

## *EMC Test Report*

### *Application for Grant of Equipment Authorization*

### *Industry Canada RSS-Gen Issue 3 / RSS 210 Issue 8 FCC Part 15 Subpart C*

**Model: HC170**

IC CERTIFICATION #: 109AN-HC170  
FCC ID: UZ7HC170

APPLICANT: Motorola Solutions, Inc.  
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TEST SITE(S): National Technical Systems - Silicon Valley  
41039 Boyce Road.  
Fremont, CA. 94538-2435

IC SITE REGISTRATION #: 2845B-3

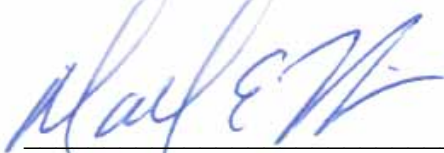
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**REVISION HISTORY**

Rev#	Date	Comments	Modified By
-	04-24-2013	First release	
1.0	05-07-2013	Updated reference to FCC test procedure. Added AC conducted emissions for optional battery charging condition.	MEH

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## SCOPE

An electromagnetic emissions test has been performed on the Motorola Solutions, Inc. model HC170, pursuant to the following rules:

Industry Canada RSS-Gen Issue 3

RSS 210 Issue 8 "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 National Technical Systems - Silicon Valley test procedures:

ANSI C63.4:2003

FCC DTS Measurement Procedure KDB558074, October 2012

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.

## 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 Motorola Solutions, Inc. model HC170 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 3

RSS 210 Issue 8 "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 modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of Motorola Solutions, Inc. model HC170 and therefore apply only to the tested sample. The sample was selected and prepared by Larry Zhou of Motorola Solutions, Inc..

#### ***DEVIATIONS FROM THE STANDARDS***

No deviations were made from the published requirements listed in the scope of this report.

**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 uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	11b: 8.4 MHz 11g: 15.3 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	11b: 17.0dBm 11g: 13.0 dBm (0.05 Watts) EIRP = 0.104 W <sup>Note 1</sup>	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	11b: -5.0 dBm/30 kHz 11g: -11.1 dBm/30 kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions more than < 30dBc	< -30dBc <sup>Note 2</sup>	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.0 dBμV/m @ 2483.5 MHz (-1.0 dB)	15.207 in restricted bands, all others <-30dBc <sup>Note 2</sup>	Complies
Note 1: EIRP calculated using antenna gain of 3.2 dBi for the highest EIRP system. Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst).					

**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 connection is non-accessible	Unique or integral antenna required	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	57.7 dBμV @ 0.152 MHz (-8.2 dB)	Refer to standard	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	-	-	N/A
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to KDB 196803	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 for products with detachable antenna	Complies
-	RSP 100 RSS GEN 4.4.1	99% Bandwidth	11b: 14.0 MHz 11g: 18.1 MHz	Information only	N/A

**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	Measurement Unit	Frequency Range	Expanded Uncertainty
RF power, conducted (power meter)	dBm	25 to 7000 MHz	$\pm 0.52$ dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	$\pm 0.7$ dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	$\pm 0.7$ dB
Conducted emission of receiver	dBm	25 to 26500 MHz	$\pm 0.7$ dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	$\pm 2.5$ dB
Radiated emission (field strength)	dB $\mu$ V/m	25 to 1000 MHz	$\pm 3.6$ dB
		1000 to 40000 MHz	$\pm 6.0$ dB
Conducted Emissions (AC Power)	dB $\mu$ V	0.15 to 30 MHz	$\pm 2.4$ dB

**EQUIPMENT UNDER TEST (EUT) DETAILS****GENERAL**

The Motorola Solutions, Inc. model HC170 is a mobile computer that is designed to be worn on the head. Since the EUT would be placed on a tabletop during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The EUT is powered from a rechargeable Lithium-ion 1950 or 4800mAh minimum (3.7V) battery

The sample was received on February 2, 2013 and tested on February 2, 5, 6 and 10 and April 1, 2 and 3, and May 6, 2013. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Motorola	HC170	Head Mounted Computer	NTS sample: 2013-3415 (antenna port measurements)	UZ7HC170
Motorola	HC170	Head Mounted Computer	NTS sample: 2013-2342 (radiated port measurements)	UZ7HC170
Motorola	86-14000-249R	AC/DC adapter	11Sep12006L	N/A
Motorola	KT-CRDHC1X-01R	Charge Module	-	N/A

**OTHER EUT INFORMATION**

The EUT supports the following:

802.11bg, on channels 1 – 13

Bluetooth 2.1

Simultaneous transmission of Bluetooth and 802.11 is not possible

**ANTENNA SYSTEM**

The antenna system consists of an embedded IFA Antenna model number EMM00028-MT1 with a gain of 3.2dBi.

**ENCLOSURE**

The EUT enclosure measures approximately 24cm by 29cm by 5.5cm. It is primarily constructed of uncoated plastic

**MODIFICATIONS**

No modifications were made to the EUT during the time the product was at National Technical Systems - Silicon Valley.

**SUPPORT EQUIPMENT**

The following equipment was used as support equipment for testing:

Manufacturer	Model	Description	Serial Number	FCC ID
HP	Pavilion	Laptop	CNF73411TQ	DoC
HP	PPP009L	AC/DC adapter	592C40ELTUW5A1	N/A

**EUT INTERFACE PORTS**

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
USB	Laptop	USB	Shielded	1

**AC conducted emissions**

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
USB	Laptop	USB	Shielded	1
EUT	Charge Module	Direct Connection	-	-
Charge Module	AC/DC adapter	2wire	Unshielded	1.5
AC/DC Adapter	AC Mains	2wire	Unshielded	1.5

**EUT OPERATION**

The EUT was configured to transmit continuously on the desired channel at the maximum output power. All testing was performed at 1Mb/s for 11b and 6Mb/s for 11g, as these rates yielded the highest output power.

During AC conducted emissions testing, the EUT was configured to continuously transmit on channel 6, 802.11b mode, at maximum output power.

## TEST SITE

### GENERAL INFORMATION

Final test measurements were taken 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 3	769238	2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 7	A2LA accreditation	2845B-7	

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. The test site(s) contain 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.

### CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.10. 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.

## **MEASUREMENT INSTRUMENTATION**

### **RECEIVER SYSTEM**

An EMI receiver as specified in CISPR 16-1-1 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.

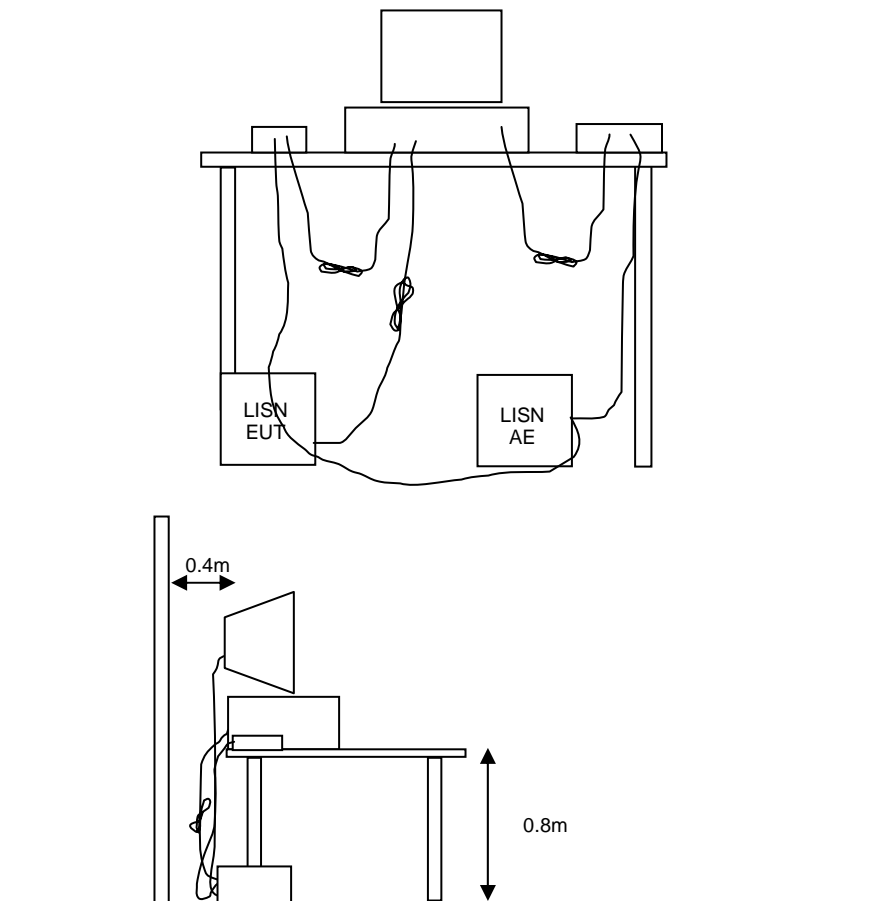
## TEST PROCEDURES

### 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.

### 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.



**Figure 1 Typical Conducted Emissions Test Configuration**

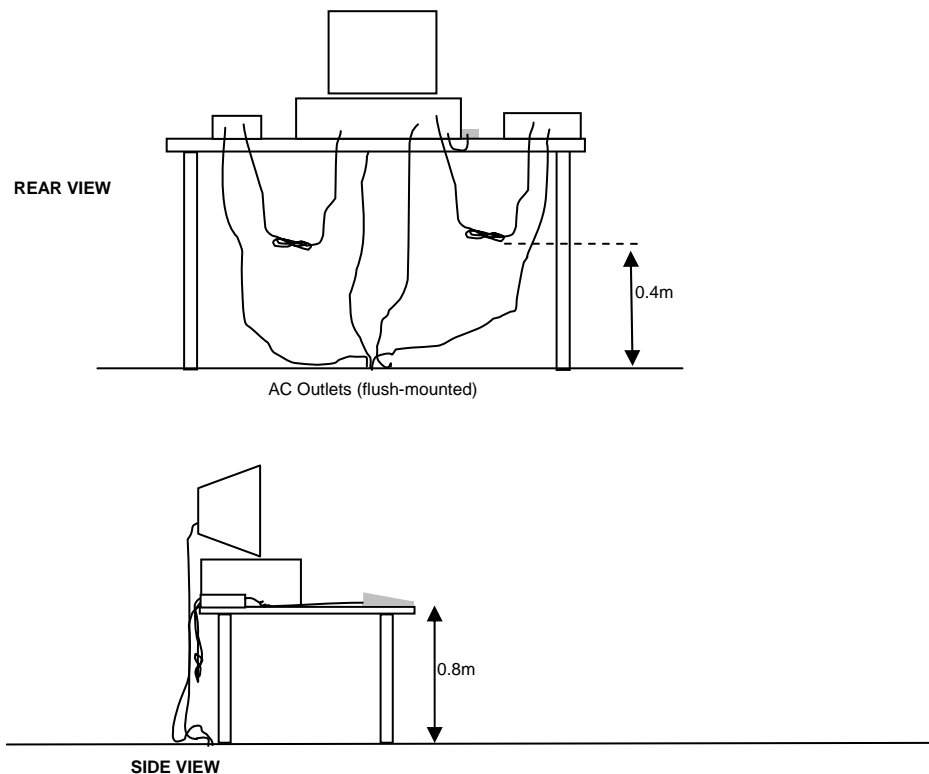
**RADIATED EMISSIONS**

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.

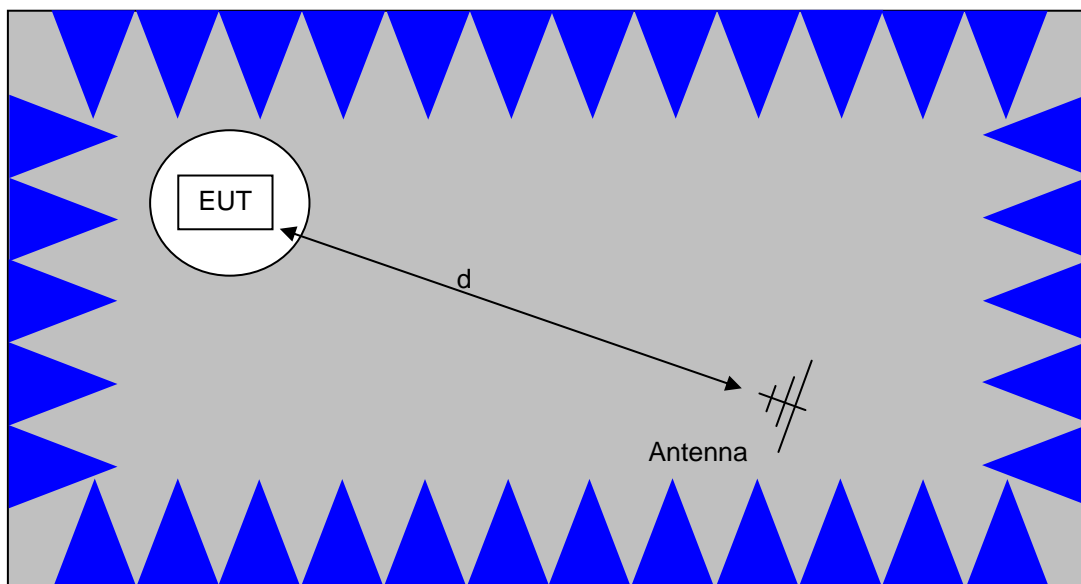
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.

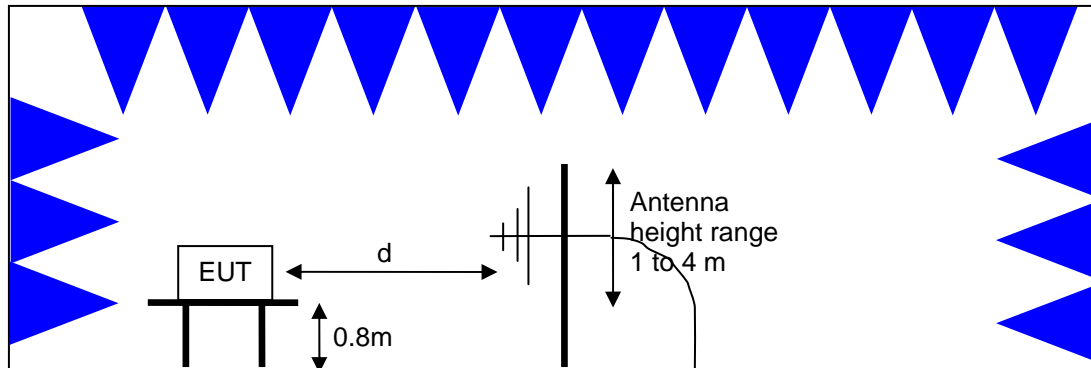


Typical Test Configuration for Radiated Field Strength Measurements



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.

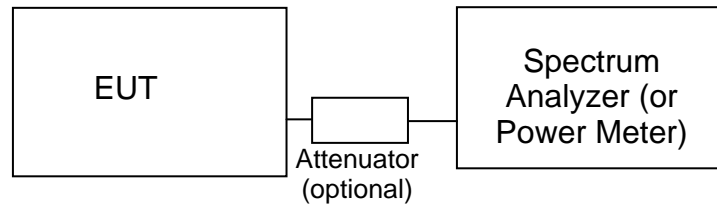
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

**CONDUCTED EMISSIONS FROM ANTENNA PORT**

Direct measurements of power, bandwidth and power spectral density are performed, where possible, with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.

**Test Configuration for Antenna Port Measurements**

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and National Technical Systems - Silicon Valley's test procedures for the type of radio being tested. When power measurements are made using a resolution bandwidth less than the signal bandwidth the power is calculated by summing the power across the signal bandwidth using either the analyzer channel power function or by capturing the trace data and calculating the power using software. In both cases the summed power is corrected to account for the equivalent noise bandwidth (ENBW) of the resolution bandwidth used.

If power averaging is used (typically for certain digital modulation techniques), the EUT is configured to transmit continuously. Power averaging is performed using either the built-in function of the analyzer or, if the analyzer does not feature power averaging, using external software. In both cases the average power is calculated over a number of sweeps (typically 100). When the EUT cannot be configured to continuously transmit then either the analyzer is configured to perform a gated sweep to ensure that the power is averaged over periods that the device is transmitting or power averaging is disabled and a max-hold feature is used.

If a power meter is used to make output power measurements the sensor head type (peak or average) is stated in the test data table.

**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<sup>1</sup> (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 <sub>KHz</sub> @ 300m	67.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 300m
0.490-1.705	24000/F <sub>KHz</sub> @ 30m	87.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 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

<sup>1</sup> 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:

$$R_T - S = M$$

where:

$R_T$  = 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:

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

where:

$$F_d = \text{Distance Factor in dB}$$

$$D_m = \text{Measurement Distance in meters}$$

$$D_s = \text{Specification Distance in meters}$$

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:

$$F_d = 40 * \text{LOG}_{10} (D_m/D_s)$$

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:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

**Appendix A Test Equipment Calibration Data**

<b><u>Manufacturer</u></b>	<b><u>Description</u></b>	<b><u>Model</u></b>	<b><u>Asset #</u></b>	<b><u>Cal Due</u></b>
<b>Radio Antenna Port (Power and Spurious Emissions), 05-Feb-13</b>				
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013
<b>Radio Antenna Port (Power and Spurious Emissions), 06-Feb-13</b>				
Agilent	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	2/23/2013
<b>Radiated Emissions, 1000 - 26,500 MHz, 02-Apr-13</b>				
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/19/2014
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/2/2013
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	2199	2/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	8/10/2013
<b>Radiated Spurious Emissions, 1000 - 25,000 MHz, 03-Apr-13</b>				
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	8/23/2014
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/2/2013
Hewlett Packard	Head (Inc W1-W4, 1946 , 1947) Purple	84125C	1772	5/1/2013
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	4/17/2013
Hewlett Packard	Microwave Preamplifier, 1- 26.5GHz	8449B	2199	2/19/2014
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	8/10/2013
<b>Radio Antenna Port (Power and Spurious Emissions), 04-Apr-13</b>				
Rohde & Schwarz	Power Sensor, 1 uW-100 mW, DC-18 GHz, 50ohms	NRV-Z51	1070	6/1/2013
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1071	3/20/2014
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts use with 20dB attenuator sn:100059 only	NRV-Z32	1423	9/18/2013
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/12/2013
<b>Radiated Spurious Emissions, 1000 - 2,500 MHz, 08-Apr-13</b>				
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/12/2013
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	7/12/2014
<b>Conducted Emissions, AC Power, 06-May-13</b>				
EMCO	LISN, 10 kHz-100 MHz	3825/2	1293	02/14/14
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1594	05/22/13
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	05/21/13
Com-Power	9KHz-30MHz, 50uH, 15Aac, 10Adc, max	LI-215A	2671	05/25/13

## ***Appendix B Test Data***

T90507 Pages 23 - 56

Client:	Motorola Solutions	Job Number:	J89057
Product:	HC170 Head Mounted Computer	T-Log Number:	T90507
		Account Manager:	Christine Krebill
Contact:	Larry Zhou		
Emissions Standard(s):	FCC 15.247 / RSS-210	Class:	-
Immunity Standard(s):	-	Environment:	-

## EMC Test Data

For The

### Motorola Solutions

Product

HC170 Head Mounted Computer

Date of Last Test: 5/6/2013

Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

### Test Specific Details

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

### 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: 15-18 °C

Rel. Humidity: 30-35 %

### Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11b	Ch 1 2412MHz	17000	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 15.247( c)	43.1 dBµV/m @ 2386.3 MHz (-10.9 dB)
1b		Ch 11 2462MHz	17000	-	Restricted Band Edge (2483.5 MHz)		45.8 dBµV/m @ 2488.3 MHz (-8.2 dB)
1c		Ch 13 2472MHz	11500	-	Restricted Band Edge (2483.5 MHz)		52.5 dBµV/m @ 2487.3 MHz (-1.5 dB)
1d		Ch 12 2467MHz	14000	-	Restricted Band Edge (2483.5 MHz)		52.3 dBµV/m @ 2484.7 MHz (-1.7 dB)
2a	802.11g	Ch 1 2412MHz	13000	-	Restricted Band Edge (2390 MHz)		45.4 dBµV/m @ 2390.0 MHz (-8.6 dB)
2b		Ch 11 2462MHz	13000	-	Restricted Band Edge (2483.5 MHz)		47.9 dBµV/m @ 2483.5 MHz (-6.1 dB)
2c		Ch 13 2472MHz	13000 capped	-	Restricted Band Edge (2483.5 MHz)		71.9 dBµV/m @ 2483.5 MHz (-2.1 dB)
2d		Ch 12 2467MHz	10500	-	Restricted Band Edge (2483.5 MHz)		53.0 dBµV/m @ 2483.5 MHz (-1.0 dB)

### 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:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## Notes

Sample: NTS tag - 2013-2342  
 Software: HC1BSP4.8.3\_Integrity2b\_NTS

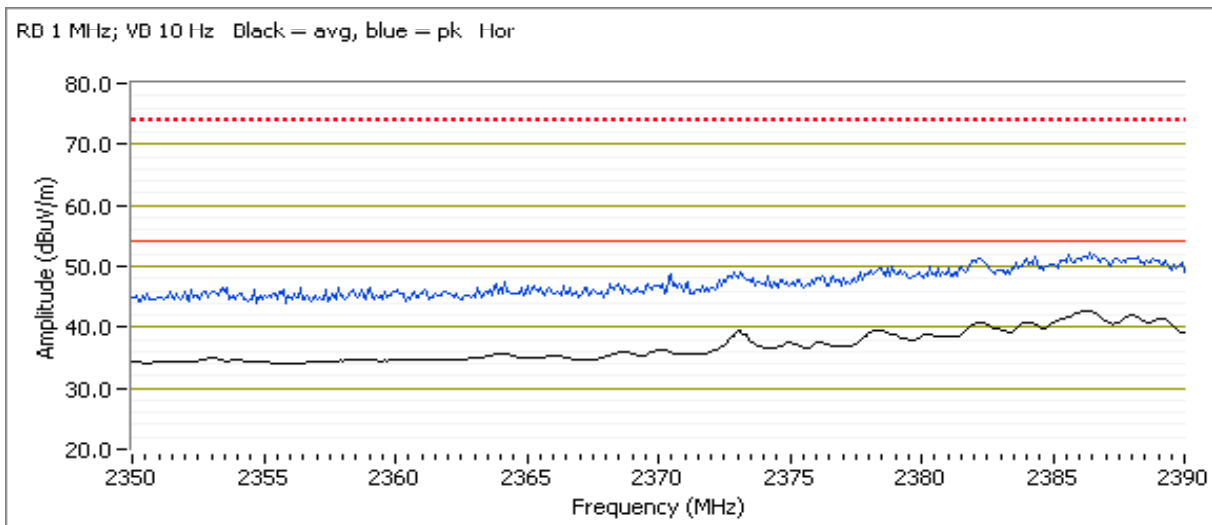
## Run #1: Radiated Spurious Emissions, 30 - 25000 MHz. Operating Mode: 802.11b

Date of Test: 4/2/2013      Test Location: Chamber #3  
 Test Engineer: John Caizzi

## Run #1a: Low Channel @ 2412 MHz, power setting = 17000

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2386.310	43.1	H	54.0	-10.9	AVG	238	1.08	
2386.390	51.8	H	74.0	-22.2	PK	238	1.08	
2386.390	39.9	V	54.0	-14.1	AVG	315	1.37	
2389.040	49.0	V	74.0	-25.0	PK	315	1.37	

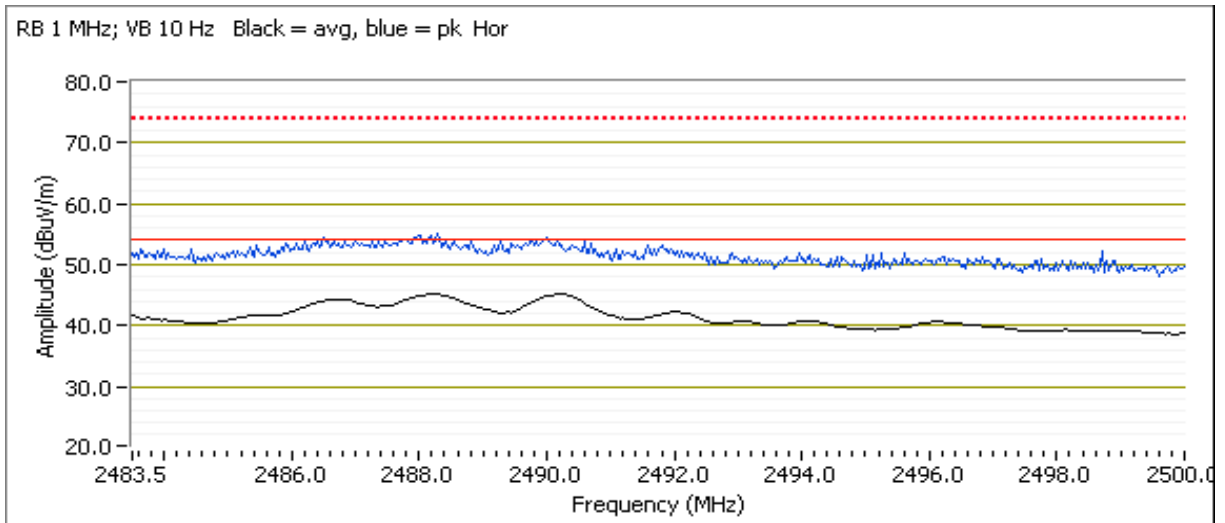


Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## Run #1b: Channel 11 @ 2462 MHz, power setting = 17000

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2488.260	45.8	H	54.0	-8.2	AVG	242	1.08	
2488.100	54.8	H	74.0	-19.2	PK	242	1.08	



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

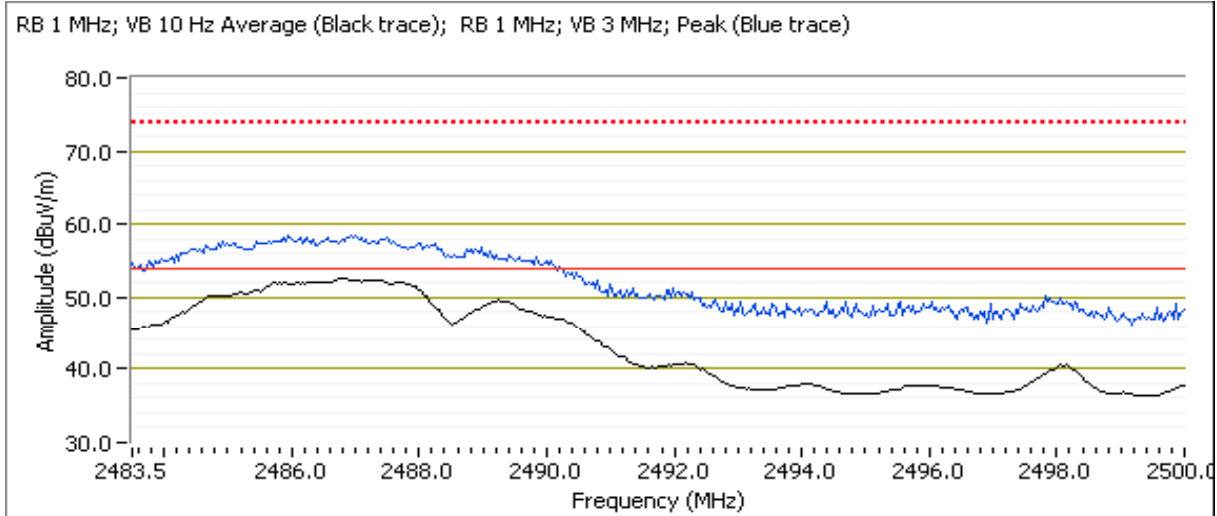
Date of Test: 4/2/2013  
 Test Engineer: Mehran Birgani

Test Location: Chamber #3

## Run #1c: Channel 13 @ 2472 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	V/H	Limit	Margin	PK/QP/Avg	degrees	meters	
2487.340	52.5	H	54.0	-1.5	AVG	252	1.09	Pwr setting = 11500
2486.970	58.6	H	74.0	-15.4	PK	252	1.09	Pwr setting = 11500



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

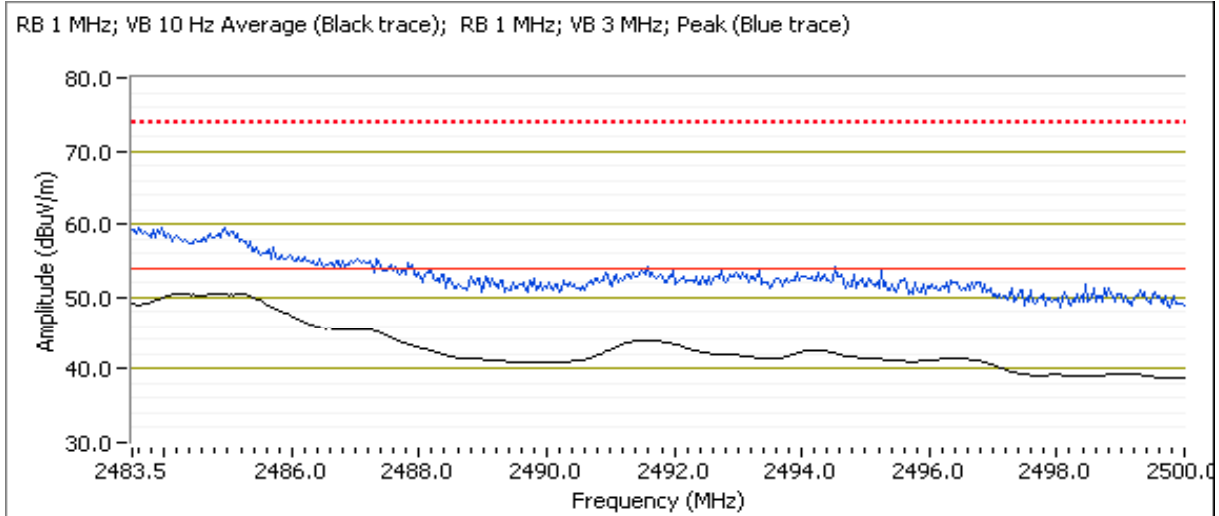
Date of Test: 4/2/2013  
 Test Engineer: Mehran Birgani

Test Location: Chamber #3

## Run #1d: Channel 12 @ 2467 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2484.690	52.3	H	54.0	-1.7	AVG	252	1.09	Pwr setting = 14000
2485.090	59.8	H	74.0	-14.2	PK	252	1.09	Pwr setting = 14000



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## Run #2: Radiated Spurious Emissions, 30 - 25000 MHz. Operating Mode: 802.11g

Date of Test: 4/2/2013

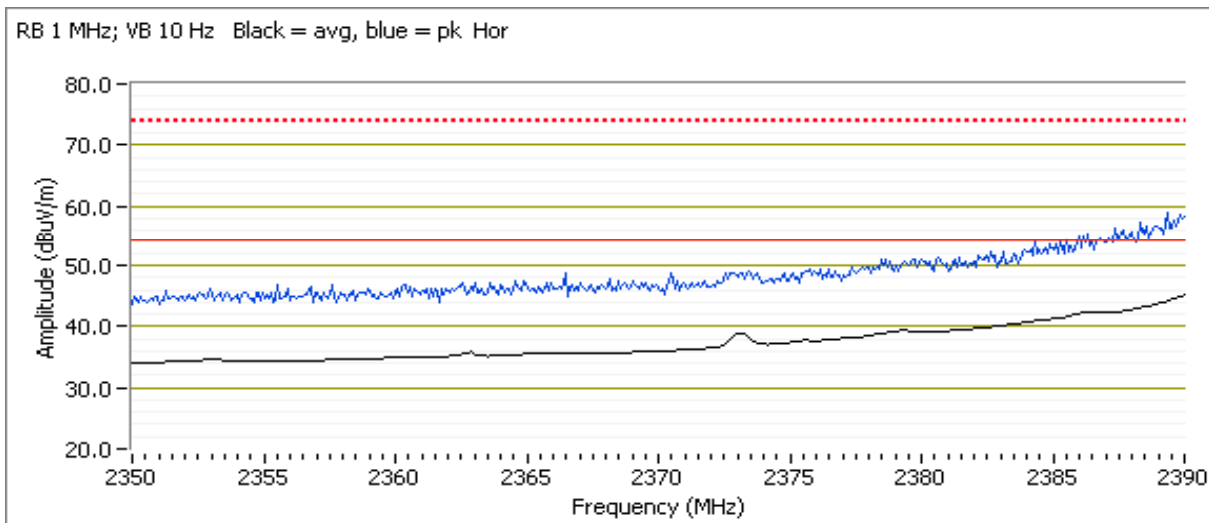
Test Location: Chamber #3

Test Engineer: John Caizzi

## Run #2a: Low Channel @ 2412 MHz, power setting = 13000

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2390.000	45.4	H	54.0	-8.6	AVG	246	1.09	Registry cap
2387.760	58.0	H	74.0	-16.0	PK	246	1.09	Registry cap
2390.000	42.4	V	54.0	-11.6	AVG	309	1.37	Registry cap
2389.760	54.2	V	74.0	-19.8	PK	309	1.37	Registry cap

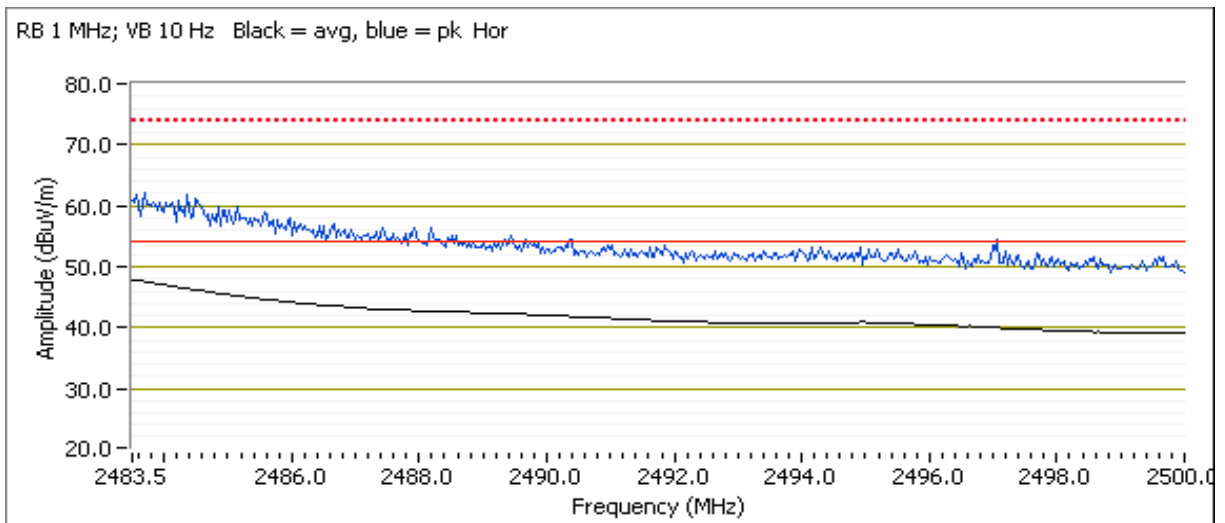


Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## Run #2b: Channel 11 @ 2462 MHz, power setting = 13000

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	47.9	H	54.0	-6.1	AVG	243	1.06	Registry cap
2483.700	61.6	H	74.0	-12.4	PK	243	1.06	Registry cap



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

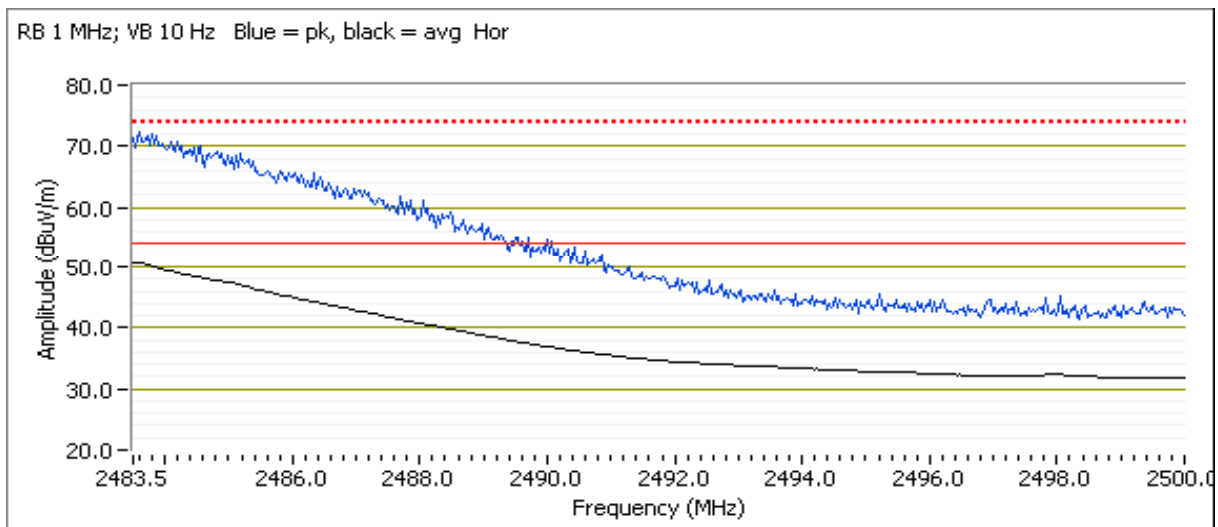
Date of Test: 4/8/2013  
 Test Engineer: John Caizzi

Test Location: Chamber #4

**Run #2c: Channel 13 @ 2472 MHz. Registry power capped at 00.**

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.530	50.7	H	54.0	-3.3	AVG	255	1.11	Pwr setting = 13000
2483.500	71.9	H	74.0	-2.1	PK	255	1.11	Pwr setting = 13000
2483.500	47.4	V	54.0	-6.6	AVG	59	1.31	Pwr setting = 13000
2483.930	68.5	V	74.0	-5.5	PK	59	1.31	Pwr setting = 13000



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

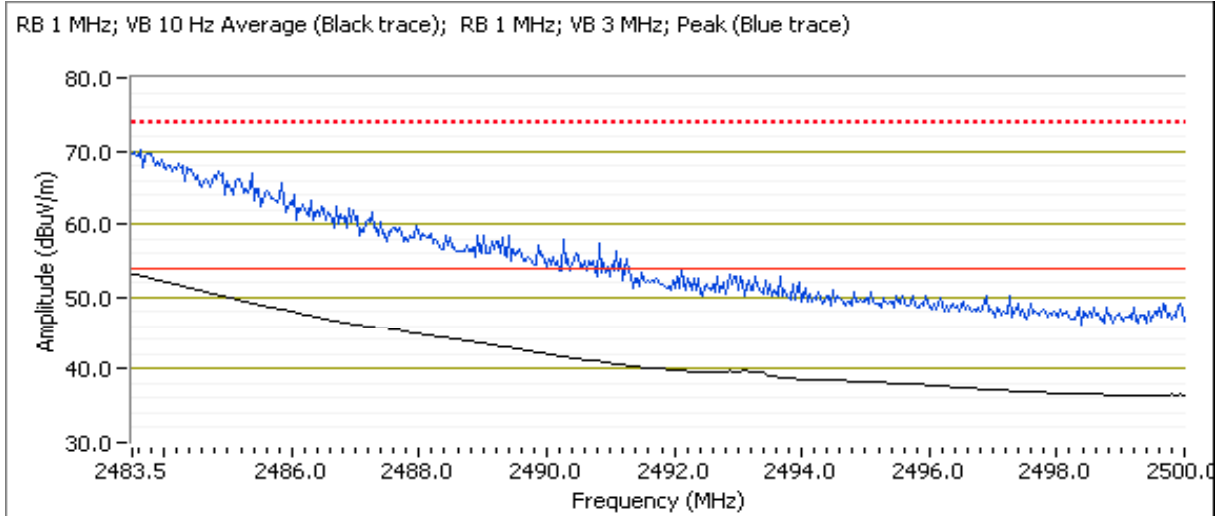
Date of Test: 4/2/2013  
Test Engineer: Mehran Birgani

Test Location: Chamber #3

## Run #2d: Channel 12 @ 2467 MHz

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	V/H	Limit	Margin	PK/QP/Avg	degrees	meters	
2483.500	53.0	H	54.0	-1.0	AVG	252	1.1	Pwr setting = 10500
2483.530	71.1	H	74.0	-2.9	PK	252	1.1	Pwr setting = 10500



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

### Test Specific Details

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

### 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:

	2-Apr	3-Apr
Temperature:	23	23 °C
Rel. Humidity:	45	40 %

### Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11b	Ch 1 - 2412MHz	17000	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	47.9 dBμV/m @ 1500.0 MHz (-6.1 dB)
1b		Ch 6 - 2437MHz	17000	-			46.1 dBμV/m @ 1457.6 MHz (-7.9 dB)
1c		Ch 13 - 2472MHz	17000	-			41.3 dBμV/m @ 4944.0 MHz (-12.7 dB)

### 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.

### Notes

Sample: NTS tag 2013-2342

Software: HC1BSP4.8.3\_Integrity2b\_NTS

Testing performed on 802.11b mode only, as this was the worse case condition from preliminary testing.

No radio related emissions observed below 1GHz.

Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## Run #1: Radiated Spurious Emissions, 30 - 25000 MHz. Operating Mode: 802.11b

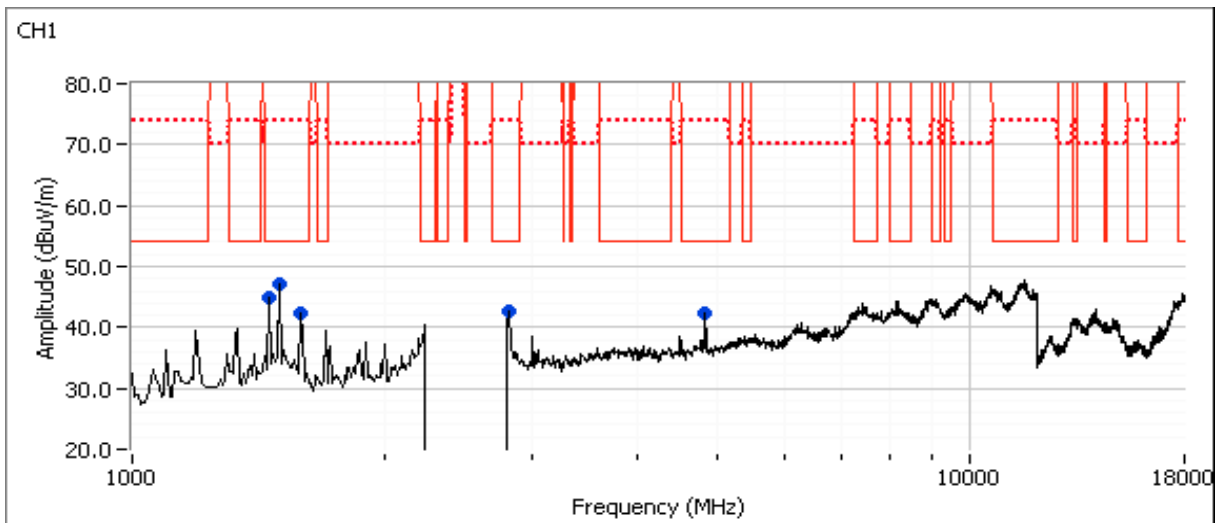
Date of Test: 4/2/2013 & 4/3/13  
 Test Engineer: John Caizzi  
 Test Location: Chamber 3

## Run #1a: Low Channel @ 2412 MHz, power setting = 17000

### 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	
1500.030	47.9	V	54.0	-6.1	AVG	179	1.00	
1500.030	50.9	V	74.0	-23.1	PK	179	1.00	
2814.020	40.7	V	54.0	-13.3	AVG	156	1.01	
2813.900	48.2	V	74.0	-25.8	PK	156	1.01	
4824.020	40.3	V	54.0	-13.7	AVG	87	1.17	
4824.130	46.6	V	74.0	-27.4	PK	87	1.17	
1458.330	44.8	V	54.0	-9.2	Peak	175	1.00	Measured on center channel.
1591.670	42.2	V	54.0	-11.8	Peak	116	1.00	

- Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
- Note 2: 18-25 GHz scan not done because scans on center & high channels showed no emissions in that frequency range.



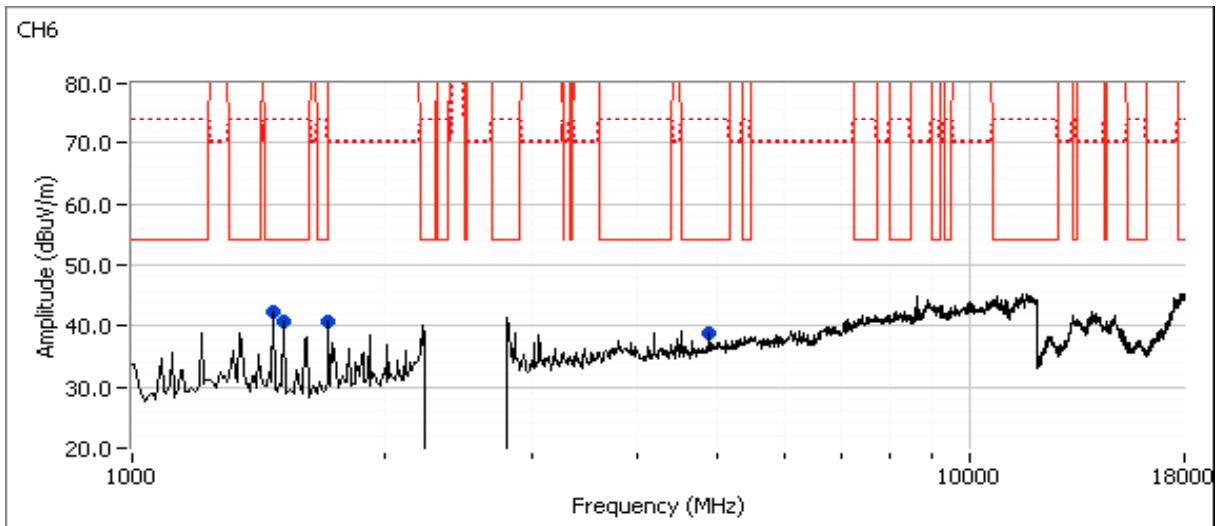
Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1b: Center Channel @ 2437 MHz, power setting = 17000

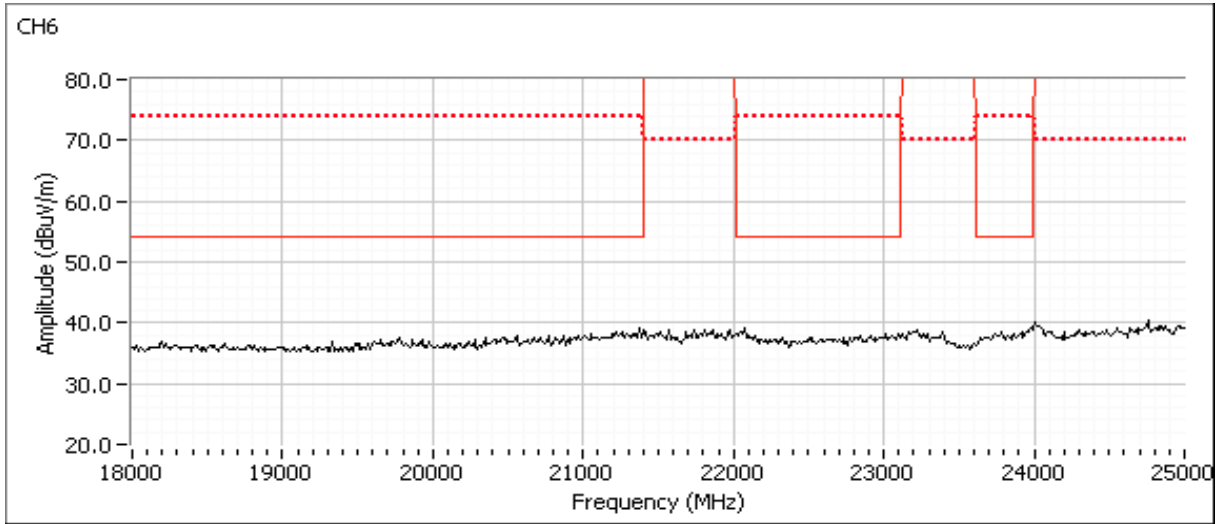
## Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.030	39.8	V	54.0	-14.2	AVG	228	1.03	
4874.120	46.1	V	74.0	-27.9	PK	228	1.03	
1457.570	46.1	V	54.0	<b>-7.9</b>	AVG	173	1.00	
1457.550	48.9	V	74.0	-25.1	PK	173	1.00	
1700.050	38.6	V	54.0	-15.4	AVG	186	1.00	
1699.980	43.1	V	74.0	-30.9	PK	186	1.00	
1516.670	40.8	V	54.0	-13.2	Peak	175	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A



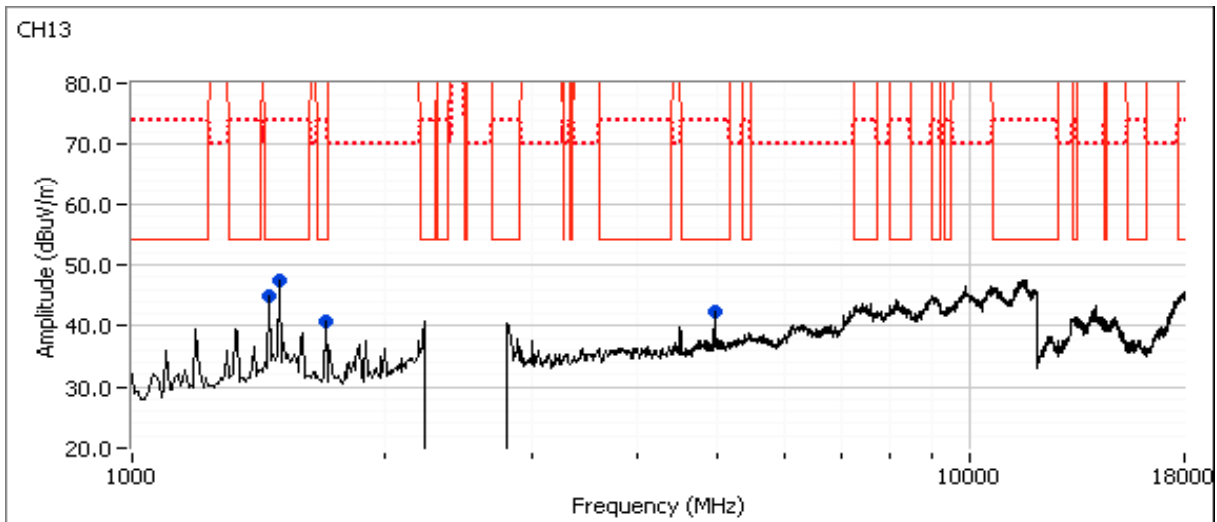
Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Run #1c: High Channel @ 2472 MHz, power setting = 17000

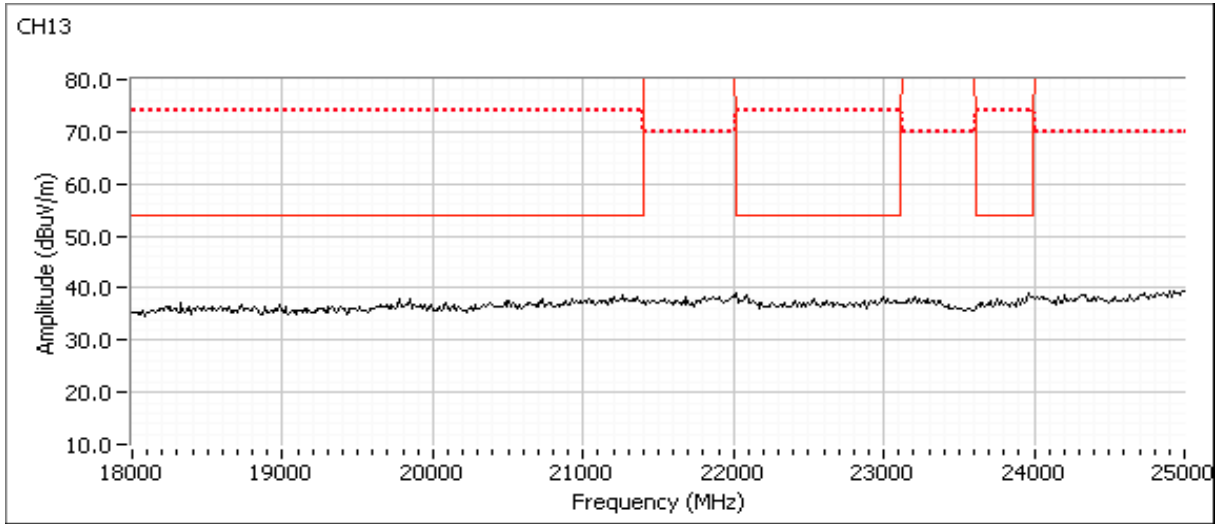
## Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1500.000	47.6	V	54.0	-6.4	Peak	181	1.0	Measured on low channel.
1458.330	44.9	V	54.0	-9.1	Peak	91	1.0	Measured on center channel.
1700.000	40.6	V	54.0	-13.4	Peak	192	1.0	Measured on center channel.
4944.030	41.3	H	54.0	-12.7	AVG	127	1.00	
4943.870	46.4	H	74.0	-27.6	PK	127	1.00	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

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

### Test Specific Details

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: 2/5/2013, 2/6/2013  
 Test Engineer: Deniz Demirci  
 Test Location: FT Lab#4b

Config. Used: 1  
 Config Change: None  
 EUT Voltage: 3.7 VDC

### 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: 21 °C  
 Rel. Humidity: 35 %

### Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	b = 17000 q = 13000	-	Output Power	15.247(b)	Pass	802.11b = 17.0 dBm 802.11g = 13.0 dBm
2	b = 17000 q = 13000	-	Power spectral Density (PSD)	15.247(d)	Pass	b = -5.0 dBm/30 kHz q = -11.1 dBm/30 kHz
3	b = 17000 q = 13000	-	Minimum 6dB Bandwidth	15.247(a)	Pass	b = 8.4 MHz q = 15.3 MHz
3	b = 17000 q = 13000	-	99% Bandwidth	RSS GEN	-	b = 14.0 MHz q = 18.1 MHz
4	b = 17000 q = 13000	-	Spurious emissions	15.247(b)	Pass	Pass

### 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:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## Notes

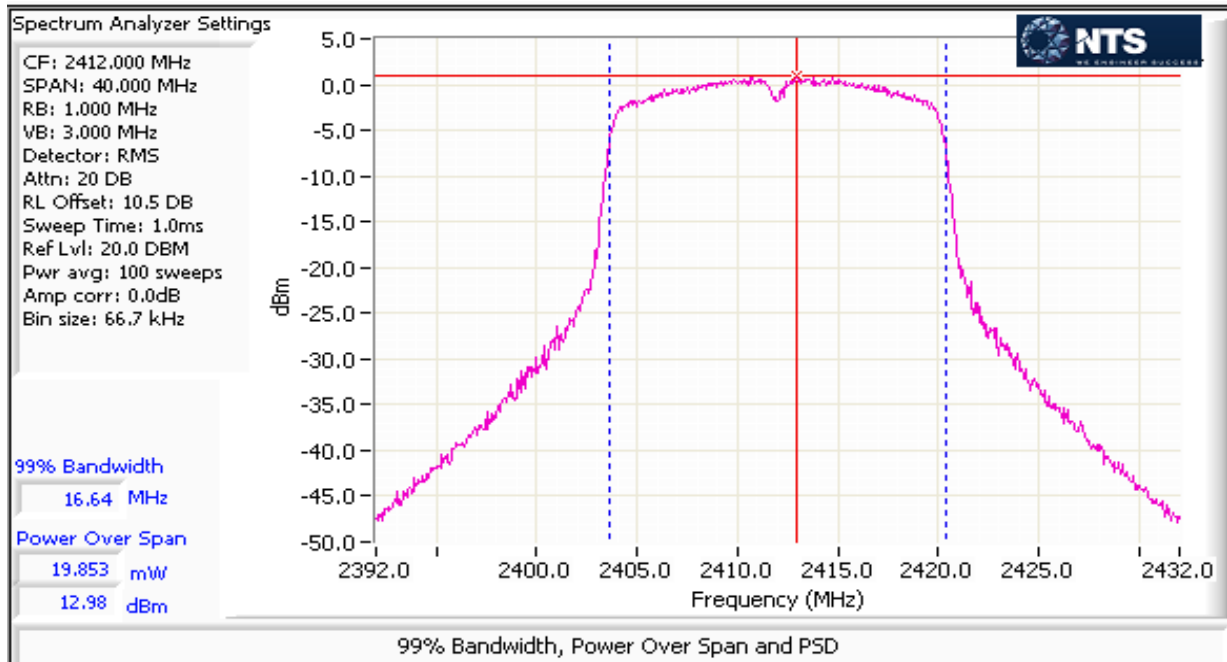
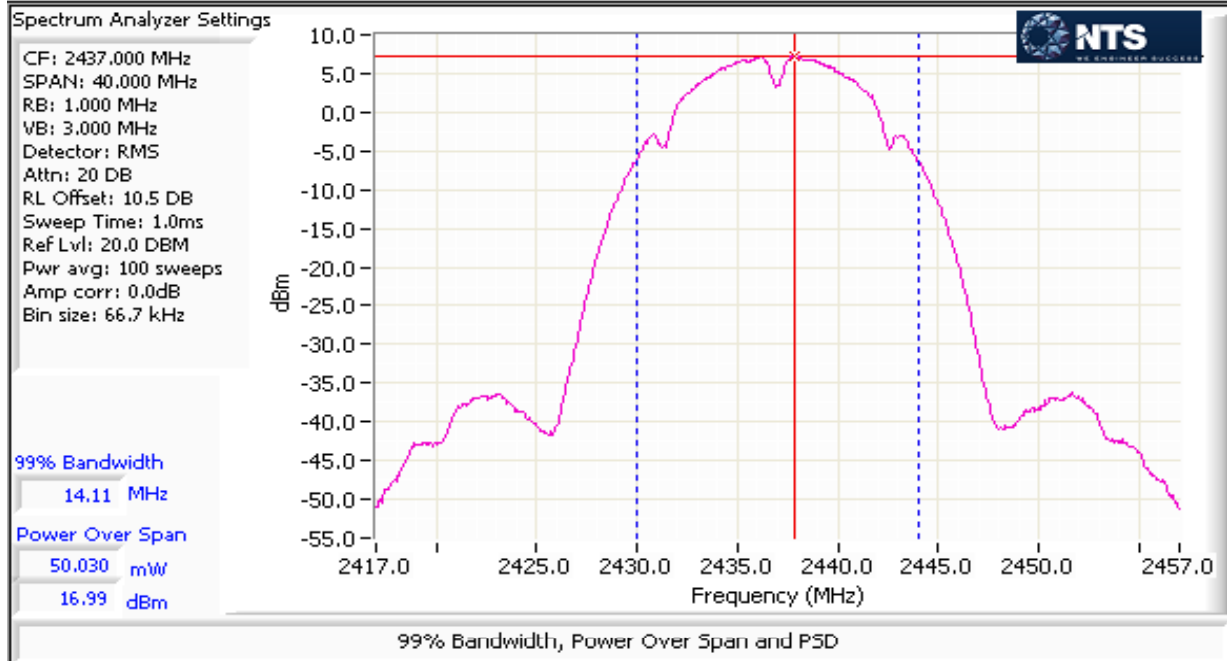
Sample: Elliott tag - 2012-3415  
 Software: HC1BSP4.8.3\_Integrity2b\_NTS  
 EUT only supports 802.11bg single-chain legacy operation  
 Updated results based on antenna gain of 3.15dBi

## Run #1: Output Power

Power Setting <sup>2</sup>	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP <sup>Note 2</sup>		Output Power	
		(dBm) <sup>1</sup>	mW			dBm	W	(dBm) <sup>3</sup>	mW
<b>802.11b</b>									
17000	2412	16.5	44.4	3.2	Pass	19.7	0.093		
17000	2437	17.0	50.0	3.2	Pass	20.2	0.104		
11500	2472	10.9	12.2	3.2	Pass	14.1	0.026		
<b>802.11g</b>									
13000	2412	13.0	19.9	3.2	Pass	16.2	0.041		
13000	2437	13.0	19.7	3.2	Pass	16.2	0.041		
13000 cap	2472	-0.7	0.9	3.2	Pass	2.5	0.002		

Note 1:	Output power measured using a spectrum analyzer (see plots below) with RBW=1MHz, VB=3 MHz, RMS detector, power averaging on (transmitted signal was continuous) and power integration over 40 MHz (option #2, method 1 in KDB 558074, equivalent to method 1 of DA-02-2138A1 for U-NII devices). Spurious limit becomes -30dBc.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Power measured using average power meter and is included for reference only.

Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A



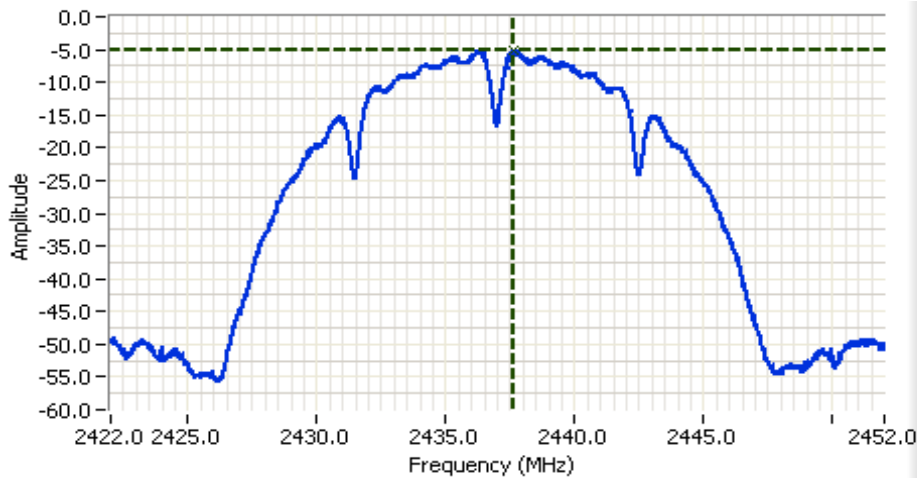
Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## Run #2: Power spectral Density

Power Setting	Frequency (MHz)	PSD (dBm/30 kHz) Note 1	Limit dBm/3kHz	Result
<b>802.11b</b>				
17000	2412	-6.0	8.0	Pass
17000	2437	-5.0	8.0	Pass
11500	2472	-12.7	8.0	Pass
<b>802.11g</b>				
13000	2412	-11.1	8.0	Pass
13000	2437	-11.2	8.0	Pass
13000 cap	2472	-25.7	8.0	Pass

Note 1:	Power spectral density measured using RB=30 kHz, VB=100 kHz, analyzer with RMS detector, sweep time auto, trace averaging enabled (100 traces). (transmitted signal was continuous). The span is set to at least 1.5 times the DTS channel bandwidth. (Option 2 of KDB 558074 D01 v02)
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Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

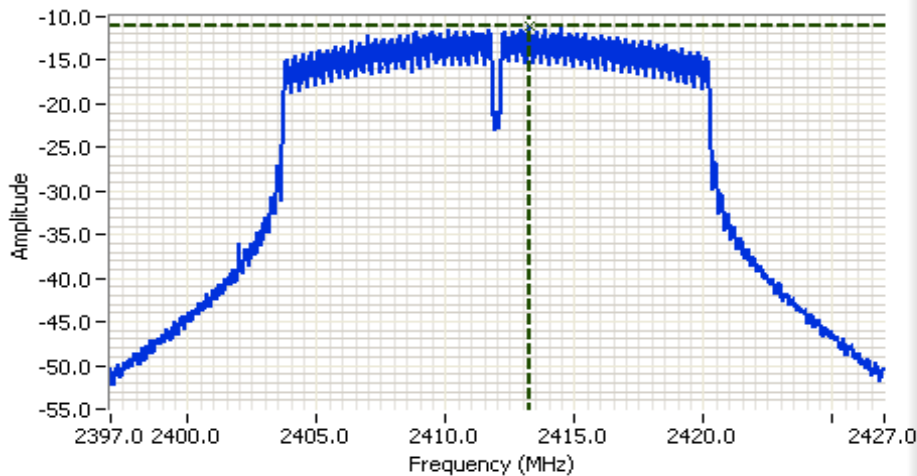
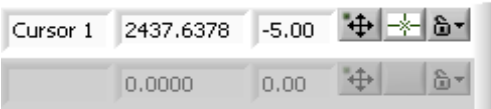


## Analyzer Settings

Agilent Technologies, E4446A  
 CF: 2437.000 MHz  
 SPAN: 30.000 MHz  
 RB: 30.0 kHz  
 VB: 100 kHz  
 Detector: RMS  
 Attn: 20 DB  
 RL Offset: 10.5 DB  
 Sweep Time: 100.1ms  
 Ref Lvl: 20.0 DBM  
 RMS: 100

## Comments

PSD: -5.00 dBm/30 kHz  
 802.11b Ch6

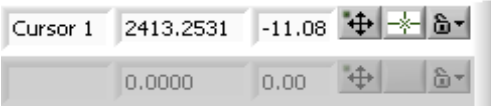


## Analyzer Settings

Agilent Technologies, E4446A  
 CF: 2412.000 MHz  
 SPAN: 30.000 MHz  
 RB: 30.0 kHz  
 VB: 100 kHz  
 Detector: RMS  
 Attn: 20 DB  
 RL Offset: 10.5 DB  
 Sweep Time: 100.1ms  
 Ref Lvl: 10.0 DBM  
 RMS: 100

## Comments

PSD: -11.08 dBm/30 kHz  
 802.11g Ch1



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

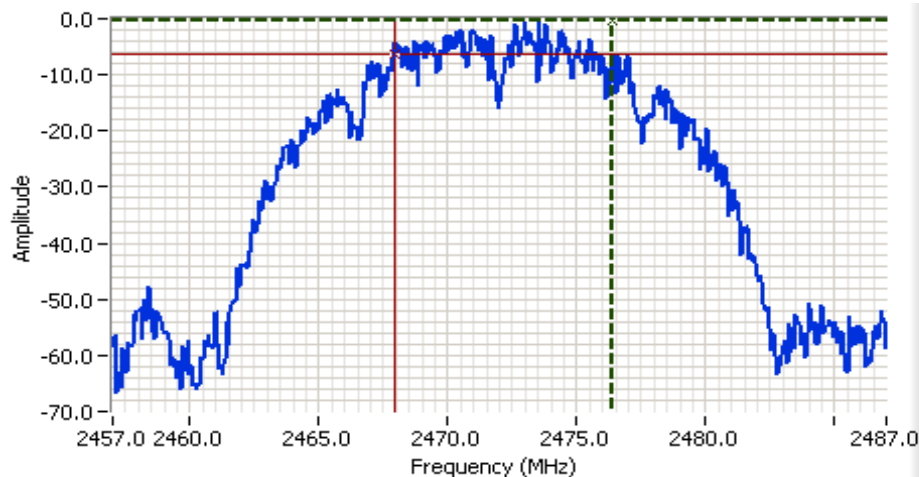
## Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Resolution Bandwidth	Bandwidth (MHz)	
			6dB	99%
802.11b				
17000	2412	100 kHz	9.1	14.0
17000	2437	100 kHz	9.1	14.0
11500	2472	100 kHz	8.4	14.1
802.11g				
13000	2412	100 kHz	15.3	17.5
13000	2437	100 kHz	17.0	18.1
13000 cap	2472	100 kHz	16.7	17.7

Note 1: 99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB

Client: Motorola Solutions	Job Number: J89057
Model: HC170 Head Mounted Computer	T-Log Number: T90507
Contact: Larry Zhou	Account Manager: Christine Krebill
Standard: FCC 15.247 / RSS-210	Class: N/A

## Run#3a: 6 dB BW



### Analyzer Settings

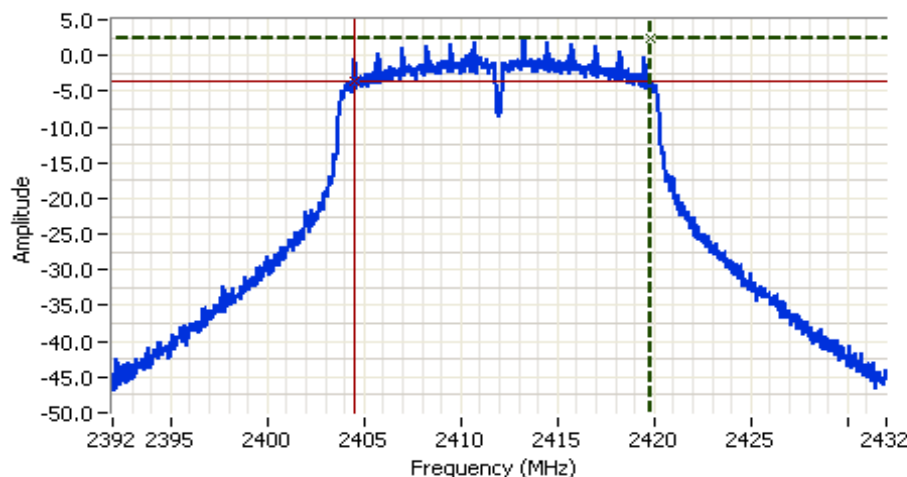
Rohde&Schwarz, ESI  
 CF: 2472.000 MHz  
 SPAN: 30.000 MHz  
 RB: 100 kHz  
 VB: 300 kHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 11.0 DB  
 Sweep Time: 7.5ms  
 Ref Lvl: 6.0 DBM

### Comments

6dB BW: 8.417 MHz

Cursor 1 2476.3587 -0.29  
 Cursor 2 2467.9419 -6.29

Delta Freq. 8.417  
 Delta Amplitude 6.00



### Analyzer Settings

Agilent Technologies, E4446A  
 CF: 2412.000 MHz  
 SPAN: 40.000 MHz  
 RB: 100 kHz  
 VB: 300 kHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 10.5 DB  
 Sweep Time: 3.9ms  
 Ref Lvl: 10.0 DBM

### Comments

6dB BW: 15.308 MHz  
 802.11g Ch1

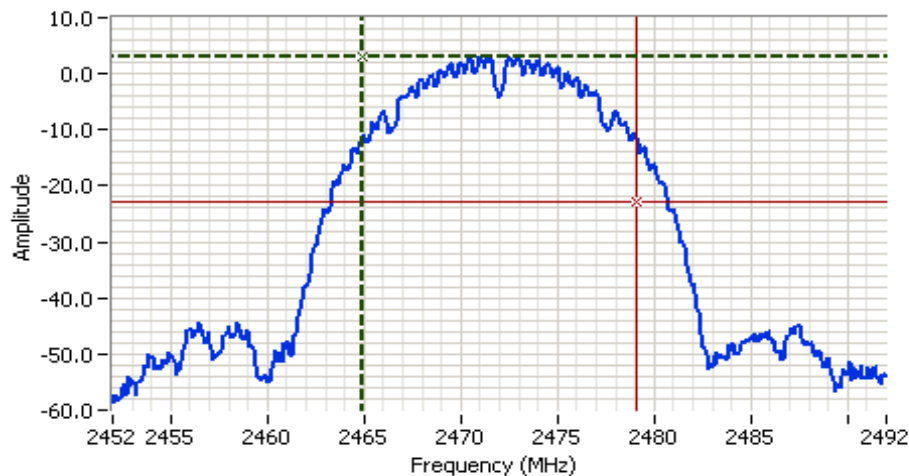
Cursor 1 2419.7739 2.33  
 Cursor 2 2404.4662 -3.67

Delta Freq. 15.308  
 Delta Amplitude 6.00



Client: Motorola Solutions	Job Number: J89057
Model: HC170 Head Mounted Computer	T-Log Number: T90507
Contact: Larry Zhou	Account Manager: Christine Krebill
Standard: FCC 15.247 / RSS-210	Class: N/A

## Run#3b: 99% BW



### Analyzer Settings

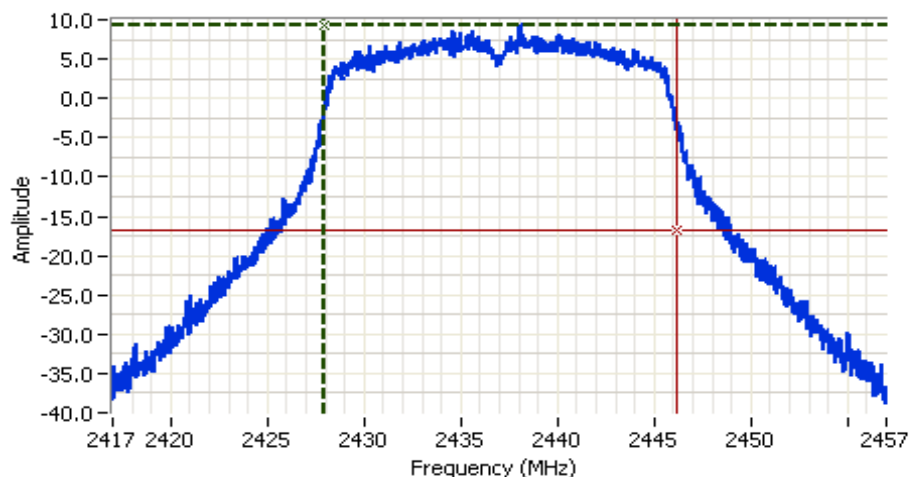
Rohde&Schwarz, ESI  
 CF: 2472.000 MHz  
 SPAN: 40.000 MHz  
 RB: 500 kHz  
 VB: 2.000 MHz  
 Detector: POS  
 Attn: 10 DB  
 RL Offset: 11.0 DB  
 Sweep Time: 5.0ms  
 Ref Lvl: 6.0 DBM

### Comments

99% power BW: 14.080 MHz  
 802.11b

Cursor 1 2464.9600 3.17  
 Cursor 2 2479.0400 -22.83

Delta Freq. 14.080  
 Delta Amplitude 26.00



### Analyzer Settings

Agilent Technologies, E4446A  
 CF: 2437.000 MHz  
 SPAN: 40.000 MHz  
 RB: 510 kHz  
 VB: 2.000 MHz  
 Detector: POS  
 Attn: 20 DB  
 RL Offset: 10.5 DB  
 Sweep Time: 1.1ms  
 Ref Lvl: 10.0 DBM

### Comments

99% power BW: 18.140 MHz  
 802.11g Ch6

Cursor 1 2427.9800 9.29  
 Cursor 2 2446.1200 -16.71

Delta Freq. 18.140  
 Delta Amplitude 26.00

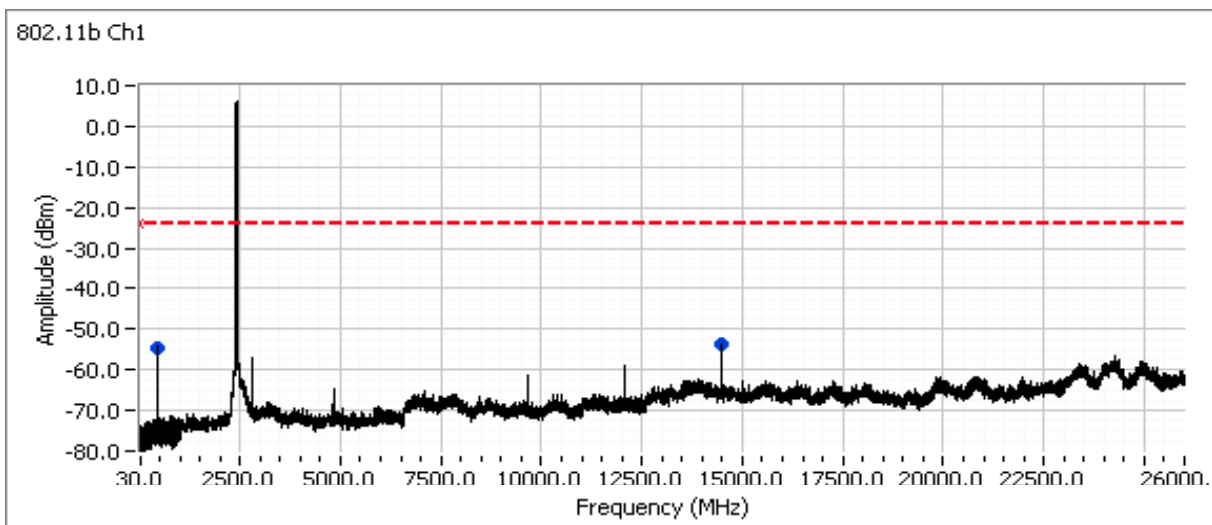


Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

## Run #4: Out of Band Spurious Emissions

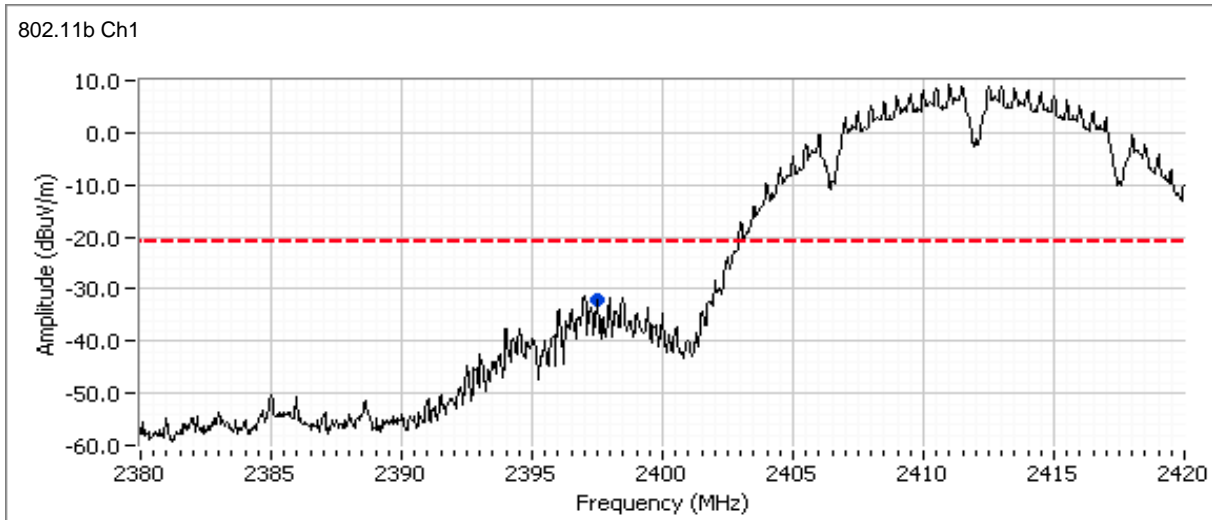
### Run #4a: 802.11b spurious emissions

Plots for low channel, power setting(s) = 17000

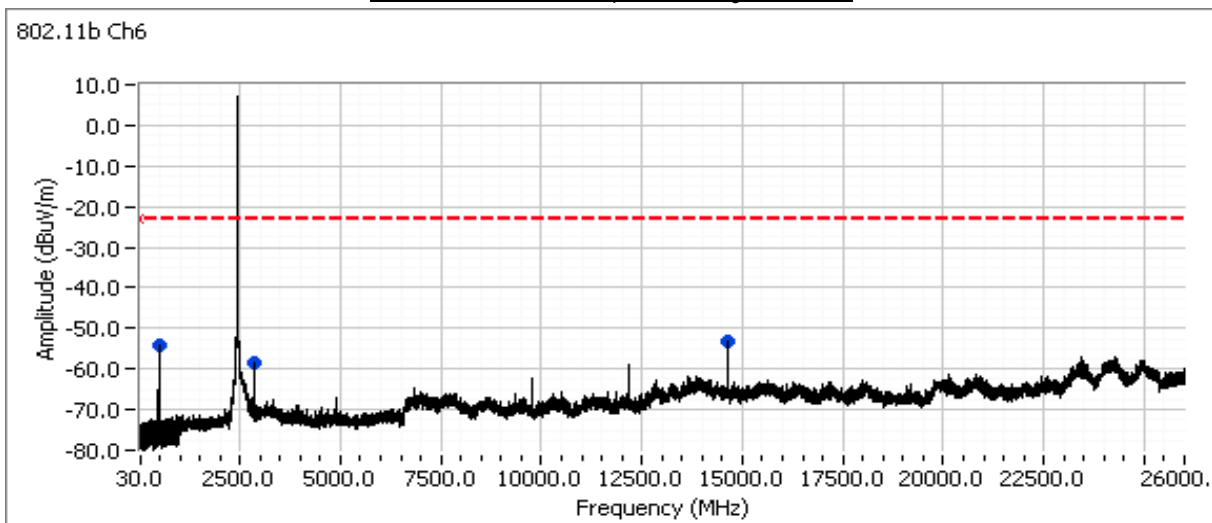


Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

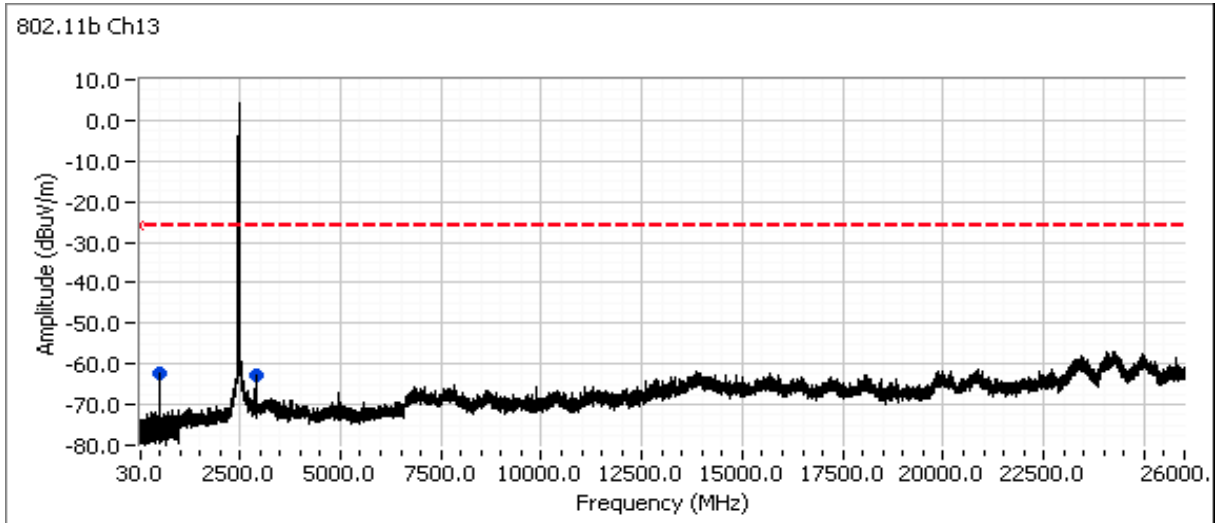


Plots for center channel, power setting(s) = 17000



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

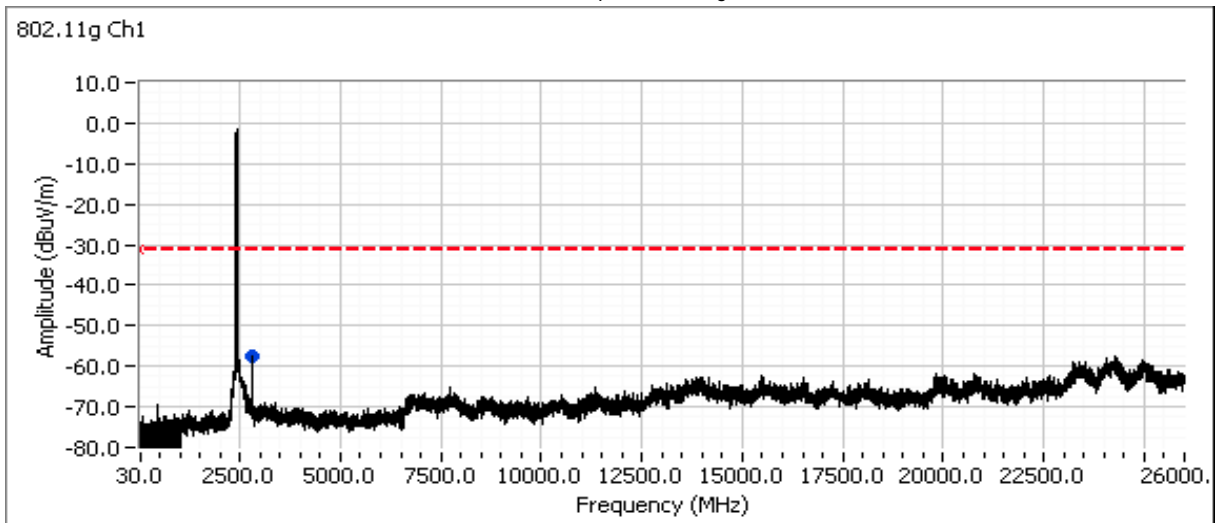
Plots for high channel, power setting(s) = 13000



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

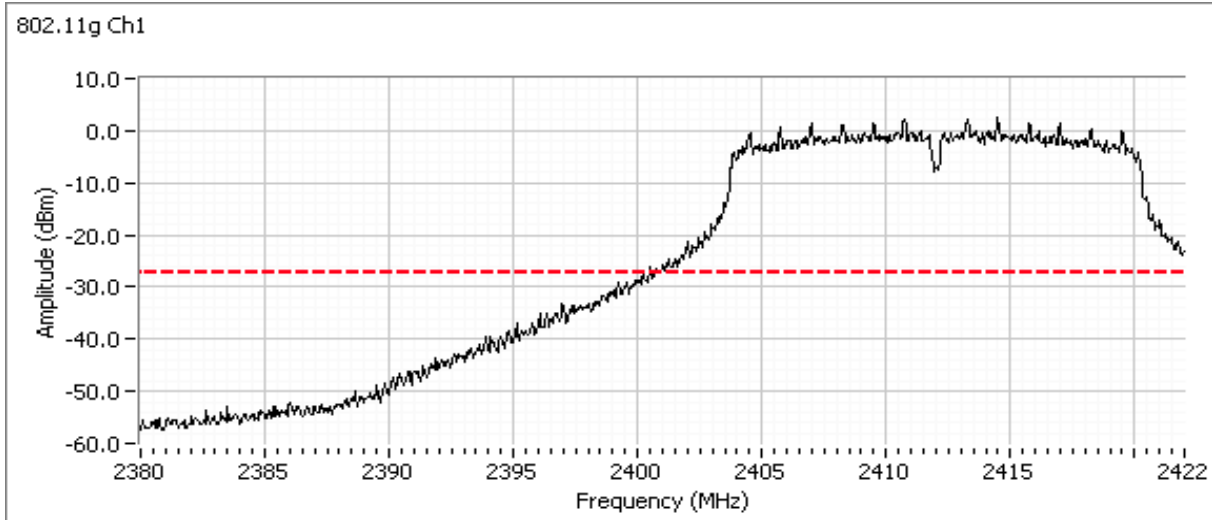
## Run #4b: 802.11g spurious emissions

Plots for low channel, power setting(s) = 13000

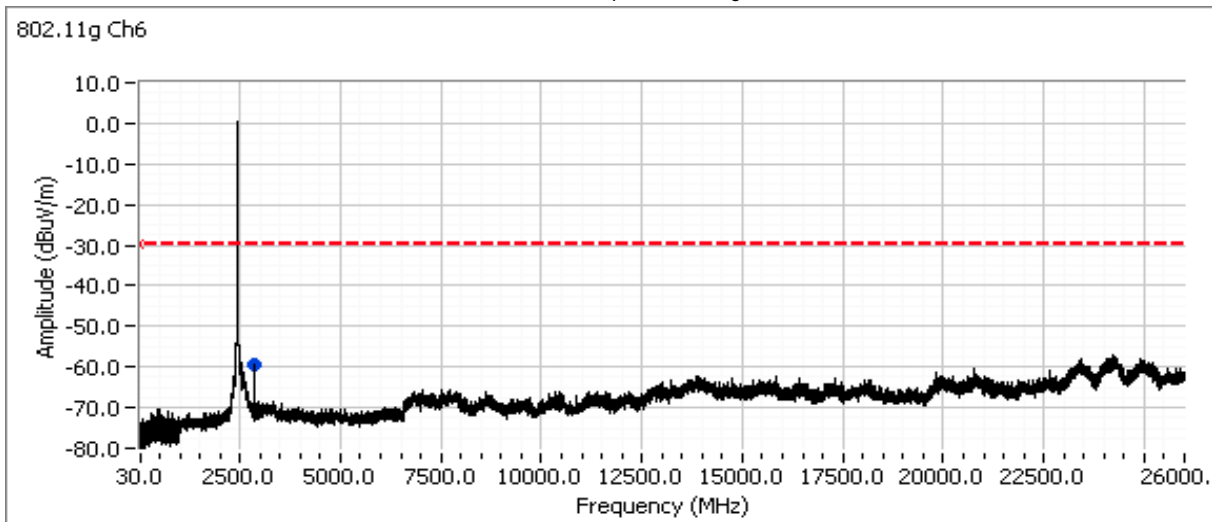


Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

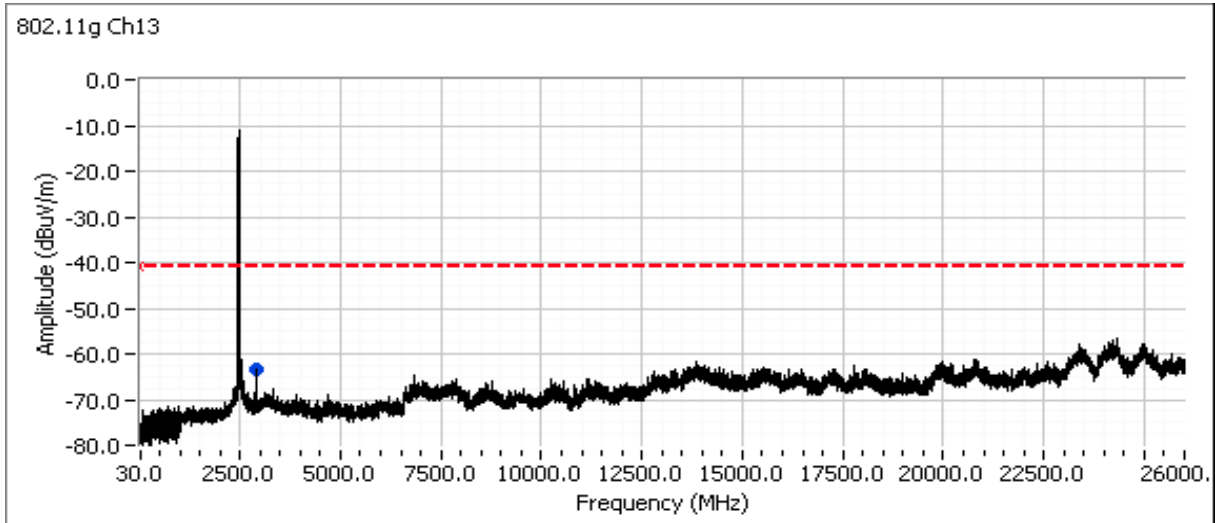


Plots for center channel, power setting(s) = 13000



Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Account Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Class:	N/A

Plots for high channel, power setting(s) = 13000 (no cap)





## EMC Test Data

Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Project Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Project Coordinator:	-
		Class:	-

### Conducted Emissions

*(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)*

#### Test Specific Details

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: 5/6/2013  
Test Engineer: Jack Liu  
Test Location: Fremont Chamber #7

Config. Used: 2  
Config Change: None  
EUT Voltage: 120V/60Hz

#### General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

**Ambient Conditions:**  
Temperature: 23 °C  
Rel. Humidity: 45 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120V/60Hz	Class B	Pass	57.7 dB $\mu$ V @ 0.152 MHz (-8.2 dB)

#### Modifications Made During Testing

No modifications were made to the EUT during testing

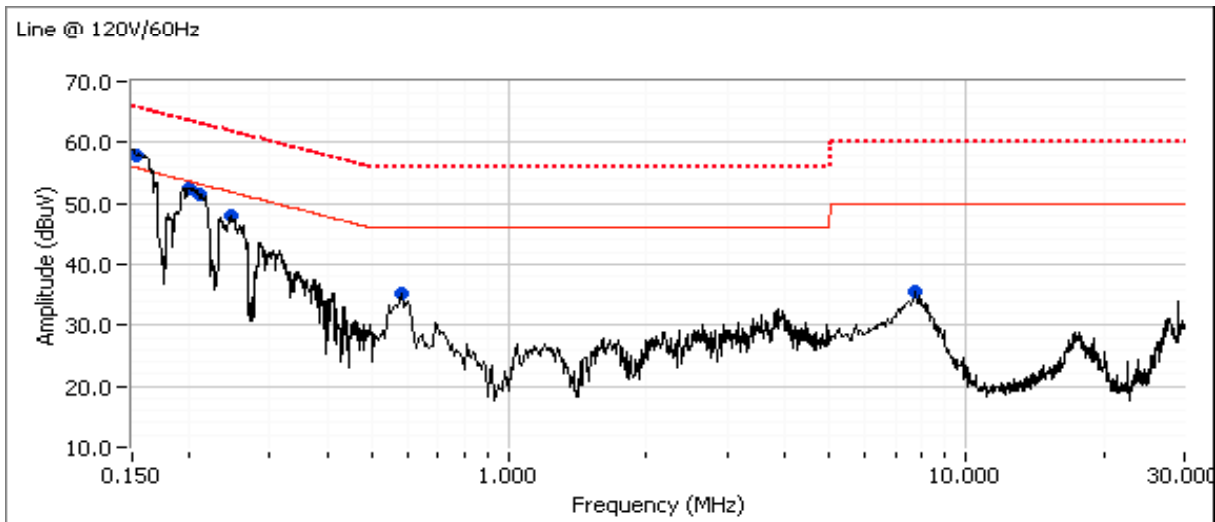
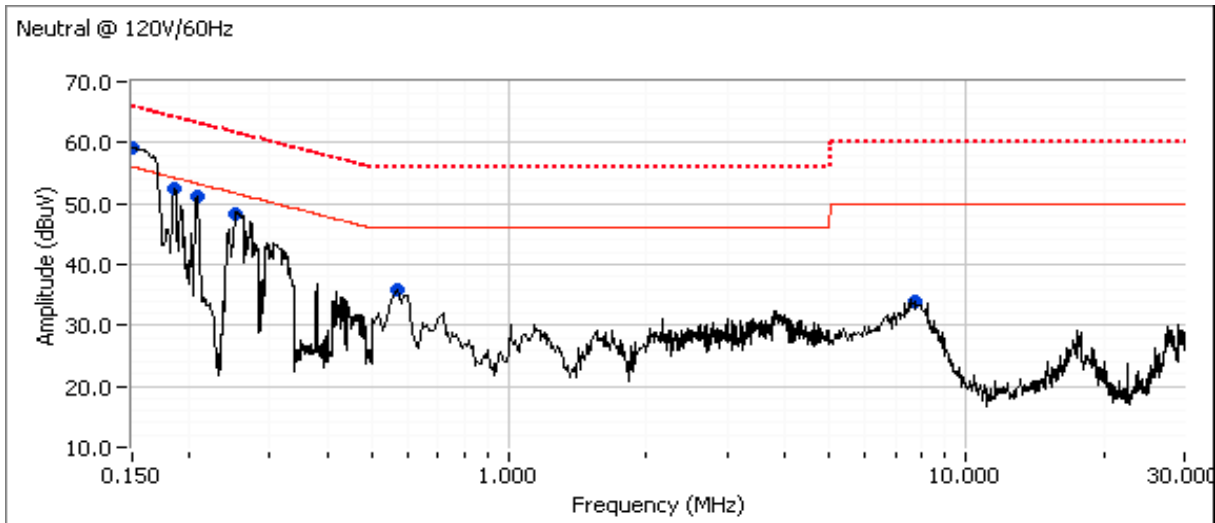
#### Deviations From The Standard

No deviations were made from the requirements of the standard.

EUT: S/N:13049010501369 (NTS: 2013-2342)  
Battery: P/N 82-71364-06 (NTS: 2012-3437)  
AC Adapter: PWRS14000-149R (NTS: 2013-1140)

Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Project Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Project Coordinator:	-
		Class:	-

## Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz





## EMC Test Data

Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Project Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Project Coordinator:	-
		Class:	-

### Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency MHz	Level dB $\mu$ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
7.771	34.0	Neutral	50.0	-16.0	Peak	
0.595	35.9	Neutral	46.0	-10.1	Peak	
0.152	59.2	Neutral	56.0	3.2	Peak	
0.186	52.3	Neutral	54.2	-1.9	Peak	
0.207	51.3	Neutral	53.3	-2.0	Peak	
0.252	48.4	Neutral	51.7	-3.3	Peak	
7.639	35.6	Line 1	50.0	-14.4	Peak	
0.593	35.2	Line 1	46.0	-10.8	Peak	
0.153	57.9	Line 1	55.8	2.1	Peak	
0.202	52.5	Line 1	53.6	-1.1	Peak	
0.210	51.5	Line 1	53.2	-1.7	Peak	
0.247	47.9	Line 1	51.9	-4.0	Peak	

Client:	Motorola Solutions	Job Number:	J89057
Model:	HC170 Head Mounted Computer	T-Log Number:	T90507
Contact:	Larry Zhou	Project Manager:	Christine Krebill
Standard:	FCC 15.247 / RSS-210	Project Coordinator:	-
		Class:	-

## Final quasi-peak and average readings

Frequency MHz	Level dBμV	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.152	57.7	Neutral	65.9	-8.2	QP	
0.186	20.0	Neutral	54.2	-34.2	AVG	
7.771	22.1	Neutral	50.0	-27.9	AVG	
7.771	29.3	Neutral	60.0	-30.7	QP	
0.595	23.0	Neutral	46.0	-23.0	AVG	
0.595	33.2	Neutral	56.0	-22.8	QP	
0.152	39.8	Neutral	55.9	-16.1	AVG	
0.186	45.9	Neutral	64.2	-18.3	QP	
0.207	33.7	Neutral	53.3	-19.6	AVG	
0.207	50.6	Neutral	63.3	-12.7	QP	
0.252	29.2	Neutral	51.7	-22.5	AVG	
0.252	45.6	Neutral	61.7	-16.1	QP	
0.153	57.1	Line	65.8	-8.7	QP	
0.201	32.6	Line	53.6	-21.0	AVG	
7.639	21.7	Line	50.0	-28.3	AVG	
7.639	28.7	Line	60.0	-31.3	QP	
0.593	21.4	Line	46.0	-24.6	AVG	
0.593	31.8	Line	56.0	-24.2	QP	
0.153	38.3	Line	55.8	-17.5	AVG	
0.201	50.3	Line	63.6	-13.3	QP	
0.210	28.2	Line	53.2	-25.0	AVG	
0.210	48.7	Line	63.2	-14.5	QP	
0.247	26.8	Line	51.9	-25.1	AVG	
0.247	45.2	Line	61.9	-16.7	QP	

Note 1: EUT is continuous transmit on 802.11 b mode CH6

***End of Report***

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