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

Report nun	nber:	137054-11RFWL		
Apparatus:		ASRF 6602		
Applicant:		Directed Electronics Canada Inc. 5764 Rue Pare Montreal, QC H4P 2M2, Canada		
FCC ID:		EZSNAH6602		
Test specif	ication:			
Chapter I - Fe Subchapter A Part 15 - Radi	elecommunication deral Communications - General o Frequency Devices tentional Radiators			
•	81 - Periodic operatio nintentional Radiators	on in the band 40.66–40.70 MHz and above 70 MHz		
- §15.10	7 and §15.107			
Reviewed by:	Signature Kevin Ma, Wireless/EM	Date		
Tested by:	Andrey Adelberg, Senio	or Wireless/EMC Specialist		
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actions based on this report.



Report Number: 137054-1TRFWL

Specification: FCC 15.231

Table of contents

Section 1: Report summary	
Section 2: Equipment under test	
2.1 Identification of equipment under test (EUT)	4
2.2 Accessories and support equipment	4
2.3 EUT description	
2.4 Technical specifications of the EUT	5
2.5 EUT setup diagram	6
2.6 Operation of the EUT during testing	6
2.7 Modifications incorporated in the EUT	6
Section 3: Test conditions	
3.1 Deviations from laboratory tests procedures	7
3.2 Test conditions, power source and ambient temperatures	7
3.3 Measurement uncertainty	8
3.4 Test equipment	
Section 4: Result summary	9
4.1 FCC Part 15 Subpart C, 15.231: Test results	
Appendix A: Test results	10
Clause 15.203 Antenna requirement	
Clause 15.107(a) Conducted emissions	11
Clause 15.109(a) Radiated emissions	14
Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation	17
Clause 15.231(b) Field strength of emissions	
Clause 15.231(c) Emission bandwidth	
Appendix B: Block diagrams of test set-ups	



Section 1: Report summary
Report Number: 137054-1TRFWL

Specification: FCC 15.231

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, 15.231

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

FCC Part 15 Subpart B, 15.107 and 15.109

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

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Section 2: Equipment under test Report Number: 137054-1TRFWL

Specification: FCC 15.231

Section 2: Equipment under test

2.1 Identification of equipment under test (EUT) The following information identifies the EUT under test:				
Type of equipment:	Remote car starter			
Product marketing name:	Autostart			
Model number:	ASRF 6602			
Serial number:	None			
Nemko sample number:	1			
FCC ID:	EZSNAH6602			
Date of receipt:	October 26, 2009			

2.2 Accessories and support equipment The following information identifies accessories used to exercise the EUT during testing: Item # 1 Type of equipment: Battery charger (AC/DC adapter) Model name or number: YL20W-050A-050 Nemko sample number: 2 Connection port: Mini USB Cable length and type: 1.5 m, USB cable

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

Section 2: Equipment under test

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Section 2: Equipment under test, continued

2.3 EUT description

ASRF 6602 is a remote end of a half duplex car starter/alarm system with LCD that operates at 433.92 MHz.

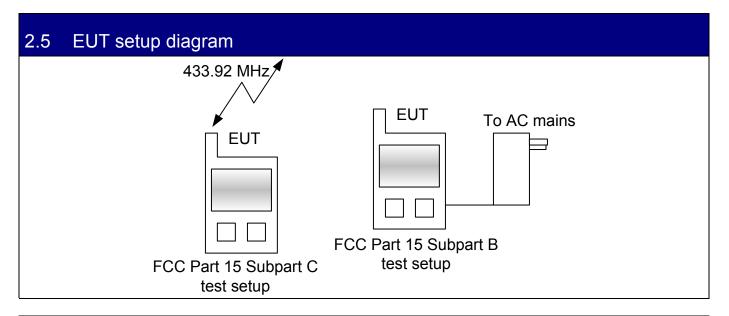
2.4 Technical specifications of the EUT

Operating frequency:	433.92 MHz
Modulation type:	FSK
Occupied bandwidth:	240 kHz
Emission designator:	Q1D
Antenna type:	Integral
	Permanent fixed antenna, which may be built-in,
	(Equipment does not have an external 50 Ω RF connector)
Power source	Rechargeable 4.2 VDC internal Lithium battery

Section 2: Equipment under test Report Number: 137054-1TRFWL

Specification: FCC 15.231

Section 2: Equipment under test, continued



2.6 Operation of the EUT during testing

The EUT has been modified to transmit constantly by pressing on the button.

2.7 Modifications incorporated in the EUT

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

Section 3: Test conditions

Report Number: 137054-1TRFWL

Specification: FCC 15.231

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 ±5 %, for which the equipment was designed.			

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

Section 3: Test conditions

Report Number: 137054-1TRFWL

Specification: FCC 15.231

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.

Manufacturer	Model No.	Asset/Serial No.	Next cal.
California Inst.	3001i	FA001021	Jan. 13/10
Rohde & Schwarz	ESU 26	FA002043	Dec. 16/09
Sunol	JB3	FA002108	Jan. 27/10
EMCO	3115	FA000825	Jan. 21/10
JCA	JCA118-503	FA002091	Oct 07/10
Rohde & Schwarz	ENV216	FA002023	Sept. 08/10
	California Inst. Rohde & Schwarz Sunol EMCO JCA	California Inst. 3001i Rohde & Schwarz ESU 26 Sunol JB3 EMCO 3115 JCA JCA118-503	California Inst. 3001i FA001021 Rohde & Schwarz ESU 26 FA002043 Sunol JB3 FA002108 EMCO 3115 FA000825 JCA JCA118-503 FA002091

Section 4: Result summary
Report Number: 137054-1TRFWL

Specification: FCC Part 15.231

Section 4: Result summary

4.1 FCC Part 15 Subpart C, 15.231: 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 requir	ements for FCC Part 15		
§15.31(e)	Variation of power source	N	
§15.203	Antenna requirement	Y	Pass
§15.207(a)	Conducted limits	N	
General requir	ements for FCC Part 15 Subpart B		
§15.107(a)	Conducted emissions for class B	Y	Pass
§15.109(a)	Radiated emissions for class B	Y	Pass
Specific requir	ements for FCC Part 15 Subpart C, 15.231		
§15.231(a)	Conditions for intentional radiators to comply with periodic operation		
§15.231(a)(1)	Manually operated transmitter	Υ	Pass
§15.231(a)(2)	Automatically activated transmitter	N	
§15.231(a)(3)	Periodic transmissions at regular predetermined intervals	N	
§15.231(a)(4)	Radiators used in cases of emergency	N	
§15.231(a)(5)	Set-up information transmission for security systems	N	
§15.231(b)	Field strength of emissions	Υ	Pass
§15.231(c)	Emission bandwidth	Υ	Pass
§15.231(d)	Requirements for devices operating within 40.66–40.70 MHz band	N	
§15.231(e)	Field strength of emissions for periodic radiators	N	
Notes: Conduct	ed emissions test was performed on the battery charger. The FUT doe	s not transi	mit

Notes: Conducted emissions test was performed on the battery charger. The EUT does not transmit while charging.

Appendix A: Test results

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Appendix A: Test results

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.

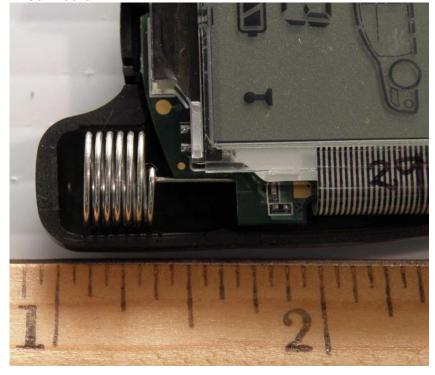
Test date: October 29, 2009

Test results: Pass

Test data

The EUT uses a non-detachable antenna to the intentional radiator.

Detailed photo of RF connector



Appendix A: Test results

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.107(a) Conducted emissions

An unintentional 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 band edges.

Frequency of emission (MHz)	Conducted limit (dBµV)		
Frequency of emission (MHz)	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 28, 2009

Test results: Pass

Special notes

Port under test: Battery charger (AC/DC adapter)

Preview measurements:

0.15 MHz to 30 MHz Receiver settings:

Peak and average detector

9 kHz RBW

Final measurement:

0.15 MHz to 30 MHz Receiver settings:

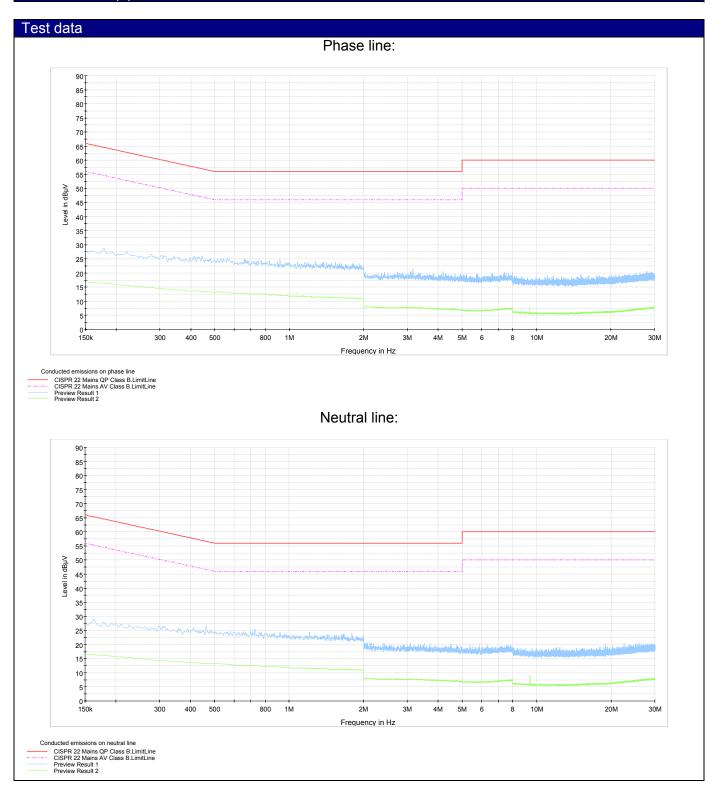
- Q-Peak and average detector
- 9 kHz RBW
- Spectral plots have been corrected for transducer factors; cable loss, LISN, and attenuators.
- No emissions were detected within 6 dB of limit.

Appendix A: Test results

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.107(a) Conducted emisisons, continued



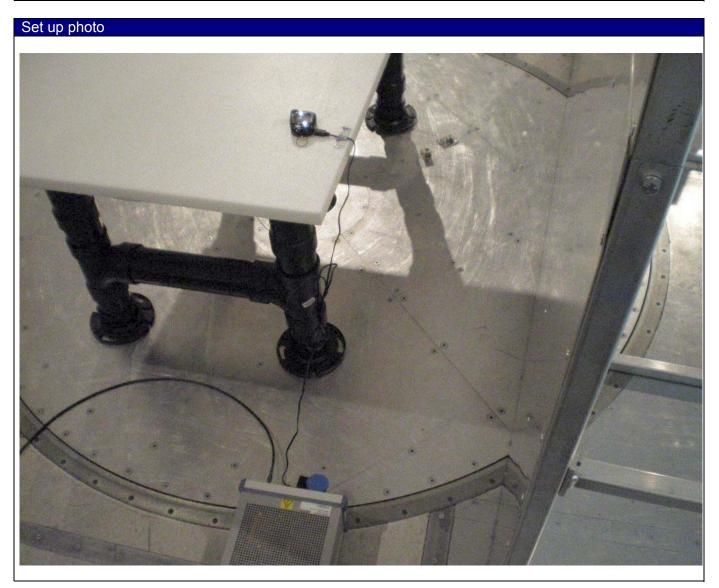


Appendix A: Test results

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.107(a) Conducted emissions, continued



Appendix A: Test results

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.109(a) Radiated emissions

The field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency	Field strength		
(MHz)	(μV/m)	(dBµV/m)	
30–88	100	40.0	
88–216	150	43.5	
216–960	200	46.0	
above 960	500	54.0	

Notes: 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.

In the emission tables above, the tighter limit applies at the band edges. Sections 15.33 and 15.35, which specify the frequency range over which radiated emissions, are to be measured and the detector functions and other measurement standards apply.

Test date: October 28, 2009

Test results: Pass

Special notes

Measuring distance: 3 m Antenna height: 1–4 m

Preview measurements:

30 MHz to 1 GHz

Receiver settings:

Peak detector, Max hold

120 kHz RBW

Final measurement:

30 MHz to 1 GHz

Receiver settings:

- Quasi-Peak detector

120 kHz RBW

1 GHz to 6 GHz
Spectrum analyzer settings:

1 GHz to 6 GHz
Receiver settings:

Peak detector, Max hold
 Average and Peak detector

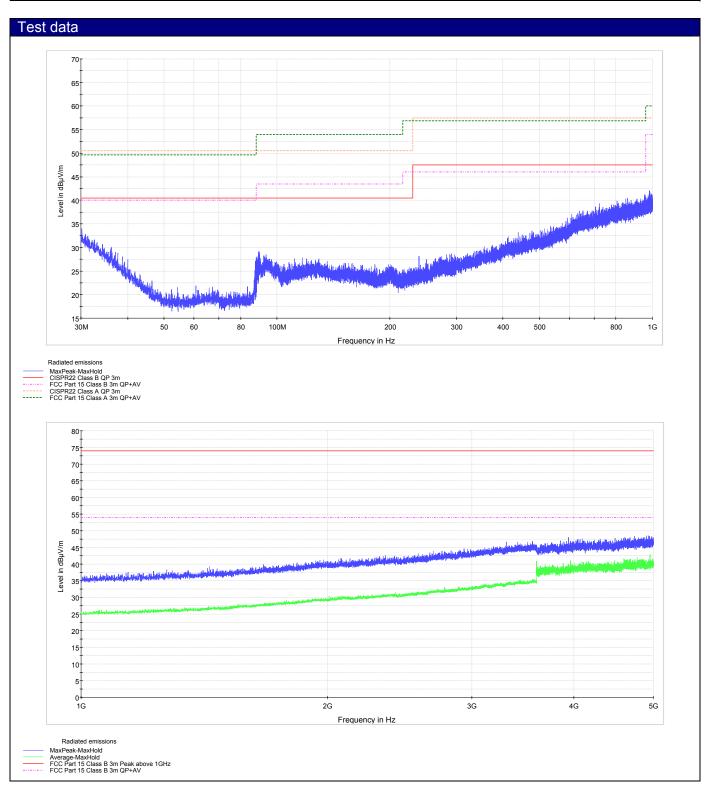
– 1 MHz RBW – 1 MHz RBW

- The spectral plot is a combined vertical and horizontal scan.
- Spectral plots have been corrected with transducer factors for antennas, cable loss, amplifiers, and attenuators.
- Limits have been adjusted to reflect 3 m measurement.
- The preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated and antenna adjusted for maximized radiated emission.
- No emissions were detected within 6 dB of limit.

Appendix A: Test results
Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.109(a) Radiated emissions, continued



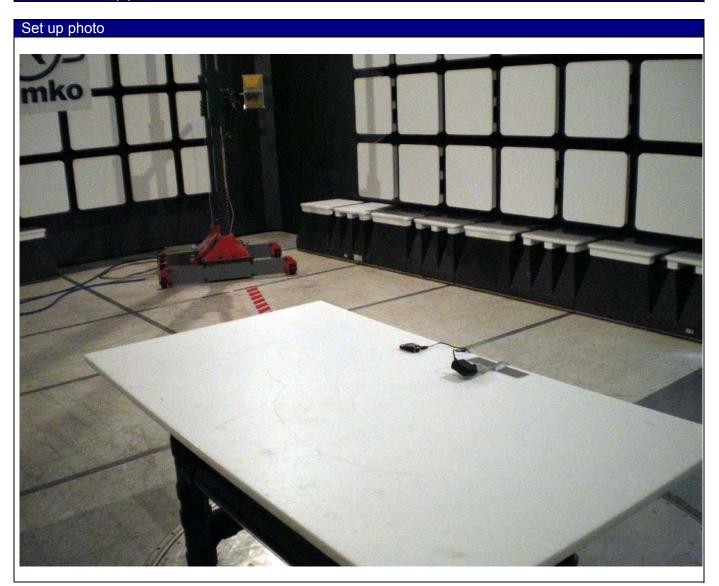


Appendix A: Test results

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.109(a) Radiated emissions, continued



Report Number: 137054-1TRFWL

Specification: FCC 15.231

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

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.

Test date: November 2, 2009

Test results: Pass

Special notes

None

Report Number: 137054-1TRFWL Specification: FCC 15.231

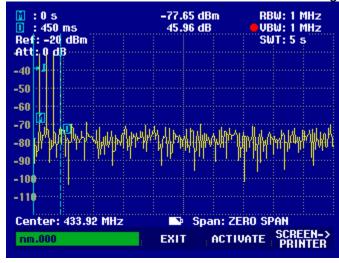
Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation, continued

Test data

- (1) The EUT is manually triggered.

 See attached plot for the timing of a manually trigger event.
- (2) The EUT is not activated automatically.
- (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

The EUT ceases to transmit 450 ms after the button is being released.



Report Number: 137054-1TRFWL

Specification: FCC 15.231

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:

Fundamental	Field strength of		Field strength of	
frequency	fundamental		spurious emissions	
(MHz)	(µV/m)	μV/m) (dBμV/m)		(dBµV/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.

The field strength of emissions appearing within restricted bands (as specified in §15.205) shall not exceed the limits from §15.209:

Frequency	Fiel	d strength	Measurement distance
(MHz)	(µV/m)	(dBµV/m)	(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: October 28, 2009

Test results: Pass

The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

Appendix A: Test results

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.231(b) Field strength of 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 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.
- Fully charged battery was used throughout the test.

§ 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				

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.231(b) Field strength of emissions, continued

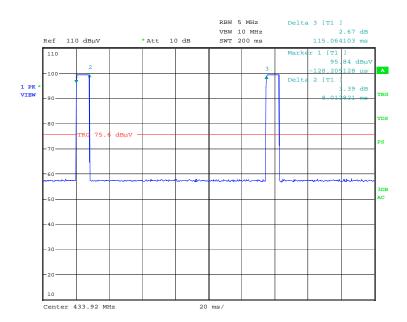
Test data

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:

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

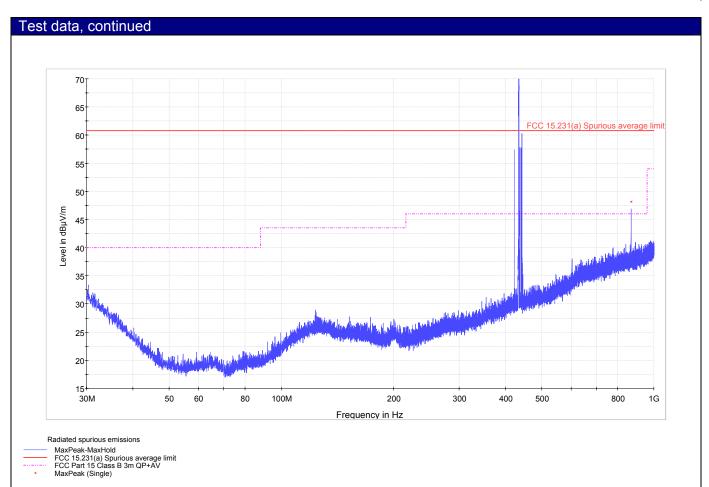


$$Duty cycle / average factor = 20 \times \log_{10} \left(\frac{8.01 ms}{100 ms} \right) = -21.93 [dB]$$

Appendix A: Test results
Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.231(b) Field strength of emissions, continued



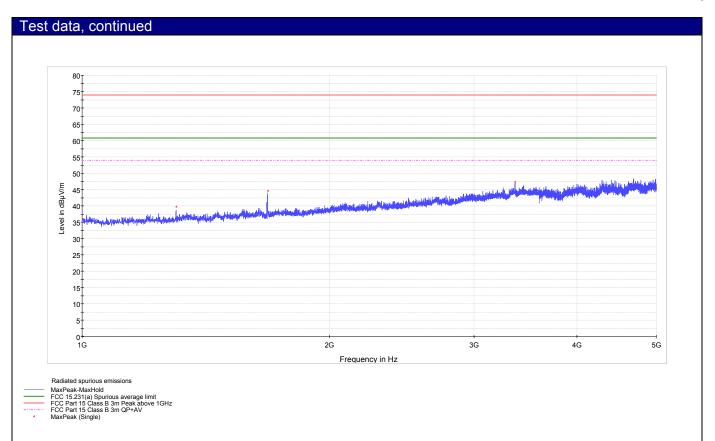
Tabular o	Tabular data								
Freq. (MHz)	Pol. V/H	Peak field strength (dB _µ V/m)	Correction (dB)	Peak limit (dBµV/m)	Peak margin (dB)	Duty cycle corr. (dB)	Avg field strength (dBµV/m)	Avg limit (dBµV/m)	Avg margin (dB)
433.920	Н	100.06	17.7	100.8	0.74	21.93	78.13	80.8	2.67
433.920	V	95.67	17.7	100.8	5.13	21.93	73.74	80.8	7.06
867.840	Н	46.3	24.9	80.8	34.5	21.93	24.4	60.8	36.4

Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.

Appendix A: Test results
Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.231(b) Field strength of emissions, continued



Tabular c	Tabular data								
Freq. (MHz)	Pol. V/H	Peak field strength (dB _µ V/m)	Correction (dB)	Peak limit (dBµV/m)	Peak margin (dB)	Duty cycle corr. (dB)	Avg field strength (dBµV/m)	Avg limit (dBµV/m)	Avg margin (dB)
1301.60	Н	39.8	-18.8	74.0	34.2	21.93	17.9	54.0	36.1
1682.00	Н	44.6	-17.1	74.0	29.4	21.93	22.7	54.0	31.3
3364.00	Н	47.4	-9.6	80.8	33.4	21.93	25.5	60.8	35.3

Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.



Appendix A: Test results

Report Number: 137054-1TRFWL

Specification: FCC 15.231

Clause 15.231(b) Field strength of emissions, continued





Appendix A: Test results

Report Number: 137054-1TRFWL

Specification: FCC 15.231

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.

Test date: October 26, 2009

Test results: Pass

Special notes

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

Appendix A: Test results
Report Number: 137054-1TRFWL

Specification: FCC 15.231

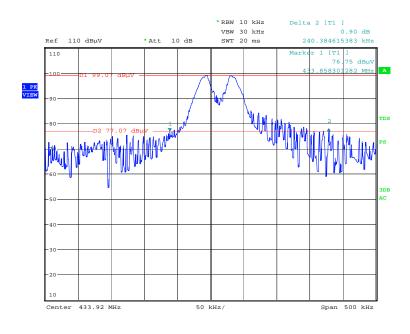
Clause 15.231(c) Emission bandwidth, continued

Test data

Limits

0.25 % of 433.92 MHz is 1084.8 kHz

Measured results



Date: 26.OCT.2009 11:41:22

20 dB bandwidth, kHz	Limit, kHz	Margin, kHz
240	1084.8	844.8

Appendix B: Block diagrams
Report Number: 137054-1TRFWL

Specification: FCC 15.231

Appendix B: Block diagrams of test set-ups

