FCC RF Test Report

APPLICANT	:	**ZTE CORPORATION**
EQUIPMENT	:	**LTE/WCDMA/GSM(GPRS) Multi-Mode Digital Mobile Phone**
BRAND NAME	:	**ZTE**
MODEL NAME	:	**Z970**
FCC ID	:	**SRQ-Z970**
STANDARD	:	**FCC Part 15 Subpart E §15.407**
CLASSIFICATION	:	**(NII) Unlicensed National Information Infrastructure**

The product was received on Apr. 04, 2014 and testing was completed on Jul. 17, 2014. 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.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory 2627

SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR440404D	Rev. 01	Initial issue of report	Jul. 22, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	99% Bandwidth	-	Pass	-
3.2	15.407(a)	Maximum Conducted Output Power	≤ 17, 24, 30 dBm (depend on band)	Pass	-
3.3	15.407(a)	Power Spectral Density	≤ 4, 11, 17 dBm (depend on band)	Pass	-
3.4	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm (depend on band)&15.209(a)	Pass	Under limit 2.23 dB at 5147.550 MHz
3.5	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 4.48 dB at 0.390 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

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

1.2 Manufacturer

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	LTE/WCDMA/GSM(GPRS) Multi-Mode Digital Mobile Phone
Brand Name	ZTE
Model Name	Z970
FCC ID	SRQ-Z970
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/HSPA+(Downlink Only)/DC-HSDPA/LTE/ WLAN 2.4GHz 802.11b/g/n HT20/HT40/ WLAN 5GHz 802.11a/n HT20/HT40/ WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
HW Version	wwdB
SW Version	Z970V1.0.0B01
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 Frequency Range	5180 MHz ~ 5240 MHz
Maximum Output Power to Antenna	802.11a : 14.65 dBm / 0.02917 W 802.11n HT20 : 14.46 dBm / 0.02793 W 802.11n HT40 : 13.91 dBm / 0.02460 W 802.11ac VHT20 : 13.86 dBm / 0.02432 W 802.11ac VHT40 : 12.97 dBm / 0.01982 W 802.11ac VHT80 : 14.96 dBm / 0.03133 W
99% Occupied Bandwidth	802.11a : 18.25 MHz 802.11n HT20 : 18.95 MHz 802.11n HT40 : 36.54 MHz 802.11ac VHT20: 18.95 MHz 802.11ac VHT40 : 36.55 MHz 802.11ac VHT80 : 75.04 MHz
Antenna Type	PIFA Antenna with gain -6.00 dBi
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

1.5 Modification of EUT

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

1.6 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	**Sporton Site No.**			**FCC Registration No.**
	TH01-KS	03CH01-KS	CO01-KS	149928

1.7 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 644545 D01 Guidance for IEEE 802.11ac and Pre-ac Device Emissions Testing v01r02.
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01
- ANSI C63.4-2003

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 (Y 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 Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5150-5250 MHz Band 1 (U-NII-1)	36	5180	44	5220
	38	**5190**	**46**	**5230**
	40	5200	48	5240
	42	5210		

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. Final Output Power equals to Measured Output Power adds the duty factor.

WLAN 5GHz 802.11a RF Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	Data Rate / 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	14.47	CH 48	14.48	14.58	14.63	14.36	14.38	14.56	14.39
CH 44	5220	14.36								
CH 48	5240	**14.65**								

WLAN 5GHz 802.11n-HT20 RF Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index / MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	14.12	CH 48	14.25	14.28	14.02	14.11	14.26	14.11	14.16
CH 44	5220	14.05								
CH 48	5240	**14.46**								

WLAN 5GHz 802.11n-HT40 RF Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index / MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190 MHz	13.64	CH 46	13.82	13.61	13.56	13.69	13.86	13.83	13.70
CH 46	5230 MHz	**13.91**								

WLAN 5GHz 802.11ac VHT20 RF Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index / MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 36	5180 MHz	13.46	CH 48	13.83	13.82	13.71	13.82	13.84	13.84	13.74	13.82
CH 44	5220 MHz	13.71									
CH 48	5240 MHz	**13.86**									

WLAN 5GHz 802.11ac VHT40 RF Power (dBm)											
Power vs. Channel			Power vs. MCS Index								
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 38	5190 MHz	12.62	CH 46	12.85	12.86	12.73	12.89	12.96	12.95	12.88	12.96	12.55
CH 46	5230 MHz	**12.97**										

WLAN 5GHz 802.11ac VHT80 RF Power (dBm)											
Power vs. Channel			Power vs. MCS Index								
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 42	5210MHz	**14.96**	CH 42	14.79	14.86	14.90	14.82	14.79	14.86	14.87	14.82	14.71

2.3 Test Mode

Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
	Test Items	Mode	Data rate	Test Channel
Conducted TCs	99% BW Power Spectral Density	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0	L/M/H
		802.11n HT40	MCS0	L/M/H
		802.11ac VHT20	MCS0	L/M/H
		802.11ac VHT40	MCS0	L/M/H
		802.11ac VHT80	MCS0	M
	20dB Occupied Bandwidth	802.11a	6 Mbps	H
		802.11n HT20	MCS0	H
		802.11n HT40	MCS0	H
		802.11ac VHT20	MCS0	H
		802.11ac VHT40	MCS0	H
		802.11ac VHT80	MCS0	H
	Output Power	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0	L/M/H
		802.11n HT40	MCS0	L/M/H
		802.11ac VHT20	MCS0	L/M/H
		802.11ac VHT40	MCS0	L/M/H
		802.11ac VHT80	MCS0	M
	Frequency Stability	802.11a	6 Mbps	L

Test Cases				
Radiated TCs	Radiated Band Edge	802.11a	6 Mbps	L/H
		802.11n HT20	MCS0	L/H
		802.11n HT40	MCS0	L/H
		802.11ac VHT80	MCS0	M
	Radiated Spurious Emission	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0	L/M/H
		802.11n HT40	MCS0	L/M/H
		802.11ac VHT80	MCS0	M
AC Conducted Emission	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (5G) Link + USB Cable (Charging from Adapter)			

Ch. #		Band I : 5150-5250 MHz
		802.11a
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I : 5150-5250 MHz
		802.11n HT20
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I : 5150-5250 MHz
		802.11n HT40
L	Low	38
M	Middle	-
H	High	46

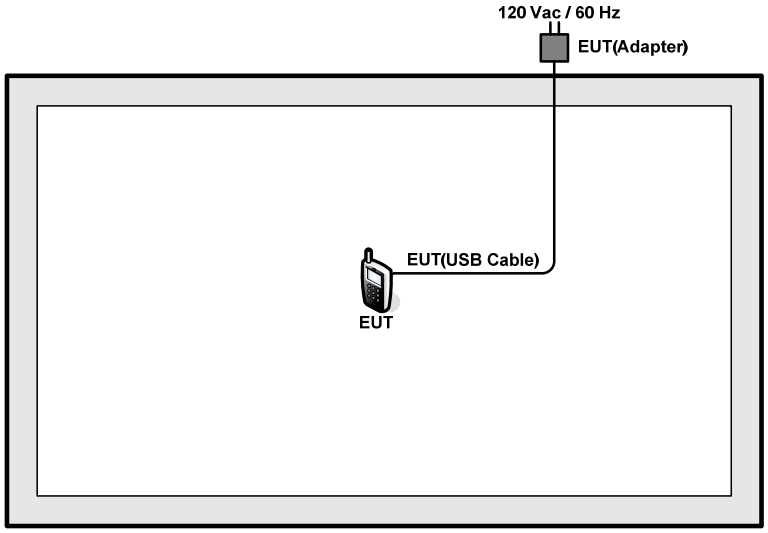
Ch. #		Band I：5150-5250 MHz
		802.11ac VHT20
L	Low	36
M	Middle	44
H	High	48

Ch. #		Band I：5150-5250 MHz
		802.11ac VHT40
L	Low	38
M	Middle	-
H	High	46

Ch. #		Band I：5150-5250 MHz
		802.11ac VHT80
L	Low	-
M	Middle	42
H	High	-

2.4 Connection Diagram of Test System

<Radiated Emission Mode>



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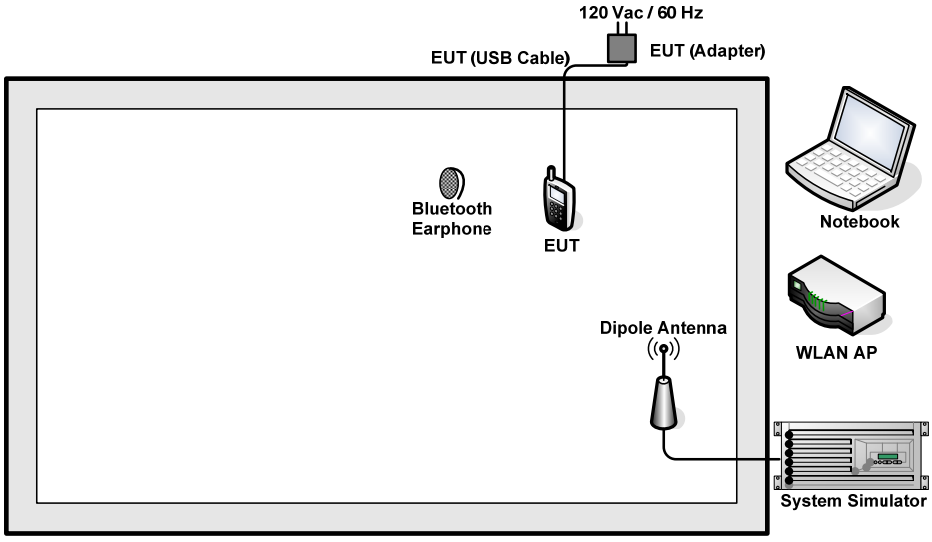


2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
4.	Notebook	Acer	MS2204	QDS-BRCM1018	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 0.9 m
5.	Bluetooth Earphone	Lenovo	LBH505	N/A	N/A	N/A

2.6 EUT Operation Test Setup

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

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP 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 and attenuator factor 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 and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 7.3 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 7.3 + 10 = 17.3 (dB)

3 Test Result

3.1 99% Occupied Bandwidth Measurement

3.1.1 Description of 99% Occupied Bandwidth

This section is for reporting purpose only.

There is no restriction limits for bandwidth.

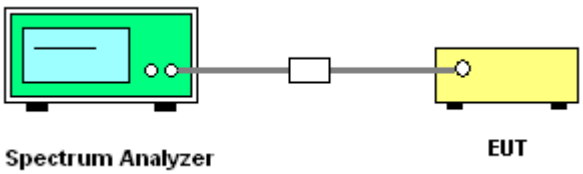
3.1.2 Measuring Instruments

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 v01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) ≥ 3 * RBW.
7. Measure and record the results in the test report.

3.1.4 Test Setup

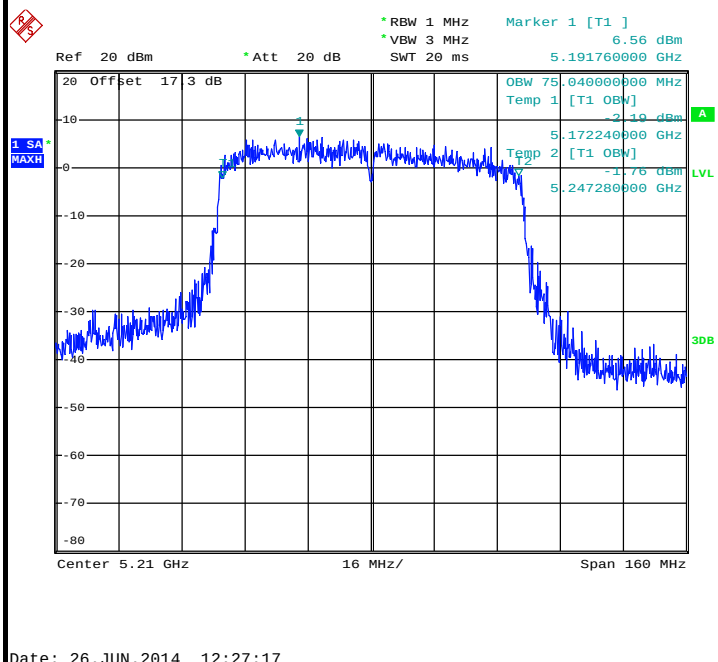


3.1.5 Test Result of 99% Occupied Bandwidth Plots

Test Band :	5GHz band 1	Temperature :	25~27℃
Test Engineer :	Steven Hao	Relative Humidity :	42~43%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	99% Bandwidth (MHz)	99% Bandwidth EIRP Limit (dBm)
11a	6Mbps	1	36	5180	17.95	22.54
11a	6Mbps	1	44	5220	18.25	22.61
11a	6Mbps	1	48	5240	18.25	22.61
HT20	MCS0	1	36	5180	18.95	22.78
HT20	MCS0	1	44	5220	18.85	22.75
HT20	MCS0	1	48	5240	18.90	22.76
HT40	MCS0	1	38	5190	36.45	23.01
HT40	MCS0	1	46	5230	36.54	23.01
VHT20	MCS0	1	36	5180	18.90	22.76
VHT20	MCS0	1	44	5220	18.95	22.78
VHT20	MCS0	1	48	5240	18.95	22.78
VHT40	MCS0	1	38	5190	36.50	23.01
VHT40	MCS0	1	46	5230	36.55	23.01
VHT80	MCS0	1	42	5210	75.04	23.01

Maximum 99% Occupied Bandwidth



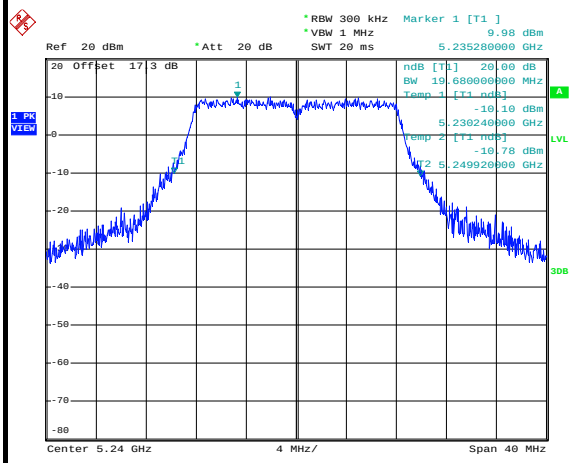
Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.1.6 Test Result of 20dB Occupied Bandwidth

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth Upper Frequency (FH) (MHz)	Upper Limit Line (MHz)	Pass/Fail
11a	6Mbps	1	48	5240	19.68	5249.92	5250	Pass
HT20	MCS0	1	48	5240	20.00	5249.92		Pass
HT40	MCS0	1	46	5230	38.48	5249.04		Pass
VHT20	MCS0	1	48	5240	19.68	5249.80		Pass
VHT40	MCS0	1	46	5230	38.16	5249.12		Pass
VHT80	MCS0	1	42	5210	79.52	5249.52		Pass

20dB Occupied Bandwidth

802.11a CH48 5240MHz



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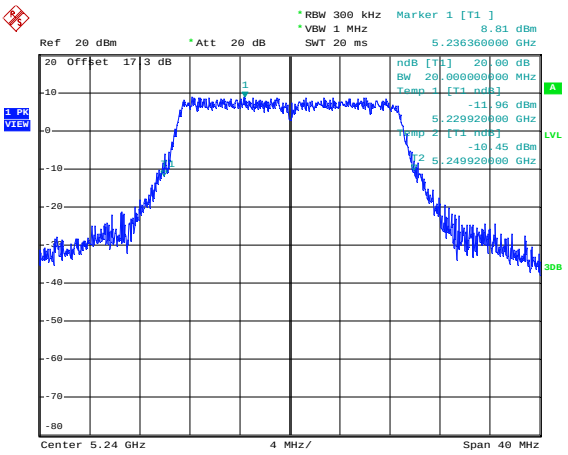
802.11n HT20 CH48 5240MHz



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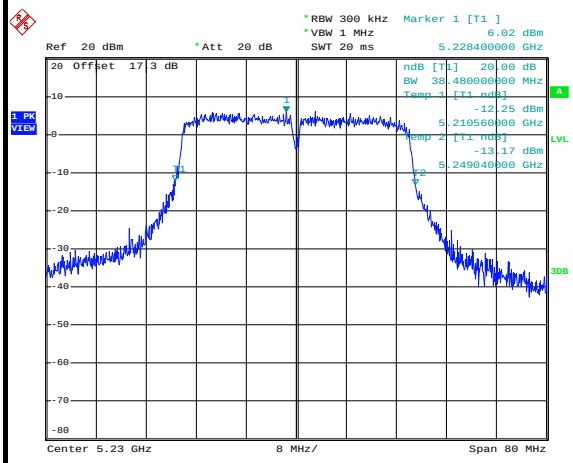
802.11n HT40 CH46 5230MHz



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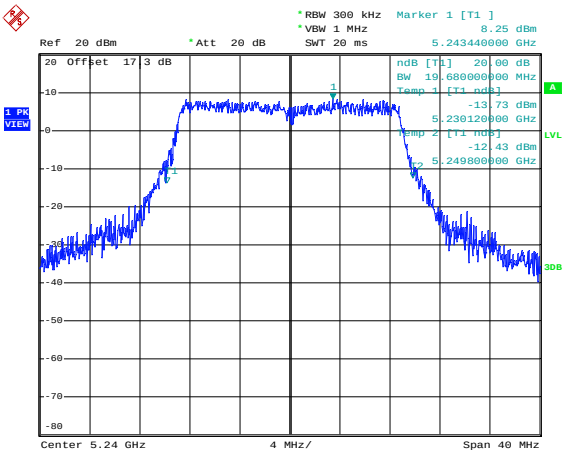
802.11ac VHT20 CH48 5240MHz



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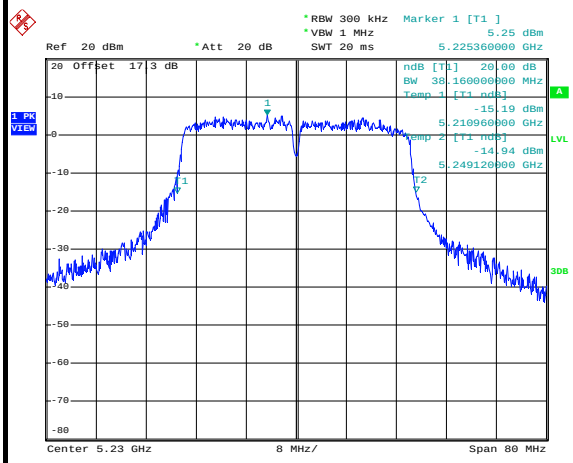
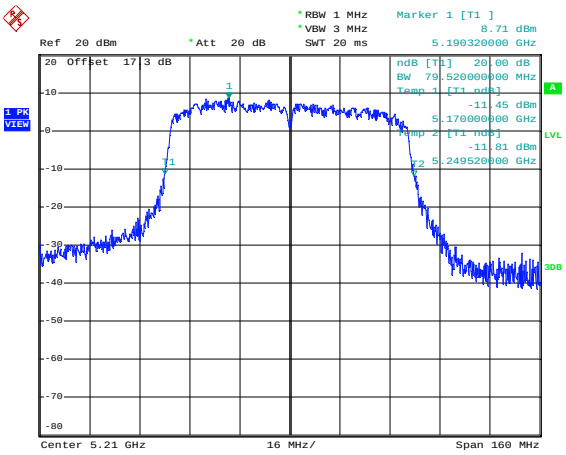
20dB Occupied Bandwidth	
802.11ac VHT40 CH46 5230MHz	802.11ac VHT80 CH42 5210MHz





3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

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.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

3.2.2 Measuring Instruments

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

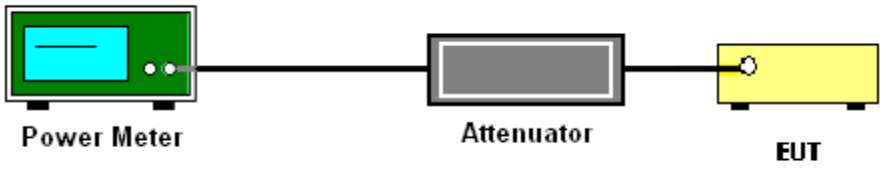
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v01.

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

Test Band :	5GHz band 1	Temperature :	25~27℃
Test Engineer :	Steven Hao	Relative Humidity :	42~43%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)	FCC Conducted Power Limit (dBm)	DG (dBi)	-	Pass/Fail
11a	6Mbps	1	36	5180	0.59	14.47	24.00	-6.00	-	Pass
11a	6Mbps	1	44	5220	0.59	14.36	24.00	-6.00		Pass
11a	6Mbps	1	48	5240	0.59	14.65	24.00	-6.00		Pass
HT20	MCS0	1	36	5180	0.62	14.12	24.00	-6.00		Pass
HT20	MCS0	1	44	5220	0.62	14.05	24.00	-6.00		Pass
HT20	MCS0	1	48	5240	0.62	14.46	24.00	-6.00		Pass
HT40	MCS0	1	38	5190	1.17	13.64	24.00	-6.00		Pass
HT40	MCS0	1	46	5230	1.17	13.91	24.00	-6.00		Pass
VHT20	MCS0	1	36	5180	0.82	13.46	24.00	-6.00		Pass
VHT20	MCS0	1	44	5220	0.82	13.71	24.00	-6.00		Pass
VHT20	MCS0	1	48	5240	0.82	13.86	24.00	-6.00		Pass
VHT40	MCS0	1	38	5190	1.45	12.62	24.00	-6.00		Pass
VHT40	MCS0	1	46	5230	1.45	12.97	24.00	-6.00		Pass
VHT80	MCS0	1	42	5210	2.59	14.96	24.00	-6.00		Pass

Note:

1. Final Output Power equals to Measured Output Power adds the duty factor.
2. For the band 5150-5250 MHz, the maximum average conducted output power shall not exceed 24dBm for client device for FCC.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz 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

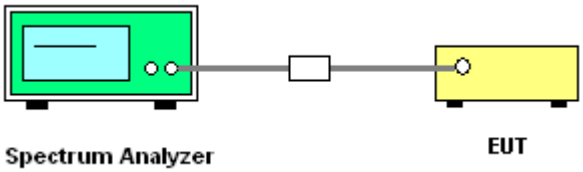
The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01. Section F) Maximum power spectral density.

 # 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 v01.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 MHz.
   - Number of points in sweep ≥ 2 Span / RBW.
   - Sweep time = auto.
   - Detector = RMS
   - Trace average at least 100 traces in power averaging mode.
   - 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

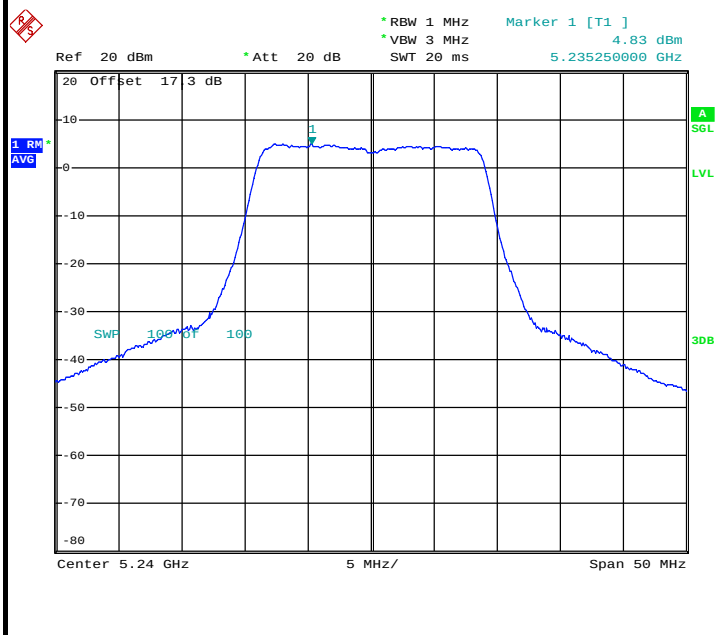


3.3.5 Test Result of Power Spectral Density

Test Band :	5GHz band 1	Temperature :	25~27℃
Test Engineer :	Steven Hao	Relative Humidity :	42~43%

Mod.	Data Rate	N_{TX}	CH	Freq. (MHz)	Duty Factor (dB)	Average Power Density (dBm/MHz)	Average PSD Limit (dBm)	DG (dBi)	Pass/Fail
11a	6Mbps	1	36	5180	0.59	4.27	11.00	-6.00	Pass
11a	6Mbps	1	44	5220	0.59	4.37	11.00	-6.00	Pass
11a	6Mbps	1	48	5240	0.59	4.63	11.00	-6.00	Pass
HT20	MCS0	1	36	5180	0.62	3.67	11.00	-6.00	Pass
HT20	MCS0	1	44	5220	0.62	3.87	11.00	-6.00	Pass
HT20	MCS0	1	48	5240	0.62	3.98	11.00	-6.00	Pass
HT40	MCS0	1	38	5190	1.17	1.24	11.00	-6.00	Pass
HT40	MCS0	1	46	5230	1.17	1.20	11.00	-6.00	Pass
VHT20	MCS0	1	36	5180	0.82	5.24	11.00	-6.00	Pass
VHT20	MCS0	1	44	5220	0.82	5.52	11.00	-6.00	Pass
VHT20	MCS0	1	48	5240	0.82	5.65	11.00	-6.00	Pass
VHT40	MCS0	1	38	5190	1.45	1.86	11.00	-6.00	Pass
VHT40	MCS0	1	46	5230	1.45	2.15	11.00	-6.00	Pass
VHT80	MCS0	1	42	5210	2.59	-0.64	11.00	-6.00	Pass

Worst Case Power Spectral Density(dBm/MHz)



Note: Average Power Density (dB) = Measured value+ Duty Factor

3.4 Unwanted Radiated Emission 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 Part15.205.

3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

(2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 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.

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

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

(3) KDB789033 v01 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 v01. 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 ≥ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

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

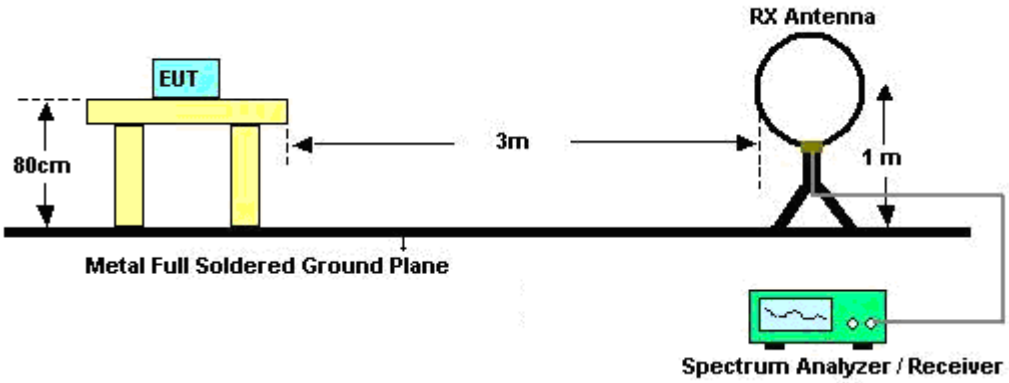
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	87.23	1.36	0.74	1kHz
802.11n HT20	86.60	1.27	0.79	1kHz
802.11n HT40	76.31	0.64	1.56	3kHz
802.11n VHT20	82.85	0.98	1.02	3kHz
802.11n VHT40	71.55	0.50	2.01	3kHz
802.11n VHT80	55.11	0.25	4.03	10kHz

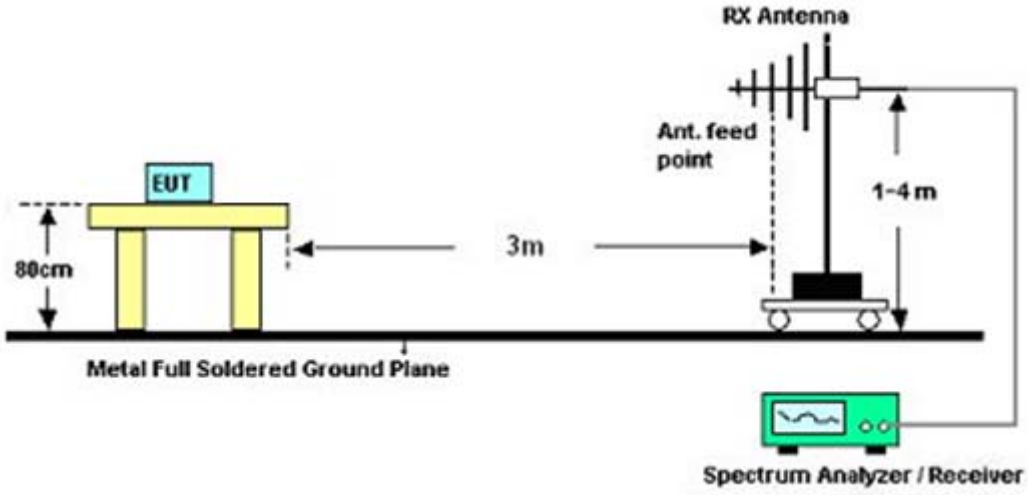
2. The EUT was placed on a rotatable table top 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters 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

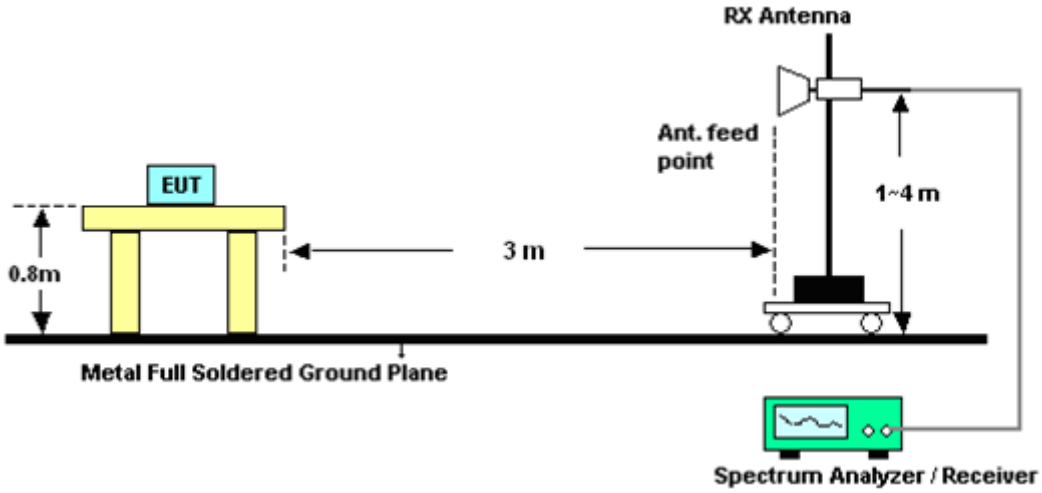
For radiated emissions below 30MHz



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

3.4.6.1 Test Result of Radiated Band Edges

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	36	Relative Humidity :	42~43%
Test Engineer :	Star Wei		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5149.85	59.74	-14.26	74	56.88	34.11	3.9	35.15	100	286	Peak
5127.7	42.94	-11.06	54	40.1	34.09	3.88	35.13	100	286	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5149.85	62.45	-11.55	74	59.59	34.11	3.9	35.15	132	6	Peak
5127.65	46.88	-7.12	54	44.04	34.09	3.88	35.13	132	6	Average

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	48	Relative Humidity :	42~43%
Test Engineer :	Star Wei		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5376.25	54.36	-19.64	74	51.3	34.41	4.02	35.37	124	307	Peak
5395	39.46	-14.54	54	36.37	34.46	4.03	35.4	124	307	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5379.25	53.15	-20.85	74	50.07	34.44	4.02	35.38	127	64	Peak
5379.2	39.47	-14.53	54	36.39	34.44	4.02	35.38	127	64	Average

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	36	Relative Humidity :	42~43%
Test Engineer :	Star Wei		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5150	59.22	-14.78	74	56.36	34.11	3.9	35.15	100	296	Peak
5128.3	43.38	-10.62	54	40.54	34.09	3.88	35.13	100	296	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5149.6	61.04	-12.96	74	58.18	34.11	3.9	35.15	108	0	Peak
5128.2	47.25	-6.75	54	44.41	34.09	3.88	35.13	108	0	Average

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	48	Relative Humidity :	42~43%
Test Engineer :	Star Wei		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5375.45	52.63	-21.37	74	49.58	34.41	4.01	35.37	100	303	Peak
5399.95	39.03	-14.97	54	35.94	34.46	4.03	35.4	100	303	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5371	50.79	-23.21	74	47.74	34.41	4.01	35.37	119	0	Peak
5371	38.49	-15.51	54	35.44	34.41	4.01	35.37	119	0	Average

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	38	Relative Humidity :	42~43%
Test Engineer :	Star Wei		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5148.25	69.72	-4.28	74	66.86	34.11	3.9	35.15	100	293	Peak
5149.85	46.34	-7.66	54	43.48	34.11	3.9	35.15	100	293	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5147.55	71.77	-2.23	74	68.91	34.11	3.9	35.15	108	333	Peak
5149.85	48.44	-5.56	54	45.58	34.11	3.9	35.15	108	333	Average

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	46	Relative Humidity :	42~43%
Test Engineer :	Star Wei		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5380.4	53.67	-20.33	74	50.59	34.44	4.02	35.38	100	122	Peak
5399.35	39.94	-14.06	54	36.85	34.46	4.03	35.4	100	122	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5398.15	53.37	-20.63	74	50.28	34.46	4.03	35.4	110	13	Peak
5361.8	39.99	-14.01	54	36.94	34.41	4.01	35.37	110	13	Average

Test Mode :	802.11n VHT80	Temperature :	22~23°C
Test Channel :	42	Relative Humidity :	42~43%
Test Engineer :	Star Wei		

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5125.7	61.83	-12.17	74	58.99	34.09	3.88	35.13	100	302	Peak
5147.55	45.84	-8.16	54	42.98	34.11	3.9	35.15	100	302	Average
5398.35	53.56	-20.44	74	50.47	34.46	4.03	35.4	100	302	Peak
5362.35	41.63	-12.37	54	38.58	34.41	4.01	35.37	100	302	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5134.2	63.96	-10.04	74	61.12	34.09	3.88	35.13	109	306	Peak
5143.8	47.99	-6.01	54	45.13	34.11	3.9	35.15	109	306	Average
5353.05	53.57	-20.43	74	50.53	34.39	4	35.35	109	0	Peak
5387.05	41.46	-12.54	54	38.38	34.44	4.02	35.38	109	0	Average

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

Test Mode :	802.11a	**Temperature :**	22~23°C
Test Channel :	36	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Horizontal
Remark :	1. 5180 MHz is fundamental signal which can be ignored. 2. 10368 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5180	108.88	-	-	105.98	34.16	3.92	35.18	100	286	Peak
5180	95.83	-	-	92.93	34.16	3.92	35.18	100	286	Average
10368	49.73	-24.27	74	75.04	1.46	7.72	34.49	100	102	Peak
15540	38.83	-35.17	74	60.86	1.57	10.53	34.13	100	205	Peak

Test Mode :	802.11a	**Temperature :**	22~23°C
Test Channel :	36	**Relative Humidity :**	42~43%
Test Engineer :	Star Wei	**Polarization :**	Vertical
Remark :	1. 5180 MHz is fundamental signal which can be ignored. 2. 10350 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5180	110.67	-	-	107.77	34.16	3.92	35.18	132	60	Peak
5180	99.14	-	-	96.24	34.16	3.92	35.18	132	60	Average
10350	41.39	-32.61	74	66.74	1.45	7.71	34.51	100	20	Peak
15540	38.56	-35.44	74	60.59	1.57	10.53	34.13	100	256	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	44	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5220 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5220	110.15	-	-	107.22	34.2	3.95	35.22	100	295	Peak
5220	97.8	-	-	94.87	34.2	3.95	35.22	100	295	Average
10440	57.51	-16.49	74	82.66	1.53	7.76	34.44	100	52	Peak
10440	42.74	-11.26	54	67.89	1.53	7.76	34.44	100	52	Average
15669	43.31	-30.69	74	66	1.39	10.17	34.25	100	51	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	44	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5220 MHz is fundamental signal which can be ignored. 2. 10449 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5220	113.09	-	-	110.16	34.2	3.95	35.22	116	55	Peak
5220	100.62	-	-	97.69	34.2	3.95	35.22	116	55	Average
10449	43.26	-30.74	74	68.38	1.54	7.77	34.43	100	21	Peak
15669	41.72	-32.28	74	64.41	1.39	10.17	34.25	100	163	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	48	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5240 MHz is fundamental signal which can be ignored. 2. 10480 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5240	109.18	-	-	106.23	34.23	3.95	35.23	124	307	Peak
5240	97.24	-	-	94.29	34.23	3.95	35.23	124	307	Average
10480	58.08	-15.92	74	83.14	1.56	7.79	34.41	100	65	Peak
10480	43.23	-10.77	54	68.29	1.56	7.79	34.41	100	65	Average
15723	43.65	-30.35	74	66.62	1.34	10	34.31	100	104	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	48	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5240 MHz is fundamental signal which can be ignored. 2. 10476 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5240	112.71	-	-	109.76	34.23	3.95	35.23	127	64	Peak
5240	100.34	-	-	97.39	34.23	3.95	35.23	127	64	Average
10476	43.94	-30.06	74	69.03	1.55	7.78	34.42	100	58	Peak
15726	42.41	-31.59	74	65.38	1.34	10	34.31	100	81	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	36	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5180 MHz is fundamental signal which can be ignored. 2. 10356 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5180	107.18	-	-	104.28	34.16	3.92	35.18	100	296	Peak
5180	94.74	-	-	91.84	34.16	3.92	35.18	100	296	Average
10356	47.54	-26.46	74	72.89	1.45	7.71	34.51	100	106	Peak
15537	38.06	-35.94	74	60.09	1.57	10.53	34.13	100	41	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	36	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5180 MHz is fundamental signal which can be ignored. 2. 10368 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5180	110.89	-	-	107.99	34.16	3.92	35.18	108	0	Peak
5180	98.81	-	-	95.91	34.16	3.92	35.18	108	0	Average
10368	40.28	-33.72	74	65.59	1.46	7.72	34.49	100	120	Peak
15537	40.77	-33.23	74	62.8	1.57	10.53	34.13	100	205	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	44	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5220 MHz is fundamental signal which can be ignored. 2. 10437 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5220	106.88	-	-	103.95	34.2	3.95	35.22	100	293	Peak
5220	95.74	-	-	92.81	34.2	3.95	35.22	100	293	Average
10437	50.89	-23.11	74	76.04	1.53	7.76	34.44	100	115	Peak
15669	39.09	-34.91	74	61.78	1.39	10.17	34.25	100	110	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	44	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5220 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5220	109.69	-	-	106.76	34.2	3.95	35.22	116	52	Peak
5220	99	-	-	96.07	34.2	3.95	35.22	116	52	Average
10440	43.52	-30.48	74	68.67	1.53	7.76	34.44	100	81	Peak
15648	39.91	-34.09	74	62.51	1.41	10.22	34.23	100	203	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	48	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5240 MHz is fundamental signal which can be ignored. 2. 10491 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5240	107.48	-	-	104.53	34.23	3.95	35.23	100	303	Peak
5240	96.11	-	-	93.16	34.23	3.95	35.23	100	303	Average
10491	50.52	-23.48	74	75.58	1.56	7.79	34.41	100	51	Peak
15711	40.58	-33.42	74	63.45	1.36	10.06	34.29	100	51	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	48	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5240 MHz is fundamental signal which can be ignored. 2. 10482 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5240	109.43	-	-	106.48	34.23	3.95	35.23	119	0	Peak
5240	96.97	-	-	94.02	34.23	3.95	35.23	119	0	Average
10482	43	-31	74	68.06	1.56	7.79	34.41	100	158	Peak
15723	39.71	-34.29	74	62.68	1.34	10	34.31	100	82	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	38	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5190 MHz is fundamental signal which can be ignored. 2. 10383 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
32.91	26.27	-13.73	40	43.3	16.04	0.52	33.59	100	26	Peak
200.72	18.72	-24.78	43.5	41.93	9.04	1.31	33.56	-	-	Peak
229.82	22.3	-23.7	46	43.49	10.9	1.39	33.48	-	-	Peak
333.61	17.13	-28.87	46	34.73	14.08	1.68	33.36	-	-	Peak
443.22	21.14	-24.86	46	36.13	16.27	1.96	33.22	-	-	Peak
901.06	23.41	-22.59	46	32.67	20.45	2.72	32.43	-	-	Peak
5190	104.23	-	-	101.33	34.16	3.92	35.18	100	293	Peak
5190	93.31	-	-	90.41	34.16	3.92	35.18	100	293	Average
10383	46.12	-27.88	74	71.39	1.48	7.73	34.48	100	64	Peak
15567	35.74	-38.26	74	57.92	1.52	10.45	34.15	100	162	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	38	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5190 MHz is fundamental signal which can be ignored. 2. 10377 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
38.73	33.39	-6.61	40	53.46	12.98	0.59	33.64	100	169	Peak
88.2	29.54	-13.96	43.5	53.99	8.3	0.87	33.62	-	-	Peak
225.94	22.5	-23.5	46	44.03	10.59	1.38	33.5	-	-	Peak
444.19	21.18	-24.82	46	36.16	16.27	1.96	33.21	-	-	Peak
731.31	22.79	-23.21	46	33.44	19.71	2.45	32.81	-	-	Peak
875.84	21.57	-24.43	46	30.98	20.48	2.68	32.57	-	-	Peak
5190	106.42	-	-	103.52	34.16	3.92	35.18	108	333	Peak
5190	95.31	-	-	92.41	34.16	3.92	35.18	108	333	Average
10377	38.45	-35.55	74	63.72	1.48	7.73	34.48	100	56	Peak
15576	37.9	-36.1	74	60.08	1.52	10.45	34.15	100	41	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	46	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5230 MHz is fundamental signal which can be ignored. 2. 10455 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5230	104.43	-	-	101.48	34.23	3.95	35.23	100	122	Peak
5230	92.97	-	-	90.02	34.23	3.95	35.23	100	122	Average
10455	50.04	-23.96	74	75.16	1.54	7.77	34.43	100	152	Peak
15684	37.54	-36.46	74	60.31	1.38	10.12	34.27	100	63	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	46	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5230 MHz is fundamental signal which can be ignored. 2. 10452 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5230	105.77	-	-	102.82	34.23	3.95	35.23	108	12	Peak
5230	94.85	-	-	91.9	34.23	3.95	35.23	108	12	Average
10452	39.05	-34.95	74	64.17	1.54	7.77	34.43	100	201	Peak
15675	37.75	-36.25	74	60.44	1.39	10.17	34.25	100	18	Peak

Test Mode :	802.11n VHT80	Temperature :	22~23°C
Test Channel :	42	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5210 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5210	100.26	-	-	97.34	34.2	3.94	35.22	100	302	Peak
5210	91.28	-	-	88.36	34.2	3.94	35.22	100	302	Average
10440	44.19	-29.81	74	69.34	1.53	7.76	34.44	100	156	Peak
15630	33.08	-40.92	74	55.6	1.43	10.27	34.22	100	261	Peak

Test Mode :	802.11n VHT80	Temperature :	22~23°C
Test Channel :	42	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5210 MHz is fundamental signal which can be ignored. 2. 10422 MHz is not within a restricted band and satisfies both the average and peak limits of 15.209. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5210	101.82	-	-	98.9	34.2	3.94	35.22	109	0	Peak
5210	92.7	-	-	89.78	34.2	3.94	35.22	109	0	Average
10422	36.08	-37.92	74	61.28	1.51	7.75	34.46	100	26	Peak
15630	33.08	-40.92	74	55.6	1.43	10.27	34.22	100	109	Peak

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 (dBμV)	
	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.

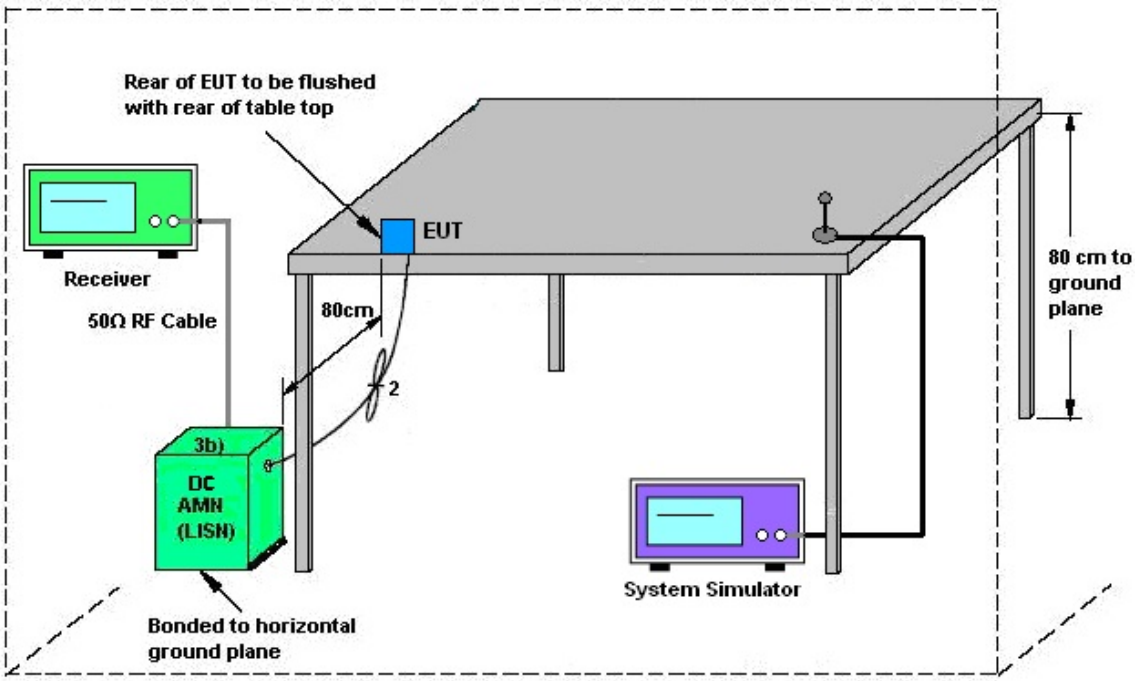
3.5.2 Measuring Instruments

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.

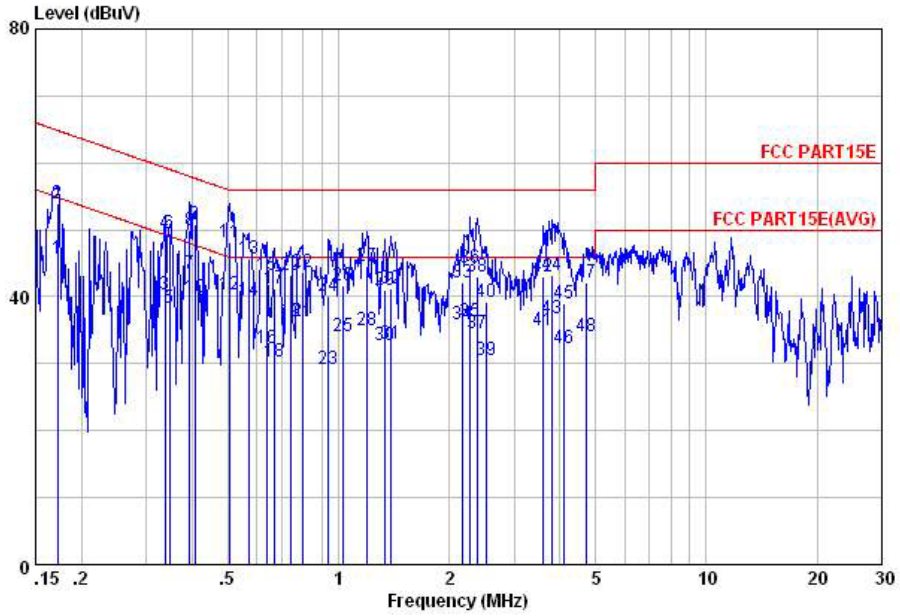
3.5.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.5.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Eligah Wang	Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (5G) Link + USB Cable (Charging from Adapter)		

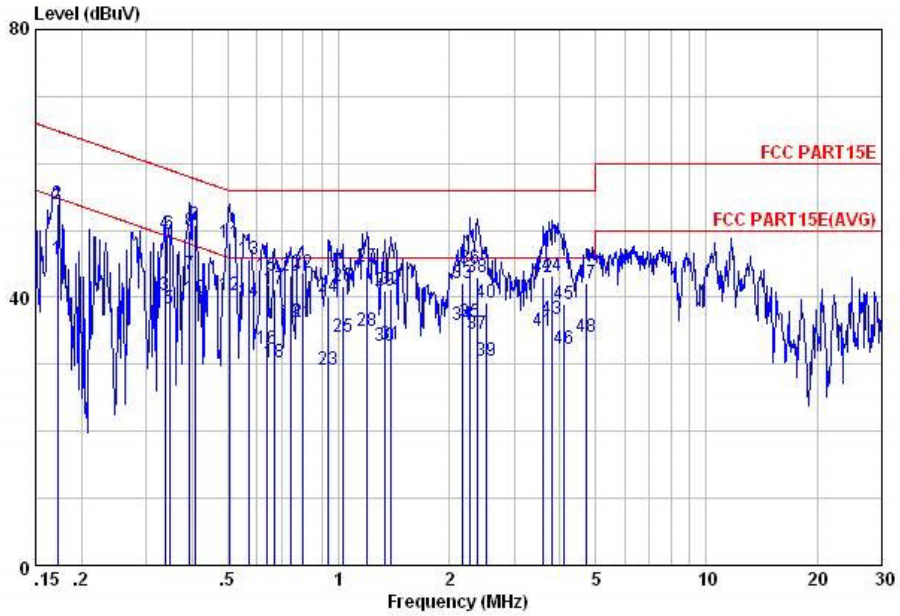


Site : C001-KS
Condition: FCC PART15E LISN-L20130306 LINE

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.17	45.74	-9.12	54.86	33.60	1.50	10.64	Average
2	0.17	54.04	-10.82	64.86	41.90	1.50	10.64	QP
3	0.34	40.41	-8.86	49.27	29.60	0.48	10.33	Average
4	0.34	49.41	-9.86	59.27	38.60	0.48	10.33	QP
5	0.35	38.37	-10.68	49.05	27.60	0.45	10.32	Average
6	0.35	49.37	-9.68	59.05	38.60	0.45	10.32	QP
7	0.39	43.51	-4.48	47.99	32.90	0.33	10.28	Average
8	0.39	49.91	-8.08	57.99	39.30	0.33	10.28	QP
9	0.41	50.89	-6.84	57.73	40.30	0.31	10.28	QP
10	0.41	39.89	-7.84	47.73	29.30	0.31	10.28	Average
11	0.51	48.06	-7.94	56.00	37.60	0.20	10.26	QP
12	0.51	40.36	-5.64	46.00	29.90	0.20	10.26	Average
13	0.57	45.75	-10.25	56.00	35.30	0.20	10.25	QP
14	0.57	39.35	-6.65	46.00	28.90	0.20	10.25	Average
15	0.64	43.23	-12.77	56.00	32.80	0.20	10.23	QP
16	0.64	32.33	-13.67	46.00	21.90	0.20	10.23	Average
17	0.67	41.32	-14.68	56.00	30.90	0.20	10.22	QP
18	0.67	30.32	-15.68	46.00	19.90	0.20	10.22	Average
19	0.74	36.29	-9.71	46.00	25.89	0.19	10.21	Average
20	0.74	43.19	-12.81	56.00	32.79	0.19	10.21	QP
21	0.80	36.26	-9.74	46.00	25.89	0.17	10.20	Average
22	0.80	43.76	-12.24	56.00	33.39	0.17	10.20	QP
23	0.94	29.20	-16.80	46.00	18.91	0.11	10.18	Average
24	0.94	40.20	-15.80	56.00	29.91	0.11	10.18	QP
25	1.03	34.18	-11.82	46.00	23.90	0.10	10.18	Average
26	1.03	41.58	-14.42	56.00	31.30	0.10	10.18	QP
27	1.19	44.58	-11.42	56.00	34.30	0.10	10.18	QP
28	1.19	34.88	-11.12	46.00	24.60	0.10	10.18	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Eligah Wang	Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (5G) Link + USB Cable (Charging from Adapter)		

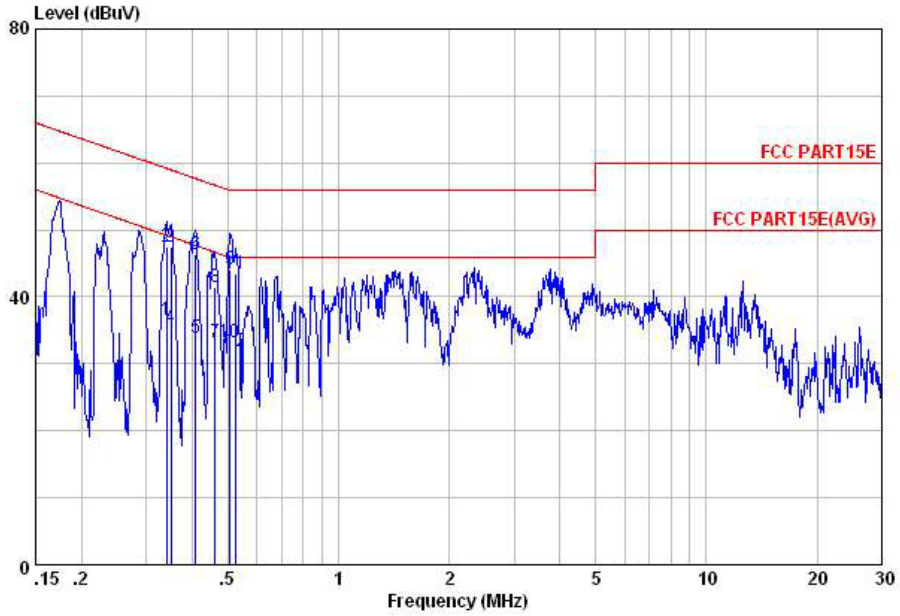


Site : C001-KS
Condition: FCC PART15E LISN-L20130306 LINE

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
29	1.33	41.08	-14.92	56.00	30.80	0.10	10.18	QP
30	1.33	32.68	-13.32	46.00	22.40	0.10	10.18	Average
31	1.39	33.08	-12.92	46.00	22.80	0.10	10.18	Average
32	1.39	41.18	-14.82	56.00	30.90	0.10	10.18	QP
33	2.17	42.10	-13.90	56.00	31.81	0.10	10.19	QP
34	2.17	35.90	-10.10	46.00	25.61	0.10	10.19	Average
35	2.27	36.40	-9.60	46.00	26.09	0.11	10.20	Average
36	2.27	44.40	-11.60	56.00	34.09	0.11	10.20	QP
37	2.38	34.61	-11.39	46.00	24.30	0.11	10.20	Average
38	2.38	42.91	-13.09	56.00	32.60	0.11	10.20	QP
39	2.51	30.42	-15.58	46.00	20.10	0.12	10.20	Average
40	2.51	39.22	-16.78	56.00	28.90	0.12	10.20	QP
41	3.60	35.01	-10.99	46.00	24.61	0.17	10.23	Average
42	3.60	43.01	-12.99	56.00	32.61	0.17	10.23	QP
43	3.82	36.72	-9.28	46.00	26.30	0.18	10.24	Average
44	3.82	43.32	-12.68	56.00	32.90	0.18	10.24	QP
45	4.11	39.03	-16.97	56.00	28.60	0.19	10.24	QP
46	4.11	32.33	-13.67	46.00	21.90	0.19	10.24	Average
47	4.72	42.05	-13.95	56.00	31.60	0.20	10.25	QP
48	4.72	34.05	-11.95	46.00	23.60	0.20	10.25	Average

Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Eligah Wang	Relative Humidity :	37~39%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (5G) Link + USB Cable (Charging from Adapter)		



Site : C001-KS
Condition: FCC PART15E LISN-N20130306 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	0.34	36.46	-12.72	49.18	25.60	0.53	10.33	Average
2	0.34	47.46	-11.72	59.18	36.60	0.53	10.33	QP
3	0.35	47.43	-11.53	58.96	36.60	0.51	10.32	QP
4	0.35	35.43	-13.53	48.96	24.60	0.51	10.32	Average
5	0.41	33.97	-13.71	47.68	23.30	0.39	10.28	Average
6	0.41	46.27	-11.41	57.68	35.60	0.39	10.28	QP
7	0.46	33.20	-13.47	46.67	22.60	0.33	10.27	Average
8	0.46	41.50	-15.17	56.67	30.90	0.33	10.27	QP
9	0.51	44.16	-11.84	56.00	33.60	0.30	10.26	QP
10	0.51	33.16	-12.84	46.00	22.60	0.30	10.26	Average
11	0.53	43.45	-12.55	56.00	32.90	0.29	10.26	QP
12	0.53	31.85	-14.15	46.00	21.30	0.29	10.26	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.

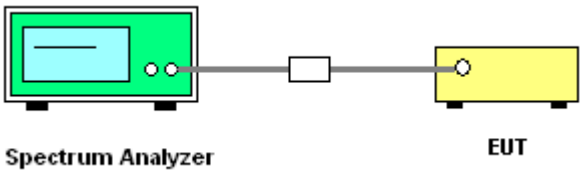
3.6.2 Measuring Instruments

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

Test Band :	5GHz band 1	Test Engineer :	Steven Hao

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (˚C)	Voltage (V)
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	20	3.5
11a	6Mbps	1	36	5180	5180.025	0.025	4.83	20	4.35
11a	6Mbps	1	36	5180	5180.025	0.025	4.83	20	3.8
11a	6Mbps	1	36	5180	5180.025	0.025	4.83	-10	3.8
11a	6Mbps	1	36	5180	5180.000	0.000	0.00	55	3.8

Note: Center Frequency = (Low Frequency + High Frequency) / 2.

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 peak output power limit.

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 28, 2013	Jun. 26, 2014	Dec. 27, 2014	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Feb. 27, 2014	Jun. 26, 2014	Feb. 26, 2015	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Feb. 27, 2014	Jun. 26, 2014	Feb. 26, 2015	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Dec. 10, 2013	Jun. 26, 2014	Dec. 09, 2014	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 05, 2013	Jul. 15, 2014	Nov. 04, 2014	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 28, 2013	Jul. 15, 2014	Dec. 27, 2014	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 09, 2013	Jul. 15, 2014	Oct. 08, 2014	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Jan. 08, 2014	Jul. 15, 2014	Jan. 07, 2015	Radiation (03CH01-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 08, 2014	Jul. 15, 2014	Jan. 07, 2015	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 18, 2013	Jul. 15, 2014	Nov. 17, 2014	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Mar. 10, 2014	Jul. 15, 2014	Mar. 09, 2015	Radiation (03CH01-KS)
Amplifier	com-power	PA-103A	161073	1MHz~1GHz	May 04, 2014	Jul. 15, 2014	May 03, 2015	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02371	1GHz~26.5GHz	Dec. 10, 2013	Jul. 15, 2014	Dec. 09, 2014	Radiation (03CH01-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jul. 15, 2014	NCR	Radiation (03CH01-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jul. 15, 2014	NCR	Radiation (03CH01-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jul. 15, 2014	NCR	Radiation (03CH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 04, 2014	Jul. 17, 2014	May 03, 2015	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Dec. 10, 2013	Jul. 17, 2014	Dec. 09, 2014	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Dec. 10, 2013	Jul. 17, 2014	Dec. 09, 2014	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Nov. 12, 2013	Jul. 17, 2014	Nov. 11, 2014	Conduction (CO01-KS)

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**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.5**