



FCC PART 15C TEST REPORT No.I20Z60563-IOT06

for

Client Name: TCL Communication Ltd.

Product Name: 5G NR/ LTE/WCDMA/GSM Mobile Phone

Model Name: T790Y

With

FCC ID: 2ACCJN043

Hardware Version: 03

Software Version:v2.0.1A.H.6

Issued Date: 2020-06-02

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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I20Z60563-IOT06	Rev.0	1st edition	2020-06-02

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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1:CTTL(Huayuan North Road)

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

Location 2:CTTL(BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology
Development Area, Beijing, P. R. China 100176

1.3. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project date

Testing Start Date: 2020-04-16

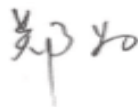
Testing End Date: 2020-06-02

1.5. Signature



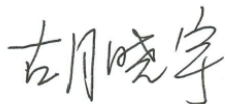
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2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
Address: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Telephone: 0086-755-36611722
Fax: 0086-755-36612000-81722

2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Telephone: 0086-755-36611722
Fax: 0086-755-36612000-81722

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

3.1. About EUT

Description	5G NR/ LTE/WCDMA/GSM Mobile Phone		
Model name	T790Y		
FCC ID	2ACCJN043		
With WLAN Function	Yes		
Frequency Range	ISM 2400MHz~2483.5MHz		
Type of Modulation	DSSS/CCK/OFDM		
Number of Channels	11		
Antenna	Integral Antenna		
Antenna Gain	-4.10dBi(ant4),-3.70dBi(ant5)		
MAX Conducted Power	28.11dBm		
Power Supply	3.85V		
Antenna Function Description	802.11b/g/n MIMO	Ant4	Ant5

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version
EUT38a	354926110009808	03	v2.0.1A.H.6
EUT2	354926110009766	03	v2.0.1A.H.6

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

3.3. Internal Identification of AE

AE ID*	Description	SN
AE1	Battery	/
AE2	Charger	/
AE3	USB Cable	/

AE1

Model	TLp043E7
Manufacturer	VEKEN
Capacitance	4360mAh
Nominal voltage	/

AE2

Model	QC13US
Manufacturer	BYD
Length of cable	/

AE3

Model	CDA0000139C1
Manufacturer	Juwei
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 5G NR/ LTE/WCDMA/GSM Mobile Phone with integrated antenna and inbuilt battery.

It has Bluetooth (EDR) function.

It consists of normal options: travel charger, USB cable.

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.

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.	2018
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013
KDB 662911	Federal Communications Commission Office of Engineering and Technology Laboratory Division Emissions Testing of Transmitters with Multiple Outputs in the Same Band	2013
KDB 558074 D01	Federal Communications Commission Office of Engineering and Technology Laboratory Division GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES	2019

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

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°C
Voltage	V nom	3.85V
Humidity	H nom	20-75%

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2021-05-06
2	LISN	ENV216	101459	Rohde & Schwarz	1 year	2021-03-17
3	Test Receiver	ESCI	100766	Rohde & Schwarz	1 year	2021-03-10
4	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100376	Rohde & Schwarz	1 year	2020-10-30
2	BiLog Antenna	VULB9163	9163-482	Schwarzbeck	1 year	2020-09-16
3	Dual-Ridge Waveguide Horn Antenna	3117	00139065	ETS-Lindgren	1 year	2020-11-10
4	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	1 year	2020-10-08
5	Vector Signal Analyzer	FSV40	101047	Rohde & Schwarz	1 year	2020-06-16

7. Measurement Uncertainty

7.1. Maximum Output Power

Measurement Uncertainty: 0.387dB, k=1.96

7.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB, k=1.96

7.3. DTS 6-dB Signal Bandwidth

Measurement Uncertainty: 60.80Hz, k=1.96

7.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB, k=1.96

7.5. Transmitter Spurious Emission

Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
$30\text{MHz} \leq f \leq 2\text{GHz}$	1.22
$2\text{GHz} \leq f \leq 3.6\text{GHz}$	1.22
$3.6\text{GHz} \leq f \leq 8\text{GHz}$	1.22
$8\text{GHz} \leq f \leq 12.75\text{GHz}$	1.51
$12.75\text{GHz} \leq f \leq 26\text{GHz}$	1.51
$26\text{GHz} \leq f \leq 40\text{GHz}$	1.59

Radiated (k=2)

Frequency Range	Uncertainty(dB)
9kHz-30MHz	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.40
$1\text{GHz} \leq f \leq 18\text{GHz}$	4.32
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.26

7.6. AC Power-line Conducted Emission

Measurement Uncertainty : 3.08dB, k=2

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

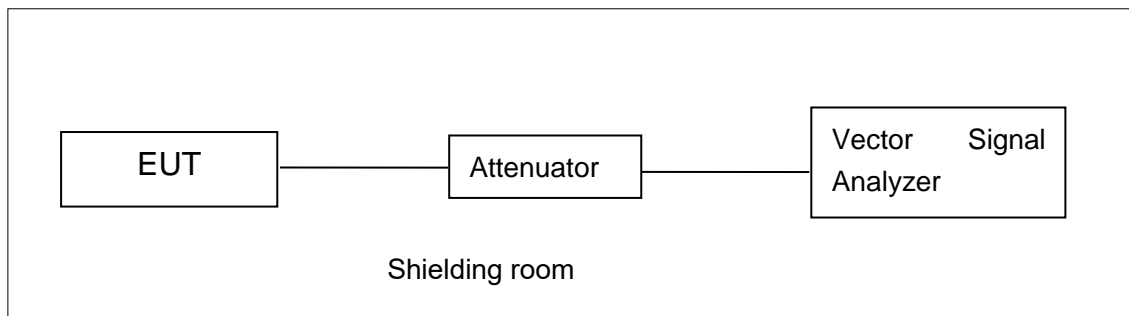


Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements

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;

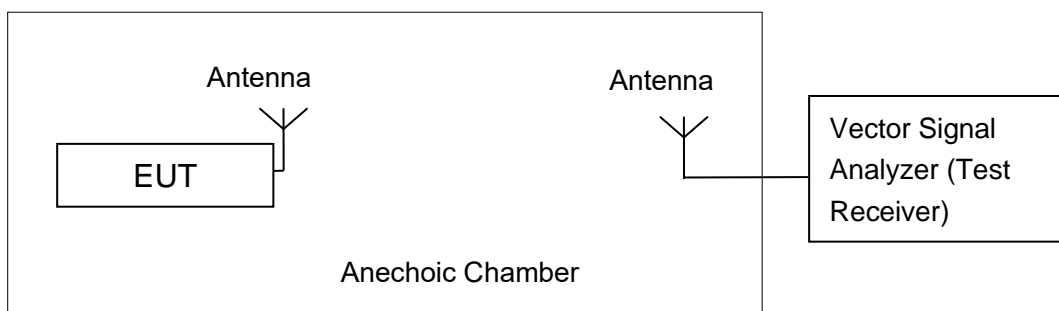


Fig.A.1.2.1: Test Setup Diagram for Radiated Measurements

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 $\geq [1.5 \times \text{DTS bandwidth}]$.
- 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

Peak Output Power-conducted

Duty cycle:

11b	1Mbps	2Mbps	5.5Mbps	11Mbps					
	98.69%	98.65%	99.29%	99.32%					
11g	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps	
	98.68%	98.65%	98.44%	98.60%	98.25%	98.38%	98.00%	98.03%	
11n-20	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
	99.50%	99.30%	99.12%	99.03%	98.96%	98.35%	98.28%	98.29%	
11n-40	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
	99.08%	98.96%	98.46%	97.97%	96.71%	96.07%	95.63%	95.19%	

Measurement Results:

The data rate 11Mbps(11b)、9Mbps(11g) and MCS2(11n-20)、MCS3(11n-40)are selected as worse condition, and the following cases are performed with this condition.

MIMO&CDD:

2.4GHz Band									
Mode	Date Rate	Chnanel	Freq.(MHz)	Peak Conducted Power(dBm)			Conducted Power Limit(dBm)		Pass/Fail
				Ant4	Ant5	SUM	Ant4	Ant5	

11b	11Mbps	1	2412	22.56	23.51	26.07	30.00	Pass
11b	11Mbps	6	2437	22.97	23.58	26.30	30.00	Pass
11b	11Mbps	11	2462	22.78	22.36	25.59	30.00	Pass
11g	9Mbps	1	2412	24.19	25.18	27.72	30.00	Pass
11g	9Mbps	6	2437	24.51	25.62	28.11	30.00	Pass
11g	9Mbps	11	2462	23.01	25.02	27.14	30.00	Pass
11n-20	MCS2	1	2412	24.40	25.38	27.93	30.00	Pass
11n-20	MCS2	6	2437	24.59	25.35	28.00	30.00	Pass
11n-20	MCS2	11	2462	24.64	25.41	28.05	30.00	Pass
11n-40	MCS3	3	2422	23.49	23.90	26.71	30.00	Pass
11n-40	MCS3	6	2437	23.79	24.12	26.97	30.00	Pass
11n-40	MCS3	9	2452	23.34	23.98	26.68	30.00	Pass

Conclusion: Pass

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:

MIMO&CDD:

2.4GHz Band									
Mode	Date Rate	Chnanel	Freq.(MHz)	Peak Power Spectral Density(dBm/3 kHz)			Peak Power Spectral Density Limit(dBm/3 kHz)		Pass/Fail
				Ant4	Ant5	SUM	Ant4	Ant5	
11b	11Mbps	1	2412	-5.74	-4.02	-1.79	8.00		Pass
11b	11Mbps	6	2437	-5.34	-4.48	-1.88	8.00		Pass
11b	11Mbps	11	2462	-5.55	-4.77	-2.13	8.00		Pass
11g	9Mbps	1	2412	-11.03	-9.89	-7.41	8.00		Pass
11g	9Mbps	6	2437	-10.19	10.19	-7.18	8.00		Pass
11g	9Mbps	11	2462	-10.06	10.03	-7.03	8.00		Pass
11n-20	MCS2	1	2412	-11.23	-9.45	-7.24	8.00		Pass
11n-20	MCS2	6	2437	-10.83	-9.64	-7.18	8.00		Pass



11n-20	MCS2	11	2462	-10.56	-	10.42	-7.48	8.00	Pass
11n-40	MCS3	3	2422	-13.50	-	13.70	10.59	8.00	Pass
11n-40	MCS3	6	2437	-10.61	-	-11.77	-8.14	8.00	Pass
11n-40	MCS3	9	2452	-11.13	-	12.02	-8.54	8.00	Pass

Conclusion: Pass

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	8050.00	P
	6	Fig.A.4.2	8050.00	P
	11	Fig.A.4.3	8050.00	P
802.11g	1	Fig.A.4.4	15450.00	P
	6	Fig.A.4.5	15350.00	P
	11	Fig.A.4.6	15350.00	P

802.11n-HT20 mode

Mode	Channel	Occupied 6dB Bandwidth (kHz)		conclusion
802.11n (HT20)	1	Fig.A.4.7	15950.00	P
	6	Fig.A.4.8	16000.00	P
	11	Fig.A.4.9	15950.00	P

802.11n-HT40 mode

Mode	Channel	Occupied 6dB Bandwidth (kHz)		conclusion
802.11n (HT40)	3	Fig.A.4.10	35120.00	P
	6	Fig.A.4.11	35280.00	P
	9	Fig.A.4.12	36320.00	P

Conclusion: Pass

Test graphs as below:



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

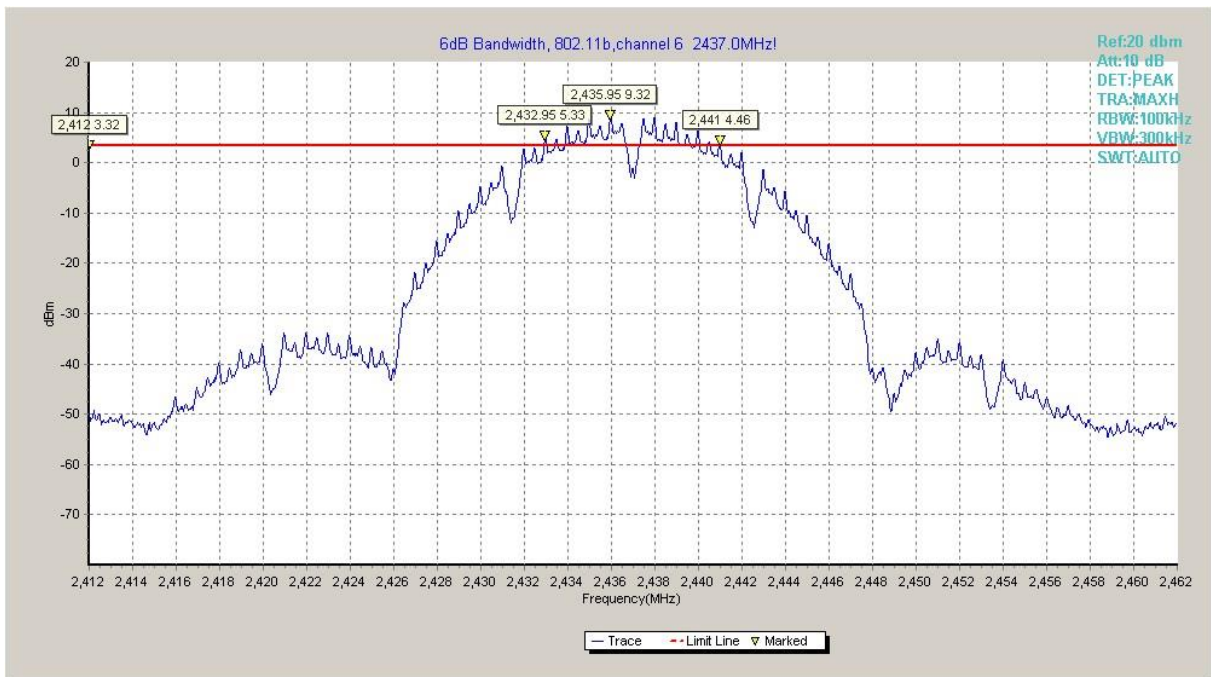


Fig.A.4.2 Occupied 6dB Bandwidth (802.11b, Ch 6)



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

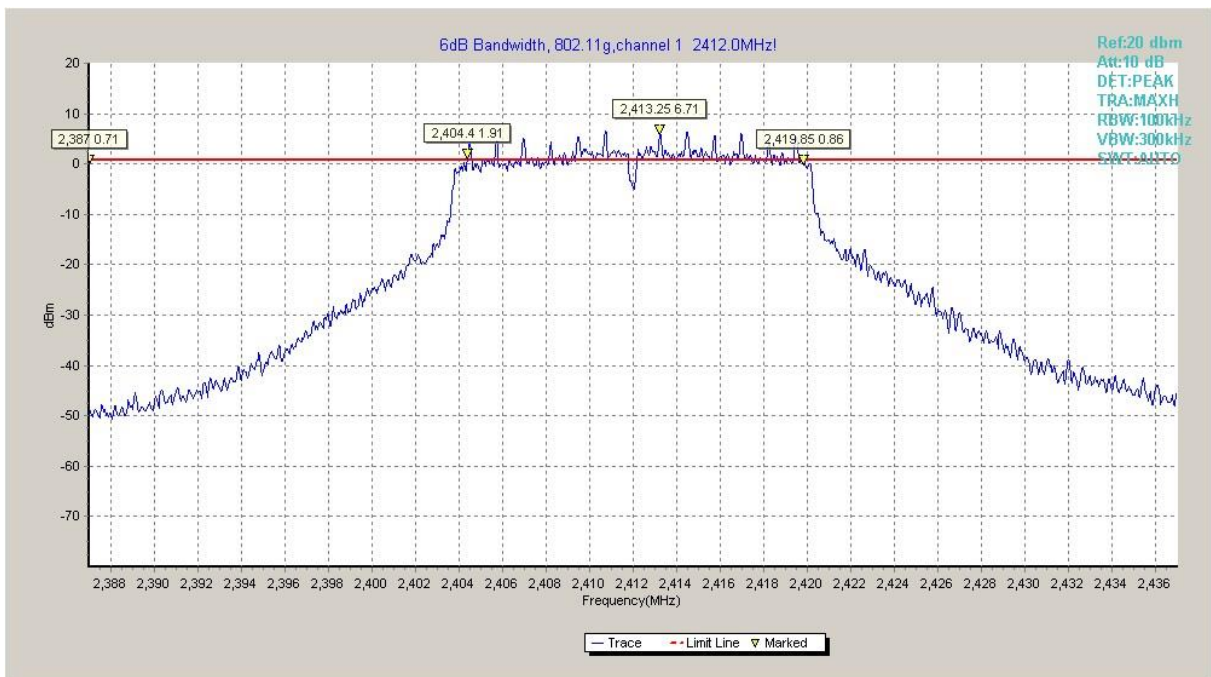


Fig.A.4.4 Occupied 6dB Bandwidth (802.11g, Ch 1)

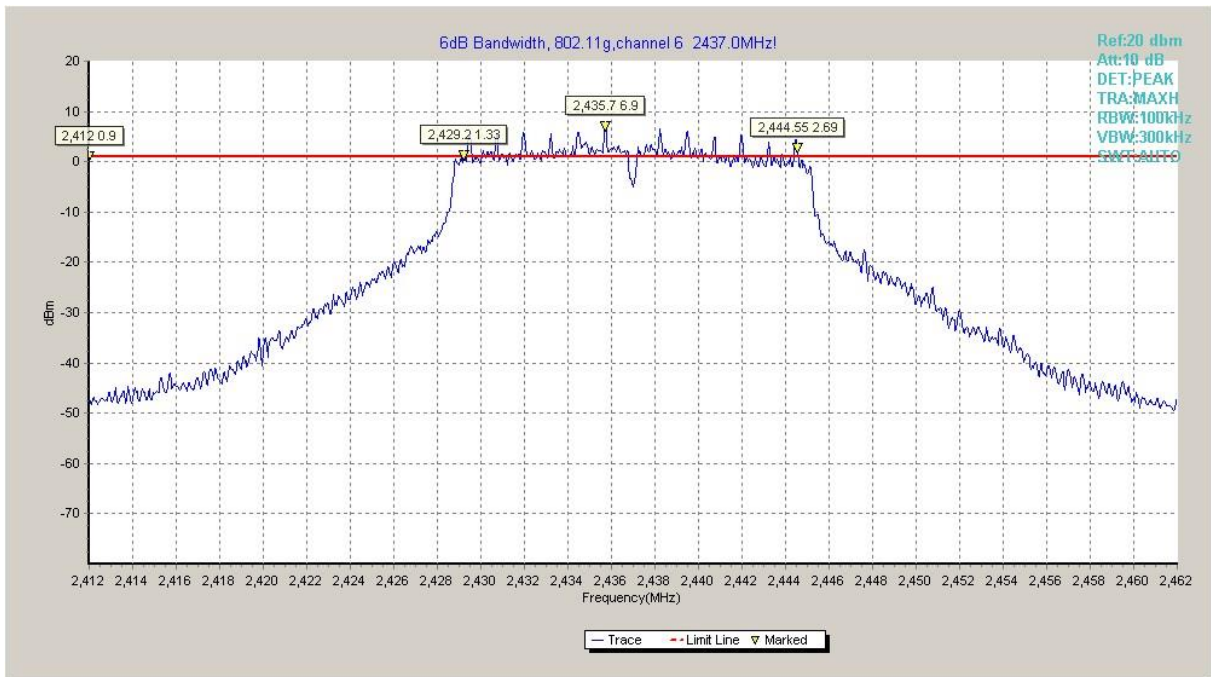


Fig.A.4.5 Occupied 6dB Bandwidth (802.11g, Ch 6)

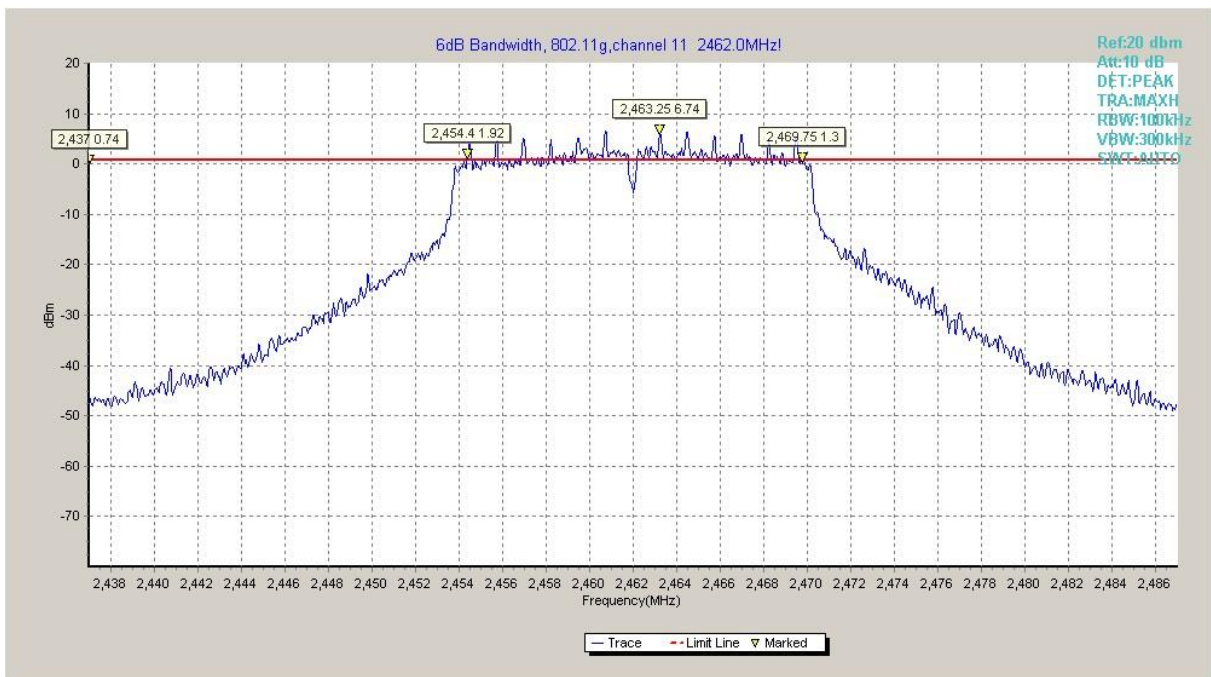


Fig.A.4.6 Occupied 6dB Bandwidth (802.11g, Ch 11)

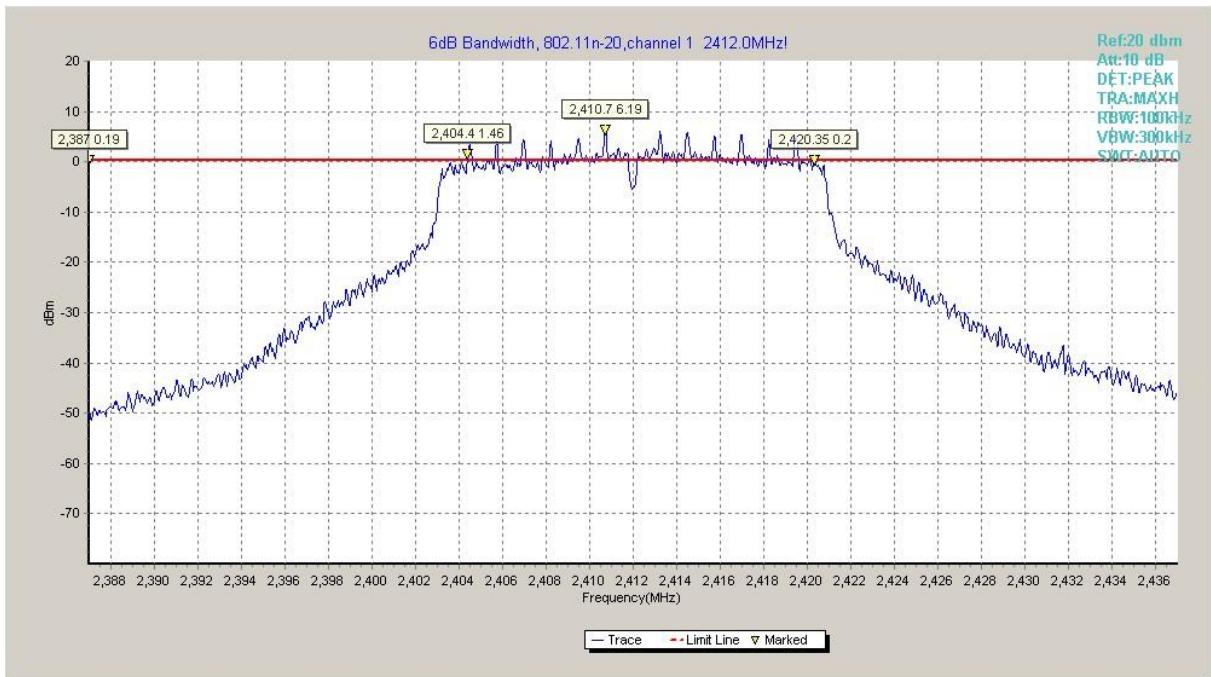


Fig.A.4.7 Occupied 6dB Bandwidth (802.11n-20MHz, Ch 1)

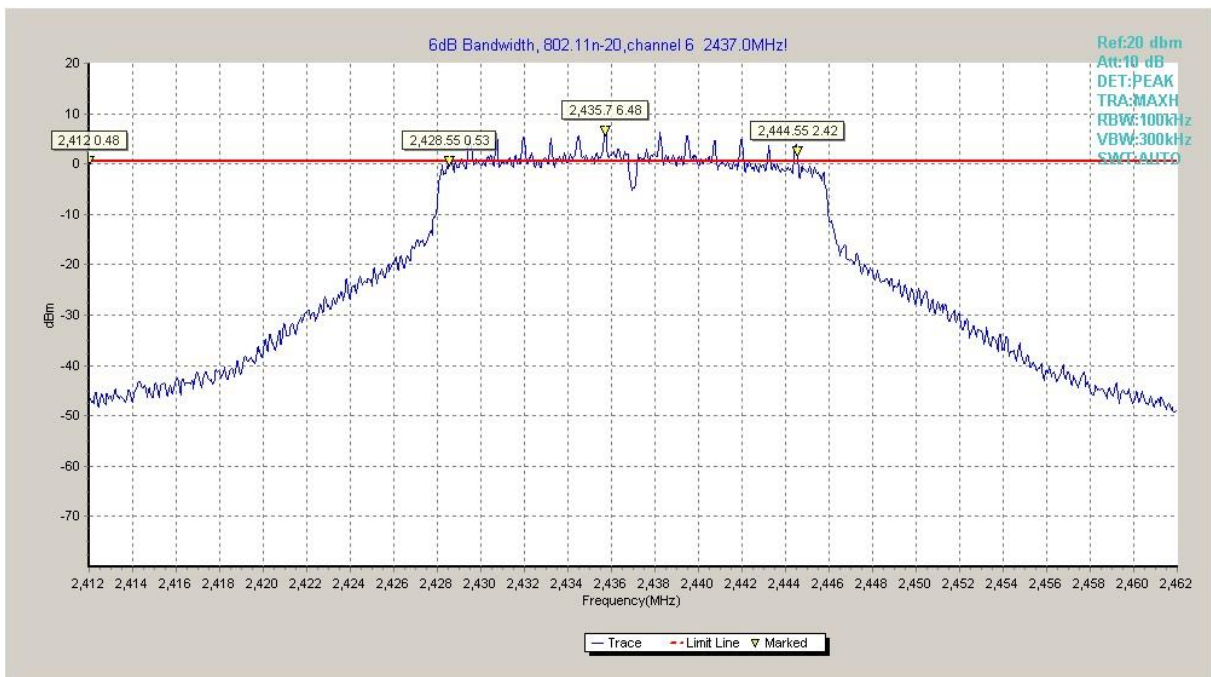


Fig.A.4.8 Occupied 6dB Bandwidth (802.11n-HT20, Ch 6)

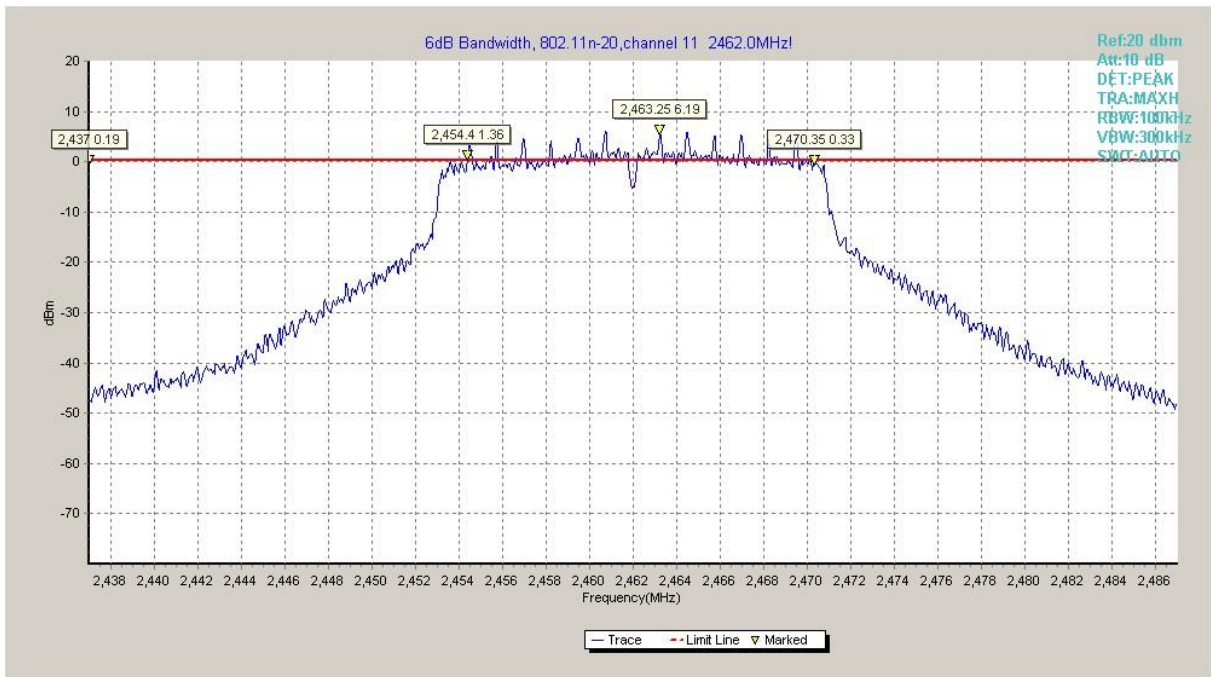


Fig.A.4.9 Occupied 6dB Bandwidth (802.11n-HT20, Ch 11)

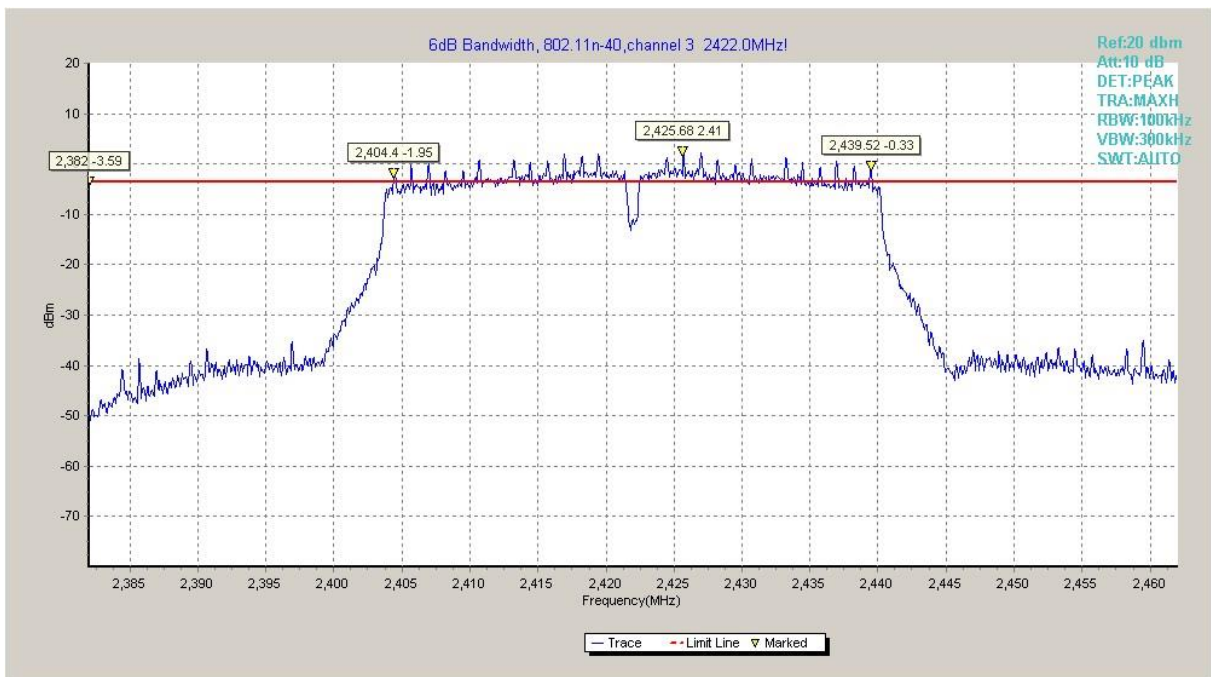


Fig.A.4.10 Occupied 6dB Bandwidth (802.11n-40MHz, Ch 3)

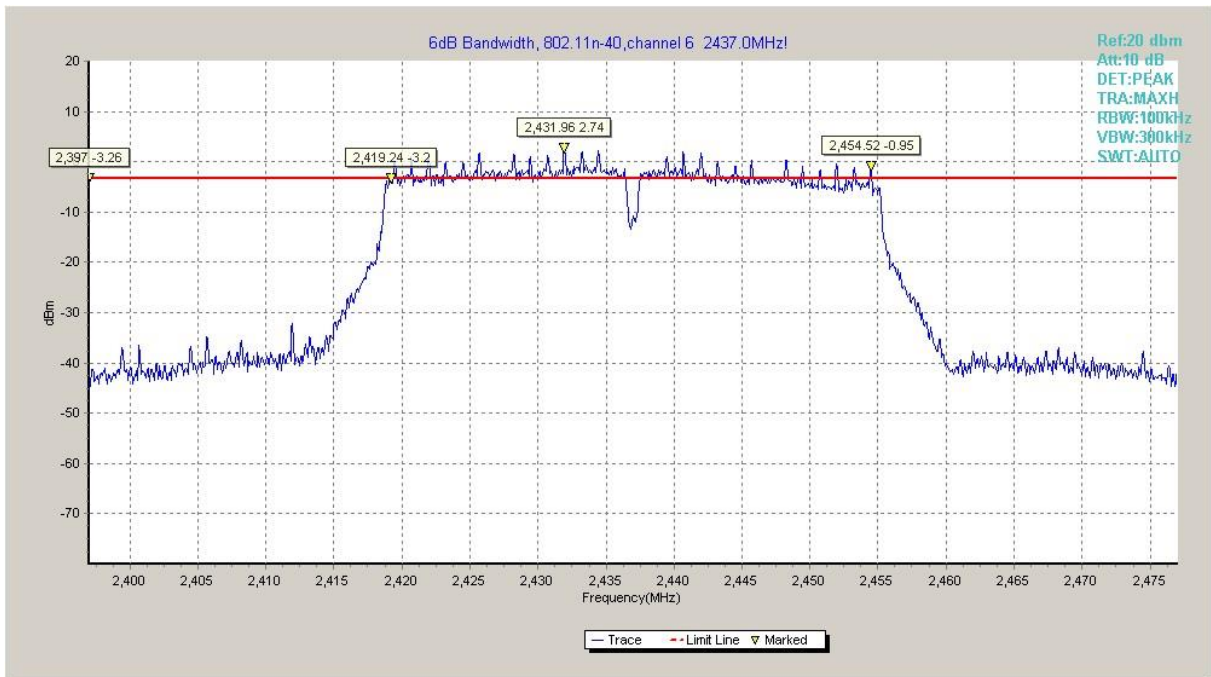


Fig.A.4.11 Occupied 6dB Bandwidth (802.11n-HT40, Ch 6)

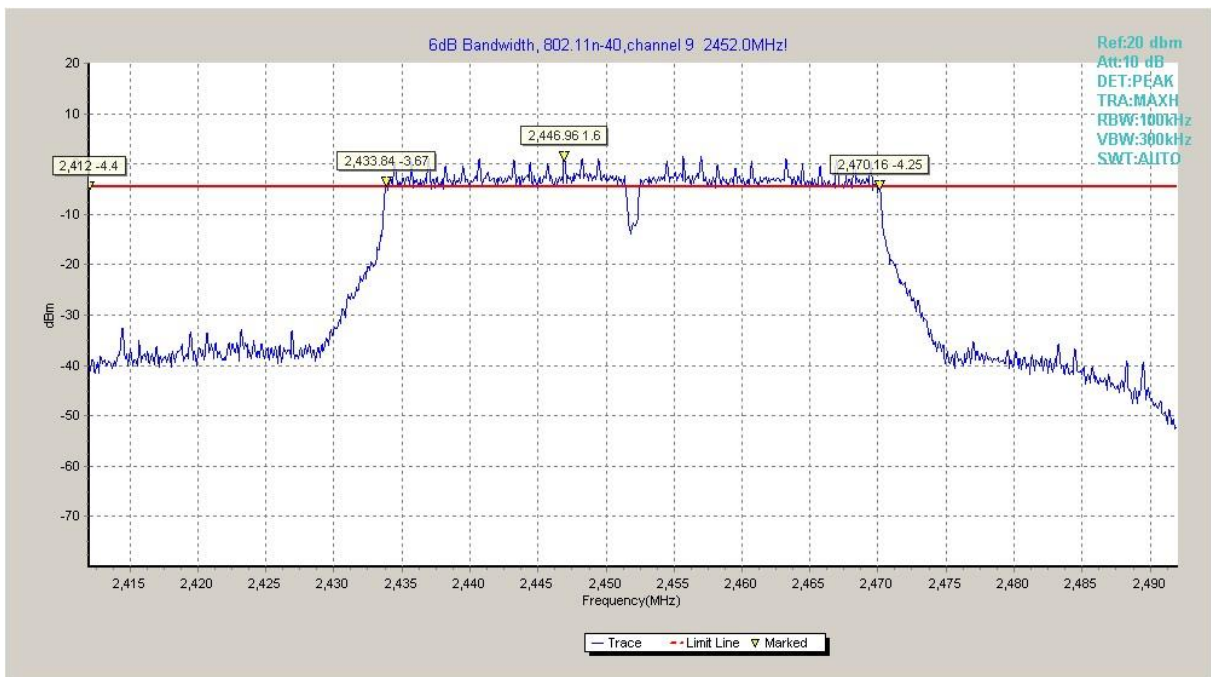


Fig.A.4.12 Occupied 6dB Bandwidth (802.11n-HT40, Ch 9)

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:



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

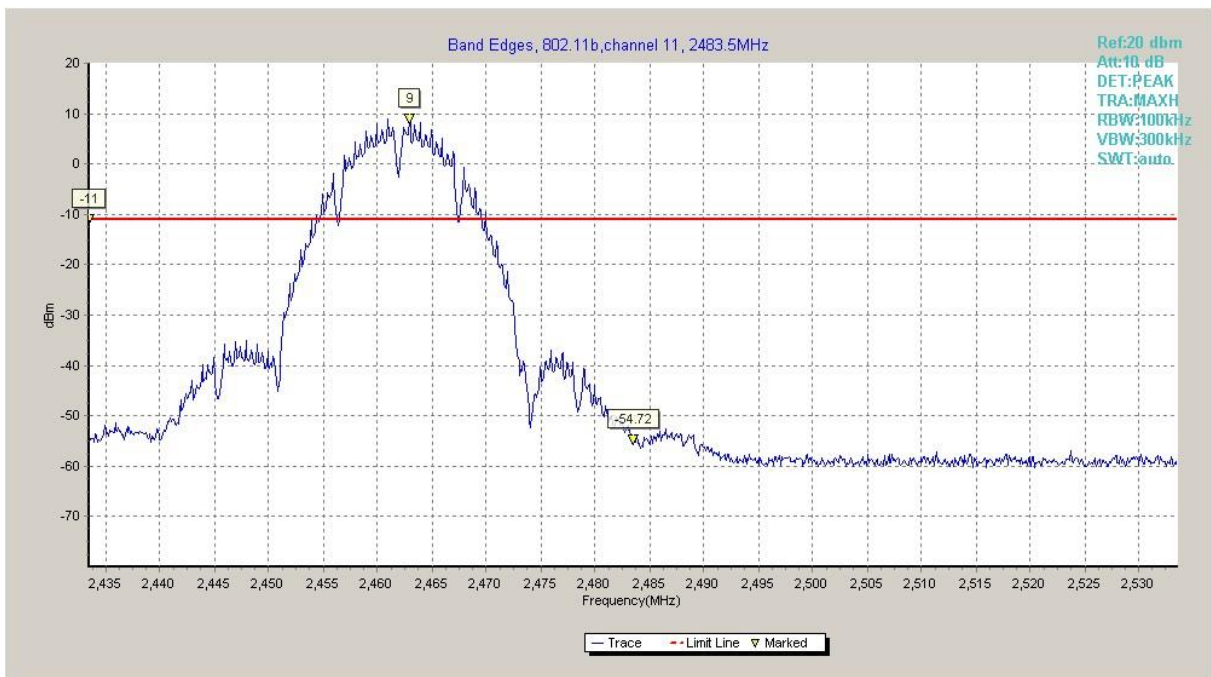


Fig.A.5.2 Band Edges (802.11b, Ch 11)