



FCC RF Test Report

APPLICANT : TCL Communication Ltd.
EQUIPMENT : HSUPA/HSDPA/UMTS Tri Band/GSM Quad Band/LTE 7
band mobile phone
BRAND NAME : Vodafone
MODEL NAME : VFD 900
FCC ID : 2ACCJN007
STANDARD : FCC Part 15 Subpart E §15.407
CLASSIFICATION : (NII) Unlicensed National Information Infrastructure

The product was received on Dec. 14, 2015 and testing was completed on Apr. 01, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR5D1401F	Rev. 01	Initial issue of report	Apr. 14, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	6dB, 26dB and 99% Occupied Bandwidth	> 500kHz	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 30 dBm	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 30 dBm/500kHz	Pass	-
3.4	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm/MHz & 15.209(a)	Pass	Under limit 3.33 dB at 30.000 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 4.53 dB at 26.140 MHz
3.6	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.7	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.8	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

TCL Communication Ltd.

5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203

1.2 Manufacturer

TCL Communication Ltd.

5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	HSUPA/HSDPA/UMTS Tri Band/GSM Quad Band/LTE 7 band mobile phone
Brand Name	Vodafone
Model Name	VFD 900
FCC ID	2ACCJN007
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(16QAM uplink is not supported)/LTE/NFC/ WLAN 2.4GHz 802.11b/g/n HT20/ WLAN 5GHz 802.11a/n HT20/HT40/ WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0+EDR/ Bluetooth v4.0 LE/ Bluetooth v4.2 LE
IMEI Code	Conducted: 357066070004866 Radiation: 357066070005020 Conduction: 357066070004395
HW Version	PIO
SW Version	V3HT1
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	5745 MHz ~ 5805 MHz
Maximum Output Power	802.11a : 11.33 dBm / 0.0136 W 802.11n HT20 : 11.08 dBm / 0.0128 W 802.11n HT40 : 9.33 dBm / 0.0086 W 802.11ac VHT20: 9.85 dBm / 0.0097 W 802.11ac VHT40: 9.55 dBm / 0.0090 W 802.11ac VHT80: 9.15 dBm / 0.0082 W
99% Occupied Bandwidth	802.11a : 18.83 MHz 802.11n HT20 : 19.48 MHz 802.11n HT40 : 36.86 MHz 802.11ac VHT20: 19.38 MHz 802.11ac VHT40: 36.86 MHz 802.11ac VHT80: 74.69 MHz
Antenna Type / Gain	LDS Antenna with gain -0.40 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

1.5 Specification of Accessory

Specification of Accessory				
AC Adapter	Brand Name	N/A	Model Name	QC10US
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5.0Vdc, 2A, / 9.0Vdc, 1.67A		
	Manufacturer	BYD	P/N	CBA0060AG1C1
Battery	Brand Name	ALCATEL ONETOUCH	Model Name	TLp030F2
	Power Rating	3.84Vdc, 3000mAh		
	Manufacturer	SCUD	P/N	CAC3000013C2
USB Cable 1	Brand Name	N/A	Model Name	CDA0000043C8
	Signal Line Type	1.01m shielded without core		
	Manufacturer	PUAN	P/N	N/A
USB Cable 2	Brand Name	N/A	Model Name	CDA0000043C2 CDA0000087C2
	Signal Line Type	1.00m shielded without core		
	Manufacturer	Shenghua	P/N	N/A
Earphone	Brand Name	N/A	Model Name	WH60
	Signal Line Type	1.24m non-shielded without core		
	Manufacturer	Lianchuang	P/N	N/A

1.6 Modification of EUT

No modifications are made to the EUT during all test items.



1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	Sporton Site No.			FCC Registration No.
	TH01-KS	CO01-KS	03CH03-KS	306251

Note: The test site complies with ANSI C63.4 2014 requirement.

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5745 MHz ~ 5805 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151	5755	159	5795
	153	5765	161	5805
	155	5775		

Note: The above Frequency and Channel in boldface were 802.11n HT40.



2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables.

WLAN 5GHz 802.11a Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps								
CH 149	5745	11.33	CH 149	11.25	11.28	11.28	11.22	11.28	11.31	11.30
CH 157	5785	11.29								
CH 161	5805	11.23								

WLAN 5GHz 802.11n-HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0								
CH 149	5745	11.08	CH 149	10.97	11.01	10.94	11.06	11.00	11.02	11.05
CH 157	5785	10.96								
CH 161	5805	10.98								

WLAN 5GHz 802.11n-HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0								
CH 151	5755	9.07	CH 159	9.19	9.28	9.32	9.26	9.29	9.27	9.31
CH 159	5795	9.33								

WLAN 5GHz 802.11ac VHT20 Average Power (dBm)											
Power vs. Channel			Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
		MCS0									
CH 149	5745	9.50	CH 157	9.65	9.73	9.68	9.75	9.78	9.80	9.83	9.82
CH 157	5785	9.85									
CH 161	5805	9.64									

WLAN 5GHz 802.11ac VHT40 Average Power (dBm)												
Power vs. Channel			Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
		MCS0										
CH 151	5755	9.29	CH 159	9.48	9.34	9.33	9.40	9.36	9.32	9.53	9.44	9.51
CH 159	5795	9.55										

WLAN 5GHz 802.11n-HT80 Average Power (dBm)												
Power vs. Channel			Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
		MCS0										
CH 155	5775	9.15	CH 155	9.00	8.97	9.07	9.01	9.10	9.12	9.11	9.05	9.13

2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

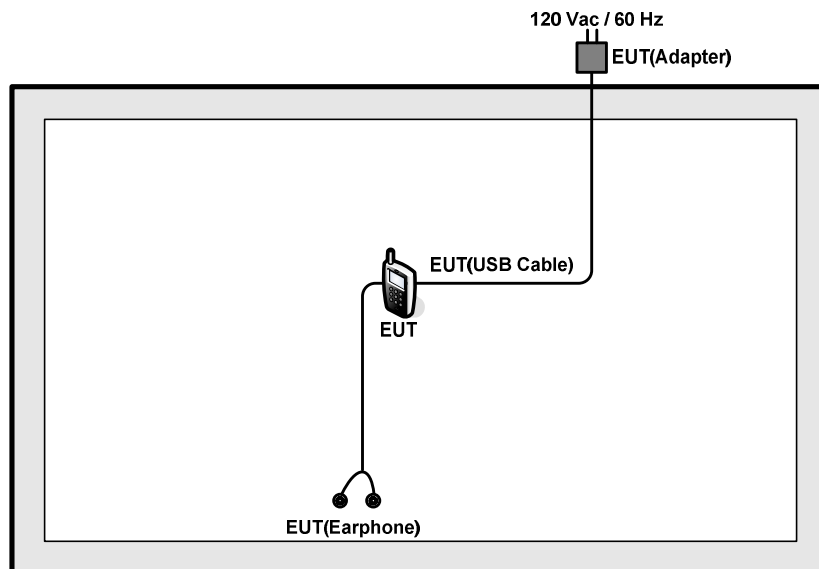
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable 1 (Charging from Adapter)
Remark:	
1. For Radiated TCs, the tests were performed with Adapter, Earphone and USB cable 1.	

Ch. #		Band IV : 5745 ~ 5805 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	149	149	151
M	Middle	157	157	-
H	High	161	161	159

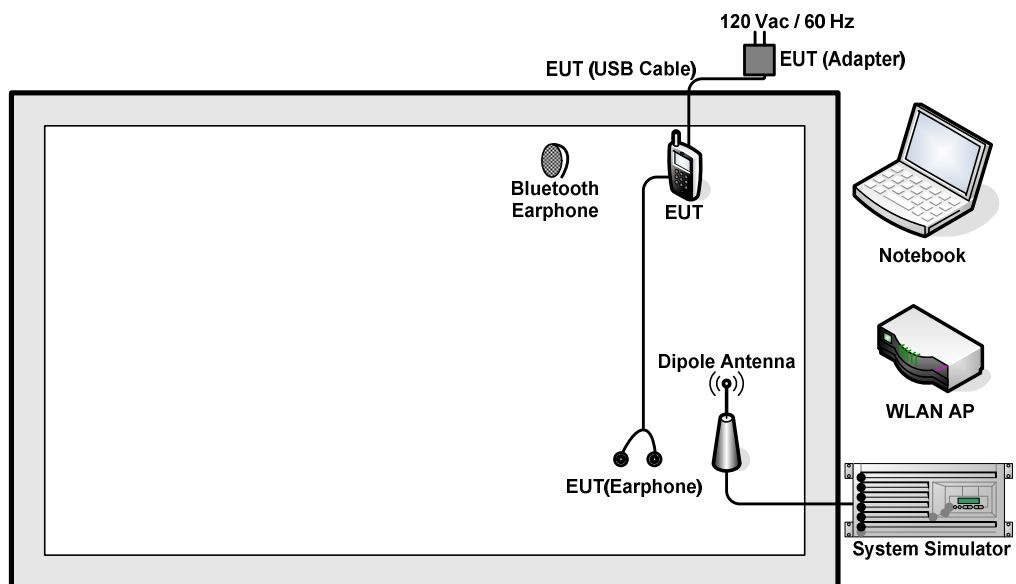
Ch. #		Band IV : 5745 ~ 5805MHz		
		802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	149	151	-
M	Middle	157	-	155
H	High	161	151	-

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
2.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
3.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
5.	DC Power Supply	GW INSTEK	GPD-2303S	N/A	N/A	Unshielded, 1.8 m

2.6 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the Notebook under large package sizes transmission.

2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss.

Offset = RF cable loss.

Following shows an offset computation example with cable loss 6.2 dB.

Offset (dB) = RF cable loss(dB).

= 6.2 (dB)

3 Test Result

3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

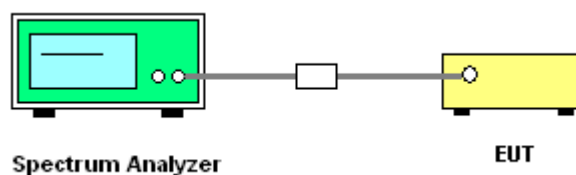
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

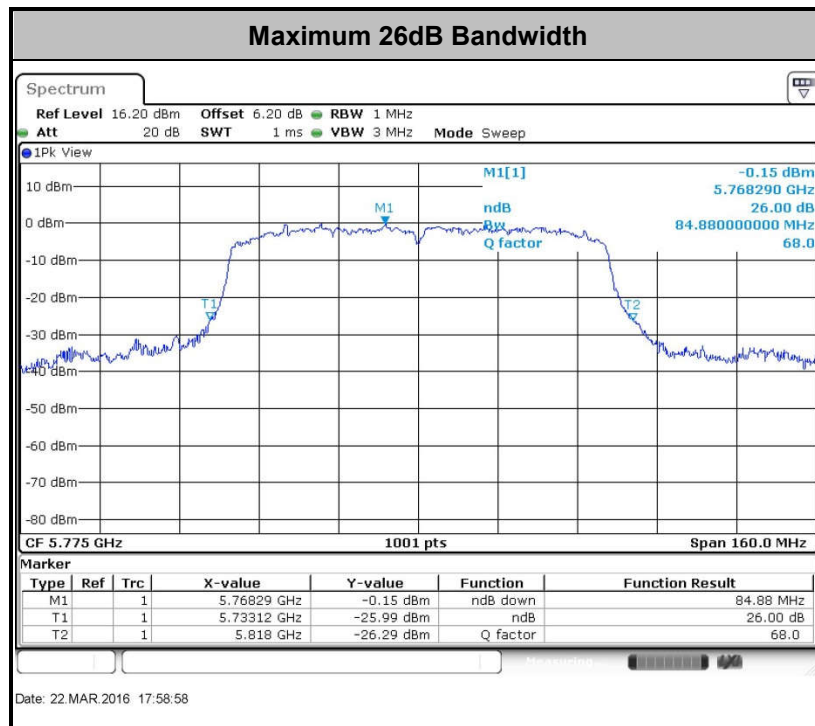
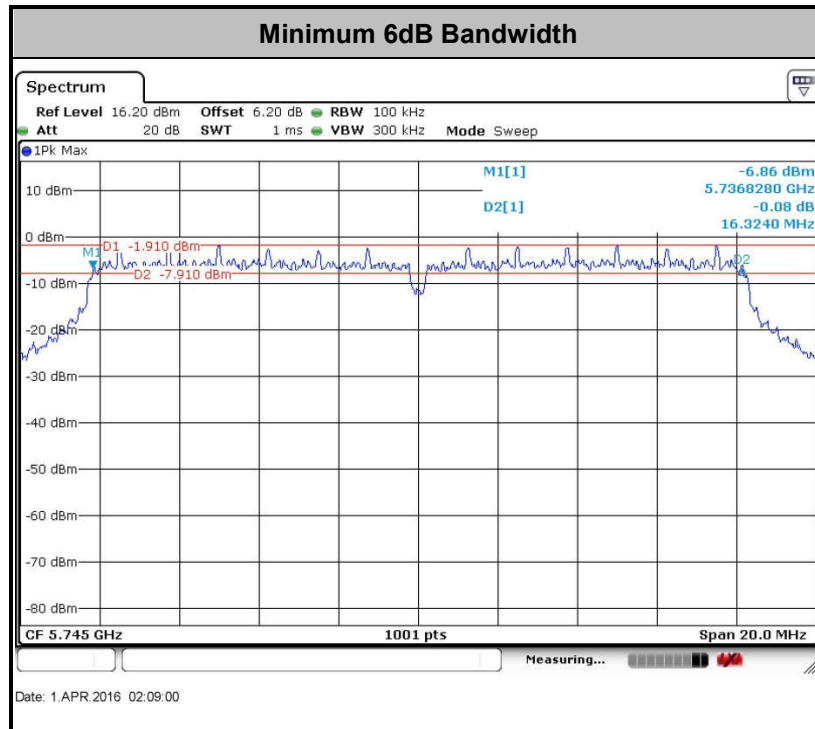
3.1.4 Test Setup

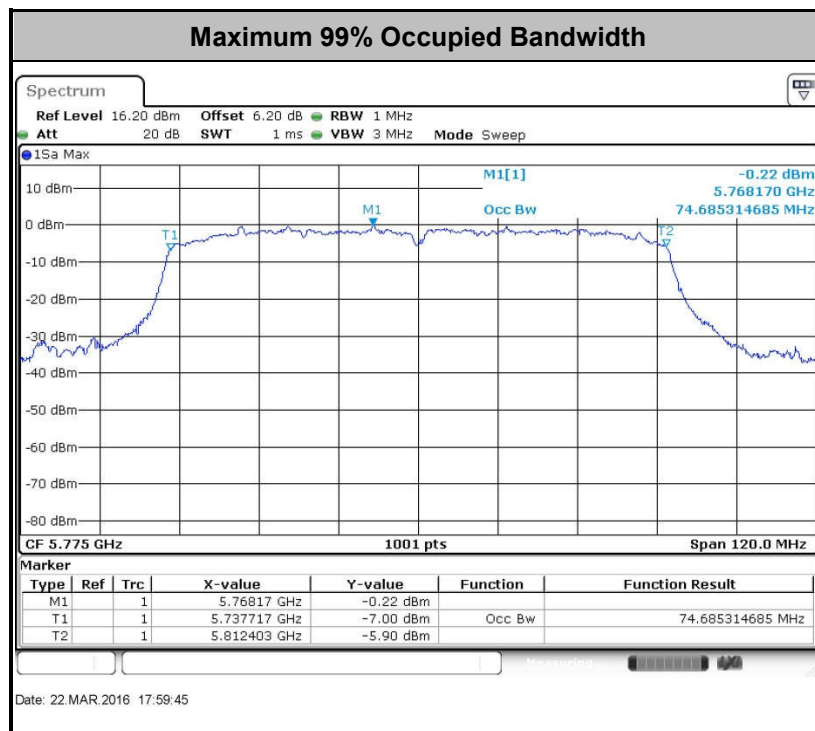




3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.





Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

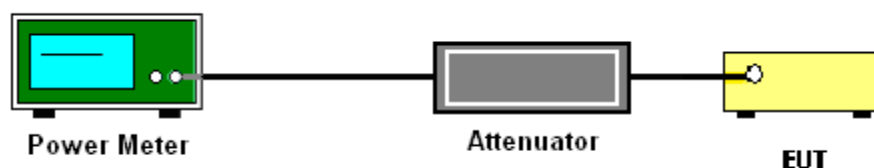
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, $10 \log(1/x)$, where x is the duty cycle.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
Section F) Maximum power spectral density.

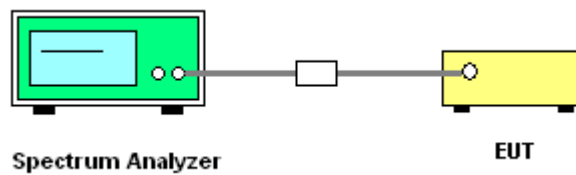
Method SA-2

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. The testing follows Method SA-2 of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
 - Measure the duty cycle.
 - Set span to encompass the entire emission bandwidth (EBW) of the signal.
 - Set RBW = 300 kHz.
 - Set VBW \geq 1 MHz.
 - Number of points in sweep \geq 2 Span / RBW.
 - Sweep time = auto.
 - Detector = RMS
 - Trace average at least 100 traces in power averaging mode.
 - Add $10 \log(500\text{kHz}/\text{RBW})$ to the test result.
 - Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.

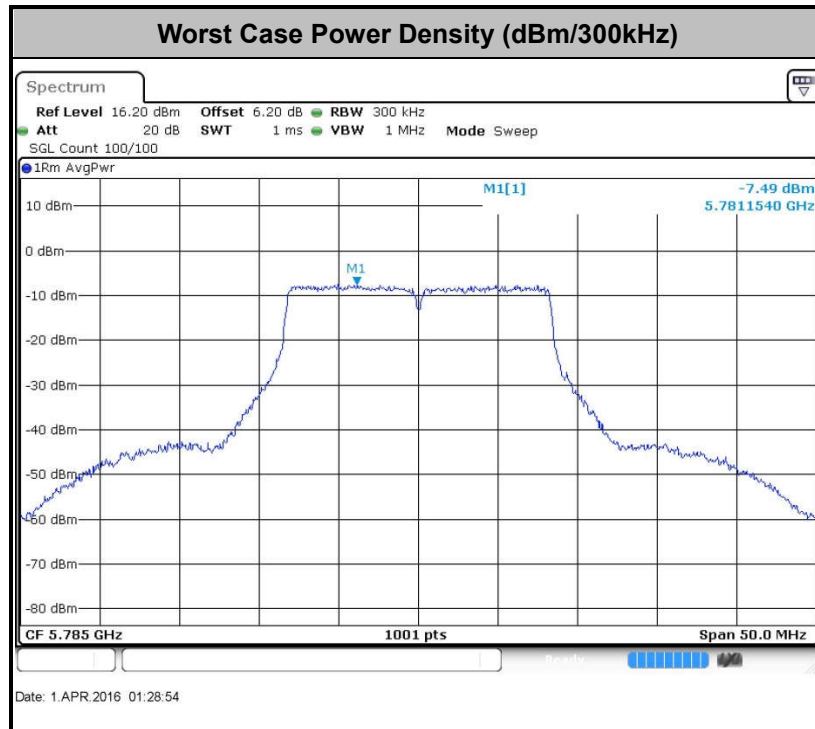
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



3.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part 15.205.

3.4.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5725-5850 MHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBμV/m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBμV/m).
- (2) Unwanted spurious emissions fallen in restricted bands per FCC Part 15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

Note: The following formula is used to convert the EIRP to field strength.

$$E = \frac{1000000\sqrt{30P}}{3} \text{ } \mu\text{V/m, where P is the eirp (Watts)}$$

EIRP (dBm)	Field Strength at 3m (dBμV/m)
-17	78.3
-27	68.3

- (3) KDB 789033 D02 General UNII Test Procedures New Rules v01r02 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02.
Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW \geq 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW \geq 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

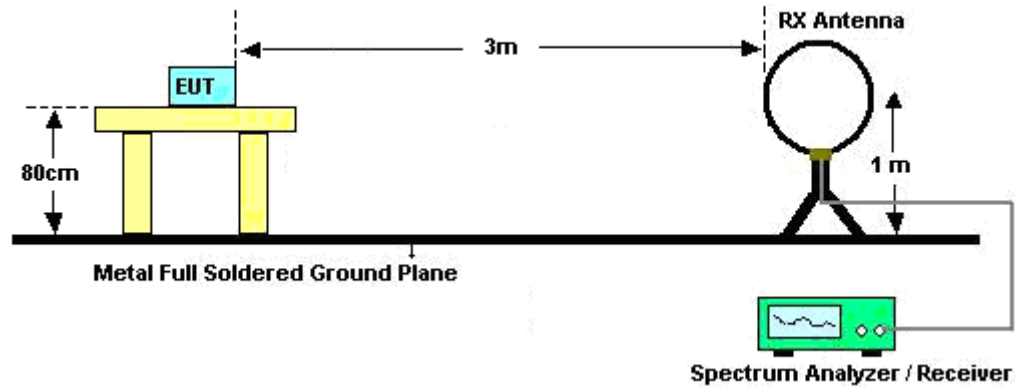
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	87.500	1.370	0.730	1kHz
802.11n HT20	86.092	1.274	0.785	1kHz
802.11n HT40	76.522	0.638	1.568	3kHz
802.11ac VHT20	83.333	0.978	1.022	3kHz
802.11ac VHT40	70.418	0.490	2.041	3kHz
802.11ac VHT80	55.484	0.249	4.012	10kHz



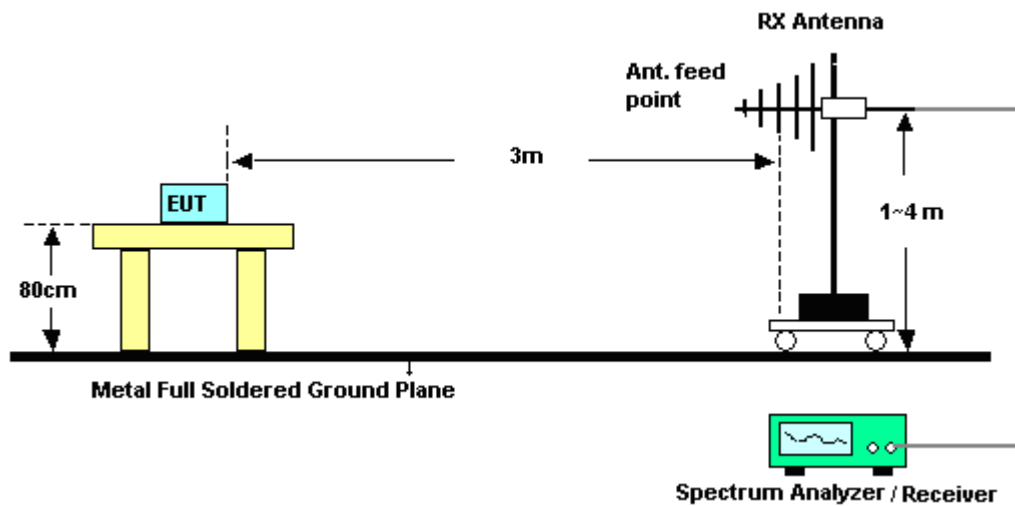
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.4.4 Test Setup

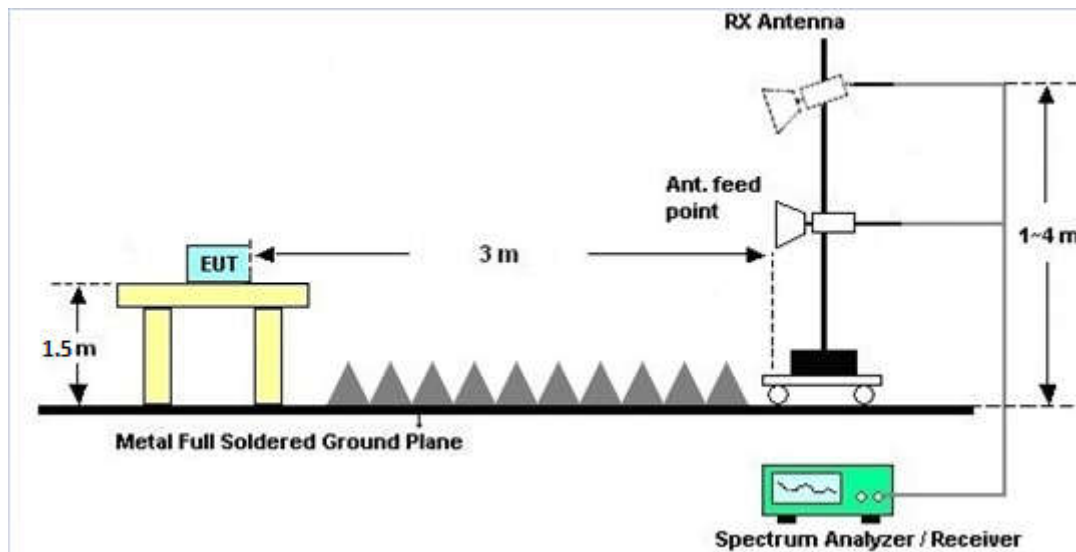
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.4.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix B.

3.4.7 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B.

3.5 AC Conducted Emission Measurement

3.5.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

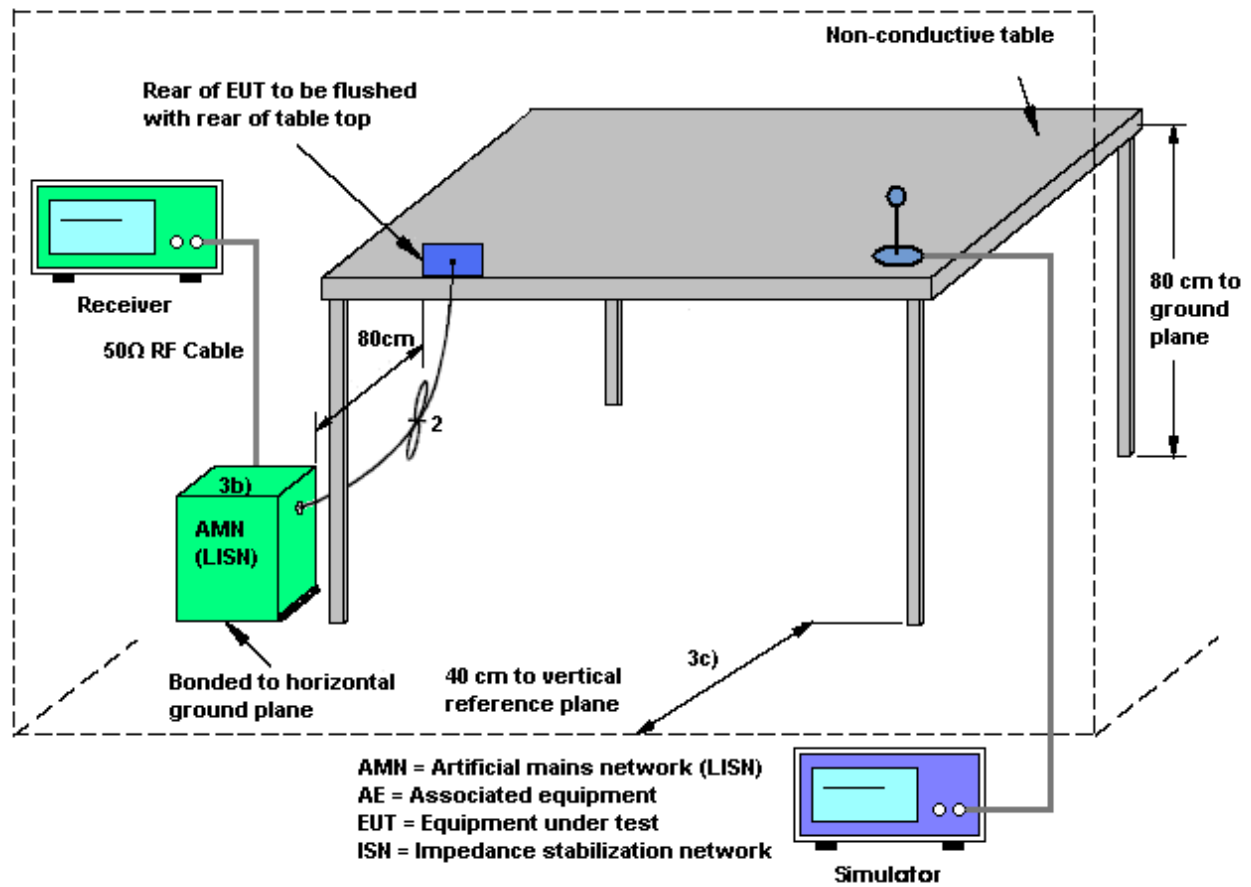
3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

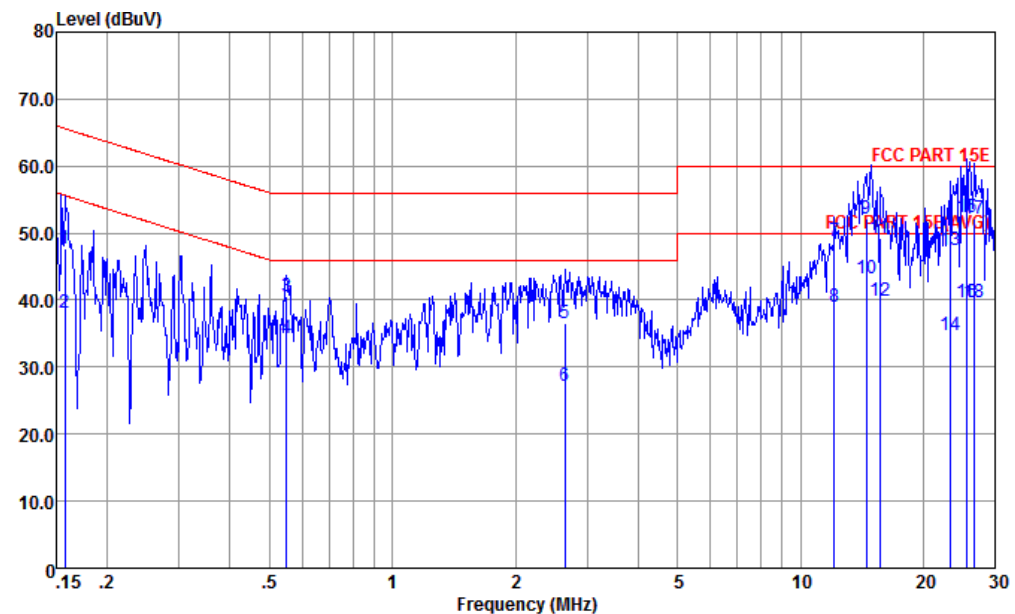
3.5.4 Test Setup





3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~46%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable 1 (Charging from Adapter)		



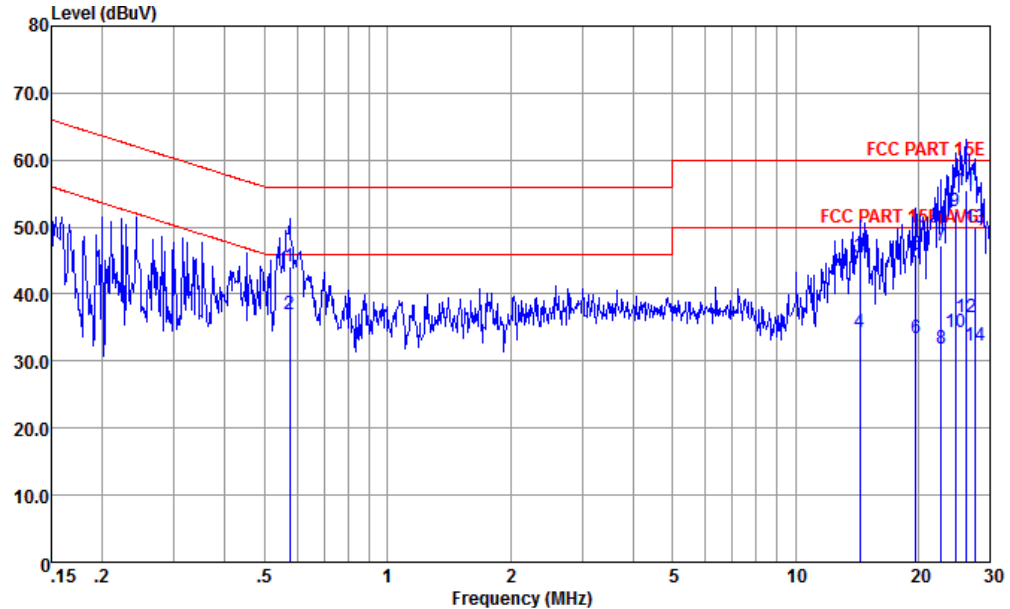
Site : CO01-KS
Condition : FCC PART 15E LISN-L-20151024 LINE

mode : Mode 1

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.16	47.79	-17.81	65.60	37.20	0.48	10.11	QP
2	0.16	38.09	-17.51	55.60	27.50	0.48	10.11	Average
3	0.55	40.49	-15.51	56.00	30.10	0.23	10.16	QP
4	0.55	34.29	-11.71	46.00	23.90	0.23	10.16	Average
5	2.65	36.53	-19.47	56.00	26.20	0.18	10.15	QP
6	2.65	27.23	-18.77	46.00	16.90	0.18	10.15	Average
7	12.12	48.77	-11.23	60.00	38.20	0.25	10.32	QP
8	12.12	39.07	-10.93	50.00	28.50	0.25	10.32	Average
9	14.52	52.23	-7.77	60.00	41.60	0.26	10.37	QP
10 *	14.52	43.13	-6.87	50.00	32.50	0.26	10.37	Average
11	15.63	49.27	-10.73	60.00	38.60	0.26	10.41	QP
12	15.63	39.87	-10.13	50.00	29.20	0.26	10.41	Average
13	23.26	47.37	-12.63	60.00	36.50	0.24	10.63	QP
14	23.26	34.77	-15.23	50.00	23.90	0.24	10.63	Average
15	25.46	52.42	-7.58	60.00	41.50	0.22	10.70	QP
16	25.46	39.72	-10.28	50.00	28.80	0.22	10.70	Average
17	26.70	52.17	-7.83	60.00	41.20	0.22	10.75	QP
18	26.70	39.57	-10.43	50.00	28.60	0.22	10.75	Average



Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~46%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (5GHz) Link + Earphone + USB Cable 1 (Charging from Adapter)		



Site : CO01-KS
Condition : FCC PART 15E LISN-N-20151024 NEUTRAL
mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.58	44.09	-11.91	56.00	33.60	0.33	10.16	QP
2	0.58	37.09	-8.91	46.00	26.60	0.33	10.16	Average
3	14.36	45.54	-14.46	60.00	34.90	0.27	10.37	QP
4	14.36	34.24	-15.76	50.00	23.60	0.27	10.37	Average
5	19.74	45.88	-14.12	60.00	35.10	0.25	10.53	QP
6	19.74	33.38	-16.62	50.00	22.60	0.25	10.53	Average
7	22.78	47.16	-12.84	60.00	36.30	0.24	10.62	QP
8	22.78	31.76	-18.24	50.00	20.90	0.24	10.62	Average
9	24.66	52.42	-7.58	60.00	41.50	0.24	10.68	QP
10	24.66	34.22	-15.78	50.00	23.30	0.24	10.68	Average
11 *	26.14	55.47	-4.53	60.00	44.50	0.24	10.73	QP
12	26.14	36.47	-13.53	50.00	25.50	0.24	10.73	Average
13	27.56	49.92	-10.08	60.00	38.90	0.24	10.78	QP
14	27.56	32.32	-17.68	50.00	21.30	0.24	10.78	Average

3.6 Frequency Stability Measurement

3.6.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

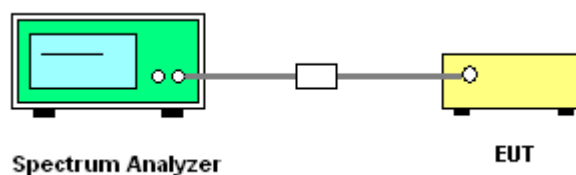
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

3.6.4 Test Setup



3.6.5 Test Result of Frequency Stability

Please refer to Appendix A.



3.7 Automatically Discontinue Transmission

3.7.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.7.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



3.8 Antenna Requirements

3.8.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2), if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.8.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.8.3 Antenna Gain

The antenna gain is less than 6 dBi. Therefore, it is not necessary to reduce maximum output power limit.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV30	101338	9kHz~30GHz	May 04, 2015	Mar. 22, 2016~ Apr. 01, 2016	May 03, 2016	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	30MHz~40GHz	Jan. 20, 2016	Mar. 22, 2016~ Apr. 01, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 20, 2016	Mar. 22, 2016~ Apr. 01, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 24, 2015	Mar. 22, 2016~ Apr. 01, 2016	Oct. 23, 2016	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	Mar. 23, 2016	Sep. 09, 2016	Radiation (03CH03-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Jun. 05, 2015	Mar. 23, 2016	Jun. 04, 2016	Radiation (03CH03-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 07, 2015	Mar. 23, 2016	Nov. 06, 2016	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	25MHz~2GHz	Mar. 12, 2016	Mar. 23, 2016	Mar. 11, 2017	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Jun. 25, 2015	Mar. 23, 2016	Jun. 24, 2016	Radiation (03CH03-KS)
SHF-EHF Horn	com-power	AH-840	101070	18Ghz~40Ghz	Oct. 10, 2015	Mar. 23, 2016	Oct. 09, 2016	Radiation (03CH03-KS)
Amplifier	Burgeon	BPA-530	102212	0.01MHz~3000MHz	Aug. 10, 2015	Mar. 23, 2016	Aug. 09, 2016	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 24, 2015	Mar. 23, 2016	Oct. 23, 2016	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Mar. 23, 2016	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Mar. 23, 2016	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Mar. 23, 2016	NCR	Radiation (03CH03-KS)
EMI Receiver	R&S	ESC17	100768	9kHz~7GHz	May 04, 2015	Mar. 14, 2016	May 03, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 24, 2015	Mar. 14, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 24, 2015	Mar. 14, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 24, 2015	Mar. 14, 2016	Oct. 23, 2016	Conduction (CO01-KS)

NCR: No Calibration Required



5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.3 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.5 dB
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Appendix A. Conducted Test Results

Report Number : FR5D1401F

Test Engineer:	Issac Song	Temperature:	24~25	°C
Test Date:	2016/3/22~2016/4/01	Relative Humidity:	49~51	%

TEST RESULTS DATA
6dB and 26dB EBW and 99% OBW

Band IV									
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)	26 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	6dB Bandwidth min. Limit (MHz)	Pass/Fail
11a	6M bps	1	149	5745	18.63	23.53	16.32	0.5	Pass
11a	6Mbps	1	157	5785	18.83	23.93	16.34	0.5	Pass
11a	6Mbps	1	161	5825	18.78	23.68	16.34	0.5	Pass
HT20	MCS 0	1	149	5745	19.48	23.98	17.56	0.5	Pass
HT20	MCS 0	1	157	5785	19.48	24.03	17.56	0.5	Pass
HT20	MCS 0	1	161	5825	19.38	23.78	17.56	0.5	Pass
HT40	MCS 0	1	151	5755	36.76	44.51	35.13	0.5	Pass
HT40	MCS 0	1	159	5795	36.86	44.87	35.13	0.5	Pass
VHT20	MCS 0	1	149	5745	19.38	23.93	17.56	0.5	Pass
VHT20	MCS 0	1	157	5785	19.28	24.03	17.56	0.5	Pass
VHT20	MCS 0	1	161	5825	19.38	24.13	17.56	0.5	Pass
VHT40	MCS 0	1	151	5755	36.86	45.23	35.17	0.5	Pass
VHT40	MCS 0	1	159	5795	36.86	44.96	35.17	0.5	Pass
VHT80	MCS 0	1	155	5775	74.69	84.88	75.05	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)		Pass/Fail
11a	6M bps	1	149	5745	0.58	11.33	30.00	-0.40		Pass
11a	6Mbps	1	157	5785	0.58	11.29	30.00	-0.40		Pass
11a	6Mbps	1	161	5825	0.58	11.23	30.00	-0.40		Pass
HT20	MCS 0	1	149	5745	0.65	11.08	30.00	-0.40		Pass
HT20	MCS 0	1	157	5785	0.65	10.96	30.00	-0.40		Pass
HT20	MCS 0	1	161	5825	0.65	10.98	30.00	-0.40		Pass
HT40	MCS 0	1	151	5755	1.16	9.07	30.00	-0.40		Pass
HT40	MCS 0	1	159	5795	1.16	9.33	30.00	-0.40		Pass
VHT20	MCS 0	1	149	5745	0.79	9.50	30.00	-0.40		Pass
VHT20	MCS 0	1	157	5785	0.79	9.85	30.00	-0.40		Pass
VHT20	MCS 0	1	161	5825	0.79	9.64	30.00	-0.40		Pass
VHT40	MCS 0	1	151	5755	1.52	9.29	30.00	-0.40		Pass
VHT40	MCS 0	1	159	5795	1.52	9.55	30.00	-0.40		Pass
VHT80	MCS 0	1	155	5775	2.56	9.15	30.00	-0.40		Pass

TEST RESULTS DATA
Power Spectral Density

Band IV										
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	10log (500kHz /RBW) Factor (dB)	Average Power Density (dBm/500kHz)	Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass/Fail
11a	6M bps	1	149	5745	0.58	2.22	-4.88	30.00	-0.40	Pass
11a	6Mbps	1	157	5785	0.58	2.22	-4.69	30.00	-0.40	Pass
11a	6Mbps	1	161	5825	0.58	2.22	-4.82	30.00	-0.40	Pass
HT20	MCS 0	1	149	5745	0.65	2.22	-5.63	30.00	-0.40	Pass
HT20	MCS 0	1	157	5785	0.65	2.22	-5.56	30.00	-0.40	Pass
HT20	MCS 0	1	161	5825	0.65	2.22	-5.46	30.00	-0.40	Pass
HT40	MCS 0	1	151	5755	1.16	2.22	-8.45	30.00	-0.40	Pass
HT40	MCS 0	1	159	5795	1.16	2.22	-8.80	30.00	-0.40	Pass
VHT20	MCS 0	1	149	5745	0.79	2.22	-5.26	30.00	-0.40	Pass
VHT20	MCS 0	1	157	5785	0.79	2.22	-5.38	30.00	-0.40	Pass
VHT20	MCS 0	1	161	5825	0.79	2.22	-4.97	30.00	-0.40	Pass
VHT40	MCS 0	1	151	5755	1.52	2.22	-8.08	30.00	-0.40	Pass
VHT40	MCS 0	1	159	5795	1.52	2.22	-8.37	30.00	-0.40	Pass
VHT80	MCS 0	1	155	5775	2.56	2.22	-10.40	30.00	-0.40	Pass

TEST RESULTS DATA
Frequency Stability

Band IV										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (°C)	Voltage (V)	Note
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	3.5	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	4.4	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	20	3.8	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	-30	3.8	
11a	6M bps	1	149	5745	5745.000	0.000	0.00	50	3.8	



Appendix B. Radiated Test Results

15E Band 4 - 5725~5850MHz

WIFI 802.11a (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5713.88	55.16	-13.14	68.3	50.85	32.03	8.55	36.27	100	124	P	H
		5723.88	65.19	-13.11	78.3	60.86	32.04	8.57	36.28	100	124	P	H
	*	5750	101.62	-	-	97.28	32.05	8.58	36.29	100	124	P	H
	*	5740	94.36	-	-	90.02	32.05	8.58	36.29	100	124	A	H
		5713.48	55.32	-12.98	68.3	51.01	32.03	8.55	36.27	380	92	P	V
		5724.04	71.08	-7.22	78.3	66.75	32.04	8.57	36.28	380	92	P	V
	*	5746	103.42	-	-	99.08	32.05	8.58	36.29	380	92	P	V
	*	5748	96.04	-	-	91.7	32.05	8.58	36.29	380	92	A	V
802.11a CH 157 5785MHz	*	5780	102.94	-	-	98.59	32.06	8.6	36.31	100	124	P	H
	*	5780	95.69	-	-	91.34	32.06	8.6	36.31	100	124	A	H
	*	5792	104.07	-	-	99.7	32.07	8.62	36.32	318	70	P	V
	*	5790	96.72	-	-	92.35	32.07	8.62	36.32	318	70	A	V
802.11a CH 161 5805MHz	*	5810	104.43			100.05	32.08	8.63	36.33	100	121	P	H
	*	5810	96.32			91.94	32.08	8.63	36.33	100	121	A	H
		5858.48	51.52	-26.78	78.3	47.13	32.1	8.66	36.37	100	121	P	H
		5860.4	48.62	-19.68	68.3	44.23	32.1	8.66	36.37	100	121	P	H
	*	5812	104.35			99.97	32.08	8.63	36.33	290	82	P	V
	*	5810	96.88			92.5	32.08	8.63	36.33	290	82	A	V
		5857.04	51.59	-26.71	78.3	47.2	32.1	8.66	36.37	290	82	P	V
		5860.16	47.95	-20.35	68.3	43.56	32.1	8.66	36.37	290	82	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		11490	43.45	-30.55	74	51.2	38.59	14.2	60.54	100	0	P	H
		11490	45.23	-28.77	74	52.98	38.59	14.2	60.54	100	0	P	V
802.11a CH 157 5785MHz		11571	43.9	-30.1	74	51.4	38.75	14.25	60.5	100	0	P	H
		11571	45.93	-28.07	74	53.43	38.75	14.25	60.5	100	0	P	V
802.11a CH 161 5805MHz		11610	45.36	-28.64	74	52.74	38.83	14.27	60.48	100	0	P	H
		11610	45.89	-28.11	74	53.27	38.83	14.27	60.48	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 149 5745MHz		5712.6	51.42	-16.88	68.3	47.11	32.03	8.55	36.27	100	125	P	H
		5724.44	61.78	-16.52	78.3	57.45	32.04	8.57	36.28	100	125	P	H
	*	5750	100.52	-	-	96.18	32.05	8.58	36.29	100	125	P	H
	*	5738	93.09	-	-	88.75	32.05	8.58	36.29	100	125	A	H
		5714.52	51.96	-16.34	68.3	47.65	32.03	8.55	36.27	300	77	P	V
		5721.96	63.32	-14.98	78.3	58.99	32.04	8.57	36.28	300	77	P	V
	*	5740	101.38	-	-	97.04	32.05	8.58	36.29	300	77	P	V
	*	5740	93.84	-	-	89.5	32.05	8.58	36.29	300	77	A	V
802.11n HT20 CH 157 5785MHz	*	5794	100.07	-	-	95.7	32.07	8.62	36.32	300	124	P	H
	*	5792	93.07	-	-	88.7	32.07	8.62	36.32	300	124	A	H
	*	5792	102.25	-	-	97.88	32.07	8.62	36.32	300	85	P	V
	*	5792	94.55	-	-	90.18	32.07	8.62	36.32	300	85	A	V
802.11n HT20 CH 161 5805MHz	*	5812	101.39	-	-	97.01	32.08	8.63	36.33	112	120	P	H
	*	5800	93.88	-	-	89.51	32.07	8.62	36.32	112	120	A	H
		5857.44	50.91	-27.39	78.3	46.52	32.1	8.66	36.37	112	120	P	H
		5867.6	48.09	-20.21	68.3	43.7	32.1	8.66	36.37	112	120	P	H
	*	5810	101.68	-	-	97.3	32.08	8.63	36.33	325	116	P	V
	*	5800	94.21	-	-	89.84	32.07	8.62	36.32	325	116	A	V
		5856.72	51.47	-26.83	78.3	47.08	32.1	8.66	36.37	325	116	P	V
		5860.48	47.82	-20.48	68.3	43.43	32.1	8.66	36.37	325	116	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 149 5745MHz		11490	43.04	-30.96	74	50.79	38.59	14.2	60.54	100	0	P	H
		11490	43.52	-30.48	74	51.27	38.59	14.2	60.54	100	0	P	V
802.11n HT20 CH 157 5785MHz		11571	42.25	-31.75	74	49.75	38.75	14.25	60.5	100	0	P	H
		11571	43.05	-30.95	74	50.55	38.75	14.25	60.5	100	0	P	V
802.11n HT20 CH 161 5805MHz		11610	44.3	-29.7	74	51.68	38.83	14.27	60.48	100	0	P	H
		11610	44.62	-29.38	74	52	38.83	14.27	60.48	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 151 5755MHz		5714.6	54.26	-14.04	68.3	49.95	32.03	8.55	36.27	100	123	P	H
		5718.36	58.29	-20.01	78.3	53.96	32.04	8.57	36.28	100	123	P	H
	*	5766	95.75	-	-	91.41	32.05	8.59	36.3	100	123	P	H
	*	5766	88.45	-	-	84.11	32.05	8.59	36.3	100	123	A	H
		5713.48	58.16	-10.14	68.3	53.85	32.03	8.55	36.27	346	89	P	V
		5723.64	57.51	-20.79	78.3	53.18	32.04	8.57	36.28	346	89	P	V
	*	5766	95.36	-	-	91.02	32.05	8.59	36.3	346	89	P	V
	*	5742	88.43	-	-	84.09	32.05	8.58	36.29	346	89	A	V
802.11n HT40 CH 159 5795MHz	*	5808	95.98	-	-	91.6	32.08	8.63	36.33	100	125	P	H
	*	5808	88.94	-	-	84.56	32.08	8.63	36.33	100	125	A	H
		5857.2	48.31	-29.99	78.3	43.92	32.1	8.66	36.37	100	125	P	H
		5861.2	48.47	-19.83	68.3	44.08	32.1	8.66	36.37	100	125	P	H
	*	5808	96.75	-	-	92.37	32.08	8.63	36.33	352	101	P	V
	*	5806	89.54	-	-	85.16	32.08	8.63	36.33	352	101	A	V
		5853.28	49.23	-29.07	78.3	44.85	32.09	8.65	36.36	352	101	P	V
		5863.44	47.31	-20.99	68.3	42.92	32.1	8.66	36.37	352	101	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT40 CH 151 5755MHz		11511	43.85	-30.15	74	51.58	38.6	14.21	60.54	100	0	P	H
		11511	42.83	-31.17	74	50.56	38.6	14.21	60.54	100	0	P	V
802.11n HT40 CH 159 5795MHz		11589	43.52	-30.48	74	50.96	38.79	14.26	60.49	100	0	P	H
		11589	45.37	-28.63	74	52.81	38.79	14.26	60.49	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz
WIFI 802.11ac VHT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT20 CH 149 5745MHz		5708.76	53.1	-15.2	68.3	48.79	32.03	8.55	36.27	100	123	P	H
		5723.32	64.55	-13.75	78.3	60.22	32.04	8.57	36.28	100	123	P	H
	*	5738	99.29	-	-	94.95	32.05	8.58	36.29	100	123	P	H
	*	5740	92.2	-	-	87.86	32.05	8.58	36.29	100	123	A	H
		5708.52	52.66	-15.64	68.3	48.35	32.03	8.55	36.27	309	77	P	V
		5723.72	65.59	-12.71	78.3	61.26	32.04	8.57	36.28	309	77	P	V
	*	5752	101.53	-	-	97.19	32.05	8.59	36.3	309	77	P	V
	*	5752	94.36	-	-	90.02	32.05	8.59	36.3	309	77	A	V
802.11ac VHT20 CH 157 5785MHz	*	5790	99.23	-	-	94.86	32.07	8.62	36.32	100	124	P	H
	*	5778	92.45	-	-	88.1	32.06	8.6	36.31	100	124	A	H
	*	5790	101.88	-	-	97.51	32.07	8.62	36.32	301	76	P	V
	*	5790	94.65	-	-	90.28	32.07	8.62	36.32	301	76	A	V
802.11ac VHT20 CH 161 5805MHz	*	5798	102.07	-	-	97.7	32.07	8.62	36.32	105	116	P	H
	*	5812	95.06	-	-	90.68	32.08	8.63	36.33	105	116	A	H
		5856.96	51.82	-26.48	78.3	47.43	32.1	8.66	36.37	105	116	P	H
		5860.24	48.61	-19.69	68.3	44.22	32.1	8.66	36.37	105	116	P	H
	*	5810	102.37	28.37	-	-	32.08	8.63	36.33	316	83	P	V
	*	5812	94.87	40.87	-	-	32.08	8.63	36.33	316	83	A	V
		5856.96	51.2	-27.1	78.3	46.81	32.1	8.66	36.37	316	83	P	V
		5870.96	49.02	-19.28	68.3	44.63	32.1	8.67	36.38	316	83	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

WIFI 802.11ac VHT20 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT20 CH 149 5745MHz		11490	43.15	-30.85	74	50.9	38.59	14.2	60.54	100	0	P	H
		11490	44.19	-29.81	74	51.94	38.59	14.2	60.54	100	0	P	V
802.11ac VHT20 CH 157 5785MHz		11571	43.29	-30.71	74	50.79	38.75	14.25	60.5	100	0	P	H
		11571	45.43	-28.57	74	52.93	38.75	14.25	60.5	100	0	P	V
802.11ac VHT20 CH 161 5805MHz		11610	46.21	-27.79	74	53.59	38.83	14.27	60.48	100	0	P	H
		11610	45.18	-28.82	74	52.56	38.83	14.27	60.48	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz
WIFI 802.11ac VHT40 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT40 CH 151 5755MHz		5713.96	54.72	-13.58	68.3	50.41	32.03	8.55	36.27	100	122	P	H
		5724.12	60.39	-17.91	78.3	56.06	32.04	8.57	36.28	100	122	P	H
	*	5766	95.79	-	-	91.45	32.05	8.59	36.3	100	122	P	H
	*	5766	88.48	-	-	84.14	32.05	8.59	36.3	100	122	A	H
		5713.72	55.31	-12.99	68.3	51	32.03	8.55	36.27	300	70	P	V
		5723.96	59.85	-18.45	78.3	55.52	32.04	8.57	36.28	300	70	P	V
	*	5744	95.9	-	-	91.56	32.05	8.58	36.29	300	70	P	V
	*	5744	88.46	-	-	84.12	32.05	8.58	36.29	300	70	A	V
802.11ac VHT40 CH 159 5795MHz	*	5808	96.95	-	-	92.57	32.08	8.63	36.33	100	127	P	H
	*	5806	89.38	-	-	85	32.08	8.63	36.33	100	127	A	H
		5851.04	49.86	-28.44	78.3	45.48	32.09	8.65	36.36	100	127	P	H
		5863.68	48.99	-19.31	68.3	44.6	32.1	8.66	36.37	100	127	P	H
	*	5806	96.62	-	-	92.24	32.08	8.63	36.33	310	79	P	V
	*	5804	89.16	-	-	84.78	32.08	8.63	36.33	310	79	A	V
		5857.68	48.93	-29.37	78.3	44.54	32.1	8.66	36.37	310	79	P	V
		5861.84	48.16	-20.14	68.3	43.77	32.1	8.66	36.37	310	79	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz

WIFI 802.11ac VHT40 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT40		11511	43.33	-30.67	74	51.06	38.6	14.21	60.54	100	0	P	H
CH 151 5755MHz		11511	43.52	-30.48	74	51.25	38.6	14.21	60.54	100	0	P	V
802.11ac VHT40		11589	43.47	-30.53	74	50.91	38.79	14.26	60.49	100	0	P	H
CH 159 5795MHz		11589	43.57	-30.43	74	51.01	38.79	14.26	60.49	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Band 4 5725~5850MHz
WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT80 CH 155 5775MHz		5708.2	53.64	-14.66	68.3	49.33	32.03	8.55	36.27	100	115	P	H
		5723.08	54.87	-23.43	78.3	50.54	32.04	8.57	36.28	100	115	P	H
	*	5756	91.34	-	-	87	32.05	8.59	36.3	100	115	P	H
	*	5778	84.47	-	-	80.12	32.06	8.6	36.31	100	115	A	H
		5852.8	52.37	-25.93	78.3	47.99	32.09	8.65	36.36	100	115	P	H
		5862	52.51	-15.79	68.3	48.12	32.1	8.66	36.37	100	115	P	H
		5705.96	54.27	-14.03	68.3	49.96	32.03	8.55	36.27	300	68	P	V
		5718.6	56.76	-21.54	78.3	52.43	32.04	8.57	36.28	300	68	P	V
	*	5794	93.58	-	-	89.21	32.07	8.62	36.32	300	68	P	V
	*	5788	87.07	-	-	82.7	32.07	8.62	36.32	300	68	A	V
		5854.48	55.1	-23.2	78.3	50.71	32.1	8.66	36.37	300	68	P	V
		5866.48	54.24	-14.06	68.3	49.85	32.1	8.66	36.37	300	68	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**15E Band 4 5725~5850MHz****WIFI 802.11ac VHT80 (Harmonic @ 3m)**

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT80		11550	42.26	-31.74	74	49.82	38.71	14.24	60.51	100	0	P	H
CH 155 5775MHz		11550	43.23	-30.77	74	50.79	38.71	14.24	60.51	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15E Emission below 1GHz

5GHz WIFI 802.11a (LF @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11a LF		30.97	28.66	-11.34	40	40.6	18.46	0.66	31.06	100	187	P	H
		159.98	22.42	-21.08	43.5	38.1	13.19	1.53	30.4	-	-	P	H
		323.91	19.29	-26.71	46	32.3	15.33	2.21	30.55	-	-	P	H
		414.12	21.88	-24.12	46	32.88	17.12	2.52	30.64	-	-	P	H
		630.43	20.07	-25.93	46	28.57	18.6	3.16	30.26	-	-	P	H
		777.87	22.06	-23.94	46	27.72	21.3	3.54	30.5	-	-	P	H
	!	30	36.67	-3.33	40	48.52	18.6	0.65	31.1	100	98	QP	V
	!	79.47	34.61	-5.39	40	54.76	9.27	1.08	30.5	-	-	P	V
		288.02	23.03	-22.97	46	36.99	14.5	2.04	30.5	-	-	P	V
		323.91	25.12	-20.88	46	38.13	15.33	2.21	30.55	-	-	P	V
		572.23	18.79	-27.21	46	28.07	17.98	2.99	30.25	-	-	P	V
		868.08	24.65	-21.35	46	28.88	22.48	3.76	30.47	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

**Note symbol**

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency per 15.209(c).
!	Test result is over limit line.
P/A	P eak or A verage
H/V	H orizontal or V ertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.