

Produkte
Products

Prüfbericht - Nr.: 15060225 001
Test Report No.:

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Auftraggeber: Pioneer Corporation
Client: 25-1 Nishimachi Yamada Kawagoe 350-8555 Japan

Gegenstand der Prüfung: Bluetooth Module
Test item:

Bezeichnung: YWX5044 **Serien-Nr.: N/A**
Identification: Serial No.:
FCC ID :AJDK071
IC:775E-K071

Wareneingangs-Nr.: 154020724 **Eingangsdatum: 2013-3-1**
Receipt No.: Date of receipt:

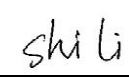
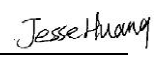
Zustand des Prüfgegenstandes bei Anlieferung: Test sample(s) is/are not damaged and suitable for testing.
Condition of test item at delivery:

Prüfört: • TÜV Rheinland (Shanghai) Co., Ltd.
Testing location: • **QuieTek Technology(Suzhou)Co., Ltd.**
(Detailed address refer to clause 2.1)

Prüfgrundlage: FCC 47 CFR Part 15, Subpart C, § 15.247
Test specification: **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: Building 2, No. 777 Guangzhong Road West, Shanghai 200072, P.R. China

geprüft/ tested by:			kontrolliert/ reviewed by:		
2013-04-23	Shili / Inspector		2013-04-23	Jesse Huang / Reviewer	
Datum	Name/Stellung	Unterschrift	Datum	Name/Stellung	Unterschrift
Date	Name/Position	Signature	Date	Name/Position	Signature

Sonstiges/ Other Aspects:

Abkürzungen:	P(ass) = entspricht Prüfgrundlage	Abbreviations:	P(ass) = passed
	F(ail) = entspricht nicht Prüfgrundlage		F(ail) = failed
	N/A = nicht anwendbar		N/A = not applicable
	N/T = nicht getestet		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.
This test report relates to the a. m. test item. 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)& (3) 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)& (2) 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

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

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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	15.05.2013

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 Bluetooth module.

3.2 System Details

Radio standard:	Bluetooth
Max output power:	4dBm
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

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: 2013-3-17

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.

Table 3: Conducted Output Power, Mode A

Data Rate [Mbps]	Reading [dBm]	Correction Factor [dB]	RBW [MHz]	Output Power [dBm]	Limit [dBm]
1	4.0	0.63	3	4.0	21
2	3.97	0.63	3	3.97	21
3	3.91	0.69	3	3.91	21

Table 4: Conducted Output Power, Mode B

Data Rate [Mbps]	Reading [dBm]	Correction Factor [dB]	RBW [MHz]	Output Power [dBm]	Limit [dBm]
1	3.95	0.63	3	3.95	21
2	3.81	0.63	3	3.81	21
3	3.91	0.69	3	3.91	21

Notes: Cable loss was included in reading as offset.

Table 5: Conducted Output Power, Mode C

Data Rate [Mbps]	Reading [dBm]	Correction Factor [dB]	RBW [MHz]	Output Power [dBm]	Limit [dBm]
1	3.37	0.63	3	3.37	21
2	3.12	0.63	3	3.12	21
3	3.28	0.69	3	3.28	21

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: 2013-3-17

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.

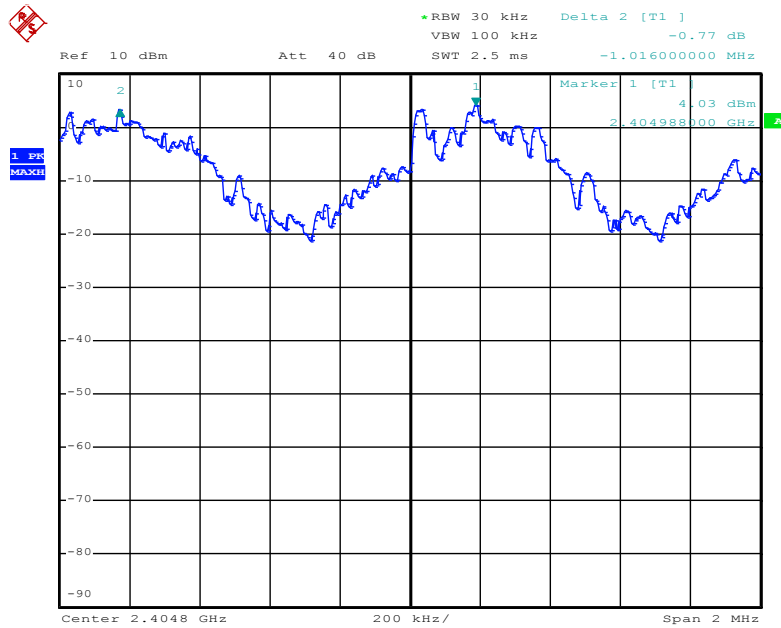
A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth was set to 30kHz and the video bandwidth to 100kHz. The Delta Marker function was used to determine the separation between the peaks of two adjacent channels.

Table 6: Carrier Frequency Separation

Channel	Channel Separation [kHz]	20dB Bandwidth [kHz](8DPSK)	Limit [kHz]
Low	1016	1233	822
Middle	1004	1224	816
High	1002	1215	810

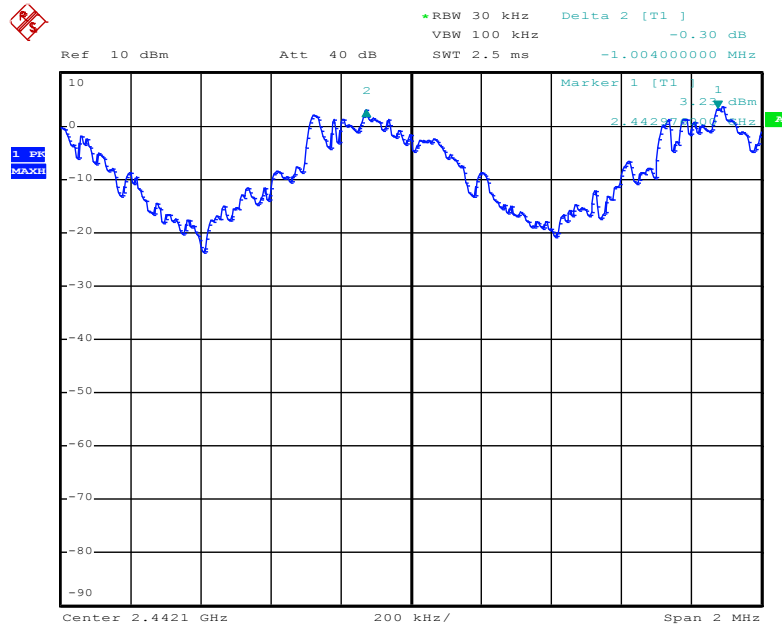
Notes: Limit = 20dB bandwidth * 2/3 since it is greater than 25kHz and the output power is less than 125mW.

Figure 1: Carrier Frequency Separation-Low Channel



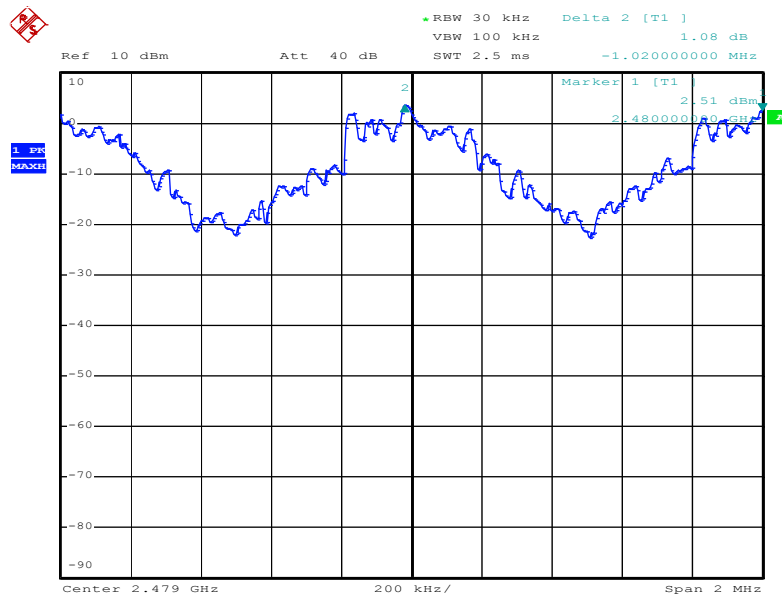
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Figure 2: Carrier Frequency Separation-Middle Channel



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Figure 3: Carrier Frequency Separation-High Channel



Date: 17.APR.2013 21:38:48

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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: 2013-3-17

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:

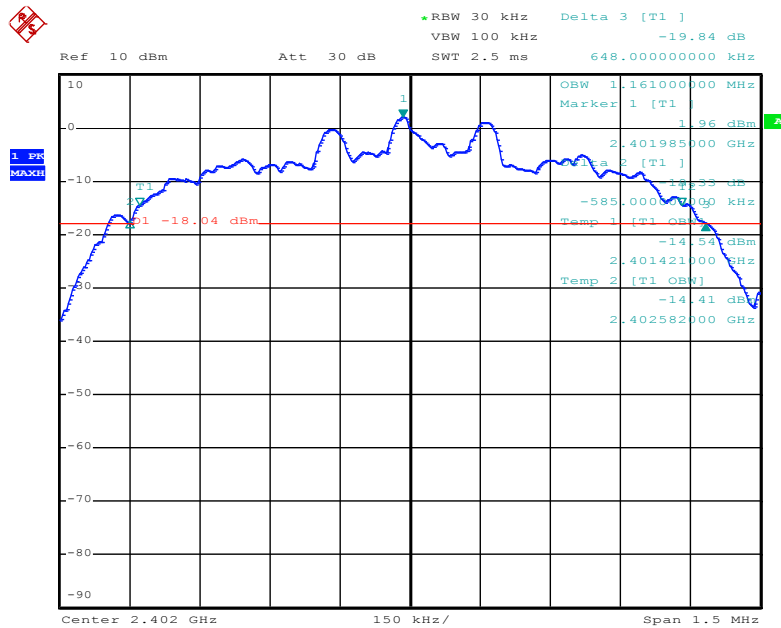
ANSI C63.4-2003, RSS-Gen 4.6.2 and Public Notice DA 00-705.

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.

Table 7: 20dB &99% Bandwidth (bluetooth BDR and EDR)

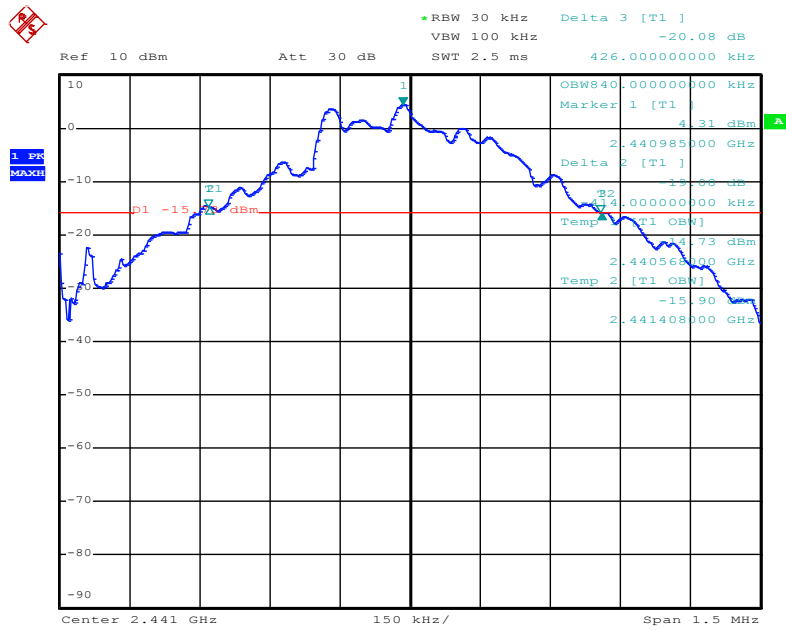
Operating Frequency [MHz]	20dB Bandwidth [kHz](8DPSK)	20dB Bandwidth [kHz](GFSK)	99% Bandwidth [kHz](8DPSK)	99% Bandwidth [kHz](GFSK)
2402	1233	843	1161	843
2441	1224	840	1164	840
2480	1215	873	1167	837

Figure 4: 20dB &99% Bandwidth, Mode A (8DPSK and GFSK)



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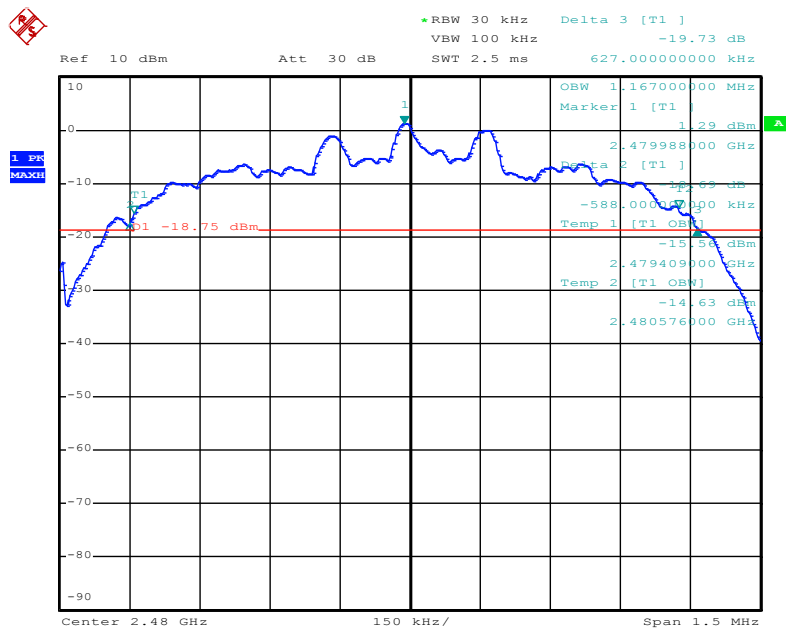
8DPSK



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GFSK

Figure 6: 20dB Bandwidth, Mode C (8DPSK and GFSK)

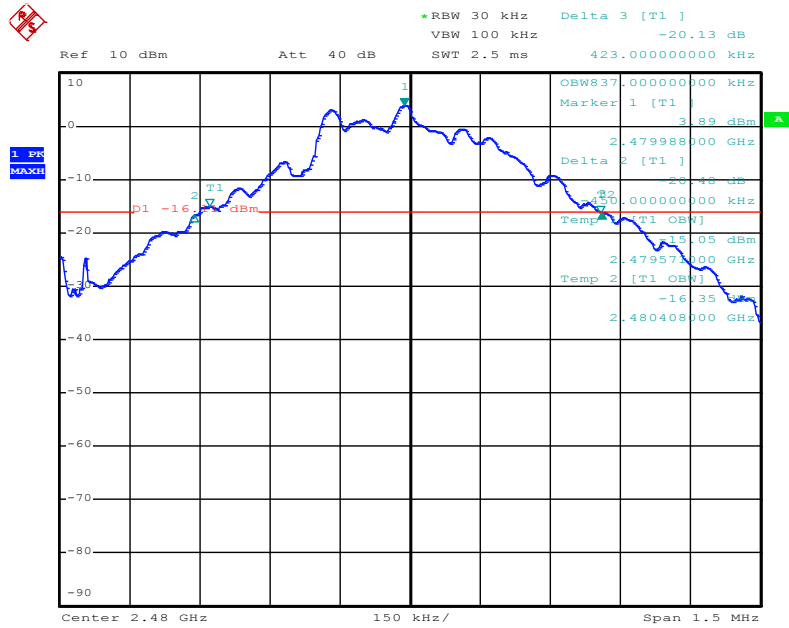


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8DPSK

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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: 2013-3-17

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:

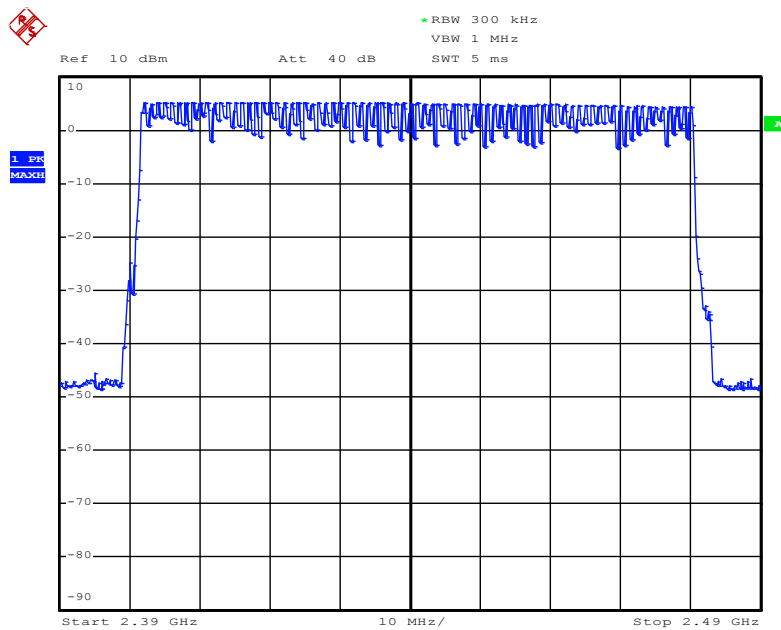
ANSI C63.4-2003 and Public Notice DA 00-705.

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

Figure 7: Hopping Frequencies



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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: 2013-3-17

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.

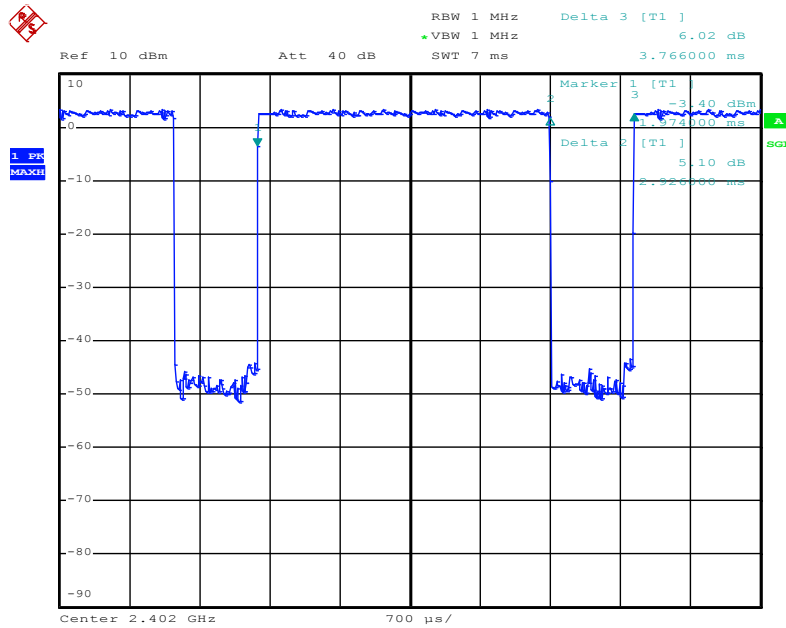
A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth and video bandwidth were set to 1MHz. The average time of occupancy was obtained by measuring first the dwell time of a single packet with the Delta Marker function using a zero span centered on a hopping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

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	2.92	106.81	311.88	400
Mid	1M-DH5	2.94	106.81	314.02	400
High	1M-DH5	2.92	106.81	311.88	400

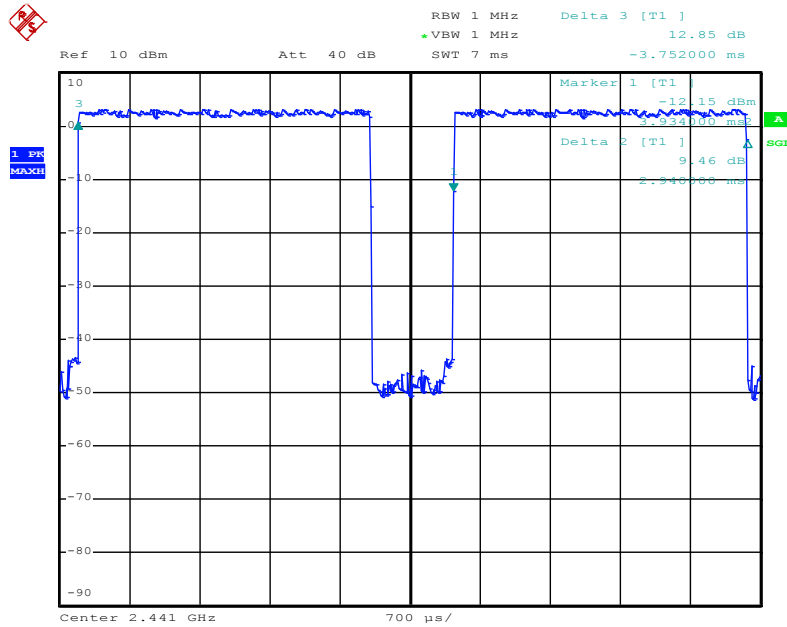
Notes: Average time of occupancy = Packet duration * Number of hops per channel in a 31.6s period

Figure 8: Dwell Time, Mode (Hopping), 1M-DH5, Low channel



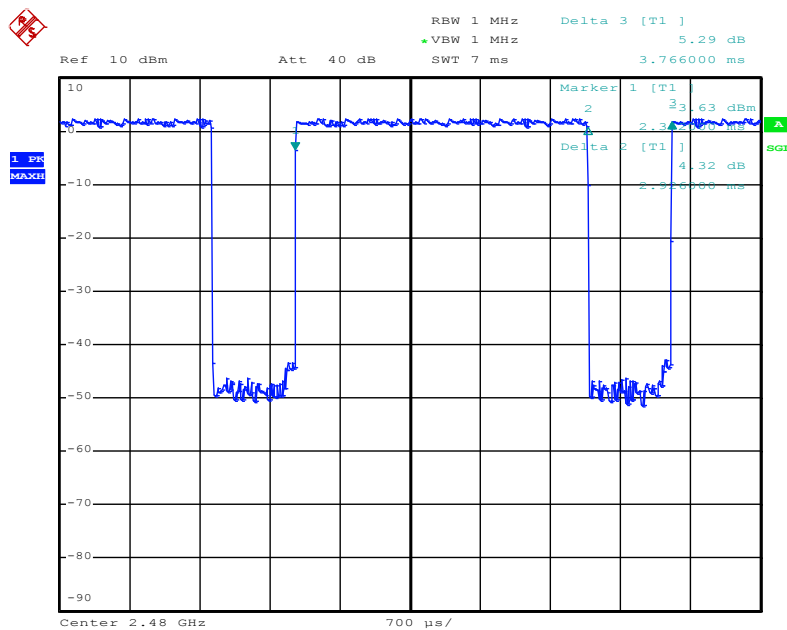
Date: 17.APR.2013 21:45:48

Figure 9: Dwell Time, Mode (Hopping), 1M-DH5, Mid channel



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Figure 10: Dwell Time, Mode (Hopping), 1M-DH5, High channel



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

RESULT: **PASS**

Date of testing: 2013-3-17

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).

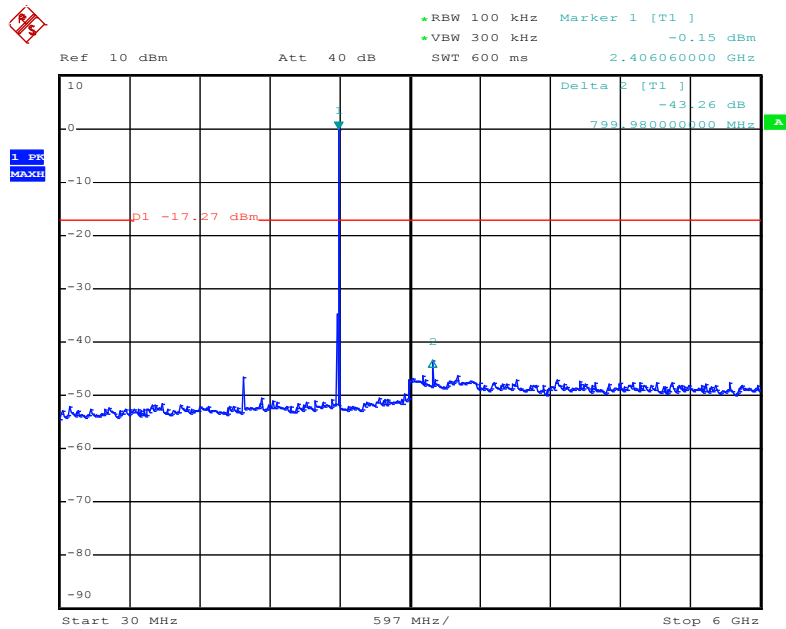
The final measurement takes into account the loss generated by all the involved cables.

Table 10: Conducted Spurious Emission, Mode A

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
24278	-31.45	-0.15	-17.27	14.18
3206	-43.26	-0.15	-17.27	25.99
2402	-0.15	-0.15	N/A	N/A

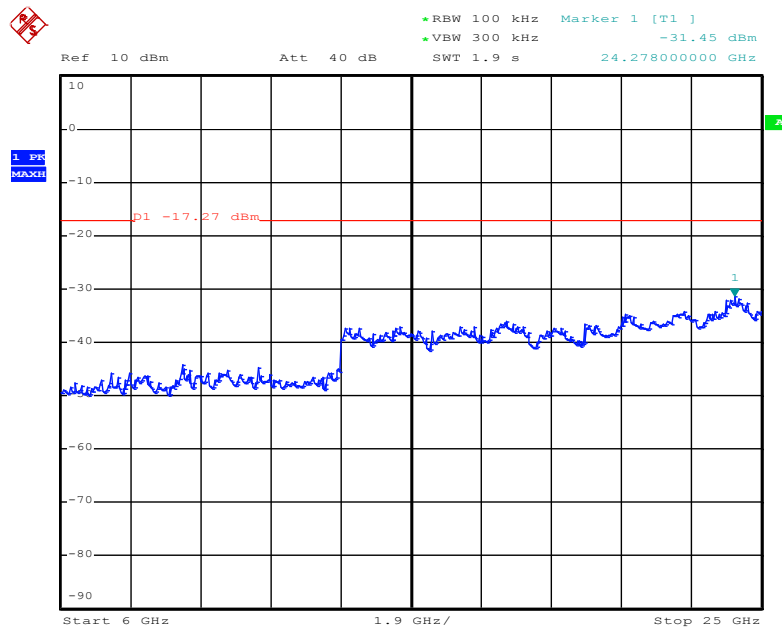
Notes: Cable loss was included in reading as offset.
Limit = Reading of fundamental + Correction factor – 20dB

Figure 11: Conducted Spurious Emission, 30MHz – 6GHz, Mode A



Date: 17.APR.2013 21:54:35

Figure 12: Conducted Spurious Emission, 6 – 26GHz, Mode A



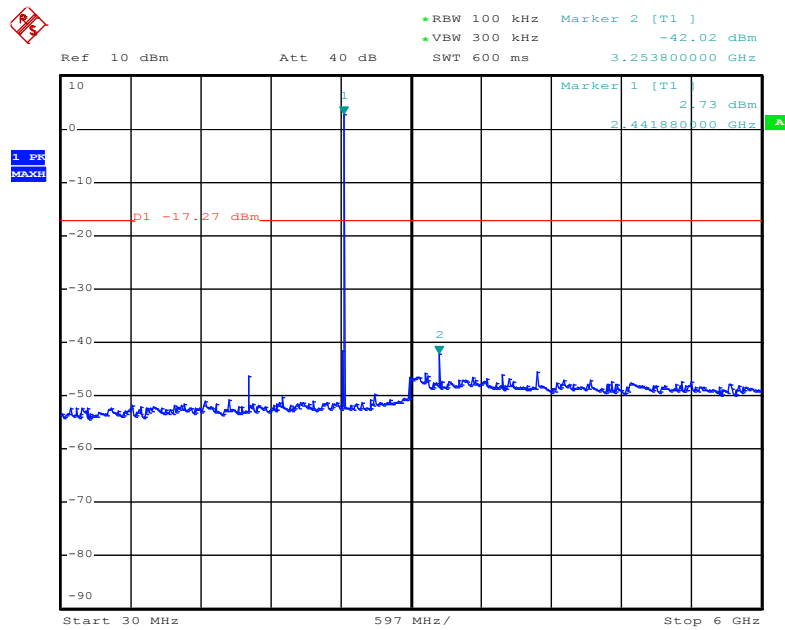
Date: 17.APR.2013 21:55:16

Table 11: Conducted Spurious Emission, Mode B

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
25440	-31.01	2.73	-17.27	13.74
3253	-42.02	2.73	-17.27	24.75
2441	2.73	2.73	NA	N/A

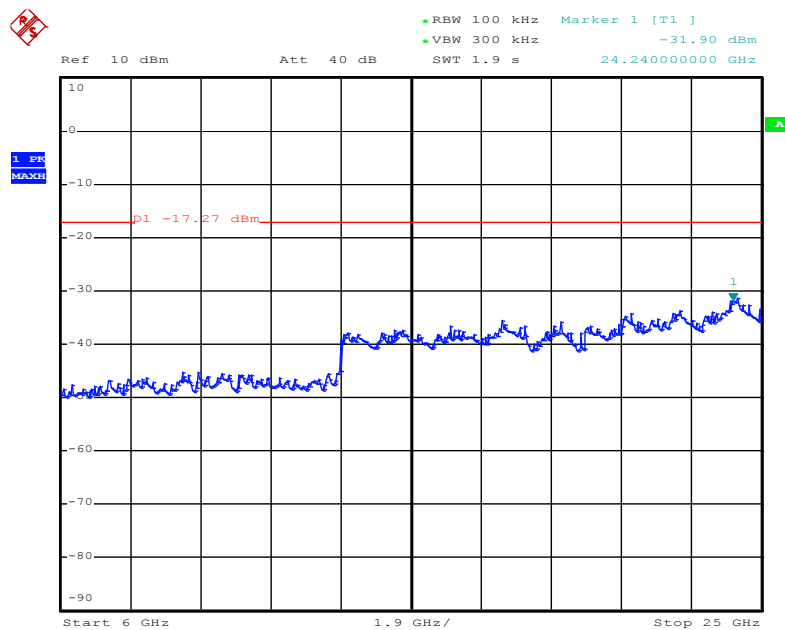
Notes: Cable loss was included in reading as offset.
Limit = Reading of fundamental + Correction factor – 20dB

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



Date: 17.APR.2013 21:52:10

Figure 14: Conducted Spurious Emission, 6 – 26GHz, Mode B



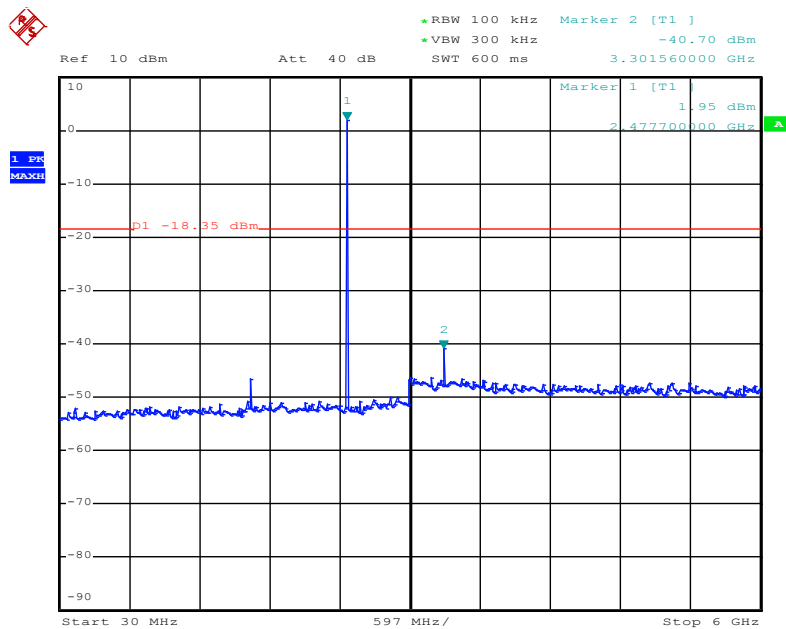
Date: 17.APR.2013 21:52:50

Table 12: Conducted Spurious Emission, Mode C

Frequency [MHz]	Reading [dBm]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
24392	-32.96	1.95	-18.35	14.61
3301	-40.70	1.95	-18.35	22.35
2480	1.95	1.95	N/A	N/A

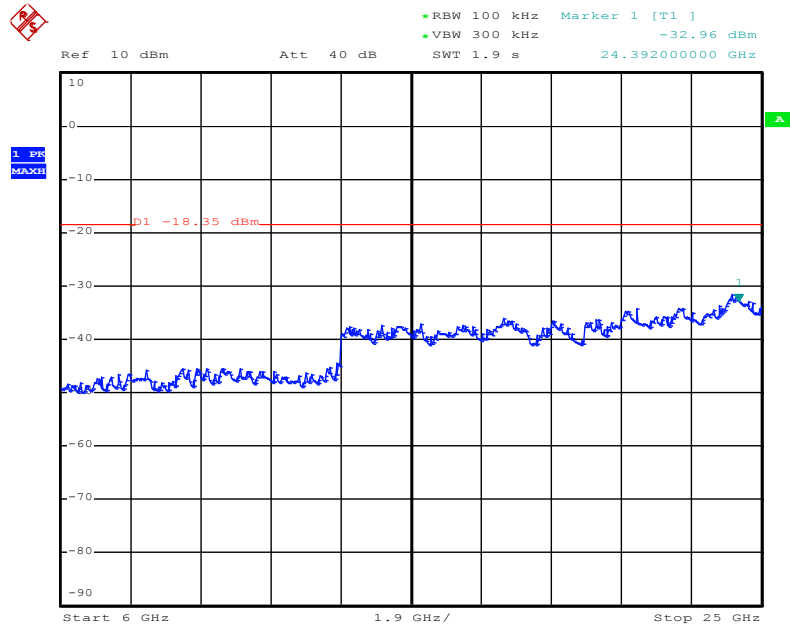
Notes: Cable loss was included in reading as offset.
Limit = Reading of fundamental + Correction factor – 20dB

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



Date: 17.APR.2013 21:49:19

Figure 16: Conducted Spurious Emission, 6 – 26GHz, Mode C



Date: 17.APR.2013 21:50:04

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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: 2013-4-17

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.

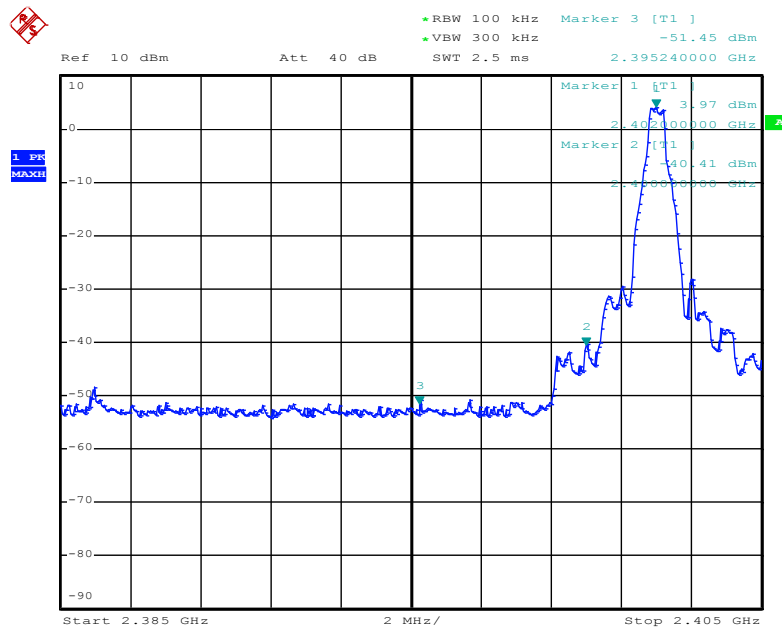
Test procedure:

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.

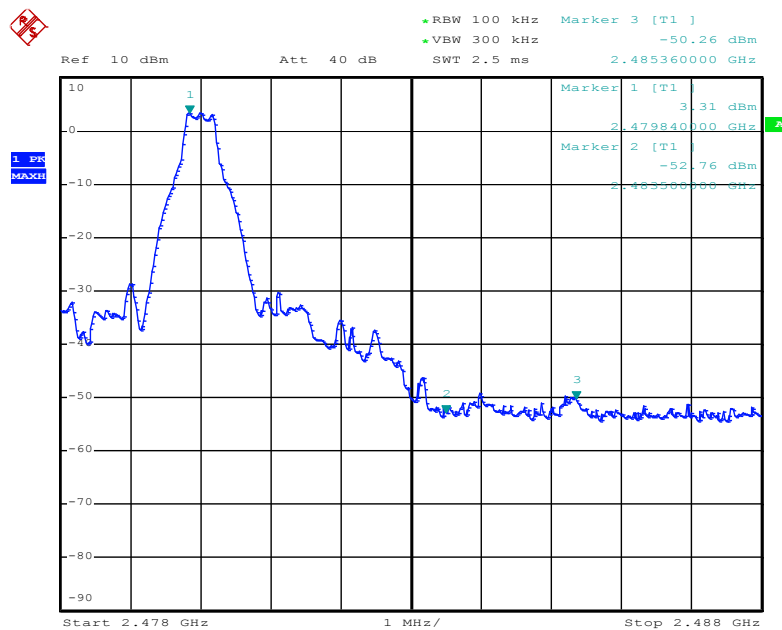
The final measurement takes into account the loss generated by all the involved cables.

Figure 17: Lower Band Edge Conducted Mode A



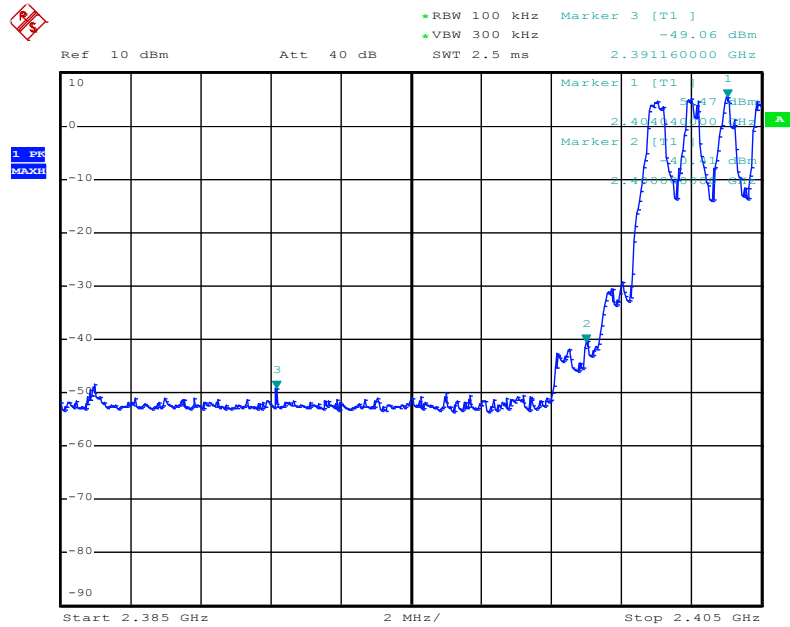
Date: 17.APR.2013 21:58:02

Figure 18: Upper Band Edge Conducted Mode C



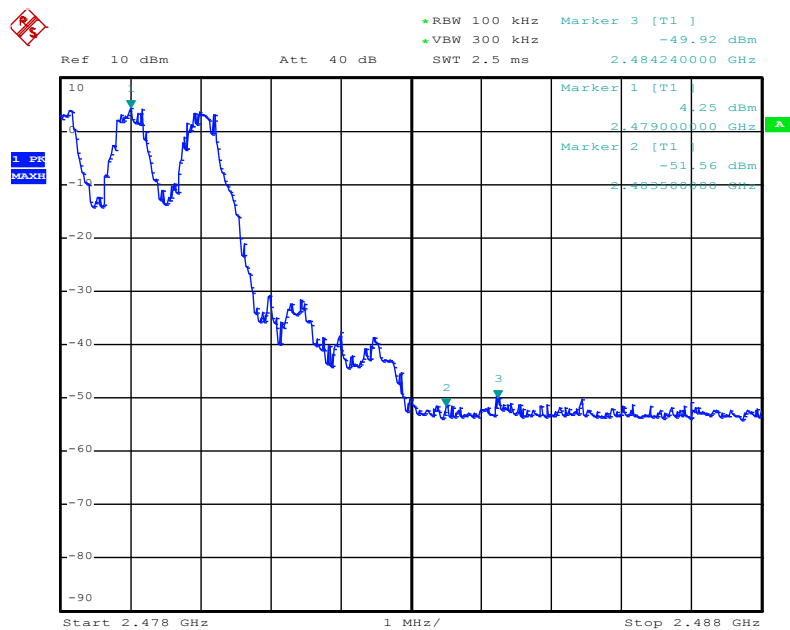
Date: 17.APR.2013 22:01:45

Figure 19: Lower Band Edge Conducted Mode A(Hopping)



Date: 17.APR.2013 21:59:08

Figure 20: Lower Band Edge Conducted Mode C(Hopping)



Date: 17.APR.2013 22:00:44

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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: 2013-4-16

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.

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	60.264	31.007	-13.736	74.000	29.257	PK
2	Horizontal	2399.898	61.139	61.139	-12.861	74.000	0.000	PK
3	Horizontal	2401.885	89.123	59.865	N/A	N/A	29.258	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	46.631	17.374	-7.369	54.000	29.257	AV
2	Horizontal	2399.898	49.285	49.285	-4.715	54.000	0.000	AV
3	Horizontal	2402.026	80.106	50.848	N/A	N/A	29.259	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	59.941	30.684	-14.059	74.000	29.257	PK
2	Vertical	2399.898	60.601	60.601	-13.399	74.000	0.000	PK
3	Vertical	2402.120	88.335	59.077	N/A	N/A	29.258	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	46.181	16.924	-7.819	54.000	29.257	AV
2	Vertical	2399.898	48.111	48.111	-5.889	54.000	0.000	AV
3	Vertical	2402.449	79.635	50.377	N/A	N/A	29.258	AV

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2479.122	85.117	56.059	N/A	N/A	29.058	PK
2	Horizontal	2483.500	59.319	30.273	-14.681	74.000	29.046	PK
3	Horizontal	2484.900	59.548	59.548	-14.452	74.000	0.000	PK

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Horizontal	2480.024	76.278	47.222	N/A	N/A	29.056	AV
2	Horizontal	2483.500	45.730	16.684	-8.270	54.000	29.046	AV
3	Horizontal	2484.900	45.684	45.684	-8.316	54.000	0.000	AV

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2479.881	86.682	57.626	N/A	N/A	29.056	PK
2	Vertical	2483.500	59.259	30.213	-14.741	74.000	29.046	PK
3	Vertical	2484.900	59.214	59.214	-14.786	74.000	0.000	PK

No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	Vertical	2479.980	77.684	48.628	N/A	N/A	29.056	AV
2	Vertical	2483.500	45.854	16.808	-8.146	54.000	29.046	AV
3	Vertical	2484.900	45.775	45.775	-8.225	54.000	0.000	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: 2013-4-16

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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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:	2013-4-17
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 body-worn. 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. emission in mode D, E, F . all signals found in the pre-testing were more than 20 dB below the limit .

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7. Photographs of the Test Setup

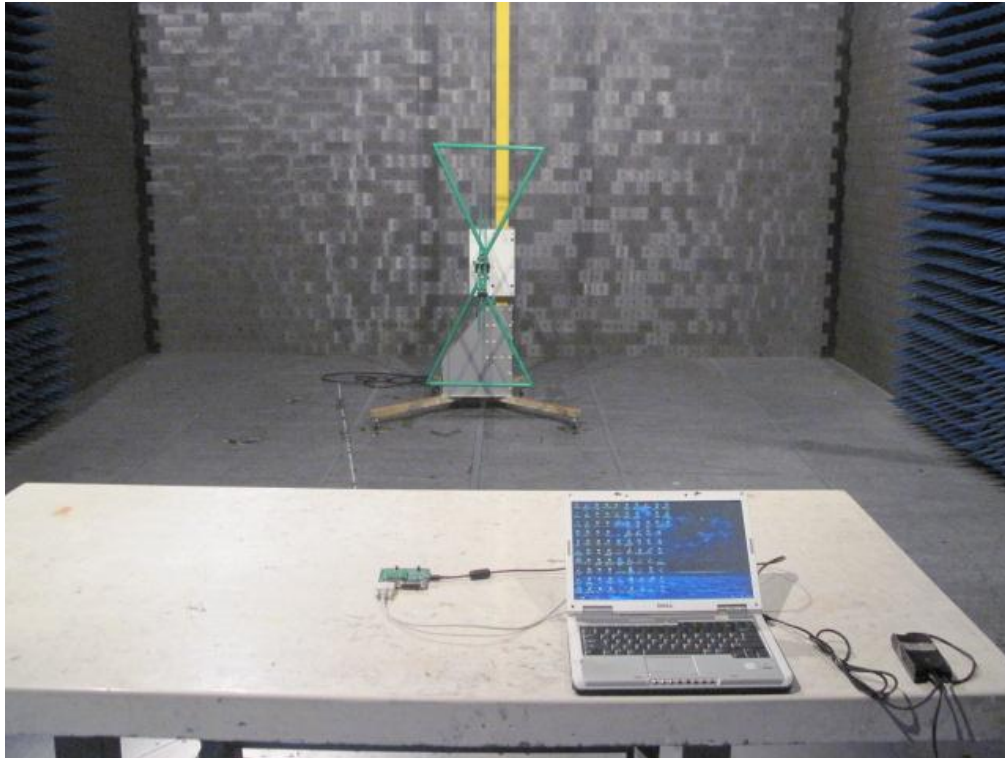
Photograph 1: Set-up for Conducted RF test at Antenna Port



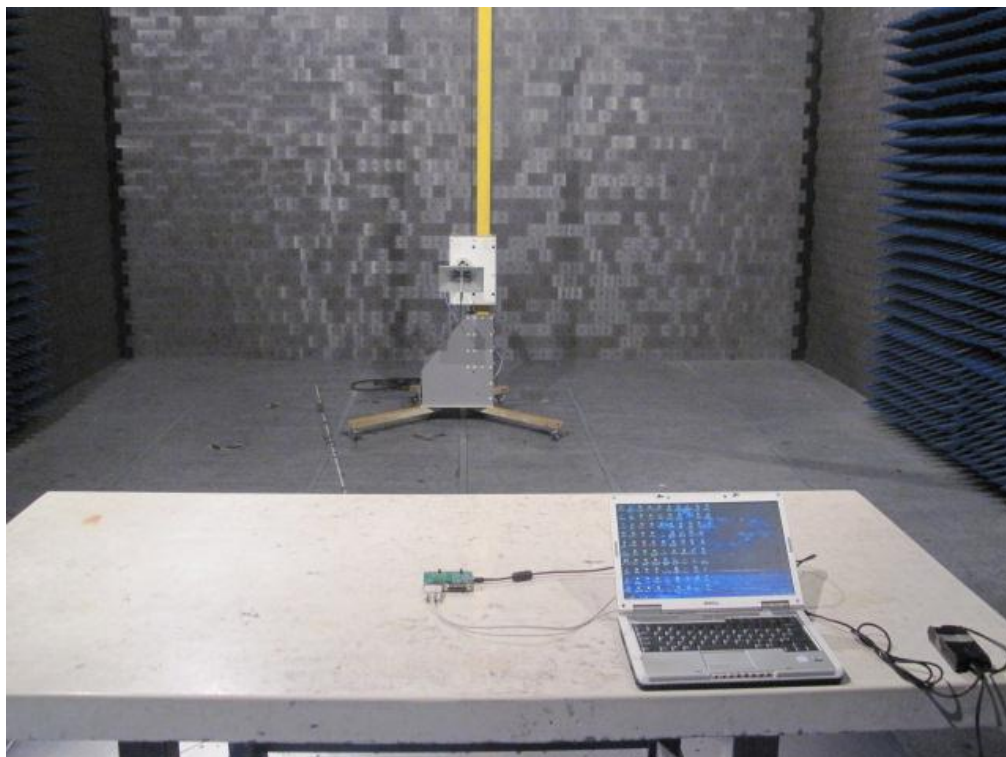
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Photograph 3: Set-up for Radiated Spurious Emission, 1G-18GHz



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