

Prüfbericht - Nr.:

15050672 001

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Test Report No.:

Auftraggeber:

.

Andon Health Co., Ltd.

Client:

3 Jinping Street, YaAn Road, Nankai District, Tianjin, China

Gegenstand der Prüfung:

Test Item:

Wireless Blood pressure Monitor(BP5)

Bezeichnung: Identification:

KD-936

Serien-Nr.: Serial No.:

Engineering sample

Wareneingangs-Nr.:

Receipt No.:

153189615

Eingangsdatum: Date of Receipt:

2012-03-09

Prüfort:

TÜV Rheinland (Shanghai) Co., Ltd.

Testing Location:

Building 177, No. 777 Guangzhong Road West, Shanghai 200072, P.R. China

Prüfgrundlage:

FCC 47 CFR Part 15, Subpart C, Section 15.247 (October 1, 2009)

Test Specification: AN

ANSI C63.4-2003

Public Notice DA 00-705: Filing and Measurement Guidelines for Frequency Hopping

Spread Spectrum Systems (March 30, 2000)

RSS-210 (Issue 8): 2010 RSS-Gen (Issue 3): 2010

Prüfergebnis:

Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).

Test Result:

The test item passed the test specification(s).

Prüflaboratorium:

TÜV Rheinland (Shanghai) Co., Ltd.

Testing Laboratory:

10-15/F, Huatsing Building, No.88, Lane 777, Guangzhong Road West, Shanghai

200072, P.R. China

Shill

geprüft/ tested by:

kontrolliert/ reviewed by:

2012-06-07

Shi Li / Inspector

2012-06-07 Rene Charton / Reviewer

Datum Date Name/Stellung Name/Position Unterschrift Signature Datum Name/Stellung
Date Name/Position

Unterschrift Signature

Sonstiges / Other Aspects:

Abkürzungen:

P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage Abbreviations:

P(ass) = passedF(ail) = failed

F(ail) N/A

= nicht anwendbar = nicht getestet N/A

= not applicable = 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. This test report 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 safety mark on this or similar products.



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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 AND RSS-GEN 7.1.4

RESULT: PASS

5.1.1 CONDUCTED OUTPUT POWER, FCC 15.247(B)(1) AND RSS-210 A8.4(2)

5.1.2 Carrier Frequency Separation, FCC 15.247(a)(1) and RSS-210 A8.1(b)

RESULT:

5.1.3 20DB BANDWIDTH, FCC 15.247(A)(1) AND RSS-210 A8.1(A)

5.1.4 99% BANDWIDTH, RSS-GEN 4.6.1

5.1.5 Number of Hopping Frequencies, FCC 15.247(a)(1)(iii) and RSS-210 A8.1(d)

RESULT: PASS

5.1.6 AVERAGE TIME OF OCCUPANCY, FCC 15.247(A)(1)(III) AND RSS-210 A8.1(D)

RESULT:

5.1.7 CONDUCTED SPURIOUS EMISSION, FCC 15.247(D) AND RSS-210 A8.5

RESULT: PASS

5.1.8 BAND EDGE COMPLIANCE OF RF CONDUCTED EMISSION, FCC 15.247(D) AND

RSS-210 A8.5

RESULT: **PASS**

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

RSS-210 2.2, RSS-210 2.6 AND RSS-210 A8.5

RESULT: Pass

6.1.2 RADIATED SPURIOUS EMISSION OF TRANSMITTER, FCC 15.205, FCC 15.209, FCC

15.247(D), RSS-210 2.2, RSS-210 2.6 AND RSS-210 A8.5

RESULT: **PASS**

6.2.1 RADIATED SPURIOUS EMISSION OF RECEIVER, FCC 15.109, RSS-210 2.2, RSS-

210 2.6, RSS-210 A8.5, RSS-GEN 7.2.3.2

RESULT: PASS

7.1.1 AC POWER LINE CONDUCTED EMISSION, FCC 15.207 AND RSS-GEN 7.2.2

RESULT:



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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

Lab.1:TÜV Rheinland (Shanghai) Co., Ltd. 10-15/F, Huatsing Building, No.88, Lane 777, West Guangzhong Road, Zhabei District Shanghai 200072, P.R. China

Lab.2:Quietek Technology (Suzhou)Co.,Ltd. No.99 Hongye Rd.,Suzhou Industrial 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 657274.

The Industry Canada has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance. The description of the test facility is listed under chambers filing number 2932F-1.

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2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Lab.1:

Equipment	Model	Serial no.	Cal. due date
Spectrum analyzer	FSP30	100192	21.05.2013
EMI test receiver	ESIB26	100227	21.05.2013
Artificial mains network	NNB 42	04/10048	15.02.2013

Lab.2:

Equipment	Model	Serial no.	Cal. due date
Spectrum analyzer	Agilent	N9010A	18.04.2013
EMI Test Receiver	R&S	ESCI	18.04.2013
Bilog Antenna	Teseq Gmbh	CBL6112D	18.10.2012
Broad-band Horn Antenna	Schwarzbeck	BBHA9120 D	11.06.2012
Preamplifier	Preamplifier	AP-180C	03.05.2013
Coaxial cable	Huber+Suhner	SUCOFLEX 106	02.03.2013
Temperature/Humidity Meter	Zhicheng	ZC1-2	10.01.2013

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 a Wireless Blood pressure Monitor.

3.2 System Details

Radio standard: Bluetooth Specified output power: 2dBm Antenna gain: 2.45dBi

Antenna type: Internal antenna

Antenna mounting type: Printed Antenna cable length: N/A

Frequency range: 2402 – 2480MHz

Number of channels: 79 Channel spacing: 1MHz

Modulation type: GFSK, $\pi/4$ -DQPSK or 8DPSK

Rated voltage: 3.7V for battery (Li-ion400mAh), the Power Adapter can output

DC 5V for charging the battery

Protection class: III

Test voltage: 3.7V (full charged battery)

3.2.1 Voltage Requirements, FCC 15.31(e)

RESULT: Pass

All the tests were performed using battery 1* 3.7V (Li-ion 400mAh). And the Power Adapter can output DC 5V for charging the battery. Hence it complies with the power supply requirements.

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3.2.2 Antenna Requirements, FCC 15.203, FCC 15.204 and RSS-Gen 7.1.4

RESULT: Pass

The EUT has an internal 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 C63.4:2003. Testing was performed at the lowest operating frequency (2402MHz), at the operating frequency in the middle of the specified frequency band (2441MHz) and at the highest operating frequency (2480MHz) with different modulation types.

The basic operation modes are:

- A. EUT transmits (TX mode), with full power, at lowest channel (2402MHz), a continuous modulated signal streaming with 35% duty cycle.
- B. EUT transmits (TX mode), with full power, at middle channel (2441MHz), a continuous modulated signal streaming with 35% duty cycle.
- C. EUT transmits (TX mode), with full power, at highest channel (2480MHz), a continuous modulated signal streaming with 35% duty cycle.
- D. EUT receives (RX mode), at lowest channel (2441MHz), continuously.
- E. EUT receives (RX mode), at middle channel (2441MHz), continuously.
- F. EUT receives (RX mode), at highest channel (2441MHz), continuously.
- G. EUT transmits on pseudo-random sequence on all channels (hopping mode).

3.4 Clock Frequencies

The highest clock frequency generated by the EUT is 16 MHz.

3.5 Noise Suppressing Parts

Refer to schematics and internal photos.

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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 Public Notice DA 00-705.

The test methods, which have been used, are based on ANSI C63.4-2003 and RSS-Gen (Issue 3).

For details, see under each test item.

4.2 Physical Configuration for Testing

The EUT was designed to get into related working mode with the control of a laptop computer through RS 232 interface.

Notes:

Two test samples were available. One for antennas conducted measurements and the other one 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: ISRT V1.0.31.2786 by client.

This software was running on the laptop computer connected to the EUT by RS232. It was used to enable the test operation modes listed in section 3.3 as appropriate.

4.4 Special Accessories and Auxiliary Equipment

The product has a AC to DC adapter to charge the battery in the EUT.

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4.5 Countermeasures to achieve EMC Compliance						
No additional measures v	were employed to achieve compliar	nce.				

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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)(1) and RSS-210 A8.4(2)

RESULT: Pass

Date of testing: 2012-05-31

Ambient temperature: 20°C Relative humidity: 39.6% Atmospheric pressure: 101.5hPa

Requirements:

For frequency hopping systems operating in the 2400-2483.5MHz band employing at least 75 non-overlapping hopping channels, the maximum peak output power shall be 1W (30dBm). For other hopping systems operating in the 2400-2483.5MHz band, the maximum peak output power shall be 0.125W (21dBm).

Test procedure:

ANSI C63.4-2003, RSS-Gen 4.8 and Public Notice DA 00-705.

The maximum peak output power (conducted) was measured at the antenna connector with a spectrum analyzer. The analyzer resolution bandwidth was set to 3MHz and the video bandwidth to 10MHz. The final measurement takes into account the loss generated by all the involved cables.

Table 3: Conducted Output Power, Mode A (2402MHz)

Data Rate [Mbps]	Reading [dBm]	Correction Factor [dB]	RBW [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
1	0.21	0.69	3	0.21	21	20.79
2	-1.38	0.69	3	-1.38	21	22.38
3	-1.38	0.69	3	-1.38	21	22.38

Notes: Cable loss was included in reading as offset.

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Table 4: Conducted Output Power, Mode B (2441MHz)

Data Rate [Mbps]	Reading [dBm]	Correction Factor [dB]	RBW [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
1	0.03	0.69	3	0.03	21	20.97
2	-1.77	0.69	3	-1.77	21	22.77
3	-1.37	0.69	3	-1.37	21	22.37

Notes: Cable loss was included in reading as offset.

Table 5: Conducted Output Power, Mode C (2480MHz)

Data Rate [Mbps]	Reading [dBm]	Correction Factor [dB]	RBW [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
1	-0.72	0.69	3	-0.72	21	21.72
2	-2.40	0.69	3	-2.40	21	23.40
3	-2.06	0.69	3	-2.06	21	23.06

Notes: Cable loss was included in reading as offset.

Remark:

The above results show that the worst case output power is found at the data rate of 1Mbps. 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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5.1.2 Carrier Frequency Separation, FCC 15.247(a)(1) and RSS-210 A8.1(b)

RESULT: Pass

Date of testing: 2012-05-31

Ambient temperature: 20°C Relative humidity: 39.6% Atmospheric pressure: 101.5hPa

Requirements:

Frequency hopping systems operating in the 2400-2483.5MHz band shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. In case of an output power less than 125mW, the frequency hopping system may have channels separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

Test procedure:

ANSI C63.4-2003 and Public Notice DA 00-705.

A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth was set to 30kHz and the video bandwidth to 100kHz. The Delta Marker function was used to determine the separation between the peaks of two adjacent channels.





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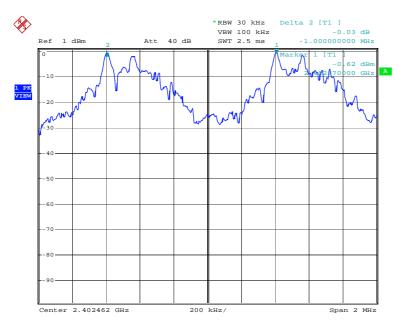
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Table 6: Carrier Frequency Separation

Channel	Channel Separation [kHz]	Limit [kHz]	20dB Bandwidth [kHz](EDR)	20dB Bandwidth [kHz](GFSK)
Low	1000	848.0	1272	690
Middle	1000	850.7	1276	694
High	1000	848.0	1272	694

Notes: Limit = 20dB bandwidth * 2/3 since it is greater than 25kHz and the output power is less than 125mW.

Figure 1: Carrier Frequency Separation-Low Channel



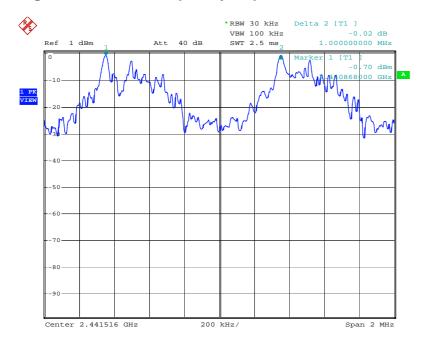
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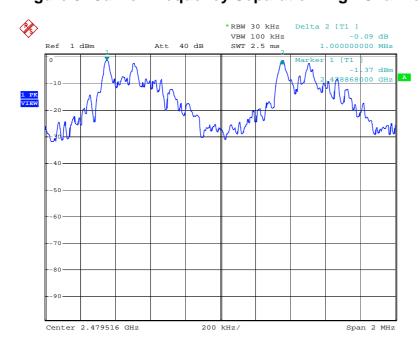
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Figure 2: Carrier Frequency Separation-Middle Channel



Date: 31.MAY.2012 15:03:47

Figure 3: Carrier Frequency Separation-High Channel



Date: 31.MAY.2012 15:05:51

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5.1.3 20dB Bandwidth, FCC 15.247(a)(1) and RSS-210 A8.1(a)

Date of testing: 2012-05-31

Ambient temperature: 20°C
Relative humidity: 39.6%
Atmospheric pressure: 101.5hPa

Requirements:

For frequency hopping systems operating in the 2400-2483.5MHz band, no bandwidth limit is specified. Test data is provided for reference.

Test procedure:

ANSI C63.4-2003, RSS-Gen 4.6.2 and Public Notice DA 00-705.

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 30kHz, the video bandwidth to 100kHz and the span to 2MHz.



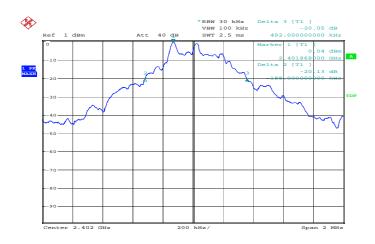
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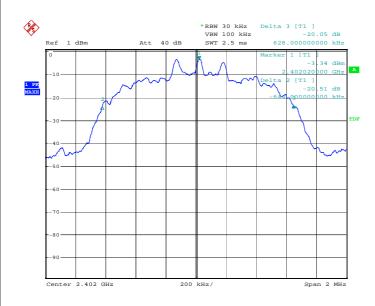
Table 7: 20dB Bandwidth

Operating Frequency [MHz]	20dB Bandwidth [kHz](EDR)	20dB Bandwidth [kHz](GFSK)
2402	1272	690
2441	1276	694
2480	1272	694

Figure 4: 20dB Bandwidth, Mode A (2402MHz)



Date: 31.MAY.2012 15:08:40



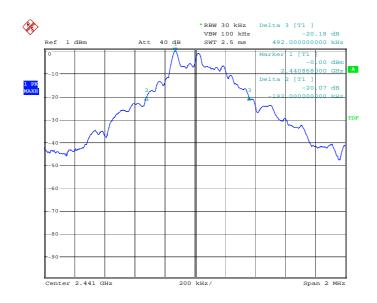
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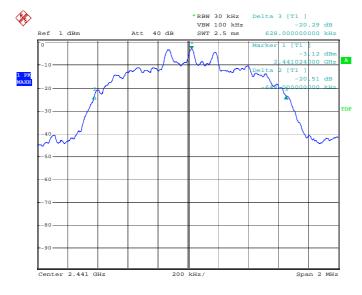
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Figure 5: 20dB Bandwidth, Mode B (2441MHz)



Date: 31.MAY.2012 15:10:34



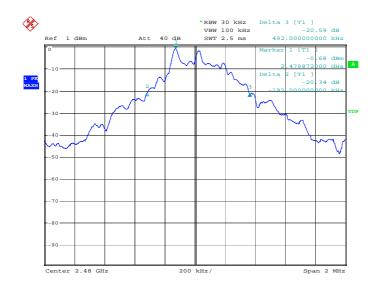
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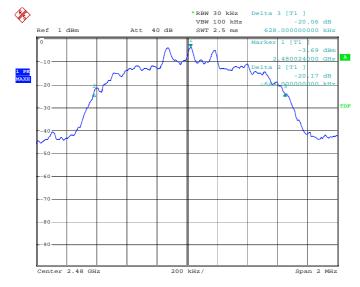
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Figure 6: 20dB Bandwidth, Mode C (2480MHz)



Date: 31.MAY.2012 15:11:57



Date: 31.MAY.2012 15:33:11

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5.1.4 99% Bandwidth, RSS-Gen 4.6.1

Date of testing: 2012-05-31

Ambient temperature: 20°C Relative humidity: 39.6% Atmospheric pressure: 101.5hPa

Requirements:

The 99% bandwidth shall be reported according to RSS-Gen 4.6.1.

Test procedure:

RSS-Gen 4.6.1.

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 1% of the span (2MHz). The 99% bandwidth was measured by using the OBW function of the analyzer with a 99% coverage setting.

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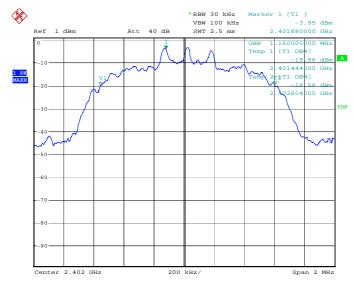
Table 8: 99% Bandwidth

Operating Frequency [MHz]	99% Bandwidth [MHz](EDR)	99% Bandwidth [MHz](GFSK)
2402	1.160	732
2441	1.160	736
2480	1.164	748

Figure 7: 99% Bandwidth, Mode A (2402MHz)



Date: 31.MAY.2012 15:37:44





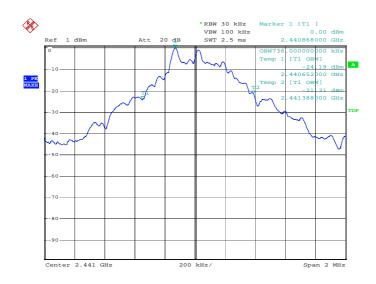
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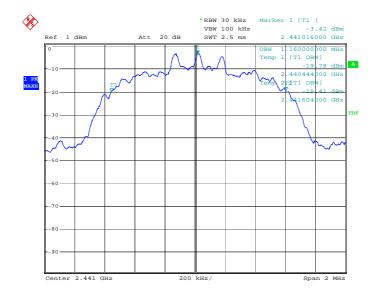
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Figure 8: 99% Bandwidth, Mode B (2441MHz)



Date: 31.MAY.2012 15:39:24



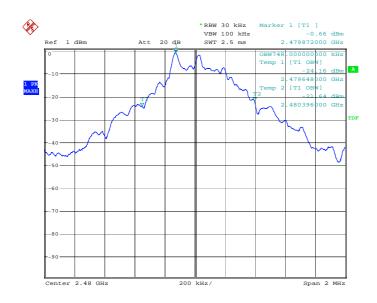
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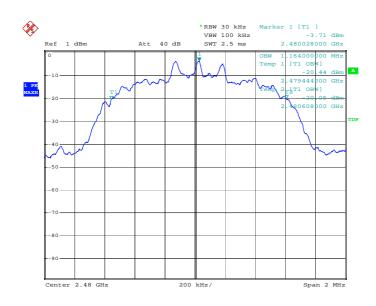
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Figure 9: 99% Bandwidth, Mode C (2480MHz)



Date: 31.MAY.2012 15:40:38



Date: 31.MAY.2012 15:34:05

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5.1.5 Number of Hopping Frequencies, FCC 15.247(a)(1)(iii) and RSS-210 A8.1(d)

RESULT: Pass

Date of testing: 2012-05-31

Ambient temperature: 20°C Relative humidity: 39.6% Atmospheric pressure: 101.5hPa

Requirements:

Frequency hopping systems operating in the 2400-2483.5MHz band shall use at least 15 channels.

Test procedure:

ANSI C63.4-2003 and Public Notice DA 00-705.

A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth was set to 300kHz and video bandwidth was set to 1MHz. The spectrum was broken in three plots to show all the hopping frequencies.

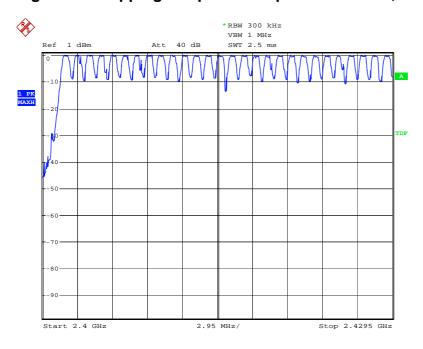
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Table 9: Number of Hopping Frequencies

Number of Hopping Frequencies	Limit	
79	15	

Figure 10: Hopping Frequencies up to 2429.5MHz, Mode G (Hopping)



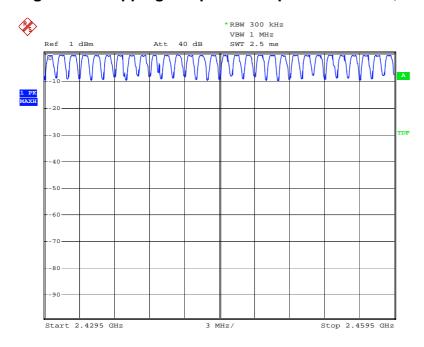
Date: 31.MAY.2012 15:43:23



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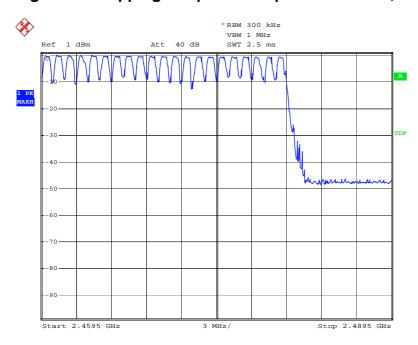
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Figure 11: Hopping Frequencies up to 2459.5MHz, Mode G (Hopping)



Date: 31.MAY.2012 15:45:20

Figure 12: Hopping Frequencies up to 2489.5MHz, Mode G (Hopping)



Date: 31.MAY.2012 15:46:58

Products

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5.1.6 Average Time of Occupancy, FCC 15.247(a)(1)(iii) and RSS-210 A8.1(d)

RESULT: Pass

Date of testing: 2012-05-31

Ambient temperature: 20°C Relative humidity: 39.6% Atmospheric pressure: 101.5hPa

Requirements:

For frequency hopping systems operating in the 2400-2483.5MHz band, the average time of occupancy on any channel shall not be greater than 0.4s within a period of 0.4s multiplied by the number of hopping channels employed.

Test procedure:

ANSI C63.4-2003 and Public Notice DA 00-705.

A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth and video bandwidth were set to 1MHz. The average time of occupancy was obtained by measuring first the dwell time of a single packet with the Delta Marker function using a zero span centered on a hopping channel and by counting then the number of hops per channel in a 31.6s period (0.4s times the number of hopping channels).





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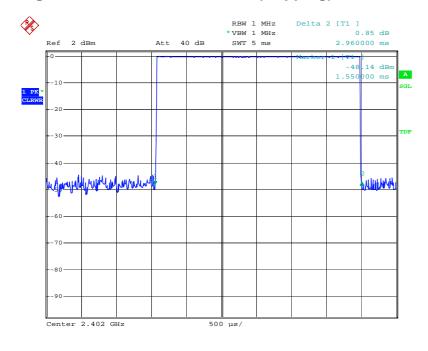
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Table 10: Average Time of Occupancy

Channel	Packet Type	Packet Duration [ms]	Number of Hops per Channel in a 31.6s Period	Average Time of Occupancy [ms]	Limit [ms]
	DH5	2.96	106.81	316.2	400
Low	2-DH5	2.95	106.81	315.1	400
	3-DH5	2.94	106.81	314.0	400
Mid	DH5	2.95	106.81	315.1	400
	2-DH5	2.95	106.81	315.1	400
	3-DH5	2.95	106.81	315.1	400
High	DH5	2.96	106.81	316.2	400
	2-DH5	2.95	106.81	315.1	400
	3-DH5	2.95	106.81	315.1	400

Notes: Average time of occupancy = Packet duration * Number of hops per channel in a 31.6s period

Figure 13: Dwell Time, Mode G (Hopping), DH5, Low channel



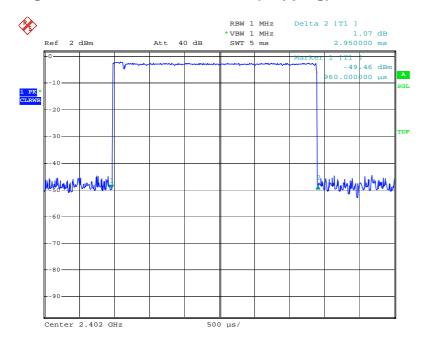
Date: 31.MAY.2012 15:50:44



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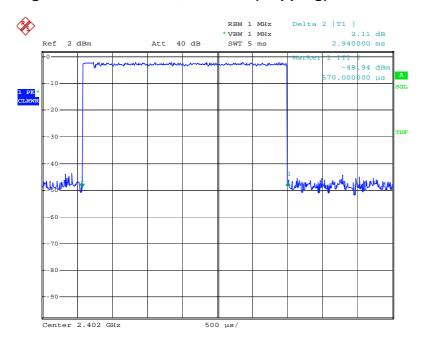
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Figure 14: Dwell Time, Mode G (Hopping),2-DH5, Low channel



Date: 31.MAY.2012 15:52:40

Figure 15: Dwell Time, Mode G (Hopping), 3-DH5, Low channel



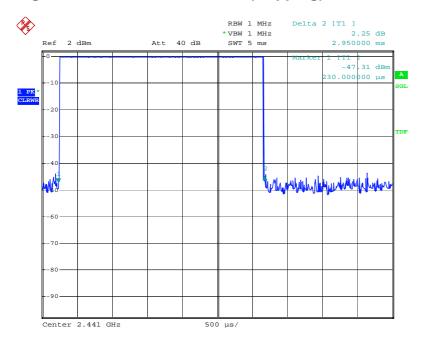
Date: 31.MAY.2012 15:54:18



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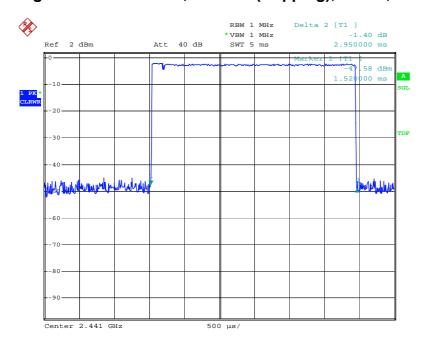
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Figure 16: Dwell Time, Mode G(Hopping), DH5, Mid channel



Date: 31.MAY.2012 15:55:59

Figure 17: Dwell Time, Mode G (Hopping), 2-DH5, Mid channel



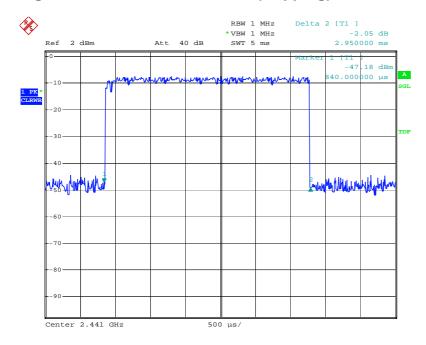
Date: 31.MAY.2012 15:57:44



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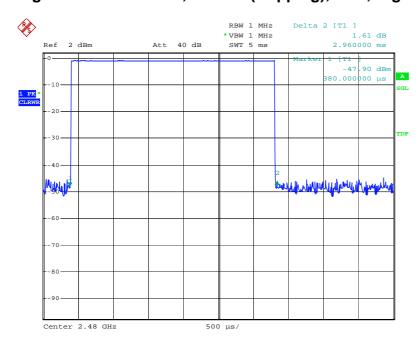
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Figure 18: Dwell Time, Mode G (Hopping), 3-DH5, Mid channel



Date: 31.MAY.2012 15:59:56

Figure 19: Dwell Time, Mode G(Hopping), DH5, High channel



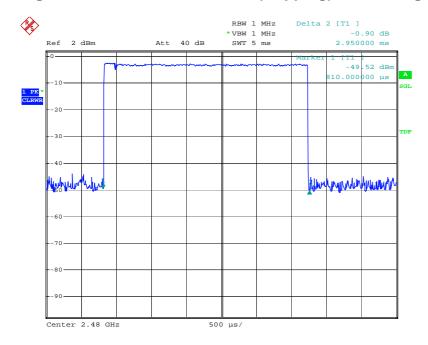
Date: 31.MAY.2012 16:02:36



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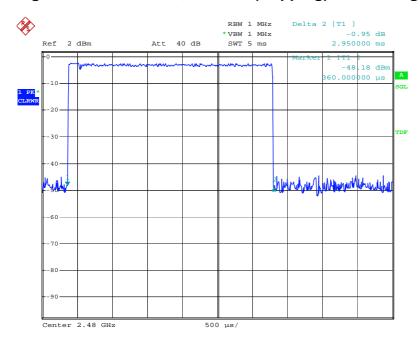
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Figure 20: Dwell Time, Mode G (Hopping), 2-DH5, High channel



Date: 31.MAY.2012 16:04:25

Figure 21: Dwell Time, Mode G (Hopping),3- DH5, High channel



Date: 31.MAY.2012 16:06:04

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5.1.7 Conducted Spurious Emission, FCC 15.247(d) and RSS-210 A8.5

RESULT: Pass

Date of testing: 2012-05-31

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 C63.4-2003, RSS-Gen 4.9 and Public Notice DA 00-705.

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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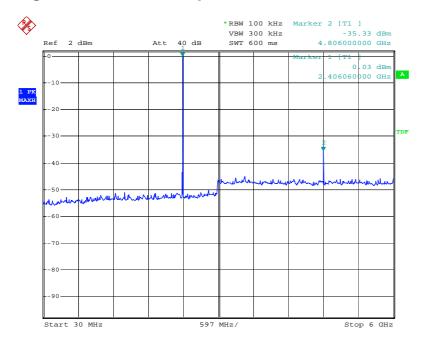
Table 11: Conducted Spurious Emission, Mode A (2402MHz)

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
4806	-35.33	-35.33	-19.97	15.36
24050	-28.67	-28.67	-19.97	8.70
2406.06	0.03	0.03	NA	NA

Notes: Cable loss was included in reading as offset.

Limit = Reading of fundamental + Correction factor – 20dB

Figure 22: Conducted Spurious Emission, 30MHz – 6GHz, Mode A (2402MHz)



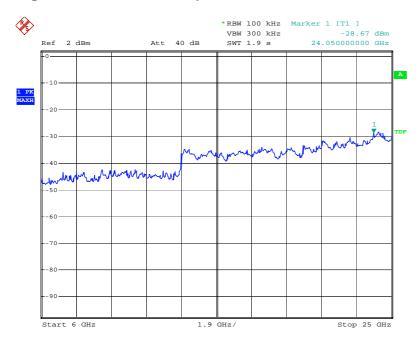
Date: 31.MAY.2012 16:12:00



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Figure 23: Conducted Spurious Emission, 6 – 25GHz, Mode A (2402MHz)



Date: 31.MAY.2012 16:12:46

Table 12: Conducted Spurious Emission, Mode B (2441MHz)

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
4889.58	-36.75	-36.75	-20.09	16.66
24164	-27.83	-27.83	-20.09	7.74
2441.88	-0.09	-0.09	NA	N/A

Notes: Cable loss was included in reading as offset.

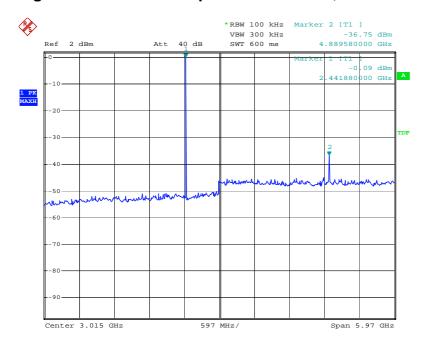
Limit = Reading of fundamental + Correction factor – 20dB



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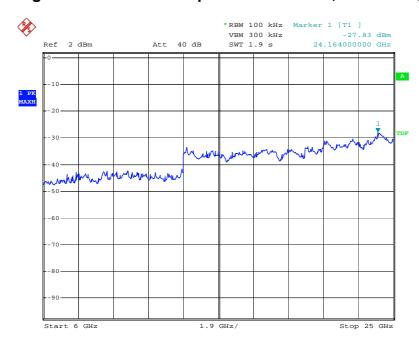
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Figure 24: Conducted Spurious Emission, 30MHz – 6GHz, Mode B (2441MHz)



Date: 31.MAY.2012 16:14:39

Figure 25: Conducted Spurious Emission, 6 – 25GHz, Mode B (2441MHz)



Date: 31.MAY.2012 16:15:50



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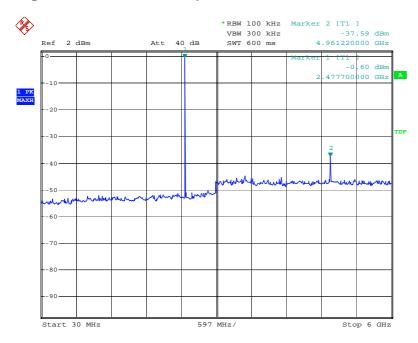
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Table 13: Conducted Spurious Emission, Mode C (2480MHz)

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
4961.22	-37.59	-37.59	-20.06	17.53
24392	-27.65	-27.65	-20.06	7.59
2477.7	-0.60	-0.60	N/A	N/A

Notes: Cable loss was included in reading as offset. Limit = Reading of fundamental + Correction factor – 20dB

Figure 26: Conducted Spurious Emission, 30MHz – 6GHz, Mode C (2480MHz)



Date: 31.MAY.2012 16:16:58

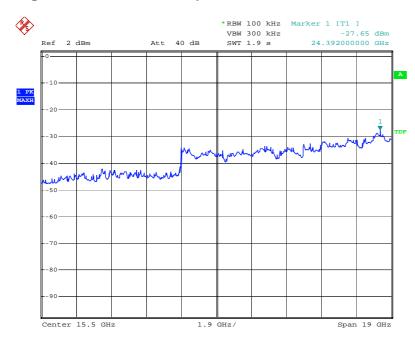




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Figure 27: Conducted Spurious Emission, 6 – 25GHz, Mode C (2480MHz)



Date: 31.MAY.2012 16:17:51

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5.1.8 Band Edge Compliance of RF Conducted Emission, FCC 15.247(d) and RSS-210 A8.5

RESULT: Pass

Date of testing: 2012-05-31

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 C63.4-2003 and Public Notice DA 00-705.

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.

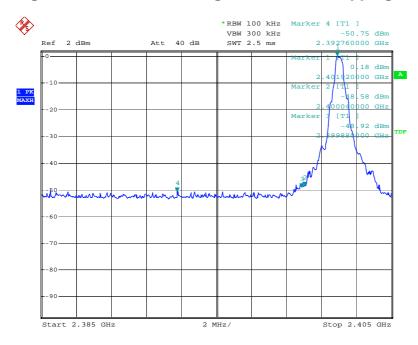
The final measurement takes into account the loss generated by all the involved cables.



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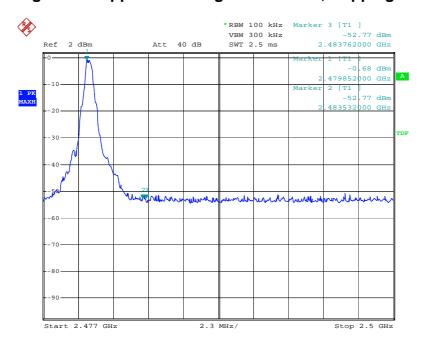
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Figure 28: Lower Band Edge Conducted, Hopping Disenabled



Date: 31.MAY.2012 16:33:53

Figure 29: Upper Band Edge Conducted, Hopping Disenabled



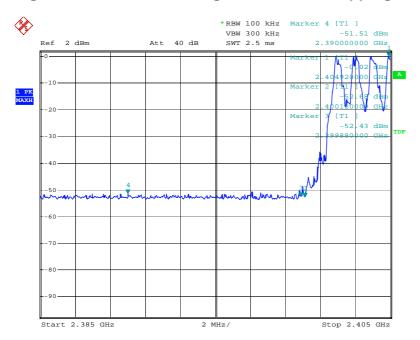
Date: 31.MAY.2012 16:35:44



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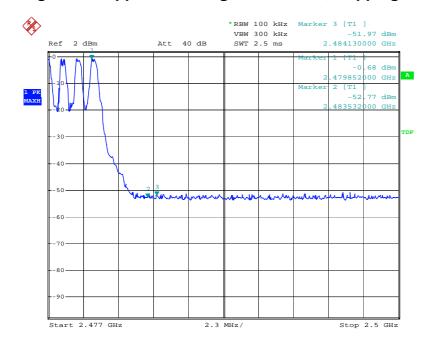
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Figure 30: Lower Band Edge Conducted, Hopping Enabled



Date: 31.MAY.2012 16:40:33

Figure 31: Upper Band Edge Conducted, Hopping Enabled



Date: 31.MAY.2012 16:38:20

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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(d), RSS-210 2.2, RSS-210 2.6 and RSS-210 A8.5

RESULT: Pass

Date of testing: 2012-06-02

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) and RSS-210 2.7 (Table 1), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-210 2.7 (Table 2 and 3).

Test procedure:

ANSI C63.4-2003, RSS-Gen 4.9 and Public Notice DA 00-705.

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.

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Table 14: Band Edge Radiated Emission

Operating Frequency [MHz]	EUT / Antenna Orient.	Average Value [dBµV/m]	Peak Value [dBµV/m]	Average Limit [dBµV/m]	Peak Limit [dBµV/m]	Average Margin [dB]	Peak Margin [dB]
2390.0000	X/H	No peak found	61.166	54	74	N/A	12.834
2399.8900	X/H	No peak found	65.602	54	74	N/A	8.398
2390.0000	X/V	No peak found	60.848	54	74	N/A	13.152
2399.8900	X/V	No peak found	62.197	54	74	N/A	11.803
2483.4500	X/H	No peak found	61.786	54	74	N/A	12.214
2484.9000	X/H	No peak found	61.144	54	74	N/A	12.856
2483.4500	X/V	No peak found	61.293	54	74	N/A	12.707
2484.9000	X/V	No peak found	61.408	54	74	N/A	12.592

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.

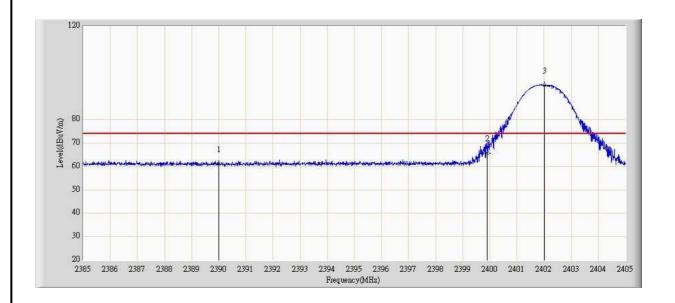
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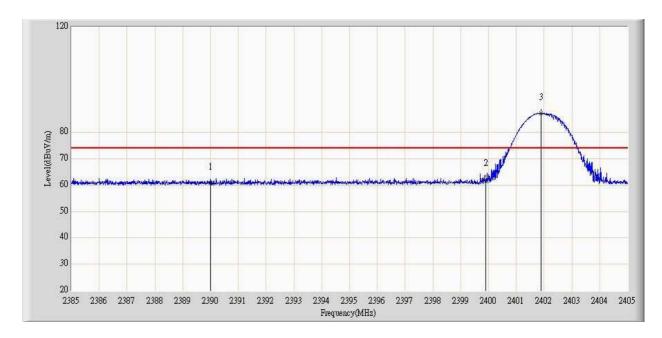


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Figure 32: Band Edge Radiated Emission, Spectral Diagram, Mode A (2402MHz)





Note: The upper diagram shows the vertical peak value and the lower diagram shows the horizontal value.

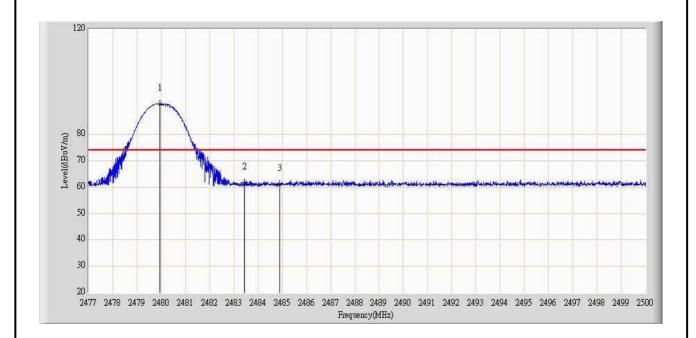
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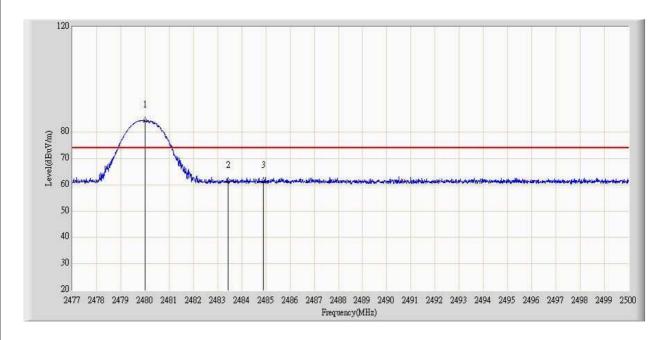


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Figure 33: Band Edge Radiated Emission, Spectral Diagram, Mode C (2480MHz)





Note: The upper diagram shows the vertical peak value and the lower diagram shows the horizontal value.

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6.1.2 Radiated Spurious Emission of Transmitter, FCC 15.205, FCC 15.209, FCC 15.247(d), RSS-210 2.2, RSS-210 2.6 and RSS-210 A8.5

RESULT: Pass

Date of testing: 2012-06-02

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) and RSS-210 2.7 (Table 1), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-210 2.7 (Table 2 and 3).

Test procedure:

ANSI C63.4-2003, RSS-Gen 4.9 and Public Notice DA 00-705.

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 bodyworn.

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.

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Table 15: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz)

Freq. [MHz]	EUT / Antenna Orientation	Level AV [dBµV/m]	Level PK [dBµV/m]	Limit AV [dBµV/m]	Limit PK [dBµV/m]	Margin AV [dB]	Margin PK [dB]
7205	X/H	47.003	55.790	54	74	6.997	18.210
7205	X/V	49.732	57.627	54	74	4.268	16.373

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

Table 16: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2441MHz)

Freq. [MHz]	EUT / Antenna Orientation	Level AV [dBµV/m]	Level PK [dBµV/m]	Limit AV [dBµV/m]	Limit PK [dBµV/m]	Margin AV [dB]	Margin PK [dB]
7324	X/H	39.684	55.129	54	74	14.316	18.871
7324	X/V	40.729	57.574	54	74	13.271	16.426

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

Table 17: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2441MHz)

Freq. [MHz]	EUT / Antenna Orientation	Level AV [dBµV/m]	Level PK [dBµV/m]	Limit AV [dBµV/m]	Limit PK [dBµV/m]	Margin AV [dB]	Margin PK [dB]
7443	X/H	42.323	56.434	54	74	11.677	17.566
7443	X/V	42.726	59.526	54	74	11.274	14.474

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

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6.2 Receiver Parameters

6.2.1 Radiated Spurious Emission of Receiver, FCC 15.109, RSS-210 2.2, RSS-210 2.6, RSS-210 A8.5, RSS-Gen 7.2.3.2

RESULT: Pass

Date of testing: 2012-03-05

Ambient temperature: 23.5°C
Relative humidity: 45%
Atmospheric pressure: 101.5hPa

Frequency range: 30MHz – 12.5GHz

Measurement distance: 3m

Kind of test site: Semi Anechoic Chamber

Requirements:

The emissions from the unintentional radiator shall not exceed the field strength specified in 15.109(a) and RSS-210 Table 2 (and RSS-Gen Table 1).

Test procedure:

ANSI C63.4-2003 and RSS-Gen 4.10.

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 bodyworn.

The spectrum was examined from 30MHz to the 5th harmonic of the highest fundamental operation frequency (12.5GHz). Final radiated emission measurements were made at 3m distance.

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. No spurious emission was found in the range 30MHz – 12500MHz.

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7. Test Results of AC Power Line Conducted Measurements

7.1.1 AC Power Line Conducted Emission, FCC 15.207 and RSS-Gen 7.2.2

RESULT: Pass

Date of testing: 2012-04-05

Ambient temperature: 23.0°C
Relative humidity: 45%
Atmospheric pressure: 101.5hPa

Frequency range: 0.15 – 30MHz Kind of test site: Shielded Room

Requirements:

The AC power line conducted emission on any frequency within the band 150 kHz to 30MHz shall not exceed the limits specified in FCC 15.207 and RSS-Gen 7.2.2.

Test procedure:

ANSI C63.4-2003.

The EUT was placed on a wooden table raised 80cm above the reference ground plane. A vertical conducting plane of the screened room was located 40cm to the rear of the EUT. The AC adapter of the EUT was connected to a Line Impedance Stabilization Network (LISN).

The physical arrangement of the test system and associated cabling was varied to determine the effect on the EUT's emissions in amplitude and frequency in order to ensure that maximum emission amplitudes were attained.

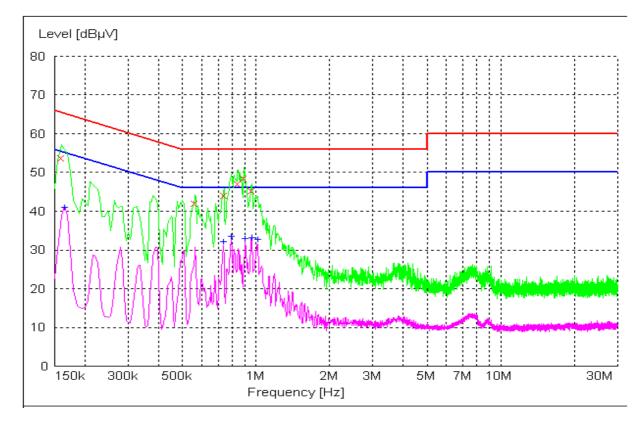
The measurements were performed with the receiver operating in the CISPR quasipeak and average detection modes.



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Figure 34: Spectral Diagrams, Conducted Emission, 150kHz - 30MHz, L



Final quasi-peak measurement results:

Frequency	Level	Transd	Limit	Margin	Line
MHz	dΒμV	dВ	dΒμV	dВ	
0.160000	53.80	20.3	65.5	11.7	L1
0.565000	42.10	20.5	56.0	13.9	L1
0.740000	44.20	20.5	56.0	11.8	L1
0.845000	47.30	20.5	56.0	8.7	L1
0.895000	48.70	20.4	56.0	7.3	L1
0.960000	45.30	20.4	56.0	10.7	L1

Final average measurement results:

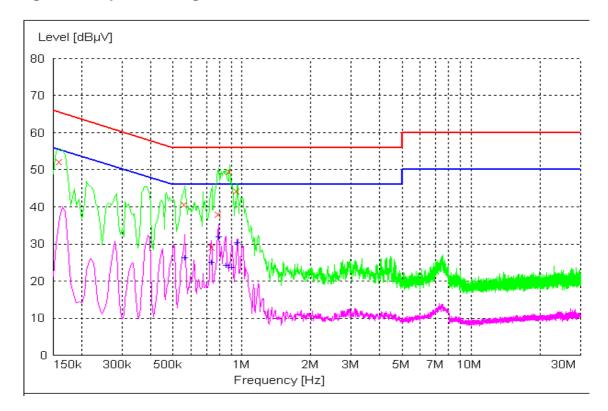
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line
0.165000	41.00	20.4	55.2	14.3	L1
0.735000	32.10	20.5	46.0	13.9	L1
0.790000	33.40	20.5	46.0	12.6	L1
0.905000	32.90	20.4	46.0	13.1	L1
0.960000	33.00	20.4	46.0	13.0	L1
1.105000	32.70	20.4	46.0	13.3	L1



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Figure 35: Spectral Diagrams, Conducted Emission, 150kHz - 30MHz, N



Final quasi-peak measurement results:

Frequency	Level		Limit	Margin	Line
MHz	dΒμV	dB	dΒμV	dB	
0.160000	52.30	20.0	65.5	13.2	N
0.565000	40.70	20.3	56.0	15.3	N
0.740000	29.30	20.1	56.0	26.7	N
0.795000	38.10	20.2	56.0	17.9	N
0.885000	49.70	20.2	56.0	6.3	N
0.955000	44.40	20.2	56.0	11.6	N

Final average measurement results:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line
0.565000	26.20	20.3	46.0	19.8	N
0.735000	25.10	20.1	46.0	20.9	N
0.790000	31.80	20.2	46.0	14.2	N
0.850000	24.20	20.2	46.0	21.8	N
0.905000	23.60	20.2	46.0	22.4	N
0 955000	30 30	20 2	46 N	15 7	N

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8. Photographs of the Test Setup

Photograph 1: Set-up for AC Power Line Conducted Emission



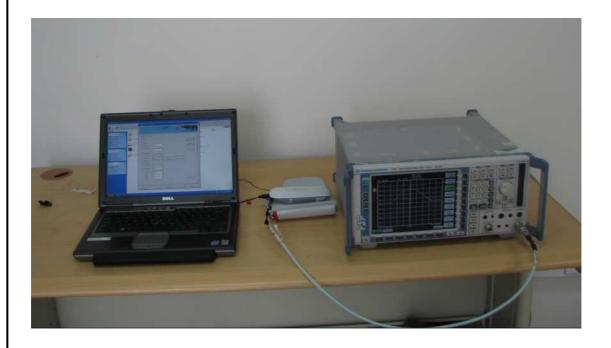
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Photograph 2: Set-up for Conducted Emission at Antenna Port



Photograph 3: Set-up for Radiated Emission, 30MHz-1000MHz



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Photograph 4: Set-up for Radiated Emission, 1G-18GHz



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