RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & IC Certification Report

Model: DJ-G29T
222/902 MHz Dual Band FM Transceiver
Handheld Amateur Radio

FCC ID: PH3-DJG29T
IC: 3070C-DJG29T

Alinco Incorporated
Electronics Division
Yodoyabashi Dai Building 13F
4-4-9 Koraibashi, Chuo-ku
Osaka 541-0043 Japan

November 4, 2011

Standards Referenced for this Report	
Part 2: 2010	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15.121: 2010	Radio Frequency Devices; Scanning Receivers and Frequency Converters Used with Scanning Receivers
ANSI C63.4-2003	Standard Format Measurement/Technical Report Personal Computer and Peripherals
RSS-215 Issue 2	Analogue Scanner Receivers

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designators
216-249.995	N/A	N/A	16K0F3E
902-927.995	N/A	N/A	16K0F3E

Report Prepared By:

Test Engineer: Jon Wilson
Administrative Writer: Jon Wilson

Document Number: 2011180

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

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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-G29T, FCC ID: PH3-DJG29T, IC: 3070C-DJG29T. 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, 2003. 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 C63.4-2003. 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 C63.4-2003).

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-G29T is a dual band transceiver designed to function at the following frequency ranges: 216.000-249.995 MHz and 902.000-927.995 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: 216, 232.995, 249.995, 902, 915, and 927.993 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 October 27, 2011. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are shown in the table that follows.

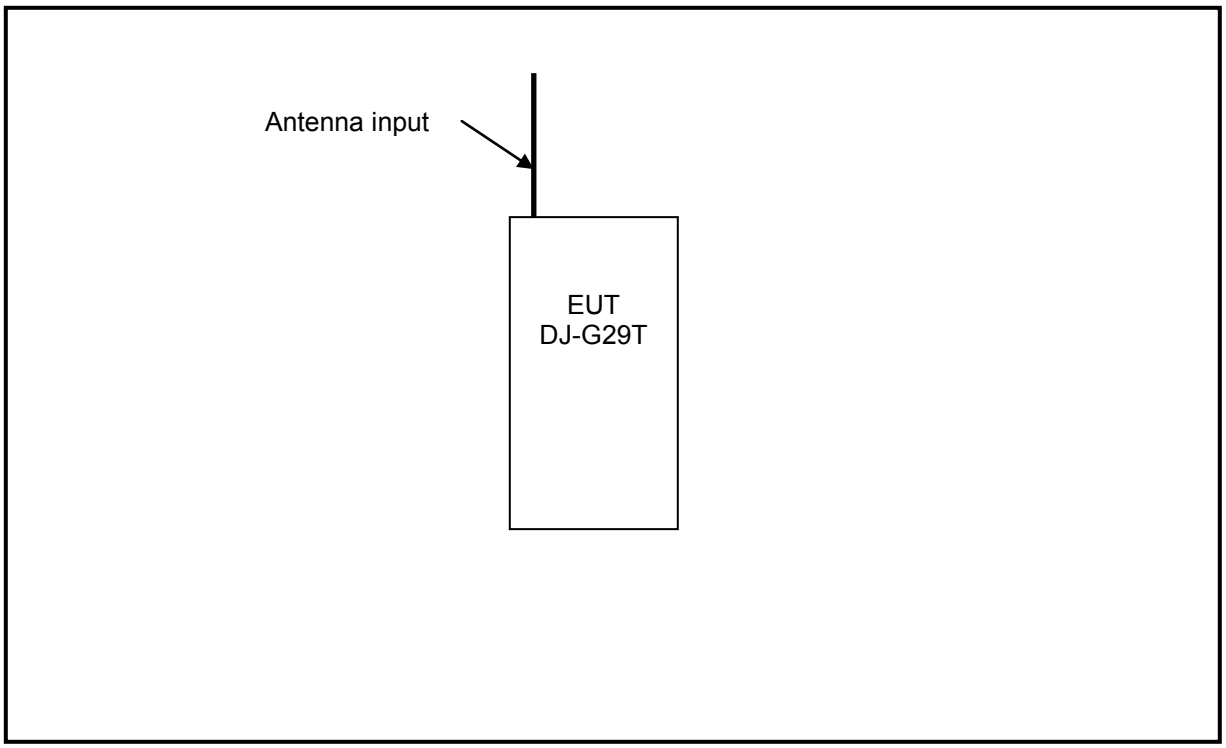
Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	Serial Number	Cable Description	RTL Bar Code
Dual Band Transceiver	Alinco	DJ-G29T	M000490	N/A	020459
Li-Ion Battery Pack	Alinco	EBP-73	006757	N/A	020462
Charging Base	Alinco	EDC-173	M003405	N/A	020468
AC Adapter (for Charging Base)	Alinco	EDC-170	YSU15120	Unshielded	020466
Flex Whip Antenna	Alinco	EA-203	N/A	N/A	N/A

Table 2-2: Auxiliary Equipment

Part	Manufacturer	Model	Serial Number	Cable Description	RTL Bar Code
Headphone/ Microphone	Harris Corp.	EME-34A	N/A	Unshielded	018881

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 emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was placed on a wooden table. 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 AC 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's auxiliary equipment. This peripheral LISN was also fed AC power.

The spectrum analyzer was connected to the AC 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. Video filters less than 3 times the resolution bandwidth are not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, 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.

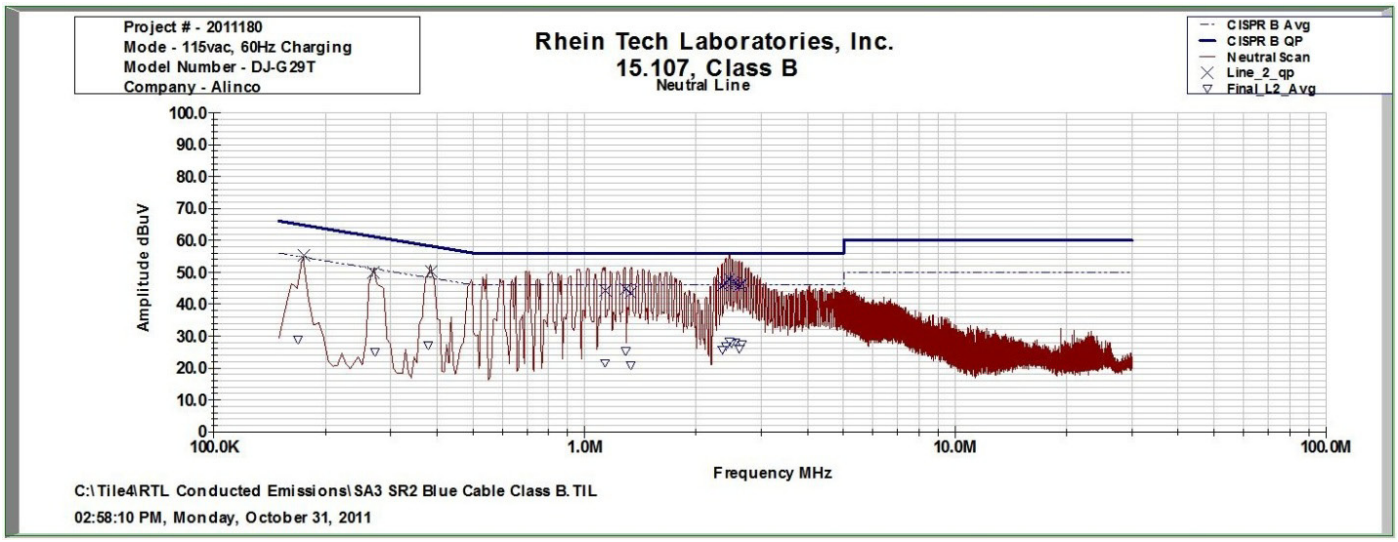
3.2 Test Limits

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

Plot 3-1: Conducted Emissions Test Data – Mode RX, Neutral (EDC-173 Charger)



Plot 3-2: Conducted Emissions Test Data – Mode RX, Phase (EDC-173 Charger)

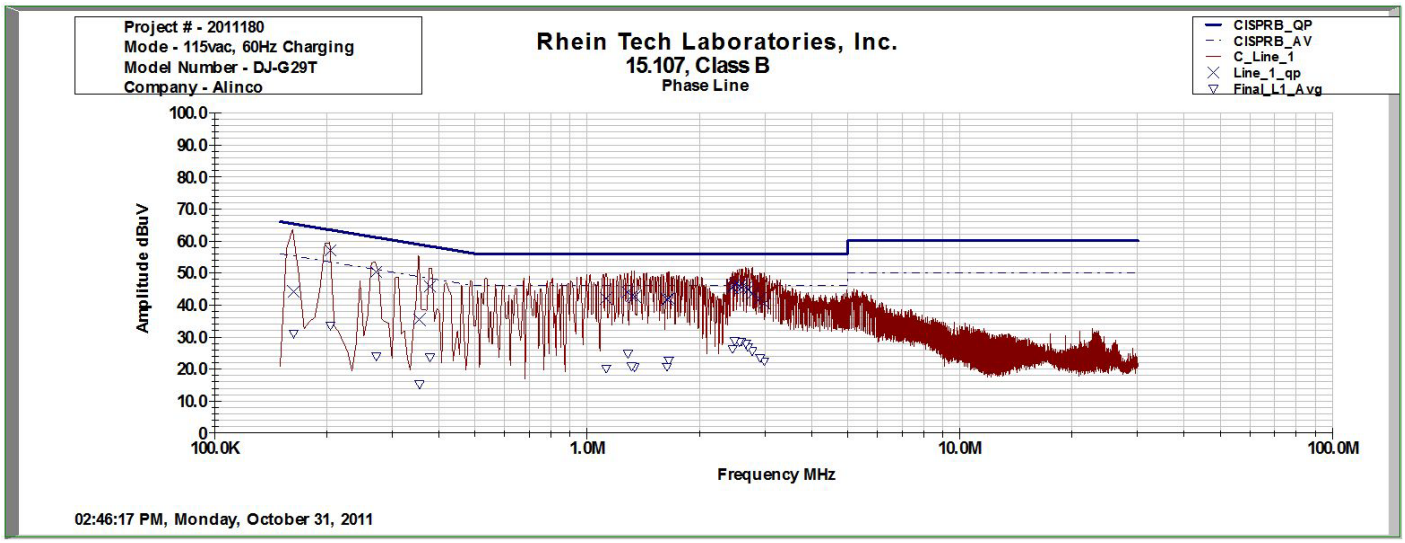


Table 3-1: Equipment Used for Testing Conducted Emissions

Part Type	Manufacturer	Model	Serial Number	RTL Bar Code	Calibration Due Date
Spectrum Analyzer (100Hz-.15GHz)	Hewlett Packard	8567A	2602A00160	900968	11/17/12
Spectrum Analyzer Display Section	Hewlett Packard	85662A	2542A11239	900970	11/17/12
Quasi-Peak Adapter	Hewlett Packard	85650A	2521A00743	900339	11/17/12
Filter	Solar	8130	947306	900728	2/22/12
16A LISN	AFJ International	LS16/110VAC	16010020080	901083	12/1/12
Test software	Quantum Change	Tile!	4.0.A.8	N/A	N/A

Test Personnel:

Jon Wilson		October 31, 2011
Test Engineer	Signature	Date Of Test

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

4.2 Radiated Emissions Data

Table 4-1: Radiated Emissions – Mode RX Ch 216 MHz

Temperature: 39°F Humidity: 97%										
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)	Pass/ Fail
267.650	Qp	V	90	1.0	36.5	-14.1	22.4	46.0	-23.6	Pass
535.300	Qp	H	120	1.0	32.6	-7.2	25.4	46.0	-20.6	Pass
802.950	Qp	V	45	1.2	36.7	-4.1	32.6	46.0	-13.4	Pass
1070.600	Av	H	180	1.2	35.0	-0.2	34.8	54.0	-19.2	Pass
1338.250	Av	V	210	1.0	31.9	3.5	35.4	54.0	-18.6	Pass
1605.900	Av	V	50	1.0	29.5	6.8	36.3	54.0	-17.7	Pass
1873.550	Av	V	280	1.0	28.0	10.7	38.7	54.0	-15.3	Pass

Table 4-2: Radiated Emissions – Mode RX Ch 232.995 MHz

Temperature: 39°F Humidity: 97%										
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)	Pass/ Fail
284.645	Qp	H	320	1.5	40.8	-14.0	26.8	46.0	-19.2	Pass
569.290	Qp	V	75	1.0	38.1	-6.5	31.6	46.0	-14.4	Pass
853.935	Qp	V	180	1.0	34.8	-2.6	32.2	46.0	-13.8	Pass
1138.580	Av	V	45	1.0	34.8	1.0	35.8	54.0	-18.2	Pass
1423.225	Av	V	270	1.0	30.1	5.0	35.1	54.0	-18.9	Pass
1707.870	Av	H	90	1.0	31.1	8.3	39.4	54.0	-14.6	Pass
1992.515	Av	V	345	1.0	30.7	13.3	44.0	54.0	-10.0	Pass

Table 4-3: Radiated Emissions – Mode RX Ch 249.995 MHz

Temperature: 42°F Humidity: 85%										
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)	Pass/ Fail
301.645	Qp	H	180	1.0	39.4	-14.0	25.4	46.0	-20.6	Pass
603.290	Qp	H	75	1.5	34.4	-6.5	27.9	46.0	-18.1	Pass
904.935	Qp	V	90	1.0	36.3	-3.0	33.3	46.0	-12.7	Pass
1206.580	Av	V	145	1.0	30.3	2.0	32.3	54.0	-21.7	Pass
1508.225	Av	H	135	1.2	31.1	5.9	37.0	54.0	-17.0	Pass
1809.870	Av	V	180	1.0	30.8	9.2	40.0	54.0	-14.0	Pass

Table 4-4: Radiated Emissions – Mode RX Ch 902 MHz

Temperature: 43°F Humidity: 75%										
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)	Pass/ Fail
953.65	Qp	V	135	1.2	40.2	-2.1	38.1	46.0	-7.9	Pass
1907.297	Av	V	10	1.0	31.2	11.7	42.9	54.0	-11.1	Pass
2,860.947	Av	V	90	1.0	45.2	-8.3	36.9	54.0	-17.1	Pass
3,814.597	Av	H	145	1.0	39.7	-6.2	33.5	54.0	-20.5	Pass
4,768.247	Av	H	20	1.0	28.9	-1.3	27.6	54.0	-26.4	Pass

Table 4-5: Radiated Emissions – Mode RX Ch 915 MHz

Temperature: 43°F Humidity: 75%										
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)	Pass/ Fail
966.650	Qp	V	320	1.2	41.5	-1.6	39.9	54.0	-14.1	Pass
1933.300	Av	H	180	1.0	30.1	11.9	42.0	54.0	-12.0	Pass
2899.950	Av	V	45	1.0	45.1	-8.3	36.8	54.0	-17.2	Pass
3866.600	Av	H	230	1.0	40.6	-6.2	34.4	54.0	-19.6	Pass
4833.250	Av	H	320	1.0	28.8	-1.1	27.7	54.0	-26.3	Pass

Table 4-6: Radiated Emissions – Mode RX Ch 927.993 MHz

Temperature: 43°F Humidity: 75%										
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)	Pass/ Fail
979.643	Qp	V	75	1.0	41.3	-1.7	39.6	54.0	-14.4	Pass
1959.286	Av	V	290	1.0	29.4	12.3	41.7	54.0	-12.3	Pass
2938.929	Av	V	45	1.2	42.7	-7.9	34.8	54.0	-19.2	Pass
3918.572	Av	H	180	1.0	39.9	-6.3	33.6	54.0	-20.4	Pass
4898.215	Av	H	15	1.0	27.3	-1.1	26.2	54.0	-27.8	Pass

Table 4-7: Radiated Emissions – Mode RX Ch 216 MHz, Charging

Temperature: 43°F Humidity: 73%										
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)	Pass/ Fail
56.250	Qp	H	270	2.0	43.3	-22.7	20.6	40.0	-19.4	Pass
78.500	Qp	V	180	1.0	43.6	-22.0	21.6	40.0	-18.4	Pass
155.000	Qp	V	165	1.5	44.5	-18.6	25.9	43.5	-17.6	Pass
220.750	Qp	V	45	1.0	37.5	-18.9	18.6	46.0	-27.4	Pass
270.000	Qp	V	50	1.0	37.3	-14.2	23.1	46.0	-22.9	Pass
535.300	Qp	H	180	2.0	35.6	-7.2	28.4	46.0	-17.6	Pass

Limit/Distance: FCC B/3m

Table 4-8: Equipment Used for Testing Radiated Emissions

Part Type	Manufacturer	Model	Serial Number	RTL Bar Code	Calibration Due Date
Amplifier (20 MHz-2 GHz)	Rhein Tech Laboratories, Inc.	PR-1040	900905	900905	4/10/12
Bilog Periodic Antenna (25 MHz-2 GHz)	Schaffner Chase	CBL6112	2099	900791	12/12/12
EMI Receiver RF Section (9 KHz-6.5 GHz)	Hewlett Packard	85462A	3325A00159	900913	8/17/12
RF Filter Section (100 KHz-6.5 GHz)	Hewlett Packard	85460A	3330A00107	900914	8/17/12
Spectrum Analyzer	Hewlett Packard	8596EM	3826A00144	901215	11/23/11
Amplifier (1 GHz–26.4 GHz)	Rhein Tech Laboratories, Inc.	PR-1042	1003	901364	3/31/12
Horn Antenna (2.0-4.0 GHz)	EMCO	3161-02	9804-1044	900772	6/13/12
Horn Antenna (4.0-8.2 GHz)	EMCO	3161-03	9508-1020	900321	6/13/12
Emissions Testing Software	Rhein Tech Laboratories, Inc.	Automated Emission Tester	Rev. 14.0.2	N/A	N/A

Test Personnel:

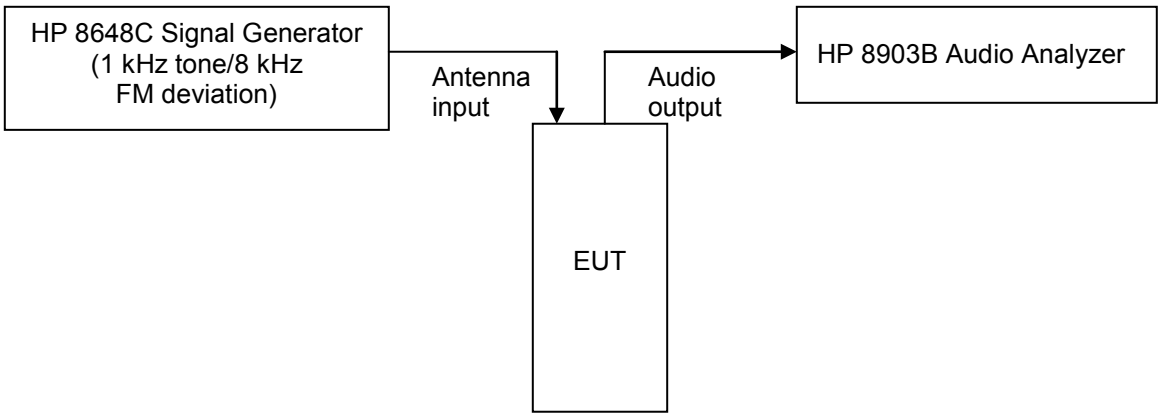
Jon Wilson		October 31, 2011
Test Engineer	Signature	Date Of Test

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 80 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-G29T unit reference level used was –60 dBm from the signal generator. The DJ-G29T 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 (869.04-893.970 MHz)

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

Frequency Injected: 869.04 MHz		Temperature: 74°F; Humidity: 32%		
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: 32%		
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: 32%		
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: 32%		
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: 32%		
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

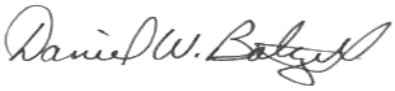
Table 5-6: 38 dB Rejection {Frequency Injected: 848.970 MHz} (Mobile Band)

Frequency Injected: 848.970 MHz		Temperature: 74°F; Humidity: 32%		
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 38 dB Rejection Testing

Part Type	Manufacturer	Model	Serial Number	RTL Bar Code	Calibration Due Date
Signal Generator, (100 kHz-3.2 GHz)	Hewlett Packard	8648C	3537A01741	900917	10/20/12
Audio Analyzer	Hewlett Packard	HP8903B	2450A00135	901067	1/12/12

Test Personnel:



Daniel W. Baltzell		November 1, 2011
Test Engineer	Signature	Date Of Test

6 Conclusion

The data in this measurement report shows that the Alinco Incorporated Model DJ-G29T, FCC ID: PH3-DJG29T, IC: 3070C-DJG29T, complies with all applicable requirements of Parts 2 and 15.121 of the FCC Rules and Industry Canada RSS-215, Issue 2.