

Nemko Test Report: 133253-1TRFWL

Applicant: DEI Headquarters Inc.
1 Viper Way
Vista, CA
92081, USA

Apparatus: TW-104

FCC ID: EZSNAH104

In Accordance With: FCC Part 15 Subpart B, 15.107 and 15.109
Unintentional Radiators
FCC Part 15 Subpart C, 15.231
Periodic operation in the band 40.66–40.70 MHz
and above 70 MHz.

Authorized By: 
Andrey Adelberg, Senior Wireless/EMC Specialist

Date: September 16, 2009

Total Number of Pages: 19

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Section 1 : Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart B and Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003.

The assessment summary is as follows:

Apparatus Assessed:	TW-104
Specification:	FCC Part 15 Subpart B, 15.107 and 15.109 FCC Part 15 Subpart C, 15.231
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release
Test Locations:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
FCC Test Site Reference No.:	176392 (3 m Semi-Anechoic Chamber)
Tests Performed By:	Kevin Ma EMC/Wireless Specialist
Test Dates:	August 14, 2009 to August 17, 2009

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

2.1 Identification of Equipment Under Test (EUT)

The following information identifies the EUT under test:

Type of Equipment:	Low Power Transceiver
Product Name:	2-Way Remote Control Engine Starter
Brand Name:	DEI Headquarters
Model Name or Number:	TW-104
Serial Number:	Test Samples
Nemko Sample Number:	1
FCC ID:	EZSNAH104
Date of Receipt:	August 14, 2009
Primary User Functions of EUT:	Car Engine Starter

2.2 Accessories

No accessories were used during this assessment.

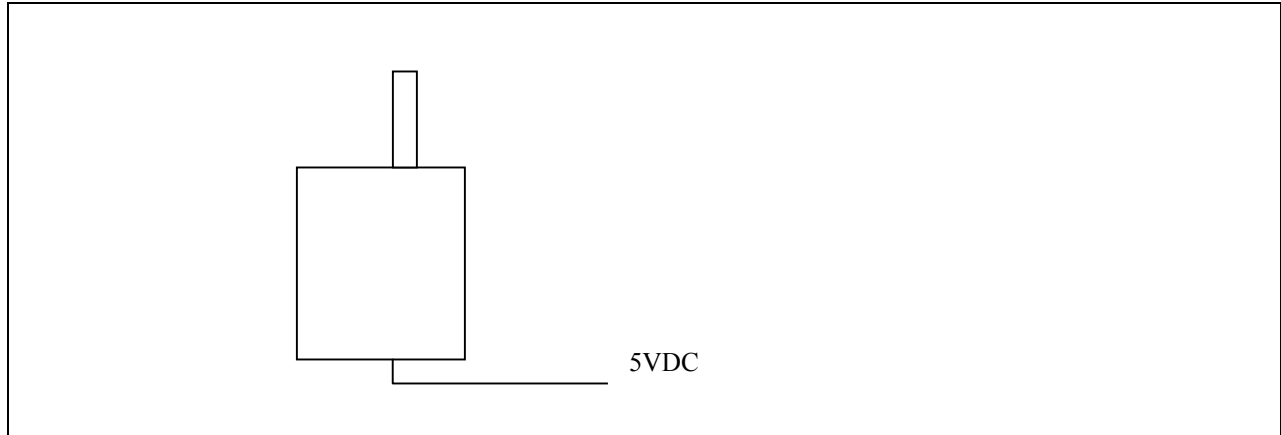
2.3 EUT Description

The TW-104 is used in the Remote end of a half duplex car starter/alarm system and operates at 433.92 MHz

2.4 Technical Specifications of the EUT

Operating Frequency:	433.92 MHz
Modulation:	ASK
Occupied Bandwidth:	0.878 kHz
Emission Designator:	878HK1D
Antenna Data:	Integrated antenna.
Power Supply Requirements:	DC 5 V from main unit
Receiver Type:	Superheterodyne receiver

2.5 EUT Setup diagram



2.6 Modifications incorporated in the EUT

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

Section 3 : Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart B, 15.107 and 15.109

Unintentional Radiators

FCC Part 15 Subpart C, 15.231

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

3.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15–30 °C
Humidity range	:	20–75 %
Pressure range	:	86–106 kPa
Power supply range	:	±5 % of rated voltages

3.4 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.

3.5 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
3 m EMI Test Chamber	TDK	SAC-3	FA002047	May 06/10
Spectrum Analyzer	Rohde & Schwarz	FSU46	FA001877	Aug 28/09
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU 26	FA002043	Dec. 16/09
Flush Mount Turntable	Sunol	FM2022	FA002082	NCR
Controller	Sunol	SC104V	FA002060	NCR
Mast	Sunol	TLT2	FA002061	NCR
Bilog	Sunol	JB3	FA002108	Jan. 27/10
Horn Antenna #2	EMCO	3115	FA000825	Jan. 21/10
1 – 18 GHz Amplifier	JCA	JCA118-503	FA002091	Oct 2/09

COU – Calibrate on Use

NCR – No Calibration Required

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart B : Test Results

FCC Part 15 Subpart C : 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)

4.1 FCC Part 15 Subpart B : Test Results

Part 15	Test Description	Required	Result
15.107(a) 15.109(a)	Conducted Emissions for Class B Radiated Emissions for Class B (Unintentional)	N Y	Pass

4.2 FCC Part 15 Subpart C : Test Results

Part 15	Test Description	Required	Result
15.31(e)	Variation of Power source	Y	Pass
15.203	Antenna Requirement (Permanently attached antenna used with this device)	Y	Pass
15.207(a)	Powerline Conducted Emissions	N	
15.209(a)	Radiated Emissions within Restricted Bands	Y	Pass
15.231(a)(1)	Manually operated transmitter	Y	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 for security systems	N	
15.231(b)	Radiated Emissions – Fundamental, Harmonics and Spurious	Y	Pass
15.231(c)	20 dB Bandwidth	Y	Pass
15.231(d)	Devices operating within the frequency band 40.66–40.70 MHz	N	
15.231(e)	Radiated emissions for Periodic radiators	N	

Appendix A : Part 15 Subpart B Test Results

Clause 15.109(a) Radiated Emissions

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (microvoltsmeter)
30-88	100
88-216	150
216-960	200
Above 960	500

Test Results: Pass

Additional Observations:

- The Spectrum was searched from 30 MHz to the 3000 MHz.
- The EUT was measured on three orthogonal axis with vertical and horizontal receiving antenna. Only worst case was presented.
- 5VDC power supply was used instead the main unit for power supply throughout all tests.
- Measurement equipment setup was 120 kHz/300 kHz RBW/VBW with Quasi-peak detector for measurements below 1 GHz and 1 MHz/3 MHz RBW/VBW peak detector above 1 GHz.
- All Measurements were performed at 3 meters.
- No emissions within 20 dB below the limit were found

Appendix B : Part 15 Subpart C Test Results

Clause 15.209(a) Radiated Emissions within Restricted Bands

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvoltsmeter) (kHz)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Results: Pass

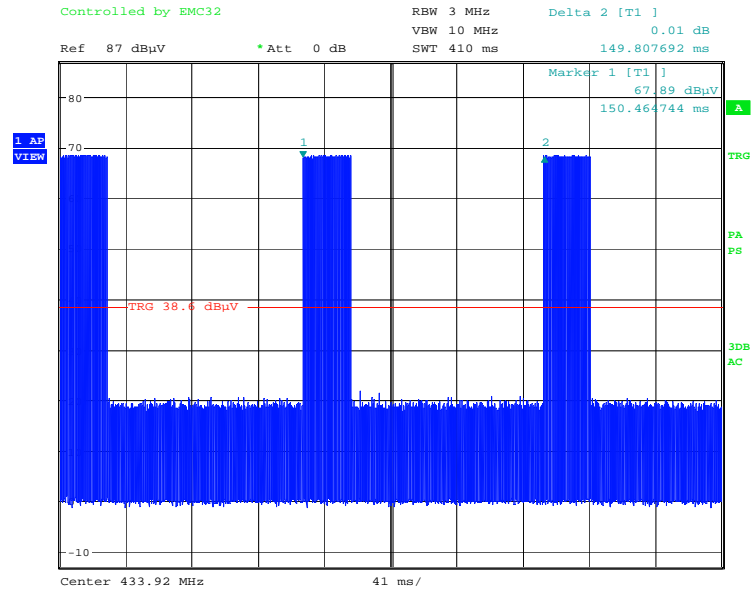
Additional Observations:

- The Spectrum was searched from 30 MHz to the 10th Harmonic.
- These results apply to emissions found in the Restricted bands defined in FCC Part 15 Subpart C, 15.205.
- The EUT was measured on three orthogonal axis with vertical and horizontal receiving antenna. Only worst case was presented.
- 5VDC power supply was used instead the main unit for power supply throughout all tests.
- All measurements were performed using a Peak Detector with 100 kHz/300 kHz RBW/VBW below 1 GHz and a 1 MHz/3 MHz RBW/VBW above 1 GHz at a distance of 3 meters.

Frequency (MHz)	Polarity	Emission Level (dB μ V/m)	Corr. Factor (dB)	Duty Cycle Corr. (dB)	Measurement	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1301.600	V	60.70	7.2	-22.89	Peak	60.70	74.00	13.30
					Average	37.81	54.00	16.19
3905.500	V	48.40	9.7	-22.89	Peak	48.40	74.00	25.60
					Average	25.51	54.00	28.49

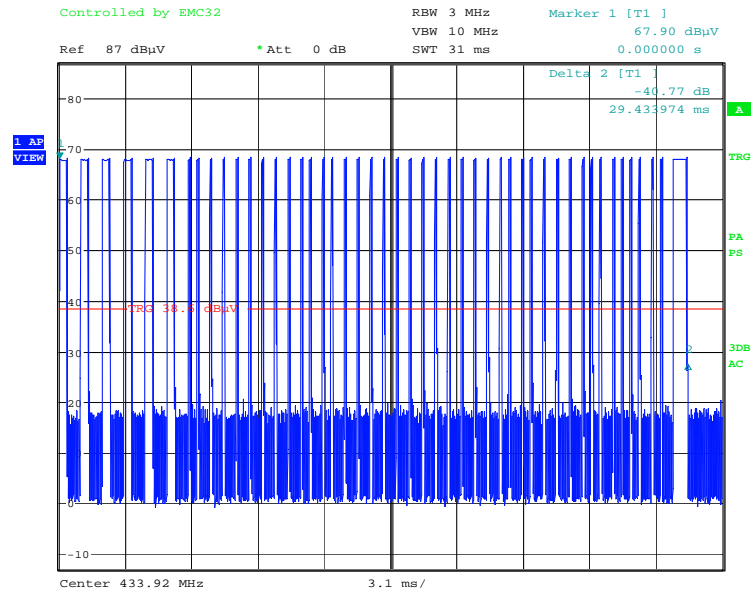
Note 1: Emission level includes Correction factor of Antenna factor, cable loss and amplifier gain where applicable.

Duty Cycle within 100 ms:



Date: 14.AUG.2009 11:20:47

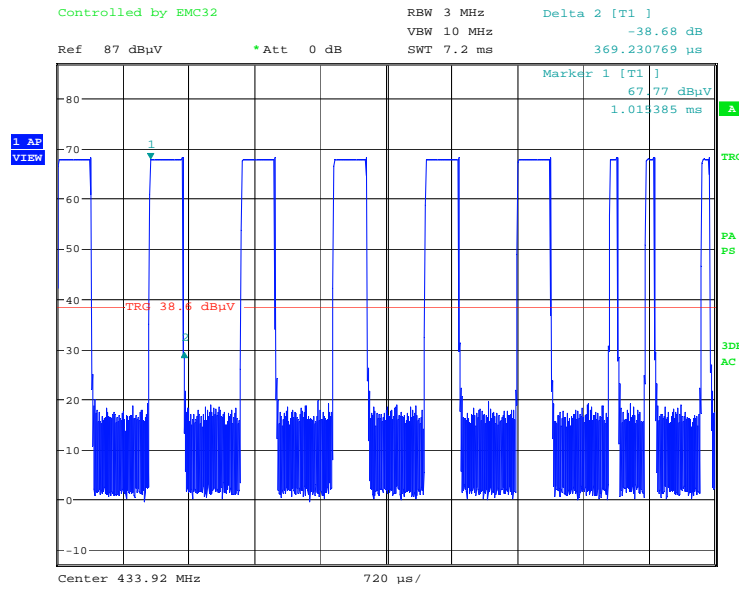
Pulse Transmission:



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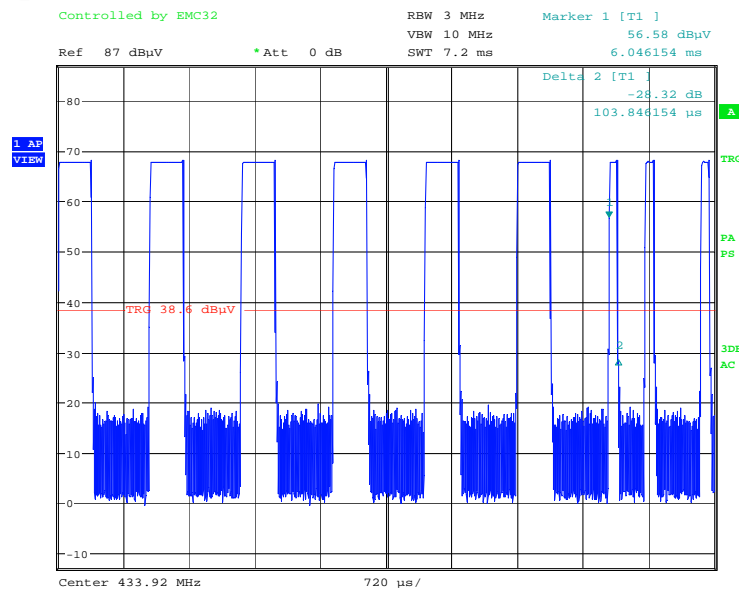
One frame contains all pulse signals

On time of frontal pulse:



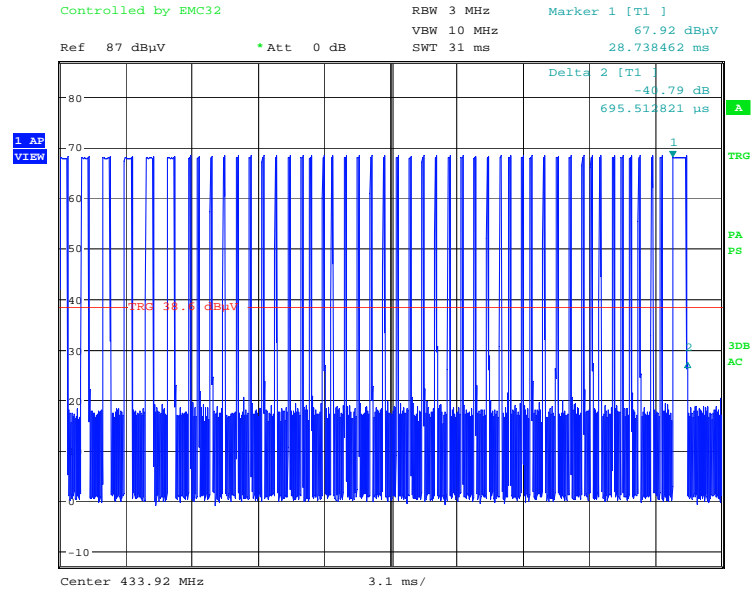
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On time of mid pulses:



Date: 14.AUG.2009 11:27:09

On time of end pulse:



Date: 14.AUG.2009 11:31:44

Duty cycle correction factor calculation:

Totally On time in one frame:

$$369.23 \mu s * 6 + 103.85 \mu s * 41 + 695.51 \mu s * 1 = 7.17 \text{ ms}$$

$$Duty Cycle = 20 \log \left(\frac{Pulse\ time}{100ms} \right) = 20 \log \left(\frac{7.17}{100} \right) = -22.89dB$$

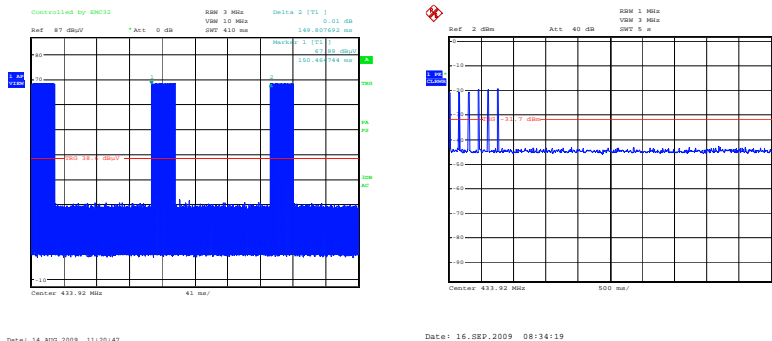
Clause 15.231(a) Conditions for intentional radiators to comply with periodic operation

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 Results: Pass

- (1) Manually operated transmitter, deactivates within 5 seconds after being released:



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The system will transmit 6 frames and stop.

Total transmitting time equals to $150 \text{ ms} * 6 = 900 \text{ ms} < 5 \text{ s}$

- (2) No automatic activation according to user manual and applicant declaration
- (3) There are no periodic transmissions at regular predetermined intervals implemented according to user manual and applicant declaration

- (4) Not intended for radio control purposes during emergencies according to user manual and applicant declaration
- (5) Not intended for security applications according to user manual and applicant declaration

Clause 15.231(b) Radiated 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 Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66–40.70	2,250	225
70–130	1,250	125
130–174	1,250 to 3,750	125 to 375
174–260	3,750	375
260–470	3,750 to 12,500	375 to 1,250
Above 470	12,500	1,250

Test Results: Pass

Additional Observations:

- The Spectrum was searched from 30 MHz to the 10th Harmonic.
- The EUT was measured on three orthogonal axis with vertical and horizontal receiving antenna. Only worst case was presented.
- 5VDC power supply was used instead the main unit for power supply throughout all tests.
- All measurements were performed using a Peak Detector with 100 kHz/300 kHz RBW/VBW below 1 GHz and a 1 MHz/3 MHz RBW/VBW above 1 GHz at a distance of 3 meters.
- Fundamental field strengths measurements were also performed with the supply voltage variation between 85–115 %. No noticeable difference in filed strengths measurement was observed due to voltage variation.

Freq. (MHz)	Ant.	Pol. V/H	Emission level (dBμV/m)	Corr. Factor (dB)	Duty Cycle Corr. (dB)	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Average Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)
Fundamental											
433.92	BL	V	100.20	20.9	-22.89	100.20	100.83	0.63	77.31	80.83	3.52
Harmonics											
867.92	BL	V	68.30	28.5	-22.89	68.30	80.83	12.53	45.41	60.83	15.42
1736.00	Horn	V	60.70	8.8	-22.89	60.70	80.83	20.13	37.81	60.83	23.02
2604.00	Horn	V	67.86	11.5	-22.89	67.86	80.83	12.97	44.97	60.83	15.86
3038.00	Horn	V	63.80	12.8	-22.89	63.80	80.83	17.03	40.91	60.83	19.92
3471.50	Horn	V	50.40	14.3	-22.89	50.40	80.83	30.43	27.51	60.83	33.32

Note 1: Antenna Legend: BC = Biconical, BL = Bilog, LP = Log-Periodic, Horn = Horn, ED = EMCO Dipole
 Note 2: Emission level includes Correction factor of Antenna factor, cable loss and amplifier gain where applicable.



Nemko Canada Inc.

Report Number: 133253-1TRFWL

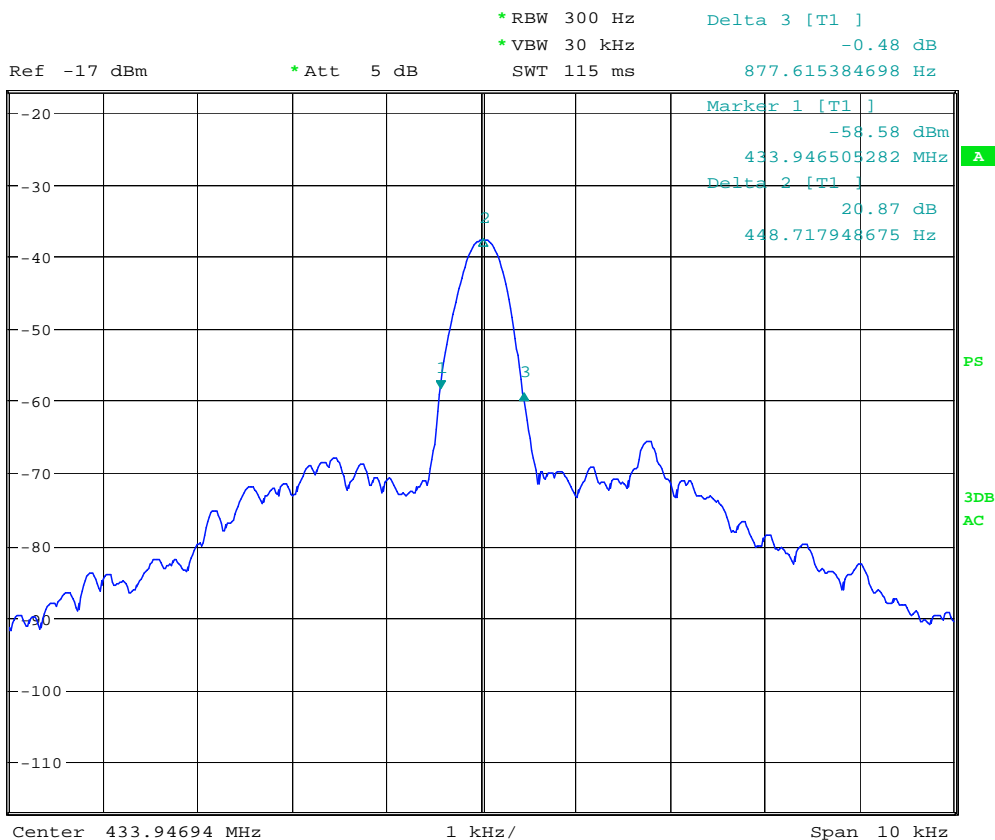
Specification: FCC Part 15 Subpart C, 15.231

Clause 15.231(c) 20 dB 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 Results: Pass

20 dB Bandwidth:

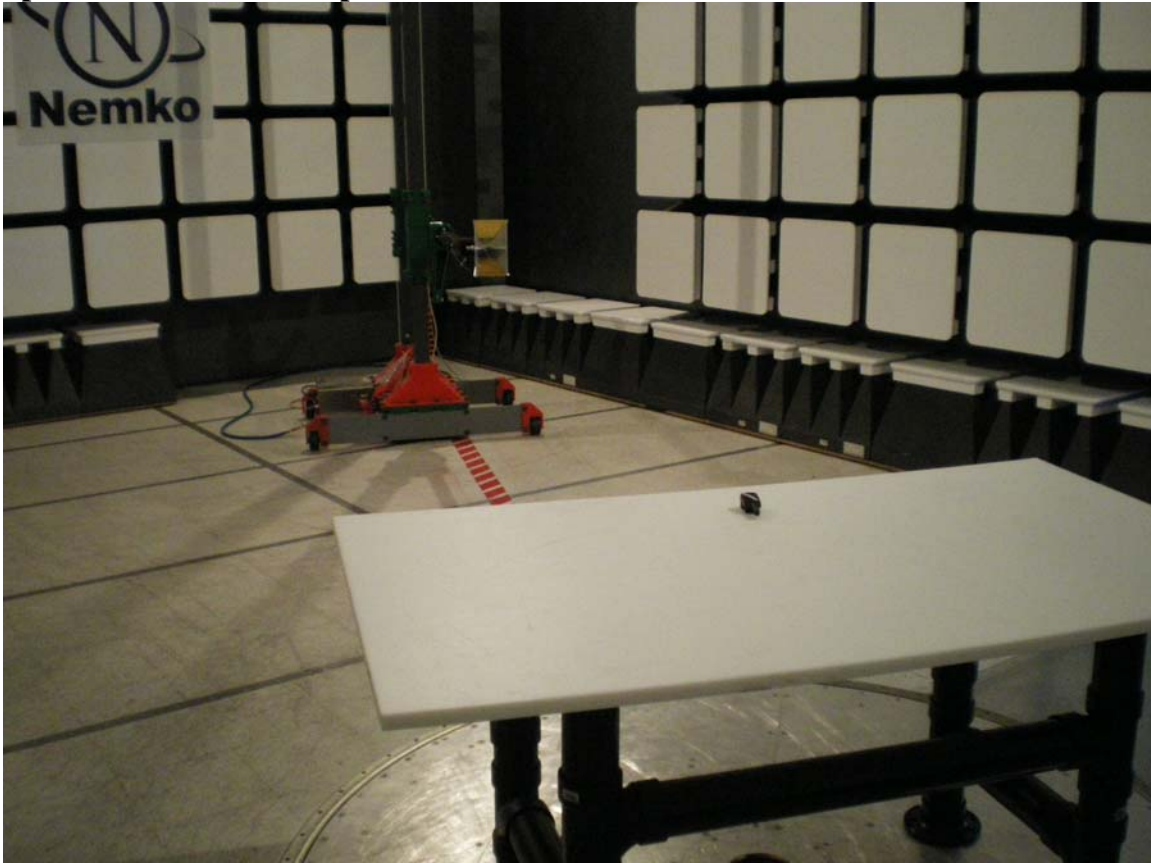


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Frequency, MHz	20 dB BW, kHz	Limit, kHz	Margin, kHz
433.92	0.878	1084.8	1083.9

Appendix C : Setup Photographs

Spurious Emissions Setup:



Appendix D : Block Diagram of Test Setups

Radiated Emissions above 30 MHz Test Site

