Beijing InHand Networks Technology Co,. Ltd.

Industrial Cellular Router

Main Model: IR615WH01-AP
Serial Model: See Page 5

March 20, 2013

Report No.: 13020108-1-FCC-R2
(This report supersedes NONE)

Modifications made to the product : None

This Test Report is Issued Under the Authority of:		
Deon Dai	Alex Liu	
Deon Dai **Compliance Engineer**	**Alex Liu** **Technical Manager**	

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Test result presented in this test report is applicable to the representative sample only.

RF Test Report
To: FCC Part 15.247: 2012

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Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
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Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
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Accreditations for Product Certifications

Country/Region	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC, (RCB 208)	RF , Telecom
Hong Kong	OFTA (US002)	RF , Telecom

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1 Executive Summary & EUT information

The purpose of this test programme was to demonstrate compliance of the Beijing InHand Networks Technology Co,. Ltd., Industrial Cellular Router and model: IR615WH01-AP against the current Stipulated Standards. The Industrial Cellular Router has demonstrated compliance with the FCC Part 15.247: 2012 (KDB 558074).

EUT Information

EUT Description	:	**Industrial Cellular Router**
Main Model	:	**IR615WH01-AP**
Serial Model		**IR605WH01-AP, IR605WH01-STA, IR615WH01-STA, IR695WH01-AP, IR695WH01-STA, IG605WH01-AP, IG605WH01-STA, IG615WH01-AP, IG615WH01-STA, IG695WH01-AP, IG695WH01-STA**
Antenna Gain	:	**Wifi: 3.0 dBi** **GPRS/WCDMA: 0.8dBi**
Input Power	:	**Adapter** **Model：AW018WR-1200 100CV** **Input：100-240V 50/60Hz 0.5A** **Output: 12V 1A** **EUT Power supply: 9-26V DC Power Terminal**
Classification Per Stipulated Test Standard	:	**FCC Part 15.247: 2012 (KDB 558074)**

2 TECHNICAL DETAILS

Purpose	**Compliance testing of Industrial Cellular Router with stipulated standard**
Applicant / Client	**Beijing InHand Networks Technology Co,. Ltd. West Wing, 11th Floor, Building G, Wang Jing Science Park, Chaoyang District, Beijing, 100102 China**
Manufacturer	**Beijing InHand Networks Technology Co,. Ltd. West Wing, 11th Floor, Building G, Wang Jing Science Park, Chaoyang District, Beijing, 100102 China**
Laboratory performing the tests	**SIEMIC Nanjing (China) Laboratories NO.2-1,Longcang Dadao, Yuhua Economic Development Zone, Nanjing, China Tel:+86(25)86730128/86730129 Fax:+86(25)86730127 Email:info@siemic.com**
Test report reference number	**13020108-1-FCC-R2**
Date EUT received	**March 06, 2013**
Standard applied	**FCC Part 15.247: 2012 (KDB 558074)**
Dates of test (from – to)	**March 12, 2013 to March 14, 2013**
No of Units :	**#1**
Equipment Category :	**Spread Spectrum System/Device**
Trade Name :	**N/A**
RF Operating Frequency (ies)	**GSM850 TX : 824.2 ~ 848.8 MHz; RX : 869.2 ~ 893.8 MHz PCS1900 TX : 1850.2 ~ 1909.8 MHz; RX : 1930.2 ~ 1989.8 MHz WLAN:2.4GHz band: 802.11b/g/n(HT 20) : 2412-2462 MHz 802.11n(HT 40): 2422~2452MHz**
Number of Channels	**299CH (PCS1900) and 124CH (GSM850) WiFi: 11CH**
Modulation	**GSM / GPRS: GMSK WLAN: DSSS/OFDM**
FCC ID	**ZAZIR6X5WAP**

3 MODIFICATION

NONE

4 TEST SUMMARY

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

Spread Spectrum System/Device

Test Results Summary

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.247 (a)(2)	6 dB Bandwidth	Compliance
§15.247(b)(3)	Conducted Maximum Output Power	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band Edge & Conducted Spurious Emissions	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Restricted Bands	Compliance

5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

5.1 §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has 2 antennas, one is a PIFA antenna for WLAN, the gain is 3.0 dBi; other is a PIFA antenna for GPRS/WCMDA, the gain is 5.0 dBi which in accordance to section 15.203, please refer to the internal photos.

Result: Compliant.

5.2 §15.247(a) (2) – 6 dB BANDWIDTH TESTING

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions

Temperature	22°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : March 12, 2013
   Tested By : Deon Dai

Requirement(s): §15.247(a)(2) specifies that the minimum 6 dB bandwidth shall be at least 500 kHz. In addition, the EBW is required information for subsequent band power measurements. The following procedures can be used to determine the EBW:

Procedures:
1. Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

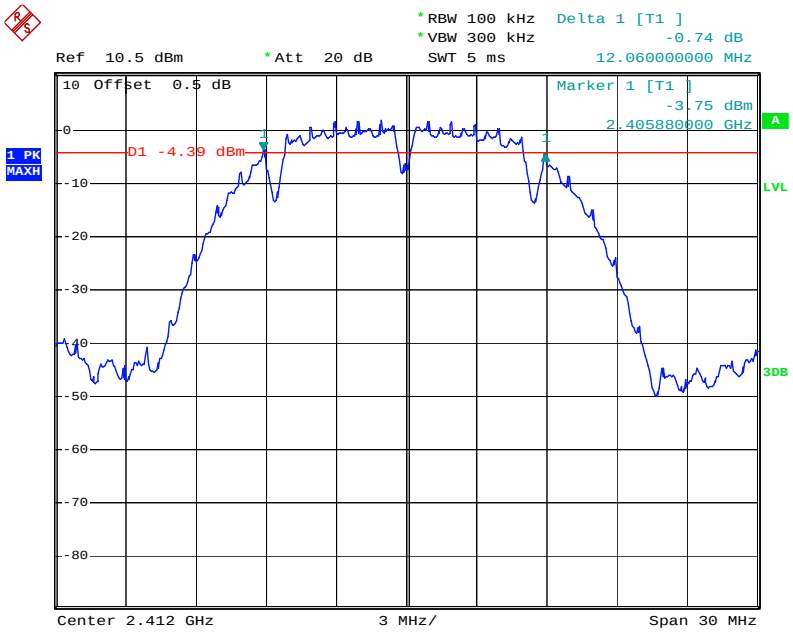
Test Result: Pass.

Please see the next page

Please refer to the following tables and plots.

Channel	Channel Frequency (MHz)	Measured 6dB Bandwidth (MHz)	FCC Part 15.247 Limit (kHz)
802.11b mode			
Low	2412	12.060	＞500
Middle	2437	12.060	＞500
High	2462	12.060	＞500
802.11g mode			
Low	2412	16.500	＞500
Middle	2437	16.500	＞500
High	2462	16.620	＞500
802.11n(20M) mode			
Low	2412	17.700	＞500
Middle	2437	17.700	＞500
High	2462	17.700	＞500
802.11n(40M) mode			
Low	2422	36.400	＞500
Middle	2437	36.200	＞500
High	2452	36.400	＞500

802.11b Low Channel



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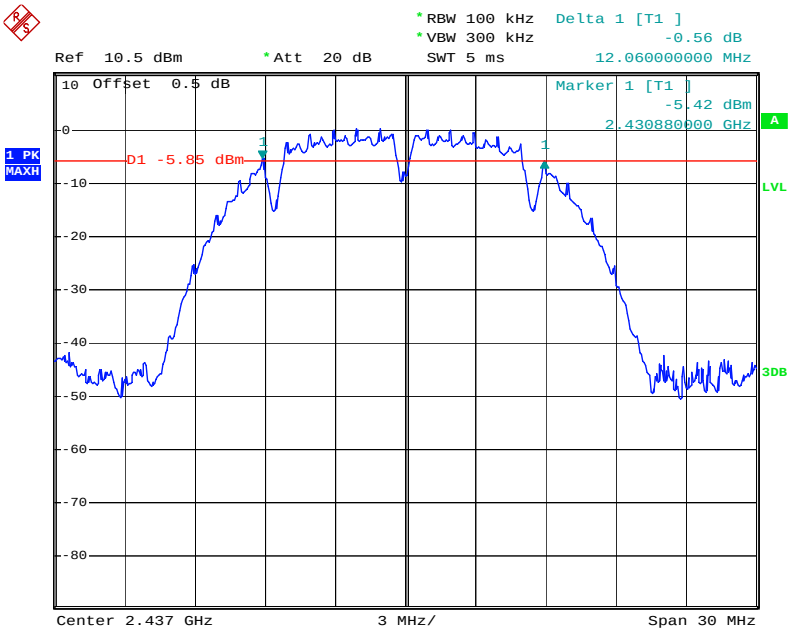
802.11b Middle Channel



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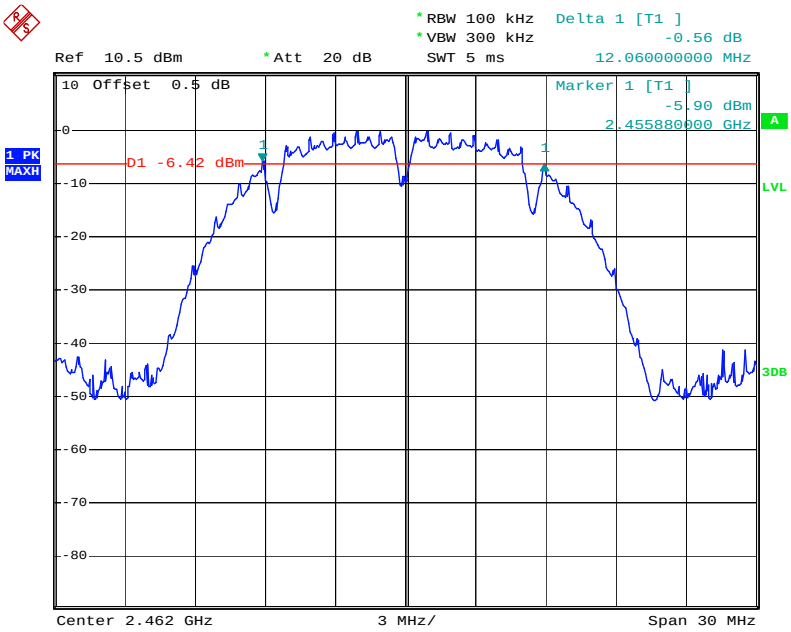
802.11b High Channel



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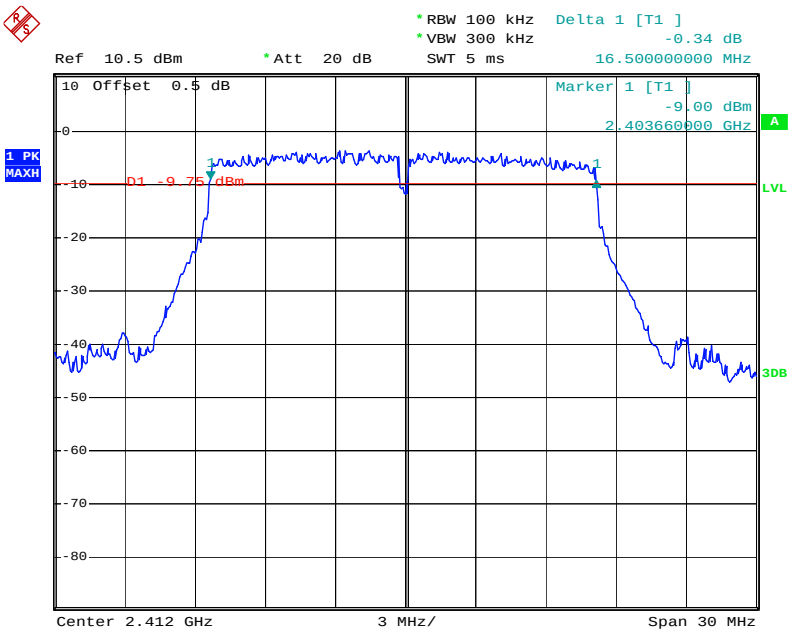
802.11g Low Channel



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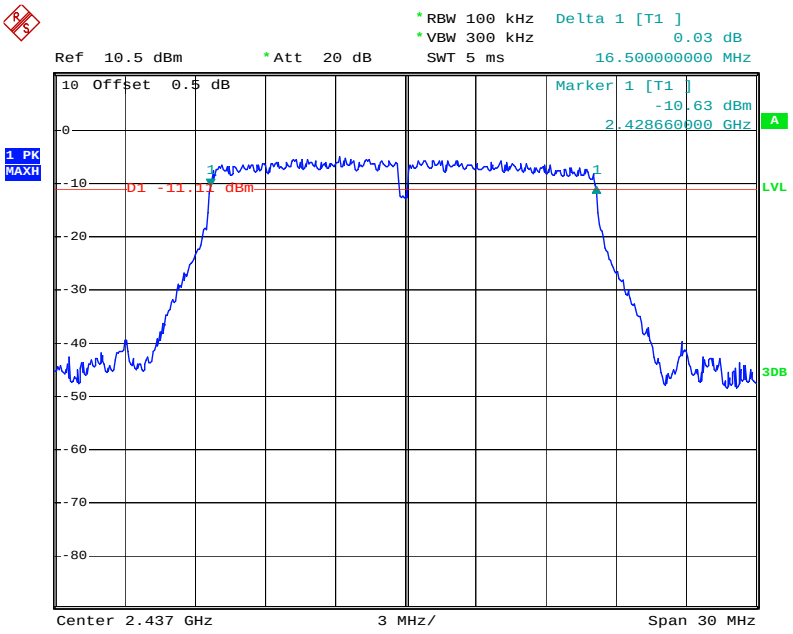

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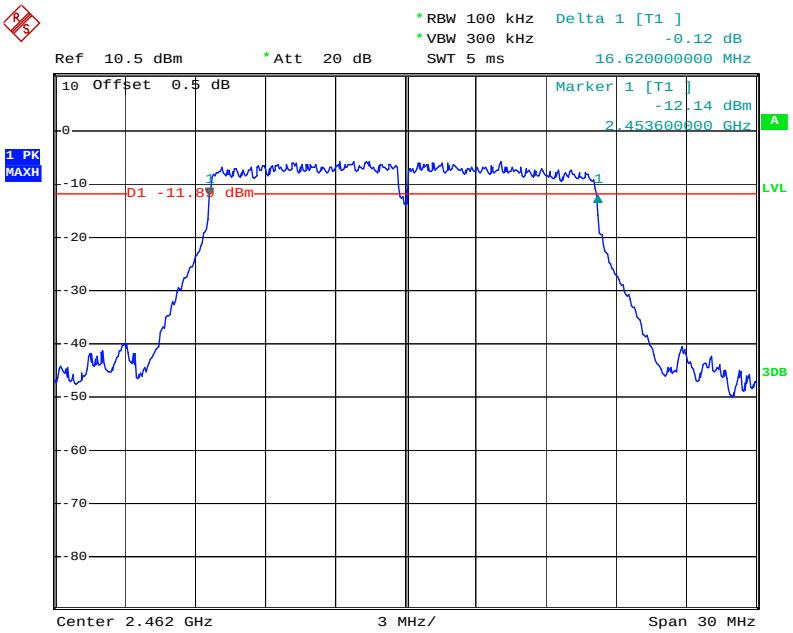
802.11g High Channel



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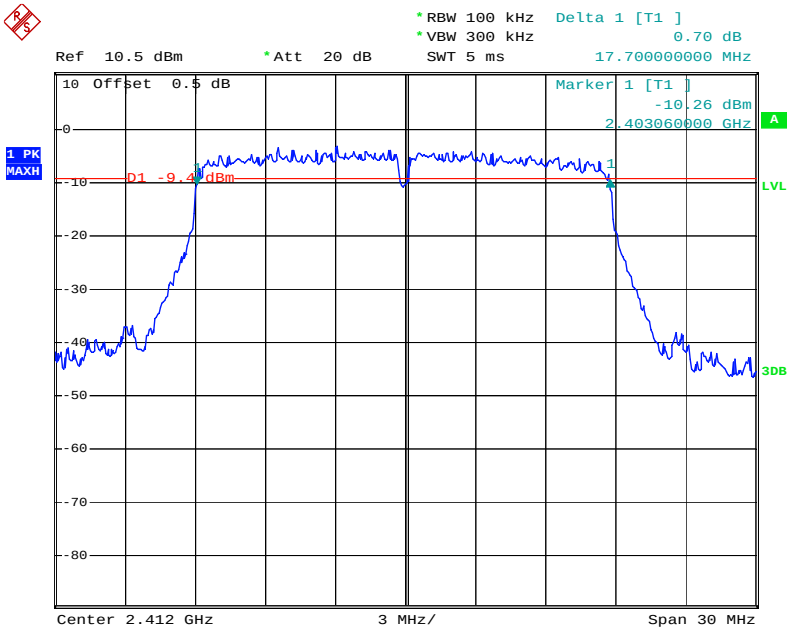
802.11n(20M) Low Channel



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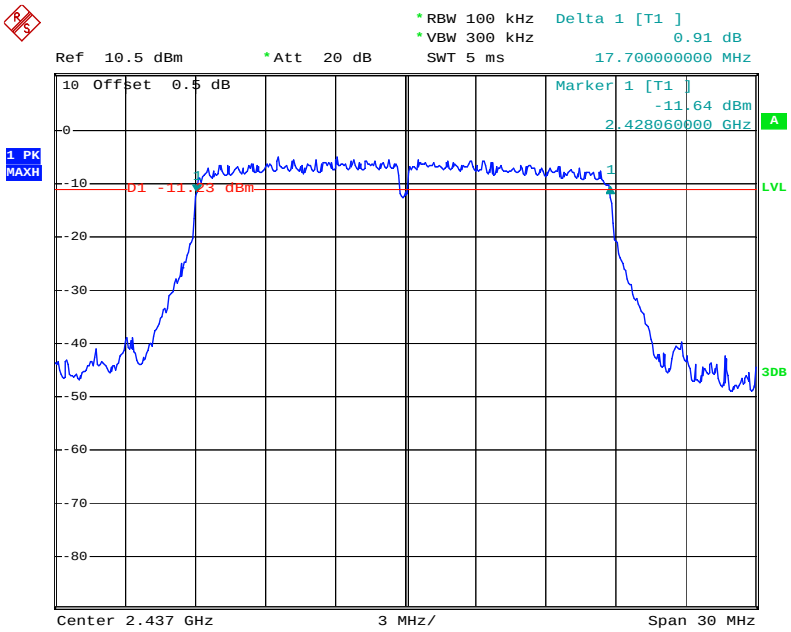

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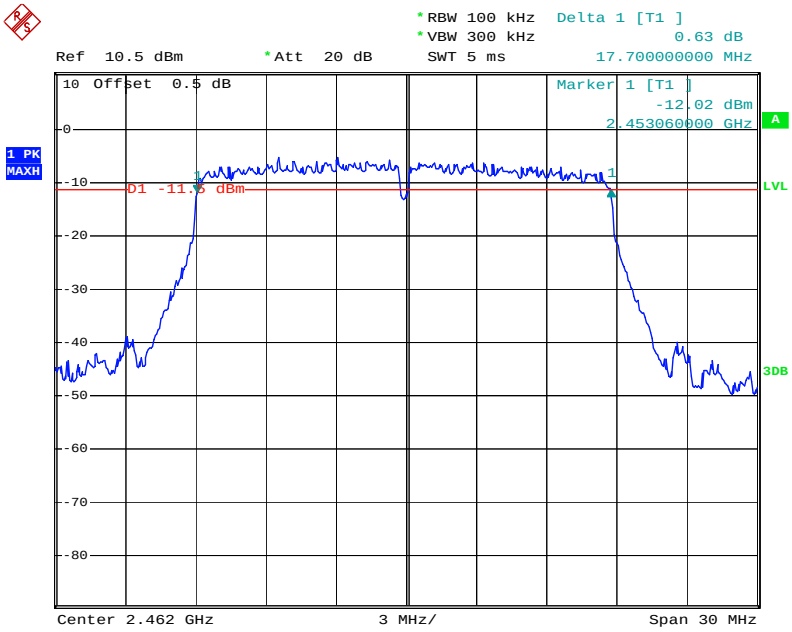
802.11n(20M) High Channel



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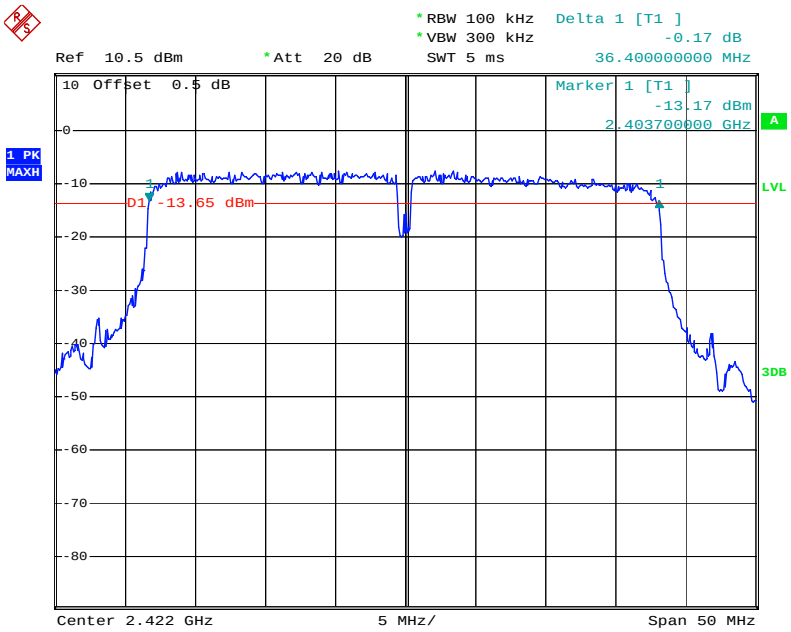
802.11n(40M) Low Channel



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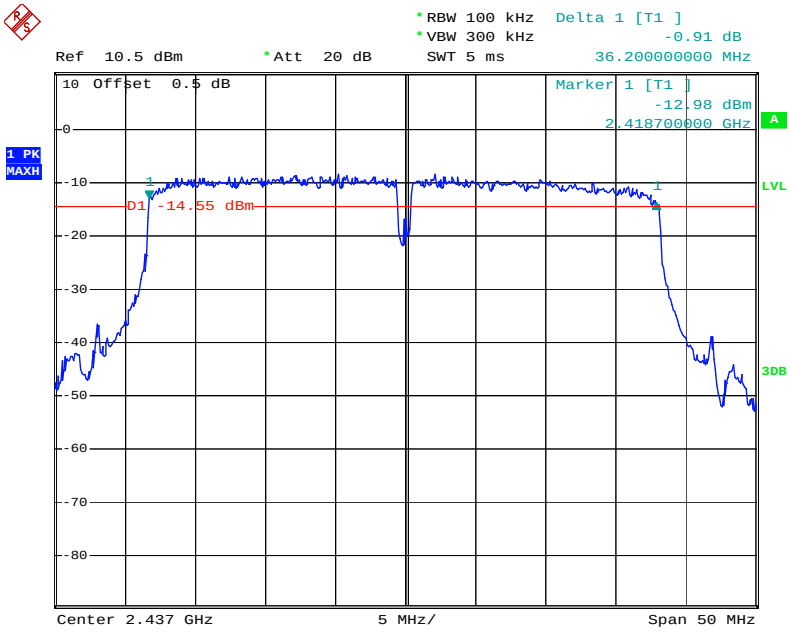
802.11n(40) Middle Channel



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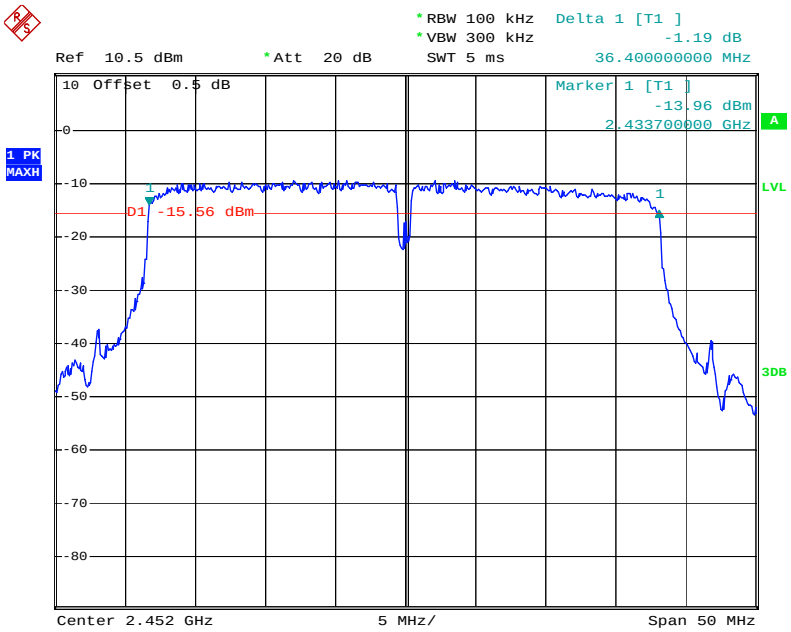
802.11n(40M) High Channel



Date: 14.MAR.2013 22:49:58

5.3 15.247(b) (3) - Conducted Maximum Output Power

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	16°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : March 12, 2013 to March 14, 2013
   Tested By : Deon Dai

Standard Requirement:
Maximum Peak Conducted Output Power Level:
§15.247(b)(3) specifies that the maximum peak conducted output power for DTS transmitters in any of the three authorized frequency bands is 1 watt (30 dBm). The following procedures can be used to determine the maximum peak conducted output power from a DTS EUT using a spectrum analyzer.

Procedures:
Channel integration method
This procedure should only be used when the maximum available RBW of the spectrum/signal analyzer is less than the DTS bandwidth.
1. Set the RBW = maximum available (at least 1 MHz).
2. Set the VBW = 3 x RBW or maximum available setting (must be ≥ RBW).
3. Set the span to fully encompass the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the spectrum analyzer's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some analyzers, this may require a manual override to ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

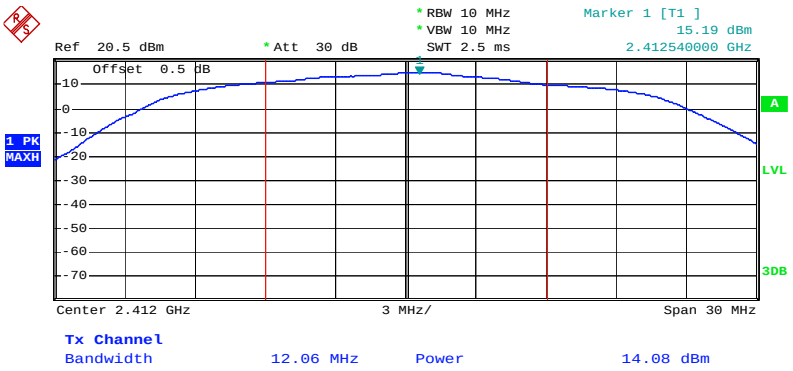
Test Result: Pass.

Please refer to the following tables and plots.

Channel	Channel Frequency (MHz)	Data Rate (Mbps)	PK Output Power (dBm)	Limit (dBm)
802.11b mode				
Low	2412	1	14.08	30
Middle	2437	1	12.65	30
High	2462	1	12.22	30
802.11g mode				
Low	2412	6	17.75	30
Middle	2437	6	16.46	30
High	2462	6	15.81	30
802.11n(20M) mode				
Low	2412	Mcs0	18.56	30
Middle	2437	Mcs0	17.12	30
High	2462	Mcs0	16.45	30
802.11n(40M) mode				
Low	2422	Mcs0	16.25	30
Middle	2437	Mcs0	17.40	30
High	2452	Mcs0	12.66	30

802.11b Mode:

802.11b PK Output Power, Low Channel



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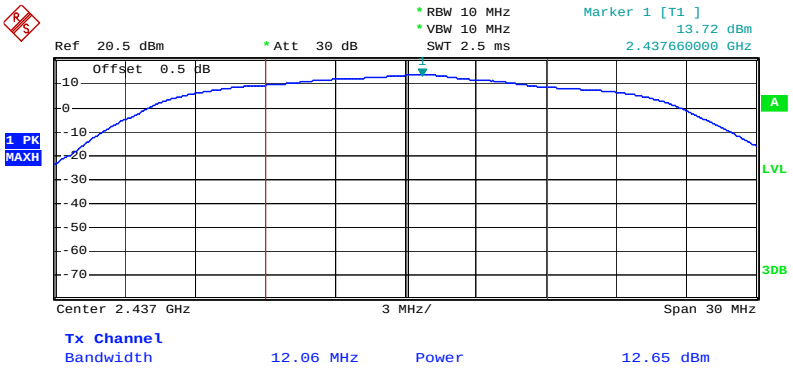
802.11b PK Output Power, Middle Channel



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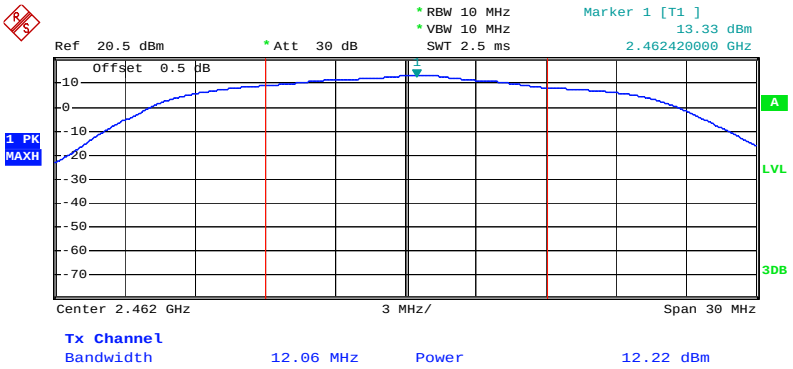
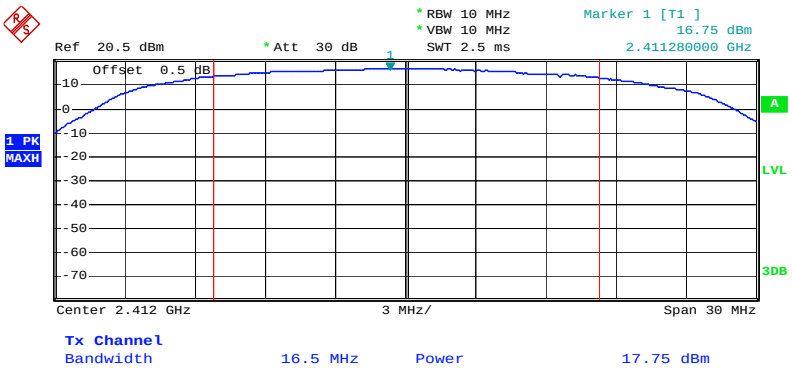
802.11b PK Output Power, High Channel



Date: 12.MAR.2013 23:48:50

802.11g Mode:

802.11g PK Output Power, Low Channel



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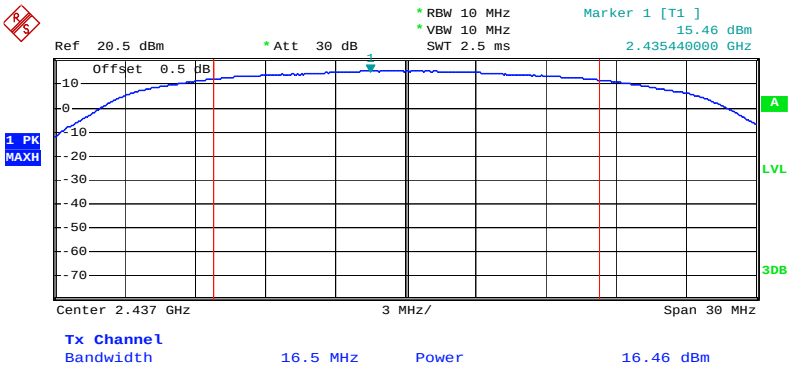
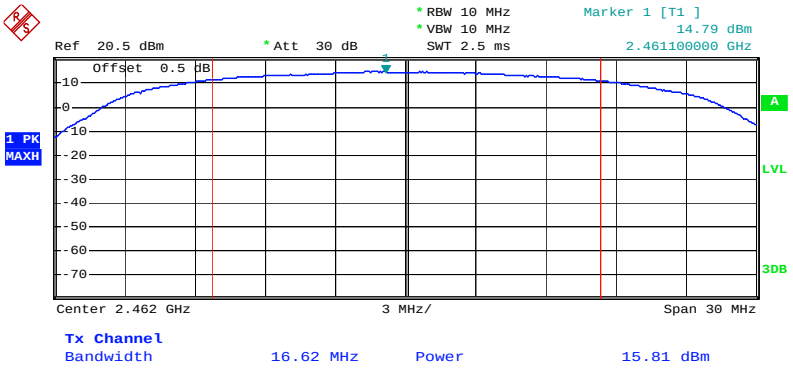
802.11g PK Output Power, Middle Channel



Date: 12.MAR.2013 23:51:56

802.11g PK Output Power, High Channel



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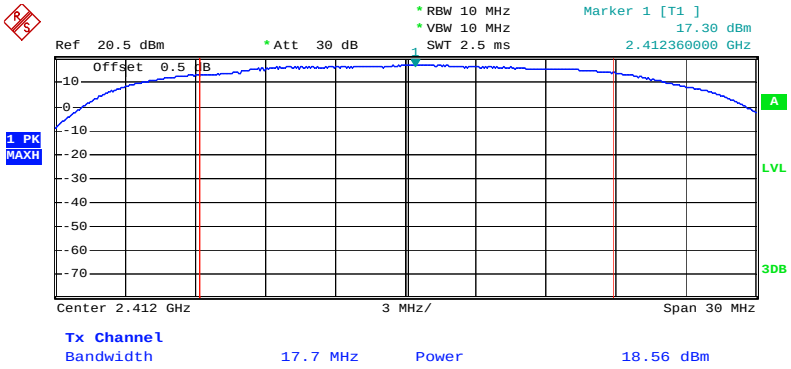
802.11n(20M) Mode:

802.11n(20M) PK Output Power, Low Channel



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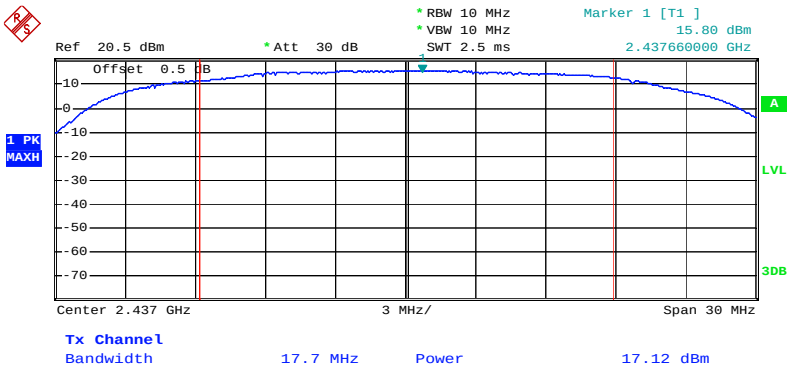
802.11n(20M) PK Output Power, Middle Channel



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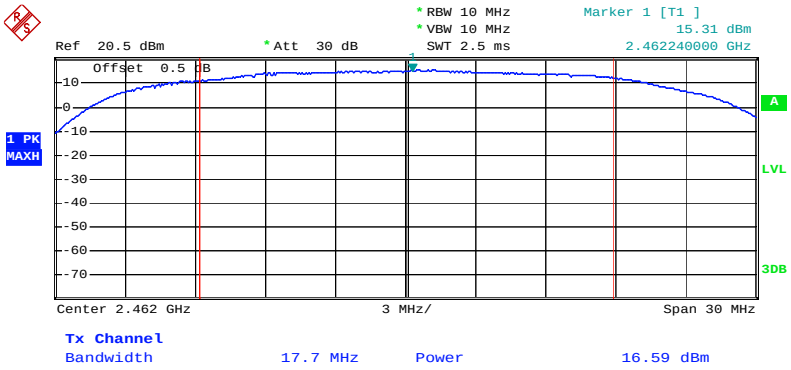

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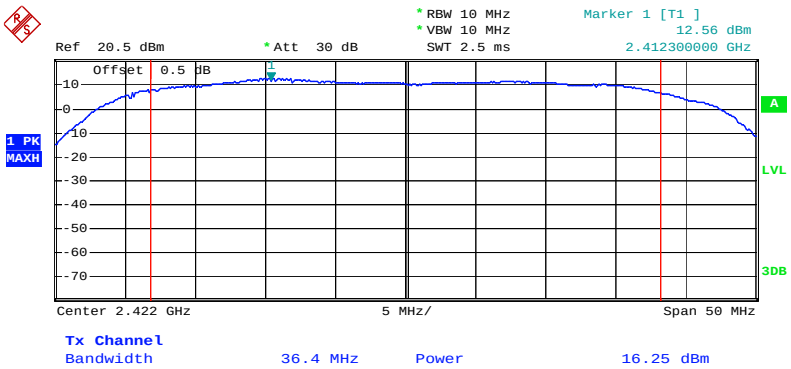
802.11n(40M) Mode:

802.11n(40M) PK Output Power, Low Channel



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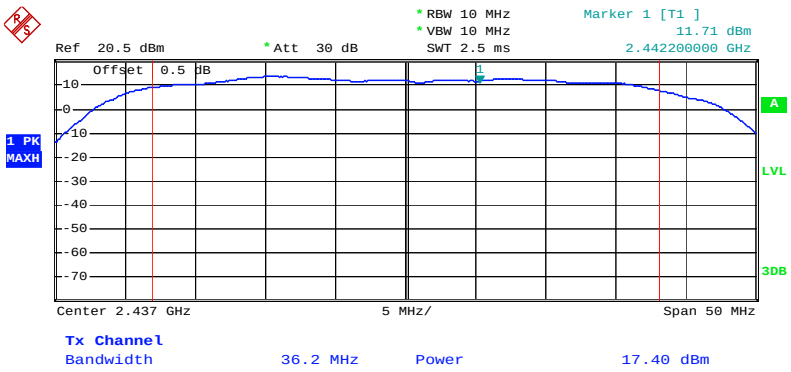
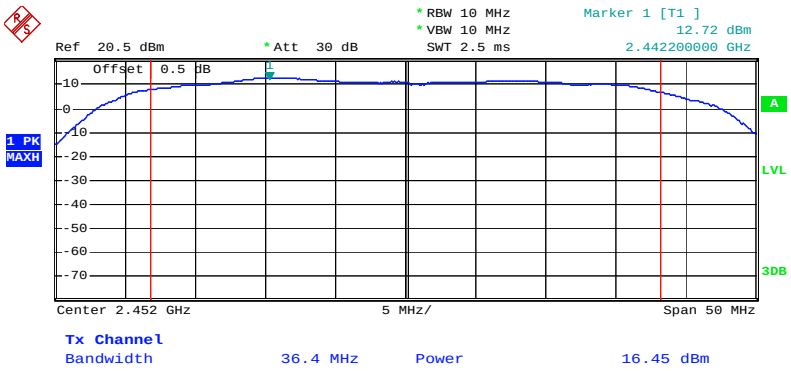
802.11n(40M) PK Output Power, Middle Channel



Date: 14.MAR.2013 22:53:42

802.11n(40M) PK Output Power, High Channel



Date: 14.MAR.2013 22:52:21

5.4 §15.247(e) - Power Spectral Density

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions

Temperature	22°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : March 13, 2013 to March 14, 2013
   Tested By : Deon Dai

Requirement(s): §15.247(e) specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segment within the fundamental EBW during any time interval of continuous transmission. The same method as used to determine the conducted output power shall be used to determine the power spectral density (i.e., if peak-detected fundamental power was measured then use the peak PSD procedure and if average fundamental power was measured then use the average PSD procedure).

Procedures:

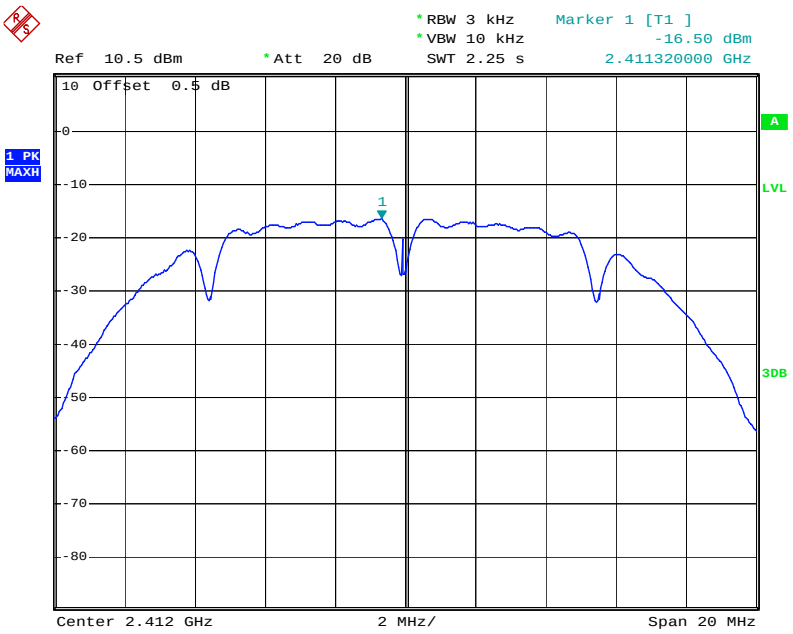
1. This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.
2. Set analyzer center frequency to DTS channel center frequency.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW ≥ 3 kHz.
5. Set the VBW ≥ 3 x RBW.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level.
11. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Result: Pass.

Please refer to the following tables and plots.

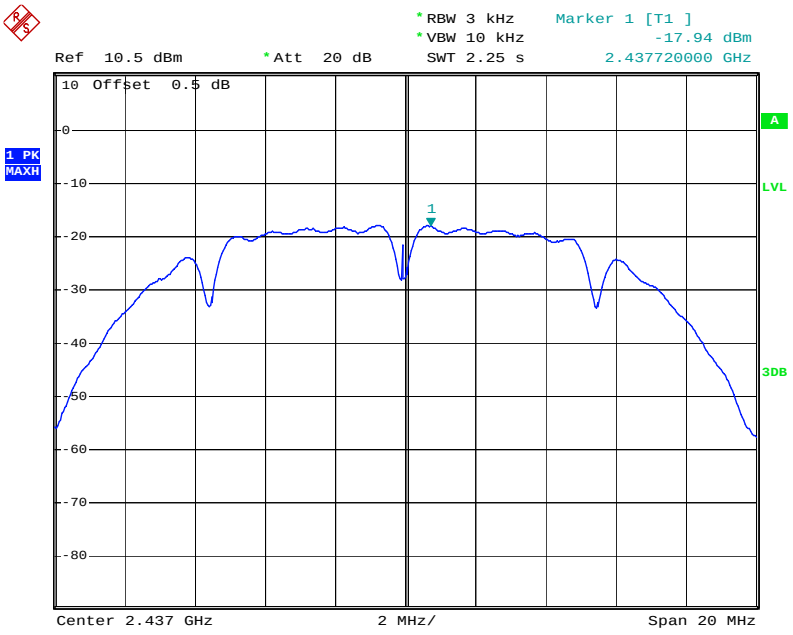
Channel	Frequency (MHz)	Data Rate	PSD (dBm)	Limit (dBm)
802.11b				
Low	2412	1	-16.50	8
Middle	2437	1	-17.94	8
High	2462	1	-18.39	8
802.11g				
Low	2412	6	-17.32	8
Middle	2437	6	-19.22	8
High	2462	6	-19.67	8
802.11n (20M)				
Low	2412	MCS0	-17.84	8
Middle	2437	MCS0	-19.45	8
High	2462	MCS0	-19.74	8
802.11n (40M)				
Low	2422	MCS0	-22.44	8
Middle	2437	MCS0	-20.93	8
High	2452	MCS0	-21.84	8

Power Spectral Density, 802.11b Low Channel



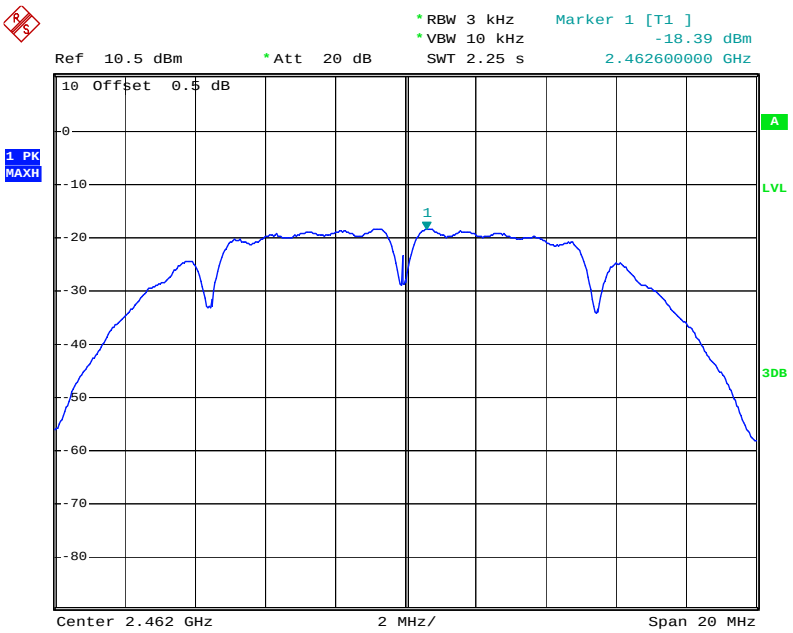
Date: 13.MAR.2013 21:36:13

Power Spectral Density, 802.11b Middle Channel



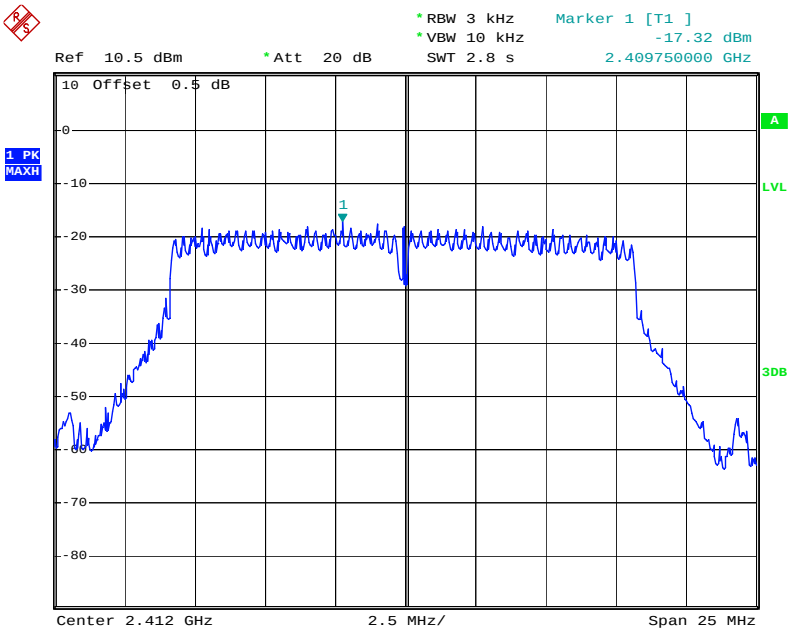
Date: 13.MAR.2013 21:36:48

Power Spectral Density, 802.11b High Channel



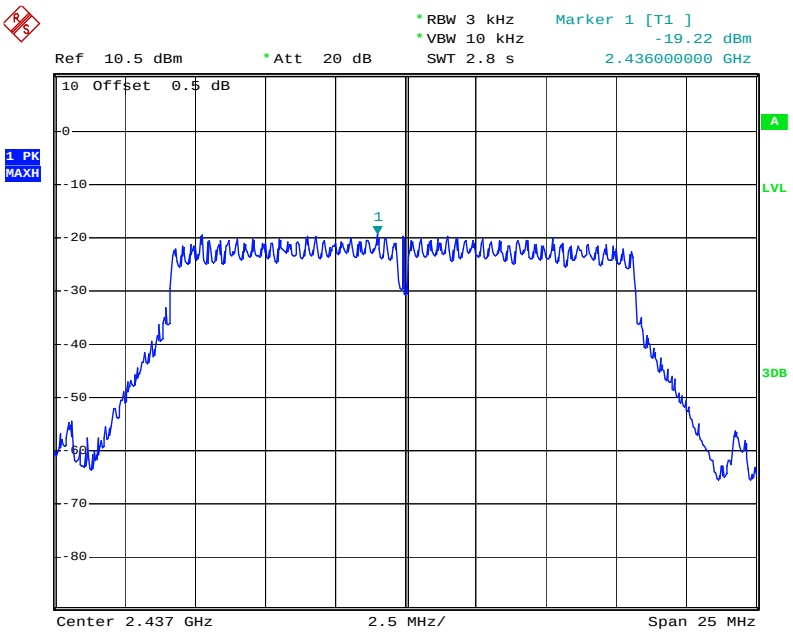
Date: 13.MAR.2013 21:38:10

Power Spectral Density, 802.11g Low Channel



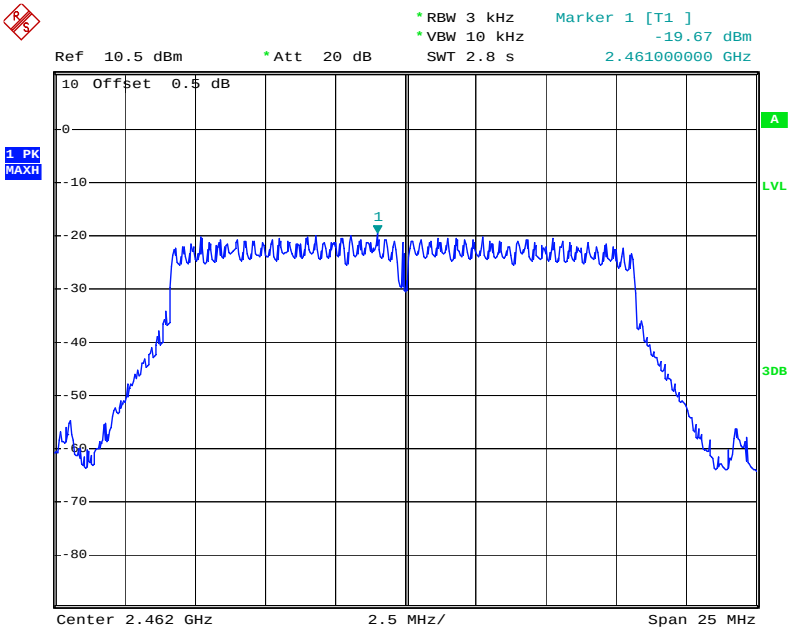
Date: 13.MAR.2013 21:26:01

Power Spectral Density, 802.11g Middle Channel



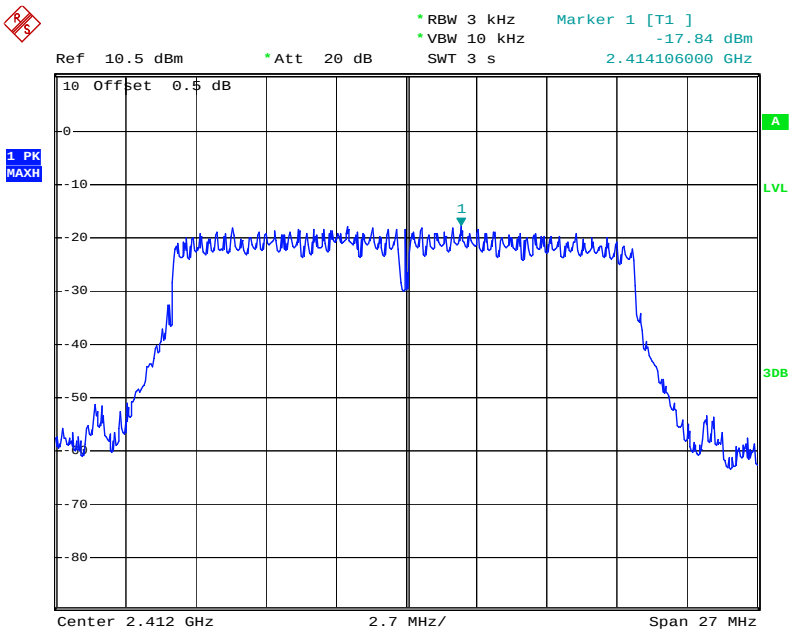
Date: 13.MAR.2013 21:25:26

Power Spectral Density, 802.11g High Channel



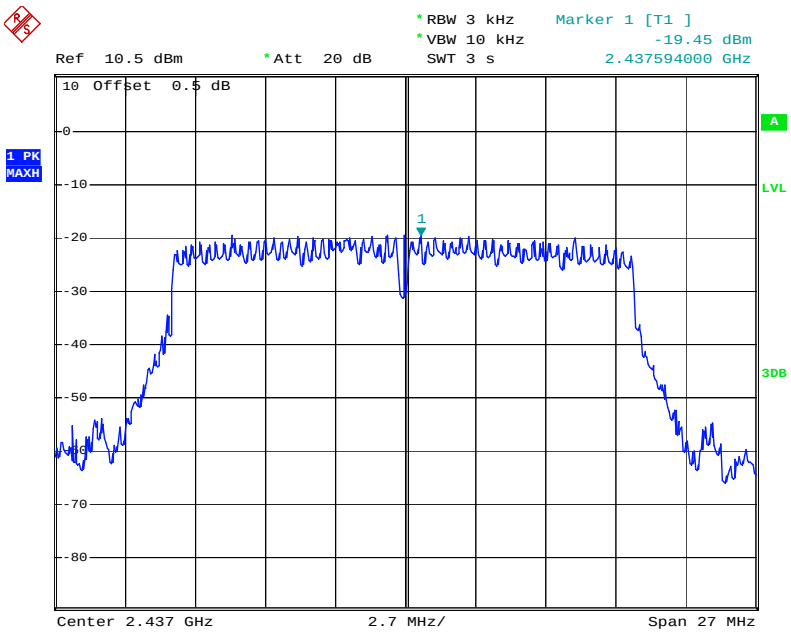
Date: 13.MAR.2013 21:23:50

Power Spectral Density, 802.11n(20M) Low Channel



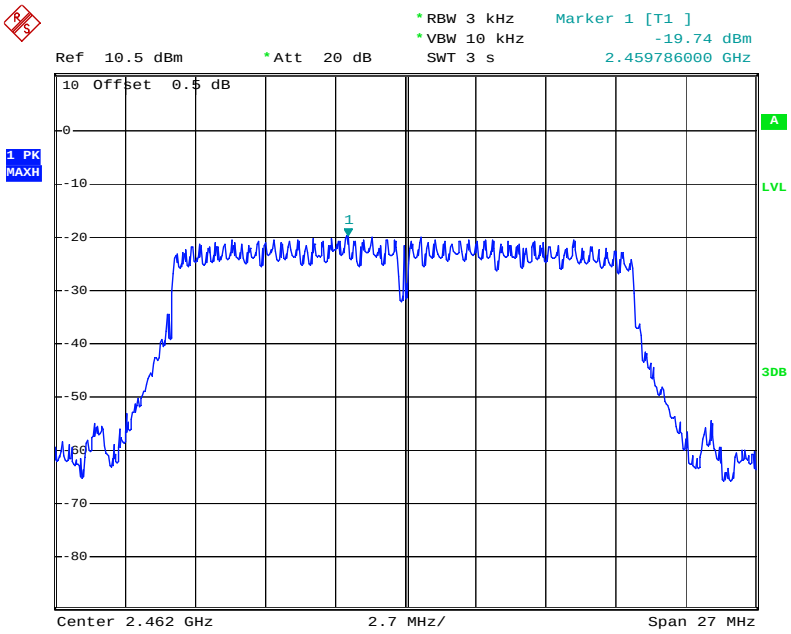
Date: 13.MAR.2013 21:28:05

Power Spectral Density, 802.11n(20M) Middle Channel



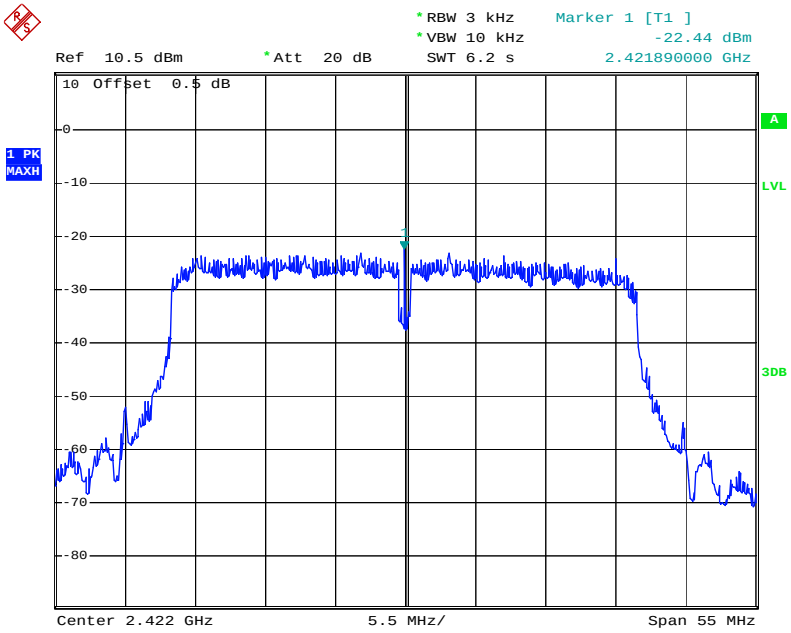
Date: 13.MAR.2013 21:28:42

Power Spectral Density, 802.11n(20M) High Channel



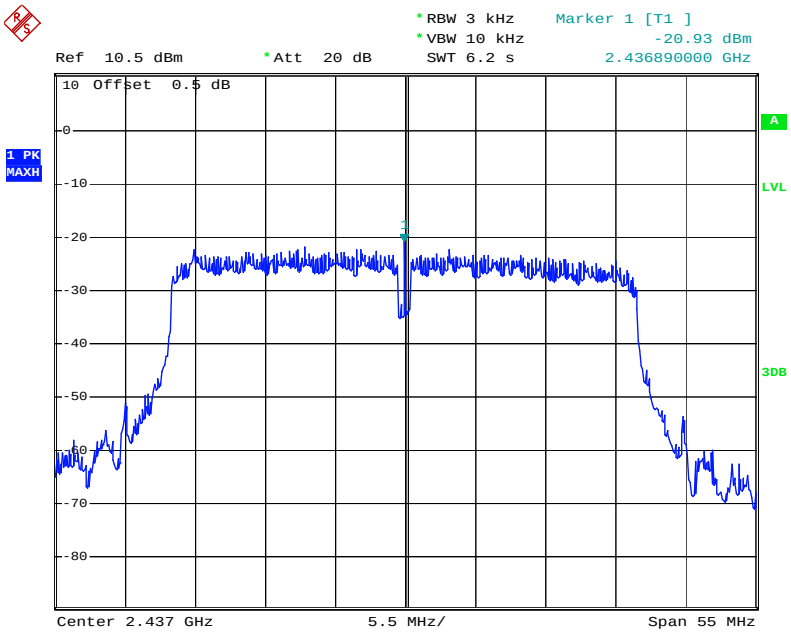
Date: 13.MAR.2013 21:30:36

Power Spectral Density, 802.11n(40M) Low Channel



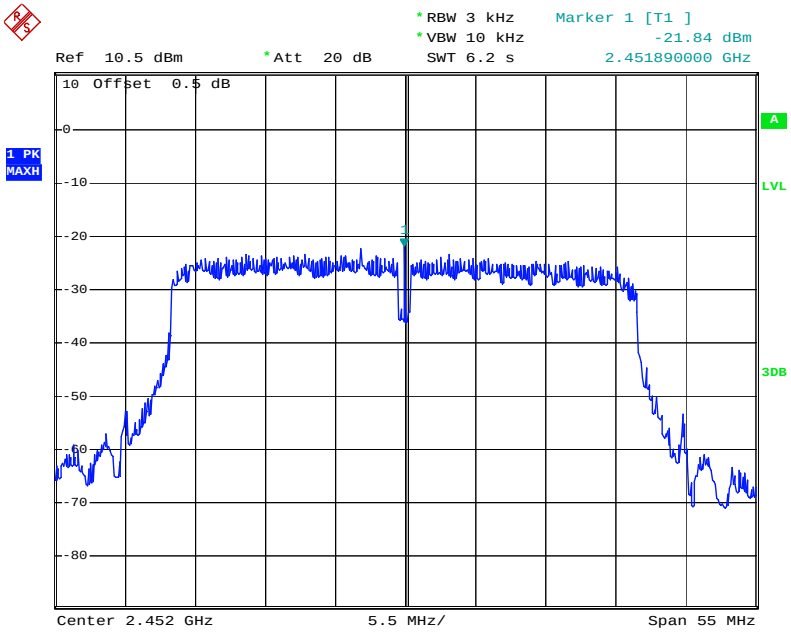
Date: 14.MAR.2013 22:56:46

Power Spectral Density, 802.11n(40M) Middle Channel



Date: 14.MAR.2013 22:59:00

Power Spectral Density, 802.11n(40M) High Channel



Date: 14.MAR.2013 22:59:34

5.5 §15.247(d) –Band Edge & Conducted Spurious Emissions

1. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

2. Environmental Conditions

Temperature	16oC
Relative Humidity	50%
Atmospheric Pressure	1019mbar

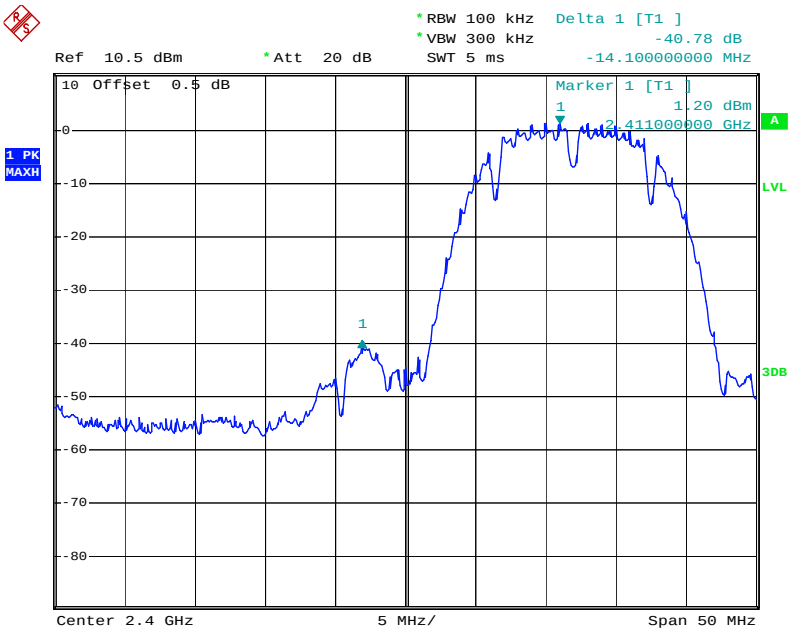
3. Test date : March 14, 2013
Tested By : Deon Dai

Test Result: Pass.

Please refer to the following tables and plots.

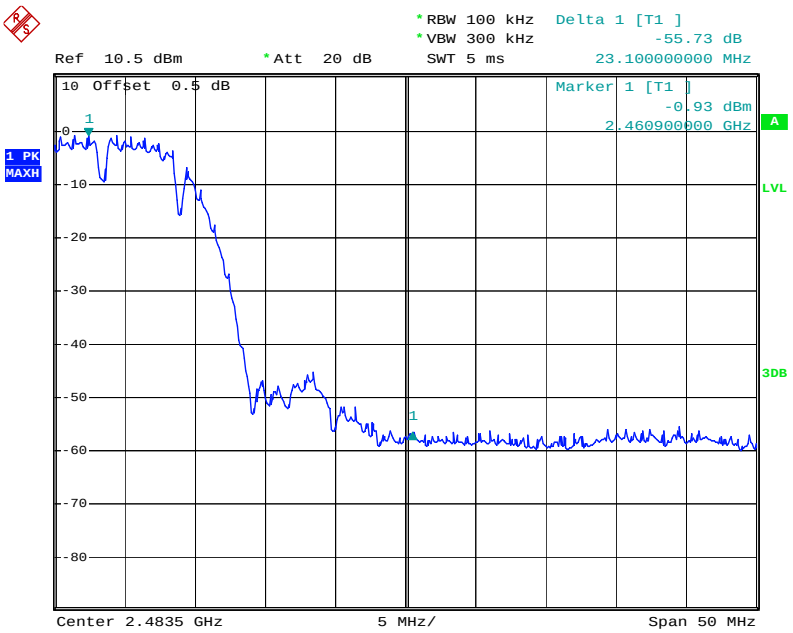
Band Edge	Delta Peak to band emission (dB)	Limit (dB)
802.11b mode		
Left Side	40.78	20
Right Side	55.73	20
802.11g mode		
Left Side	34.52	20
Right Side	49.94	20
802.11n(20M) mode		
Left Side	34.96	20
Right Side	49.12	20
802.11n(40M) mode		
Left Side	28.47	20
Right Side	41.01	20

802.11b: Band Edge, Left Side



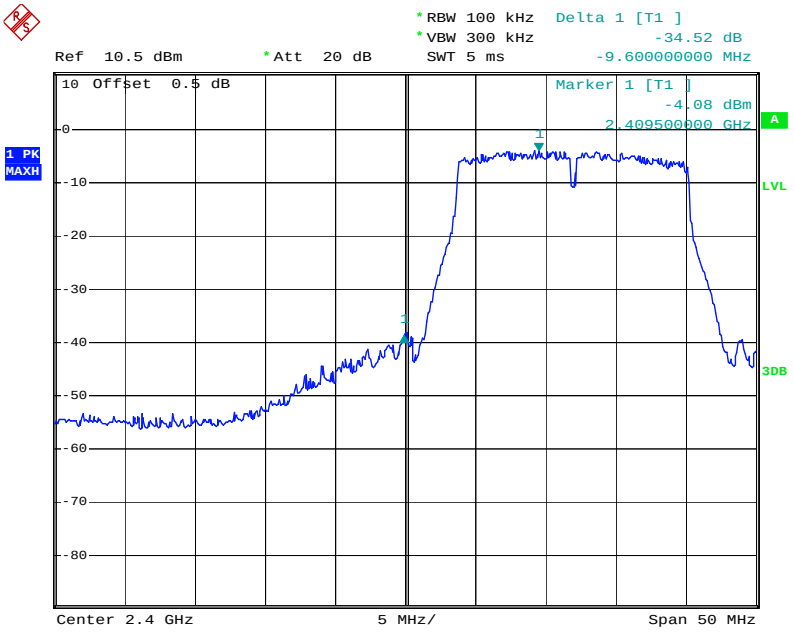
Date: 14.MAR.2013 23:09:24

802.11b: Band Edge, Right Side



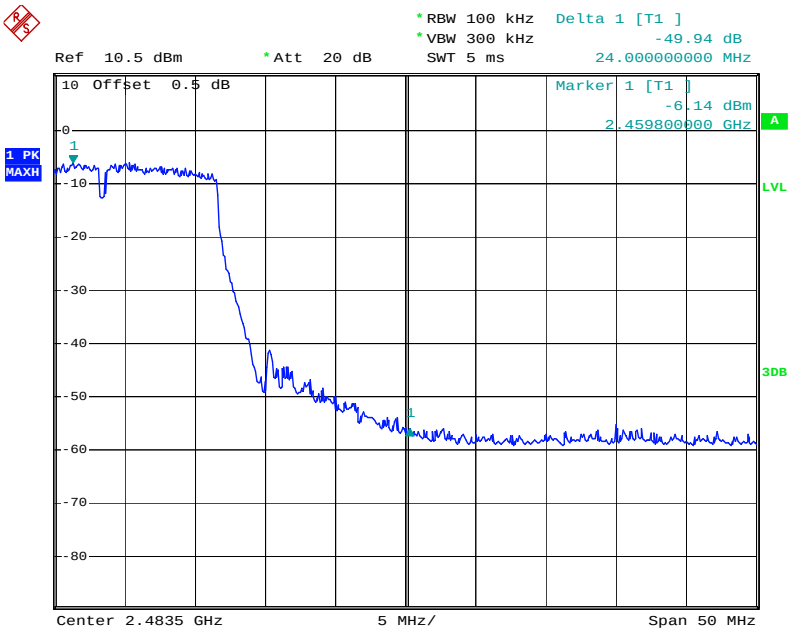
Date: 14.MAR.2013 23:10:22

802.11g: Band Edge, Left Side



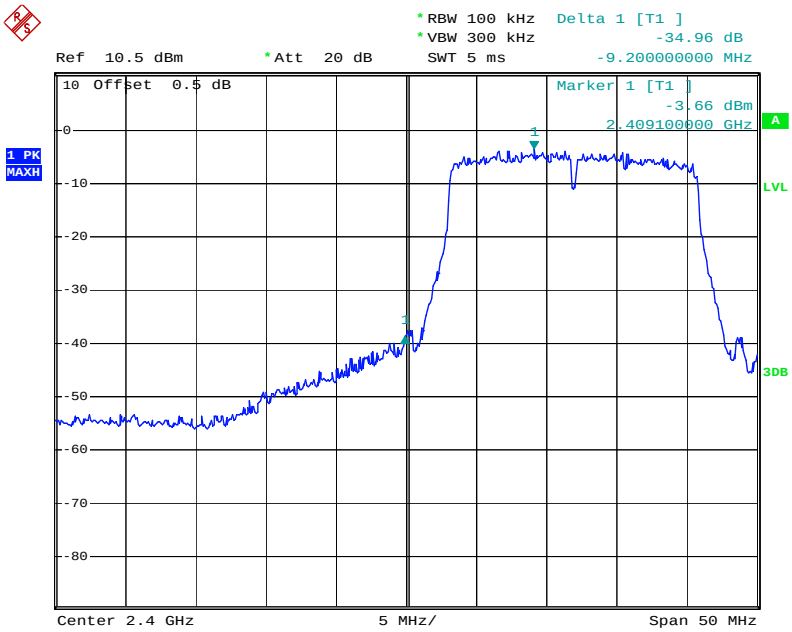
Date: 14.MAR.2013 23:08:38

802.11g: Band Edge, Right Side



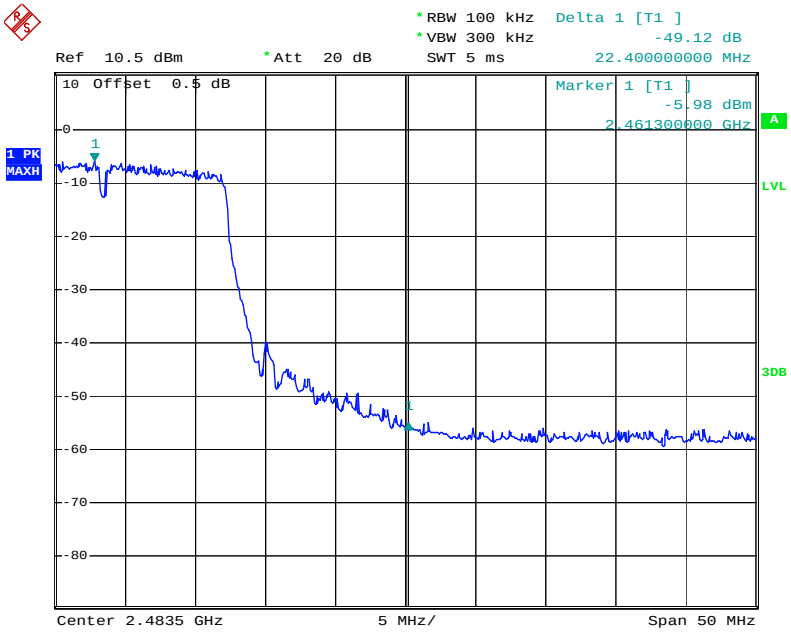
Date: 14.MAR.2013 23:07:31

802.11n(20M): Band Edge, Left Side



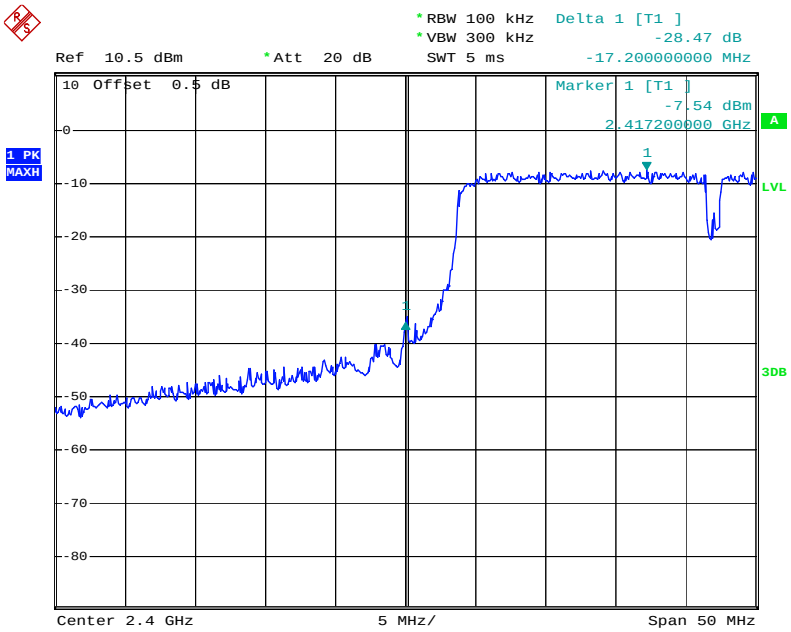
Date: 14.MAR.2013 23:05:05

802.11n(20M): Band Edge, Right Side



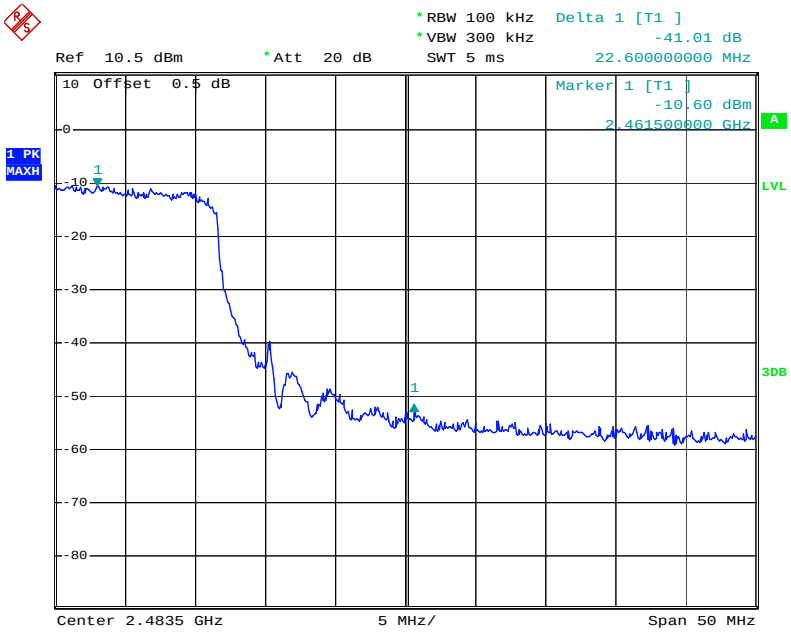
Date: 14.MAR.2013 23:06:34

802.11n(40M): Band Edge, Left Side



Date: 14.MAR.2013 23:03:38

802.11n(40M): Band Edge, Right Side

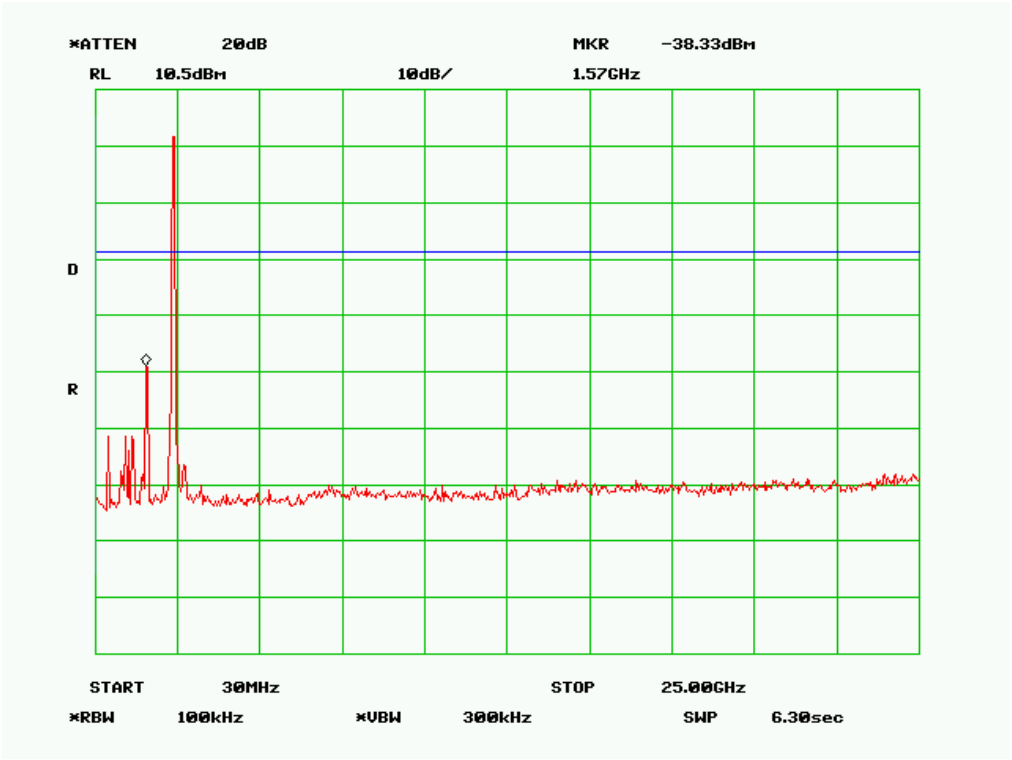


Date: 14.MAR.2013 23:02:06

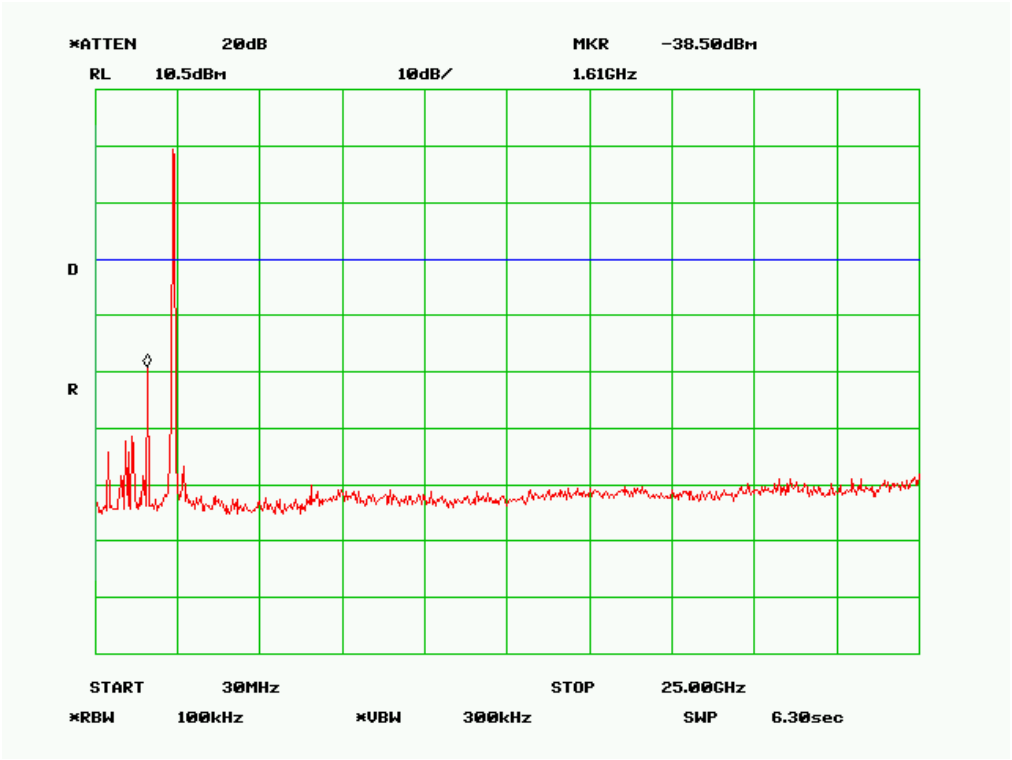
Antenna Port Conducted Spurious Emissions

Please refer to the following plots.

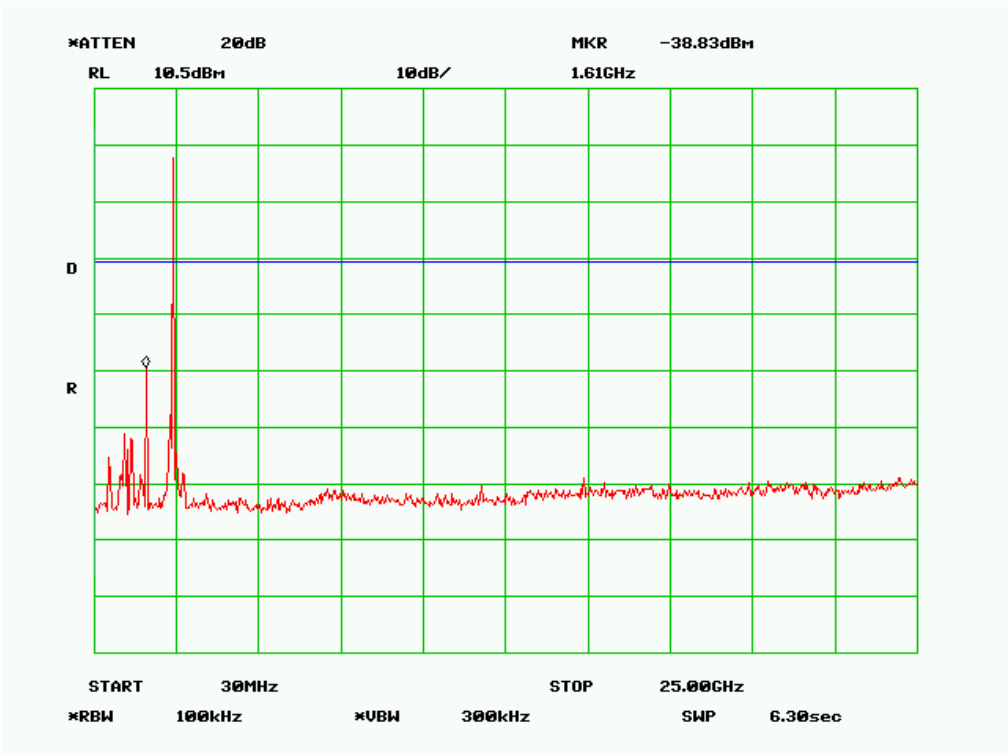
802.11b Low Channel



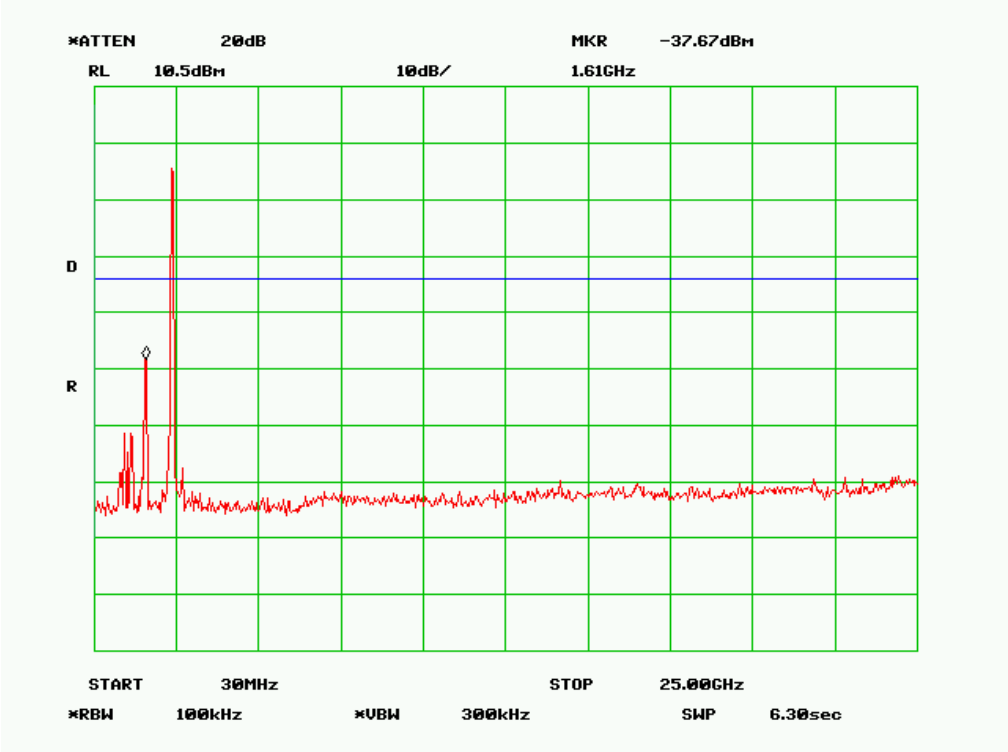
802.11b Middle Channel



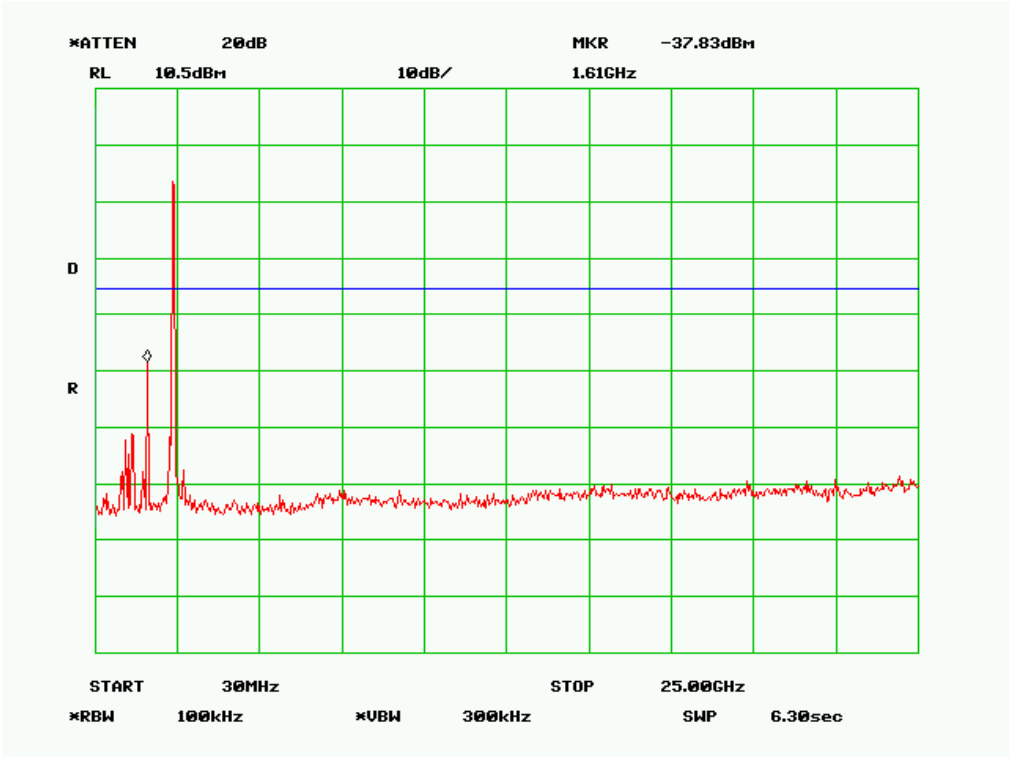
802.11b High Channel



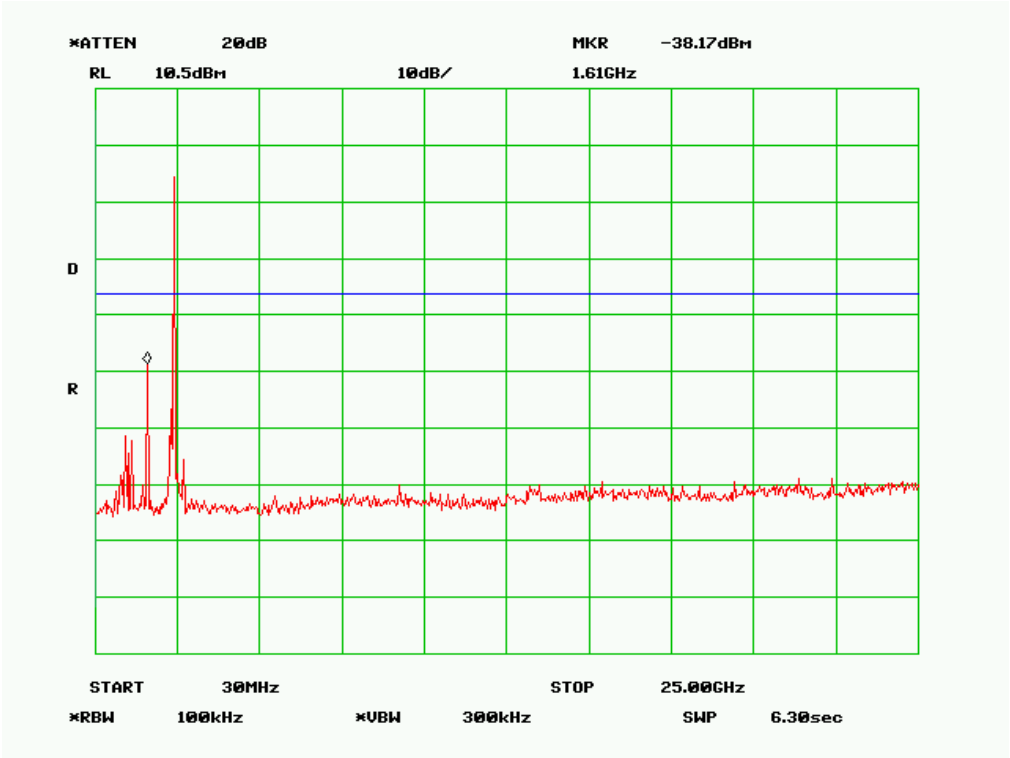
802.11g Low Channel



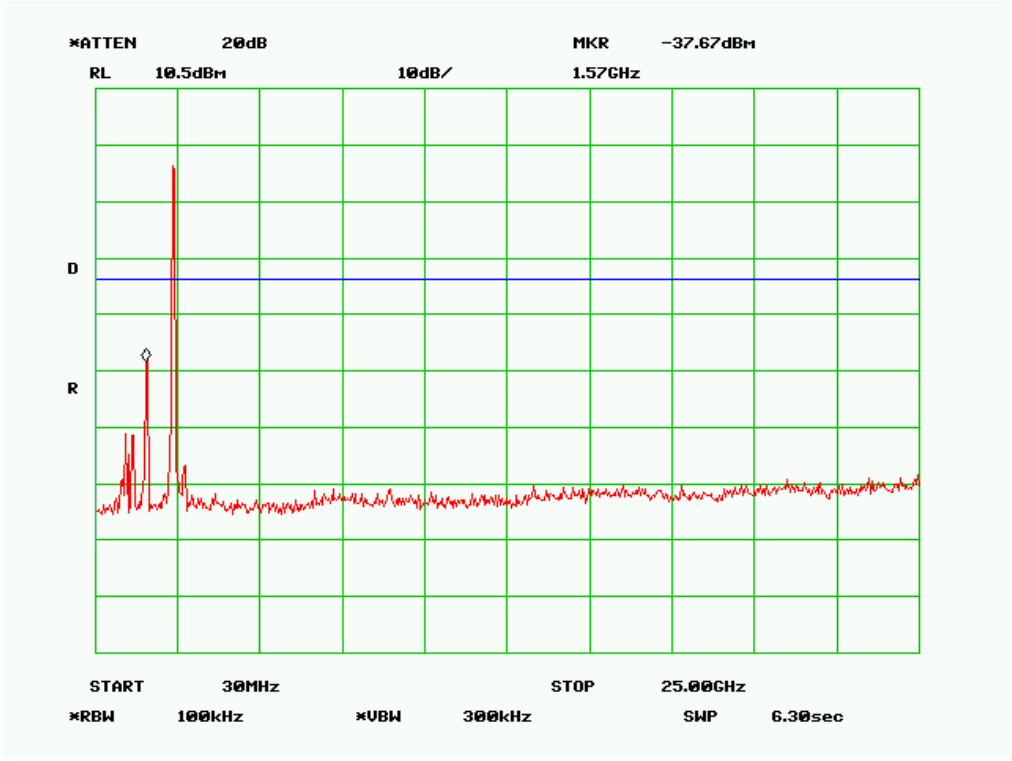
802.11g Middle Channel



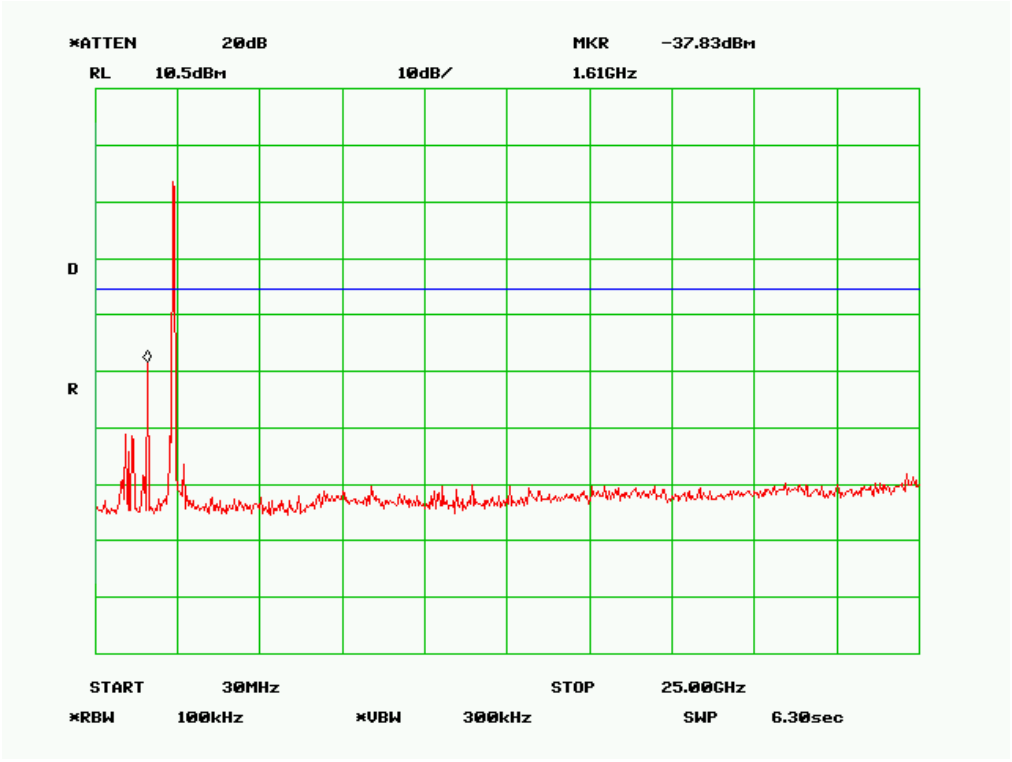
802.11g High Channel



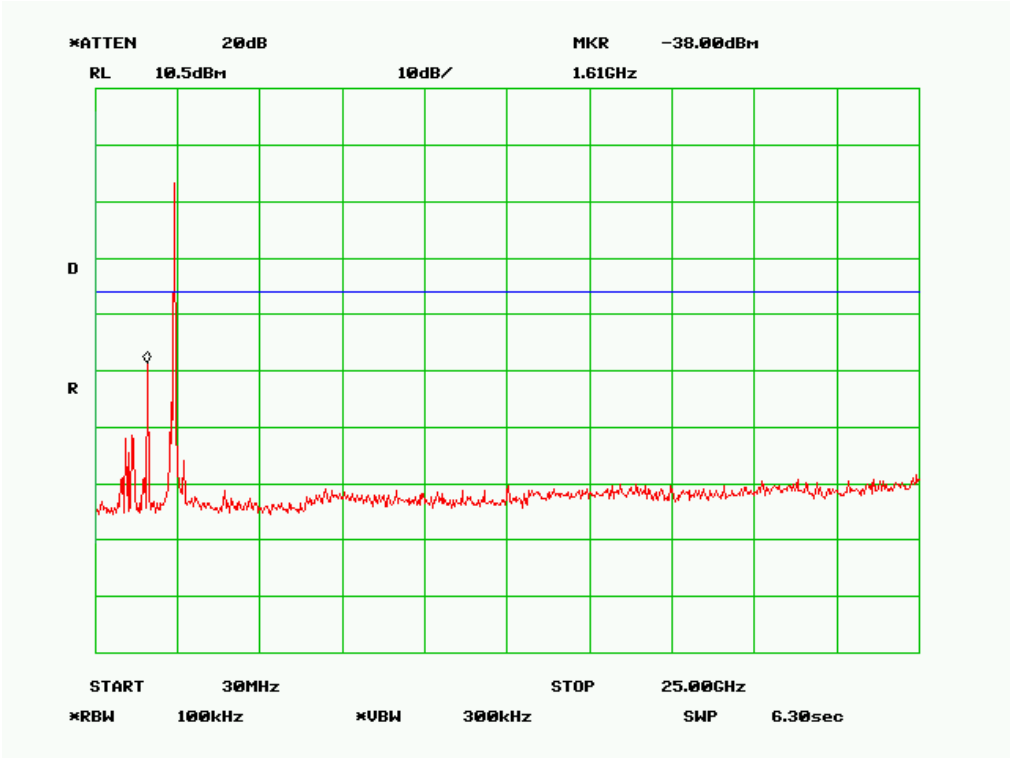
802.11n(20M) Low Channel



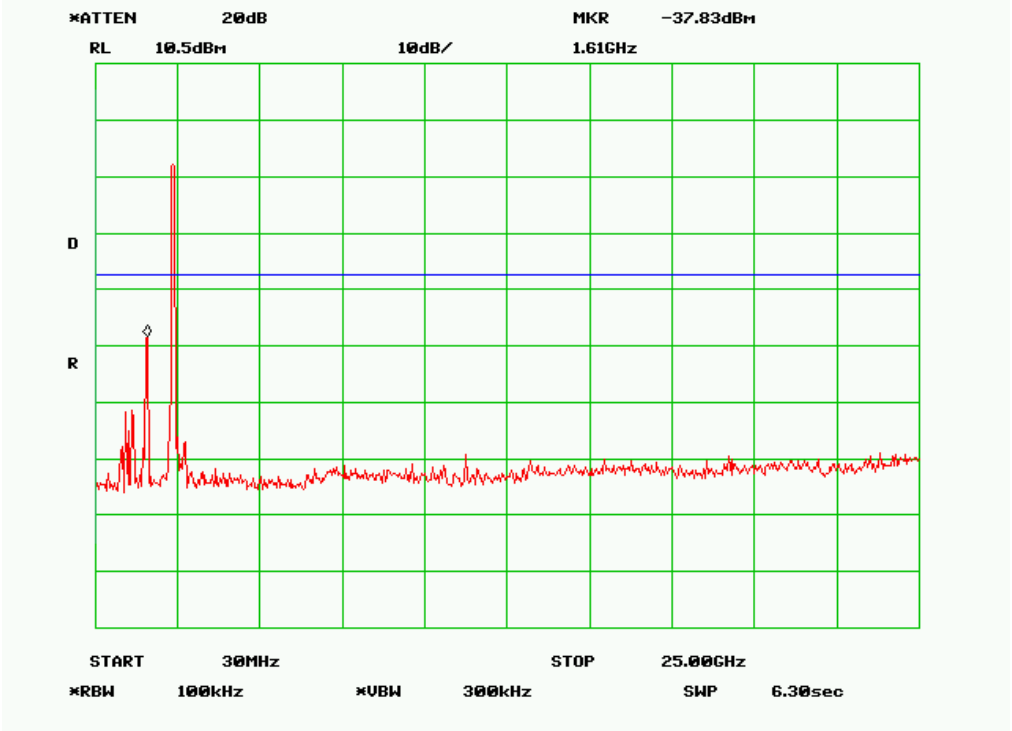
802.11n(20M) Middle Channel



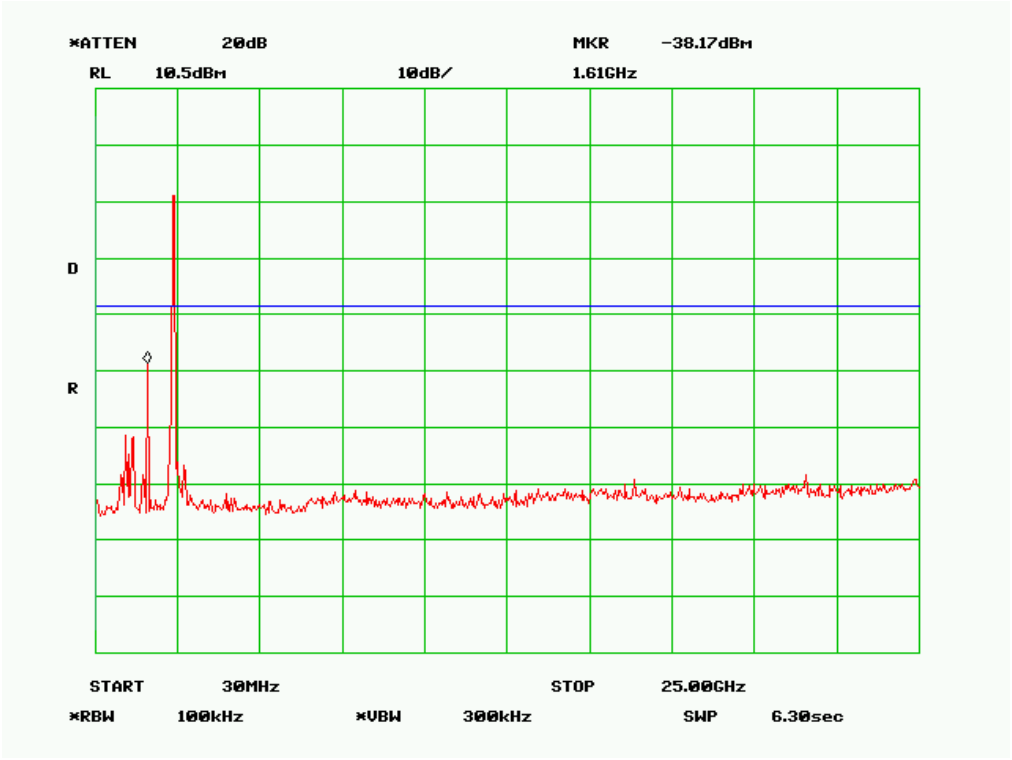
802.11n(20M) High Channel



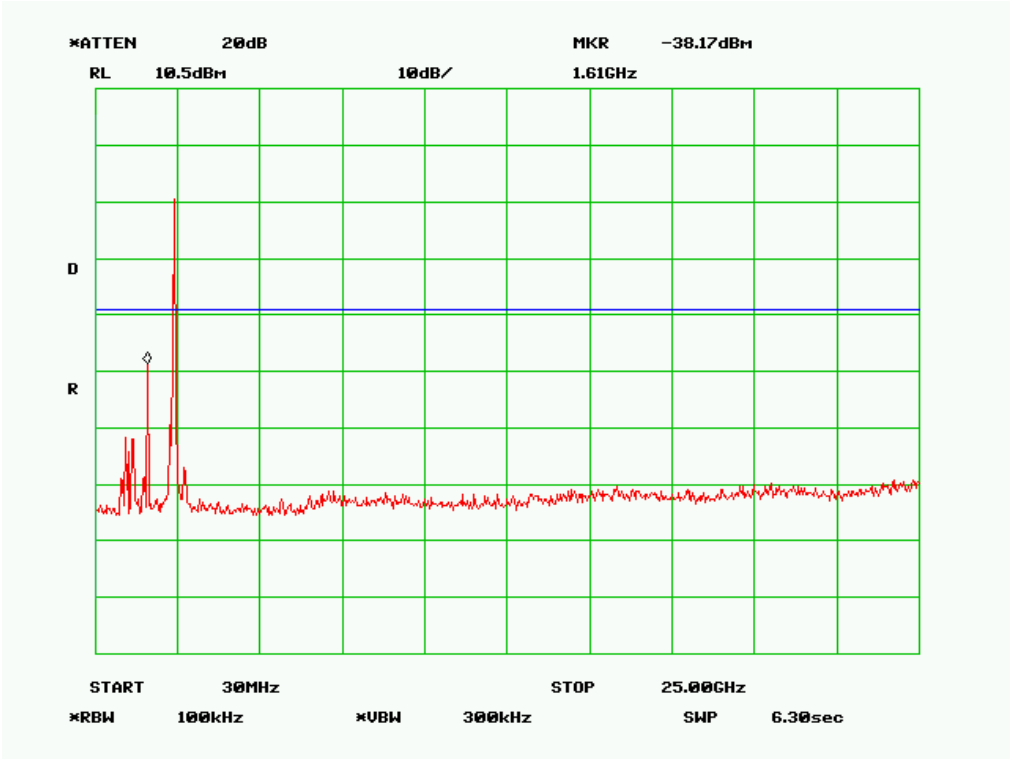
802.11n(40M) Low Channel



802.11n(40M) Middle Channel



802.11n(40M) High Channel



5.6 §15.207 (a) - AC Power Line Conducted Emissions

Requirement:

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.

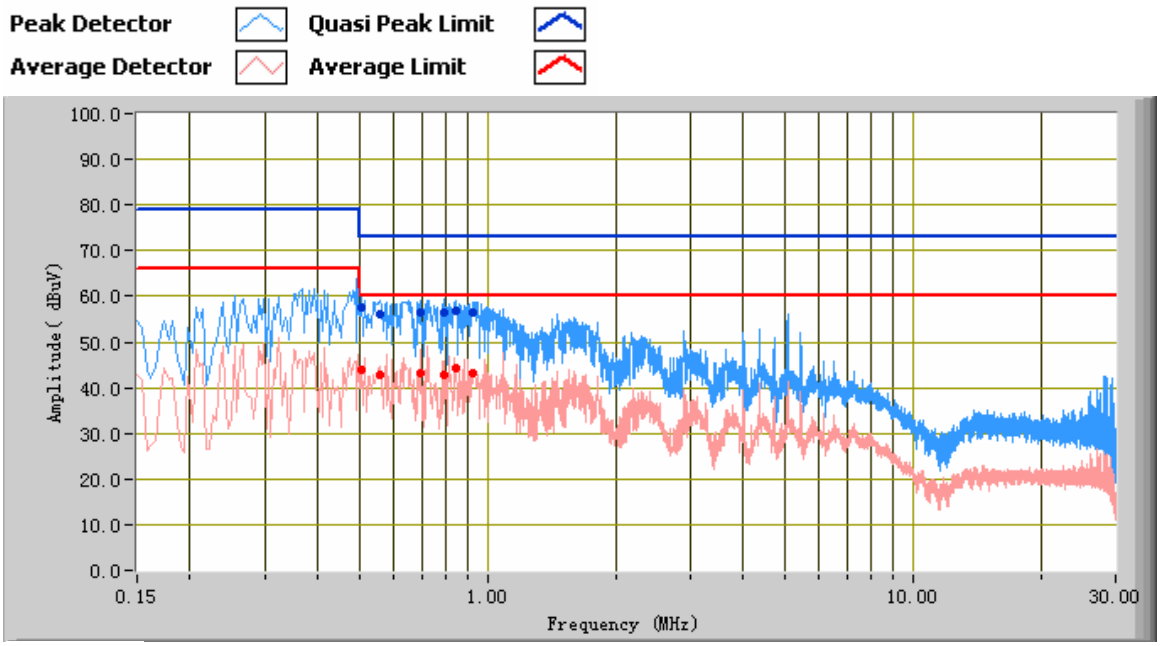
Procedures:

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.5dB.
4. Environmental Conditions

Temperature	22°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

5. Test date : March 14, 2013
   Tested By : Deon Dai

Test Mode:	Traffic Operating 802.11b Mode

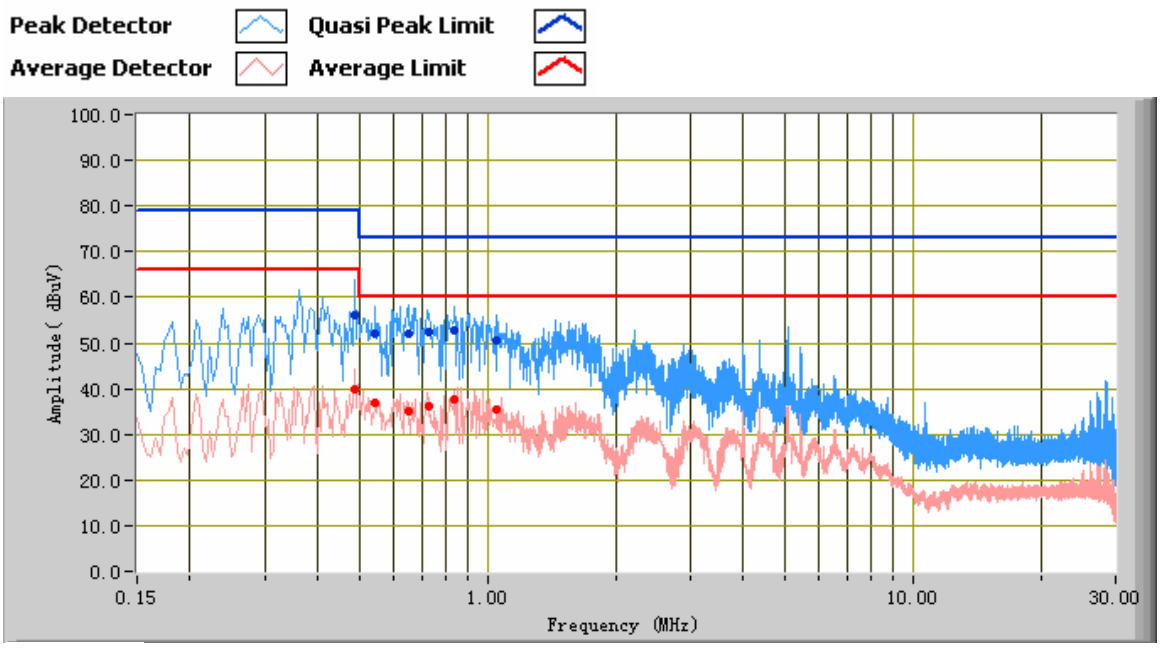


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.51	57.50	73.00	-15.50	43.96	60.00	-16.04	11.08
0.79	56.40	73.00	-16.60	42.82	60.00	-17.18	10.85
0.70	56.28	73.00	-16.72	43.00	60.00	-17.00	10.93
0.84	56.84	73.00	-16.16	44.25	60.00	-15.75	10.81
0.56	56.26	73.00	-16.74	42.79	60.00	-17.21	11.04
0.93	56.29	73.00	-16.71	43.29	60.00	-16.71	10.74

Test Mode:	Traffic Operating 802.11b Mode

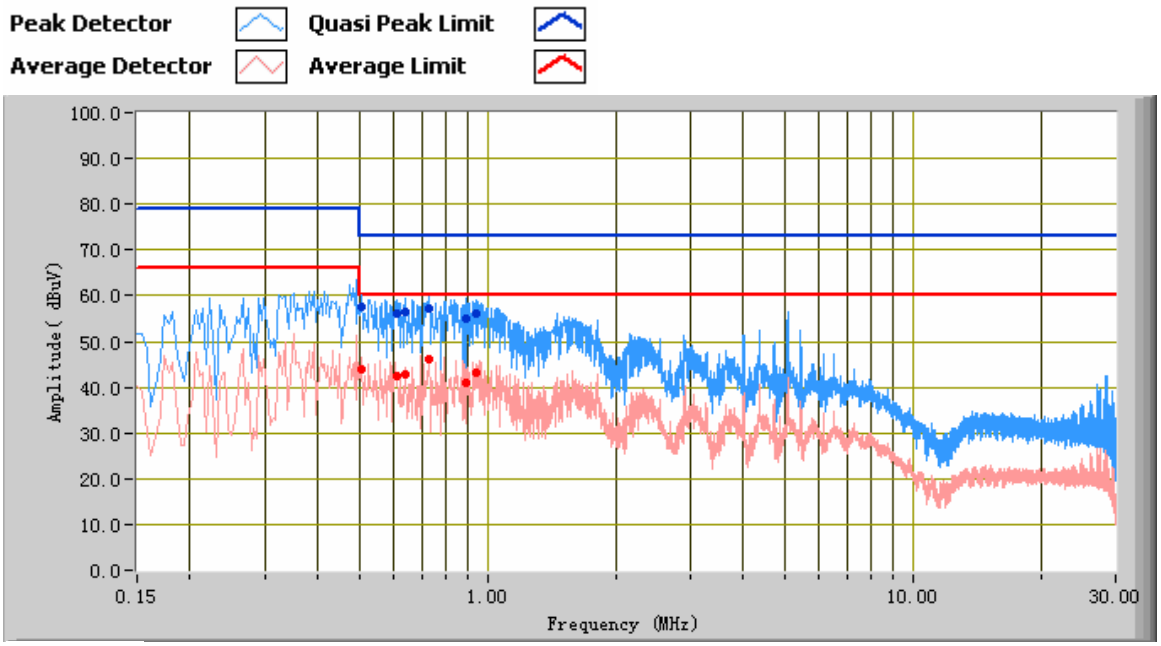


Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.65	51.86	73.00	-21.14	35.04	60.00	-24.96	10.95
0.84	52.94	73.00	-20.06	37.57	60.00	-22.43	10.82
0.55	51.97	73.00	-21.03	37.05	60.00	-22.95	11.03
0.49	56.12	79.00	-22.88	39.80	66.00	-26.20	11.08
0.73	52.36	73.00	-20.64	36.21	60.00	-23.79	10.89
1.05	50.58	73.00	-22.42	35.37	60.00	-24.63	10.71

Test Mode:	Traffic Operating 802.11g Mode

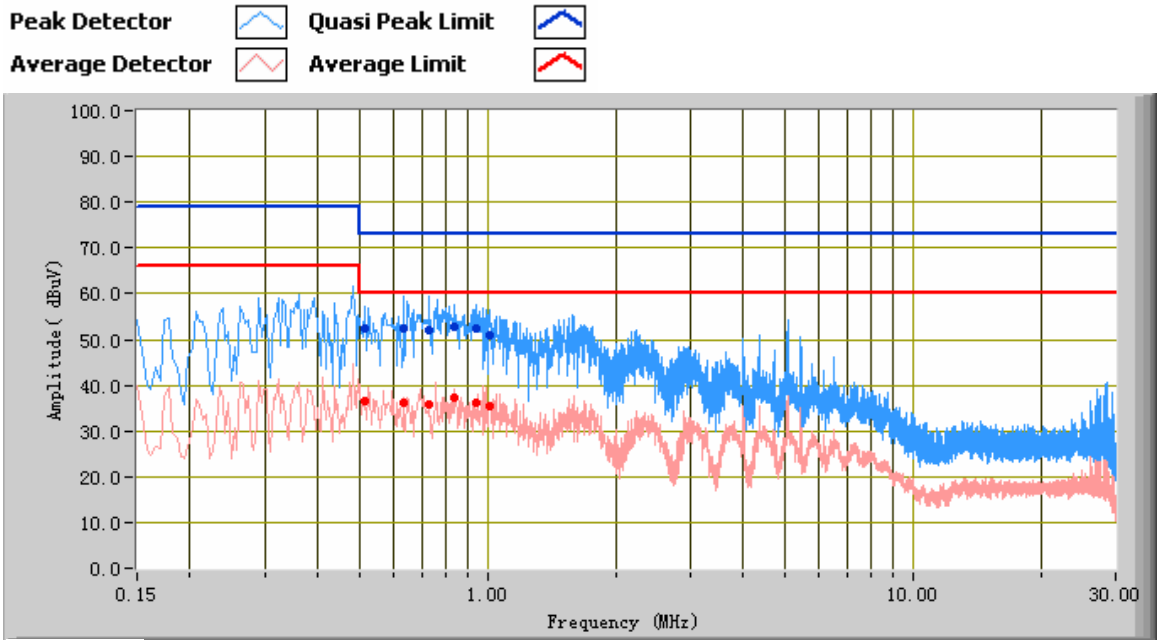


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.51	57.59	73.00	-15.41	43.91	60.00	-16.09	11.08
0.73	57.33	73.00	-15.67	46.31	60.00	-13.69	10.90
0.64	56.52	73.00	-16.48	42.77	60.00	-17.23	10.97
0.89	54.93	73.00	-18.07	40.81	60.00	-19.19	10.77
0.94	56.26	73.00	-16.74	43.35	60.00	-16.65	10.73
0.61	56.24	73.00	-16.76	42.27	60.00	-17.73	11.00

Test Mode:	Traffic Operating 802.11g Mode

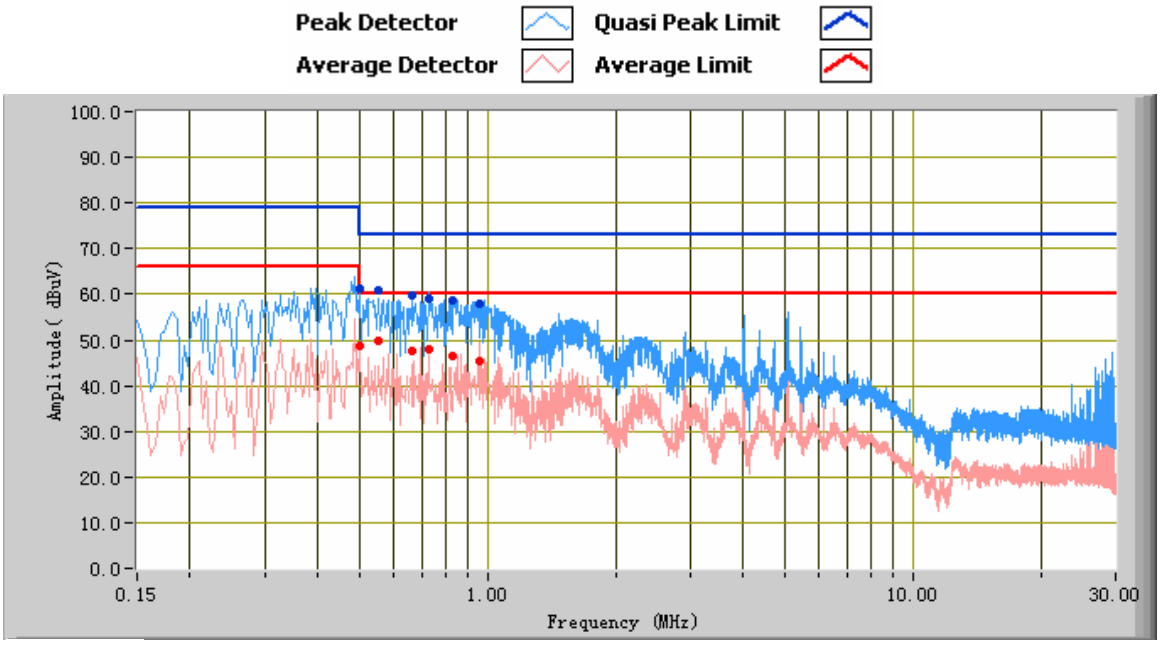


Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.64	52.32	73.00	-20.68	36.15	60.00	-23.85	10.96
0.73	51.97	73.00	-21.03	35.79	60.00	-24.21	10.89
0.84	52.93	73.00	-20.07	37.26	60.00	-22.74	10.82
0.94	52.51	73.00	-20.49	36.02	60.00	-23.98	10.74
0.51	52.40	73.00	-20.60	36.55	60.00	-23.45	11.05
1.01	50.91	73.00	-22.09	35.51	60.00	-24.49	10.70

Test Mode:	Traffic Operating 802.11n (20M) Mode

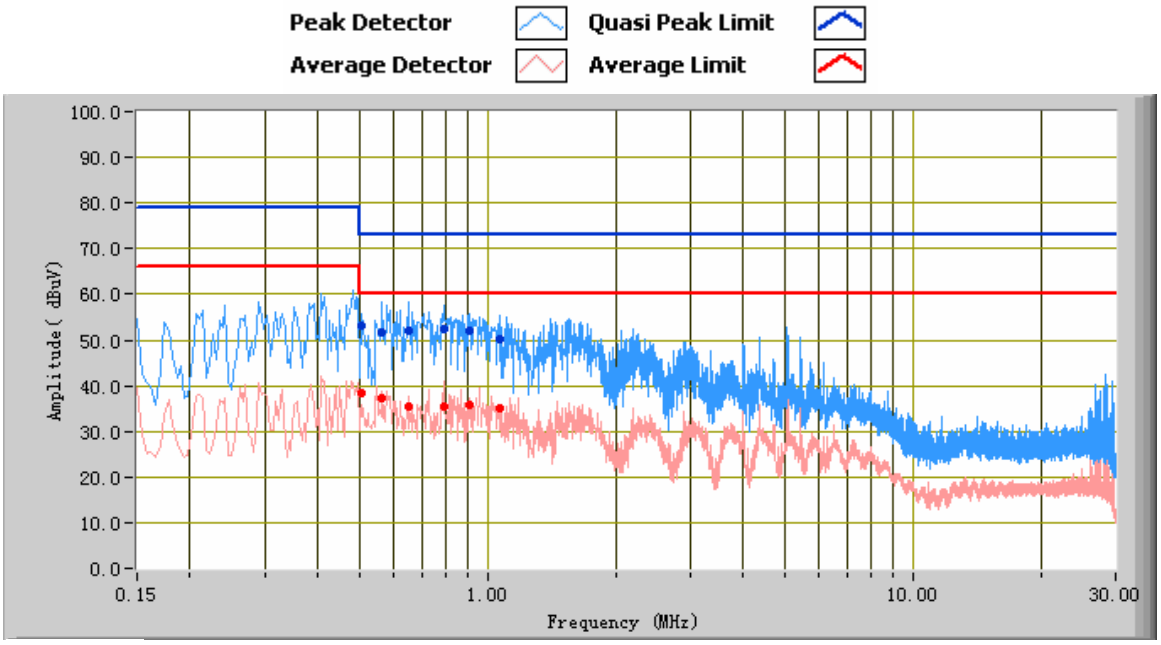


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.73	59.11	73.00	-13.89	47.88	60.00	-12.12	10.90
0.50	61.29	73.00	-11.71	48.54	60.00	-11.46	11.09
0.66	59.64	73.00	-13.36	47.70	60.00	-12.30	10.96
0.83	58.80	73.00	-14.20	46.35	60.00	-13.65	10.82
0.55	60.81	73.00	-12.19	49.85	60.00	-10.15	11.04
0.95	58.02	73.00	-14.98	45.36	60.00	-14.64	10.72

Test Mode:	Traffic Operating 802.11n (20M) Mode

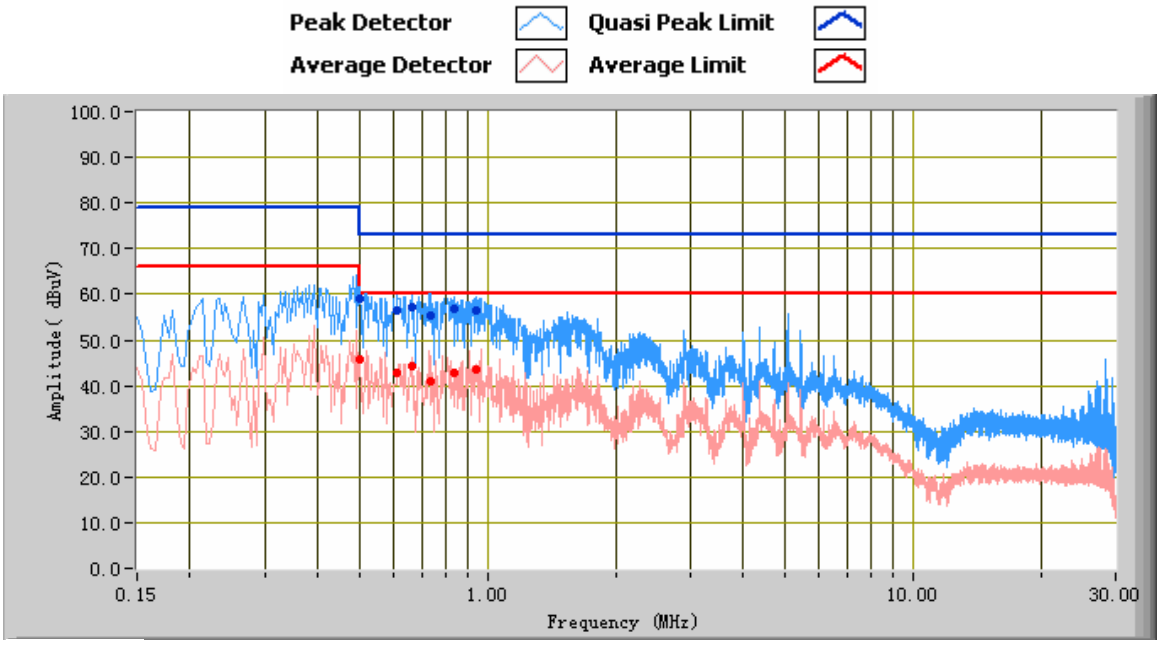


Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.57	51.76	73.00	-21.24	37.17	60.00	-22.83	11.01
0.65	52.15	73.00	-20.85	35.49	60.00	-24.51	10.95
0.79	52.29	73.00	-20.71	35.46	60.00	-24.54	10.85
0.91	52.13	73.00	-20.87	35.95	60.00	-24.05	10.77
0.51	53.17	73.00	-19.83	38.36	60.00	-21.64	11.05
1.07	50.07	73.00	-22.93	34.96	60.00	-25.04	10.71

Test Mode:	Traffic Operating 802.11n (40M) Mode

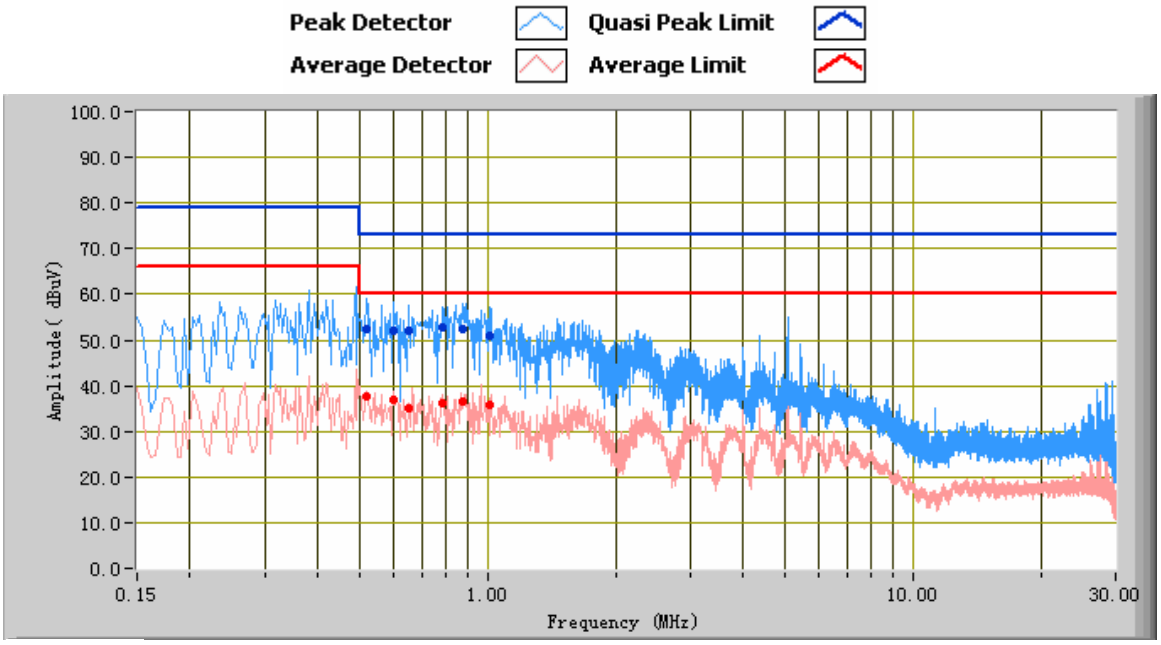


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.50	59.12	73.00	-13.88	45.62	60.00	-14.38	11.09
0.73	55.31	73.00	-17.69	40.95	60.00	-19.05	10.90
0.61	56.58	73.00	-16.42	42.72	60.00	-17.28	11.00
0.67	57.10	73.00	-15.90	44.31	60.00	-15.69	10.95
0.83	56.72	73.00	-16.28	42.95	60.00	-17.05	10.82
0.94	56.47	73.00	-16.53	43.45	60.00	-16.55	10.73

Test Mode:	Traffic Operating 802.11n (40M) Mode



Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.52	52.56	73.00	-20.44	37.57	60.00	-22.43	11.05
0.60	52.06	73.00	-20.94	36.98	60.00	-23.02	10.99
0.87	52.33	73.00	-20.67	36.56	60.00	-23.44	10.79
0.65	52.10	73.00	-20.90	34.94	60.00	-25.06	10.95
0.79	52.71	73.00	-20.29	36.21	60.00	-23.79	10.85
1.01	50.89	73.00	-22.11	35.73	60.00	-24.27	10.70

5.7 §15.209, §15.205 & §15.247(d) - Radiated Spurious Emissions & Restricted Bands

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz & 1GHz above (3m & 10m) is +/-6dB.
4. Environmental Conditions

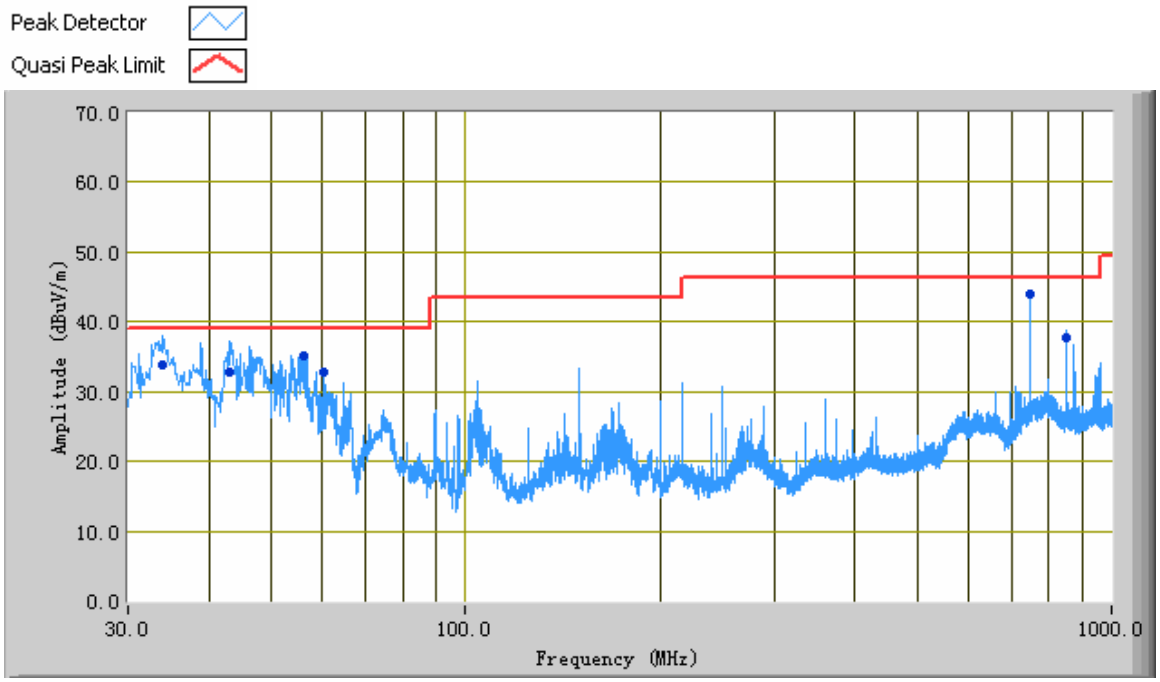
Temperature	22°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

5. Test date : March 14, 2013
   Tested By : Deon Dai

Standard Requirement: The emissions from the Low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges.

Test Result: Pass

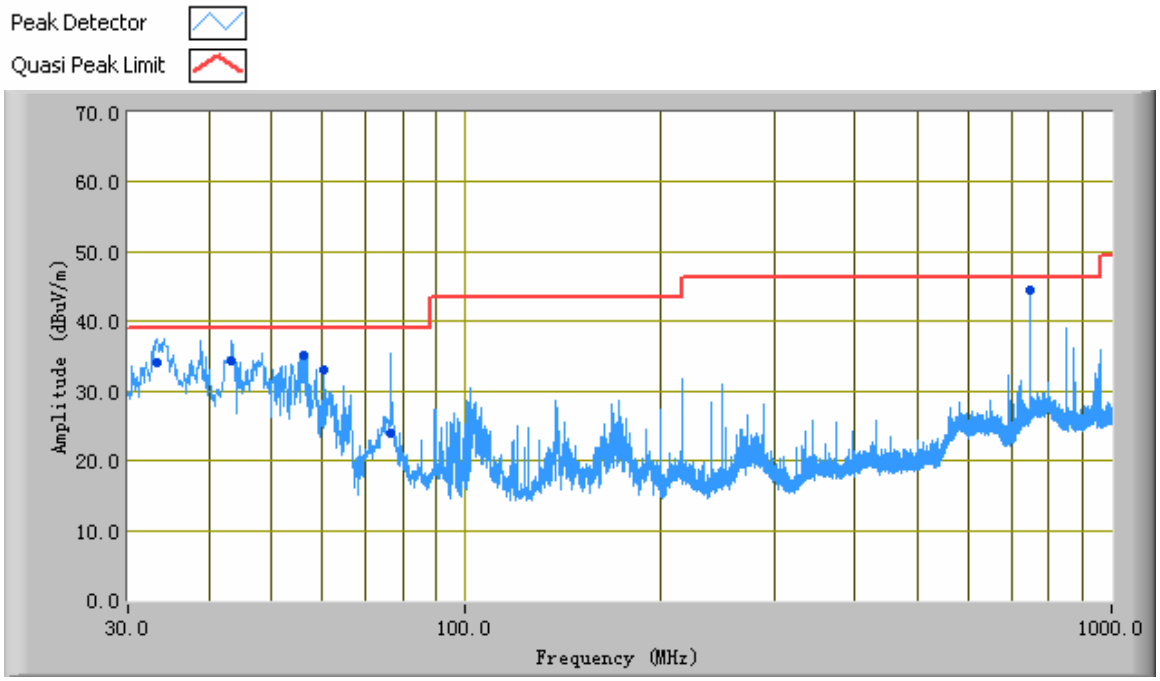
Test Mode:	Traffic Operating 802.11b Mode (Below 1GHz)



Test Data

Frequency (MHz)	Quasi Peak (dBµV /m)	Azimuth	Polarity(H /V)	Height (cm)	Factors (dB)	Limit (dBµV /m)	Margin (dB)
34.11	33.81	140.00	V	257.00	-22.75	39.00	-5.19
42.87	32.89	359.00	V	243.00	-29.30	39.00	-6.11
746.65	44.01	26.00	H	122.00	-19.22	46.44	-2.43
56.00	35.14	215.00	V	148.00	-36.43	39.00	-3.86
60.22	32.70	206.00	V	264.00	-38.82	39.00	-6.30
853.31	37.79	16.00	H	113.00	-19.55	46.44	-8.65

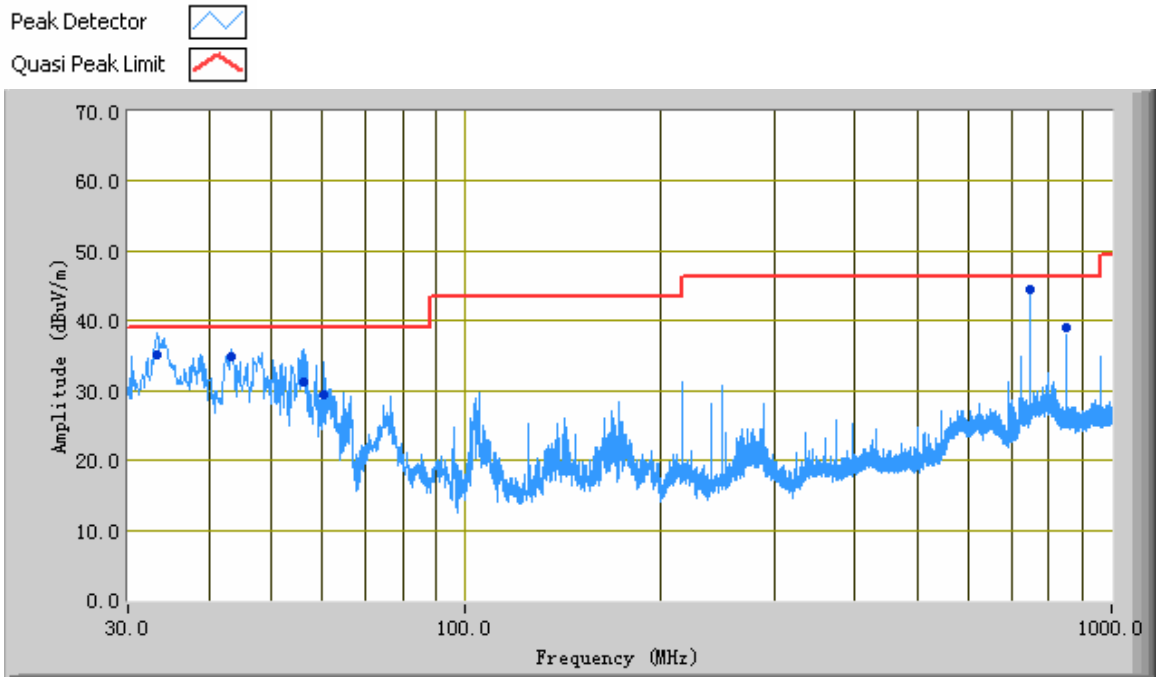
Test Mode:	Traffic Operating 802.11g Mode (Below 1GHz)



Test Data

Frequency (MHz)	Quasi Peak (dBµV /m)	Azimuth	Polarity(H /V)	Height (cm)	Factors (dB)	Limit (dBµV /m)	Margin (dB)
33.15	34.18	98.00	V	101.00	-22.14	39.00	-4.82
746.64	44.50	30.00	H	158.00	-19.22	46.44	-1.94
43.54	34.48	316.00	V	226.00	-29.54	39.00	-4.52
76.54	22.31	315.00	H	232.00	-37.86	39.00	-16.69
56.00	35.05	209.00	V	100.00	-36.43	39.00	-3.95
60.22	33.06	250.00	V	146.00	-38.82	39.00	-5.94

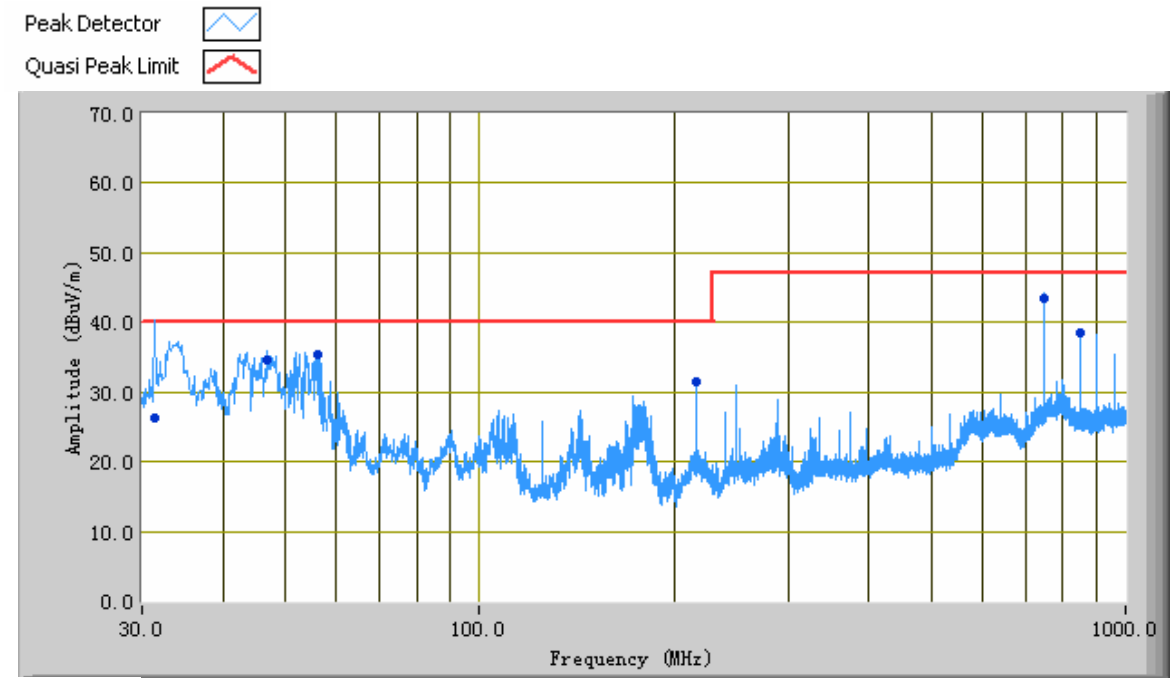
Test Mode:	Traffic Operating 802.11n (20M) Mode (Below 1GHz)



Test Data

Frequency (MHz)	Quasi Peak (dBµV /m)	Azimuth	Polarity(H /V)	Height (cm)	Factors (dB)	Limit (dBµV /m)	Margin (dB)
33.41	35.23	85.00	V	107.00	-22.14	39.00	-3.77
746.64	44.55	24.00	H	122.00	-19.22	46.44	-1.89
43.63	34.90	1.00	V	376.00	-29.54	39.00	-4.10
56.00	31.21	226.00	V	208.00	-36.43	39.00	-7.79
60.22	29.51	244.00	V	197.00	-38.82	39.00	-9.49
853.30	39.04	20.00	H	125.00	-19.55	46.44	-7.40

Test Mode:	Traffic Operating 802.11n(40M) Mode (Below 1GHz)



Test Data

Frequency (MHz)	Quasi Peak (dBµV /m)	Azimuth	Polarity(H /V)	Height (cm)	Factors (dB)	Limit (dBµV /m)	Margin (dB)
31.40	26.25	149.00	V	209.00	-20.52	40.00	-13.75
746.65	43.39	206.00	H	122.00	-19.22	47.00	-3.61
46.96	34.62	88.00	V	104.00	-31.35	40.00	-5.38
56.02	35.33	137.00	V	186.00	-36.43	40.00	-4.67
216.42	31.39	360.00	V	130.00	-33.35	40.00	-8.61
853.31	38.51	26.00	H	110.00	-19.55	47.00	-8.49

Above 1 GHz:

Test Mode: Transmitting

Note: Other modes were verified, only the result of worst case basic rate mode was presented.

Mode: 802.11b

Low Channel (2412 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4824	60.25	AV	133	102	V	32.7	4	55	41.95	54	-12.05
4824	75.32	PK	133	102	V	32.7	4	55	57.02	74	-16.98
4824	61.29	AV	233	200	H	32.7	4	55	42.99	54	-11.01
4824	73.56	PK	233	200	H	32.7	4	55	55.26	74	-18.74
2375.5	60.44	AV	360	100	V	30.2	2.5	55	38.14	54	-15.86
2375.5	72.64	PK	360	100	V	30.2	2.5	55	50.34	74	-23.66
2375.5	59.29	AV	280	198	H	30.4	2.5	55	37.19	54	-16.81
2375.5	75.63	PK	280	198	H	30.4	2.5	55	53.53	74	-20.47

Middle Channel (2437 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4874	61.32	AV	14	100	V	32.8	4.5	55	43.62	54	-10.38
4874	72.45	PK	14	100	V	32.8	4.5	55	54.75	74	-19.25
4874	59.65	AV	180	200	H	32.8	4.5	55	41.95	54	-12.05
4874	69.32	PK	180	200	H	32.8	4.5	55	51.62	74	-22.38
7311	51.35	AV	255	105	V	35.6	11.16	55	43.11	54	-10.89
7311	65.25	PK	255	105	V	35.6	11.16	55	57.01	74	-16.99
7311	47.38	AV	188	200	H	35.6	11.16	55	39.14	54	-14.86
7311	64.36	PK	188	200	H	35.6	11.16	55	56.12	74	-17.88

High Channel (2462 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4924	62.36	AV	260	101	V	32.9	4.16	55	44.42	54	-9.58
4924	72.33	PK	260	101	V	32.9	4.16	55	54.39	74	-19.61
4924	59.14	AV	199	199	H	32.9	4.16	55	41.2	54	-12.8
4924	71.32	PK	199	199	H	32.9	4.16	55	53.38	74	-20.62
2483	59.47	AV	120	110	V	30.5	2.3	55	37.27	54	-16.73
2483	72.32	PK	120	110	V	30.5	2.3	55	50.12	74	-23.88
2483	59.15	AV	355	198	H	30.6	2.3	55	37.05	54	-16.95
2483	73.22	AV	355	198	H	30.6	2.3	55	51.12	74	-22.88

Mode: 802.11g

Low Channel (2412 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4824	62.29	AV	98	100	V	32.7	4	55	43.99	54	-10.01
4824	76.18	PK	98	100	V	32.7	4	55	57.88	74	-16.12
4824	63.18	AV	255	200	H	32.7	4	55	44.88	54	-9.12
4824	74.82	PK	255	200	H	32.7	4	55	56.52	74	-17.48
2380	61.21	AV	199	101	V	30.2	2.5	55	38.91	54	-15.09
2380	72.15	PK	199	101	V	30.2	2.5	55	49.85	74	-24.15
2380	62.14	AV	23	199	H	30.4	2.5	55	40.04	54	-13.96
2380	74.35	PK	23	199	H	30.4	2.5	55	52.25	74	-21.75

Middle Channel (2437 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4874	63.33	AV	255	101	V	32.8	4.5	55	45.63	54	-8.37
4874	74.32	PK	255	101	V	32.8	4.5	55	56.62	74	-17.38
4874	61.21	AV	360	100	H	32.8	4.5	55	43.51	54	-10.49
4874	70.95	PK	360	100	H	32.8	4.5	55	53.25	74	-20.75
7310	51.36	AV	265	110	V	35.6	11.16	55	43.12	54	-10.88
7310	64.33	PK	265	110	V	35.6	11.16	55	56.09	74	-17.91
7310	49.69	AV	299	200	H	35.6	11.16	55	41.45	54	-12.55
7310	63.21	PK	299	200	H	35.6	11.16	55	54.97	74	-19.03

High Channel (2462 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4924	62.35	AV	187	100	V	32.9	4.16	55	44.41	54	-9.59
4924	71.26	PK	187	100	V	32.9	4.16	55	53.32	74	-20.68
4924	58.36	AV	244	200	H	32.9	4.16	55	40.42	54	-13.58
4924	72.31	PK	244	200	H	32.9	4.16	55	54.37	74	-19.63
2482.5	61.32	AV	198	100	V	30.5	2.3	55	39.12	54	-14.88
2482.5	69.69	PK	198	100	V	30.5	2.3	55	47.49	74	-26.51
2482.5	60.95	AV	320	201	H	30.6	2.3	55	38.85	54	-15.15
2482.5	71.02	AV	320	201	H	30.6	2.3	55	48.92	74	-25.08

Mode: 802.11n (20M)

Low Channel (2412 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4824	59.32	AV	322	110	V	32.7	4	55	41.02	54	-12.98
4824	73.25	PK	322	110	V	32.7	4	55	54.95	74	-19.05
4824	61.25	AV	254	200	H	32.7	4	55	42.95	54	-11.05
4824	71.35	PK	254	200	H	32.7	4	55	53.05	74	-20.95
2376	58.32	AV	149	101	V	30.2	2.5	55	36.02	54	-17.98
2376	69.14	PK	149	101	V	30.2	2.5	55	46.84	74	-27.16
2376	59.32	AV	98	180	H	30.4	2.5	55	37.22	54	-16.78
2376	71.32	PK	98	180	H	30.4	2.5	55	49.22	74	-24.78

Middle Channel (2437 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4874	61.25	AV	241	100	V	32.8	4.5	55	43.55	54	-10.45
4874	72.75	PK	241	100	V	32.8	4.5	55	55.05	74	-18.95
4874	59.65	AV	320	200	H	32.8	4.5	55	41.95	54	-12.05
4874	68.66	PK	320	200	H	32.8	4.5	55	50.96	74	-23.04
7311	49.32	AV	146	120	V	35.6	11.16	55	41.08	54	-12.92
7311	62.14	PK	146	120	V	35.6	11.16	55	53.9	74	-20.1
7311	47.32	AV	211	210	H	35.6	11.16	55	39.08	54	-14.92
7311	61.95	PK	211	210	H	35.6	11.16	55	53.71	74	-20.29

High Channel (2462 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4924	61.25	AV	144	100	V	32.9	4.16	55	43.31	54	-10.69
4924	70.95	PK	144	100	V	32.9	4.16	55	53.01	74	-20.99
4924	55.35	AV	249	200	H	32.9	4.16	55	37.41	54	-16.59
4924	69.63	PK	249	200	H	32.9	4.16	55	51.69	74	-22.31
2485	59.21	AV	359	120	V	30.5	2.3	55	37.01	54	-16.99
2485	67.21	PK	359	120	V	30.5	2.3	55	45.01	74	-28.99
2485	58.21	AV	322	200	H	30.6	2.3	55	36.11	54	-17.89
2485	70.88	AV	322	200	H	30.6	2.3	55	48.78	74	-25.22

Mode: 802.11n (40M)

Low Channel (2422 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4844	58.32	AV	201	110	V	32.7	4	55	40.02	54	-13.98
4844	72.14	PK	201	110	V	32.7	4	55	53.84	74	-20.16
4844	60.21	AV	198	200	H	32.7	4	55	41.91	54	-12.09
4844	69.14	PK	198	200	H	32.7	4	55	50.84	74	-23.16
7264	42.56	AV	144	120	V	35.6	11.16	55	34.32	54	-19.68
7264	54.55	PK	144	120	V	35.6	11.16	55	46.31	74	-27.69
7264	38.35	AV	322	201	H	35.6	11.16	55	30.11	54	-23.89
7264	51.25	PK	322	201	H	35.6	11.16	55	43.01	74	-30.99

Middle Channel (2437 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4874	59.52	AV	100	110	V	32.8	4.5	55	41.82	54	-12.18
4874	70.14	PK	100	110	V	32.8	4.5	55	52.44	74	-21.56
4874	55.58	AV	321	200	H	32.8	4.5	55	37.88	54	-16.12
4874	66.34	PK	321	200	H	32.8	4.5	55	48.64	74	-25.36
7310	46.38	AV	41	105	V	35.6	11.16	55	38.14	54	-15.86
7310	61.25	PK	41	105	V	35.6	11.16	55	53.01	74	-20.99
7310	41.25	AV	219	210	H	35.6	11.16	55	33.01	54	-20.99
7310	54.25	PK	219	210	H	35.6	11.16	55	46.01	74	-27.99

High Channel (2452 MHz)

Frequency (MHz)	Substituted level (dBm)	Detector (PK/AV)	Direction (degree)	Height (cm)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBm)	Margin (dB)
4904	56.36	AV	98	120	V	32.9	4.16	55	38.42	54	-15.58
4904	67.41	PK	98	120	V	32.9	4.16	55	49.47	74	-24.53
4904	52.34	AV	166	210	H	32.9	4.16	55	34.4	54	-19.6
4904	68.35	PK	166	210	H	32.9	4.16	55	50.41	74	-23.59
7355	44.25	AV	355	108	V	35.6	11.16	55	36.01	54	-17.99
7355	60.58	PK	355	108	V	35.6	11.16	55	52.34	74	-21.66
7355	41.67	AV	148	200	H	35.6	11.16	55	33.43	54	-20.57
7355	54.21	AV	148	200	H	35.6	11.16	55	45.97	74	-28.03

Annex A. TEST INSTRUMENT & METHOD

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Model	Serial Model	Calibration Date	Calibration Due Date
AC Conducted Emissions				
R&S EMI Test Receiver	ESPI3	101216	10/26/2012	10/25/2013
R&S LISN	LI-115	241091	05/26/2012	05/25/2013
Radiated Emissions				
Spectrum Analyzer	8563E	3821A09023	01/10/2013	01/09/2014
EMI Receiver	ESPI3	101216	10/26/2012	10/25/2013
Antenna(1 ~18GHz)	3115	N/A	10/29/2012	10/28/2013
Antenna (30MHz~2GHz)	JB1	A112107	10/04/2012	10/03/2013
Chamber	3m		4/13/2012	4/13/2013
Pre-Amplifier(1 ~ 18GHz)	AMF-7D-00101800-30-10P	1451709	11/03/2012	11/02/2013
Horn Antenna (18~40GHz)	AH-840	101013	04/22/2012	04/22/2013
Microwave Pre-Amp (18~40GHz)	PA-840	181250	05/30/2012	05/29/2013
Universal Radio Communication Tester	CMU200	104031	10/27/2012	10/26/2013
Signal Analyzer	8665B	3744A01862	10/27/2012	10/26/2013
Temperature/Humidity Chamber	1007H		06/08/2011	06/08/2012

Annex A.ii. CONDUCTED EMISSIONS TEST DESCRIPTION

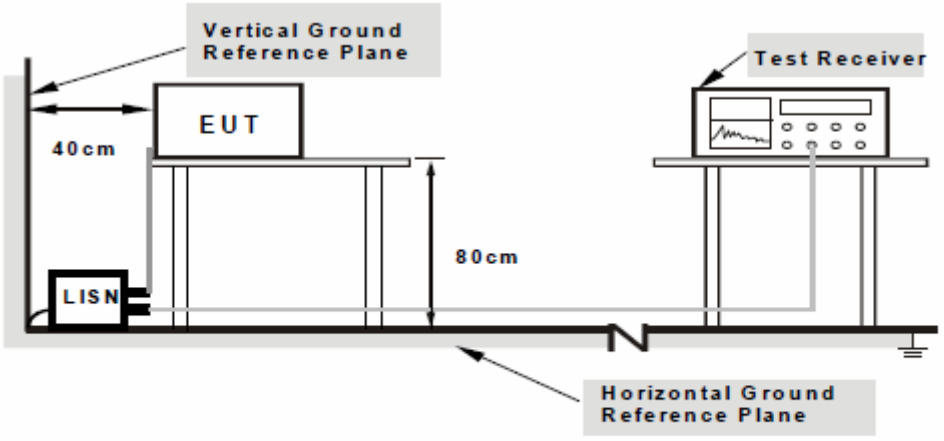
Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.

2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

4. All other supporting equipments were powered separately from another main supply.



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration1.

Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.

3. High peaks, relative to the limit line, were then selected.

4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 KHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made.

5. Steps 2 to 4 were then repeated for the LIVE line (for AC mains) or DC line (for DC power).

Description of Conducted Emission Program

This EMC Measurement software run LabView automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the common scan range from 150 kHz to 30 MHz; the program will first start a peak and average scan on selectable measurement time and step size. After the program complete the pre-scan, this program will perform the Quasi Peak and Average measurement, based on the pre-scan peak data reduction result.

Sample Calculation Example

At 20 MHz limit = 250 μV = 47.96 dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.20 dB

Q-P reading obtained directly from EMI Receiver = 40.00 dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 47.96 – 40.00 = 7.96 i.e. **7.96 dB below limit**

Annex A. iii RADIATED EMISSIONS TEST DESCRIPTION

EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 10th Harmonic , was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

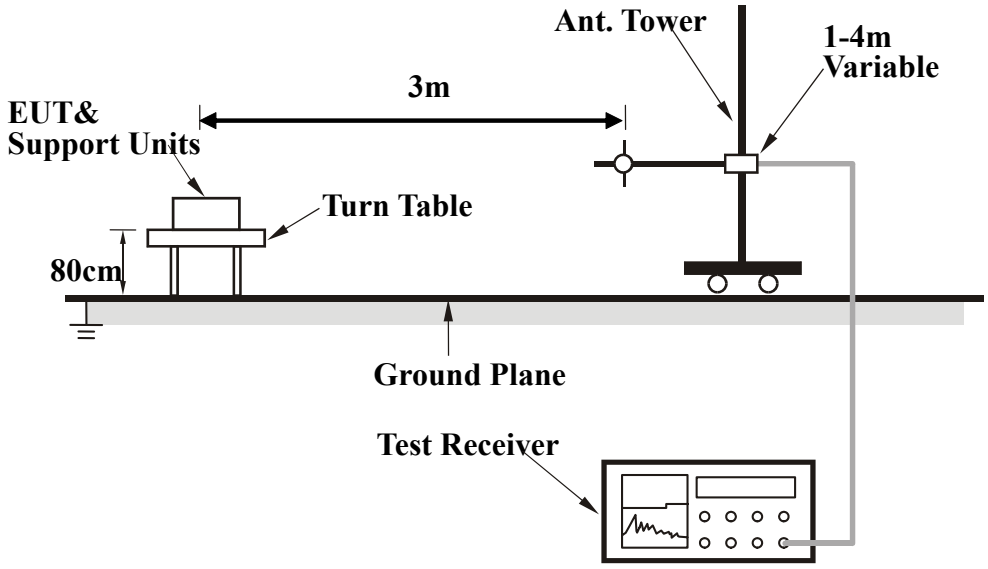
The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS).

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.

2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



Test Method

The following procedure was performed to determine the maximum emission axis of EUT:
1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

Final Radiated Emission Measurement
1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.

2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ◦ to 360 ◦ with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.

5. Repeat step 4 until all frequencies need to be measured were complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100 kHz	100 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Sample Calculation Example

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

where
Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)
And the average value is

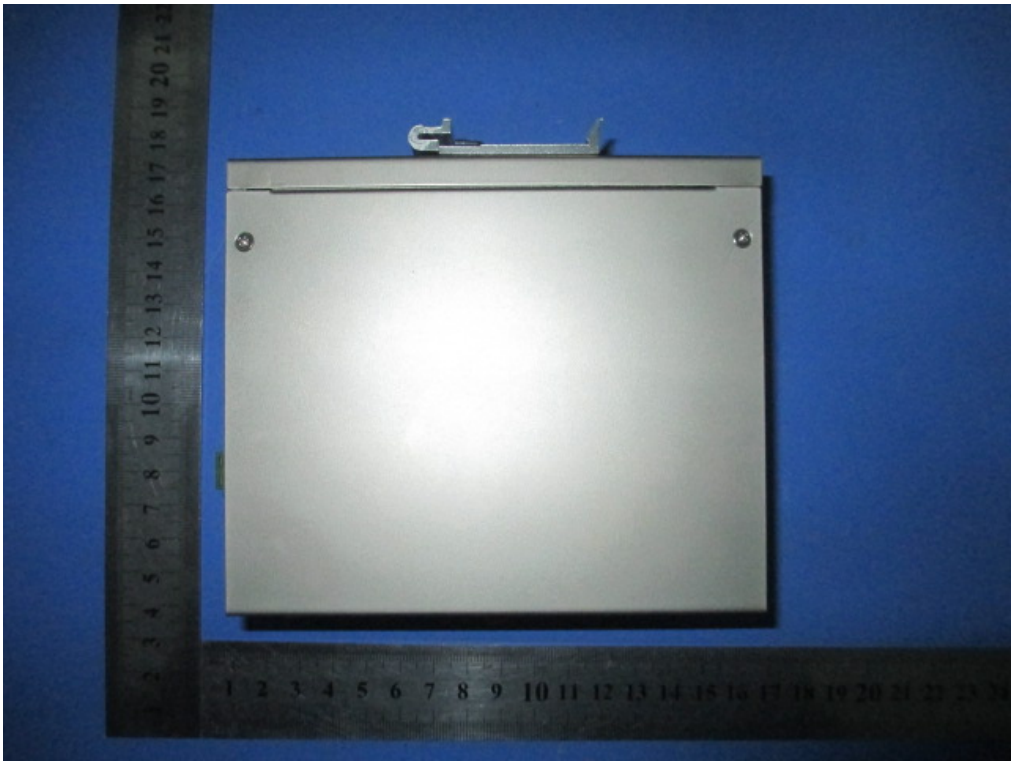
Average = Peak Value + Duty Factor or
Set RBW = 1MHz, VBW = 10Hz.

Note :
If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.

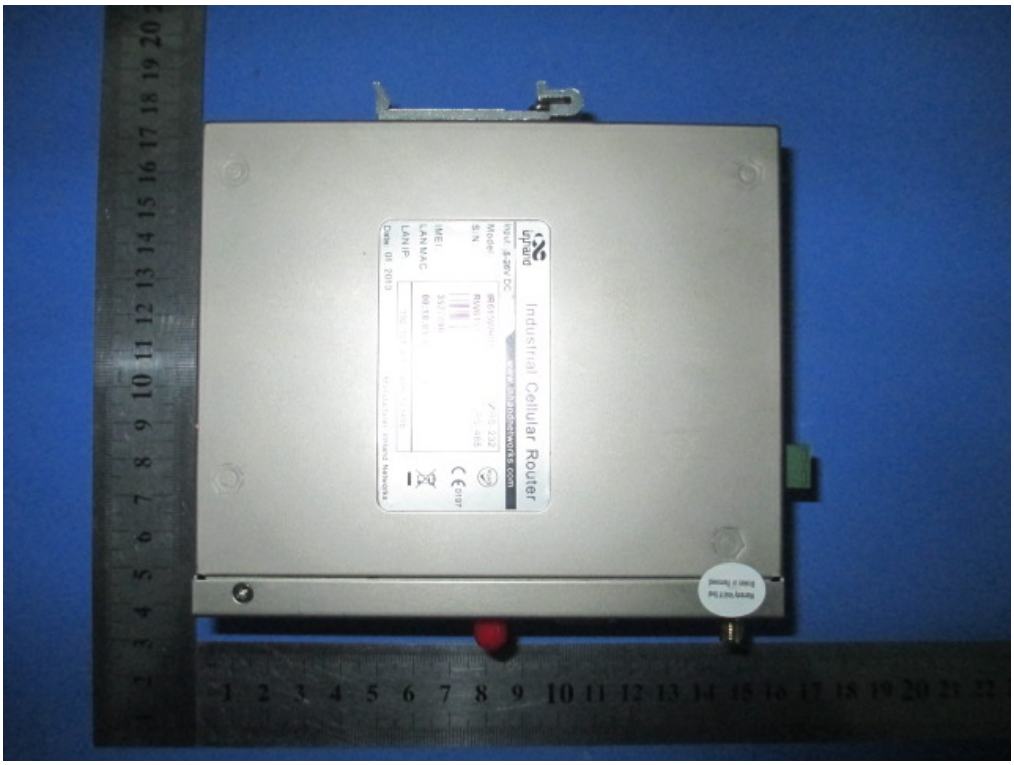
Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Annex B.i. Photograph 1: EUT External Photo

Whole Package View



Top View of EUT



Bottom View of EUT

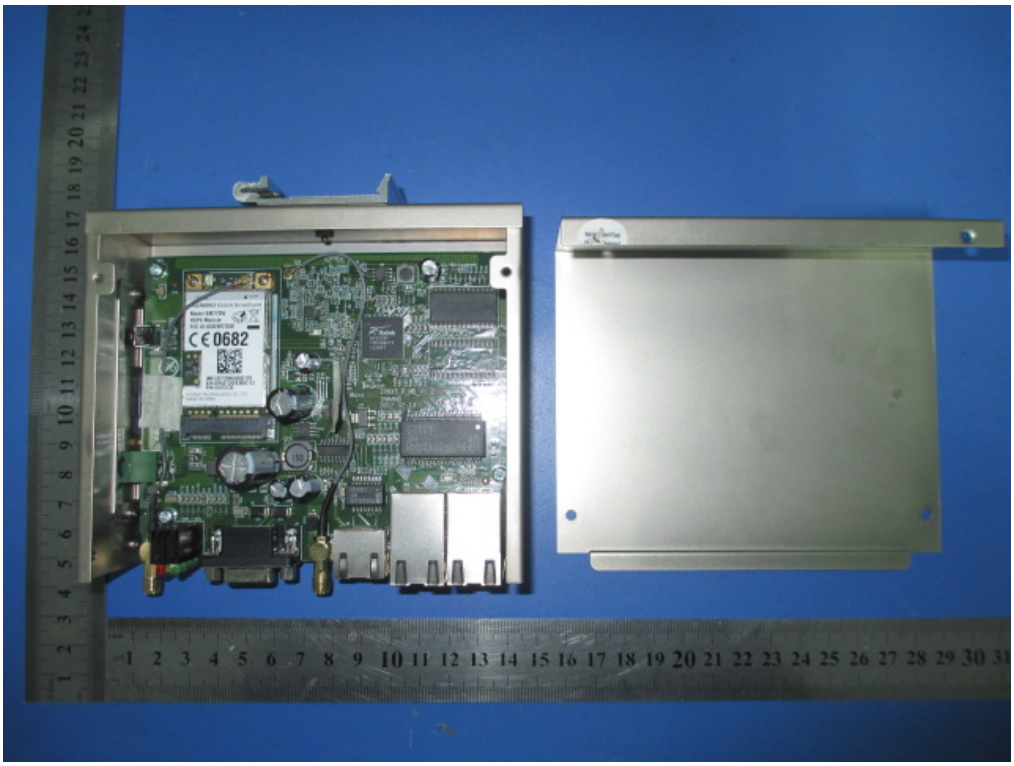
Front View of EUT

Rear View of EUT

Left View of EUT

Right View of EUT

Annex B.ii. Photograph 2: EUT Internal Photo

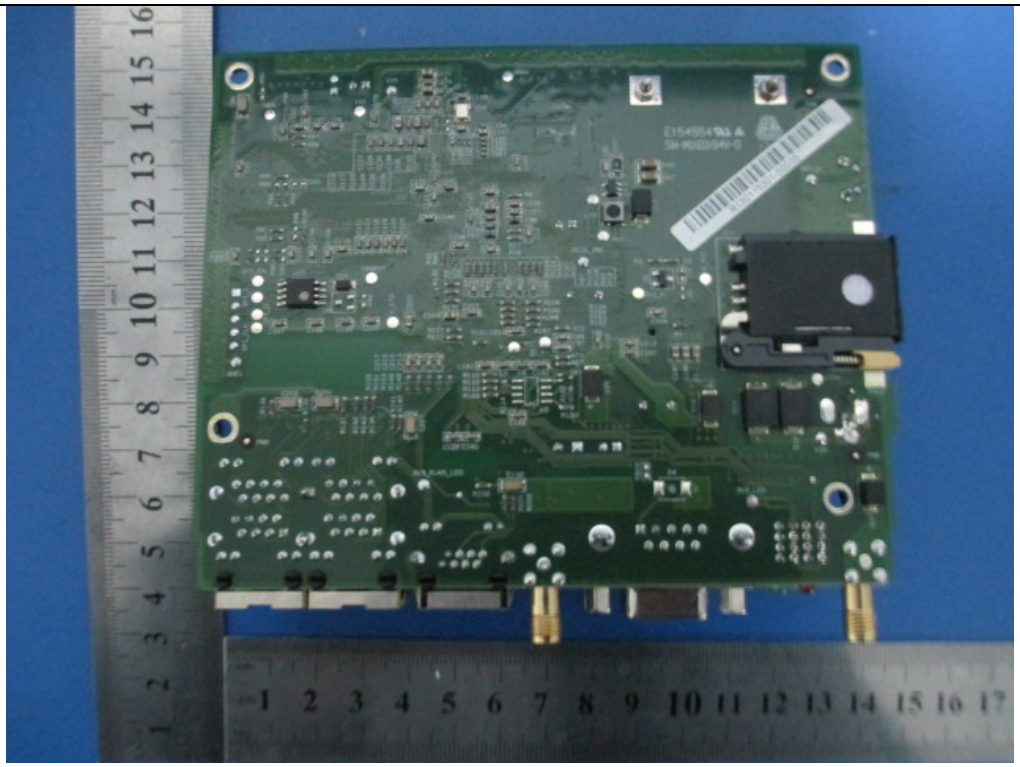


Cover Off - Front View

Antenna View

3GModule View for IR615WH01-AP

Main Board Front View

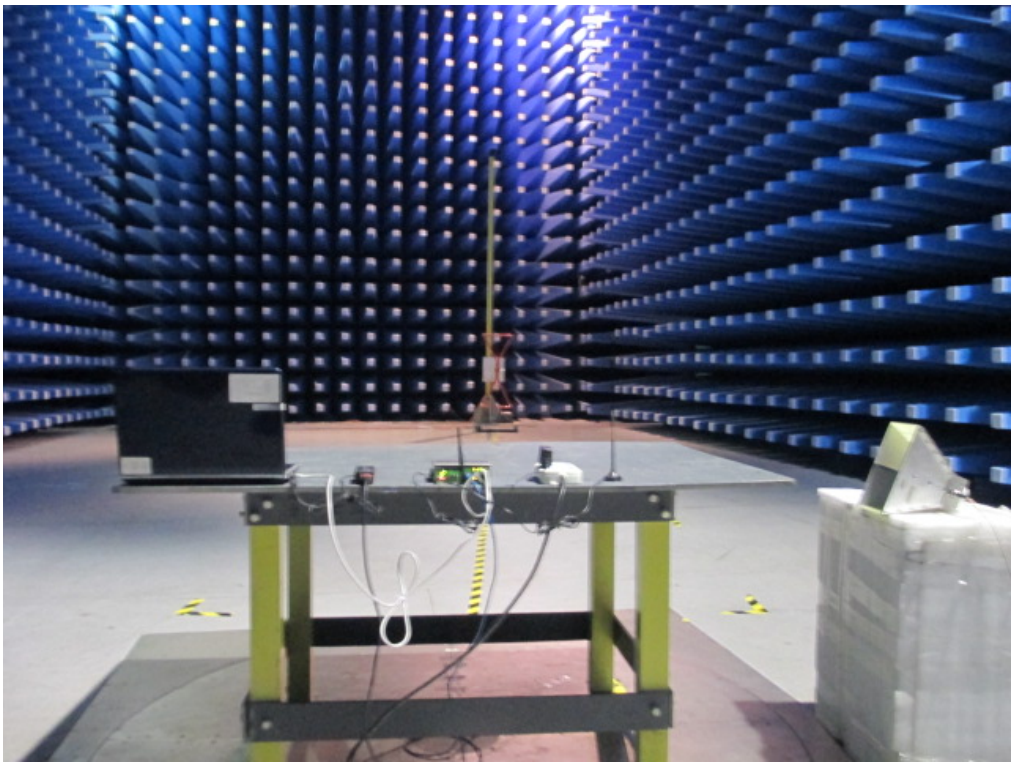


Main Board Rear View

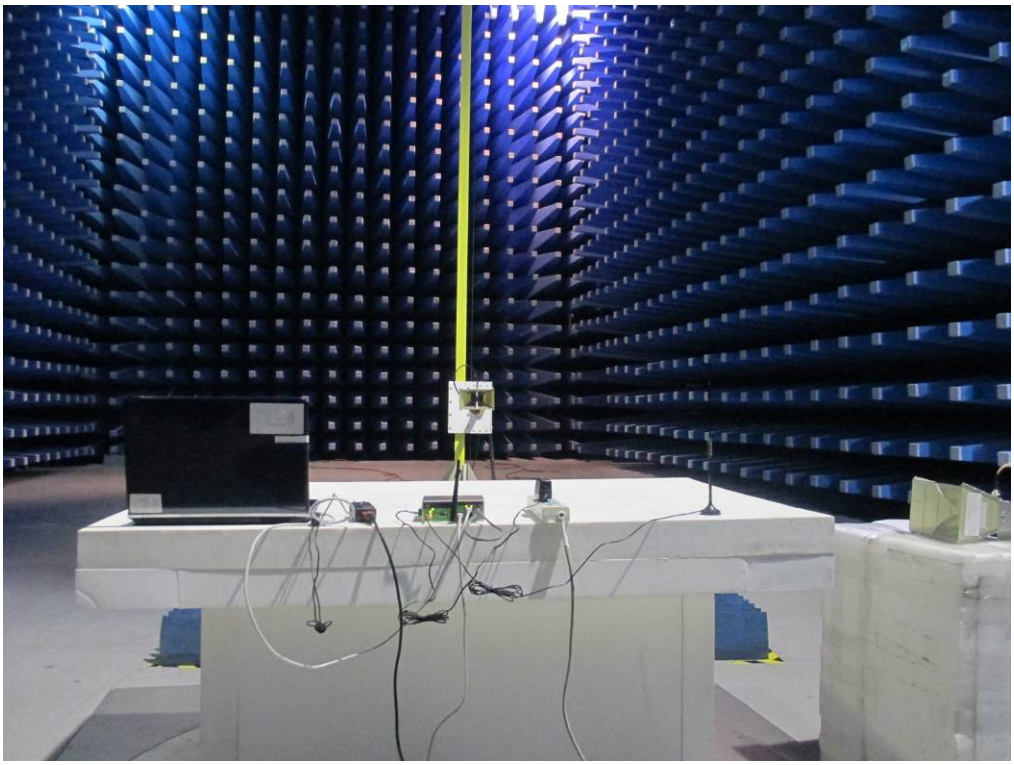
Annex B.iii. Photograph 3: Test Setup Photo

Conducted Emissions Test Setup - Front View

Conducted Emissions Test Setup - Side View



Radiated Emissions Test Setup Below 1GHz - Front View



Radiated Emissions Test Setup Above 1GHz - Front View

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

EUT TEST CONDITIONS

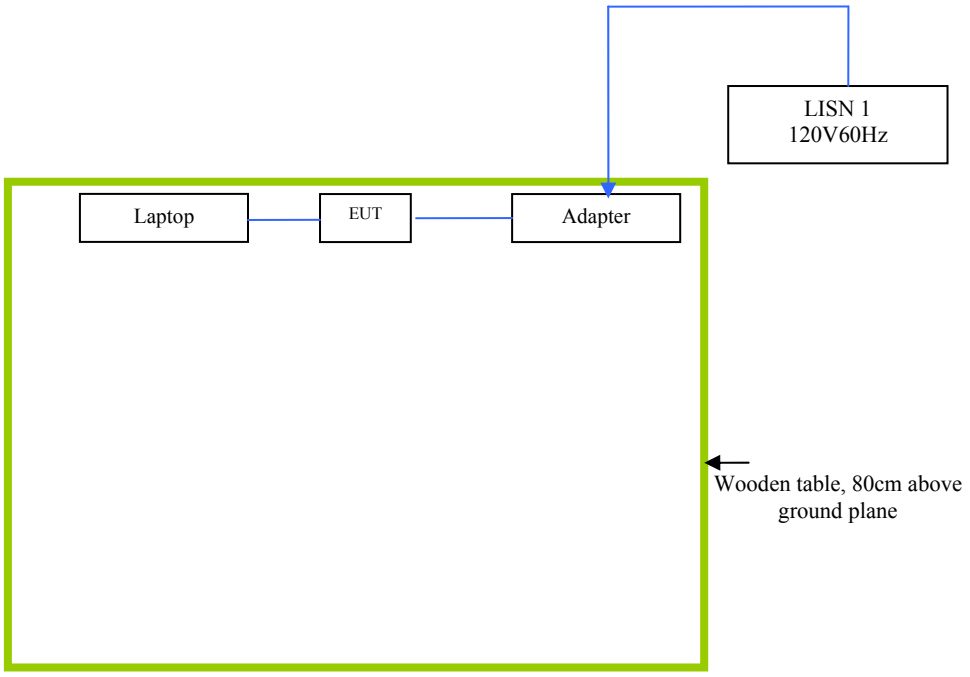
Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Equipment Description (Including Brand Name)	Model & Serial Number	Cable Description (List Length, Type & Purpose)
Gateway Laptop	MS2288 & LXWHF02013951C3CA92200	N/A

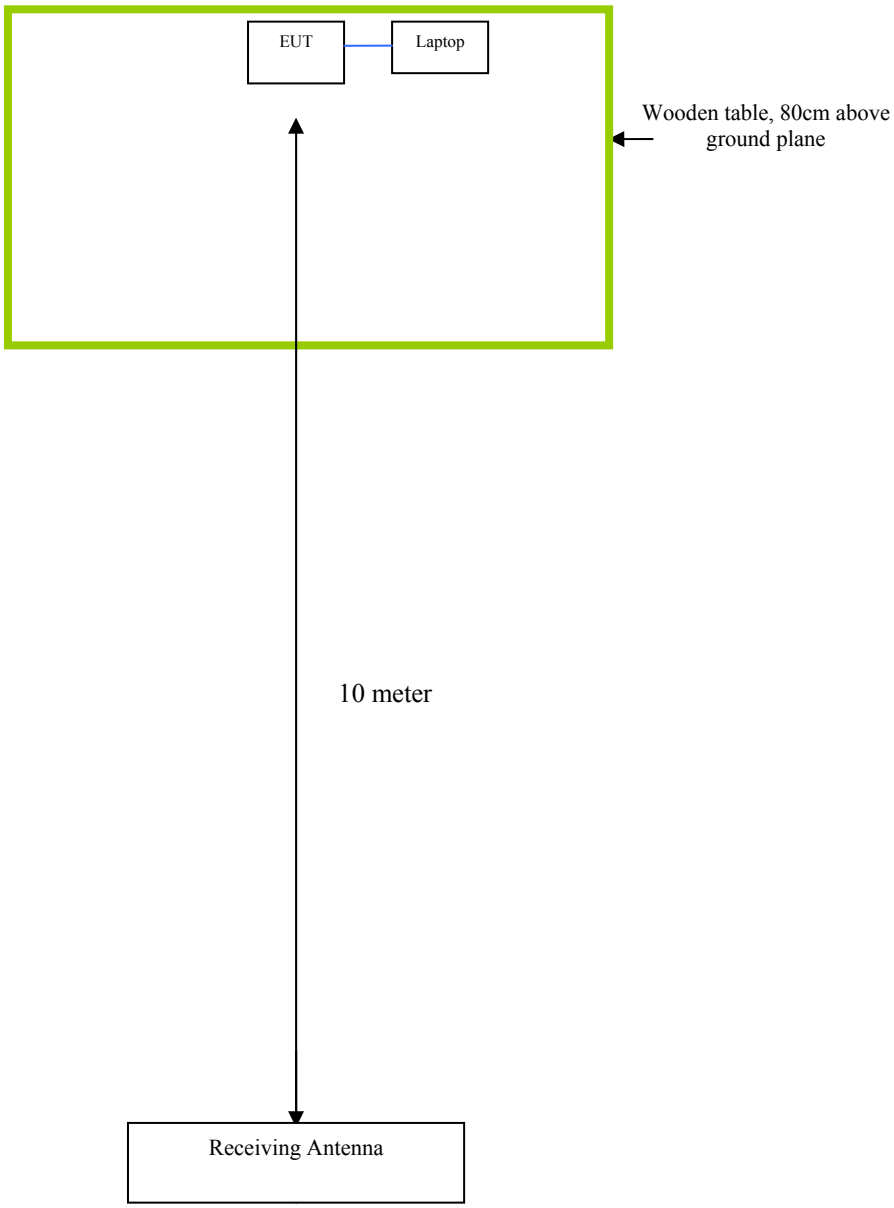
Block Configuration Diagram for Conducted Emissions

Note: Before Testing, the EUT must be set up for transmitting by laptop.



Block Configuration Diagram for Radiated Emissions

Note: Before Testing, the EUT must be set up for transmitting by laptop.



Annex C.ii. EUT OPERATING CONDITIONS

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
Emissions Testing	The EUT was continuously transmitting to stimulate the worst case.

Annex D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PART LIST

Please see attachment

Annex E. DECLARATION OF SIMILARITY

Declaration letter

Beijing InHand Networks Technology Co., Ltd

To: SIEMIC Nanjing (China) Laboratories
No.2-1 Longcang Dadao
Yuhua Economic Development Zone
Nanjing,P.R.China

Dear Sir,

For our business issue and marketing requirement, we would like to list different models numbers on the CE/FCC certificates and reports, as following:

Model No.: IR615WH01-AP

IR605WH01-AP	IR605WH01-STA
IR695WH01-AP	IR615WH01-STA
IG605WH01-AP	IR695WH01-STA
IG615WH01-AP	IG605WH01-STA
IG695WH01-AP	IG615WH01-STA
	IG695WH01-STA

The twelve models are the same in these: appearance,PCB layout,and basic software function;The differences are as follows:

Ia6b5WH01-c		
【a】	【b】	【c】
R:router G:gateway	0: basic SW function 1: support VPN (IPsec/PPTP/L2TP) 9: support VPN\CA certificate\SSL	AP: Wi-Fi AP STA: Wi-Fi client

【a】, 【b】, 【c】 is software different only;

Thank you!

Signature: 王标

Printed name/title:Wangbiao/ EMC engineer

Address: WestWing 11th Floor, Buiding G, Wangjing Science Park, Chaoyang District, Beijing