FCC RF Test Report

APPLICANT	:	Opticon Sensors Europe B.V.
EQUIPMENT	:	Android Industrial Smartphone
BRAND NAME	:	Opticon
MODEL NAME	:	H-27
FCC ID	:	Q2QH-27
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was received on Mar. 21, 2014 and testing was completed on Jun. 11, 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
FR422837-02	Rev. 01	Initial issue of report	Jun. 20, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	26dB 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(a)(6)	Peak Excursion Ratio	≤ 13dB	Pass	-
3.5	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm (depend on band)&15.209(a)	Pass	Under limit 1.01 dB at 5469.600 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 12.49 dB at 24.010 MHz
3.7	15.407(g)	Frequency Stability	Within Operation Band	Pass	-
3.8	15.407(c)	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.9	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Opticon Sensors Europe B.V.
Opaallaan 35, 2132 XV Hoofddorp, The Netherlands

1.2 Manufacturer

Opticon Sensors Europe B.V.
Opaallaan 35, 2132 XV Hoofddorp, The Netherlands

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Android Industrial Smartphone
Brand Name	Opticon
Model Name	H-27
FCC ID	Q2QH-27
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/NFC/ WLAN 2.4GHz 802.11b/g/n HT20/HT40/ WLAN 5GHz 802.11a/n HT20/HT40/ Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
HW Version	V4.0
SW Version	R06C
EUT Stage	Production Unit

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 subjective to this standard

Product Specification subjective to this standard	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz 5260 MHz ~ 5320 MHz 5500 MHz ~ 5580 MHz 5660 MHz ~ 5700 MHz
Maximum Output Power to Antenna	**<5180 MHz ~ 5240 MHz>** 802.11a : 14.27 dBm / 0.0267 W 802.11n HT20 : 12.23 dBm / 0.0167 W 802.11n HT40 : 12.30 dBm / 0.0170 W **<5260 MHz ~ 5320 MHz>** 802.11a : 14.10 dBm / 0.0257 W 802.11n HT20 : 11.76 dBm / 0.0150 W 802.11n HT40 : 12.56 dBm / 0.0180 W **<5500 MHz ~ 5580 MHz and 5660 MHz ~ 5700 MHz >** 802.11a : 13.54 dBm / 0.0226 W 802.11n HT20 : 12.22 dBm / 0.0167 W 802.11n HT40 : 11.91 dBm / 0.0155 W
Antenna Type	PIFA Antenna
Antenna Gain	5150 MHz ~ 5250 MHz : 0.41 dBi 5250 MHz ~ 5350 MHz : 0.44 dBi 5470 MHz ~ 5725 MHz : 0.38 dBi
Type of Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)

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

Note: The test site complies with ANSI C63.4 2003 requirement.

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 789033 D01 General UNII Test Procedures Old Rules v01r04
- 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 (Z 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

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5250-5350 MHz Band 2 (U-NII-2A)	52	5260	60	5300
	54	**5270**	**62**	**5310**
	56	5280	64	5320

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5470-5600 MHz and 5650-5725 MHz Band 3 (U-NII-2C)	100	5500	116	5580
	102	**5510**	132	5660
	104	5520	**134**	**5670**
	108	5540	136	5680
	110	**5550**	140	5700
	112	5560		

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.

5GHz 802.11a RF Output Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps								
CH 36	5180	13.65	CH 48	14.13	14.13	14.13	14.17	14.19	14.16	14.11
CH 44	5220	13.88								
CH 48	5240	**14.27**								
CH 52	5260	13.74	CH 64	13.78	13.92	13.94	13.80	14.06	14.03	14.02
CH 60	5300	13.34								
CH 64	5320	**14.10**								
CH 100	5500	12.65	CH 116	13.36	13.39	13.42	13.50	13.53	13.49	13.53
CH 116	5580	**13.54**								
CH 140	5700	10.92								

5GHz 802.11n HT20 RF Output Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0								
CH 36	5180	11.47	CH 48	11.98	12.18	12.22	12.19	12.18	12.17	12.21
CH 44	5220	11.86								
CH 48	5240	**12.23**								
CH 52	5260	11.35	CH 64	11.66	11.65	11.67	11.75	11.64	11.67	11.64
CH 60	5300	10.95								
CH 64	5320	**11.76**								
CH 100	5500	11.24	CH 116	12.15	12.10	12.21	12.05	12.20	12.14	12.05
CH 116	5580	**12.22**								
CH 140	5700	9.13								

5GHz 802.11n HT40 RF Output 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	11.78	CH 46	12.18	12.25	12.19	12.19	12.20	12.02	12.25
CH 46	5230	**12.30**								
CH 54	5270	12.40	CH 62	12.53	12.51	12.49	12.48	12.19	12.49	12.50
CH 62	5310	**12.56**								
CH 102	5510	11.31	CH 134	11.86	11.80	11.83	11.73	11.89	11.84	11.89
CH 110	5550	11.82								
CH 134	5670	**11.91**								

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	26dB 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
	Output Power	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0	L/M/H
		802.11n HT40	MCS0	L/M/H
	Peak Excursion	802.11a	6 Mbps	L
		802.11n HT20	MCS0	L
		802.11n HT40	MCS0	L
	Frequency Stability	802.11a	6 Mbps	L/H
Radiated TCs	Radiated Band Edge	802.11a	MCS0	L/H
		802.11n HT20	MCS0	L/H
		802.11n HT40	MCS0	L/H
	Radiated Spurious Emission	802.11a	6 Mbps	L/M/H
		802.11n HT20	MCS0	L/M/H
		802.11n HT40	MCS0	L/M/H
AC Conducted Emission	Mode 1 : GSM850 Idle + Function 1 + Bluetooth Link + WLAN (5G) Link + Earphone			

Remark:

1. Function 1 stands for adapter + connector cable + EUT.
2. For radiated TCs, the tests were performed with adapter, connector cable and earphone.

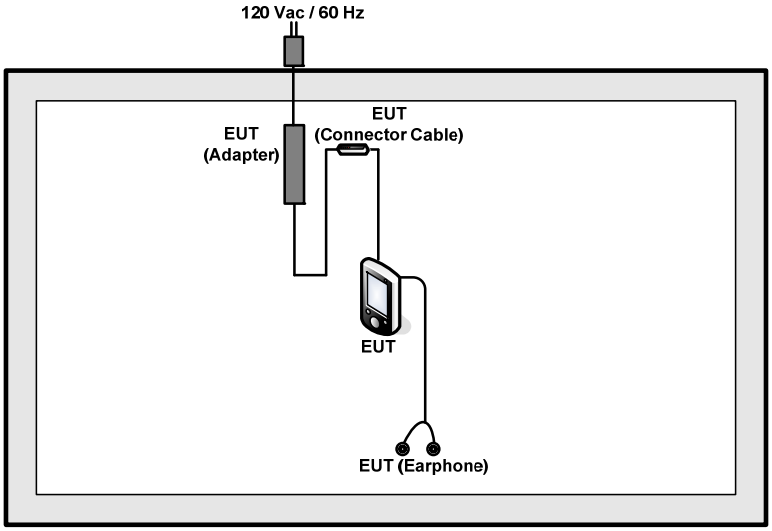
Ch. #		Band I：5150-5250 MHz	Band II：5250-5350 MHz	Band III：5470-5600 MHz and 5650-5725MHz
		802.11a	802.11a	802.11a
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140

Ch. #		Band I：5150-5250 MHz	Band II：5250-5350 MHz	Band III：5470-5600 MHz and 5650-5725MHz
		802.11n HT20	802.11n HT20	802.11n HT20
L	Low	36	52	100
M	Middle	44	60	116
H	High	48	64	140

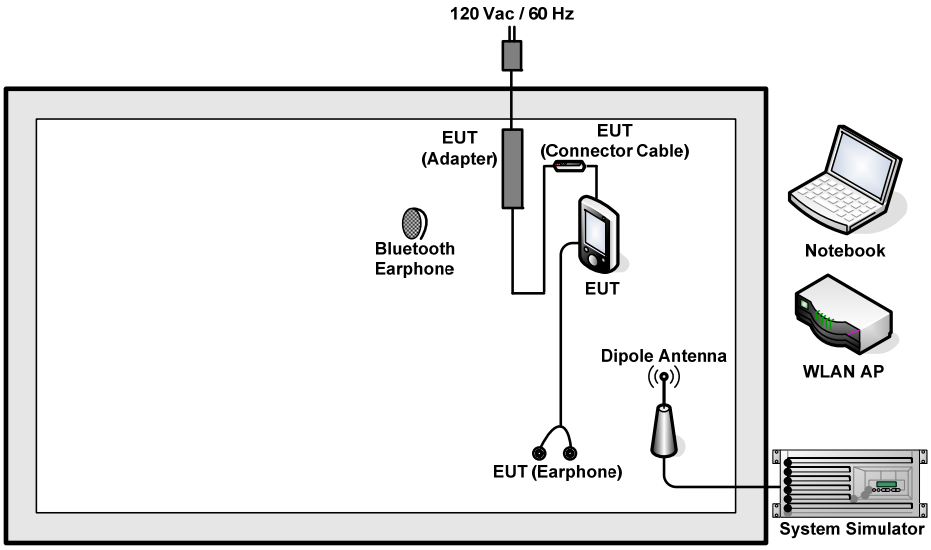
Ch. #		Band I：5150-5250 MHz	Band II：5250-5350 MHz	Band III：5470-5600 MHz and 5650-5725MHz
		802.11n HT40	802.11n HT40	802.11n HT40
L	Low	38	54	102
M	Middle	-	-	110
H	High	46	62	134

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.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Lenovo	LBH505	N/A	N/A	N/A
4.	Notebook	Acer	MS2204	QDS-BRCM1018	N/A	AC I/P: Unshielded, 0.9 m DC O/P: Shielded, 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 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 6 dB and 10dB attenuator.

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

= 6 + 10 = 16 (dB)

3 Test Result

3.1 26dB Bandwidth Measurement

3.1.1 Description of 26dB Bandwidth

There is no restriction limits for bandwidth. The maximum conducted output power can be limited by measured emission bandwidth (B).

For the band 5150-5250 MHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B.

For the bands 5250-5350 MHz and 5470-5600 MHz and 5650-5725MHz, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B.

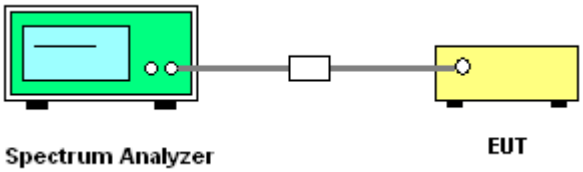
3.1.2 Measuring Instruments

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 D01 General UNII Test Procedures Old Rules v01r04. Section D) 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. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. Measure and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of 26dB Bandwidth Plots

Test Band :	5GHz band 1	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	26dB Bandwidth (MHz)	FCC 26dB Bandwidth Power Limit (dBm)
11a	6Mbps	1	36	5180	39.70	16.99
11a	6Mbps	1	44	5220	38.55	16.99
11a	6Mbps	1	48	5240	37.75	16.99
HT20	MCS0	1	36	5180	27.35	16.99
HT20	MCS0	1	44	5220	26.70	16.99
HT20	MCS0	1	48	5240	30.70	16.99
HT40	MCS0	1	38	5190	51.03	16.99
HT40	MCS0	1	46	5230	48.60	16.99

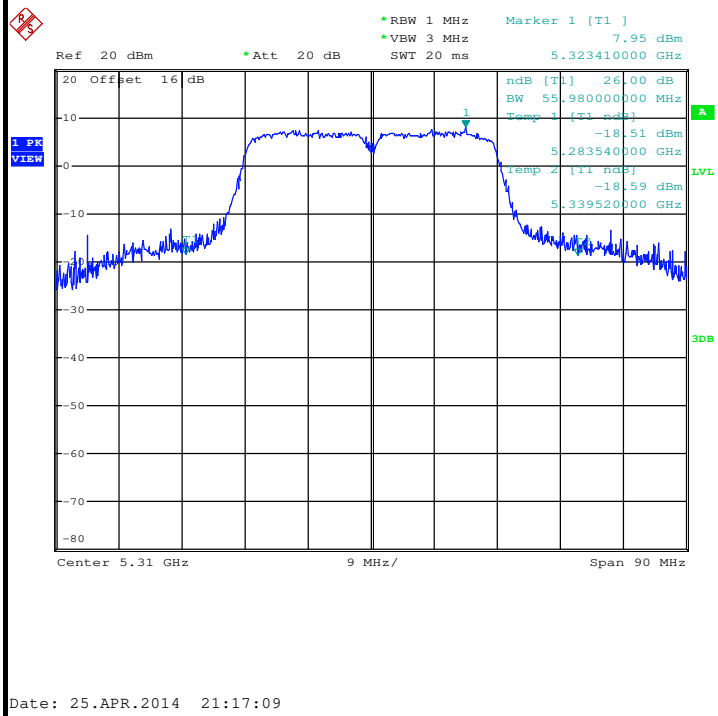
Test Band :	5GHz band 2	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	26dB Bandwidth (MHz)	FCC 26dB Bandwidth Power Limit (dBm)
11a	6Mbps	1	52	5260	36.95	23.98
11a	6Mbps	1	60	5300	35.60	23.98
11a	6Mbps	1	64	5320	36.35	23.98
HT20	MCS0	1	52	5260	25.50	23.98
HT20	MCS0	1	60	5300	25.05	23.98
HT20	MCS0	1	64	5320	25.05	23.98
HT40	MCS0	1	54	5270	55.44	23.98
HT40	MCS0	1	62	5310	55.98	23.98

Test Band :	5GHz band 3	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	26dB Bandwidth (MHz)	FCC 26dB Bandwidth Power Limit (dBm)
11a	6Mbps	1	100	5500	24.15	23.98
11a	6Mbps	1	116	5580	22.65	23.98
11a	6Mbps	1	140	5700	22.70	23.98
HT20	MCS0	1	100	5500	22.80	23.98
HT20	MCS0	1	116	5580	22.95	23.98
HT20	MCS0	1	140	5700	22.75	23.98
HT40	MCS0	1	102	5510	45.00	23.98
HT40	MCS0	1	110	5550	46.35	23.98
HT40	MCS0	1	134	5670	46.62	23.98

Maximum 26dB Bandwidth



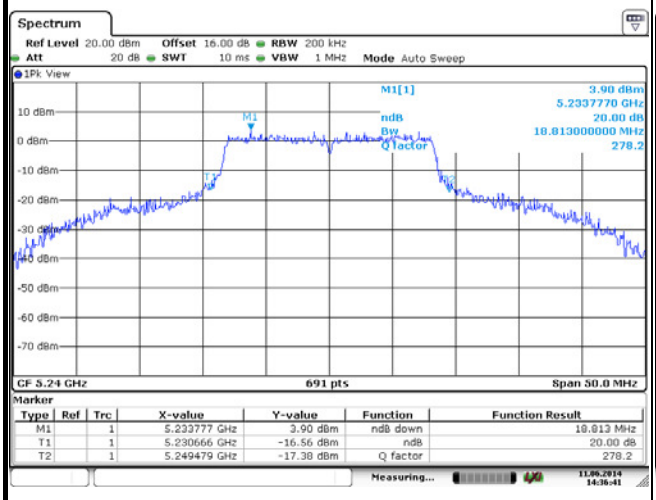
Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.1.6 Test Result of 20dB Occupied Bandwidth

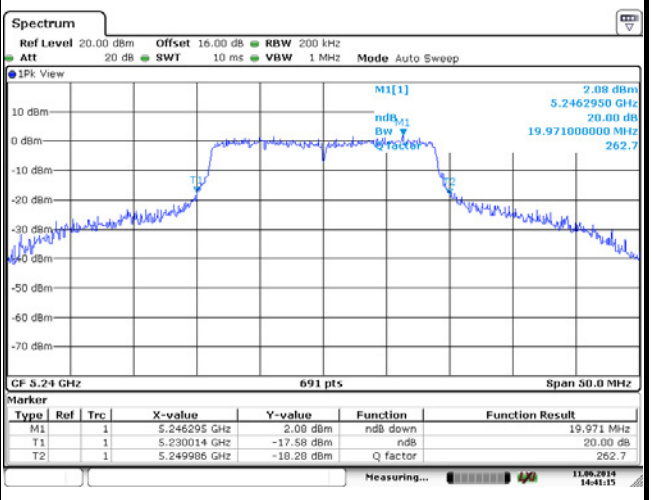
Mod.	Data Rate	NTX	Channel	Freq. (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth Upper Frequency (FH) (MHz)	Upper Limit Line (MHz)	Pass/Fail
11a	6Mbps	1	48	5240	18.8130	5249.48	5250	Pass
HT20	MCS0	1	48	5240	19.9700	5249.99		Pass
HT40	MCS0	1	46	5230	39.9900	5249.93		Pass

20dB Occupied Bandwidth

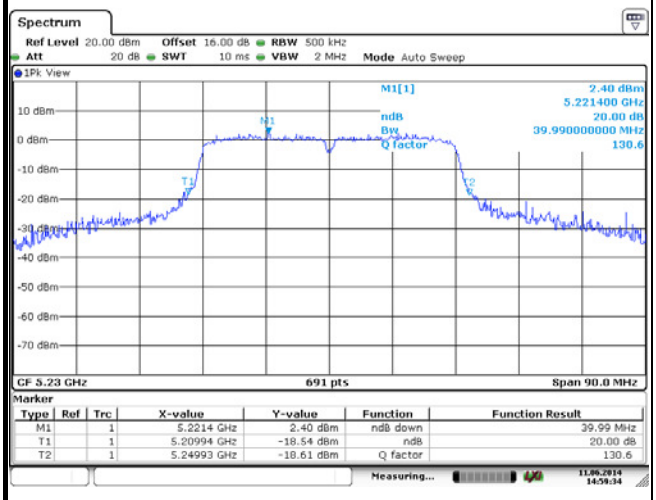
802.11a CH48 5240MHz



802.11n HT20 CH48 5240MHz



802.11n HT40 CH46 5230MHz



3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

For the band 5150-5250 MHz, the maximum conducted output power shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B, where B is the 26 dB emissions bandwidth in 1-MHz. If transmitting antenna directional gain is greater than 6 dBi, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the bands 5250-5350 MHz and 5470-5600 MHz and 5650-5725 MHz, bands, the maximum conducted output power shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B, where B is the 26 dB emissions bandwidth in 1-MHz. If transmitting antenna directional gain is greater than 6 dBi, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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.

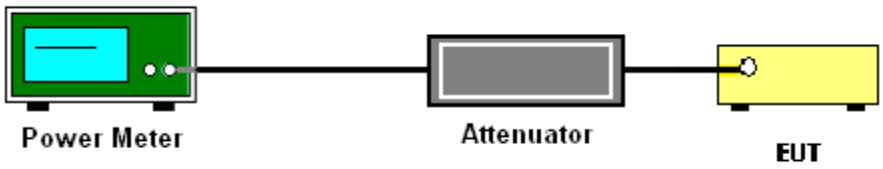
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D01 General UNII Test Procedures Old Rules v01r04.

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 :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

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	13.65	16.99	0.41	-	Pass
11a	6Mbps	1	44	5220	0.59	13.88	16.99	0.41		Pass
11a	6Mbps	1	48	5240	0.59	14.27	16.99	0.41		Pass
HT20	MCS0	1	36	5180	0.64	11.47	16.99	0.41		Pass
HT20	MCS0	1	44	5220	0.64	11.86	16.99	0.41		Pass
HT20	MCS0	1	48	5240	0.64	12.23	16.99	0.41		Pass
HT40	MCS0	1	38	5190	0.63	11.78	16.99	0.41		Pass
HT40	MCS0	1	46	5230	0.63	12.30	16.99	0.41		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 lesser of 50 mW (17dBm) or 4 dBm + 10log (B), where B is 26dB BW for FCC.

Test Band :	5GHz band 2	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

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	52	5260	0.59	13.74	23.98	0.44		Pass
11a	6Mbps	1	60	5300	0.59	13.34	23.98	0.44		Pass
11a	6Mbps	1	64	5320	0.59	14.10	23.98	0.44		Pass
HT20	MCS0	1	52	5260	0.64	11.35	23.98	0.44		Pass
HT20	MCS0	1	60	5300	0.64	10.95	23.98	0.44	-	Pass
HT20	MCS0	1	64	5320	0.64	11.76	23.98	0.44		Pass
HT40	MCS0	1	54	5270	0.63	12.40	23.98	0.44		Pass
HT40	MCS0	1	62	5310	0.63	12.56	23.98	0.44		Pass

Note:

1. Final Output Power equals to Measured Output Power adds the duty factor.
2. For the 5250-5350 MHz and 5470-5600 MHz and 5650-5725 MHz bands, the maximum conducted output power shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log (B), where B is 26dB BW for FCC.

Test Band :	5GHz band 3	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

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	100	5500	0.59	12.65	23.98	0.38		Pass
11a	6Mbps	1	116	5580	0.59	13.54	23.98	0.38		Pass
11a	6Mbps	1	140	5700	0.59	10.92	23.98	0.38		Pass
HT20	MCS0	1	100	5500	0.64	11.24	23.98	0.38		Pass
HT20	MCS0	1	116	5580	0.64	12.22	23.98	0.38	-	Pass
HT20	MCS0	1	140	5700	0.64	9.13	23.98	0.38		Pass
HT40	MCS0	1	102	5510	0.63	11.31	23.98	0.38		Pass
HT40	MCS0	1	110	5550	0.63	11.82	23.98	0.38		Pass
HT40	MCS0	1	134	5670	0.63	11.91	23.98	0.38		Pass

Note:

1. Final Output Power equals to Measured Output Power adds the duty factor.
2. For the 5250-5350 MHz and 5470-5600 MHz and 5650-5725 MHz bands, the maximum conducted output power shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log (B), where B is 26dB BW for FCC.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5150-5250 MHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band.

For the bands 5250-5350 MHz and 5470-5600 and 5650-5725 MHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band.

If transmitting antenna directional gain is greater than 6 dBi, both the maximum conducted output 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.

3.3.2 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 D01 General UNII Test Procedures Old Rules v01r04. Section F) Peak power spectral density (PPSD).

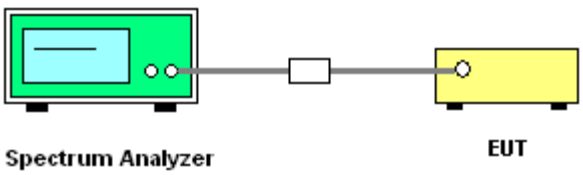
Note: Though the rule refers to “peak power spectral density”, the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission.

 # 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 D01 General UNII Test Procedures Old Rules v01r04.
   - 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 :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

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	3.48	4.00	0.41	Pass
11a	6Mbps	1	44	5220	0.59	2.86	4.00	0.41	Pass
11a	6Mbps	1	48	5240	0.59	3.83	4.00	0.41	Pass
HT20	MCS0	1	36	5180	0.64	1.00	4.00	0.41	Pass
HT20	MCS0	1	44	5220	0.64	1.04	4.00	0.41	Pass
HT20	MCS0	1	48	5240	0.64	1.36	4.00	0.41	Pass
HT40	MCS0	1	38	5190	0.63	-1.54	4.00	0.41	Pass
HT40	MCS0	1	46	5230	0.63	-1.90	4.00	0.41	Pass

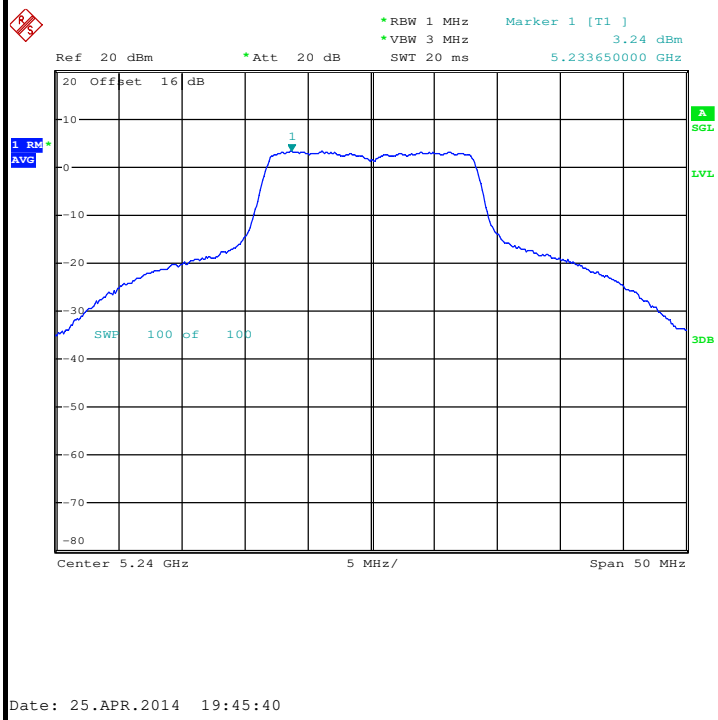
Test Band :	5GHz band 2	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

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	52	5260	0.59	3.58	11.00	0.44	Pass
11a	6Mbps	1	60	5300	0.59	3.23	11.00	0.44	Pass
11a	6Mbps	1	64	5320	0.59	3.33	11.00	0.44	Pass
HT20	MCS0	1	52	5260	0.64	0.79	11.00	0.44	Pass
HT20	MCS0	1	60	5300	0.64	0.73	11.00	0.44	Pass
HT20	MCS0	1	64	5320	0.64	0.66	11.00	0.44	Pass
HT40	MCS0	1	54	5270	0.63	-1.43	11.00	0.44	Pass
HT40	MCS0	1	62	5310	0.63	-1.38	11.00	0.44	Pass

Test Band :	5GHz band 3	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

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	100	5500	0.59	1.61	11.00	0.38	Pass
11a	6Mbps	1	116	5580	0.59	1.56	11.00	0.38	Pass
11a	6Mbps	1	140	5700	0.59	-0.16	11.00	0.38	Pass
HT20	MCS0	1	100	5500	0.64	-0.08	11.00	0.38	Pass
HT20	MCS0	1	116	5580	0.64	-0.23	11.00	0.38	Pass
HT20	MCS0	1	140	5700	0.64	-2.10	11.00	0.38	Pass
HT40	MCS0	1	102	5510	0.63	-3.12	11.00	0.38	Pass
HT40	MCS0	1	110	5550	0.63	-2.81	11.00	0.38	Pass
HT40	MCS0	1	134	5670	0.63	-3.91	11.00	0.38	Pass

Worst Case Power Spectral Density(dBm/MHz)



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

3.4 Peak Excursion Ratio Measurement

3.4.1 Limit of Peak Excursion Ratio

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

The testing follows FCC KDB 789033 D01 General UNII Test Procedures Old Rules v01r04.

Section G) Peak excursion measurement

1. The transmitter output is connected to the spectrum analyzer.
2. Set the spectrum analyzer span to view the entire emission bandwidth.
3. Find the maximum of the peak-max-hold spectrum.

   *Set RBW = 1MHz.

   *Set VBW ≥ 3MHz.

   *Detector = peak.

   *Trace mode = max-hold.

   *Allow the sweeps to continue until the trace stabilizes.

   *Use the peak search function to find the peak of the spectrum.
4. Use the procedure found under section 3.3 to measure the PPSD.
5. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

3.4.4 Test Setup

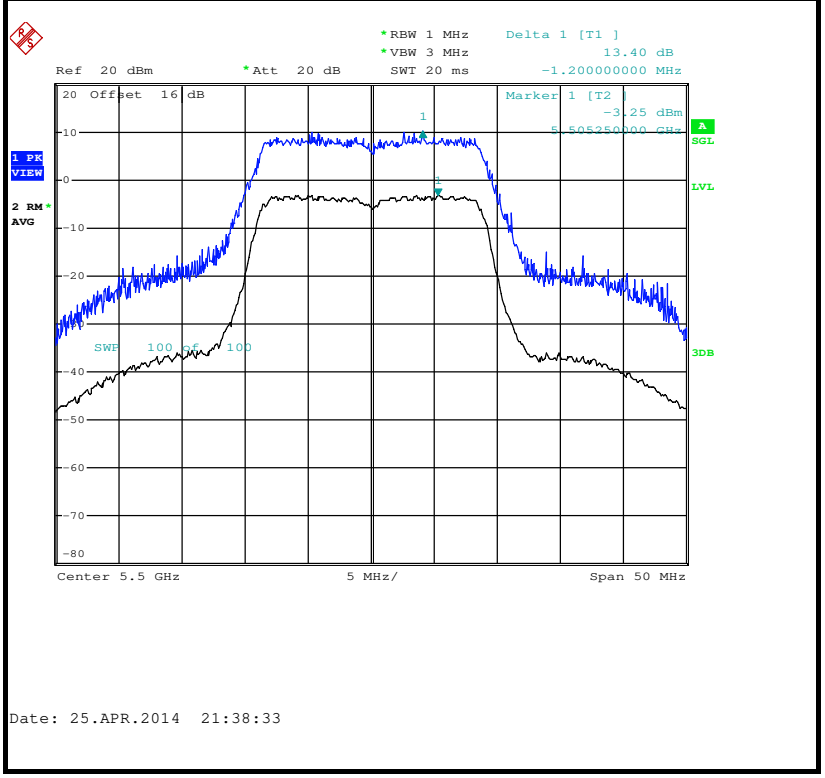
3.4.5 Test Result of Peak Excursion Ratio

Test Band :	5GHz band 3	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

Mod.	N_{TX}	Channel	Freq. (MHz)	Peak Excursion Ratio (dB)					Max. Limits (dB)	Pass/Fail
				BPSK	QPSK	16QAM	64QAM	256QAM		
11a	1	100	5500	9.41	10.00	9.09	9.24	-	13	Pass
HT20	1	100	5500	9.23	9.52	10.10	10.25	-	13	Pass
HT40	1	102	5510	9.94	9.67	10.19	8.89	-	13	Pass

Note: All modulation measured based on the minimum data rate setting.

Worst Case Peak Excursion Ratio (dB)



Note: Peak Excursion Ratio (dB) = Peak – (Average + Duty Cycle Offset)

Duty Cycle Offset: 3.15 dB

3.5 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.

3.5.1 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.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5600 MHz and 5650-5725MHz band: all emissions outside of the 5470-5600 MHz and 5650-5725MHz band shall not exceed an EIRP of -27 dBm/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.

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

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

(3) KDB789033 Old Rules v01r04 H)2)c)(i) 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.

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The testing follows FCC KDB 789033 D01 General UNII Test Procedures Old Rules v01r04. Section H) 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

   - The setting follows the H) 5) of FCC KDB 789033.
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

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

   - The setting follows H) 6) of FCC KDB 789033.
   - 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.

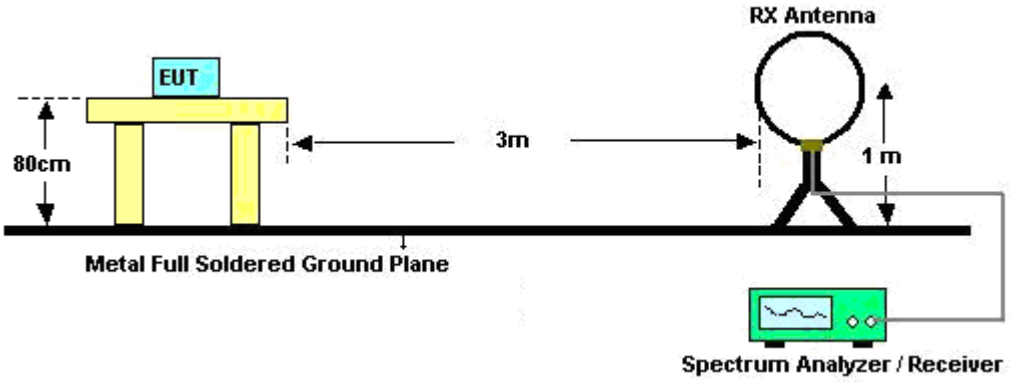
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11a	87.26	1.37	0.73	1kHz
802.11n HT20	86.39	1.28	0.78	1kHz
802.11n HT40	86.49	0.64	1.56	3kHz

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.

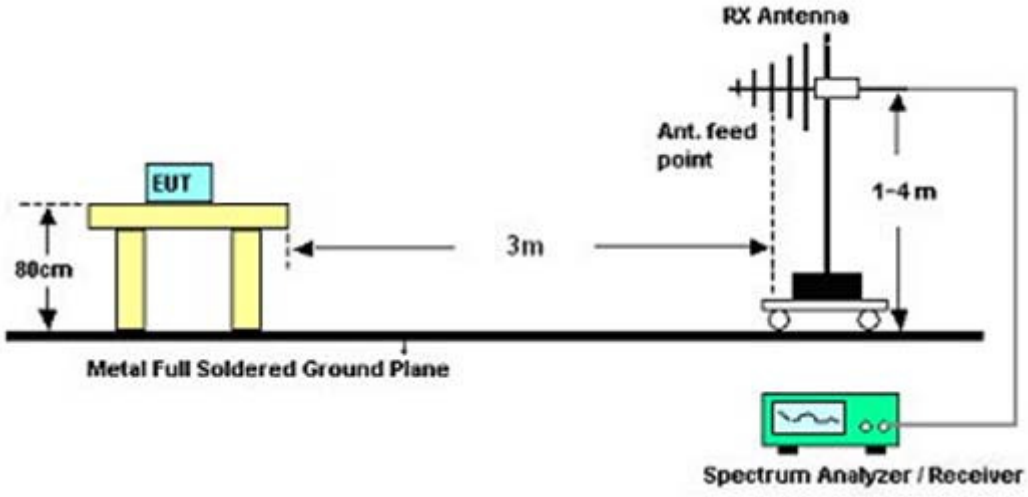
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, 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.

3.5.4 Test Setup

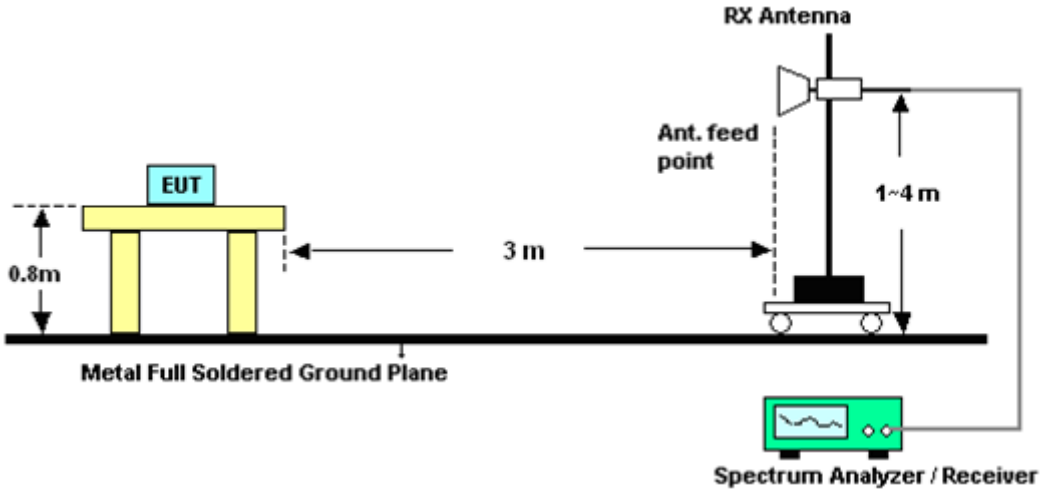
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 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.

3.5.6 Test Result

3.5.6.1 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
5149.6	67.28	-6.72	74	60.42	35.25	5.38	33.77	100	353	Peak
5150	45.04	-8.96	54	38.18	35.25	5.38	33.77	100	353	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
5149.75	67	-7	74	60.14	35.25	5.38	33.77	100	343	Peak
5150	45.07	-8.93	54	38.21	35.25	5.38	33.77	100	343	Average

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	64	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
5350.05	62.79	-11.21	74	55.75	35.32	5.45	33.73	100	342	Peak
5350	46.17	-7.83	54	39.13	35.32	5.45	33.73	100	342	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
5351.1	61.39	-12.61	74	54.35	35.32	5.45	33.73	102	139	Peak
5350.75	44.01	-9.99	54	36.97	35.32	5.45	33.73	102	139	Average

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	100	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
5467.04	66.2	-2.1	68.3	59.05	35.39	5.47	33.71	100	342	Peak

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
5468	63.72	-4.58	68.3	56.57	35.39	5.47	33.71	100	345	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	140	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
5725	71.47	-2.53	74	64	35.52	5.65	33.7	104	331	Peak
5725	48.69	-5.31	54	41.22	35.52	5.65	33.7	104	331	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
5725	67.66	-6.34	74	60.19	35.52	5.65	33.7	100	350	Peak
5725	45.46	-8.54	54	37.99	35.52	5.65	33.7	100	350	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
5149	58.62	-15.38	74	51.76	35.25	5.38	33.77	114	342	Peak
5149.85	43.36	-10.64	54	36.5	35.25	5.38	33.77	114	342	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
5143.05	58.42	-15.58	74	51.56	35.25	5.38	33.77	100	350	Peak
5150	42.87	-11.13	54	36.01	35.25	5.38	33.77	100	350	Average

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	64	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
5351.45	59.61	-14.39	74	52.57	35.32	5.45	33.73	100	341	Peak
5371.75	43.45	-10.55	54	36.39	35.33	5.45	33.72	100	341	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
5353.1	58.5	-15.5	74	51.46	35.32	5.45	33.73	100	131	Peak
5350.05	41.75	-12.25	54	34.71	35.32	5.45	33.73	100	131	Average

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	100	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
5468.72	62.75	-5.55	68.3	55.6	35.39	5.47	33.71	100	341	Peak

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
5467.84	59.12	-9.18	68.3	51.97	35.39	5.47	33.71	100	147	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	140	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
5725	66.98	-1.32	68.3	59.51	35.52	5.65	33.7	100	337	Peak

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
5725	65.51	-2.79	68.3	58.04	35.52	5.65	33.7	100	349	Peak

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
5147.75	70.45	-3.55	74	63.59	35.25	5.38	33.77	119	341	Peak
5149.55	50.73	-3.27	54	43.87	35.25	5.38	33.77	119	341	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
5150	67.23	-6.77	74	60.37	35.25	5.38	33.77	120	349	Peak
5149.05	47.05	-6.95	54	40.19	35.25	5.38	33.77	120	349	Average

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	62	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
5352.15	72.62	-1.38	74	65.58	35.32	5.45	33.73	100	326	Peak
5350.05	50.81	-3.19	54	43.77	35.32	5.45	33.73	100	326	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
5350.7	70.29	-3.71	74	63.25	35.32	5.45	33.73	100	140	Peak
5350.85	47.87	-6.13	54	40.83	35.32	5.45	33.73	100	140	Average

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	102	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
5469.68	70.09	-3.91	74	62.94	35.39	5.47	33.71	100	332	Peak
5469.6	52.99	-1.01	54	45.84	35.39	5.47	33.71	100	332	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
5469.84	67.09	-6.91	74	59.94	35.39	5.47	33.71	100	155	Peak
5470	48.25	-5.75	54	41.1	35.39	5.47	33.71	100	155	Average

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	134	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
5725	64.65	-3.65	68.3	57.18	35.52	5.65	33.7	100	351	Peak

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
5725	61.02	-7.28	68.3	53.55	35.52	5.65	33.7	100	349	Peak

3.5.6.2 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. 10359 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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	105.29	-	-	98.41	35.26	5.39	33.77	120	345	Peak
5180	94.03	-	-	87.15	35.26	5.39	33.77	120	345	Average
10359	32.04	-36.26	68.3	57.35	1.46	7.72	34.49	120	185	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. 10359 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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	104.69	-	-	97.81	35.26	5.39	33.77	100	347	Peak
5180	93.05	-	-	86.17	35.26	5.39	33.77	100	347	Average
10359	31.96	-36.34	68.3	57.27	1.46	7.72	34.49	185	252	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	52	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5260 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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
5260	105.6	-	-	98.64	35.29	5.42	33.75	100	341	Peak
5260	93.82	-	-	86.86	35.29	5.42	33.75	100	341	Average
10520	30.34	-37.96	68.3	55.34	1.58	7.81	34.39	100	225	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	52	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5260 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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
5260	104.2	-	-	97.24	35.29	5.42	33.75	102	125	Peak
5260	93.05	-	-	86.09	35.29	5.42	33.75	102	125	Average
10521	33.39	-34.91	68.3	58.39	1.58	7.81	34.39	100	100	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	64	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5320 MHz is fundamental signal which can be ignored. 2. 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
5320	107.8	-	-	100.78	35.31	5.44	33.73	100	339	Peak
5320	95.62	-	-	88.6	35.31	5.44	33.73	100	339	Average
10641	30.91	-43.09	74	55.65	1.7	7.87	34.31	195	59	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	64	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5320 MHz is fundamental signal which can be ignored. 2. 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
5320	106.52	-	-	99.5	35.31	5.44	33.73	103	53	Peak
5320	95.44	-	-	88.42	35.31	5.44	33.73	103	53	Average
10641	34.02	-39.98	74	58.76	1.7	7.87	34.31	100	100	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	100	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5500 MHz is fundamental signal which can be ignored. 2. 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
5500	108.56	-	-	101.37	35.41	5.48	33.7	102	328	Peak
5500	96.54	-	-	89.35	35.41	5.48	33.7	102	328	Average
11001	26.32	-47.68	74	49.99	2.21	8.12	34	100	166	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	100	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5500 MHz is fundamental signal which can be ignored. 2. 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
5500	104.82	-	-	97.63	35.41	5.48	33.7	100	149	Peak
5500	92.65	-	-	85.46	35.41	5.48	33.7	100	149	Average
11001	26.33	-47.67	74	50	2.21	8.12	34	184	226	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	116	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5580 MHz is fundamental signal which can be ignored. 2. 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
5580	110.47	-	-	103.2	35.45	5.52	33.7	107	330	Peak
5580	99.53	-	-	92.26	35.45	5.52	33.7	107	330	Average
11160	31.94	-42.06	74	54.7	2.9	8.34	34	100	184	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	116	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5580 MHz is fundamental signal which can be ignored. 2. 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
5580	106.22	-	-	98.95	35.45	5.52	33.7	106	151	Peak
5580	95.09	-	-	87.82	35.45	5.52	33.7	106	151	Average
11160	34.03	-39.97	74	56.79	2.9	8.34	34	174	45	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	140	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5700 MHz is fundamental signal which can be ignored. 2. 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
5700	106.15	-	-	98.73	35.5	5.62	33.7	105	333	Peak
5700	95.51	-	-	88.09	35.5	5.62	33.7	105	333	Average
11400	33.66	-40.34	74	54.79	4.13	8.74	34	165	245	Peak

Test Mode :	802.11a	Temperature :	22~23°C
Test Channel :	140	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5700 MHz is fundamental signal which can be ignored. 2. 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
5700	102.84	-	-	95.42	35.5	5.62	33.7	100	347	Peak
5700	90.88	-	-	83.46	35.5	5.62	33.7	100	347	Average
11400	34.74	-39.26	74	55.87	4.13	8.74	34	174	141	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. 10359 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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	102.56	-	-	95.68	35.26	5.39	33.77	100	345	Peak
5180	90.71	-	-	83.83	35.26	5.39	33.77	100	345	Average
10359	31.43	-36.87	68.3	56.74	1.46	7.72	34.49	174	118	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. 10359 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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	102	-	-	95.12	35.26	5.39	33.77	100	351	Peak
5180	90.22	-	-	83.34	35.26	5.39	33.77	100	351	Average
10359	33.55	-34.75	68.3	58.86	1.46	7.72	34.49	100	184	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	52	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5260 MHz is fundamental signal which can be ignored. 2. 10521 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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
5260	103.13	-	-	96.17	35.29	5.42	33.75	100	336	Peak
5260	90.91	-	-	83.95	35.29	5.42	33.75	100	336	Average
10521	31.52	-36.78	68.3	56.52	1.58	7.81	34.39	185	54	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	52	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5260 MHz is fundamental signal which can be ignored. 2. 10521 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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
5260	99.9	-	-	92.94	35.29	5.42	33.75	100	347	Peak
5260	88.35	-	-	81.39	35.29	5.42	33.75	100	347	Average
10521	33.75	-34.55	68.3	58.75	1.58	7.81	34.39	184	110	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	64	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5320 MHz is fundamental signal which can be ignored. 2. 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
5320	104.08	-	-	97.06	35.31	5.44	33.73	100	338	Peak
5320	92.47	-	-	85.45	35.31	5.44	33.73	100	338	Average
10641	31.1	-42.9	74	55.84	1.7	7.87	34.31	100	184	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	64	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5320 MHz is fundamental signal which can be ignored. 2. 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
5320	100.9	-	-	93.88	35.31	5.44	33.73	100	347	Peak
5320	88.91	-	-	81.89	35.31	5.44	33.73	100	347	Average
10641	34.52	-39.48	74	59.26	1.7	7.87	34.31	174	122	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	100	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5500 MHz is fundamental signal which can be ignored. 2. 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
5500	106.2	-	-	99.01	35.41	5.48	33.7	108	330	Peak
5500	94.74	-	-	87.55	35.41	5.48	33.7	108	330	Average
11001	26.78	-47.22	74	50.45	2.21	8.12	34	174	129	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	100	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5500 MHz is fundamental signal which can be ignored. 2. 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
5500	102.73	-	-	95.54	35.41	5.48	33.7	100	142	Peak
5500	91.46	-	-	84.27	35.41	5.48	33.7	100	142	Average
11001	27.63	-46.37	74	51.3	2.21	8.12	34	154	111	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	116	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5580 MHz is fundamental signal which can be ignored. 2. 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
5580	107.71	-	-	100.44	35.45	5.52	33.7	108	335	Peak
5580	96.77	-	-	89.5	35.45	5.52	33.7	108	335	Average
11160	31.06	-42.94	74	53.82	2.9	8.34	34	147	184	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	116	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5580 MHz is fundamental signal which can be ignored. 2. 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
5580	105.42	-	-	98.15	35.45	5.52	33.7	108	160	Peak
5580	93.87	-	-	86.6	35.45	5.52	33.7	108	160	Average
11160	31.31	-42.69	74	54.07	2.9	8.34	34	120	102	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	140	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5700 MHz is fundamental signal which can be ignored. 2. 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
5700	107	-	-	99.58	35.5	5.62	33.7	105	328	Peak
5700	95.35	-	-	87.93	35.5	5.62	33.7	105	328	Average
11400	35.44	-38.56	74	56.57	4.13	8.74	34	100	187	Peak

Test Mode :	802.11n HT20	Temperature :	22~23°C
Test Channel :	140	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5700 MHz is fundamental signal which can be ignored. 2. 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
5700	102.51	-	-	95.09	35.5	5.62	33.7	100	346	Peak
5700	90.6	-	-	83.18	35.5	5.62	33.7	100	346	Average
11400	35.63	-38.37	74	56.76	4.13	8.74	34	100	174	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. 10380 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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
5190	101.16	-	-	94.28	35.26	5.39	33.77	115	338	Peak
5190	90.36	-	-	83.48	35.26	5.39	33.77	115	338	Average
10380	32.66	-35.64	68.3	57.93	1.48	7.73	34.48	100	187	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. 10380 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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
5190	99.55	-	-	92.67	35.26	5.39	33.77	113	123	Peak
5190	88.53	-	-	81.65	35.26	5.39	33.77	113	123	Average
10380	33.25	-35.05	68.3	58.52	1.48	7.73	34.48	114	121	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	54	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5270 MHz is fundamental signal which can be ignored. 2. 10539 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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
5270	102.26	-	-	95.3	35.29	5.42	33.75	100	337	Peak
5270	91.06	-	-	84.1	35.29	5.42	33.75	100	337	Average
10539	32.31	-35.99	68.3	57.27	1.6	7.82	34.38	120	118	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	54	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5270 MHz is fundamental signal which can be ignored. 2. 10539 MHz is not within a restricted band and satisfies 68.3 dBμV /m peak emission 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
5270	100.15	-	-	93.19	35.29	5.42	33.75	100	130	Peak
5270	88.33	-	-	81.37	35.29	5.42	33.75	100	130	Average
10539	34.12	-34.18	68.3	59.08	1.6	7.82	34.38	100	162	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	62	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5310 MHz is fundamental signal which can be ignored. 2. 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
5310	102.66	-	-	95.64	35.31	5.44	33.73	100	335	Peak
5310	91.71	-	-	84.69	35.31	5.44	33.73	100	335	Average
10620	31.65	-42.35	74	56.43	1.68	7.86	34.32	100	162	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	62	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5310 MHz is fundamental signal which can be ignored. 2. 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
5310	99.87	-	-	92.85	35.31	5.44	33.73	106	137	Peak
5310	88.71	-	-	81.69	35.31	5.44	33.73	106	137	Average
10620	34.23	-39.77	74	59.01	1.68	7.86	34.32	100	184	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	102	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5510 MHz is fundamental signal which can be ignored. 2. 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
69.77	32	-8	40	59.51	5.3	0.78	33.59	-	-	Peak
179.38	31.32	-12.18	43.5	55.2	8.47	1.22	33.57	-	-	Peak
233.7	38.64	-7.36	46	59.53	11.17	1.41	33.47	-	-	Peak
252.13	38.82	-7.18	46	58.77	12.03	1.46	33.44	154	118	Peak
342.34	32.67	-13.33	46	50	14.33	1.7	33.36	-	-	Peak
463.59	26.9	-19.1	46	41.62	16.5	1.97	33.19	-	-	Peak
5510	104.52	-	-	97.33	35.41	5.48	33.7	110	328	Peak
5510	93.34	-	-	86.15	35.41	5.48	33.7	110	328	Average
11019	27.7	-46.3	74	51.29	2.27	8.14	34	154	100	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	102	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5510 MHz is fundamental signal which can be ignored. 2. 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
31.94	32.64	-7.36	40	49.17	16.55	0.5	33.58	100	184	Peak
70.74	32.53	-7.47	40	59.96	5.38	0.78	33.59	-	-	Peak
233.7	31.52	-14.48	46	52.41	11.17	1.41	33.47	-	-	Peak
288.02	26.89	-19.11	46	45.9	12.82	1.56	33.39	-	-	Peak
463.59	24.01	-21.99	46	38.73	16.5	1.97	33.19	-	-	Peak
551.86	21.53	-24.47	46	33.94	18.5	2.1	33.01	-	-	Peak
5510	100.29	-	-	93.1	35.41	5.48	33.7	100	341	Peak
5510	89.21	-	-	82.02	35.41	5.48	33.7	100	341	Average
11019	28.92	-45.08	74	52.51	2.27	8.14	34	200	100	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	110	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5550 MHz is fundamental signal which can be ignored. 2. 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
5550	105.62	-	-	98.37	35.44	5.51	33.7	119	329	Peak
5550	94.05	-	-	86.8	35.44	5.51	33.7	119	329	Average
11100	30.33	-43.67	74	53.49	2.6	8.24	34	100	162	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	110	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5550 MHz is fundamental signal which can be ignored. 2. 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
5550	101.31	-	-	94.06	35.44	5.51	33.7	100	341	Peak
5550	89.99	-	-	82.74	35.44	5.51	33.7	100	341	Average
11100	30.77	-43.23	74	53.93	2.6	8.24	34	132	114	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	134	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Horizontal
Remark :	1. 5670 MHz is fundamental signal which can be ignored. 2. 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
5670	105.57	-	-	98.17	35.5	5.6	33.7	116	332	Peak
5670	94.88	-	-	87.48	35.5	5.6	33.7	116	332	Average
11340	34.71	-39.29	74	56.24	3.83	8.64	34	115	141	Peak

Test Mode :	802.11n HT40	Temperature :	22~23°C
Test Channel :	134	Relative Humidity :	42~43%
Test Engineer :	Star Wei	Polarization :	Vertical
Remark :	1. 5670 MHz is fundamental signal which can be ignored. 2. 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
5670	101.19	-	-	93.79	35.5	5.6	33.7	100	344	Peak
5670	89.72	-	-	82.32	35.5	5.6	33.7	100	344	Average
11340	35.54	-38.46	74	57.07	3.83	8.64	34	120	185	Peak

3.6 AC Conducted Emission Measurement

3.6.1 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.

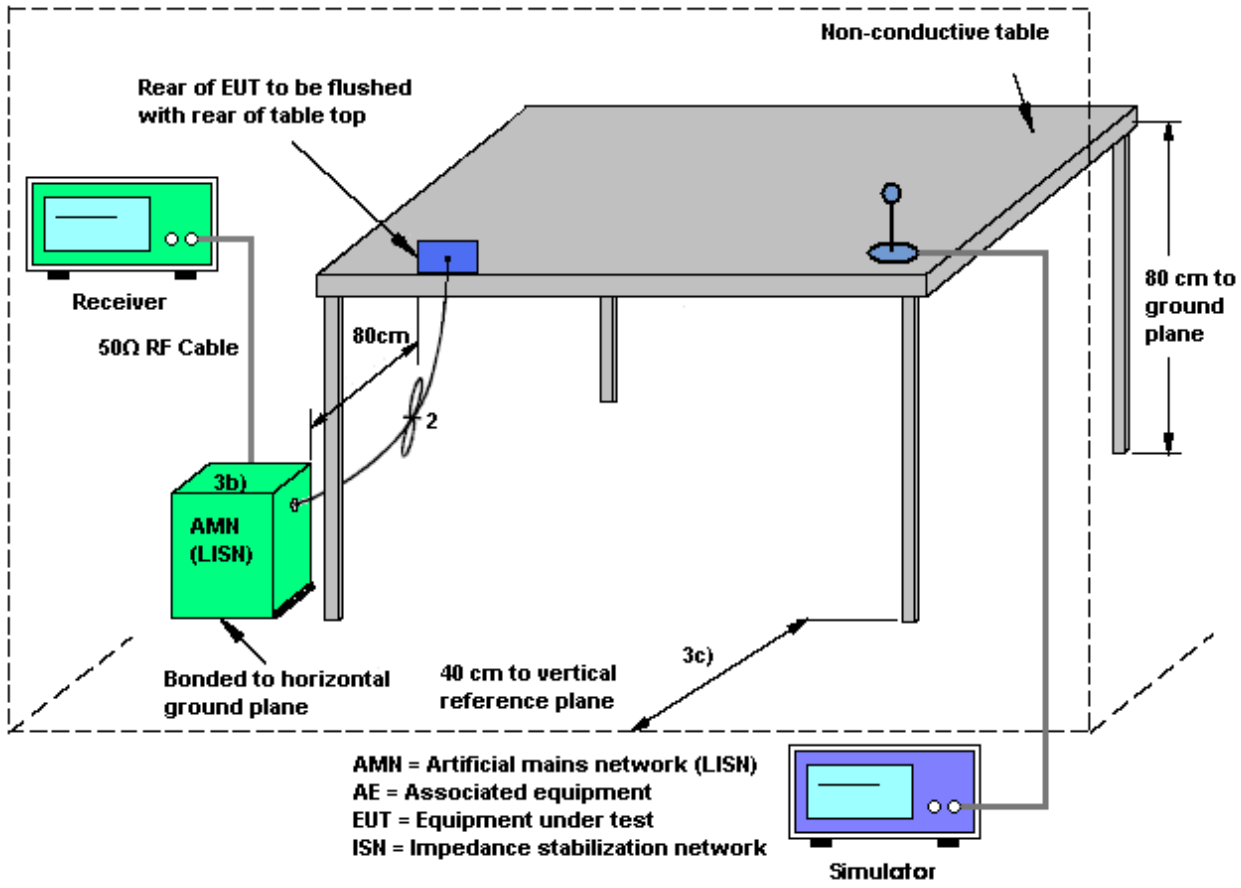
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

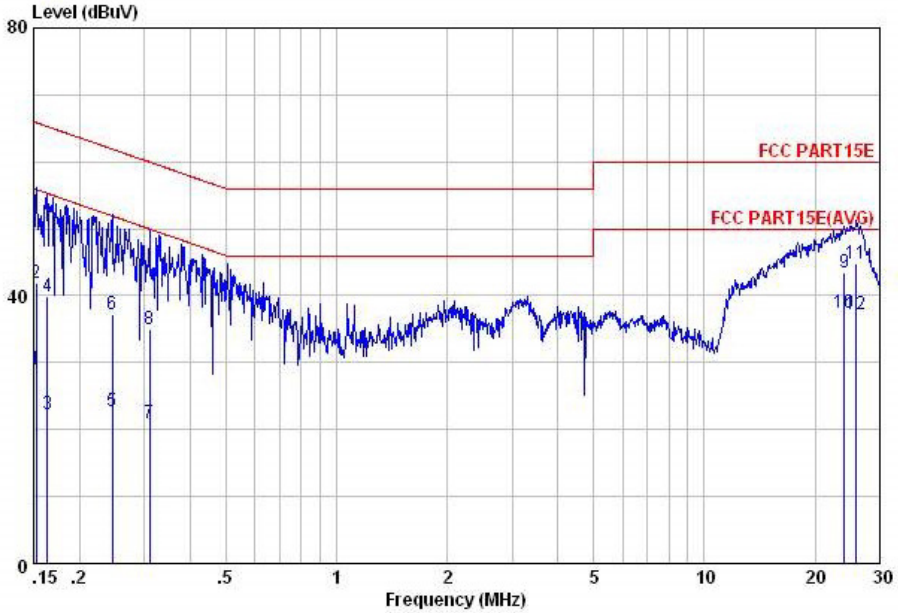
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
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.

3.6.4 Test Setup



3.6.5 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 + Function 1 + Bluetooth Link + WLAN (5G) Link + Earphone		

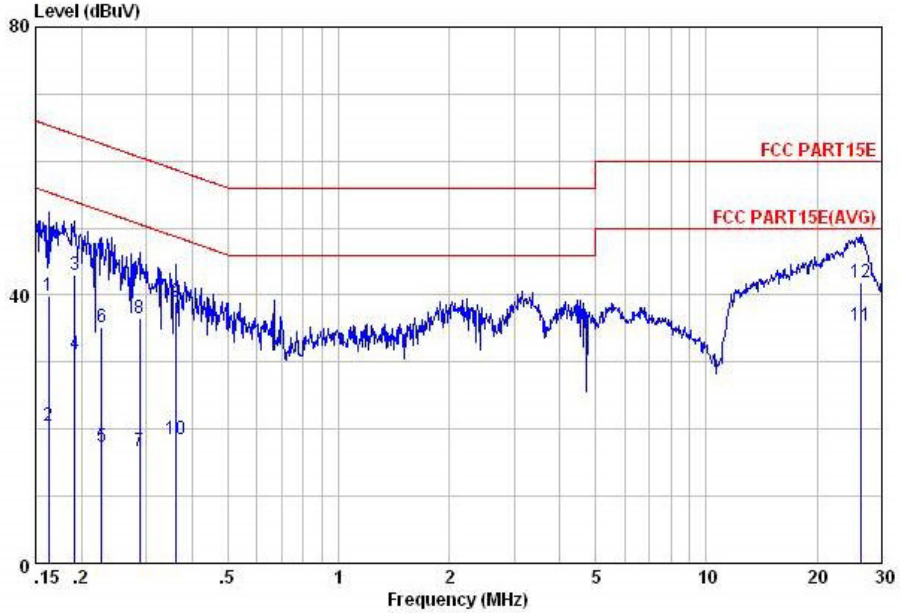


Site : C001-KS
Condition: FCC PART15E LISN-L20130306 LINE

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15	28.92	-26.95	55.87	16.31	1.91	10.70	Average
2	0.15	41.92	-23.95	65.87	29.31	1.91	10.70	QP
3	0.16	22.28	-33.02	55.30	9.90	1.72	10.66	Average
4	0.16	39.98	-25.32	65.30	27.60	1.72	10.66	QP
5	0.25	22.70	-29.21	51.91	11.30	0.89	10.51	Average
6	0.25	37.30	-24.61	61.91	25.90	0.89	10.51	QP
7	0.31	20.91	-29.06	49.97	9.91	0.63	10.37	Average
8	0.31	34.91	-25.06	59.97	23.91	0.63	10.37	QP
9	24.01	43.51	-16.49	60.00	32.90	0.10	10.51	QP
10	24.01	37.51	-12.49	50.00	26.90	0.10	10.51	Average
11	25.86	44.75	-15.25	60.00	34.10	0.10	10.55	QP
12	25.86	37.25	-12.75	50.00	26.60	0.10	10.55	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 + Function 1 + Bluetooth Link + WLAN (5G) Link + Earphone		



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	0.16	39.86	-25.48	65.34	27.50	1.70	10.66	QP
2	0.16	20.46	-34.88	55.34	8.10	1.70	10.66	Average
3	0.19	42.99	-20.99	63.98	31.30	1.10	10.59	QP
4	0.19	31.29	-22.69	53.98	19.60	1.10	10.59	Average
5	0.23	17.39	-35.18	52.57	5.90	0.95	10.54	Average
6	0.23	35.29	-27.28	62.57	23.80	0.95	10.54	QP
7	0.29	16.80	-33.79	50.59	5.60	0.78	10.42	Average
8	0.29	36.50	-24.09	60.59	25.30	0.78	10.42	QP
9	0.36	38.99	-19.70	58.69	28.20	0.48	10.31	QP
10	0.36	18.49	-30.20	48.69	7.70	0.48	10.31	Average
11	26.42	35.32	-14.68	50.00	24.60	0.17	10.55	Average
12	26.42	41.82	-18.18	60.00	31.10	0.17	10.55	QP

3.7 Frequency Stability Measurement

3.7.1 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.

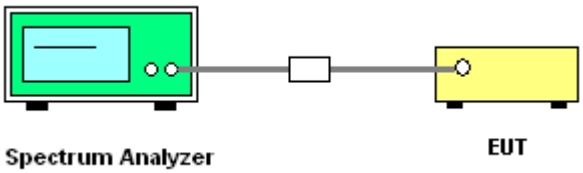
3.7.2 Measuring Instruments

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

3.7.3 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.

3.7.4 Test Setup



3.7.5 Test Result of Frequency Stability

Test Band :	5GHz band 1,2,3	Temperature :	24~25℃
Test Engineer :	Issac Song	Relative Humidity :	47~51%

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	5180.05	0.05	9.65	20	3.6
11a	6Mbps	1	36	5180	5180.05	0.05	9.65	20	4.2
11a	6Mbps	1	36	5180	5180.05	0.05	9.65	20	3.8
11a	6Mbps	1	36	5180	5180.05	0.05	9.65	-10	3.8
11a	6Mbps	1	36	5180	5180.05	0.05	9.65	50	3.8

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (˚C)	Voltage (V)
11a	6Mbps	1	64	5320	5320.00	0.00	0.00	20	3.6
11a	6Mbps	1	64	5320	5320.05	0.05	9.40	20	4.2
11a	6Mbps	1	64	5320	5320.00	0.00	0.00	20	3.8
11a	6Mbps	1	64	5320	5320.00	0.00	0.00	-10	3.8
11a	6Mbps	1	64	5320	5320.05	0.05	9.40	50	3.8

Mod.	Data Rate	NTX	Channel	Freq. (MHz)	Center Frequency (MHz)	Frequency Deviation (MHz)	Frequency Stability (ppm)	Temperature (˚C)	Voltage (V)
11a	6Mbps	1	100	5500	5500.08	0.08	13.64	20	3.6
11a	6Mbps	1	100	5500	5500.05	0.05	9.09	20	4.2
11a	6Mbps	1	100	5500	5500.05	0.05	9.09	20	3.8
11a	6Mbps	1	100	5500	5500.05	0.05	9.09	-10	3.8
11a	6Mbps	1	100	5500	5500.03	0.02	4.55	50	3.8

Note:

1. Center Frequency = (Low Frequency + High Frequency) / 2.
2. The frequency band 5180-5240MHz which was verified by testing against other standard is less than 20 ppm which is sufficient to maintain the signal within the 5150-5250MHz band.

3.8 Automatically Discontinue Transmission

3.8.1 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.

3.8.2 Measuring Instruments

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

3.8.3 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.

3.9 Antenna Requirements

3.9.1 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.

3.9.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.9.3 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	Apr. 25, 2014~ Jun. 11, 2014	Dec. 27, 2014	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV30	101338	9kHz~30GHz	Jun. 17, 2013	Apr. 25, 2014~ Jun. 11, 2014	Jun. 16, 2014	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	30MHz~40GHz	Feb. 27, 2014	Apr. 25, 2014~ Jun. 11, 2014	Feb. 26, 2015	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Feb. 27, 2014	Apr. 25, 2014~ Jun. 11, 2014	Feb. 26, 2015	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 05, 2013	Apr. 18, 2014	Nov. 04, 2014	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP30	101399	9kHz~30GHz	May 23, 2013	Apr. 18, 2014	May 22, 2014	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 09, 2013	Apr. 18, 2014	Oct. 08, 2014	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Jan. 08, 2014	Apr. 18, 2014	Jan. 07, 2015	Radiation (03CH01-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 08, 2014	Apr. 18, 2014	Jan. 07, 2015	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 18, 2013	Apr. 18, 2014	Nov. 17, 2014	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Mar. 10, 2014	Apr. 18, 2014	Mar. 09, 2015	Radiation (03CH01-KS)
Amplifier	com-power	PA-103A	161073	1MHz~1GHz	May 05, 2013	Apr. 18, 2014	May 04, 2014	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02371	1GHz~26.5GHz	Dec. 10, 2013	Apr. 18, 2014	Dec. 09, 2014	Radiation (03CH01-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Apr. 18, 2014	NCR	Radiation (03CH01-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Apr. 18, 2014	NCR	Radiation (03CH01-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Apr. 18, 2014	NCR	Radiation (03CH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 04, 2014	Jun. 11, 2014	May 03, 2015	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Dec. 10, 2013	Jun. 11, 2014	Dec. 09, 2014	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Dec. 10, 2013	Jun. 11, 2014	Dec. 09, 2014	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Nov. 12, 2013	Jun. 11, 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))	2.26

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.54