

FCC PART 15.231

EMI MEASUREMENT AND TEST REPORT



For

Dakota Alert

112 W. Main St., PO Box 130, Elk Point, SD57025, USA

FCC ID: QK83000T

December 8, 2004

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Driveway Radio
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Report No.: RSZ04112501	
Test Date: December 3, 2004	
Reviewed By: William Chan 	
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Note: The test report is specially limited to the above company and the product model only.
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Dakota Alert*'s product, model *3000T* or the "EUT" as referred to in this report is a Driveway Radio, at frequency range 433.92 MHz, which measures approximately 17.0cm L x 14.0cm W x 11.0cm H, rated input voltage: DC 9V battery.

** The test data gathered are from an engineering sample, serial number: 0411025, provided by the manufacturer.*

Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203,15.205,15.209 and 15.231 rules.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2003, 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. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

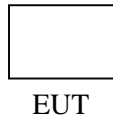
The EUT was configured for testing according to ANSI C63.4 - 2003.

The final qualification test was performed with the EUT operating at normal mode

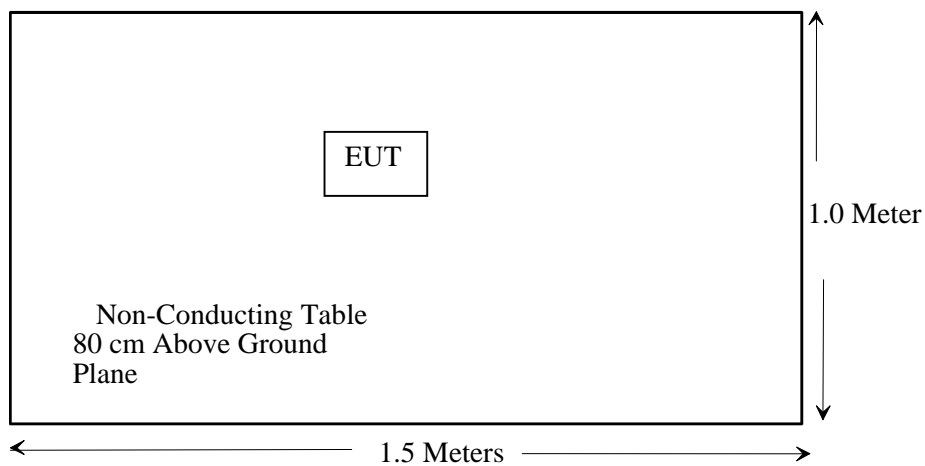
Equipment Modifications

No modifications were made to the EUT.

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Passed
§15.231 (b)	Radiated Emission	Passed
§15.231 (c)	-20dB Band Width Testing	Passed
§15.231 (a)(1)	Deactivation Testing	Passed
§15.205	Restricted Band	Passed
§15.209	General requirement	Passed

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

According to § 15.203, 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.

Refer to statement below for compliance.

“The antenna for this device is an integral antenna that the end user cannot access. Furthermore the device is for outdoor use as detailed in the Users Manual and Operational Description”.

Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement.

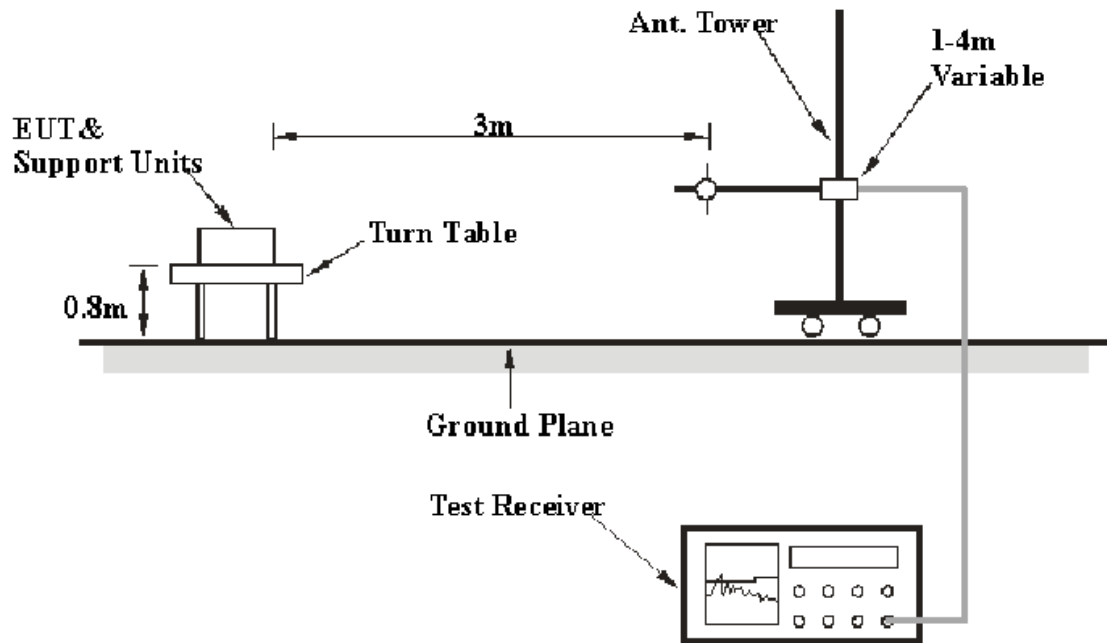
§15.231 (b)- RADIATED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

EUT Setup



The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15 § 15.231(b)"

Spectrum Analyzer Setup

The system was investigated from 30 MHz to 4.34 GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>VBW</i>
30 – 1000 MHz	100 kHz	100 kHz
1000 MHz – 4.34 GHz	1 MHz	1 MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB1	A040904-1	2004-4-19	2005-4-18
HP	Spectrum Analyzer	8593A	29190A00242	2004-4-19	2005-4-18
THERMAX	Coaxial Cable	RGS-142	EC002	2004-11-20	2005-11-19
HP	Preamplifier	8449B	3008A00277	2004-10-30	2005-10-29

* **Statement of Traceability:** BAACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Peak and Average detection mode.

Standard Applicable

According to §15.231(b), 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 3,370.....	125 to375
174-260.....	3,750	375
260-470.....	3,750 to12, 500.....	375 to 1,250
Above 470	12,500.....	1,250

Linear interpolations for frequency ranges 130 - 174 MHz and 260 - 470 MHz

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

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -5.8dB means the emission is 5.8dB below the maximum limit for Class C. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Subpart C Limit}$$

Test Data

Date of Test: December 3, 2004 Temperature: 25°C
 EUT: Driveway Radio Humidity: 50%
 M/N: 3000T Operating Mode: Transmitting with fresh battery
 S/N: 0411025 Test Engineer: Jandy Su

Frequency	Reading	Detector	Source	Direction	Height	Polar	Antenna Factor	Cable loss	Amplifier	Corrected Reading	FCC 15.231 Limit	FCC 15.231 Margin
MHz	dBuV/m			Degree	Meter	H / V	dB/m	dB	dB	dBuV/m	dBuV/m	dB
433.920	84.13	AV	Fundamental	180	1.2	v	16.8	2.2	25.51	77.6	80.8	-3.2
433.930	84.03	AV	Fundamental	45	1.0	h	16.8	2.2	25.51	77.5	80.8	-3.3
1300.960	35.20	AV	Others	45	1.2	v	23.8	3.7	24.23	38.5	54	-15.5
867.840	42.30	PK	Others	180	1.2	h	22.2	3.4	24.62	43.3	60.8	-17.5
433.930	85.98	PK	Fundamental	45	1.0	h	16.8	2.2	25.51	79.5	100.8	-21.3
867.060	38.20	PK	Others	45	1.0	h	22.2	3.4	24.62	39.2	60.8	-21.6
433.920	85.24	PK	Fundamental	180	1.2	v	16.8	2.2	25.51	78.7	100.8	-22.1
1301.860	27.80	AV	Others	45	1.2	h	23.8	3.7	24.23	31.1	54	-22.9
867.810	35.60	PK	Others	45	1.0	v	22.2	3.4	24.62	36.6	60.8	-24.2
868.610	31.80	PK	Others	60	1.0	h	22.2	3.4	24.62	32.8	60.8	-28.0
730.940	33.26	PK	Others	90	1.2	h	21.2	3.1	25.32	32.2	60.8	-28.6
867.060	30.10	PK	Others	60	1.2	v	22.2	3.4	24.62	31.1	60.8	-29.7
723.330	32.32	PK	Others	180	1.2	h	20.7	3.1	25.50	30.6	60.8	-30.2
626.330	29.70	PK	Others	90	1.2	v	19.3	2.8	25.75	26.1	60.8	-34.7
626.330	29.40	PK	Others	270	1.0	h	19.3	2.8	25.75	25.7	60.8	-35.1
868.630	24.50	PK	Others	270	1.0	v	22.2	3.4	24.62	25.5	60.8	-35.3
578.720	29.00	PK	Others	0	1.0	v	19.2	2.6	26.03	24.8	60.8	-36.0
481.720	30.10	PK	Others	45	1.2	v	17.9	2.3	25.82	24.4	60.8	-36.4

Test Result: Pass

* Note: The EUT was tested in all three orthogonal planes.

§15.231(c) –20dB BANDWIDTH TESTING

Requirement

Per 15.231(c), 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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Procedure

With the EUT's antenna attached, the EUT's –20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

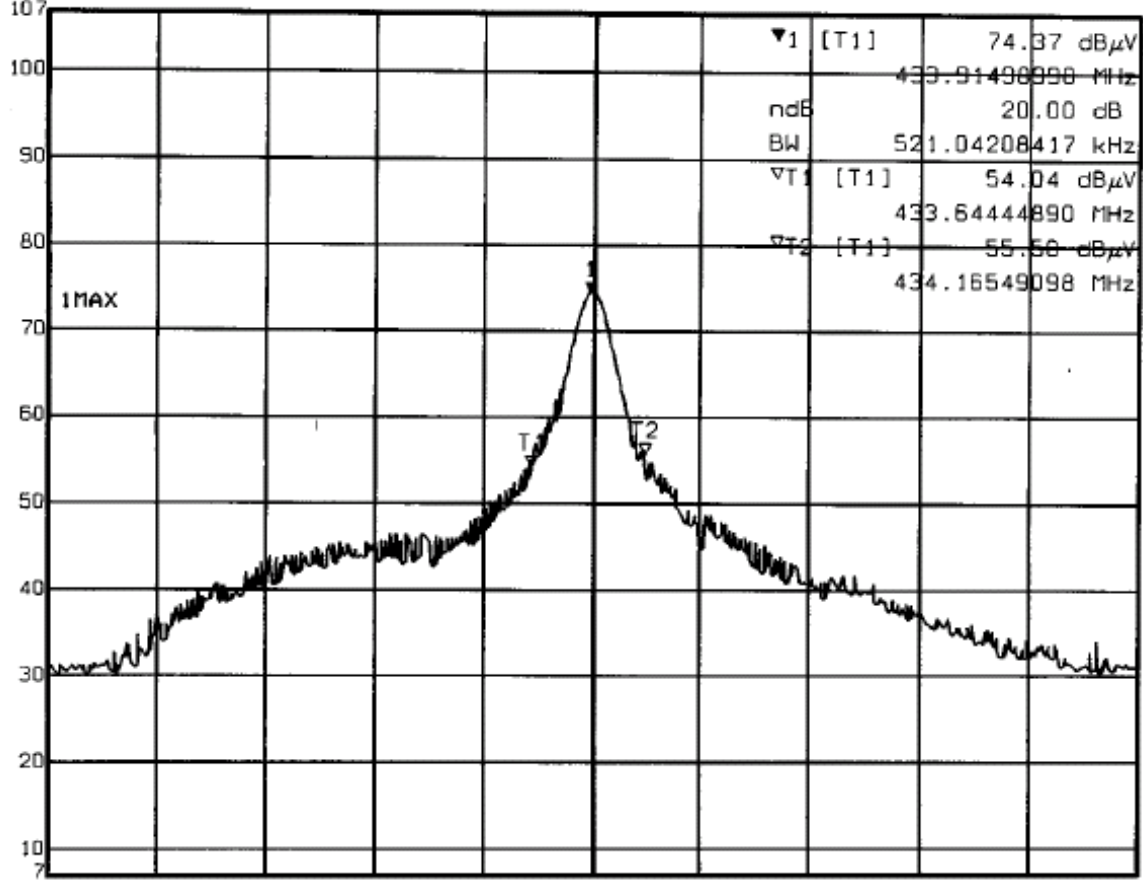
The 0.25% of 433.92 MHz = 1.0848 MHz

-20dB Bandwidth was 521.04 kHz < 1.0848 MHz

Test Result: Pass



Ref Lvl 107 dBμV
 Marker 1 [T1 ndB] 20.00 dB
 BW 521.04208417 kHz
 RBW 100 kHz
 VBW 100 kHz
 SWT 500 ms
 RF Att 10 dB
 Unit dBμV



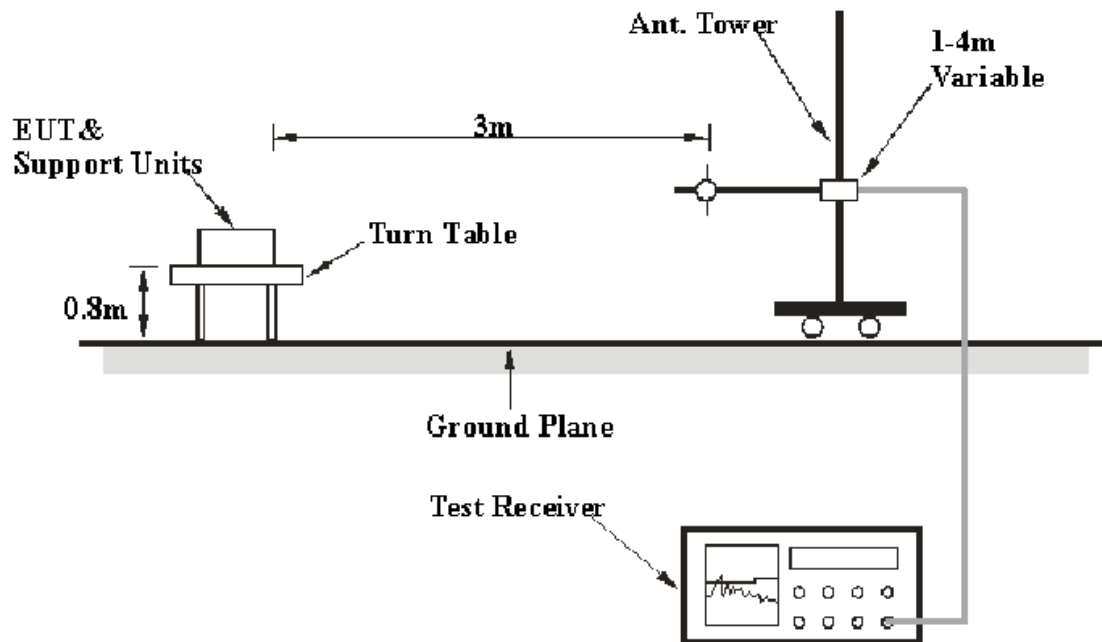
Center 433.92 MHz 500 kHz Span 5 MHz
 Date: 03.DEC.2004 14:24:17 *Judy mdr 03*

§15.231(a)-DEACTIVATION TESTING

Requirement

Per 15.231(a) (1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

EUT Setup



The deactivation test was performed in the 3-meter Chamber, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15.231(a) limits.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Refer to the attached plots.

Test Result: Pass

