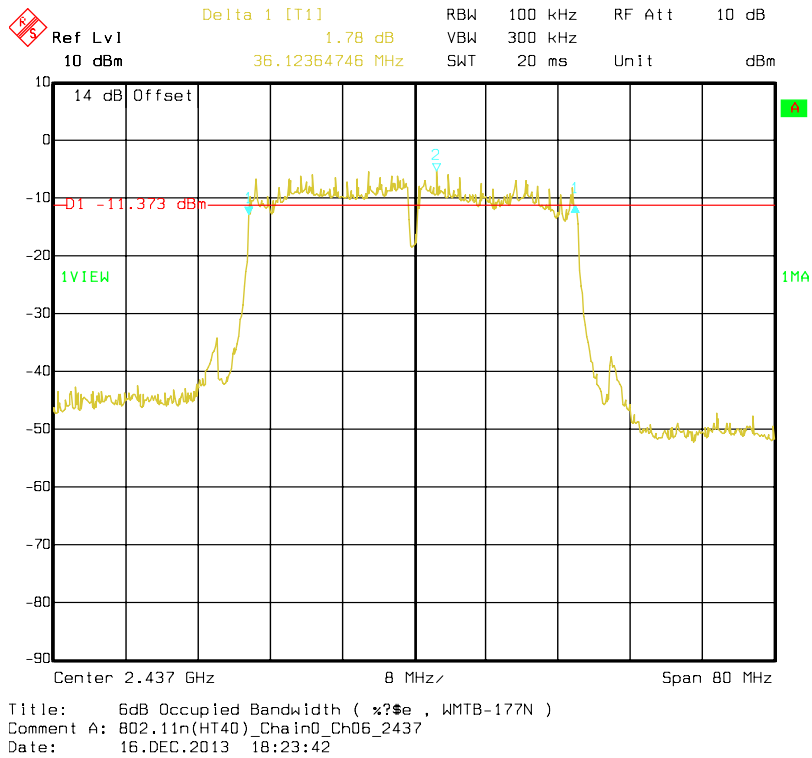


Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
 Comment A: 802.11n(HT20)\_Chain1\_Ch165\_5825  
 Date: 10.MAR.2014 16:59:19

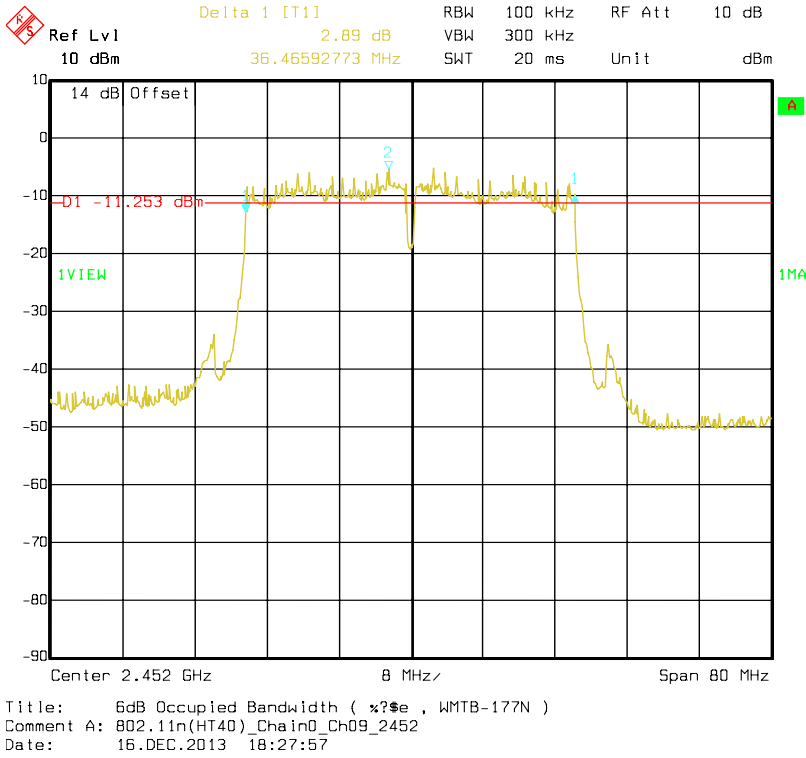
### Chain 0 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 03



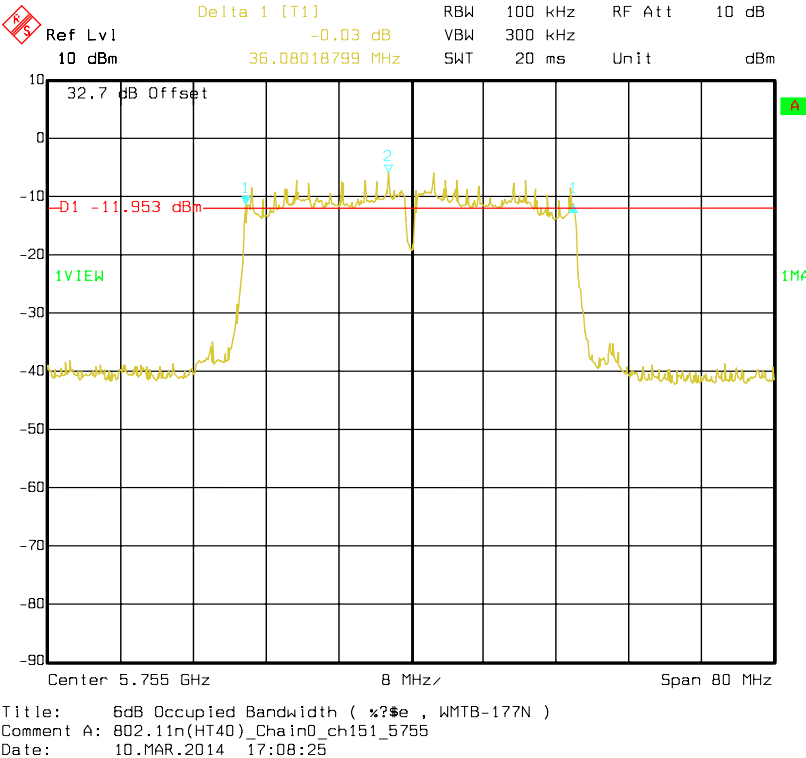
### Chain 0 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 06



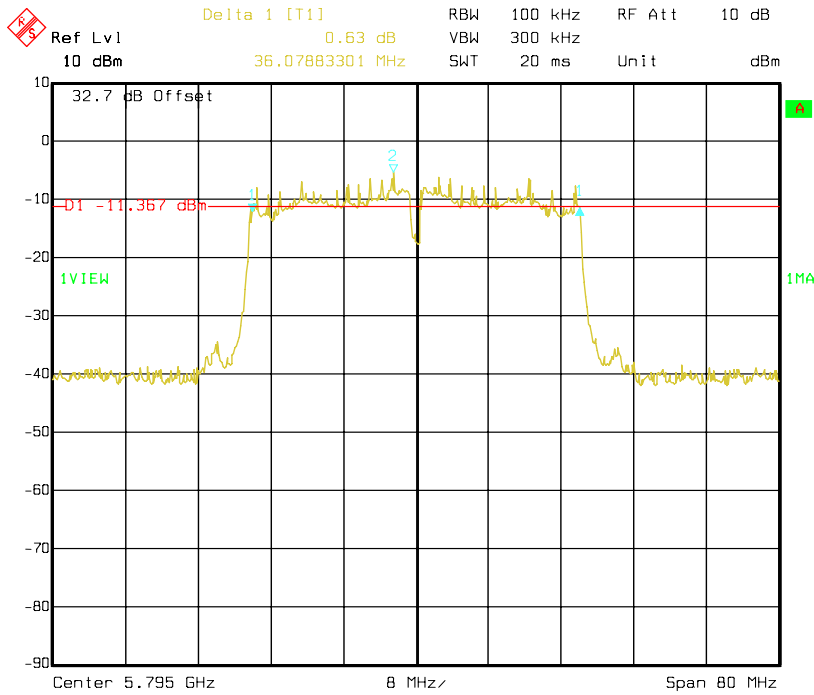
Chain 0 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 09



Chain 0 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 151

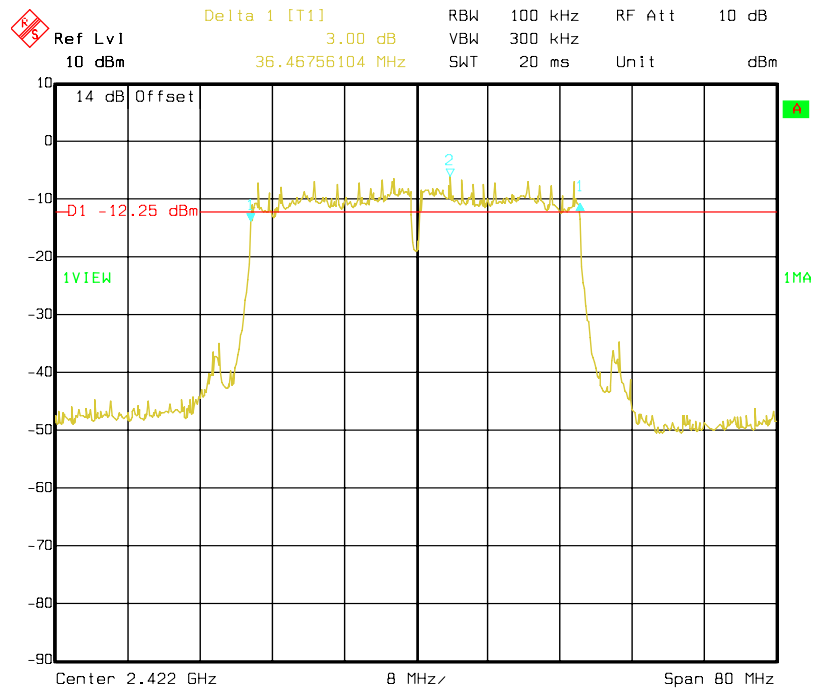


### Chain 0 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 159



Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
 Comment A: 802.11n(HT40)\_Chain0\_ch159\_5795  
 Date: 10.MAR.2014 17:09:39

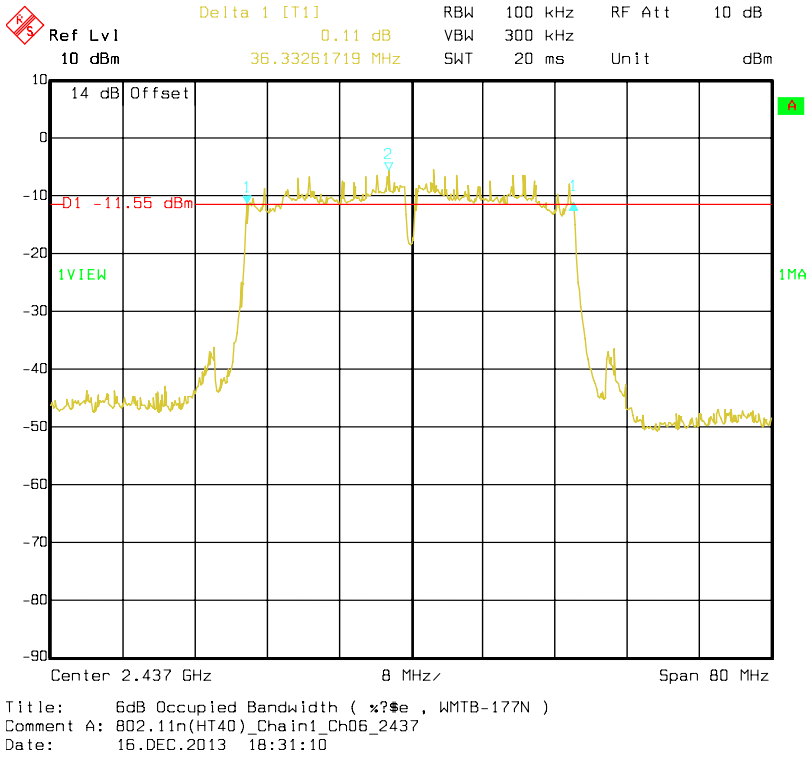
### Chain1 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 03



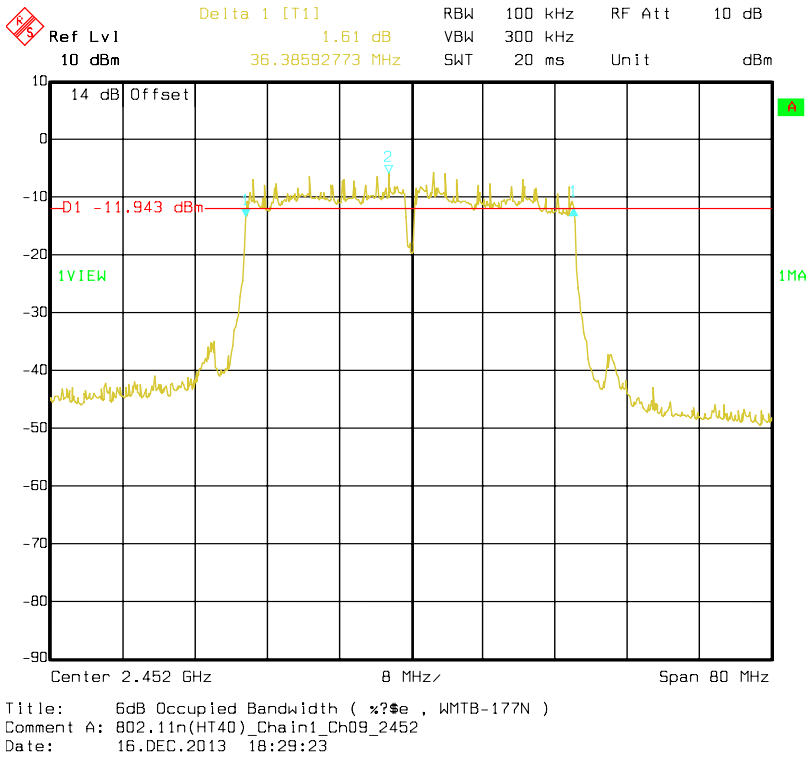
Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
 Comment A: 802.11n(HT40)\_Chain1\_Ch03\_2422  
 Date: 16.DEC.2013 18:33:49



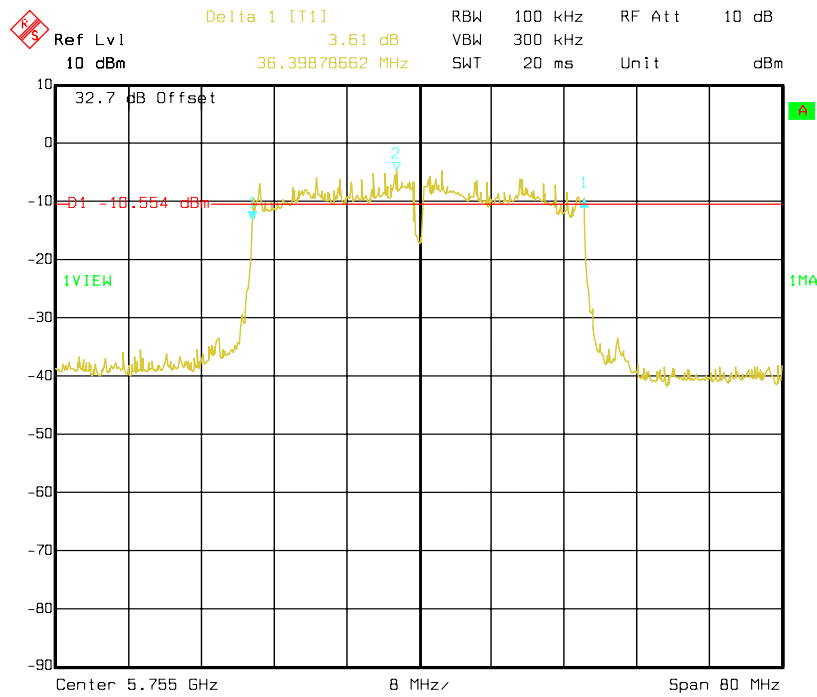
### Chain1 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 06



### Chain1 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 09

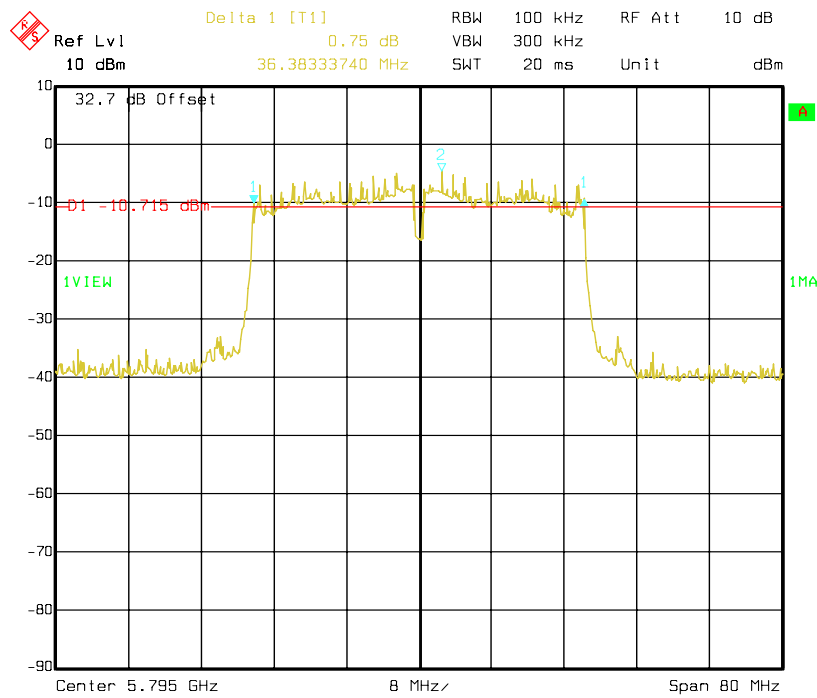


## Chain1 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 151



Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
Comment A: 802.11n(HT40)\_Chain1\_ch151\_5755  
Date: 10.MAR.2014 17:11:18

## Chain1 : 6dB Occupied Bandwidth @ 802.11n(HT 40) Mode Channel 159



Title: 6dB Occupied Bandwidth ( %?#e , WMTB-177N )  
Comment A: 802.11n(HT40)\_Chain1\_ch159\_5795  
Date: 10.MAR.2014 17:12:32

#### 4. Maximum Output Power

<b>Name of Test</b>	Maximum output power
<b>Base Standard</b>	FCC 15.247(b)

**Measurement Uncertainty:** ±0.392 dB (k=2)

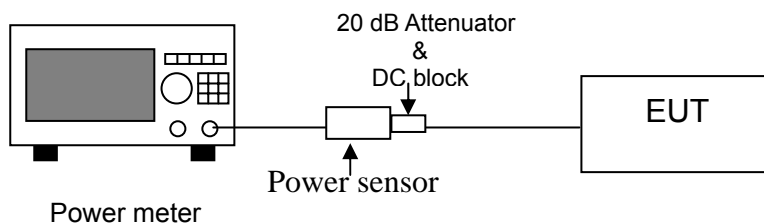
**Test Result:** Complies

**Method of Measurement:**

**Reference FCC document: KDB 558074 D01 v03r01 & KDB 662911 D01 v02r01**

Test procedures refer to clause 9.1.3 peak power meter method and clause 9.2.3.2 measurement using a gated RF average power meter of KDB 558074 D01 v03r01 measurements is performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required

**Test Diagram:**



**Note 1:** §15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**Note 2:** §15.247 (b) (4) (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximun power (PK) (dBm)	Maximun power (PK) (mW)	Limit (dBm)	Margin (dB)
802.11b (chain0)	1	2412	15.87	38.64	19.55	90.16	30	-10.45
	6	2437	15.89	38.82	19.47	88.51	30	-10.53
	11	2462	15.97	39.54	19.57	90.57	30	-10.43
802.11b (chain1)	1	2412	15.19	33.04	18.81	76.03	30	-11.19
	6	2437	15.45	35.08	19.2	83.18	30	-10.80
	11	2462	15.77	37.76	19.56	90.36	30	-10.44
802.11g (chain0)	1	2412	14.73	29.72	21.83	152.41	30	-8.17
	6	2437	14.7	29.51	21.37	137.09	30	-8.63
	11	2462	14.69	29.44	22.97	198.15	30	-7.03
802.11g (chain1)	1	2412	14.53	28.38	23.31	214.29	30	-6.69
	6	2437	14.58	28.71	23.13	205.59	30	-6.87
	11	2462	14.5	28.18	21.49	140.93	30	-8.51
802.11a (chain0)	149	5745	12.17	26.17	21.83	152.41	30	-8.17
	157	5785	12.18	26.25	21.37	137.09	30	-8.63
	165	5825	12.09	26.41	22.97	198.15	30	-7.03
802.11a (chain1)	149	5745	11.96	23.44	23.31	214.29	30	-6.69
	157	5785	12.19	24.56	23.13	205.59	30	-6.87
	165	5825	12.27	24.42	21.49	140.93	30	-8.51

Mode	Channel	Frequency (MHz)	PSD (dBm)		Duty factor (dBm)	Total PSD with Duty factor		Limit (dBm)	Margin (dB)
			chain0	chain1		mW	dBm		
802.11n (HT 20)	1	2412	-16.13	-12.79	0.22	0.08	-10.92	8	-18.92
	6	2437	-11.31	-15.59	0.22	0.11	-9.72	8	-17.72
	11	2462	-16.76	-16.03	0.22	0.05	-13.15	8	-21.15
	149	5745	-15.00	-15.63	0.21	0.06	-12.08	8	-20.08
	157	5785	-15.71	-15.64	0.21	0.06	-12.45	8	-20.45
	165	5825	-15.06	-15.33	0.21	0.06	-11.97	8	-19.97
802.11n (HT 40)	3	2422	-21.07	-19.87	0.41	0.02	-17.00	8	-25.00
	6	2437	-20.8	-20.09	0.41	0.02	-17.01	8	-25.01
	9	2452	-20.48	-20.41	0.41	0.02	-17.02	8	-25.02
	151	5755	-20.8	-19.31	0.43	0.02	-16.56	8	-24.56
	159	5795	-20.48	-19.01	0.43	0.02	-16.25	8	-24.25

## 5. Power Spectral Density

<b>Name of Test</b>	Power Spectral Density
<b>Base Standard</b>	FCC 15.247(e)

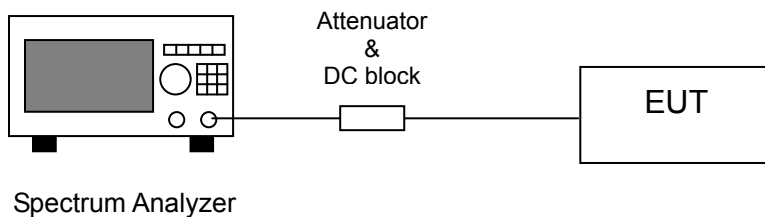
**Test Result:** Complies  
**Measurement Data:** See Table & plots below

### Method of Measurement:

**Reference FCC document: KDB 558074 D01 v03r01 & KDB 662911 D01 v02r01**

The power spectrum density was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer. Locate and zoom in on emission peak(s) within the passband. Set RBW = 3 kHz, VBW  $\geq$ 3RBW, sweep time= auto couple. The peak level measured must be no greater than + 8 dBm. Power spectrum density was read directly and cable loss (1 dB)/external attenuator (20 dB) correction was added to the reading to obtain power at the EUT antenna terminals.

### Test Diagram:



Spectrum Analyzer

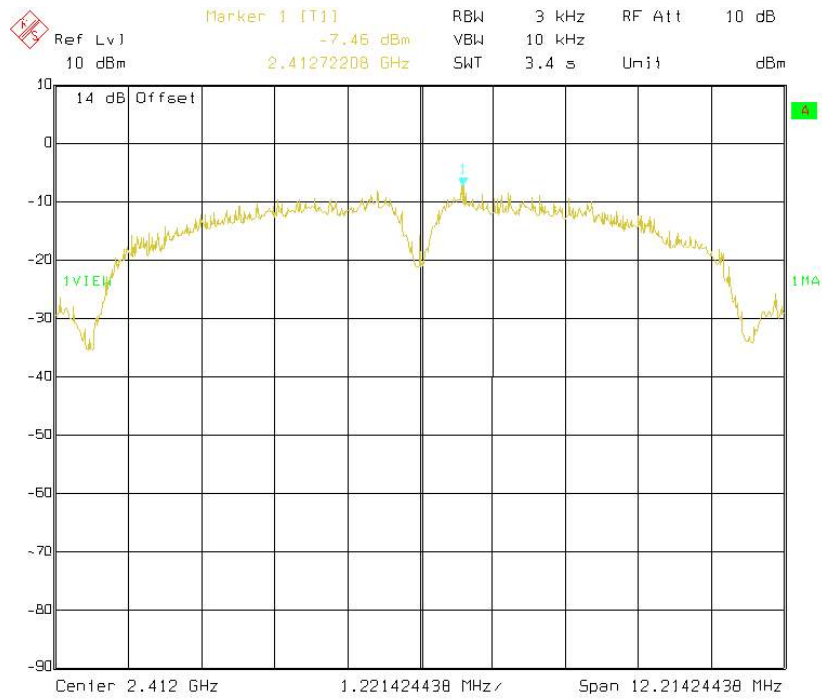
Mode	Channel	Frequency (MHz)	PSD (dBm)	Duty factor (dBm)	PSD with Duty factor (dBm)	PSD with Duty factor (mw)	Limit (dBm)	Margin (dB)
802.11b (chain0)	1	2412	-7.46	0.22	-7.24	0.18	8	-15.46
	6	2437	-8.4	0.22	-8.18	0.14	8	-16.40
	11	2462	-8.59	0.22	-8.37	0.14	8	-16.59
802.11b (chain1)	1	2412	-8.76	0.22	-8.54	0.13	8	-16.76
	6	2437	-8.22	0.22	-8.00	0.15	8	-16.22
	11	2462	-8.81	0.22	-8.59	0.13	8	-16.81
802.11g (chain0)	1	2412	-10.92	0.21	-10.71	0.08	8	-18.92
	6	2437	-11.56	0.21	-11.35	0.07	8	-19.56
	11	2462	-11.32	0.21	-11.11	0.07	8	-19.32
802.11g (chain1)	1	2412	-10.55	0.21	-10.34	0.09	8	-18.55
	6	2437	-10.87	0.21	-10.66	0.08	8	-18.87
	11	2462	-10.08	0.21	-9.87	0.10	8	-18.08
802.11g (chain0)	1	2412	-10.92	0.21	-10.71	0.08	8	-18.92
	6	2437	-11.56	0.21	-11.35	0.07	8	-19.56
	11	2462	-11.32	0.21	-11.11	0.07	8	-19.32
802.11g (chain1)	1	2412	-10.55	0.21	-10.34	0.09	8	-18.55
	6	2437	-10.87	0.21	-10.66	0.08	8	-18.87
	11	2462	-10.08	0.21	-9.87	0.10	8	-18.08

Mode	Channel	Frequency (MHz)	PSD (dBm)		Duty factor (dBm)	Total PSD with Duty factor		Limit (dBm)	Margin (dB)
			chain0	chain1		mW	dBm		
802.11n (HT 20)	1	2412	-16.13	-12.79	0.22	0.08	-10.92	8	-18.92
	6	2437	-11.31	-15.59	0.22	0.11	-9.72	8	-17.72
	11	2462	-16.76	-16.03	0.22	0.05	-13.15	8	-21.15
	1	2412	-16.13	-12.79	0.22	0.08	-10.92	8	-18.92
	6	2437	-11.31	-15.59	0.22	0.11	-9.72	8	-17.72
	11	2462	-16.76	-16.03	0.22	0.05	-13.15	8	-21.15
802.11n (HT 40)	3	2422	-21.07	-19.87	0.41	0.02	-17.00	8	-25.00
	6	2437	-20.8	-20.09	0.41	0.02	-17.01	8	-25.01
	9	2452	-20.48	-20.41	0.41	0.02	-17.02	8	-25.02
	6	2437	-20.8	-20.09	0.41	0.02	-17.01	8	-25.01
	9	2452	-20.48	-20.41	0.41	0.02	-17.02	8	-25.02

Mode	Channel	Frequency (MHz)	PSD (dBm)		Duty factor (dBm)	Total PSD with Duty factor		Limit (dBm)	Margin (dB)
			chain0	chain1		mW	dBm		
802.11n (HT 20)	1	2412	-16.13	-12.79	0.22	0.08	-10.92	8	-18.92
	6	2437	-11.31	-15.59	0.22	0.11	-9.72	8	-17.72
	11	2462	-16.76	-16.03	0.22	0.05	-13.15	8	-21.15
	149	5745	-15	-15.63	0.21	0.06	-12.08	8	-20.08
	157	5785	-15.71	-15.64	0.21	0.06	-12.45	8	-20.45
	165	5825	-15.06	-15.33	0.21	0.06	-11.97	8	-19.97
802.11n (HT 40)	3	2422	-21.07	-19.87	0.41	0.02	-17.00	8	-25.00
	6	2437	-20.8	-20.09	0.41	0.02	-17.01	8	-25.01
	9	2452	-20.48	-20.41	0.41	0.02	-17.02	8	-25.02
	151	5755	-20.8	-19.31	0.43	0.02	-16.56	8	-24.56
	159	5795	-20.48	-19.01	0.43	0.02	-16.25	8	-24.25

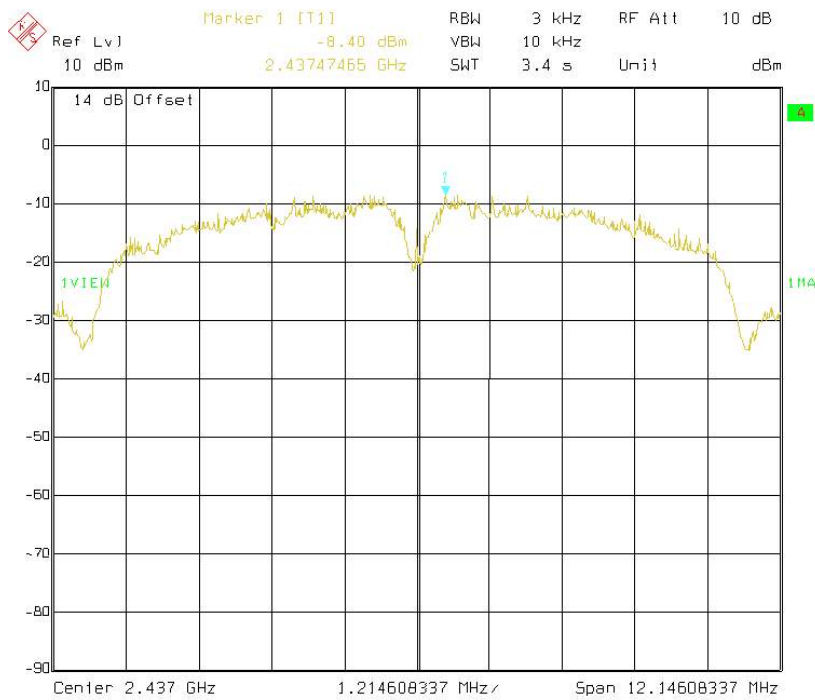


### Chain 0: Power Spectral Density @ 802.11b mode channel 1



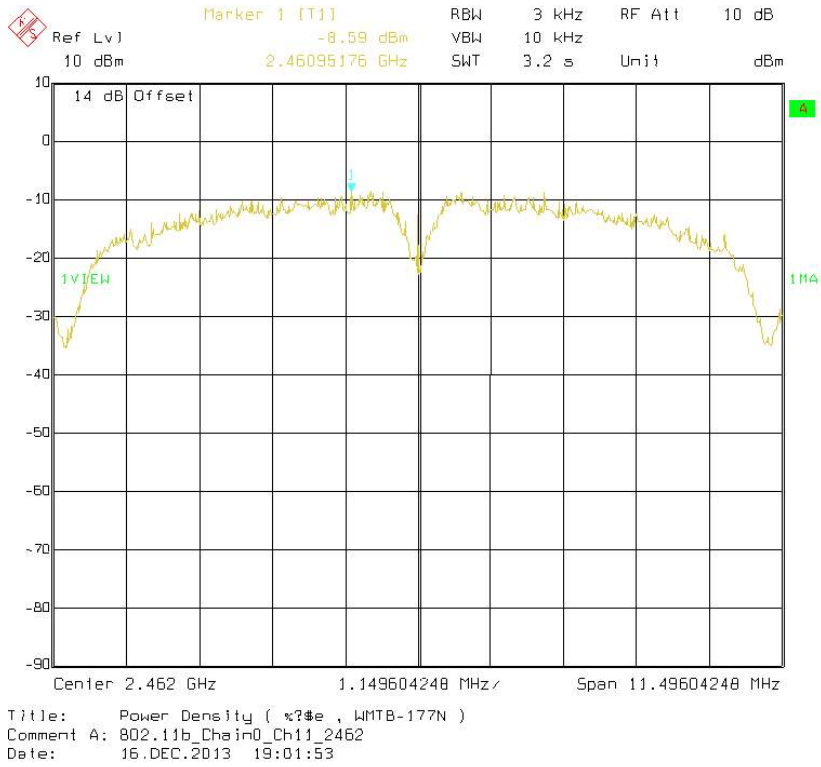
Title: Power Density ( %?#e , WMTB-177N )  
Comment A: 802.11b\_Chain0\_Ch01\_2412  
Date: 16.DEC.2013 18:59:08

### Chain 0: Power Spectral Density @ 802.11b mode channel 6

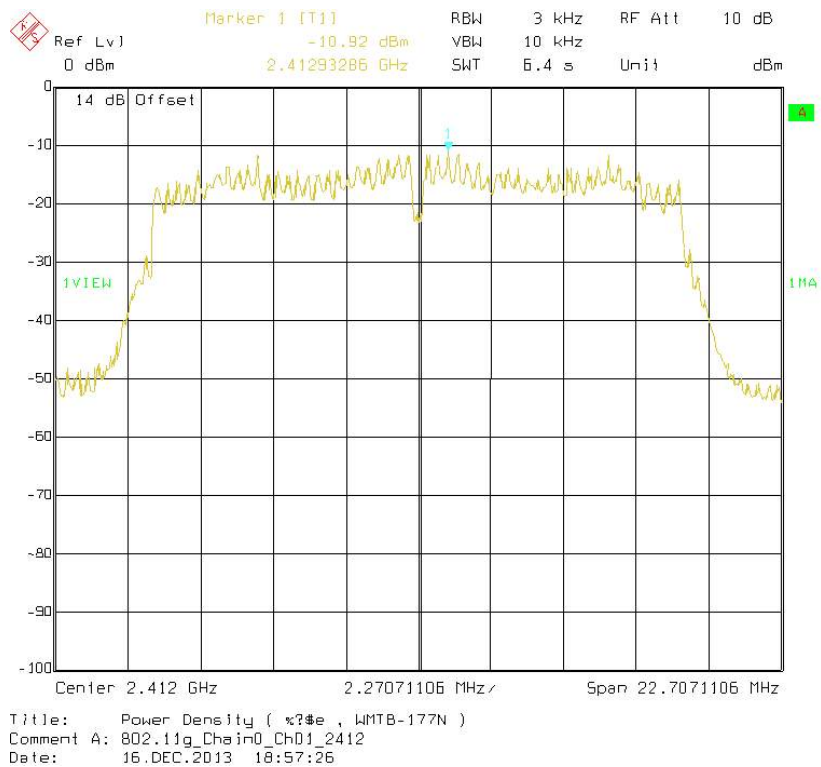


Title: Power Density ( %?#e , WMTB-177N )  
Comment A: 802.11b\_Chain0\_Ch06\_2437  
Date: 16.DEC.2013 19:00:36

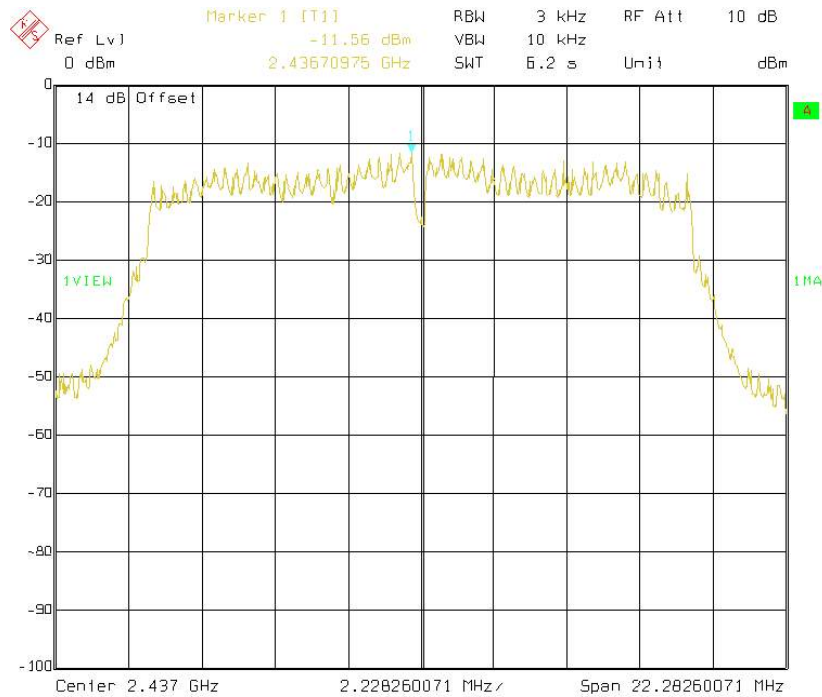
### Chain 0: Power Spectral Density @ 802.11b mode channel 11



### Chain 0: Power Spectral Density @ 802.11g mode channel 1

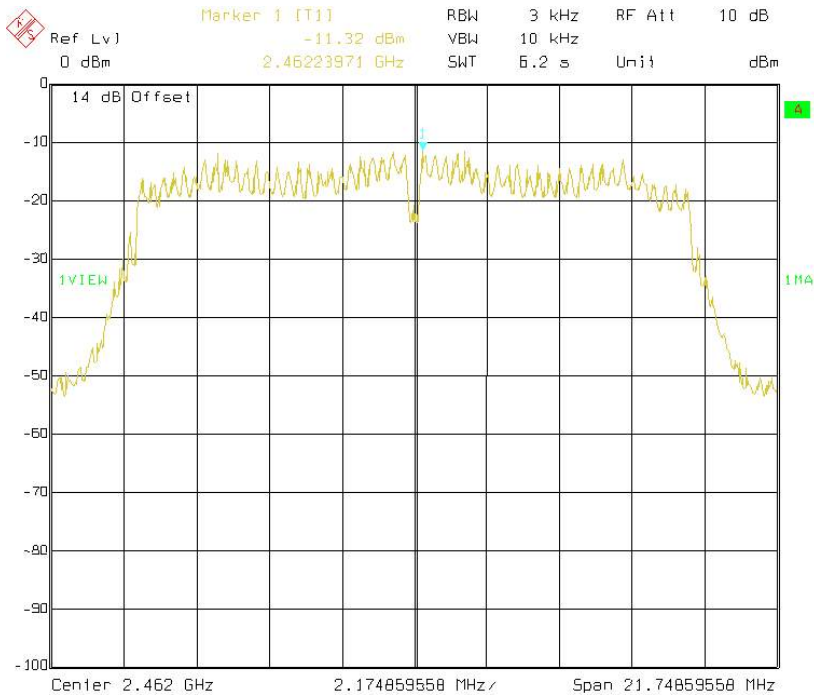


**Chain 0: Power Spectral Density @ 802.11g mode channel 6**



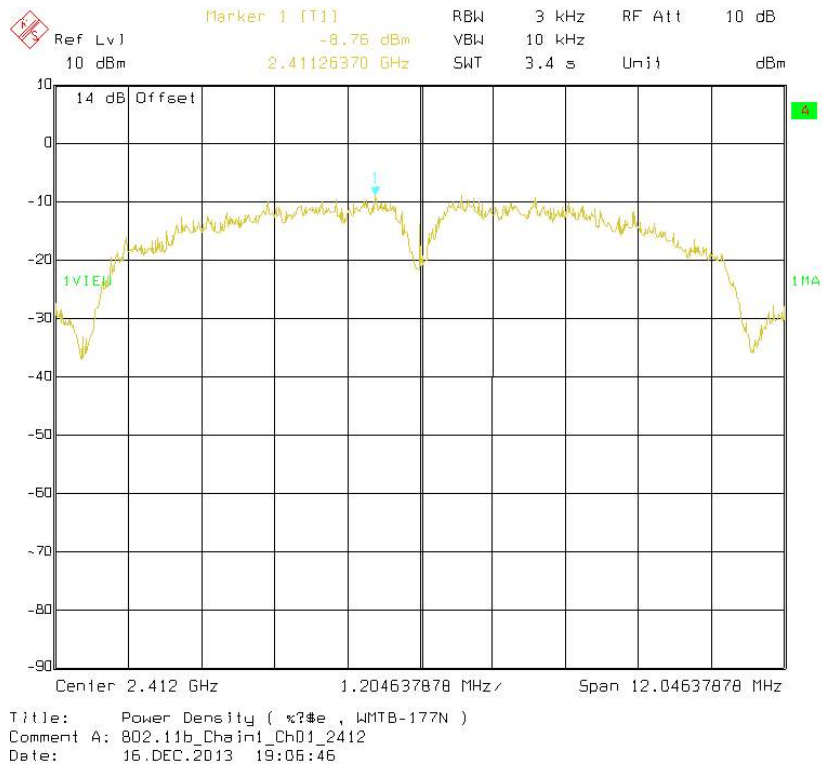
Title: Power Density ( \*?#e , WMTB-177N )  
Comment A: 802.11g\_Chain0\_Ch06\_2437  
Date: 16.DEC.2013 18:56:15

**Chain 0: Power Spectral Density @ 802.11g mode channel 11**

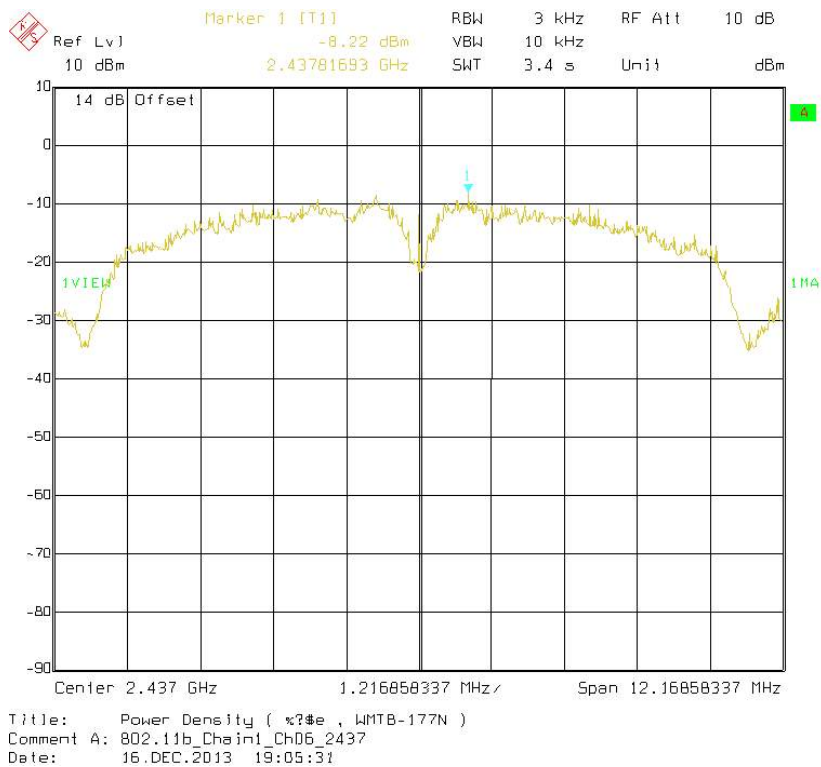


Title: Power Density ( \*?#e , WMTB-177N )  
Comment A: 802.11g\_Chain0\_Ch11\_2462  
Date: 16.DEC.2013 18:54:53

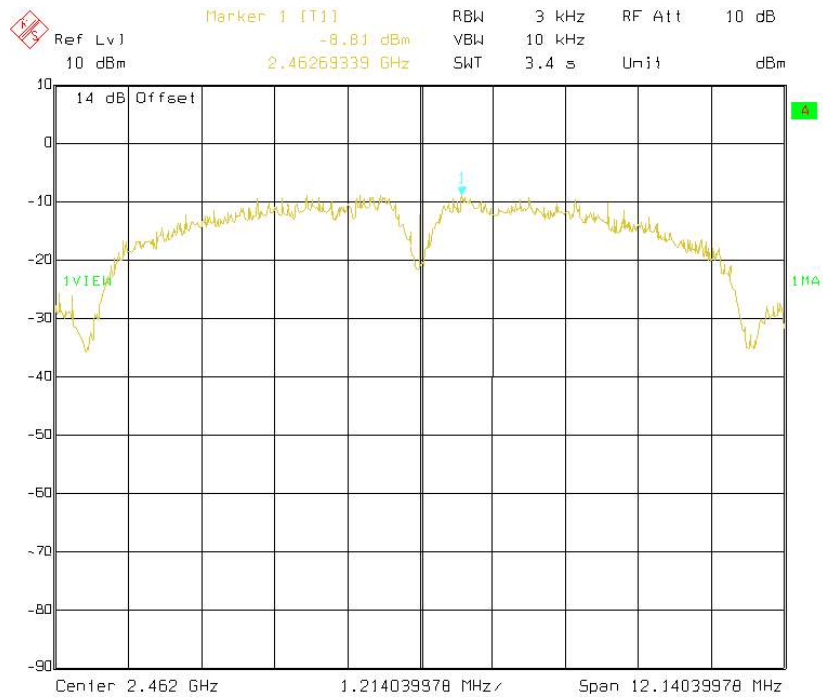
## Chain 1: Power Spectral Density @ 802.11b mode channel 1



## Chain 1: Power Spectral Density @ 802.11b mode channel 6

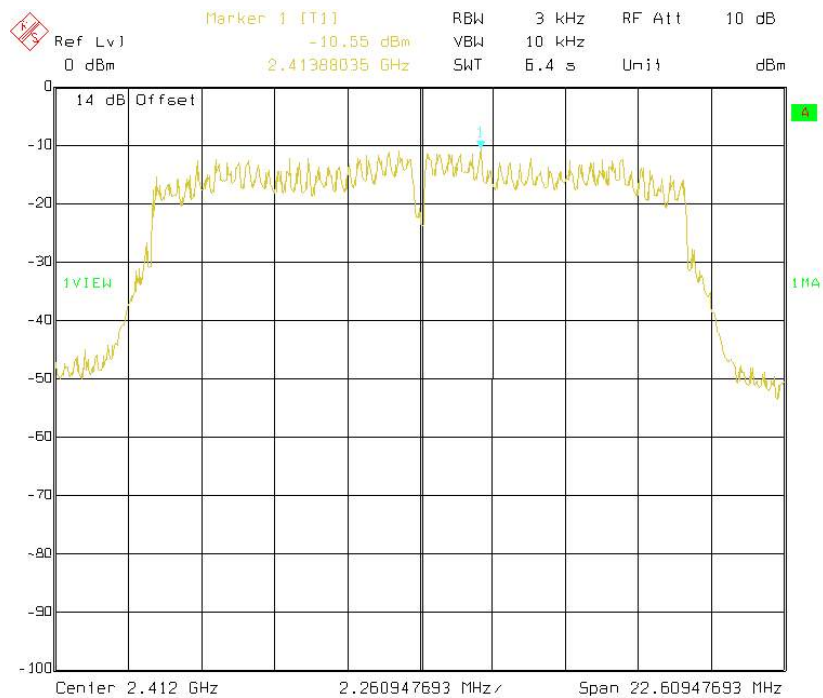


## Chain 1: Power Spectral Density @ 802.11b mode channel 11



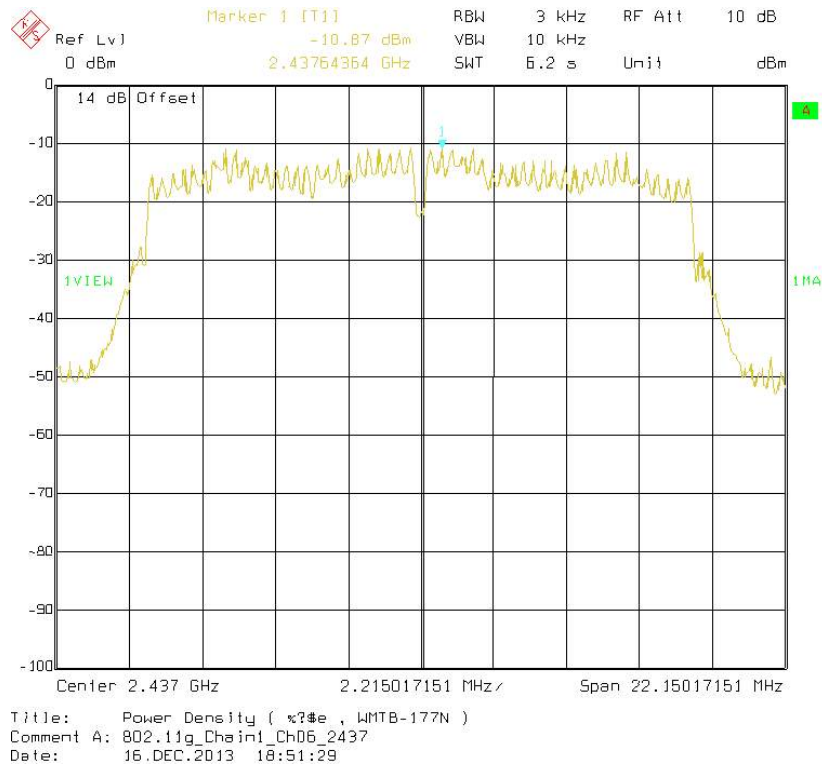
Title: Power Density ( ?#e , WMTB-177N )  
Comment A: 802.11b\_Chain1\_Ch11\_2462  
Date: 16.DEC.2013 19:04:08

## Chain 1: Power Spectral Density @ 802.11g mode channel 1

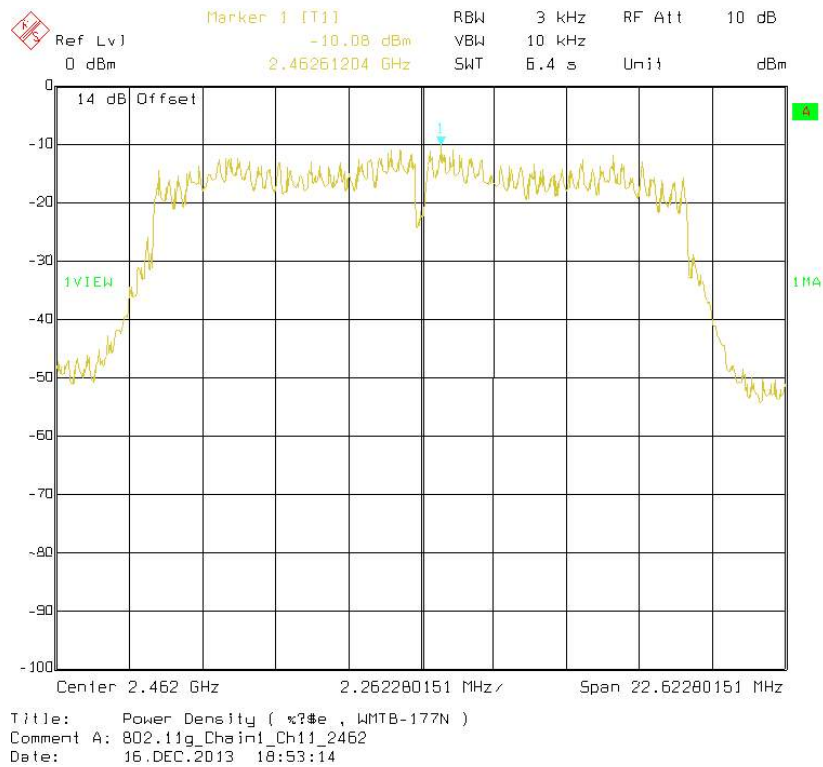


Title: Power Density ( ?#e , WMTB-177N )  
Comment A: 802.11g\_Chain1\_Ch01\_2412  
Date: 16.DEC.2013 18:50:12

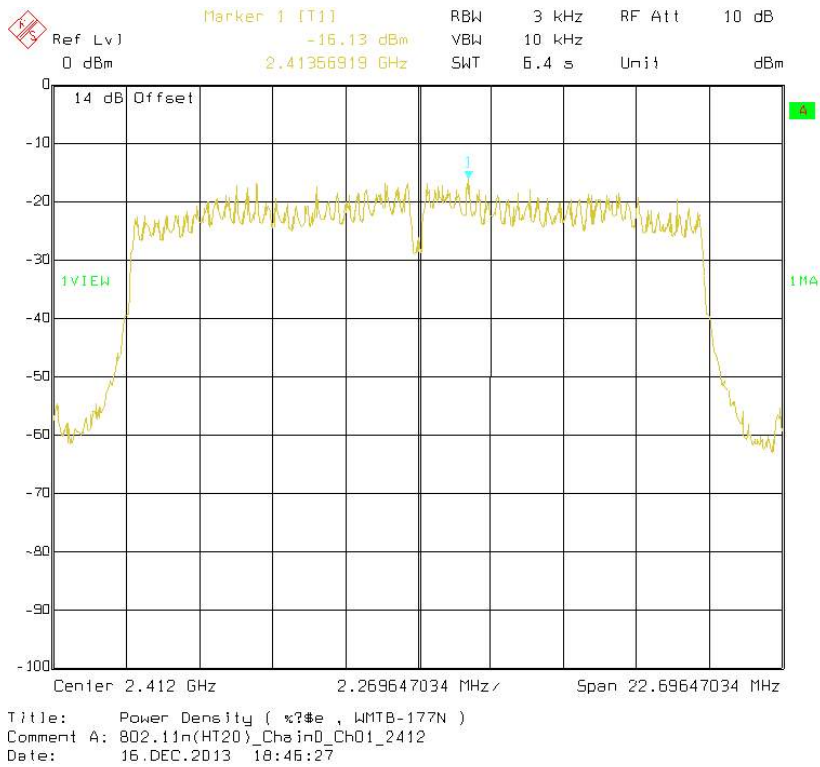
## Chain 1: Power Spectral Density @ 802.11g mode channel 6



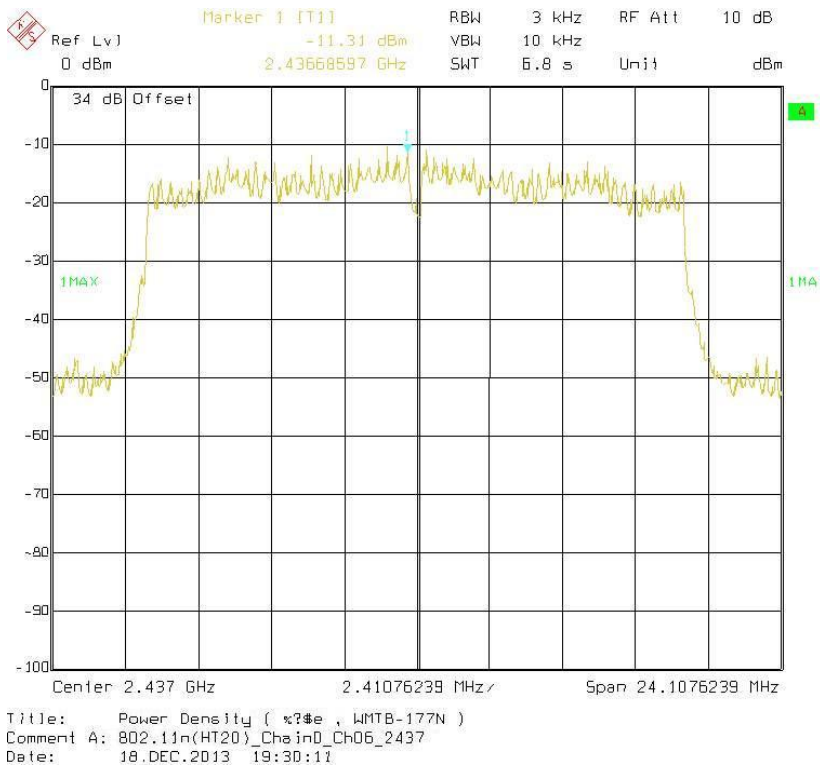
## Chain 1: Power Spectral Density @ 802.11g mode channel 11



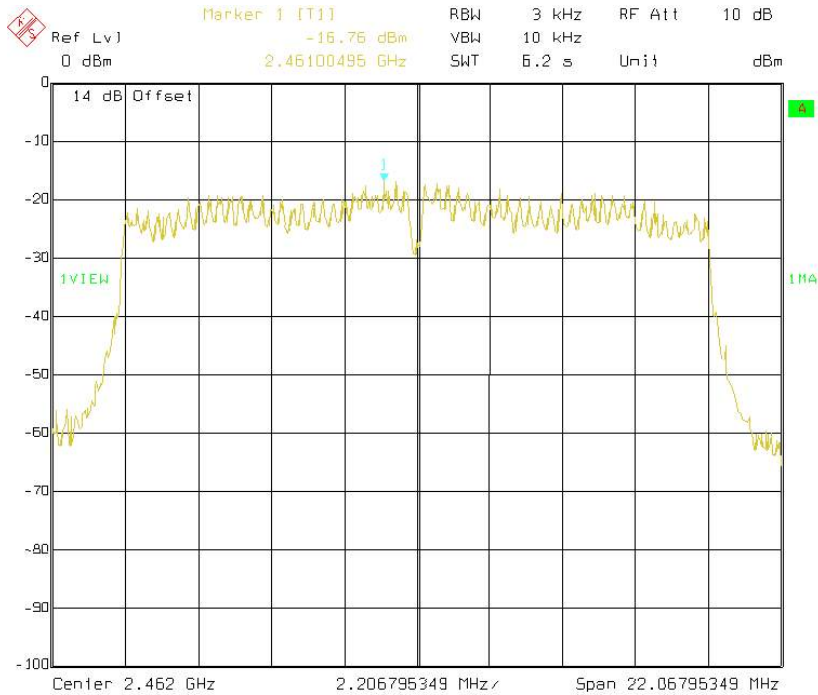
**Chain 0: Power Spectral Density @ 802.11n (HT 20) mode channel 1**



**Chain 0: Power Spectral Density @ 802.11n (HT 20) mode channel 6**

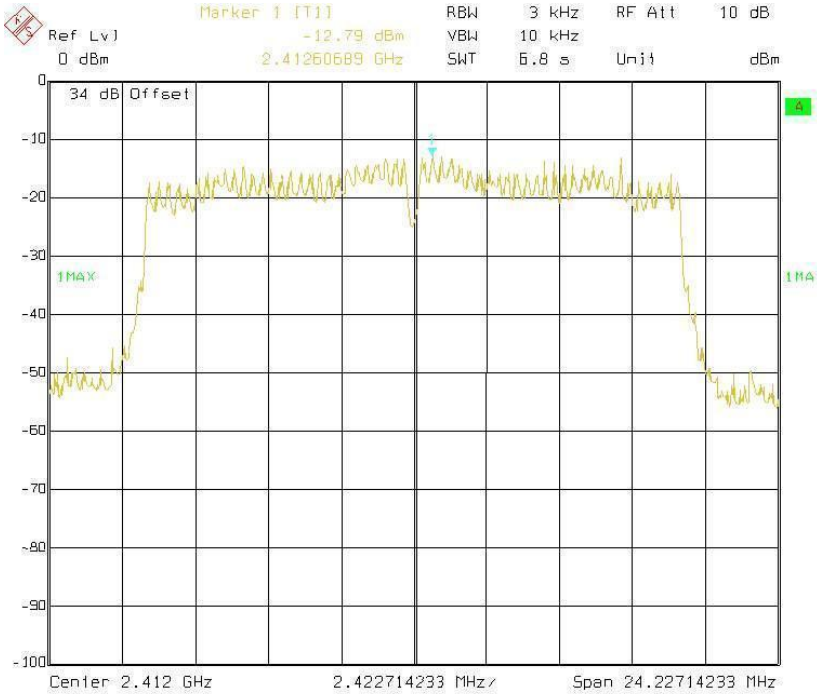


### Chain 0: Power Spectral Density @ 802.11n (HT 20) mode channel 11



Title: Power Density (WMTB-177N)  
Comment A: 802.11n(HT20)\_Chain0\_Ch11\_2462  
Date: 16.DEC.2013 18:42:25

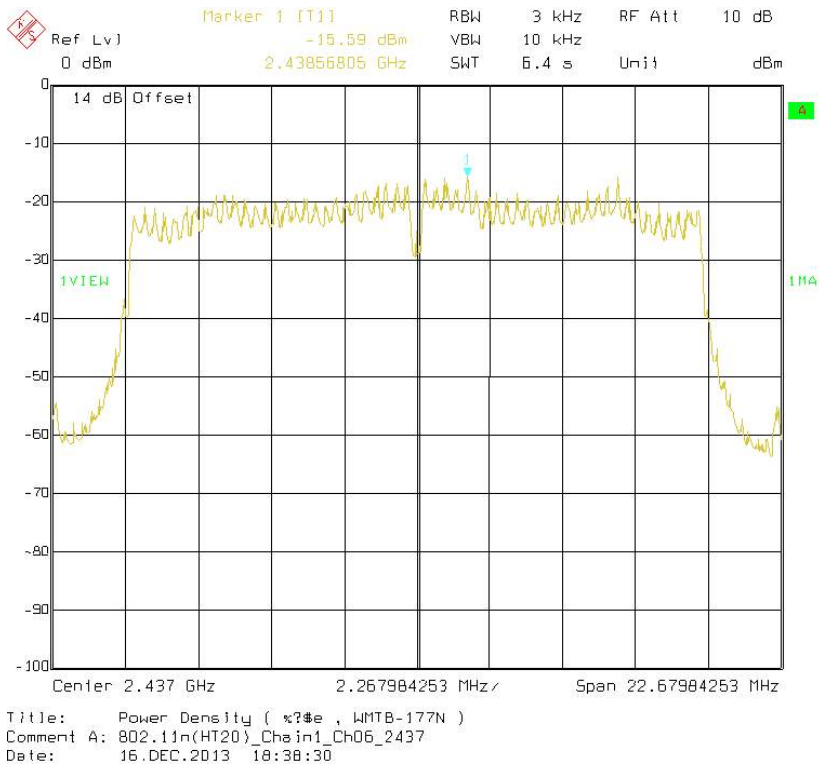
### Chain 1 Power Spectral Density @ 802.11n (HT 20) mode channel 1



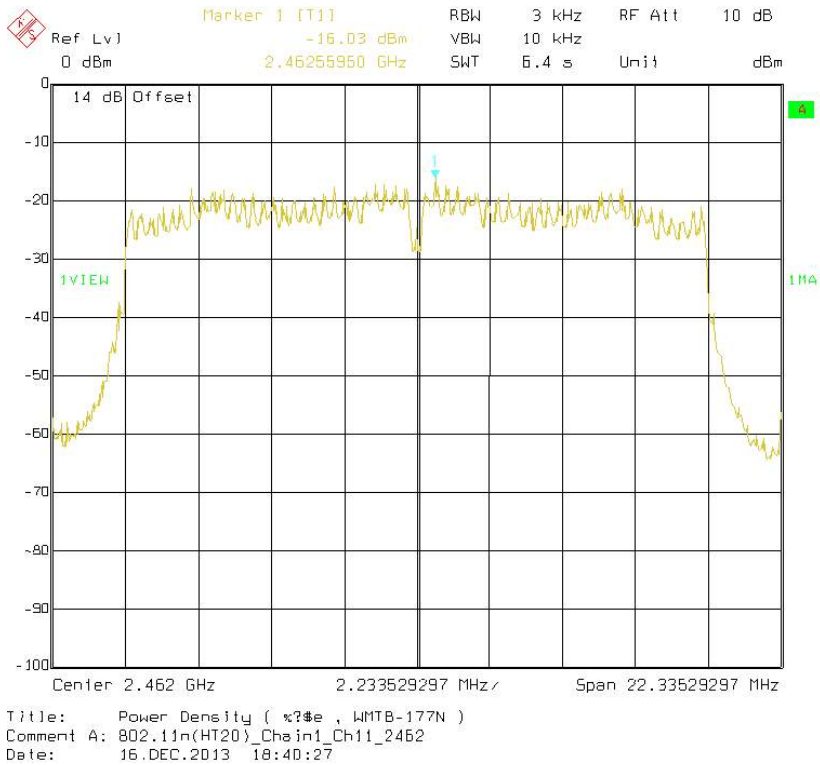
Title: Power Density (WMTB-177N)  
Comment A: 802.11n(HT20)\_Chain1\_Ch01\_2412  
Date: 18.DEC.2013 19:28:06



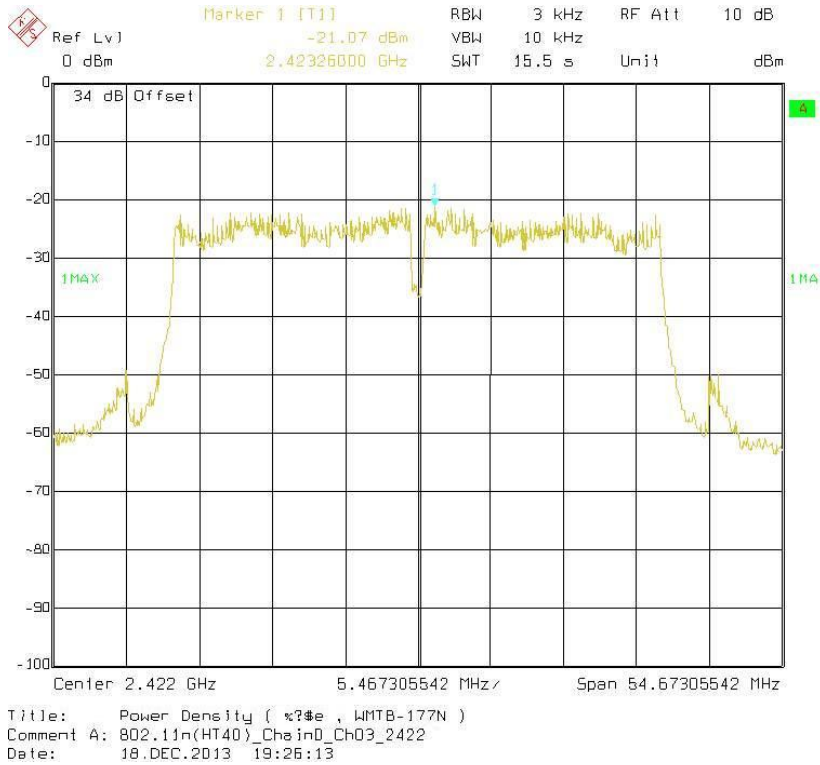
### Chain 1 Power Spectral Density @ 802.11n (HT 20) mode channel 6



### Chain 1 Power Spectral Density @ 802.11n (HT 20) mode channel 11



### Chain 0 Power Spectral Density @ 802.11n (HT 40) mode channel 3



### Chain 0 Power Spectral Density @ 802.11n (HT 40) mode channel 6

