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Electromagnetic Emissions Test Report

Application for Grant of Equipment Authorization
pursuant to
Industry Canada RSS-Gen Issue 2 / RSS 210 Issue 7
FCC Part 15 Subpart C
on the
Griffin Technology
Transmitter
Model: Evolve Remote (1201R-B)

UPN:	6384A-1201RMTB
FCC ID:	PAV1201RB
GRANTEE:	Griffin Technology 1930 Air Lane Drive Nashville, TN 37210
TEST SITE:	Elliott Laboratories 684 W. Maude Ave Sunnyvale, CA 94086
REPORT DATE:	May 9, 2008
REVISION DATE:	October 17, 2008
FINAL TEST DATE:	April 29, 2008

AUTHORIZED SIGNATORY:

Mark E. Hill
Staff Engineer

ACCREDITED

Testing Cert #2016-01

REVISION HISTORY

Rev #	Date	Comments	Modified By
1	July 21, 2008	Initial Release	
2	October 17, 2008	Recalculated average measurements based on peak measurements and duty cycle. Added duty cycle plots. Added transmission shutdown data.	MEH

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SCOPE

An electromagnetic emissions test has been performed on the Griffin Technology model Evolve Remote pursuant to the following rules:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Griffin Technology model Evolve Remote and therefore apply only to the tested sample. The sample was selected and prepared by Jeff Altheide of Griffin Technology.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of Griffin Technology model Evolve Remote complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TEST RESULTS SUMMARY

MOMENTARILY OPERATED DEVICES – CONTROL SIGNALS

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.231 (a) (1)	RSS 210 A1.1.1 (1)	Duration of manually activated transmissions	<5 seconds	< 5 seconds	Complies – Note 1
15.231 (a) (2)	RSS 210 A1.1.1 (2)	Duration of automatically activated transmissions		< 5 seconds	N/A – Note 3
15.231 (a) (3)	RSS 210 A1.1.1 (3)	Transmissions at predetermined / regular intervals		Such transmissions are not permitted	Complies – Note 3
15.231 (a) (4)	RSS 210 A1.1.1 (4)	Pendency of transmissions used during emergencies			Complies – Note 3
15.231 (b)	RSS 210 Table 4	Fundamental Signal Strength	73.5dBµV/m @ 433.498MHz (-7.3dB)	Refer to table in limits section	Complies
15.231 (b) / 15.209	RSS 210 Table 2 / 4	Radiated Spurious Emissions, 30-1000 MHz	57.1 dBuV/m @ 867.095 MHz (-3.7 dB)	Refer to table in limits section	Complies
15.231 (c)	RSS 210 A1.1.3	Bandwidth	450kHz	< 0.5% of operating frequency	Complies
15.231 (d)	RSS 210 A1.1.4	Frequency Stability - 40.66 – 40.70 MHz band			N/A – Note 4

Note 1 – Refer to the operational description included with this application for detailed description and timing diagrams for transmission duration.
Note 2 – As the device is intended for hand-held operation it was tested in all three orthogonal orientations.
Note 3 – The device uses only manually activated transmissions. The control purposes do not include emergency alarm activation.
Note 4 – The device operates with a fundamental frequency of 433.5 MHz.

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Antenna is internal to the device		Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions		Refer to standard	N/A – Note 1
15.207	RSS GEN Table 2	AC Conducted Emissions		Refer to standard	N/A – Note 2
-	RSS 102	RF Exposure Requirements	RSS 102 declaration	Refer to OET 65, FCC Part 1 and RSS 102	Complies
	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding non-interference	Complies
	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding detachable antenna	N/A – Note 3

Note 1 – The device does not have a receiver function.
Note 2 – The device is battery powered.
Note 3 – The antenna is not detachable and is internal to the device.

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	0.015 to 30	± 3.0
Radiated Emissions	30 to 1000	± 3.6
Radiated Emissions	1000 to 40000	± 6.0

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Griffin Technology model Evolve Remote is a 433.5 MHz remote control for the Evolve Speaker System.

The sample was received on April 29, 2008 and tested on April 29, 2008. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Griffin	Evolve Remote (1201R-B)	Wireless Remote Control	N/A	

ANTENNA SYSTEM

The internal printed circuit antenna is approximately 190 mm in length and is slightly larger than a ¼ wave monopole when operating at 433.54 MHz.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 4 cm wide by 10 cm deep by 1 cm high.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with emissions specifications.

SUPPORT EQUIPMENT

No support equipment was used during emissions testing.

EUT INTERFACE PORTS

The EUT does not have any interface ports.

EUT OPERATION

During testing the EUT was configured to continuously transmit.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on April 29, 2008 at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with Industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 4	211948	IC 4549-4	41039 Boyce Road Fremont, CA 94538-2435

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

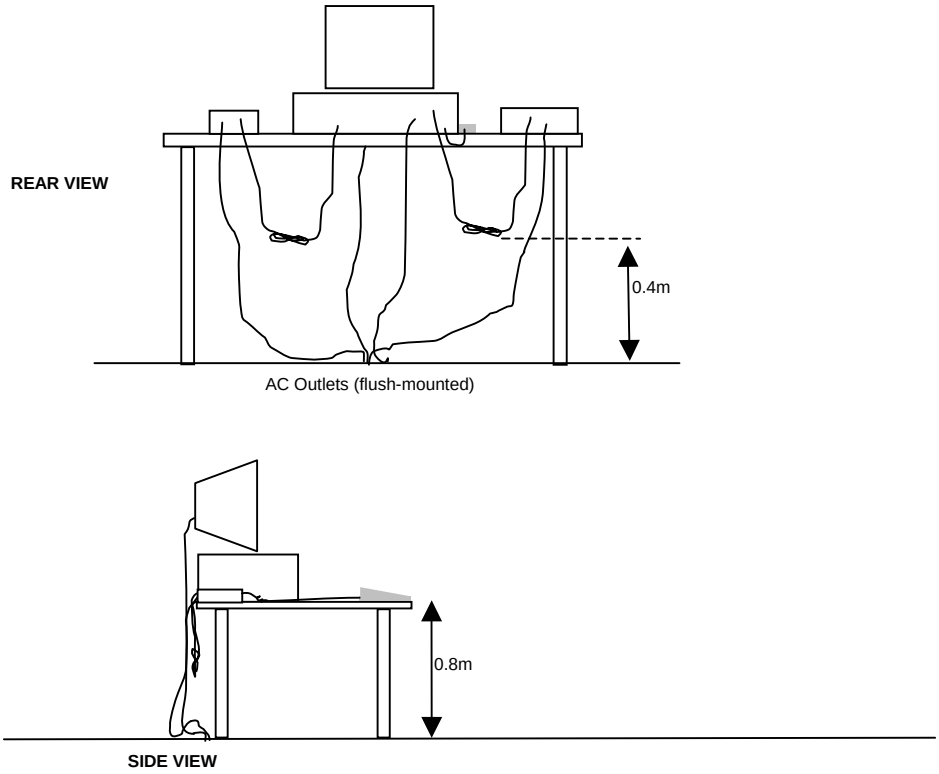
RADIATED EMISSIONS

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

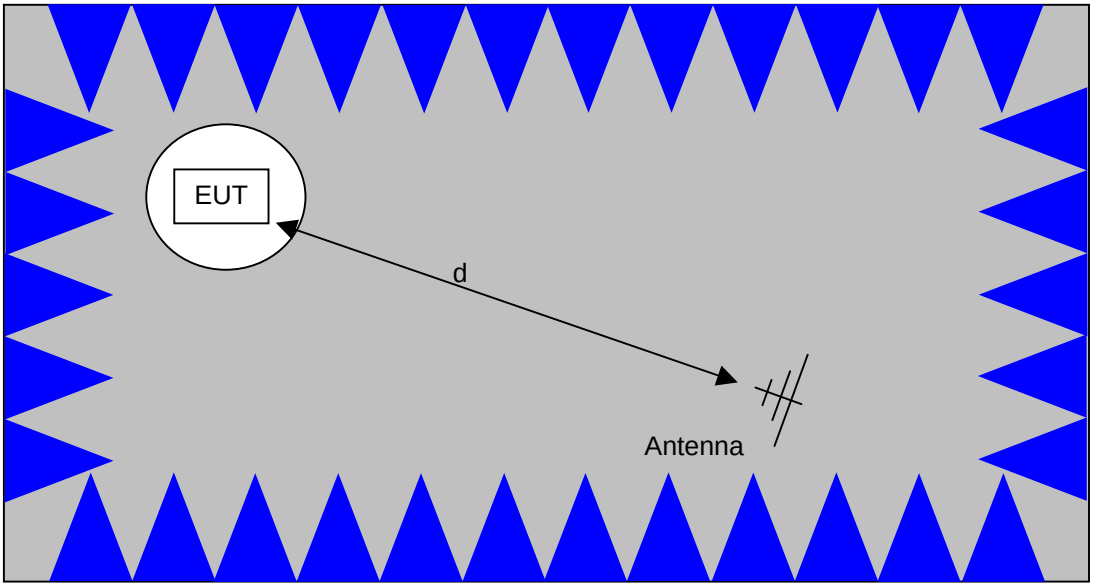
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.

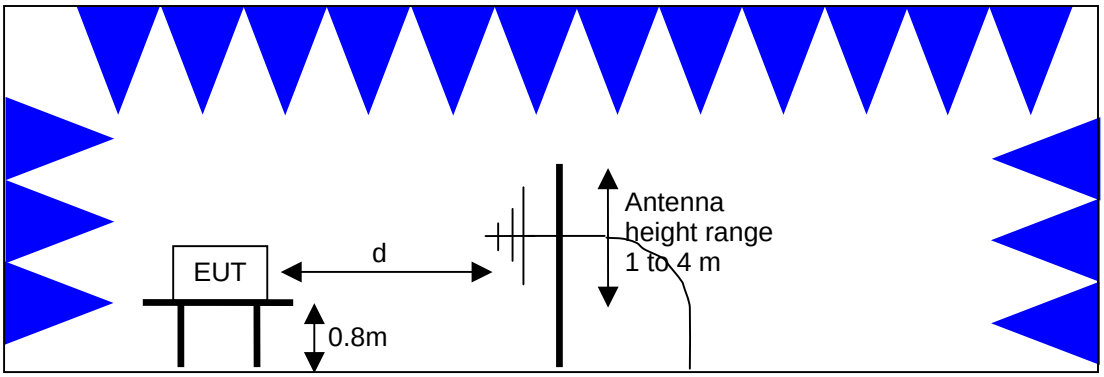


Typical Test Configuration for Radiated Field Strength Measurements



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1] (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

[1] The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

The table below shows the limits for both the fundamental and spurious emissions for control signals. The limits for data signals, or signals with predetermined transmissions, are given in the second table

Operating Frequency (MHz)	Fundamental Field Strength (microvolts/m)	Spurious Emissions (microvolts/m)
70 - 130	1250	125
130 - 174	1250 - 3750	125 - 375
174 – 260	3750	375
260 – 470	3750 – 12,500	375 - 1250
Above 470	12,500	1250

Spurious Emissions Limits – Control Signals

Operating Frequency (MHz)	Fundamental Field Strength (microvolts/m)	Spurious Emissions (microvolts/m)
70 - 130	500	50
130 - 174	500 - 1500	50 - 150
174 – 260	1500	150
260 – 470	1500 – 5000	150 - 500
Above 470	5000	500

Spurious Emissions Limits – Data Signals

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{3} \text{ microvolts per meter}$$

where P is the eirp (Watts)

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 4,000 MHz, 29-Apr-08
Engineer: rvarelas

Manufacturer	Description	Model #	Asset #	Cal Due
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	07-Jun-08
Hewlett Packard	Spectrum Analyzer 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	15-Jan-09
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	25-Aug-08
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447E	1606	07-May-08
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	03-May-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	06-Nov-08

EXHIBIT 2: Test Measurement Data

10 Pages

Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	Test-Log Number:	T71526
		Project Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Emissions Spec:	FCC 15.231(a)/RSS-210	Class:	B
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Griffin Technology

Model

Evolve Remote

Date of Last Test: 5/10/2008

Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	Test-Log Number:	T71526
		Project Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Emissions Spec:	FCC 15.231(a)/RSS-210	Class:	B
Immunity Spec:	-	Environment:	-

EUT INFORMATION

The following information was collected during the test sessions(s).

General Description

The EUT is a remote control that is designed to transmit commands to the Evolve Base. An iPod is placed on the Evolve Base which receives the sent commands from the remote . The EUT was tested and treated as hand held device. The EUT is battery powered (3.0V).

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Griffin	Evolve	Remote		

EUT Antenna (Intentional Radiators Only)

The antenna is integral to the device.

EUT Enclosure

The EUT enclosure is primarily constructed of plastic. It measures approximately 4 cm wide by 10 cm deep by 1 cm high.

Modification History

Mod. #	Test	Date	Modification
1	-	-	None

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	T-Log Number:	T71526
		Project Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Emissions Spec:	FCC 15.231(a)/RSS-210	Class:	B
Immunity Spec:	-	Environment:	-

Test Configuration #1

The following information was collected during the test sessions(s).

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
-	-	-	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
-	-	-	-	-

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
None	-	-	-	-

EUT Operation During Emissions Tests - for Tx Mode

During emissions, the EUT was configured to transmit continously.

Performance Criteria for Immunity Tests

Criterion A:

During and after testing the EUT shall continue to transmit for Tx Mode.

Criterion B:

During application of the transient test, degradation of performance is allowed provided that the EUT self-recovers to normal operation after testing without any operator intervention.

Criterion C:

Loss of function is allowed provided that normal operation can be restored by user intervention .

Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	T-Log Number:	T71526
		Account Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Standard:	FCC 15.231(a)/RSS-210	Class:	B

Radiated Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 4/29/2008
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #4

Config. Used: Refer to individual runs
Config Change: Refer to individual runs
EUT Voltage: Battery

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 19.7 °C
Rel. Humidity: 41 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Fundamental Emissions	FCC 15.231(a)	Pass	73.5dBµV/m @ 433.498MHz (-7.3dB)
2	RE, Spurious Emissions	FCC 15.231(a) 15.209	Pass	57.1 dBuV/m @ 867.095 MHz (-3.7 dB)
3	99% Bandwidth	FCC 15.231(a) 15.209	-	450kHz
4	Transmitter Shutdown	FCC 15.231(a)(1)	Pass	Less than 5 seconds

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0

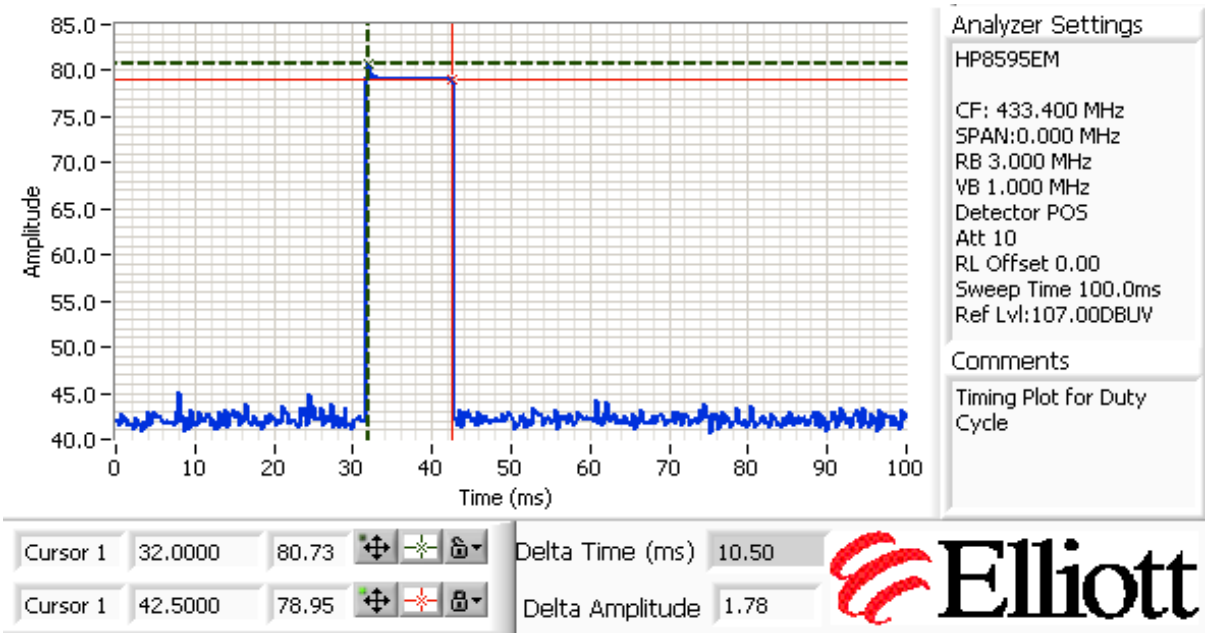
Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	T-Log Number:	T71526
		Account Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Standard:	FCC 15.231(a)/RSS-210	Class:	B

Run #1: Maximized Fundamental Measurements

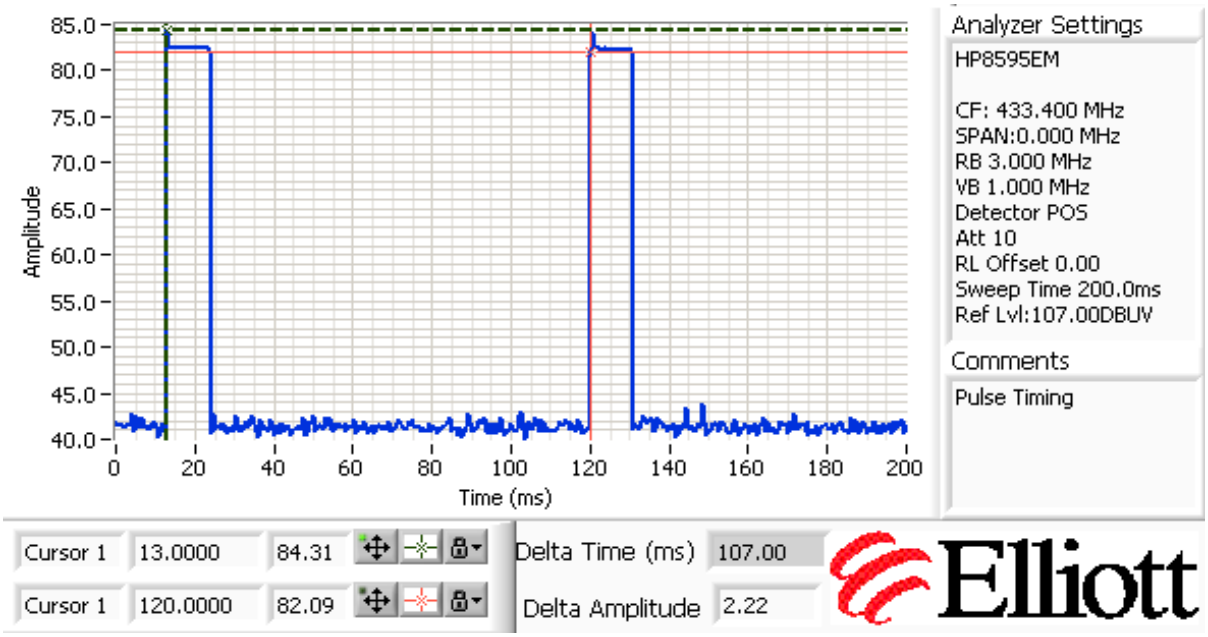
EUT and Test Configuration Details:
EUT configured to transmit continuously
FCC Sample, Elliott tag 2008-2456

Frequency	Level	Pol	FCC 15.231(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
433.498	73.5	V	80.8	-7.3	AVG	260	1.1	EUT Upright
433.498	73.2	H	80.8	-7.6	AVG	203	1.0	EUT Flat
433.498	72.8	V	80.8	-8.0	AVG	274	1.1	EUT Side
433.498	67.1	H	80.8	-13.7	AVG	205	3.4	EUT Side
433.498	65.6	H	80.8	-15.2	AVG	218	1.6	EUT Upright
433.498	62.6	V	80.8	-18.2	AVG	305	2.5	EUT Flat
433.498	93.0	V	100.8	-7.8	PK	260	1.1	EUT Upright
433.498	92.7	H	100.8	-8.1	PK	203	1.0	EUT Flat
433.498	92.3	V	100.8	-8.5	PK	274	1.1	EUT Side
433.498	86.6	H	100.8	-14.2	PK	205	3.4	EUT Side
433.498	85.1	H	100.8	-15.7	PK	218	1.6	EUT Upright
433.498	82.1	V	100.8	-18.7	PK	305	2.5	EUT Flat

Note 1	Average readings are calculated from the peak readings, based on a duty cycle correction of -19.5 dB (20log(10.5/100)). See plots shown below.

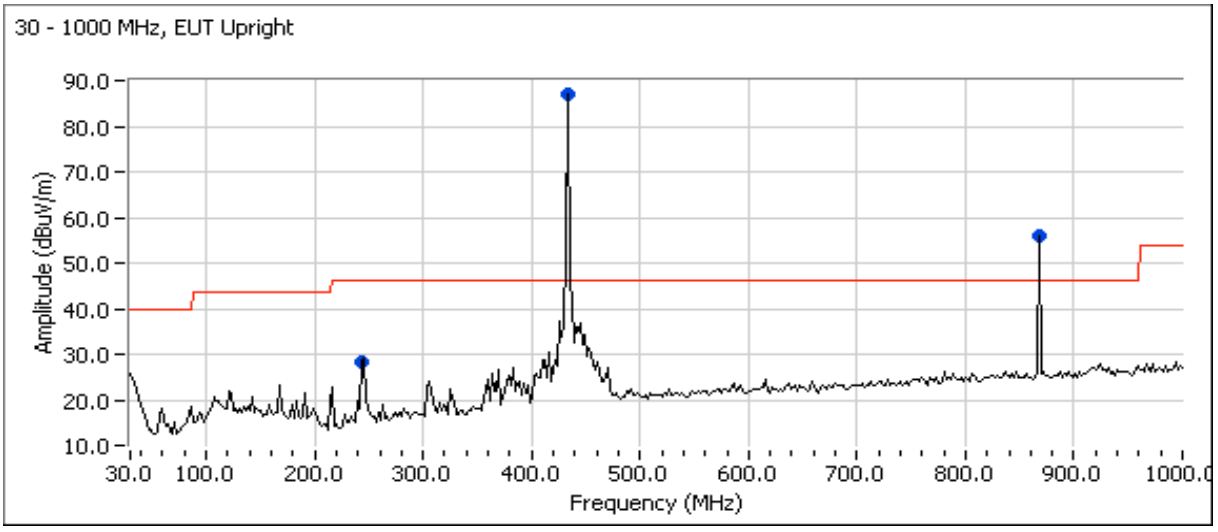


Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	T-Log Number:	T71526
		Account Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Standard:	FCC 15.231(a)/RSS-210	Class:	B



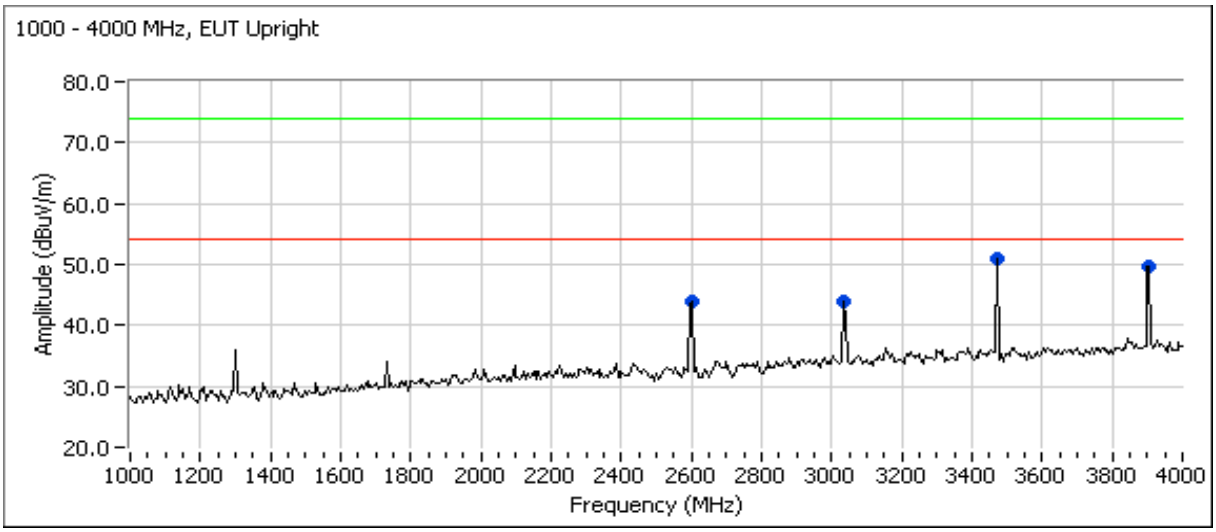
Run #2: Spurious Emissions, 30 - 1000 MHz

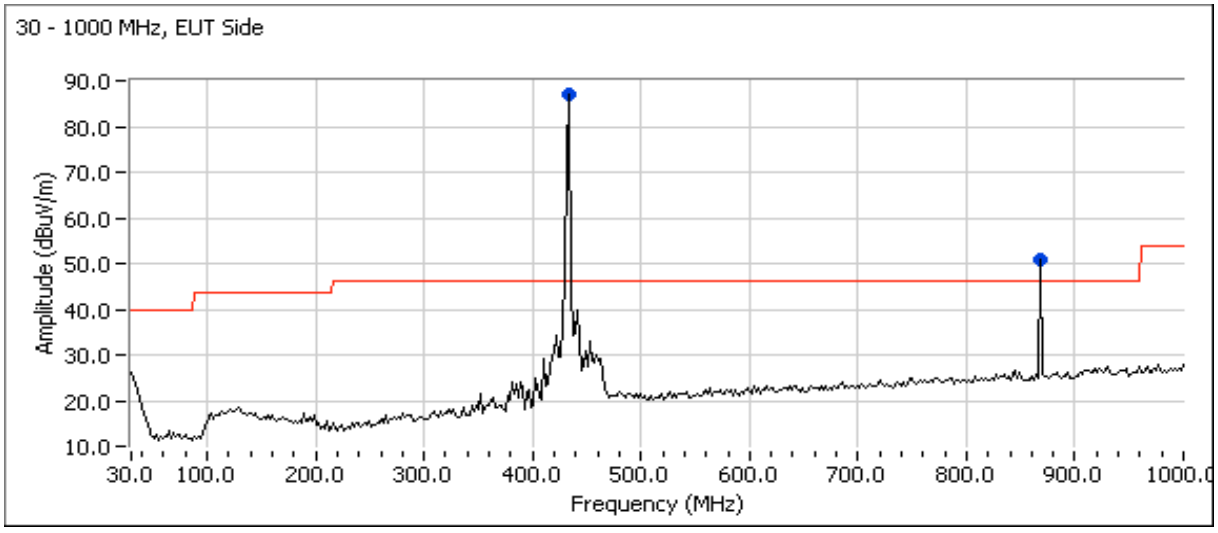
EUT and Test Configuration Details:
EUT configured to transmit continuously
FCC Sample, Elliott tag 2008-2456



Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	T-Log Number:	T71526
		Account Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Standard:	FCC 15.231(a)/RSS-210	Class:	B

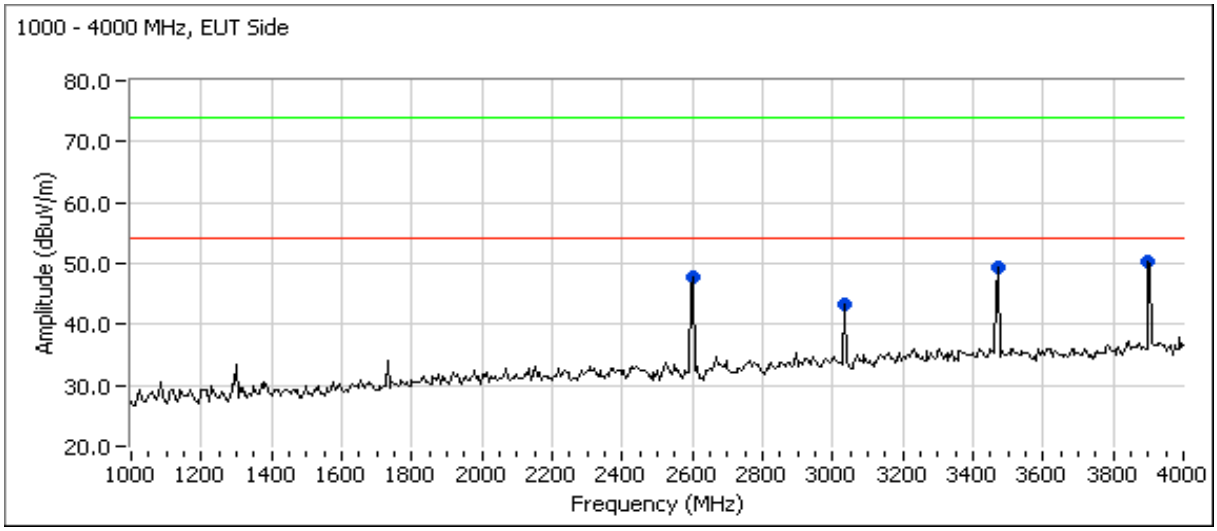
Run #2: Continued

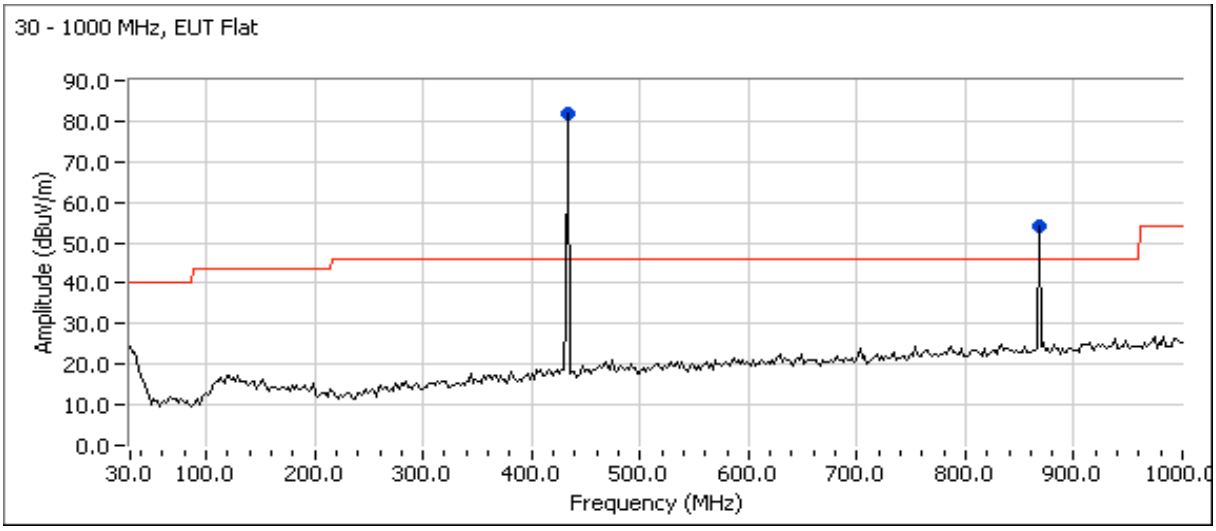




Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	T-Log Number:	T71526
		Account Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Standard:	FCC 15.231(a)/RSS-210	Class:	B

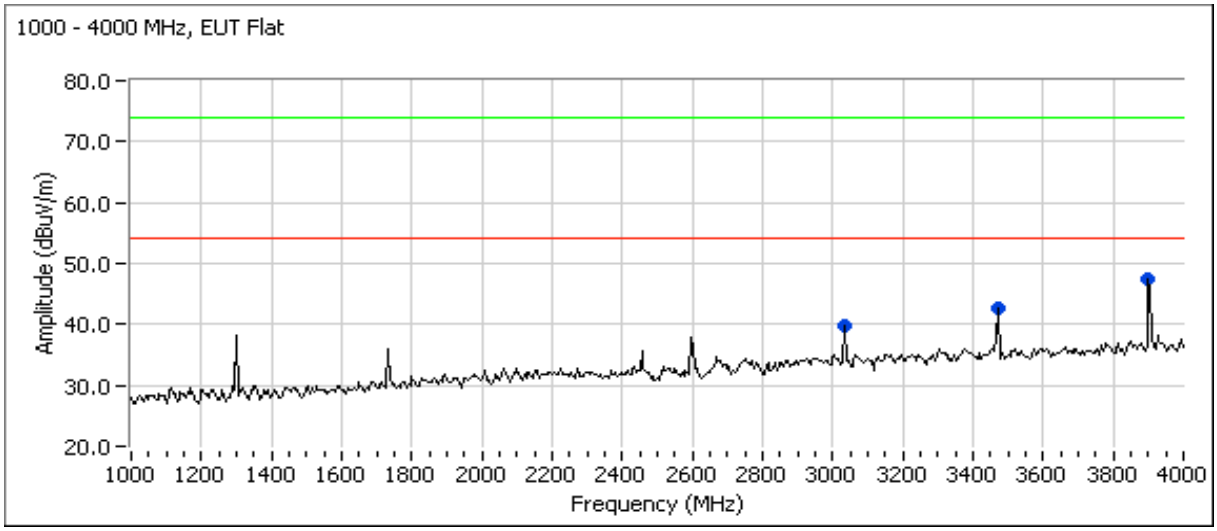
Run #2: Continued





Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	T-Log Number:	T71526
		Account Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Standard:	FCC 15.231(a)/RSS-210	Class:	B

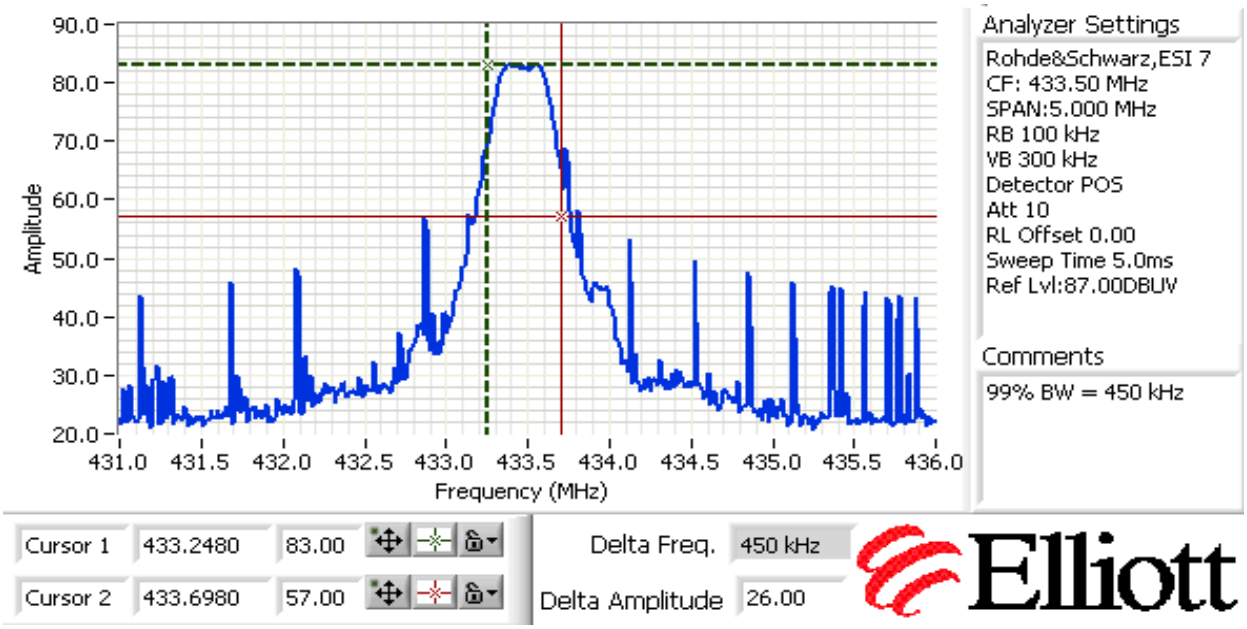
Run #2: Continued



Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
434.329	87.2	V	-	-	Peak	270	1.0	EUT Upright, Fundamental
434.329	87.1	V	-	-	Peak	53	1.0	EUT Side, Fundamental
434.329	81.7	H	-	-	Peak	29	1.0	EUT Flat, Fundamental
867.095	57.1	V	60.8	-3.7	QP	46	1.1	EUT Side, Non-restricted
867.095	54.3	H	60.8	-6.5	Peak	44	1.0	EUT Flat - Non-restricted
3035.000	44.0	H	54.0	-10.0	Peak	151	1.6	EUT Upright, Non-restricted
2600.000	43.9	H	54.0	-10.1	Peak	350	1.0	EUT Upright, Non-restricted
3034.830	43.2	V	54.0	-10.8	Peak	175	1.0	EUT Side, Non-restricted
867.095	49.8	V	60.8	-11.0	QP	118	1.5	EUT Upright - Non-restricted
3470.000	42.8	V	54.0	-11.2	Peak	256	1.3	EUT Flat - Non-restricted
3901.600	40.6	V	54.0	-13.4	AVG	324	1.0	EUT Upright
3901.170	40.3	V	54.0	-13.7	AVG	255	1.6	EUT Side
3035.000	39.9	V	54.0	-14.1	Peak	94	1.3	EUT Flat - Non-restricted
3467.410	39.0	H	54.0	-15.0	AVG	201	1.3	EUT Upright, Non-restricted
3468.390	39.0	V	54.0	-15.0	AVG	177	1.3	EUT Side, Non-restricted
2600.590	36.6	V	54.0	-17.4	AVG	137	1.3	EUT Side, Non-restricted
3467.410	52.6	H	74.0	-21.4	PK	201	1.3	EUT Upright, Non-restricted
3899.730	30.8	H	54.0	-23.2	AVG	68	1.6	EUT Flat
3901.600	50.2	V	74.0	-23.8	PK	324	1.0	EUT Upright
2600.590	49.8	V	74.0	-24.2	PK	137	1.3	EUT Side, Non-restricted
3901.170	49.8	V	74.0	-24.2	PK	255	1.6	EUT Side
239.991	19.0	V	46.0	-27.0	QP	133	1.0	EUT Upright, Non-restricted
3899.730	41.9	H	74.0	-32.1	PK	68	1.6	EUT Flat
3468.390	40.6	V	74.0	-33.4	PK	177	1.3	EUT Side, Non-restricted

Client:	Griffin Technology	Job Number:	J71514
Model:	Evolve Remote	T-Log Number:	T71526
		Account Manager:	Sheareen Washington
Contact:	Jeff Altheide		
Standard:	FCC 15.231(a)/RSS-210	Class:	B

Run #3: 99% Bandwidth



Run #4: Transmit Shutdown

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

Result: EUT ceased transmission within 5seconds of release, See plot

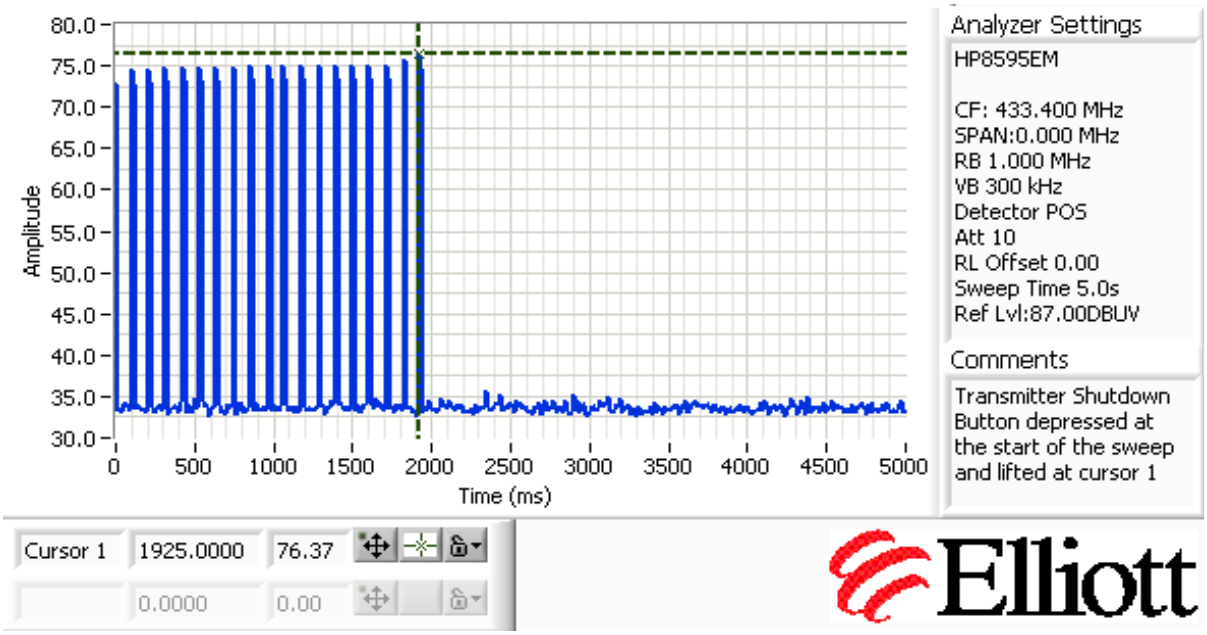


EXHIBIT 3: Photographs of Test Configurations

EXHIBIT 4: Proposed FCC ID Label & Label Location

EXHIBIT 5: Detailed Photographs of Griffin Technology Model Evolve RemoteConstruction

EXHIBIT 6: Operator's Manual for Griffin Technology Model Evolve Remote

EXHIBIT 7: Block Diagram of Griffin Technology Model Evolve Remote

EXHIBIT 8: Schematic Diagrams for Griffin Technology Model Evolve Remote

EXHIBIT 9: Theory of Operation for Griffin Technology Model Evolve Remote

EXHIBIT 10: RF Exposure Information