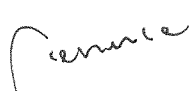


Produkte
Products

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<i>Test Report No.:</i>			
Auftraggeber: Nokia (China) Investment Co., Ltd. <i>Client:</i> B2, Nokia China Campus, Beijing Economic and Tech Development Area, No.5. Donghuan Zhonglu, Beijing, China			
Gegenstand der Prüfung: Nokia Bluetooth Headset <i>Test item:</i>			
Bezeichnung: BH-608 <i>Identification:</i>	Serien-Nr.: <i>Serial No.:</i>	Engineering Sample	
Wareneingangs-Nr.: PT0213095563-1 <i>Receipt No.:</i>	Eingangsdatum: 2010-01-25 <i>Date of receipt:</i>		
Prüfart: TÜV Rheinland Japan Ltd. - Global Technology Assessment Center <i>Testing location:</i> 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan			
Prüfgrundlage: 47 CFR Part 15.247 (Subpart: C), October, 2009 <i>Test specification:</i> ANSI C63.4-2003 FCC Public Notice DA 00-705, Released March 30, 2000 RSS-210 (Issue 7): 2007 RSS-Gen (Issue 2): 2007			
Prüfresultat: Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>Test Result:</i> The test item passed the test specification(s).			
Prüflaboratorium: TÜV Rheinland Japan Ltd. - Global Technology Assessment Center <i>Testing Laboratory:</i> 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan			
geprüft/ tested by:  2010-02-19 Y. Sasaki / Inspector		kontrolliert/ reviewed by:  2010-02-19 T. Cheung / Reviewer	
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>
			Name/Stellung <i>Name/Position</i>
			Unterschrift <i>Signature</i>
Sonstiges / Other Aspects: Details refer to Section 1: "General Remarks"			
Abkürzungen: P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet		Abbreviations: P(ass) = passed F(ail) = failed 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 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>			

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 AT ANTENNA TERMINALS, 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, FCC 15.247(A)(1)(II) AND RSS-210 A8.1(A)

RESULT: PASS

5.1.4 99% BANDWIDTH, RSS-GEN 4.6.1

RESULT: PASS

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

RESULT: PASS

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

RESULT: PASS

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

RESULT: PASS

6.1.1 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE OF TRANSMITTER, FCC 15.207 AND RSS-GEN 7.2.2

RESULT: PASS

6.2.1 AC POWER LINE CONDUCTED EMISSION OF RECEIVER, FCC 15.107 AND RSS-GEN 7.2.2

RESULT: PASS

7.1.1 BAND EDGE RADIATED EMISSION, FCC 15.247(D) AND RSS- 210 2.2

RESULT: PASS

7.1.2 RADIATED EMISSION, OUT-OF-BAND AND SPURIOUS EMISSION, FCC 15.247(D), FCC 15.205, FCC 15.209, RSS-210 2.2, RSS-210 A8.5 AND RSS-GEN 7.2.1

RESULT: PASS

7.2.1 RADIATED 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

There are 3 different types of AC-DC adaptors and single type of DC-DC adaptor for the Bluetooth Headset.

Model name of the AC-DC adaptors: AC-3, AC-4 and AC-5

Model name of the DC-DC adaptor: DC-4 and DC-9

The AC-DC adaptors: AC-3, AC-4 and AC-5 and DC-DC adaptor: DC-4 and DC-9 were pre-tested before the representative adaptors were selected to conduct the full test with the Wireless Headset. All the adaptors were scanned with spectrums, Adaptor AC-4 was found that it causes the worst measurement. AC-4 was selected as representative adaptor for all testing.

Test report number	Content
12606564 001	Intentional radiator
12606564 002	Test setup photos of Intentional radiator
12606564 003	Unintentional radiator
12606564 004	Exposure letter

1.1 Complementary Materials

There is no attachment for this test report

2. Test Sites

2.1 Test Facilities

TÜV Rheinland Japan Ltd. - Global Technology Assessment Center
4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan

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

The Federal Communication 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 299054.

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 O.A.T.S filing number 3466B.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Model Name	Serial Number	Equipment ID	Calibrated until
For Antenna Port Conducted Emission					
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	2010-12
RF Power Meter	Agilent	N1911A	MY451017 37	BT-8226	2010-11
RF Peak Power Sensor	Agilent	N1921A	MY452422 28	BT-8227	2010-11
DC Power Supply	Hewlett Packard	E3631A	KR9292029 6	BT-8155	N/A
For AC Power Line Conducted Emission					
Receiver	Rohde & Schwarz	ESU 8	100025	RF-0020	2010-02
LISN	Rohde & Schwarz	ENV216	100276	RF-0016	2010-05
For Radiated Emission					
Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	2010-12
RF Selector (10m)	Toyo Corporation	NS4900	0703-182	RF-0029	2010-05

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Kind of Equipment	Manufacturer	Model Name	Serial Number	Equipment ID	Calibrated until
3dB Attenuator 50Ohm	Tamagawa Electronics Co., Ltd.	CFA-01	-	RF-0265	2010-05
Low Noise Pre-Amplifier	TSJ	MLA-10K01-B01-35	1370750	RF-0253	2010-05
Microwave Pre-Amplifier, 1-8GHz	Toyo Corporation	TPA0108-40	0634	RF-0052	2010-11
Band Reject Filter	Nitsuki	NF-49BT	027	RF-0131	2010-11
Trilog Antenna, 30-1000MHz	Schwarzbeck	VULB9168	0245	RF-0019	2010-05
Horn Antenna, 1-10GHz	Schwarzbeck	BBHA9120B	419	RF-0050	2010-05
Horn Antenna with Pre-Amplifier, 2-18GHz	Toyo Corporation	HAP06-18W	00000025	RF-0065	2010-05
Horn Antenna with Pre-Amplifier, 18-26.5GHz	Toyo Corporation	HAP18-26N	00000010	RF-0070	2010-05
Constant Voltage Constant Frequency Stabilizers					
CVCF (Shielded Room)	NF Corporation	ESU2000S	9075612	RF-0210	N/A
CVCF Booster (Shielded Room)	NF Corporation	ESU2000B	9074403	RF-0211	N/A
CVCF (10m chamber)	NF Corporation	ESU2000S	9067307	RF-0212	N/A
CVCF Booster (10m chamber)	NF Corporation	ESU2000B	9074408	RF-0213	N/A

2.3 Measurement Uncertainty

Table 2: Emission Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Conducted Emission	150kHz - 30MHz	±1.4dB
Antenna Port Conducted Emissions	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Radiated Emission (Horizontal Orientation)	30MHz - 1GHz	±4.8dB
	> 1GHz	±5.2dB
Radiated Emission (Vertical Orientation)	30MHz - 1GHz	±4.2dB
	> 1GHz	±5.2dB

3. General Product Information

3.1 Product Function and Intended Use

The **EUT** (Equipment Under Test) BH-608 is intended to operate with cellular phone(s) as hand free headset.

3.2 System Details

Bluetooth core spec.:	Version 2.1 + EDR Support HSP version 1.1 and HFP version 1.5
Power output:	5.41dBm (Conducted, Peak)
Antenna gain:	+2.2dBi
Antenna type:	Chip antenna
Frequency range:	2402 – 2480 MHz
Number of channel:	79
Channel spacing:	1 MHz
Modulation type:	FHSS
FCC Classification:	DSS
Classification:	F1D
HW version:	0.41
Mech version:	0.4
SW version:	5011
System Input Voltage:	DC 3.7V, Battery operated AC 100-240V, 50/60Hz, AC-DC adaptor DC 12/24V, DC-DC adaptor
Protection Class:	II & III

3.2.1 Voltage Requirements, FCC 15.31(e)

RESULT:

PASS

The EUT has an internal voltage regulator to supply the RF circuit. 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 inverted-F antenna printed on the PCB, details refer to the internal photos.

3.3 Clock Frequencies

The EUT generates internally the following clock frequency:

Frequency	Source
26 MHz	Crystal of IC Bluetooth Module

3.4 Independent Operation Modes

The system was configured for testing 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 (2402 MHz), the operating frequency in the middle of the specified frequency band (2441 MHz) and the highest operating frequency (2480 MHz).

The basic operation modes are:

- A. EUT transmits at lowest Channel (2402 MHz)
- B. EUT transmits at middle Channel (2441 MHz)
- C. EUT transmits at highest Channel (2480 MHz)
- D. EUT transmits on pseudo -random sequence on the 79 channels
- E. EUT receives packets

4. Test Set-up and Operation Modes

4.1 Test Methodology

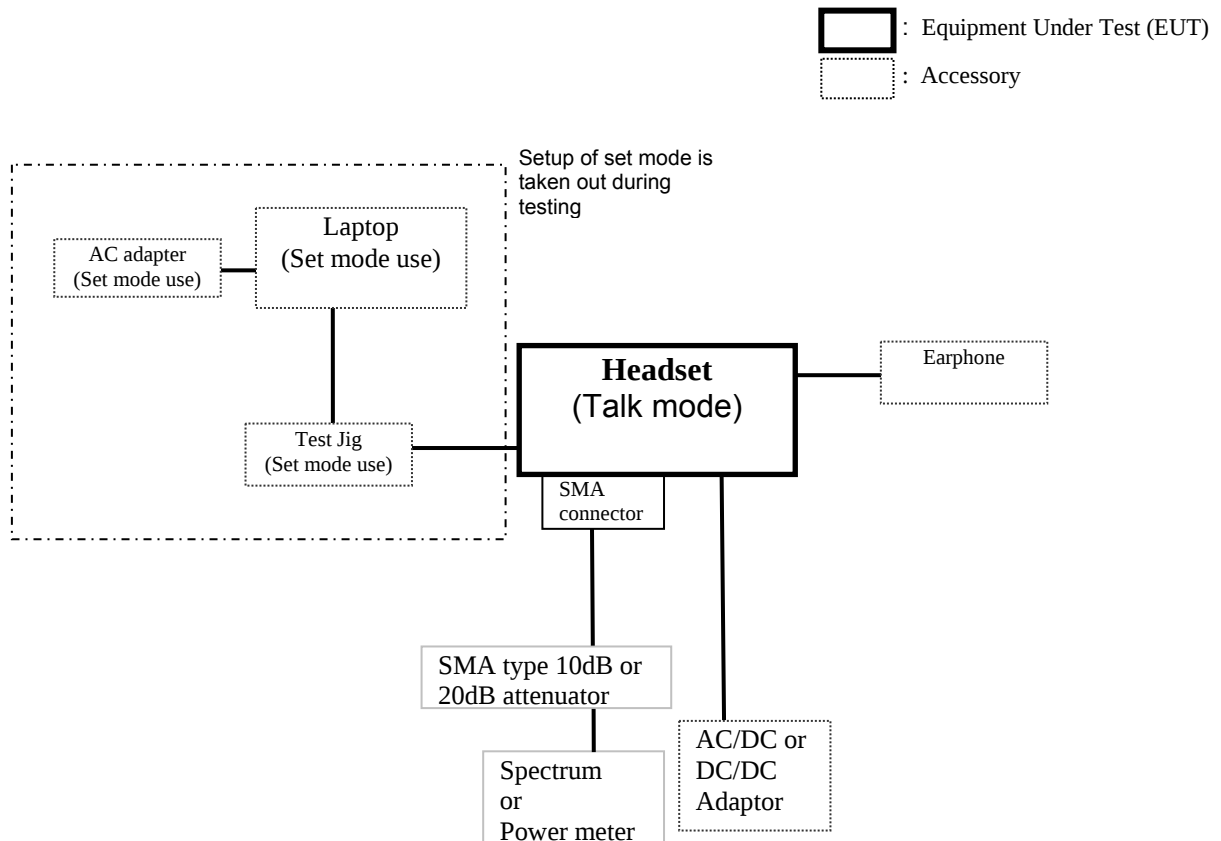
The test methodology used is based on the requirements of 47 CFR Part 15, sections 15.31, 15.33, 15.35, 15.205, 15.209, FCC Public Notice DA 00-705. Released March 30, 2000

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

For details, see under each test item.

4.2 Physical Configuration for Testing

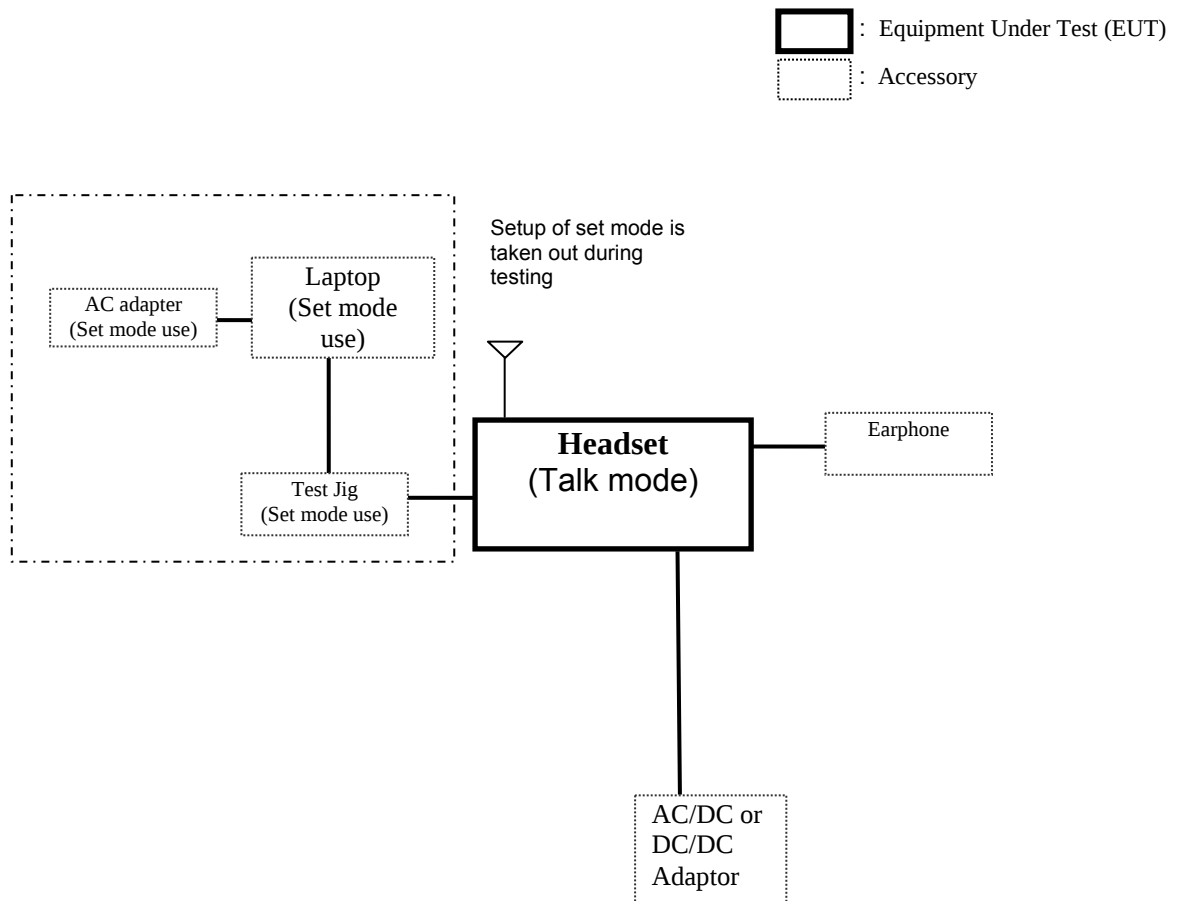
Figure 1: Test setup of Conducted radio testing



The power line of the adaptor is not mention in the figure.

In the sample for conducted tests, the antenna was replaced by a 50Ω antenna connector.

Figure 2: Test setup of Radiated testing



The power line of the adaptor is not mention in the figure.

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

4.3 Test Operation and Test Software

A software Bluetest3 of CSR BlueSuite Version 2.2 was used for testing.

The software was running on the external PC performing continuous radio communication of the EUT with selected operation mode, frequency channel, packet type, packet size. It was used to enable on the EUT the test operation mode specified in section 3.4.

4.4 Special Accessories and Auxiliary Equipment

The product has been set up or tested with the following additional accessories:

1. Product: Personal Computer
Manufacturer: IBM
Model: 2684-KAU
Rated voltage: AC120V
Input current: 1.5A
Frequency: 60Hz
Serial number: 99-DAY98
2. Product: AC Adapter
Manufacturer: IBM
Model: 08K5204
Rated voltage: AC120V
Frequency: 60Hz
Serial number: 11S08K824Z1Z6LV45B51U
3. Product: Interface board
Manufacturer: Hosiden
Model: Interface board
Rated voltage: 5.0V
Input current: 500mA max.
Frequency: -
Serial number: N/A
4. Product: Test jig
Manufacturer: Hosiden
Model: Test jig
Rated voltage: 3.3V max.
Input current: 500mA max.
Frequency: -
Serial number: N/A
5. Product: Cigarette socket
Manufacturer: un-specified
Model: un-specified
Rated voltage: 24V
Input current: -
Frequency: -
Serial number: N/A

4.5 Countermeasures to achieve EMC Compliance

No Countermeasures used to achieve compliance.

5. Test Results Conducted Testing at Antenna Port

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

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

RESULT:

PASS

Date of testing: 2010-02-18

Ambient temperature: 20°C

Relative humidity: 33%

Atmospheric pressure: 1012hPa

Requirements:

For systems using frequency hopping systems in the 2400-2483.5MHz band, the maximum peak output power is 1W (30dBm).

Test procedure:

ANSI C63.4-2003, RSS-Gen 4.8 and FCC Public Notice DA 00-705, Released March 30, 2000.

The maximum peak output power (conducted) was measured directly at the antenna connector with the power meter. The final measurement takes into account the loss generated by the short cable provided by the EUT manufacturer to support the antenna connector.

Peak EIRP was performed at ambient temperature and normal voltage at all the available modulations (data rates)/ Modulation and packet type in order to identify the one producing the highest peak output power. The worst case output power was shading in grey in the following table.

Table 3: Conducted Peak (dBm) at normal condition

Carrier Frequency [MHz]	Data Rate [Mbps]	Reading [dBm]	Cable Loss [dB]	PK [dBm]
2402	DH1	3.30	1.05	4.35
2402	2-DH1	2.60	1.05	3.65
2402	3-DH1	2.76	1.05	3.81
2402	DH3	4.18	1.05	5.23
2402	2-DH3	2.60	1.05	3.65
2402	3-DH3	2.76	1.05	3.81
2402	DH5	3.34	1.05	4.39
2402	2-DH5	2.61	1.05	3.66
2402	3-DH5	2.76	1.05	3.81
2441	DH1	3.87	1.02	4.89
2441	2-DH1	3.13	1.02	4.15
2441	3-DH1	3.25	1.02	4.27
2441	DH3	3.92	1.02	4.94
2441	2-DH3	3.06	1.02	4.08
2441	3-DH3	3.29	1.02	4.31
2441	DH5	3.85	1.02	4.87
2441	2-DH5	3.06	1.02	4.08
2441	3-DH5	3.32	1.02	4.34
2480	DH1	4.26	1.09	5.35
2480	2-DH1	3.33	1.09	4.42
2480	3-DH1	3.45	1.09	4.54
2480	DH3	4.32	1.09	5.41
2480	2-DH3	3.17	1.09	4.26
2480	3-DH3	3.55	1.09	4.64
2480	DH5	4.22	1.09	5.31
2480	2-DH5	3.24	1.09	4.33
2480	3-DH5	3.54	1.09	4.63

Notes: Peak EIRP = Reading + Cable loss + Antenna Gain + 10 x log(1/duty cycle)

where Duty cycle is 1.00

Measuring instrument: RF peak power meter

The above results confirm that the worst case output powers are found within different packet type and data rate. Therefore, the rest of the measurements for the evaluation of the Bluetooth headset have been performed using these respective data rate and packet type

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

RESULT:

PASS

Date of testing: 2010-02-18

Ambient temperature: 20°C

Relative humidity: 33%

Atmospheric pressure: 1012hPa

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:

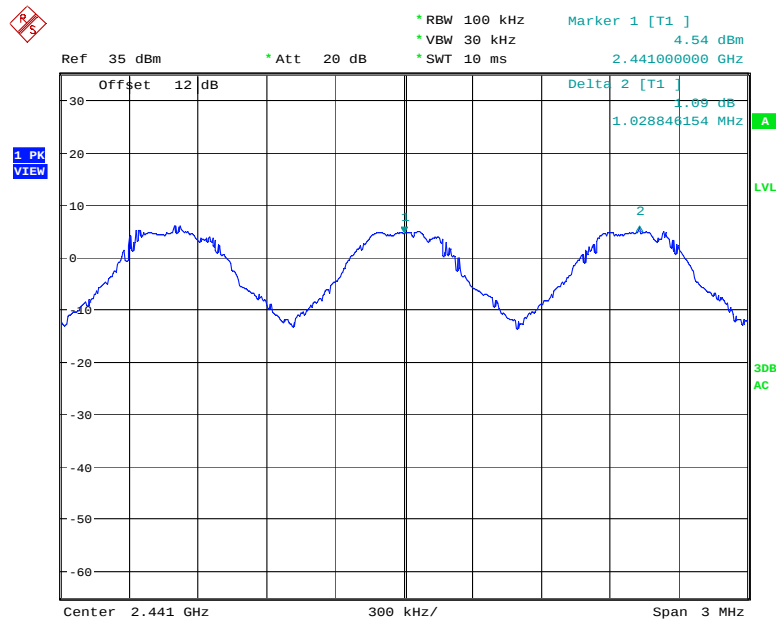
ANSI C63.4-2003, RSS-Gen 4.8 and FCC Public Notice DA 00-705, Released March 30, 2000.

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 4: Carrier Frequency Separation, DH5

Channel Separation [kHz]	Limit
1028.8	25kHz or the 20dB bandwidth of the hopping channel.

Figure 3: Carrier Frequency Separation, DH5



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

RESULT:

PASS

Date of testing: 2010-02-18

Ambient temperature: 20°C

Relative humidity: 33%

Atmospheric pressure: 1012hPa

Requirements:

For systems using frequency hopping systems in the 2400-2483.5MHz band, the limit is not specified. The test data was taken as reference.

Test procedure:

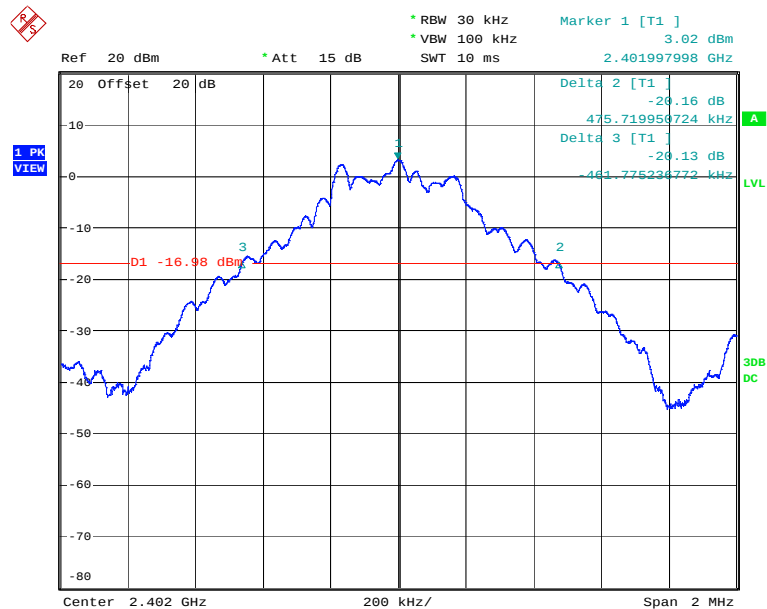
ANSI C63.4-2003, RSS-Gen 4.6.2 and FCC Public Notice DA 00-705, Released March 30, 2000.

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 3MHz.

Table 5: 20dB Bandwidth, DH3

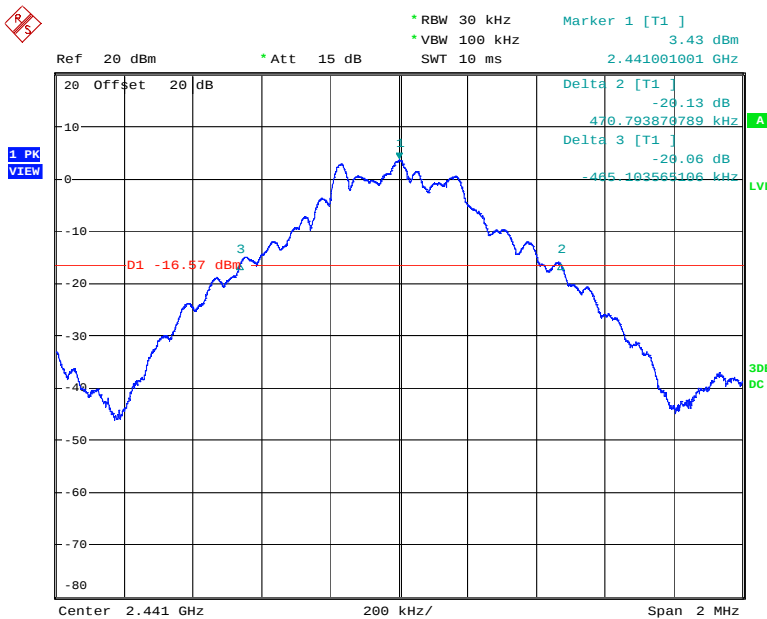
Frequency [MHz]	20dB Bandwidth [MHz]	Minimum Limit [kHz]
2402	0.9375	N/A
2441	0.9359	N/A
2480	0.9378	N/A

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



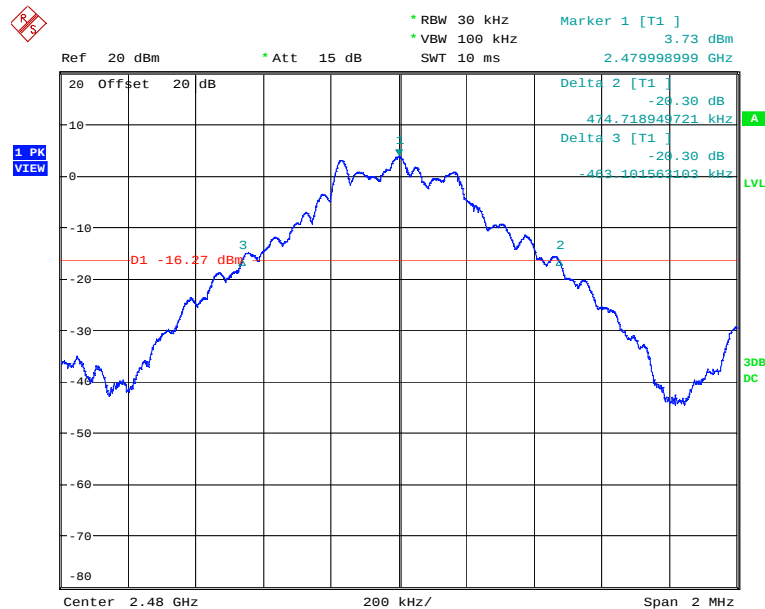
Mode Aa1

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



Mode Ba1

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



Mode Ca1

5.1.4 99% Bandwidth, RSS-Gen 4.6.1

RESULT:

PASS

Date of testing: 2010-02-18

Ambient temperature: 20°C

Relative humidity: 33%

Atmospheric pressure: 1012hPa

Requirements:

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

Test procedure:

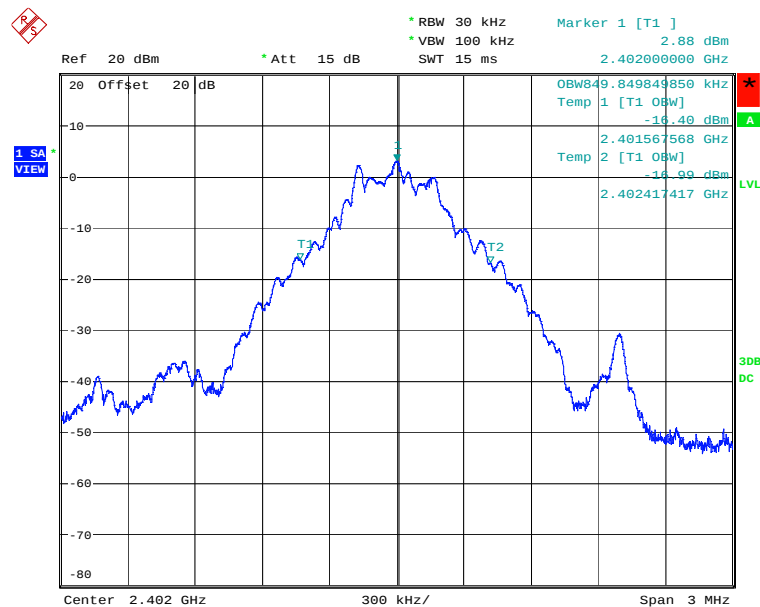
RSS-Gen 4.6.1

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 1% of the span 3MHz. The 99% bandwidth was measured by using the OBW function of the analyzer with a 99% coverage setting.

Table 6: 99% Bandwidth, DH3

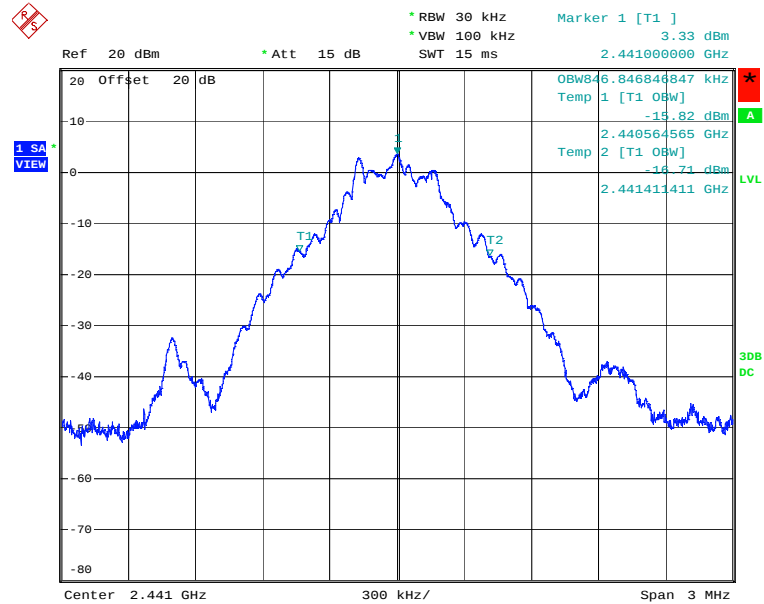
Operating Frequency [MHz]	99% Bandwidth [MHz]	Minimum Limit [kHz]
2402	0.849	N/A
2441	0.847	N/A
2480	0.849	N/A

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



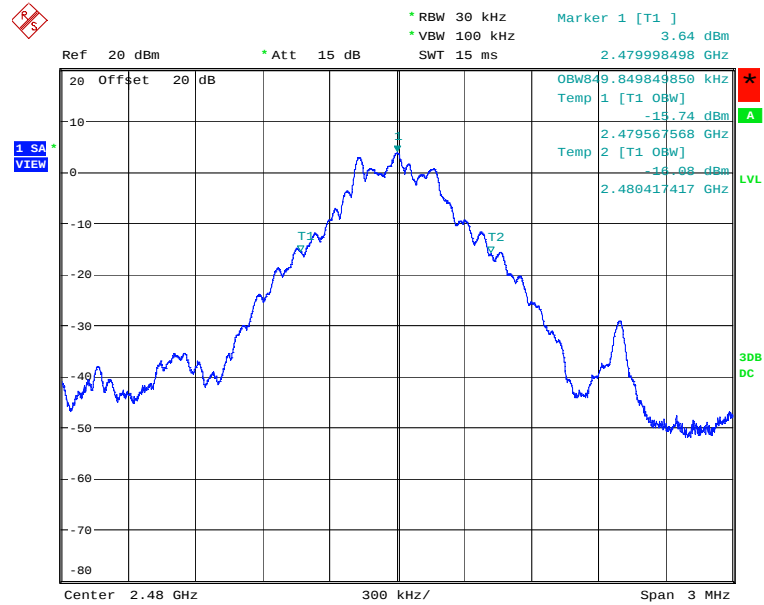
Mode Aa1

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



Mode Ba1

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



Mode Ca1

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

RESULT:

PASS

Date of testing: 2010-02-18

Ambient temperature: 20°C

Relative humidity: 33%

Atmospheric pressure: 1012hPa

Requirements:

For systems using frequency hopping systems in the 2400-2483.5MHz band, the number of hopping frequency is at least 15 channels.

Test procedure:

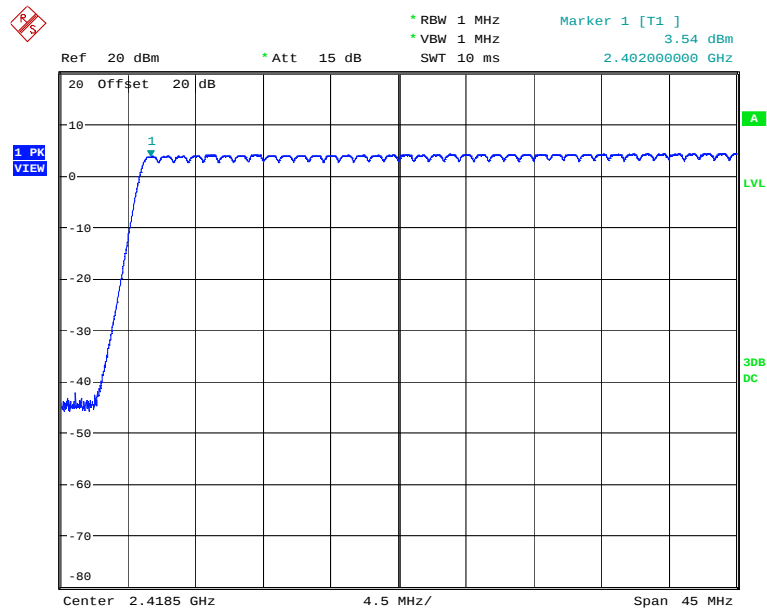
ANSI C63.4-2003, RSS-Gen 4.8 and FCC Public Notice DA 00-705, Released March 30, 2000.

A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth and video bandwidth were set to 1MHz. The spectrum was broken in two plots having each a 45MHz span to show all the hopping frequencies.

Table 7: Carrier Frequency Separation, DH5

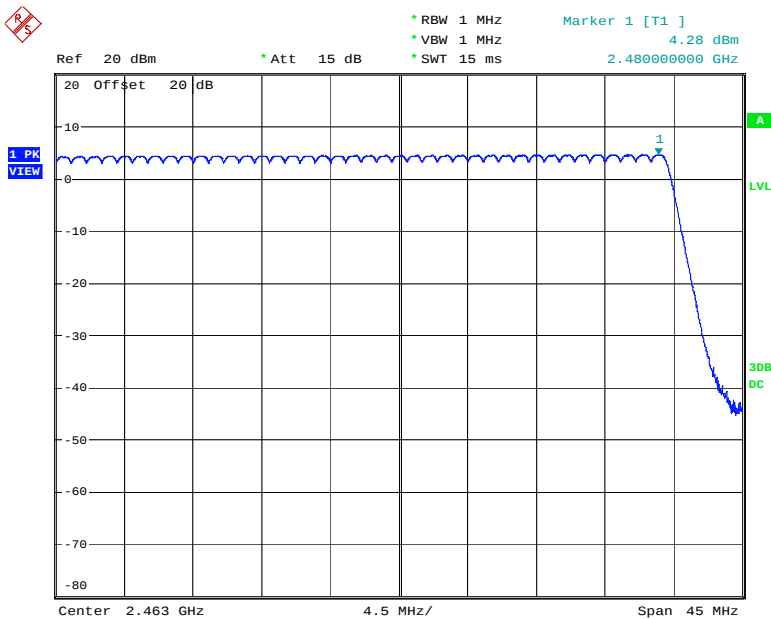
Hopping Channel	Limit
79	15

Figure 10: Hopping frequencies up to 2440MHz , Mode D



Mode D

Figure 11: Hopping frequencies above 2440MHz, Mode D



Mode D

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

RESULT:

PASS

Date of testing: 2010-02-18

Ambient temperature: 20°C

Relative humidity: 33%

Atmospheric pressure: 1012hPa

Requirements:

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

Test procedure:

ANSI C63.4-2003, RSS-Gen 4.8 and FCC Public Notice DA 00-705, Released March 30, 2000.

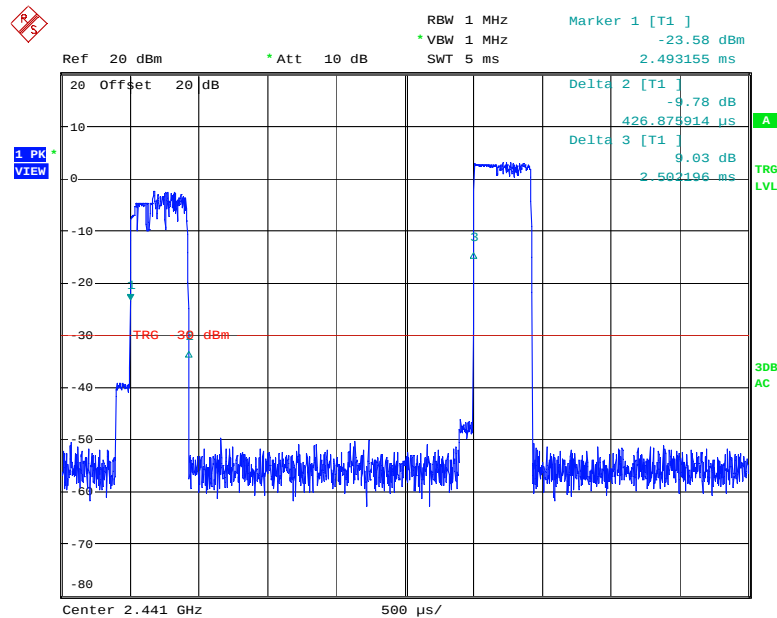
A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth and video bandwidth were set to 1MHz. The average time of occupancy was obtained by measuring first the dwell time of a single packet with the Delta Marker function using a zero span centered on a hopping 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 8: Average time of Occupancy

Packet Type	Packet Duration [ms]	Number of Hops per Channel in a 31.6s Period	Average Time of Occupancy [ms]	Limit [ms]
DH1	0.427	320	147.2	400
DH5	2.909	106.67	310.3	400

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

Figure 12: Average time of occupancy, Mode D, DH1



Mode D, DH1

DH1 packet:

DH1 Packet type permits maximum $1600 / 79 / 2 = 10.13$ hops per second in each channel (1 time slot for Tx and 1 time slot for Rx).

The number of hops within 31.6 sec.

$$= 10.13 \times 31.6$$

$$= 320 \text{ hops in each channel}$$

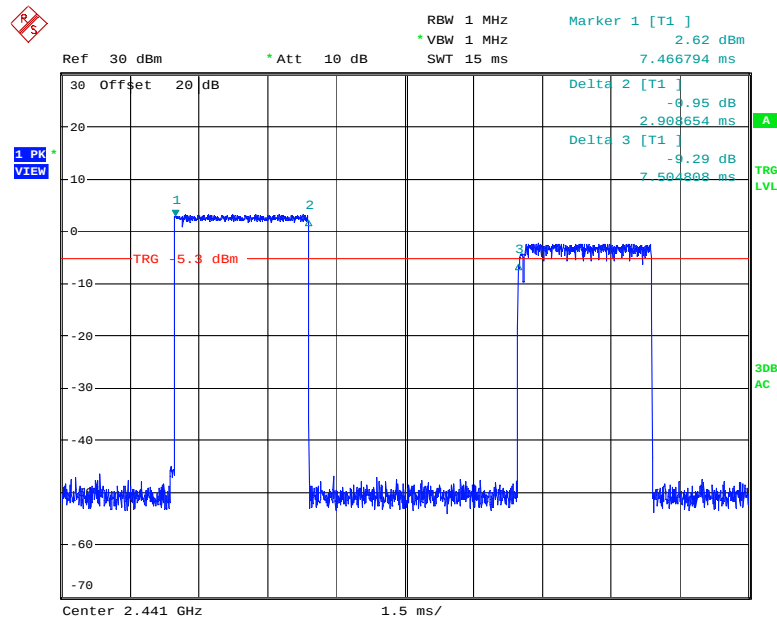
As the time duration of one pulse is 0.427ms,

the dwell time (the time duration of the pulses) within 31.6 sec.

$$= 0.427 \times 320$$

$$= 147.2 \text{ ms}$$

Figure 13: Average time of occupancy, Mode D, DH5



Mode D, DH5

DH5 packet:

DH5 Packet type permits maximum $1600 / 79 / 6 = 3.38$ hops per second in each channel (5 time slot for Tx and 1 time slot for Rx).

The number of hops within 31.6 sec.

$$= 3.38 \times 31.6$$

$$= 106.67 \text{ hops in each channel}$$

As the time duration of one pulse is 2.909ms,

the dwell time (the time duration of the pulses) within 31.6 sec.

$$= 2.909 \times 106.67$$

$$= 310.3\text{ms}$$

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

RESULT:

PASS

Date of testing: 2010-02-18

Ambient temperature: 20°C

Relative humidity: 33%

Atmospheric pressure: 1012hPa

Requirements:

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

Test procedure:

ANSI C63.4-2003, RSS-Gen 4.9 and FCC Public Notice DA 00-705, Released March 30, 2000.

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

The final measurement takes into account the loss generated by all the involved cables. The final measurement takes into account the loss generated by the short cable provided by the EUT manufacturer to support the antenna connector.

Table 9: Conducted Spurious Emission, Mode A (2402MHz), DH3

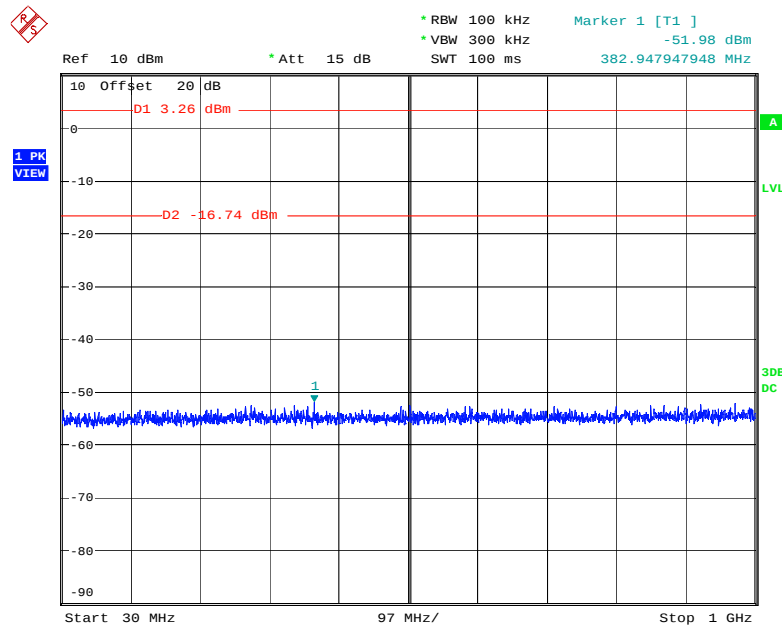
Frequency [MHz]	Reading [dBm]	Correction Factor [dB]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
382.95	-51.98	0.73	-51.25	-15.69	35.56
2402.00	3.26	1.05	4.31	N/A	N/A
4805.80	-42.64	1.33	-41.31	-15.69	25.62
6408.91	-44.92	1.44	-43.48	-15.69	27.79
10410.41	-51.53	1.70	-49.83	-15.69	34.14
22998.00	-49.33	2.19	-47.14	-15.69	31.46

Notes: Limit = Reading of fundamental + Correction factor – 20dB

Emission level = Reading + Correction factor

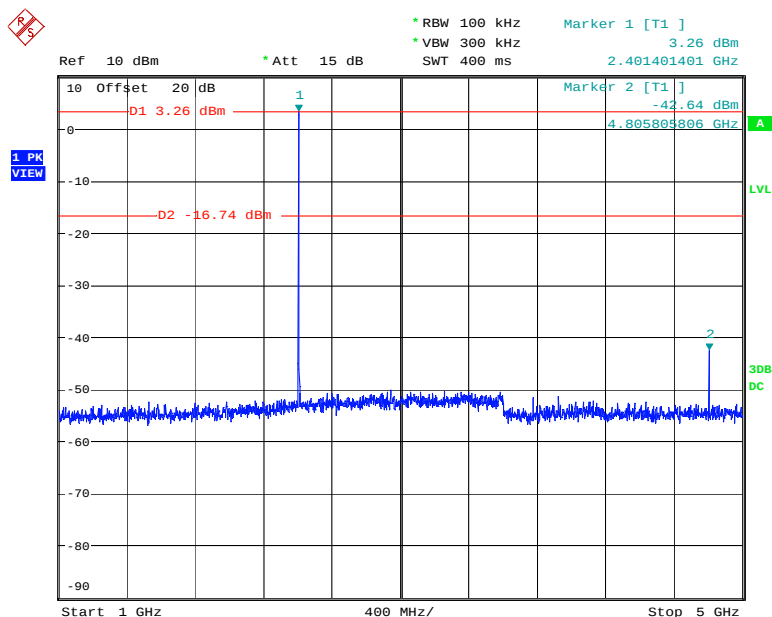
Correction factor = Total cable loss

Figure 14: Spurious Emission from 30MHz to 1GHz, Mode A (2402MHz), DH3



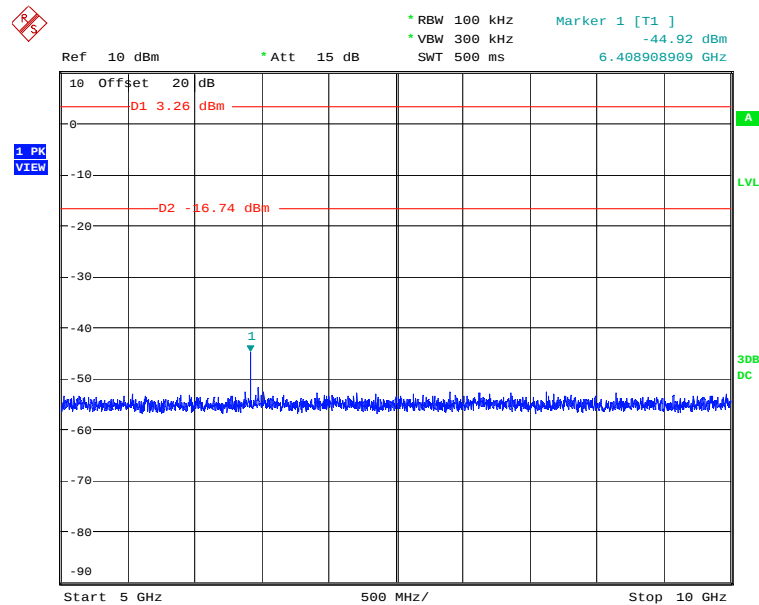
Mode Aa1

Figure 15: Spurious Emission from 1 to 5GHz, Mode A (2402MHz), DH3



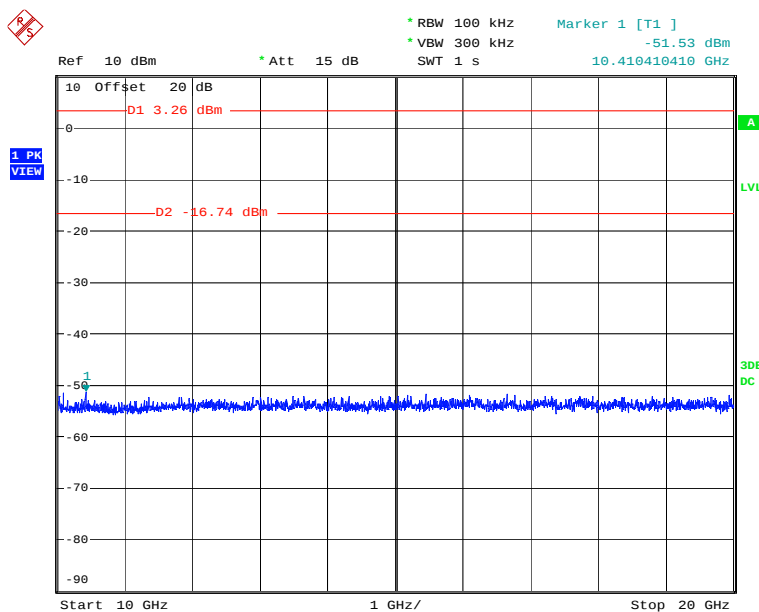
Mode Aa1

Figure 16: Spurious Emission from 5 to 10GHz, Mode A (2402MHz), DH3



Mode Aa1

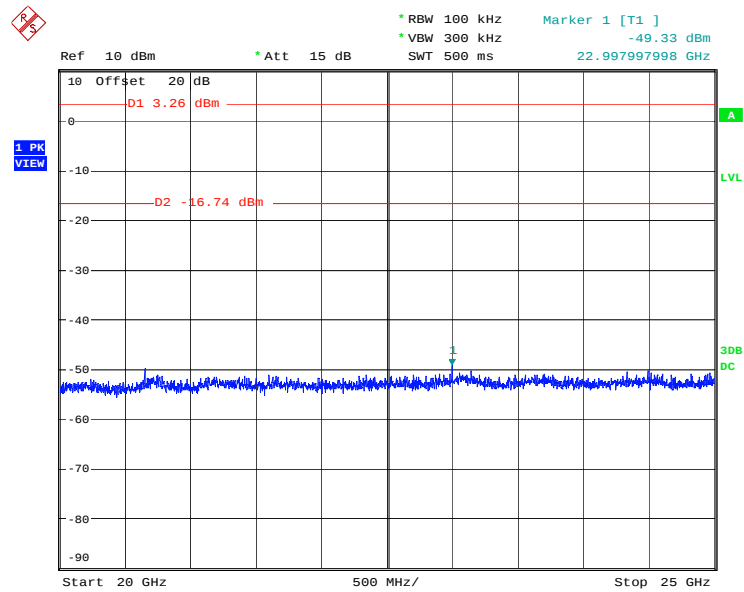
Figure 17: Spurious Emission from 10 to 20GHz, Mode A (2402MHz), DH3



Mode Aa1

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Figure 18: Spurious Emission from 20 to 25GHz, Mode A (2402MHz), DH3



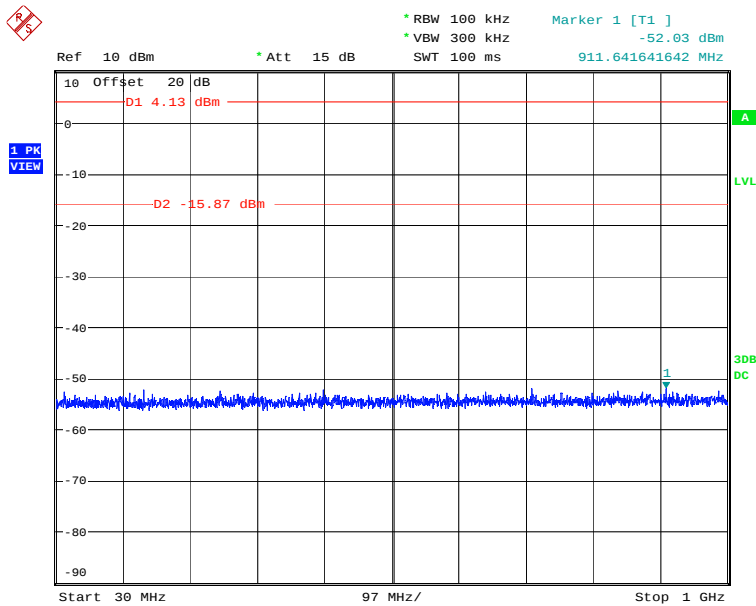
Mode Aa1

Table 10: Conducted Spurious Emission, Mode B (2441MHz), DH3

Frequency [MHz]	Reading [dBm]	Correction Factor [dB]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
911.64	-52.03	0.82	-51.21	-14.85	36.36
2441.00	4.13	1.02	5.15	N/A	N/A
4883.88	-41.94	1.34	-40.60	-14.85	25.75
6506.51	-44.07	1.42	-42.65	-14.85	27.81
13073.07	-51.47	1.86	-49.61	-14.85	34.76
23726.23	-50.47	2.22	-48.25	-14.85	33.40

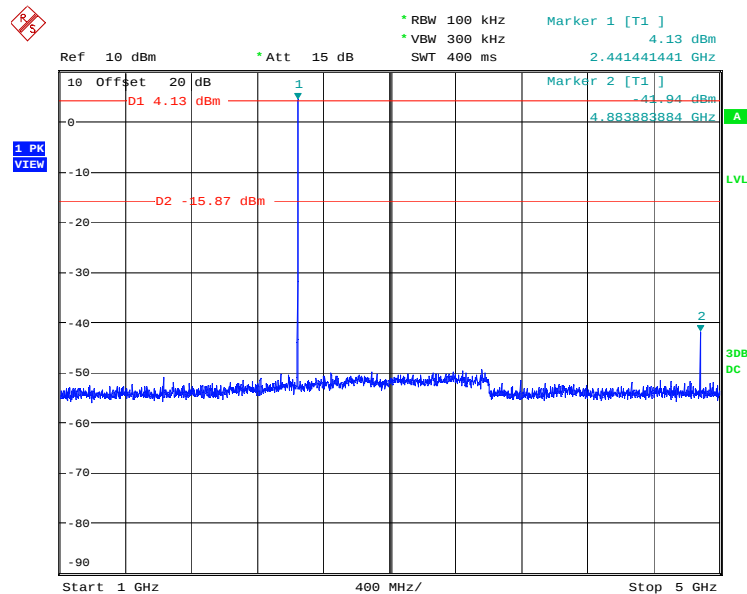
Notes: Limit = Reading of fundamental + Correction factor – 20dB
Emission level = Reading + Correction factor
Correction factor = Total cable loss

Figure 19: Spurious Emission from 30MHz to 1GHz, Mode B (2441MHz), DH3



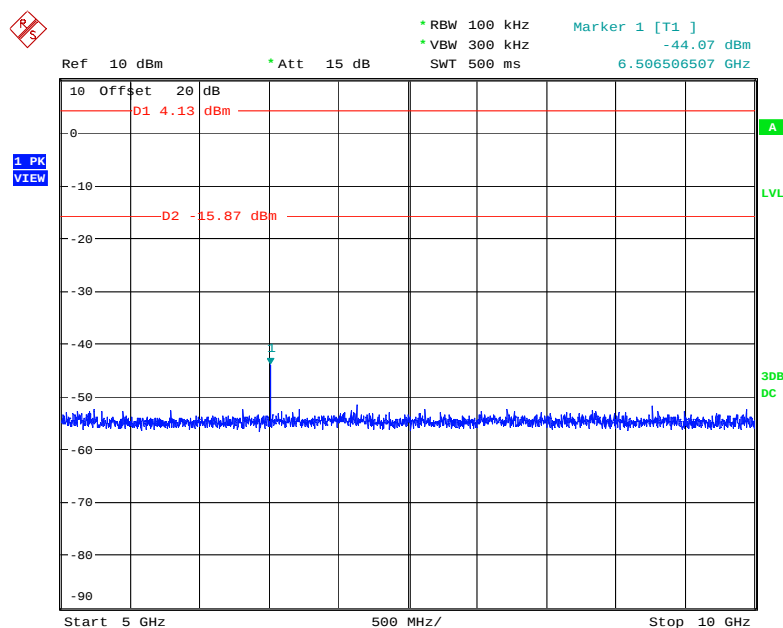
Mode Ba1

Figure 20: Spurious Emission from 1 to 5GHz, Mode B (2441MHz), DH3



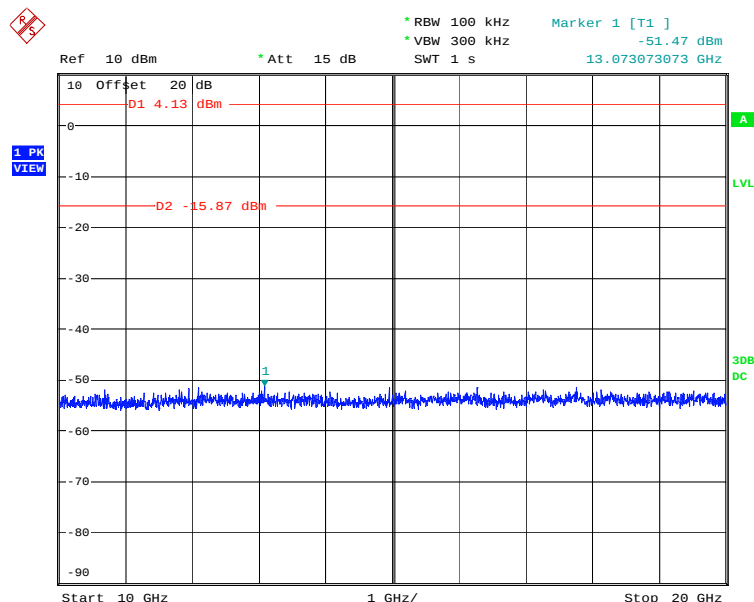
Mode Ba1

Figure 21: Spurious Emission from 5 to 10GHz, Mode B (2441MHz), DH3



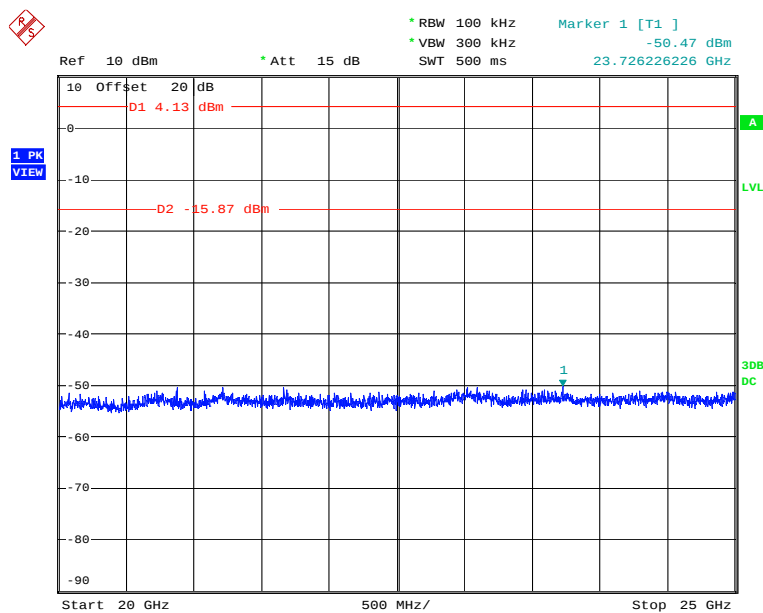
Mode Ba1

Figure 22: Spurious Emission from 10 to 20GHz, Mode B (2441MHz), DH3



Mode Ba1

Figure 23: Spurious Emission from 20 to 25GHz, Mode B (2441MHz), DH3



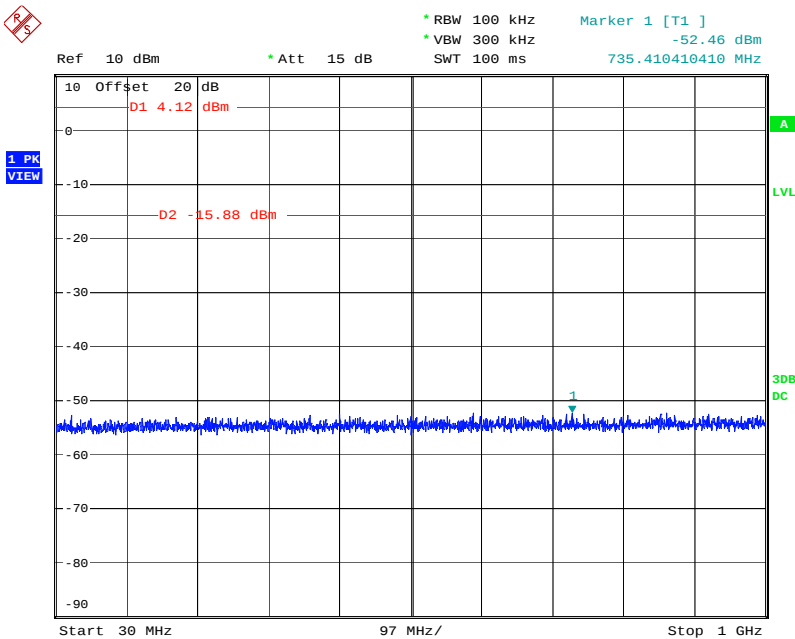
Mode Ba1

Table 11: Conducted Spurious Emission, Mode C (2480MHz), DH3

Frequency [MHz]	Reading [dBm]	Correction Factor [dB]	Emission Level [dBm]	Limit [dBm]	Margin [dB]
735.41	-52.46	0.82	-51.64	-14.79	36.85
2480.00	4.12	1.09	5.21	N/A	N/A
4961.96	-40.51	1.38	-39.13	-14.79	24.35
6616.62	-43.08	1.44	-41.64	-14.79	26.85
16016.02	-51.62	1.99	-49.63	-14.79	34.84
20795.80	-50.09	2.10	-47.99	-14.79	33.20

Notes: Limit = Reading of fundamental + Correction factor – 20dB
Emission level = Reading + Correction factor
Correction factor = Total cable loss

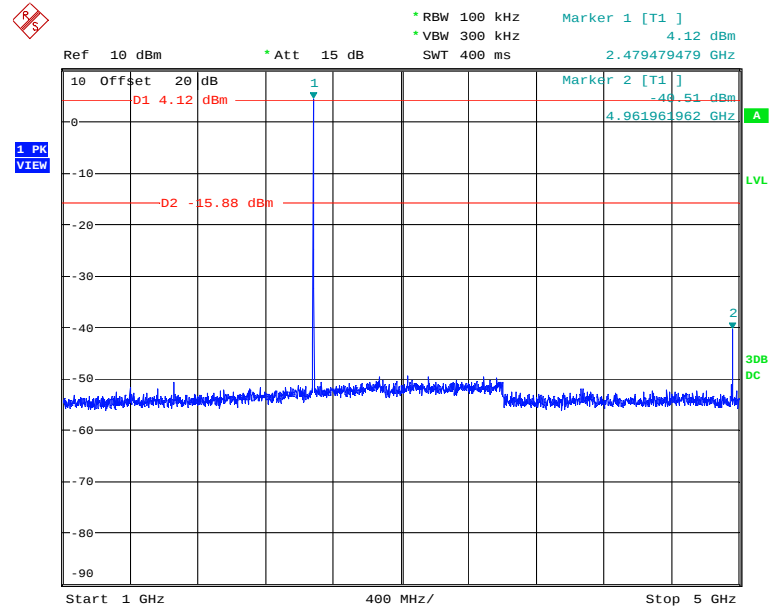
Figure 24: Spurious Emission from 30MHz to 1GHz, Mode C (2480MHz), DH3



Mode Ca1

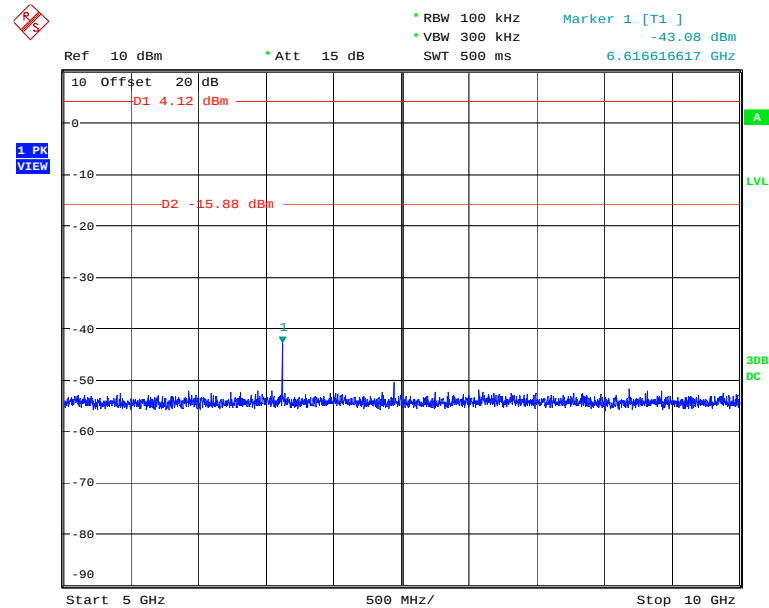
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Figure 25: Spurious Emission from 1 to 5GHz, Mode C (2480MHz), DH3



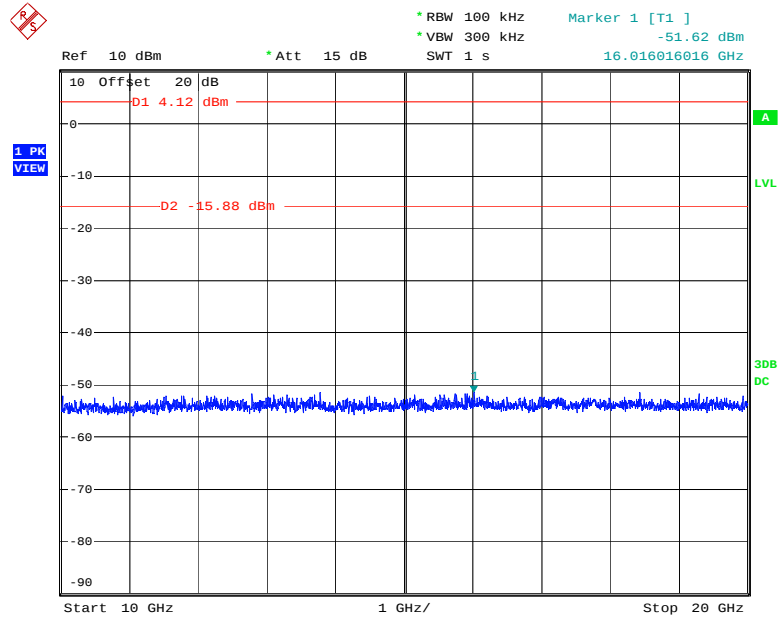
Mode Ca1

Figure 26: Spurious Emission from 5 to 10GHz, Mode C (2480MHz), DH3



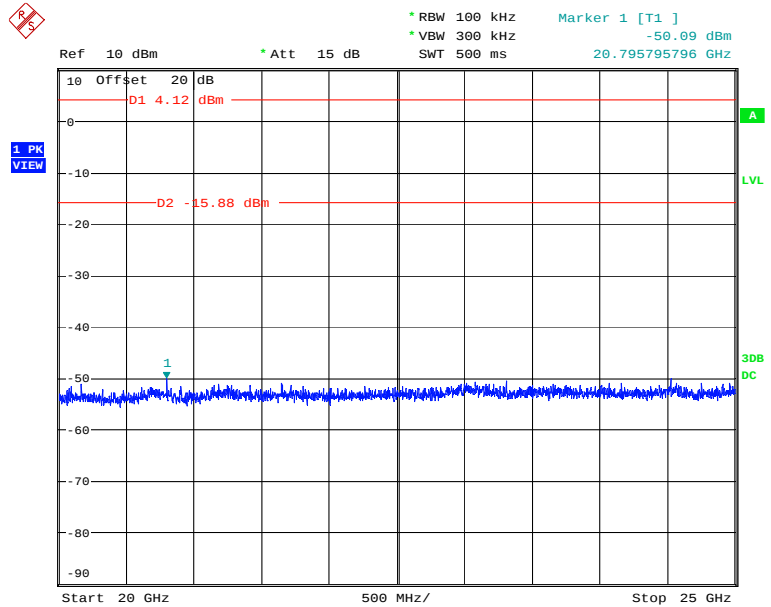
Mode Ca1

Figure 27: Spurious Emission from 10 to 20GHz, Mode C (2480MHz), DH3



Mode Ca1

Figure 28: Spurious Emission from 20 to 25GHz, Mode C (2480MHz), DH3



Mode Ca1

6. Test Results AC Mains Conducted Emission

6.1 AC Mains Conducted Emission of Transmitter

6.1.1 Mains Terminal Continuous Disturbance Voltage of Transmitter, FCC 15.207 and RSS-Gen 7.2.2

RESULT: **PASS**

Date of testing: 2010-02-18 2010-02-19

Ambient temperature: 23°C 23°C

Relative humidity: 33% 29%

Atmospheric pressure: 1012hPa 1009hPa

Frequency range: 0.15 – 30MHz

Kind of test site: Shielded Room

Requirements:

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

Test procedure:

ANSI C63.4-2003 and RSS-Gen 7.2.2

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

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

The measurements were performed with the spectrum analyzer operating in the CISPR quasi-peak and average detection modes. The analyzer's 6 dB bandwidth was set to 9kHz. No video filter less than 10 times the resolution bandwidth was used.

Disturbances other than those mentioned are small or not detectable.

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Table 12: Conducted Emission, 150kHz – 30MHz, Quasi Peak and Average Data, Phase N (N) and L1 (L), Mode A, DH3

Freq. [MHz]	Phase	Reading QP [dB(μV)]	Reading AV [dB(μV)]	Factor [dB]	Level QP [dB(μV)]	Level AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
0.275	N	4.5	-3.2	9.7	14.2	6.5	61.0	51.0	46.8	44.5
0.487	N	13.9	0.2	9.7	23.6	9.9	56.2	46.2	32.6	36.3
2.875	N	9.1	-4.8	9.8	18.9	5.0	56.0	46.0	37.1	41.0
7.546	N	11.8	-4.9	10.0	21.8	5.1	60.0	50.0	38.2	44.9
0.185	L1	9.7	3.5	9.7	19.4	13.2	64.3	54.3	44.9	41.1
0.290	L1	7.0	-3.4	9.7	16.7	6.3	60.5	50.5	43.8	44.2
2.882	L1	7.9	-6.4	9.8	17.7	3.4	56.0	46.0	38.3	42.6
6.837	L1	9.8	-6.5	9.8	19.7	3.4	60.0	50.0	40.3	46.6

Notes: Level QP = Reading QP + Factor
Level AV = Reading AV + Factor

Table 13: Conducted Emission, 150kHz – 30MHz, Quasi Peak and Average Data, Phase N (N) and L1 (L), Mode C, DH3

Freq. [MHz]	Phase	Reading QP [dB(μV)]	Reading AV [dB(μV)]	Factor [dB]	Level QP [dB(μV)]	Level AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
0.487	N	14.5	1.2	9.7	24.2	10.9	56.2	46.2	32.0	35.3
2.469	N	4.0	-7.1	9.8	13.8	2.7	56.0	46.0	42.2	43.3
4.209	N	7.5	-6.8	9.8	17.3	3.0	56.0	46.0	38.7	43.0
7.074	N	12.1	-4.5	10.0	22.1	5.5	60.0	50.0	37.9	44.5
0.155	L1	12.7	-0.7	9.7	22.4	9.0	65.7	55.7	43.3	46.7
0.494	L1	11.4	-0.8	9.7	21.1	8.9	56.1	46.1	35.0	37.2
4.830	L1	7.5	-7.2	9.9	17.4	2.7	56.0	46.0	38.6	43.3
6.522	L1	10.0	-6.3	9.9	19.9	3.6	60.0	50.0	40.1	46.4

Notes: Level QP = Reading QP + Factor
Level AV = Reading AV + Factor

6.2 AC Power Line Conducted Emission of Receiver

6.2.1 AC Power Line Conducted Emission of Receiver, FCC 15.107 and RSS-Gen 7.2.2

RESULT:

PASS

Date of testing: 2010-02-18 2010-02-19

Ambient temperature: 23°C 23°C

Relative humidity: 33% 29%

Atmospheric pressure: 1012hPa 1009hPa

Frequency range: 0.15 – 30MHz

Kind of test site: Shielded Room

Requirements:

The AC power line on any frequency within the band 150 kHz to 30MHz shall not exceed the limits specified in FCC 15.107(a) and RSS-Gen 7.2.2.

Test procedure:

ANSI C63.4-2003 and RSS-Gen 7.2.2

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

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

The measurements were performed with the spectrum analyzer operating in the CISPR quasi-peak and average detection modes. The analyzer's 6 dB bandwidth was set to 9kHz. No video filter less than 10 times the resolution bandwidth was used.

Disturbances other than those mentioned are small or not detectable.

Table 14: Conducted Emission, 150kHz – 30MHz, Quasi Peak and Average Data, Phase N (N) and L1 (L), Mode E, DH3

Freq. [MHz]	Phase	Reading QP [dB(μV)]	Reading AV [dB(μV)]	Factor [dB]	Level QP [dB(μV)]	Level AV [dB(μV)]	Limit QP [dB(μV)]	Limit AV [dB(μV)]	Margin QP [dB]	Margin AV [dB]
0.165	N	10.3	-1.8	9.7	20.0	7.9	65.2	55.2	45.2	47.3
2.961	N	9.1	-5.9	9.8	18.9	3.9	56.0	46.0	37.1	42.1
4.699	N	7.6	-6.9	9.9	17.5	3.0	56.0	46.0	38.5	43.0
7.006	N	9.1	-7.0	10.0	19.1	3.0	60.0	50.0	40.9	47.0
0.174	L1	8.9	-2.0	9.7	18.6	7.7	64.8	54.8	46.2	47.1
0.496	L1	13.8	0.2	9.7	23.5	9.9	56.1	46.1	32.6	36.2
4.499	L1	8.9	-5.7	9.8	18.7	4.1	56.0	46.0	37.3	41.9
6.184	L1	11.2	-5.4	9.9	21.1	4.5	60.0	50.0	38.9	45.5

Notes: Level QP = Reading QP + Factor
Level AV = Reading AV + Factor

7. Test Results Radiated Emission

7.1 Radiated Emission of Transmitter

7.1.1 Band Edge Radiated Emission, FCC 15.247(d) and RSS- 210 2.2

RESULT: **Pass**

Date of testing:	2010-02-18	2010-02-19
Ambient temperature:	23°C	23°C
Relative humidity:	33%	29%
Atmospheric pressure:	1012hPa	1009hPa
Measurement distance:	3m	
Kind of test site:	Semi Anechoic Chamber	

Requirements:

Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-210 2.7 (Table 1), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-210 2.7 (Table 2 and 3).

Test procedure:

ANSI C63.4-2003, RSS-Gen 4.9, 4.10 and FCC Public Notice DA 00-705, Released March 30, 2000

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

Measurements were taken using both horizontal and vertical antenna polarizations for 3 orientations (X, Y and Z) of the EUT.

Peak (1 MHz RBW/VBW) and average (1 MHz RBW/10 Hz VBW) radiated measurements were taken with a suitable span to encompass the peak of the fundamental.

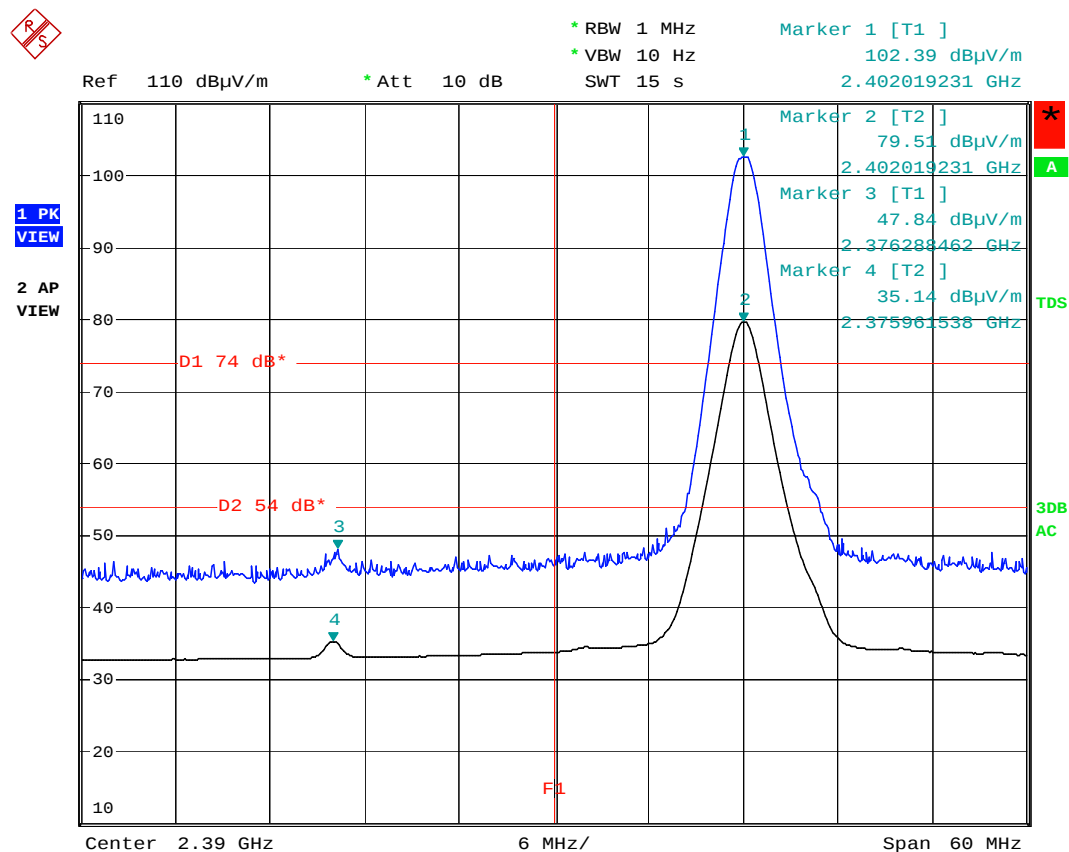
The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Table 15: Band Edge Radiated Emission

Operating Frequency [MHz]	EUT / Antenna Orient.	Peak Value [dBuV/m]	Average Value [dBuV/m]	Peak Limit [dBuV/m]	Average Limit [dBuV/m]	Peak Margin [dB]	Average Margin [dB]
2402	Z / V	47.84	35.14	74.00	54.00	26.16	18.86
2480	Z / V	60.10	48.53	74.00	54.00	13.90	5.47

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

Figure 29: Band Edge Radiated Emission, Mode A (2402MHz), Peak and Average



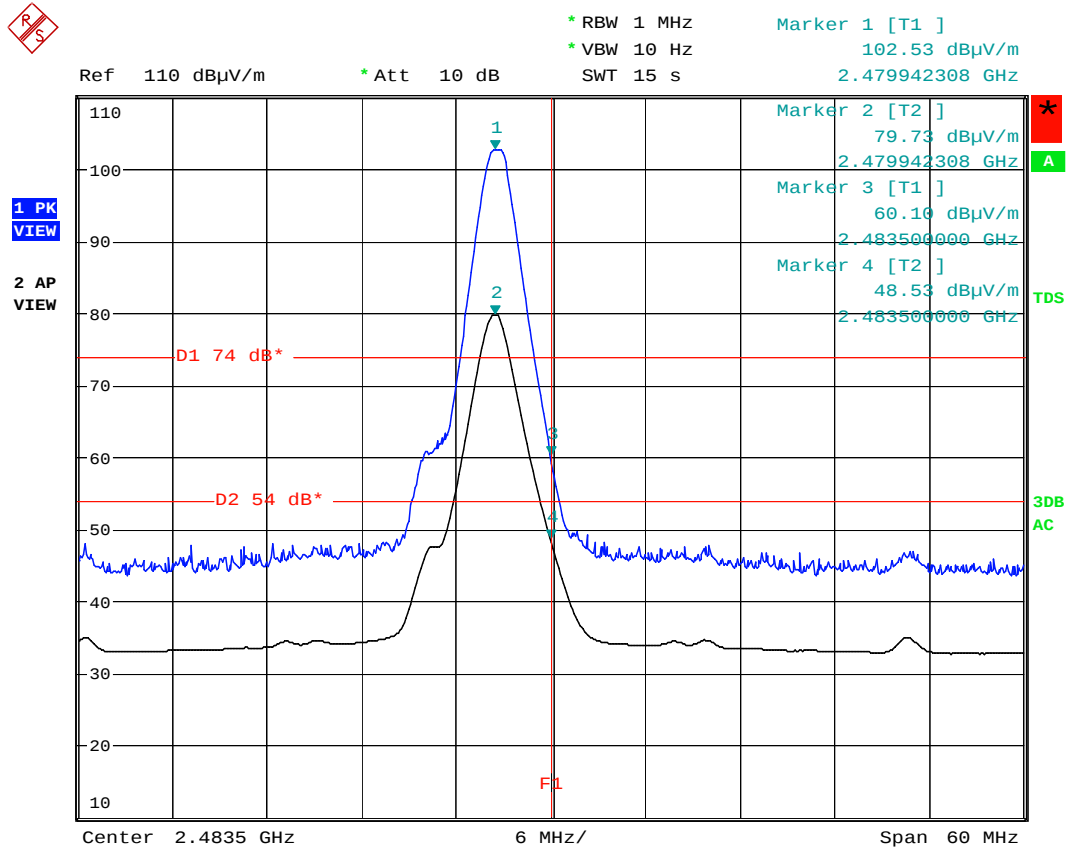
Note: The upper trace shows the peak value and the lower trace shows the average value.

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Figure 30: Band Edge Radiated Emission, Mode C (2480MHz), Peak and Average



Mode: C, Ver, Z

Note: The upper trace shows the peak value and the lower trace shows the average value.

7.1.2 Radiated Emission, Out-of-Band and Spurious Emission, FCC 15.247(d), FCC 15.205, FCC 15.209, RSS-210 2.2, RSS-210 A8.5 and RSS-Gen 7.2.1

RESULT:

PASS

Date of testing: 2010-02-18 2010-02-19

Ambient temperature: 23°C 23°C

Relative humidity: 33% 29%

Atmospheric pressure: 1012hPa 1009hPa

Frequency range: 9kHz – 25GHz

Measurement distance: 3m

Kind of test site: Semi Anechoic Chamber

Requirements:

The emissions from the intentional radiator shall not exceed the field strength specified in FCC 15.209(a) and RSS-210 2.7.

Test procedure:

ANSI C63.4-2003, RSS-Gen 4.9, 4.10 and FCC Public Notice DA 00-705, Released March 30, 2000

Before final measurements of radiated emissions were made in Semi Anechoic Chamber, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling and the orientation (X, Y and Z) of the EUT were varied in order to ensure that maximum emission amplitudes were attained.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Final radiated emission measurements were made at 3m. The spectrum was examined from 30 MHz to the 10th harmonic of the highest fundamental transmitter frequency (25 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters 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, emissions were measured using following settings: Peak: RBW=1MHz, 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 16: Radiated Emission 30MHz – 1GHz, Horizontal & Vertical Antenna Orientations, Quasi Peak Data, Mode A

Freq. [MHz]	EUT / Antenna Orientation	Reading QP [dB(μV)]	Factor [dB(1/m)]	Level QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [°]
44.992	Y / V	53.6	-23.5	30.1	40.0	9.9	100	165
66.019	Y / V	49.0	-24.3	24.7	40.0	15.3	100	13
85.326	Y / V	46.6	-27.5	19.1	40.0	20.9	101	209
111.835	Y / H	45.2	-24.9	20.3	43.5	23.2	295	303
347.026	Y / H	46.2	-19.8	26.4	46.0	19.6	101	193
471.571	Y / V	46.0	-15.9	30.1	46.0	15.9	102	249

Note: Level QP = Reading QP + Factor

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

Freq. [MHz]	EUT / Antenna P	Reading AV [dB(μV)]	Reading PK [dB(μV)]	Factor [dB(1/m)]	Level AV [dB(μV/m)]	Level PK [dB(μV/m)]	Limit AV / PK [dB(μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [°]
1256.90	Y / H	38.2	52.2	-15.4	22.8	36.8	54.0 / 74.0	31.2	37.2	178	212
3203.99	Y / H	46.5	57.2	-11.5	35.0	45.7	54.0 / 74.0	19.0	28.3	106	132
4803.95	Y / H	51.5	61.6	-9.7	41.8	51.9	54.0 / 74.0	12.2	22.1	111	124
1601.99	Z / V	44.2	53.5	-14.4	29.8	39.1	54.0 / 74.0	24.2	34.9	145	171
3204.00	Z / V	44.9	56.2	-11.5	33.4	44.7	54.0 / 74.0	20.6	29.3	118	228
4803.97	Z / V	49.5	59.7	-9.7	39.8	50.0	54.0 / 74.0	14.2	24.0	118	41

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

Table 18: Radiated Emission 30MHz – 1GHz, Horizontal & Vertical Antenna Orientations, Quasi Peak Data, Mode B

Freq. [MHz]	EUT / Antenna Orientation	Reading QP [dB(μV)]	Factor [dB(1/m)]	Level QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [°]
44.69	Y / V	52.9	-23.5	29.4	40.0	10.6	100	169
66.00	Y / H	49.1	-24.6	24.5	40.0	15.5	285	89
85.45	Y / V	45.1	-27.5	17.6	40.0	22.4	102	234
132.01	Y / V	40.9	-24.1	16.8	43.5	26.7	104	167
350.83	Y / H	48.2	-19.7	28.5	46.0	17.5	101	178
532.78	Y / H	44.5	-15.1	29.4	46.0	16.6	165	43

Note: Level QP = Reading QP + Factor

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

Freq. [MHz]	EUT / Antenna P	Reading AV [dB(μV)]	Reading PK [dB(μV)]	Factor [dB(1/m)]	Level AV [dB(μV/m)]	Level PK [dB(μV/m)]	Limit AV / PK [dB(μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [°]
3256.03	Y / H	46.5	57.7	-11.4	35.1	46.3	54.0 / 74.0	18.9	27.7	101	131
4881.99	Y / H	53.5	63.9	-9.3	44.2	54.6	54.0 / 74.0	9.8	19.4	107	142
6512.01	Y / V	44.5	54.9	-6.1	38.4	48.8	54.0 / 74.0	15.6	25.2	116	359
7602.60	Y / H	37.9	52.0	-4.6	33.3	47.4	54.0 / 74.0	20.7	26.6	173	295
1627.98	Z / V	47.0	55.8	-14.2	32.8	41.6	54.0 / 74.0	21.2	32.4	142	194
3254.98	Z / H	44.5	55.2	-11.4	33.1	43.8	54.0 / 74.0	20.9	30.2	122	40
4881.97	Z / V	51.7	61.8	-9.3	42.4	52.5	54.0 / 74.0	11.6	21.5	100	60

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

Table 20: Radiated Emission 30MHz – 1GHz, Horizontal & Vertical Antenna Orientations, Quasi Peak Data, Mode C

Freq. [MHz]	EUT / Antenna Orientation	Reading QP [dB(μV)]	Factor [dB(1/m)]	Level QP [dB(μV/m)]	Limit [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [°]
41.19	Y / V	49.5	-23.9	25.6	40.0	14.4	103	150
45.35	Y / V	53.8	-23.5	30.3	40.0	9.7	103	177
86.45	Y / V	45.5	-27.6	17.9	40.0	22.1	154	279
162.67	Y / H	42.5	-22.2	20.3	43.5	23.2	173	25
354.09	Y / H	47.7	-19.6	28.1	46.0	17.9	101	186
537.93	Y / H	44.6	-14.9	29.7	46.0	16.3	166	47

Note: Level QP = Reading QP + Factor

Table 21: Radiated Emission 1GHz – 25GHz, Horizontal & Vertical Antenna Orientations, Peak and Average Data, Mode C

Freq. [MHz]	EUT / Antenna P	Reading AV [dB(μV)]	Reading PK [dB(μV)]	Factor [dB(1/m)]	Level AV [dB(μV/m)]	Level PK [dB(μV/m)]	Limit AV / PK [dB(μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [°]
1652.65	Y / H	53.3	59.1	-14.1	39.2	45.0	54.0 / 74.0	14.8	29.0	134	268
3305.32	Y / H	48.0	58.5	-11.4	36.6	47.1	54.0 / 74.0	17.4	26.9	102	120
4959.98	Y / H	52.0	62.0	-9.1	42.9	52.9	54.0 / 74.0	11.1	21.1	106	128
6610.60	Y / V	42.9	53.8	-6.0	36.9	47.8	54.0 / 74.0	17.1	26.2	126	355
1652.65	Z / H	56.6	60.0	-14.1	42.5	45.9	54.0 / 74.0	11.5	28.1	133	162
3305.34	Z / V	47.6	58.3	-11.4	36.2	46.9	54.0 / 74.0	17.8	27.1	114	20
4959.98	Z / V	49.8	59.8	-9.1	40.7	50.7	54.0 / 74.0	13.3	23.3	100	346
9919.97	Z / V	41.3	53.9	-8.9	32.4	45.0	54.0 / 74.0	21.6	29.0	103	96

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

7.2 Radiated Emission of Receiver

7.2.1 Radiated 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:	2010-02-18	2010-02-19
Ambient temperature:	23°C	23°C
Relative humidity:	33%	29%
Atmospheric pressure:	1012hPa	1009hPa
Frequency range:	30MHz – 25GHz	
Equipment classification:	Class B	
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 4.9, 4.10

Before final measurements of radiated emissions were made in Semi Anechoic Chamber, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling and the orientation (X, Y and Z) of the EUT were varied in order to ensure that maximum emission amplitudes were attained.

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Final radiated emission measurements were made at 3m. The spectrum was examined from 30 MHz to the 5th harmonic of the highest fundamental transmitter frequency (12.5 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters 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, emissions were measured using following settings: Peak: RBW=1MHz, 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 22: Radiated Emission 30MHz – 1GHz, Horizontal & Vertical Antenna Orientations, Quasi Peak Data, Mode E (FCC limit)

Freq. [MHz]	EUT / Antenna Orientation	Reading QP [dB(μV)]	Factor [dB(1/m)]	Level QP [dB(μV/m)]	FCC Limit [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [°]
43.32	Y / V	54.1	-23.6	30.5	40.0	9.5	100	168
63.07	Y / V	52.1	-24.2	27.9	40.0	12.1	100	235
109.18	Y / V	43.1	-25.6	17.5	43.5	26.0	109	147
299.99	Y / H	40.4	-21.2	19.2	46.0	26.8	348	13
348.00	Y / H	41.4	-19.7	21.7	46.0	24.3	350	32
429.99	Y / V	39.2	-17.0	22.2	46.0	23.8	101	359

Note: Level QP = Reading QP + Factor

Table 23: Radiated Emission 30MHz – 1GHz, Horizontal & Vertical Antenna Orientations, Quasi Peak Data, Mode E (IC limit)

Freq. [MHz]	EUT / Antenna Orientation	Reading QP [dB(μV)]	Factor [dB(1/m)]	Level QP [dB(μV/m)]	IC Limit [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [°]
43.32	Y / V	54.1	-23.6	30.5	40.0	9.5	100	168
63.07	Y / V	52.1	-24.2	27.9	40.0	12.1	100	235
109.18	Y / V	43.1	-25.6	17.5	40.0	22.5	109	147
299.99	Y / H	40.4	-21.2	19.2	47.0	27.8	348	13
348.00	Y / H	41.4	-19.7	21.7	47.0	25.3	350	32
429.99	Y / V	39.2	-17.0	22.2	47.0	24.8	101	359

Note: Level QP = Reading QP + Factor

Limit value is for 3m measurement

Table 24: Radiated Emission 1GHz – 25GHz, Horizontal & Vertical Antenna Orientations, Peak and Average Data, Mode E

Freq. [MHz]	EUT / Antenna P	Reading AV [dB(μV)]	Reading PK [dB(μV)]	Factor [dB(1/m)]	Level AV [dB(μV/m)]	Level PK [dB(μV/m)]	Limit AV / PK [dB(μV/m)]	Margin AV [dB]	Margin PK [dB]	Height [cm]	Angle [°]
3861.69	Y / H	38.4	52.4	-10.6	27.8	41.7	54.0 / 74.0	26.2	32.3	176	71
5713.38	Y / H	38.1	52.0	-7.7	30.4	44.3	54.0 / 74.0	23.6	29.7	190	340
7803.64	Y / H	37.6	51.5	-3.6	34.0	47.9	54.0 / 74.0	20.0	26.1	101	129
1204.73	Z / V	41.8	53.9	-15.8	26.0	38.1	54.0 / 74.0	28.0	35.9	111	255
1628.31	Z / H	48.4	54.9	-14.2	34.2	40.7	54.0 / 74.0	19.8	33.3	102	185
3853.35	Z / V	38.5	52.1	-10.6	27.9	41.5	54.0 / 74.0	26.1	32.5	155	202

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

8. Photographs of test setup

Refer to test report 12606564 002

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