

FCC RF Test Report

APPLICANT : Cymbidium LLC.
EQUIPMENT : Electronic Display Device
MODEL NAME : NM460GZ
FCC ID : 4AY-6415
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was tested on Nov. 15, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant with the applicable technical standards.

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



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

Report No. : FR2N3053-01
Report Version : Rev. 01
Page Number : 1 of 56

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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.55 dB at 2390.000 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.40 dB at 0.518 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Cymbidium LLC.

2704 Commerce Avenue, Suite B, Harrisburg, PA 17110-9380

1.2 Feature of Equipment Under Test

Product Feature	
Equipment	Electronic Display Device
Model Name	NM460GZ
FCC ID	4AY-6415
EUT supports Radios application	WLAN 11b/g/n (HT20)
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.

1.3 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	802.11b/g/n : 2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 18.67 dBm (0.0736 W) 802.11g : 22.65 dBm (0.1841 W) 802.11n HT20 : 23.14 dBm (0.2061 W)
Antenna Type	802.11b/g/n : Fixed Internal Antenna type with gain 4.291 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.4 Modification of EUT

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

1.5 Testing Site

Test Site	SPORTON INTERNATIONAL INC.			
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978			
Test Site No.	Sporton Site No.			FCC Registration No.
	TH02-HY	CO05-HY	03CH07-HY	722060

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

1.6 Applied Standards

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

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
- ♦ 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 (X plane) were recorded in this report.

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

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

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	-	-

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 shown in the following tables.

2.4GHz 802.11b mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	18.67	18.56	18.51	18.59

2.4GHz 802.11g mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Peak Power (dBm)	22.65	22.64	22.62	22.63	22.57	22.57	22.63	22.59

2.4GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	23.14	22.76	22.71	21.97	23.11	23.10	23.02	23.12

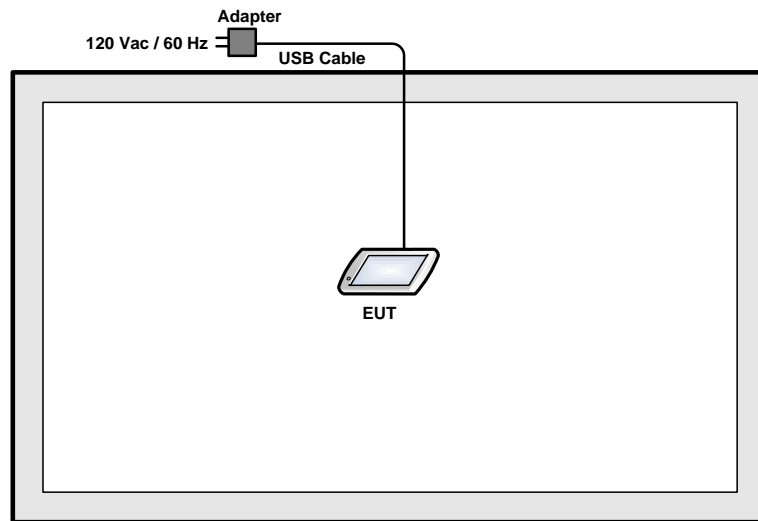
2.3 Test Mode

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

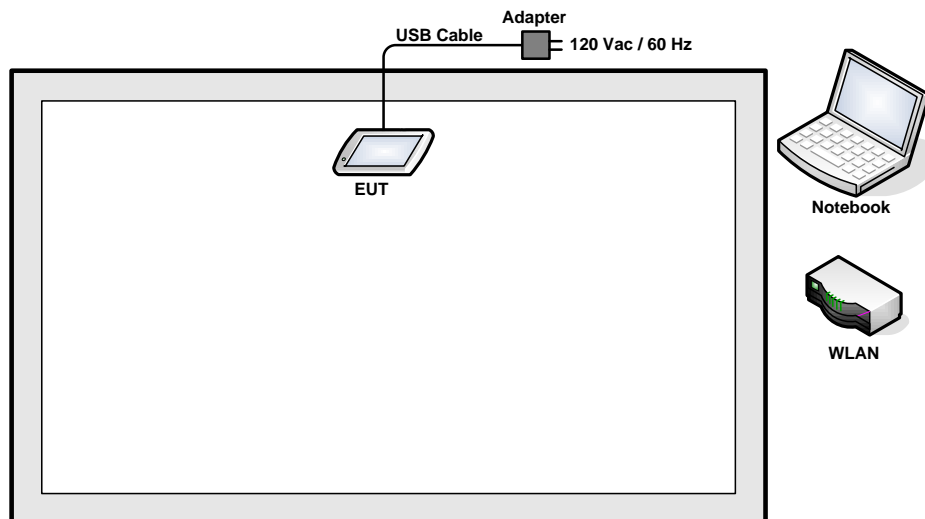
Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	6dB BW Power Spectral Density	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/10/11
		802.11n HT20	MCS0	1/2/6/10/11
	Conducted Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/11
		802.11n HT20	MCS0	1/11
	Conducted Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	1/11
		802.11g	6 Mbps	1/10/11
		802.11n HT20	MCS0	1/2/10/11
	Radiated Spurious Emission	802.11b	1 Mbps	1/6/11
		802.11g	6 Mbps	1/6/11
		802.11n HT20	MCS0	1/6/11
AC Conducted Emission	Mode 1 : WLAN Link + USB Cable (Charging from Adapter)			

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.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Adapter	Foxlink	PE98ED	Verification	N/A	N/A
4.	USB Cable	Foxlink	VR47XW	N/A	Unshielded, 1.6 m	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.

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 4.2 dB and 10dB attenuator.

$$\begin{aligned} \text{Offset}(dB) &= \text{RF cable loss}(dB) + \text{attenuator factor}(dB). \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

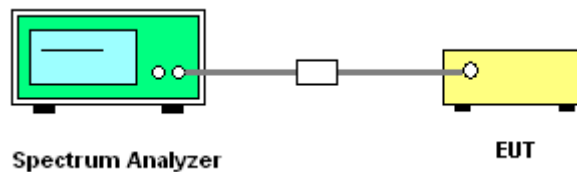
3.1.2 Measuring Instruments

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

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

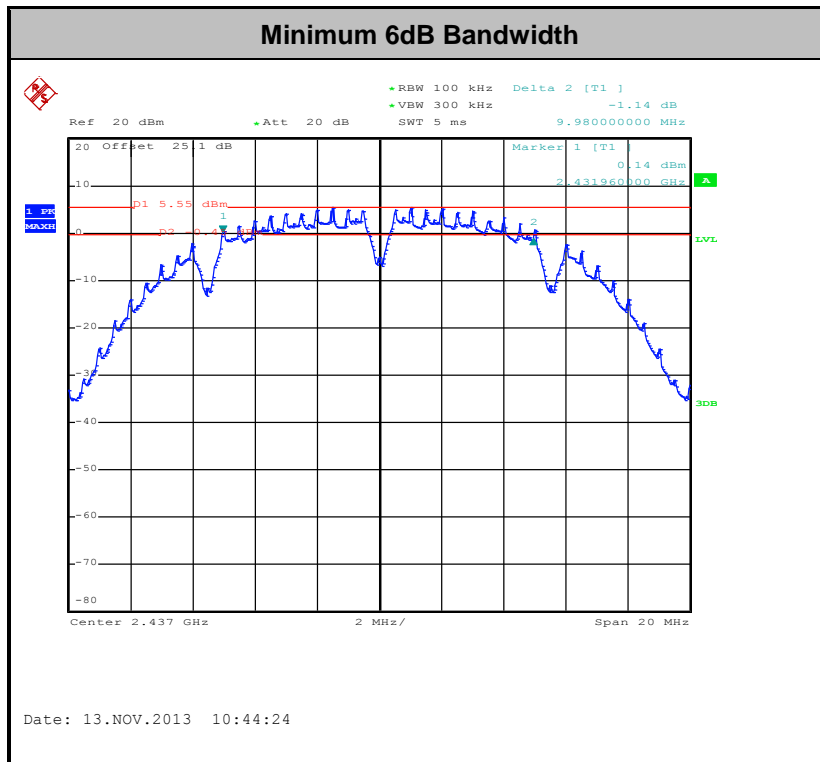
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Test Band :	2.4GHz	Temperature :	21~26°C
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	10.06	0.5	Pass
11b	1Mbps	1	6	2437	9.98	0.5	Pass
11b	1Mbps	1	11	2462	10.08	0.5	Pass
11g	6Mbps	1	1	2412	16.32	0.5	Pass
11g	6Mbps	1	6	2437	16.30	0.5	Pass
11g	6Mbps	1	11	2462	16.32	0.5	Pass
HT20	MCS0	1	1	2412	17.52	0.5	Pass
HT20	MCS0	1	6	2437	17.50	0.5	Pass
HT20	MCS0	1	11	2462	17.54	0.5	Pass



3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting Antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the Antenna exceeds 6dBi.

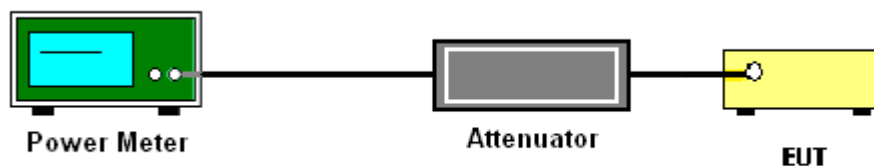
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r01.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test Mode :	2.4GHz	Temperature :	21~26°C
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	RF Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	16.56	30	4.291	Pass
11b	1Mbps	1	6	2437	18.41	30	4.291	Pass
11b	1Mbps	1	11	2462	18.67	30	4.291	Pass
11g	6Mbps	1	1	2412	21.94	30	4.291	Pass
11g	6Mbps	1	6	2437	22.65	30	4.291	Pass
11g	6Mbps	1	10	2457	22.58	30	4.291	Pass
11g	6Mbps	1	11	2462	20.69	30	4.291	Pass
HT20	MCS0	1	1	2412	20.27	30	4.291	Pass
HT20	MCS0	1	2	2417	22.72	30	4.291	Pass
HT20	MCS0	1	6	2437	23.14	30	4.291	Pass
HT20	MCS0	1	10	2457	22.68	30	4.291	Pass
HT20	MCS0	1	11	2462	19.11	30	4.291	Pass

Note: Measured power (dBm) has offset with cable loss.

3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	2.4GHz	Temperature :	21~26°C
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Duty Factor (dB)	Average Output Power (dBm)	Power Limit (dBm)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	0.00	13.82	30	4.291	Pass
11b	1Mbps	1	6	2437	0.00	15.57	30	4.291	Pass
11b	1Mbps	1	11	2462	0.00	16.38	30	4.291	Pass
11g	6Mbps	1	1	2412	0.06	13.25	30	4.291	Pass
11g	6Mbps	1	6	2437	0.06	14.72	30	4.291	Pass
11g	6Mbps	1	10	2457	0.06	14.57	30	4.291	Pass
11g	6Mbps	1	11	2462	0.06	11.58	30	4.291	Pass
HT20	MCS0	1	1	2412	0.07	11.07	30	4.291	Pass
HT20	MCS0	1	2	2417	0.07	14.42	30	4.291	Pass
HT20	MCS0	1	6	2437	0.07	14.91	30	4.291	Pass
HT20	MCS0	1	10	2457	0.07	14.37	30	4.291	Pass
HT20	MCS0	1	11	2462	0.07	9.67	30	4.291	Pass

Note: Measured power (dBm) has offset with cable loss and duty factor.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

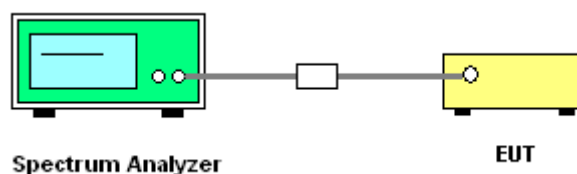
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

3.3.4 Test Setup

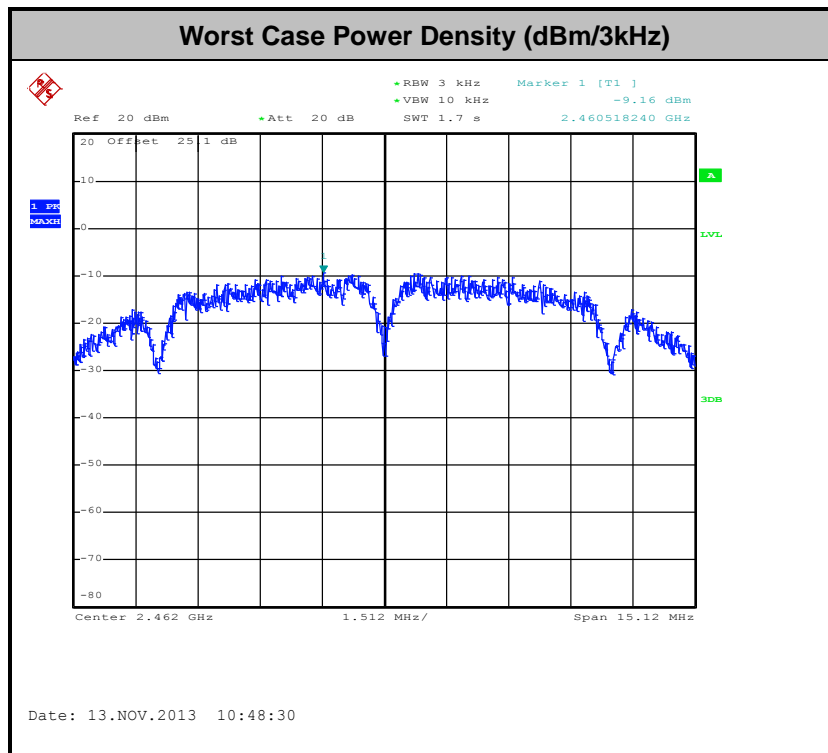


3.3.5 Test Result of Power Spectral Density

Test Mode :	2.4GHz	Temperature :	21~26°C
Test Engineer :	Stuart Lin	Relative Humidity :	45~54%

Mod.	Data Rate	N _{TX}	Channel	Freq. (MHz)	Peak Power Density (dBm/3kHz)	Max. Limits (dBm/3kHz)	DG (dBi)	Pass/Fail
11b	1Mbps	1	1	2412	-12.20	8	4.291	Pass
11b	1Mbps	1	6	2437	-9.89	8	4.291	Pass
11b	1Mbps	1	11	2462	-9.16	8	4.291	Pass
11g	6Mbps	1	1	2412	-12.70	8	4.291	Pass
11g	6Mbps	1	6	2437	-10.75	8	4.291	Pass
11g	6Mbps	1	11	2462	-13.91	8	4.291	Pass
HT20	MCS0	1	1	2412	-15.94	8	4.291	Pass
HT20	MCS0	1	6	2437	-11.07	8	4.291	Pass
HT20	MCS0	1	11	2462	-16.79	8	4.291	Pass

Note: Measured power density (dBm) has offset with cable loss.



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

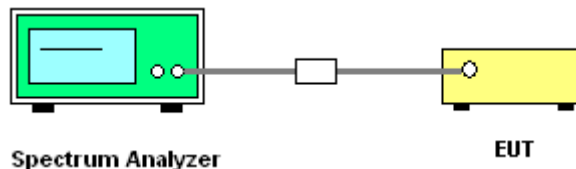
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

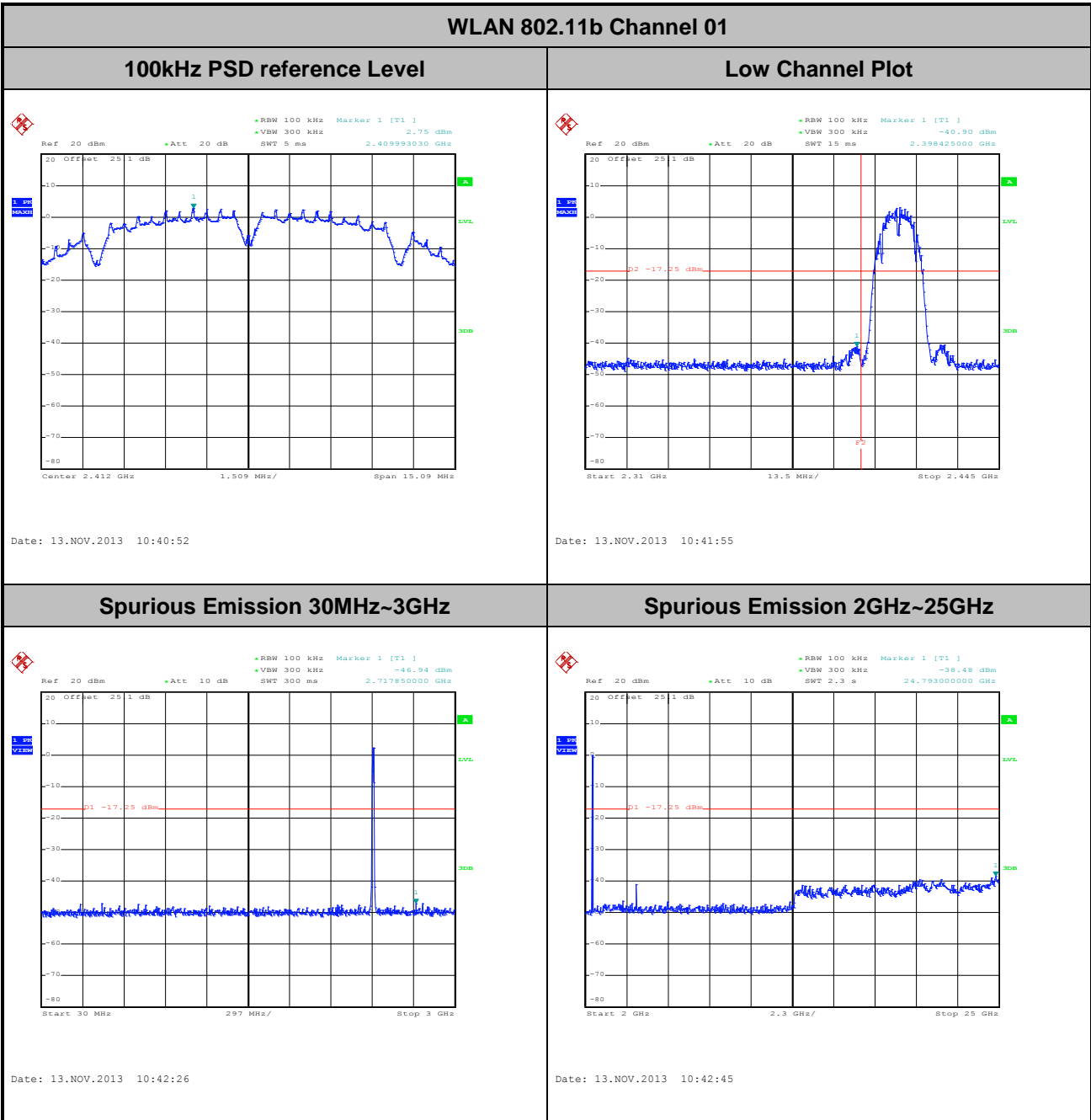
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



3.4.5 Test Result of Conducted Band Edges and Spurious Emission

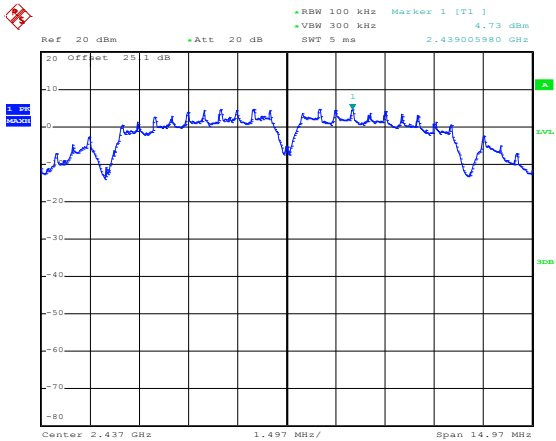
Test Mode :	802.11b	Temperature :	21~26°C
Test Band :	2.4GHz Low	Relative Humidity :	45~54%
Test Channel :	01	Test Engineer :	Stuart Lin



Test Mode :	802.11b	Temperature :	21~26°C
Test Band :	2.4GHz Mid	Relative Humidity :	45~54%
Test Channel :	06	Test Engineer :	Stuart Lin

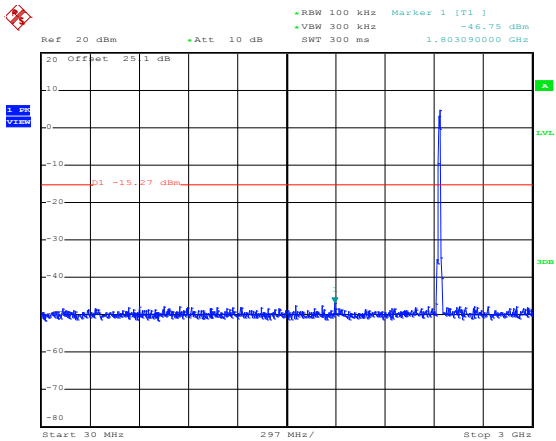
WLAN 802.11b Channel 06

100kHz PSD reference Level



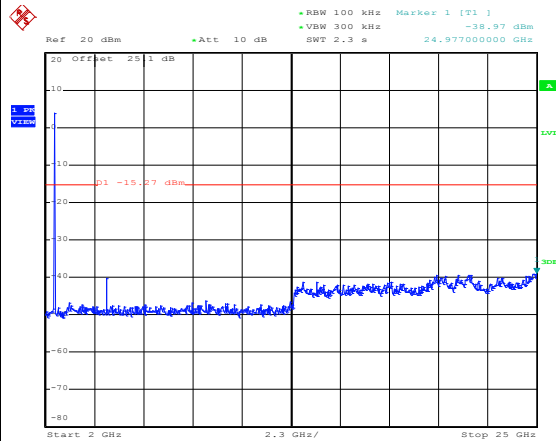
Date: 13.NOV.2013 10:45:13

Spurious Emission 30MHz~3GHz



Date: 13.NOV.2013 10:45:51

Spurious Emission 2GHz~25GHz

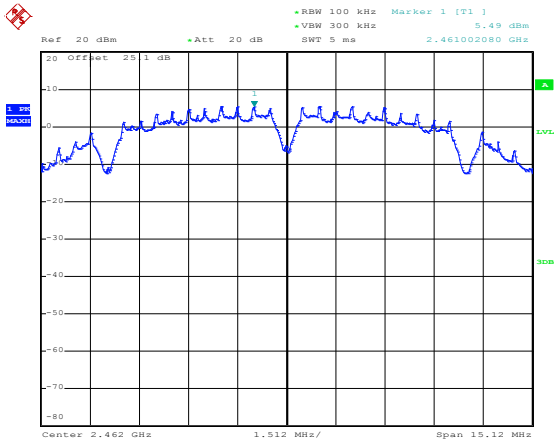


Date: 13.NOV.2013 10:46:09

Test Mode :	802.11b	Temperature :	21~26°C
Test Band :	2.4GHz High	Relative Humidity :	45~54%
Test Channel :	11	Test Engineer :	Stuart Lin

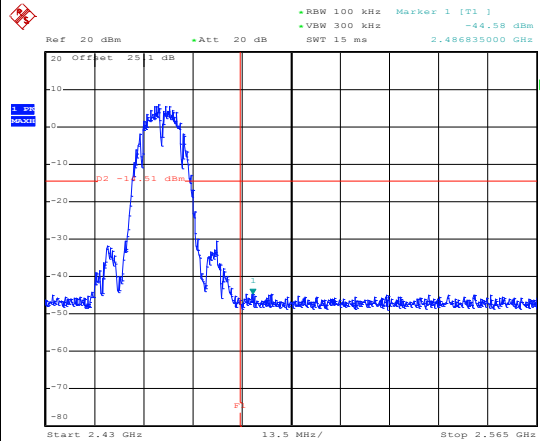
WLAN 802.11b Channel 11

100kHz PSD reference Level



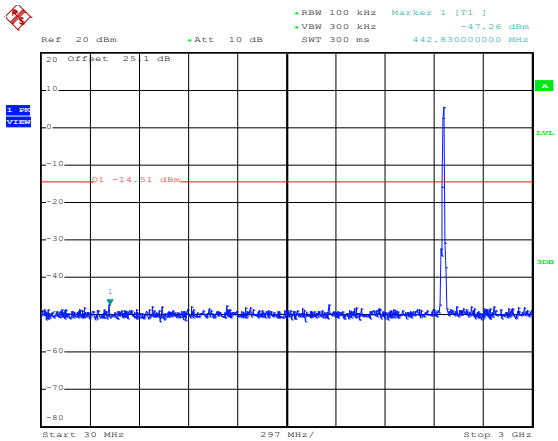
Date: 13.NOV.2013 10:48:41

High Channel Plot



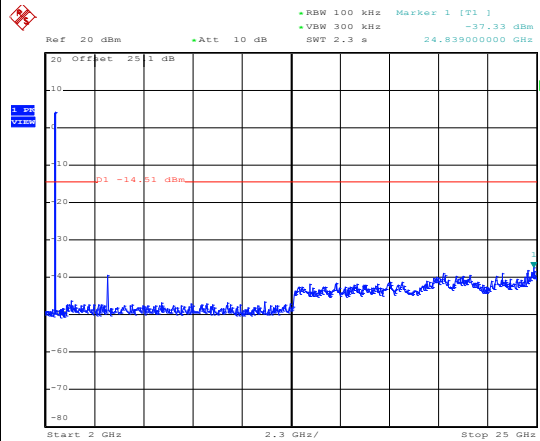
Date: 13.NOV.2013 10:49:02

Spurious Emission 30MHz~3GHz



Date: 13.NOV.2013 10:49:53

Spurious Emission 2GHz~25GHz

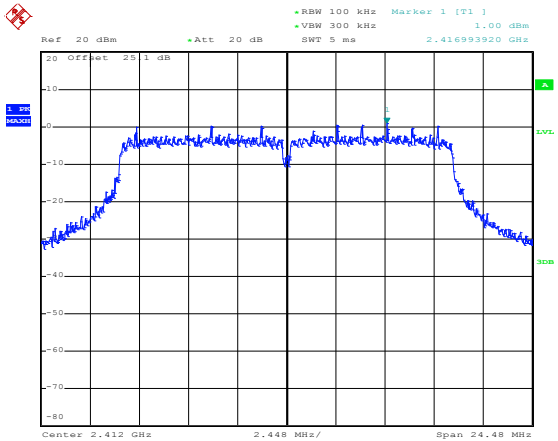


Date: 13.NOV.2013 10:50:12

Test Mode :	802.11g	Temperature :	21~26°C
Test Band :	2.4GHz Low	Relative Humidity :	45~54%
Test Channel :	01	Test Engineer :	Stuart Lin

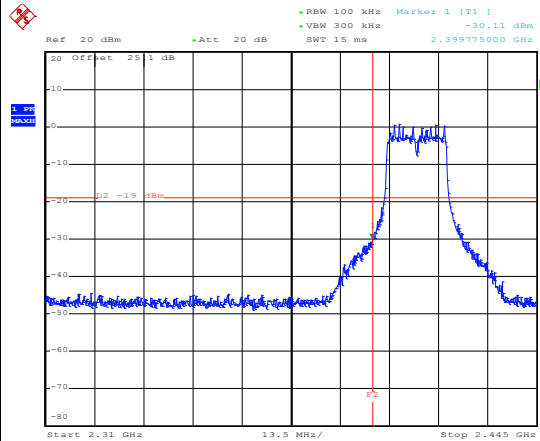
WLAN 802.11g Channel 01

100kHz PSD reference Level



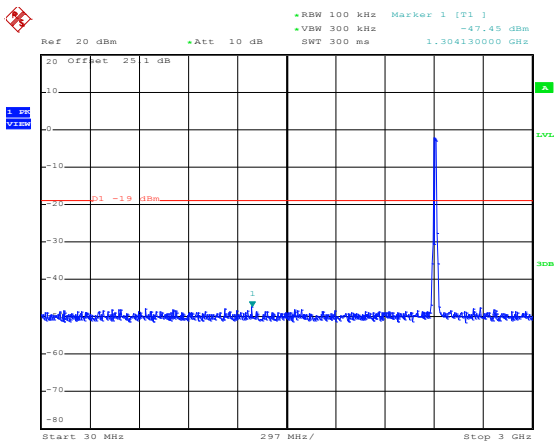
Date: 13.NOV.2013 11:06:48

Low Channel Plot



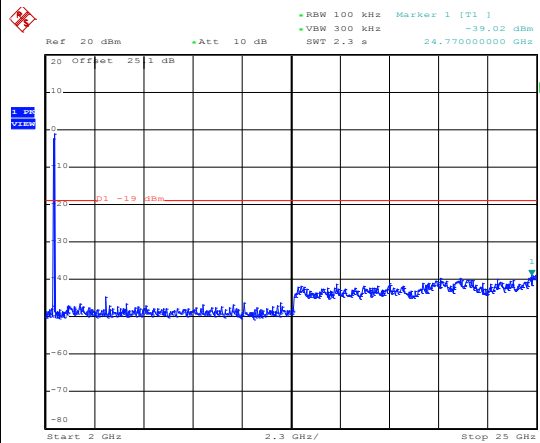
Date: 13.NOV.2013 11:07:46

Spurious Emission 30MHz~3GHz



Date: 13.NOV.2013 11:08:53

Spurious Emission 2GHz~25GHz

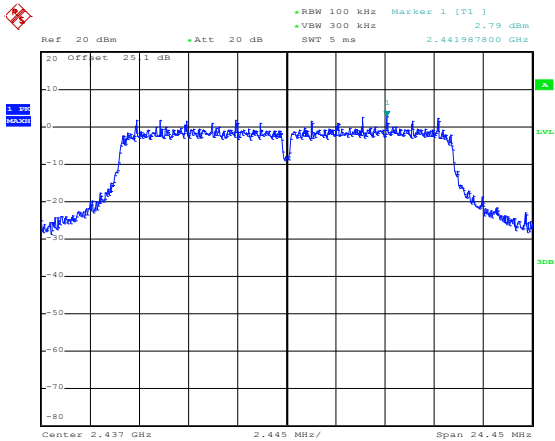


Date: 13.NOV.2013 11:09:11

Test Mode :	802.11g	Temperature :	21~26°C
Test Band :	2.4GHz Mid	Relative Humidity :	45~54%
Test Channel :	06	Test Engineer :	Stuart Lin

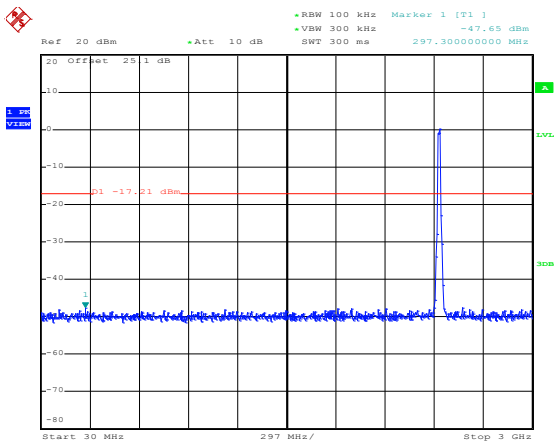
WLAN 802.11g Channel 06

100kHz PSD reference Level



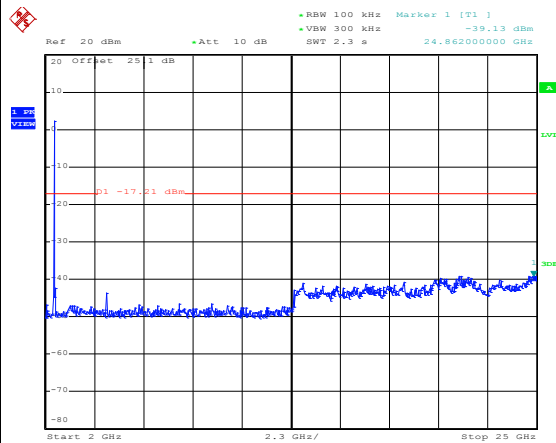
Date: 13.NOV.2013 10:58:00

Spurious Emission 30MHz~3GHz



Date: 13.NOV.2013 10:58:36

Spurious Emission 2GHz~25GHz

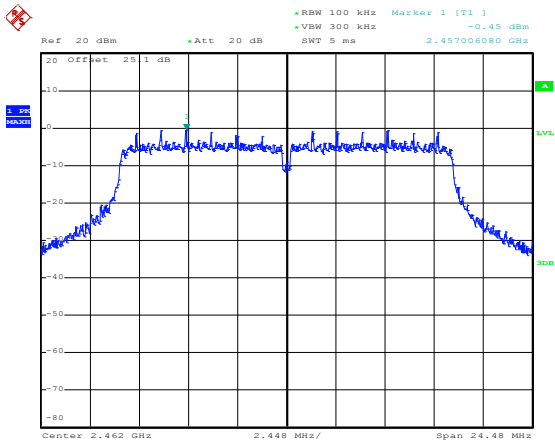


Date: 13.NOV.2013 10:58:54

Test Mode :	802.11g	Temperature :	21~26°C
Test Band :	2.4GHz High	Relative Humidity :	45~54%
Test Channel :	11	Test Engineer :	Stuart Lin

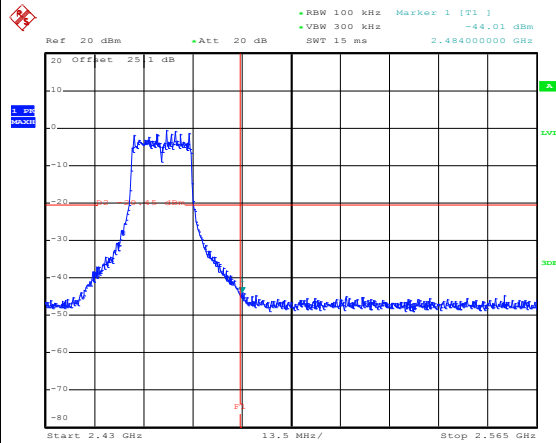
WLAN 802.11g Channel 11

100kHz PSD reference Level



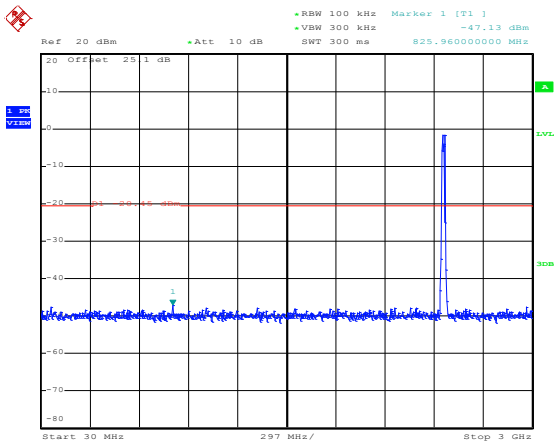
Date: 13.NOV.2013 10:52:35

High Channel Plot



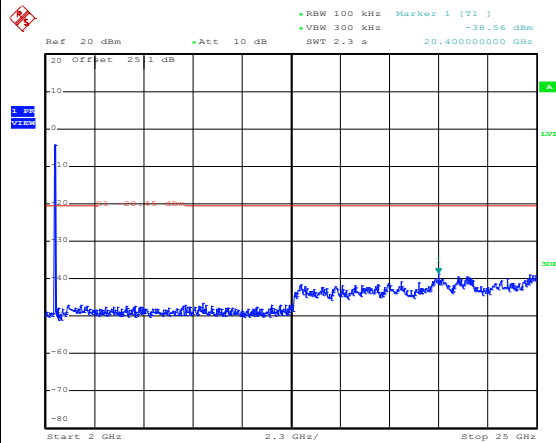
Date: 13.NOV.2013 10:53:24

Spurious Emission 30MHz~3GHz



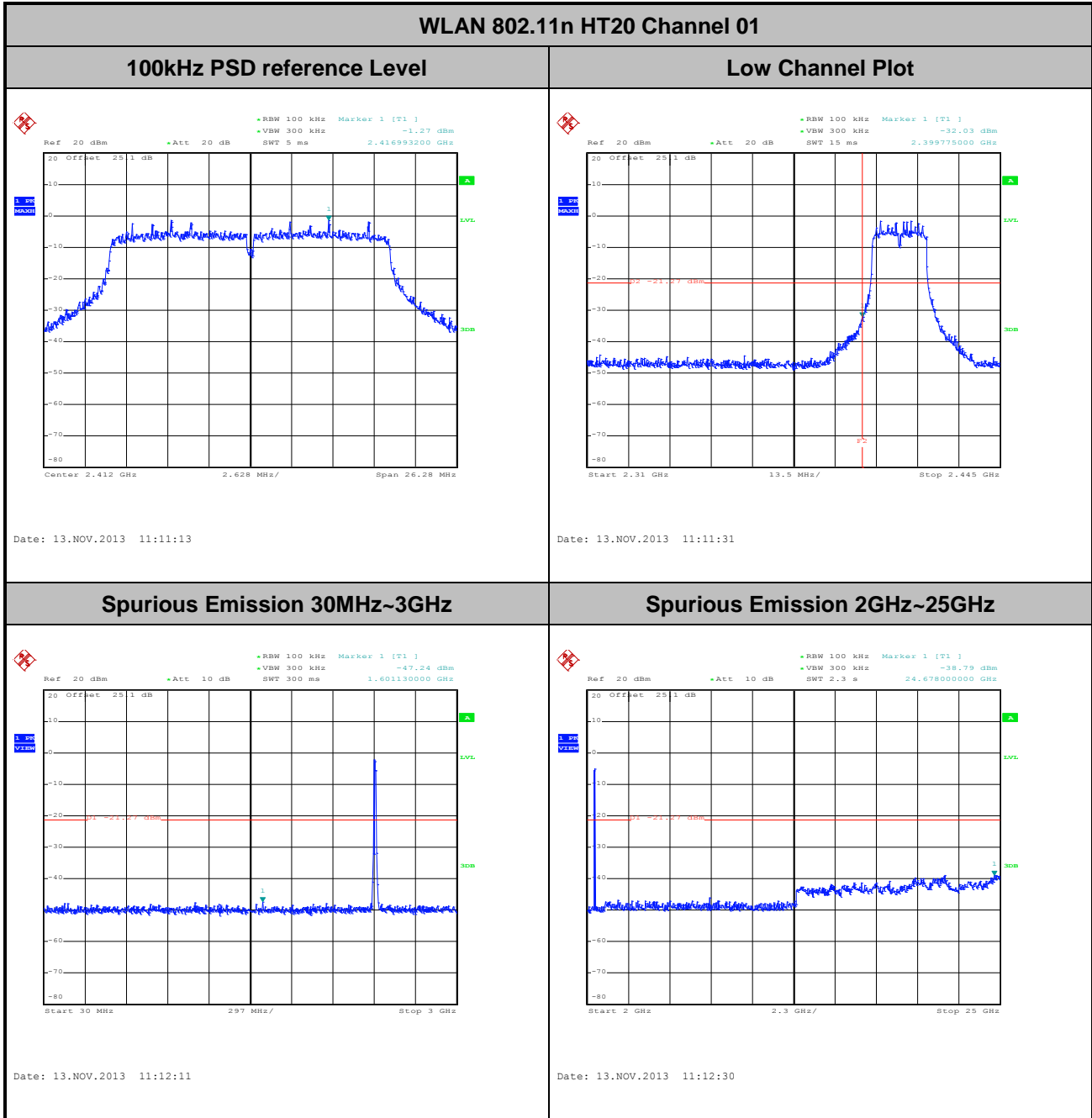
Date: 13.NOV.2013 10:53:46

Spurious Emission 2GHz~25GHz



Date: 13.NOV.2013 10:54:05

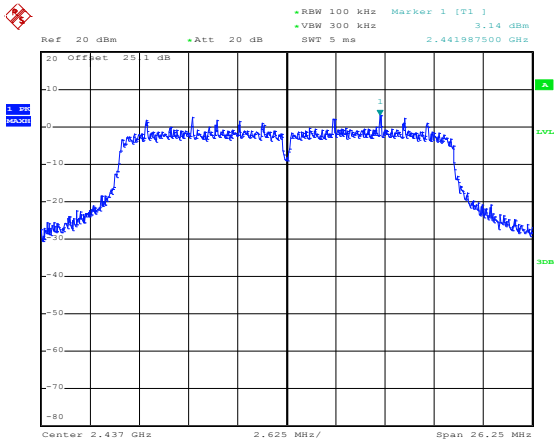
Test Mode :	802.11n HT20	Temperature :	21~26°C
Test Band :	2.4GHz Low	Relative Humidity :	45~54%
Test Channel :	01	Test Engineer :	Stuart Lin



Test Mode :	802.11n HT20	Temperature :	21~26°C
Test Band :	2.4GHz Mid	Relative Humidity :	45~54%
Test Channel :	06	Test Engineer :	Stuart Lin

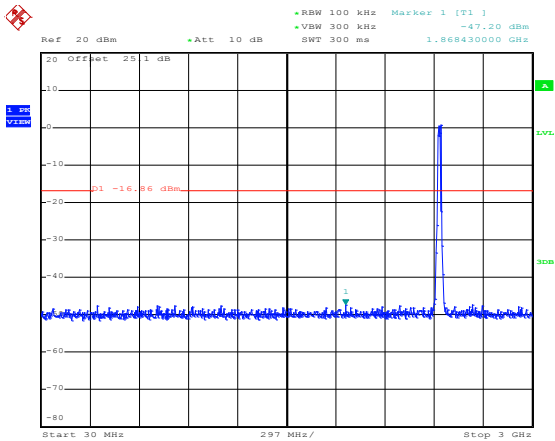
WLAN 802.11n HT20 Channel 06

100kHz PSD reference Level

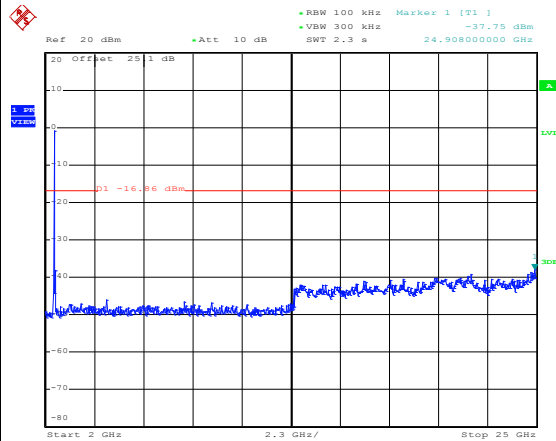


Date: 13.NOV.2013 11:15:07

Spurious Emission 30MHz~3GHz **Spurious Emission 2GHz~25GHz**

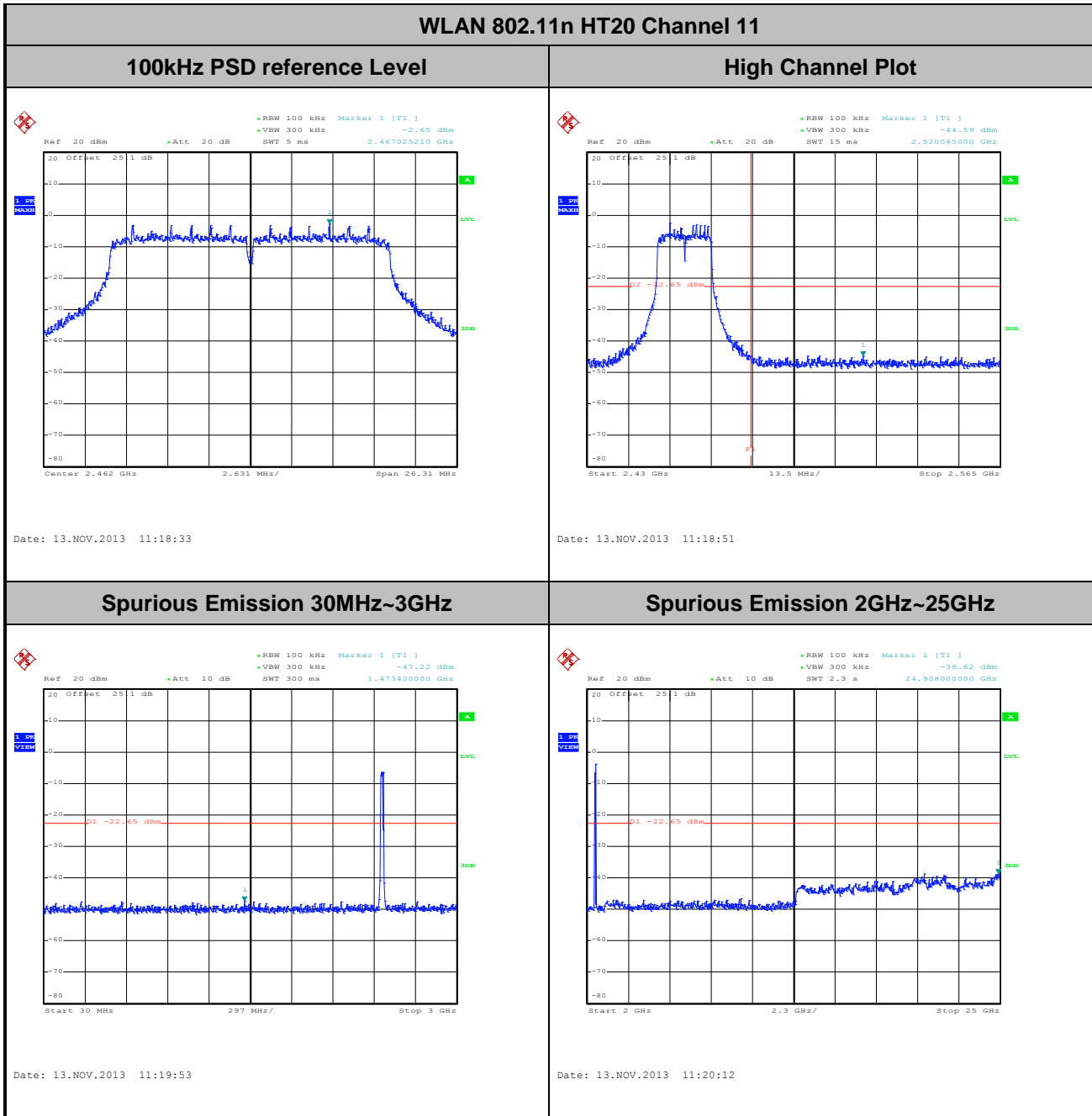


Date: 13.NOV.2013 11:15:46



Date: 13.NOV.2013 11:16:05

Test Mode :	802.11n HT20	Temperature :	21~26°C
Test Band :	2.4GHz High	Relative Humidity :	45~54%
Test Channel :	11	Test Engineer :	Stuart Lin



3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

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

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 Publication No. 558074 D01 DTS Meas. Guidance v03r01.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

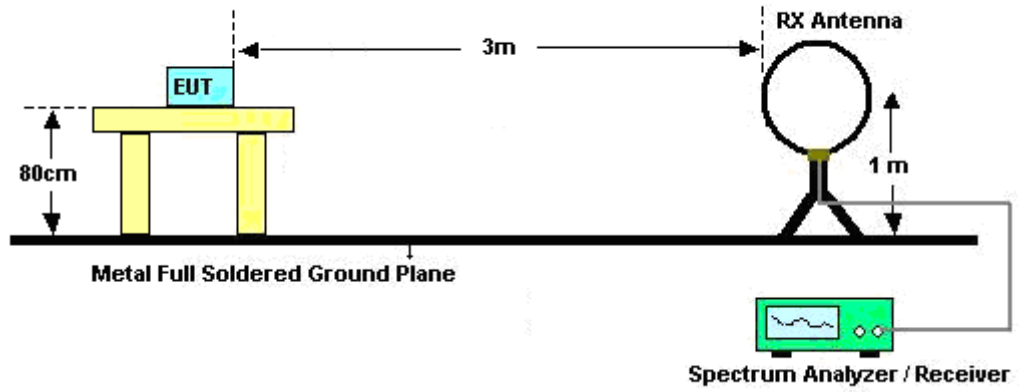
For average measurement:

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

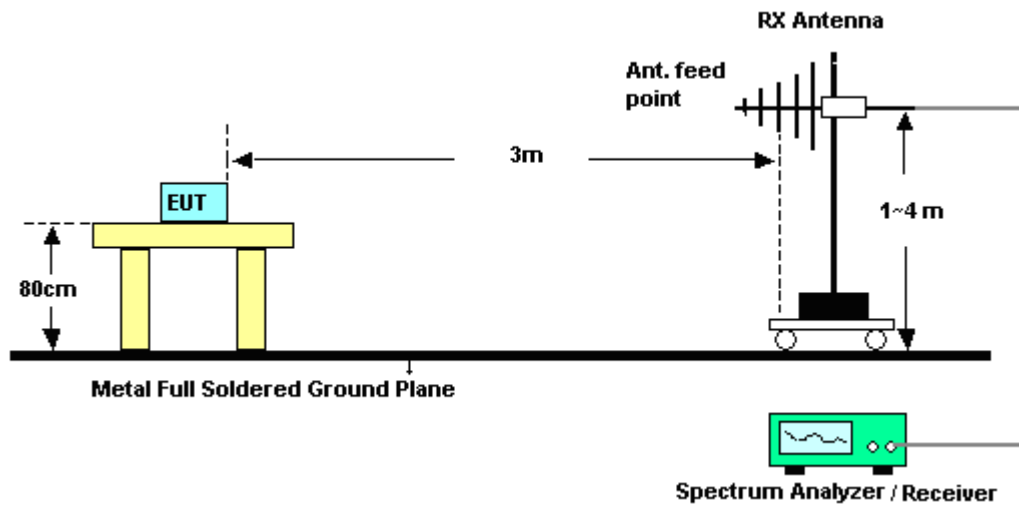
Band	Duty Cycle(%)	T(μ s)	1/T(kHz)	VBW Setting
802.11b	100.00	-	-	10Hz
802.11g	98.54	-	-	10Hz
2.4GHz 802.11n HT20	98.44	-	-	10Hz

3.5.4 Test Setup

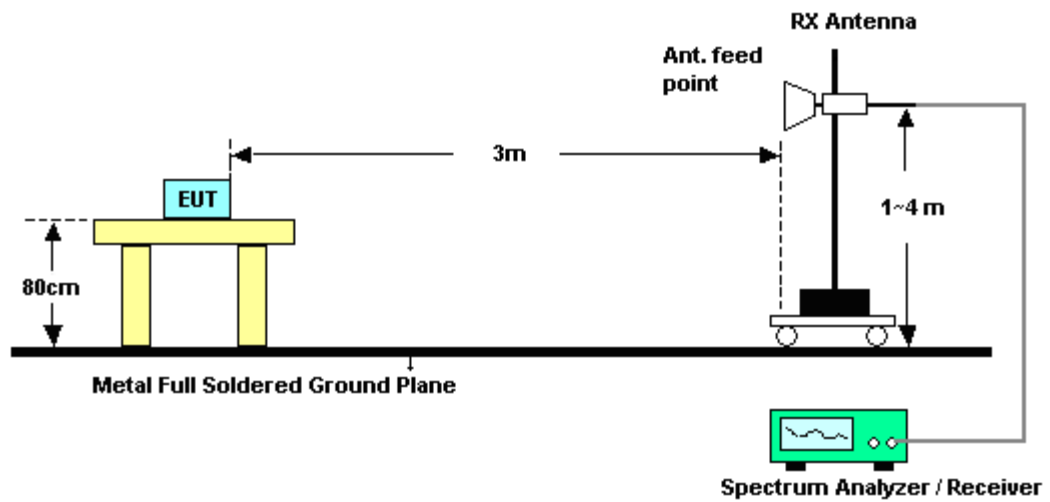
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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 of Radiated Spurious at Band Edges

Test Mode :	802.11b	Temperature :	21~24°C
Test Band :	Low	Relative Humidity :	54~58%
Test Channel :	01	Test Engineer :	Stan Hsieh

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2383.53	57.11	-16.89	74	52.19	32.28	6.91	34.27	118	327	Peak
2386.77	44.62	-9.38	54	39.68	32.3	6.91	34.27	118	327	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2387.49	57.03	-16.97	74	52.09	32.3	6.91	34.27	181	115	Peak
2387.13	44.36	-9.64	54	39.42	32.3	6.91	34.27	181	115	Average

Test Mode :	802.11b	Temperature :	21~24°C
Test Band :	High	Relative Humidity :	54~58%
Test Channel :	11	Test Engineer :	Stan Hsieh

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.56	58.49	-15.51	74	53.48	32.38	7.06	34.43	110	325	Peak
2486.8	45.32	-8.68	54	40.31	32.38	7.06	34.43	110	325	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2491.51	56.56	-17.44	74	51.53	32.4	7.06	34.43	171	124	Peak
2486.35	43.5	-10.5	54	38.49	32.38	7.06	34.43	171	124	Average

Test Mode :	802.11g	Temperature :	21~24°C
Test Band :	Low	Relative Humidity :	54~58%
Test Channel :	01	Test Engineer :	Stan Hsieh

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.83	71.88	-2.12	74	66.97	32.3	6.91	34.3	119	148	Peak
2390	53.45	-0.55	54	48.54	32.3	6.91	34.3	119	148	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.92	71.94	-2.06	74	67.03	32.3	6.91	34.3	188	116	Peak
2390	52.86	-1.14	54	47.95	32.3	6.91	34.3	188	116	Average

Test Mode :	802.11g	Temperature :	21~24°C
Test Band :	High	Relative Humidity :	54~58%
Test Channel :	10	Test Engineer :	Stan Hsieh

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2454	112.03	-	-	107.03	32.37	7.02	34.39	116	10	Peak
2454	100.97	-	-	95.97	32.37	7.02	34.39	116	10	Average
2484.52	73.27	-0.73	74	68.26	32.38	7.06	34.43	116	10	Peak
2483.5	50.73	-3.27	54	45.72	32.38	7.06	34.43	116	10	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2457	111.09	-	-	106.09	32.37	7.02	34.39	145	115	Peak
2457	100.26	-	-	95.26	32.37	7.02	34.39	145	115	Average
2485.48	70.75	-3.25	74	65.74	32.38	7.06	34.43	145	115	Peak
2483.5	48.56	-5.44	54	43.55	32.38	7.06	34.43	145	115	Average

Test Mode :	802.11g	Temperature :	21~24°C
Test Band :	High	Relative Humidity :	54~58%
Test Channel :	11	Test Engineer :	Stan Hsieh

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.92	72.73	-1.27	74	67.72	32.38	7.06	34.43	118	327	Peak
2483.5	52.79	-1.21	54	47.78	32.38	7.06	34.43	118	327	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.53	71.32	-2.68	74	66.31	32.38	7.06	34.43	182	114	Peak
2483.5	50.95	-3.05	54	45.94	32.38	7.06	34.43	182	114	Average

Test Mode :	802.11n HT20	Temperature :	21~24°C
Test Band :	Low	Relative Humidity :	54~58%
Test Channel :	01	Test Engineer :	Stan Hsieh

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
2389.2	73.23	-0.77	74	68.29	32.3	6.91	34.27	156	145	Peak
2390	52.86	-1.14	54	47.95	32.3	6.91	34.3	156	145	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
2390	69.06	-4.94	74	64.15	32.3	6.91	34.3	189	122	Peak
2390	50.18	-3.82	54	45.27	32.3	6.91	34.3	189	122	Average

Test Mode :	802.11n HT20	Temperature :	21~24°C
Test Band :	Low	Relative Humidity :	54~58%
Test Channel :	02	Test Engineer :	Stan Hsieh

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
2389.65	68.19	-5.81	74	63.25	32.3	6.91	34.27	152	7	Peak
2390	49.24	-4.76	54	44.33	32.3	6.91	34.3	152	7	Average
2417	112.37	-	-	107.46	32.31	6.95	34.35	152	7	Peak
2417	100.5	-	-	95.59	32.31	6.95	34.35	152	7	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
2386.77	69.97	-4.03	74	65.03	32.3	6.91	34.27	177	122	Peak
2390	49.02	-4.98	54	44.11	32.3	6.91	34.3	177	122	Average
2416	110.18	-	-	105.27	32.31	6.95	34.35	177	122	Peak
2416	98.66	-	-	93.75	32.31	6.95	34.35	177	122	Average

Test Mode :	802.11n HT20	Temperature :	21~24°C
Test Band :	High	Relative Humidity :	54~58%
Test Channel :	10	Test Engineer :	Stan Hsieh

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
2456	111.64	-	-	106.64	32.37	7.02	34.39	115	11	Peak
2456	100.23	-	-	95.23	32.37	7.02	34.39	115	11	Average
2484.64	73.2	-0.8	74	68.19	32.38	7.06	34.43	115	11	Peak
2483.5	51.61	-2.39	54	46.6	32.38	7.06	34.43	115	11	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
2458	110.77	-	-	105.77	32.37	7.02	34.39	146	112	Peak
2458	99.35	-	-	94.35	32.37	7.02	34.39	146	112	Average
2484.19	70.29	-3.71	74	65.28	32.38	7.06	34.43	146	112	Peak
2483.5	49.14	-4.86	54	44.13	32.38	7.06	34.43	146	112	Average

Test Mode :	802.11n HT20	Temperature :	21~24°C
Test Band :	High	Relative Humidity :	54~58%
Test Channel :	11	Test Engineer :	Stan Hsieh

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
2484.43	72.51	-1.49	74	67.5	32.38	7.06	34.43	117	323	Peak
2483.5	51.65	-2.35	54	46.64	32.38	7.06	34.43	117	323	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
2483.71	70.44	-3.56	74	65.43	32.38	7.06	34.43	179	118	Peak
2483.5	49.71	-4.29	54	44.7	32.38	7.06	34.43	179	118	Average

3.5.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Note: Pre-scanned all test modes and only choose the worst case mode recorded in the test report for radiated spurious emission below 1GHz.

Test Mode :	802.11b	Temperature :	21~24°C
Test Channel :	01	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	2414 MHz is fundamental signal which can be ignored.		

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
2414	104.6	-	-	99.64	32.31	6.95	34.3	118	327	Average
2414	109.53	-	-	104.57	32.31	6.95	34.3	118	327	Peak
4824	52.95	-1.05	54	69.14	33.97	8.77	58.93	114	168	Average
4824	54.59	-19.41	74	70.78	33.97	8.77	58.93	114	168	Peak

Test Mode :	802.11b	Temperature :	21~24°C
Test Channel :	01	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	2414 MHz is fundamental signal which can be ignored.		

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
2414	100.61	-	-	95.65	32.31	6.95	34.3	181	115	Average
2414	105.58	-	-	100.62	32.31	6.95	34.3	181	115	Peak
4824	50.83	-3.17	54	67.02	33.97	8.77	58.93	192	129	Average
4824	51.91	-22.09	74	68.1	33.97	8.77	58.93	192	129	Peak

Test Mode :	802.11b	Temperature :	21~24°C
Test Channel :	06	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	1. 2437 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 (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	106.05	-	-	101.06	32.35	6.99	34.35	114	326	Average
2437	110.85	-	-	105.86	32.35	6.99	34.35	114	326	Peak
4875	53.4	-0.6	54	69.46	33.95	8.82	58.83	107	163	Average
4875	54.52	-19.48	74	70.58	33.95	8.82	58.83	107	163	Peak
7311	40.19	-33.81	74	51.47	35.54	10.91	57.73	100	0	Peak

Test Mode :	802.11b	Temperature :	21~24°C
Test Channel :	06	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	1. 2437 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 (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	103.52	-	-	98.53	32.35	6.99	34.35	177	120	Average
2437	108.42	-	-	103.43	32.35	6.99	34.35	177	120	Peak
4875	51.88	-2.12	54	67.94	33.95	8.82	58.83	185	38	Average
4875	53.24	-20.76	74	69.3	33.95	8.82	58.83	185	38	Peak
7311	39.66	-34.34	74	50.94	35.54	10.91	57.73	100	0	Peak

Test Mode :	802.11b	Temperature :	21~24°C
Test Channel :	11	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	1. 2464 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 (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2464	106.03	-	-	101.03	32.37	7.02	34.39	110	325	Average
2464	110.77	-	-	105.77	32.37	7.02	34.39	110	325	Peak
4923	52.78	-1.22	54	68.71	33.93	8.87	58.73	105	162	Average
4923	54.24	-19.76	74	70.17	33.93	8.87	58.73	105	162	Peak
7386	40.6	-33.4	74	51.89	35.52	10.99	57.8	100	0	Peak

Test Mode :	802.11b	Temperature :	21~24°C
Test Channel :	11	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	1. 2464 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 (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2464	103.13	-	-	98.13	32.37	7.02	34.39	171	124	Average
2464	107.64	-	-	102.64	32.37	7.02	34.39	171	124	Peak
4923	52.18	-1.82	54	68.11	33.93	8.87	58.73	198	39	Average
4923	53.82	-20.18	74	69.75	33.93	8.87	58.73	198	39	Peak
7386	40.13	-33.87	74	51.42	35.52	10.99	57.8	100	0	Peak

Test Mode :	802.11g	Temperature :	21~24°C
Test Channel :	01	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	2414 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
46.2	25.76	-14.24	40	46.59	9.7	0.67	31.2	196	188	Peak
230.34	23.65	-22.35	46	41.91	11.25	1.49	31	-	-	Peak
278.67	19.37	-26.63	46	35.65	13	1.64	30.92	-	-	Peak
426	18.22	-27.78	46	30.21	16.55	2.23	30.77	-	-	Peak
669.6	21.43	-24.57	46	28.66	20.35	2.88	30.46	-	-	Peak
832.7	24.56	-21.44	46	29.26	22.43	3.23	30.36	-	-	Peak
2414	99.16	-	-	94.2	32.31	6.95	34.3	119	148	Average
2414	110.51	-	-	105.55	32.31	6.95	34.3	119	148	Peak
4824	46.86	-7.14	54	63.05	33.97	8.77	58.93	108	190	Average
4824	60.3	-13.7	74	76.49	33.97	8.77	58.93	108	190	Peak

Test Mode :	802.11g	Temperature :	21~24°C
Test Channel :	01	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
47.28	25.18	-14.82	40	46.41	9.3	0.67	31.2	122	56	Peak
83.46	13.53	-26.47	40	35.79	7.97	0.9	31.13	-	-	Peak
154.74	11.2	-32.3	43.5	30.28	10.85	1.22	31.15	-	-	Peak
602.4	21.11	-24.89	46	29.19	19.82	2.7	30.6	-	-	Peak
735.4	23.28	-22.72	46	29.54	21.12	3.02	30.4	-	-	Peak
854.4	24.85	-21.15	46	29.32	22.64	3.28	30.39	-	-	Peak
2412	98.8	-	-	93.84	32.31	6.95	34.3	188	116	Average
2412	110.74	-	-	105.78	32.31	6.95	34.3	188	116	Peak
4824	42.81	-11.19	54	59	33.97	8.77	58.93	193	134	Average
4824	56.25	-17.75	74	72.44	33.97	8.77	58.93	193	134	Peak

Test Mode :	802.11g	Temperature :	21~24°C
Test Channel :	06	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	1. 2437 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 (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	102.33	-	-	97.34	32.35	6.99	34.35	118	326	Average
2437	114.24	-	-	109.25	32.35	6.99	34.35	118	326	Peak
4875	46.22	-7.78	54	62.28	33.95	8.82	58.83	106	165	Average
4875	62.09	-11.91	74	78.15	33.95	8.82	58.83	106	165	Peak
7311	41.6	-32.4	74	52.88	35.54	10.91	57.73	100	0	Peak

Test Mode :	802.11g	Temperature :	21~24°C
Test Channel :	06	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	1. 2437 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 (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	100.1	-	-	95.11	32.35	6.99	34.35	184	120	Average
2437	111.32	-	-	106.33	32.35	6.99	34.35	184	120	Peak
4874	42	-12	54	58.06	33.95	8.82	58.83	166	142	Average
4874	56.1	-17.9	74	72.16	33.95	8.82	58.83	166	142	Peak
7311	41.96	-32.04	74	53.24	35.54	10.91	57.73	100	0	Peak

Test Mode :	802.11g	Temperature :	21~24°C
Test Channel :	11	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	1. 2462 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
2462	99.16	-	-	94.16	32.37	7.02	34.39	118	327	Average
2462	110.43	-	-	105.43	32.37	7.02	34.39	118	327	Peak
4924	48.91	-25.09	74	64.81	33.93	8.9	58.73	100	0	Peak
7386	41.78	-32.22	74	53.07	35.52	10.99	57.8	100	0	Peak

Test Mode :	802.11g	Temperature :	21~24°C
Test Channel :	11	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	1. 2462 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
2462	96.3	-	-	91.3	32.37	7.02	34.39	182	114	Average
2462	107.35	-	-	102.35	32.37	7.02	34.39	182	114	Peak
4924	49.42	-24.58	74	65.32	33.93	8.9	58.73	100	0	Peak
7386	42.19	-31.81	74	53.48	35.52	10.99	57.8	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	21~24°C
Test Channel :	01	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	97.7	-	-	92.74	32.31	6.95	34.3	156	145	Average
2412	109.08	-	-	104.12	32.31	6.95	34.3	156	145	Peak
4824	42.65	-11.35	54	58.84	33.97	8.77	58.93	108	190	Average
4824	59.96	-14.04	74	76.15	33.97	8.77	58.93	108	190	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	21~24°C
Test Channel :	01	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	2412 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	95.85	-	-	90.89	32.31	6.95	34.3	189	122	Average
2412	107.11	-	-	102.15	32.31	6.95	34.3	189	122	Peak
4824	38.79	-15.21	54	54.98	33.97	8.77	58.93	193	134	Average
4824	56.4	-17.6	74	72.59	33.97	8.77	58.93	193	134	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	21~24°C
Test Channel :	06	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	1. 2437 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
2437	100.44	-	-	95.45	32.35	6.99	34.35	121	324	Average
2437	111.53	-	-	106.54	32.35	6.99	34.35	121	324	Peak
4874	44.21	-9.79	54	60.27	33.95	8.82	58.83	107	165	Average
4874	60.42	-13.58	74	76.48	33.95	8.82	58.83	107	165	Peak
7311	41.47	-32.53	74	52.75	35.54	10.91	57.73	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	21~24°C
Test Channel :	06	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	1. 2437 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
2437	97.91	-	-	92.92	32.35	6.99	34.35	183	120	Average
2437	109.38	-	-	104.39	32.35	6.99	34.35	183	120	Peak
4874	39.03	-14.97	54	55.09	33.95	8.82	58.83	167	142	Average
4874	55.37	-18.63	74	71.43	33.95	8.82	58.83	167	142	Peak
7311	41.6	-32.4	74	52.88	35.54	10.91	57.73	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	21~24°C
Test Channel :	11	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Horizontal
Remark :	1. 2462 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 (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	97.35	-	-	92.35	32.37	7.02	34.39	117	323	Average
2462	108.22	-	-	103.22	32.37	7.02	34.39	117	323	Peak
4924	47.37	-26.63	74	63.27	33.93	8.9	58.73	100	0	Peak
7386	42.34	-31.66	74	53.63	35.52	10.99	57.8	100	0	Peak

Test Mode :	2.4GHz 802.11n HT20	Temperature :	21~24°C
Test Channel :	11	Relative Humidity :	54~58%
Test Engineer :	Stan Hsieh	Polarization :	Vertical
Remark :	1. 2462 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 (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	93.75	-	-	88.75	32.37	7.02	34.39	179	118	Average
2462	105.11	-	-	100.11	32.37	7.02	34.39	179	118	Peak
4924	48.47	-25.53	74	64.37	33.93	8.9	58.73	100	0	Peak
7386	41.44	-32.56	74	52.73	35.52	10.99	57.8	100	0	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 (dB μ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

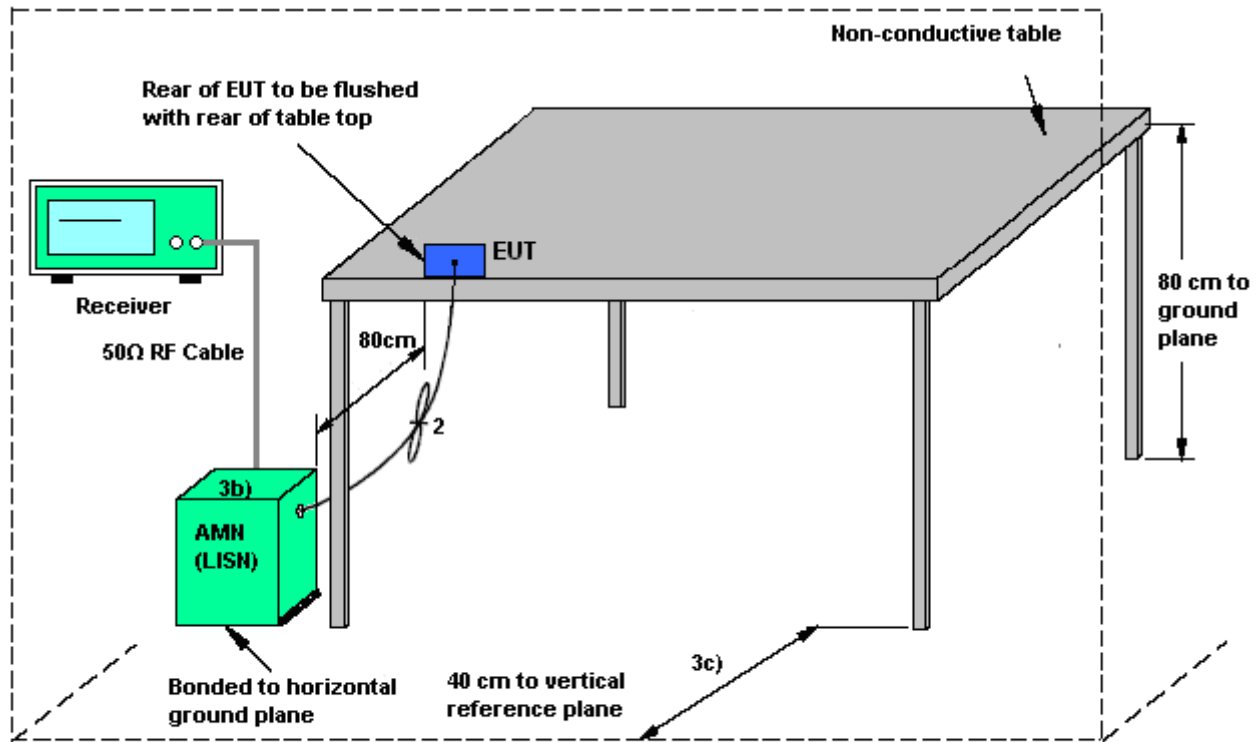
3.6.2 Measuring Instruments

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, and it 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.

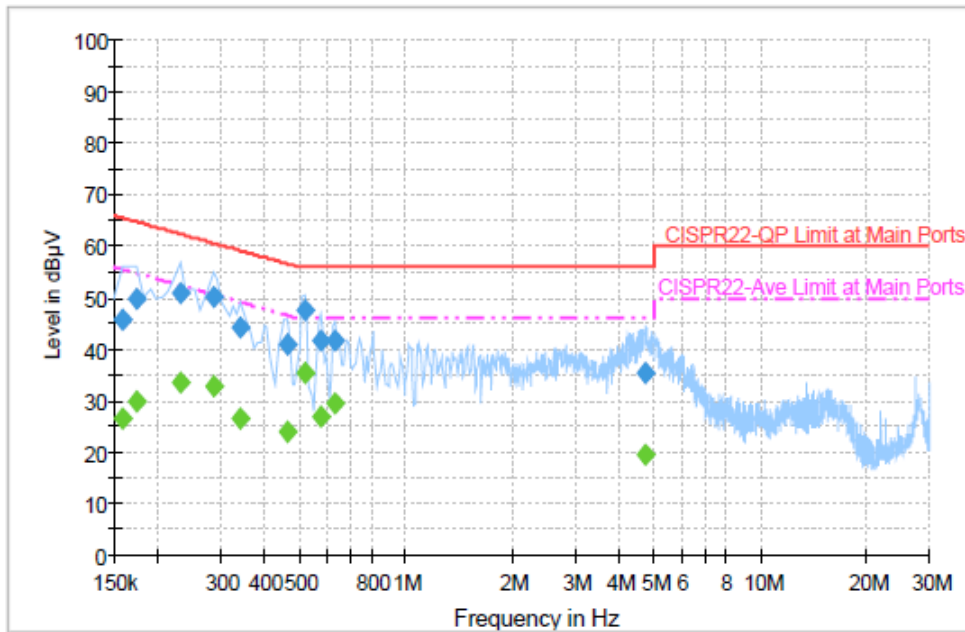
3.6.4 Test Setup



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

3.6.5 Test Result of AC Conducted Emission

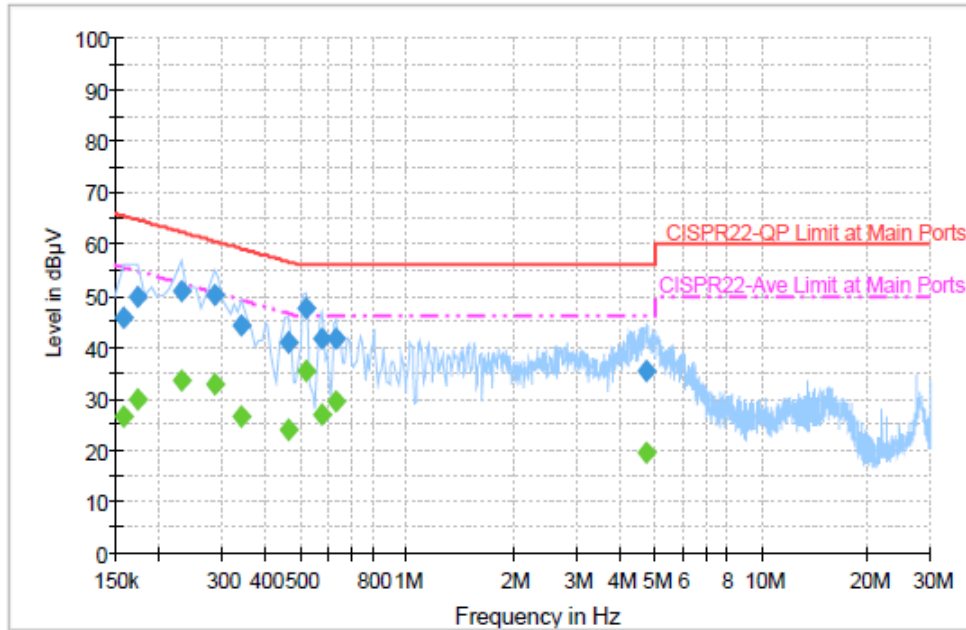
Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link + USB Cable (Charging from Adapter)		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	45.6	Off	L1	19.4	20.0	65.6
0.174000	50.0	Off	L1	19.4	14.8	64.8
0.230000	51.0	Off	L1	19.4	11.4	62.4
0.286000	50.1	Off	L1	19.4	10.5	60.6
0.342000	44.4	Off	L1	19.4	14.8	59.2
0.462000	41.0	Off	L1	19.4	15.7	56.7
0.518000	47.6	Off	L1	19.4	8.4	56.0
0.574000	41.7	Off	L1	19.4	14.3	56.0
0.630000	41.8	Off	L1	19.4	14.2	56.0
4.718000	35.3	Off	L1	19.5	20.7	56.0

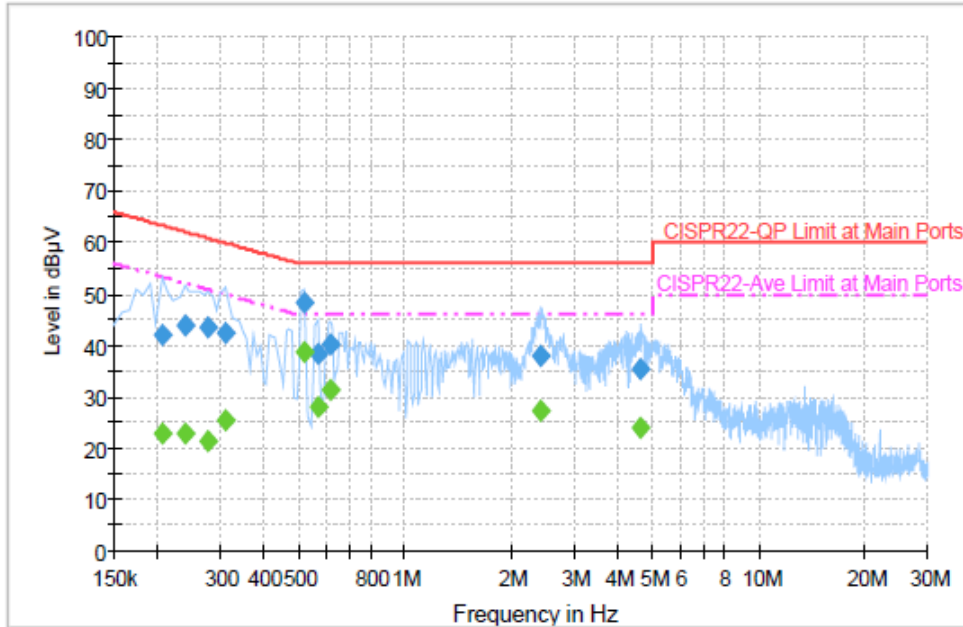
Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link + USB Cable (Charging from Adapter)		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	26.7	Off	L1	19.4	28.9	55.6
0.174000	29.9	Off	L1	19.4	24.9	54.8
0.230000	33.6	Off	L1	19.4	18.8	52.4
0.286000	32.7	Off	L1	19.4	17.9	50.6
0.342000	26.7	Off	L1	19.4	22.5	49.2
0.462000	24.0	Off	L1	19.4	22.7	46.7
0.518000	35.5	Off	L1	19.4	10.5	46.0
0.574000	26.8	Off	L1	19.4	19.2	46.0
0.630000	29.6	Off	L1	19.4	16.4	46.0
4.718000	19.5	Off	L1	19.5	26.5	46.0

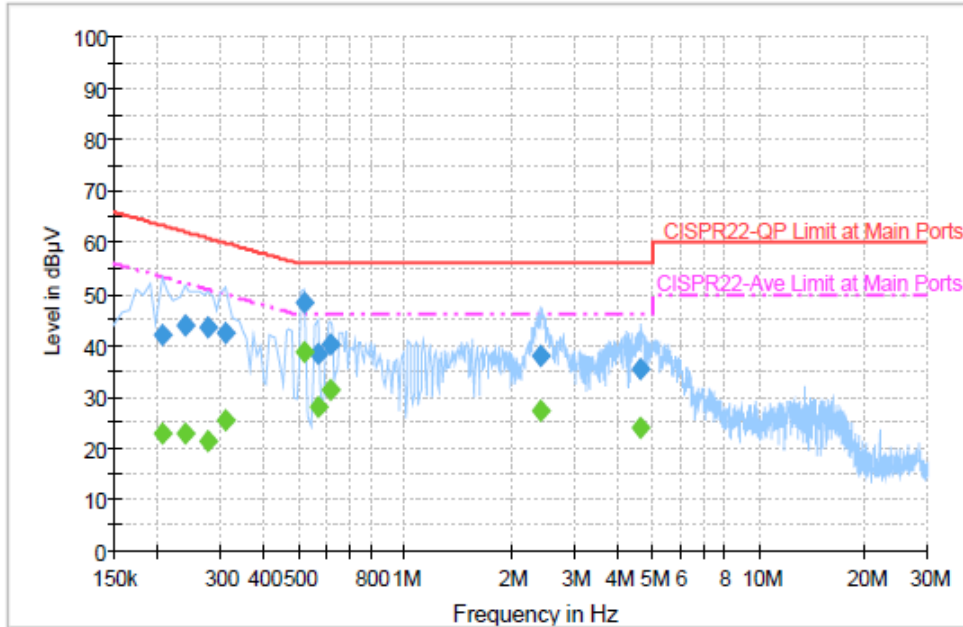
Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + USB Cable (Charging from Adapter)		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	42.2	Off	N	19.4	21.2	63.4
0.238000	43.8	Off	N	19.4	18.4	62.2
0.278000	43.4	Off	N	19.4	17.5	60.9
0.310000	42.5	Off	N	19.4	17.5	60.0
0.518000	48.4	Off	N	19.4	7.6	56.0
0.566000	38.5	Off	N	19.4	17.5	56.0
0.614000	40.4	Off	N	19.4	15.6	56.0
2.414000	38.0	Off	N	19.5	18.0	56.0
4.638000	35.5	Off	N	19.5	20.5	56.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Kai-Chun Chu	Relative Humidity :	46~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + USB Cable (Charging from Adapter)		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.206000	22.8	Off	N	19.4	30.6	53.4
0.238000	22.8	Off	N	19.4	29.4	52.2
0.278000	21.3	Off	N	19.4	29.6	50.9
0.310000	25.6	Off	N	19.4	24.4	50.0
0.518000	38.6	Off	N	19.4	7.4	46.0
0.566000	27.9	Off	N	19.4	18.1	46.0
0.614000	31.3	Off	N	19.4	14.7	46.0
2.414000	27.2	Off	N	19.5	18.8	46.0
4.638000	24.1	Off	N	19.5	21.9	46.0

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Oct. 17, 2013~ Nov. 13, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Aug. 17, 2013	Oct. 17, 2013~ Nov. 13, 2013	Aug. 16, 2014	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Aug. 17, 2013	Oct. 17, 2013~ Nov. 13, 2013	Aug. 16, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 06, 2013	Oct. 25, 2013~ Nov. 15, 2013	Sep. 05, 2014	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9kHz ~ 30GHz	Nov. 30, 2012	Oct. 25, 2013~ Nov. 15, 2013	Nov. 29, 2013	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	860004/00 01	9kHz~30 Mhz	Jul. 03, 2012	Oct. 25, 2013~ Nov. 15, 2013	Jul. 03, 2014	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 10, 2013	Oct. 25, 2013~ Nov. 15, 2013	Oct. 09, 2014	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz~18GHz	Aug. 22, 2013	Oct. 25, 2013~ Nov. 15, 2013	Aug. 21, 2014	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA917 0251	15GHz- 40GHz	Oct. 03, 2013	Oct. 25, 2013~ Nov. 15, 2013	Oct. 02, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	30MHz~1GHz	Feb. 26, 2013	Oct. 25, 2013~ Nov. 15, 2013	Feb. 25, 2014	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A019 17	1GHz~26.5GHz	Aug. 12, 2013	Oct. 25, 2013~ Nov. 15, 2013	Aug. 11, 2014	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	159088	DC~18G High Gain	Feb. 27, 2013	Oct. 25, 2013~ Nov. 15, 2013	Feb. 26, 2014	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Oct. 25, 2013~ Nov. 15, 2013	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Oct. 25, 2013~ Nov. 15, 2013	N/A	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz ~ 7GHz	Sep. 06, 2013	Nov. 12, 2013	Sep. 05, 2014	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2012	Nov. 12, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 06, 2012	Nov. 12, 2013	Dec. 05, 2013	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Nov. 12, 2013	N/A	Conduction (CO05-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.26
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.50
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