

**Produkte**  
Products

<b>Prüfbericht - Nr.:</b> <b>15045012 001</b>		<b>Seite 1 von 48</b>			
<i>Test Report No.:</i>		<i>Page 1 of 48</i>			
<b>Auftraggeber:</b> <i>Client:</i>	<b>Andon Health Co., Ltd.</b> No.31 Changjiang Road, Nankai District Tianjin 300193, P.R. China				
<b>Gegenstand der Prüfung:</b> <i>Test Item:</i>	<b>Automatic Blood Pressure Monitor</b>				
<b>Bezeichnung:</b> <i>Identification:</i>	<b>KD-923</b>	<b>Serien-Nr.:</b> <i>Serial No.:</i>	<b>Engineering sample</b>		
<b>Wareneingangs-Nr.:</b> <i>Receipt No.:</i>	<b>153166307</b>	<b>Eingangsdatum:</b> <i>Date of Receipt:</i>	<b>2011-07-06</b>		
<b>Prüfört:</b> <i>Testing Location:</i>	<b>TÜV Rheinland (Shanghai) Co., Ltd.</b> Building 2, No. 777 Guangzhong Road West, Shanghai 200072, P.R. China				
<b>Prüfgrundlage:</b> <i>Test Specification:</i>	<b>FCC 47 CFR Part 15, Subpart C, Section 15.247 (October 1, 2009)</b> ANSI C63.4-2003 Public Notice DA 00-705: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems (March 30, 2000)				
<b>Prüfergebnis:</b> <i>Test Result:</i>	<b>Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).</b> <i>The test item passed the test specification(s).</i>				
<b>Prüflaboratorium:</b> <i>Testing Laboratory:</i>	<b>TÜV Rheinland (Shanghai) Co., Ltd.</b> 10-15/F, Huatsing Building, No.88, Lane 777, Guangzhong Road West, Shanghai 200072, P.R. China				
<b>geprüft/ tested by:</b>		<b>kontrolliert/ reviewed by:</b>			
2011-08-25	Shi Li / Inspector	<i>Li-shi</i>	2011-08-25 Kong Xiangming / Reviewer <i>Kong Xiangming</i>		
<b>Datum</b> <i>Date</i>	<b>Name/Stellung</b> <i>Name/Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name/Stellung</b> <i>Name/Position</i>	<b>Unterschrift</b> <i>Signature</i>
<b>Sonstiges / Other Aspects:</b>					
<b>Abkürzungen:</b> P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet					
<b>Abbreviations:</b> P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested					
<p><b>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.</b>  <i>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.</i></p>					

**Prüfbericht - Nr.: 15045012 001**  
*Test Report No.:*

**Seite 2 von 48**  
*Page 2 of 48*

## TEST SUMMARY

### **3.2.1 VOLTAGE REQUIREMENTS, FCC 15.31(E)**

*RESULT: PASS*

### **3.2.2 ANTENNA REQUIREMENTS, FCC 15.203 AND FCC 15.204**

*RESULT: PASS*

### **5.1.1 CONDUCTED OUTPUT POWER, FCC 15.247(B)(1)**

*RESULT: PASS*

### **5.1.2 CARRIER FREQUENCY SEPARATION, FCC 15.247(A)(1)**

*RESULT: PASS*

### **5.1.3 20dB BANDWIDTH, FCC 15.247(A)(1)**

### **5.1.4 NUMBER OF HOPPING FREQUENCIES, FCC 15.247(A)(1)(III)**

*RESULT: PASS*

### **5.1.5 AVERAGE TIME OF OCCUPANCY, FCC 15.247(A)(1)(III)**

*RESULT: PASS*

### **5.1.6 CONDUCTED SPURIOUS EMISSION, FCC 15.247(D)**

*RESULT: PASS*

### **5.1.7 BAND EDGE COMPLIANCE OF RF CONDUCTED EMISSION, FCC 15.247(D)**

*RESULT: PASS*

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

*RESULT: Pass*

### **6.1.2 RADIATED SPURIOUS EMISSION OF TRANSMITTER, FCC 15.205, FCC 15.209 AND FCC 15.247(D)**

*RESULT: PASS*

### **6.2.1 RADIATED SPURIOUS EMISSION OF RECEIVER, FCC 15.109**

*RESULT: PASS*

**Prüfbericht - Nr.: 15045012 001**

Test Report No.:

Seite 3 von 48

Page 3 of 48

## Contents

<b>1.</b>	<b>GENERAL REMARKS .....</b>	<b>5</b>
<b>1.1</b>	<b>COMPLEMENTARY MATERIALS .....</b>	<b>5</b>
<b>2.</b>	<b>TEST SITES .....</b>	<b>5</b>
<b>2.1</b>	<b>TEST FACILITIES .....</b>	<b>5</b>
<b>2.2</b>	<b>LIST OF TEST AND MEASUREMENT INSTRUMENTS .....</b>	<b>6</b>
<b>2.3</b>	<b>MEASUREMENT UNCERTAINTY .....</b>	<b>6</b>
<b>3.</b>	<b>GENERAL PRODUCT INFORMATION .....</b>	<b>7</b>
<b>3.1</b>	<b>PRODUCT FUNCTION AND INTENDED USE .....</b>	<b>7</b>
<b>3.2</b>	<b>SYSTEM DETAILS .....</b>	<b>7</b>
3.2.1	<i>Voltage Requirements, FCC 15.31(e).....</i>	<i>7</i>
3.2.2	<i>Antenna Requirements, FCC 15.203 and FCC 15.204 .....</i>	<i>7</i>
<b>3.3</b>	<b>INDEPENDENT OPERATION MODES .....</b>	<b>8</b>
<b>3.4</b>	<b>CLOCK FREQUENCIES .....</b>	<b>8</b>
<b>3.5</b>	<b>NOISE SUPPRESSING PARTS.....</b>	<b>8</b>
<b>4.</b>	<b>TEST SET-UP AND OPERATION MODES .....</b>	<b>9</b>
<b>4.1</b>	<b>TEST METHODOLOGY .....</b>	<b>9</b>
<b>4.2</b>	<b>PHYSICAL CONFIGURATION FOR TESTING .....</b>	<b>9</b>
<b>4.3</b>	<b>TEST OPERATION AND TEST SOFTWARE .....</b>	<b>9</b>
<b>4.4</b>	<b>SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT .....</b>	<b>9</b>
<b>4.5</b>	<b>COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....</b>	<b>9</b>
<b>5.</b>	<b>TEST RESULTS OF CONDUCTED MEASUREMENTS AT ANTENNA PORT .....</b>	<b>10</b>
<b>5.1</b>	<b>TRANSMITTER PARAMETERS.....</b>	<b>10</b>
5.1.1	<i>Conducted Output Power, FCC 15.247(b)(1) .....</i>	<i>10</i>
5.1.2	<i>Carrier Frequency Separation, FCC 15.247(a)(1) .....</i>	<i>12</i>
5.1.3	<i>20dB Bandwidth, FCC 15.247(a)(1).....</i>	<i>15</i>
5.1.4	<i>Number of Hopping Frequencies, FCC 15.247(a)(1)(iii).....</i>	<i>19</i>
5.1.5	<i>Average Time of Occupancy, FCC 15.247(a)(1)(iii) .....</i>	<i>22</i>
5.1.6	<i>Conducted Spurious Emission, FCC 15.247(d).....</i>	<i>28</i>
5.1.7	<i>Band Edge Compliance of RF Conducted Emission, FCC 15.247(d) .....</i>	<i>34</i>
<b>6.</b>	<b>TEST RESULTS OF RADIATED MEASUREMENTS .....</b>	<b>37</b>
<b>6.1</b>	<b>TRANSMITTER PARAMETERS.....</b>	<b>37</b>
6.1.1	<i>Band Edge Radiated Emission, FCC 15.205, FCC 15.209 and FCC 15.247(d) .....</i>	<i>37</i>
6.1.2	<i>Radiated Spurious Emission of Transmitter, FCC 15.205, FCC 15.209 and FCC 15.247(d) ...</i>	<i>41</i>
<b>6.2</b>	<b>RECEIVER PARAMETERS .....</b>	<b>43</b>
6.2.1	<i>Radiated Spurious Emission of Receiver, FCC 15.109.....</i>	<i>43</i>

**Prüfbericht - Nr.: 15045012 001**  
*Test Report No.:*

**Seite 4 von 48**  
*Page 4 of 48*

<b>7.</b>	<b>PHOTOGRAPHS OF THE TEST SETUP.....</b>	<b>45</b>
<b>8.</b>	<b>LIST OF TABLES.....</b>	<b>47</b>
<b>9.</b>	<b>LIST OF FIGURES .....</b>	<b>47</b>
<b>10.</b>	<b>LIST OF PHOTOGRAPHS.....</b>	<b>48</b>

**Prüfbericht - Nr.:** 15045012 001  
*Test Report No.:*

**Seite 5 von 48**  
*Page 5 of 48*

## 1. General Remarks

### 1.1 Complementary Materials

All attachments are integral parts of this test report.

## 2. Test Sites

### 2.1 Test Facilities

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

**Prüfbericht - Nr.: 15045012 001**  
*Test Report No.:*

**Seite 6 von 48**  
*Page 6 of 48*

## 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**

Equipment	Model	Serial no.	Cal. due date
3m modified semi-anechoic chamber	SAC	N/A	22.11.2012
EMI test receiver	ESCI	100280	22.11.2011
Trilog broadband antenna	VULB 9163	9163-492	23.05.2013
Spectrum analyzer	FSP30	100192	31.05.2012
Broadband coaxial preamplifier	BBV 9718	9718-012	01.04.2012
Double ridged broadband horn antenna	BBHA 9120 D	9120D-433	15.05.2013

## 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

**Prüfbericht - Nr.:** 15045012 001  
*Test Report No.:*

**Seite 7 von 48**  
*Page 7 of 48*

### 3. General Product Information

#### 3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a blood pressure monitor with bluetooth function.

#### 3.2 System Details

Radio standard:	Bluetooth
Specified output power:	8dBm
Antenna gain:	2.28dBi
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:	6V (Battery)
Protection class:	III
Test voltage:	6V

##### 3.2.1 Voltage Requirements, FCC 15.31(e)

**RESULT:** **PASS**

All the tests were performed using new batteries. Hence it complies with the power supply requirements.

##### 3.2.2 Antenna Requirements, FCC 15.203 and FCC 15.204

**RESULT:** **PASS**

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

**Prüfbericht - Nr.: 15045012 001***Test Report No.:***Seite 8 von 48***Page 8 of 48*

### **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.

The basic operation modes are:

- A. EUT transmits (TX mode), with full power, at lowest channel (2402MHz), a continuous modulated signal streaming with 30% duty cycle.
- B. EUT transmits (TX mode), with full power, at middle channel (2441MHz), a continuous modulated signal streaming with 30% duty cycle.
- C. EUT transmits (TX mode), with full power, at highest channel (2480MHz), a continuous modulated signal streaming with 30% duty cycle.
- D. EUT receives (RX mode), at lowest, middle and highest channel, continuously.
- E. 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.



**Prüfbericht - Nr.: 15045012 001**  
*Test Report No.:*

**Seite 9 von 48**  
*Page 9 of 48*

## **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.

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.

Notes:

Two test samples were available. Sample No.1 was used for antenna conducted measurements and sample No. 2 was used for radiated measurements.

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

For antenna conducted measurements, the antenna were removed and replaced by an N-type connector attached to the EUT antenna port.

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

### **4.3 Test Operation and Test Software**

Software used for testing: EDR RF test version 080812 by client.

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.

### **4.4 Special Accessories and Auxiliary Equipment**

N/A.

### **4.5 Countermeasures to achieve EMC Compliance**

No additional measures were employed to achieve compliance.

**Prüfbericht - Nr.: 15045012 001**  
 Test Report No.:

Seite 10 von 48  
 Page 10 of 48

## 5. Test Results of Conducted Measurements at Antenna Port

### 5.1 Transmitter Parameters

#### 5.1.1 Conducted Output Power, FCC 15.247(b)(1)

**RESULT:**

**PASS**

Date of testing: 2011-07-12

Ambient temperature: 23.1°C

Relative humidity: 60%

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 and Public Notice DA 00-705.

The maximum peak output power (conducted) was measured at the antenna connector with a spectrum analyzer. 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]	Output Power [dBm]	Limit [dBm]	Margin [dB]
1	8.77	0.63	8.77	30	21.23
2	8.70	0.63	8.70	30	21.30
3	8.69	0.69	8.69	30	21.31

Notes: Cable loss was included in reading as offset.

**Prüfbericht - Nr.: 15045012 001**
**Seite 11 von 48**
*Test Report No.:*
*Page 11 of 48*
**Table 4: Conducted Output Power, Mode B (2441MHz)**

Data Rate [Mbps]	Reading [dBm]	Correction Factor [dB]	Output Power [dBm]	Limit [dBm]	Margin [dB]
1	8.60	0.63	8.60	30	21.40
2	8.58	0.63	8.58	30	21.42
3	8.57	0.69	8.57	30	21.43

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]	Output Power [dBm]	Limit [dBm]	Margin [dB]
1	8.30	0.63	8.30	30	21.70
2	8.27	0.63	8.27	30	21.73
3	8.26	0.69	8.26	30	21.74

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.

**Prüfbericht - Nr.: 15045012 001**

Test Report No.:

Seite 12 von 48

Page 12 of 48

**5.1.2 Carrier Frequency Separation, FCC 15.247(a)(1)****RESULT:****PASS**

Date of testing: 2011-07-12

Ambient temperature: 23.1°C

Relative humidity: 60%

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.

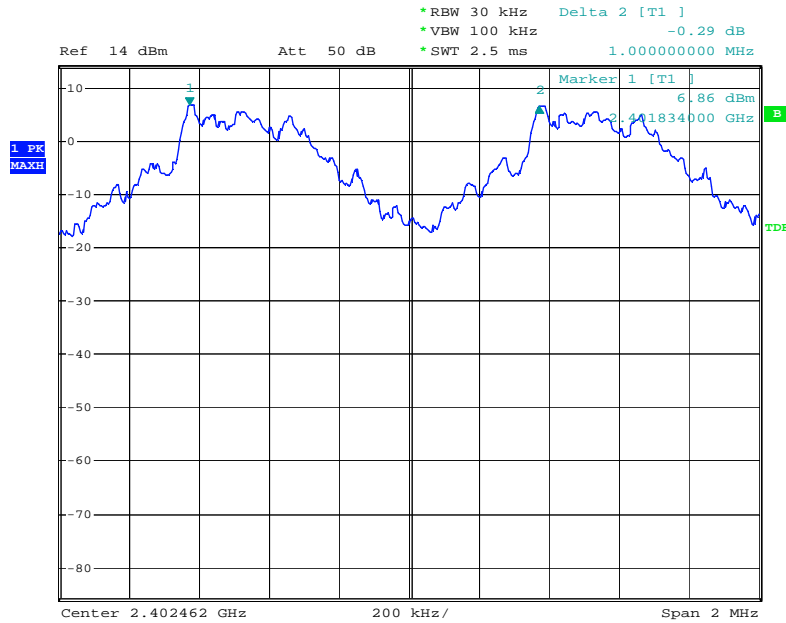
A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth was set to 100kHz and the video bandwidth to 300kHz. The Delta Marker function was used to determine the separation between the peaks of two adjacent channels.

**Table 6: Carrier Frequency Separation**

Channel	Channel Separation [kHz]	20dB Bandwidth [kHz](EDR)	20dB Bandwidth [kHz](GFSK)	Limit [kHz]
Low	1000	1292	880	861.3
Middle	1000	1300	880	866.7
High	1000	1304	876	869.3

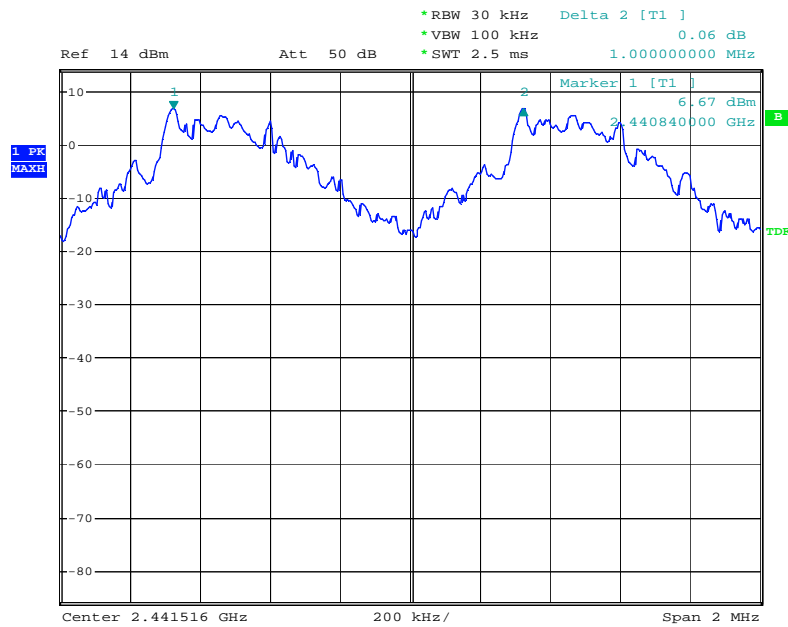
Notes: Limit = 20dB bandwidth \* 2/3 since it is greater than 125kHz and the output power is less than 125mW.

**Figure 1: Carrier Frequency Separation-Low Channel**



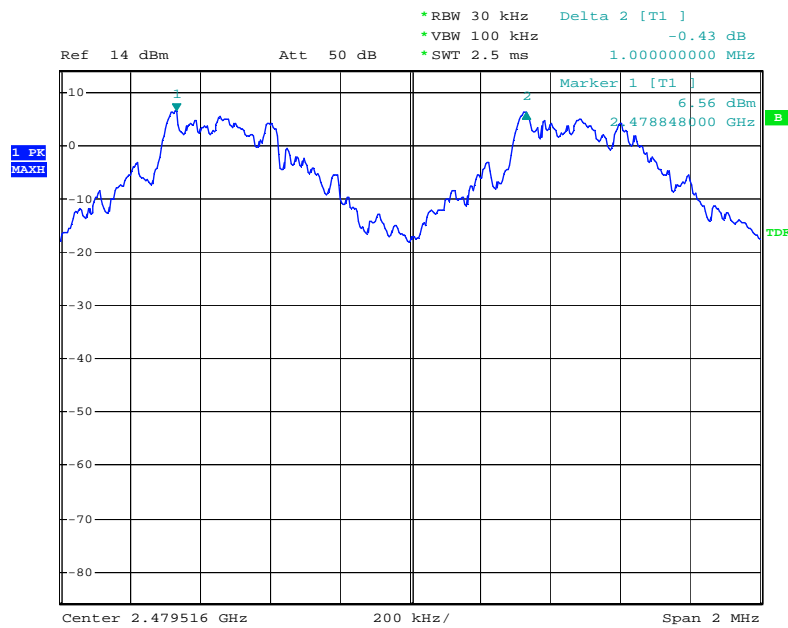
Date: 12.JUL.2011 15:54:59

**Figure 2: Carrier Frequency Separation-Middle Channel**



Date: 12.JUL.2011 16:11:36

**Figure 3: Carrier Frequency Separation-High Channel**



Date: 12.JUL.2011 16:13:54

**Prüfbericht - Nr.: 15045012 001**  
*Test Report No.:***Seite 15 von 48**  
*Page 15 of 48***5.1.3 20dB Bandwidth, FCC 15.247(a)(1)**

Date of testing: 2011-07-12

Ambient temperature: 23.0°C

Relative humidity: 60%

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:**

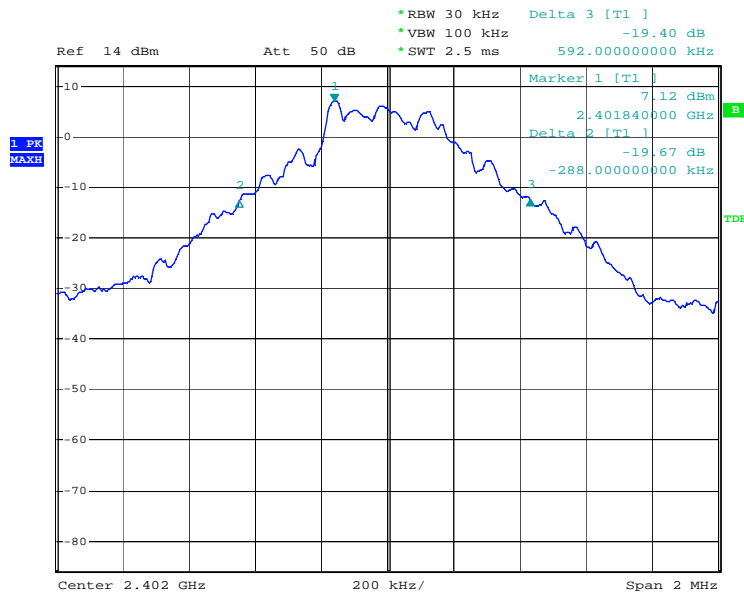
ANSI C63.4-2003 and Public Notice DA 00-705.

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.

**Table 7: 20dB Bandwidth**

Operating Frequency [MHz]	20dB Bandwidth [kHz](EDR)	20dB Bandwidth [kHz](GFSK)
2402	1292	880
2441	1300	880
2480	1304	876

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



Date: 12.JUL.2011 16:19:54

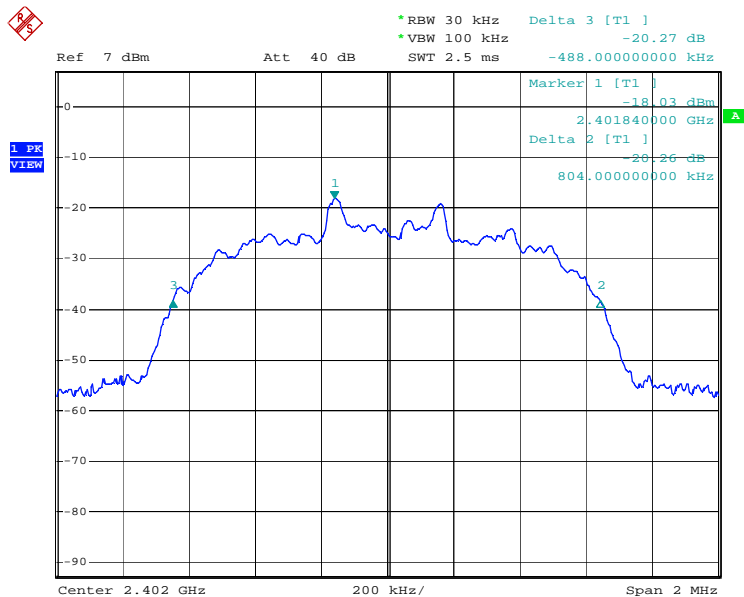
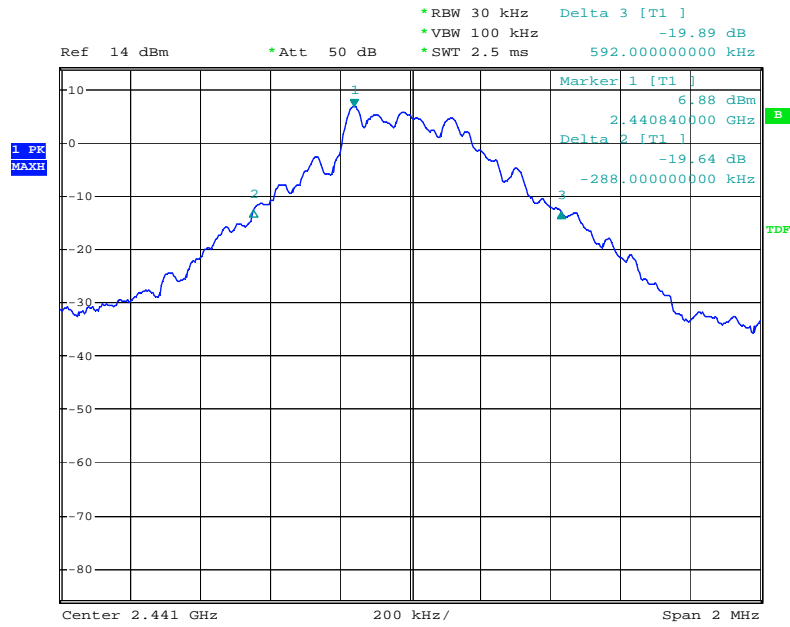
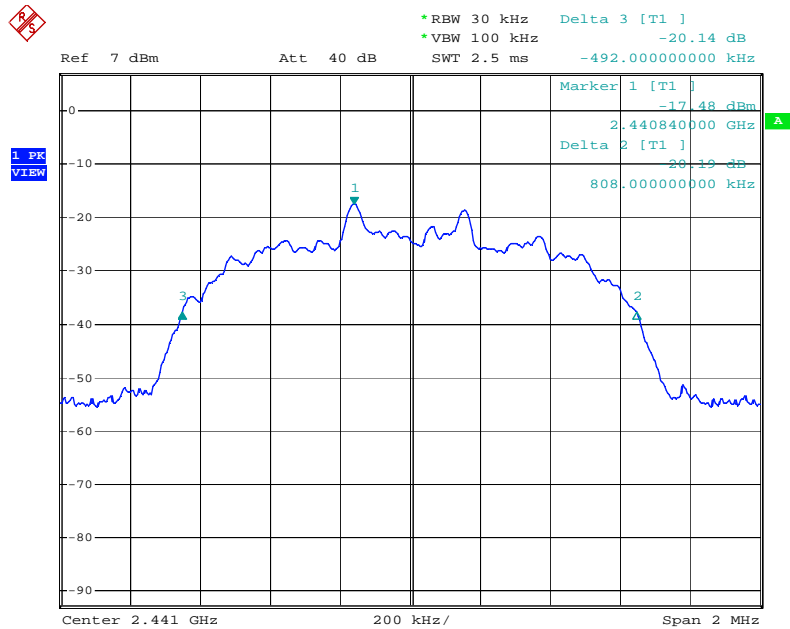




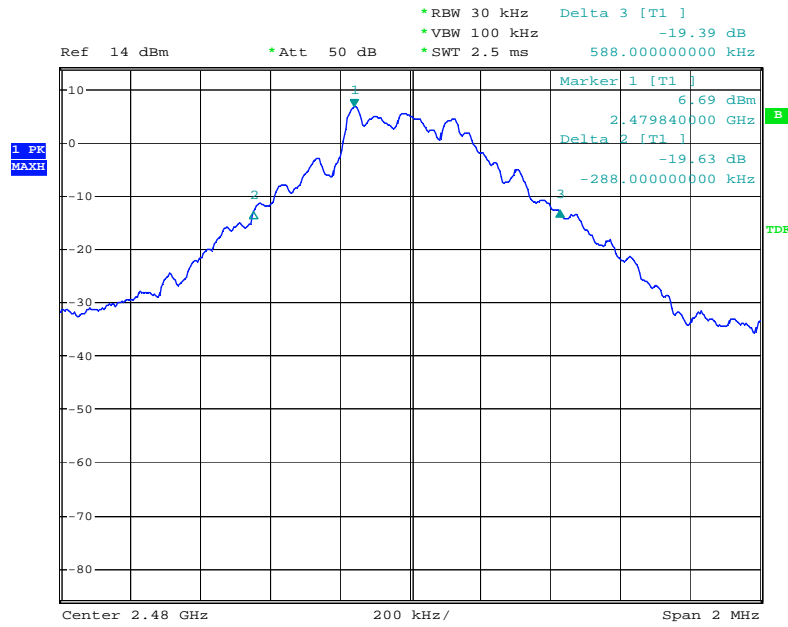
Figure 5: 20dB Bandwidth, Mode B (2441MHz)



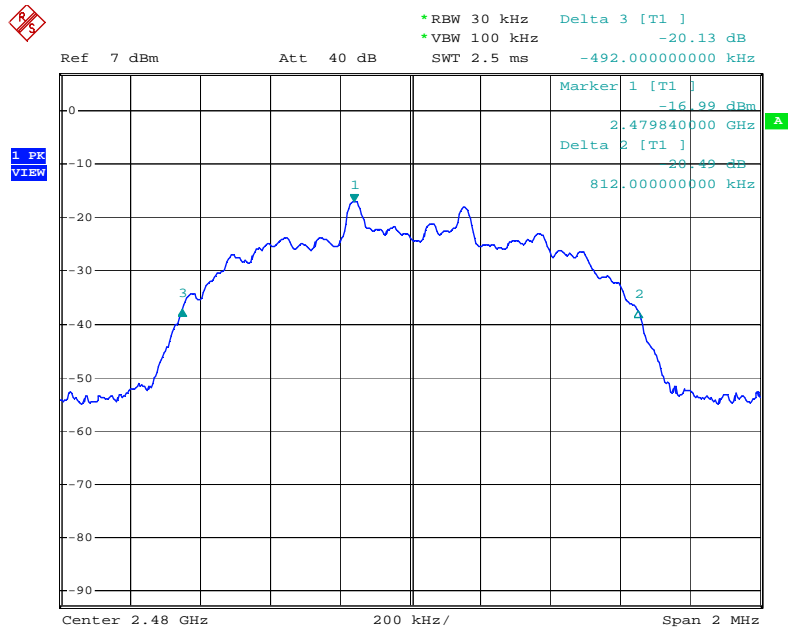
Date: 12.JUL.2011 16:25:09



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



Date: 12.JUL.2011 16:27:33



**Prüfbericht - Nr.: 15045012 001****Seite 19 von 48***Test Report No.:**Page 19 of 48***5.1.4 Number of Hopping Frequencies, FCC 15.247(a)(1)(iii)****RESULT:****PASS**

Date of testing: 2011-07-12

Ambient temperature: 23.0°C

Relative humidity: 60%

Atmospheric pressure: 101.5hPa

## Requirements:

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

## Test procedure:

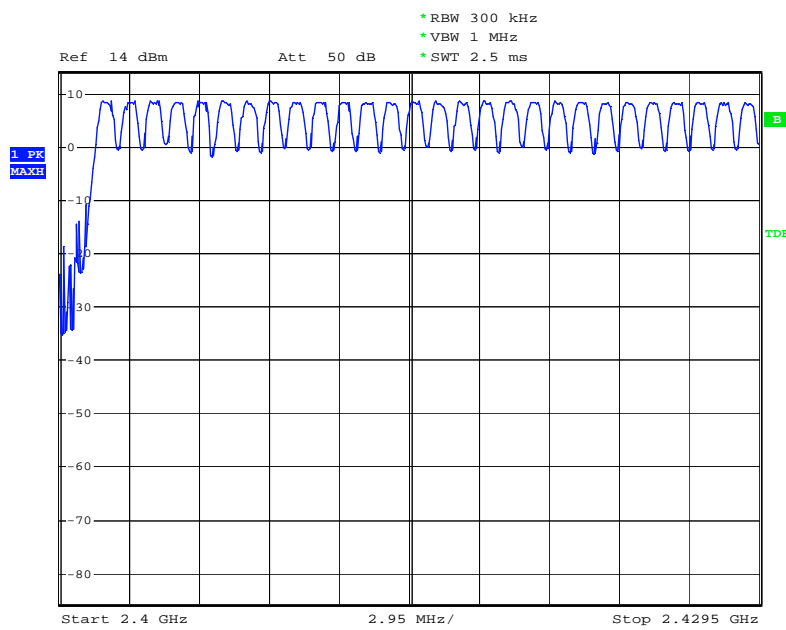
ANSI C63.4-2003 and Public Notice DA 00-705.

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.

**Table 8: Number of Hopping Frequencies**

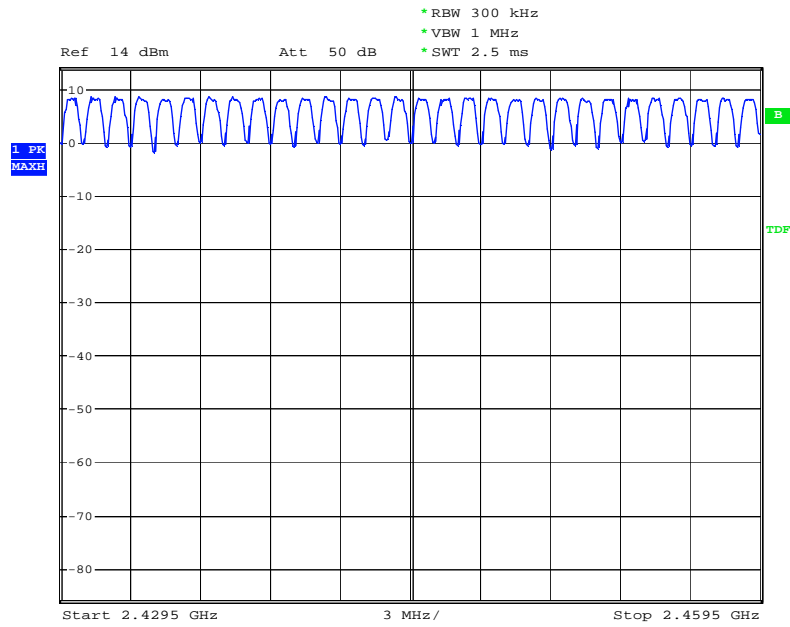
Number of Hopping Frequencies	Limit
79	15

**Figure 7: Hopping Frequencies up to 2429.5MHz, Mode E (Hopping)**



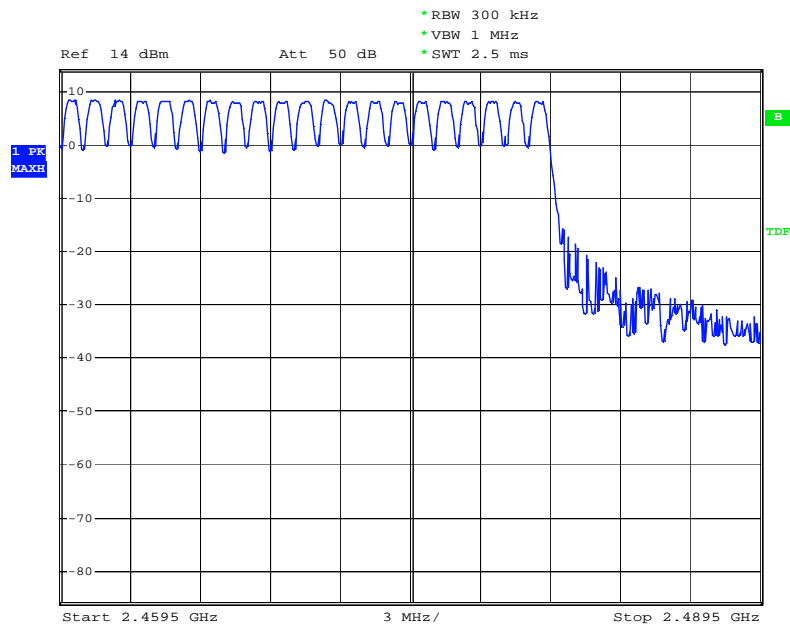
Date: 12.JUL.2011 16:39:08

Figure 8: Hopping Frequencies up to 2459.5MHz, Mode E (Hopping)



Date: 12.JUL.2011 16:41:15

Figure 9: Hopping Frequencies up to 2489.5MHz, Mode E (Hopping)



Date: 12.JUL.2011 16:43:17

**Prüfbericht - Nr.: 15045012 001**

Test Report No.:

Seite 22 von 48

Page 22 of 48

**5.1.5 Average Time of Occupancy, FCC 15.247(a)(1)(iii)****RESULT:****PASS**

Date of testing: 2011-07-12

Ambient temperature: 23.0°C

Relative humidity: 60%

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.

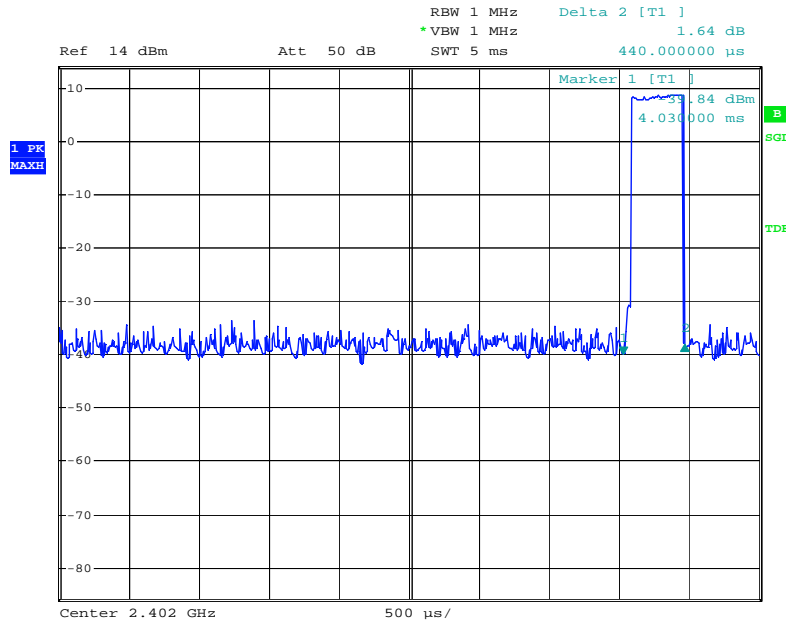
A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth and video bandwidth were set to 1MHz. The average time of occupancy was obtained by measuring first the dwell time of a single packet with the Delta Marker function using a zero span centered on a hopping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

**Table 9: 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]
Low	DH1	0.44	320.1	140.844	400
	DH3	1.70	159.9	271.83	400
	DH5	2.94	106.81	314.0214	400
Mid	DH1	0.421	320.1	134.7621	400
	DH3	1.6848	159.9	269.39952	400
	DH5	2.9376	106.81	313.765056	400
High	DH1	0.44	320.1	140.844	400
	DH3	1.76	159.9	281.424	400
	DH5	2.97	106.81	317.2257	400

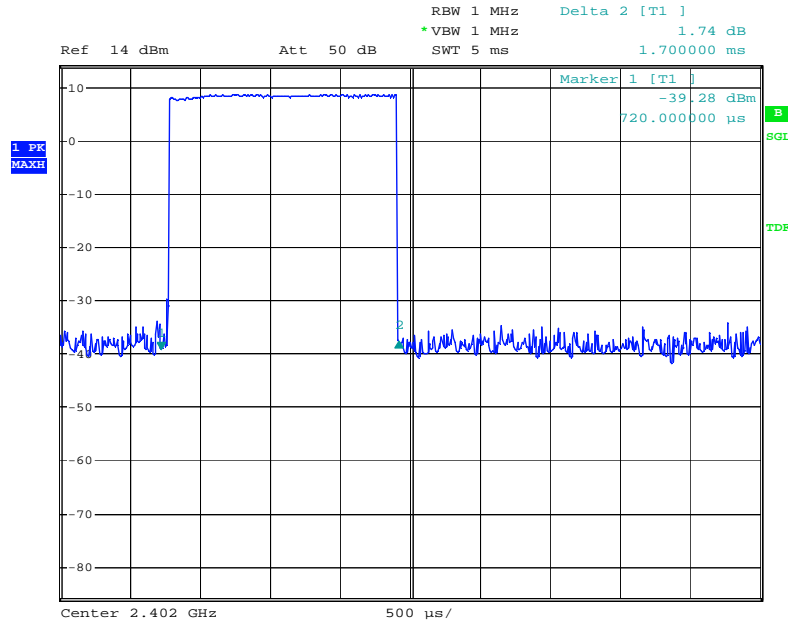
Notes: Average time of occupancy = Packet duration \* Number of hops per channel in a 31.6s period

**Figure 10: Dwell Time, Mode E (Hopping), DH1, Low channel**



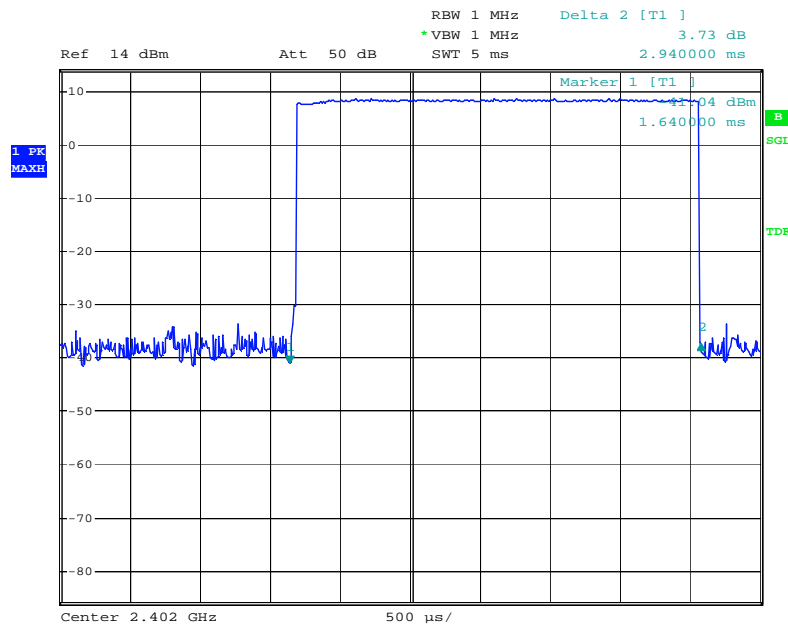
Date: 12.JUL.2011 17:07:06

Figure 11: Dwell Time, Mode E (Hopping), DH3, Low channel



Date: 12.JUL.2011 17:09:55

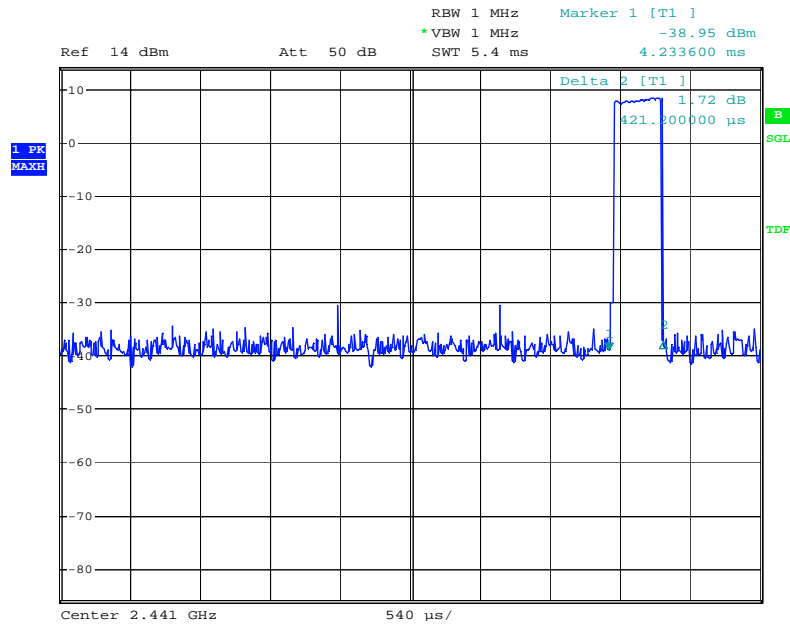
Figure 12: Dwell Time, Mode E (Hopping), DH5, Low channel



Date: 12.JUL.2011 17:14:11

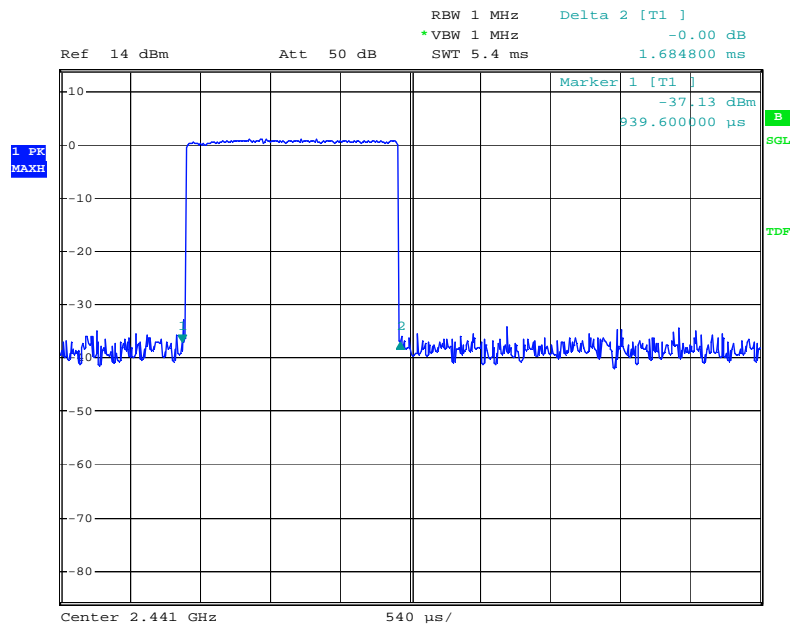


Figure 13: Dwell Time, Mode E (Hopping), DH1, Mid channel



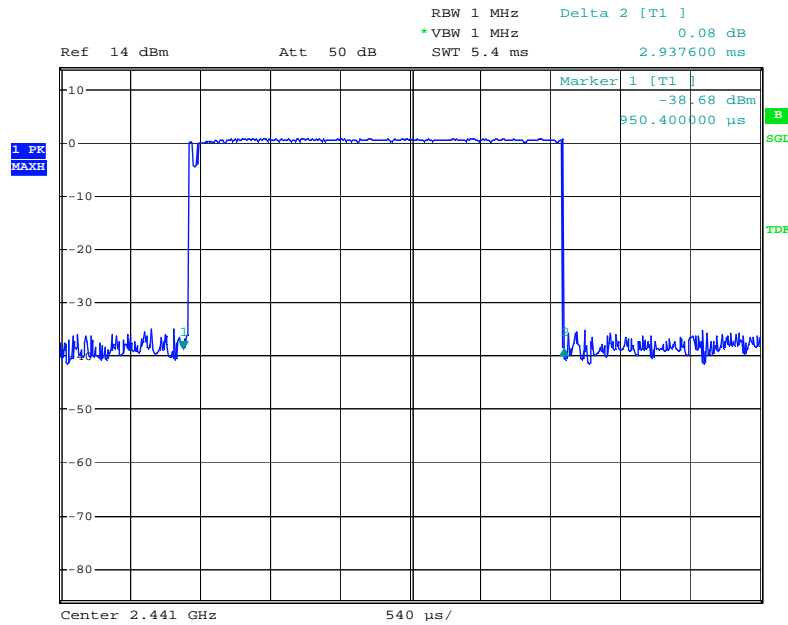
Date: 12.JUL.2011 17:17:21

Figure 14: Dwell Time, Mode E (Hopping), DH3, Mid channel



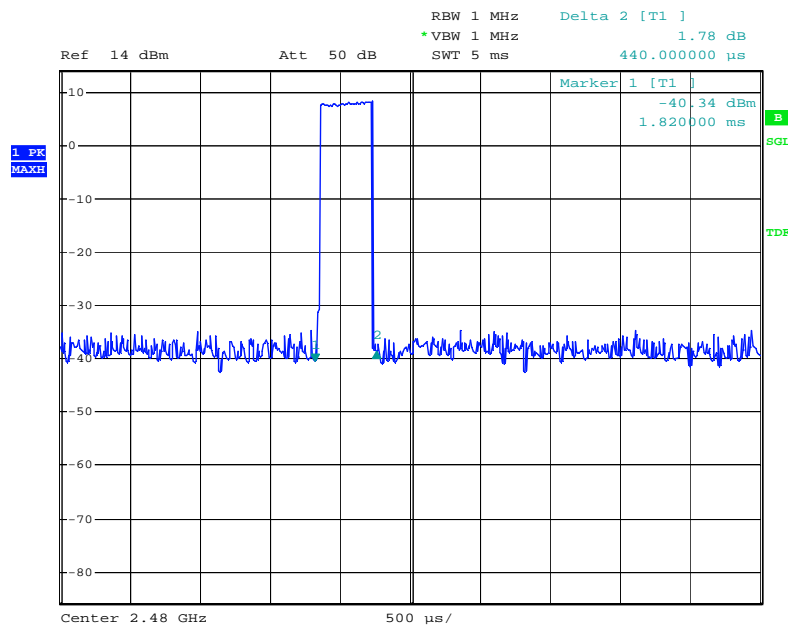
Date: 12.JUL.2011 17:19:36

**Figure 15: Dwell Time, Mode E (Hopping), DH5, Mid channel**



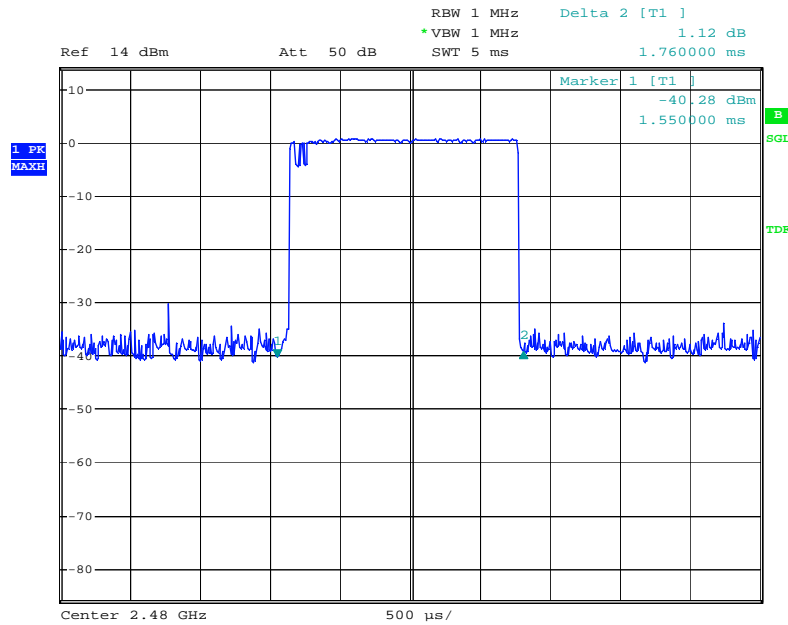
Date: 12.JUL.2011 17:22:46

**Figure 16: Dwell Time, Mode E (Hopping), DH1, High channel**



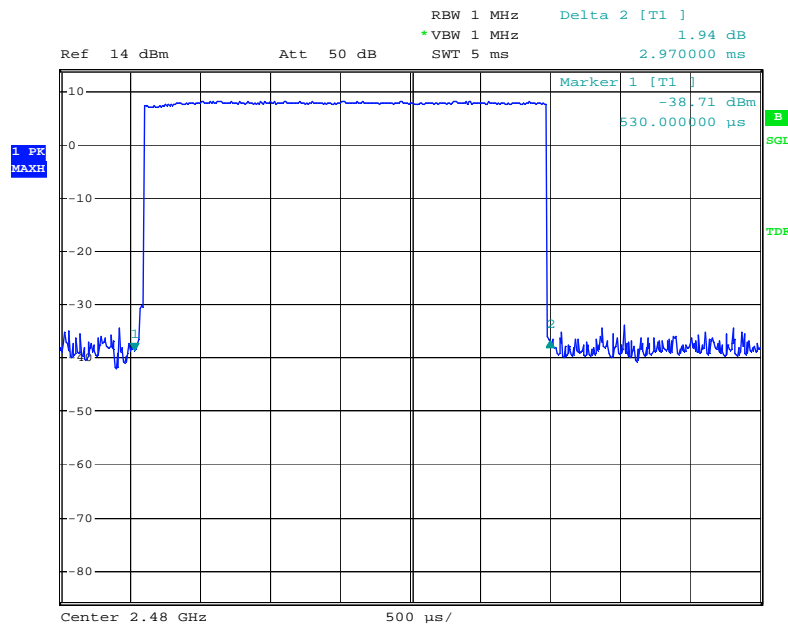
Date: 12.JUL.2011 17:25:48

Figure 17: Dwell Time, Mode E (Hopping), DH3, High channel



Date: 12.JUL.2011 17:28:10

Figure 18: Dwell Time, Mode E (Hopping), DH5, High channel



Date: 12.JUL.2011 17:34:15

**Prüfbericht - Nr.:** 15045012 001  
*Test Report No.:***Seite 28 von 48**  
*Page 28 of 48*

### 5.1.6 Conducted Spurious Emission, FCC 15.247(d)

**RESULT:****PASS**

Date of testing: 2011-07-13

Ambient temperature: 23.0°C

Relative humidity: 60%

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. 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 (10<sup>th</sup> harmonics).

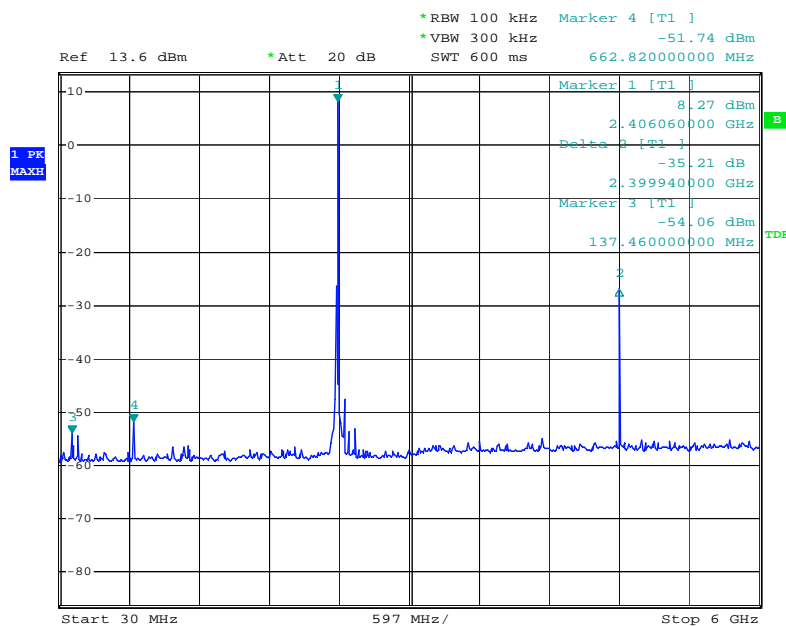
The final measurement takes into account the loss generated by all the involved cables.

**Table 10: Conducted Spurious Emission, Mode A (2402MHz)**

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
137.46	-54.06	-54.06	-11.73	42.33
662.82	-51.74	-51.74	-11.73	40.01
4806.00	-26.94	-26.94	-11.73	15.21
7178.00	-52.53	-52.53	-11.73	40.80
2406.06	8.27	8.27	N/A	N/A

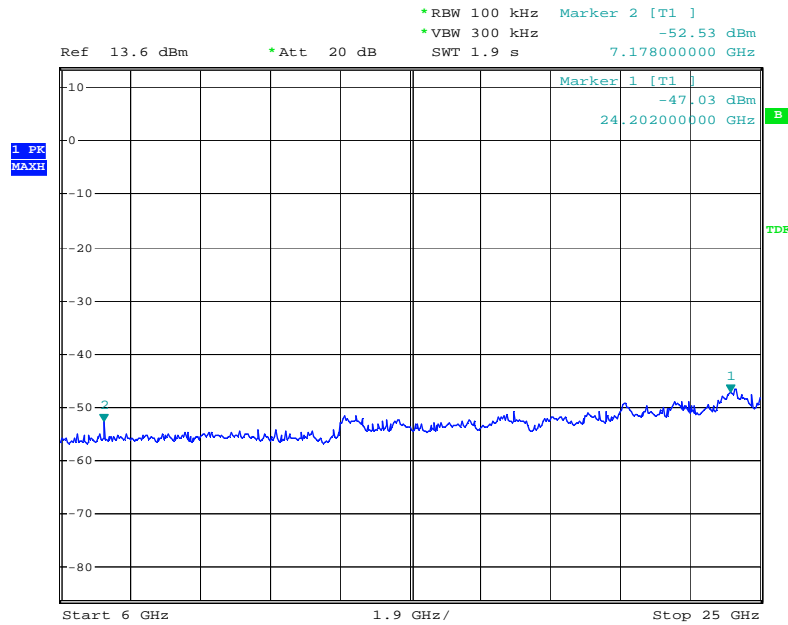
Notes: Cable loss was included in reading as offset.  
Limit = Reading of fundamental + Correction factor – 20dB

**Figure 19: Conducted Spurious Emission, 30MHz – 6GHz, Mode A (2402MHz)**



Date: 13.JUL.2011 10:11:56

**Figure 20: Conducted Spurious Emission, 6 – 25GHz, Mode A (2402MHz)**



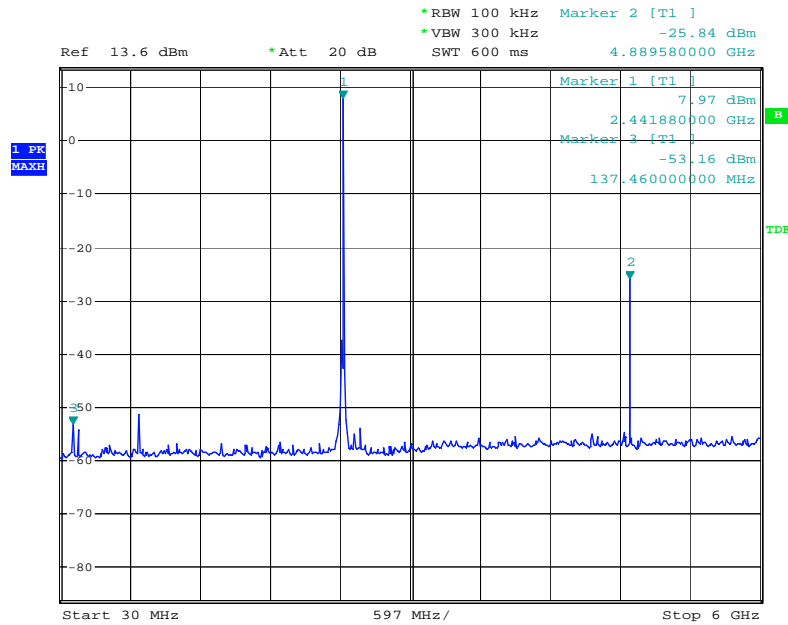
Date: 13.JUL.2011 10:14:01

**Table 11: Conducted Spurious Emission, Mode B (2441MHz)**

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
137.46	-53.16	-53.16	-12.03	41.13
4889.58	-25.84	-25.84	-12.03	13.81
7292.00	-49.66	-49.66	-12.03	37.63
2441.88	7.97	7.97	N/A	N/A

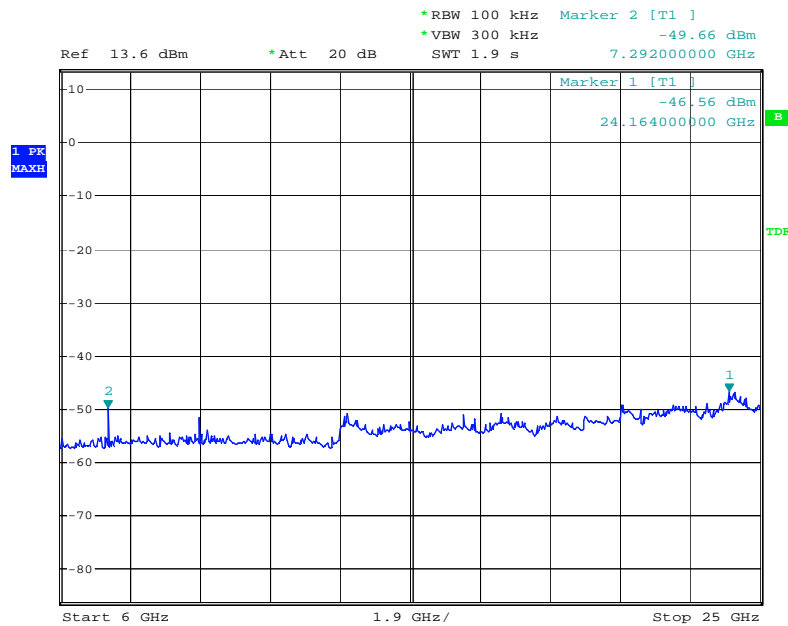
Notes: Cable loss was included in reading as offset.  
Limit = Reading of fundamental + Correction factor – 20dB

**Figure 21: Conducted Spurious Emission, 30MHz – 6GHz, Mode B (2441MHz)**



Date: 13.JUL.2011 10:16:33

**Figure 22: Conducted Spurious Emission, 6 – 25GHz, Mode B (2441MHz)**



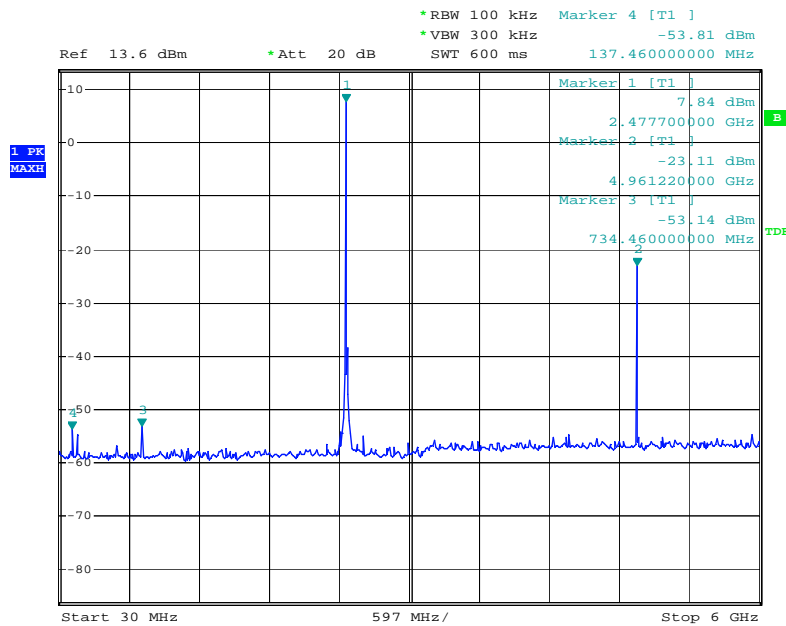
Date: 13.JUL.2011 10:17:40

**Table 12: Conducted Spurious Emission, Mode C (2480MHz)**

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
137.46	-53.81	-53.81	-12.16	41.65
734.46	-53.14	-53.14	-12.16	40.98
4961.22	-23.11	-23.11	-12.16	10.95
7406.00	-46.89	-46.89	-12.16	34.73
9914.00	-45.37	-45.37	-12.16	33.21
2477.70	7.84	7.84	N/A	N/A

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

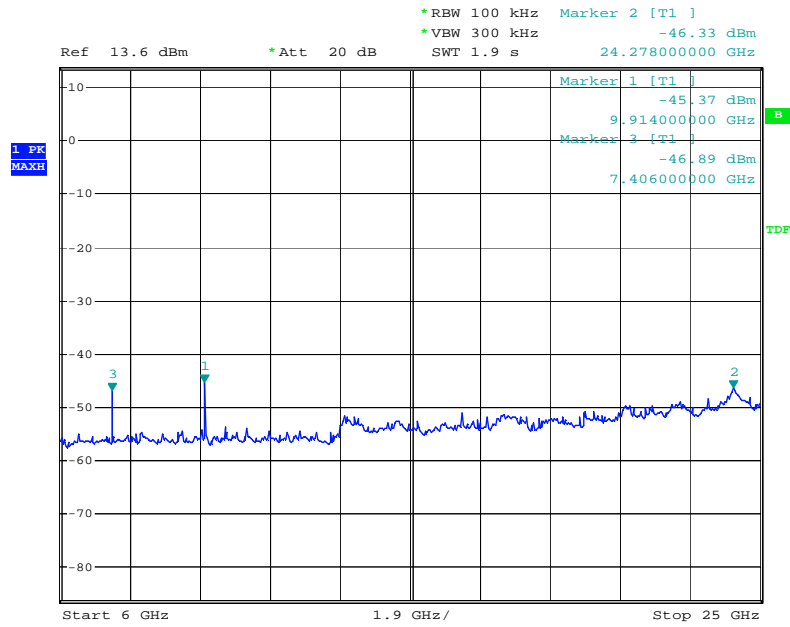
**Figure 23: Conducted Spurious Emission, 30MHz – 6GHz, Mode C (2480MHz)**



Date: 13.JUL.2011 10:20:04



**Figure 24: Conducted Spurious Emission, 6 – 25GHz, Mode C (2480MHz)**



Date: 13.JUL.2011 10:21:27

**Prüfbericht - Nr.: 15045012 001***Test Report No.:***Seite 34 von 48***Page 34 of 48***5.1.7 Band Edge Compliance of RF Conducted Emission, FCC  
15.247(d)****RESULT:****PASS**

Date of testing: 2011-07-13

Ambient temperature: 23.1°C

Relative humidity: 60%

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.

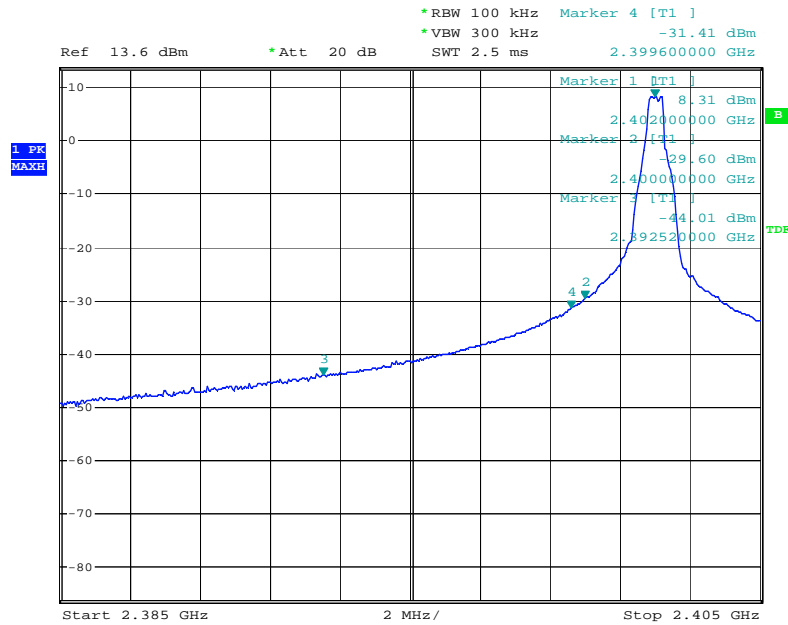
## Test procedure:

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.

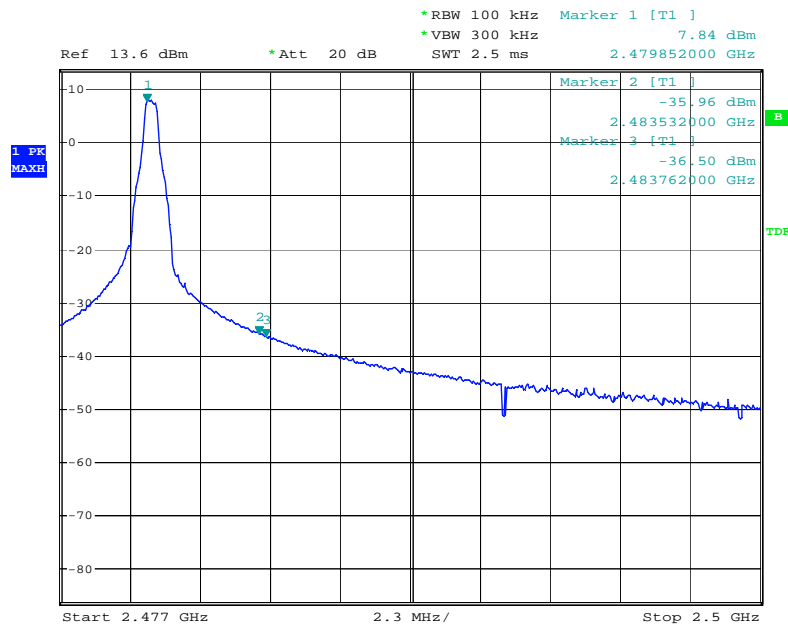
The final measurement takes into account the loss generated by all the involved cables.

Figure 25: Lower Band Edge Conducted, Hopping Disabled



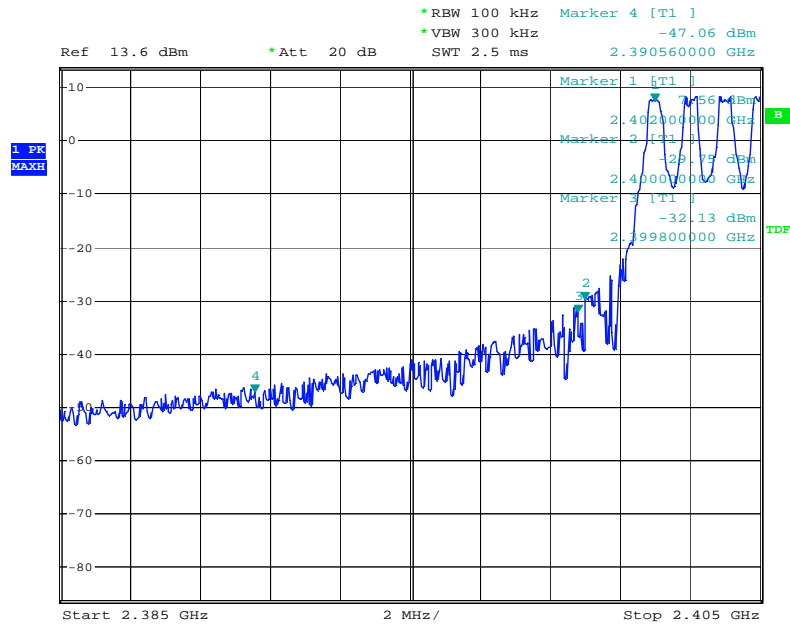
Date: 13.JUL.2011 10:39:10

Figure 26: Upper Band Edge Conducted, Hopping Disabled



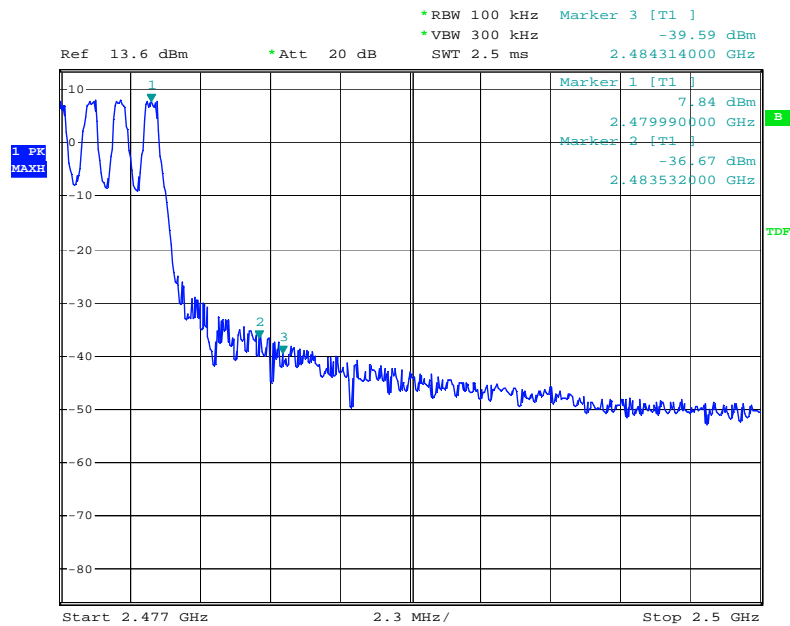
Date: 13.JUL.2011 10:53:45

**Figure 27: Lower Band Edge Conducted, Hopping Enabled**



Date: 13.JUL.2011 11:01:05

**Figure 28: Upper Band Edge Conducted, Hopping Enabled**



Date: 13.JUL.2011 11:04:15

**Prüfbericht - Nr.: 15045012 001**  
*Test Report No.:***Seite 37 von 48**  
*Page 37 of 48*

## 6. Test Results of Radiated Measurements

### 6.1 Transmitter Parameters

#### 6.1.1 Band Edge Radiated Emission, FCC 15.205, FCC 15.209 and FCC 15.247(d)

**RESULT:** **Pass**

Date of testing: 2011-07-06

Ambient temperature: 23.1°C

Relative humidity: 60%

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 C63.4-2003 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.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions, and the maximum emission was found in the orientation shown in the test setup photos.

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.

**Prüfbericht - Nr.: 15045012 001**
**Seite 38 von 48**

Test Report No.:

Page 38 of 48

**Table 13: Band Edge Radiated Emission**

Operating Frequency [MHz]	EUT / Antenna Orient.	Average Value [dB $\mu$ V/m]	Peak Value [dB $\mu$ V/m]	Average Limit [dB $\mu$ V/m]	Peak Limit [dB $\mu$ V/m]	Average Margin [dB]	Peak Margin [dB]
2399.9725	X/H	No peak found	64.18	54	74	N/A	9.82
2391.50725	X/H	No peak found	49.85	54	74	N/A	24.15
2399.95	X/V	No peak found	62.18	54	74	N/A	11.82
2395.1275	X/V	No peak found	51.64	54	74	N/A	22.36
2483.417	X/H	No peak found	57.89	54	74	N/A	16.11
2486.70025	X/H	No peak found	51.51	54	74	N/A	22.49
2483.35087 5	X/V	No peak found	57.77	54	74	N/A	16.23
32485.8262 5	X/V	No peak found	53.51	54	74	N/A	20.49

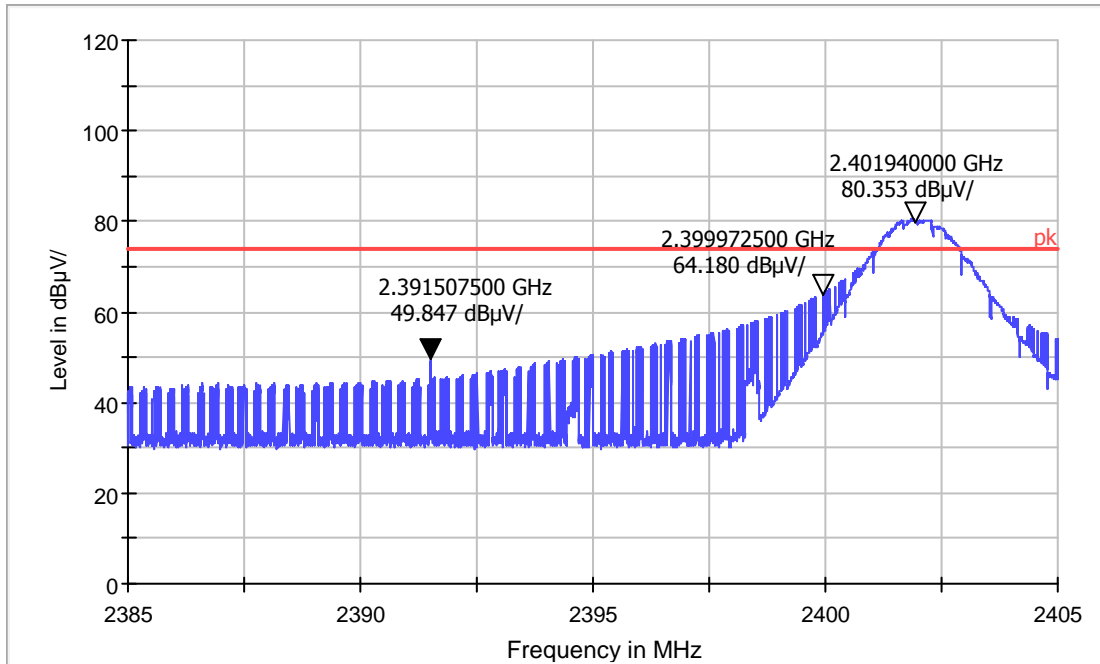
Notes: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values.

 Average limit in dB $\mu$ V/m is calculated as follows: Average limit = 20 x log(500 $\mu$ V/m).

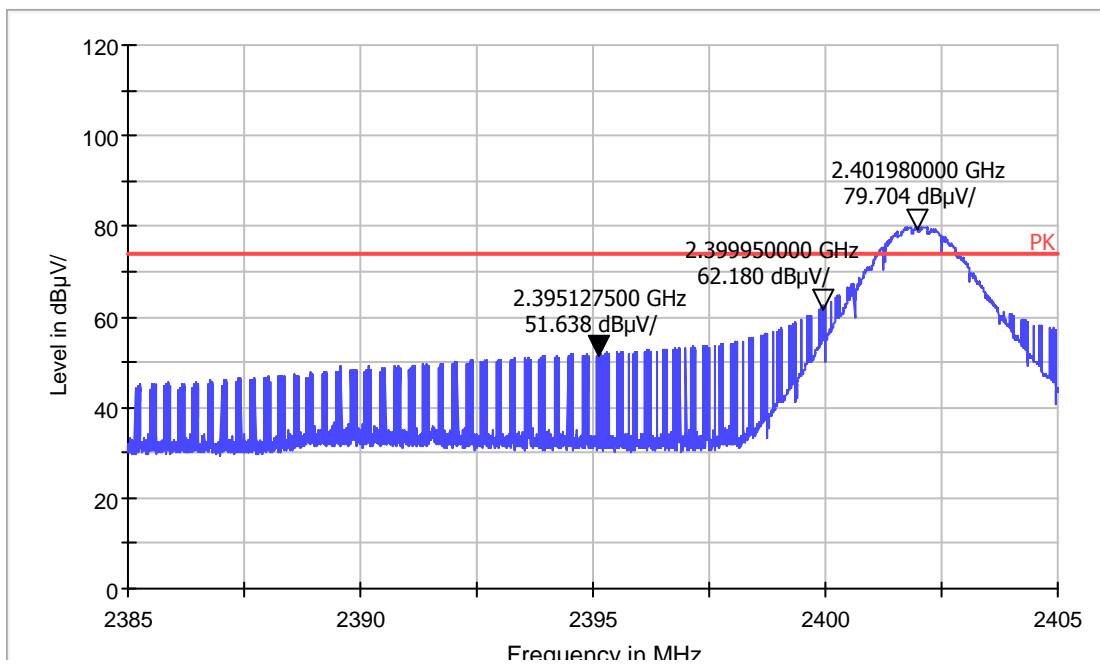
 Peak limit in dB $\mu$ V/m is calculated as follows: Peak limit = Average limit + 20dB.

**Figure 29: Band Edge Radiated Emission, Spectral Diagram, Mode A (2402MHz)**

2011of FCC 1.0-18G\_FSP 30+BBV9718 NEW BAND EDGE



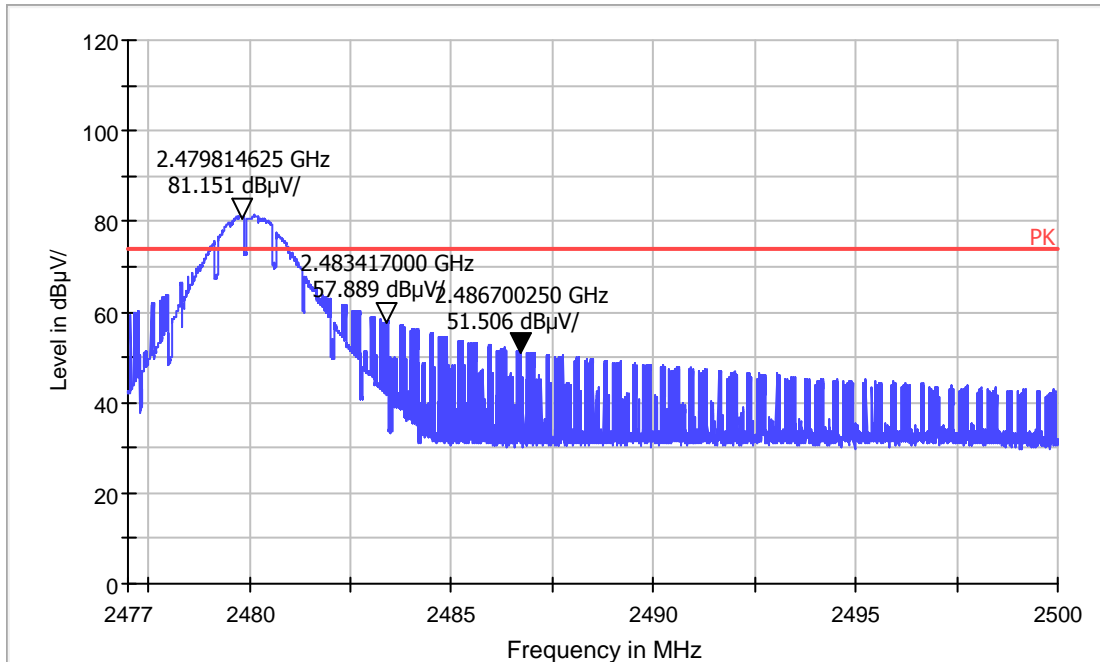
2011of FCC 1.0-18G\_FSP 30+BBV9718 NEW BAND EDGE



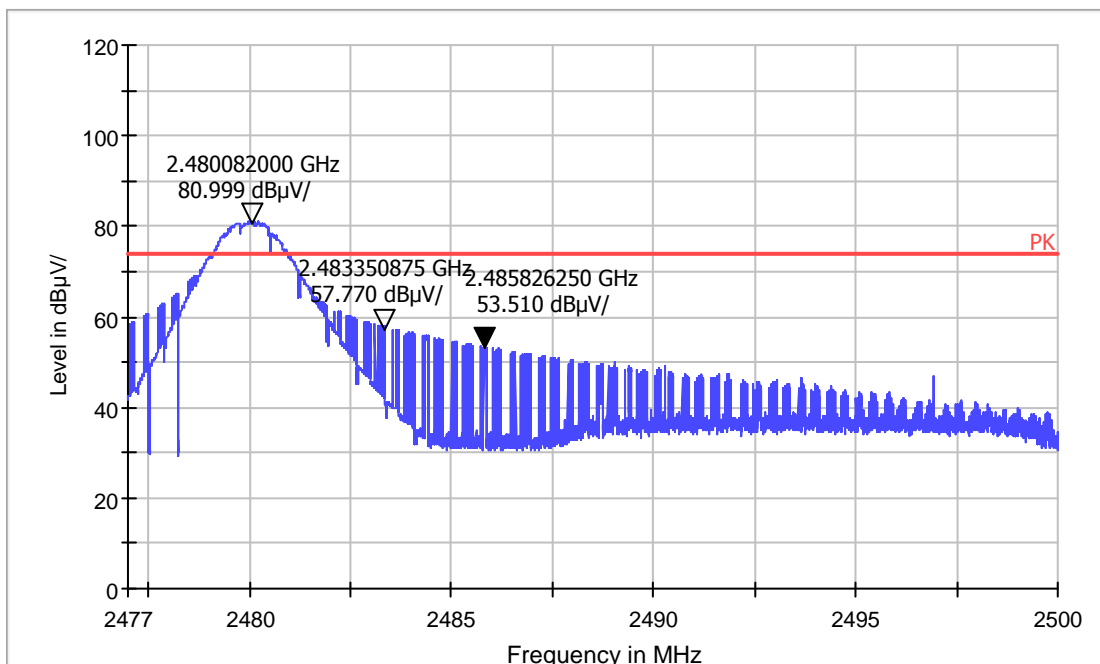
Note: The upper diagram shows the vertical peak value and the lower diagram shows the horizontal value.

**Figure 30: Band Edge Radiated Emission, Spectral Diagram, Mode C (2480MHz)**

2011of FCC 1.0-18G\_FSP 30+BBV9718 NEW BAND EDGE



2011of FCC 1.0-18G\_FSP 30+BBV9718 NEW BAND EDGE



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



**Prüfbericht - Nr.: 15045012 001**

Test Report No.:

Seite 41 von 48

Page 41 of 48

**6.1.2 Radiated Spurious Emission of Transmitter, FCC 15.205, FCC 15.209 and FCC 15.247(d)****RESULT:****PASS**

Date of testing:	2011-07-05
Ambient temperature:	23.1°C
Relative humidity:	60%
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 C63.4-2003 and Public Notice DA 00-705.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. The EUT was placed on a nonconductive turntable 0.8m above the ground plane. During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions, and the maximum emission was found in the orientation shown in the test setup photos.

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 receiver's bandwidth was set to 120 kHz, and the receiver was operated in the CISPR quasi-peak detection mode. For emissions above 1GHz, measurements were performed with spectrum analyzer 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.

**Prüfbericht - Nr.: 15045012 001****Seite 42 von 48**

Test Report No.:

Page 42 of 48

**Table 14: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz)**

Freq. [MHz]	EUT / Antenna Orientation	Level AV [dB $\mu$ V/m]	Level PK [dB $\mu$ V/m]	Limit AV [dB $\mu$ V/m]	Limit PK [dB $\mu$ V/m]	Margin AV [dB]	Margin PK [dB]
4804	X/H	31.14	59.51	54	74	22.86	14.49
7205.5	X/H	--	50.15	54	74	N/A	23.85
4804	X/V	34.98	53.37	54	74	19.02	20.63
9607.75	X/V	35.98	56.50	54	74	18.02	17.50

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

(-- ) The measured peak result is below the AV limit, so no AV result measurement needed.

**Table 15: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2441MHz)**

Freq. [MHz]	EUT / Antenna Orientation	Level AV [dB $\mu$ V/m]	Level PK [dB $\mu$ V/m]	Limit AV [dB $\mu$ V/m]	Limit PK [dB $\mu$ V/m]	Margin AV [dB]	Margin PK [dB]
4882	X/H	30.91	54.40	54	74	23.09	19.60
4882	X/V	31.00	55.55	54	74	23.00	18.45

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 C (2480MHz)**

Freq. [MHz]	EUT / Antenna Orientation	Level AV [dB $\mu$ V/m]	Level PK [dB $\mu$ V/m]	Limit AV [dB $\mu$ V/m]	Limit PK [dB $\mu$ V/m]	Margin AV [dB]	Margin PK [dB]
4960	X/H	29.72	59.21	54	74	24.28	14.79
7439.5	X/H	34.37	55.04	54	74	19.63	18.96
4960	X/V	32.18	58.48	54	74	21.82	15.52
9919.75	X/V	36.67	53.56	54	74	17.33	20.44

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

**Prüfbericht - Nr.: 15045012 001**

Test Report No.:

Seite 43 von 48

Page 43 of 48

## 6.2 Receiver Parameters

### 6.2.1 Radiated Spurious Emission of Receiver, FCC 15.109

**RESULT:****PASS**

Date of testing: 2011-07-05

Ambient temperature: 23.1°C

Relative humidity: 60%

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).

## Test procedure:

ANSI C63.4-2003.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions, and the maximum emission was found in the orientation shown in the test setup photos.

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.

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

The peak level of the highest emission amplitudes is far below the appropriate limit, so no QP level recorded in this report. No spurious emission was found in the range 1000MHz – 12500MHz.

**Prüfbericht - Nr.: 15045012 001**
**Seite 44 von 48**
*Test Report No.:*
*Page 44 of 48*
**Table 17: Radiated Emission, Quasi Peak Data, 30MHz – 1GHz, Horizontal and Vertical Antenna Orientations, Mode D (Receive at 2402MHz)**

Freq. [MHz]	EUT / Antenna Orientation	Level PK [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]
65.25	X/H	28.44	40	11.56
712.11625	X/H	30.85	46	15.15
427.21625	X/V	38.01	46	7.99

**Table 18: Radiated Emission, Quasi Peak Data, 30MHz – 1GHz, Horizontal and Vertical Antenna Orientations, Mode D (Receive at 2441MHz)**

Freq. [MHz]	EUT / Antenna Orientation	Level PK [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]
65.775	X/H	28.56	40	11.44
191.975	X/H	31.97	43.5	11.53
427.3125	X/V	36.68	46	9.32
567.54875	X/V	32.81	46	13.19

**Table 19: Radiated Emission, Quasi Peak Data, 30MHz – 1GHz, Horizontal and Vertical Antenna Orientations, Mode D (Receive at 2480MHz)**

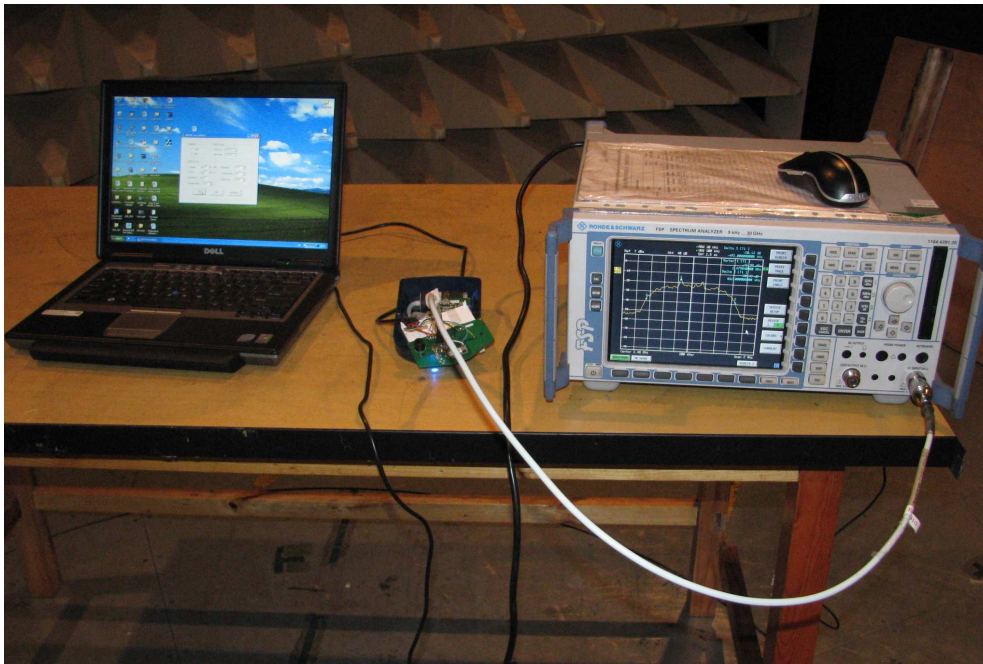
Freq. [MHz]	EUT / Antenna Orientation	Level PK [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]
192.000	X/H	30.73	43.5	12.77
709.5175	X/H	31.71	46	14.29
425.7725	X/V	36.39	46	9.61

**Prüfbericht - Nr.:** 15045012 001  
*Test Report No.:*

**Seite 45 von 48**  
*Page 45 of 48*

## 7. Photographs of the Test Setup

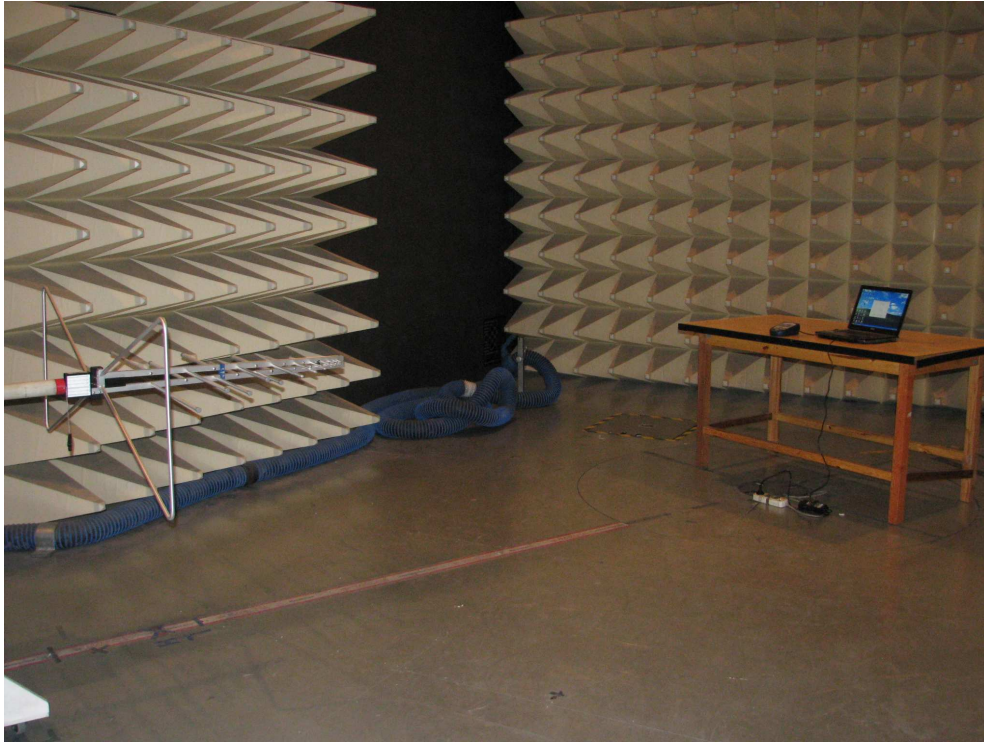
**Photograph 1: Set-up for Conducted Emissions at Antenna Port**



**Photograph 2: Maximum emission orientation of the sample on the table**



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



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



## 8. List of Tables

Table 1: List of Test and Measurement Equipment .....	6
Table 2: Emission Measurement Uncertainty .....	6
Table 3: Conducted Output Power, Mode A (2402MHz) .....	10
Table 4: Conducted Output Power, Mode B (2441MHz) .....	11
Table 5: Conducted Output Power, Mode C (2480MHz) .....	11
Table 6: Carrier Frequency Separation .....	13
Table 7: 20dB Bandwidth .....	16
Table 8: Number of Hopping Frequencies .....	20
Table 9: Average Time of Occupancy .....	23
Table 10: Conducted Spurious Emission, Mode A (2402MHz) .....	29
Table 11: Conducted Spurious Emission, Mode B (2441MHz) .....	30
Table 12: Conducted Spurious Emission, Mode C (2480MHz) .....	32
Table 13: Band Edge Radiated Emission .....	38
Table 14: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, Mode A (2402MHz) .....	42
Table 15: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, Mode B (2441MHz) .....	42
Table 16: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, Mode C (2480MHz) .....	42
Table 17: Radiated Emission, Quasi Peak Data, 30MHz – 1GHz, Horizontal and Vertical Antenna Orientations, Mode D (Receive at 2402MHz) .....	44
Table 18: Radiated Emission, Quasi Peak Data, 30MHz – 1GHz, Horizontal and Vertical Antenna Orientations, Mode D (Receive at 2441MHz) .....	44
Table 19: Radiated Emission, Quasi Peak Data, 30MHz – 1GHz, Horizontal and Vertical Antenna Orientations, Mode D (Receive at 2480MHz) .....	44

## 9. List of Figures

Figure 1: Carrier Frequency Separation-Low Channel .....	13
Figure 2: Carrier Frequency Separation-Middle Channel .....	14
Figure 3: Carrier Frequency Separation-High Channel .....	14
Figure 4: 20dB Bandwidth, Mode A (2402MHz) .....	16
Figure 5: 20dB Bandwidth, Mode B (2441MHz) .....	17
Figure 6: 20dB Bandwidth, Mode C (2480MHz) .....	18
Figure 7: Hopping Frequencies up to 2429.5MHz, Mode E (Hopping) .....	20
Figure 8: Hopping Frequencies up to 2459.5MHz, Mode E (Hopping) .....	21
Figure 9: Hopping Frequencies up to 2489.5MHz, Mode E (Hopping) .....	21
Figure 10: Dwell Time, Mode E (Hopping), DH1, Low channel .....	23
Figure 11: Dwell Time, Mode E (Hopping), DH3, Low channel .....	24
Figure 12: Dwell Time, Mode E (Hopping), DH5, Low channel .....	24
Figure 13: Dwell Time, Mode E (Hopping), DH1, Mid channel .....	25
Figure 14: Dwell Time, Mode E (Hopping), DH3, Mid channel .....	25
Figure 15: Dwell Time, Mode E (Hopping), DH5, Mid channel .....	26
Figure 16: Dwell Time, Mode E (Hopping), DH1, High channel .....	26
Figure 17: Dwell Time, Mode E (Hopping), DH3, High channel .....	27
Figure 18: Dwell Time, Mode E (Hopping), DH5, High channel .....	27
Figure 19: Conducted Spurious Emission, 30MHz – 6GHz, Mode A (2402MHz) .....	29
Figure 20: Conducted Spurious Emission, 6 – 25GHz, Mode A (2402MHz) .....	30
Figure 21: Conducted Spurious Emission, 30MHz – 6GHz, Mode B (2441MHz) .....	31
Figure 22: Conducted Spurious Emission, 6 – 25GHz, Mode B (2441MHz) .....	31
Figure 23: Conducted Spurious Emission, 30MHz – 6GHz, Mode C (2480MHz) .....	32

**Prüfbericht - Nr.: 15045012 001***Test Report No.:***Seite 48 von 48***Page 48 of 48*

Figure 24: Conducted Spurious Emission, 6 – 25GHz, Mode C (2480MHz) .....	33
Figure 25: Lower Band Edge Conducted, Hopping Disenabled .....	35
Figure 26: Upper Band Edge Conducted, Hopping Disenabled .....	35
Figure 27: Lower Band Edge Conducted, Hopping Enabled .....	36
Figure 28: Upper Band Edge Conducted, Hopping Enabled .....	36
Figure 29: Band Edge Radiated Emission, Spectral Diagram, Mode A (2402MHz).....	39
Figure 30: Band Edge Radiated Emission, Spectral Diagram, Mode C (2480MHz).....	40

## 10. List of Photographs

Photograph 1: Set-up for Conducted Emissions at Antenna Port.....	45
Photograph 2: Maximum emission orientation of the sample on the table .....	45
Photograph 3: Set-up for Set-up for Radiated Emission, 30MHz-1000MHz.....	46
Photograph 4: Set-up for Radiated Emission, 1G-18GHz .....	46