TEST REPORT

Test Report No. : UL-RPT-RP91842JD07C V3.0

Manufacturer	:	Alert MetalGuard ApS
Model No.	:	Alert HyperGuard V2.0 Antenna 12cm
FCC ID	:	S8OHYPER1730
IC Certification No.	:	5849A-HYPER1730
Test Standard(s)	:	FCC Parts 15.207, 15.209 15.215 (c) Industry Canada RSS-Gen 4.6.1, 4.8, 4.9, 4.11, 7.2.4 & 7.2.5; Industry Canada RSS-210 2.5

1. This test report shall not be reproduced in full or partial, without the written approval of UL.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 3.0 supersedes all previous versions.

Date of Issue: 06 August 2013

Checked by:

Ian Watch
Senior Engineer, Radio Laboratory

Issued by :

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John Newell
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This laboratory is accredited by UKAS. The tests reported herein have been performed in accordance with its' terms of accreditation.

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1. Customer Information

Company Name:	Alert MetalGuard ApS
Address:	Vester Voldgade 104 1552 Copenhagen V Denmark

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.207, 47CFR15.209 and 47CFR15.215
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) : Part 15 Subpart C (Intentional Radiators) - Sections 15.207, 209 and 15.215
Specification Reference:	RSS-Gen Issue 3 December 2010
Specification Title:	General Requirements and Information for the Certification of Radio Apparatus
Specification Reference:	RSS-210 Issue 8 December 2010
Specification Title:	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
Site Registration:	FCC: 209735; Industry Canada: 3245B-2
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	28 February 2013 to 15 May 2013

2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 15.207	RSS-Gen 7.2.4	Transmitter AC Conducted Emissions	✓
Part 15.209	RSS-Gen 4.9/7.2.5 RSS-210 2.5	Transmitter Radiated Emissions	✓
Part 15.209	N/A	Transmitter Radiated Emissions (Fundamental)	✓
N/A	RSS-Gen 4.8/7.2.5	Transmitter Output Power	✓
Part 15.215(c)	N/A	Transmitter 20 dB Bandwidth	✓
N/A	RSS-Gen 4.6.1	Transmitter 99% Occupied Bandwidth	✓

Key to Results

✓ = Complied ✗ = Did not comply

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2009)
Title:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Reference:	ANSI C63.10 (2009)
Title:	American National Standard for Testing Unlicensed Wireless Devices

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Alert HyperGuard
Model Name or Number:	Alert HyperGuard V2.0 Antenna 12cm
Serial Number:	1501050126-08313001
FCC ID:	S8OHYPER1730
IC Certification Number:	5849A-HYPER1730

Brand Name:	Alert HyperGuard
Model Name or Number:	Alert HyperGuard V2.0 Antenna 12cm
Serial Number:	1501050126-08313002
FCC ID:	S8OHYPER1730
IC Certification Number:	5849A-HYPER1730

Description of EUT

The Equipment Under Test was a pair of antennas used as part of an electronic article surveillance control unit for use in a retail anti-theft system. One antenna is used as a transmit antenna, the other as a receive antenna. Both antennas are connected to a HyperGuard V2.0 Combo control unit (as listed in the Support Equipment section of this report) via CAT5 cables. The metal detecting antennas are floor standing. The antenna width is 12 cm.

3.2. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.3. Additional Information Related to Testing

Tested Technology:	RFID	
Power Supply Requirement:	Nominal	24 VDC
Type of Unit:	Transceiver	
Transmit Frequency	24.960 kHz	

3.4. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Brand Name:	Alert HyperGuard
Model Name or Number:	HyperGuard V2.0 Combo
Serial Number:	2C:E8:71:00:00:15
Hardware Version Number:	AMG Hyper Controller 2.0 01066005B
Software Version Number:	1.0

Description:	Notebook PC running HyperGUARD Configuration Tool software
Brand Name:	Hewlett Packard
Model Name or Number:	nx9005
Serial Number:	CNF32905YD

Description:	DC Power Supply Unit
Brand Name:	ISO-Tech
Model Name or Number:	IPS2302A
Serial Number:	504E005G2

Description:	Ethernet cable
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated

Description:	Mini USB cable
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated

Description:	Male to Male USB cable
Brand Name:	Nikkai
Model Name or Number:	L03BT

Description:	Micro SD card
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Transceive mode
- The EUT has only one mode of operation as it is constantly transmitting and receiving when in operation. It does not have a dedicated 'receive only' mode.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- Controlled using the HyperGUARD configuration application on a laptop PC. The application was used to enable continuous transmit mode.
- For Radiated testing, the Combo was placed at the centre of the turntable, on an 80cm high table. The two antennas were floor mounted and placed at opposite ends of the table. The antennas were connected to each other and to the Combo by two CAT5 cables.
- Ethernet, USB and mini USB unused ports on the Combo were terminated into a laptop PC. The laptop was placed outside the anechoic chamber during radiated testing. The Combo had a micro SD slot; this was terminated by a micro SD card.
- Power was supplied to the EUT via the Combo box

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 Measurement Uncertainty for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Andrew Edwards	**Test Date:**	02 April 2013
Test Sample Serial No.:	1501050126-08313001 & 1501050126-08313002		

FCC Reference:	Part 15.207
Industry Canada Reference:	RSS-Gen 7.2.4
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	29

Note(s):

1. The EUT power was supplied from the Combo with the Combo power being supplied from the 24 VDC output of an ISO-Tech bench power supply. The power supply input was connected to a 120 VAC 60 Hz single phase supply via a LISN.

Transmitter AC Conducted Spurious Emissions (continued)

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
6.297	Live	34.8	60.0	25.2	Complied
6.500	Live	41.8	60.0	18.2	Complied
6.599	Live	38.6	60.0	21.4	Complied
6.707	Live	37.6	60.0	22.4	Complied
6.999	Live	37.4	60.0	22.6	Complied
19.001	Live	25.2	60.0	34.8	Complied
20.000	Live	27.9	60.0	32.1	Complied
20.999	Live	29.8	60.0	30.2	Complied
22.002	Live	28.6	60.0	31.4	Complied
24.000	Live	24.7	60.0	35.3	Complied

Results: Live / Average

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
6.383	Live	24.5	50.0	25.5	Complied
6.500	Live	15.0	50.0	35.0	Complied
6.626	Live	24.2	50.0	25.8	Complied
7.607	Live	22.1	50.0	27.9	Complied
18.645	Live	21.6	50.0	28.4	Complied
18.645	Live	21.6	50.0	28.4	Complied

Transmitter AC Conducted Spurious Emissions (continued)

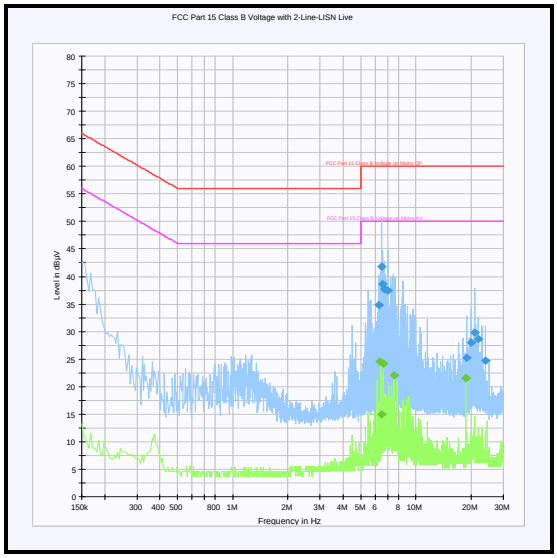
Results: Neutral / Quasi Peak

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
5.501	Neutral	31.7	60.0	28.3	Complied
6.401	Neutral	37.8	60.0	22.2	Complied
6.500	Neutral	42.1	60.0	17.9	Complied
6.707	Neutral	37.9	60.0	22.1	Complied
6.999	Neutral	38.2	60.0	21.8	Complied
7.499	Neutral	35.4	60.0	24.6	Complied
7.998	Neutral	30.4	60.0	29.6	Complied
19.001	Neutral	25.4	60.0	34.6	Complied
20.000	Neutral	28.0	60.0	32.0	Complied
20.999	Neutral	29.6	60.0	30.4	Complied

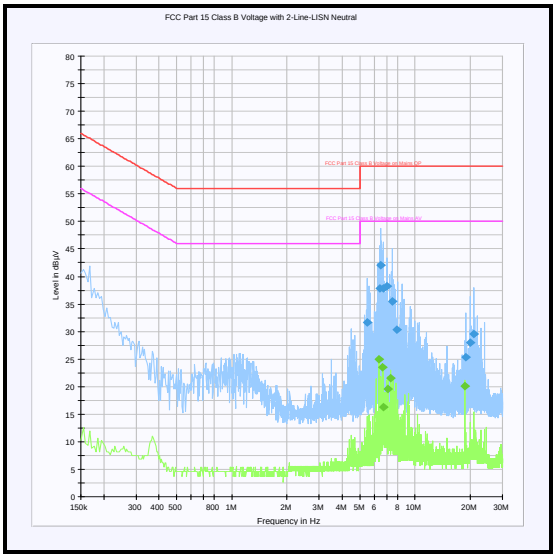
Results: Neutral / Average

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
6.374	Neutral	24.9	50.0	25.1	Complied
6.617	Neutral	23.6	50.0	26.4	Complied
6.707	Neutral	16.2	50.0	33.8	Complied
7.107	Neutral	19.5	50.0	30.5	Complied
7.355	Neutral	21.5	50.0	28.5	Complied
18.645	Neutral	20.1	50.0	29.9	Complied

Transmitter AC Conducted Spurious Emissions (continued)



Live



Neutral

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A649	Single Phase LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Apr 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	19 Feb 2014	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	09 Aug 2013	12

5.2.2. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Andrew Edwards	**Test Dates:**	28 March 2013 & 01 April 2013
Test Sample Serial No.:	1501050126-08313001 & 1501050126-08313002		

FCC Reference:	Part 15.209
Industry Canada Reference:	RSS-Gen 4.9 & RSS-210 2.5
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range:	9 kHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	21 to 22
Relative Humidity (%):	27 to 28

Note(s):

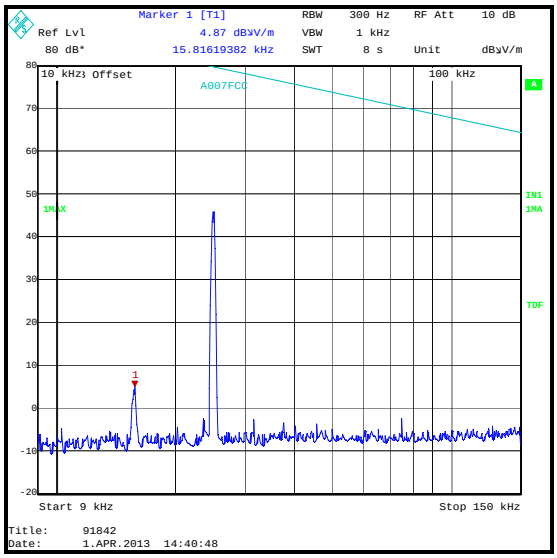
1. Limits below 30 MHz are specified at a test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40dB/decade).
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required. A distance extrapolation factor of 40 dB was used.
3. Final measurement values include corrections for antenna factor and cable losses.
4. The emission shown at approximately 25 kHz is the fundamental emission frequency which was greater than 20 dB below the specified limit.
5. The emissions from 15 kHz to 54 kHz were investigated and found to be radiating from the test site turntable.
6. Measurements in the range 30 MHz to 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
7. Suitable RF attenuation was used when making measurements in the 9 kHz to 150 kHz frequency range to prevent the EUT carrier overloading the test receiver. The RF level offset for the attenuation has been compensated for in the measurement results.
8. The EUT formed a large system. The test site antenna measurement point was positioned so that it was 3 metres from the closest periphery of the EUT.

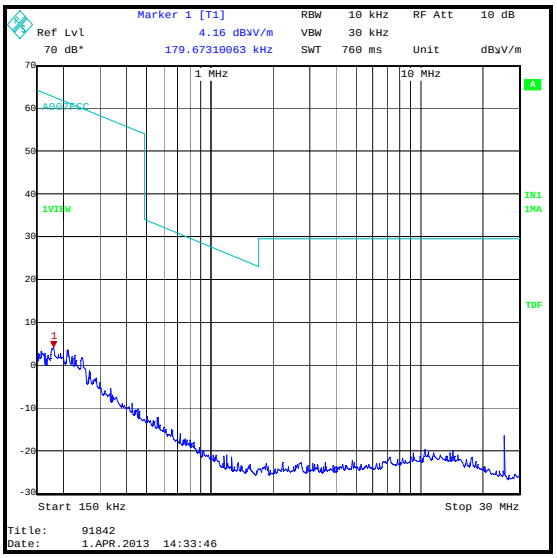
Transmitter Radiated Spurious Emissions (continued)

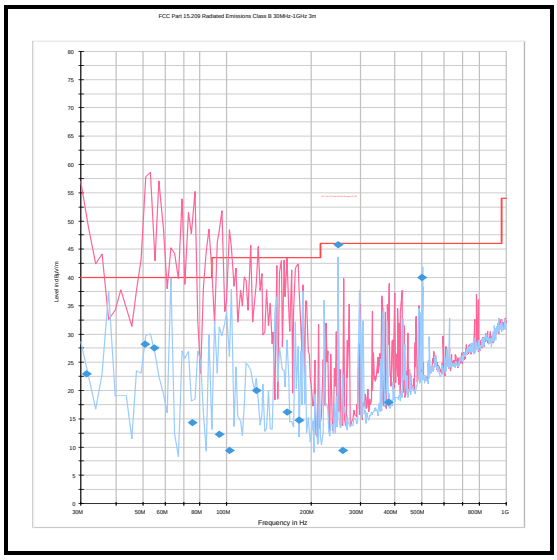
Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
31.313	Vertical	23.0	40.0	17.0	Complied
50.975	Vertical	28.2	40.0	11.8	Complied
54.997	Vertical	27.6	40.0	12.4	Complied
74.975	Vertical	14.3	40.0	25.7	Complied
127.411	Vertical	20.0	43.5	23.5	Complied
163.710	Vertical	16.1	43.5	27.4	Complied
181.252	Vertical	14.8	43.5	28.7	Complied
249.991	Vertical	45.8	46.0	0.2	Complied
378.818	Vertical	17.9	46.0	28.1	Complied
500.002	Horizontal	40.0	46.0	6.0	Complied

Transmitter Radiated Spurious Emissions (continued)







Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying table.

Transmitter Radiated Spurious Emissions (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A490	Bilog Antenna	Chase	CBL6111A	1590	14 May 2013	12
A1834	Attenuator	Hewlett Packard	8491B	10444	17 Jan 2014	12
A2000	Attenuator	Huber & Suhner	6830.17.B	301623	03 Apr 2013	12
G0543	Amplifier	Sonoma	310N	230801	03 Apr 2013	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12
M1568	Magnetic Loop Antenna	Rohde & Schwarz	HFH2-Z2	879284/2	12 Feb 2014	12

5.2.3. Transmitter Radiated Emissions (Fundamental)

Test Summary:

Test Engineer:	Andrew Edwards	**Test Date:**	01 April 2013
Test Sample Serial No.:	1501050126-08313001 & 1501050126-08313002		

FCC Part:	15.209
Test Method Used:	ANSI C63.10 Section 6.4

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	27

Results: Quasi Peak

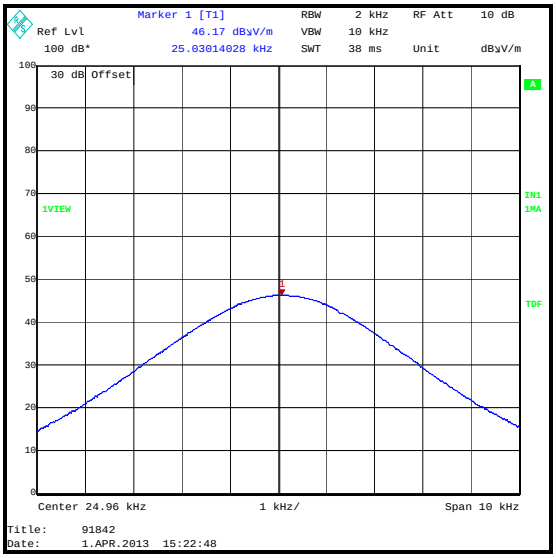
Frequency (kHz)	Antenna Polarity	Level (dBµV/m)	Limit at 300 m (dBµV/m)	Margin (dB)	Result
24.960	90° to EUT	6.4	39.7	33.3	Complied

Note(s):

1. The limit is specified at a test distance of 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40dB/decade).
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres. The transducer factor has a 40 dB extrapolation at a distance of 30 metres (1 decade). Measurements below 490 kHz should be performed at a distance of 300 metres (2 decades) therefore another 40 dB was subtracted from the measured value. The quasi peak level was measured as 46.4 dBµV/m – 40 = 6.4 dBµV/m.
3. Suitable RF attenuation was used when making measurements in the 9 kHz to 150 kHz frequency range to prevent the EUT carrier overloading the test receiver. The RF level offset for the attenuation has been compensated for in the measurement results.
4. The EUT formed a large system. The test site antenna measurement point was positioned so that it was 3 metres from the closest periphery of the EUT.

Transmitter Radiated Emissions (Fundamental) (continued)

Results:



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A2000	Attenuator	Huber & Suhner	6830.17.B	301623	03 Apr 2013	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12
M1568	Magnetic Loop Antenna	Rohde & Schwarz	HFH2-Z2	879284/2	12 Feb 2014	12

5.2.4. Transmitter Output Power

Test Summary:

Test Engineer:	Andrew Edwards	**Test Date:**	01 April 2013
Test Sample Serial No.:	1501050126-08313001 & 1501050126-08313002		

Industry Canada Reference:	RSS-Gen 4.8
Test Method Used:	RSS-Gen 7.2.5 & ANSI C63.10 Section 6.4

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	27

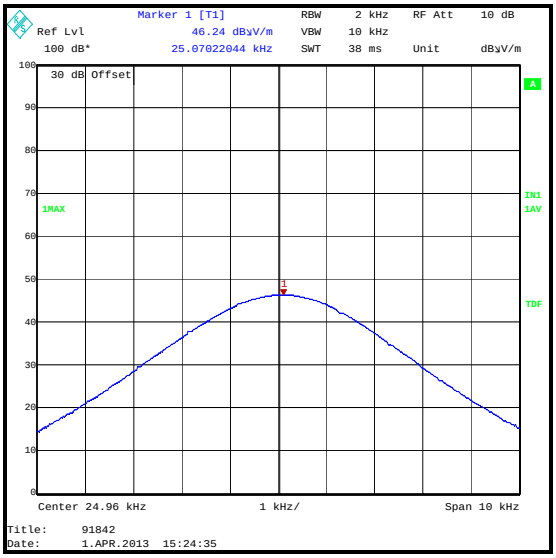
Results: Average

Frequency (kHz)	Antenna Polarity	Level (dBμV/m)	Limit at 300 m (dBμV/m)	Margin (dB)	Result
24.960	90° to EUT	6.7	39.7	33.0	Complied

Note(s):

1. The limit is specified at a test distance of 300 metres. However, as specified by RSS Gen Sections 4.11 and 7.2.7(b), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40dB/decade).
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres. The transducer factor has a 40 dB extrapolation at a distance of 30 metres (1 decade). Measurements below 490 kHz should be performed at a distance of 300 metres (2 decades) therefore another 40 dB was subtracted from the measured value. The average level was measured as 46.7 dBμV/m – 40 = 6.7 dBμV/m.
3. RSS-Gen section 4.8 & 7.2.5 states that this test should be measured with an average detector using a bandwidth > 99% Emission bandwidth.
4. Suitable RF attenuation was used when making measurements in the 9 kHz to 150 kHz frequency range to prevent the EUT carrier overloading the test receiver. The RF level offset for the attenuation has been compensated for in the measurement results.
5. The EUT formed a large system. The test site antenna measurement point was positioned so that it was 3 metres from the closest periphery of the EUT.

Transmitter Output Power (continued)
Results:



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A2000	Attenuator	Huber & Suhner	6830.17.B	301623	03 Apr 2013	12
K0001	5 m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12
M1568	Magnetic Loop Antenna	Rohde & Schwarz	HFH2-Z2	879284/2	12 Feb 2014	12

5.2.5. Transmitter 20 dB Bandwidth

Test Summary:

Test Engineer:	Nick Steele	**Test Date:**	28 February 2013
Test Sample Serial No.:	1501050126-08313001 & 1501050126-08313002		

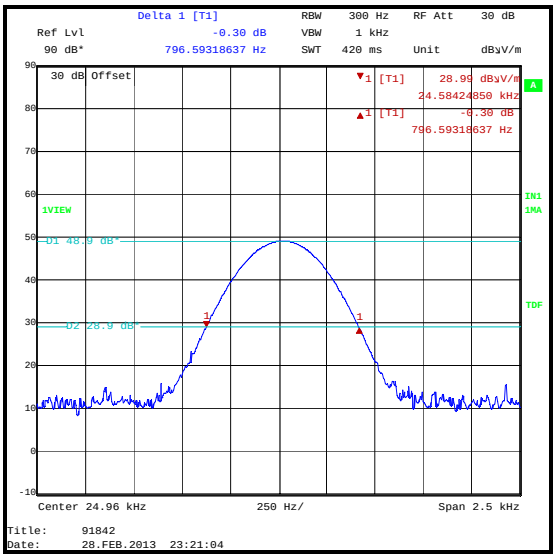
FCC Reference:	Part 15.215(c)
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.1

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	27

Results:

20 dB Bandwidth (kHz)
0.797



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A2000	Attenuator	Huber & Suhner	6830.17.B	301623	03 Apr 2013	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12
M1568	Magnetic Loop Antenna	Rohde & Schwarz	HFH2-Z2	879284/2	12 Feb 2014	12

5.2.6. Transmitter 99% Occupied Bandwidth

Test Summary:

Test Engineer:	Andrew Edwards	**Test Date:**	15 May 2013
Test Sample Serial No.:	1501050126-08313001 & 1501050126-08313002		

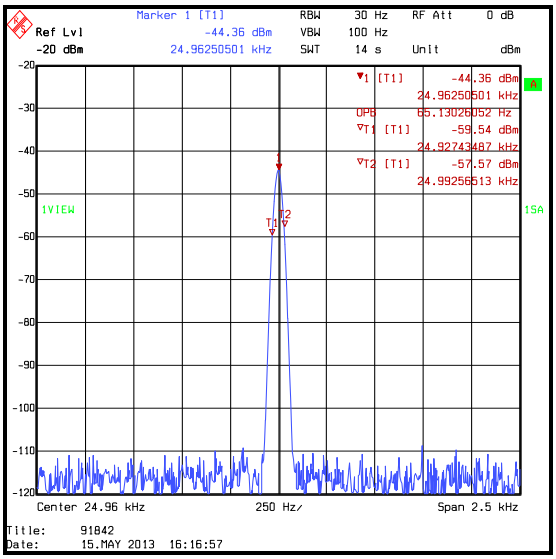
Industry Canada Reference:	RSS-Gen 4.6.1
Test Method Used:	Test receiver 99% occupied bandwidth function

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	32

Results:

99% Emission Bandwidth (Hz)
65



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	13 Aug 2013	12

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±4.69 dB
20 dB Bandwidth	24.960 kHz	95%	±0.92 ppm
99% Occupied Bandwidth	24.960 kHz	95%	±0.92 ppm
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	±3.73 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	**Clause**	**Details**
1.0	-	-	Initial Version
2.0	All	-	Corrected EUT description and serial numbers. Updated 99% occupied bandwidth results. References to UL VS LIMITED changed to UL VS LTD due to company name change.
3.0	All	-	Added further Industry Canada RSS-Gen and RSS-210 clause references.