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September 28, 2006

Tom R Lafleur
DriveCam, Inc.
3954 Murphy Canyon Road, Suite D205
San Diego, CA. 92133

Subject: FCC and Industry Canada Report, model DCIII

Dear Mr. Lafleur:

A report has been created detailing the results of the FCC and IC electromagnetic emissions testing performed on the DCIII. This can be submitted to a TCB to obtain the appropriate equipment certifications. Please find this report enclosed.

If you have any questions, please don't hesitate to call us at 408-245-7800.

Sincerely,

Juan Martinez
Senior EMC Engineer

JM/dmg
Enclosure: Copy of Application Package

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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to Industry Canada RSS-Gen Issue 1 / RSS 210 Issue 6 FCC Part 15 Subpart C on the DriveCam, Inc. Video Event Recorder Model: DCIII

UPN:	6778A-DCIII
FCC ID:	U03DCIII
GRANTEE:	DriveCam, Inc. 3954 Murphy Canyon Road, Suite D205 San Diego, CA. 92133
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Ave Sunnyvale, CA 94086
REPORT DATE:	September 28, 2006
FINAL TEST DATE:	June 21 and September 7, 2006

AUTHORIZED SIGNATORY: _____

Juan Martinez
Senior EMC Engineer

A2LA ACCREDITED
2016-01

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REVISION HISTORY

Revision #	Date	Comments	Modified By
1	October 30, 2006	Initial Release	David Guidotti

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SCOPE

An electromagnetic emissions test has been performed on the DriveCam, Inc. model DCIII pursuant to the following rules:

Industry Canada RSS-Gen Issue 1
RSS 210 Issue 6 "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
RSS-212 Issue 1 Test Facilities and Test Methods for Radio Equipment

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 DriveCam, Inc. model DCIII and therefore apply only to the tested sample. The sample was selected and prepared by Tom R Lafleur of DriveCam, Inc.

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 DriveCam, Inc. model DCIII complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 1
RSS 210 Issue 6 "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

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems DSSS techniques	-	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	10.2 MHz	>500kHz	Complies
	RSP100	99% Bandwidth	18.2 MHz	Information only	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	18.5 dBm (.071 Watts)	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	-4.3dBm/3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	Refer to plots	< -30dBc Note 2	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.8dBµV/m (489.8µV/m) @ 2386.9MHz (-0.2dB)	15.207 in restricted bands, all others <-30dBc Note 2	Complies

Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst) / RMS averaging over a time interval, as permitted under RSS 210 section A8.4(4).

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 surface mount and internal to the device (permanently attached)		Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	Radio is never in receive only it will be always transmitting		N/A
15.207	RSS GEN Table 2	AC Conducted Emissions	Unit receives power from a continuous 12VDC source from a vehicle	Refer to standard	N/A
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11	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	
	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding detachable antenna	

MEASUREMENT UNCERTAINTIES

ISO Guide 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 DriveCam, Inc. model DCIII is a video event recorder that is mounted on the windshield behind the rearview mirror in a vehicle and captures sights and sounds inside and outside the vehicle. Forces (e.g. hard braking, swerving, collision, etc.) cause the recorder to save 20 seconds of audio and video footage – the 10 seconds immediately before and after the triggered event. Events are offloaded from the unit using an 802.11b WLAN daughter board. The WLAN board is based on a Phillips BGW200 802.11b single chip transceiver and uses on-board surface mount antennas. The antennas used are GigaAnt Rufa 2.4 GHz SMD antennas (PN: 3030A5839-01 & 330A5887-01).

The sample was received on June 20, 2006 and tested on June 21 and September 7, 2006. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
DriveCam, Inc.	DCIII	Video Event Recorder	n/a	U03DCIII

ANTENNA SYSTEM

The antenna is integral to the device.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 12 cm wide by 6.5 cm deep by 12 cm high.

MODIFICATIONS

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

SUPPORT EQUIPMENT

No local support equipment was used during emissions testing.

The following equipment was used as remote support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard	E3632A	DC Power Supply	KR75305082	-
Compaq	PP2040	PC Laptop	n/a	-

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet	PC Laptop/ DC Power Supply	RJ45 2Wires to DC Power Supply/ 2Wires to PC Laptop	Unshielded	10.0

EUT OPERATION

During emissions testing the EUT was transmitting data on three channels Low, Medium & High .

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on June 21 and September 7, 2006at the Elliott Laboratories Open Area Test Site #2 located at 684 West Maude Avenue, Sunnyvale, California or 41039 Boyce Road, Fremont, California 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.

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 and RSS 212.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003 and RSS 212. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

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 / RSS 212.

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 and RSS 212 specify 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.

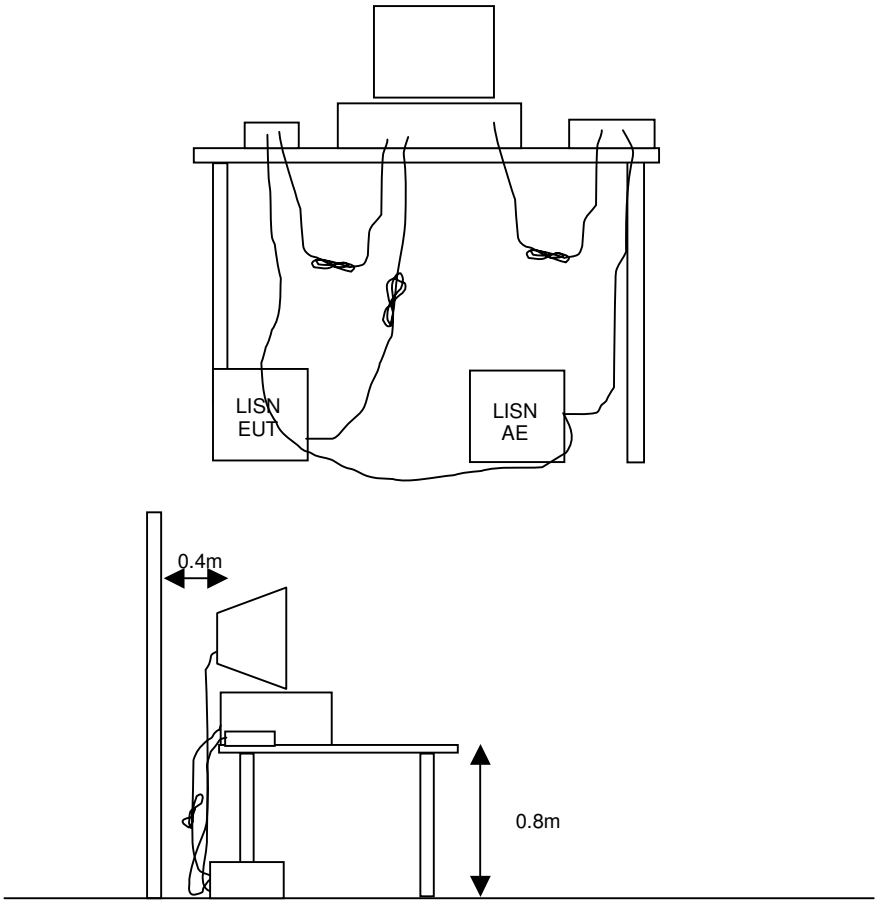
TEST PROCEDURES

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.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

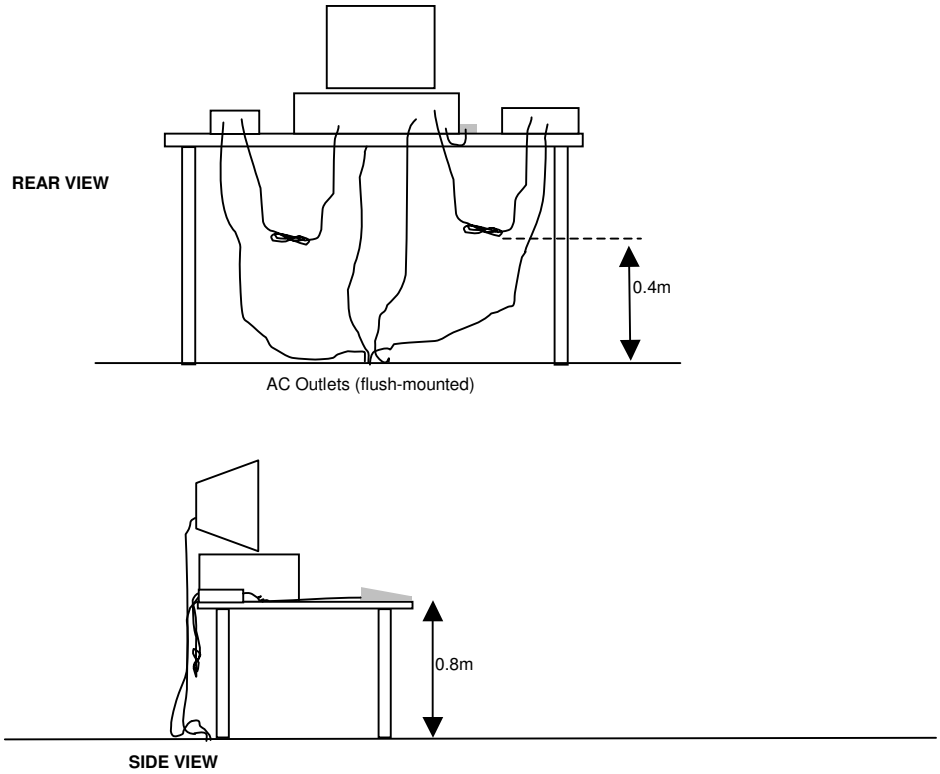


RADIATED EMISSIONS

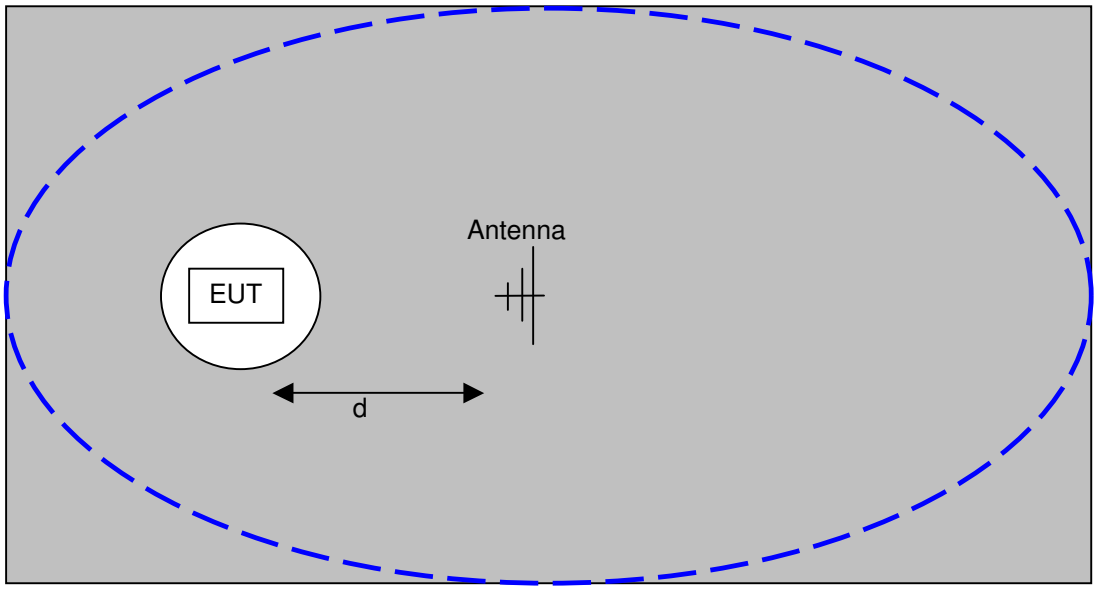
A preliminary scan of the radiated emissions is perfromed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). 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.

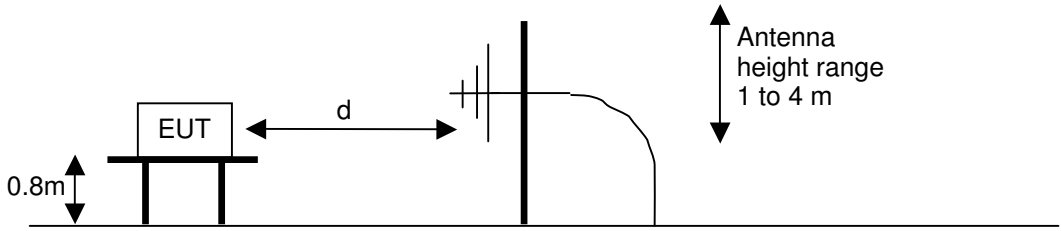
Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna 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.



Typical Test Configuration for Radiated Field Strength Measurements



The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.



Test Configuration for Radiated Field Strength Measurements
OATS- 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

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109, RSS 210 Table 2, RSS GEN Table 1 and RSS 310 Table 3. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

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

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

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

Radio Antenna Port (Power and Spurious Emissions), 21-Jun-06
Engineer: Chris Groat

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-07
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1290	12-May-07
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FMT (SA40) Blue	8564E (84125C)	1393	10-Nov-06
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-May-07
Rohde & Schwarz	Power Sensor 100 uW - 10 Watts	NRV-Z53	1796	31-Jan-07

Radiated Emissions, Selected Frequencies, 10-Jul-06
Engineer: David Bare

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	13-Jan-07
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FMT (SA40) Blue	8564E (84125C)	1393	10-Nov-06
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-May-07
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	14-Oct-06

Transmitter Spurious Emissions 1000 - 18,000, 07-Sep-06
Engineer: Juan Martinez

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	24-Apr-07
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FMT (SA40) Blue	8564E (84125C)	1393	10-Nov-06
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	14-Oct-06
EMCO	Antenna, Horn, 1-18 GHz (SA40 9kHz)	3115	1779	07-Feb-07

EXHIBIT 2: Test Measurement Data

20 Pages

Elliott

EMC Test Data

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	Test-Log Number:	T64413
		Project Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Emissions Spec:	FCC 15.247, RSS-210	Class:	Radio
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

DriveCam, Inc

Model

DCIII

Date of Last Test: 9/7/2006

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	Test-Log Number:	T64413
		Project Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Emissions Spec:	FCC 15.247, RSS-210	Class:	Radio
Immunity Spec:	-	Environment:	-

EUT INFORMATION

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

General Description

The EUT is a video event recorder that is mounted on the windshield behind the rearview mirror in a vehicle and captures sights and sounds inside and outside the vehicle. Forces (e.g. hard braking, swerving, collision, etc.) cause the recorder to save 20 seconds of audio and video footage – the 10 seconds immediately before and after the triggered event. Events are offloaded from the unit using an 802.11b WLAN daughter board. The WLAN board is based on a Phillips BGW200 802.11b single chip transceiver and uses on-board surface mount antennas. The antennas used are GigaAnt Rufa 2.4 GHz SMD antennas (PN: 3030A5839-01 & 330A5887-01).

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
DriveCam, Inc.	DCIII	Video Event Recorder	n/a	-

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 12 cm wide by 6.5 cm deep by 12 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:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Project Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Emissions Spec:	FCC 15.247, RSS-210	Class:	Radio
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
Hewlett Packard	E3632A	DC Power Supply	KR75305082	-
Compaq	PP2040	PC Laptop	n/a	-

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Ethernet	PC Laptop/ DC Power Supply	RJ45 2Wires to DC Power Supply/ 2Wires to PC Laptop	Unshielded	10.0

Note: All ports were connected during testing.

EUT Operation During Emissions Tests

During emissions testing the EUT was transmitting data on three channels Low, Medium & High .

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

RSS 210 and FCC 15.247 Radiated Spurious Emissions

Test Specifics

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

Date of Test: 9/7/2006
Test Engineer: Juan Martinez
Test Location: SVOATS #2
Config. Used: 1
Config Change: none
EUT Voltage: 12Vdc

General Test Configuration

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

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 29 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a-1c	RE, 30 - 25,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	53.8dBµV/m (489.8µV/m) @ 2386.9MHz (-0.2dB)
2	Duty Cycle	-	-	Refer to plots

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.

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

Run #1: Radiated Spurious Emissions, 1000 - 25,000 MHz. Operating Mode: 802.11b

Run #1a: Low Channel @ 2412 MHz

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2412.720	103.0	V	-	-	AVG	196	1.0	
2412.720	106.3	V	-	-	PK	196	1.0	
2412.710	98.0	H	-	-	AVG	105	1.0	
2412.710	101.3	H	-	-	PK	105	1.0	
2386.850	53.8	V	54.0	-0.2	AVG	187	1.0	Setting 14, Bandedge
2386.850	64.5	V	74.0	-9.5	PK	187	1.0	Setting 14, Bandedge
2387.230	52.0	H	54.0	-2.0	AVG	107	1.0	Setting 14, Bandedge
2387.230	60.4	H	74.0	-13.6	PK	107	1.0	Setting 14, Bandedge

Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	**Note 1 applies to all measurements**
4824.130	53.2	V	54.0	-0.8	AVG	63	1.0	Note 2
4824.130	65.2	V	74.0	-8.8	PK	63	1.0	
12051.83	39.9	V	54.0	-14.1	AVG	360	1.0	
12051.83	51.0	V	74.0	-23.0	PK	360	1.0	
7235.470	45.3	V	54.0	-8.7	AVG	70	1.0	
7235.470	51.9	V	74.0	-22.1	PK	70	1.0	
4824.170	50.1	H	54.0	-3.9	AVG	70	2.0	Note 2
4824.170	62.1	H	74.0	-11.9	PK	70	2.0	
7235.570	38.7	H	54.0	-15.3	AVG	68	1.0	
7235.570	47.2	H	74.0	-26.8	PK	68	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Device has an inherent duty cycle during normal operation. 25.2 ms over a 100 ms gives a -11.9dB of correction. The duty correction factor was subtracted from to the Peak measurements value to determine the Average value.
Note 3:	No other emissions detected 20-dB of the limit after the 3rd harmonic.

Elliott

EMC Test Data

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

Run #1b: Center Channel @ 2437 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	**Note 1 applies to all measurements**
2436.530	104.0	V	-	-	AVG	134	1.0	Fundamental
2436.530	107.2	V	-	-	PK	134	1.0	Fundamental
4874.170	53.1	V	54.0	-0.9	AVG	71	1.0	Note 2
4874.170	65.1	V	74.0	-8.9	PK	71	1.0	
7312.300	44.5	V	54.0	-9.5	AVG	78	1.0	
7312.300	51.5	V	74.0	-22.5	PK	78	1.0	
4874.140	50.2	H	54.0	-3.8	AVG	91	1.9	Note 2
4874.140	62.2	H	74.0	-11.8	PK	91	1.9	
7310.410	38.7	H	54.0	-15.3	AVG	33	1.0	
7310.410	47.7	H	74.0	-26.3	PK	33	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Device has an inherent duty cycle during normal operation. 25.2 ms over a 100 ms gives a -11.9dB of correction. The duty correction factor was subtracted from to the Peak measurements value to determine the Average value.
Note 3:	No other emissions detected 20-dB of the limit after the 3rd harmonic.

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

Run #1c: High Channel @ 2462 MHz

Bandedge Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2461.530	103.9	V	-	-	AVG	192	1.0	Fundamental
2461.530	106.9	V	-	-	PK	192	1.0	Fundamental
2462.610	99.3	H	-	-	AVG	104	1.3	Fundamental
2462.610	102.6	H	-	-	PK	104	1.3	Fundamental
2488.390	52.3	H	54.0	-1.7	AVG	105	1.0	Setting of 13, Bandedge
2488.390	60.3	H	74.0	-13.7	PK	105	1.0	Setting of 13, Bandedge
2488.690	53.4	V	54.0	-0.6	AVG	188	1.0	Setting of 13, Bandedge
2488.690	62.3	V	74.0	-11.7	PK	188	1.0	Setting of 13, Bandedge

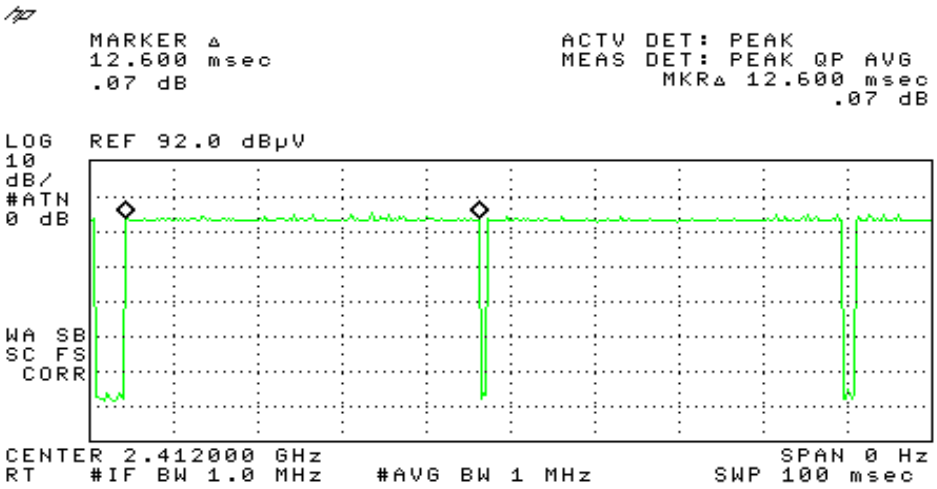
Other Spurious Emissions

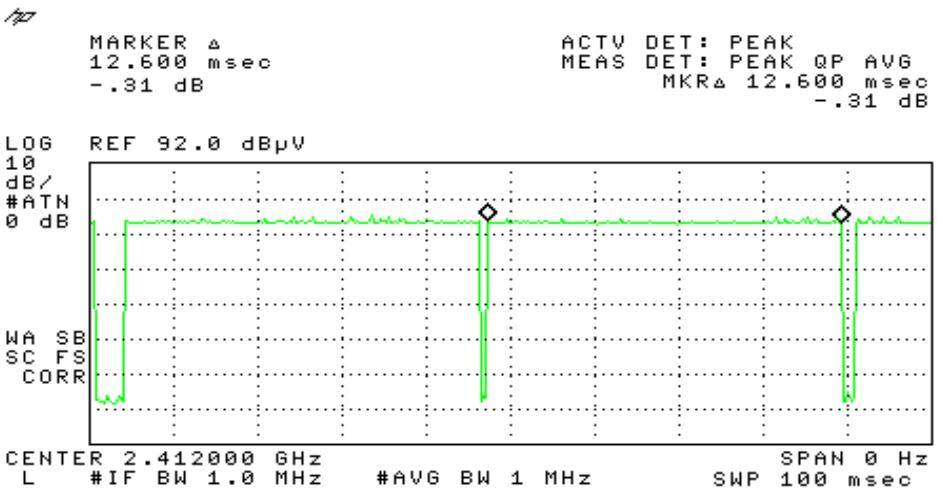
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	**Note 1 applies to all measurements unless otherwise noted**
4924.190	48.6	H	54.0	-5.4	AVG	80	2.0	Note 3
4924.190	60.6	H	74.0	-13.4	PK	80	2.0	
7387.260	39.6	H	54.0	-14.4	AVG	29	1.7	
7387.260	48.5	H	74.0	-25.5	PK	29	1.7	
4924.120	51.5	V	54.0	-2.5	AVG	167	1.0	Note 3
4924.120	63.5	V	74.0	-10.5	PK	167	1.0	
7387.200	42.2	V	54.0	-11.8	AVG	84	1.0	
7387.200	50.2	V	74.0	-23.8	PK	84	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used.
Note 2:	Signal is not in the restricted band but the more stringent restricted band limit was used
Note 3:	Device has an inherent duty cycle during normal operation. 25.2 ms over a 100 ms gives a -11.9dB of correction. The duty correction factor was subtracted from to the Peak measurements value to determine the Average value.
Note 4:	No other emissions detected 20-dB of the limit after the 3rd harmonic.

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

Run #2: Duty Cycle plots





Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements
Power, Bandwidth and Spurious Emissions

Test Specifics

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

Date of Test: 9/7/2006
Test Engineer: Juan Martinez
Test Location: SVOATS #2
Config. Used: 1
Config Change: none
EUT Voltage: 12Vdc

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 29 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1	Output Power	15.247(b)	Pass	18.5 dBm
2	Power Spectral Density (PSD)	15.247(d)	Pass	-4.3dBm/3kHz
3	6dB Bandwidth	15.247(a)	Pass	10.2 MHz
3	99% Bandwidth	RSS GEN	Pass	18.2 MHz
4	Spurious emissions	15.247(b)	Pass	Refer to plots

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

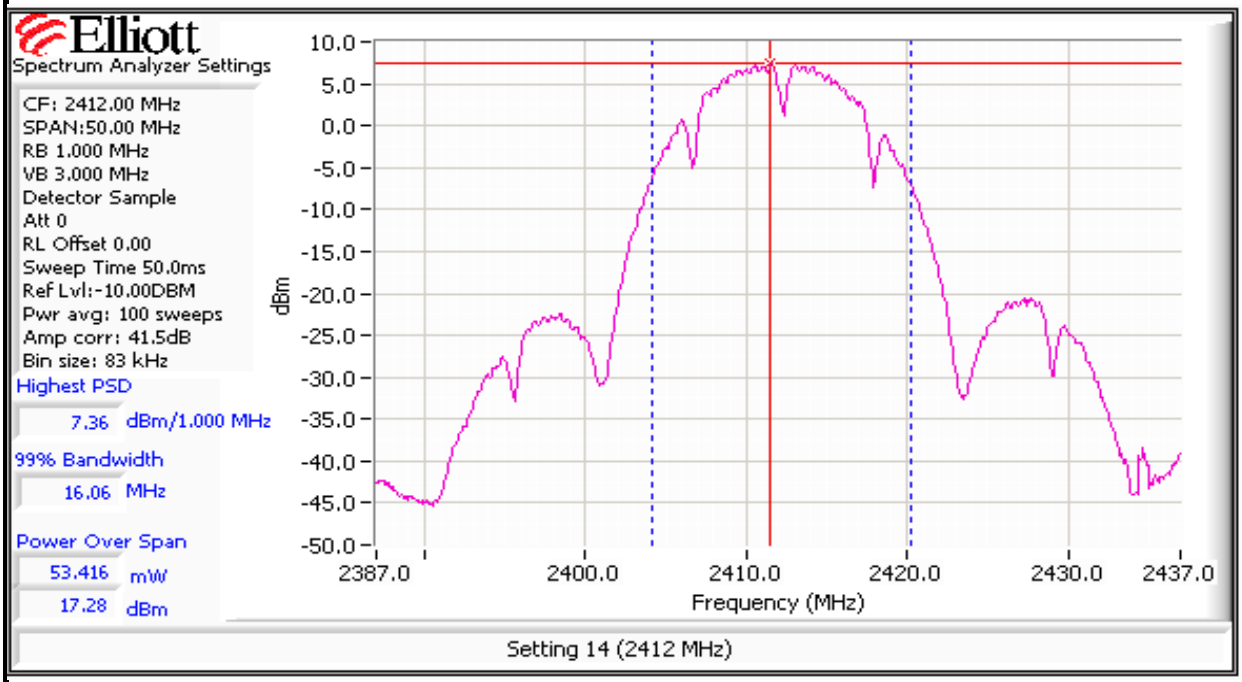
No deviations were made from the requirements of the standard.

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

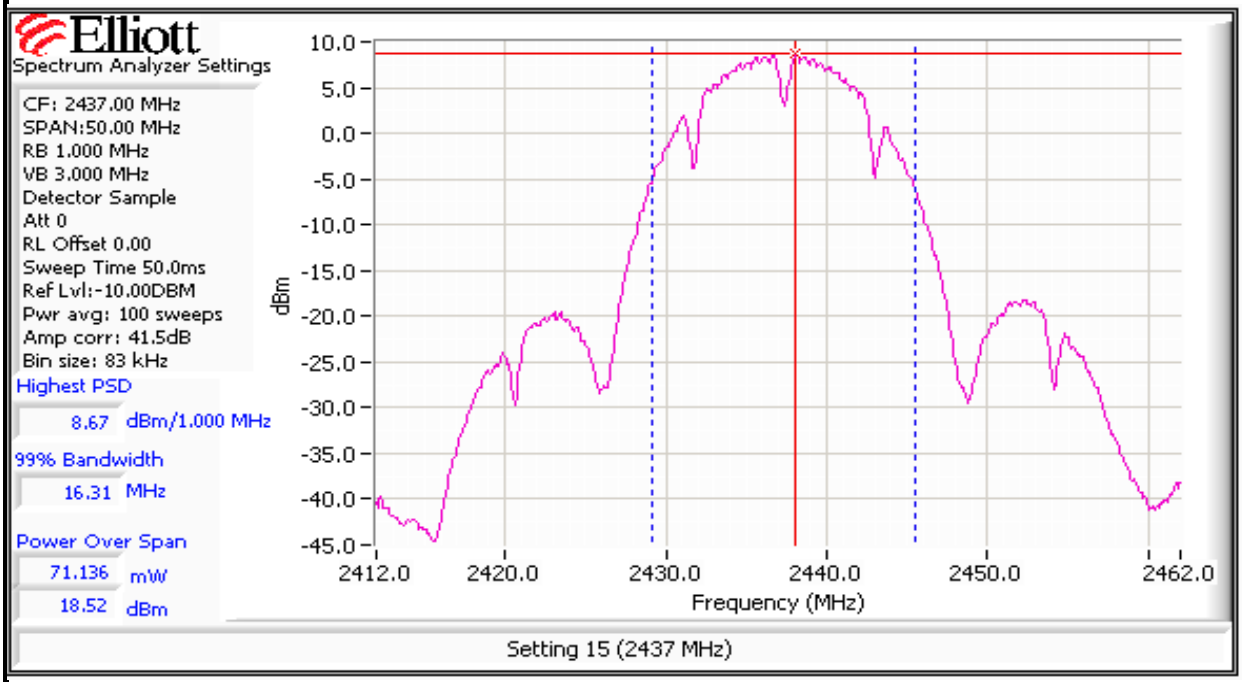
Run #1: Output Power

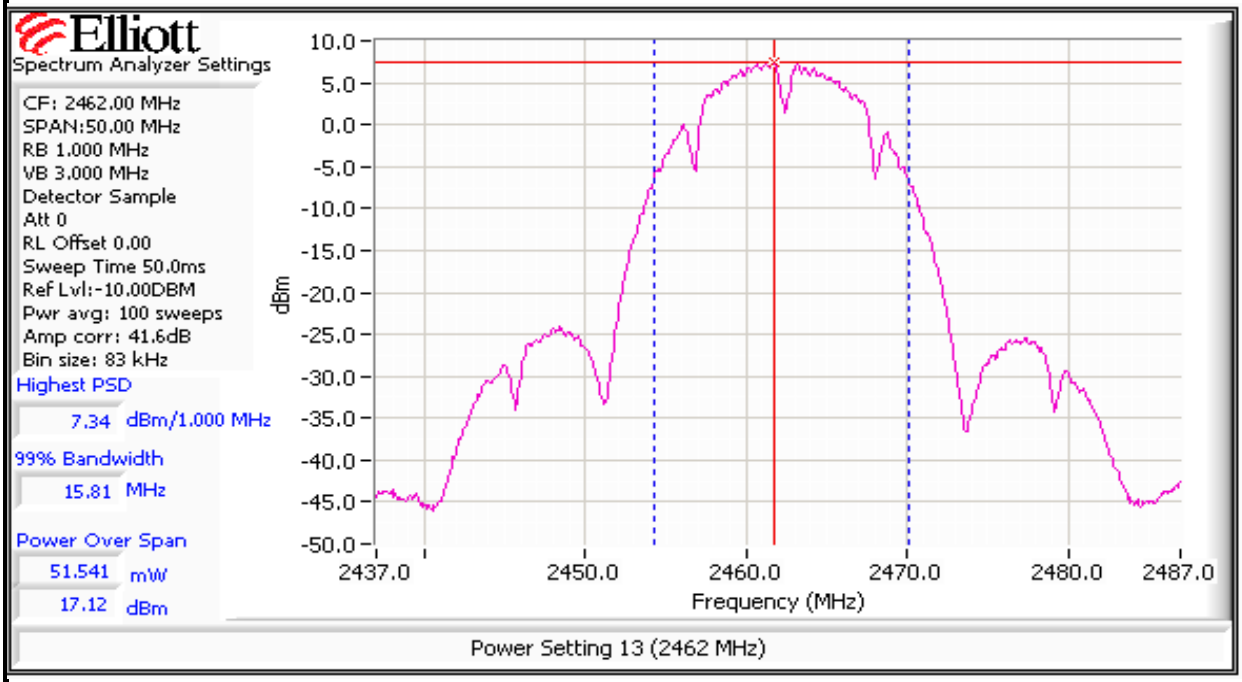
Power Setting[2]	Frequency (MHz)	Output Power (dBm)[1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP[Note 2] dBm	EIRP[Note 2] W
-	2412	17.3	53.5		Pass	17.3	0.053
-	2437	18.5	71.1		Pass	18.5	0.071
-	2462	17.1	51.5		Pass	17.1	0.052

Note 1:	Output power measured Radiated at 3 meters buy using the following to get the output power in dBm. 95.2dB - 107 = 11.7 dB. 11.7dB is used to convert the field strenght (dBuV/m) to (dBm). Then added the of the horn antenna factor which was 29.9dB. Correction used for the power output measurement was 41.5 dB.
Note 1:	Output power measured using a spectrum analyzer with: RBW=1MHz, VB=3 MHz, sample detector, power averaging on and power integration over 50MHz
Note 2:	Total power in EIRP.
Note 3:	Be aware that the client never provided antenna gain to include into the power measurements.



Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A



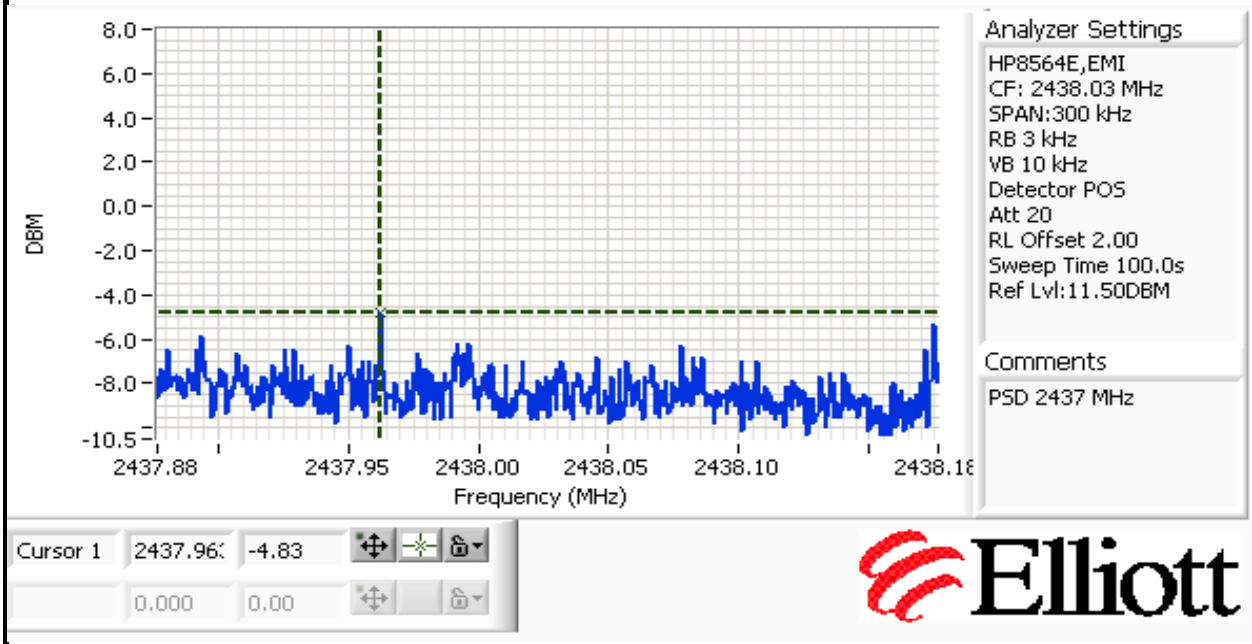


Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

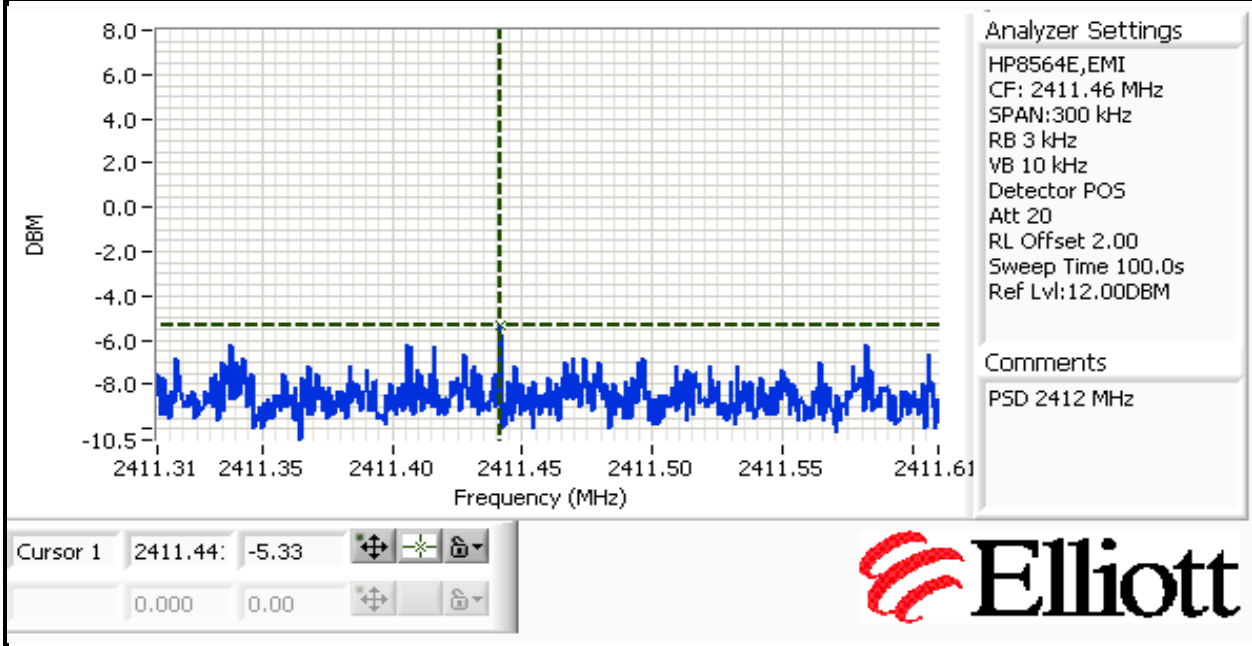
Run #2: Power Spectral Density

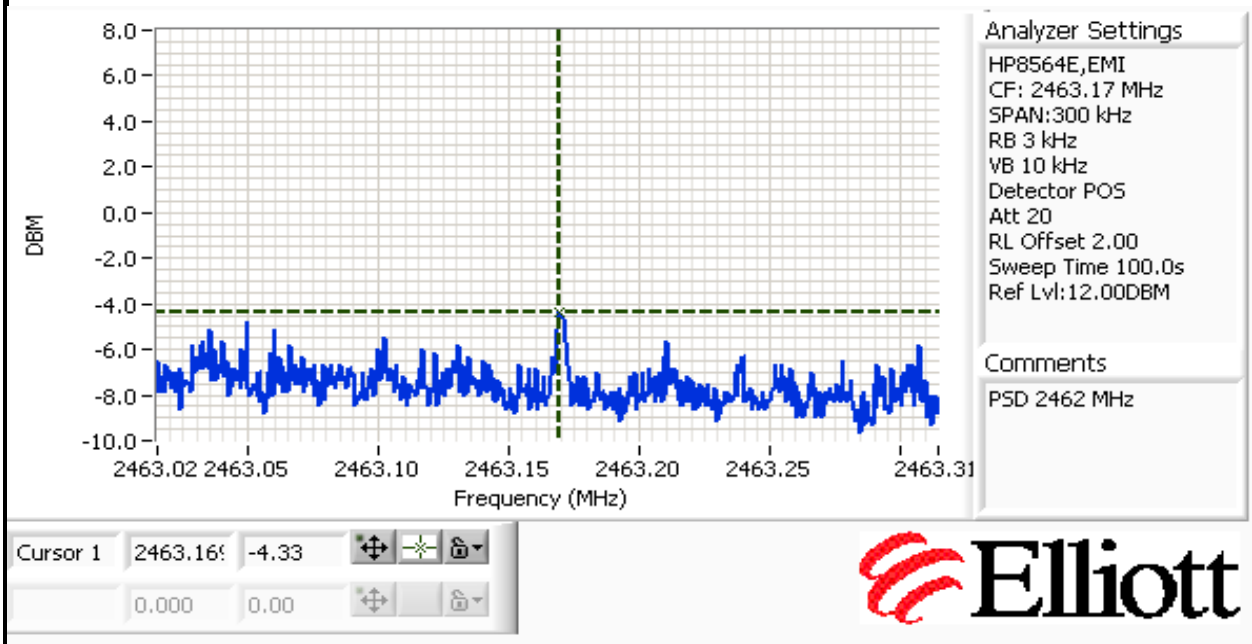
Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1	Limit dBm/3kHz	Result
-	2412	-4.8	8.0	Pass
-	2437	-5.3	8.0	Pass
-	2462	-4.3	8.0	Pass

Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.



Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

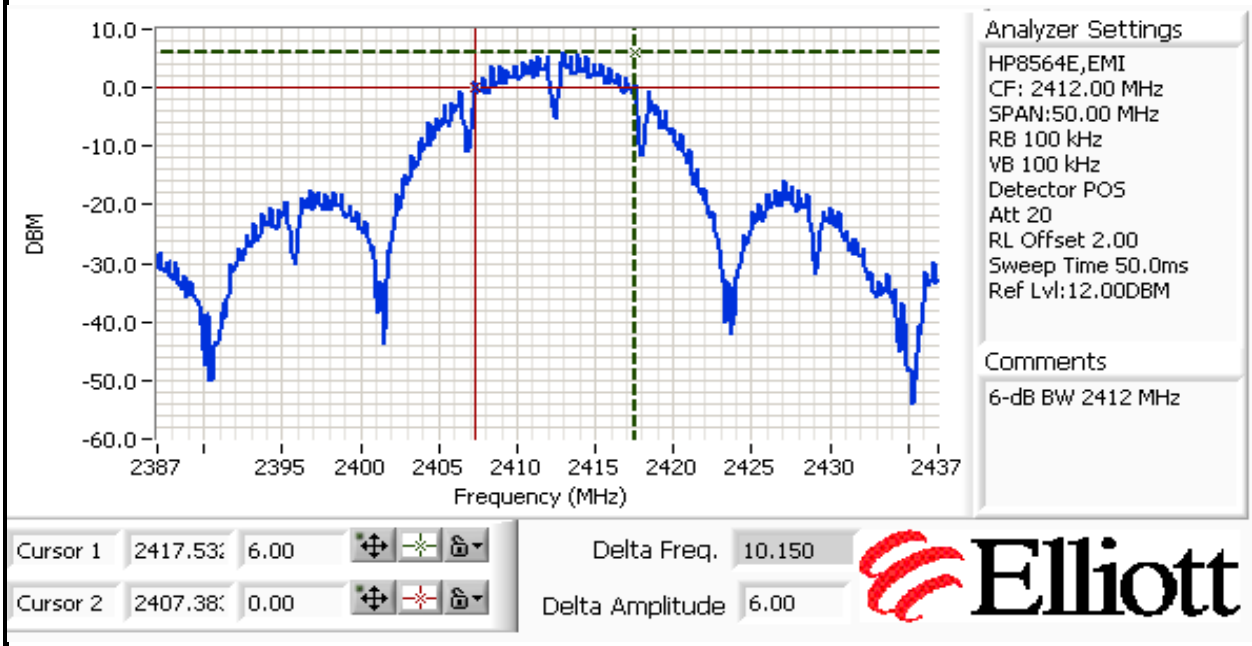




Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

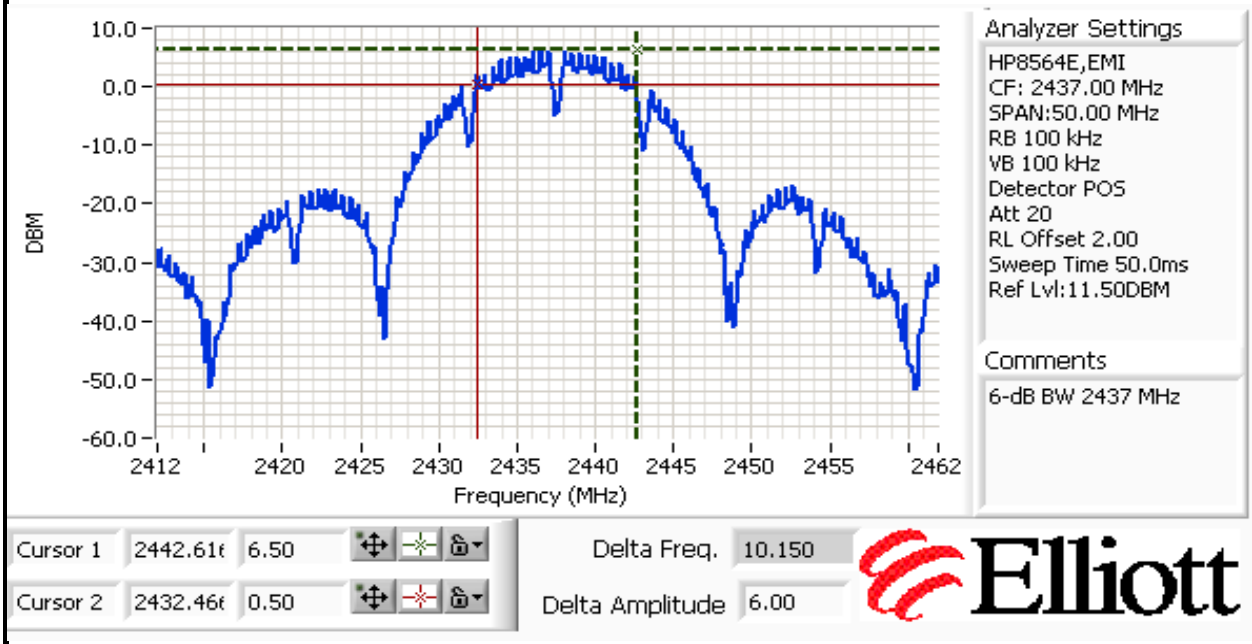
Run #3: Signal Bandwidth

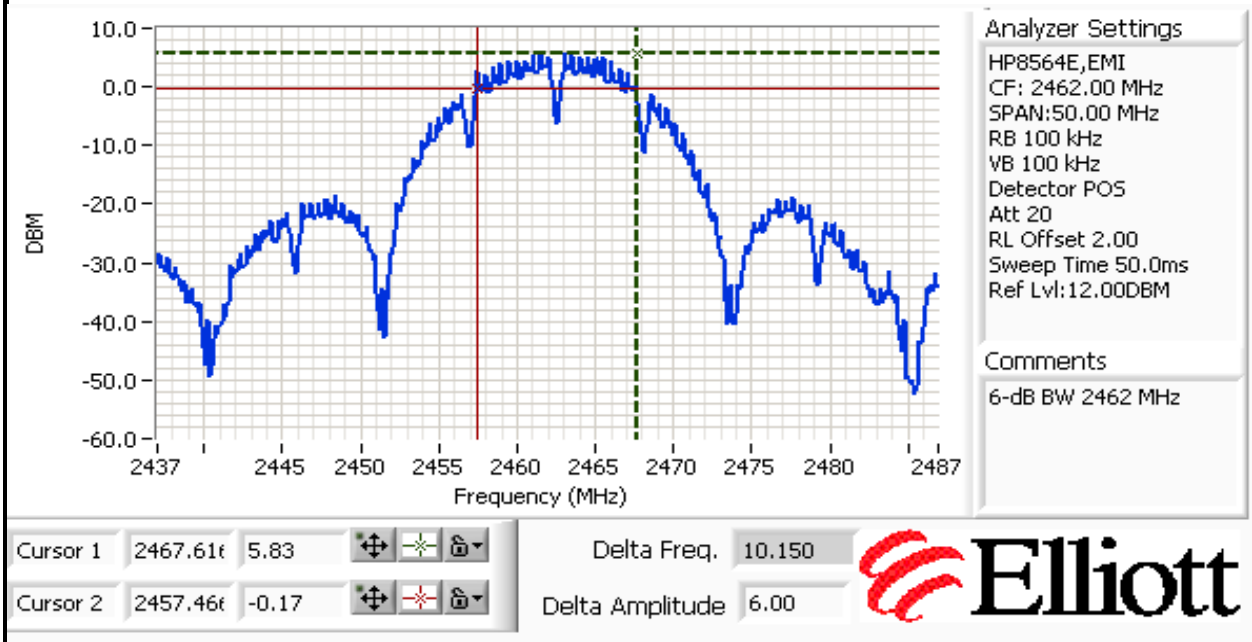
Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz) 6dB	99%
-	2412	100kHz	10.15	18.2
-	2437	100kHz	10.15	18.3
-	2462	100kHz	10.15	17.8



EMC Test Data

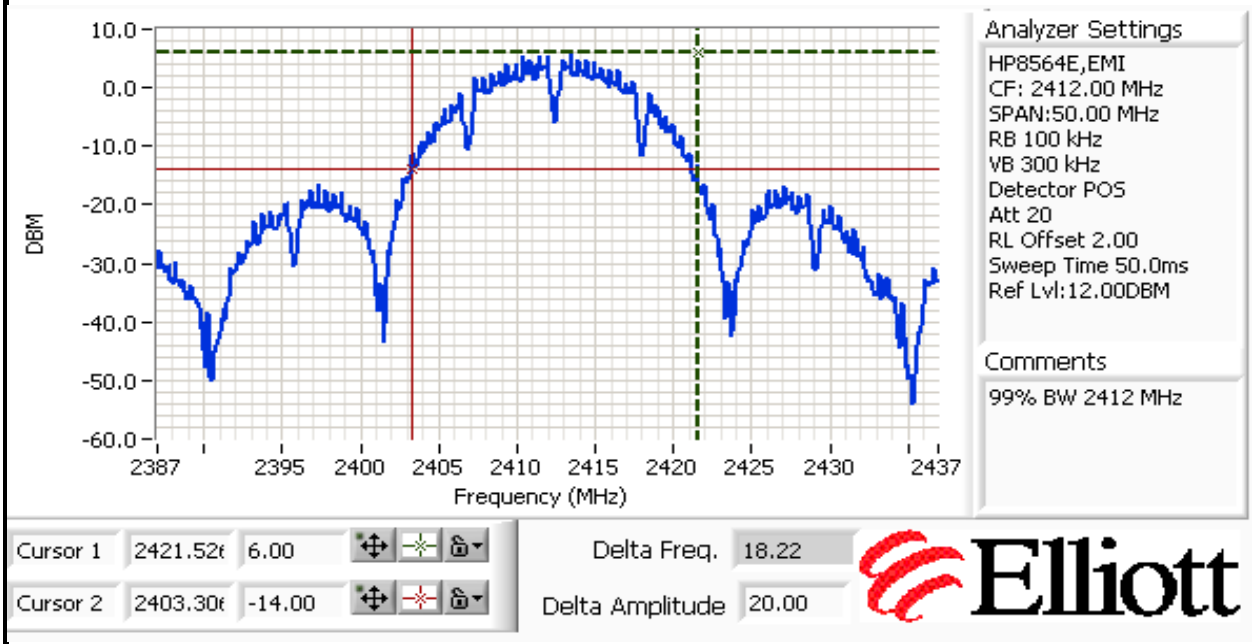
Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

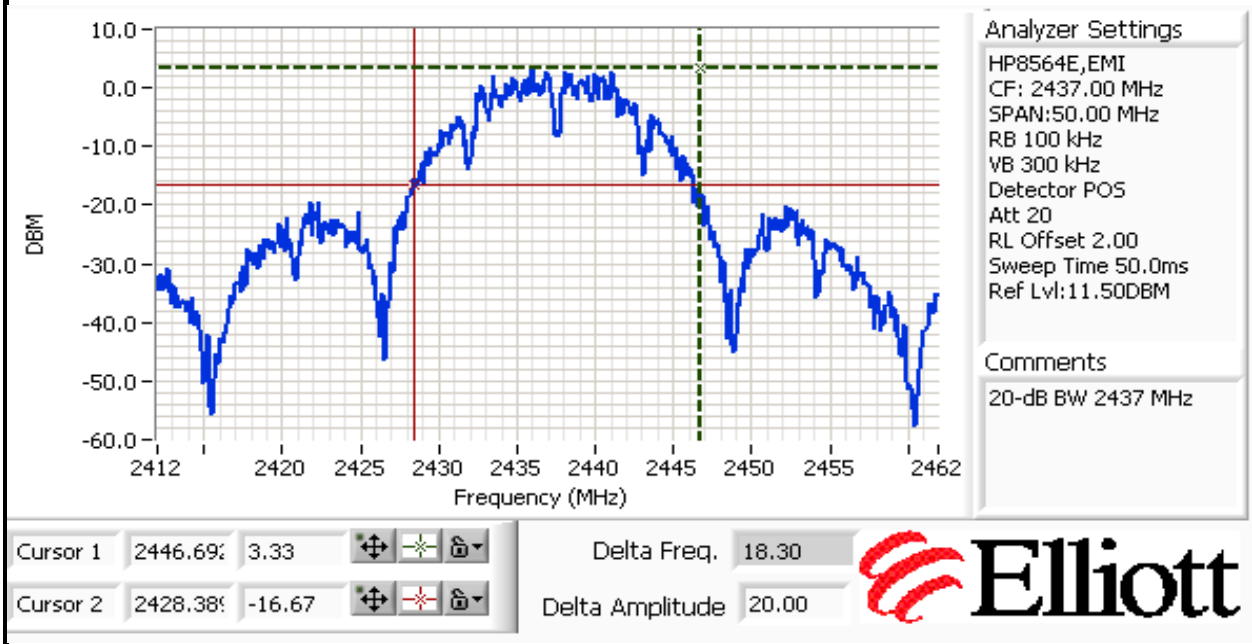




EMC Test Data

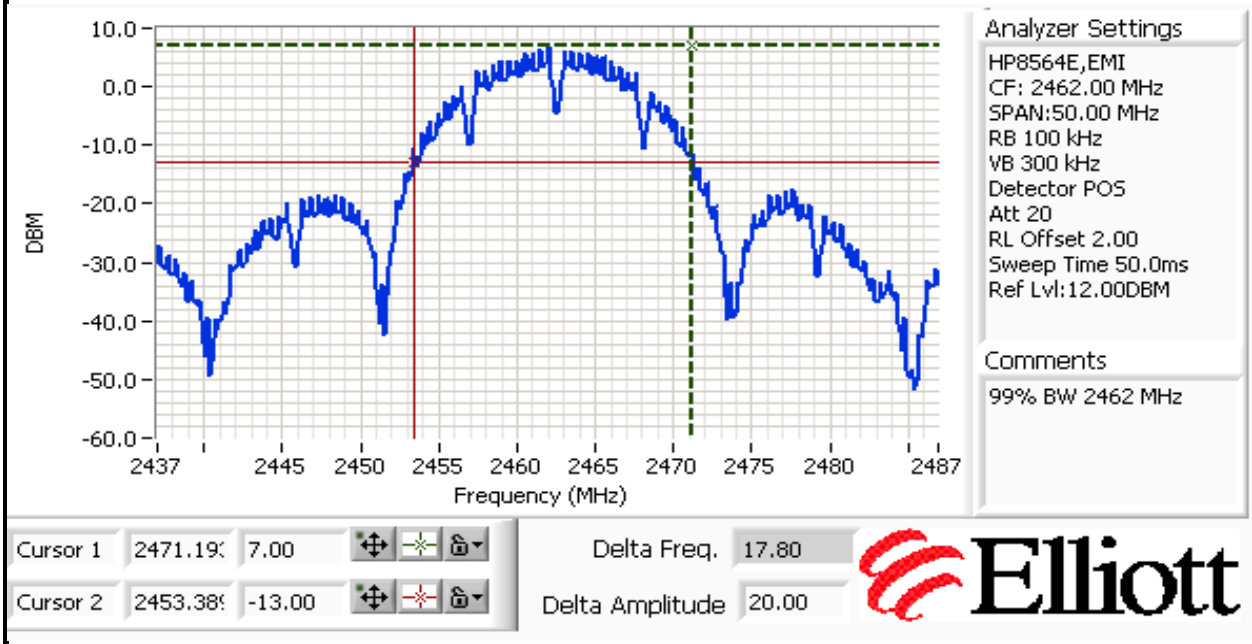
Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A





EMC Test Data

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

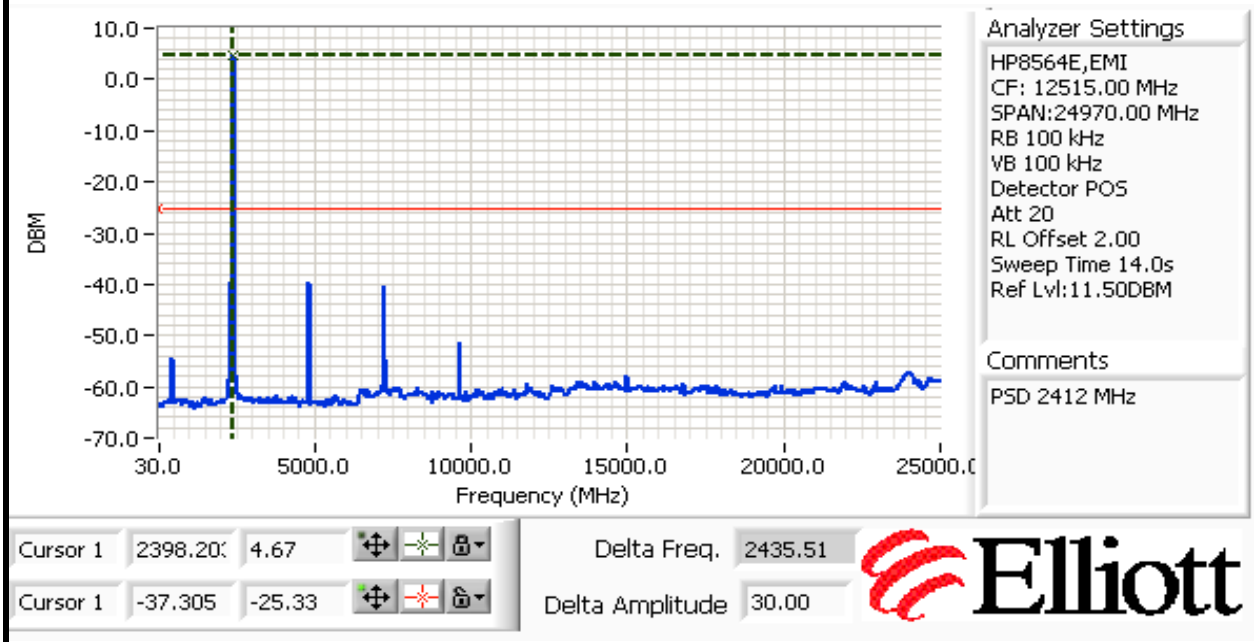


Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

Run #4: Out of Band Spurious Emissions

Frequency (MHz)	Limit	Result
2412	-30dBc	Refer to plots
2437	-30dBc	Refer to plots
2462	-30dBc	Refer to plots

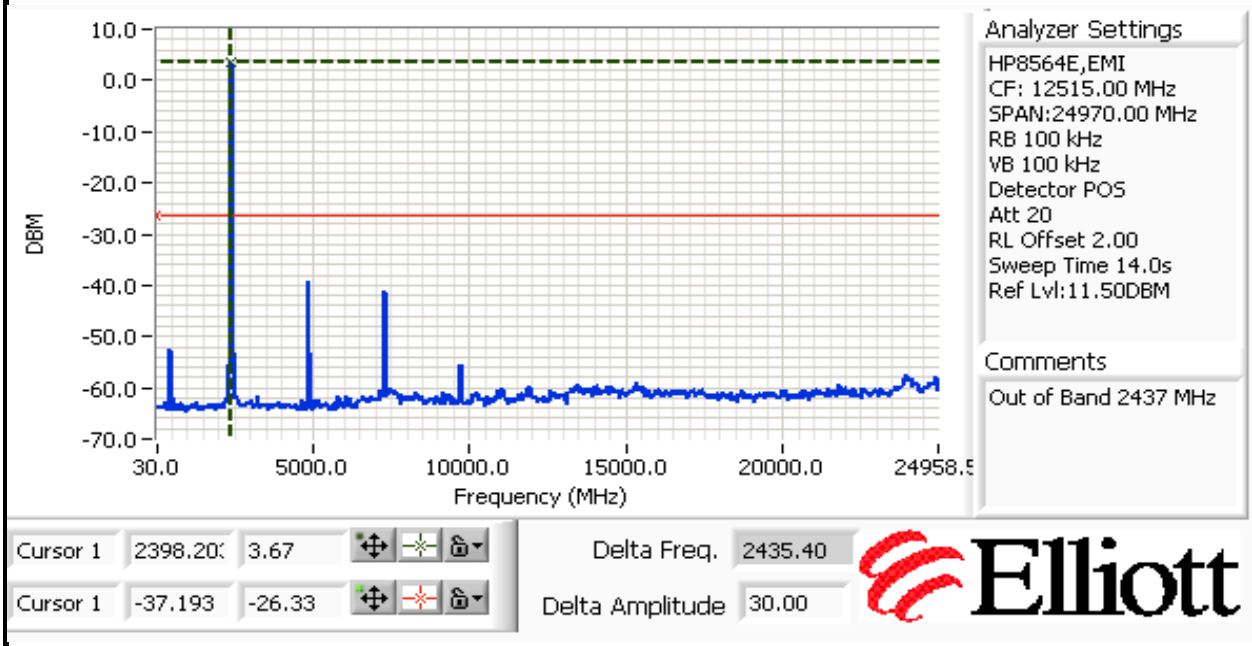
Plots for low channel



EMC Test Data

Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

Plots for center channel



Client:	DriveCam, Inc	Job Number:	J64199
Model:	DCIII	T-Log Number:	T64413
		Account Manager:	Susan Pelzl
Contact:	Tom Lafleur		
Spec:	FCC 15.247, RSS-210	Class:	N/A

Plots for high channel

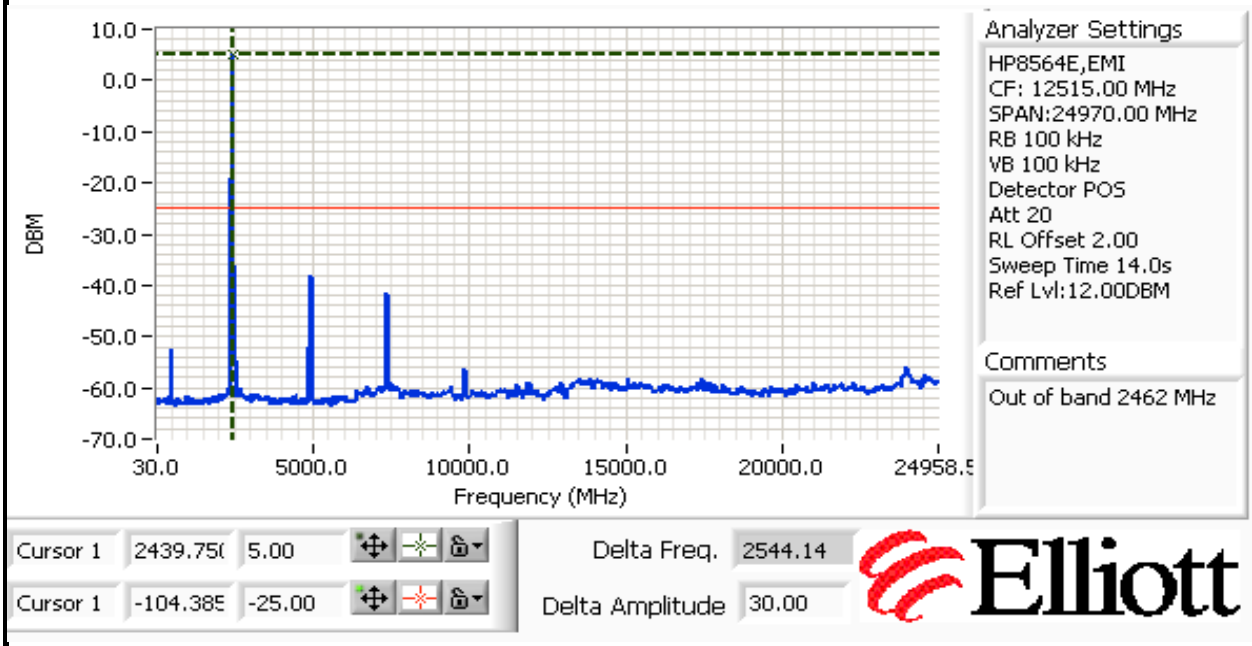
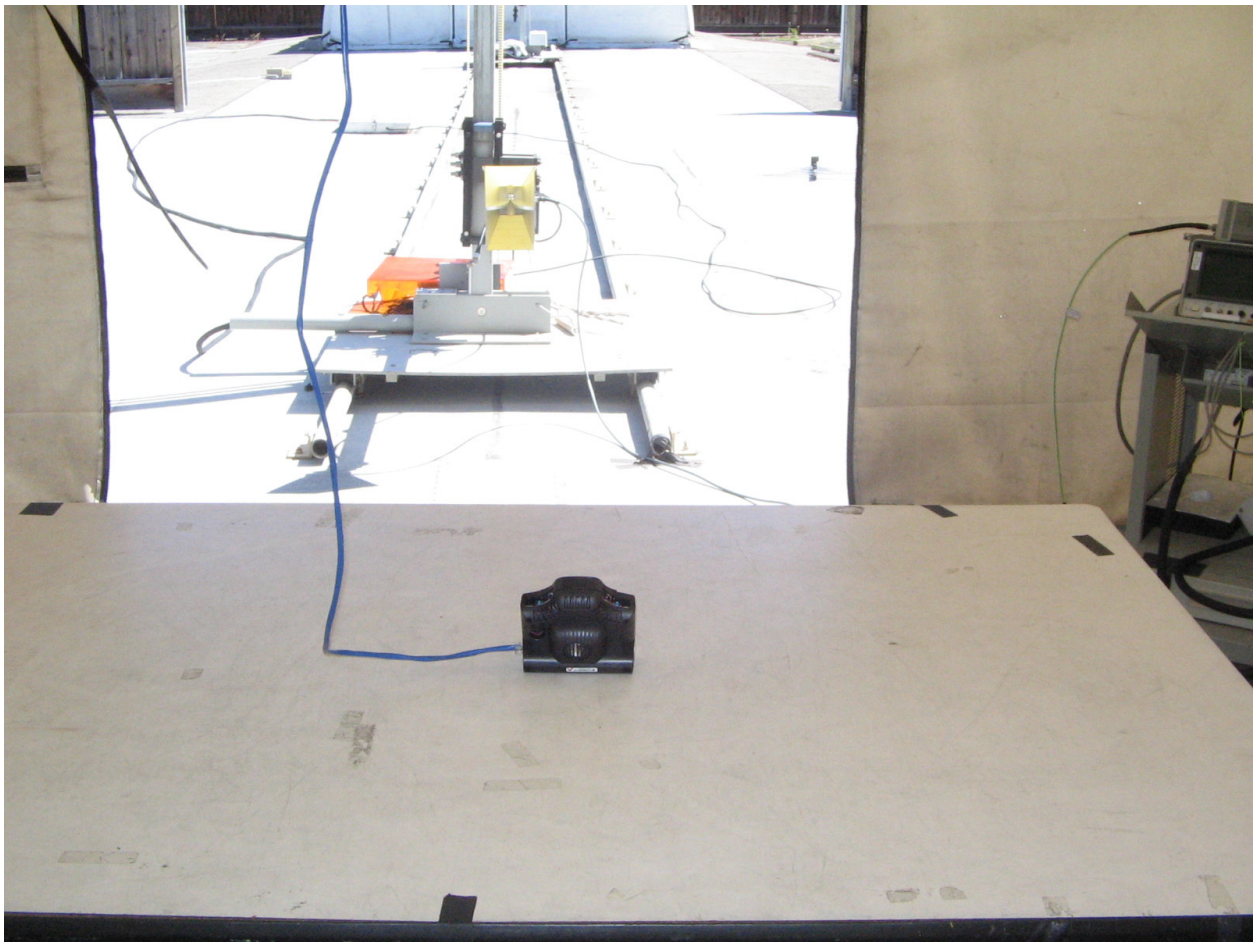


EXHIBIT 3: Photographs of Test Configurations

2 Pages

Radiated Emissions Test Configuration Photographs



Radiated Emissions Test Configuration Photographs