

# FCC PART 15C TEST REPORT

No.I18Z60272-IOT03

for

**TCL Communication Ltd.** 

# GSM Quad-band/HSPA-UMTS Six-band/LTE 18-bands mobile phone

**BBE100-2** 

with

FCC ID: 2ACCJN024

Hardware Version: 04

Software Version: V6R13-6

Issued Date: 2018-06-13



#### 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.

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# **REPORT HISTORY**

Report Number	Revision	Description	Issue Date
I18Z60272-IOT03	Rev.0	1st edition	2018-06-13



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# 1. Test Laboratory

# 1.1. Testing Location

Location 1:CTTL(Huayuan North Road)

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

P. R. China100191

Location 2:CTTL(Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road,

Haidian District, Beijing, P. R. China100191

1.2. Testing Environment

Normal Temperature:  $15-35^{\circ}$ C Extreme Temperature:  $-20/+55^{\circ}$ C Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2018-05-04
Testing End Date: 2018-06-11

1.4. Signature

Jiang Xue

(Prepared this test report)

知か

Zheng Wei

(Reviewed this test report)

Lv Songdong

(Approved this test report)



# 2. Client Information

# 2.1. Applicant Information

Company Name: TCL Communication Ltd.

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Company Name: TCL Communication Ltd.

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Address: Nanshan District, Shenzhen, Guangdong, P.R. China 518052

Shenzhen, Guangdong

City: Shenzhen
Postal Code: 518052
Country: China

Telephone: 0086-755-36611722

Fax: 0086-75536612000-81722



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

## 3.1. About EUT

Description GSM Quad-band/HSPA-UMTS Six-band/LTE 18-bands

mobile phone

Model name BBE100-2 FCC ID 2ACCJN024

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 25.31dBm

Power Supply 3.85V DC by Battery

# 3.2. <u>Internal Identification of EUT</u>

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	015138000009416	04	V6R13-6
EUT2	015138000010372	04	V6R13-6

<sup>\*</sup>EUT ID: is used to identify the test sample in the lab internally.

### 3.3. <u>Internal Identification of AE</u>

AE ID*	Description	SN	Remarks
AE1	Battery	/	/
AE2	Charger	/	/
AE3	USB Cable	/	/
AE4	USB Cable	/	/
AE5	Charger	/	NO TEST
AE1			
Model		TLp029C1	
Manufac	turer	BYD	
Capacita	ance	2900mAh	
Nominal	voltage	3.85V	
AE2			
Model		CBA0064AGBC1	
Manufac	turer	BYD	
Length o	of cable	/	
AE3			
Model		CDA0000113CF	
Manufacturer		LUXSHARE	



Length of cable cm

AE4

Model CDA0000113C1

Manufacturer Juwei Length of cable cm

AE5

Model CBA0064AHBC1

Manufacturer BYD Length of cable /

# 3.4. EUT set-ups

EUT set-up No.Combination of EUT and AERemarksSet.11EUT5+ AE1+ AE2+ AE3WIFI

## 3.5. General Description

The Equipment under Test (EUT) is a model of GSM Quad-band/HSPA-UMTS Six-band/LTE 18-bands 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.

# 3.6. <u>Interpretation of the Test Environment</u>

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 CFR 47, Part 15, Subpart C:	
	15.205 Restricted bands of operation;	
FCC Part15	15.209 Radiated emission limits, general requirements;	2016
	15.247 Operation within the bands 902-928MHz,	
	2400-2483.5 MHz, and 5725-5850 MHz.	
ANCI 062 10	American National Standard of Procedures for Compliance	2013
ANSI C63.10	Testing of Unlicensed Wireless Devices	2013

<sup>\*</sup>AE ID: is used to identify the test sample in the lab internally.



# 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)	1	Р
Peak Power Spectral Density	15.247 (e)	1	Р
Occupied 6dB Bandwidth	15.247 (a)	1	Р
Band Edges Compliance	15.247 (d)	1	Р
Transmitter Spurious Emission - Conducted	15.247 (d)	1	Р
Transmitter Spurious Emission - Radiated	15.247, 15.205, 15.209	1	Р
AC Powerline Conducted Emission	15.107, 15.207	1	Р

Please refer to ANNEX A for detail.

Terms used in Verdict column

Р	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	3.85V(By battery)	
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	FSQ40	200089	Rohde &	1 year	2019-05-17
'	Analyzer	1 3040	200009	Schwarz	i yeai	2019-03-17
2	LISN	ENV216	101200	Rohde &	1 year	2018-08-03
	LION	EINVZIO	101200	Schwarz	1 year	2010-00-03
2	Toot Doooiyar	ECCI 2	100244	Rohde &	1 400"	2040 02 20
3 Te	Test Receiver	ESCI 3	100344	Schwarz	1 year	2019-02-28
4	Shielding Room	S81	/	ETS-Lindgren	/	/

# Radiated emission test system

	······································					
No.	Equipment	Model	Serial	Manufacturer	Calibration	Calibration
	_qp		Number		Period	Due date
1	Test Receiver	ESU26	100376	Rohde &	1 year	2018-12-30
'	rest iveceiver	L3020	100370	Schwarz	i yeai	2010-12-30
2	BiLog Antenna	VULB9163	514	Schwarzbeck	3 years	2021-01-03
	Dual-Ridge					
4	Waveguide Horn	3116	2663	ETS-Lindgren	3 years	2020-05-31
	Antenna					
6	EMI Antenna	3117	00139065	ETS-Lindgren	3 Years	2020-11-15
7	Spectrum Applyzor	FSV40	101047	Rohde &	1 voor	2018-07-22
′	Spectrum Analyzer	F5V40	101047	Schwarz	1 year	2018-07-22



# 7. Measurement Uncertainty

# 7.1. Maximum Output Power

Measurement Uncertainty: 0.387dB,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. <u>Transmitter Spurious Emission</u>

### Conducted (k=1.96)

Odiladotea (N=1:00)	
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



# **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

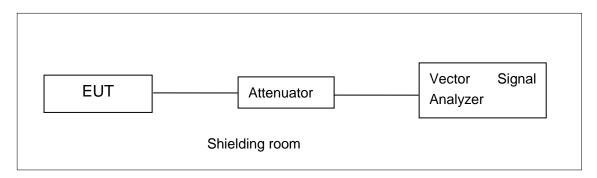


Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements

#### 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;

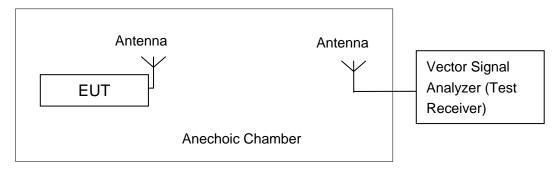


Fig.A.1.2.1: Test Setup Diagram for Radiated Measurements

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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  $\geq$  [1.5  $\times$  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/a mode

	Data Rate	Test Result (dBm)			
Mode		2412MHz	2437MHz	2462 MHz	
	(Mbps)	(Ch1)	(Ch6)	(Ch11)	
	1	20.58	/	/	
802.11b	2	20.81	/	/	
802.110	5.5	21.71	/	/	
	11	22.64	22.64 22.07	22.97	
	6	23.59	/	/	
	9	23.71	/	/	
	12	23.53	/	/	
902 11 a	18	24.28	/	/	
802.11g	24	24.86	/	/	
	36	25.07	/	/	
	48	25.12	/	/	
	54	25.31	24.83	22.31	

The data rate 11Mbps and 54Mbps are selected as worse condition, and the following cases are performed with this condition.



#### 802.11n-HT20 mode

	Data Rate	Test Result (dBm)			
Mode		2412MHz	2437MHz	2462 MHz	
	(Index)	(Ch1)	(Ch6)	(Ch11)	
	MCS0	22.36	/	/	
	MCS1	22.06	/	/	
	MCS2	23.21	/	/	
802.11n	MCS3	23.39	/	/	
(20MHz)	MCS4	23.70	/	/	
	MCS5	23.82	/	/	
	MCS6	23.94	23.69	22.16	
	MCS7	23.76	/	/	

The data rate MCS6 is selected as worse condition, and the following cases are performed with this condition.

802.11n-HT40 mode

	Data Bata	Test Result (dBm)		
Mode	Data Rate (Index)	2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)
	MCS0	23.38	/	/
-	MCS1	23.06	/	/
-	MCS2	23.14	/	/
802.11n	MCS3	23.57	/	/
(40MHz)	MCS4	24.20	/	/
-	MCS5	24.48	24.60	24.13
	MCS6	24.40	/	/
	MCS7	24.12	/	/

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 = 1.50BW.
- b) Set RBW = 1MHz.
- c) Set VBW = 3MHz
- d) Number of points in sweep = 625
- e) Sweep time = auto.
- f) Detector = RMS.
- g) If transmit duty cycle < 98%, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFFintervals) or at duty



cycle  $\ge$ 98%, and if each transmission is entirely at the maximum power control level, then 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 band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

## 802.11b/g mode

Mada		Test Result (dBm)			
Mode	2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)		
802.11b	18.77	18.32	18.73		
802.11g	17.09	16.62	14.58		

#### 802.11n-HT20 mode

Mode	Test Result (dBm)		
iviode	2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11n (20MHz)	15.72	15.51	14.39

#### 802.11n-HT40 mode

Mode	Test Result (dBm)		
wiode	2422MHz (Ch3)	2437MHz (Ch6)	2452 MHz (Ch9)
802.11n(40MHz)	15.96	15.92	15.37

**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:**

#### 802.11b/g mode

Mode	Channel	Power Spectral Density ( dBm/3 kHz )		Conclusion	
	1	Fig.A.3.1	-4.71	Р	
802.11b	6	Fig.A.3.2	-5.02	Р	
	11	Fig.A.3.3	-4.17	Р	
	1	Fig.A.3.4	-9.94	Р	
802.11g	6	Fig.A.3.5	-10.67	Р	
	11	Fig.A.3.6	-12.69	Р	

#### 802.11n-HT20 mode

Mode	Channel	-	ctral Density /3 kHz )	Conclusion
802.11n (HT20)	1	Fig.A.3.7	-10.82	Р
	6	Fig.A.3.8	-10.86	Р
	11	Fig.A.3.9	-11.89	Р

### 802.11n-HT40 mode

Mode	Channel	-	ctral Density /3 kHz )	Conclusion
802.11n (HT40)	3	Fig.A.3.10	-13.06	Р
	6	Fig.A.3.11	-13.75	Р
	9	Fig.A.3.12	-14.49	Р

**Conclusion: Pass** 

Test graphs as below:



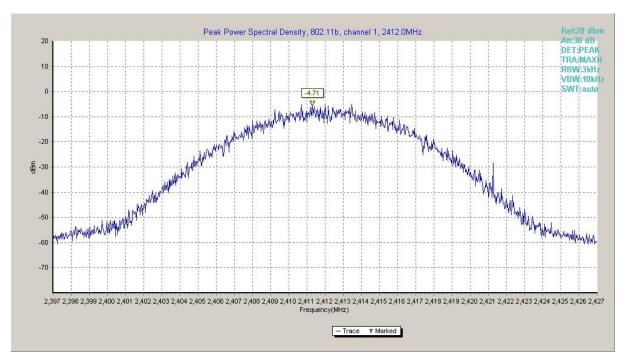


Fig.A.3.1 Power Spectral Density(802.11b,Ch1)

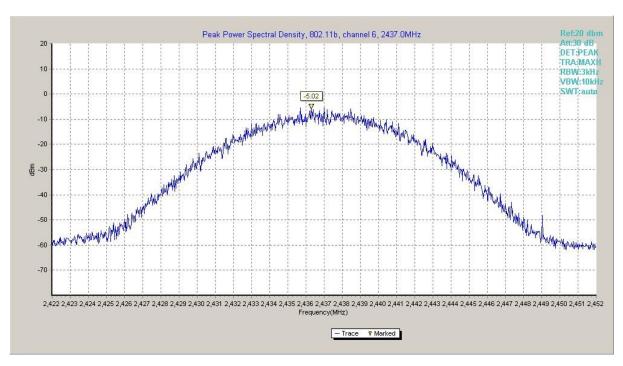


Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)



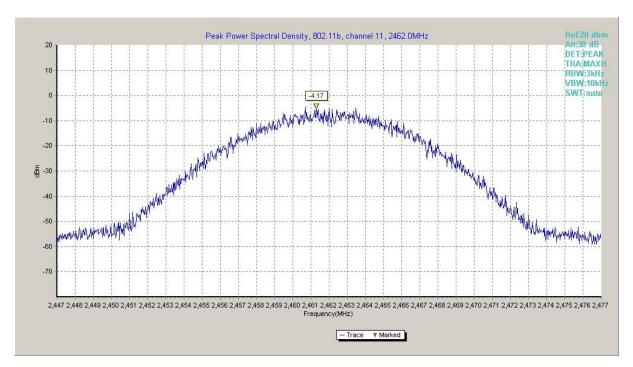


Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)

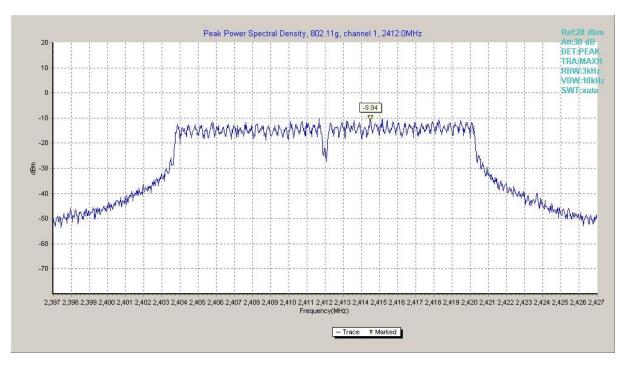


Fig.A.3.4 Power Spectral Density (802.11g, Ch 1)



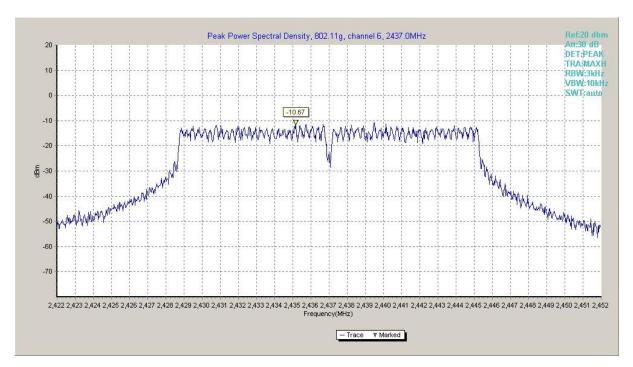


Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)

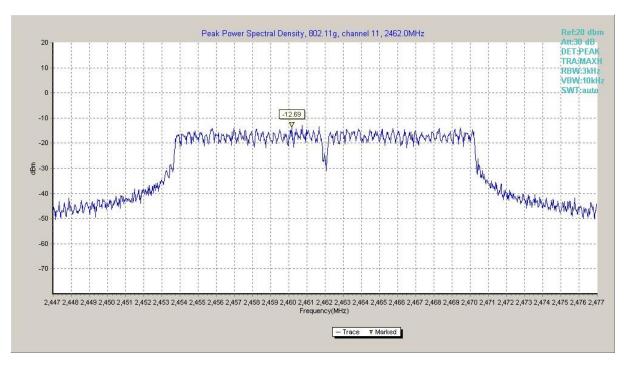


Fig.A.3.6 Power Spectral Density (802.11g, Ch 11)



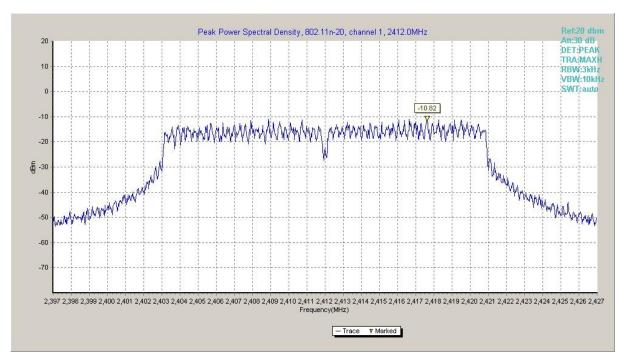


Fig.A.3.7 Power Spectral Density (802.11n-HT20, Ch 1)

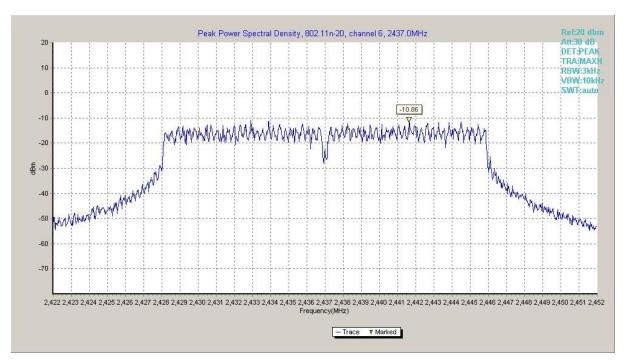


Fig.A.3.8 Power Spectral Density (802.11n-HT20, Ch 6)



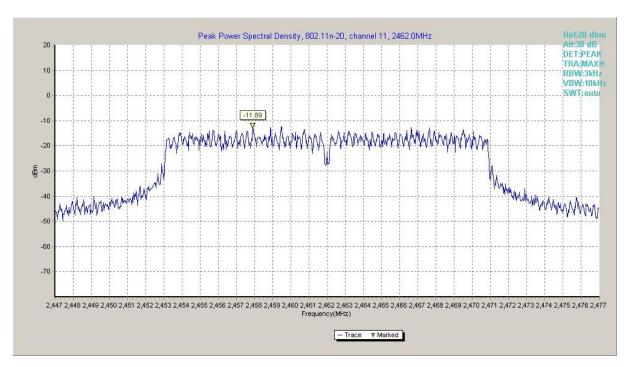


Fig.A.3.9 Power Spectral Density (802.11n-HT20, Ch 11)

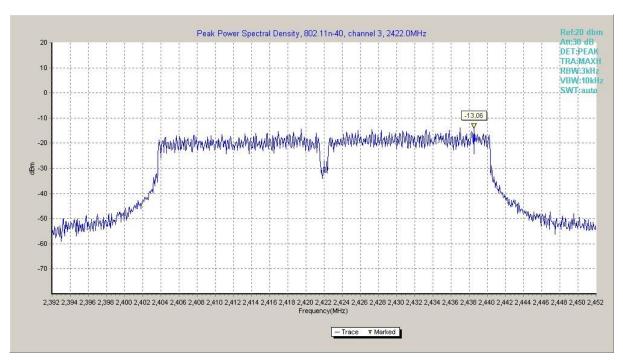


Fig.A.3.10 Power Spectral Density (802.11n-HT40, Ch 3)



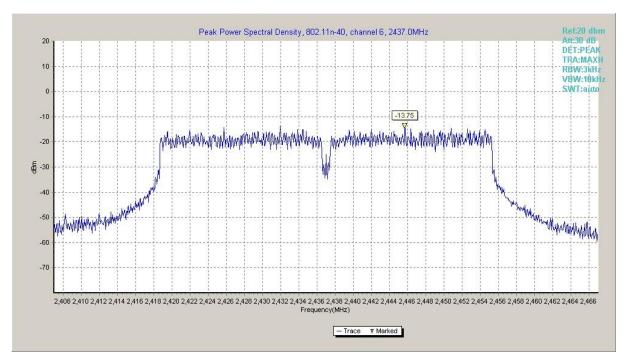


Fig.A.3.11 Power Spectral Density (802.11n-HT40, Ch 6)

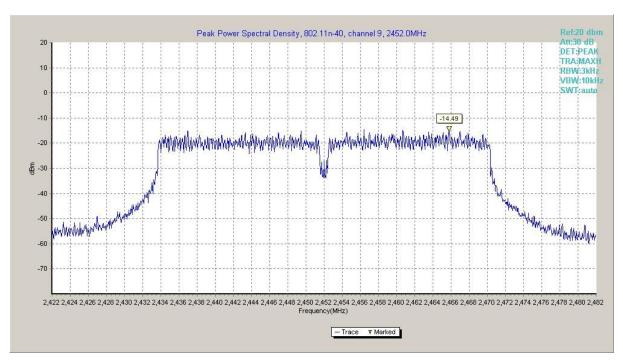


Fig.A.3.12 Power Spectral Density (802.11n-HT40, Ch 9)



# 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	7300	Р
	6	Fig.A.4.2	6850	Р
	11	Fig.A.4.3	6950	Р
802.11g	1	Fig.A.4.4	16450	Р
	6	Fig.A.4.5	16500	Р
	11	Fig.A.4.6	16500	Р

#### 802.11n-HT20 mode

Mode	Channel	Occupied 6dB Bandwidth ( kHz)		conclusion
802.11n (HT20)	1	Fig.A.4.7	17650	Р
	6	Fig.A.4.8	17700	Р
	11	Fig.A.4.9	17700	Р

#### 802.11n-HT40 mode

Mode	Channel	Occupied 6dB Bandwidth ( kHz)		conclusion
802.11n (HT40)	3	Fig.A.4.10	36400	Р
	6	Fig.A.4.11	36400	Р
	9	Fig.A.4.12	36480	Р

**Conclusion: Pass** 



#### Test graphs as below:

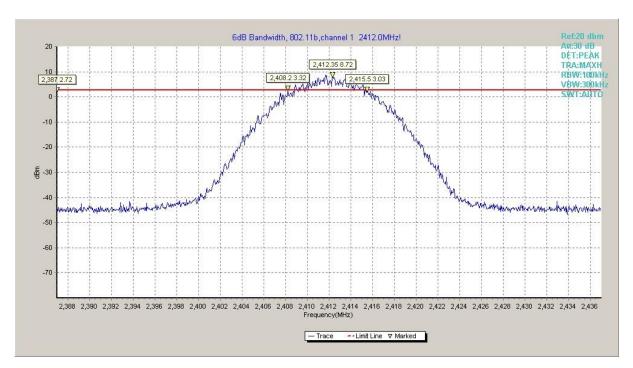


Fig.A.4.1 Occupied 6dB Bandwidth(802.11b,Ch 1)



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



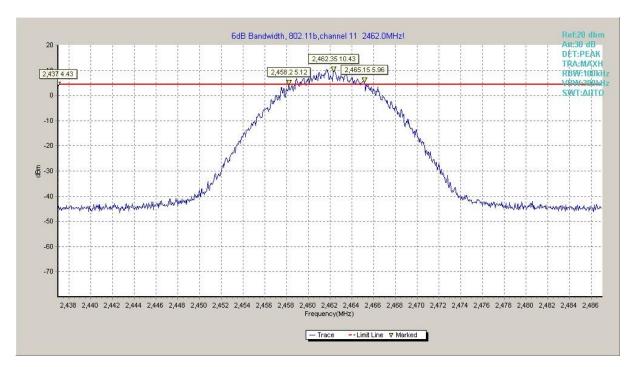


Fig.A.4.3 Occupied 6dB Bandwidth (802.11b, Ch 11)

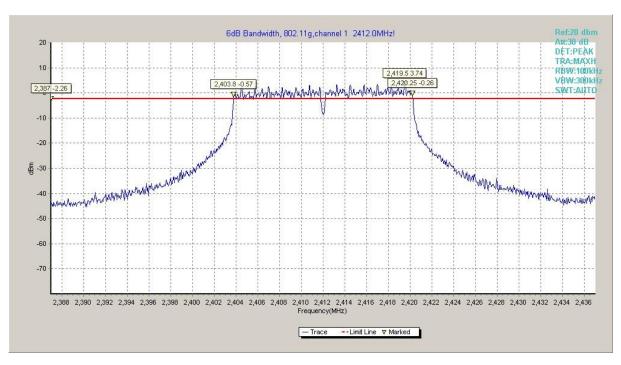


Fig.A.4.4 Occupied 6dB Bandwidth (802.11g, Ch 1)



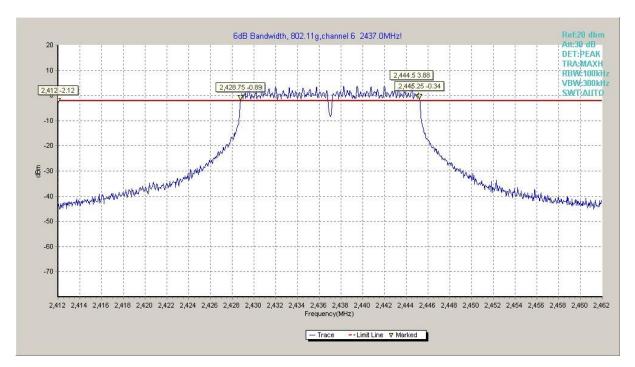


Fig.A.4.5 Occupied 6dB Bandwidth (802.11g, Ch 6)

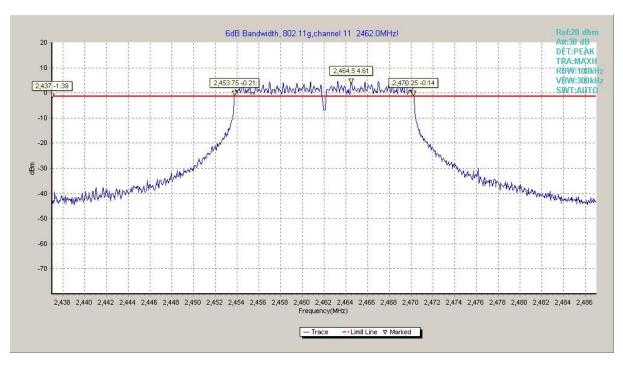


Fig.A.4.6 Occupied 6dB Bandwidth (802.11g, Ch 11)