Engineering and Testing for EMC and Safety Compliance

Accredited under A2LA Testing Certificate # 2653.01

FCC & IC Certification Report

VHF FM Transceiver
Model: DJ-175T

FCC ID: PH3DJ-175T
IC: 3070C-DJ175T

Alinco Incorporated
Electronics Division
Shin-Dai Building 9F
2-6, 1-Chome, Dojimahama, Kita-ku
Osaka 530-0004 Japan

August 8, 2008

Standards Referenced for this Report	
Part 2: 2006	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15.121: 2007	Radio Frequency Devices; Scanning Receivers and Frequency Converters Used with Scanning Receivers
ANSI C63.4-2007	Standard Format Measurement/Technical Report Personal Computer and Peripherals
RSS-215; Issue 1 (Provisional)	Analogue Scanner Receivers

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designators
136-173.995	N/A	N/A	16K0F3E

REPORT PREPARED BY:

Test Engineer: Daniel Baltzell
Administrative Writer: Daniel Baltzell

Rhein Tech Laboratories, Inc.

Document Number: 2008118

360 Herndon Parkway, Suite 1400
Herndon, VA 20170
Tel: 703-689-0368 Fax: 703-689-2056

Table of Contents

Table Index

Appendix Index

Photograph Index

1 General Information

The following application for certification of an analog scanning receiver is prepared on behalf of Alinco Incorporated; Electronics Division, in accordance with the applicable portions of the FCC Rules and Regulations Parts 2 and 15 and Industry Canada RSS-215. The Equipment Under Test (EUT) is Model DJ-175T, FCC ID: PH3DJ-175T, IC: 3070C-DJ175T. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 2007. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

1.1 Modifications

No modifications were made during testing.

1.2 Related Submittal(s)/Grant(s)

This is an original certification submission.

1.3 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4-2007. Radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report, submitted to, and approved by the Federal Communications Commission; to perform AC line conducted and radiated emissions testing (ANSI C63.4-2007).

2 System Test Configuration

2.1 Justification

To complete the test configuration required by the FCC, the receiver was connected to an external antenna, which receives a signal from a signal generator output. With the antenna installed, the receiver indicator was used to determine optimal reception. The EUT's intermediate frequencies (IF), local oscillators (LO), crystal oscillators, and harmonics of each were investigated. Conducted emissions were measured from the AC port of the charger. All modes were investigated and tested, including standby mode and scanning mode. The final radiated data was taken with the EUT locked to a set frequency.

2.2 Exercising the EUT

The DJ-175T is a VHF FM transceiver designed to function at the following frequency range: TX 144-147.995 MHz; RX 136-173.995 MHz. The transmitter portion of the transceiver is subject to the FCC/IC amateur radio rules and was not tested. The following receiver frequencies were tested: 136, 154.4975, and 173.995 MHz. In order to activate the receiver circuitry, a signal was transmitted from a signal generator. This allowed the EUT to function in its typical state throughout the course of all testing.

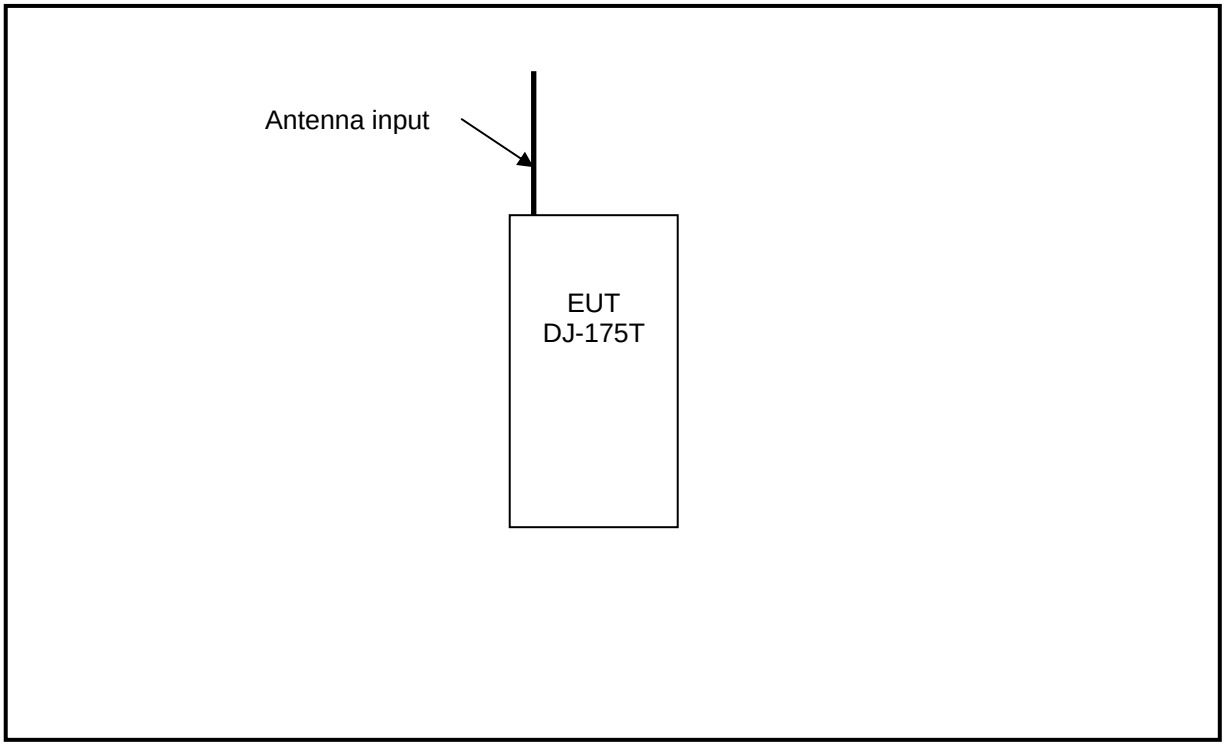
2.3 Test System Details

The test sample was received on August 7, 2008. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are shown in the table that follows.

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable	RTL Bar Code
FCC VHF FM Transceiver	Alinco	DJ-175T	M000403	PH3DJ-175T	N/A	18568
7.4V 1200mAh Li-Ion Battery	Alinco	EBP-71	004025	N/A	N/A	18522
7.4V 1200mAh Li-Ion Battery	Alinco	EBP-71	N/A	N/A	N/A	18523
7.2V 700mAh Ni-MH Battery	Alinco	EBP-72	004011	N/A	N/A	18524
7.2V 700mAh Ni-MH Battery	Alinco	EBP-72	004012	N/A	N/A	18525
Li-Ion Battery Charger	Alinco	EDC-164	M000401	N/A	N/A	18526
Ni-MH Battery Charger	Alinco	EDC-165	M000403	N/A	N/A	18531
EDC-164 AC Adapter	Alinco	EDC-170 YSU15120	N/A	N/A	1.7m unshielded power	18527
EDC-165 AC Adapter	Alinco	EDC-146 AD35-12002	N/A	N/A	1.7m unshielded power	18532
Antenna	Alinco	EA0142	N/A	N/A	N/A	18540
Antenna	Alinco	EA0142	N/A	N/A	N/A	18541
Antenna	Alinco	EA0142	N/A	N/A	N/A	18542
Antenna	Alinco	EA0142	N/A	N/A	N/A	18543

2.4 Configuration of Tested System



3 AC Conducted Emissions - FCC Rules and Regulations Part 15 §15.107(b): Conducted Limits

3.1 Site and Test Description

The power line conducted emissions measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50-ohm/50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable).

The analyzer's 6 dB bandwidth was set to 9 kHz. A video filter less than 10 times the resolution bandwidth is not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded.

3.2 Test Limits

Class A Line Conducted Emissions		
	Limit (dBµV)	
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	79	66
0.50 to 30.0	73	60

Class B Line Conducted Emissions		
	Limit (dBµV)	
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.00	60	50

3.3 Conducted Emissions Test Data

Table 3-1: Conducted Emissions Test Data – Mode RX, Neutral (EDC-165 NiMH Charger)

Temperature: 76.7°F Humidity: 27%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.159	Pk	41.2	0.2	41.4	65.5	-24.1	55.5	-14.1	Pass
0.310	Pk	37.9	0.2	38.1	60.0	-21.9	50.0	-11.9	Pass
0.498	Pk	37.1	0.2	37.3	56.0	-18.7	46.0	-8.7	Pass
0.560	Pk	35.9	0.2	36.1	56.0	-19.9	46.0	-9.9	Pass
7.760	Pk	18.1	1.6	19.7	60.0	-40.3	50.0	-30.3	Pass
18.970	Pk	17.8	2.5	20.3	60.0	-39.7	50.0	-29.7	Pass

Table 3-2: Conducted Emissions Test Data – Mode RX, Phase (EDC-165 NiMH Charger)

Temperature: 76.7°F Humidity: 27%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.162	Pk	40.7	0.2	40.9	65.4	-24.5	55.4	-14.5	Pass
0.322	Pk	37.7	0.2	37.9	59.7	-21.8	49.7	-11.8	Pass
0.496	Pk	36.3	0.2	36.5	56.1	-19.6	46.1	-9.6	Pass
0.740	Pk	26.9	0.3	27.2	56.0	-28.8	46.0	-18.8	Pass
13.480	Pk	17.0	2.2	19.2	60.0	-40.8	50.0	-30.8	Pass
28.850	Pk	17.5	2.8	20.3	60.0	-39.7	50.0	-29.7	Pass

Table 3-3: Conducted Emissions Test Data – Mode RX, Neutral (EDC-164 Li-Ion Charger)

Temperature: 76.7°F Humidity: 27%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.179	Av	25.5	0.2	25.7	64.5	-38.8	54.5	-28.8	Pass
0.179	Qp	50.8	0.2	51.0	64.5	-13.5	54.5	-3.5	Pass
0.270	Av	18.6	0.2	18.8	61.1	-42.3	51.1	-32.3	Pass
0.270	Qp	39.6	0.2	39.8	61.1	-21.3	51.1	-11.3	Pass
0.361	Av	16.4	0.2	16.6	58.7	-42.1	48.7	-32.1	Pass
0.361	Qp	35.3	0.2	35.5	58.7	-23.2	48.7	-13.2	Pass
1.541	Av	14.5	0.8	15.3	56.0	-40.7	46.0	-30.7	Pass
1.541	Qp	35.4	0.8	36.2	56.0	-19.8	46.0	-9.8	Pass
2.670	Av	16.5	1.1	17.6	56.0	-38.4	46.0	-28.4	Pass
2.670	Qp	37.4	1.1	38.5	56.0	-17.5	46.0	-7.5	Pass
10.960	Pk	27.6	1.8	29.4	60.0	-30.6	50.0	-20.6	Pass

Table 3-4: Conducted Emissions Test Data – Mode RX, Phase (EDC-164 Li-Ion Charger)

Temperature: 76.7°F Humidity: 27%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.183	Av	20.1	0.2	20.3	64.3	-44.0	54.3	-34.0	Pass
0.183	Qp	49.0	0.2	49.2	64.3	-15.1	54.3	-5.1	Pass
0.275	Av	16.2	0.2	16.4	61.0	-44.6	51.0	-34.6	Pass
0.275	Qp	37.5	0.2	37.7	61.0	-23.3	51.0	-13.3	Pass
0.370	Av	17.0	0.2	17.2	58.5	-41.3	48.5	-31.3	Pass
0.370	Qp	35.7	0.2	35.9	58.5	-22.6	48.5	-12.6	Pass
1.097	Av	14.0	0.6	14.6	56.0	-41.4	46.0	-31.4	Pass
1.097	Qp	33.0	0.6	33.6	56.0	-22.4	46.0	-12.4	Pass
2.462	Av	17.0	1.1	18.1	56.0	-37.9	46.0	-27.9	Pass
2.462	Qp	37.6	1.1	38.7	56.0	-17.3	46.0	-7.3	Pass
11.680	Pk	27.4	2.0	29.4	60.0	-30.6	50.0	-20.6	Pass

Table 3-5: Equipment Used for Testing

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900896	Hewlett Packard	85662A	Display Section	2816A16471	4/2/09
900897	Hewlett Packard	8567A	HP Spectrum Analyzer (10KHz-1.5GHz)	2727A00535	4/2/09
900901	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz-1 GHz)	3145A01599	4/2/09
901082	AFJ International	LS16	16A LISN	16010020081	4/2/09

Test Personnel:

Daniel W. Baltzell		August 8, 2008
Test Engineer	Signature	Date Of Test

4 Radiated Emissions – FCC Rules and Regulations Part 15 §15.109(a): Radiated Emissions Limits; RSS-215 Section 7 - Receiver Spurious Emissions

4.1 Test Methodology for Radiated Emissions Measurements

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances, in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction, and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 80 centimeters above the ground plane. The spectrum was examined from 30 MHz to 1000 MHz using a spectrum analyzer, a quasi-peak adapter, and EMCO log periodic and biconical antenna. In order to gain sensitivity, a preamplifier was connected in series between the antenna and the input of the spectrum analyzer.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The second harmonic of the highest LO was tested. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

4.2 Radiated Emissions Data

Table 4-1: Radiated Emissions – Mode RX

Temperature: 78°F Humidity: 38%									
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
48.226	Qp	H	0	1.0	34.8	-14.5	20.3	40.0	-19.7
130.200	Qp	V	0	1.0	33.9	-13.4	20.5	43.5	-23.0
144.671	Qp	H	0	1.0	33.3	-14.1	19.2	43.5	-24.3
148.300	Qp	V	180	1.0	32.3	-14.4	17.9	43.5	-25.6
246.600	Qp	H	0	1.0	31.1	-12.5	18.6	46.0	-27.4
313.456	Qp	V	0	1.0	31.1	-10.4	20.7	46.0	-25.3

Notes: A low, middle, and high channel was checked for the receive band
Limit/Distance: FCC B/3M

Table 4-2: Equipment Used for Testing

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900905	Rhein Tech Laboratories	PR-1036	OATS 1 Preamplifier 40 dB (30 MHz–2 GHz)	1006	6/2/09
900913	Hewlett Packard	8546A	Spectrum Analyzer (9 kHz-6.5 GHz)	3325A00159	4/15/09
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz-2 GHz)	2648	12/20/08

Test Personnel:

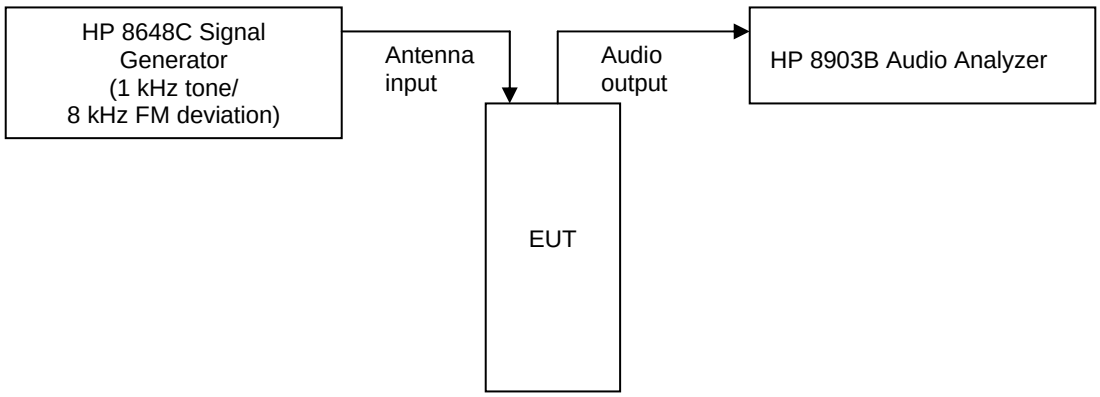
Daniel W. Baltzell		August 8, 2008
Test Engineer	Signature	Date Of Test

5 FCC Rules and Regulations Part 15 §15.121(b) - 38 dB Rejection Test

A signal generator was connected to the receiver under test, and the output of the receiver was connected to an audio analyzer.

An FM signal was applied to the receiver antenna input with a 1 kHz tone modulated at 5 kHz deviation, and adjusted with the audio analyzer to produce a 12 dB SINAD. This was done across the receiver bands to determine a reference level. The reference level used was that with the highest sensitivity in all of the bands.

The output of the signal generator was then adjusted to a level 136 dB above the reference level established, and set to a low, medium, and high frequency in both the mobile and base cellular bands: the mobile band being 824.04 MHz-848.97 MHz, and the base band being 869.04 MHz-893. 97 MHz. The squelch of the receiver was then set to a minimum threshold level, and scanning begun from the lowest to the highest channel. Whenever the receiver stopped and "un-squelched", that frequency was noted as a response. After all the frequencies of responses were noted, the signal generator was set to measure the sensitivity at each of these response frequencies. This measurement was the reference sensitivity for the particular received frequency measured. The audio analyzer measurement was used to measure the 12 dB SINAD, which is the spurious value. The difference between the reference sensitivity and the spurious value is the rejection ratio and must be at least 38 dB.



Frequencies used on the signal generator were 824.04, 836.50, and 848.97 MHz for the mobile band, and 869.04, 881.50, and 893.97 MHz for the base band.

The DJ-175T unit reference level used was –79 dBm from the signal generator. The DJ-175T unit was scanned on all specified operating frequency ranges, per manufacturer's specifications. Signals that were noted as responses were checked with the signal generator off. If they were still present, they were determined to be ambient signals and removed from the response list.

No signals were detected for the 38 dB rejection test requirements.

5.1 38 dB Rejection Test Data for Base Band (869.014-893.970 MHz)

Table 5-1: 38 dB Rejection {Frequency Injected: 869.04 MHz} (Cellular Band)

Frequency Injected: 869.04 MHz		Temperature: 74°F; Humidity: 38%		
Frequency Detected (MHz)	**Level 12 dB SINAD at 869.04 MHz**	**Level 12 dB at Frequency Detected**	**Rejection**	**Margin**
No Frequencies Detected	N/A	N/A	N/A	N/A

Table 5-2: 38 dB Rejection {Frequency Injected: 881.500 MHz} (Cellular Band)

Frequency Injected: 881.500 MHz		Temperature: 74°F; Humidity: 38%		
Frequency Detected (MHz)	**Level 12 dB SINAD at 881.500 MHz**	**Level 12 dB at Frequency Detected**	**Rejection**	**Margin**
No Frequencies Detected	N/A	N/A	N/A	N/A

Table 5-3: 38 dB Rejection {Frequency Injected: 893.970 MHz} (Cellular Band)

Frequency Injected: 893.970 MHz		Temperature: 74°F; Humidity: 38%		
Frequency Detected (MHz)	**Level 12 dB SINAD at 893.970 MHz**	**Level 12 dB at Frequency Detected**	**Rejection**	**Margin**
No Frequencies Detected	N/A	N/A	N/A	N/A

5.2 38 dB Rejection Test Data for Mobile Band (824.04-848.970 MHz)

Table 5-4: 38 dB Rejection {Frequency Injected: 824. 04 MHz} (Mobile Band)

Frequency Injected: 824.04 MHz		Temperature: 74°F; Humidity: 38%		
Frequency Detected (MHz)	**Level 12 dB SINAD at 824.0136 MHz**	**Level 12 dB at Frequency Detected**	**Rejection**	**Margin**
No Frequencies Detected	N/A	N/A	N/A	N/A

Table 5-5: 38 dB Rejection {Frequency Injected: 836.500 MHz} (Mobile Band)

Frequency Injected: 836.500 MHz		Temperature: 74°F; Humidity: 38%		
Frequency Detected (MHz)	**Level 12 dB SINAD at 836.500 MHz**	**Level 12 dB at Frequency Detected**	**Rejection**	**Margin**
No Frequencies Detected	N/A	N/A	N/A	N/A

Table 5-6: 38 dB Rejection {Frequency Injected: 848.970 MHz} (Mobile Band)

Frequency Injected: 848.970 MHz		Temperature: 74°F; Humidity: 38%		
Frequency Detected (MHz)	**Level 12 dB SINAD at 848.970 MHz**	**Level 12 dB at Frequency Detected**	**Rejection**	**Margin**
No Frequencies Detected	N/A	N/A	N/A	N/A

Table 5-7: Equipment Used for Testing

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900917	Hewlett Packard	8648C	Signal Generator, 100 kHz-3.2 GHz	3537A01741	9/5/08
901067	Hewlett Packard	HP8903B	Audio Analyzer	2450A00135	10/17/08

Test Personnel:

Daniel W. Baltzell		August 7, 2008
Test Engineer	Signature	Date Of Test

6 Conclusion

The data in this measurement report shows that the Alinco Incorporated Model DJ-175T, FCC ID: PH3DJ-175T, IC: 3070C-DJ175T, complies with all applicable requirements of Parts 2 and 15.121 of the FCC Rules and Industry Canada RSS-215, Issue 1.