

Prüfbericht-Nr.: <i>Test Report No.:</i>	15069614 001	Auftrags-Nr.: <i>Order No.:</i>	154031076	Seite 1 von 54 Page 1 of 54
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	405064	Auftragsdatum: <i>Order date:</i>	15.07.2013	
Auftraggeber: <i>Client:</i>	Shanghai Huace Navigation Technology Ltd. Floor 5, Building 35 No. 680 Guiping Road Shanghai 200223 P.R. China			
Prüfgegenstand: <i>Test item:</i>	Handheld GPS receiver			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	LT400XY FCC ID :SY4-B01003			
Auftrags-Inhalt: <i>Order content:</i>	Complete test			
Prüfgrundlage: <i>Test specification:</i>	FCC CFR47 Part 15, Subpart C ANSI C63.10-2009 KDB 558074 D01 DTS Meas Guidance v03			
Wareneingangsdatum: <i>Date of receipt:</i>	19.07.2013			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A02 and B02			
Prüfzeitraum: <i>Testing period:</i>	09.08.2013 – 01.03.2014			
Ort der Prüfung: <i>Place of testing:</i>	QuieTek Technology(Suzhou)Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
31.03.2014 Adrian Shi / Project Engineer		31.03.2014 Sam Lin / Technical Certifier		
Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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TEST SUMMARY

3.2.1 VOLTAGE REQUIREMENTS, FCC 15.31(E)

RESULT: PASS

3.2.2 ANTENNA REQUIREMENTS, FCC 15.203, FCC 15.204

RESULT: PASS

5.1.1 CONDUCTED OUTPUT POWER, FCC 15.247(B)(3)

RESULT: PASS

5.1.2 6dB BANDWIDTH, FCC 15.247(A)(2)

5.1.3 CONDUCTED SPURIOUS EMISSION, FCC 15.247(c)

RESULT: PASS

5.1.4 POWER SPECTRAL DENSITY (PSD), FCC 15.247(E)

RESULT: PASS

5.1.5 BAND EDGE COMPLIANCE OF RF CONDUCTED EMISSION, FCC 15.247(c)

RESULT: PASS

5.1.6 CONDUCTED EMISSIONS, FCC 15.207

RESULT: PASS

6.1.1 BAND EDGE RADIATED EMISSION, FCC 15.205, FCC 15.209, FCC 15.247(c)

RESULT: PASS

6.1.2 RADIATED SPURIOUS EMISSION OF TRANSMITTER, FCC 15.205, FCC 15.209, FCC 15.247(c)

RESULT: PASS

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report.

2. Test Sites

2.1 Test Facilities

QuieTek Technology(Suzhou)Co.,Ltd.
No.99 Hongye RD.Suzhou Industnal Park Loufeng Hi-Tech Development
Zone.,Suzhou,China

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 800392.

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2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equipment	Model	Serial no.	Cal. due date
EMI Test Receiver	ESCI	100573	2014.04.18
Spectrum Analyzer	N9010A	MY48030494	2014.04.18
Spectrum Analyzer	E7405A	US44210477	2014.05.04
Bilog Antenna	CBL6112D	27611	2014.10.15
DRG Horn	ETS-Lindgren	3117	2015.01.21
Preamplifier	NSP1800-25	1364185	2014.05.04
Coaxial Cable	SUCOFLEX 106	AC2-C	2015.03.02
Temperature/Humidity Meter	ZC1-2	AC2-TH	2015.01.10
Spectrum Analyzer	FSP30	100192	2014.07.21
WIFI tester	MT8860C	1146004	2014.05.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	2015.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	2015.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	2015.03.01

2.3 Measurement Uncertainty

Table 2: Emission Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Radiated Emission	30MHz - 1GHz	±5.34dB
	> 1GHz	±5.40dB

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3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is Handheld GPS receiver.
The Applicant declares that the model LT400XY, Model LT400XY, X is variable, it indicated A-Z or 0-9, Y is variable, it indicated A-Z, 0-9 or blank.due to sales purpose in different countries or regions. The internal PCB design are no difference, but only distinct in colours and model names.The test model name is LT400H.

3.2 System Details

Radio standard:	802.11bg
Max output power:	12.25dBm
Antenna gain:	-0.24dBi
Antenna type:	PCB antenna
Antenna mounting type:	Printed
Antenna cable length:	N/A
Frequency range:	2412 – 2462MHz
Number of channels:	11
Channel spacing:	5MHz
Modulation type:	OFDM / DSSS
Low test temperature:	-20°C
Normal test temperature:	24°C
High test temperature:	55°C
Low test voltage:	DC 3.6V
Normal test voltage:	DC 3.7V
High test voltage:	DC 4.2V

3.2.1 Voltage Requirements, FCC 15.31(e)

RESULT:

PASS

All the tests were performed using steady DC 3.7 V. Hence it complies with the power supply requirements.

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3.2.2 Antenna Requirements, FCC 15.203, FCC 15.204

RESULT:

PASS

The EUT has an PCB Antenna which is not user accessible. Hence it complies with the requirements.

3.3 Independent Operation Modes

The EUT was tested on a stand-alone basis (only attached to the test jig) and the test system was configured in a typical fashion (as a customer would normally use it).

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.10:2009. Testing was performed at the lowest operating frequency, at the operating frequency in the middle of the specified frequency band and at the highest operating frequency with different modulation types.

802.11B TEST MODE			
Radiated Mode (TX and RX)		Conducted Mode	
A: Low	2412MHz	A: Low	2412MHz
B: Middle	2437MHz	B: Middle	2437MHz
C: High	2462MHz	C: High	2462MHz
802.11G TEST MODE			
Radiated Mode (TX and RX)		Conducted Mode	
A: Low	2412MHz	A: Low	2412MHz
B: Middle	2437MHz	B: Middle	2437MHz
C: High	2462MHz	C: High	2462MHz

Each mode basic operation in (802.11 b g) :

- A. EUT transmits (TX mode), with full power, at lowest channel , a continuous modulated signal streaming with 100% duty cycle.
- B. EUT transmits (TX mode), with full power, at middle channel , a continuous modulated signal streaming with 100% duty cycle.
- C. EUT transmits (TX mode), with full power, at highest channel, a continuous modulated signal streaming with 100% duty cycle.
- D. EUT receives (RX mode), at lowest channel , continuously.
- E. EUT receives (RX mode), at middle channel , continuously.
- F. EUT receives (RX mode), at highest channel , continuously.

Full test was applied on all test modes, but only worst case was shown.

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3.4 Noise Suppressing Parts

Refer to schematics and internal photos.

4. Test Set-up and Operation Modes

4.1 Test Methodology

The test methodology used is based on the requirements of 47 CFR Part 15, Sections 15.31, 15.33, 15.35, 15.205, 15.207, 15.209 and KDB558074 D01 DTS Meas Guidance v03. The test methods, which have been used, are based on ANSI C63.10-2009

For details, see under each test item.

4.2 Physical Configuration for Testing

One test sample was available. Both for antennas conducted measurements and for radiated measurements.

For antenna conducted measurements, the antenna was replaced by a 50Ω antenna connector.

For more details, refer to section: Photographs of the Test Set-Up.

4.3 Test Operation and Test Software

Software used for testing: Test mode in EUT

This software was running on the laptop computer connected to the EUT. It was used to enable the test operation modes listed in section 3.3 as appropriate for conducted test

Band	Date Rate or Sub-test	Worst case
802.11b	1M 2M 5.5M 11M	1M
802.11g	6M 9M 12M 18M 24M 36M 48M 54M	6M

4.4 Special Accessories and Auxiliary Equipment

N/A

4.5 Countermeasures to achieve EMC Compliance

No additional measures were employed to achieve compliance.

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5. Test Results of Conducted Measurements at Antenna Port

5.1 Transmitter Parameters

5.1.1 Conducted Output Power, FCC 15.247(b)(3)

RESULT:

PASS

Date of testing: 2013-09-24

Ambient temperature: 22°C

Relative humidity: 45%

Atmospheric pressure: 101.5hPa

Requirements:

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

Test procedure:

ANSI C63.10-2009 and KDB558074 D01 DTS Meas Guidance v03

The maximum peak output power (conducted) was measured at the antenna connector with a spectrum analyzer. The analyzer resolution bandwidth was set to 1MHz and the video bandwidth to 3MHz. The final measurement takes into account the loss generated by all the involved cables.

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Table 3: Conducted Output Power, Mode A

802.11B Data Rate [Mbps]	Output Peak Power [dBm]	Output Average Power [dBm]	Limit [dBm]	Margin [dB]
1	12.25	6.53	30	5.72
2	12.11	-	30	-
5.5	12.08	-	30	-
11	12.06	-	30	-

802.11G Data Rate [Mbps]	Output Peak Power [dBm]	Output Average Power [dBm]	Limit [dBm]	Margin [dB]
6	11.09	2.25	30	8.84
9	10.96	-	30	-
12	10.94	-	30	-
18	10.87	-	30	-
24	10.83	-	30	-
36	10.79	-	30	-
48	10.77	-	30	-
54	10.74	-	30	-

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Table 4: Conducted Output Power, Mode B

802.11B Data Rate [Mbps]	Output Peak Power [dBm]	Output Average Power [dBm]	Limit [dBm]	Margin [dB]
1	11.62	5.87	30	5.75
2	11.49	-	30	-
5.5	11.47	-	30	-
11	11.44	-	30	-

802.11G Data Rate [Mbps]	Output Peak Power [dBm]	Output Average Power [dBm]	Limit [dBm]	Margin [dB]
6	11.01	2.05	30	8.96
9	10.92	-	30	-
12	10.91	-	30	-
18	10.85	-	30	-
24	10.83	-	30	-
36	10.74	-	30	-
48	10.72	-	30	-
54	10.73	-	30	-

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Table 5: Conducted Output Power, Mode C

802.11B Data Rate [Mbps]	Output Peak Power [dBm]	Output Average Power [dBm]	Limit [dBm]	Margin [dB]
1	12.11	6.61	30	5.50
2	12.09	-	30	-
5.5	11.97	-	30	-
11	11.93	-	30	-

802.11G Data Rate [Mbps]	Output Peak Power [dBm]	Output Average Power [dBm]	Limit [dBm]	Margin [dB]
6	11.07	2.12	30	8.95
9	10.95	-	30	-
12	10.84	-	30	-
18	10.82	-	30	-
24	10.73	-	30	-
36	10.71	-	30	-
48	10.70	-	30	-
54	10.65	-	30	-

Remark:

The above results show that the worst case output power is found at the data rate 1M, 6M. Therefore, all the other measurements for the evaluation of the radio properties of the EUT have been performed using this data rate.

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Figure 1: Output Peak Power, 802.11B, Mode A

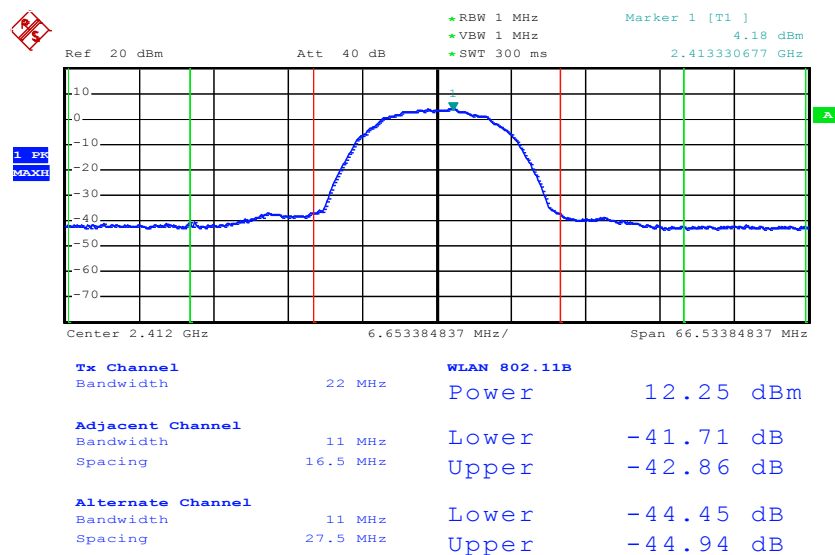
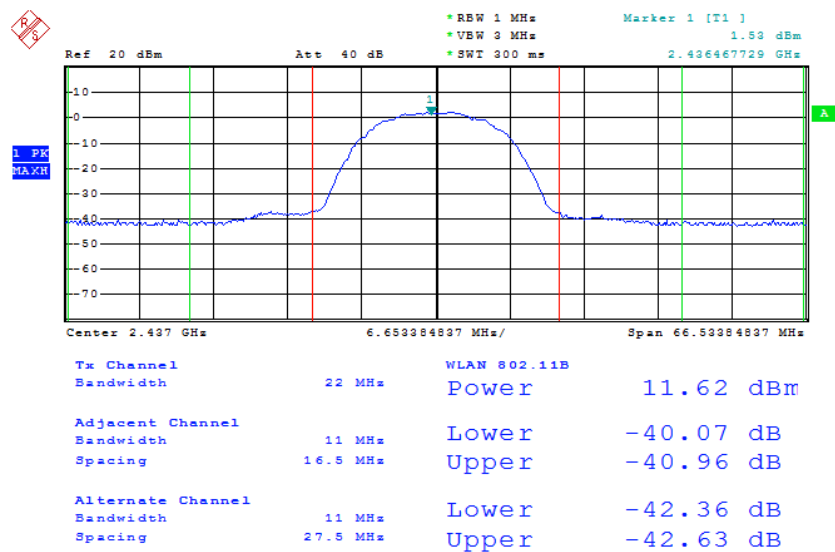


Figure 2: Output Peak Power, 802.11B, Mode B



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Figure 3: Output Peak Power, 802.11B, Mode C

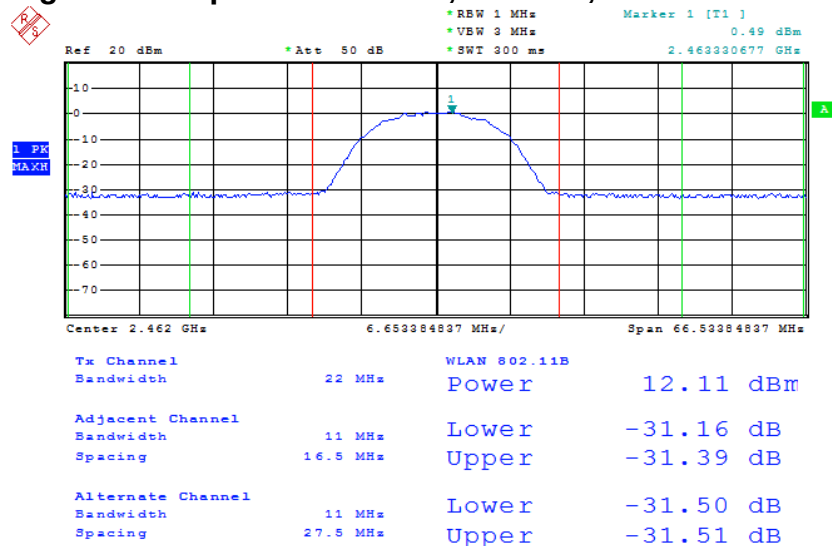
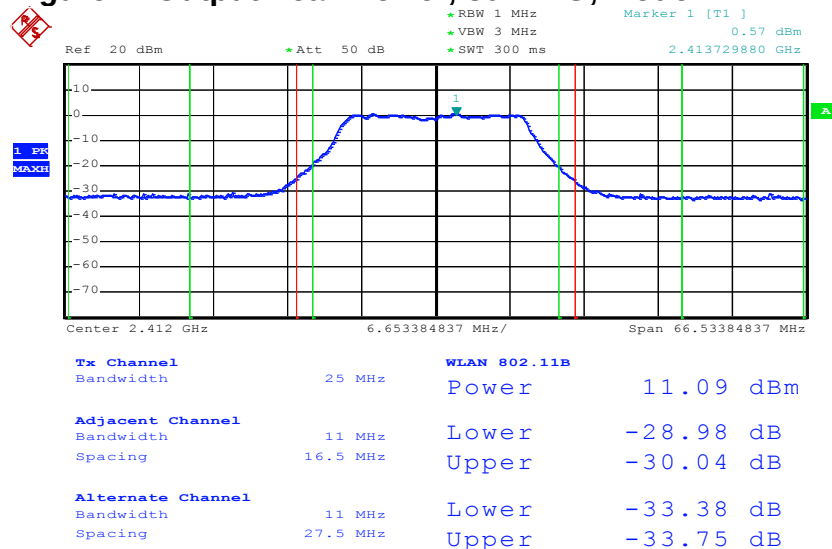


Figure 4: Output Peak Power, 802.11G, Mode A



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Figure 5: Output Peak Power, 802.11G, Mode B

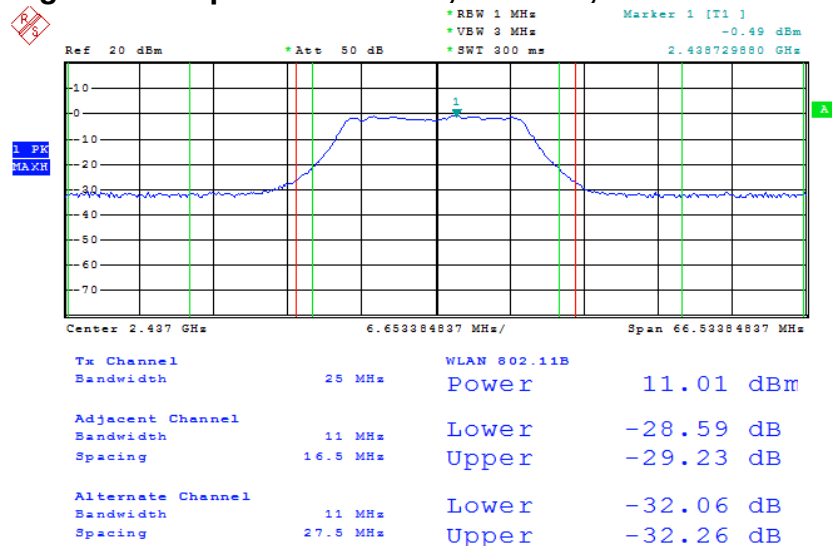
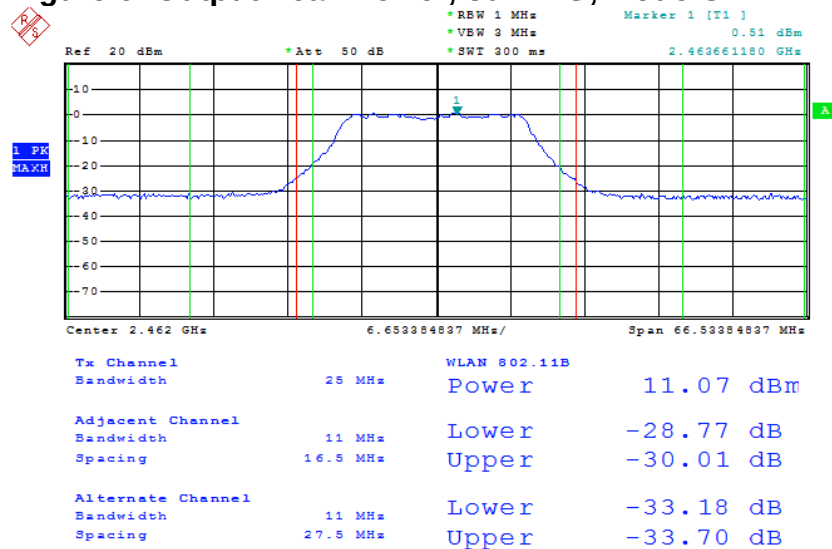


Figure 6: Output Peak Power, 802.11G, Mode C



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5.1.2 6dB Bandwidth, FCC 15.247(a)(2)

Date of testing: 2013-09-27

Ambient temperature: 22°C

Relative humidity: 45%

Atmospheric pressure: 101.5hPa

Requirements:

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure:

ANSI C63.10-2009, RSS-Gen 4.6.2 and KDB558074 D01 DTS Meas Guidance v03.

A spectrum analyzer was connected to the antenna port of the EUT.

The resolution bandwidth of the spectrum analyzer was set to at least 1% of the EUT emission bandwidth. RBW=100 kHz, VBW=300 kHz.

Table 6: 6 dB Bandwidth

Operating Frequency [MHz]	6 dB Bandwidth of 802.11B [MHz]
Low channel	9.60
Middle channel	9.60
High channel	8.96
Operating Frequency [MHz]	6 dB Bandwidth of 802.11g [MHz]
Low channel	16.64
Middle channel	16.64
High channel	16.64

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Figure 7: 6 dB Bandwidth of 802.11B, Mode A

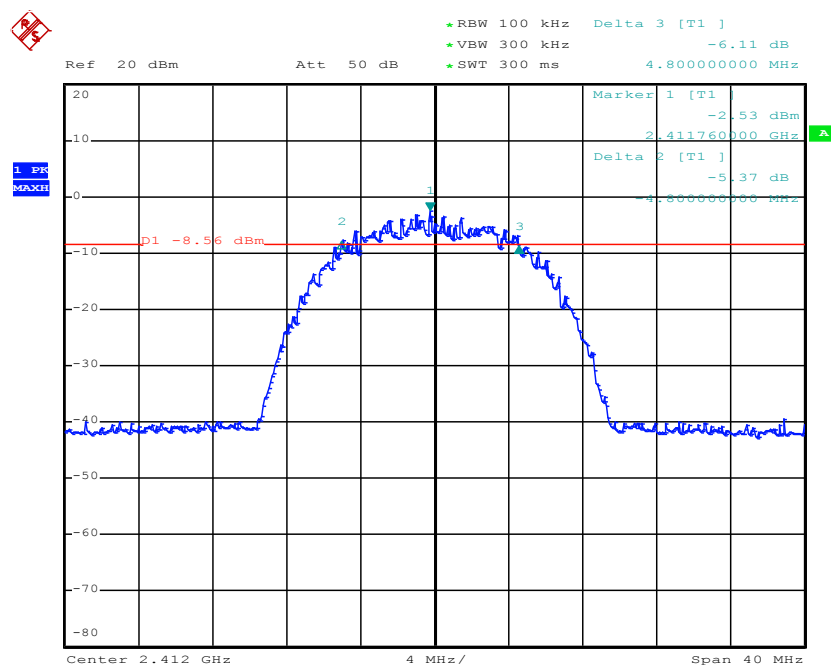
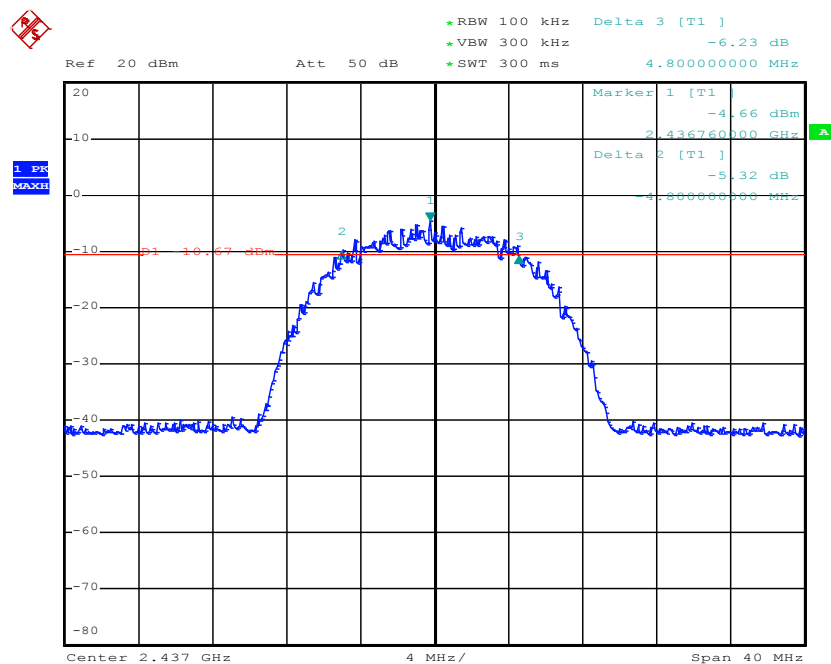


Figure 8: 6 dB Bandwidth of 802.11B, Mode B



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Figure 9: 6 dB Bandwidth of 802.11B, Mode C

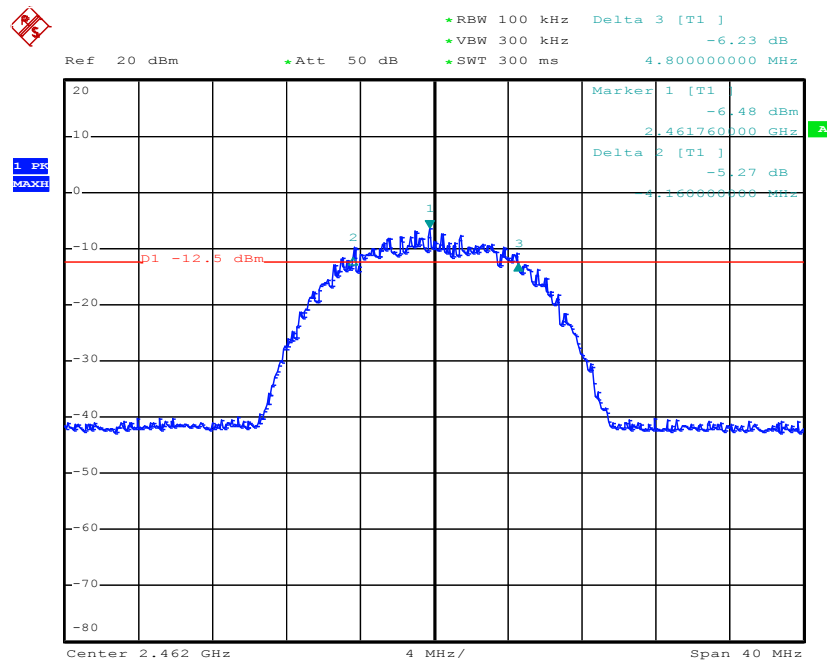
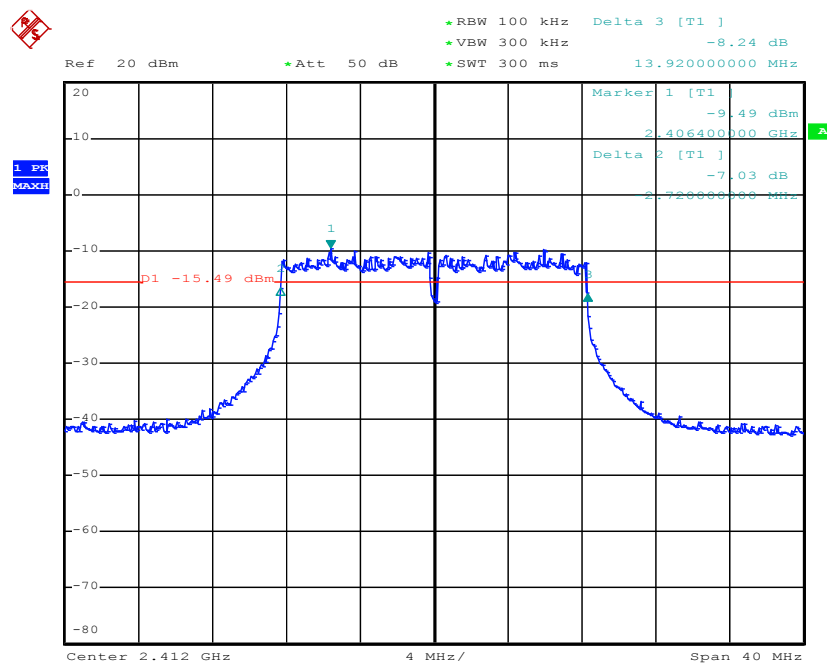


Figure 10: 6 dB Bandwidth of 802.11G, Mode A



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Figure 11: 6 dB Bandwidth of 802.11G, Mode B

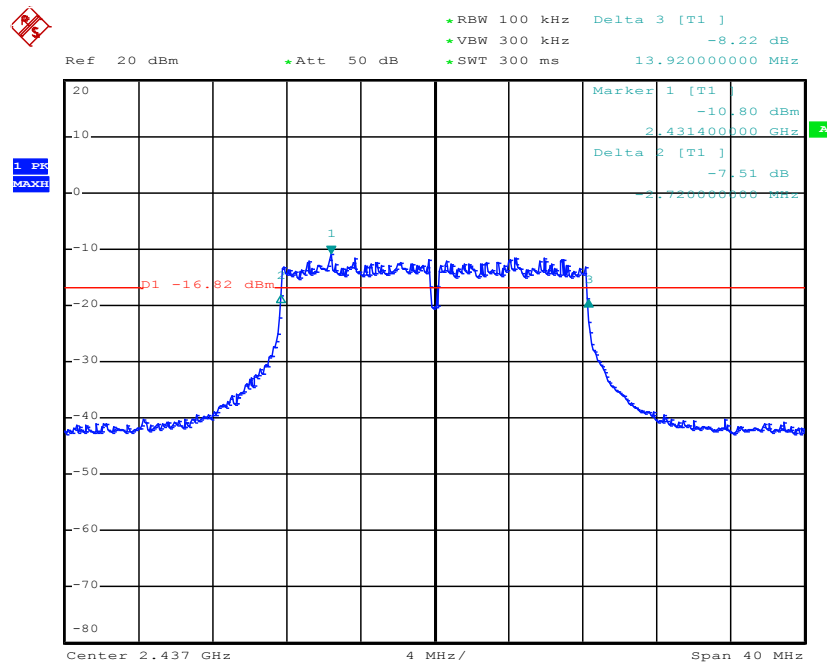
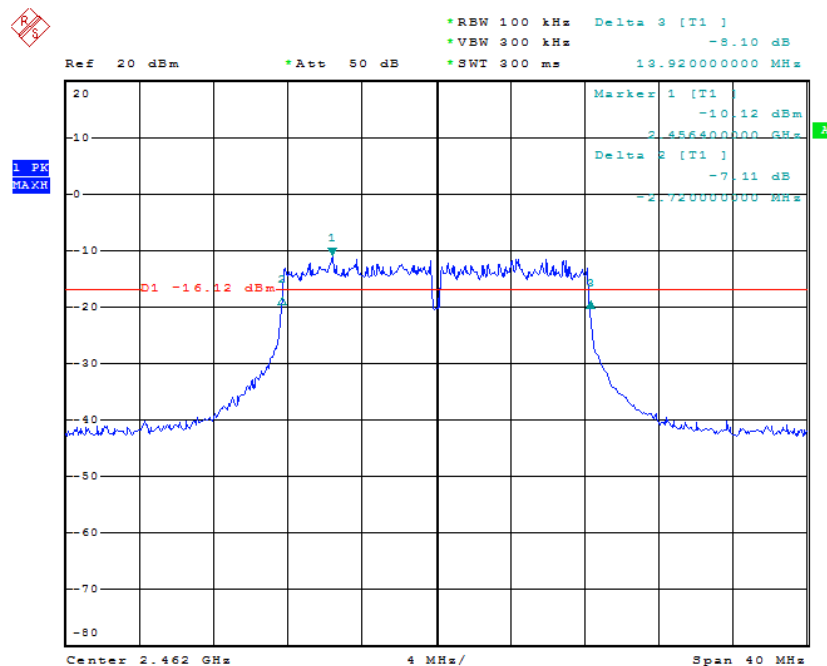


Figure 12: 6 dB Bandwidth of 802.11G, Mode C



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5.1.3 Conducted Spurious Emission, FCC 15.247(c)

RESULT:

PASS

Date of testing: 2013-09-27

Ambient temperature: 22°C

Relative humidity: 45%

Atmospheric pressure: 101.5hPa

Requirements:

In any 100kHz bandwidth outside the frequency band, the RF power shall be at least 20dB below that of the maximum in-band 100kHz emission.

Test procedure:

ANSI C63.10-2009 and KDB558074 D01 DTS Meas Guidance v03

A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth was set to 100kHz. For each channel investigated, the in-band and out-of-band emission measurements were performed. The out-of-band emissions were measured from 30MHz to 25GHz (10th harmonics).

The final measurement takes into account the loss generated by all the involved cables.

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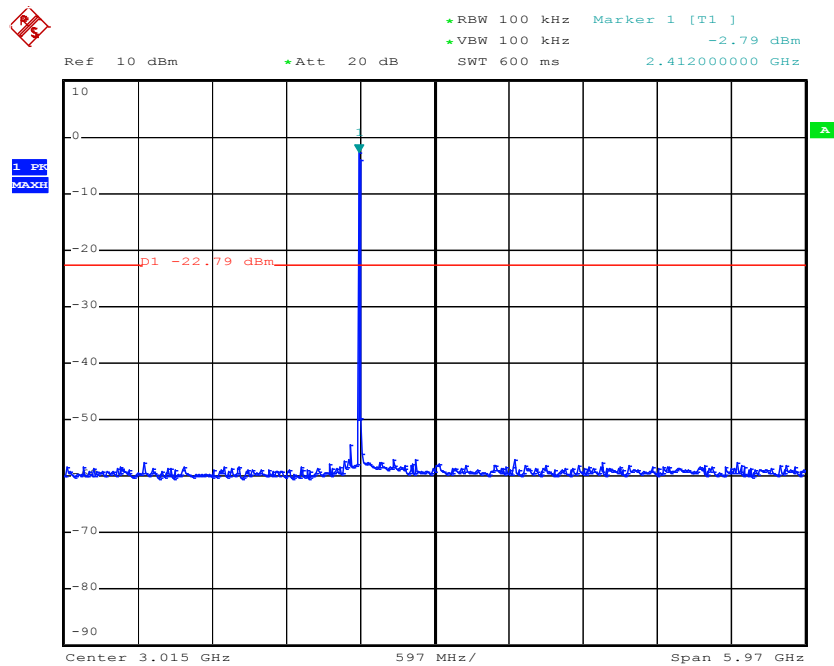
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Table 7: Conducted Spurious Emission, 802.11B, Mode A

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
24430	-51.48	-2.79	-22.79	28.69
-	-	-	-	-
2412	-2.79	-2.79	-	-

Notes: Limit = Reading of fundamental – 20dB

Figure 13: Conducted Spurious Emission, 30MHz – 6GHz, Mode A



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Figure 14: Conducted Spurious Emission, 6GHz – 25GHz, Mode A

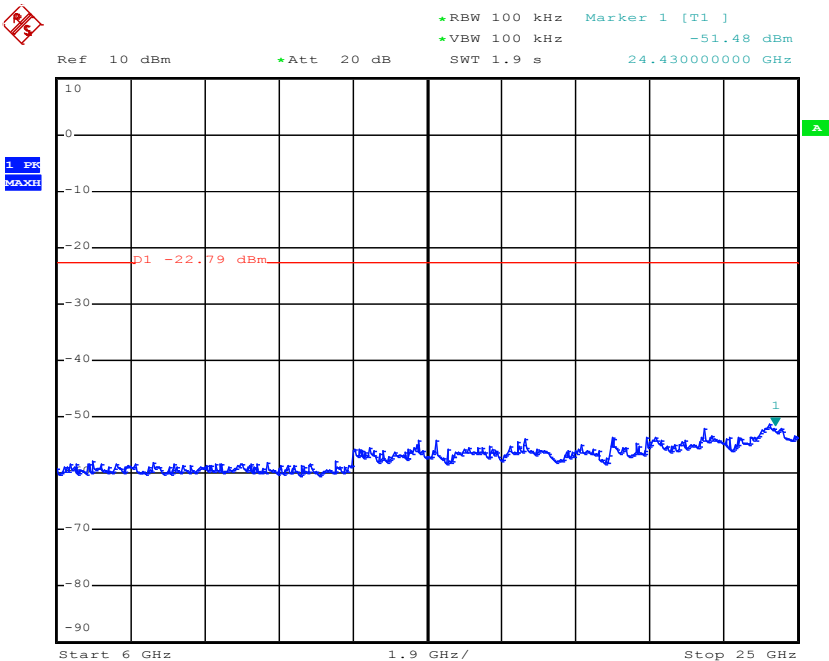


Table 8: Conducted Spurious Emission, 802.11B, Mode B

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
25392	-50.67	-5.45	-25.45	25.22
-	-	-	-	-
2437	-5.45	-5.45	-	-

Notes: Limit = Reading of fundamental – 20dB

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Figure 15: Conducted Spurious Emission, 30MHz –6GHz, Mode B

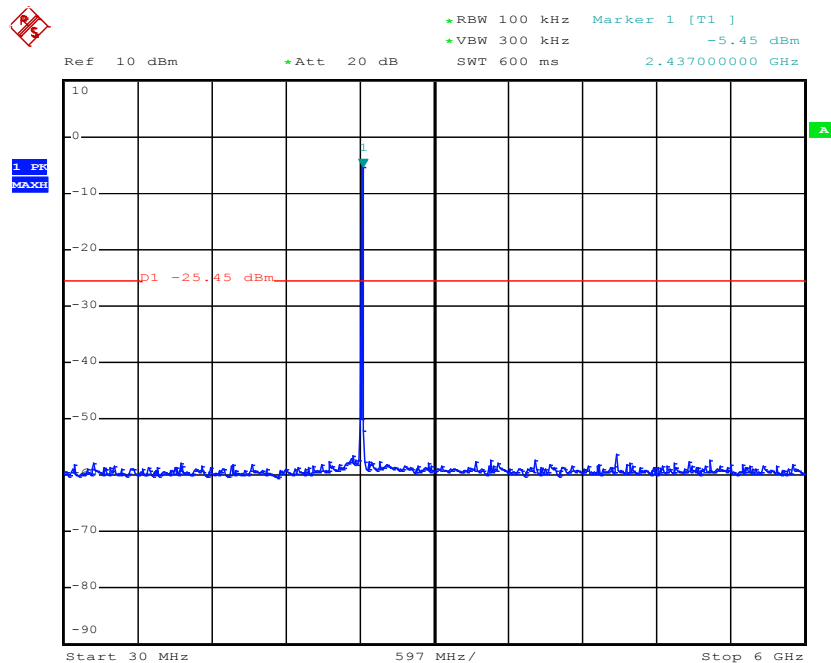
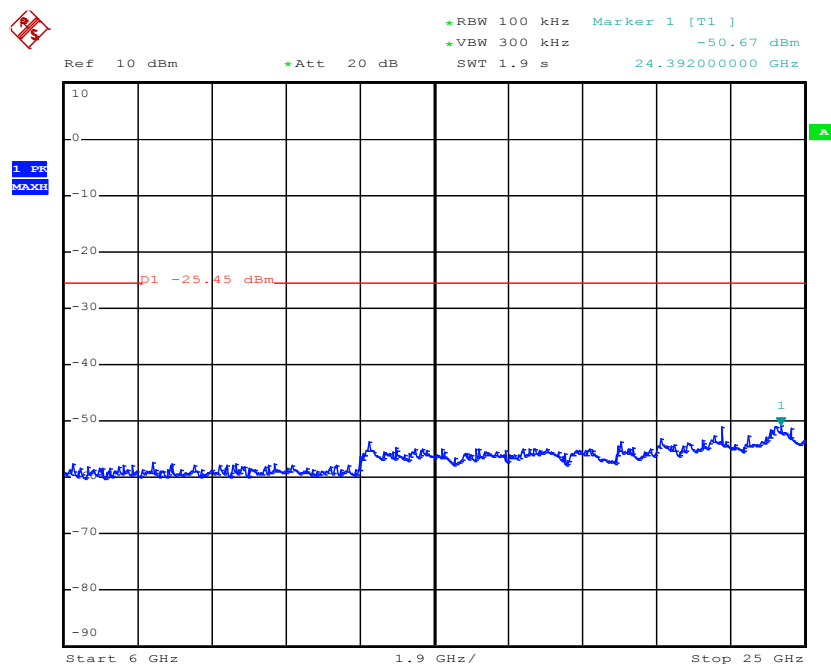


Figure 16: Conducted Spurious Emission, 6GHz – 25GHz, Mode B



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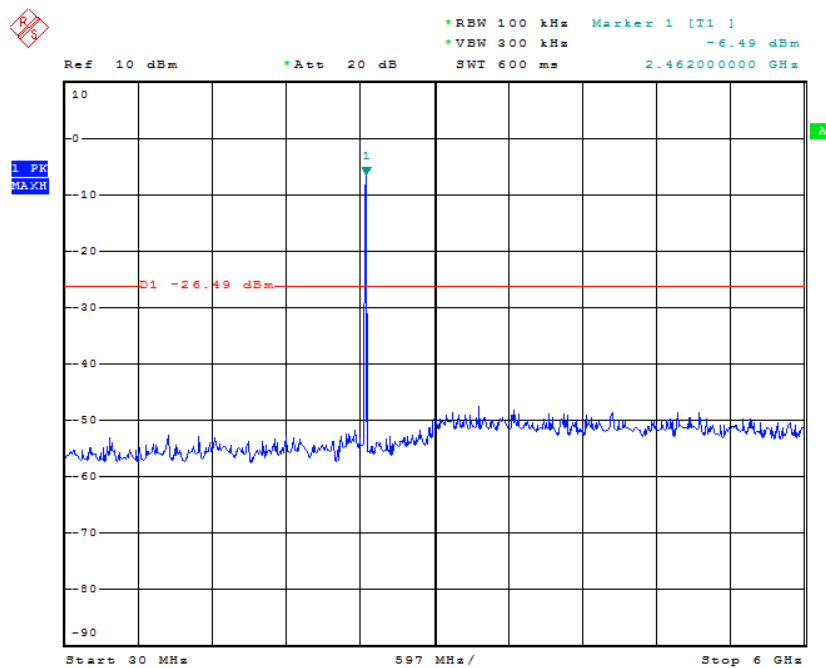
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Table 9: Conducted Spurious Emission, 802.11B, Mode C

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
25640	-31.85	-6.49	-26.49	17.39
4925	-40.36	-6.49	-26.49	25.9
2462	-6.49	-6.49	-	-

Notes: Limit = Reading of fundamental – 20dB

Figure 17: Conducted Spurious Emission, 30MHz –6GHz, Mode C



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Figure 18: Conducted Spurious Emission, 6GHz – 25GHz, Mode C

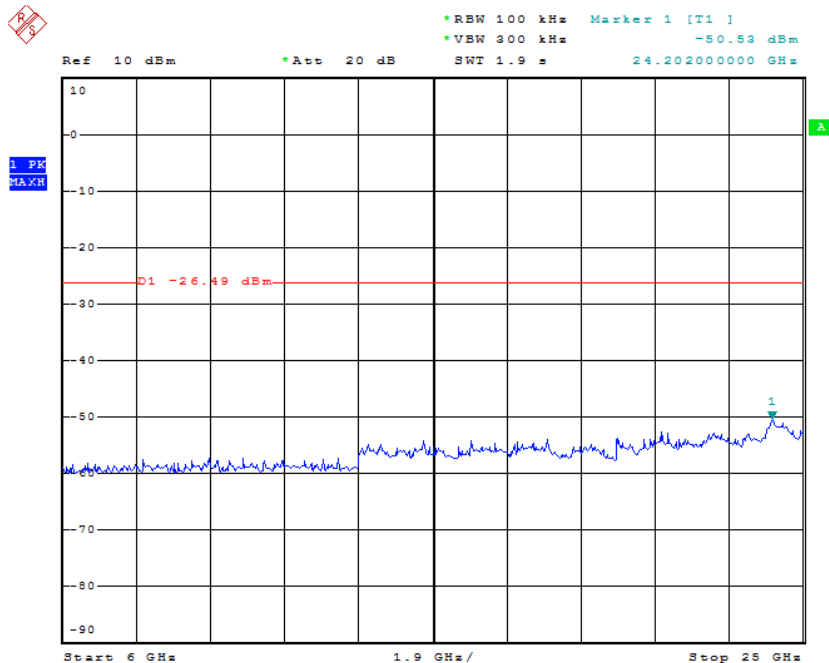


Table 10: Conducted Spurious Emission, 802.11G, Mode A

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
24354	-50.35	-11.11	-31.11	19.24
-	-	-	-	-
2412	-11.11	-11.11	-	-

Notes: Limit = Reading of fundamental – 20dB

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Figure 19: Conducted Spurious Emission, 30MHz – 6GHz, Mode A

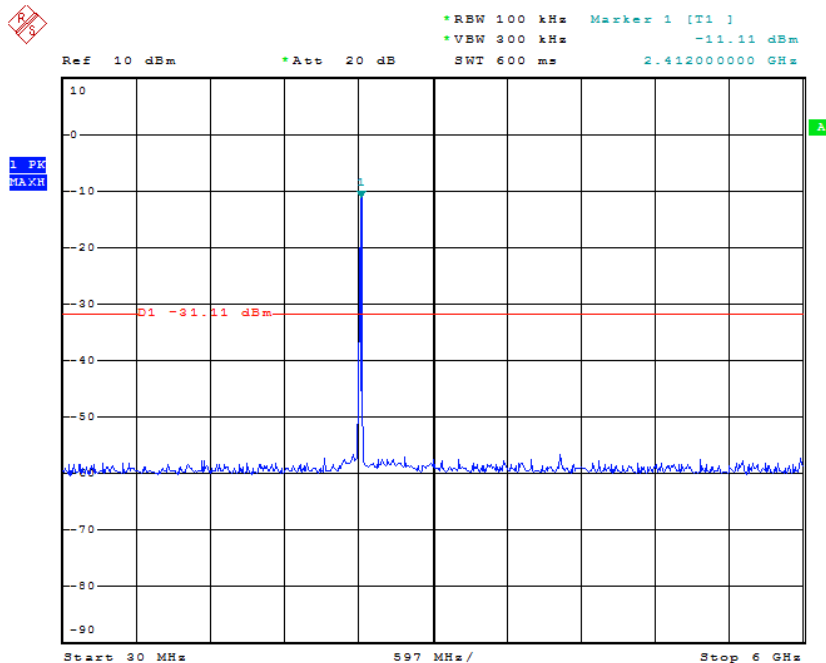
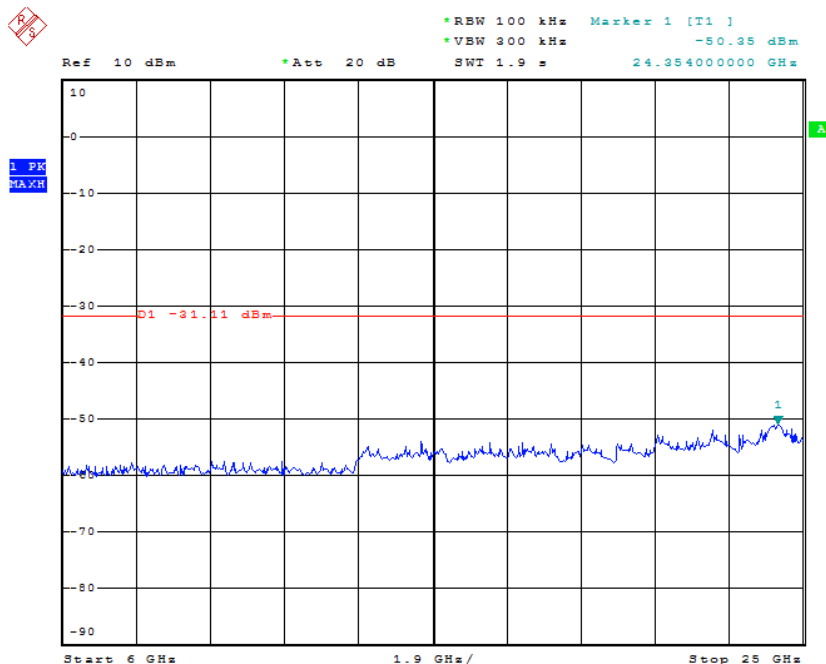


Figure 20: Conducted Spurious Emission, 6GHz – 25GHz, Mode A



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Table 11: Conducted Spurious Emission, 802.11G, Mode B

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
24354	-50.87	-0.46	-31.74	19.13
-	-	-	-	-
2437	-11.74	-11.74	-	-

Notes: Limit = Reading of fundamental – 20dB

Figure 21: Conducted Spurious Emission, 30MHz –6GHz, Mode B

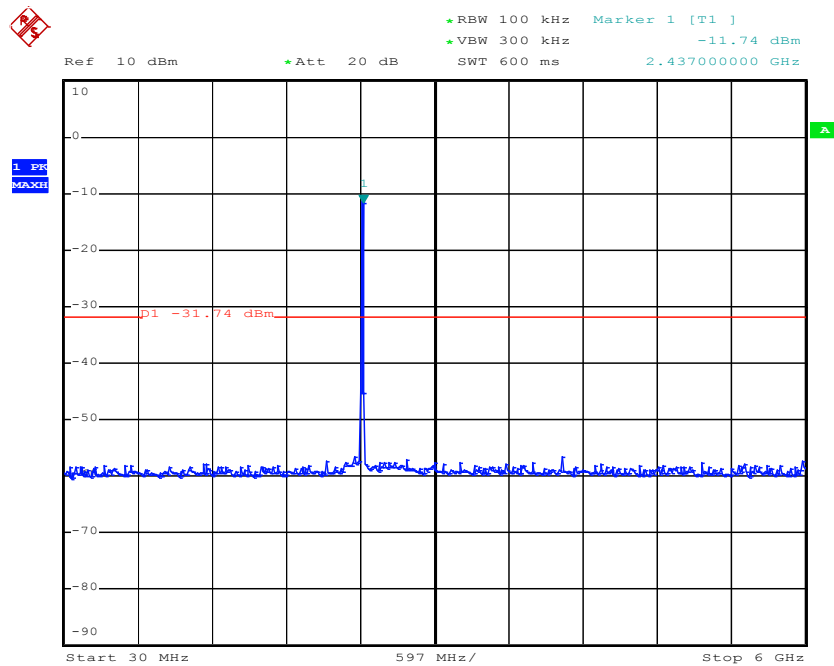


Figure 22: Conducted Spurious Emission, 6GHz – 25GHz, Mode B

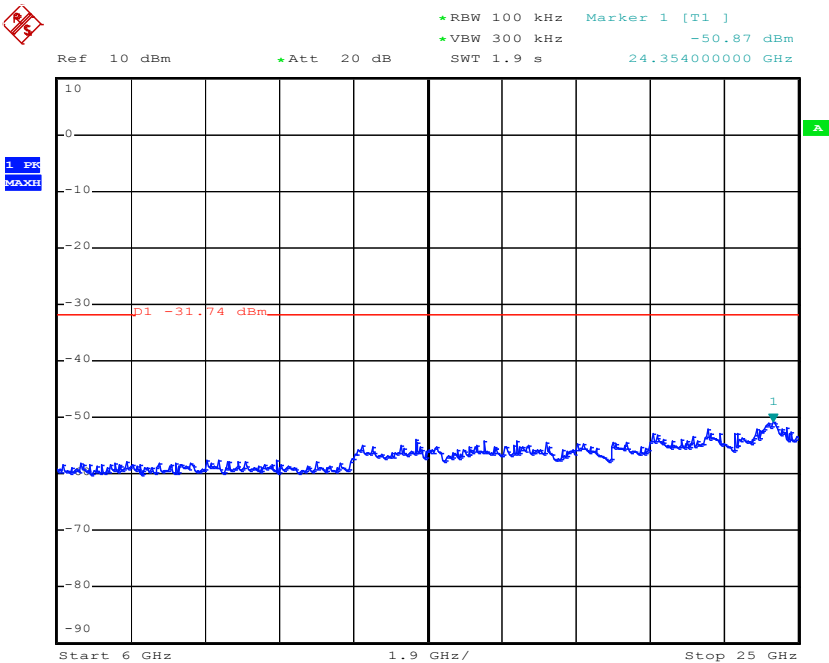


Table 12: Conducted Spurious Emission, 802.11G, Mode C

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
25440	-50.33	-9.64	-29.64	20.69
-	-	-	-	-
2462	-9.64	-9.64	-	-

Notes: Limit = Reading of fundamental – 20dB

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Figure 23: Conducted Spurious Emission, 30MHz –6GHz, Mode C

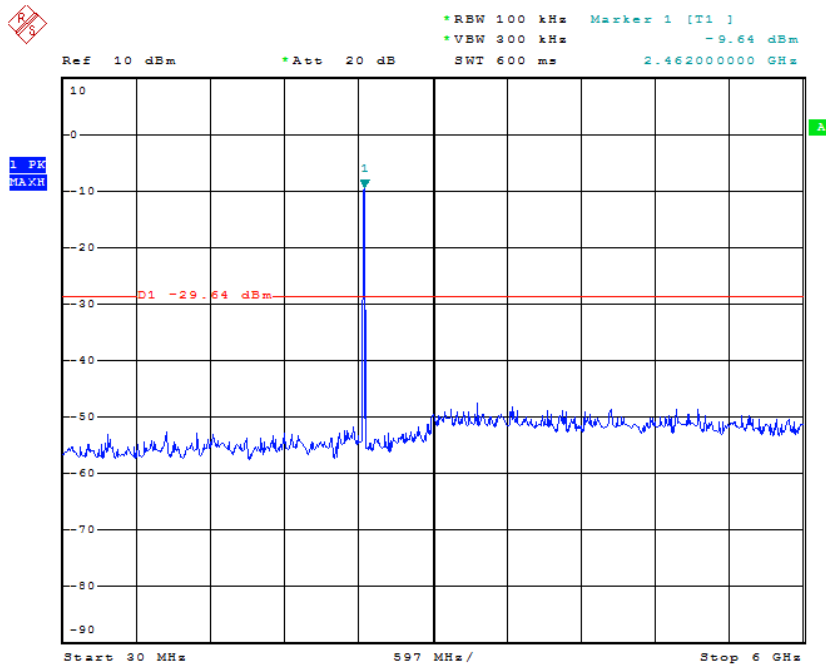
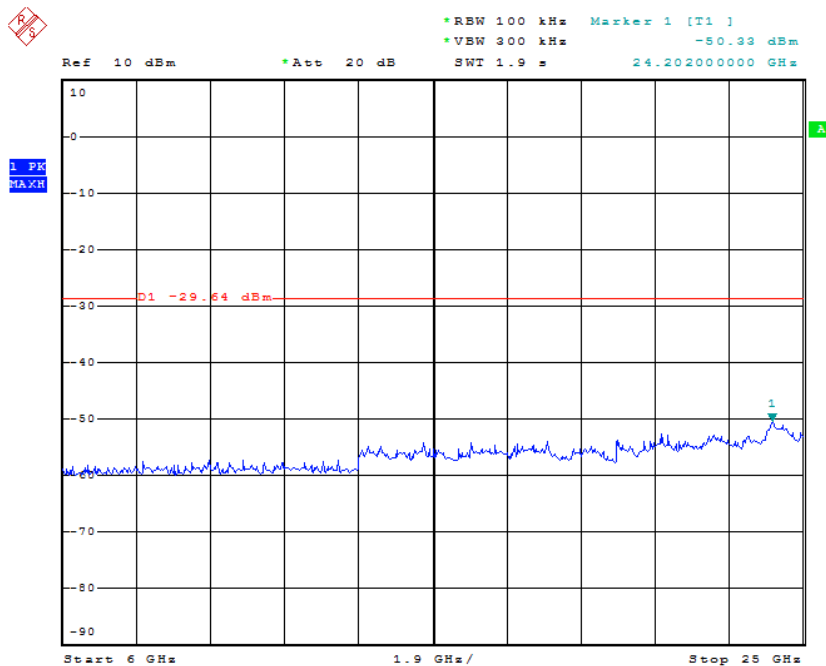


Figure 24: Conducted Spurious Emission, 6GHz – 25GHz, Mode C



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5.1.4 Power spectral density (PSD), FCC 15.247(e)

RESULT:

PASS

Date of testing: 2013-10-06

Ambient temperature: 20°C

Relative humidity: 39.6%

Atmospheric pressure: 101.5hPa

Requirements:

According to FCC section 15.247(e) and RSS-A8.2(b), the same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used.

Test procedure:

ANSI C63.10-2009 and KDB558074 D01 DTS Meas Guidance v03

A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth was set to 100kHz.

The final measurement takes into account the loss generated by all the involved cables.

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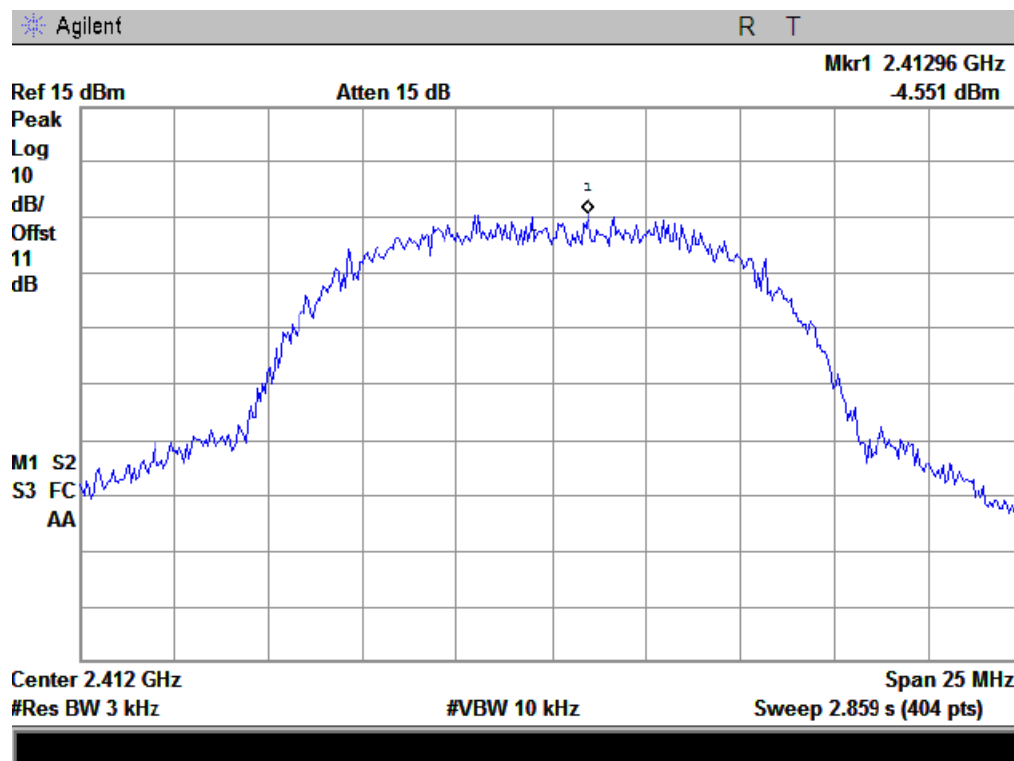
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Table 13: Power spectral density of 802.11 b g

802.11B	Reading [dBm/3KHz]	Limit [dBm/3kHz]
Low	-4.55	8
Middle	-4.37	8
High	-4.38	8

802.11G	Reading [dBm/3KHz]	Limit [dBm/3kHz]
Low	-9.61	8
Middle	-10.22	8
High	-10.60	8

Figure 25: Power spectral density, 802.11 B, Mode A



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Figure 26: Power spectral density, 802.11 B, Mode B

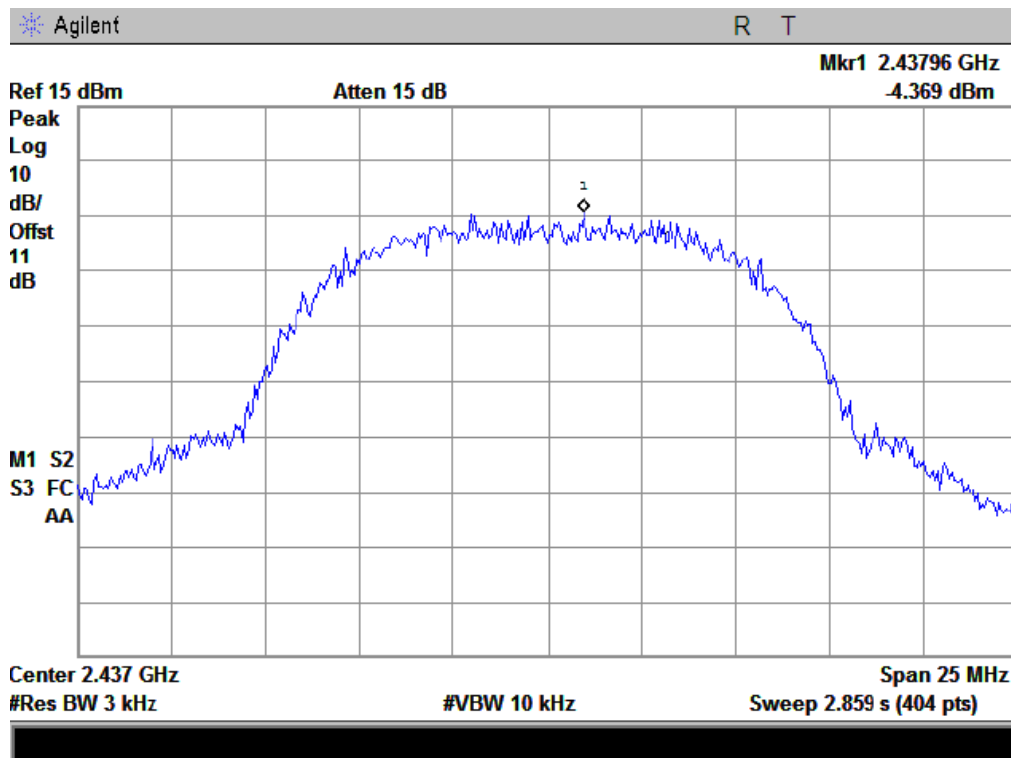
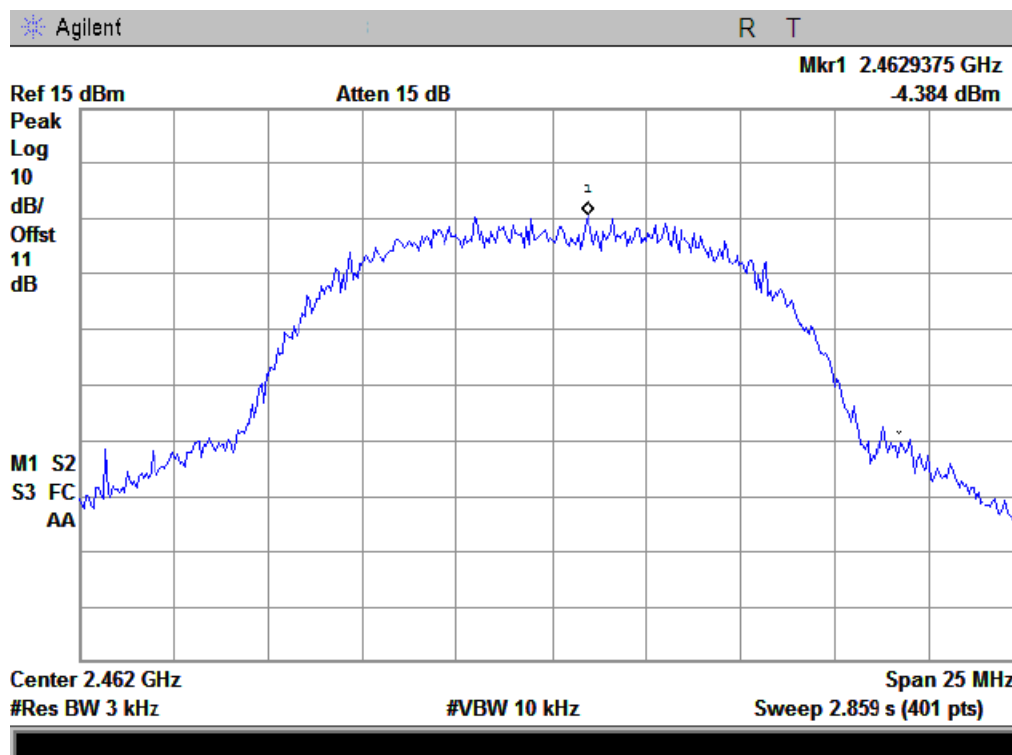


Figure 27: Power spectral density, 802.11 B, Mode C



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Figure 28: Power spectral density, 802.11 G, Mode A

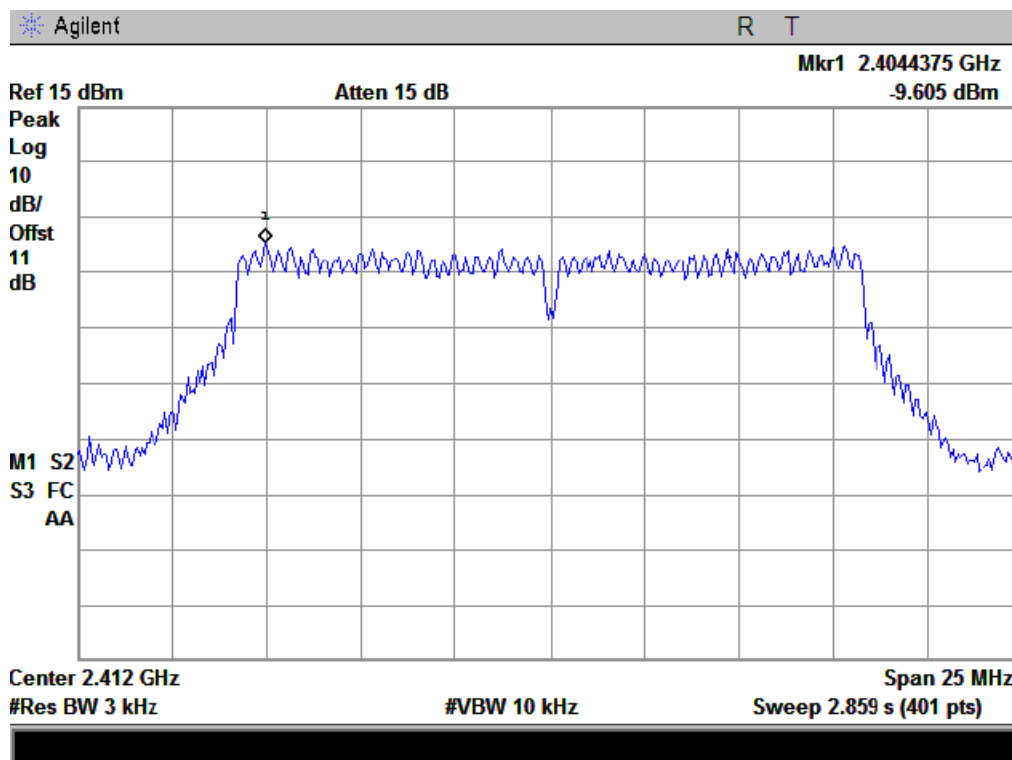
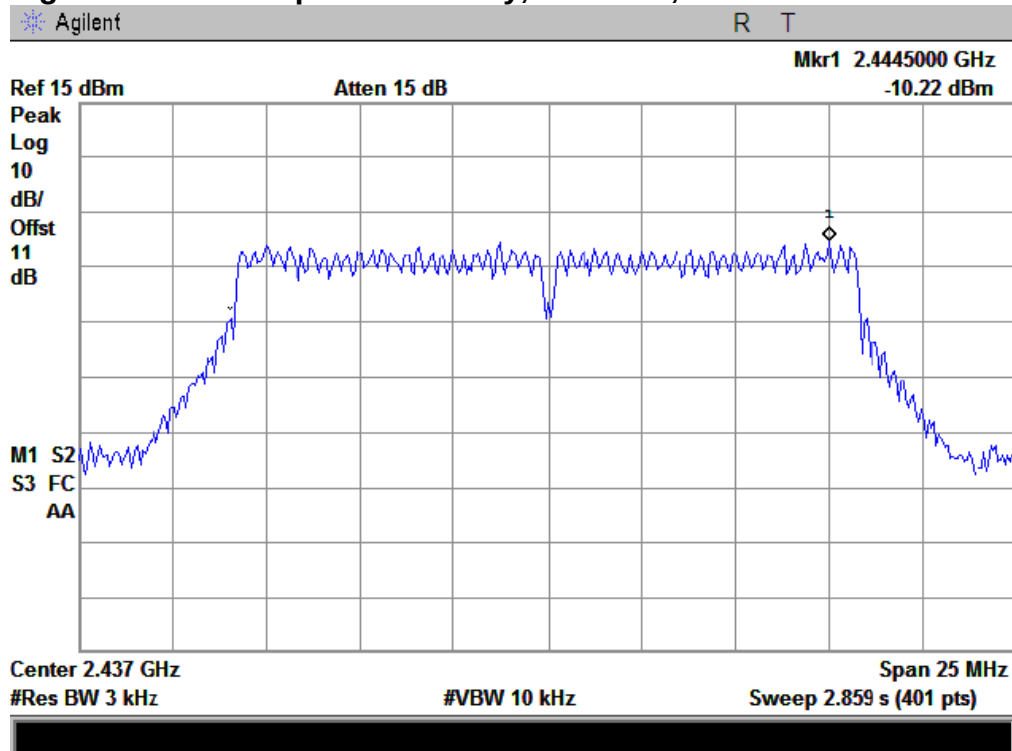


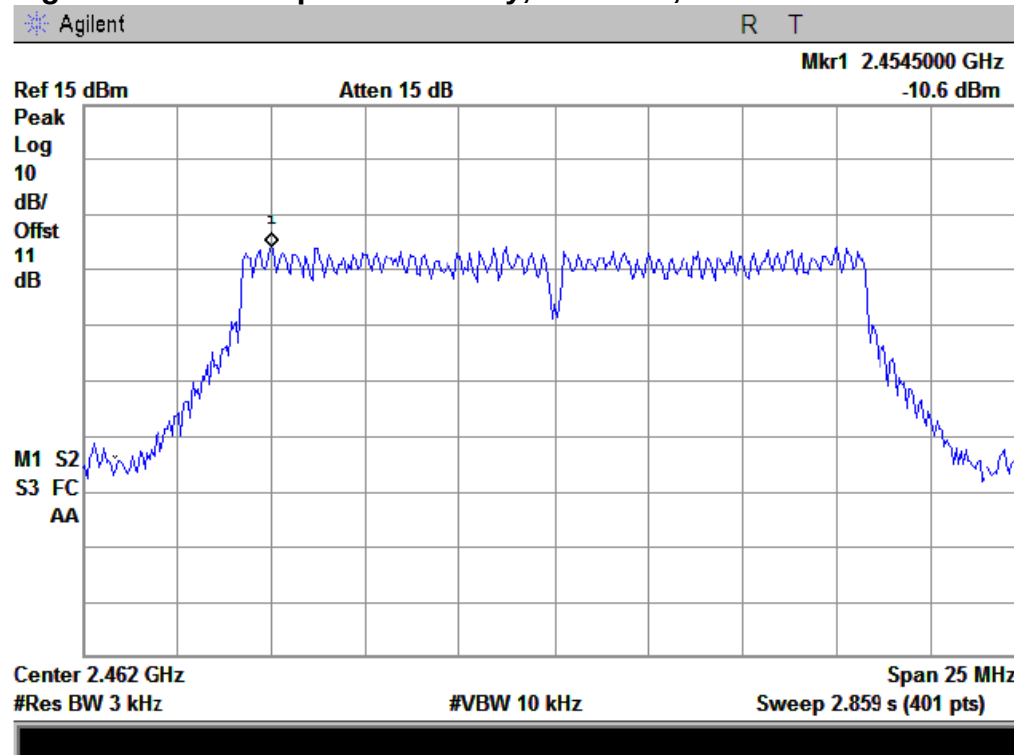
Figure 29: Power spectral density, 802.11 G, Mode B



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Figure 30: Power spectral density, 802.11 G, Mode C



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5.1.5 Band Edge Compliance of RF Conducted Emission, FCC 15.247(c)

RESULT:

PASS

Date of testing: 2013-10-06

Ambient temperature: 20°C

Relative humidity: 39.6%

Atmospheric pressure: 101.5hPa

Requirements:

In any 100kHz bandwidth outside the frequency band, the RF power shall be at least 20dB below that of the maximum in-band 100kHz emission.

Test procedure:

ANSI C63.10-2009, RSS-Gen 4.9 and KDB558074 D01 DTS Meas Guidance v03

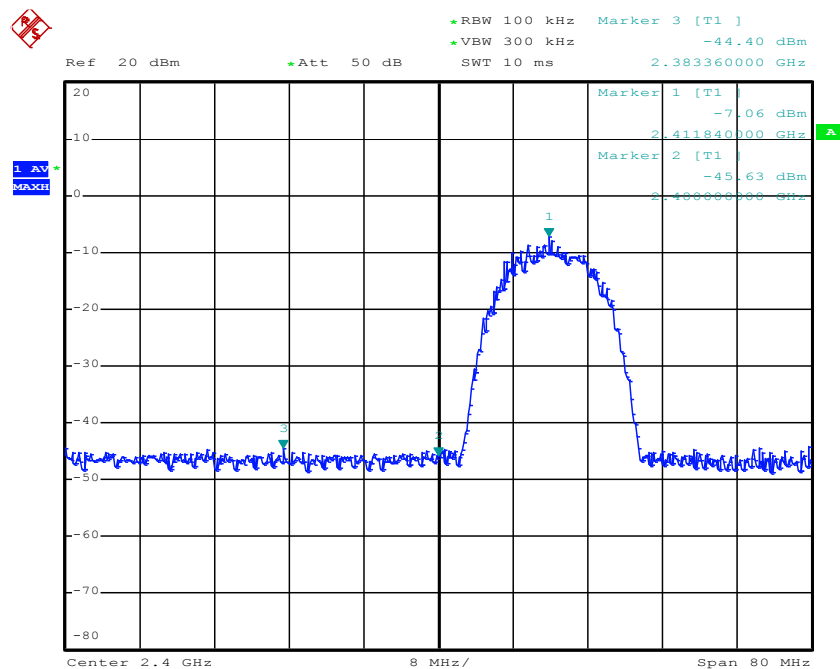
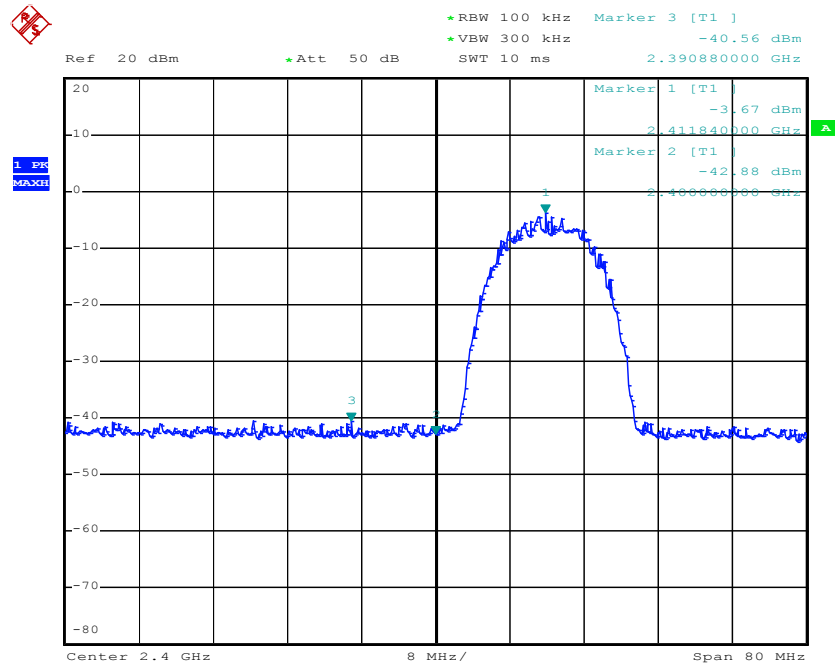
A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth was set to 100kHz and video bandwidth was set to 300kHz. Allow the trace to stabilize. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.

The final measurement takes into account the loss generated by all the involved cables.

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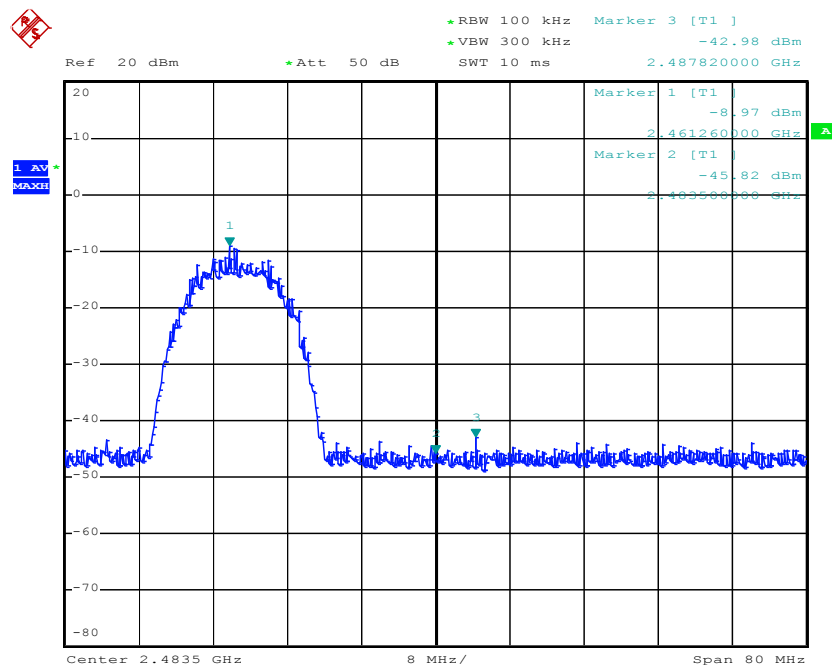
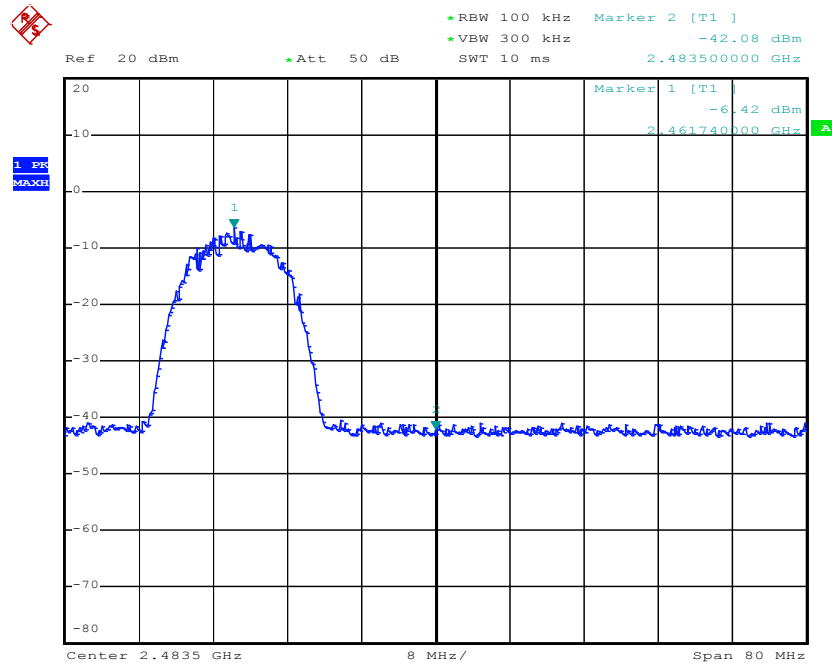
Figure 31: Lower Band Edge Conducted, 802.11 B AV and PK Detector



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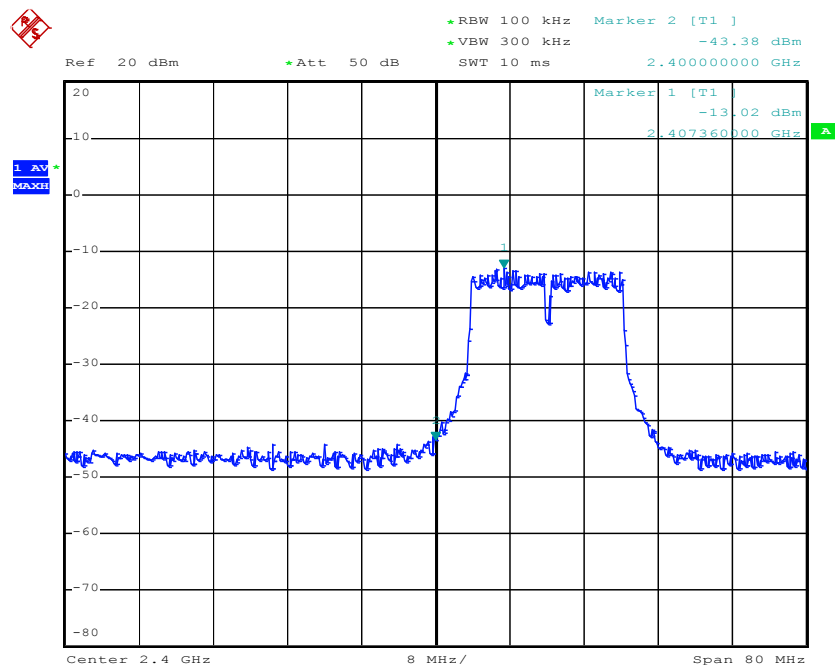
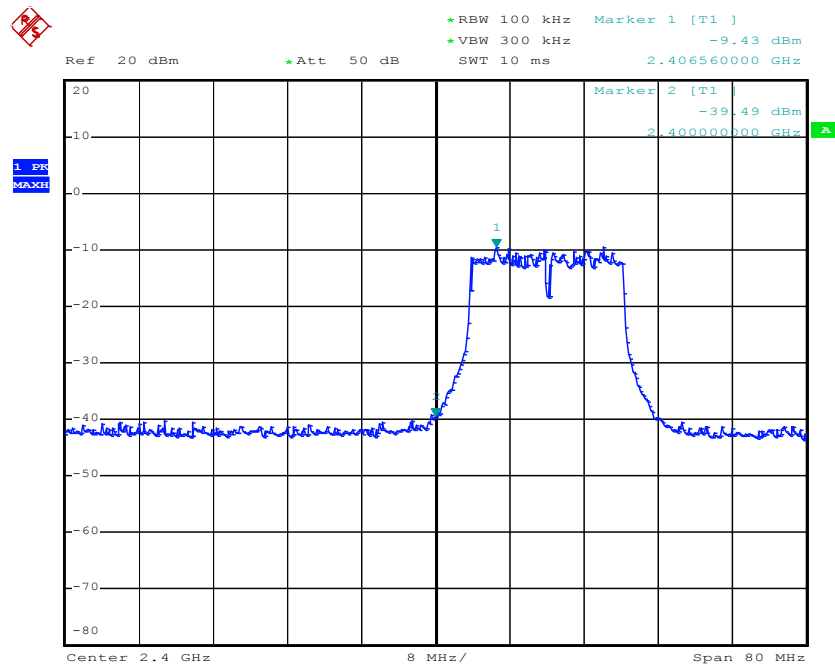
Figure 32: Upper Band Edge Conducted, 802.11 B AV and PK Detector



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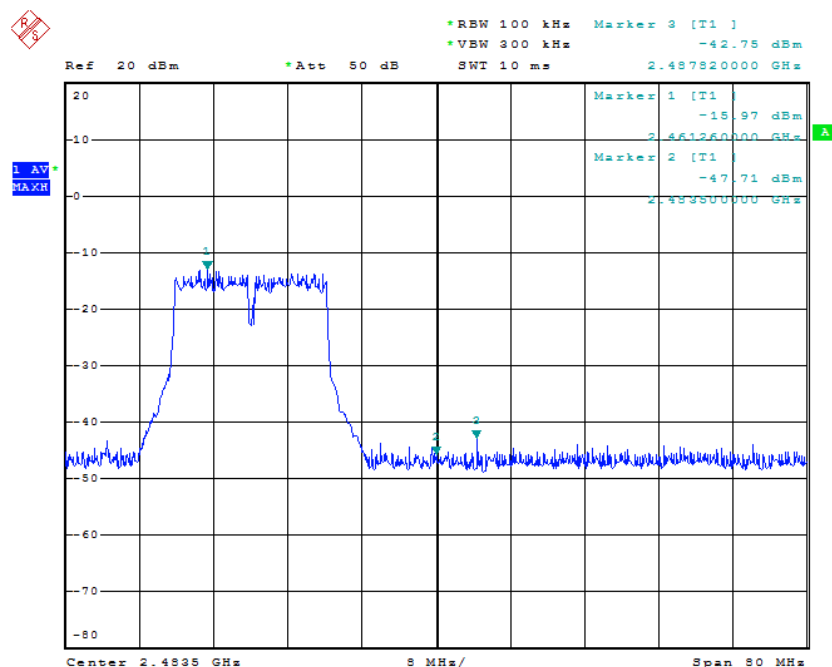
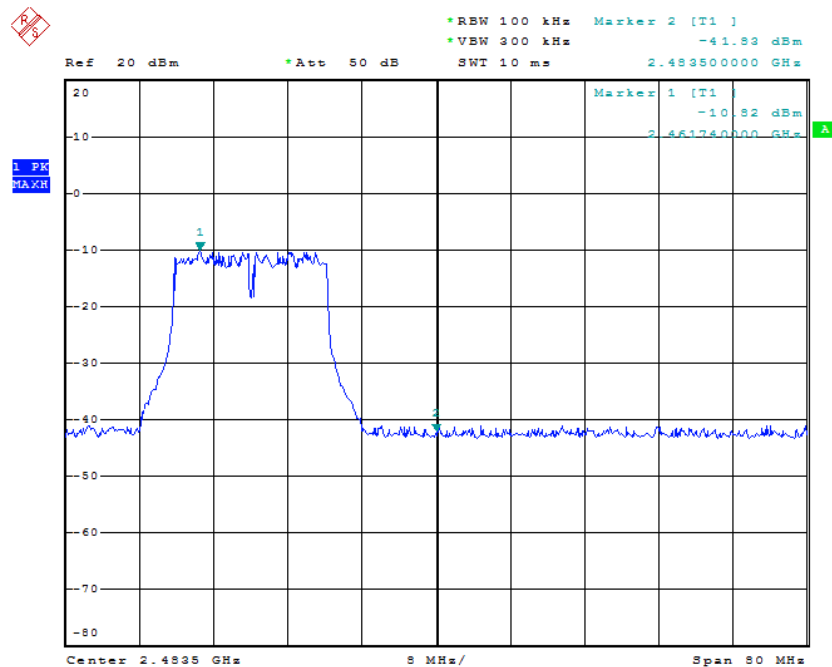
Figure 33: Lower Band Edge Conducted, 802.11 G AV and PK Detector



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Figure 34: Upper Band Edge Conducted, 802.11 G AV and PK Detector



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5.1.6 Conducted emissions, FCC 15.207

RESULT:

PASS

Date of testing:	2014-3-8
Input Voltage:	AC 120V, 60Hz
Earthing:	Not Connected
Ambient temperature:	20°C
Relative humidity:	39.6%
Atmospheric pressure:	101.5hPa

Requirements:

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 150kHz to 30MHz shall not exceed limits in FCC Part 15.207.

Test procedure:

ANSI C63.4-2009 and Public Notice DA 00-705.

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. Connect EUT to the power mains through a line impedance stabilization network (LISN). All the support units are connecting the other LISN. The LISN provides 50 ohm coupling impedance for the measuring instrument. The FCC states that a 50 ohm, 50 microhenry LISN should be used. Both sides of AC line were checked for maximum conducted interference. The frequency range from 150kHz to 30 MHz was searched. Set the test receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

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Table 14: Conducted Emission

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.351488	50.5	150.000	9.000	N	9.7	8.3	58.8	PASS
0.452231	45.9	150.000	9.000	N	9.7	10.9	56.8	PASS
0.474619	45.3	150.000	9.000	N	9.6	11.1	56.4	PASS
0.515662	45.9	150.000	9.000	N	9.7	10.1	56.0	PASS
0.571631	52.4	150.000	9.000	N	9.7	3.6	56.0	PASS
0.631331	49.6	150.000	9.000	N	9.7	6.4	56.0	PASS
0.351488	49.3	150.000	9.000	L	9.7	9.5	58.8	PASS
0.500738	52.5	150.000	9.000	L	9.7	3.5	56.0	PASS
0.549244	46.0	150.000	9.000	L	9.7	10.0	56.0	PASS
0.567900	47.8	150.000	9.000	L	9.7	8.2	56.0	PASS
0.702225	44.9	150.000	9.000	L	9.7	11.1	56.0	PASS
2.385019	45.3	150.000	9.000	L	9.8	10.7	56.0	PASS

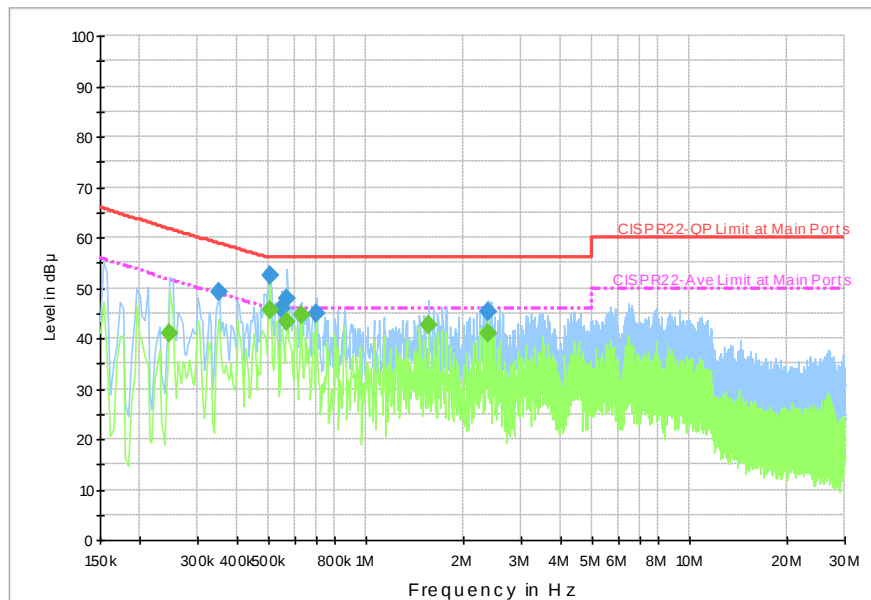
Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.198506	40.1	150.000	9.000	N	9.6	13.4	53.5	PASS
0.351488	41.1	150.000	9.000	N	9.7	7.6	48.7	PASS
0.452231	37.0	150.000	9.000	N	9.7	9.8	46.8	PASS
0.474619	37.1	150.000	9.000	N	9.6	9.3	46.4	PASS
0.571631	44.5	150.000	9.000	N	9.7	1.5	46.0	PASS
0.631331	40.2	150.000	9.000	N	9.7	5.8	46.0	PASS
0.247012	40.9	150.000	9.000	L	9.6	10.7	51.6	PASS
0.500738	45.6	150.000	9.000	L	9.7	0.4	46.0	PASS
0.567900	43.4	150.000	9.000	L	9.7	2.6	46.0	PASS
0.627600	44.5	150.000	9.000	L	9.7	1.5	46.0	PASS
1.556681	42.6	150.000	9.000	L	9.8	3.4	46.0	PASS
2.385019	41.0	150.000	9.000	L	9.8	5.0	46.0	PASS

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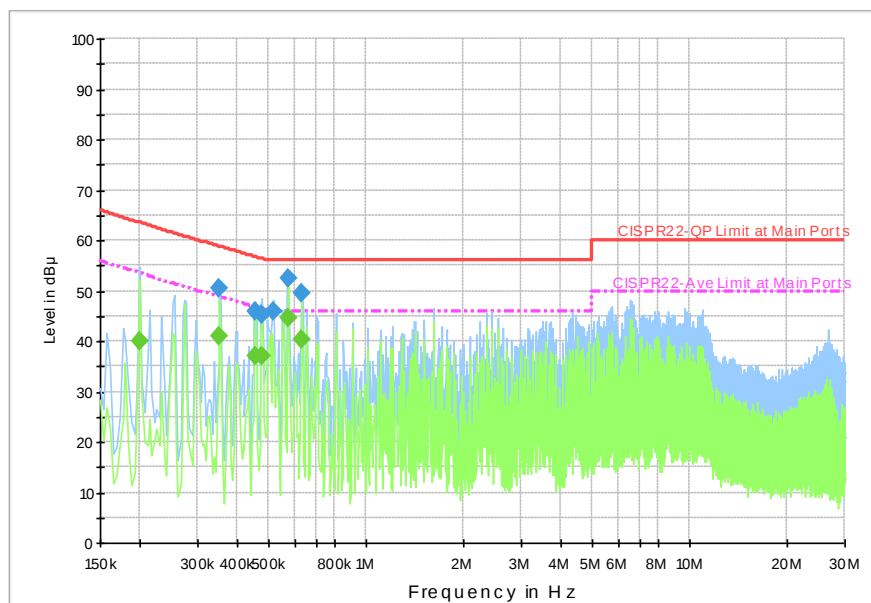
L Phase

EMI_ENV216 AutoTest - L CISPR22



N Phase

EMI_ENV216 AutoTest - N CISPR22



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6. Test Results of Radiated Measurements

6.1 Transmitter Parameters

6.1.1 Band Edge Radiated Emission, FCC 15.205, FCC 15.209, FCC 15.247(c)

RESULT: **PAss**

Date of testing:	2013-10-19
Ambient temperature:	23.5°C
Relative humidity:	45%
Atmospheric pressure:	101.5hPa
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber

Requirements:

Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must comply with the radiated emission limits specified in FCC 15.209(a).

Test procedure:

ANSI C63.10-2009 and KDB558074 D01 DTS Meas Guidance v03

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Measurements were made at 3m distance. The EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level.

Measurements were taken using both horizontal and vertical antenna polarization. The rotation through the three orthogonal axes is normally not needed for equipment that is not hand-held or body-worn. The EUT was pretested in floor-standing condition and in the table position and the worst case condition was table position which was used for the final measurements.

Measurements were performed using a spectrum analyzer with a suitable span to encompass the peak of the fundamental and using the following settings: Peak: RBW & VBW = 1MHz, Average: RBW = 1MHz, VBW = 10Hz.

The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report. plot data please checek (File: 15069614 001 APPENDIX1).

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Table 15: Band Edge Radiated Emission of 802.11B

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2390.000	52.734	15.087	-21.266	74.000	37.648	PK
2	Horizontal	2413.320	95.646	57.790	N/A	N/A	37.857	PK
3	Horizontal	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2390.000	52.620	15.633	-21.380	74.000	36.988	PK
2	Vertical	2413.208	95.422	58.319	N/A	N/A	37.103	PK
3	Vertical	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2390.000	39.825	2.178	-14.175	54.000	37.648	AV
2	Horizontal	2412.536	86.694	48.844	N/A	N/A	37.850	AV
3	Horizontal	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2390.000	39.245	2.258	-14.755	54.000	36.988	AV
2	Vertical	2411.136	86.175	49.082	N/A	N/A	37.092	AV
3	Vertical	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2463.160	91.599	53.304	N/A	N/A	38.295	PK
2	Horizontal	2483.500	52.837	14.362	-21.163	74.000	38.475	PK
3	Horizontal	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2463.160	92.882	55.539	N/A	N/A	37.342	PK
2	Vertical	2483.500	52.255	14.814	-21.745	74.000	37.441	PK
3	Vertical	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2462.656	79.673	41.382	N/A	N/A	38.291	AV
2	Horizontal	2483.500	40.645	2.170	-13.355	54.000	38.475	AV
3	Horizontal	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2462.512	84.855	47.516	N/A	N/A	37.340	AV
2	Vertical	2483.500	39.721	2.280	-14.279	54.000	37.441	AV
3	Vertical	-	-	-	-	-	-	-

Notes: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.
Average limit in dBuV/m is calculated as follows: Average limit = $20 \times \log(500\mu\text{V/m})$.
Peak limit in dBuV/m is calculated as follows: Peak limit = Average limit + 20dB.

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Table 16: Band Edge Radiated Emission of 802.11G

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2390.000	52.760	15.113	-21.240	74.000	37.648	PK
2	Horizontal	2405.256	91.073	53.289	N/A	N/A	37.784	PK
3	Horizontal	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2390.000	52.283	15.296	-21.717	74.000	36.988	PK
2	Vertical	2404.920	92.665	55.603	N/A	N/A	37.062	PK
3	Vertical	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2390.000	40.074	2.427	-13.926	54.000	37.648	AV
2	Horizontal	2406.264	79.184	41.391	N/A	N/A	37.794	AV
3	Horizontal	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2390.000	39.594	2.607	-14.406	54.000	36.988	AV
2	Vertical	2407.328	81.684	44.610	N/A	N/A	37.074	AV
3	Vertical	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2462.416	88.721	50.432	N/A	N/A	38.289	PK
2	Horizontal	2483.500	53.458	14.983	-20.542	74.000	38.475	PK
3	Horizontal	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2466.832	89.449	52.089	N/A	N/A	37.360	PK
2	Vertical	2483.500	52.940	15.499	-21.060	74.000	37.441	PK
3	Vertical	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2465.272	77.673	39.359	N/A	N/A	38.314	AV
2	Horizontal	2483.500	40.757	2.282	-13.243	54.000	38.475	AV
3	Horizontal	-	-	-	-	-	-	-
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2465.704	78.047	40.692	N/A	N/A	37.355	AV
2	Vertical	2483.500	39.880	2.439	-14.120	54.000	37.441	AV
3	Vertical	-	-	-	-	-	-	-

Notes: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.
Average limit in dBuV/m is calculated as follows: Average limit = 20 x log(500uV/m).
Peak limit in dBuV/m is calculated as follows: Peak limit = Average limit + 20dB.

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6.1.2 Radiated Spurious Emission of Transmitter, FCC 15.205, FCC 15.209, FCC 15.247(c)

RESULT:

PASS

Date of testing:	2013-10-19
Ambient temperature:	23.5°C
Relative humidity:	45%
Atmospheric pressure:	101.5hPa
Frequency range:	30MHz – 25GHz
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber

Requirements:

Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must comply with the radiated emission limits specified in FCC 15.209(a).

Test procedure:

ANSI C63.10-2009 KDB558074 D01 DTS Meas Guidance v03

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The EUT was pretested in floor-standing condition and in the table position and the worst case condition was table position which was used for the final measurements. The rotation through the three orthogonal axes is normally not needed for equipment that is not hand-held or body-worn. The spectrum was examined from 30MHz to the 10th harmonic of the highest fundamental transmitter frequency (25GHz). Final radiated emission measurements were made at 3m distance.

At each frequency where a spurious emission was found, the EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations.

For frequencies between 30MHz and 1GHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1GHz, measurements were performed using the following settings: Peak: RBW & VBW = 1MHz, Average: RBW = 1MHz, VBW = 10Hz.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Emissions other than those mentioned are small or not detectable. plot data please check (File: 15069614 001 APPENDIX1).

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Table 17: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, 802.11 B Mode A

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	4824.000	40.142	47.212	-33.858	74.000	-7.069	PK
2	Horizontal	7236.000	39.663	41.410	-34.337	74.000	-1.747	PK
3	Horizontal	9648.000	40.179	35.857	-33.821	74.000	4.321	PK
4	Vertical	4824.000	38.693	45.844	-35.307	74.000	-7.151	PK
5	Vertical	7236.000	39.695	41.453	-34.305	74.000	-1.758	PK
6	Vertical	9648.000	39.692	35.311	-34.308	74.000	4.381	PK

Note: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.

The peak value is less than limit 10dB, so no average value data in the table.

Table 18: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, 802.11 B Mode B

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	4874.000	38.076	45.087	-35.924	74.000	-7.010	PK
2	Horizontal	7311.000	41.817	43.398	-32.183	74.000	-1.581	PK
3	Horizontal	9748.000	40.868	36.387	-33.132	74.000	4.482	PK
4	Vertical	4874.000	38.277	45.289	-35.723	74.000	-7.012	PK
5	Vertical	7311.000	41.686	43.267	-32.314	74.000	-1.581	PK
6	Vertical	9748.000	40.835	36.257	-33.165	74.000	4.579	PK

Note: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.

The peak value is less than limit 10dB, so no average value data in the table.

Table 19: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, 802.11 B Mode C

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	4924.000	36.902	43.982	-37.098	74.000	-7.080	PK
2	Horizontal	7386.000	40.254	41.590	-33.746	74.000	-1.336	PK
3	Horizontal	9848.000	41.097	36.181	-32.903	74.000	4.915	PK
4	Vertical	4924.000	36.876	43.876	-37.124	74.000	-7.000	PK
5	Vertical	7386.000	40.365	41.701	-33.635	74.000	-1.336	PK
6	Vertical	9848.000	40.528	35.552	-33.472	74.000	4.975	PK

Note: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.

The peak value is less than limit 10dB, so no average value data in the table.

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Table 20: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, 802.11 G Mode A

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	4824.000	38.813	44.973	-35.187	74.000	-6.159	PK
2	Horizontal	7236.000	39.646	41.267	-34.354	74.000	-1.621	PK
3	Horizontal	9648.000	39.805	34.921	-34.195	74.000	4.883	PK
4	Vertical	4824.000	37.760	44.002	-36.240	74.000	-6.241	PK
5	Vertical	7236.000	38.746	40.378	-35.254	74.000	-1.632	PK
6	Vertical	9648.000	38.803	33.860	-35.197	74.000	4.943	PK

Note: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.
The peak value is less than limit 10dB,so no average value data in the table.

Table 21: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, 802.11 G Mode B

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	4874.000	38.806	44.964	-35.194	74.000	-6.157	PK
2	Horizontal	7311.000	39.603	41.001	-34.397	74.000	-1.397	PK
3	Horizontal	9748.000	38.866	33.823	-35.134	74.000	5.043	PK
4	Vertical	4874.000	38.073	44.232	-35.927	74.000	-6.159	PK
5	Vertical	7311.000	40.044	41.442	-33.956	74.000	-1.397	PK
6	Vertical	9748.000	39.076	33.936	-34.924	74.000	5.140	PK

Note: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.
The peak value is less than limit 10dB,so no average value data in the table.

Table 22: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, 802.11 G Mode C

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	4924.000	37.244	43.443	-36.756	74.000	-6.199	PK
2	Horizontal	7386.000	40.870	41.913	-33.130	74.000	-1.042	PK
3	Horizontal	9848.000	41.102	35.874	-32.898	74.000	5.228	PK
4	Vertical	4924.000	36.672	42.792	-37.328	74.000	-6.119	PK
5	Vertical	7386.000	41.365	42.408	-32.635	74.000	-1.042	PK
6	Vertical	9848.000	41.714	36.426	-32.286	74.000	5.288	PK

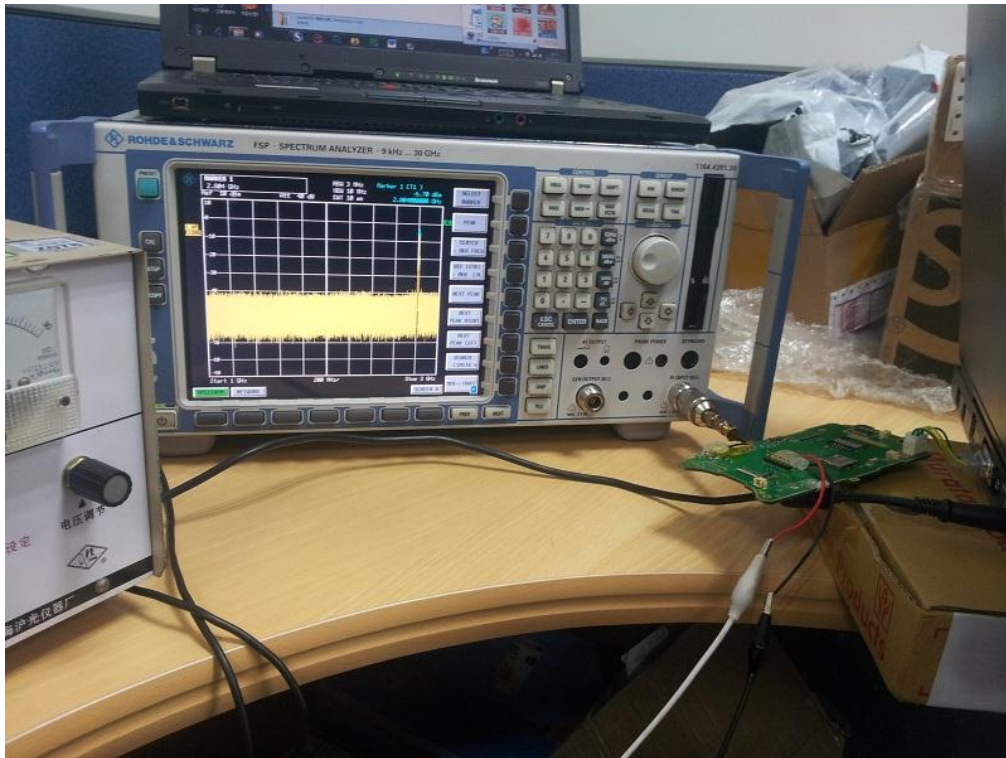
Note: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.
The peak value is less than limit 10dB,so no average value data in the table.

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7. Photographs of the Test Setup

Photograph 1: Set-up for Conducted output power at Antenna Port



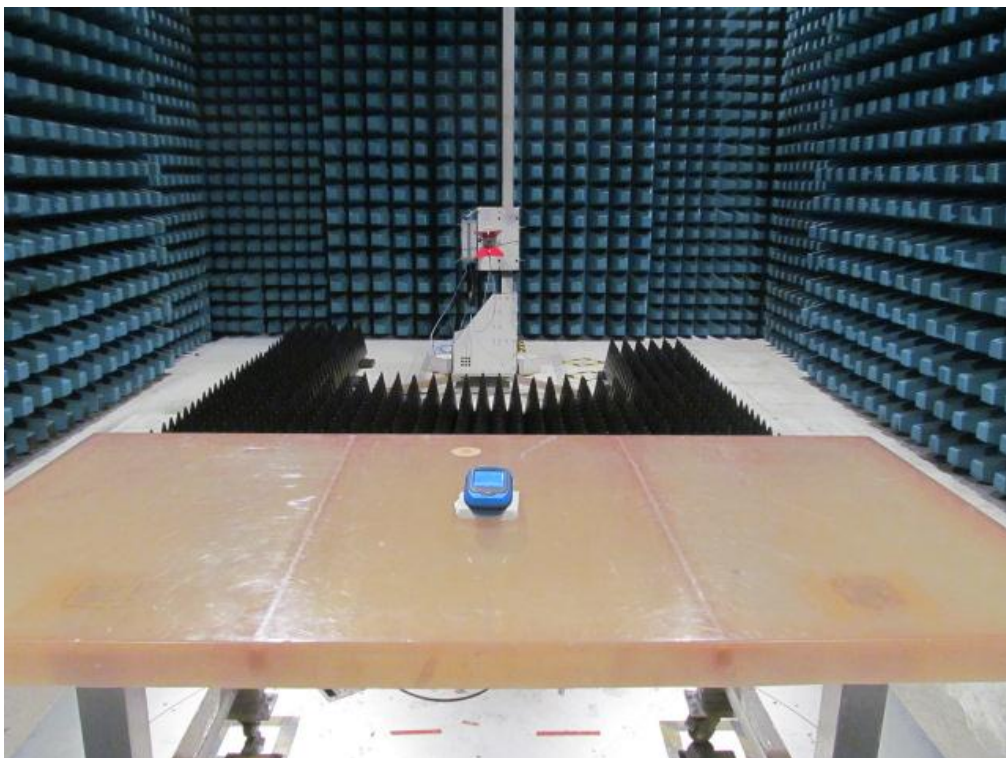
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Photograph 2: Set-up for Radiated Emission, 30MHz-1000MHz



Photograph 3: Set-up for Radiated Emission, above 1GHz



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