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Compliance test report

**176879-1TRFWL**

Date of issue  
June 29, 2011

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**FCC 47 CFR Part 15, Subpart C, Chapter 15.231**

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

Applicant **HeathCo LLC.**  
Product **Indoor RF Wall Mount Motion Sensor**  
Model **6031TX**  
Part **WC-6031-WH**  
FCC ID **BJ4-60WRC31TX**

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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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**Reviewed by**



David Duchesne, Senior EMC Specialist

June 29, 2011

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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## Table of contents

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<b>Section 1: Report summary</b>	<b>4</b>
<b>Section 2: Summary of test results</b>	<b>5</b>
<b>Section 3: Equipment under test (EUT) details</b>	<b>6</b>
<b>Section 4: Engineering considerations</b>	<b>7</b>
<b>Section 5: Test conditions</b>	<b>8</b>
<b>Section 6: Measurement uncertainty</b>	<b>9</b>
<b>Section 7: Test equipment</b>	<b>10</b>
<b>Section 8: Testing data</b>	<b>11</b>
8.1    Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation	11
8.2    Clause 15.231(b) Field strength of emissions	13
8.3    Clause 15.231(c) Emission bandwidth	18
<b>Section 9: Block diagrams of test set-ups</b>	<b>19</b>
<b>Section 10: EUT photos</b>	<b>20</b>

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## Section 1: Report summary

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### 1.1 Applicant

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HeathCo LLC  
2445 Nashville Road  
42101 Bowling Green KY  
United States

### 1.2 Manufacturer

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Desa International Inc.  
P.O. Box 90004, 2901 Industrial Avenue,  
42102 Bowling Green, KY.  
United States

### 1.3 Test specifications

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**FCC 47 CFR Part 15, Subpart C, Chapter 15.231**  
Periodic operation in the band 40.66–40.70 MHz and above 70 MHz

### 1.4 Statement of compliance

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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.*

### 1.5 Exclusions

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None

### 1.6 Test report revision history

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None

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## Section 2: Summary of test results

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### 2.1 FCC Part 15 Subpart C – Intentional Radiators, test results

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Part	Test description	Verdict
§15.207(a)	Conducted limits	N/A <sup>1</sup>
§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	N/A <sup>2</sup>
§15.231(e)	Conditions for intentional radiators to comply with periodic operation	N/A <sup>3</sup>

Notes: <sup>1</sup>The EUT is battery powered  
<sup>2</sup>The EUT does not operate in the frequency range of 40.66–40.70 MHz.  
<sup>3</sup>The EUT does not periodically transmit at predetermined intervals.

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## Section 3: Equipment under test (EUT) details

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### 3.1 Sample information

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**Receipt date** May 24, 2011  
**Nemko sample ID number** 2

### 3.2 EUT information

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**Product name** Indoor RF Wall Mount Motion Sensor  
**Model** 6031TX  
**Part** WC-6031-WH  
**Serial number** N/A

### 3.3 Technical information

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**Operating frequency** 315 MHz  
**Modulation type** Pulse modulated  
**Occupied bandwidth** 154 kHz  
**Emission designator** 154KL1D  
**Power requirements** 3 V<sub>DC</sub> 2 × “AA” type battery (All tests were performed with new battery.)  
**Antenna information** Integrated antenna

### 3.4 Product description and theory of operation

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The EUT is an indoor RF motion sensor that operates at 315 MHz.

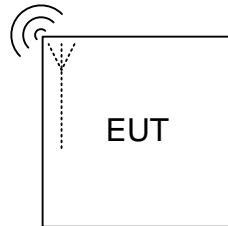
### 3.5 EUT exercise details

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The EUT was modified for testing to transmit constantly once energized.

### 3.6 EUT setup diagram

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**Diagram 3.6-1:** Setup diagram

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## Section 4: Engineering considerations

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### 1.4 Modifications incorporated in the EUT

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

### 1.5 Technical judgment

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None

### 1.6 Deviations from laboratory tests procedures

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No deviations were made from laboratory test procedures.

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## Section 5: Test conditions

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### 5.1 Atmospheric conditions

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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

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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 6: Measurement uncertainty

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### 6.1 Uncertainty of measurement

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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.

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## Section 7: Test equipment

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### 7.1 Test equipment list

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Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Mar. 09/12
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	April 27/12
Bilog antenna	Sunol	JB3	FA002108	1 year	Jan. 31/12
Horn antenna #2	EMCO	3115	FA000825	1 year	Feb. 04/12
1–18 GHz pre-amplifier	JCA	JCA118-503	FA002091	1 year	Sept. 23/11

Note: NCR = no cal required

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## Section 8: Testing data

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

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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.

#### 8.1.1 Test summary

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<b>Test date</b>	June 16, 2011	<b>Test engineer</b>	Andrey Adelberg	<b>Verdict</b>	Pass
<b>Temperature</b>	23 °C	<b>Air pressure</b>	1005 mbar	<b>Relative humidity</b>	40 %

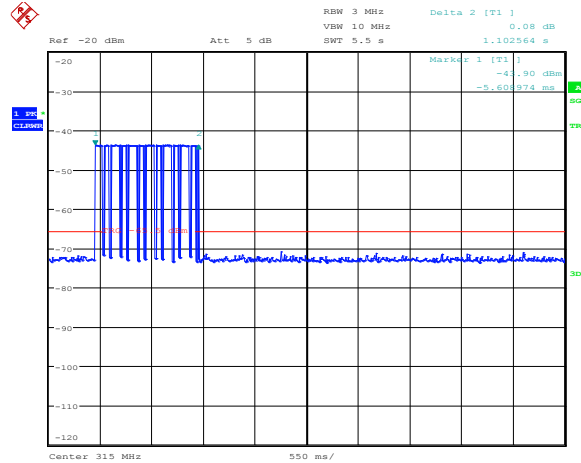
#### 8.1.2 Observations/special notes

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Compliance was determined by verification of technical specifications and a functional test on the equipment.

### 8.1.3 Test data

- (1) The EUT is not manually triggered.
- (2) The EUT is activated automatically.  
See **Plot 8.1-1** for the timing of an automatically trigger event.
- (3) The EUT is not a periodic transmitter.
- (4) The EUT usage is not for radio control purposes during emergencies.
- (5) The EUT does not transmit set-up information



Date: 16 JUN 2011 21:00:38

**Plot 8.1-1: Timing measurement**

## 8.2 Clause 15.231(b) Field strength of emissions

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	
	( $\mu\text{V/m}$ )	(dB $\mu\text{V/m}$ )	( $\mu\text{V/m}$ )	(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

\* 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.

### 8.2.1 Test summary

<b>Test date</b>	May 27, 2011	<b>Test engineer</b>	Andrey Adelberg	<b>Verdict</b>	Pass
<b>Temperature</b>	22 °C	<b>Air pressure</b>	1001 mbar	<b>Relative humidity</b>	35 %

### 8.2.2 Observations/special notes

**Table 8.2-2:** §15.209 – Radiated emission limits

Frequency (MHz)	Field strength		Measurement distance (m)
	( $\mu\text{V/m}$ )	(dB $\mu\text{V/m}$ )	
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.

8.2.2 Observations/special notes, continued

Table 8.2-3: §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			

- The spectrum was searched from 30 MHz to the 10<sup>th</sup> harmonic.
- All measurements were performed at a distance of 3 m.
- All measurements were performed:
  - within 30–1000 MHz range: using a quasi-peak detector with 120 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.

### 8.2.3 Test data

#### Duty cycle/average factor calculations

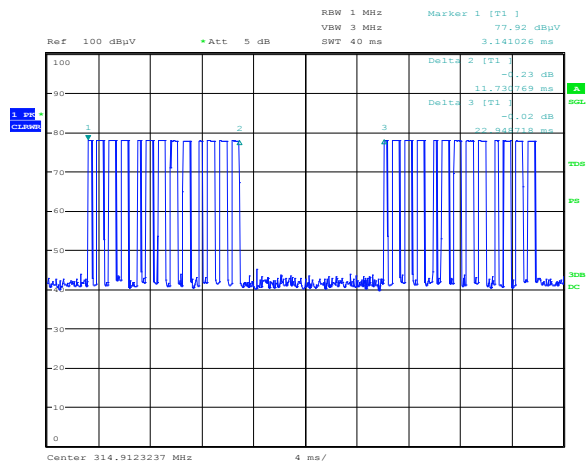
§15.35(c) When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed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

#### Duty cycle/average factor calculations:

$$\text{Duty cycle / average factor} = 20 \times \log_{10} \left( \frac{Tx_{100ms}}{100ms} \right)$$

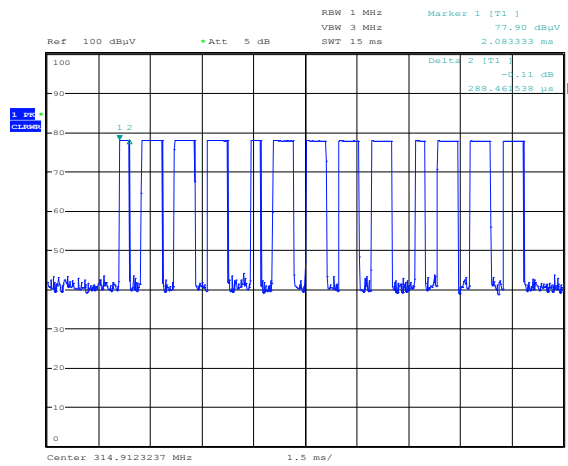
1 burst = 10 long pulses and 3 short pulses =  $10 \times 600.1 \mu s + 3 \times 288.5 \mu s = 6866.5 \mu s = 6.867 \text{ ms}$ ; silent period = 11.2 ms  
 $Tx_{100ms} = 4 \text{ bursts} + 7 \text{ long pulses} + 2 \text{ short pulses} = 4 \times 6.867 \text{ ms} + 7 \times 600.1 \mu s + 2 \times 288.5 \mu s = 32.244 \text{ ms}$

$$\text{Duty cycle / average factor} = 20 \times \log_{10} \left( \frac{32.244 \text{ ms}}{100 \text{ ms}} \right) = -9.83 \text{ dB}$$



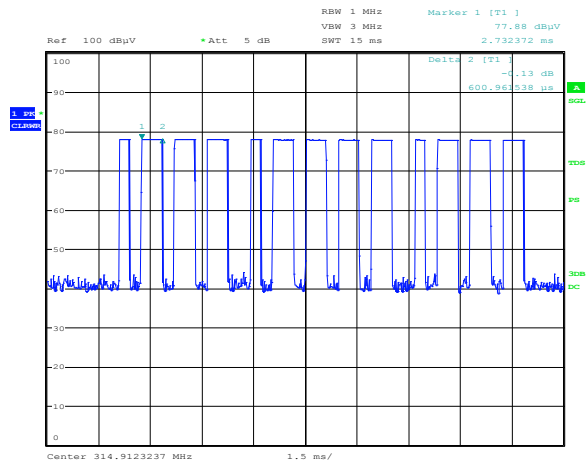
Date: 27.MAY.2011 09:33:40

**Plot 8.2-1: Burst timing**



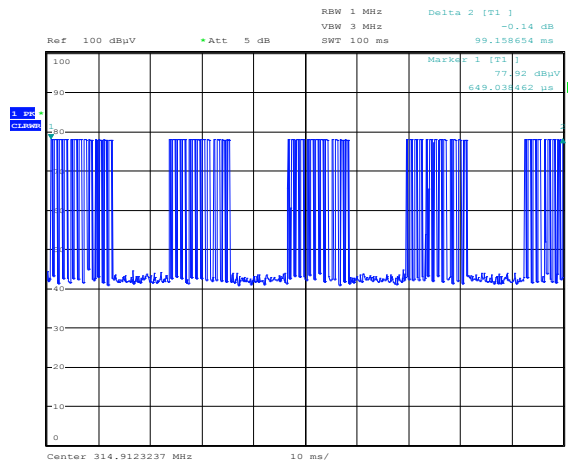
Date: 27.MAY.2011 09:36:58

**Plot 8.2-1: Short pulse duration**



Date: 27.MAY.2011 09:37:14

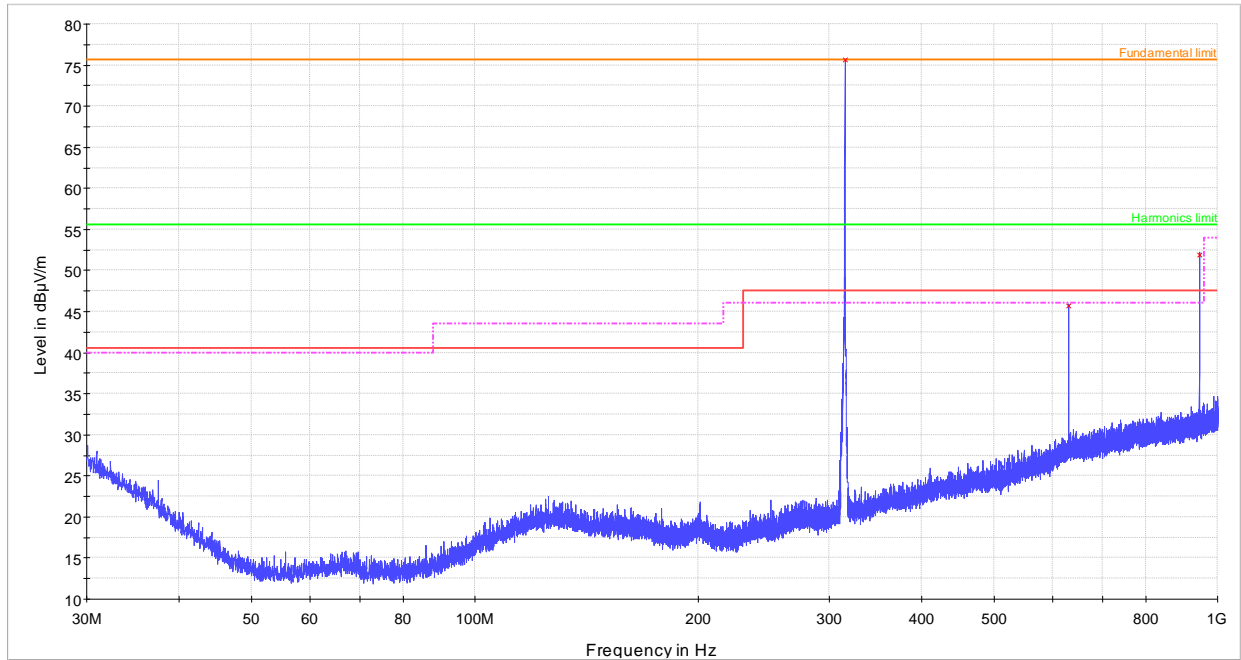
**Plot 8.2-3: Long pulse duration**



Date: 27.MAY.2011 09:40:30

**Plot 8.2-4: 100 ms sweep**

### 8.2.3 Test data, continued



Radiated emissions  
 — MaxPeak-MaxHold  
 — CISPR22 Class B QP 3m  
 - - - - - FCC Part 15 Class B 3m QP+AV  
 — Fundamental limit  
 — Harmonics limit  
 \* MaxPeak (Single)

**Plot 8.2-5:** Radiated spurious emissions within 30–1000 MHz frequency range

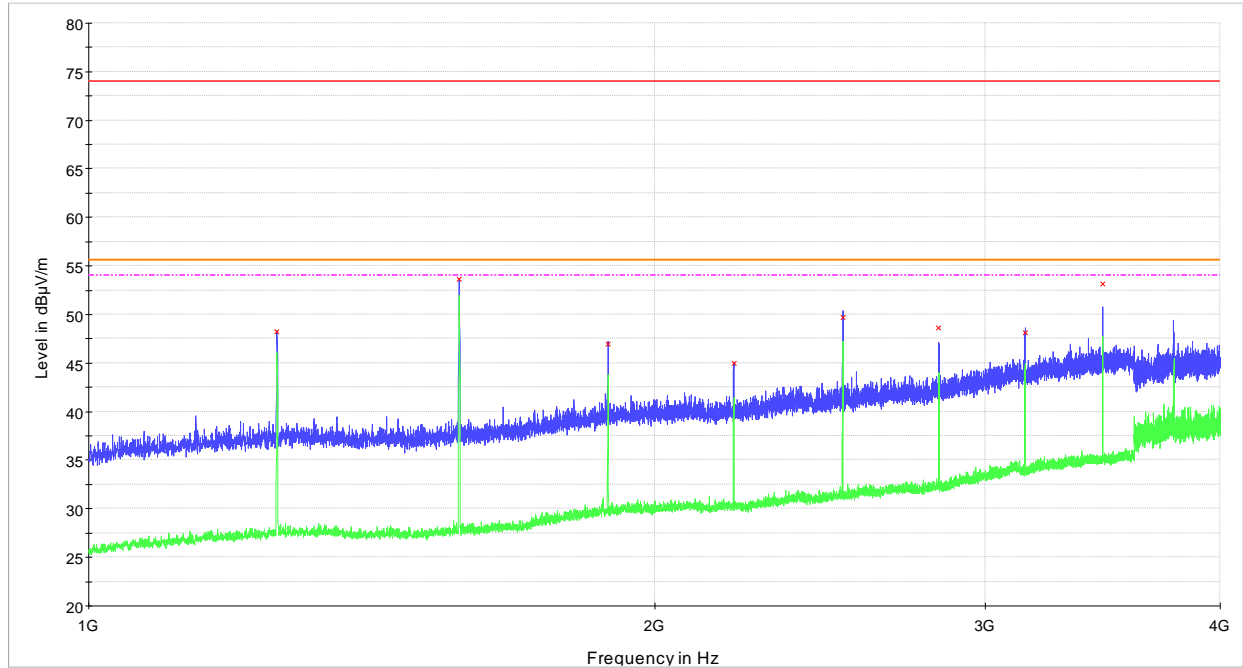
The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators) for determination of compliance. Limits have been adjusted to reflect 3 m requirements. A preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated and antenna adjusted to maximize radiated emission.

**Table 8.2-4:** Results for radiated spurious emissions within 30–1000 MHz frequency range

Frequency MHz	Meas. Time ms	Bandwidth kHz	Pol.	Corr. dB	Peak dBµV/m	Pk limit dBµV/m	Pk mrgn dB	AF dB	Avg dBµV/m	Avg Limit dBµV/m	Avg mrgn dB
314.92	100	120	H	14.4	75.70	95.6	19.9	-9.83	65.87	75.6	9.73
629.84	100	120	V	19.6	45.70	75.6	29.9	-9.83	35.87	55.6	19.73
944.76	100	120	V	22.6	51.90	75.6	23.7	-9.83	42.07	55.6	13.53



8.2.3 Test data, continued



Radiated emissions  
 — MaxPeak-MaxHold  
 — Average-MaxHold  
 — FCC Part 15 Class B 3m Peak above 1GHz  
 - - - FCC Part 15 Class B 3m QP+AV  
 x MaxPeak (Single)  
 — Harmonics limit

**Plot 8.2-6:** Radiated spurious emissions within 1–4 GHz frequency range

The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators) for determination of compliance. Limits have been adjusted to reflect 3 m requirements. A preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated and antenna adjusted to maximize radiated emission.

**Table 8.2-5:** Results for radiated spurious emissions within 1–4 GHz frequency range

Frequency MHz	Meas. Time ms	Bandwidth kHz	Pol.	Corr. dB	Peak dBµV/m	Pk limit dBµV/m	Pk mrgn dB	AF dB	Avg dBµV/m	Avg Limit dBµV/m	Avg mrgn dB
1259.52	100	1000	H	-18	48.2	75.6	27.4	-9.83	38.37	55.6	17.23
1574.52	100	1000	V	-17.7	53.7	74.0	20.3	-9.83	43.87	54.0	10.13
1889.52	100	1000	V	-15.4	47.0	75.6	28.6	-9.83	37.17	55.6	18.43
2204.20	100	1000	V	-14.6	45.0	74.0	29.0	-9.83	35.17	54.0	18.83
2519.52	100	1000	V	-13	49.7	75.6	25.9	-9.83	39.87	55.6	15.73
2834.20	100	1000	V	-11.8	48.6	74.0	25.4	-9.83	38.77	54.0	15.23
3149.52	100	1000	H	-10.1	48.2	75.6	27.4	-9.83	38.37	55.6	17.23

### 8.3 Clause 15.231(c) Emission bandwidth

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.

#### 8.3.1 Test summary

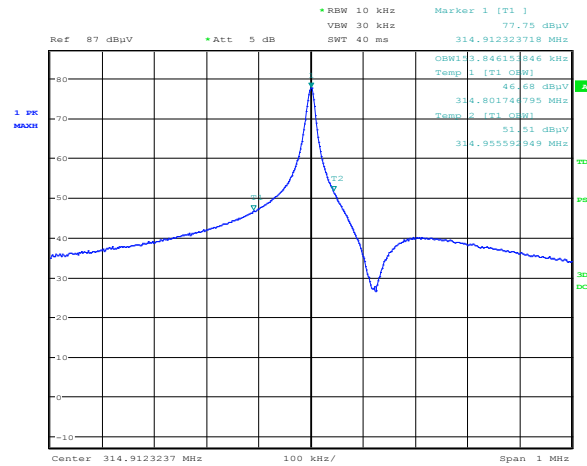
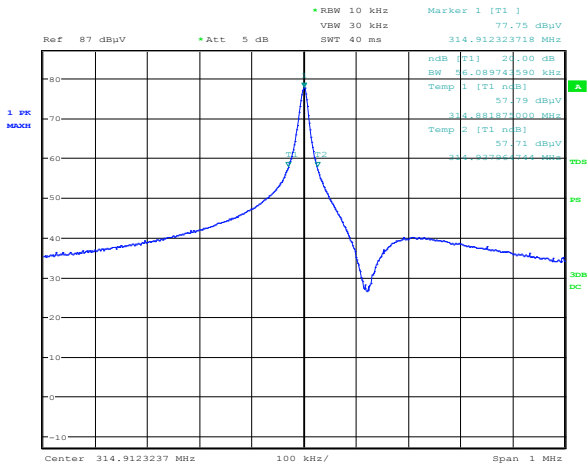
<b>Test date</b>	May 27, 2011	<b>Test engineer</b>	Andrey Adelberg	<b>Verdict</b>	Pass
<b>Temperature</b>	22 °C	<b>Air pressure</b>	1001 mbar	<b>Relative humidity</b>	35 %

#### 8.3.2 Observations/special notes

The test was performed using peak detector of the spectrum analyzer with RBW no narrower than 1 % of the emission bandwidth.

#### 8.3.3 Test data

**Limit:**  
0.25 % of 315 MHz is 787.5 kHz



Date: 27.MAY.2011 09:30:56

Date: 27.MAY.2011 09:30:15

**Plot 8.3-1: 20 dB BW**

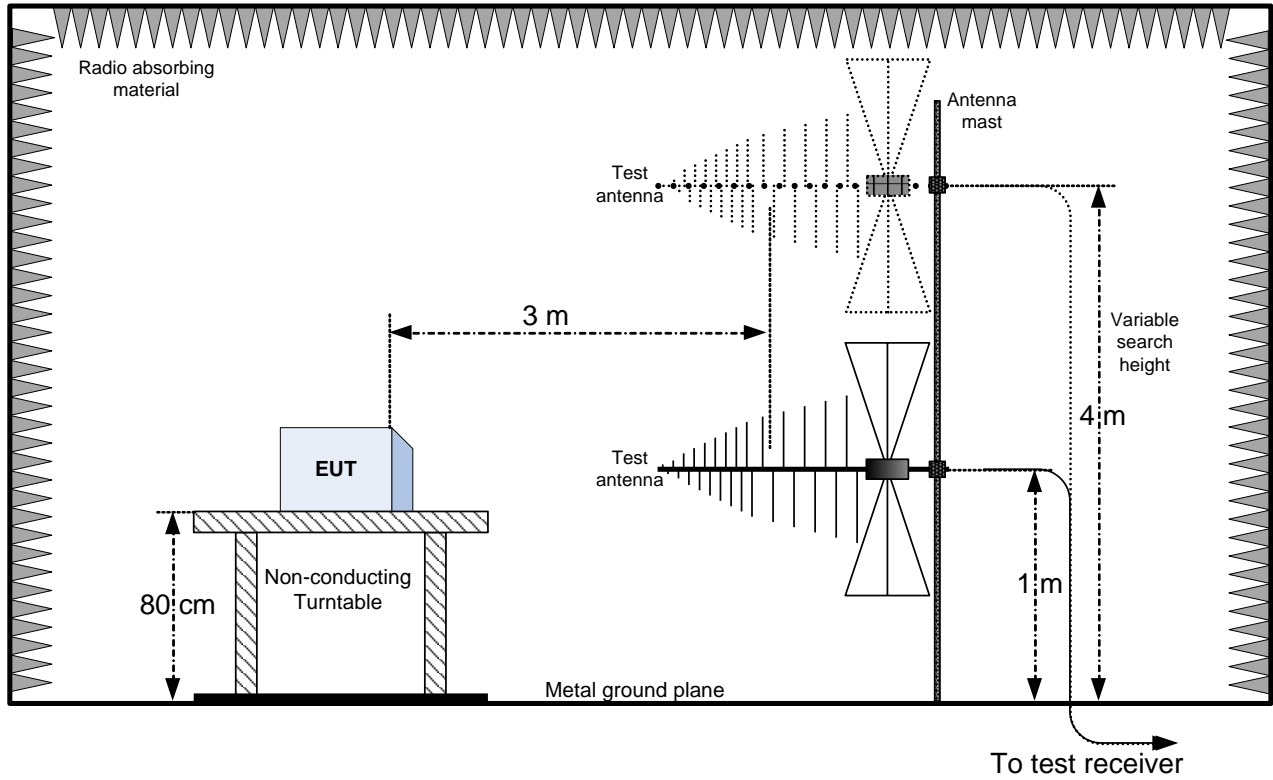
**Plot 8.3-2: 99 % OBW**

**Table 8.3-1: Emission bandwidth results**

20 dB bandwidth (kHz)	Limit (kHz)	Margin (kHz)
56.1	787.5	731.4

## Section 9: Block diagrams of test set-ups

### 9.1 Radiated emissions set-up



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Section 10: EUT photos

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10.1 Front view

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10.2 Rear view



10.3 Battery cover removed

