

Compliance test report ID

205573-1TRFWL

Date of issue
April 23, 2012

Title 47-Telecommunication

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

§15.231- Periodic operation in the band 40.66–40.70 MHz and above 70 MHz

Applicant **Digital Security Controls, a Division of Tyco Safety Products Canada Ltd.**
Product **WS4928**
Model **WS4928**
FCC ID **F5312WS4928**

Nemko Canada Inc., a testing
laboratory, is accredited by the
Standards Council of Canada. The
tests included in this report are
within the scope of this accreditation



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April 23, 2012
Date

Limits of responsibility

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 contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 15, Subpart C, Chapter 15.231

Periodic operation in the band 40.66–40.70 MHz and above 70 MHz

1.2 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “*Summary of test results*” for full details.

1.3 Exclusions

None

1.4 Test report revision history

Original report issued



Section 2 Summary of test results

2.1 Results

Table 2.1-1: FCC Part 15 Radio frequency devices – results

| Part | Test description | Verdict |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| §15.31(e) | Variation of power source | Pass ¹ |
| §15.203 | Antenna requirement | Pass ² |
| §15.207(a) | Conducted limits | Not applicable ³ |
| §15.231(a) | Conditions for intentional radiators to comply with periodic operation | Pass |
| §15.231(b) | Field strength of emissions | Pass |
| §15.231(c) | Emission bandwidth | Pass |
| §15.231(d) | Requirements for devices operating within 40.66–40.70 MHz band | Not applicable ⁴ |
| §15.231(e) | Conditions for intentional radiators to comply with periodic operation | Not applicable ⁵ |
| Notes: | ¹ Fundamental field strength was measured with a fresh battery. ² The EUT is equipped with an integral antenna. ³ The EUT is battery powered. ⁴ The EUT does not operate in the frequency range of 40.66–40.70 MHz. ⁵ The EUT does not periodically transmit at predetermined intervals. | |

Section 3 Equipment under test (EUT) details

3.1 Applicant and manufacturer

Company name Digital Security Controls, a Division of Tyco Safety Products Canada Ltd.
Company address 95 Bridgeland Ave.
Toronto, ON, Canada
M6A1Y7

3.2 Sample information

Receipt date April 11, 2012
Nemko sample ID number Item # 1

3.3 EUT information

Product name WS4928
Model WS4928
HW UA522 Rev. 02
Serial number 7008517
Power requirements 3 V_{DC} Lithium battery

Product description and theory of operation

The EUT is wireless holdup switch intended for installation under a counter, desktop or other concealed locations.

Software details

Rev 03

3.4 Technical information

| | |
|----------------------------|--------------------------|
| Operating frequency | 433.92 MHz |
| Modulation type | On/Off Keying |
| Occupied bandwidth | 42 kHz (20 dB bandwidth) |
| Antenna information | Integrated antenna |

3.5 EUT exercise and monitoring details

Client provided modified sample that could be set for continuous transmission or normal functionality.

3.6 EUT setup diagram

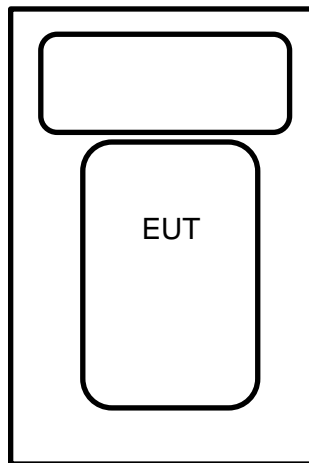


Diagram 3.6-1: Setup diagram



Section 4 Engineering considerations

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4.1 Modifications incorporated in the EUT

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

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.





Section 5 Test conditions

5.1 Atmospheric 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.

5.2 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.



Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of $K=2$ with 95% certainty.

Section 7 Test equipment

Table 6.1-1: Test equipment

| Equipment | Manufacturer | Model no. | Asset no. | Cal cycle | Next cal. |
|----------------------------|-----------------|------------|-----------|-----------|------------|
| 3 m EMI test chamber | TDK | SAC-3 | FA002047 | 1 year | Mar. 09/13 |
| Receiver/spectrum analyzer | Rohde & Schwarz | ESU 26 | FA002043 | 1 year | Apr. 27/12 |
| Bilog antenna | Sunol | JB3 | FA002108 | 1 year | Feb. 07/13 |
| Horn antenna #2 | EMCO | 3115 | FA000825 | 1 year | Feb. 24/13 |
| 50 coax cable | Huber + Suhner | NONE | FA002013 | 1 year | Aug. 15/12 |
| 50 coax cable | Huber + Suhner | NONE | FA002074 | 1 year | Aug. 15/12 |
| 1–18 GHz pre-amplifier | JCA | JCA118-503 | FA002091 | 1 year | Aug. 15/12 |
| Notes: None | | | | | |

Section 8 Testing data

8.1 § 15.231(a) Conditions for intentional radiators to comply with periodic operation

8.1.1 Definitions and limits

- (a) The provisions of this section are restricted to periodic operation within the band 40.66–40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:
- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
 - (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
 - (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
 - (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition
 - (5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

8.1.2 Test summary

Verdict Pass

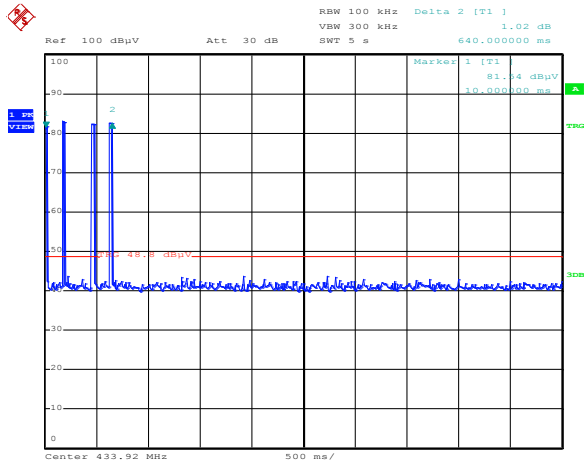
8.1.3 Observations/special notes

None

8.1.4 Test data

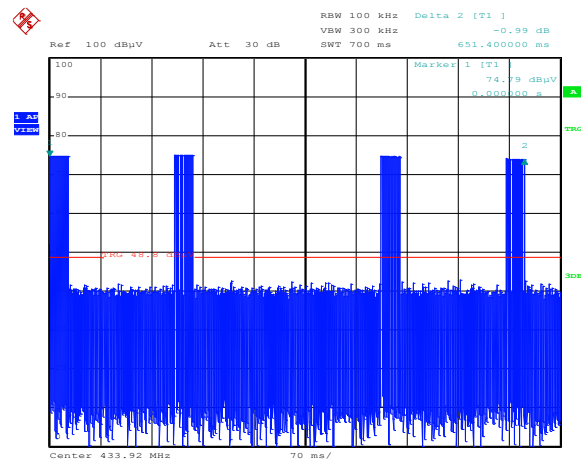
Test date April 17, 2012 Test engineer David Duchesne
Temperature 20.8 °C Air pressure 1018 mbar Relative humidity 19.7 %

- (1) The EUT is manually triggered. The EUT automatically deactivate the transmitter within 651 ms (See Plot 8.1-1 and Plot 8.1-2 below)
- (2) The EUT does not activate automatically.
- (3) The EUT is not a periodic transmitter.
- (4) The EUT usage is for radio control purposes during emergencies.
- (5) The EUT does not transmit set-up information



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Plot 8.1-1: Transmit duration



Date: 17.APR.2012 16:00:53

Plot 8.1-2: Transmit duration

8.2 § 15.231(b) Field strength of emissions

8.2.1 Definitions and limits

In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Table 8.2-1: Field strength limits

| Fundamental frequency (MHz) | Field strength of fundamental | | Field strength of spurious emissions | |
|-----------------------------|-------------------------------|------------------------------|--------------------------------------|------------------------------|
| | ($\mu\text{V/m}$) | ($\text{dB}\mu\text{V/m}$) | ($\mu\text{V/m}$) | ($\text{dB}\mu\text{V/m}$) |
| 40.66–40.70 | 2,250 | 67 | 225 | 47 |
| 70–130 | 1,250 | 61.9 | 125 | 41.9 |
| 130–174 | 1,250 to 3,750* | 61.9 to 71.5* | 125 to 375* | 41.9 to 51.5* |
| 174–260 | 3,750 | 71.5 | 375 | 51.5 |
| 260–470 | 3,750 to 12,500* | 71.5 to 81.9* | 375 to 1,250* | 51.5 to 61.9* |
| Above 470 | 12,500 | 81.9 | 1,250 | 61.9 |

Notes: * Linear interpolations

- (1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.
- (2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.
- (3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

8.2.2 Test summary

Verdict Pass

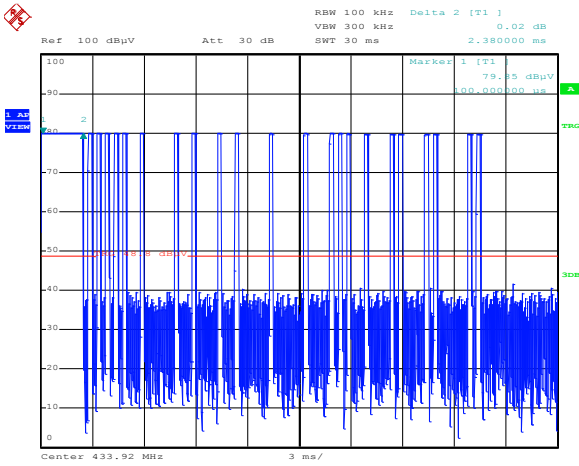
8.2.3 Observations/special notes

- The transmitter was operated at its maximum carrier power.
- The EUT was set up as table top configuration.
- The field strength from spurious emissions were below the general limits of §15.209. See spectral plots of this section.
- The spectrum was searched from 30 MHz to the 10th harmonic.
- EUT was tested with a fresh battery.
- The EUT was tested in three orthogonal positions, as the EUT can be mounted in multiple orientations.

8.2.4 Test data

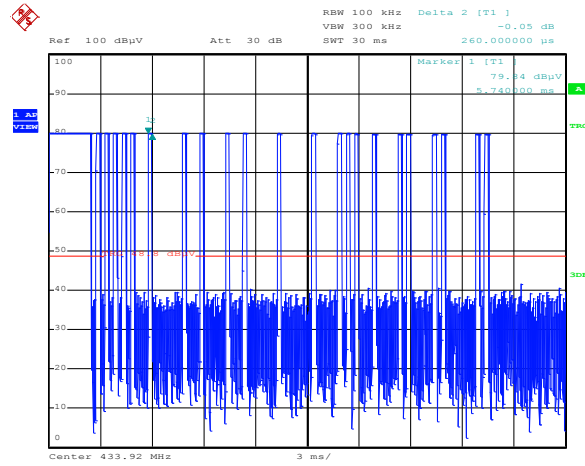
Test date April 17, 2012 **Test engineer** David Duchesne
Temperature 20.8 °C **Air pressure** 1018 mbar **Relative humidity** 19.7 %

§15.35(c) When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.



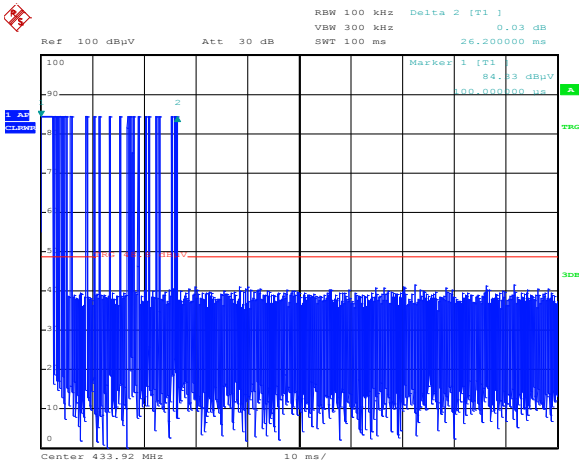
Date: 17.APR.2012 16:11:16

Plot 8.2-1: Long pulse = 2.38 ms



Date: 17.APR.2012 16:12:02

Plot 8.2-2: Short pulse = 260 µs



Date: 17.APR.2012 16:09:34

Plot 8.2-3: 100 ms sweep time

Duty cycle/average factor calculations

Long pulse (preamble) = 2.38 ms (Single pulse)
 Short pulse = 5.72 ms (22 pulses at 260 µs each)

$T_{X100ms} = 8.1 \text{ ms}$

$$\text{Duty cycle/average factor} = 20 \times \log_{10} \frac{T_{X100ms}}{100ms}$$

$$\text{Duty cycle/average factor} = 20 \times \log_{10} \frac{8.1ms}{100ms} = -21.8 \text{ dB}$$

8.2.5 Test data, continued

Table 8.2-2: § 15.231(b) Field strength of fundamental results

| Tx. freq. (MHz) | Antenna Pol. (V/H) | Peak field strength (dBµV/m) | Peak field strength Limit (dBµV/m) | Peak field strength Margin (dB) | Duty cycle correction factor (dB) | Average field strength (dBµV/m) | Average field strength Limit (dBµV/m) | Average field strength Margin (dB) |
|-----------------|--------------------|------------------------------|------------------------------------|---------------------------------|-----------------------------------|---------------------------------|---------------------------------------|------------------------------------|
| 433.92 | V | 92.24 | 100.83 | 8.59 | -21.8 | 70.44 | 80.83 | 10.39 |
| 433.92 | H | 93.43 | 100.83 | 7.40 | -21.8 | 71.63 | 80.83 | 9.2 |

Notes:

- Spectrum analyzer setting: Peak detector, RBW = 100 kHz, VBW = 300 kHz, Measurement time = 100 ms
- Measuring distance (m): 3 m.
- Test facility: 3 m Semi anechoic chamber
- Antenna height variation (m): 1-4
- Turn table position (°):0-360
- Duty cycle correction factor as calculated from §15.35 (c).
- Average field strength (dBµV/m) = Peak field strength (dBµV/m) + Duty cycle correction factor (dB)

Table 8.2-3: § 15.231(b) Field strength of spurious emissions results

| Tx. freq. (MHz) | Antenna Pol. (V/H) | Peak field strength (dBµV/m) | Peak field strength Limit (dBµV/m) | Peak field strength Margin (dB) | Duty cycle correction factor (dB) | Average field strength (dBµV/m) | Average field strength Limit (dBµV/m) | Average field strength Margin (dB) |
|-----------------|--------------------|------------------------------|------------------------------------|---------------------------------|-----------------------------------|---------------------------------|---------------------------------------|------------------------------------|
| 867.84 | H | 52.80 | 80.83 | 28.03 | -21.8 | 31.00 | 60.83 | 29.83 |
| 1735.68 | V | 54.91 | 80.83 | 25.92 | -21.8 | 33.11 | 60.83 | 27.72 |
| 2169.60 | V | 65.57 | 80.83 | 15.26 | -21.8 | 43.77 | 60.83 | 17.06 |
| 2603.52 | H | 55.15 | 80.83 | 25.68 | -21.8 | 33.35 | 60.83 | 27.48 |

Notes:

- Spectrum analyzer setting for measurements:
 - 30 to 1000 MHz: Peak detector, RBW = 100 kHz, VBW = 300 kHz, Measurement time = 100 ms
 - Above 1 GHz: Peak detector, RBW = 1 MHz, VBW = 3 MHz, Measurement time = 100 ms
- Measuring distance (m): 3 m.
- Test facility: 3 m Semi anechoic chamber
- Antenna height variation (m): 1-4
- Turn table position (°):0-360
- Duty cycle correction factor as calculated from §15.35 (c).
- Average field strength (dBµV/m) = Peak field strength (dBµV/m) + Duty cycle correction factor (dB)
- All other emissions were greater than 10 dB from limit.

Table 8.2-4: Radiated emissions falling within restricted bands as defined in §15.205(a), results

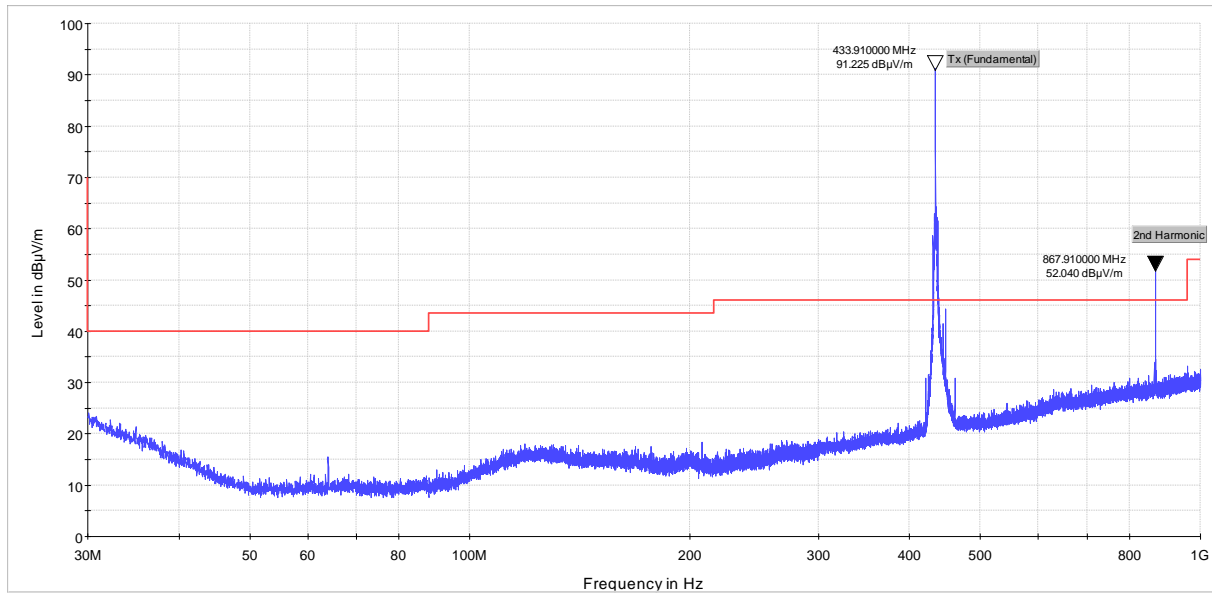
| Tx. freq. (MHz) | Antenna Pol. (V/H) | Peak field strength (dBµV/m) | Peak field strength Limit (dBµV/m) | Peak field strength Margin (dB) | Duty cycle correction factor (dB) | Average field strength (dBµV/m) | Average field strength Limit (dBµV/m) | Average field strength Margin (dB) |
|-----------------|--------------------|------------------------------|------------------------------------|---------------------------------|-----------------------------------|---------------------------------|---------------------------------------|------------------------------------|
| 1301.76 | H | 44.61 | 74 | 29 | -21.8 | 22.81 | 54 | 31.19 |

Notes:

- Spectrum analyzer setting: Peak detector, RBW = 1 MHz, VBW = 3 MHz, Measurement time = 100 ms
- Measuring distance (m): 3 m.
- Test facility: 3 m Semi anechoic chamber
- Antenna height variation (m): 1-4
- Turn table position (°):0-360
- Duty cycle correction factor as calculated from §15.35 (c).
- Average field strength (dBµV/m) = Peak field strength (dBµV/m) + Duty cycle correction factor (dB)
- All other emissions were greater than 10 dB from limit.



8.2.5 Test data, continued

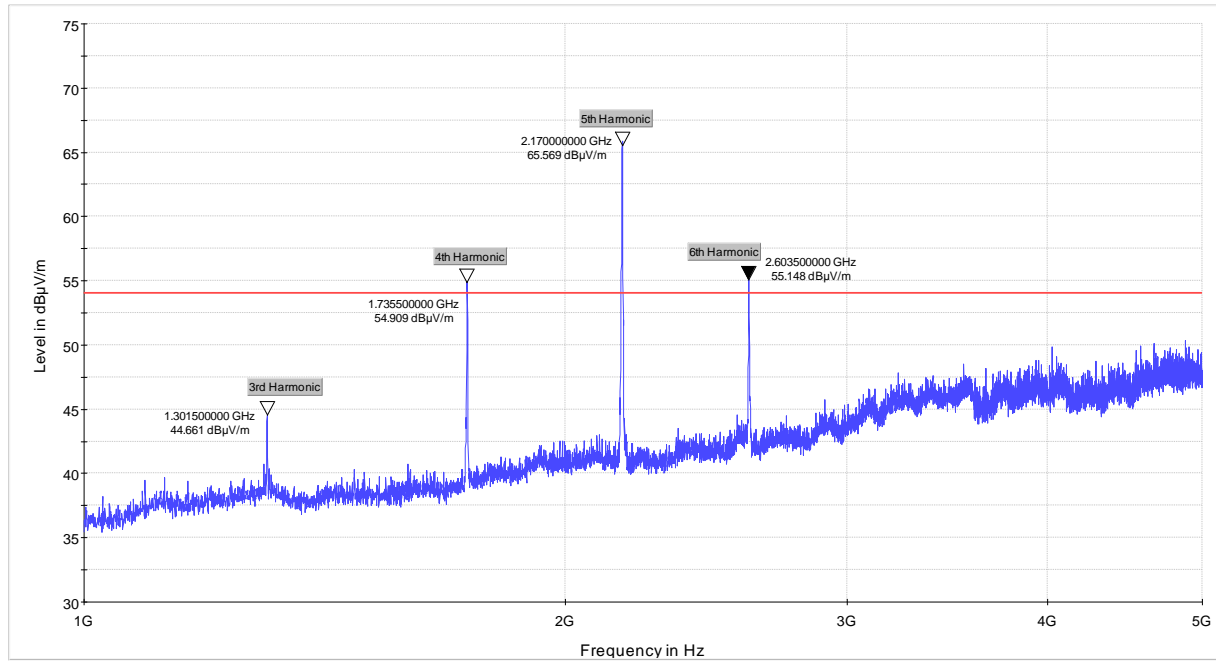


Vertical and Horizontal
Preview Peak Detector
FCC 15.209 and RSS-210 3m Q-Peak Limit

The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Plot 8.2-4: Radiated emissions (30 to 1000 MHz)

8.2.5 Test data, continued



Vertical and Horizontal
Preview Peak Detector
FCC 15.209 and RSS-210.3m Average Limit

The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Plot 8.2-5: Radiated emissions (1 to 5 GHz)

8.2.6 Setup photos



Photo 8.2-1: Field strength of emissions setup

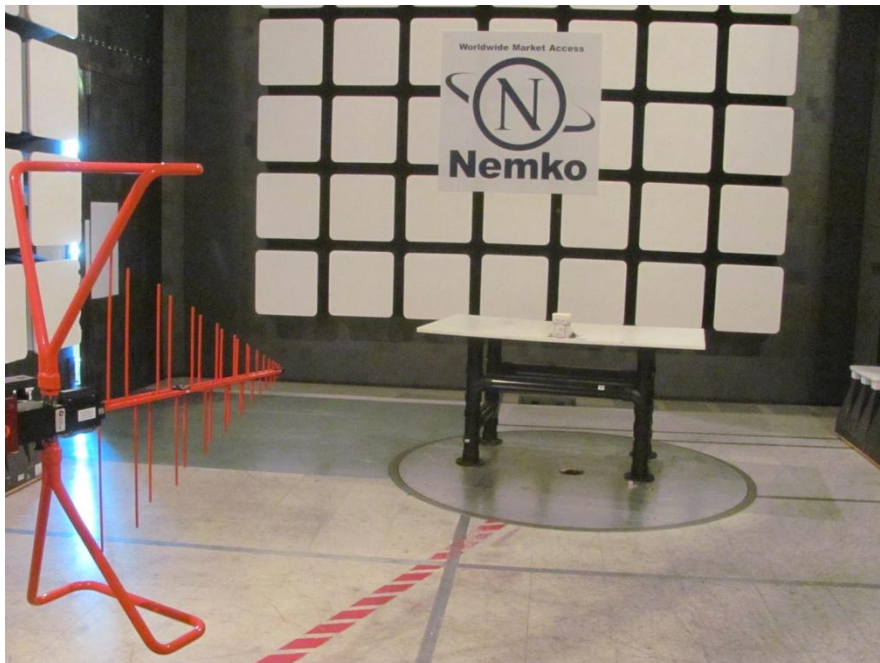


Photo 8.2-2: Field strength of emissions setup

8.3 § 15.231(c) Emission bandwidth

8.3.1 Definitions and limits

The bandwidth of the emission shall be no wider than 0.25 % of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5 % of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

8.3.2 Test summary

Verdict Pass

8.3.3 Observations/special notes

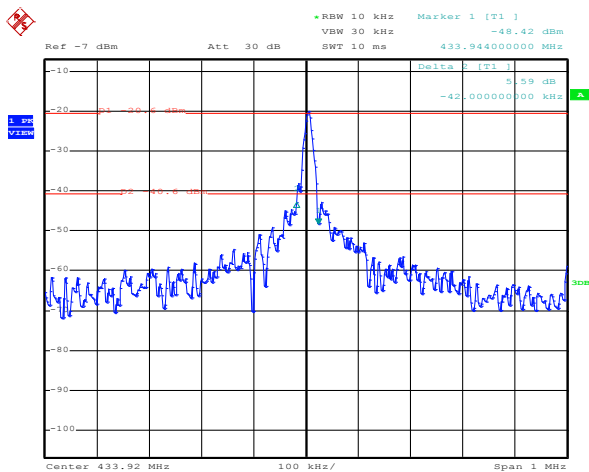
The transmitter was operated at its maximum carrier power.

8.3.4 Test data

| | | | |
|--------------------|----------------|--------------------------|----------------|
| Test date | April 17, 2012 | Test engineer | David Duchesne |
| Temperature | 20.8 °C | Air pressure | 1018 mbar |
| | | Relative humidity | 19.7 % |

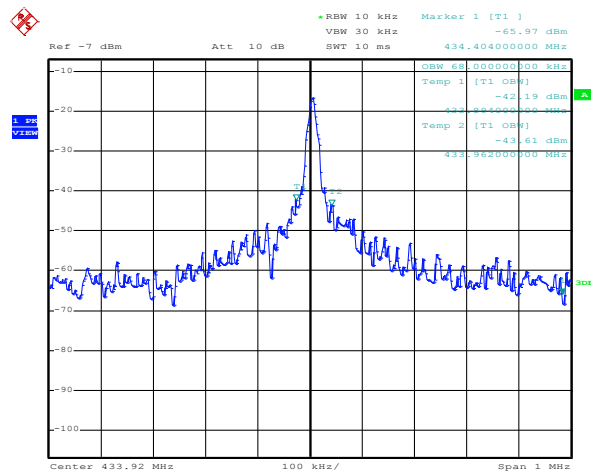
Table 8.3-1: 20 dB bandwidth results

| 20 dB bandwidth (kHz) | Limit (kHz) |
|---------------------------------------------------|-------------|
| 42 | 1084.8 |
| Notes: Limit = 0.25 % of 433.92 MHz is 1084.8 kHz | |



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Plot 8.3-1: 20 dB bandwidth

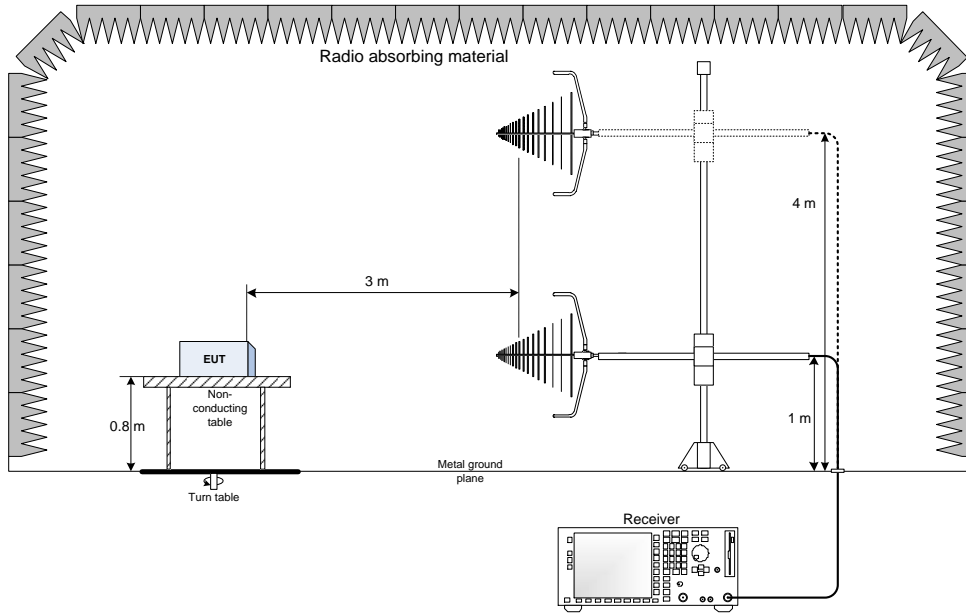


Date: 17.APR.2012 16:21:36

Plot 8.3-2: 99% OBW

Section 9 Block diagrams of test set-ups

9.1 Radiated emissions set-up



Section 10 EUT photos

10.1 External photos

