FCC PART 15C TESTREPORT

No. I17Z60505-SRD05

for

TCL Communication Ltd.

GSM Quad-band /UMTS Quad-band CDMA/EVDO Tri-band /LTE 13 bands mobile phone

6060S

with

FCC ID: 2ACCJA024

Hardware Version: 04

Software Version: v4E1W

Issued Date: 2017-05-22

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TESTING
CNAS L0570

Note: The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I17Z60505-SRD05	Rev.0	1st edition	2017-05-22

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1. Test Laboratory

1.1. Testing Location

Conducted testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

Radiated testing Location: CTTL(BDA)

Address: No. 18 Jia Kangding Street, BDA District, Beijing, P. R. China 100191

1.2. Testing Environment

Normal Temperature: 15-35℃

Extreme Temperature: -20/+60℃

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2017-4-17

Testing End Date: 2017-5-19

1.4. Signature

Jiang Xue

(Prepared this test report)

Zheng Wei

(Reviewed this test report)

Lv Songdong

(Approved this test report)

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2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203
City:	Shanghai
Postal Code:	201203
Country:	China
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203
City:	Shanghai
Postal Code:	201203
Country:	China
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	GSM Quad-band /UMTS Quad-band CDMA/EVDO Tri-band /LTE 13 bands mobile phone
Model name	6060S
FCC ID	2ACCJA024
IC ID	/
With WLAN Function	Yes
Frequency Range	ISM 2400MHz~2483.5MHz
Type of Modulation	DSSS/CCK/OFDM
Number of Channels	11
Antenna	Integral Antenna
MAX Conducted Power	27.04dBm(OFDM)
Power Supply	3.85V DC by Battery

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	01490900006748	04	v4E1W
EUT2	01490900000778	04	v4E1W

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE

AE ID*	Description	Type	SN
AE1	battery	/	/
AE2	battery	/	/
AE3	Travel charger	/	1760505CH005/004/008
AE4	USB Cable	/	1760505DC005
AE5	USB Cable	/	1760505DC011
AE6	USB Cable	/	1760505DC003

AE1

Model	CAC2560001CJ
Manufacturer	COSLIGHT
Capacitance	2560 mAh
Nominal voltage	3.85V

AE2

Model	CAC2560002C1
Manufacturer	BYD
Capacitance	2560 mAh
Nominal voltage	3.85V

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AE3

Model	CBA0059AGAC2
Manufacturer	Tenpao
Length of cable	/

AE4

Model	CDA0000078CF
Manufacturer	LUXSHARE
Length of cable	/

AE5

Model	CDA0000078C1
Manufacturer	juwei
Length of cable	/

AE6

Model	CDA0000103CF
Manufacturer	LUXSHARE
Length of cable	/

*AE ID: is used to identify the test sample in the lab internally.

3.4. General Description

The Equipment under Test (EUT) is a model of GSM Quad-band /UMTS Quad-band CDMA/EVDO Tri-band /LTE 13 bands mobile phone with integrated antenna and inbuilt battery.
It has Bluetooth (EDR) function.
It consists of normal options: travel charger, USB cable and Phone.
Manual and specifications of the EUT were provided to fulfil the test.
Samples undergoing test were selected by the client.

3.5. Interpretation of the Test Environment

For the test methods, the test environment uncertainty figures correspond to an expansion factor k=2.

Measurement Uncertainty

Parameter	Uncertainty
temperature	0.48°C
humidity	2 %
DC voltages	0.003V

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

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Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5 MHz, and 5725-5850 MHz.	2015
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013

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5. Test Results

5.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247 (b)	/	P
Peak Power Spectral Density	15.247 (e)	/	P
Occupied 6dB Bandwidth	15.247 (a)	/	P
Band Edges Compliance	15.247 (d)	/	P
Transmitter Spurious Emission - Conducted	15.247 (d)	/	P
Transmitter Spurious Emission - Radiated	15.247, 15.205, 15.209	/	P
AC Powerline Conducted Emission	15.107, 15.207	/	P

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

P	Pass, The EUT complies with the essential requirements in the standard.
NP	Not Perform, The test was not performed by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard
F	Fail, The EUT does not comply with the essential requirements in the standard

5.2. Statements

The test cases as listed in section 5.1 of this report for the EUT specified in section 3 was performed by CTTL and according to the standards or reference documents listed in section 4.2

The EUT met all requirements of the standards or reference documents, and only the WLAN function was tested in this report.

5.3. Test Conditions

T nom	Normal Temperature
T min	Low Temperature
T max	High Temperature
V nom	Normal Voltage

For this report, if the test cases listed above are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

Temperature	T nom	26℃
Voltage	V nom	3.8V (By battery)
Humidity	H nom	44%

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6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	2016-06-07	2017-06-06
2	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Calibration Due date
1	Test Receiver	ESU26	100235	Rohde & Schwarz	2017-03-02	2018-04-01
2	Loop antenna	HFH2-Z2	829324/007	Rohde & Schwarz	2014-12-17	2017-12-16
3	BiLog Antenna	VULB9163	301	Schwarzbeck	2014-12-17	2017-12-16
4	Dual-Ridge Waveguide Horn Antenna	3115	6914	EMCO	2014-12-16	2017-12-15
5	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	2014-06-18	2017-06-17
6	Vector Signal Analyzer	FSV40	101047	Rohde & Schwarz	2016-06-29	2017-06-28
7	Semi-anechoic chamber	/	CT000332-1074	Frankonia German	/	/

Test Software Utilized

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01.00	R&S
Conducted Continuous Emission	EMC32 V8.52.0	R&S

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7. Measurement Uncertainty

7.1. Maximum Output Power

Measurement Uncertainty: 0.339dB,k=1.96

7.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dBm/MHz,k=1.96

7.3. DTS 6-dB Signal Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

7.4. Band Edges Compliance

Measurement Uncertainty : 0.62dBm,k=1.96

7.5. Transmitter Spurious Emission

Conducted (k=1.96)

Frequency Range	Uncertainty(dBm)
30MHz ≤ f ≤ 2GHz	1.22
2GHz ≤ f ≤3.6GHz	1.22
3.6GHz ≤ f ≤8GHz	1.22
8GHz ≤ f ≤12.75GHz	1.51
12.75GHz ≤ f ≤26GHz	1.51
26GHz ≤ f ≤40GHz	1.59

Radiated (k=2)

Frequency Range	Uncertainty(dBm)
30MHz ≤ f ≤ 1GHz	4.86
1GHz ≤ f ≤18GHz	5.26
18GHz ≤ f ≤40GHz	5.28

7.6. AC Power-line Conducted Emission

Measurement Uncertainty : 3.38dBm,k=2

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ANNEX A: Detailed Test Results

A.1. Measurement Method

A.1.1. Conducted Measurements

Connect the EUT to the test system as Fig.A.1.1.1 shows.
Set the EUT to the required work mode.
Set the EUT to the required channel.
Set the Vector Signal Analyzer and start measurement.
Record the values. Vector Signal Analyzer

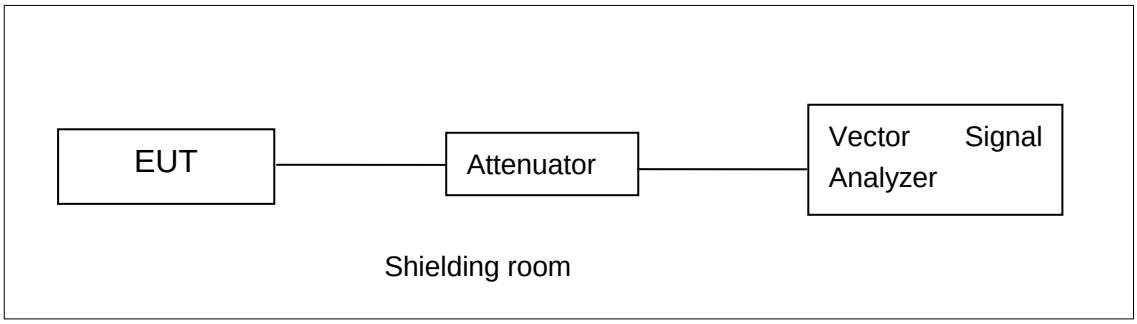

Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements

A.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,
Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;
Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;

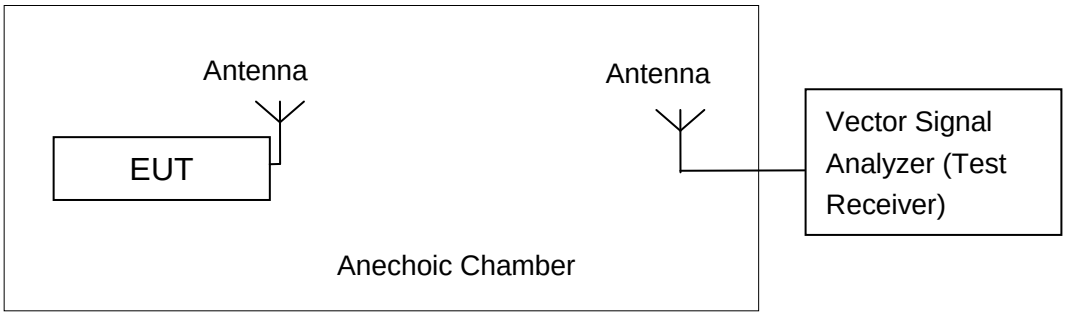

Fig.A.1.2.1: Test Setup Diagram for Radiated Measurements

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A.2. Maximum Output Power

Method of Measurement: See ANSI C63.10-2013-clause 11.9.1.2

a) Set the RBW = 1 MHz.
b) Set the VBW = 3 MHz.
c) Set the span ⩾ [1.5 × DTS bandwidth].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector).

Measurement Limit:

Standard	Limit (dBm)
FCC CRF Part 15.247(b)	< 30

EUT ID: EUT2

A.2.1. Peak Output Power-conducted

Measurement Results:

802.11b/g mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	1	22.12	/	/
	2	22.40	/	/
	5.5	24.05	/	/
	11	25.77	26.85	26.98
802.11g	6	26.36	/	/
	9	26.21	/	/
	12	26.38	/	/
	18	26.25	/	/
	24	26.62	27.03	27.04
	36	25.65	/	/
	48	25.81	/	/
	54	24.78	/	/

The data rate 11Mbps and 24Mbps are selected as worse condition, and the following cases are performed with this condition.

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802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11n (20MHz)	MCS0	25.58	/	/
	MCS1	25.35	/	/
	MCS2	25.38	/	/
	MCS3	25.61	26.13	26.08
	MCS4	24.65	/	/
	MCS5	24.89	/	/
	MCS6	23.95	/	/
	MCS7	23.85	/	/

The data rate MCS3 is selected as worse condition, and the following cases are performed with this condition.

802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)
802.11n (40MHz)	MCS0	25.35	/	/
	MCS1	25.38	/	/
	MCS2	25.41	/	/
	MCS3	25.83	/	/
	MCS4	25.78	/	/
	MCS5	25.88	25.85	25.98
	MCS6	24.85	/	/
	MCS7	24.82	/	/

The data rate MCS5 is selected as worse condition, and the following cases are performed with this condition.

Conclusion: Pass

A.2.2. Average Output Power-conducted

Method of Measurement: See ANSI C63.10-2013-clause 11.9.2.2.2

The procedure for this method is as follows:

a) Set span = 80MHz.

b) Set RBW = 1MHz.

c) Set VBW = 3MHz

d) Number of points in sweep = 625

e) Sweep time = auto.

f) Detector = RMS.

g) The trigger shall be set to “free run.”

h) Trace average 100 traces in power averaging (rms) mode.

i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s

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band power measurement function, with band limits set equal to the OBW band edges.

802.11b/g mode

Mode	Test Result (dBm)		
	2412MHz (Ch1)	**2437MHz (Ch6)**	**2462 MHz (Ch11)**
802.11b	21.30	20.99	21.21
802.11g	19.14	19.22	19.13

802.11n-HT20 mode

Mode	Test Result (dBm)		
	2412MHz (Ch1)	**2437MHz (Ch6)**	**2462 MHz (Ch11)**
802.11n (20MHz)	18.27	18.33	18.25

802.11n-HT40 mode

Mode	Test Result (dBm)		
	2422MHz (Ch3)	**2437MHz (Ch6)**	**2452 MHz (Ch9)**
802.11n(40MHz)	17.92	18.89	18.92

Conclusion: Pass

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A.3. Peak Power Spectral Density

Method of Measurement: See ANSI C63.10-2013-clause 11.10.2

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to RBW = 3 kHz.
d) Set the VBW = 10 kHz.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

Measurement Limit:

Standard	Limit
FCC CRF Part 15.247(e)	< 8 dBm/3 kHz

Measurement Results:

802.11b/g mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11b	1	Fig.A.3.1	-2.69	**P**
	6	Fig.A.3.2	-2.39	**P**
	11	Fig.A.3.3	-2.41	**P**
802.11g	1	Fig.A.3.4	-6.80	**P**
	6	Fig.A.3.5	-6.02	**P**
	11	Fig.A.3.6	-7.00	**P**

802.11n-HT20 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11n (HT20)	1	Fig.A.3.7	-8.34	**P**
	6	Fig.A.3.8	-8.30	**P**
	11	Fig.A.3.9	-7.81	**P**

802.11n-HT40 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11n (HT40)	3	Fig.A.3.10	-11.70	**P**
	6	Fig.A.3.11	-11.86	**P**
	9	Fig.A.3.12	-11.82	**P**

Conclusion: Pass

Test graphs as below:

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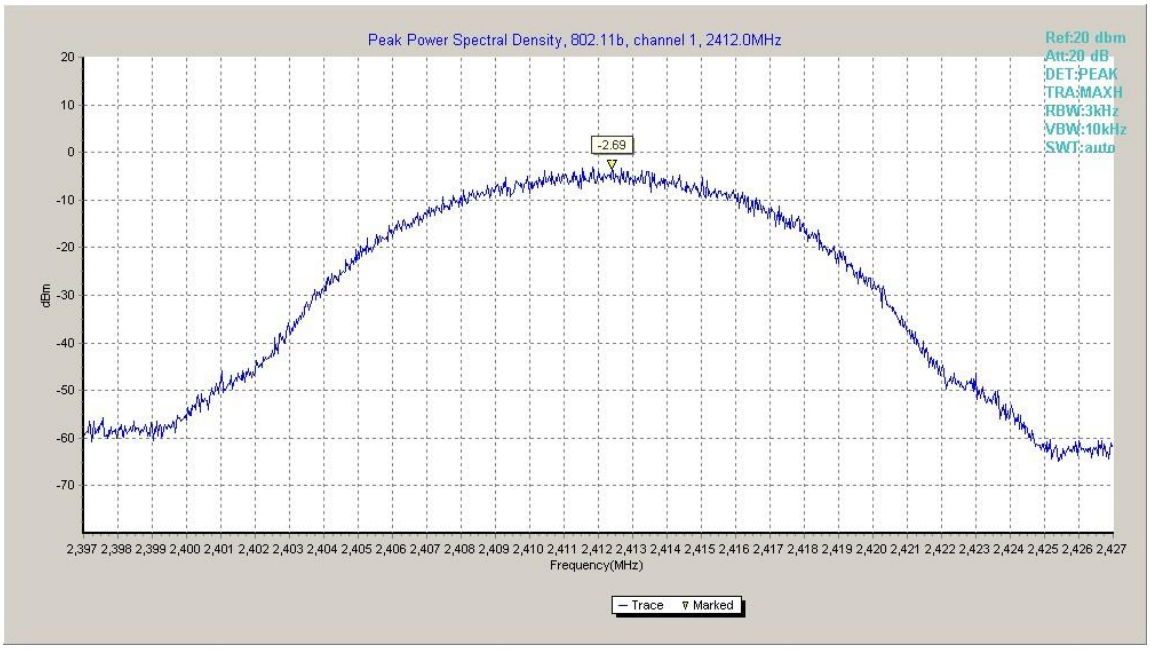

Fig.A.3.1 Power Spectral Density(802.11b,Ch1)

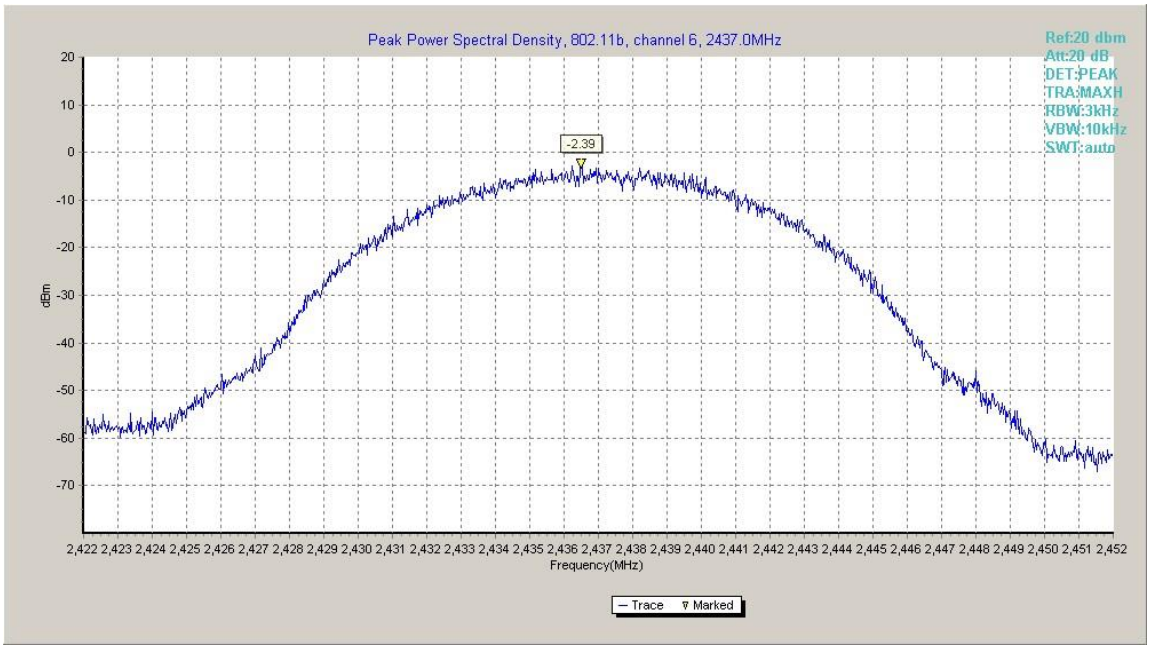

Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)

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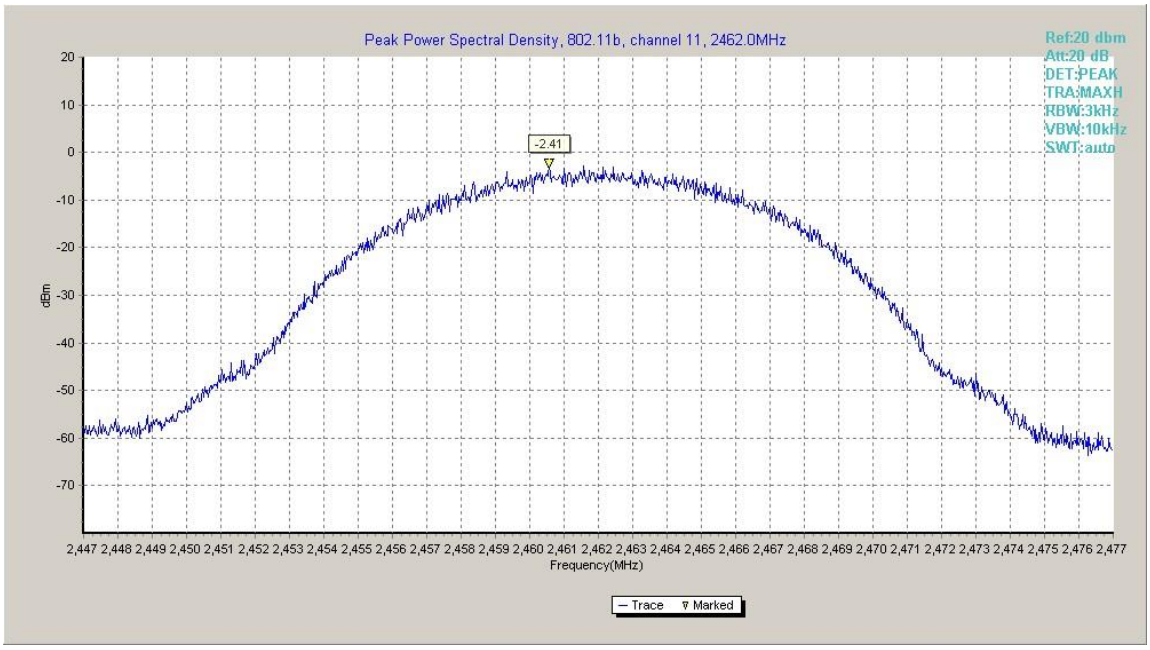

Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)

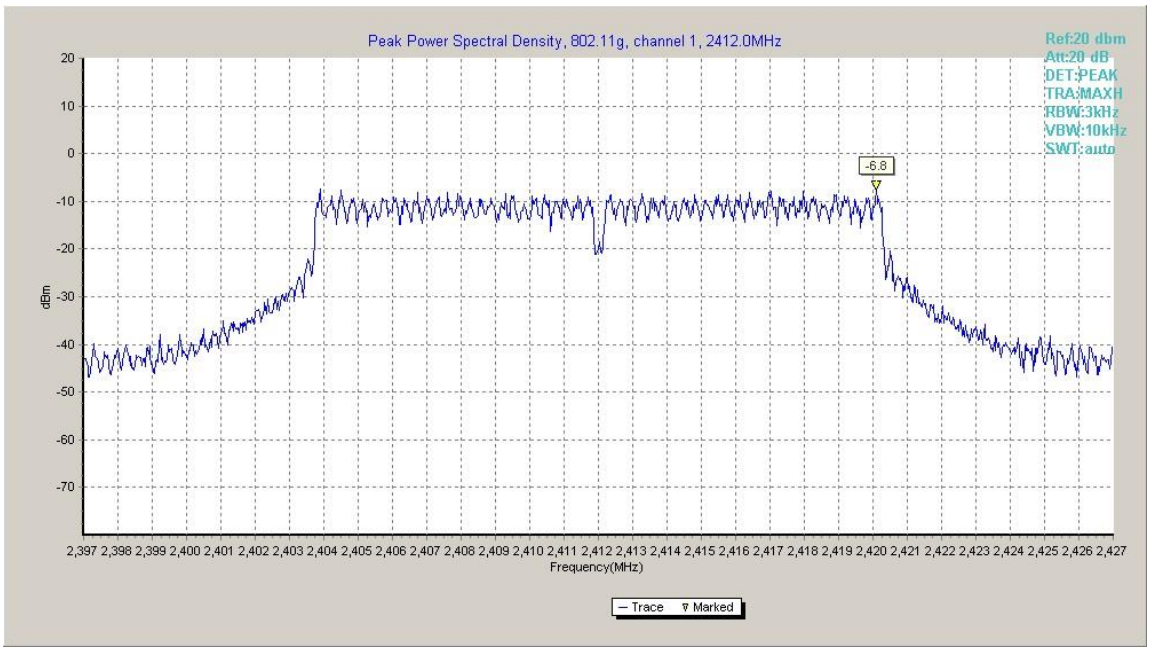

Fig.A.3.4 Power Spectral Density (802.11g, Ch 1)

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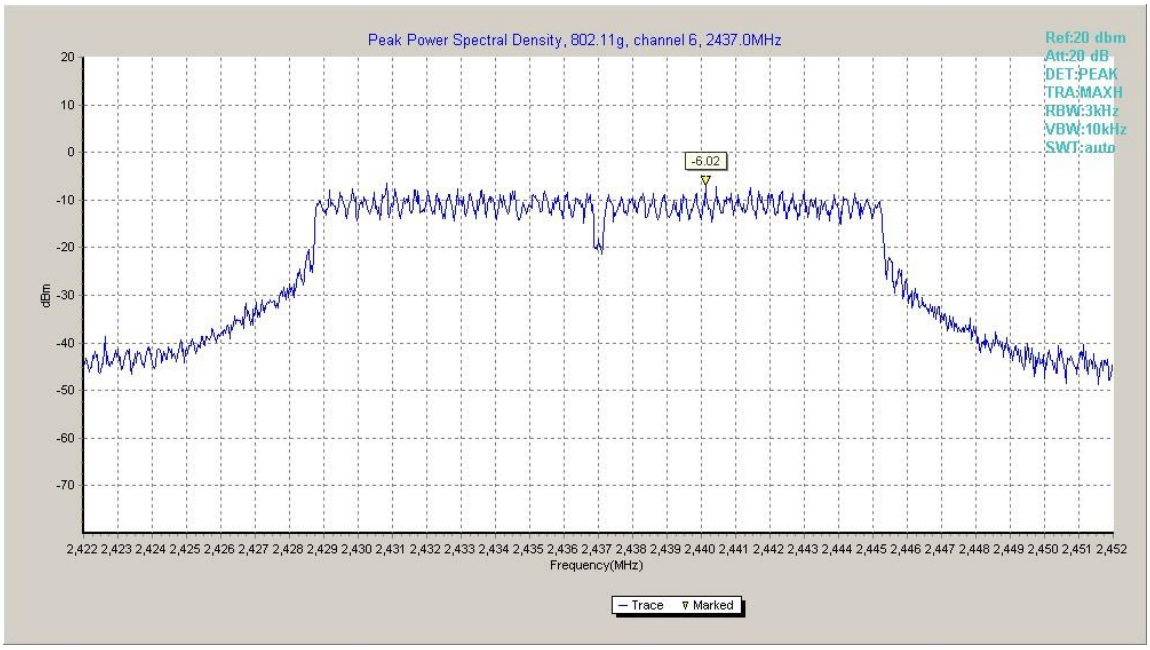

Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)

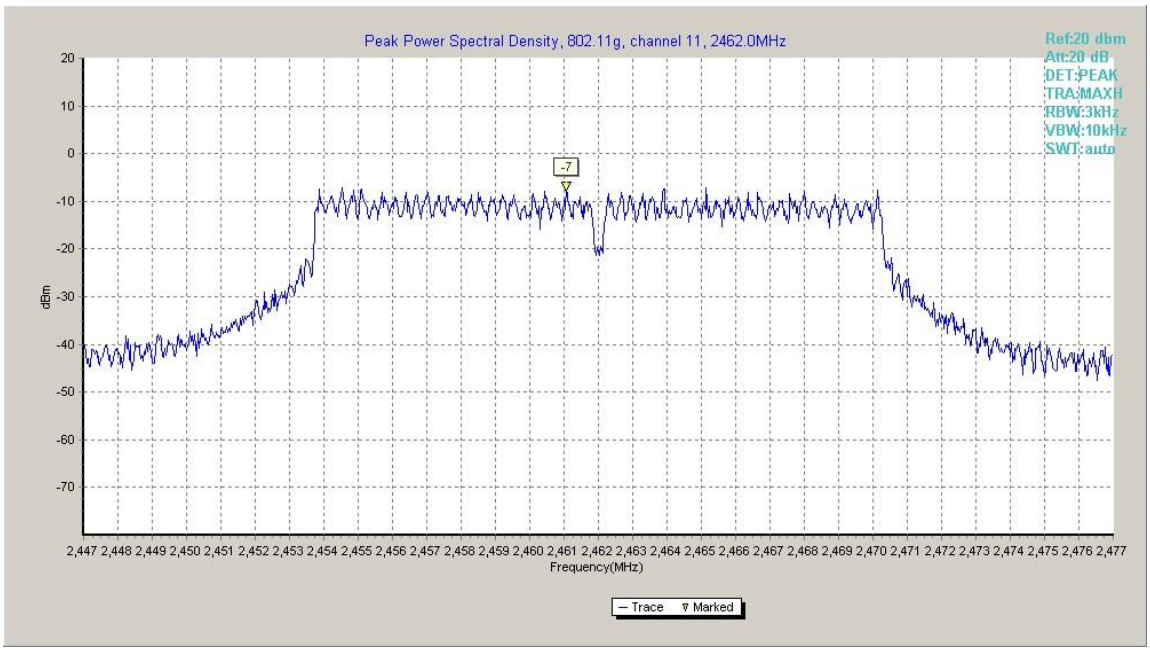

Fig.A.3.6 Power Spectral Density (802.11g, Ch 11)

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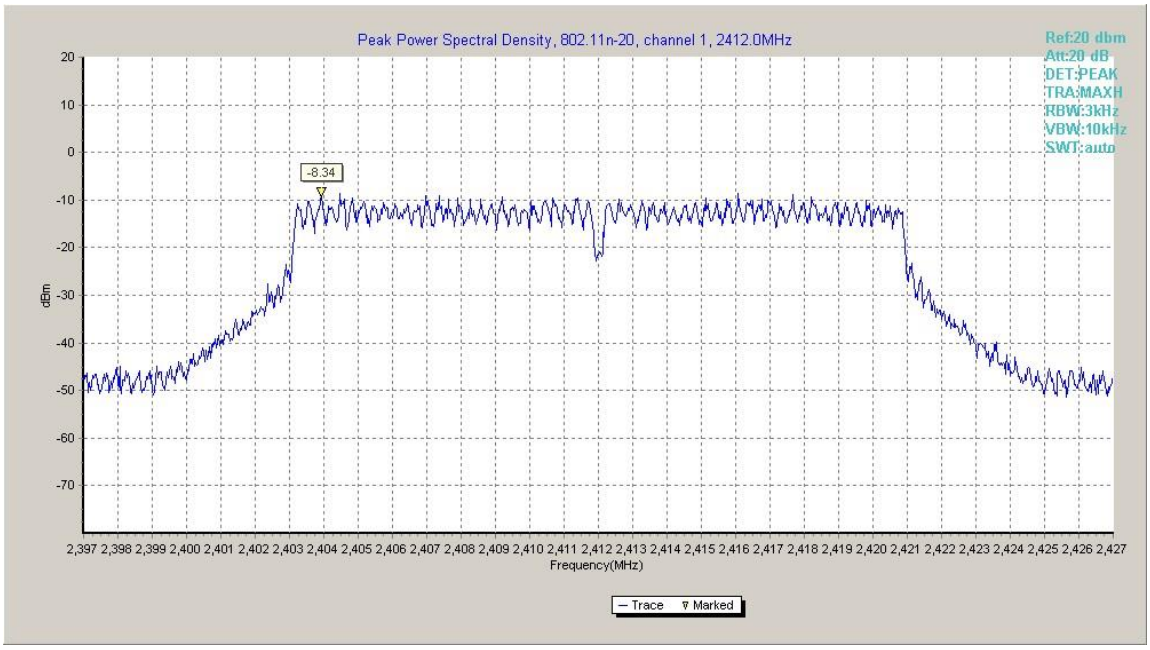

Fig.A.3.7 Power Spectral Density (802.11n-HT20, Ch 1)

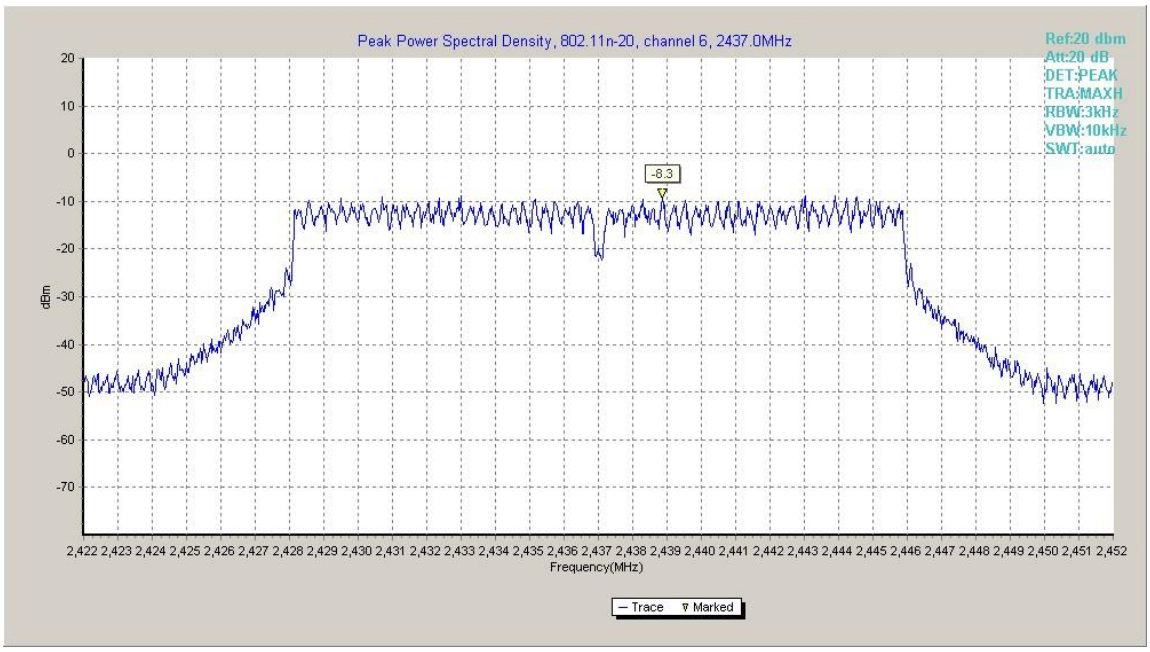

Fig.A.3.8 Power Spectral Density (802.11n-HT20, Ch 6)

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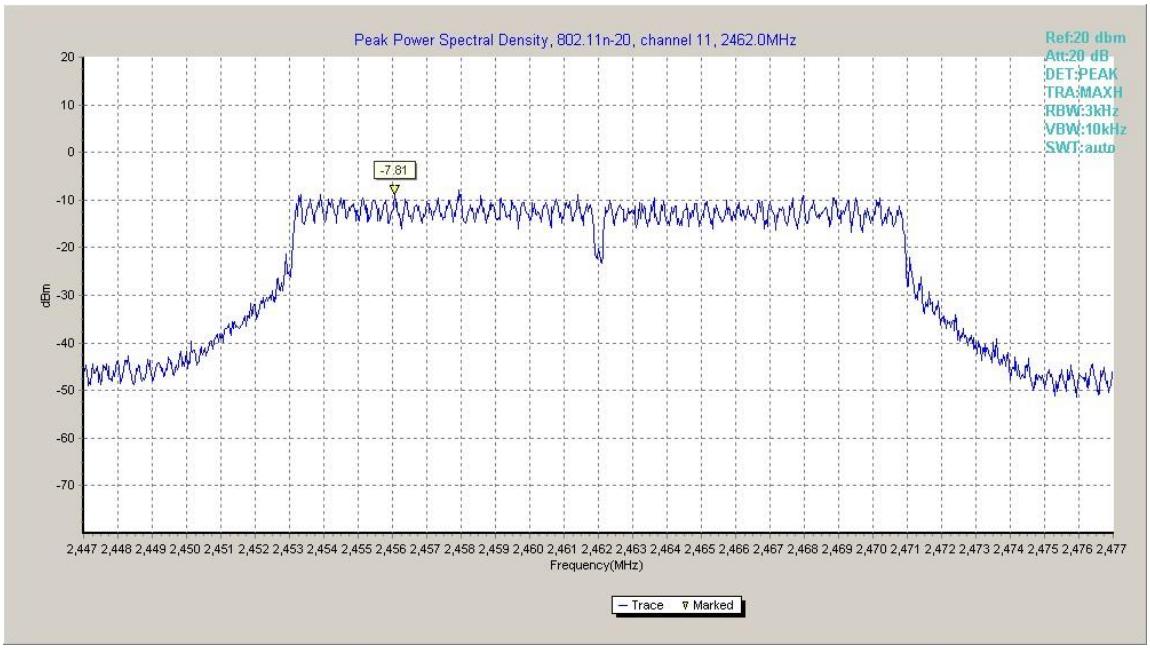

Fig.A.3.9 Power Spectral Density (802.11n-HT20, Ch 11)

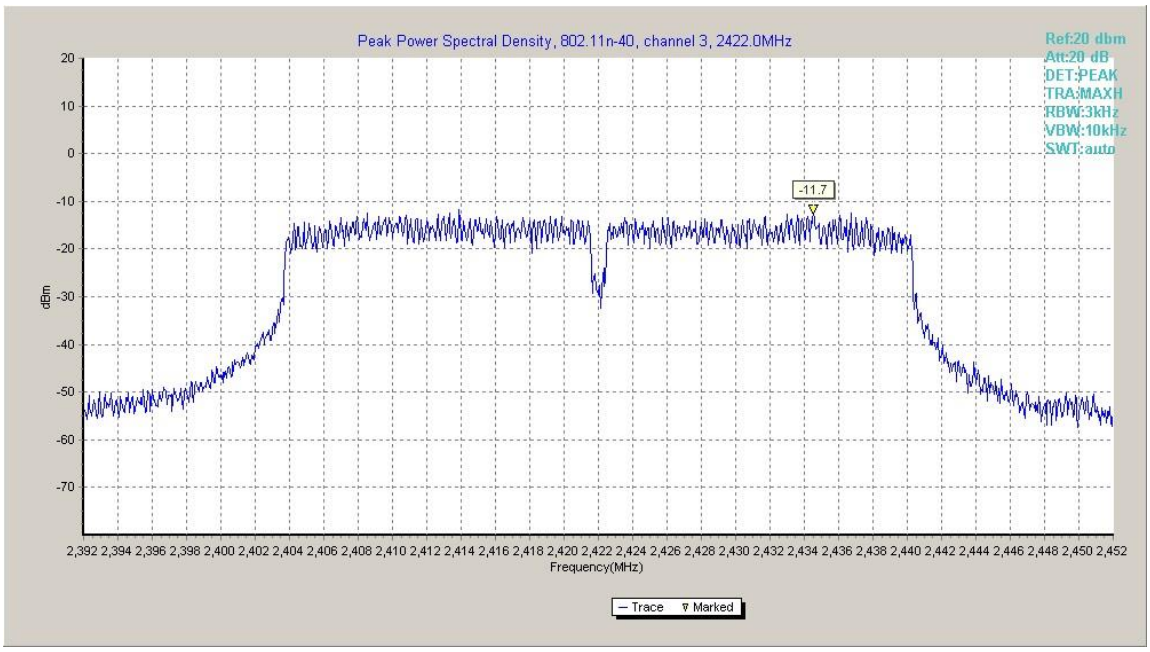

Fig.A.3.10 Power Spectral Density (802.11n-HT40, Ch 3)

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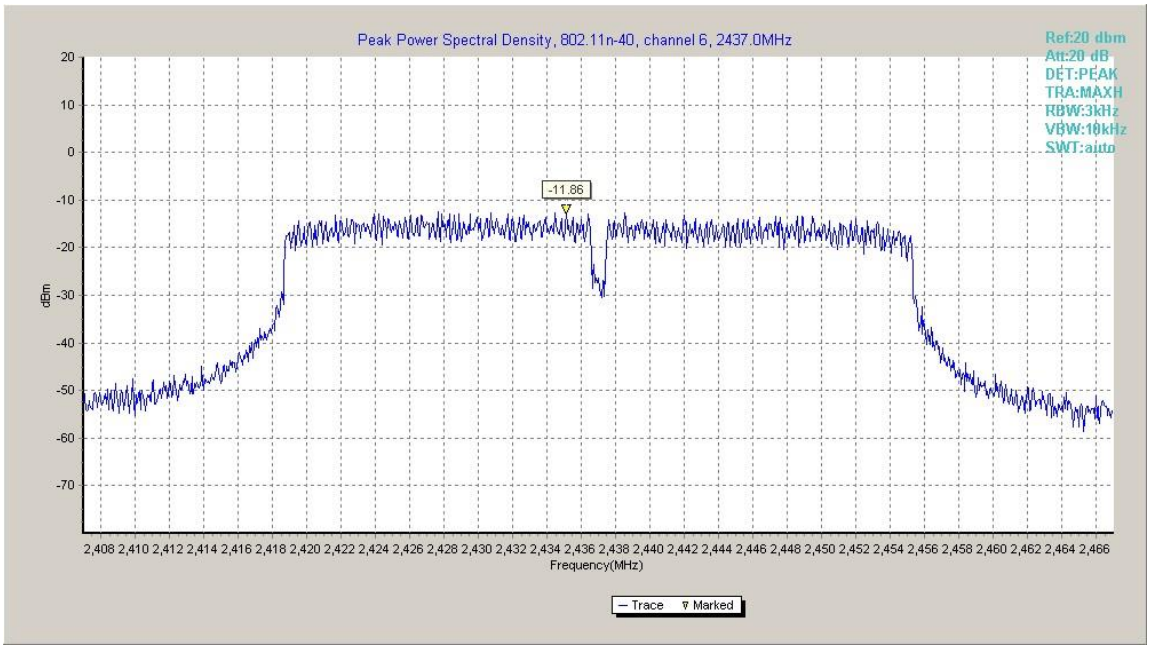

Fig.A.3.11 Power Spectral Density (802.11n-HT40, Ch 6)

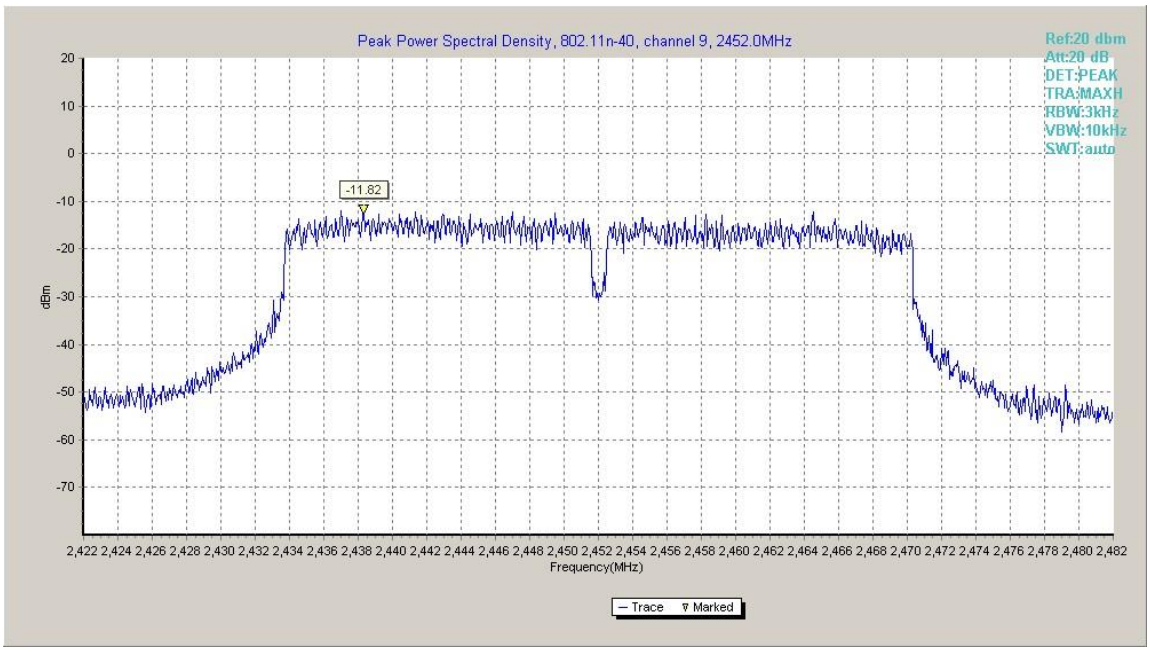

Fig.A.3.12 Power Spectral Density (802.11n-HT40, Ch 9)

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A.4. DTS 6-dB Signal Bandwidth

Method of Measurement: See ANSI C63.10-2013 section 11.8.1.

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) = 300 kHz.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	≥ 500

EUT ID: EUT2

Measurement Result:

802.11b/g mode

Mode	Channel	Occupied 6dB Bandwidth (kHz)		conclusion
802.11b	1	Fig.A.4.1	8200.00	**P**
	6	Fig.A.4.2	7500.00	**P**
	11	Fig.A.4.3	8850.00	**P**
802.11g	1	Fig.A.4.4	16450.00	**P**
	6	Fig.A.4.5	16500.00	**P**
	11	Fig.A.4.6	16500.00	**P**

802.11n-HT20 mode

Mode	Channel	Occupied 6dB Bandwidth (kHz)		conclusion
802.11n (HT20)	1	Fig.A.4.7	17700.00	**P**
	6	Fig.A.4.8	17750.00	**P**
	11	Fig.A.4.9	17700.00	**P**

802.11n-HT40 mode

Mode	Channel	Occupied 6dB Bandwidth (kHz)		conclusion
802.11n (HT40)	3	Fig.A.4.10	35360.00	**P**
	6	Fig.A.4.11	35680.00	**P**
	9	Fig.A.4.12	35440.00	**P**

Conclusion: Pass

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Test graphs as below:

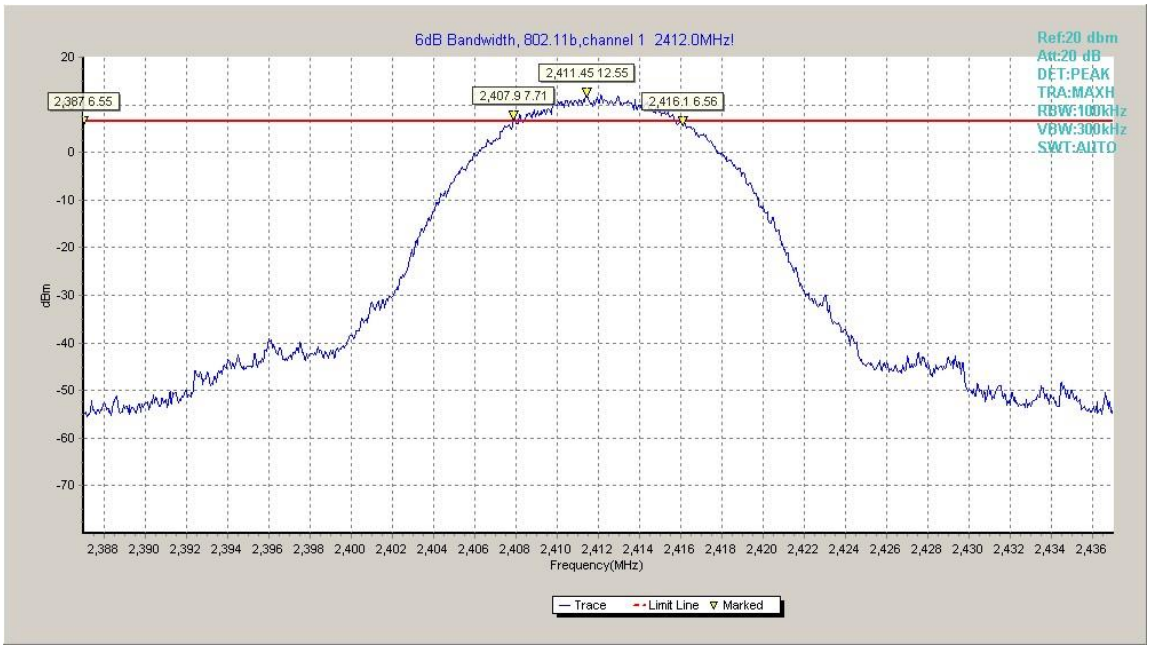

Fig.A.4.1 Occupied 6dB Bandwidth(802.11b,Ch 1)

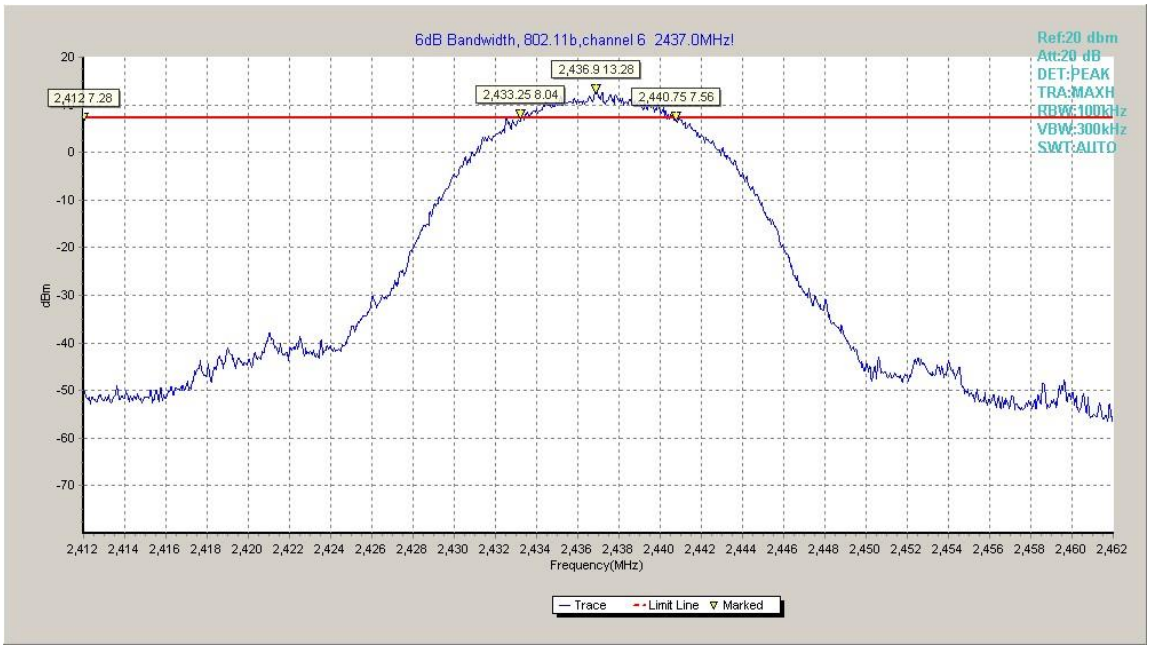

Fig.A.4.2 Occupied 6dB Bandwidth (802.11b, Ch 6)

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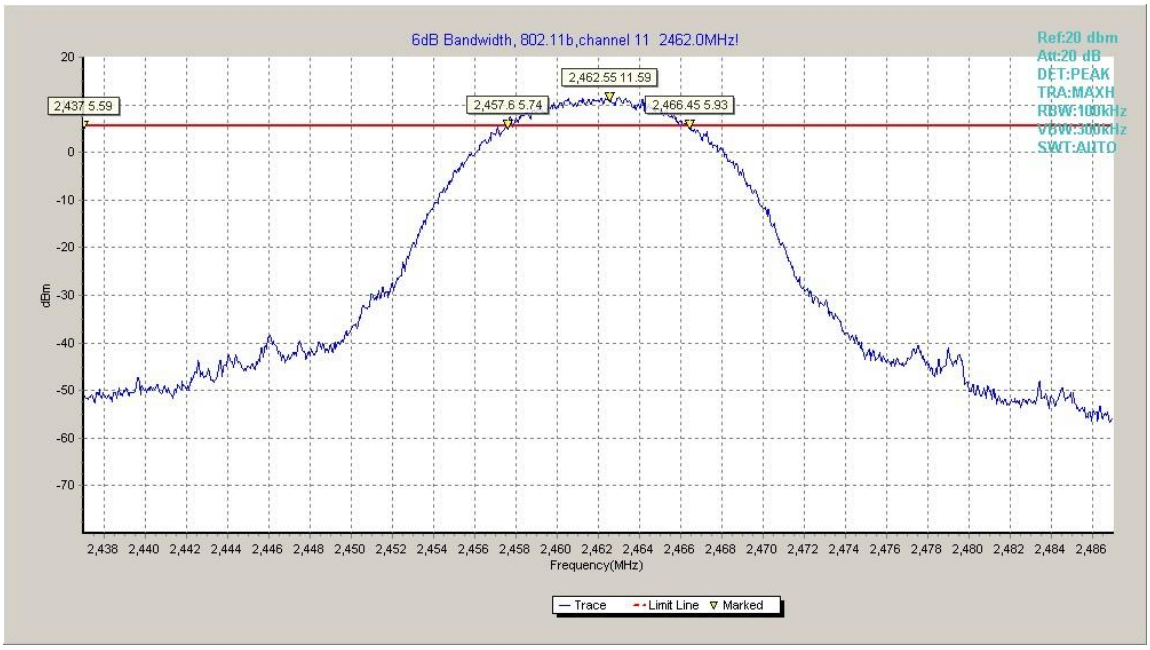

Fig.A.4.3 Occupied 6dB Bandwidth (802.11b, Ch 11)

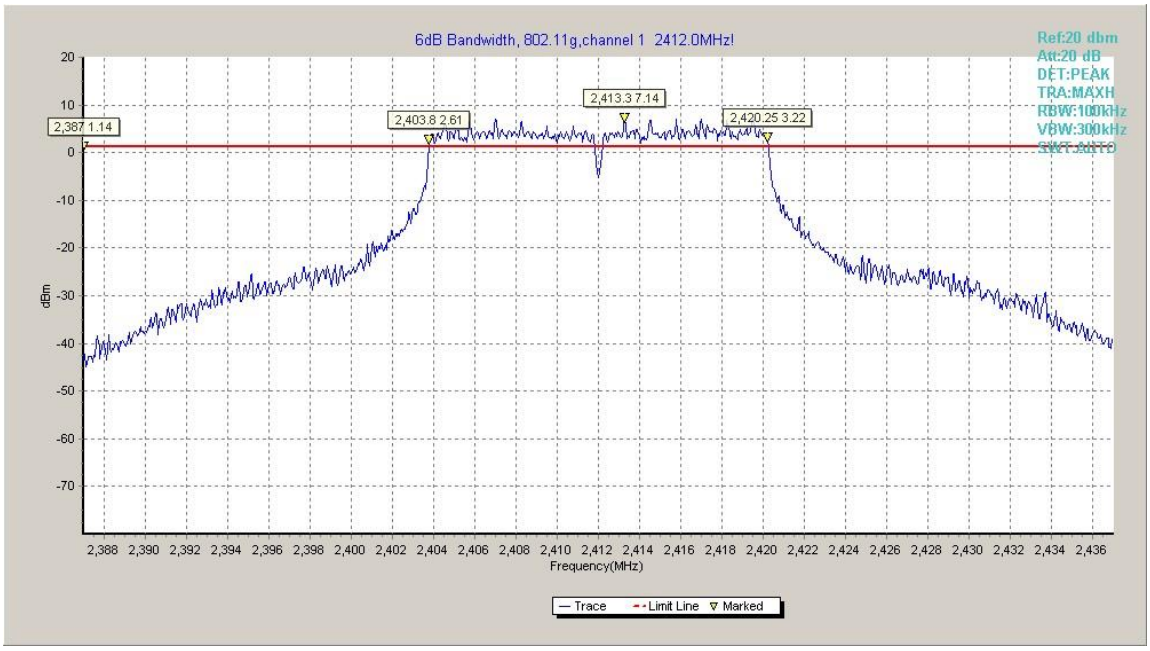

Fig.A.4.4 Occupied 6dB Bandwidth (802.11g, Ch 1)

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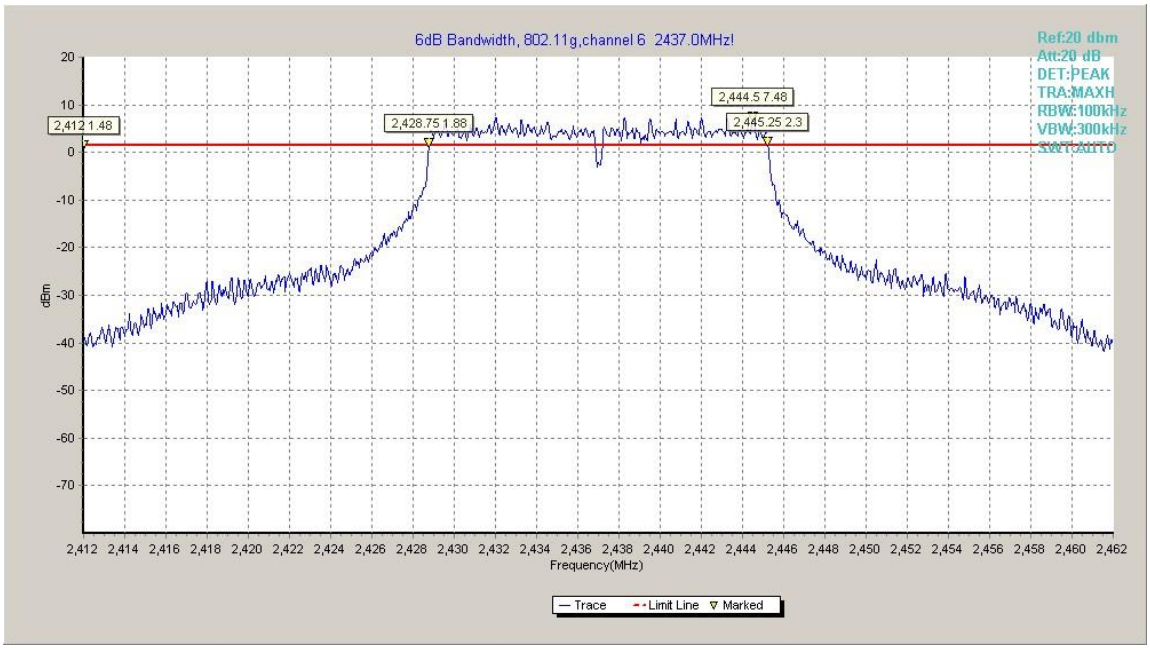

Fig.A.4.5 Occupied 6dB Bandwidth (802.11g, Ch 6)

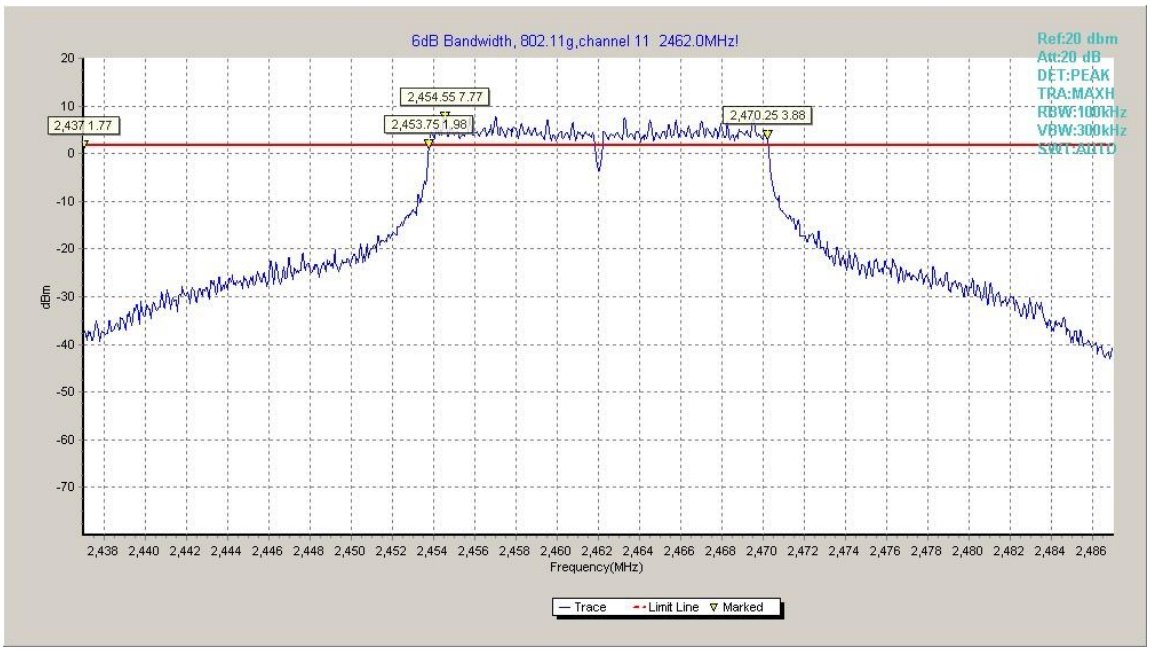

Fig.A.4.6 Occupied 6dB Bandwidth (802.11g, Ch 11)

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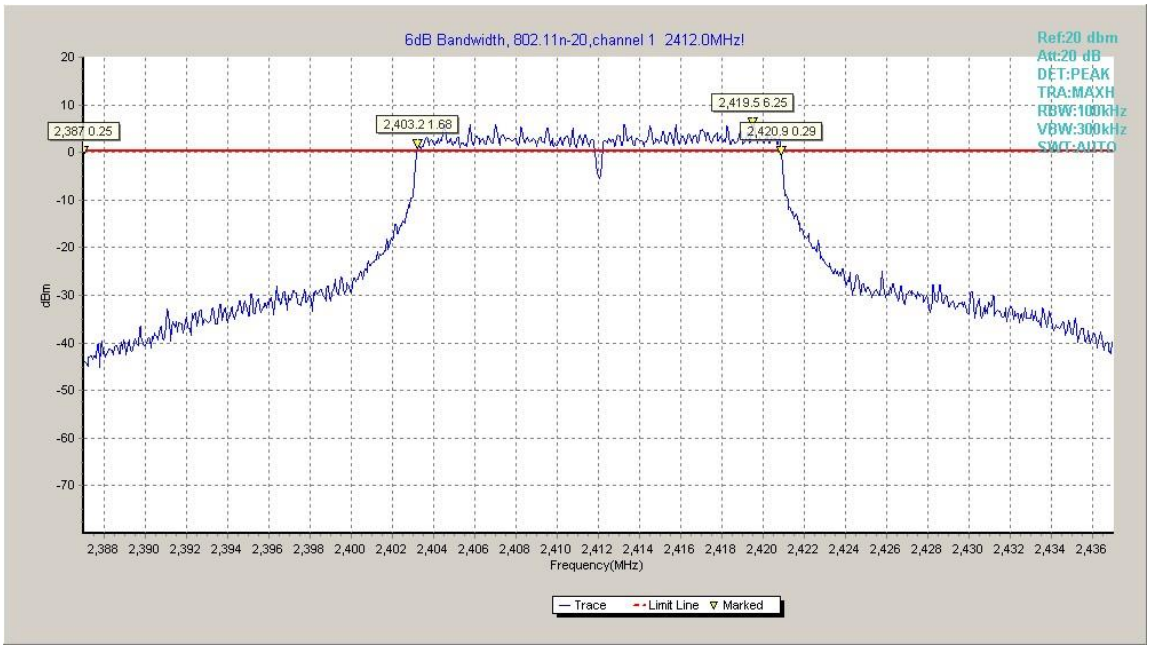

Fig.A.4.7 Occupied 6dB Bandwidth (802.11n-20MHz, Ch 1)

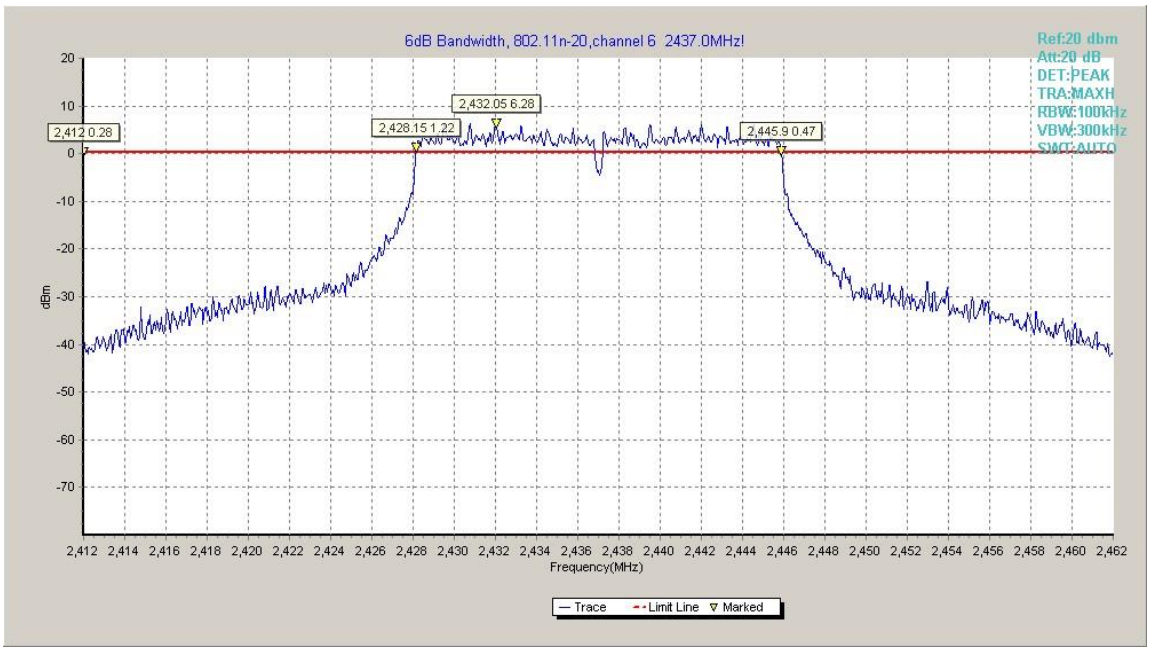

Fig.A.4.8 Occupied 6dB Bandwidth (802.11n-HT20, Ch 6)

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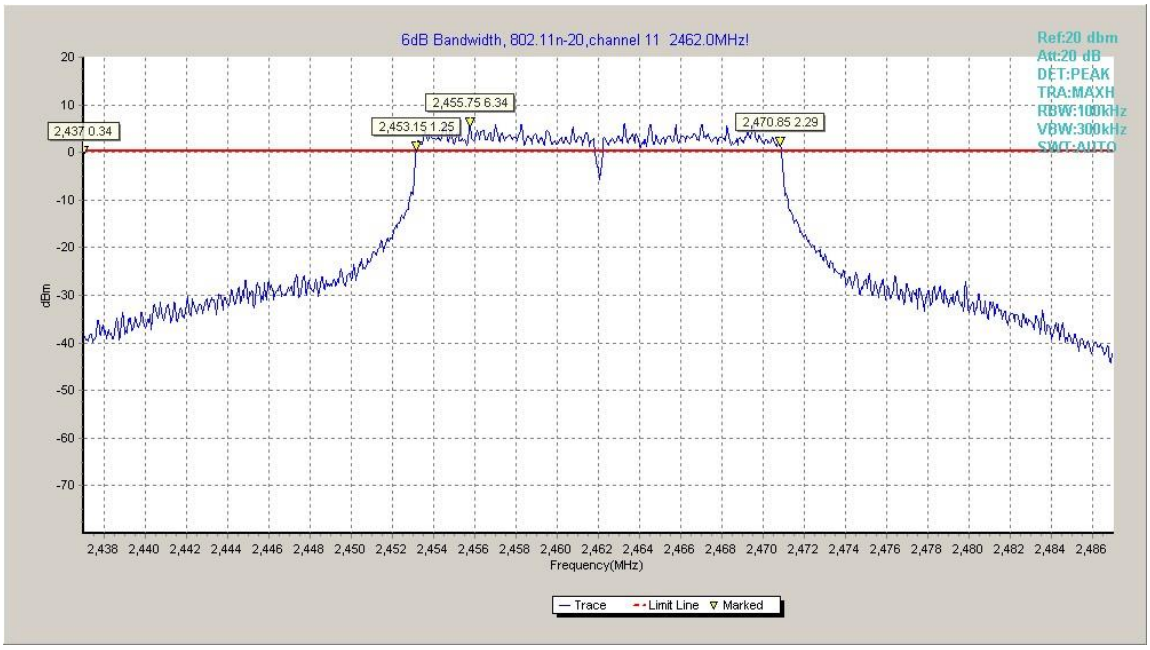

Fig.A.4.9 Occupied 6dB Bandwidth (802.11n-HT20, Ch 11)

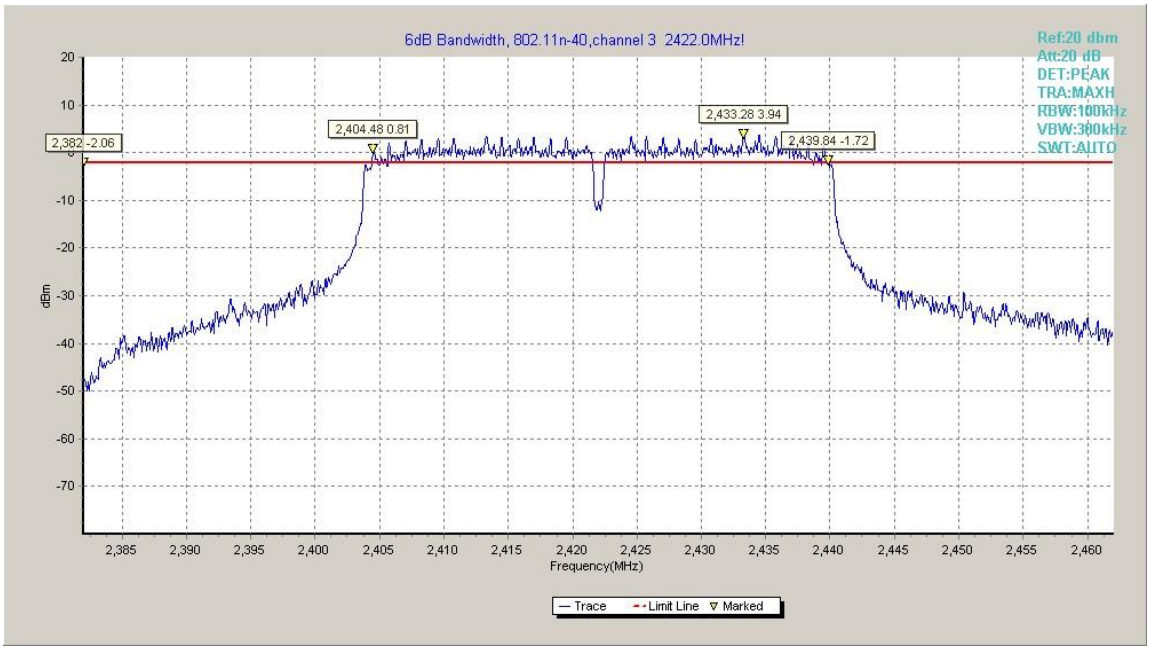

Fig.A.4.10 Occupied 6dB Bandwidth (802.11n-40MHz, Ch 3)

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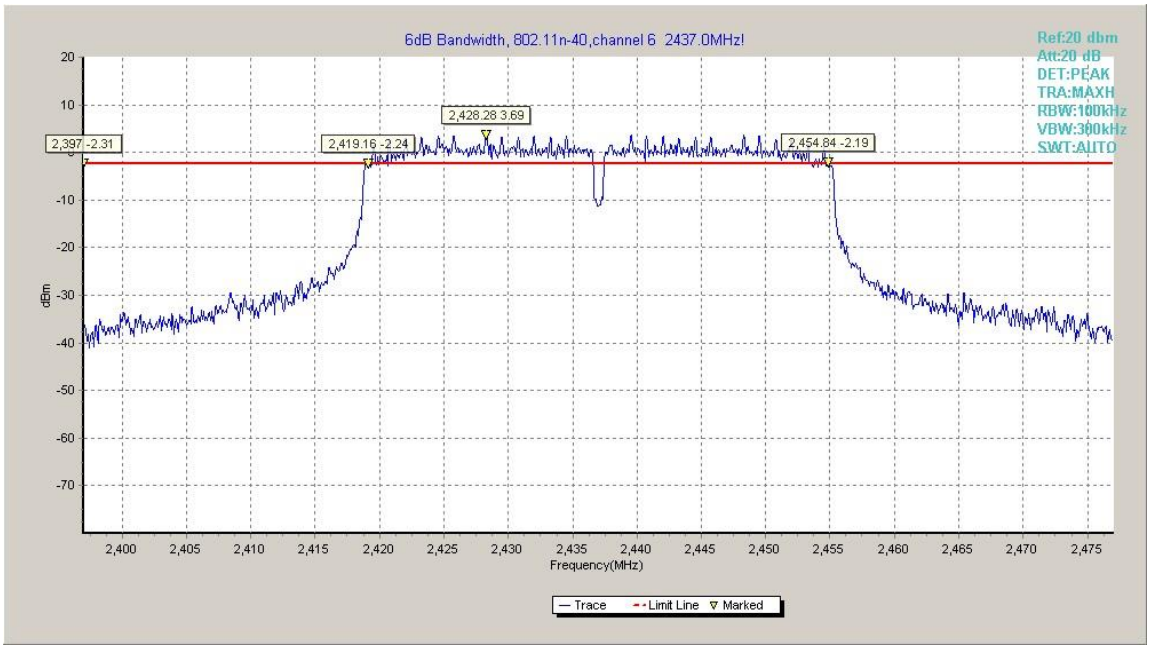

Fig.A.4.11 Occupied 6dB Bandwidth (802.11n-HT40, Ch 6)

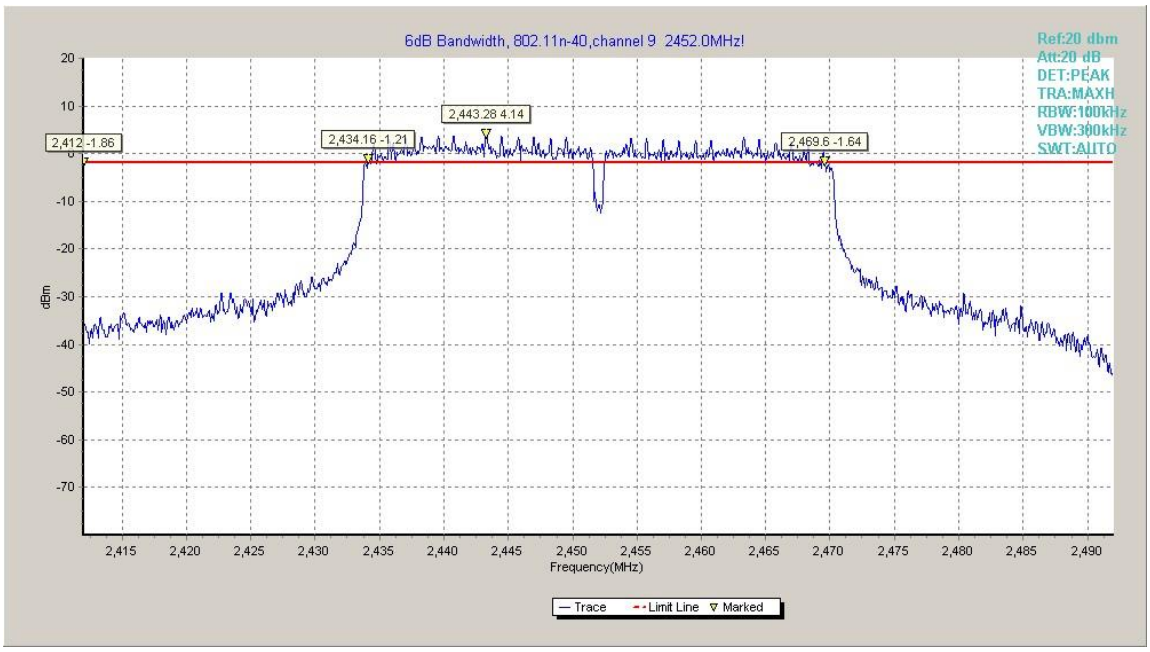

Fig.A.4.12 Occupied 6dB Bandwidth (802.11n-HT40, Ch 9)

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A.5. Band Edges Compliance

Method of Measurement: See ANSI C63.10-2013-clause 6.10.4

Connect the spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described below.

a) Set Span = 100MHz
b) Sweep Time: coupled
c) Set the RBW= 100 kHz
c) Set the VBW= 300 kHz
d) Detector: Peak
e) Trace: Max hold

Measurement Limit:

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	> 20

EUT ID: EUT2

Measurement Result:

802.11b/g mode

Mode	Channel	Test Results	Conclusion
802.11b	1	Fig.A.5.1	**P**
	11	Fig.A.5.2	**P**
802.11g	1	Fig.A.5.3	**P**
	11	Fig.A.5.4	**P**

802.11n-HT20 mode

Mode	Channel	Test Results	Conclusion
802.11n (HT20)	1	Fig.A.5.5	**P**
	11	Fig.A.5.6	**P**

802.11n-HT40 mode

Mode	Channel	Test Results	Conclusion
802.11n (HT40)	3	Fig.A.5.7	**P**
	9	Fig.A.5.8	**P**

Conclusion: Pass

Test graphs as below:

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Fig.A.5.1 Band Edges (802.11b, Ch 1)

Fig.A.5.2 Band Edges (802.11b, Ch 11)

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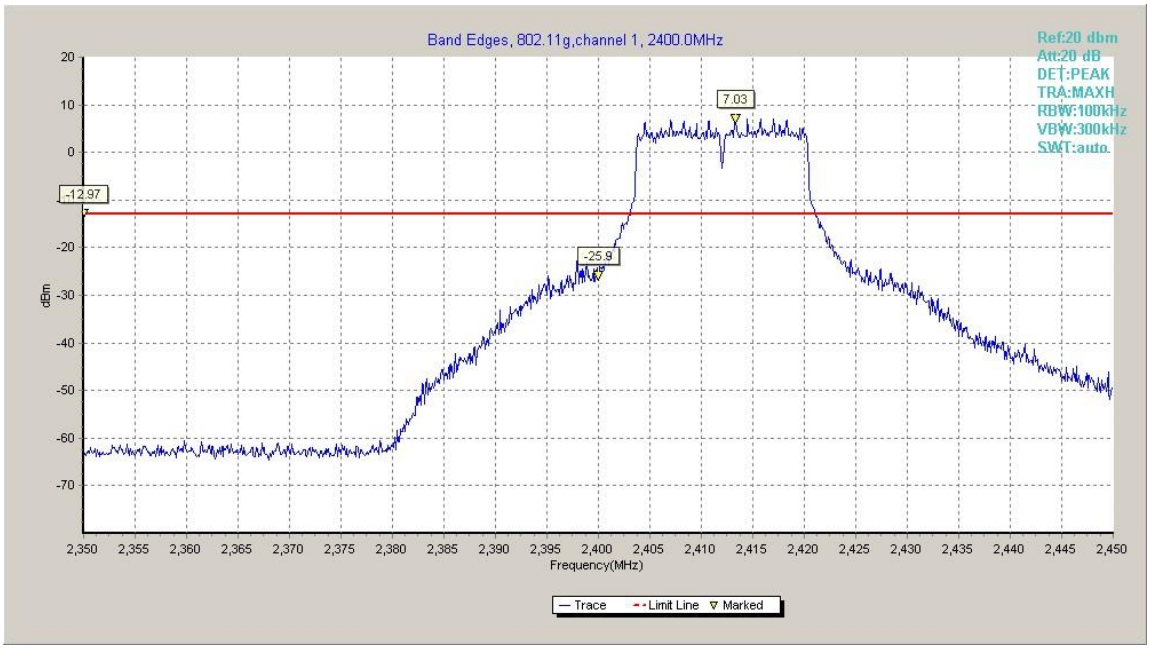

Fig.A.5.3 Band Edges (802.11g, Ch 1)

Fig.A.5.4 Band Edges (802.11g, Ch 11)

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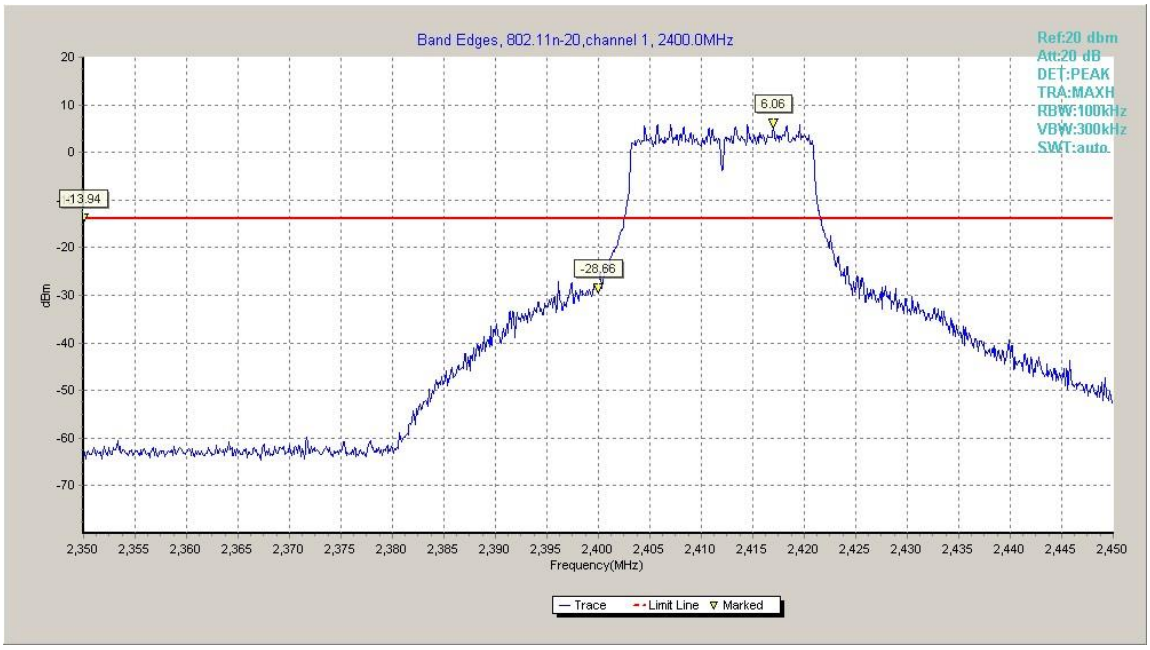

Fig.A.5.5 Band Edges (802.11n-HT20, Ch 1)

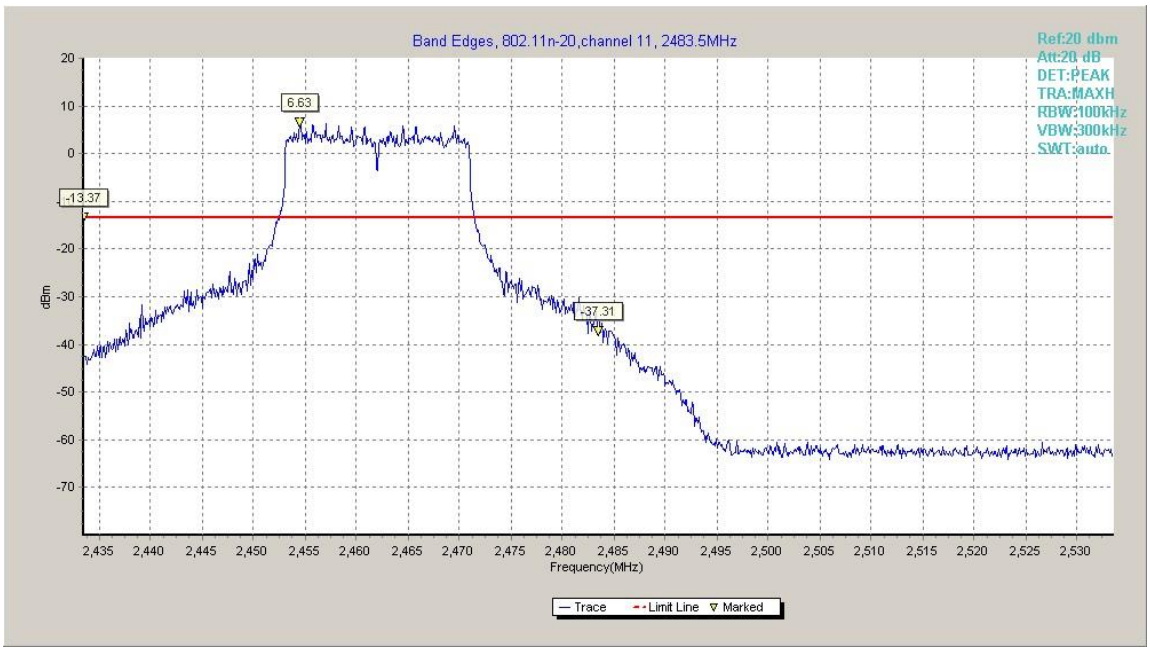

Fig.A.5.6 Band Edges (802.11n-HT20, Ch 11)

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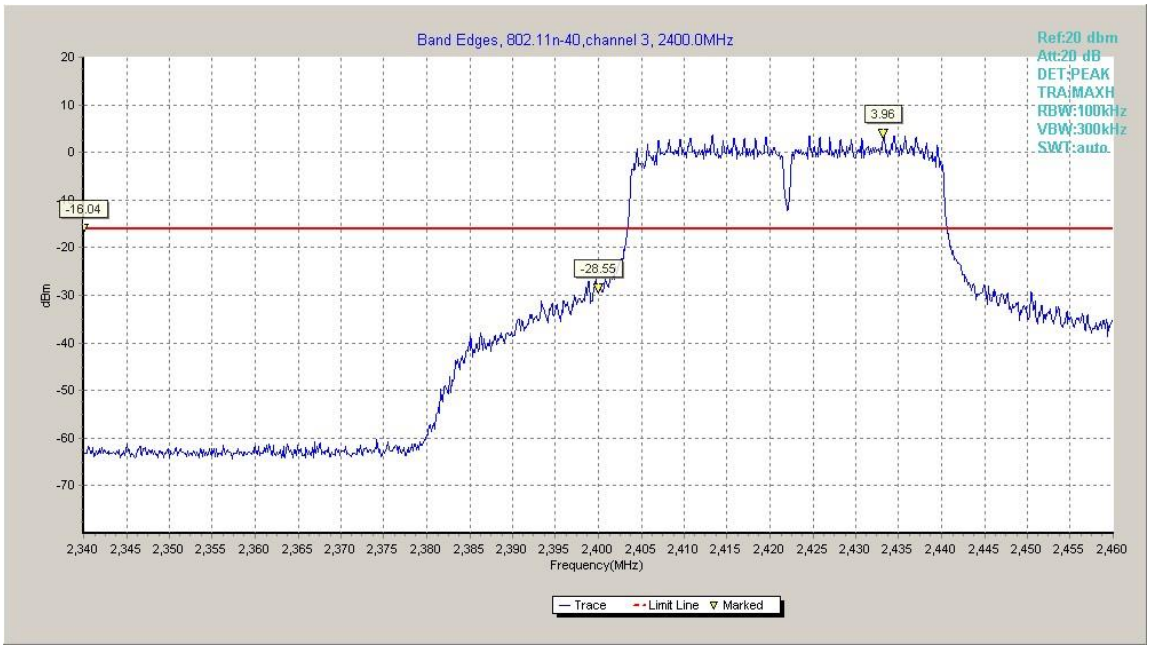

Fig.A.5.7 Band Edges (802.11n-HT40, Ch 3)

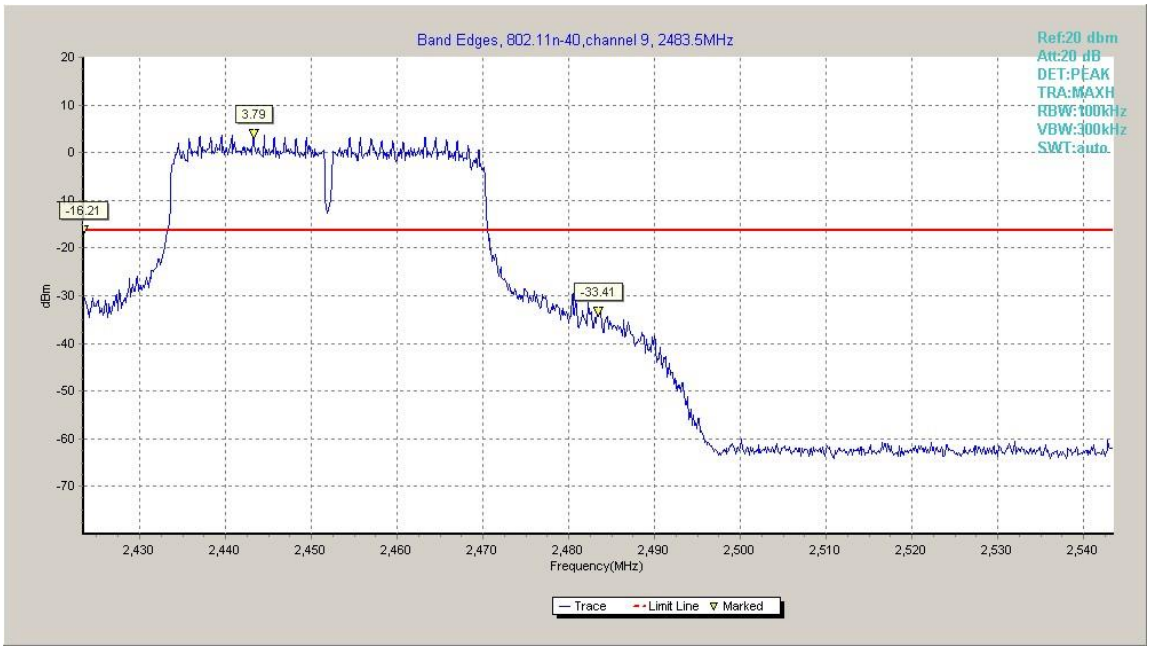

Fig.A.5.8 Band Edges (802.11n-HT40, Ch 9)

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A.6. Transmitter Spurious Emission

A.6.1 Transmitter Spurious Emission – Conducted

Method of Measurement: See ANSI C63.10-2013-clause 11.11.2

Establish a reference level by using the following procedure:

a) Set instrument center frequency to DTS channel center frequency
b) Set the span to ≥ 1.5 times the DTS bandwidth
c) Set the RBW= 100 kHz
d) Set the VBW= 300 kHz
e) Detector = Peak
f) Sweep time = auto couple
g) Trace mode = max hold
h) Allow trace to fully stabilize
i) Use the peak marker function to determine the maximum PSD level

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Establish an emission level by using the following procedure:

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW = 300 kHz.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d)	20dB below peak output power in 100 kHz bandwidth

EUT ID: EUT2

Measurement Results:

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