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Nemko Canada Inc., 303 River Road, R.R. 5, Ottawa, Ontario, Canada, K1V 1H2

Report number: 136288-4TRFWL

Apparatus: Everest Braille Note

Applicant: Technologies Humanware Inc.
445, Rue du Parc-Industriel
Longueuil, Quebec,
Canada, J4H 3V7

FCC ID: XT5APBT320

Test specification:

Title 47 - Telecommunication
Chapter I - Federal Communications Commission
Subchapter A - General
Part 15 - Radio Frequency Devices
Subpart C - Intentional Radiators

- **§15.247- Operation within the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz**

Reviewed by: Kevin Ma
Signature
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March 5, 2010
Date

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Section 1: Report summary

Report Number: 136288-4TRFWL

Specification: FCC 15.247

Section 1: Report summary

This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Canada Inc.

Test specification:

FCC Part 15 Subpart C, 15.247

Operation within the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz.

| | |
|-------------------------|---|
| Compliance status: | Complies |
| Exclusions: | None |
| Non-compliances: | None |
| Report release history: | Original release |
| Test location: | Nemko Canada Inc. 303 River Road, R.R. 5, Ottawa, Ontario, Canada, K1V 1H2 |
| Registration number: | 176392 (3 m Semi anechoic chamber) |

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 2: Equipment under test

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Specification: FCC 15.247

Section 2: Equipment under test

2.1 Identification of equipment under test (EUT)

The following information identifies the EUT under test:

| | |
|-------------------------|--|
| Type of equipment: | Braille notebook with WiFi and Bluetooth |
| Product marketing name: | Everest, BrailleNote |
| Model number: | APBT320 |
| Model variant: | APQT320 |
| Serial number: | None |
| Nemko sample number: | 2 |
| FCC ID: | XT5APBT320 |
| Date of receipt: | October 14, 2009 |

2.2 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

| | | | | | |
|------------------------|---------------------|--------------------------|--------------|----------------------|---------------|
| Type of equipment: | LCD monitor | Keyboard | Mouse | Power supply | Memory stick |
| Brand name: | Samsung | Dell | Microsoft | Globtek | Verbatim |
| Model name or number: | 2053BW | SK-8135 | X802382-004 | GTM21097-3005 | None |
| Serial number: | AQ20H9NQ703 443W | CN-0DJ346-71616-79I-0FC9 | LZ8310D06RW | TR9CA6000EJ2 YMED | Everest QA# 8 |
| Nemko sample number: | 1 | 4 | 6 | 10 | 12 |
| Connection port: | VGA | USB | USB | DC jack | USB |
| Cable length and type: | 1.5 m, VGA | 1.5 m, USB | 1.5 m, USB | 1 m, DC wire | None |
| Type of equipment: | SD card | Microphone | Microphone | Headphones | Headphones |
| Brand name: | None | Labtec | Labtec | None | None |
| Model name or number: | None | AM-252 | AM-252 | None | None |
| Serial number: | None | None | None | None | None |
| Nemko sample number: | 15 | 3 | 3 | 17 | 17 |
| Connection port: | SD slot | Audio jack | Audio jack | Audio jack | Audio jack |
| Cable length and type: | None | 1.5 m, Audio | 1.5 m, Audio | 1.5 m, Audio | 1.5 m, Audio |



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Section 2: Equipment under test

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Section 2: Equipment under test, continued

2.3 EUT description

The product is a notetaker device that includes in a single enclosure a microprocessor platform based on the Freescale iMX31 and the Microsoft Windows CE 6.0 operating system. The product provides all the functionality provided by a generic PDA but uses KeySoft software to make it accessible to blind people. The main applications provided by KeySoft are: email, internet browser, media player, word processor and daily planner.

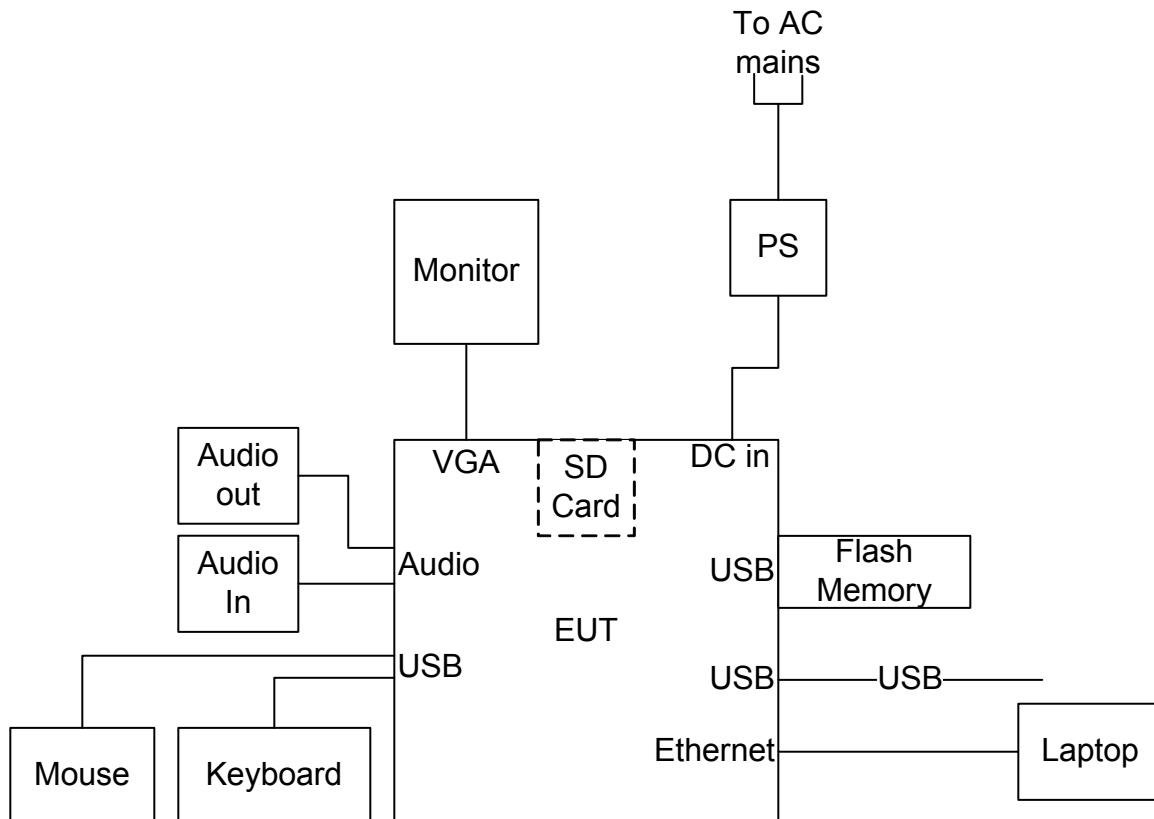
The user enters data in the notetaker using a Perkins keyboard or a QWERTY keyboard. Feedback to the user is delivered in three different ways: Audio feedback using text to speech technology (TTS), the Braille displays cells and a connected VGA display. The notetaker provides synchronization capability with a personal computer. This allows the user to share contacts, appointments and email between the PC and the notetaker. The notetaker communicates with external devices using mainstream technologies such as USB, WiFi and Bluetooth.

The BrailleNote also needs to be compatible with the DeafBlind Communicator (DBC) application (KeySoft Add-On) using a modem for TTY communication and a remote QWERTY-Bluetooth device.

Between the two model variants, only the interface with the keyboard changes, everything else is the same. EUT with Perkins keyboard (APBT320) was chosen as a representative model for testing.

2.4 Technical specifications of the EUT

| | |
|----------------------|--|
| Operating band: | 2400–2483.5 MHz |
| Operating frequency: | 2402–2480 MHz |
| Modulation type: | GFSK |
| Occupied bandwidth: | 1.0547 MHz |
| Channel spacing: | 1.0095 MHz |
| Emission designator: | F1D |
| Antenna data: | Mica 2.4 GHz SMD antenna, 1.9 dBi |
| Antenna type: | Integral Permanent fixed antenna, which may be built-in, (Equipment does not have an external 50 Ω RF connector) |
| Power source | 120 VAC, 60 Hz external |

Section 2: Equipment under test, continued**2.5 EUT setup diagram****2.6 Operation of the EUT during testing**

The EUT was controlled using following command for constant transmission on low, mid and high channels: "bt test 4 XXXX 65330" (XXXX is frequency in MHz). Frequency hopping was enabled using following command: "bt test 5 0 65330".

2.7 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.



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Section 3: Test conditions

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Section 3: Test conditions

3.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

3.2 Test conditions, power source and ambient temperatures

| | |
|---|---|
| Normal temperature, humidity and air pressure test conditions | Temperature: 15–30 °C Relative humidity: 20–75 % Air pressure: 86–106 kPa When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated. |
| Power supply range: | The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed. |



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Section 3: Test conditions

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Section 3: Test conditions, continued

3.3 Measurement uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko Canada document MU-003.

3.4 Test equipment

| Equipment | Manufacturer | Model No. | Asset/Serial No. | Next cal. |
|----------------------------|------------------|--------------|------------------|-------------|
| 3 m EMI Test Chamber | TDK | SAC-3 | FA002047 | May 06/10 |
| International Power Supply | California Inst. | 3001i | FA001021 | Jan. 13/10 |
| Receiver/Spectrum Analyzer | Rohde & Schwarz | ESU 26 | FA002043 | Dec. 16/09 |
| Spectrum Analyzer | Rohde & Schwarz | FSP | FA001920 | Apr. 24/10 |
| Bilog | Sunol | JB3 | FA002108 | Jan. 27/10 |
| Horn Antenna #2 | EMCO | 3115 | FA000825 | Jan. 21/10 |
| 1 – 18 GHz Amplifier | JCA | JCA118-503 | FA002091 | Oct 07/10 |
| Horn 18 – 26.5 GHz | Electro-Metrics | SH-50/60-1 | FA000479 | COU |
| 26 – 40.0 GHz Amplifier | NARDA | DBL-2640N610 | FA001556 | COU |
| LISN | Rohde & Schwarz | ENV216 | FA002023 | Sept. 08/10 |
| Flush Mount Turntable | Sunol | FM2022 | FA002082 | NCR |
| Controller | Sunol | SC104V | FA002060 | NCR |
| Mast | Sunol | TLT2 | FA002061 | NCR |

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use

| | |
|--|--------------------------------|
|  Nemko Nemko Canada Inc., 303 River Road, R.R. 5, Ottawa, Ontario, Canada, K1V 1H2 | Section 4: Result summary |
| | Report Number: 136288-4TRFWL |
| | Specification: FCC Part 15.247 |

Section 4: Result summary

4.1 FCC Part 15 Subpart C, 15.247: Test results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

| | |
|-----|--|
| N | No : not applicable / not relevant. |
| Y | Yes : Mandatory i.e. the apparatus shall conform to these tests. |
| N/T | Not Tested, mandatory but not assessed. (See report summary) |

| Part | Test description | Required | Result |
|--|--|----------|--------|
| General requirements for FCC Part 15 | | | |
| §15.31(e) | Variation of power source | Y | Pass |
| §15.31(m) | Number of operating frequencies | Y | Noted |
| §15.203 | Antenna requirement | Y | Pass |
| §15.207(a) | Conducted limits | Y | Pass |
| Specific requirements for FCC Part 15 Subpart C, 15.247 | | | |
| §15.247(a)(1) | Frequency hopping systems | --- | --- |
| §15.247(a)(1)(i) | Frequency hopping systems operating in the 902–928 MHz band | N | |
| §15.247(a)(1)(ii) | Frequency hopping systems operating in the 5725–5850 MHz band | N | |
| §15.247(a)(1)(iii) | Frequency hopping systems operating in the 2400–2483.5 MHz band | Y | Pass |
| §15.247(a)(2) | Systems using digital modulation techniques | N | |
| §15.247(b)(1) | Maximum peak output power of Frequency hopping systems operating in the 2400–2483.5 MHz band and 5725–5850 MHz band | Y | Pass |
| §15.247(b)(2) | Maximum peak output power of Frequency hopping systems operating in the 902–928 MHz band | N | |
| §15.247(b)(3) | Maximum peak output power of systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands | N | |
| §15.247(b)(4) | Maximum peak output power | Y | Pass |
| §15.247(c)(1) | Fixed point-to-point Operation with directional antenna gains greater than 6 dBi | N | |
| §15.247(c)(2) | Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams | N | |
| §15.247(d) | Spurious emissions | Y | Pass |
| Notes: None | | | |



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Appendix A: Test results

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Appendix A: Test results

Clause 15.31(e) Variation of the power source

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. For battery-operated equipment, the equipment tests shall be performed using a new battery.

Test date: December 14, 2009

Test results: Pass

Test data

- Transmit output power was measured while supply voltage was varied from 102 VAC to 138 VAC (85 % to 115 % of the nominal rated supply voltage). No change in transmit output power was observed.



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Appendix A: Test results

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Clause 15.31(m) Number of operating frequencies

Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

| Frequency range over which device operates | Number of frequencies | Location in the range of operation |
|--|-----------------------|---|
| 1 MHz and less | 1 | Middle |
| 1 to 10 MHz | 2 | 1 near top and 1 near bottom |
| More than 10 MHz | 3 | 1 near top, 1 near middle and 1 near bottom |

Test data

The frequency band is 83.5 MHz therefore number of operating frequencies is 3.

| | |
|--------------------------|----------|
| Low frequency / channel | 2402 MHz |
| Mid frequency / channel | 2441 MHz |
| High frequency / channel | 2480 MHz |

Clause 15.203 Antenna requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Test date: October 20, 2009

Test results: Pass

Test data

- The EUT uses an on-board antenna.

Detailed photo of the antenna





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Appendix A: Test results

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Clause 15.207(a) Conducted limits

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency of emission (MHz) | Conducted limit (dB μ V) | |
|-----------------------------|------------------------------|-----------|
| | Quasi-peak | Average |
| 0.15–0.5 | 66 to 56* | 56 to 46* |
| 0.5–5 | 56 | 46 |
| 5–30 | 60 | 50 |

*-Decreases with the logarithm of the frequency.

Test date: October 16, 2009

Test results: Pass

Special notes

Port under test: AC input of the power supply

Preview measurements:

0.15 MHz to 30 MHz

Receiver settings:

- Peak and average detector
- 9 kHz RBW

– Spectral plots have been corrected for transducer factors; cable loss, LISN, and attenuators.

– Emissions detected within 6 dB of limit were re-measured with a quasi peak or average detector for a final measurement.

Final measurement:

0.15 MHz to 30 MHz

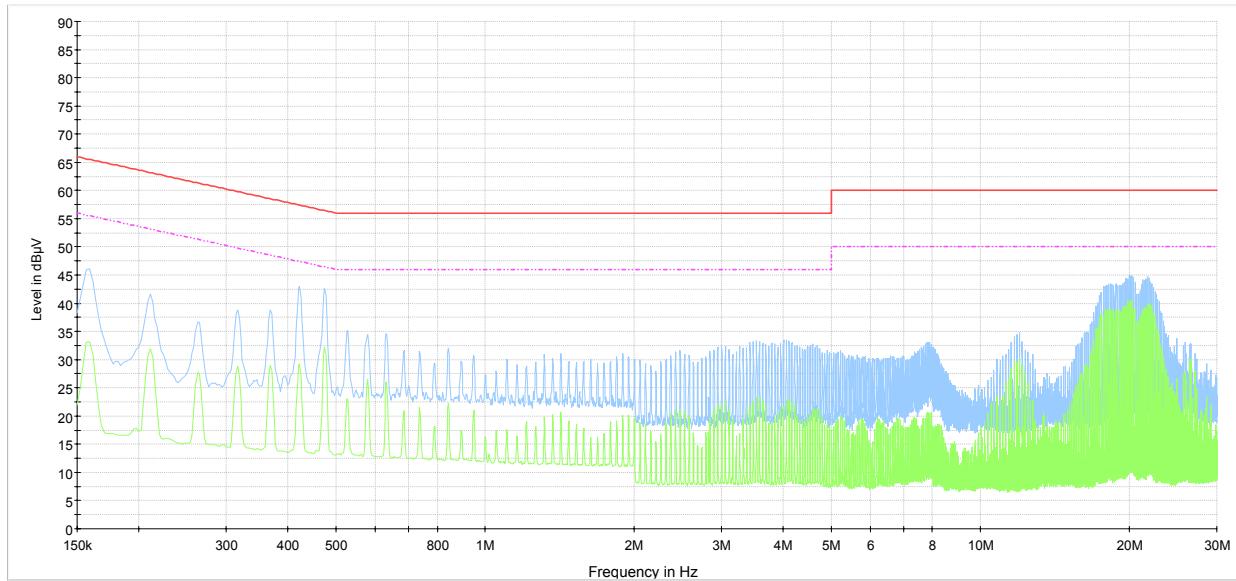
Receiver settings:

- Q-Peak and average detector
- 9 kHz RBW

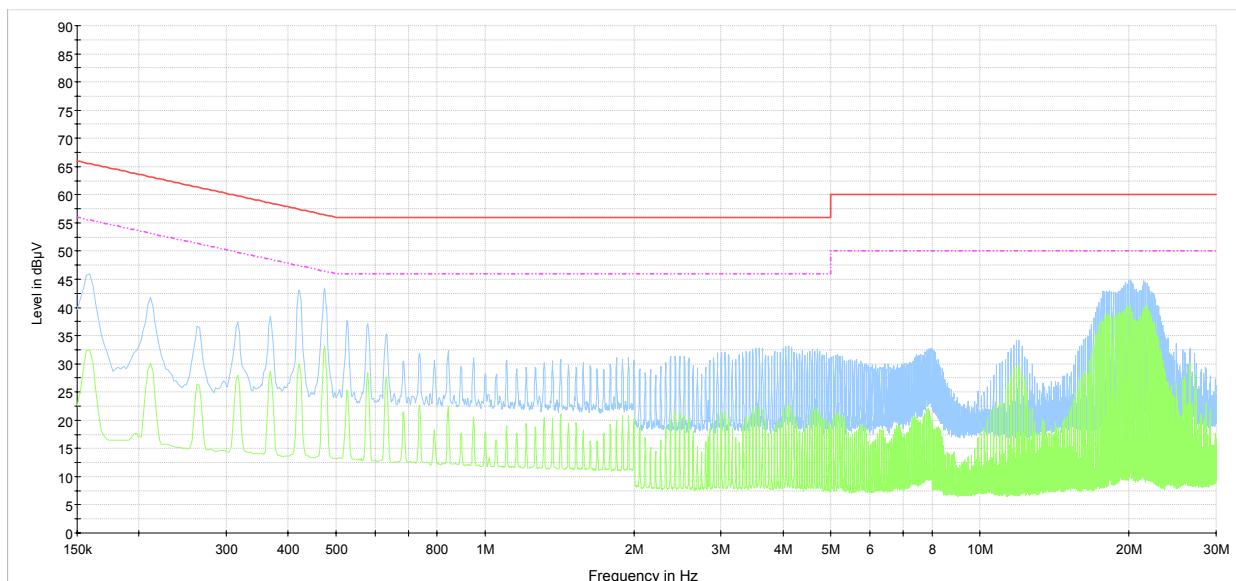
Clause 15.207(a) Conducted limits, continued

Test data

Phase line:



Neutral line:





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Appendix A: Test results

Report Number: 136288-4TRFWL

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Clause 15.207(a) Conducted limits, continued

Set up photo





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Appendix A: Test results

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Specification: FCC 15.247

Clause 15.247(a)(1) Frequency hopping requirements

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Test date: December 15, 2009

Test results: Pass

Special notes

- The peak detector was used with 100 kHz/300 kHz RBW/VBW

Test data

| Frequency, MHz | 20 dB BW, MHz |
|----------------|---------------|
| 2402 | 1.0502 |
| 2441 | 1.0520 |
| 2480 | 1.0547 |

Channel separation is 1.0095 MHz

Widest channel bandwidth was 1.055 MHz.

Two-thirds is 703 kHz

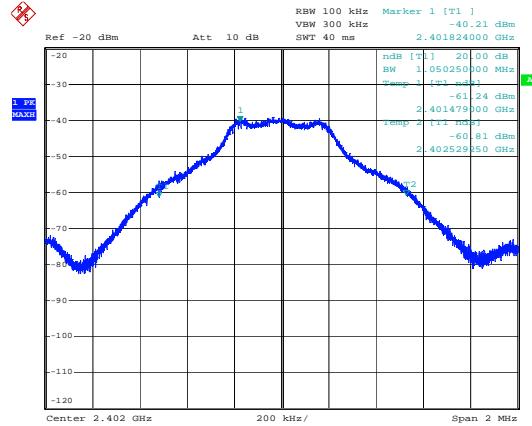
| Channel separation, MHz | Minimum limit, MHz | Margin, MHz |
|-------------------------|--------------------|-------------|
| 1.0095 | 0.703 | 0.306 |

Clause 15.247(a)(1) Frequency hopping requirements, continued

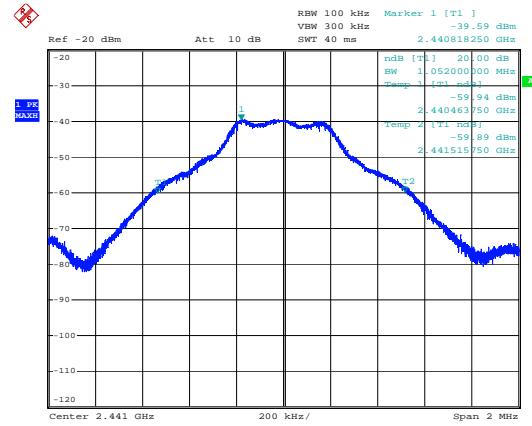
Test data, continued

20 dB bandwidth:

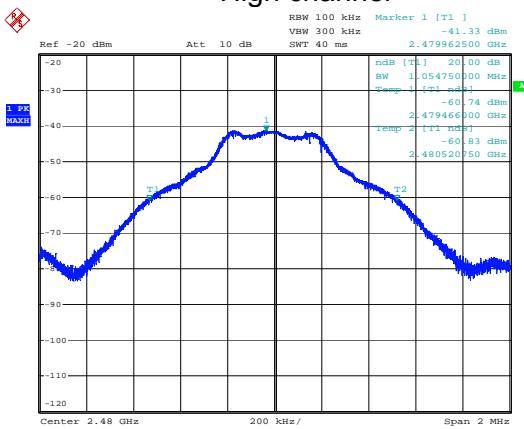
Low channel



Mid channel



High channel



Date: 15.DEC.2009 11:25:50

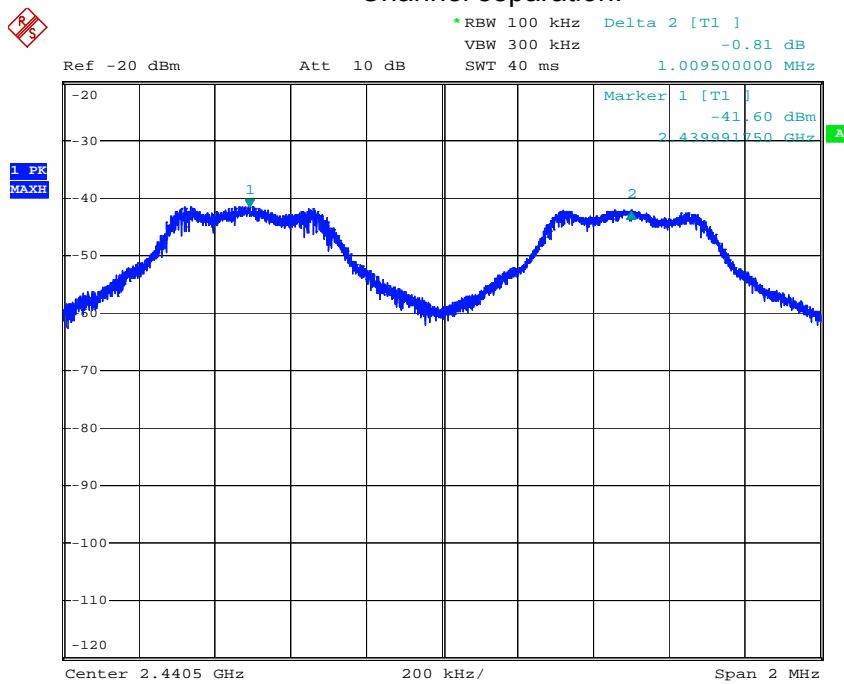
Date: 15.DEC.2009 11:24:50

Date: 15.DEC.2009 11:26:47

Clause 15.247(a)(1) Frequency hopping requirements, continued

Test data

Channel separation:



Date: 14.DEC.2009 13:12:08



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Appendix A: Test results

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Clause 15.247(a)(1)(iii) Frequency hopping systems operating in the 2400–2483.5 MHz band

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test date: December 14, 2009

Test results: Pass

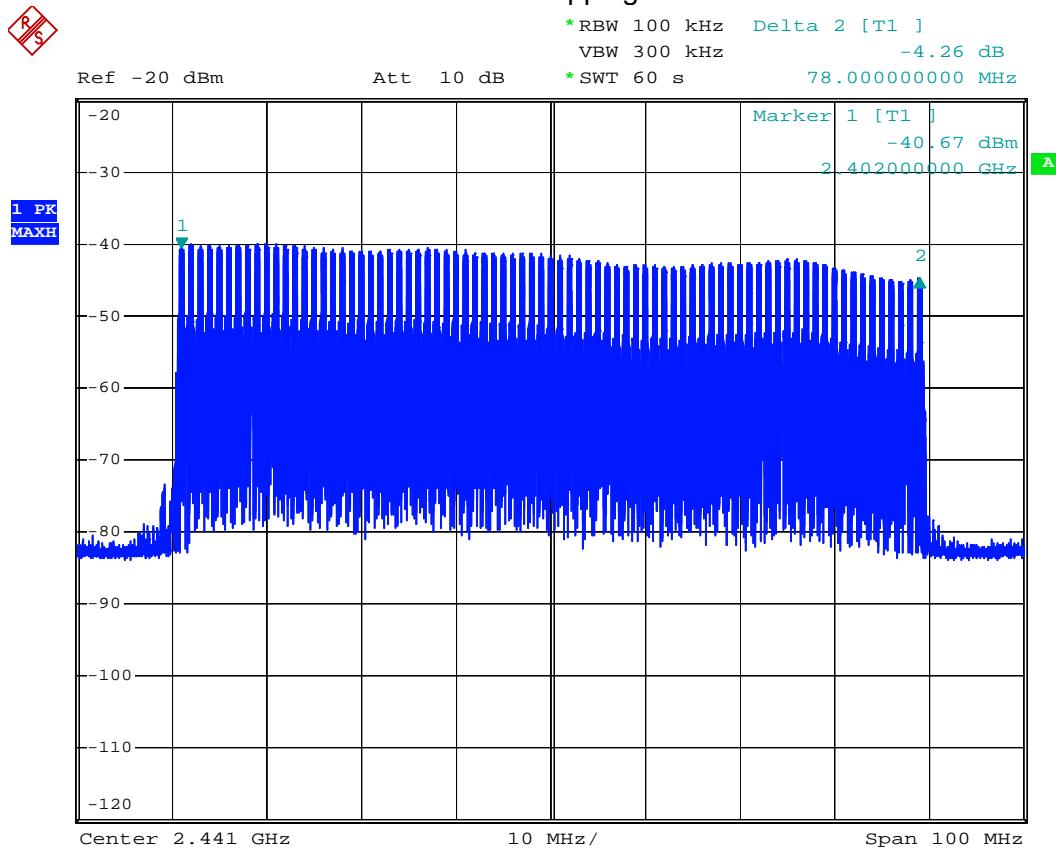
Special notes

- The peak detector was used with 100 kHz/300 kHz RBW/VBW

Clause 15.247(a)(1)(iii) Frequency hopping systems operating in the 2400–2483.5 MHz band, continued

Test data

Number of hopping channels is 79



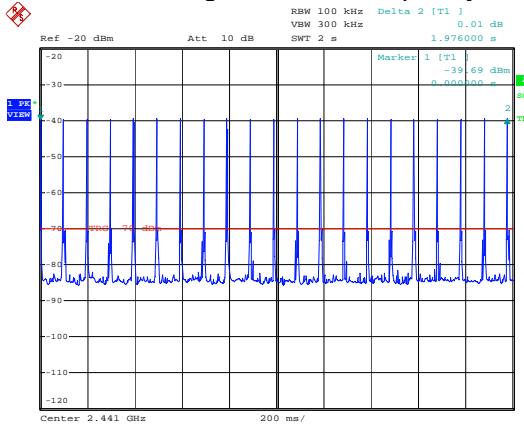
Date: 14.DEC.2009 13:05:36

| Number of channels used | Minimum number of channels limit | Margin |
|-------------------------|----------------------------------|--------|
| 79 | 15 | 64 |

Clause 15.247(a)(1)(iii) Frequency hopping systems operating in the 2400–2483.5 MHz band, continued

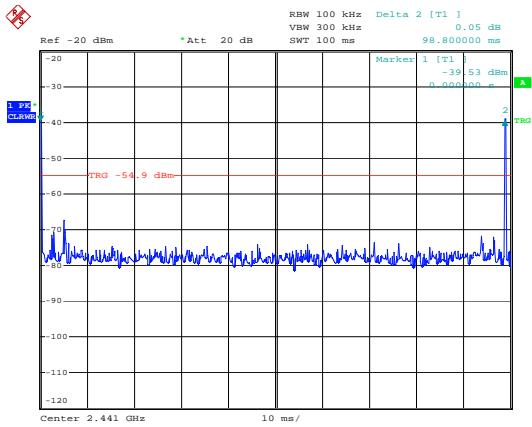
Test data, continued

Average time of occupancy:



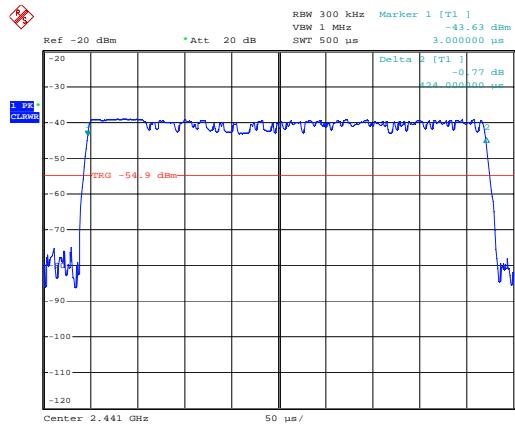
Date: 15.DEC.2009 11:19:29

Number of hits within 2 s is 21



Date: 15.DEC.2009 11:21:12

Pulse repetition is 98.8 ms



Date: 15.DEC.2009 11:22:57

Pulse width is 424 μs

Limit:

Total time of occupancy is 0.4 s within a period of time equals number of hopping channels employed multiplied by 0.4 s, which is 0.4 s within the period of time $0.4 \times 79 = 31.6$ s

Measurement data:

Time of occupancy plots showing 21 hits per 2 s; therefore there would be $16 \times 21 = 336$ hits within 32 s
 Total time of occupancy is therefore $= 336 \times 0.424$ ms = 142.5 ms

| Time of occupancy, ms | Limit, ms | Margin, ms |
|-----------------------|-----------|------------|
| 142.5 | 400 | 257.5 |



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Appendix A: Test results

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Clause 15.247(b)(1) and (4) Maximum peak conducted output power for frequency hopping systems operating in 2400–2483.5 MHz and 5725–5850 MHz bands

The maximum peak conducted output power of the intentional radiator shall not exceed the following:
(1) For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 W.
For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 W.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test date: December 15, 2009

Test results: Pass

Special notes

- The peak detector was used with RBW wider than 20 dB bandwidth.
- The span was wider than RBW.



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Appendix A: Test results

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Clause 15.247(b)(1) and (4) Maximum peak conducted output power for frequency hopping systems operating in 2400–2483.5 MHz and 5725–5850 MHz bands

Test data

EIRP measurement

| Frequency, MHz | Field strength, dB μ V/m | Conversion factor, dB | EIRP, dBm | EIRP Limit, dBm | Margin, dB |
|----------------|------------------------------|-----------------------|-----------|-----------------|------------|
| 2402 | 93.27 | 95.23 | -1.96 | 36.00 | 37.96 |
| 2441 | 93.99 | 95.23 | -1.24 | 36.00 | 37.24 |
| 2480 | 95.12 | 95.23 | -0.11 | 36.00 | 36.11 |

EIRP [dBm] = Field strength [dB μ V/m] – Conversion factor [dB]

Output power calculation

| Frequency, MHz | EIRP, dBm | Antenna gain, dBi | Output power, dBm | Power Limit, dBm | Margin, dB |
|----------------|-----------|-------------------|-------------------|------------------|------------|
| 2402 | -1.96 | 1.9 | -3.86 | 30.00 | 33.86 |
| 2441 | -1.24 | 1.9 | -3.14 | 30.00 | 33.14 |
| 2480 | -0.11 | 1.9 | -2.01 | 30.00 | 32.01 |

Output power [dBm] = EIRP [dBm] - antenna gain [dBi]



Nemko Canada Inc.,
303 River Road, R.R. 5, Ottawa, Ontario, Canada, K1V 1H2

Appendix A: Test results

Report Number: 136288-4TRFWL

Specification: FCC 15.247

Clause 15.247(d) Spurious emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)):

| Frequency (MHz) | Field strength | | Measurement distance (m) |
|--------------------|----------------|----------------|-----------------------------|
| | (μ V/m) | (dB μ V/m) | |
| 0.009–0.490 | 2400/F | 67.6–20log(F) | 300 |
| 0.490–1.705 | 24000/F | 87.6–20log(F) | 30 |
| 1.705–30.0 | 30 | 29.5 | 30 |
| 30–88 | 100 | 40.0 | 3 |
| 88–216 | 150 | 43.5 | 3 |
| 216–960 | 200 | 46.0 | 3 |
| above 960 | 500 | 54.0 | 3 |

Notes:

- F = fundamental frequency in kHz
- In the emission table above, the tighter limit applies at the band edges.
- For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Test date: December 15, 2009

Test results: Pass



Nemko Canada Inc.,
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Appendix A: Test results

Report Number: 136288-4TRFWL

Specification: FCC 15.247

Clause 15.247(d) Spurious emissions, continued

Special notes

- The spectrum was searched from 30 MHz to the 10th harmonic.
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- All measurements were performed:
 - within 30–1000 MHz range: using a peak detector with 100 kHz/300 kHz RBW/VBW,
 - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
 - and using a duty cycle/average factor for average results calculations.
- Only the worst data presented in the test report.

§ 15.205 Restricted bands of operation.

| MHz | MHz | MHz | GHz |
|-------------------|---------------------|---------------|-------------|
| 0.090–0.110 | 16.42–16.423 | 399.9–410 | 4.5–5.15 |
| 0.495–0.505 | 16.69475–16.69525 | 608–614 | 5.35–5.46 |
| 2.1735–2.1905 | 16.80425–16.80475 | 960–1240 | 7.25–7.75 |
| 4.125–4.128 | 25.5–25.67 | 1300–1427 | 8.025–8.5 |
| 4.17725–4.17775 | 37.5–38.25 | 1435–1626.5 | 9.0–9.2 |
| 4.20725–4.20775 | 73–74.6 | 1645.5–1646.5 | 9.3–9.5 |
| 6.215–6.218 | 74.8–75.2 | 1660–1710 | 10.6–12.7 |
| 6.26775–6.26825 | 108–121.94 | 1718.8–1722.2 | 13.25–13.4 |
| 6.31175–6.31225 | 123–138 | 2200–2300 | 14.47–14.5 |
| 8.291–8.294 | 149.9–150.05 | 2310–2390 | 15.35–16.2 |
| 8.362–8.366 | 156.52475–156.52525 | 2483.5–2500 | 17.7–21.4 |
| 8.37625–8.38675 | 156.7–156.9 | 2690–2900 | 22.01–23.12 |
| 8.41425–8.41475 | 162.0125–167.17 | 3260–3267 | 23.6–24.0 |
| 12.29–12.293 | 167.72–173.2 | 3332–3339 | 31.2–31.8 |
| 12.51975–12.52025 | 240–285 | 3345.8–3358 | 36.43–36.5 |
| 12.57675–12.57725 | 322–335.4 | 3600–4400 | Above 38.6 |
| 13.36–13.41 | | | |



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Appendix A: Test results

Report Number: 136288-4TRFWL

Specification: FCC 15.247

Clause 15.247(d) Spurious emissions, continued

Test data, continued

Bandedge measurements:

Hopping on measurements

Peak measurement at 2483.5 MHz using 1 MHz RBW and 3 MHz VBW

Average measurement at 2483.5 MHz using 1 MHz RBW and 10 Hz VBW

| Frequency, MHz | Peak FS, dB μ V/m | Peak Limit, dB μ V/m | Margin, dB | Average FS, dB μ V/m | Average Limit, dB μ V/m | Margin, dB |
|----------------|-----------------------|--------------------------|------------|--------------------------|-----------------------------|------------|
| 2483.5 | 56.66 | 74.00 | 17.34 | 51.10 | 54.00 | 2.9 |

Peak measurement at 2400 MHz using 100 kHz RBW and 300 kHz VBW

| Frequency, MHz | FS at channel 1, dB μ V/m | FS at band edge, dB μ V/m | Delta, dB | Minimum delta, dB | Margin, dB |
|----------------|-------------------------------|-------------------------------|-----------|-------------------|------------|
| 2400.0 | 86.16 | 54.13 | 32.03 | 20.00 | 12.03 |

Hopping off measurements

Peak measurement at 2483.5 MHz using 1 MHz RBW and 3 MHz VBW

Average measurement at 2483.5 MHz using 1 MHz RBW and 10 Hz VBW

| Frequency, MHz | Peak FS, dB μ V/m | Peak Limit, dB μ V/m | Margin, dB | Average FS, dB μ V/m | Average Limit, dB μ V/m | Margin, dB |
|----------------|-----------------------|--------------------------|------------|--------------------------|-----------------------------|------------|
| 2483.5 | 53.28 | 74.00 | 20.72 | 48.33 | 54.00 | 5.67 |

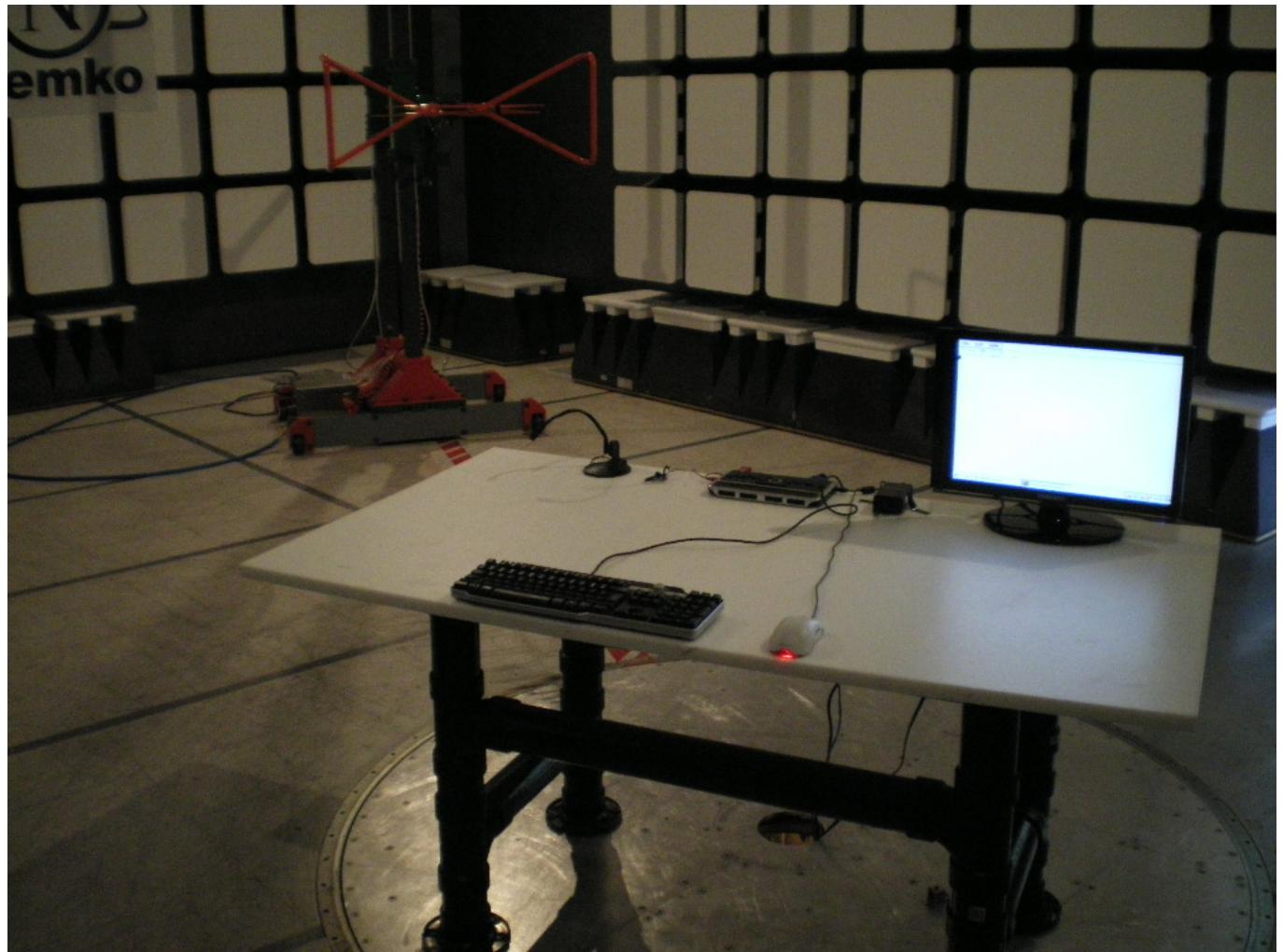
Peak measurement at 2400 MHz using 100 kHz RBW and 300 kHz VBW

| Frequency, MHz | FS at channel 1, dB μ V/m | FS at band edge, dB μ V/m | Delta, dB | Minimum delta, dB | Margin, dB |
|----------------|-------------------------------|-------------------------------|-----------|-------------------|------------|
| 2400.0 | 85.88 | 50.02 | 35.86 | 20.00 | 15.86 |

There were no other spurious emissions detected within 20 dB of the limit.

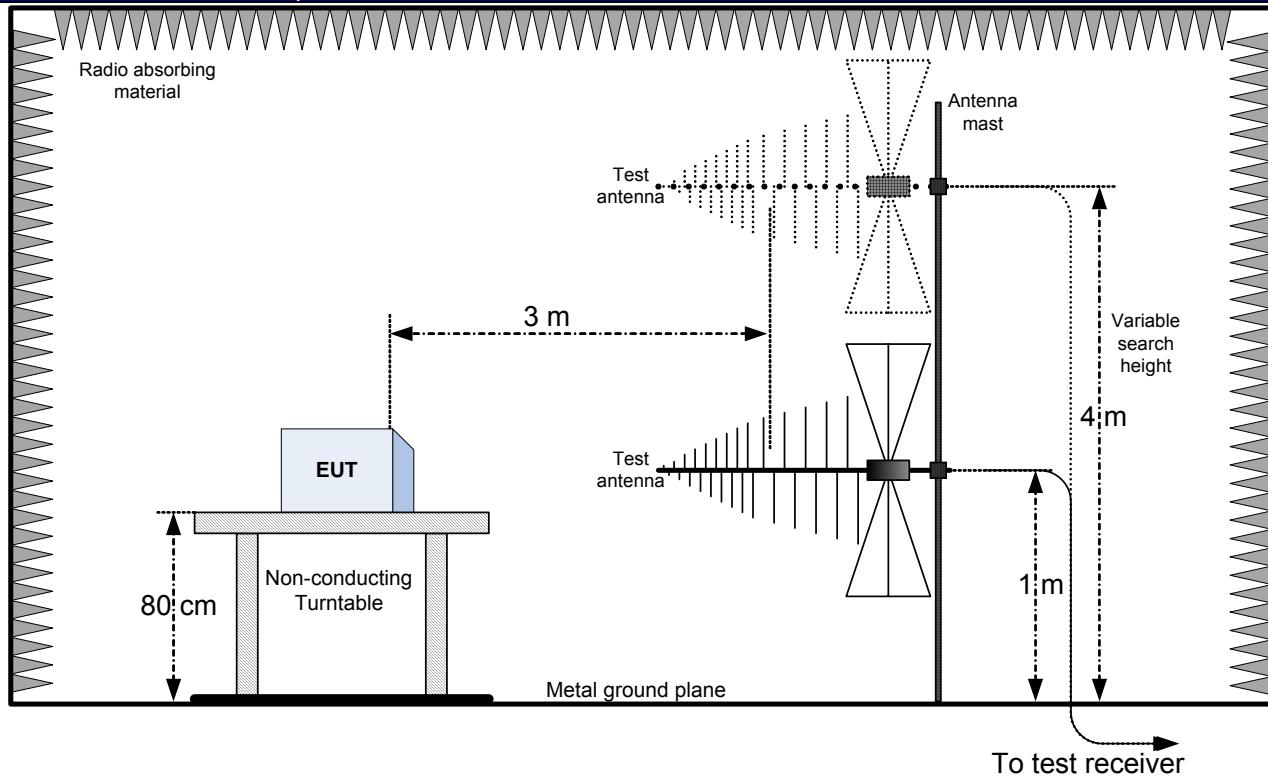
Clause 15.247(d) Spurious emissions, continued

Setup photo



Appendix B: Block diagrams of test set-ups

Radiated emissions set-up



Conducted emissions set-up

