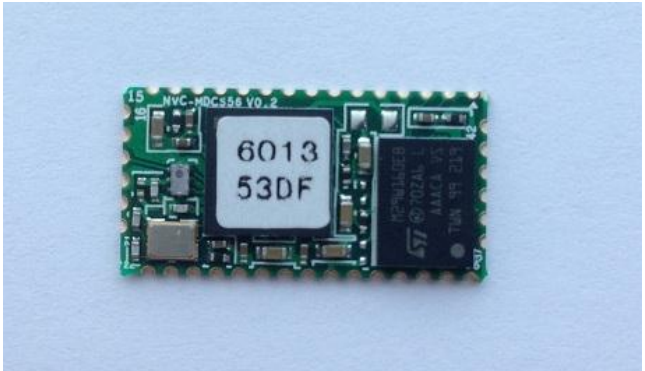


Prüfbericht-Nr.: Test Report No.:	15062958 001	Auftrags-Nr.: Order No.:	154029917	Seite 1 von 48 Page 1 of 48
Kunden-Referenz-Nr.: Client Reference No.:	470183	Auftragsdatum: Order date:	03.07.2013	
Auftraggeber: Client:	NovaComm Technologies Inc. 902A,#560 Shengxia Rd .ZJ InnoPark,Shanghai,China			
Prüfgegenstand: Test item:	Bluetooth Module			
Bezeichnung / Typ-Nr.: Identification / Type No.:	Model Name :NVC-MDCS56 FCC ID :OC3BM1856			
Auftrags-Inhalt: Order content:	Complete test			
Prüfgrundlage: Test specification:	FCC 47 CFR Part 15, Subpart C, Section 15.247 (October 1, 2009) ANSI C63.4-2003 Public Notice DA 00-705: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems (March 30, 2000)			
Wareneingangsdatum: Date of receipt:	03.07.2013			
Prüfmuster-Nr.: Test sample No.:	N.A			
Prüfzeitraum: Testing period:	03.07.2013 – 19.07.2013			
Ort der Prüfung: Place of testing:	QuieTek Technology(Suzhou)Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
19.07.2013	ShiLi / PE	19.07.2013	Jesse huang / PM	
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position
				Unterschrift Signature
Sonstiges / Other:		N.A		
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet				
Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

V04

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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)

RESULT: PASS

5.1.2 CARRIER FREQUENCY SEPARATION, FCC 15.247(A)(1) AND RSS-210 A8.1(B)

RESULT: PASS

5.1.3 20dB BANDWIDTH AND 99% BANDWIDTH, FCC 15.247(A)(1)& AND RSS-210 A8.2(A)

5.1.4 NUMBER OF HOPPING FREQUENCIES, FCC 15.247(A)(1)(III) AND RSS-210 A8.1(D)

RESULT: PASS

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

RESULT: PASS

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

RESULT: PASS

5.1.7 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

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5.1.2	<i>Carrier Frequency Separation, FCC 15.247(a)(1) and RSS-210 A8.1(b)</i>	<i>15</i>
5.1.3	<i>20dB Bandwidth and 99% Bandwidth, FCC 15.247(a)(1)& and RSS-210 A8.2(a)</i>	<i>18</i>
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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report.

2. Test Sites

2.1 Test Facilities

QuieTek Technology(Suzhou)Co.,Ltd.

No.99 Hongye RD.Suzhou Industnal Park Loufeng Hi-Tech Development
Zone.,Suzhou,China

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

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

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 4075B.

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2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equipment	Model	Serial no.	Cal. due date
3m modified semi-anechoic chamber	SAC	N/A	10.12.2014
EMI test receiver	ESCI	100280	08.11.2013
broadband antenna	BTA-H	040005H	28.07.2013
Spectrum analyzer	FSP30	100192	21.07.2013
Broadband coaxial preamplifier	BBV 9718	9718-012	04.07.2014
Double ridged broadband horn antenna	BBHA 9120 D	9120D-433	15.05.2014

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 Bluetooth module.

3.2 System Details

Radio standard:	Bluetooth
Max output power:	3.96dBm
Antenna gain:	1dBi
Antenna type:	PCB antenna
Antenna cable length:	N/A
Frequency range:	2402 – 2480MHz
EDR Number of channels:	79
EDR Channel spacing:	1MHz
Modulation type:	EDR (GFSK; $\pi/4$ -DQPSK ;8DPSK)
Rated voltage:	3.3V
Test voltage:	3.3V

3.2.1 Voltage Requirements, FCC 15.31(e)

RESULT: **PASS**

All the tests were performed using steady DC 3.3V. Hence it complies with the power supply requirements.

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.

Bluetooth BDR and EDR mode :

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.

Bluetooth BDR and EDR mode basic operation in (GFSK; $\pi/4$ -DQPSK ;8DPSK) :

- A. EUT transmits (TX mode), with full power, at lowest channel (2402MHz), a continuous modulated signal streaming with 100% duty cycle.
 - B. EUT transmits (TX mode), with full power, at middle channel (2441MHz), a continuous modulated signal streaming with 100% duty cycle.
 - C. EUT transmits (TX mode), with full power, at highest channel (2480MHz), a continuous modulated signal streaming with 100% duty cycle.
 - D. EUT receives (RX mode), at lowest channel (2402MHz), continuously.
 - E. EUT receives (RX mode), at middle channel (2441MHz), continuously.
 - F. EUT receives (RX mode), at highest channel (2480MHz), continuously.
- EUT transmits on pseudo-random sequence on all channels (hopping mode).

3.4 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

The test methods, which have been used, are based on Public Notice DA 00-705 and ANSI C63.4-2003

For details, see under each test item.

Note : Bluetooth BDR and EDR is following Public Notice DA 00-705

Technical Specification	Description
Hopping Range	Hereby we declare that the maximum frequency of this device is: 2402-2480MHz. This is according the Bluetooth Core Specification V2.1+EDR for devices which will be operated in the USA. This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/04).
Hopping Sequence	Example of a 79 hopping sequence in data mode: 33,04,21,44,23,42,53,46,55,48,40,59,72,29,76,31,08,73, 07,75,09,45,60,39,58,13,47,11,77,52,35,50,65,54,67,56, 69,62,71,64, 7,25,27,66,57,70,74,61,78,63,10,41,05,43, 15,44,64,68,02,70,06,01,51,03,55,05,03,66,53,49,36,47,
Receiver input bandwidth	The input bandwidth of the receiver is 1MHz. In every connection one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings. Repeating of a packer has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

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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 sample was available:

For antennas conducted measurements with 50Ω connector and radiated measurements.more details, refer to section: Photographs of the Test Set-Up.

4.3 Test Operation and Test Software

Software used for testing: CSR Bluetest 3 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

The product has been tested together with a PCB Development kit (Control the module).

4.5 Countermeasures to achieve EMC Compliance

No additional measures were employed to achieve compliance.

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5. Test Results of Conducted Measurements at Antenna Port

5.1 Transmitter Parameters

5.1.1 Conducted Output Power, FCC 15.247(b)(1)& and RSS-210 A8.4(2)

RESULT:

PASS

Date of testing: 2013-7-10

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 C63.10-2003, RSS-Gen 4.8 and 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.

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Table 3: Conducted Output Power, Mode A

Data Rate [Mbps]	Reading [dBm]	RBW [MHz]	Output Power [dBm]	Limit [dBm]
1	3.95	3	3.95	21
2	3.94	3	3.94	21
3	3.94	3	3.94	21

Table 4: Conducted Output Power, Mode B

Data Rate [Mbps]	Reading [dBm]	RBW [MHz]	Output Power [dBm]	Limit [dBm]
1	3.96	3	3.96	21
2	3.95	3	3.95	21
3	3.93	3	3.93	21

Table 5: Conducted Output Power, Mode C

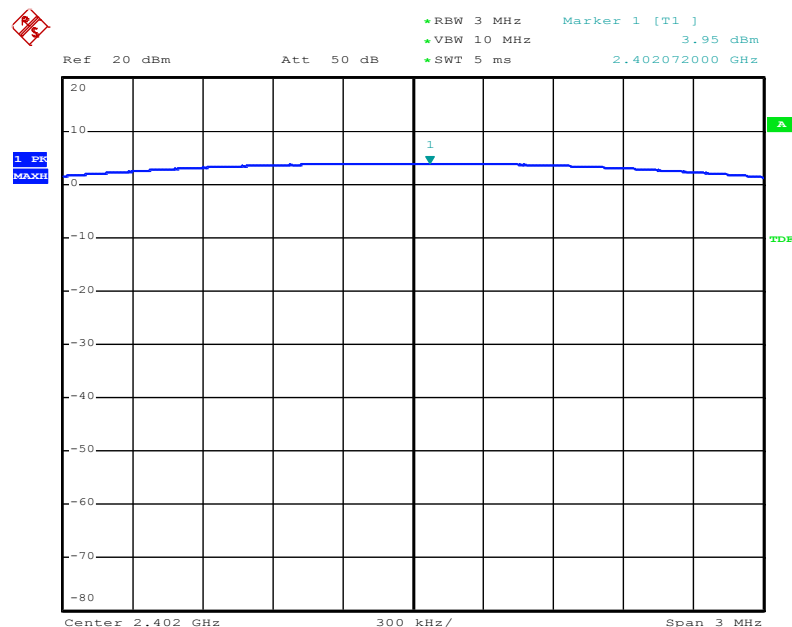
Data Rate [Mbps]	Reading [dBm]	RBW [MHz]	Output Power [dBm]	Limit [dBm]
1	3.44	3	3.37	21
2	3.40	3	3.40	21
3	3.42	3	3.42	21

Notes: Cable loss was included in reading as offset.

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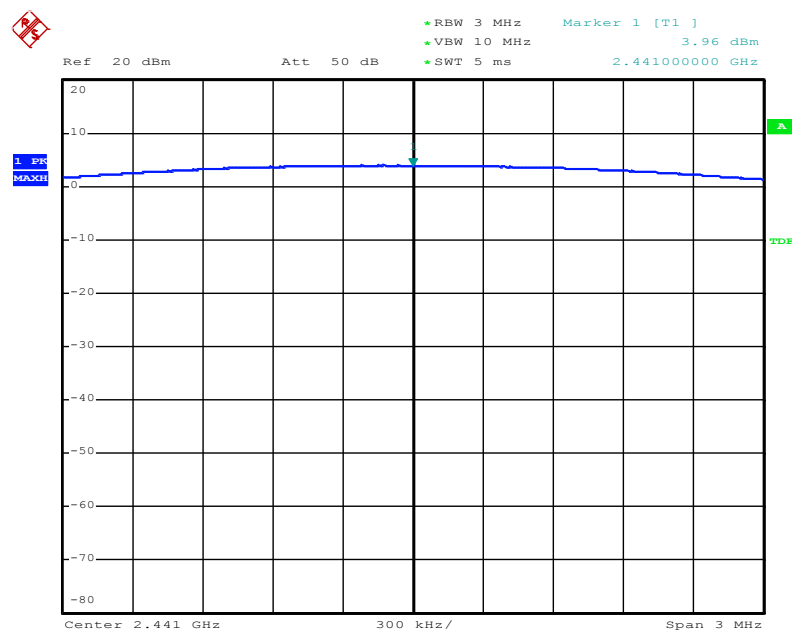
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Figure 1: Conducted Output Power-Low Channel



Date: 1.JAN.2000 03:23:07

Figure 2: Conducted Output Power-Middle Channel

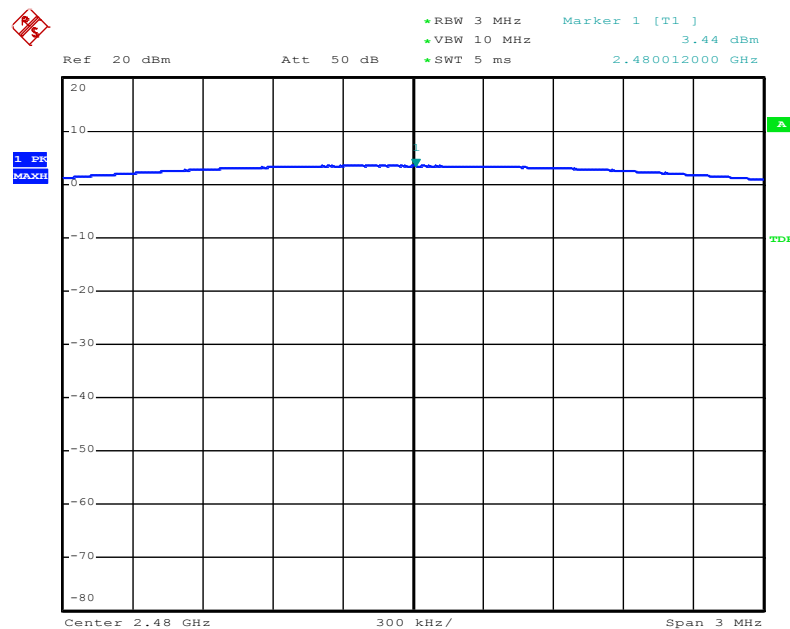


Date: 1.JAN.2000 03:24:38

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Figure 3: Conducted Output Power-High Channel



Date: 1.JAN.2000 03:25:09

Remark:

The above results show that the BDR and EDR worst case output power is found at the data rate of 1Mbps.

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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: 2013-7-10

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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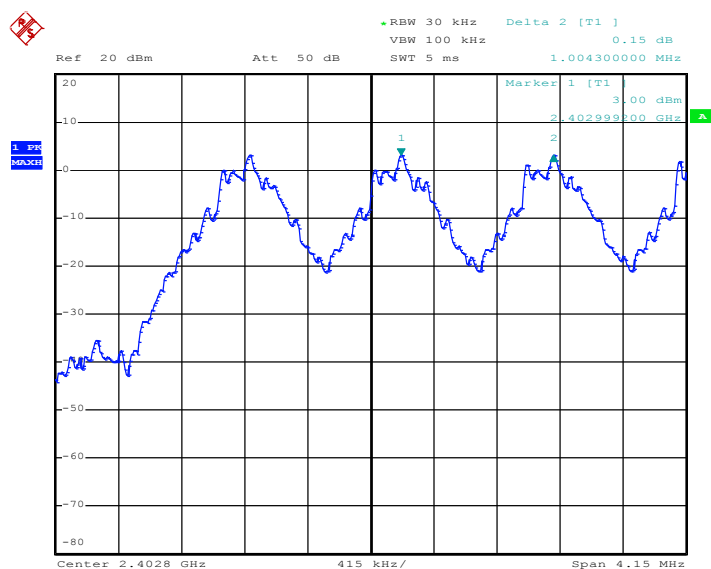
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Table 6: Carrier Frequency Separation

Channel	Channel Separation [kHz]	20dB Bandwidth [kHz](8DPSK)	Limit [kHz]
Low	1004	1233	822
Middle	1000	1224	816
High	1004	1215	810

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

Figure 4: Carrier Frequency Separation-Low Channel

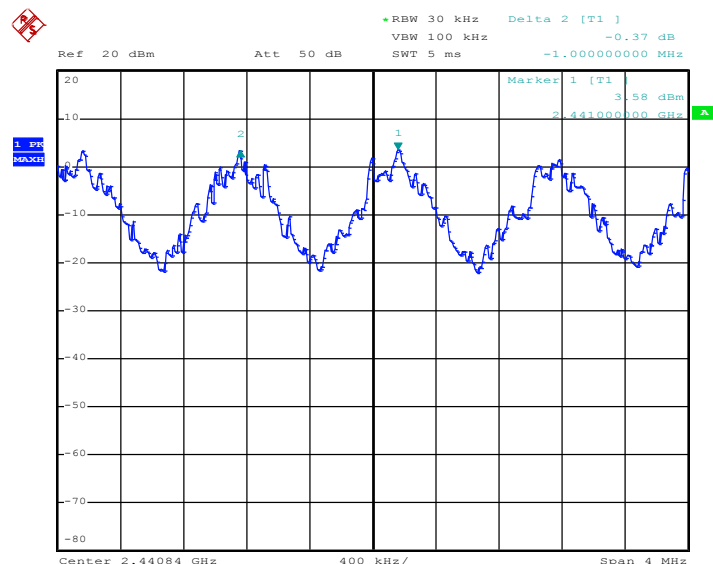


Date: 1.JAN.2000 03:05:04

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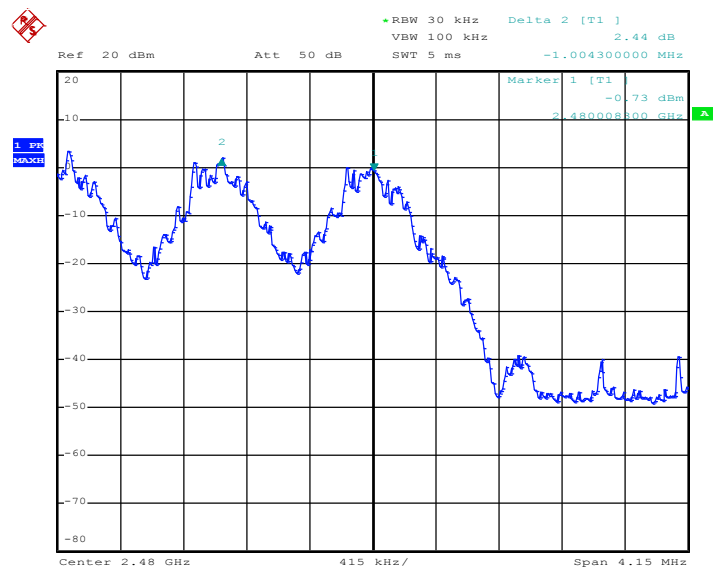
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Figure 5: Carrier Frequency Separation-Middle Channel



Date: 1.JAN.2000 01:03:12

Figure 6: Carrier Frequency Separation-High Channel



Date: 1.JAN.2000 03:06:34

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5.1.3 20dB Bandwidth and 99% Bandwidth, FCC 15.247(a)(1)& and RSS-210 A8.2(a)

Date of testing: 2013-7-10

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 100kHz, the video bandwidth to 300kHz and the span to 2MHz.

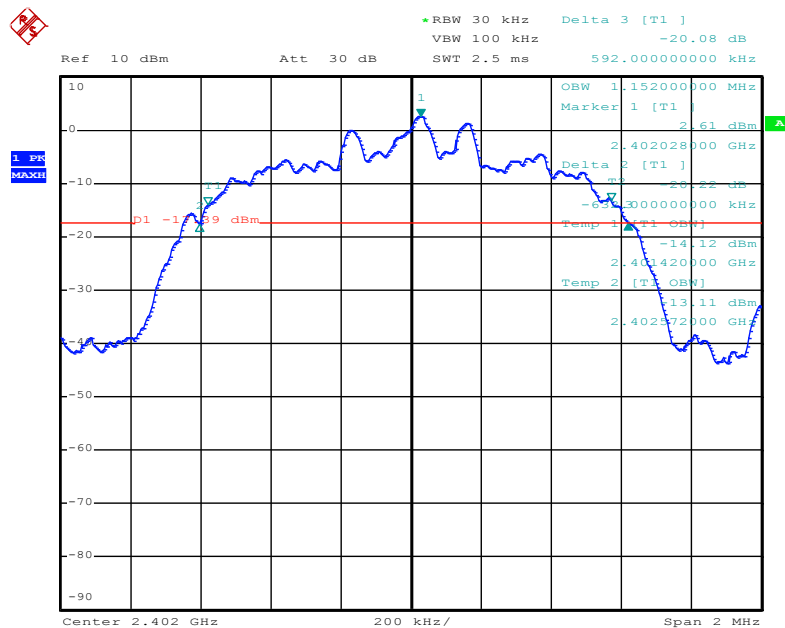
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Table 7: 20dB &99% Bandwidth

Operating Frequency [MHz]	20dB Bandwidth [kHz](8DPSK)	20dB Bandwidth [kHz](GFSK)	99% Bandwidth [kHz](8DPSK)	99% Bandwidth [kHz](GFSK)
2402	1224	816	-	-
2441	1208	800	-	-
2480	1216	808	-	-

Figure 7: 20dB &99% Bandwidth, Mode A (8DPSK and GFSK)

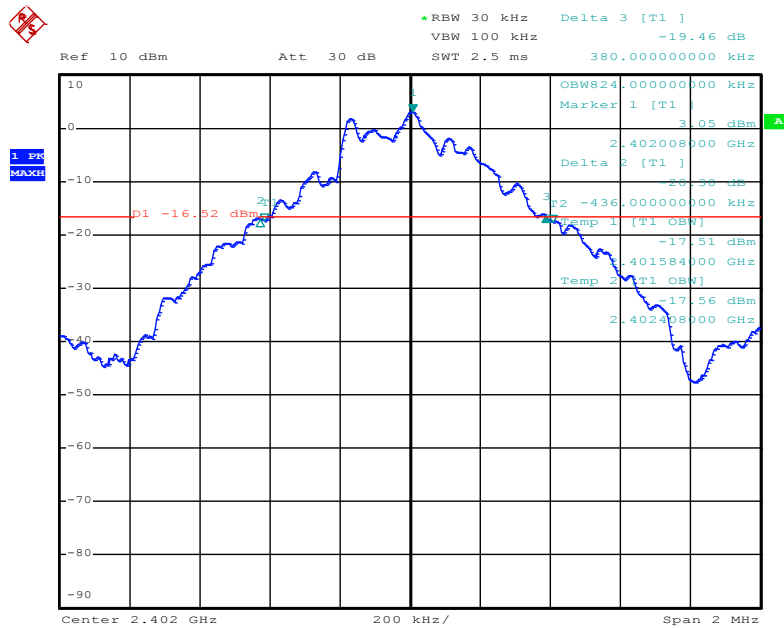


Date: 1.JAN.2000 00:45:34

8DPSK

Prüfbericht - Nr.: 15062958 001
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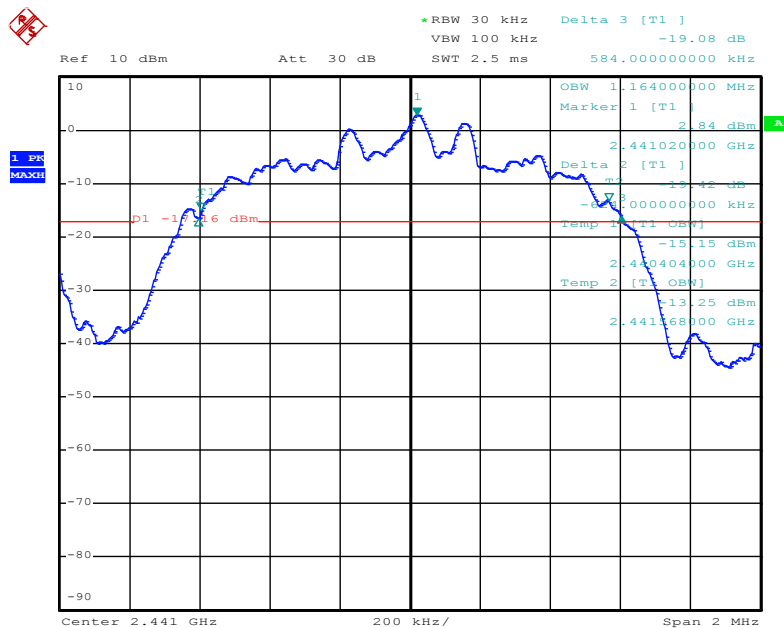
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Date: 1.JAN.2000 00:42:10

GFSK

Figure 8: 20dB Bandwidth, Mode B (8DPSK and GFSK)

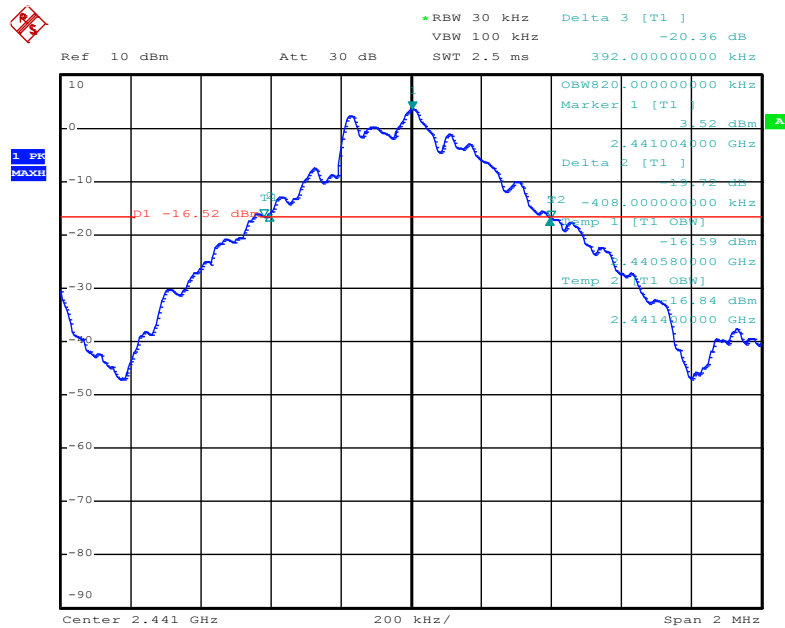


Date: 1.JAN.2000 00:46:57

8DPSK

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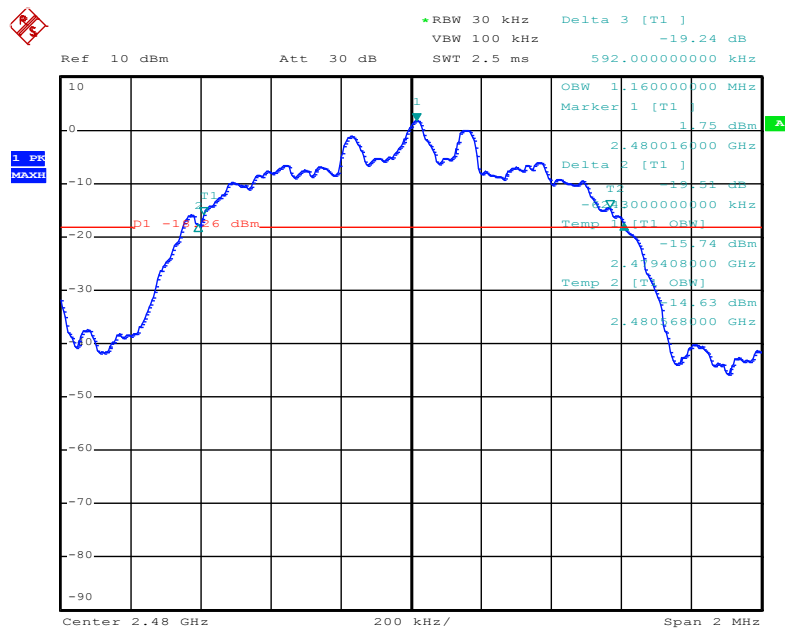
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Date: 1.JAN.2000 00:40:58

GFSK

Figure 9: 20dB Bandwidth, Mode C (8DPSK and GFSK)

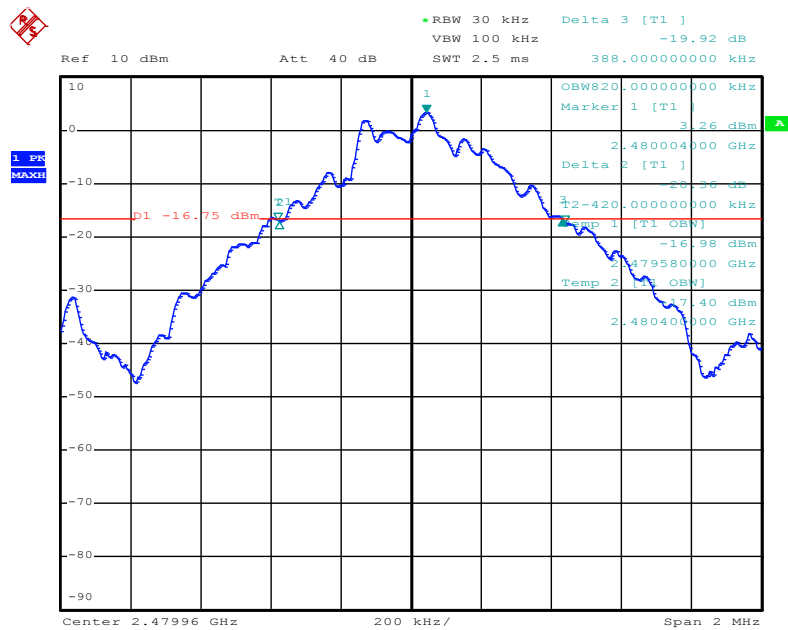


Date: 1.JAN.2000 00:48:42

8DPSK

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Date: 1.JAN.2000 00:39:22

GFSK

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

RESULT:

PASS

Date of testing: 2013-7-10

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.

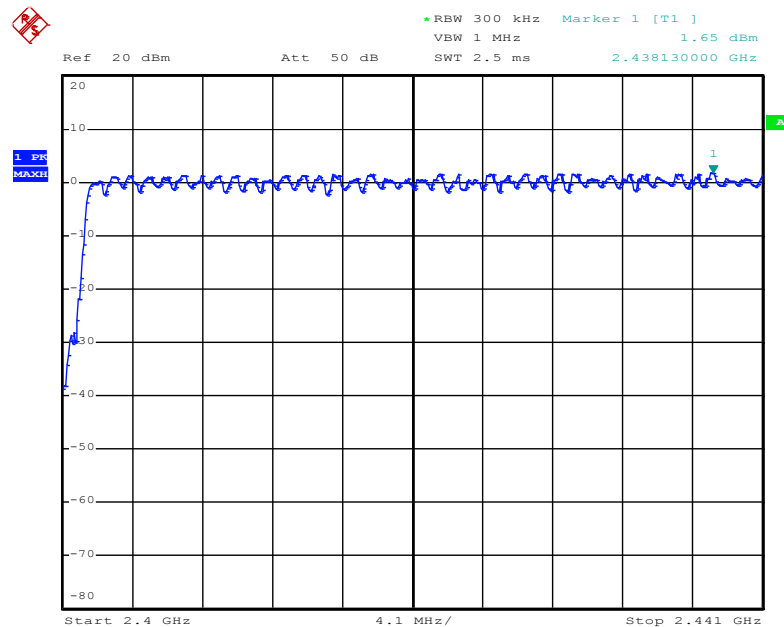
Table 8: Number of Hopping Frequencies

Number of Hopping Frequencies	Limit
79	15

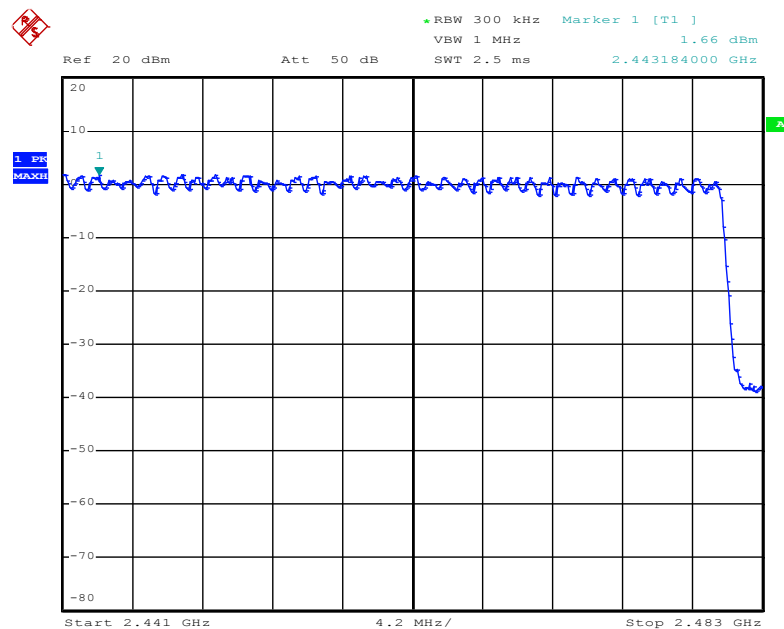
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Figure 10: Hopping Frequencies



Date: 1.JAN.2000 00:55:26



Date: 1.JAN.2000 00:56:53

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

RESULT:

PASS

Date of testing: 2013-7-10

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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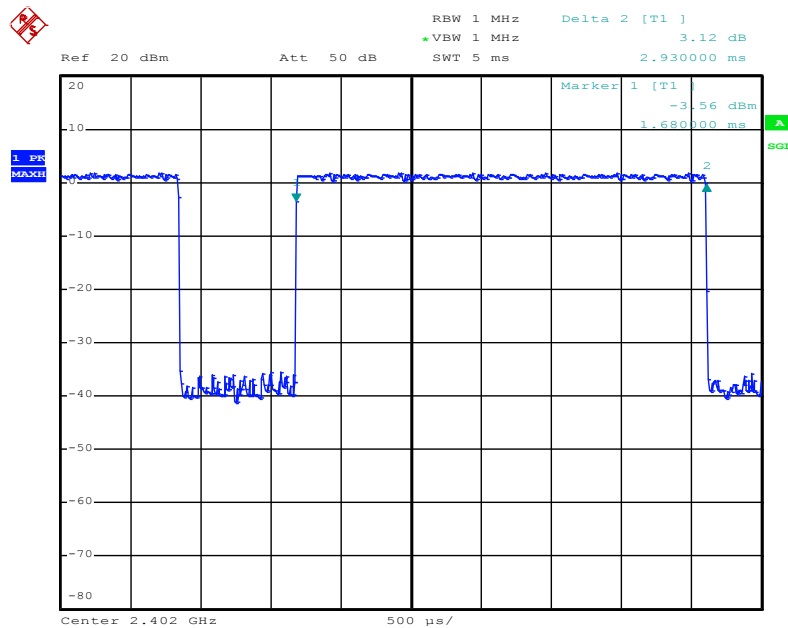
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Table 9: Average Time of Occupancy

Channel	Packet Type	Packet Duration [ms]	Number of Hops per Channel in a 31.6s Period	Average Time of Occupancy [ms]	Limit [ms]
Low	1M-DH5	2.93	106.81	312.95	400
Mid	1M-DH5	2.94	106.81	314.02	400
High	1M-DH5	2.94	106.81	314.02	400

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

Figure 11: Dwell Time, Mode (Hopping), 1M-DH5, Low channel

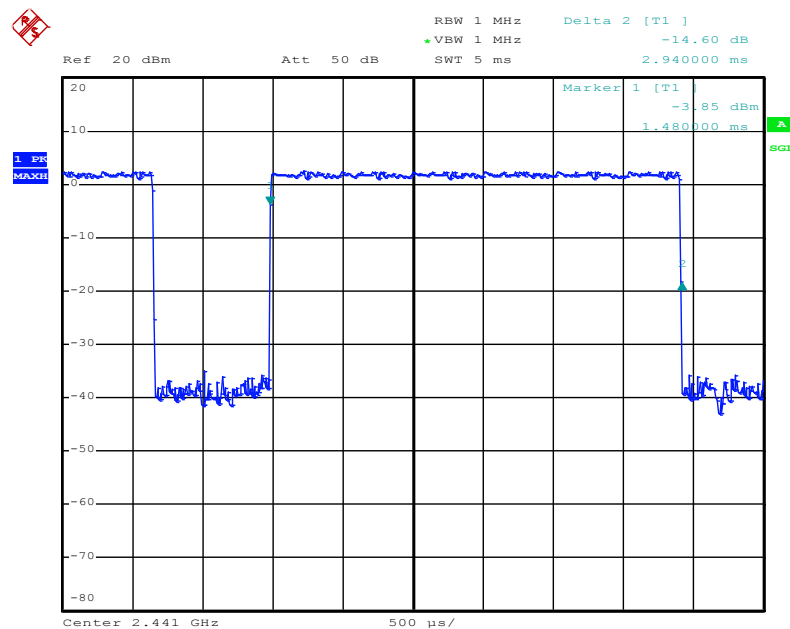


Date: 1.JAN.2000 03:11:40

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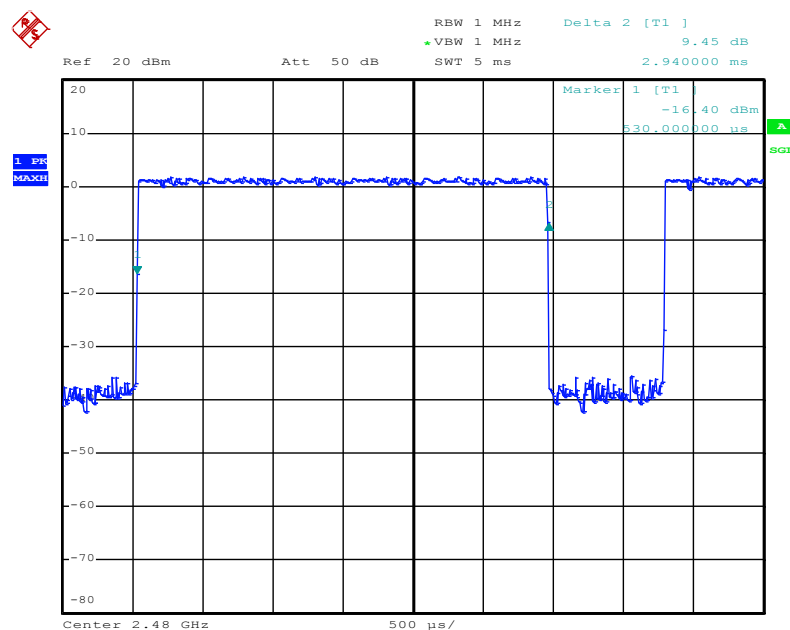
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Figure 12: Dwell Time, Mode (Hopping), 1M-DH5, Mid channel



Date: 1.JAN.2000 03:10:49

Figure 13: Dwell Time, Mode (Hopping), 1M-DH5, High channel



Date: 1.JAN.2000 03:10:03

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

RESULT:

PASS

Date of testing: 2013-7-10

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 26GHz (10th harmonics).

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

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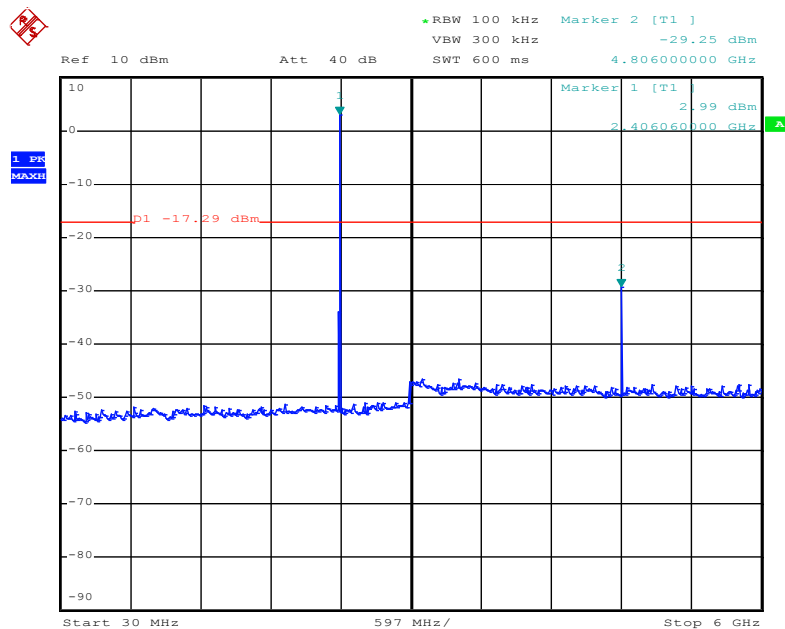
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Table 10: Conducted Spurious Emission, Mode A

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
24200	-30.95	2.99	-17.29	14.18
4806	-29.25	2.99	-17.29	25.99
2402	2.99	2.99	N/A	N/A

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

Figure 14: Conducted Spurious Emission, 30MHz – 6GHz, Mode A

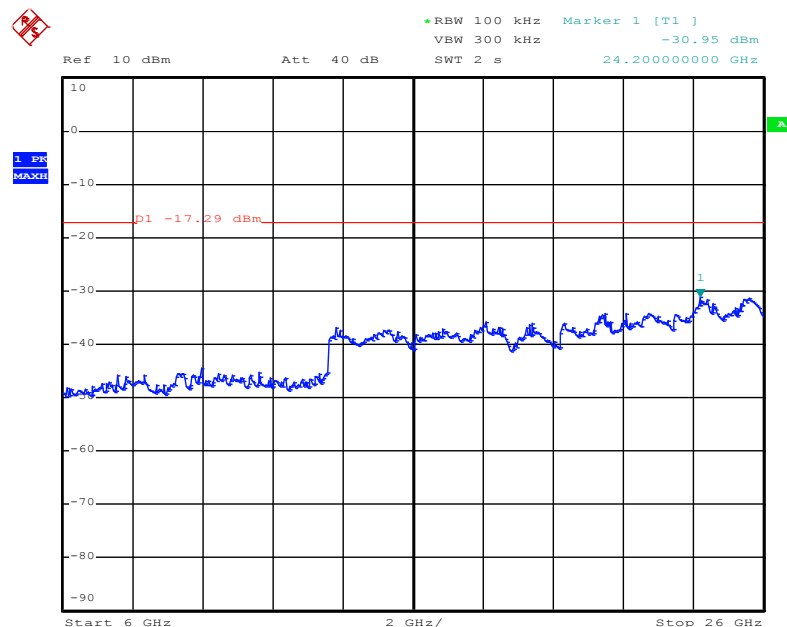


Date: 1.JAN.2000 00:31:30

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Figure 15: Conducted Spurious Emission, 6 – 26GHz, Mode A



Date: 1.JAN.2000 00:32:38

Table 11: Conducted Spurious Emission, Mode B

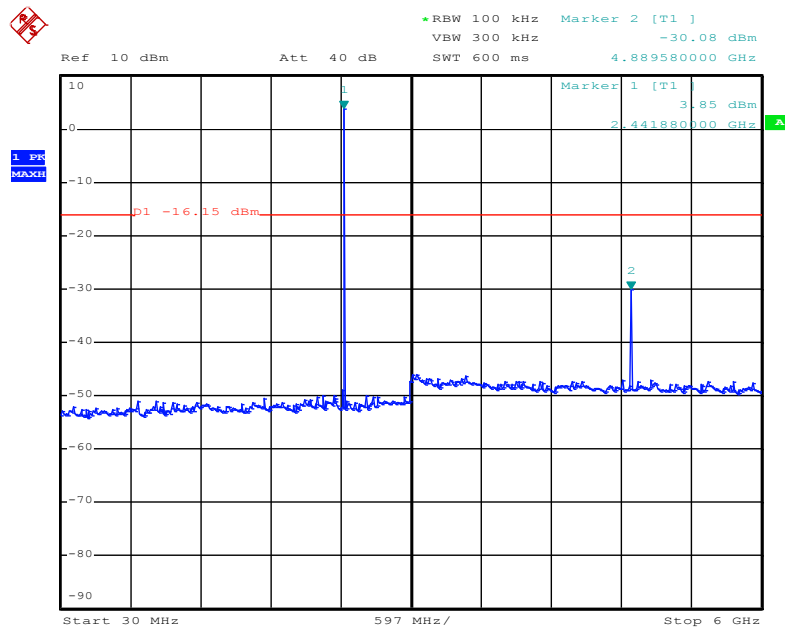
Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
7320	-41.88	3.85	-16.15	13.74
4889	-30.08	3.85	-16.15	24.75
2441	3.85	3.85	NA	N/A

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

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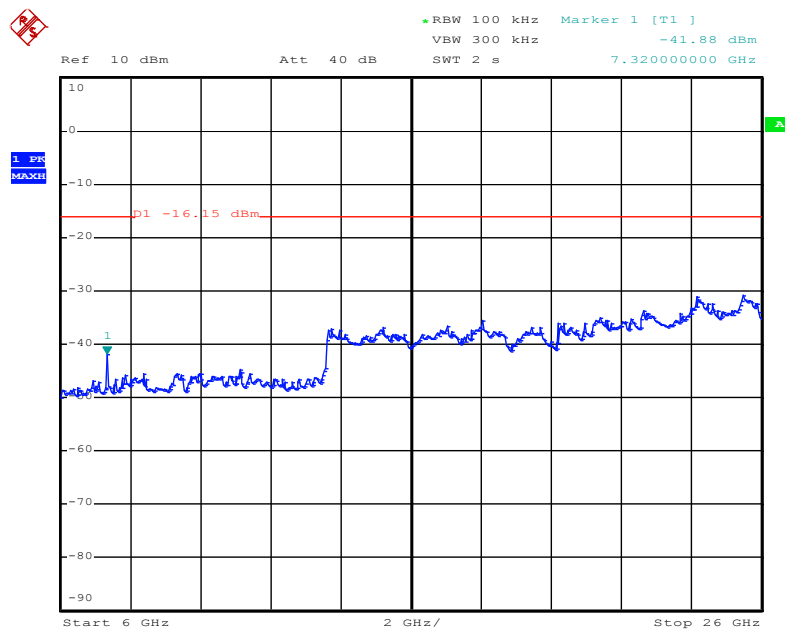
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Figure 16: Conducted Spurious Emission, 30MHz – 6GHz, Mode B



Date: 1.JAN.2000 00:28:57

Figure 17: Conducted Spurious Emission, 6 – 26GHz, Mode B



Date: 1.JAN.2000 00:29:57

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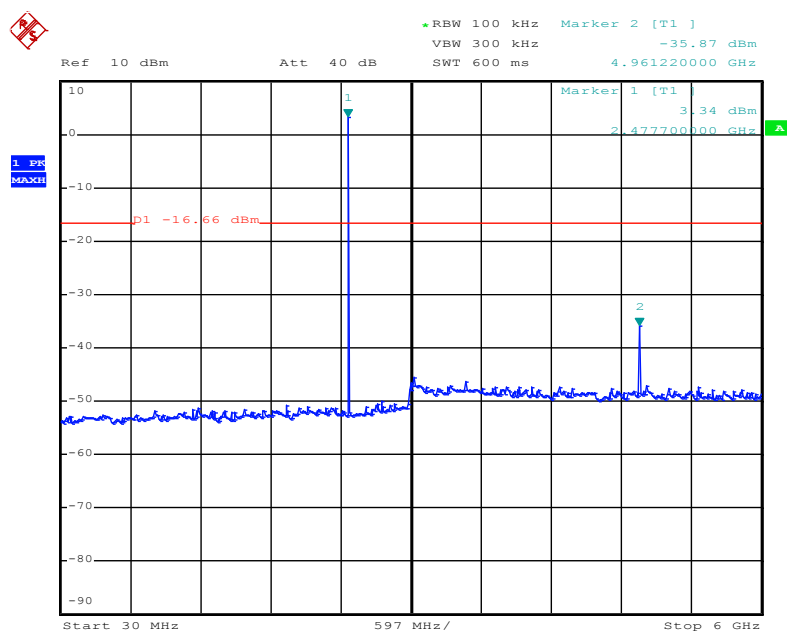
Table 12: Conducted Spurious Emission, Mode C

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
7440	-38.87	3.34	-16.66	14.61
3301	-40.70	3.34	-16.66	22.35
2480	3.34	3.34	N/A	N/A

Notes: Cable loss was included in reading as offset.

Limit = Reading of fundamental + Correction factor – 20dB

Figure 18: Conducted Spurious Emission, 30MHz – 6GHz, Mode C

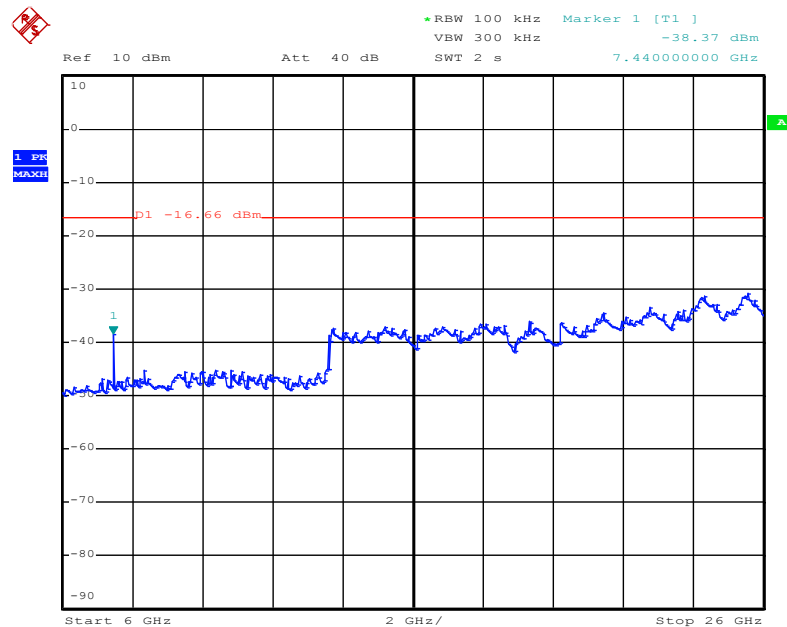


Date: 1.JAN.2000 00:34:26

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Figure 19: Conducted Spurious Emission, 6 – 26GHz, Mode C



Date: 1.JAN.2000 00:35:19

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

RESULT:

PASS

Date of testing: 2013-7-10

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 and Public Notice DA 00-705.

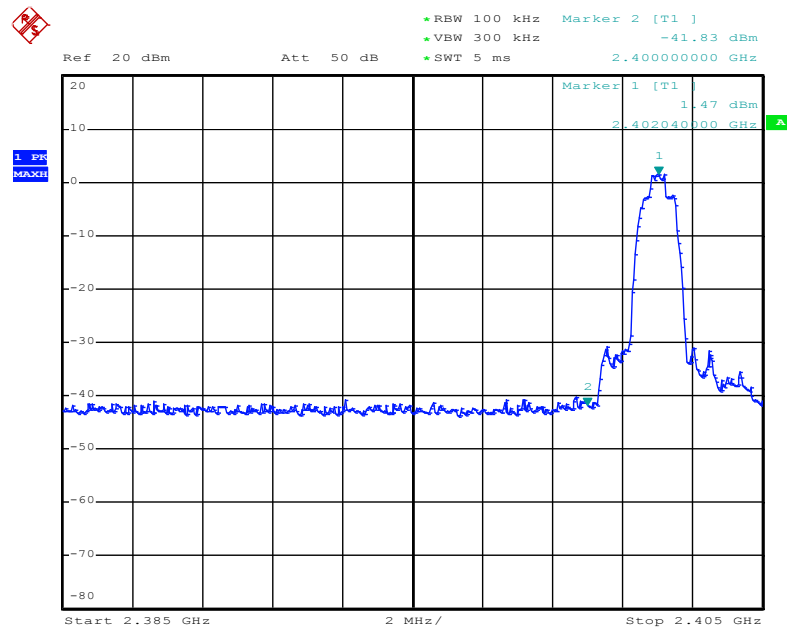
A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth was set to 100kHz and video bandwidth was set to 300kHz. Allow the trace to stabilize. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this 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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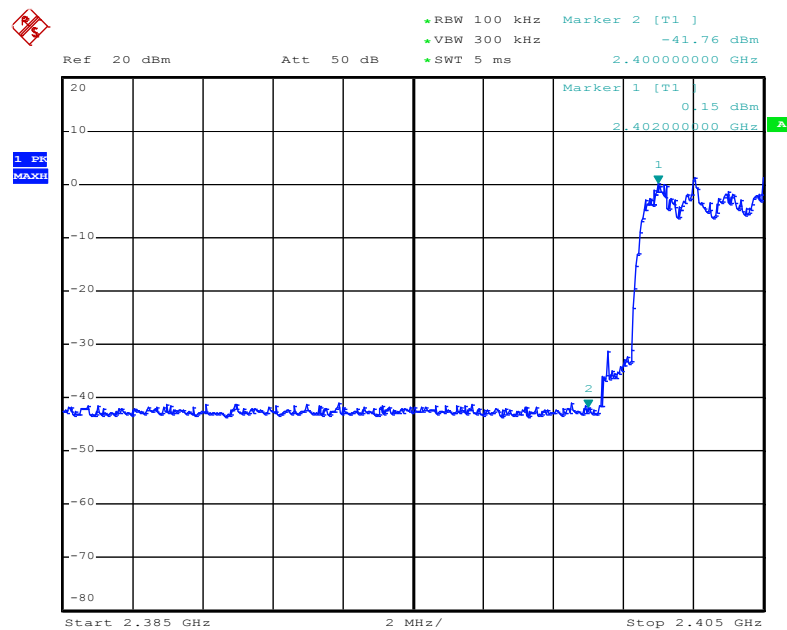
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Figure 20: Lower Band Edge Conducted Mode A



Date: 1.JAN.2000 03:15:35

Figure 21: Upper Band Edge Conducted Mode C

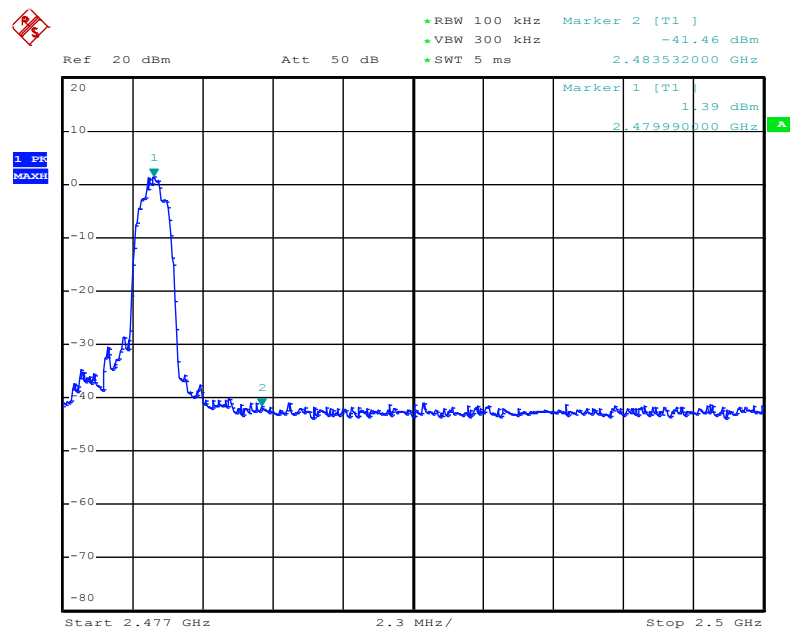


Date: 1.JAN.2000 03:17:07

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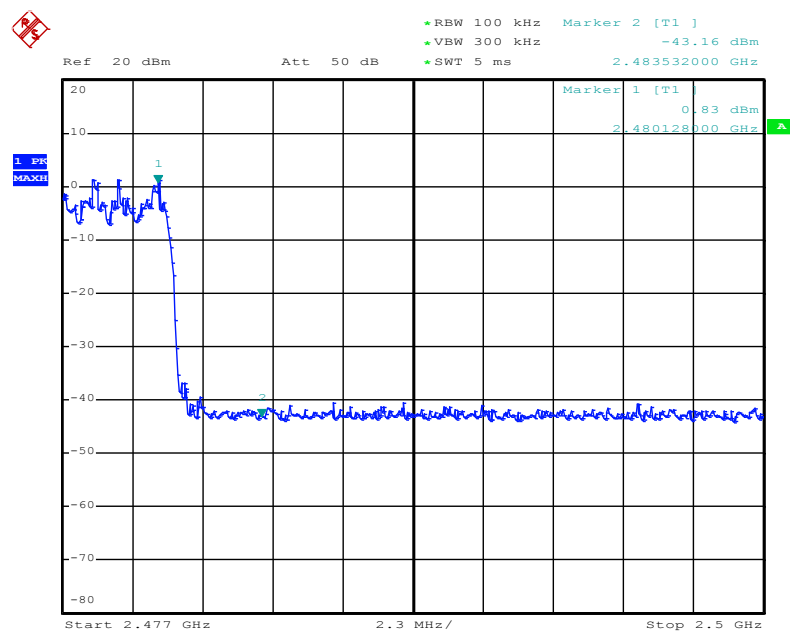
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Figure 22: Lower Band Edge Conducted Mode A(Hopping)



Date: 1.JAN.2000 03:14:12

Figure 23: Lower Band Edge Conducted Mode C(Hopping)



Date: 1.JAN.2000 03:18:27

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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: 2013-7-10

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 C63.10-2009, RSS-Gen 4.9 and KDB 558074 D01 DTS Meas Guidance v02
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 13: Band Edge Radiated Emission

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2390.000	52.072	15.771	-21.928	74.000	36.302	PK
2	Horizontal	2399.898	57.569	21.186	-16.431	74.000	36.382	PK
3	Horizontal	2401.885	92.172	55.773	N/A	N/A	36.399	PK

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2390.000	38.395	2.094	-15.605	54.000	36.302	AV
2	Horizontal	2399.898	40.526	4.143	-13.474	54.000	36.382	AV
3	Horizontal	2402.214	56.757	20.355	N/A	N/A	36.402	AV

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2390.000	50.632	14.991	-23.368	74.000	35.642	PK
2	Vertical	2399.898	60.499	24.816	-13.501	74.000	35.683	PK
3	Vertical	2401.885	96.903	61.212	N/A	N/A	35.692	PK

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2390.000	37.820	2.179	-16.180	54.000	35.642	AV
2	Vertical	2399.898	41.636	5.953	-12.364	54.000	35.683	AV
3	Vertical	2402.073	58.518	22.826	N/A	N/A	35.692	AV

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2479.969	91.039	53.980	N/A	N/A	37.058	PK
2	Horizontal	2483.500	53.309	16.219	-20.691	74.000	37.089	PK
3	Horizontal	2484.900	52.441	15.339	-21.559	74.000	37.102	PK

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2479.936	57.074	20.016	N/A	N/A	37.058	AV
2	Horizontal	2483.500	39.478	2.388	-14.522	54.000	37.089	AV
3	Horizontal	2484.900	39.358	2.256	-14.642	54.000	37.102	AV

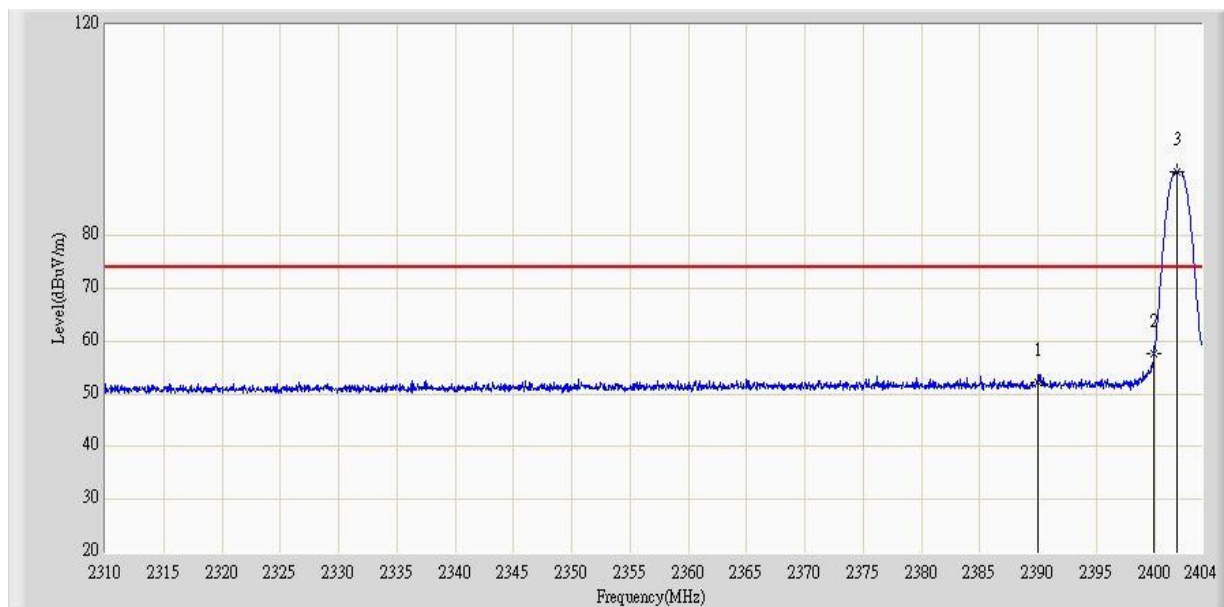
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2480.046	93.998	57.959	N/A	N/A	36.039	PK
2	Vertical	2483.500	51.278	15.222	-22.722	74.000	36.055	PK
3	Vertical	2484.900	51.431	15.369	-22.569	74.000	36.063	PK

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2479.837	57.237	21.199	N/A	N/A	36.038	AV
2	Vertical	2483.500	38.586	2.530	-15.414	54.000	36.055	AV
3	Vertical	2484.900	38.387	2.325	-15.613	54.000	36.063	AV

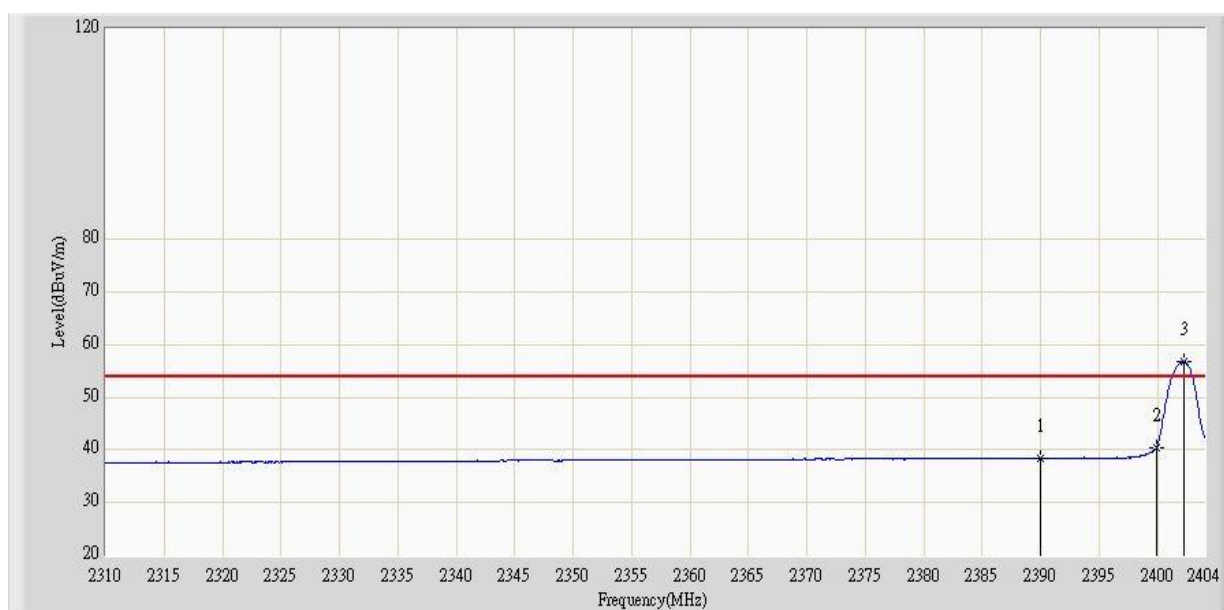
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Figure 24: Lower Band Edge Radiated Mode A



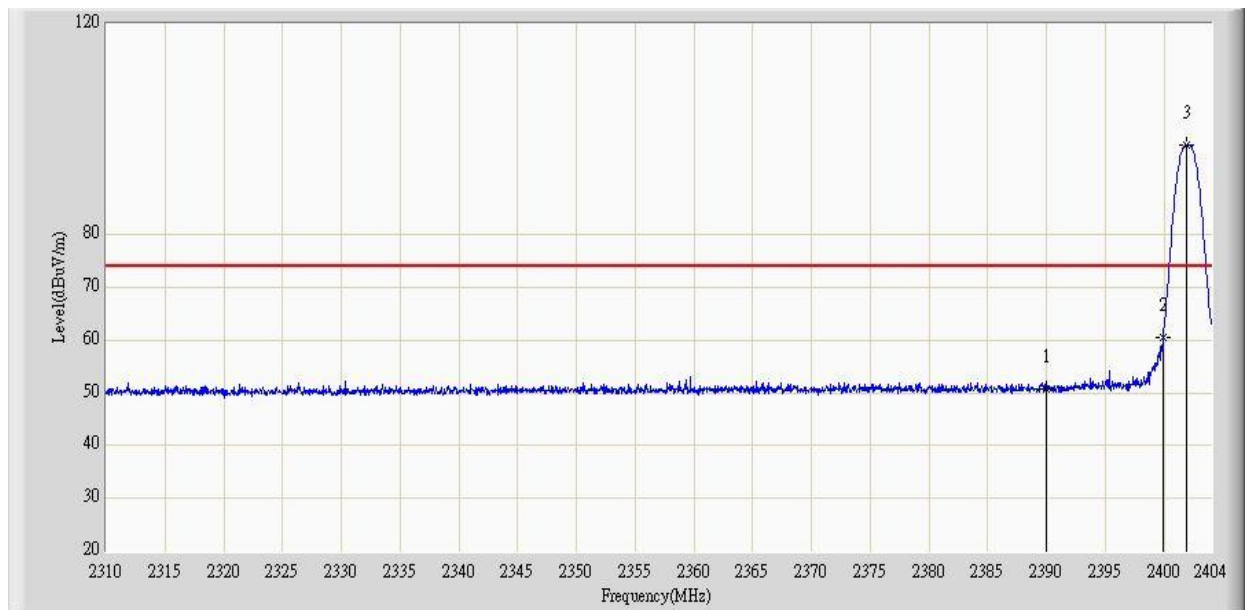
Horizontal-PK



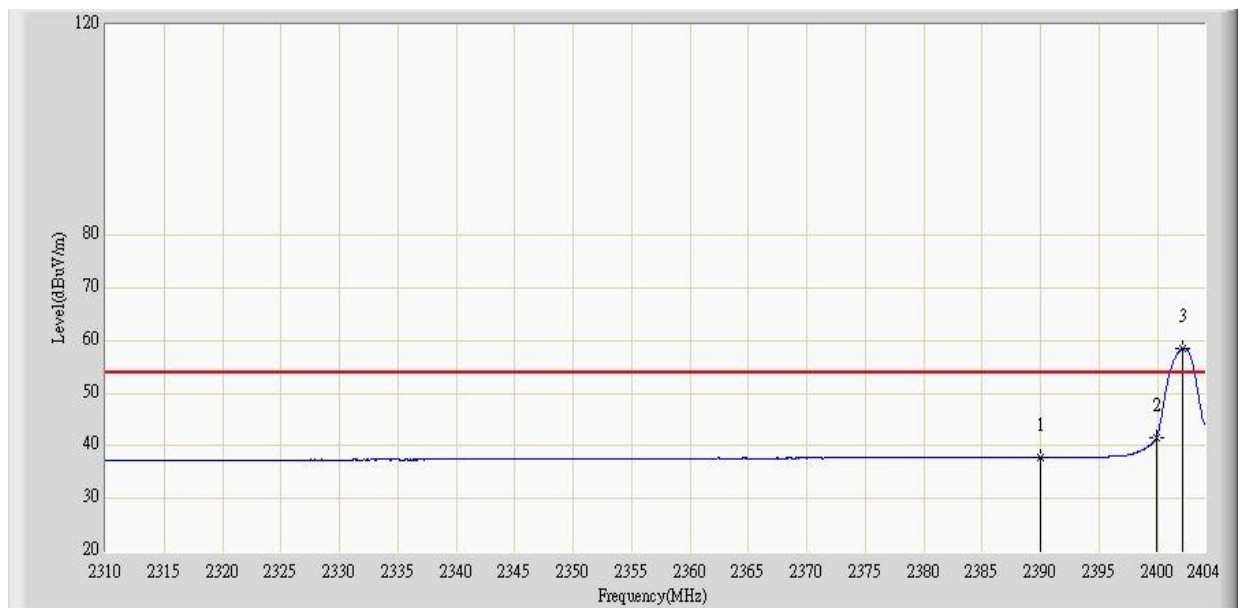
Horizontal-AV

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Vertical -PK

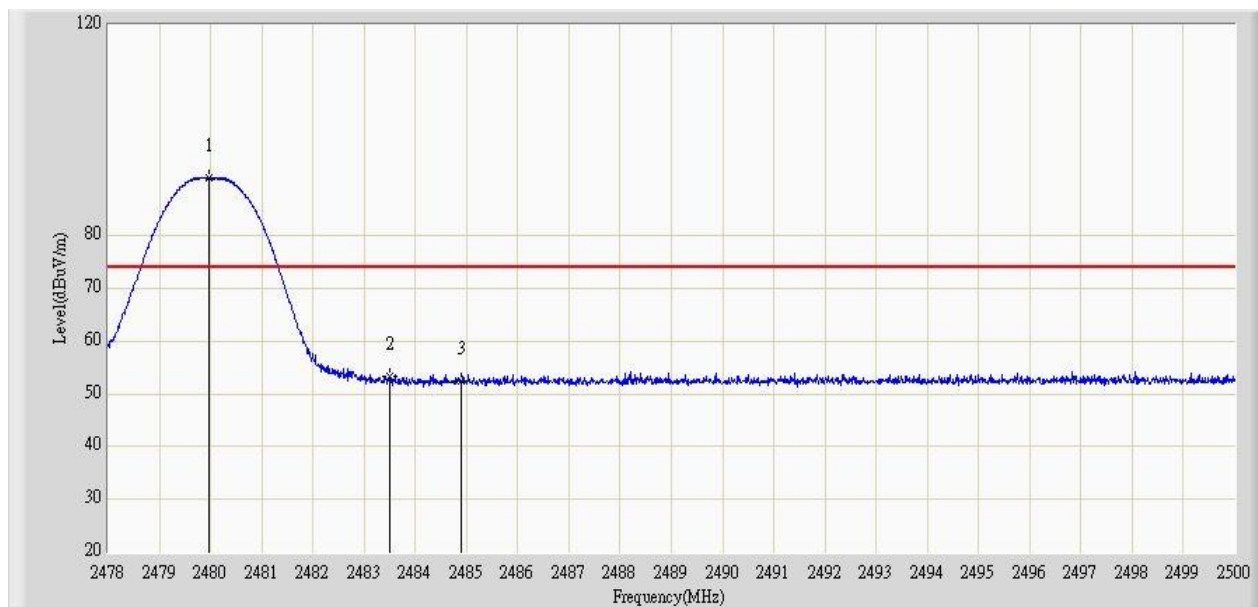


Vertical -AV

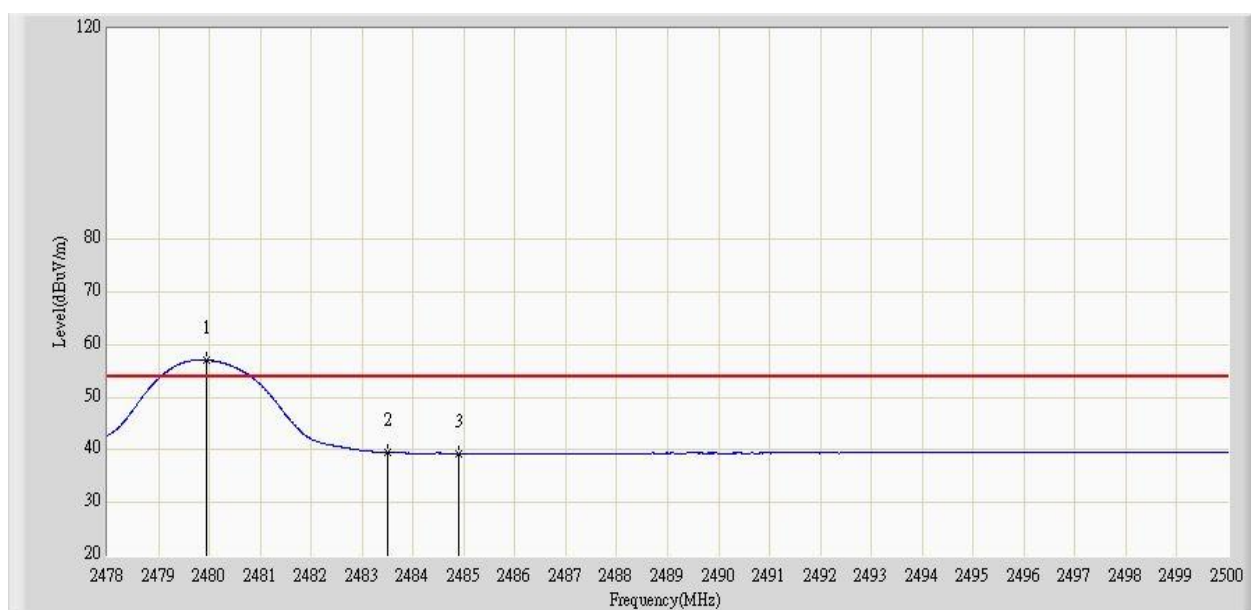
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Figure 25: Lower Band Edge Radiated Mode A



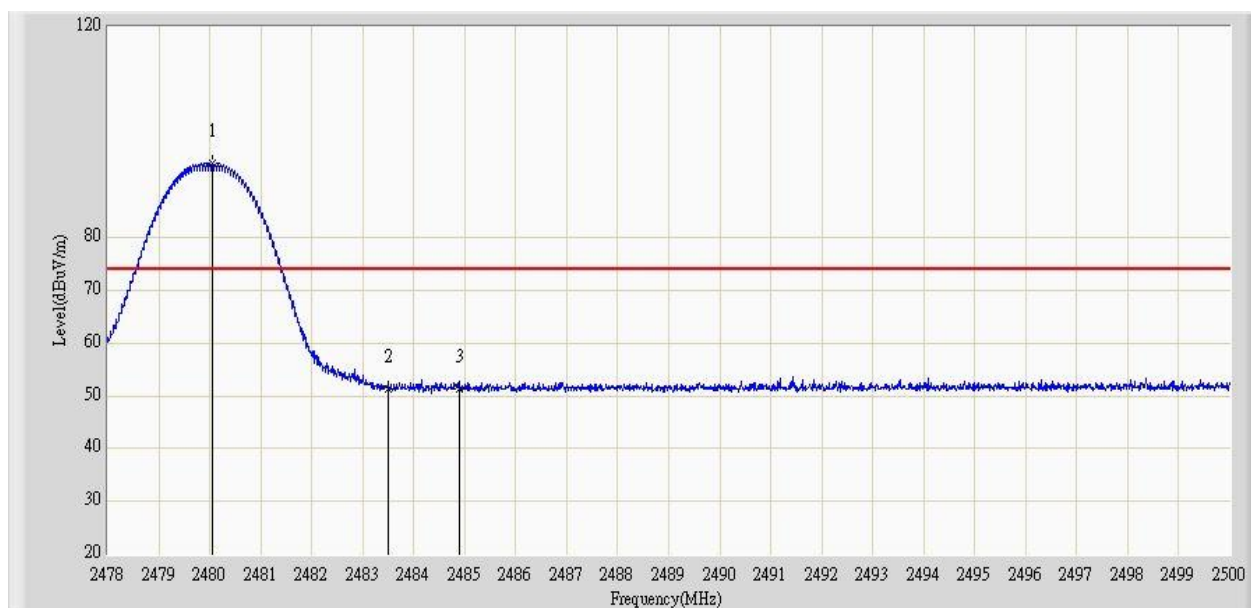
Horizontal-PK



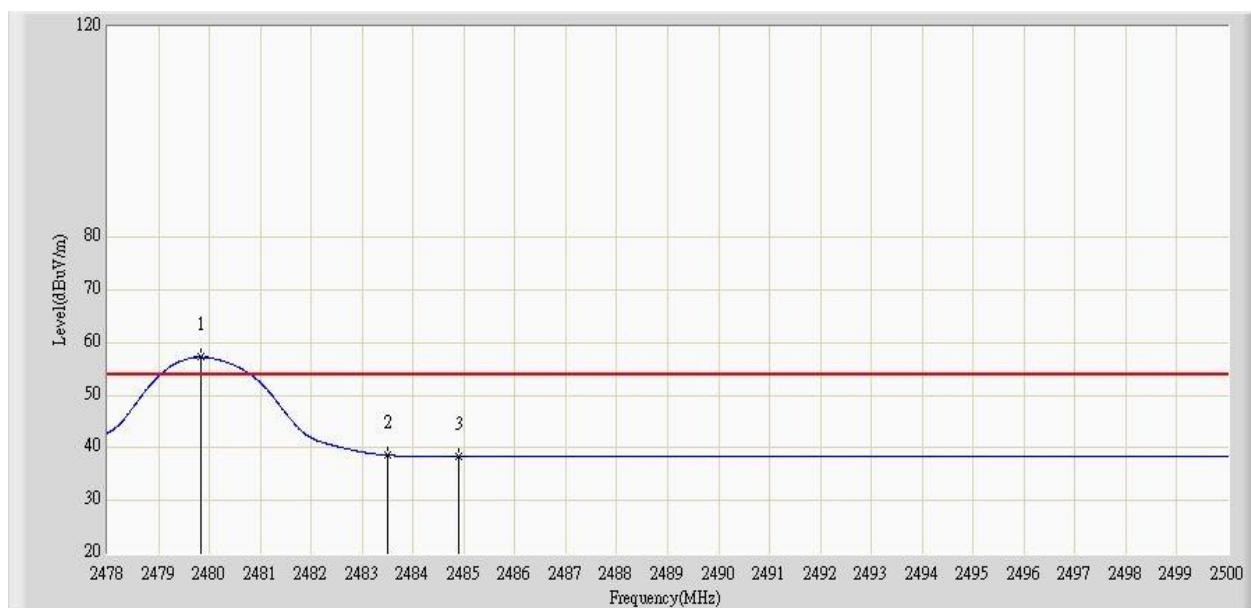
Horizontal-AV

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Vertical -PK



Vertical -AV

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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:	2013-7-10
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 C63.04-2003, 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 body-worn.

The spectrum was examined from 30MHz to the 10th harmonic of the highest fundamental transmitter frequency (25GHz). Final radiated emission measurements were made at 3m distance.

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

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

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Emissions other than those mentioned are small or not detectable.

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

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	4808.000	56.569	65.055	-17.431	74.000	-8.486	PK
2	Vertical	4799.500	59.162	67.758	-14.838	74.000	-8.595	PK

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

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

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	4884.500	58.448	66.980	-15.552	74.000	-8.533	PK
2	Vertical	4884.500	60.477	68.994	-13.523	74.000	-8.518	PK

Table 16: Radiated Emission, Average and Peak Data, 1 – 25GHz, Horizontal and Vertical Antenna Orientations, Mode C

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	4961.000	52.625	61.234	-21.375	74.000	-8.609	PK
2	Vertical	4961.000	59.065	67.536	-14.935	74.000	-8.471	PK

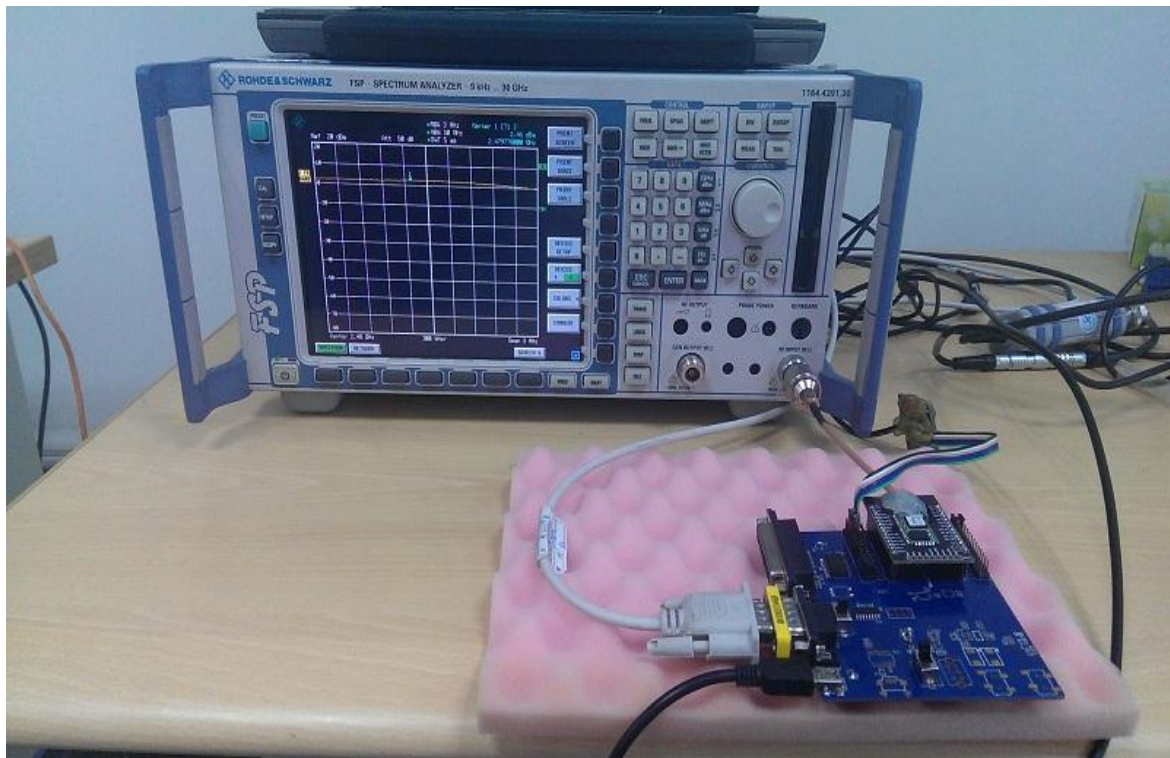
Note: All correction factors (antenna, cable, pre-amplifier) are included in the measurement values. Above 18 GHz emission far below limit

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7. Photographs of the Test Setup

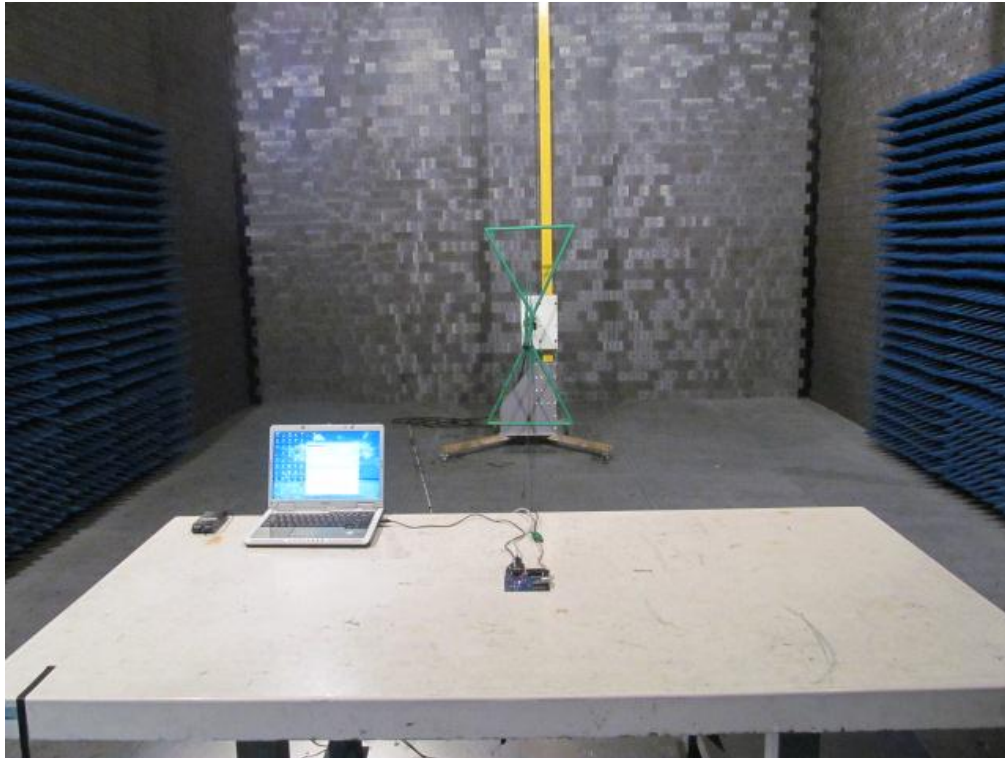
Photograph 1: Set-up for Conducted RF test at Antenna Port



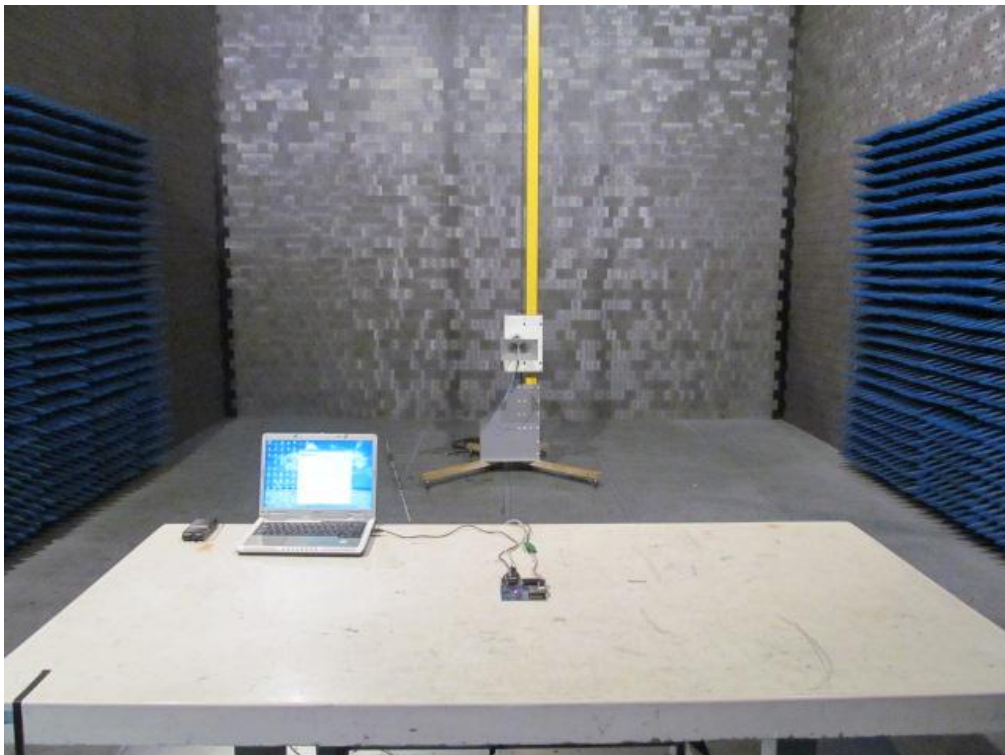
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Photograph 2: Set-up for Radiated Emission, 30MHz-1000MHz



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



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