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Compliance test report ID

225928-1TRFWL

Date of issue
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FCC 47 CFR Part 15 Subpart C, §15.225

Operation within the band 13.110–14.010 MHz
and

RSS-210, Issue 8 Annex 2.6

Band 13.110–14.010 MHz

Applicant **Information Mediary Corp.**

Product **DTR**

Model **DTR-V15**

FCC ID **TTT-DTRV15**

IC Reg # **10780A-DTRV15**

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



Test location

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Tested by Kevin Rose, Wireless/EMC Specialist

Reviewed by January 29, 2013

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

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Table of Contents

Section 1 Report summary.....	4
1.1 Applicant.....	4
1.2 Manufacturer.....	4
1.3 Test specifications	4
1.4 Test guidance	4
1.5 Statement of compliance.....	4
1.6 Exclusions.....	4
1.7 Test report revision history	4
Section 2 Summary of test results.....	5
2.1 FCC Part 15 Subpart C – general requirements, test results	5
2.2 FCC Part 15 Subpart C – Intentional Radiators, test results	5
2.3 IC RSS-GEN, Issue 3, test results.....	5
2.4 IC RSS-210, Issue 8, test results	5
Section 3 Equipment under test (EUT) details	6
3.1 Sample information	6
3.2 EUT information	6
3.3 Technical information.....	6
3.4 Product description and theory of operation	6
3.5 EUT exercise details	6
3.6 EUT setup diagram	7
Section 4 Engineering considerations	8
4.1 Modifications incorporated in the EUT	8
4.2 Technical judgment.....	8
4.3 Deviations from laboratory tests procedures	8
Section 5 Test conditions.....	9
5.1 Atmospheric conditions	9
5.2 Power supply range	9
Section 6 Measurement uncertainty	10
6.1 Uncertainty of measurement	10
Section 7 Test equipment.....	11
7.1 Test equipment list.....	11
Section 8 Testing data	12
8.1 AC power line conducted emissions.....	12
8.2 Field strength of emission	14
8.3 RSS-Gen Clause 4.6.1 Occupied bandwidth	16
8.4 Spurious (out-of-band) emissions.....	18
8.5 Frequency Stability	21
Section 9 Block diagrams of test set-ups.....	22
9.1 Radiated emissions set-up	22
9.2 Conducted emissions set-up	22
Section 10 EUT photos.....	23

Section 1 Report summary

1.1 Applicant

Information Mediary Corp.
2259 Gladwin Crescent
Ottawa, ON, CANADA
K1B 4K9

1.2 Manufacturer

Information Mediary Corp.
2259 Gladwin Crescent
Ottawa, ON, CANADA
K1B 4K9

1.3 Test specifications

Standard	Description
FCC 47 CFR Part 15, Subpart C, Chapter 15.225	Operation within the band 13.110–14.010 MHz
RSS-210, Issue 8 Annex 2.6	Band 13.110–14.010 MHz

1.4 Test guidance

None

1.5 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.

1.6 Exclusions

None

1.7 Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued

Section 2 Summary of test results

2.1 FCC Part 15 Subpart C – general requirements, test results

Part	Test description	Verdict
§15.207(a)	Conducted limits	Pass
§15.31(e)	Variation of power source	Pass ¹

Notes:

¹ Measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, was performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. No noticeable output power variation was observed

2.2 FCC Part 15 Subpart C – Intentional Radiators, test results

Part	Test description	Verdict
§15.225(a)	The field strength of any emissions within the band 13.553–13.567 MHz	Pass
§15.225(b)	The field strength of any emissions within the bands 13.410–13.553 MHz and 13.567–13.710 MHz,	Pass
§15.225(c)	The field strength of any emissions within the bands 13.110–13.410 MHz and 13.710–14.010 MHz	Pass
§15.225(d)	The field strength of any emissions appearing outside of the 13.110–14.010 MHz	Pass
§15.225(e)	Frequency tolerance	Pass
§15.225(f)	Radio frequency powered tags requirements	Pass

2.3 IC RSS-GEN, Issue 3, test results

Part	Test description	Verdict
4.6.1	Occupied bandwidth	Pass
7.2.4	AC power lines conducted emission limits	Pass
6.1	Receiver spurious emissions limits (radiated)	Not applicable
6.2	Receiver spurious emissions limits (antenna conducted)	Not applicable

Notes: EUT has no Receiver mode

2.4 IC RSS-210, Issue 8, test results

Part	Test description	Verdict
A2.6 (a)	The field strength of any emissions within the band 13.553–13.567 MHz	Pass
A2.6 (b)	The field strength of any emissions within the bands 13.410–13.553 MHz and 13.567–13.710 MHz	Pass
A2.6 (c)	The field strength of any emissions within the bands 13.110–13.410 MHz and 13.710–14.010 MHz	Pass
A2.6 (d)	The field strength of any emissions outside the band 13.110–14.010 MHz	Pass
A2.6	Carrier frequency stability	Pass

Section 3 Equipment under test (EUT) details

3.1 Sample information

Receipt date November 26, 2012
Nemko sample ID number Item # 4

3.2 EUT information

Product name DTR
Model DTR-V15
Serial number Prototype

3.3 Technical information

Operating band 13.110–14.010 MHz
Operating frequency 13.56 MHz
Modulation type ASK
Occupied bandwidth (99 %) 149.19 kHz
Emission designator A1D
Power requirements 5 V_{DC} from USB via a 120 V_{AC} 60 Hz power adapter
Antenna information
The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.

3.4 Product description and theory of operation

The DTR is a RFID reader. It scans Log-ic, Med-ic and e-CAP tags.

3.5 EUT exercise details

The EUT was set to transmit when plug in to as USB source

3.6 EUT setup diagram

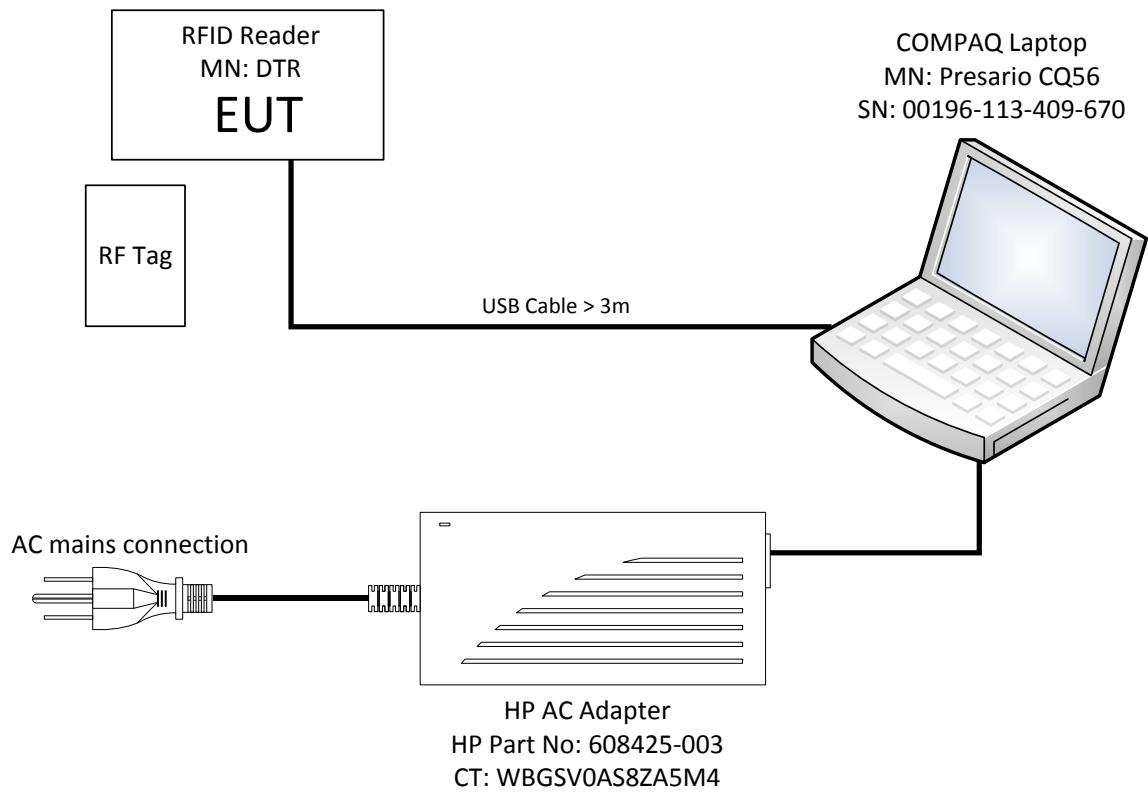


Diagram 3.6-1: Setup diagram

Section 4 Engineering considerations

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

7.1 Test equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Mar. 09/13
Power Source	California Instruments	5001ix	FA001770	1 year	June 13/13
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	May 16/13
Bilog antenna	Sunol	JB3	FA002108	1 year	Feb. 07/13
50 coax cable	Huber + Suhner	NONE	FA002392	1 year	June. 27/13
50 coax cable	Huber + Suhner	NONE	FA002074	1 year	Aug. 23/13
Power Source	California Instruments	5001ix	FA001770	1 year	June 13/13
50 coax cable	Huber + Suhner	None	FA002394	1 year	June 27/13
Four Line V-Network	TESEQ	NNB52	FA002339	1 year	Oct. 03/13
Active loop antenna	EMCO	6502	FA001686	1 year	Sept. 06/13
Temperature chamber	Thermotron	SM-16C	FA001030	1 year	NCR

Note: NCR - no calibration required

Section 8 Testing data

8.1 AC power line conducted emissions

8.1.1 Definitions and limits

FCC Clause 15.207(a): Conducted limits

RSS-Gen Clause 7.2.4: AC power line conducted emissions limits

FCC:

Except as shown in paragraphs (b) and (c) of this section, for 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.

IC:

The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network.

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 8.1-1. The tighter limit applies at the frequency range boundaries.

The conducted emissions shall be measured with a 50 Ω /50 μ H line impedance stabilization network (LISN).

Table 8.1-1: Conducted emissions limit

Frequency of emission (MHz)	Quasi-peak	Conducted limit (dB μ V)	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.

8.1.2 Test summary

Test date	November 26, 2012	Test engineer	David Duchesne
Temperature	24 °C	Air pressure	1002 mbar

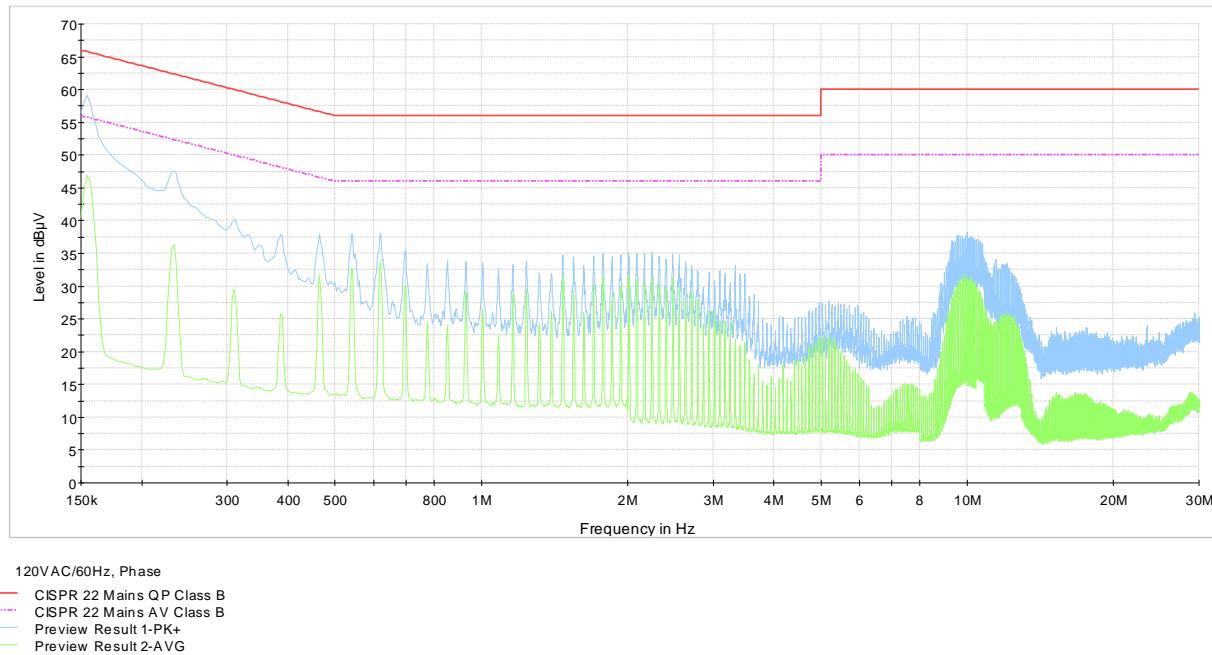
8.1.3 Observations/special notes

The EUT was set up as tabletop configuration.

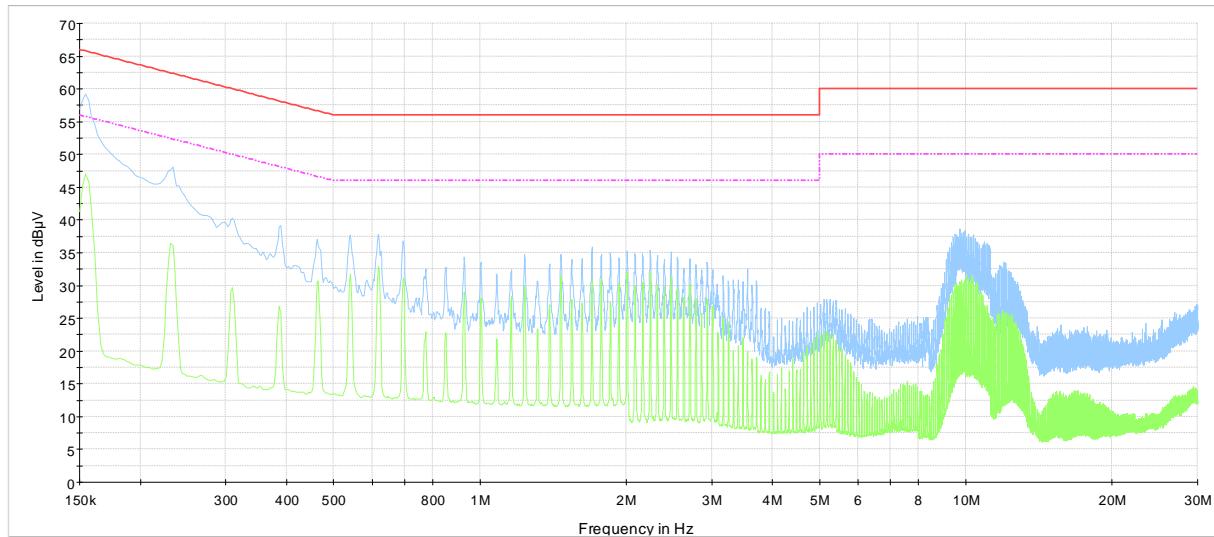
The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

Receiver/spectrum analyzer settings	Preview measurements – Receiver: Peak and Average detector (Max hold), RBW = 9 kHz, VBW = 30 kHz, Measurement time = 100 ms Final measurements – Receiver: Q-Peak and Average detector, RBW = 9 kHz, VBW = 30 kHz, Measurement time = 100 ms
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement. The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

8.1.4 Test data



Plot 8.1-1: Conducted emissions on phase line



Plot 8.1-2: Conducted emissions on neutral line

8.2 Field strength of emission

8.2.1 Definitions and limits

FCC Clause 15.225(a)-(e) and RSS-210 Clause A2.6:

Frequency start (MHz)	Frequency stop (MHz)	Limit (dB μ V) 30 meters	Limit (dB μ V) 3 meters
13.553	13.567	84	124
13.410	13.553	50.5	90.5
13.567	13.710	50.5	90.5
13.110	13.410	40.5	80.5
13.710	14.010	40.5	80.5
<13.110	>14.010	29.5 or 15.209	69.5

The standard limit is measured at a 30 m distance To convert 30 m limit to 3 m limit the following calculation was used $40 \times \log_{10}(d_1/d_2)$ where d_1 is 30 m and d_2 is 3 m. The obtained result is a factor (in dB) that needs to be added to the 30 m limit value.

8.2.2 Test summary

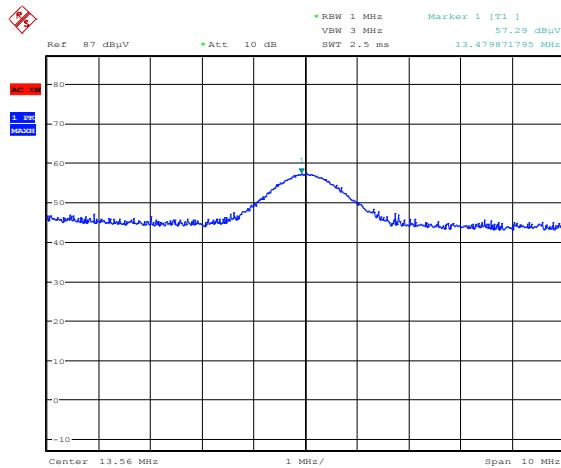
Test date	November 26, 2012	Test engineer	Kevin Rose	Verdict	Pass
Temperature	22 °C	Air pressure	1002 mbar	Relative humidity	35 %

8.2.3 Observations/special notes and procedures

Peak power measurement was done with RBW > OBW and VBW > RBW
Spurious emissions were tested with RBW = 10 kHz and VBW > RBW



8.2.4 Test data



Plot 8.2-1: Peak power

Table 8.2-1: Peak power measurement results

Frequency (MHz)	Fundamental power (dB μ V)	Limit (dB μ V) at 3 m	Margin (dB)
13.56	57.29	124	66.71

Note: The fundamental emission peak is more than 10 dB below the lowest mask emissions limit."

8.3 RSS-Gen Clause 4.6.1 Occupied bandwidth

8.3.1 Definitions and limits

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99 percent emission bandwidth, as calculated or measured.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

8.3.2 Test summary

Test date	November 26, 2012	Test engineer	Kevin Rose	Verdict	Pass
Temperature	22 °C	Air pressure	1002 mbar	Relative humidity	35 %

8.3.3 Observations/special notes

Measurements were performed with peak detector using RBW = 1–5 % of EBW. VBW was set wider than RBW.

8.3.4 Test data

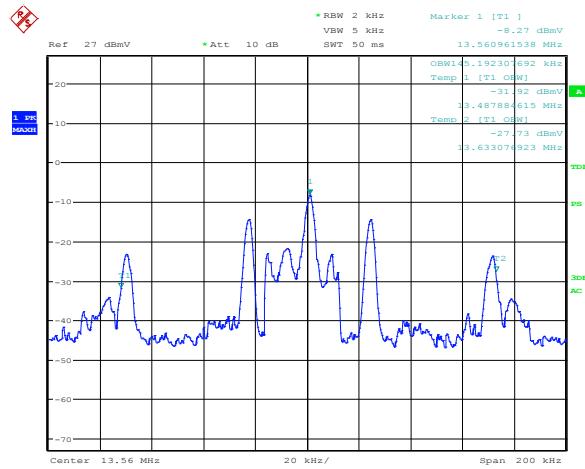


Table 8.3-1: 99 % bandwidth results

Frequency (MHz)	99 % bandwidth (kHz)
13.56	145.19

8.4 Spurious (out-of-band) emissions

8.4.1 Definitions and limits

FCC Clause 15.225(d): Spurious emissions
RSS-210 Clause A2.6: Out-of-band emissions

FCC:

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

IC:

d.30 microvolts/m (29.5 dB μ V/m) at 30 m, outside the band 13.110–14.010 MHz.

Table 8.4-1: FCC §15.209 and RSS-Gen – Radiated emission limits

Frequency (MHz)	Field strength		Measurement distance (m)
	(μ V/m)	(dB μ V/m)	
0.009–0.490*	2400/F	67.6–20 \times log ₁₀ (F)	300
0.490–1.705*	24000/F	87.6–20 \times log ₁₀ (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

* – applicable only to FCC requirements

Table 8.4-2: FCC 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			

8.4.1 Definitions and limits, continued

Table 8.4-3: IC Restricted bands of operation

MHz	MHz	MHz	GHz
0.090–0.110	12.51975–12.52025	399.9–410	5.35–5.46
2.1735–2.1905	12.57675–12.57725	608–614	7.25–7.75
3.020–3.026	13.36–13.41	960–1427	8.025–8.5
4.125–4.128	16.42–16.423	1435–1626.5	9.0–9.2
4.17725–4.17775	16.69475–16.69525	1645.5–1646.5	9.3–9.5
4.20725–4.20775	16.80425–16.80475	1660–1710	10.6–12.7
5.677–5.683	25.5–25.67	1718.8–1722.2	13.25–13.4
6.215–6.218	37.5–38.25	2200–2300	14.47–14.5
6.26775–6.26825	73–74.6	2310–2390	15.35–16.2
6.31175–6.31225	74.8–75.2	2655–2900	17.7–21.4
8.291–8.294	108–138	3260–3267	22.01–23.12
8.362–8.366	156.52475–156.52525	3332–3339	23.6–24.0
8.37625–8.38675	156.7–156.9	3345.8–3358	31.2–31.8
8.41425–8.41475	240–285	3500–4400	36.43–36.5
12.29–12.293	322–335.4	4500–5150	Above 38.6

Note: Certain frequency bands listed in Table 8.4-3 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard

8.4.2 Test summary

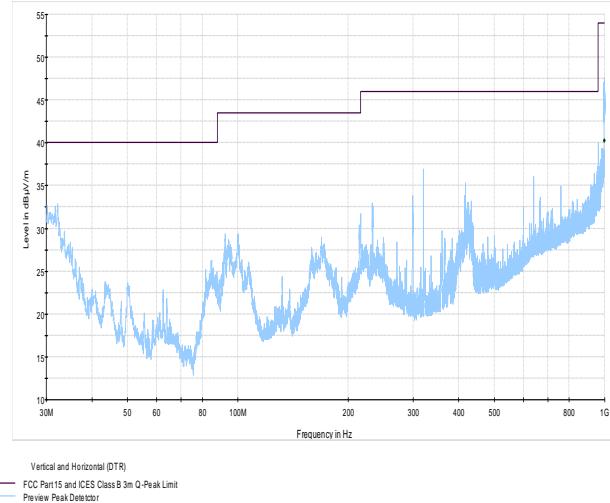
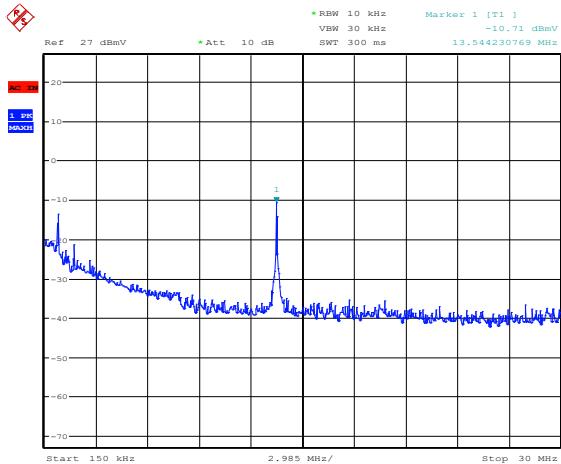
Test date	November 26, 2012	Test engineer	Kevin Rose	Verdict	Pass
Temperature	22 °C	Air pressure	1002 mbar	Relative humidity	35 %

8.4.3 Observations/special notes and procedures

No emissions were detected within 20 dB below the limit.

The EUT was tested from 150 kHz to 1 GHz. 10 kHz RBW below 30 MHz and 100 kHz above 30 MHz. VBW > RBW

8.4.4 Test data,



Plot 8.4-1: Radiated spurious emissions 150 kHz to 30 MHz

Plot 8.4-2: Radiated spurious emissions 30 MHz 1000 MHz

8.5 Frequency Stability

8.5.1 Definitions and limits

RSS-210 Clause A2.6 and FCC Part 15.225

FCC:

(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

IC:

Carrier frequency stability shall be maintained to $\pm 0.01\%$ (± 100 ppm).

8.5.2 Test summary

Test date	November 26, 2012	Test engineer	Kevin Rose	Verdict	Pass
Temperature	22 °C	Air pressure	1002 mbar	Relative humidity	35 %

8.5.3 Observations/special notes

None

8.5.4 Test data

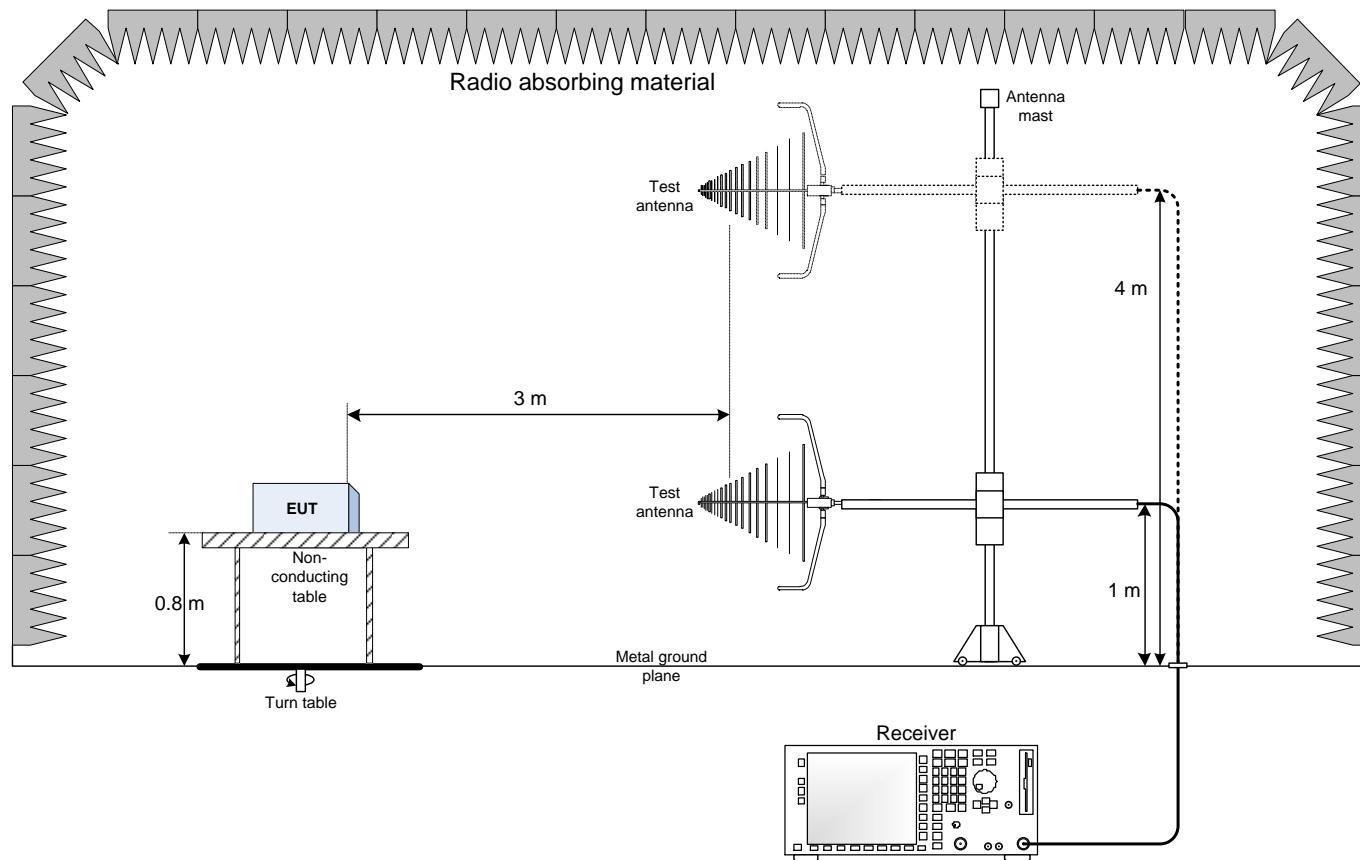
Table 8.5-1: Frequency stability results

Temperature (C)	Voltage (Vac)	Frequency (MHz)	Frequency Deviation (Hz)	Frequency drift (ppm)	Limit (\pm ppm)
20	120	13.560880	0	0	100
20	138	13.560880	0	0	100
20	102	13.560880			Reference
-20	120	13.560840	40	-2.9	100
50	120	13.560820	60	-4.4	100

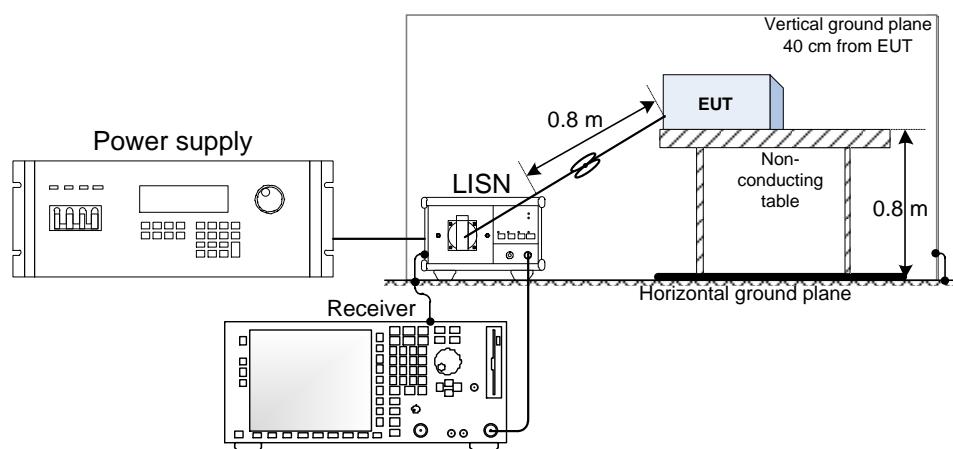
Notes: Frequency Stability calculation
$$\frac{F_{Measured} - F_{reference}}{F_{reference}} \times 10^6$$

Section 9 Block diagrams of test set-ups

9.1 Radiated emissions set-up



9.2 Conducted emissions set-up



Section 10 EUT photos

