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FCC PART 74

LOW POWER LICENSED TRANSMITTER

TEST REPORT

APPLICANT	CLEARONE INC.
	EDGEWATER CORPORATE PARK, SOUTH TOWER 5225 WILEY POST WAY, SUITE # 500 SALT LAKE CITY UTAH 84116 USA
FCC ID	FBITABLETOP
MODEL NUMBER	DS80-CC-C-M500, 910-6001-004-C, DS80-CC-C-M610, 910-6001-003-C, DS80-C0-C-M500, 910-6001-014-C, DS80-C0-C-M610,910-6001-013-C
PRODUCT DESCRIPTION	TABLE TOP WIRELESS MICROPHONE
STANDARD APPLIED	CFR 47 Part 74.801 & IC RSS-123
DATE SAMPLE RECEIVED	9/15/2014
DATE TESTED	9/22/2014
TESTED BY	Sid Sanders
APPROVED BY	Cory Leverett
TIMCO REPORT NO.	1642AUT14TestReport.docx
TEST RESULTS	☒ PASS ☐ FAIL

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

The test results relate only to the items tested.

Summary

The device under test does:
☒ fulfill the general approval requirements as identified in this test report
☐ not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669

Authorized Signatory Name:

Project Manager Name
Engineering Project Manager

Date: 9/26/14

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GENERAL INFORMATION

RULES FCC PART 2.1033 & IC RSS - Gen

EUT TECHNICAL DESCRIPTION

EUT Description	TABLE TOP WIRELESS MICROPHONE
FCC ID	FBITABLETOP
Model Number	DS80-CC-C-M500, 910-6001-004-C, DS80-CC-C-M610, 910-6001-003-C, DS80-C0-C-M500, 910-6001-014-C, DS80-C0-C-M610,910-6001-013-C
Modulation	CQPSK
Type of Emission	156K0G1D
Frequency Range	499-608MHz & 614-618MHz
Test Frequencies	499, 511.58, 605.40, 614.35, & 617.60MHz
Maximum Output Power	9.2milliWatts
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☐ Fixed
	☒ Mobile
	☐ Portable

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GENERAL INFORMATION

Test Facility	Timco Engineering, Inc. 849 NW State Road 45, Newberry, FL 32669
Test Condition	The temperature was 24-26ºC with a relative humidity of 50-60%.
Modifications	None
Test Exercise (e.g software description, test signal, etc.)	The EUT was operated in its normal mode of operation.
Applicable Standards	ANSI/TIA 603-C:2010, FCC CFR 47 Parts 2 and 74, RSS-Gen, RSS-123 Issue 2, 2011

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TEST PROCEDURES

Power Line Conducted Interference: The procedure used was ANSI/TIA 603-C:2004 using a 50uH LISN. Both lines were observed with the UUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

Bandwidth 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Power Output: For a device with a fixed antenna, RF power is measured as ERP as the antenna is permanently attached. The substitution method was used as described in ANSI/TIA-603-C:2004. If the EUT has an antenna connector the RF Power is measured conducted.

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

Radiation Interference: The test procedure used was ANSI/TIA 603-C:2004 using an Agilent spectrum receiver with preselector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

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TEST REPORT SUMMARY

Rule Part No.	Scope of Work	Status Pass/Fail/NA
Part 2.1033(c)(8), Part 2.1046(a),74.801,	DC Input into the final Amplifier RF Power Output	 PASS
Part 2.1033(c) (4) Part 2.1047(a)(b), 74.861(e)(3)	Modulation Characteristics	NA
2.1049(c), 74.861	Emission Mask and Occupied Bandwidths	PASS
2.1053	Antenna Conducted Emissions	N/A
2.1053	Field Strength Spurious Emissions	PASS
Part 2.1055 Part 74.861	Frequency Stability	PASS

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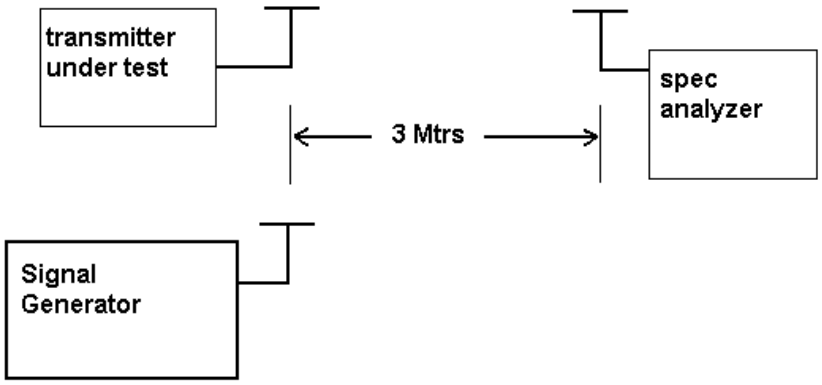
RF POWER OUTPUT

Rule Part No.: Part 2.1046(a), Part 74.801

Method of Measurement: For a device with a fixed antenna, RF power is measured as ERP as the antenna is permanently attached. The substitution method was used as described in ANSI/TIA-603-C:2004. If the EUT has an antenna connector the RF Power is measured conducted. With a nominal battery voltage, and the transmitter properly adjusted the RF output measures:

Test Setup Diagram:



Test Data:

ERP **Erp = $P_t + G_t = (E*d)^2/30 = (.0912*3)^2/30$**

OUTPUT POWER: Conducted 9.2mW

Part 2.1033 (C)(8) DC Input into the final amplifier

INPUT POWER: (3.0V)(0.025A) = .076 Watts

RF Exposure & SAR Exclusion

Maximum Power: 9.2mW
Minimum Separation: 200mm
Highest Frequency: 618MHz

Calculation: 0.0 and this number must be less than 3.0 for SAR Exclusion
Conclusion: This device is excluded from SAR Testing.

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MODULATION CHARACTERISTICS

Rule Part No.: Part 2.1047(a)(b), 74.861 (e)(3)

FCC Limit: ±75kHz Deviation

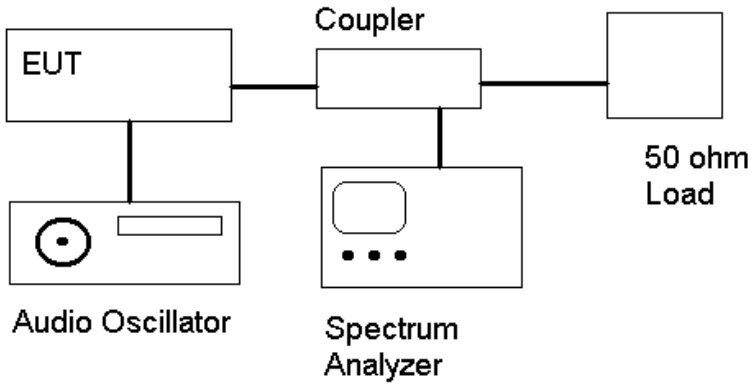
Channel Spacing 200kHz

Method of Modulation is CQPSK with an emission designator of;
156K0G1D

MODULATION CHARACTERISTICS

OCCUPIED BANDWIDTH

Data in the plots show that all sidebands between 50 & 100% for the authorized bandwidth are attenuated by at least 25dB. From 100 to 250% of the authorized bandwidth they are attenuated by at least 35dB and beyond 250% 43 log(Po) dB. The plot shows the transmitter modulated with 15000 Hz(the highest modulation frequency), adjusted for 50% modulation plus 16 dB. The spectrum analyzer was set with the unmodulated carrier at the top of the screen. The test procedure diagram and occupied bandwidth plot follows.



OCCUPIED BANDWIDTH MEASUREMENT

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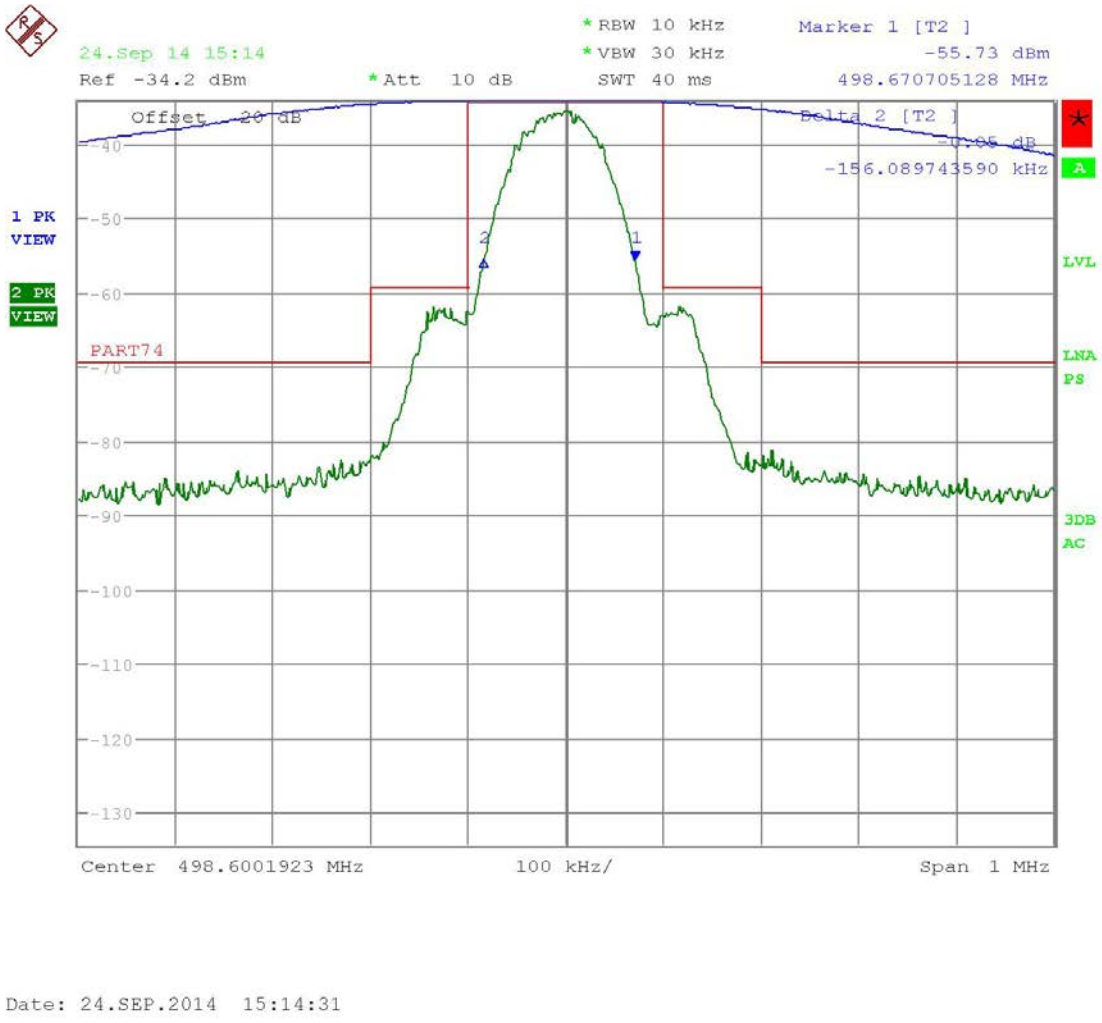
MODULATION CHARACTERISTICS OCCUPIED BANDWIDTH

20 dB



RESULTS:

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FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: Part 2.1053

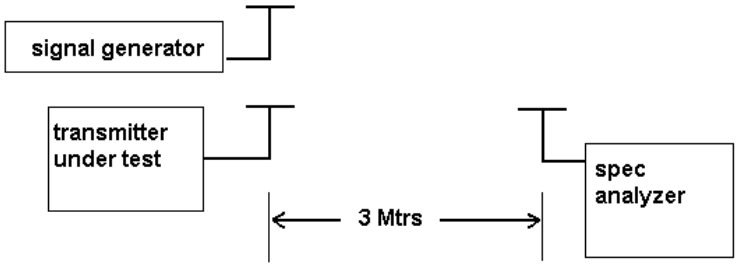
Requirements: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

43 + 10 log(.0092)= 22.6dB

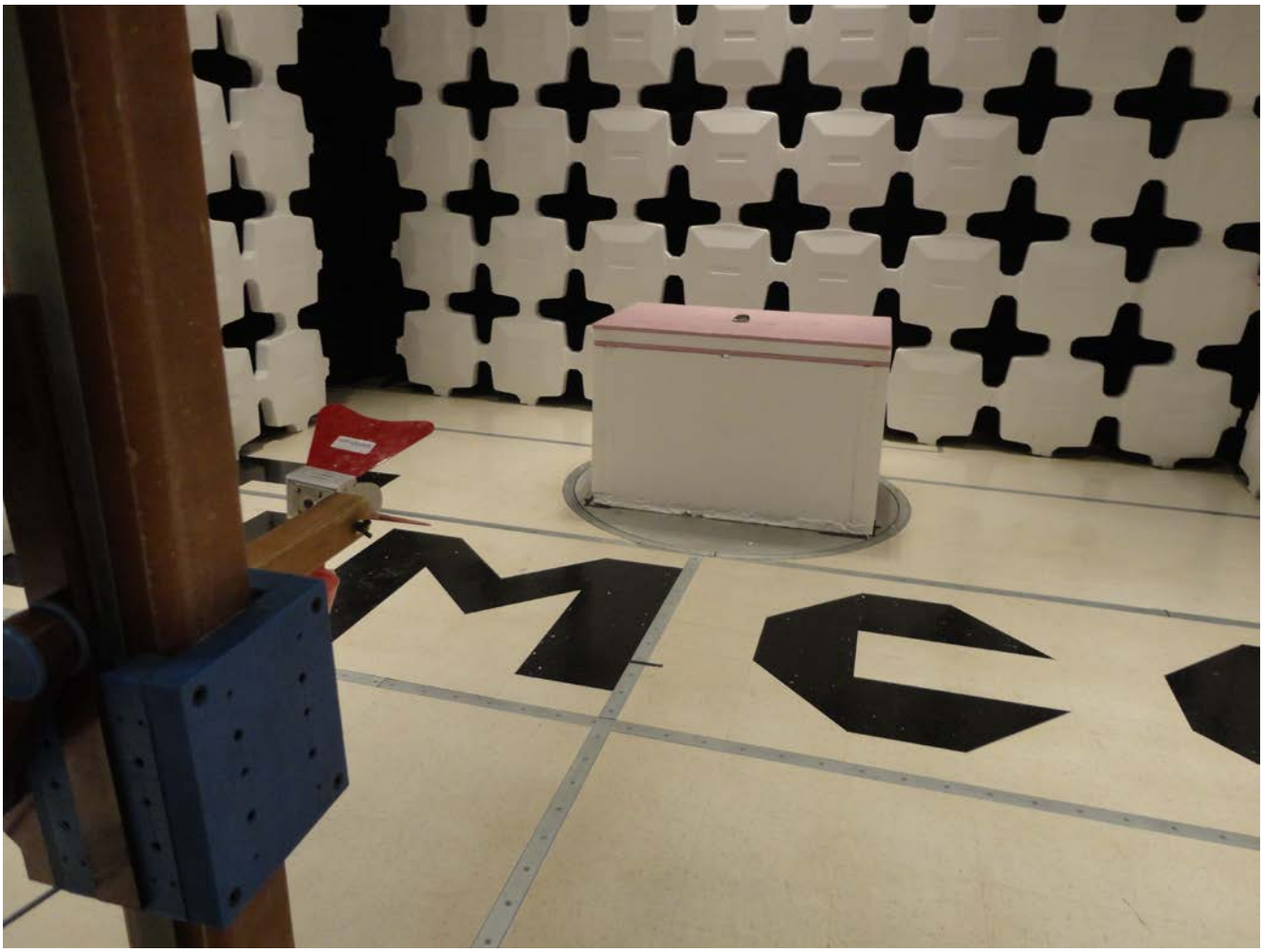
METHOD OF MEASUREMENTS: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-C:2010 using the substitution method. Measurements were made at the test site of Timco Engineering, Inc. located at 849 NW State Road 45, Newberry, FL 32669.

Test Method: TIA 603 D 2.2.12.3 Determine the EIRP of the EUT at the frequency to be tested and convert to dBm. Then use the substitution SW

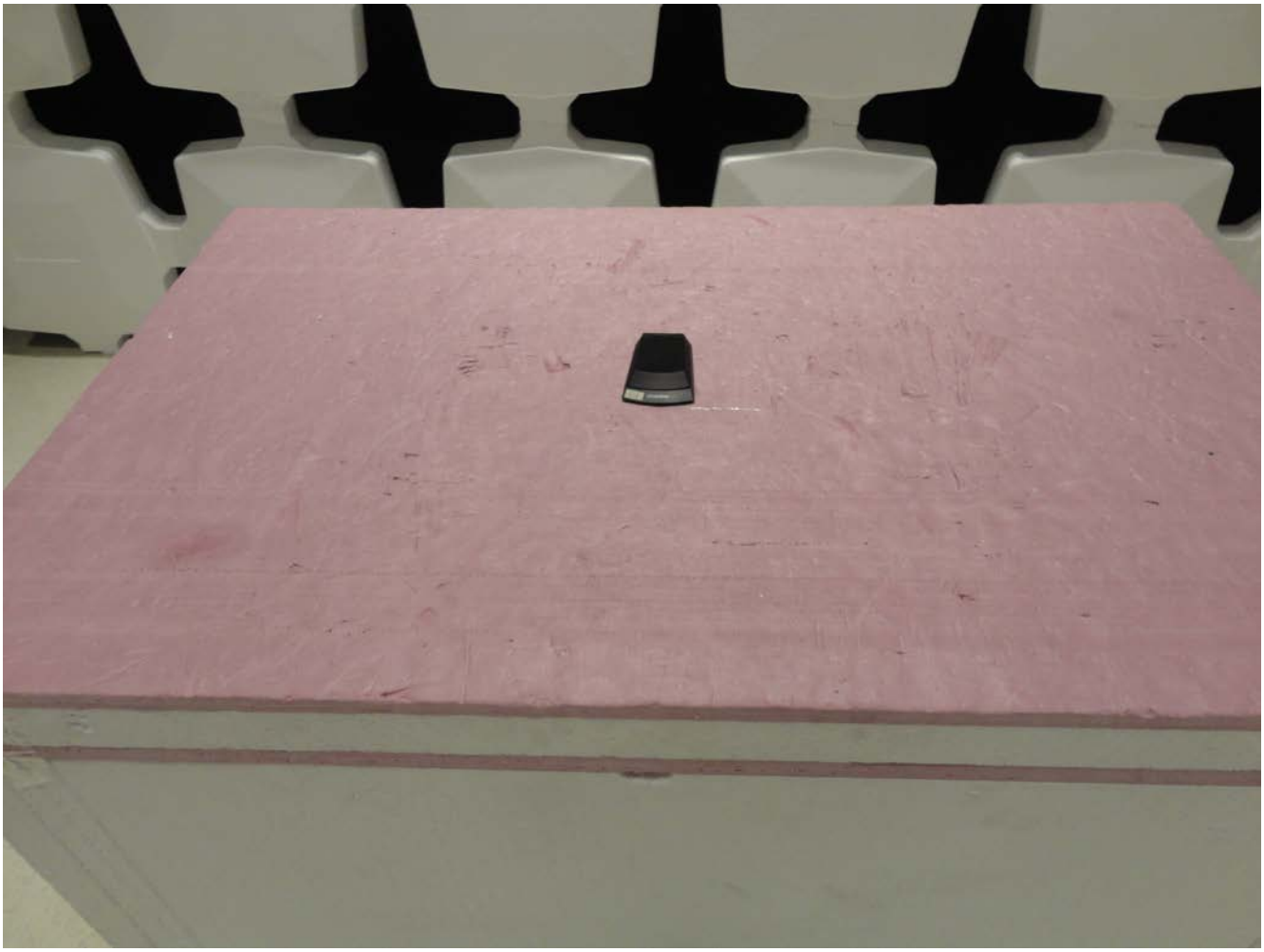
Test Setup Diagram:



FIELD STRENGTH OF SPURIOUS EMISSIONS TEST SETUP PHOTO



FIELD STRENGTH OF SPURIOUS EMISSIONS TEST SETUP PHOTO



FIELD STRENGTH OF SPURIOUS EMISSIONS TEST DATA

Test Data:

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
499.59	Hi	9.60	0.01	22.60	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
999.18	H	21.73	17.62
1,495.77	H	36.76	32.65
1,994.36	H	30.13	26.02
2,492.95	H	29.29	25.18
2,991.54	V	43.31	39.20
3,490.13	V	42.44	38.33
3,988.72	H	40.59	36.48
4,487.31	H	47.39	43.28
4,985.90	H	45.63	41.52

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
511.59	Hi	9.60	0.01	22.60	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
1,023.18	H	26.55	20.04
1,534.77	H	30.80	24.29
2,046.36	H	28.20	21.69
2,557.95	H	26.37	19.86
3,069.54	H	36.11	29.60
3,581.13	H	45.67	39.16
4,092.72	H	44.93	38.42
4,604.31	V	55.28	48.77
5,115.90	V	45.27	38.76

FIELD STRENGTH OF SPURIOUS EMISSIONS TEST DATA

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
605.40	Hi	9.60	0.01	22.60	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
1,210.80	H	24.63	16.43
1,816.20	H	25.58	17.38
2,421.60	H	32.42	24.22
3,027.00	V	36.23	28.03
3,632.40	V	35.60	27.40
4,237.80	V	40.49	32.29
4,843.20	V	39.59	31.39
5,448.60	V	45.31	37.11
6,054.00	V	46.25	38.05

(MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
614.35	Hi	9.60	0.01	22.60	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
1,228.70	H	43.27	20.67
1,843.05	H	34.53	23.39
2,457.40	V	37.71	26.57
3,071.75	V	40.12	28.98
3,686.10	V	45.20	34.06
4,300.45	V	49.94	38.80
4,914.80	V	51.83	40.69
5,529.15	V	48.22	37.08
6,143.50	H	47.92	36.78

FIELD STRENGTH OF SPURIOUS EMISSIONS TEST DATA

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
617.59	Hi	9.60	0.01	22.60	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
1,235.18	H	32.15	24.01
1,852.77	H	32.46	24.32
2,470.36	V	41.81	33.67
3,087.95	H	40.83	32.69
3,705.54	H	38.15	30.01
4,323.13	H	42.26	34.12
4,940.72	V	46.83	38.69
5,558.31	V	44.87	36.73
6,175.90	V	45.79	37.65

Results: Meets Requirements

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

TEST DATA: NOT APPLICABLE NO ANTENNA TERMINAL

FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 74.861

Requirements: Temperature and voltage tests were performed to verify that the frequency remains within the .0050%,(50 ppm)

Method of Measurements: ANSI/TIA 603-C:2004.

The test was conducted as follows: The transmitter was placed in the temperature chamber at 25 °C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15-second intervals. The worse case number used in the table below. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -30 °C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15-second intervals. The worst-case number was again used in the table below. This procedure was repeated in 10-degree increments up to + 50 degrees C.

Test Data:

Frequency Stability for FCC

Reference Frequency @ 25°C			605.4058	MHz						
		Battery (%)		Frequency)			Frequency Stability (ppm)			
		-15		605.4059	MHz		0.11			
		0		605.4057	MHz		-0.22			
		15		605.4079	MHz		3.35			
		Temperature(C)		Frequency)			Frequency Stability (ppm)			
		-30		605.4083	MHz		4.04			
		-20		605.4082	MHz		3.84			
		-10		605.4082	MHz		3.91			
		0		605.408	MHz		3.53			
		10		605.408	MHz		3.63			
		20		605.4078	MHz		3.24			
		30		605.408	MHz		3.52			
		40		605.408	MHz		3.63			
		50		605.4081	MHz		3.75			

RESULTS: MEETS FCC REQUIREMENTS

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconnical	Eaton	94455-1	1096	05/10/13	05/10/15
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	05/09/13	05/09/15
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	08/19/14	08/19/16
AC Voltmeter	HP	400FL	2213A14499	06/20/13	06/20/15
Digital Multimeter	Fluke	FLUKE-77-3	79510405	06/20/13	06/20/15
Frequency Counter	HP	5385A	2730A03025	08/22/13	08/22/15
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/15
Temperature Chamber Small	Thermotron Corp.	S1.2 Mini Max	25-1420-09	08/20/14	08/20/16
EMI Test Receiver R & S ESIB 40	Rohde & Schwarz	ESIB 40	100274	08/12/14	08/12/16
Software: Field Strength Program	Timco	N/A	Version 4.0	12/12/99	12/12/99
Hygro-Thermometer	Extech	445703	0602	06/20/13	06/20/15
Thermometer	Martel	303	080504494	2/25/13	2/25/15
Attenuator	Narda	766-30	N/A	08/01/13	08/01/15
EMI Test Receiver R & S ESU 40	Rohde & Schwarz	ESU 40	100320	03/11/14	03/11/16
Signal Generator HP 8648C	HP	8648C	3623A02898	08/29/13	08/29/15
Antenna: Double-Ridged Horn 18-40 GHz	EMCO	3116	9011-2145	09/20/13	09/20/15

***EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

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