NTS Silicon Valley
www.nts.com
41039 Boyce Road
Fremont, CA 94538
510-578-3500 Phone
510-440-9525 Fax

EMC Test Report

Application for Grant of Equipment Authorization

Industry Canada RSS-Gen Issue 4 / RSS 210 Issue 8
FCC Part 15 Subpart C

Model: H44-100

FCC ID:	G95H44-100
APPLICANT:	Technicolor USA Inc. 101 W. 103rd St Indianapolis, IN 46290
TEST SITE(S):	National Technical Systems - Silicon Valley 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-4
REPORT DATE:	March 25, 2015
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FINAL TEST DATES:	February 12, 17, 18, 20, 22, 24, 25 and 26, 2015
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PROGRAM MGR /
TECHNICAL REVIEWER:

Mark E Hill
Staff Engineer

QUALITY ASSURANCE DELEGATE /
FINAL REPORT PREPARER:

David Guidotti
Senior Technical Writer

ACCREDITED
Testing Cert #0214.26

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	March 25, 2015	First release	
1.0	May 27, 2015	Clarified PSD measurement for MIMO modes, spurious emission measurements. Revised the reference for the method used for power measurements.	MEH
2.0	June 10, 2015	Clarified conducted emissions operation and corrected typo in Duty Cycle	MEH

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SCOPE

An electromagnetic emissions test has been performed on the Technicolor USA Inc. model H44-100, pursuant to the following rules:

Industry Canada RSS-Gen Issue 4
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 C63.10-2009
FCC DTS Measurement Guidance KDB558074

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 Technicolor USA Inc. model H44-100 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 4
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 Technicolor USA Inc. model H44-100 and therefore apply only to the tested sample. The sample was selected and prepared by Steven Hershberger of Technicolor USA 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) – IEEE 802.11 Operation

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: 8.1 MHz 11g: 16.3 MHz n20: 17.6 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	1Tx Modes: 11b: 20.3dBm(108mW) 11g: 19.5dBm(89mW) 2Tx Modes: 11n: 22.2dBm(165mW) EIRP = 0.338 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 210 A8.2 (2)	Power Spectral Density	1Tx Modes: 11b: 7.8 dBm/30kHz 11g: 2.5 dBm/30kHz 2Tx Modes: n20: 6.0 dBm/30kHz	8dBm/3kHz	Complies
15.247(d)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions below -30dBc	< -30dBc Note 2	Complies
15.247(d) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.8 dBµV/m @ 2390.0 MHz (-0.2 dB)	15.209 in restricted bands, all others <-30dBc Note 2	Complies

Note 1: EIRP calculated using antenna gain of 3.1 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).

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz) – RF4CE Operation

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	1.523 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	4.5dBm (0.003W) EIRP = 5.6 mW Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	1.2 dBm/100kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions below -30dBc	< -30dBc Note 2	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	45.9 dBµV/m @ 4809.1 MHz (-8.1 dB)	15.207 in restricted bands, all others <-30dBc Note 2	Complies

Note 1: EIRP calculated using antenna gain of 3.0 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	Antennas are internal	Unique or integral antenna required	Complies
15.207	RSS GEN Table 3	AC Conducted Emissions	46.7 dBµV @ 0.444 MHz (-0.3 dB)	Refer to page 20	Complies
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in separate exhibit	Refer to OET 65, FCC Part 1 and RSS 102	Complies

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	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dBµV/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dBµV	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Technicolor USA Inc. model H44-100 is a satellite dish receiver/set-top-box. 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 electrical rating of the EUT is 120 Volts, 60 Hz, 1.3 Amps.

The sample was received on February 12, 2015 and tested on February 12, 17, 18, 20, 22, 24, 25 and 26, 2015. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Technicolor	H44-100	Set-top Box	A44LA5BG100113 (emc sample)	G95H44-100
DirectTV	EPS44R3-15	AC/DC Power Supply	CL44E1445A0360	N/A
DirectTV	EPS44R3-15	AC/DC Power Supply	CL44E1445A0364 (AC conducted emissions)	N/A

OTHER EUT DETAILS

The following EUT details should be noted:
20MHz only
FCC "New" 5GHz rules
11a legacy data rates supported in 1Tx (with Tx diversity)
HT20 - 2Tx
DFS Client device
Indoor device
FCC approval only
RF4CE radio - allows for simultaneous transmission
Use of channel 144 is not supported by the product.

ANTENNA SYSTEM

Wifi: Airgain, Model N2420DS, 3.1dBi peak gain @ 2.44GHz; 2.8dBi peak gain @ 5.2GHz
Wifi: Airgain, Model N2415D2, 2.13dBi peak gain @ 2.44GHz; 2.88dBi peak gain @ 5.2GHz; 3.57 dBi peak gain @ 5.5GHz; 4.58dBi peak gain @ 5.8GHz
RF4CE: 3.0dBi pcb trace antenna

ENCLOSURE

The EUT enclosure is primarily constructed of uncoated plastic. It measures approximately 21 cm wide by 21 cm deep by 4 cm high.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at NTS Silicon Valley.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for testing:

Radio

Company	Model	Description	Serial Number	FCC ID
HP	Pavillion dv6000	Laptop	CNF73411TQ	N/A

Conducted Emissions

Company	Model	Description	Serial Number	FCC ID
Acer	S242HL	Monitor	40302364485	N/A
Asian Power Devices	DA-40A19	AC/DC Adapter	YE561137310538543 00	N/A
Seagate	SRD00F1	SSD	NA7090JC	N/A
Verbatim	-	USB Thumb Drive	-	N/A

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

(Conducted Emissions)

Company	Model	Description	Serial Number	FCC ID
DirecTV	SWM16R-03	16 channel SWM	49001337	N/A
DirecTV	PI29R1-03	Power Inserter	YG29B1345B0238	N/A

EUT INTERFACE PORTS

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

Radio

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
SAT IN (SWM-5)	not connected	-	-	-
A/V Out	not connected	-	-	-
Digital Audio Out	not connected	-	-	-
HDMI	not connected	-	-	-
USB	not connected	-	-	-
Hard Drive	not connected	-	-	-
Power Input	AC/DC Adapter	Multiconductor	Shielded	1.5
Internal Header	USB-Serial Adapter Laptop	Multiconductor	Unshielded	1.0

Note: For all radio tests, except AC conducted emissions, the EUT was connected to the laptop via a USB-to-serial adapter connected to an internal header. Preliminary testing showed no affect to the radio related emissions from the interface cables.

AC Conducted Emissions

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
SAT IN (SWM-5)	SWM-16 (SWM2)	COAX	Shielded	10
A/V Out	Resistive Terminator	6 Wire RC	Shielded	1
Digital Audio Out	Resistive Terminator	RC Cable	Shielded	2
HDMI	Monitor	Multiconductor	Shielded	1.5
USB	Thumb Drive	Multiconductor	Shielded	2
Hard Drive	SDD	Multiconductor	Shielded	0.2
Power Input	AC/DC Adapter	Multiconductor	Shielded	1.5

Additional on Support Equipment

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
AC/DC Adapter (EUT)	AC Mains	2wire	Unshielded	1.5
Monitor - Power In	AC/DC Adapter	Multiconductor	Shielded	1.5
AC/DC Adapter (Monitor)	AC Mains	3wire	Unshielded	1.5
SWM-16 DC/Power	SWM-1	Coax	Shielded	1
SWM-16 SAT 99/101	Dish Antenna	Coax (x2)	Shielded	40
SWM-16 SAT103/110/119	Dish Antenna	Coax (x2)	Shielded	40
SWM-1 Power	AC Mains	2wire	Unshielded	1.5

EUT OPERATION

Radio testing: The EUT was configured to continuously transmit at the maximum output power on the noted channel. Testing was performed to confirm the worse case data rate for each mode tested, and is noted in the test data.

As the product supports simultaneous transmission from the Wifi and the RF4CE radios, additional testing was performed with both radios operating.

AC Conducted Emissions: The EUT was configured to transmit continuously on CH157, n20, maximum power. RF4CE was configured to continuous transmission at 2450MHz.

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	Designation / Registration Numbers		Location
	FCC	Canada	
Chamber 3	US0027	2845B-3	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4	US0027	2845B-4	

ANSI C63.4 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.

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 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4.

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 C63.10 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 as specified in ANSI C63.4. 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 C63.10, 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.

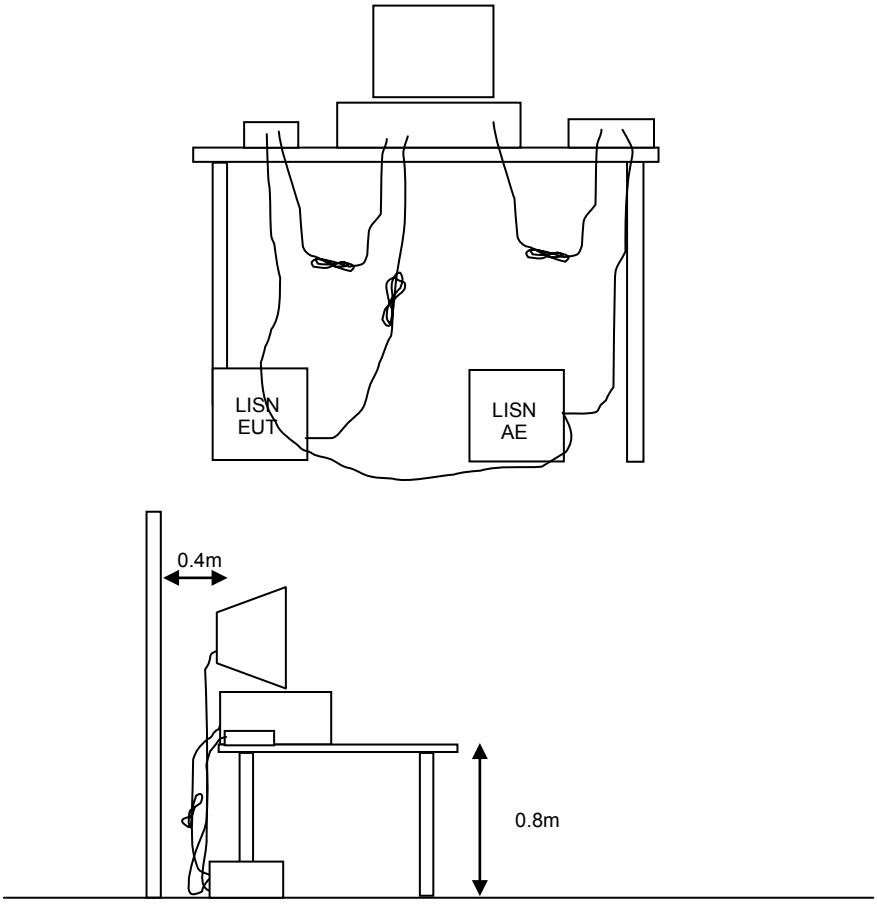


Figure 1 Typical Conducted Emissions Test Configuration

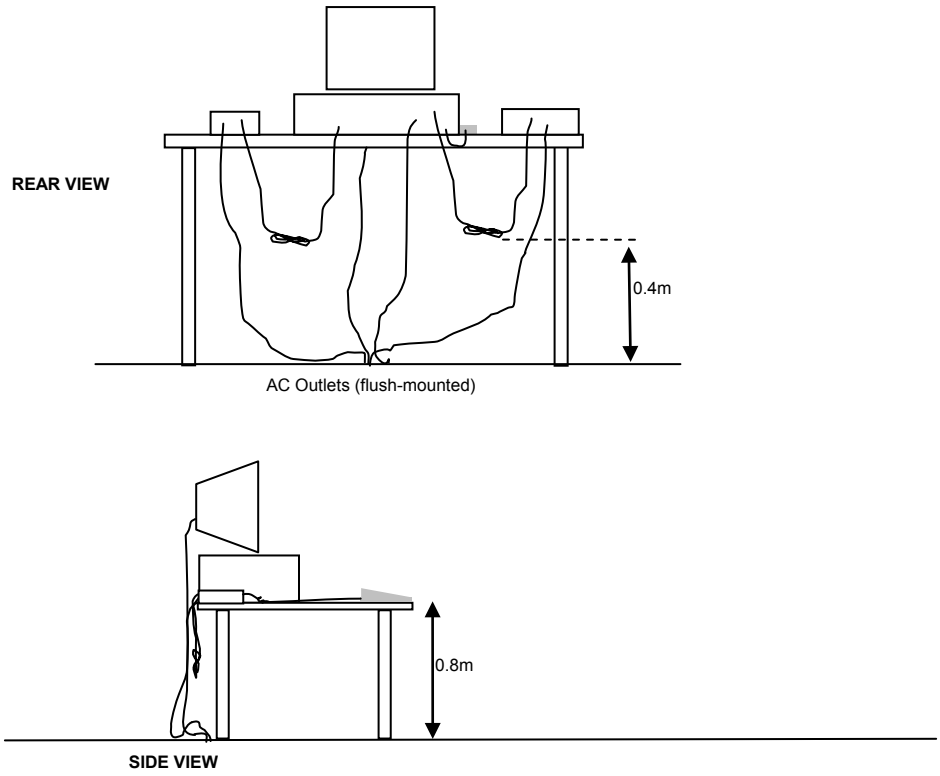
RADIATED EMISSIONS

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.

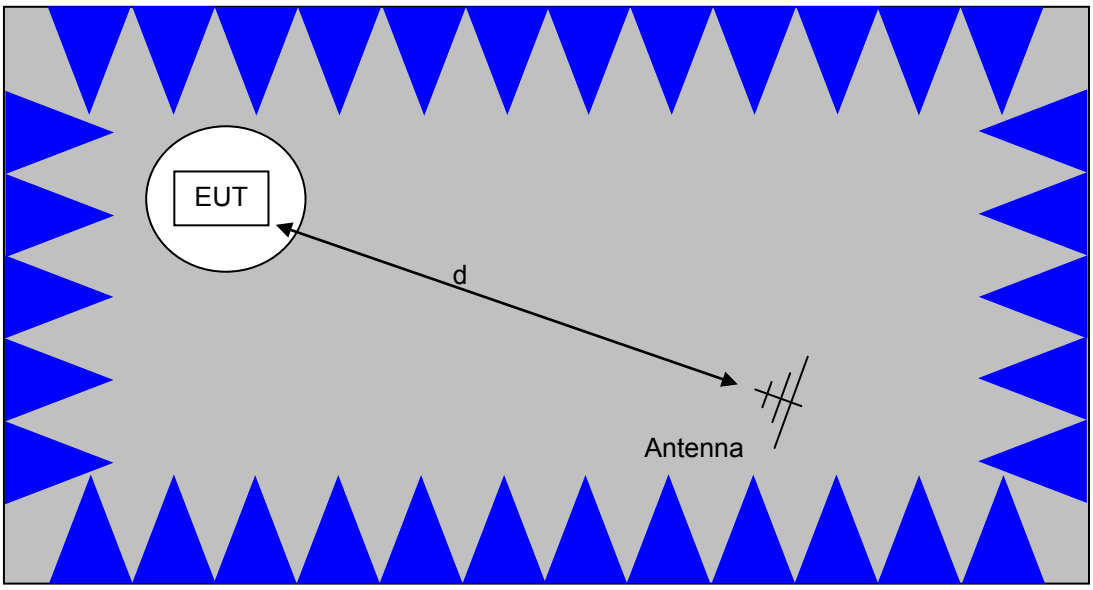
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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

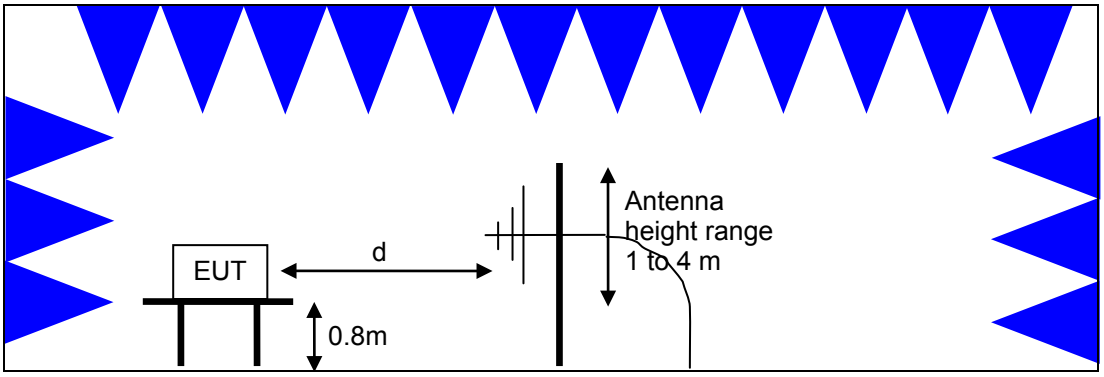


Typical Test Configuration for Radiated Field Strength Measurements



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

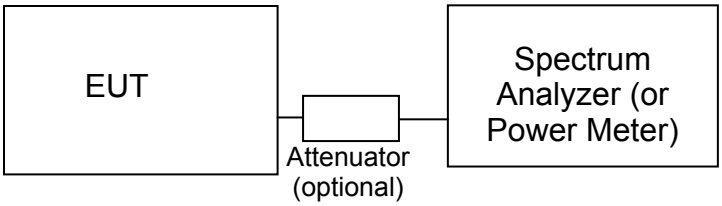
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

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 NTS 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, 26dB and/or 99% signal bandwidth are measured using the bandwidths recommended by ANSI C63.10 and 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:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

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

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

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).

[1] The restricted bands are detailed in FCC 15.205, RSS 210 Table 1 and RSS 310 Table 2

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 d (meters) from the equipment under test:

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

where P is the eirp (Watts)

For a measurement at 3m the conversion from a logarithmic value for field strength (dBuV/m) to an eirp power (dBm) is -95.3dB.

Appendix A Test Equipment Calibration Data

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Radiated Emissions, 1,000 - 6,500 MHz, 12-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/29/2014	7/29/2016
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	6/21/2014	6/21/2015
Radiated Emissions, 1,000 - 6,500 MHz, 17-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/20/2013	12/20/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	6/21/2014	6/21/2015
Radiated Emissions, 1000 - 12,000 MHz, 17-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/20/2013	12/20/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	6/21/2014	6/21/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2014	2/20/2015
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/16/2014	9/16/2015
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	2/27/2014	2/27/2015
Radiated Emissions, 1000 - 25,000 MHz, 18-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/20/2013	12/20/2015
Hewlett Packard	High Pass filter, 8.2 GHz (Purple System)	P/N 84300-80039	1767	11/14/2014	11/14/2015
Hewlett Packard	Head (Inc W1-W4, 1946 , 1947) Purple	84125C	1772	1/20/2015	1/20/2016
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	8/11/2014	8/11/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2014	2/20/2015
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/16/2014	9/16/2015
Radiated Emissions, 1,000 - 12,000 MHz, 19-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/20/2013	12/20/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2014	2/20/2015
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2239	9/16/2014	9/16/2015
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	2240	9/16/2014	9/16/2015
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	2241	9/16/2014	9/16/2015
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	2/27/2014	2/27/2015
Radiated Emissions, 1,000 - 40,000 MHz, 20-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/20/2013	12/20/2015
Hewlett Packard	High Pass filter, 8.2 GHz (Purple System)	P/N 84300-80039	1767	11/14/2014	11/14/2015
Hewlett Packard	Head (Inc W1-W4, 1946 , 1947) Purple	84125C	1772	1/20/2015	1/20/2016

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	8/11/2014	8/11/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2014	2/20/2015
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2239	9/16/2014	9/16/2015
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	2240	9/16/2014	9/16/2015
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	2241	9/16/2014	9/16/2015
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	2/27/2014	2/27/2015
Radiated Emissions, 30 - 6,500 MHz, 22-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/20/2013	12/20/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	6/21/2014	6/21/2015
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	2237	8/29/2014	8/29/2016
Com-Power	Preamplifier, 1-1000 MHz	PAM-103	2885	10/22/2014	10/22/2015
Radiated Emissions, 30 - 6,500 MHz, 22-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	786	12/20/2013	12/20/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1630	6/21/2014	6/21/2015
Radiated Emissions, 30 - 1,000 MHz, 23-Feb-15					
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	6/25/2014	6/25/2016
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	6/14/2014	6/14/2015
Hewlett Packard	9KHz-1300MHz pre-amp	8447F	2777	3/5/2014	3/5/2015
Radio Antenna Port (Power and Spurious Emissions), 24-Feb-15 to 26-Feb-15					
Rohde & Schwarz	Signal Analyzer 20 Hz - 26.5 GHz	FSQ26	2327	4/28/2014	4/28/2015
Radiated Emissions, 30 - 1,000 MHz, 27-Feb-15					
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	6/25/2014	6/25/2016
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	6/14/2014	6/14/2015
Hewlett Packard	9KHz-1300MHz pre-amp	8447F	2777	3/5/2014	3/5/2015
Radiated Emissions, 30 - 18,000 MHz, 01-Mar-15					
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	6/25/2014	6/25/2016
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	6/14/2014	6/14/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2015	2/20/2016
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	2/27/2014	3/27/2015
Hewlett Packard	9KHz-1300MHz pre-amp	8447F	2777	3/5/2014	3/5/2015
EMCO	Antenna, Horn, 1-18 GHz	3115	2870	8/20/2013	8/20/2015
Conducted Emissions - AC Power Ports, 02-Mar-15					
EMCO	LISN, 10 kHz-100 MHz, 25A	3825/2	1292	2/13/2014	3/13/2015
EMCO	LISN, 10 kHz-100 MHz	3825/2	1293	2/13/2014	4/13/2015
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1594	5/15/2014	5/15/2015

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1756	6/14/2014	6/14/2015
FCC	Decoupling Network	F-203I-DCN-23mm	2457		N/A
Radiated Emissions, 11,000 - 26,000 MHz, 02-Mar-15					
Hewlett Packard	Head (Inc W1-W4, 1946 , 1947) Purple	84125C	1772	1/20/2015	1/20/2016
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	8/11/2014	8/11/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2015	2/20/2016
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	2/27/2014	3/27/2015
FCC	Decoupling Network	F-203I-DCN-23mm	2457		N/A
EMCO	Antenna, Horn, 1-18 GHz	3115	2870	8/20/2013	8/20/2015

Appendix B Test Data

T97497 Pages 28 – 110

Client:	Technicolor USA, Inc.	Job Number:	J97449
Product	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	
Emissions Standard(s):	FCC 15.247/15.407/15.B	Class:	B
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Technicolor USA, Inc.

Product

H44-100

Date of Last Test: 3/4/2015

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Power vs. Data Rate

In normal operating modes the card uses power settings stored on EEPROM to set the output power. For a given nominal output power the actual transmit power normally is redcued as the data rate increases, therefore testing was performed at the data rate in the mode wiht highest power to determine compliance with the requirements.
The following power measurements were made using a GATED average power meter and with the device configured in a continuous transmit mode on Chain 1 at the various data rates in each mode to verify the highest power mode:

Sample Notes

Sample S/N: L044A505250029
Driver: 5.99 RC188.10

Date of Test: 2/12/2015
Test Engineer: Mark Hill
Test Location: Lab #4

Mode	Data Rate	Power (dBm)	Chain	Power setting
802.11b	1	20.0	2	20.0
	2	20.5	2	
	5.5	19.9	2	
	11	19.9	2	
	2	**21.3**	1	
802.11g	6	19.2	2	20.0
	9	19.3	2	
	12	19.3	2	
	18	19.2	2	
	24	19.3	2	
	36	19.2	2	
	48	19.3	2	
	54	19.3	2	
	9	**19.7**	1	

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Mode	Data Rate	Power (dBm)	Chain	Power setting	
802.11n 20MHz	6.5	**19.42**	2	20.0	MCS8
	13	19.36	2		MCS9
	19.5	19.27	2		MCS10
	26	19.17	2		MCS11
	39	19.02	2		MCS12
	52	19.01	2		MCS13
	58.5	19.27	2		MCS14
	65	18.96	2		MCS15

Note : Power setting - the software power setting used during testing, included for reference only.

Duty Cycle

Date of Test: 2/12/2015
Test Engineer: Mark Hill
Test Location: Lab #4

Duty cycle measurements performed on the worse case data rate for power.

Notes: Measurements taken with maximum RBW/VBW settings allowed.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	2Mb/s	0.99	Yes	-	0	0	-
11g	9Mb/s	0.99	Yes	-	0	0	-
n20	6.5	0.978	Yes	-	0.10	0.19	-
RF4CE	-	100.00	Yes	-	0	0	-

* Correction factor when using RMS/Power averaging - 10*log(1/x)
** Correction factor when using linear voltage average - 20*log(1/x)
T = Minimum transmission duration

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	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, unless otherwise noted.

Ambient Conditions:

Temperature: 22-24 °C
Rel. Humidity: 33-38 %

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

Run #	Mode	Channel	Target Power	Passing Power Setting	Test Performed	Limit	Result / Margin
1	b (Chain 1)	1 - 2412MHz	20	20	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	51.5 dBµV/m @ 2320.1 MHz (-2.5 dB)
	b (Chain 1)	11 - 2462MHz	20	20	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	47.9 dBµV/m @ 2483.5 MHz (-6.1 dB)
2	g (Chain 1)	1 - 2412MHz	20	17	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.8 dBµV/m @ 2390.0 MHz (-0.2 dB)
	g (Chain 2)	1 - 2412MHz	20	18	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	51.6 dBµV/m @ 2390.0 MHz (-2.4 dB)
	g (Chain 1)	11 - 2462MHz	20	18	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	50.5 dBµV/m @ 2483.6 MHz (-3.5 dB)
	g (Chain 2)	11 - 2462MHz	20	20	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	51.9 dBµV/m @ 2483.6 MHz (-2.1 dB)
2 Additional	g (Chain 1)	2 - 2417MHz	20	18	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	51.0 dBµV/m @ 2390.0 MHz (-3.0 dB)
3	n20 (2x2)	1 - 2412MHz	20	17	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	51.7 dBµV/m @ 2390.0 MHz (-2.3 dB)
	n20 (2x2)	11 - 2462MHz	20	18	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	72.0 dBµV/m @ 2483.9 MHz (-2.0 dB)
3 Additional	n20 (2x2)	2 - 2417MHz	20	19	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	51.7 dBµV/m @ 2389.9 MHz (-2.3 dB)

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

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.

Sample Notes

Sample S/N: L044A505250029
Driver: 5.99 RC188.10
Antenna: Airgain N2420DS / N2415D2

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	2Mb/s	0.99	Yes	-	0	0	-
11g	9Mb/s	0.99	Yes	-	0	0	-
n20	MCS8	0.978	Yes	-	0.10	0.19	-

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle < 98%, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 4:	Emission has duty cycle < 98% and is NOT constant, average measurement performed: RBW=1MHz, VBW> 1/T, peak detector, linear average mode, sweep time auto, max hold. Max hold for 50*(1/DC) traces
Note 5:	Emission has duty cycle < 98%, but constant, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Notes:

11b performed using worse case chain from 11g (CH 1 Pwr setting 17 and CH11 Pwr setting 18, Worse case is Chain 1)

Run #1: Radiated Bandedge Measurements

Date of Test: 2/12/15, 2/17/15 Config. Used: 2

Test Engineer: Jack Liu Config Change: -

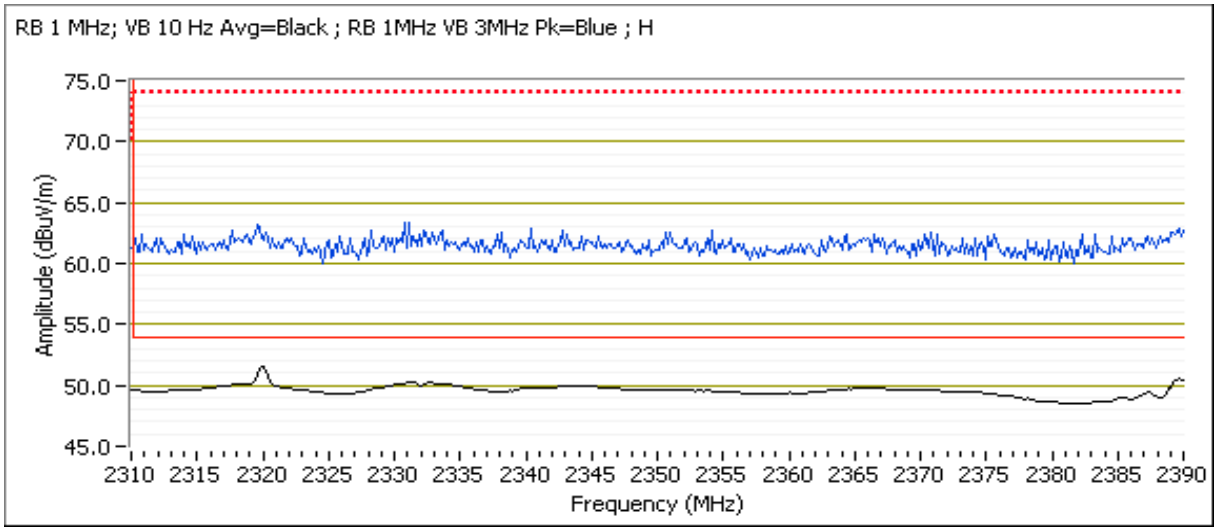
Test Location: FT Chamber #4 EUT Voltage: 120V / 60Hz

Channel: 1 Mode: b

Tx Chain: 1 Data Rate: 2Mb/s

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	
2320.100	51.5	H	54.0	-2.5	AVG	18	1.5	POS; RB 1 MHz; VB: 10 Hz
2313.050	63.0	H	74.0	-11.0	PK	18	1.5	POS; RB 1 MHz; VB: 3 MHz
2389.680	37.0	V	54.0	-17.0	AVG	151	1.0	POS; RB 1 MHz; VB: 10 Hz
2355.210	48.8	V	74.0	-25.2	PK	151	1.0	POS; RB 1 MHz; VB: 3 MHz

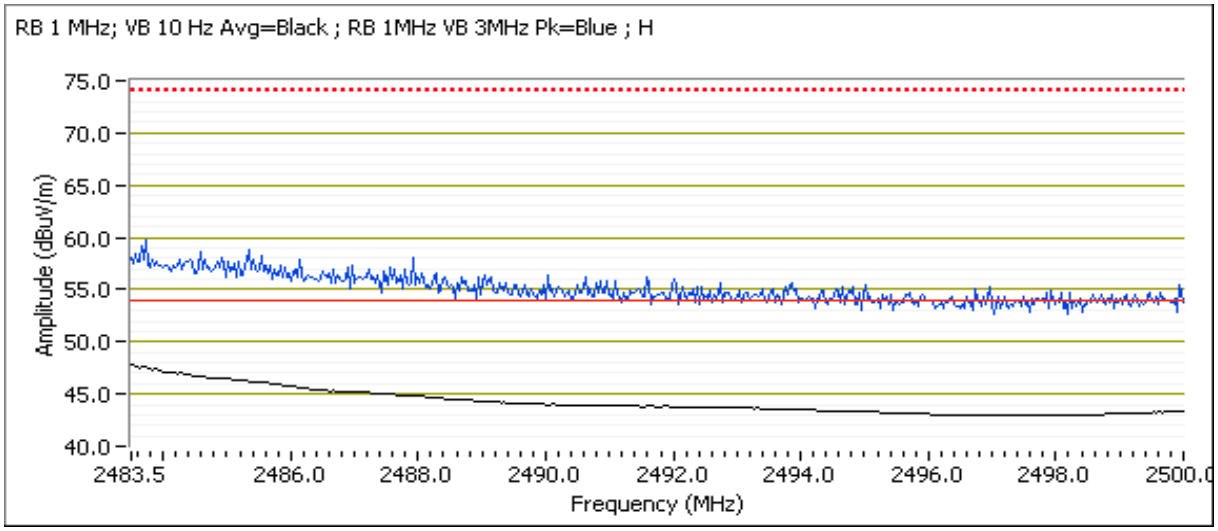


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Channel: 11 Mode: b
Tx Chain: 1 Data Rate: 2Mb/s

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	
2483.500	47.9	H	54.0	-6.1	AVG	343	1.1	POS; RB 1 MHz; VB: 10 Hz
2483.800	59.0	H	74.0	-15.0	PK	343	1.1	POS; RB 1 MHz; VB: 3 MHz
2483.500	36.7	V	54.0	-17.3	AVG	33	2.0	POS; RB 1 MHz; VB: 10 Hz
2485.650	49.8	V	74.0	-24.2	PK	33	2.0	POS; RB 1 MHz; VB: 3 MHz



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #2: Radiated Bandedge Measurements

Date of Test: 2/12/15, 2/17/15 Config. Used: 2

Test Engineer: Jack Liu Config Change: -

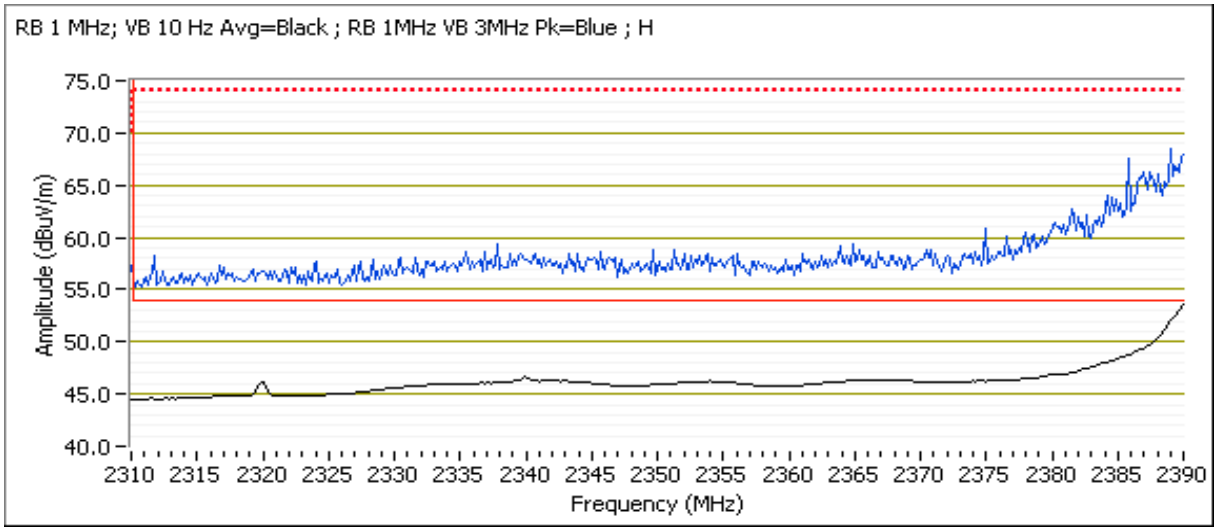
Test Location: FT Chamber #4 EUT Voltage: 120V / 60Hz

Channel: 1 Mode: g

Tx Chain: 1 Data Rate: 9Mb/s

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	
2390.000	53.8	H	54.0	-0.2	AVG	359	1.1	POS; RB 1 MHz; VB: 10 Hz
2389.960	69.3	H	74.0	-4.7	PK	359	1.1	POS; RB 1 MHz; VB: 3 MHz

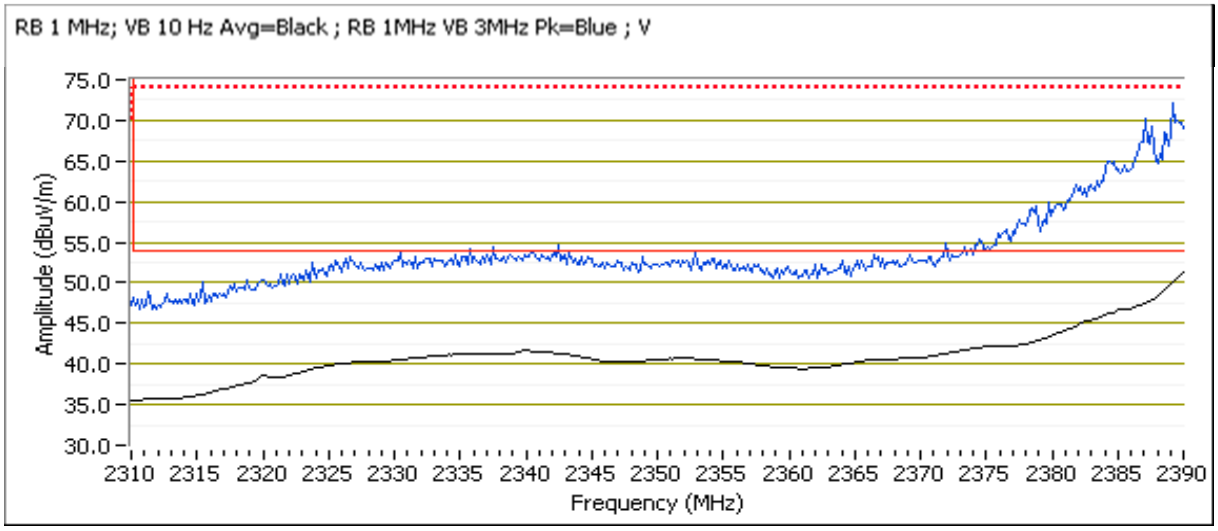


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Channel: 1 Mode: g
Tx Chain: 2 Data Rate: 9Mb/s

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	
Pwr setting 18								
2390.000	51.6	V	54.0	-2.4	AVG	319	1.0	POS; RB 1 MHz; VB: 10 Hz
2389.660	70.3	V	74.0	-3.7	PK	319	1.0	POS; RB 1 MHz; VB: 3 MHz

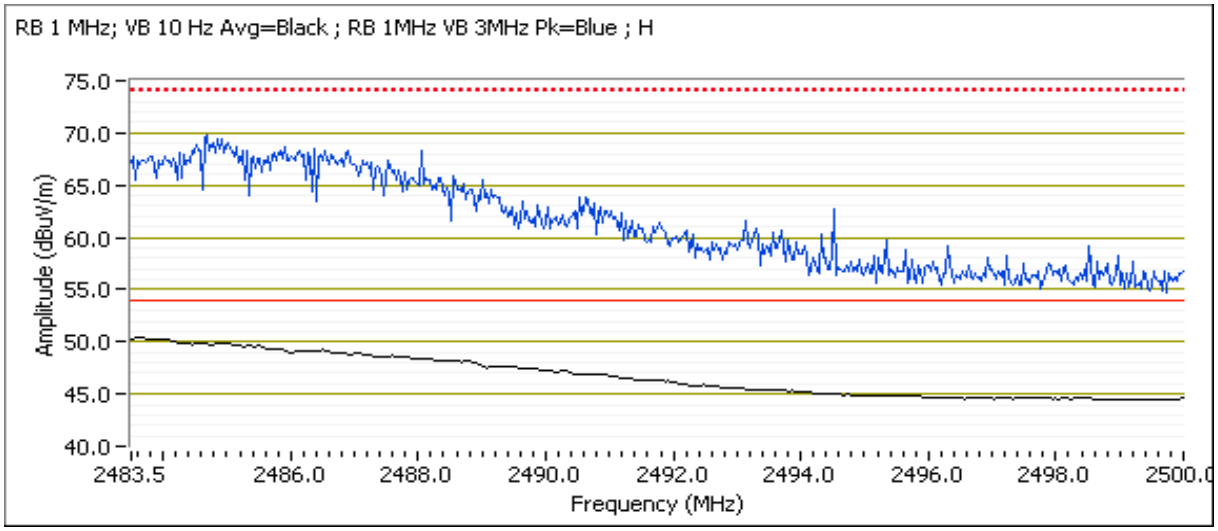


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Channel: 11 Mode: g
Tx Chain: 1 Data Rate: 9Mb/s

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	
Pwr setting 18								
2483.580	50.5	H	54.0	-3.5	AVG	0	1.7	POS; RB 1 MHz; VB: 10 Hz
2484.630	72.8	H	74.0	-1.2	PK	0	1.7	POS; RB 1 MHz; VB: 3 MHz

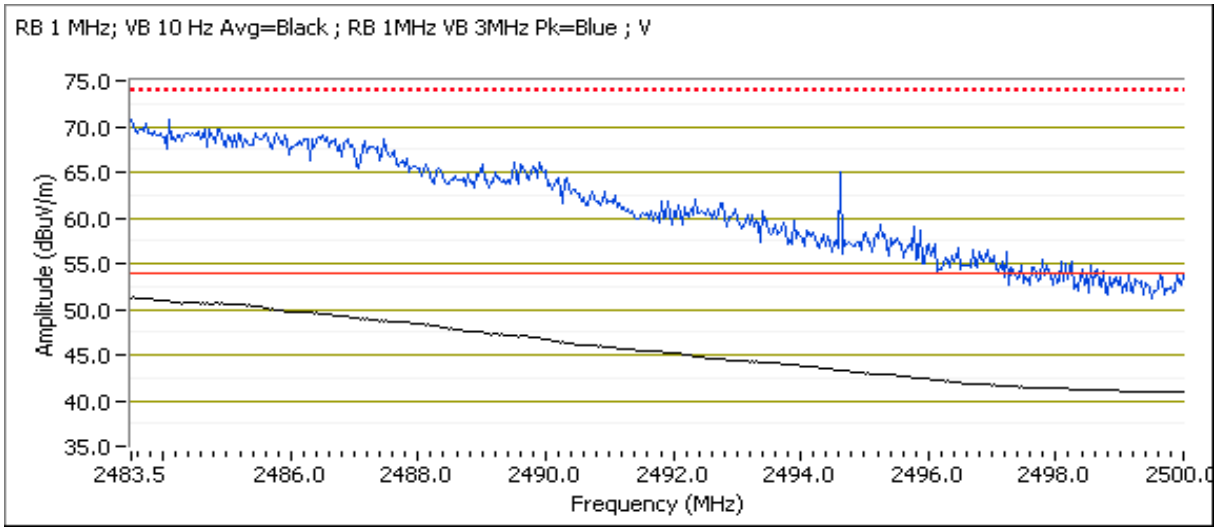


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Channel: 11 Mode: g
Tx Chain: 2 Data Rate: 9Mb/s

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	
2483.570	51.9	V	54.0	-2.1	AVG	324	0.9	POS; RB 1 MHz; VB: 10 Hz
2484.660	70.4	V	74.0	-3.6	PK	324	0.9	POS; RB 1 MHz; VB: 3 MHz
2483.570	46.5	H	54.0	-7.5	AVG	348	1.1	POS; RB 1 MHz; VB: 10 Hz
2483.960	65.9	H	74.0	-8.1	PK	348	1.1	POS; RB 1 MHz; VB: 3 MHz

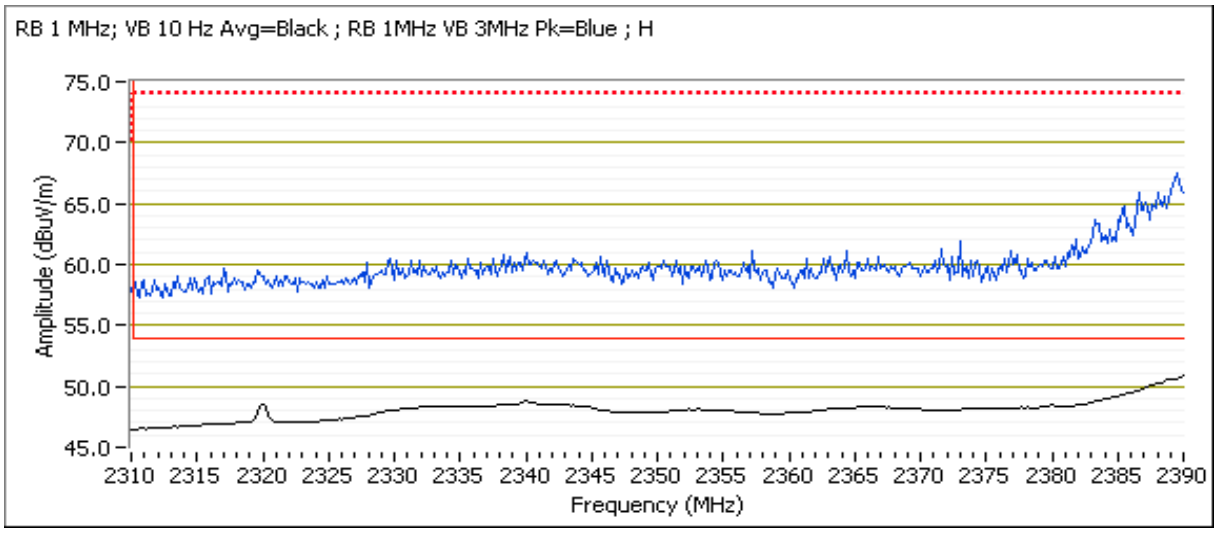


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Channel: 2 Mode: g
Tx Chain: 1 Data Rate: 9Mb/s

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	
Pwr setting 18								
2390.000	51.0	H	54.0	-3.0	AVG	19	1.1	POS; RB 1 MHz; VB: 10 Hz
2388.960	67.6	H	74.0	-6.4	PK	19	1.1	POS; RB 1 MHz; VB: 3 MHz



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #3: Radiated Bandedge Measurements

Date of Test: 2/17/2015 0:00 Config. Used: 2

Test Engineer: Jack Liu Config Change: -

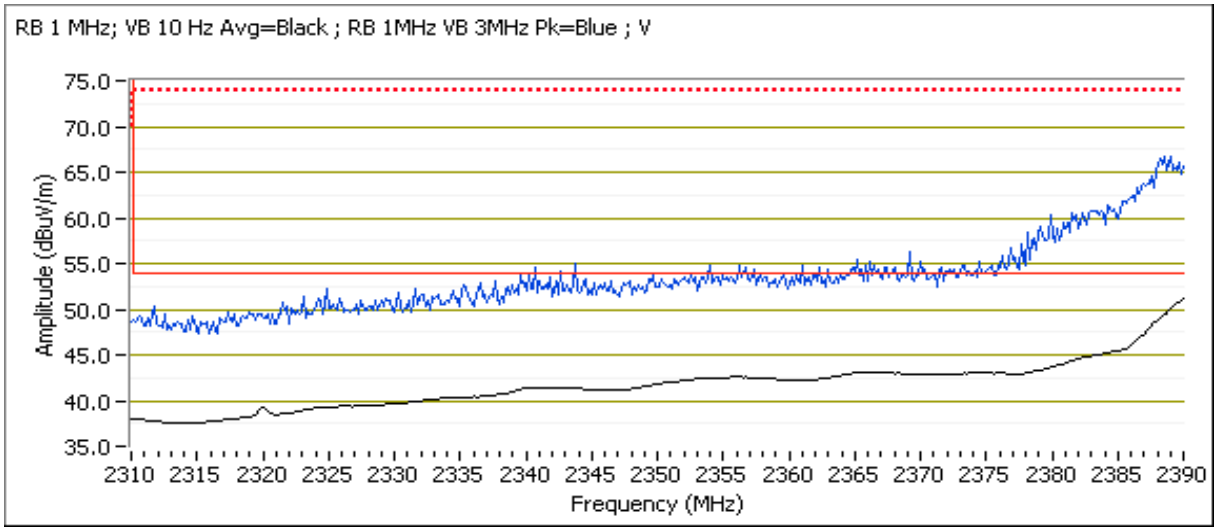
Test Location: FT Chamber#4 EUT Voltage: 120V / 60Hz

Channel: 1 Mode: n20

Tx Chain: 2x2 Data Rate: MCS8

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	
Pwr setting 17								
2390.000	51.7	V	54.0	-2.3	AVG	37	1.0	Note3; POS; RB 1 MHz; VB: 10 Hz
2389.440	66.7	V	74.0	-7.3	PK	37	1.0	POS; RB 1 MHz; VB: 3 MHz
2390.000	45.4	H	54.0	-8.6	AVG	46	1.2	Note3; POS; RB 1 MHz; VB: 10 Hz
2389.600	60.2	H	74.0	-13.8	PK	46	1.2	POS; RB 1 MHz; VB: 3 MHz

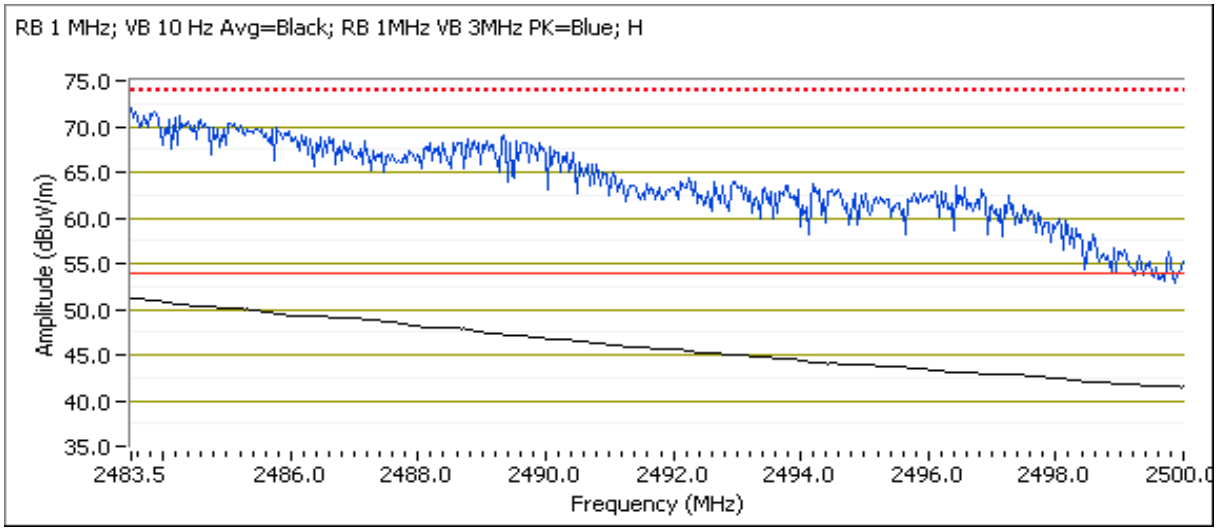


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Channel: 11 Mode: n20
Tx Chain: 2x2 Data Rate: MCS8

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	
Pwr setting 18								
2483.530	51.5	H	54.0	-2.5	AVG	50	1.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2483.930	72.0	H	74.0	-2.0	PK	50	1.0	POS; RB 1 MHz; VB: 3 MHz
2483.570	44.7	V	54.0	-9.3	AVG	64	1.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2484.030	65.4	V	74.0	-8.6	PK	64	1.1	POS; RB 1 MHz; VB: 3 MHz

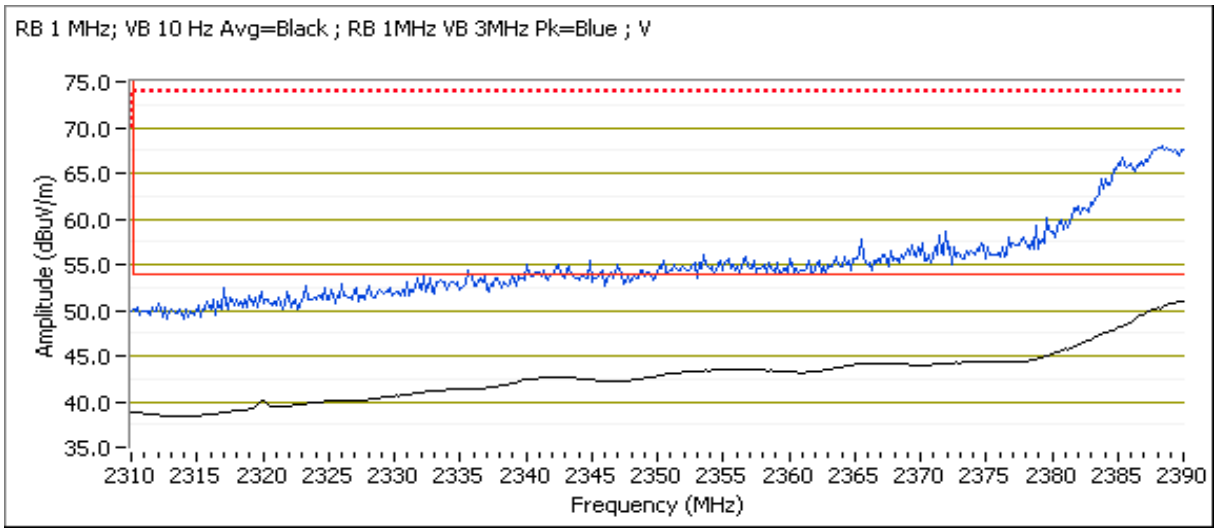


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Channel: 2 Mode: n20
Tx Chain: 2x2 Data Rate: MCS8

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	
Pwr setting 19								
2389.920	51.7	V	54.0	-2.3	AVG	37	1.0	Note3; POS; RB 1 MHz; VB: 10 Hz
2388.720	68.3	V	74.0	-5.7	PK	37	1.0	POS; RB 1 MHz; VB: 3 MHz
2390.000	45.3	H	54.0	-8.7	AVG	46	1.2	Note3; POS; RB 1 MHz; VB: 10 Hz
2388.960	61.6	H	74.0	-12.4	PK	46	1.2	POS; RB 1 MHz; VB: 3 MHz



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	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, unless otherwise noted.

Ambient Conditions:

Temperature: 20.9 °C

Rel. Humidity: 41 %

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

Run #	Mode	Channel	Target Power	Passing Power Setting	Test Performed	Limit	Result / Margin
1	b (chain 1)	1 - 2412MHz	20	20	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	43.2 dBµV/m @ 4824.0 MHz (-10.8 dB)
	b (chain 1)	6 - 2437MHz	20	20	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	49.4 dBµV/m @ 9748.0 MHz (-4.6 dB)
	b (chain 1)	11 - 2462MHz	20	20	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	47.2 dBµV/m @ 7385.0 MHz (-6.8 dB)
Scans on center channel in all OFDM modes to determine the worst case mode.							
2	g (chain 1)	6 - 2437MHz	20	20	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	51.0 dBµV/m @ 1150.0 MHz (-3.0 dB)
	g (chain 2)	6 - 2437MHz	20	20	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	50.7 dBµV/m @ 1150.0 MHz (-3.3 dB)
	n20	6 - 2437MHz	20	20	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	44.6 dBµV/m @ 7309.9 MHz (-9.4 dB)
Measurements on low and high channels in worst-case OFDM mode.							
3	g (chain 1)	1 - 2412MHz	20	20	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	44.0 dBµV/m @ 7237.0 MHz (-10.0 dB)
	g (chain 1)	11 - 2462MHz	20	20	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	41.0 dBµV/m @ 7392.2 MHz (-13.0 dB)

Notes:

11b performed using worse case chain from 11g

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

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.

Sample Notes

Sample S/N: L044A505250029
Driver: 5.99 RC188.10
Antenna: Airgain N2420DS / N2415D2

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.
2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	2Mb/s	99.0%	Yes	-	0	0	-
11g	9Mb/s	98.9%	Yes	-	0	0	-
n20	MCS1	97.8%	Yes	-	0.10	0.19	-

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle < 98%, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: 802.11b

Date of Test: 02/18/15 Test Location: Chamber #4

Test Engineer: M. Birgani EUT Voltage: 120V/ 60Hz

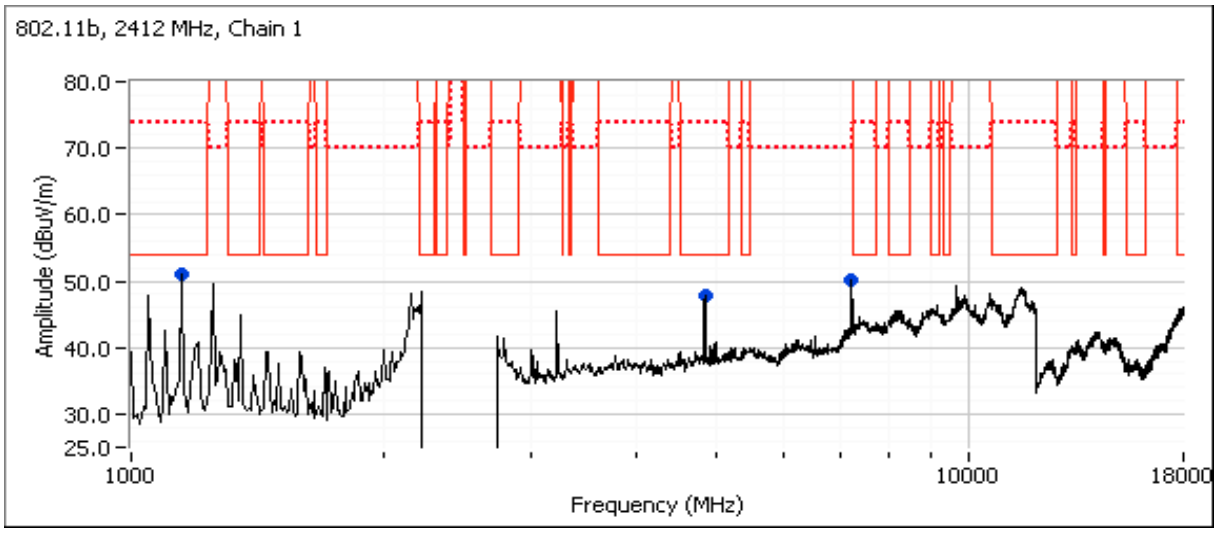
Run #1a: Low Channel

Channel: 1 Mode: b Power Setting: 20

Tx Chain: 1 Data Rate: 2Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4823.990	43.2	V	54.0	-10.8	AVG	15	1.1	RB 1 MHz;VB 10 Hz;Peak
4823.780	49.9	V	74.0	-24.1	PK	15	1.1	RB 1 MHz;VB 3 MHz;Peak
7235.310	50.2	V	70.0	-19.8	Peak	326	1.9	
1140.020	30.0	V	54.0	-24.0	AVG	0	1.0	RB 1 MHz;VB 10 Hz;Peak
1134.300	40.3	V	74.0	-33.7	PK	0	1.0	RB 1 MHz;VB 3 MHz;Peak

Note:	Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

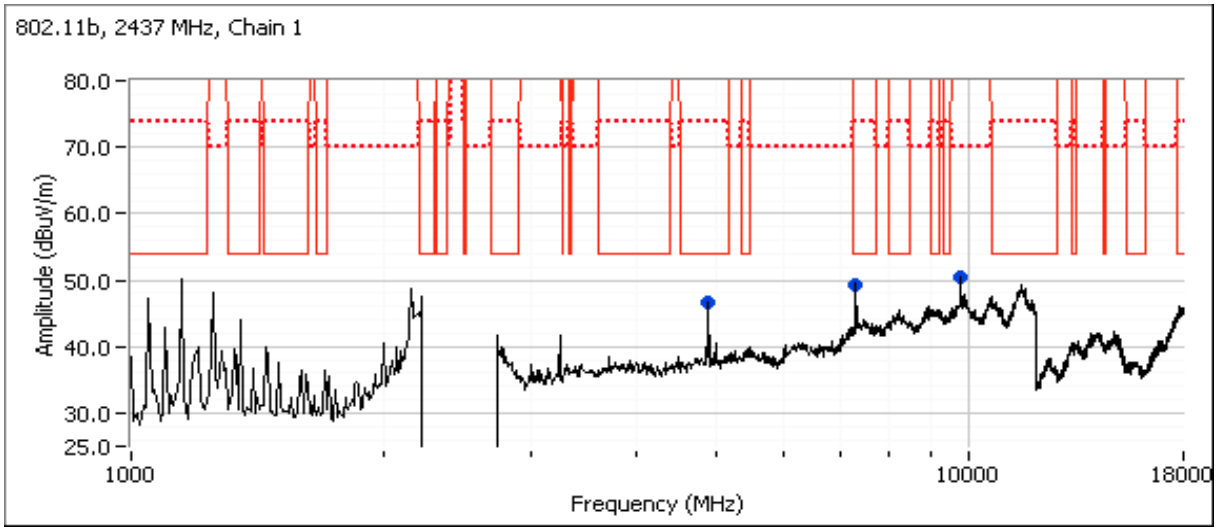
Run #1b: Center Channel

Channel: 6 Mode: b Power Setting: 20

Tx Chain: 1 Data Rate: 2Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
9747.960	49.4	V	54.0	-4.6	AVG	55	1.5	Note 1,RB 1 MHz;VB 10 Hz;Peak
9747.700	57.4	V	74.0	-16.6	PK	55	1.5	Note 1,RB 1 MHz;VB 3 MHz;Peak
4873.860	45.6	V	54.0	-8.4	AVG	349	1.9	RB 1 MHz;VB 10 Hz;Peak
4874.080	51.2	V	74.0	-22.8	PK	349	1.9	RB 1 MHz;VB 3 MHz;Peak
7309.990	48.0	V	54.0	-6.0	AVG	349	1.7	RB 1 MHz;VB 10 Hz;Peak
7313.290	55.2	V	74.0	-18.8	PK	349	1.7	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

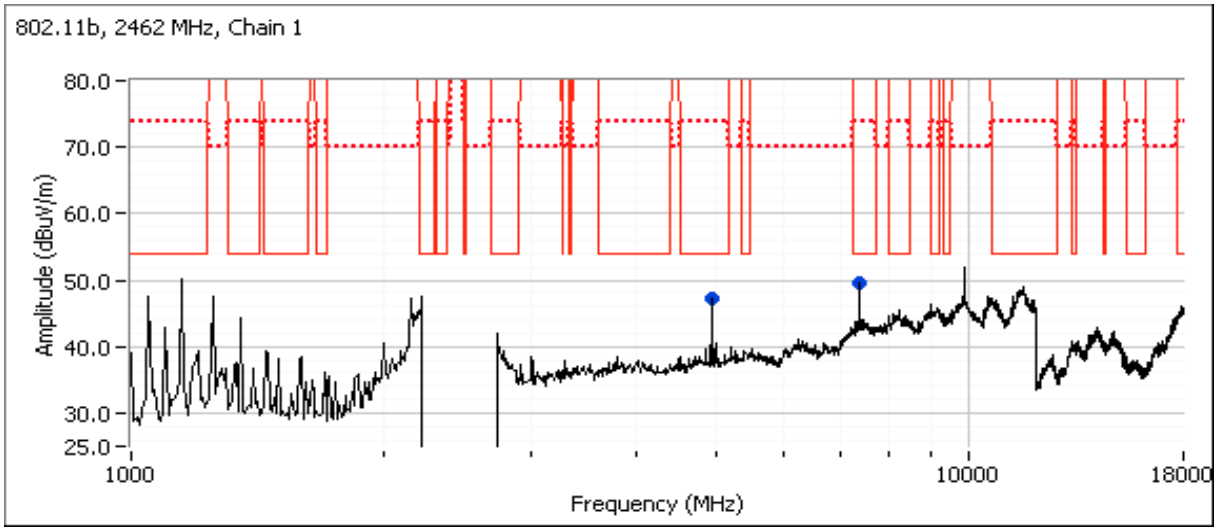
Run #1c: High Channel

Channel: 11 Mode: b Power Setting: 20

Tx Chain: 1 Data Rate: 2Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7385.040	47.2	V	54.0	-6.8	AVG	355	1.6	RB 1 MHz;VB 10 Hz;Peak
7386.560	55.6	V	74.0	-18.4	PK	355	1.6	RB 1 MHz;VB 3 MHz;Peak
4924.200	44.4	V	54.0	-9.6	AVG	348	1.7	RB 1 MHz;VB 10 Hz;Peak
4924.090	50.9	V	74.0	-23.1	PK	348	1.7	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #2: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: OFDM

Date of Test: 02/17/15 Test Location: FT Chamber #4

Test Engineer: Rafael Varelas EUT Voltage: 120V/60Hz

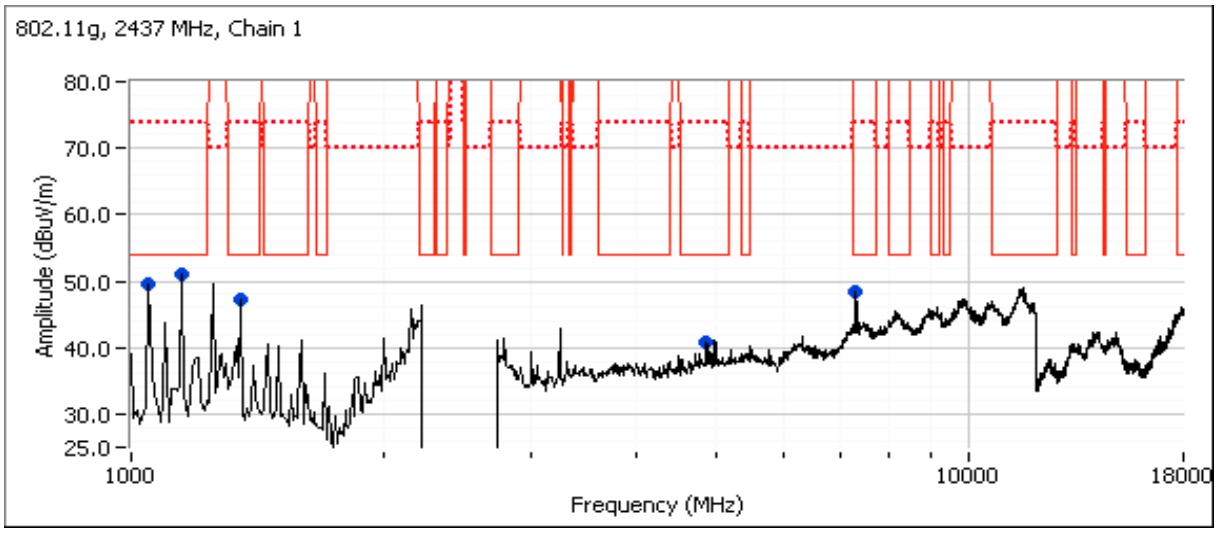
Run #2a: Center Channel

Channel: 6 Mode: g Power Setting: 20

Tx Chain: 1 Data Rate: 9Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1150.020	51.0	V	54.0	-3.0	AVG	84	1.9	RB 1 MHz;VB 10 Hz;Peak
1050.010	49.2	V	54.0	-4.8	AVG	76	1.2	RB 1 MHz;VB 10 Hz;Peak
1349.990	47.3	V	54.0	-6.7	AVG	225	1.5	RB 1 MHz;VB 10 Hz;Peak
7312.140	44.9	V	54.0	-9.1	AVG	346	1.5	RB 1 MHz;VB 10 Hz;Peak
7316.140	58.7	V	74.0	-15.3	PK	346	1.5	RB 1 MHz;VB 3 MHz;Peak
4875.120	36.3	V	54.0	-17.7	AVG	350	1.0	RB 1 MHz;VB 10 Hz;Peak
1150.060	52.1	V	74.0	-21.9	PK	84	1.9	RB 1 MHz;VB 3 MHz;Peak
1049.940	50.7	V	74.0	-23.3	PK	76	1.2	RB 1 MHz;VB 3 MHz;Peak
1350.030	49.4	V	74.0	-24.6	PK	225	1.5	RB 1 MHz;VB 3 MHz;Peak
4869.480	47.4	V	74.0	-26.6	PK	350	1.0	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

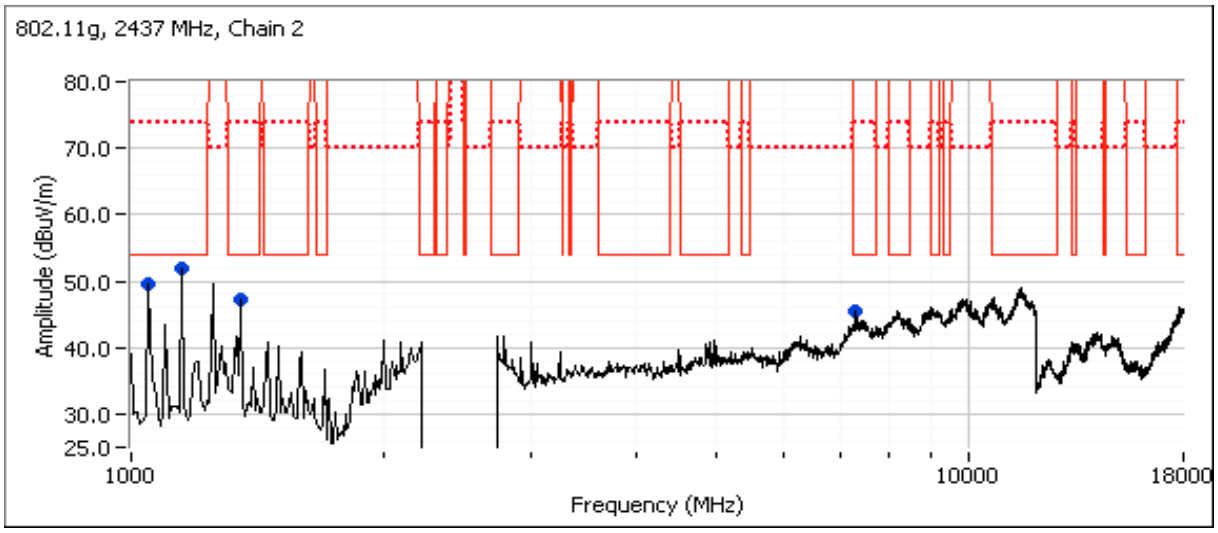
Run #2b: Center Channel

Channel: 6 Mode: g Power Setting: 20

Tx Chain: 2 Data Rate: 9Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1150.000	50.7	V	54.0	-3.3	AVG	86	1.9	RB 1 MHz;VB 10 Hz;Peak
1050.010	48.8	V	54.0	-5.2	AVG	75	1.2	RB 1 MHz;VB 10 Hz;Peak
1350.010	47.0	V	54.0	-7.0	AVG	231	1.5	RB 1 MHz;VB 10 Hz;Peak
7309.840	42.2	V	54.0	-11.8	AVG	35	1.0	RB 1 MHz;VB 10 Hz;Peak
7307.180	53.6	V	74.0	-20.4	PK	35	1.0	RB 1 MHz;VB 3 MHz;Peak
1149.890	52.0	V	74.0	-22.0	PK	86	1.9	RB 1 MHz;VB 3 MHz;Peak
1050.010	50.2	V	74.0	-23.8	PK	75	1.2	RB 1 MHz;VB 3 MHz;Peak
1349.950	49.4	V	74.0	-24.6	PK	231	1.5	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

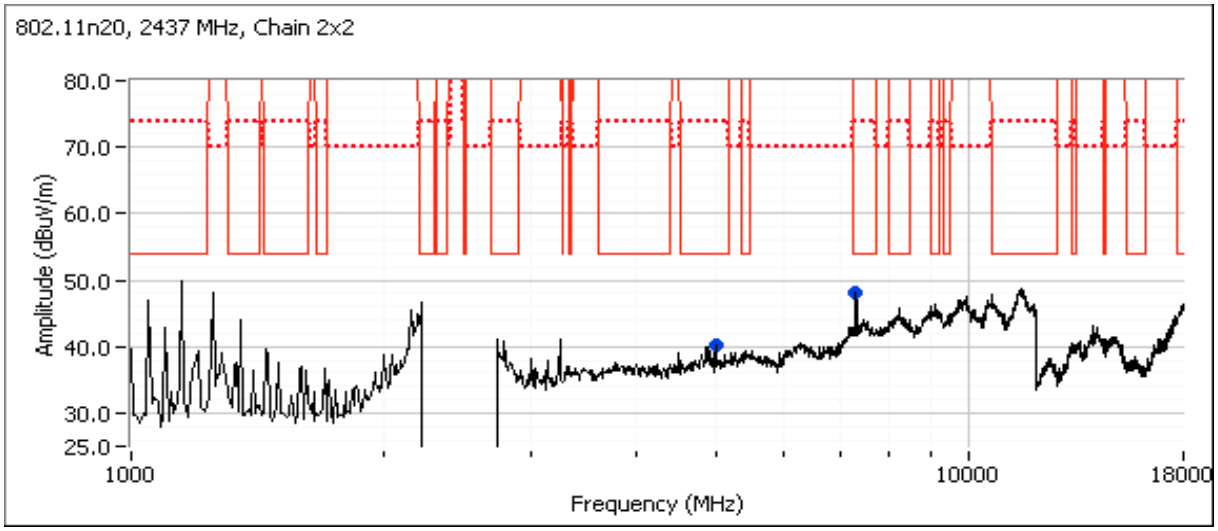
Run #2c: Center Channel

Channel: 6 Mode: n20 Power Setting: 20

Tx Chain: 2x2 Data Rate: MCS1

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7309.880	44.6	V	54.0	-9.4	AVG	345	1.6	RB 1 MHz;VB 10 Hz;Peak, note 3
7310.880	57.6	V	74.0	-16.4	PK	345	1.6	RB 1 MHz;VB 3 MHz;Peak
4968.070	37.4	H	54.0	-16.6	AVG	339	1.0	RB 1 MHz;VB 10 Hz;Peak, Note 3
4967.600	44.8	H	74.0	-29.2	PK	339	1.0	RB 1 MHz;VB 3 MHz;Peak

Note:	Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #3: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: Worse case from Run #2

Date of Test: 02/18/15 Test Location: FT Chamber #4

Test Engineer: Rafael Varelas EUT Voltage: 120V/60Hz

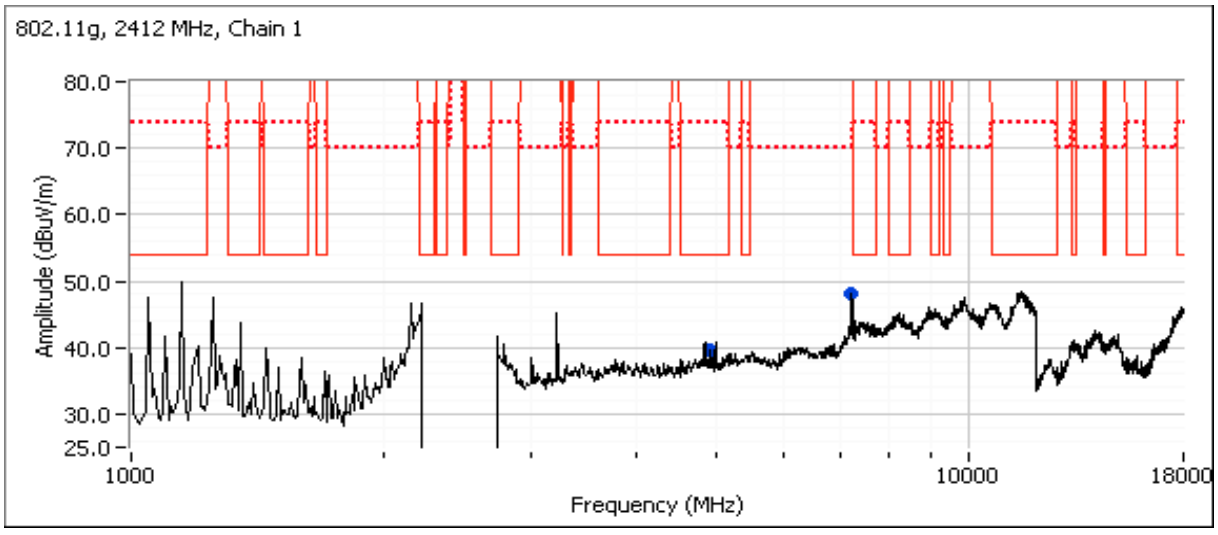
Run #3a: Low Channel

Channel: 1 Mode: g Power Setting: 20

Tx Chain: 1 Data Rate: 9Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7236.980	44.0	V	54.0	-10.0	AVG	346	1.7	Note 1,RB 1 MHz;VB 10 Hz;Peak
7239.610	58.7	V	74.0	-15.3	PK	346	1.7	Note 1,RB 1 MHz;VB 3 MHz;Peak
4823.020	34.4	V	54.0	-19.6	AVG	237	1.0	RB 1 MHz;VB 10 Hz;Peak
4826.250	45.8	V	74.0	-28.2	PK	237	1.0	RB 1 MHz;VB 3 MHz;Peak

Note:	Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

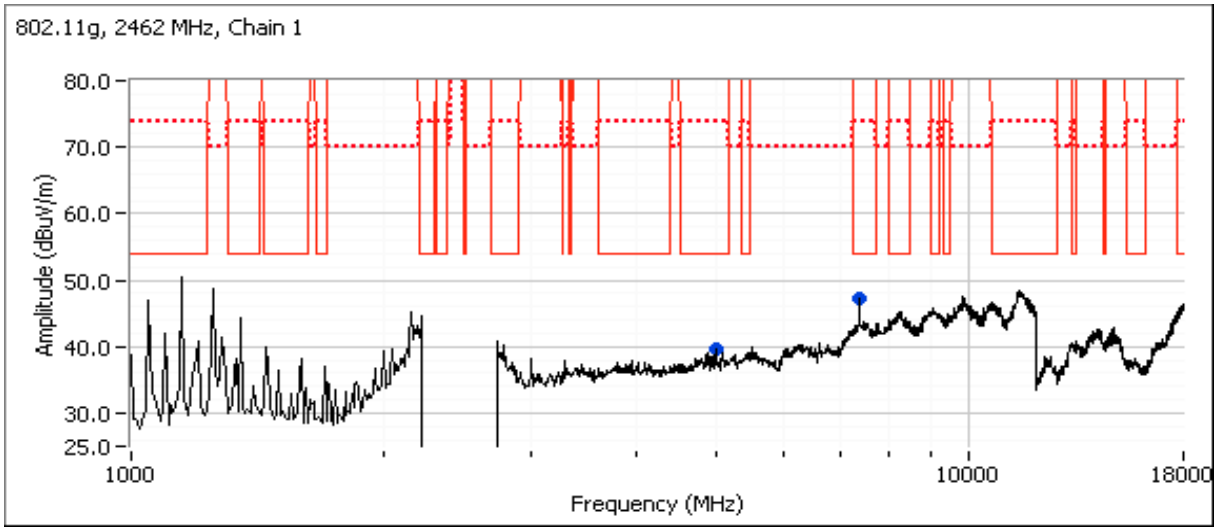
Run #3b: High Channel

Channel: 11 Mode: g Power Setting: 20

Tx Chain: 1 Data Rate: 9Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7392.170	41.0	H	54.0	-13.0	AVG	0	0.9	RB 1 MHz;VB 10 Hz;Peak
7393.070	52.5	H	74.0	-21.5	PK	0	0.9	RB 1 MHz;VB 3 MHz;Peak
4921.660	34.1	H	54.0	-19.9	AVG	297	1.4	RB 1 MHz;VB 10 Hz;Peak
4922.730	45.7	H	74.0	-28.3	PK	297	1.4	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements
MIMO and Smart Antenna Systems
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: 2/24/15, 2/25/15, 2/26/15
Test Engineer: J. Liu / R. Varelas
Test Location: FT Lab #4B

Config. Used: 2
Config Change: -
EUT Voltage: 120V/60Hz

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: 20.6 °C
Rel. Humidity: 38 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1Tx Modes						
1	-	-	Output Power	15.247(b)	Pass	11b: 20.3dBm(108mW) 11g: 19.5dBm(89mW)
2	-	-	Power spectral Density (PSD)	15.247(d)	Pass	11b: 7.8 dBm/30kHz 11g: 2.5 dBm/30kHz
2Tx Modes						
1	-	-	Output Power	15.247(b)	Pass	11n: 22.2dBm(165mW)
2	-	-	Power spectral Density (PSD)	15.247(d)	Pass	n20: 6.0 dBm/30kHz

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
All Modes						
3	-	-	Minimum 6dB Bandwidth	15.247(a)	Pass	11b: 8.1 MHz 11g: 16.3 MHz n20: 17.6 MHz
3	-	-	99% Bandwidth	RSS GEN	Pass	11b: 10.4 MHz 11g: 17.2 MHz n20: 18.2 MHz
4	-	-	Spurious emissions	15.247(b)	Pass	All emissions below -30dBc

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.

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	2Mb/s	99.0%	Yes	-	0	0	-
11g	9Mb/s	98.9%	Yes	-	0	0	-
n20	MCS13	97.8%	Yes	-	0.10	0.19	-

Sample Notes

Sample S/N: L044A505250029

Driver: 5.99 RC188.10

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Antenna Gain Information

Freq	Antenna Gain (dBi) / Chain				BF	MultiChain Legacy	CDD	Sectorized / Xpol	Dir G (PWR)	Dir G (PSD)
	1	2	3	4						
For 11b/ 11g operation										
2.4GHz	3.1	2.13			No	No	N/A	No	3.1	6.1
For n20 operation										
2.4GHz	3.1	2.13			No	No	Yes	No	3.1	6.1

For devices that support CDD modes

Min # of spatial streams: 1

Max # of spatial streams: 2

Notes:	BF = beamforming mode supported, Multichain Legacy = 802.11 legacy data rates supported for multichain transmissions, CDD = Cyclic Delay Diversity (or Cyclic Shift Diversity) modes supported, Sectorized / Xpol = antennas are sectorized or cross polarized
Notes:	Dir G (PWR) = total gain (Gant + Array Gain) for power calculations; Dir G (PSD) = total gain for PSD calculations based on FCC KDB 662911. Depending on the modes supported, the Array Gain value for power could be different from the PSD value.
Notes:	Array gain for power/psd calculated per KDB 662911 D01

Notes

Power, PSD, and conducted spurious were measured on both chains for 11b and 11g.

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #1: Output Power

Operating Mode: 11b
Directional Gain (dBi): 3.1

Max EIRP (mW): 220.3

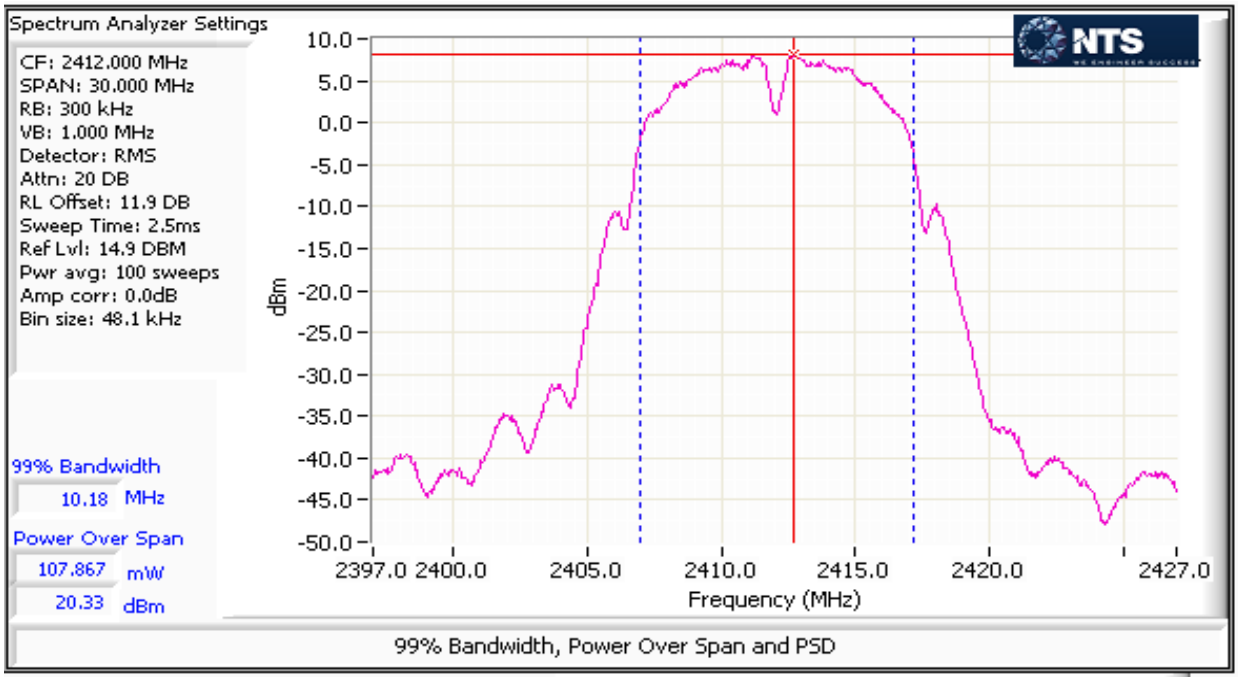
Frequency (MHz)	Chain	Software Setting	Power[1] dBm	Power[1] mW	Total mW	Total dBm	Max Power (W)	Limit dBm	Result	Power (dBm)[3]
2412	1	20	20.3	107.9	107.9	20.3	0.108	30.0	Pass	
	3									
	4									
	2									
2437	1	20	20.1	103.3	103.3	20.1				
	3									
	4									
	2									
2462	1	20	20.0	100.5	100.5	20.0				
	3									
	4									
	2									

Operating Mode: 11b
Directional Gain (dBi): 3.1

Max EIRP (mW): 208.1

Frequency (MHz)	Chain	Software Setting	Power[1] dBm	Power[1] mW	Total mW	Total dBm	Max Power (W)	Limit dBm	Result	Power (dBm)[3]
2412	1	20			101.9	20.1	0.102	30.0	Pass	
	3									
	4									
	2		20.1	101.9						
2437	1	20			96.8	19.9				
	3									
	4									
	2		19.9	96.8						
2462	1	20			96.4	19.8				
	3									
	4									
	2		19.8	96.4						

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Operating Mode: 11g
Directional Gain (dBi): 3.1

Max EIRP (mW): 181.5

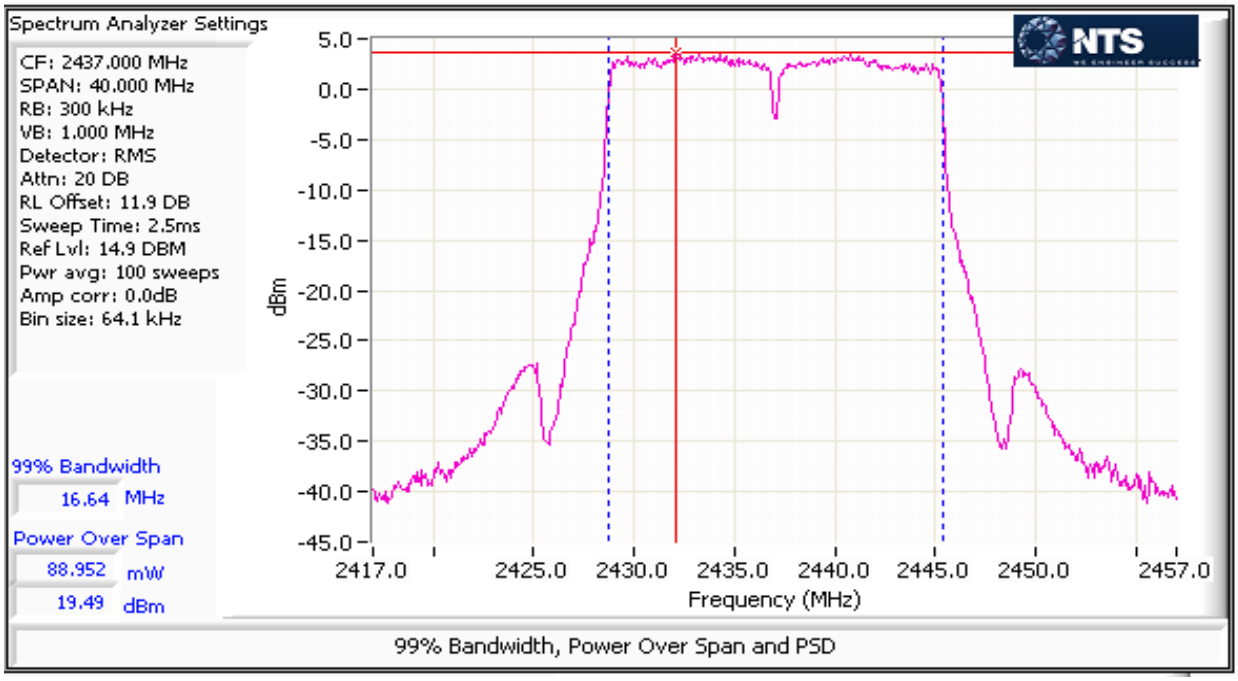
Frequency (MHz)	Chain	Software Setting	Power[1] dBm	Power[1] mW	Total mW	Total dBm	Max Power (W)	Limit dBm	Result	Power (dBm)[3]
2412	1	17	16.9	48.9	48.9	16.9	0.089	30.0	Pass	
	3									
	4									
	2									
2437	1	20	19.5	88.9	88.9	19.5				
	3									
	4									
	2									
2462	1	18	17.5	55.6	55.6	17.5				
	3									
	4									
	2									

Operating Mode: 11g
Directional Gain (dBi): 3.1

Max EIRP (mW): 166.4

Frequency (MHz)	Chain	Software Setting	Power[1] dBm	Power[1] mW	Total mW	Total dBm	Max Power (W)	Limit dBm	Result	Power (dBm)[3]
2412	1	18			54.2	17.3	0.082	30.0	Pass	
	3									
	4									
	2		17.3	54.2						
2437	1	20			81.5	19.1				
	3									
	4									
	2		19.1	81.5						
2462	1	20			79.4	19.0				
	3									
	4									
	2		19.0	79.4						

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

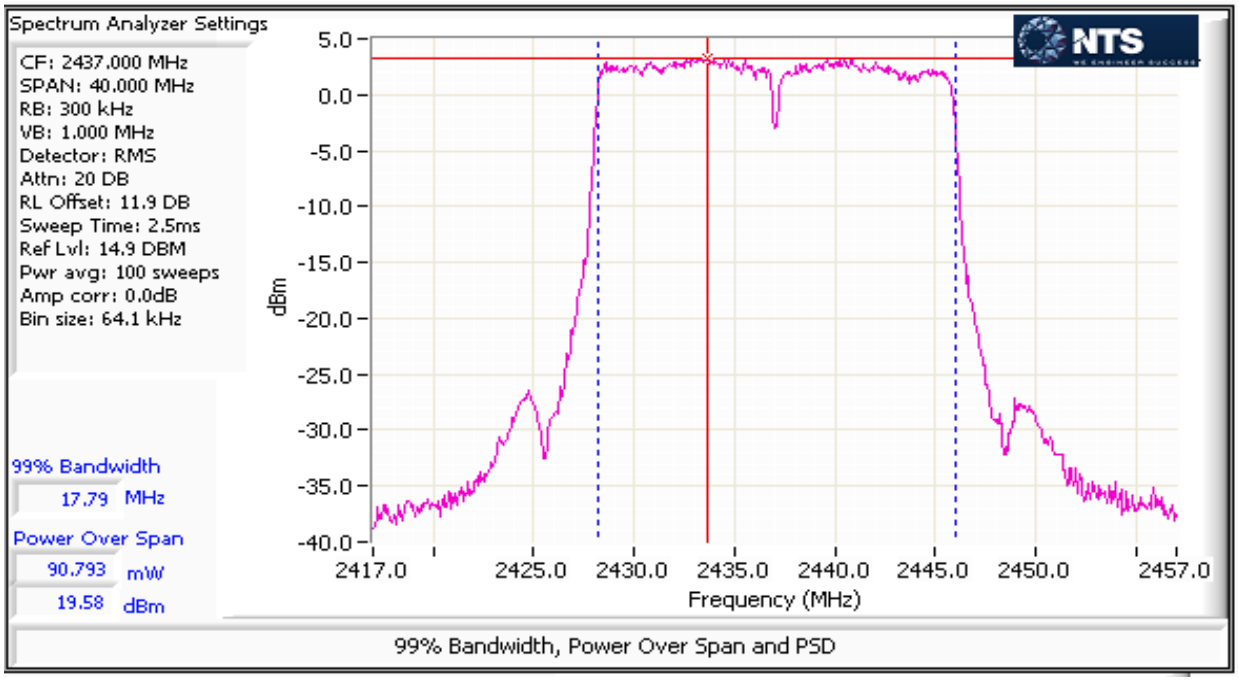
Operating Mode: n20
Directional Gain (dBi): 3.1

Max EIRP (mW): 337.5

Frequency (MHz)	Chain	Software Setting	Power[1] dBm	Power[1] mW	Total mW	Total dBm	Max Power (W)	Limit dBm	Result	Power (dBm)[3]
2412	1	17	16.9	49.1	89.2	19.5	0.165	30.0	Pass	
	3									
	4									
	2		16.0	40.1						
2437	1	20	19.6	90.8	165.3	22.2				
	3									
	4									
	2		18.7	74.5						
2462	1	18	17.4	55.0	100.7	20.0				
	3									
	4									
	2		16.6	45.7						

Note 1:	Duty Cycle < 98%, constant duty cycle. Output power measured using a spectrum analyzer (see plots below) with RBW= 1-5% of OBW, VB≥3* RBW, RMS detector, power averaging on, and power integration over the OBW, trace average 100 traces (option AVGSA-2, in KDB 558074). Measurement corrected by Pwr Cor Factor. Spurious limit becomes -30dBc.
Note 2:	Power setting - if a single number the same power setting was used for each chain. If multiple numbers the power setting for each chain is separated by a comma (e.g. x,y would indicate power setting x for chain 1, power setting y for chain 2.
Note 3:	Power measured using average power meter (non-gated) and is included for reference only.

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #2: Power spectral Density

Mode: 11b

Power Setting	Frequency (MHz)	PSD (dBm/30kHz) Note 1					Limit dBm/3kHz	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
20	2412	6.5				6.5	8.0	Pass
20	2437	7.2				7.2	8.0	Pass
20	2462	6.9				6.9	8.0	Pass

Mode: 11b

Power Setting	Frequency (MHz)	PSD (dBm/30kHz) Note 1					Limit dBm/3kHz	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
20	2412		7.8			7.8	8.0	Pass
20	2437		7.6			7.6	8.0	Pass
20	2462		7.3			7.3	8.0	Pass

Mode: 11g

Power Setting	Frequency (MHz)	PSD (dBm/30kHz) Note 1					Limit dBm/3kHz	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
17	2412	0.6				0.6	8.0	Pass
20	2437	2.5				2.5	8.0	Pass
18	2462	1.3				1.3	8.0	Pass

Mode: 11g

Power Setting	Frequency (MHz)	PSD (dBm/30kHz) Note 1					Limit dBm/3kHz	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
18	2412		1.0			1.0	8.0	Pass
20	2437		2.3			2.3	8.0	Pass
20	2462		2.3			2.3	8.0	Pass

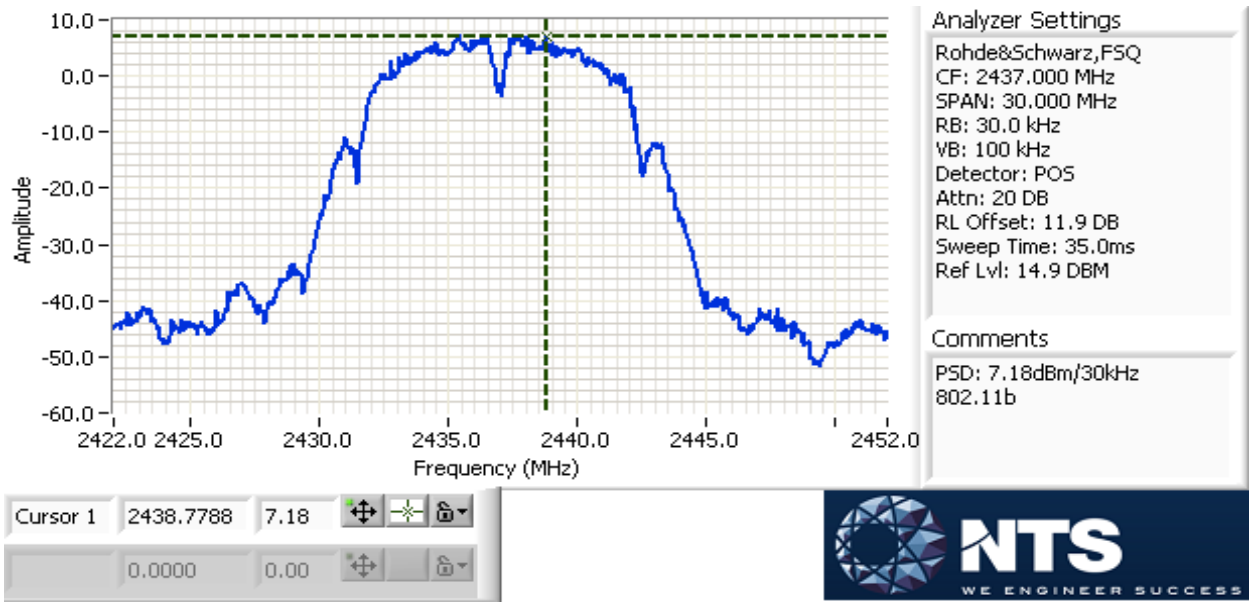
Mode: n20

Power Setting	Frequency (MHz)	PSD (dBm/30kHz) Note 1					Limit dBm/3kHz	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
17	2412	0.6	0.9			3.7	8.0	Pass
20	2437	2.6	3.5			6.0	8.0	Pass
19	2462	2.3	2.6			5.5	8.0	Pass

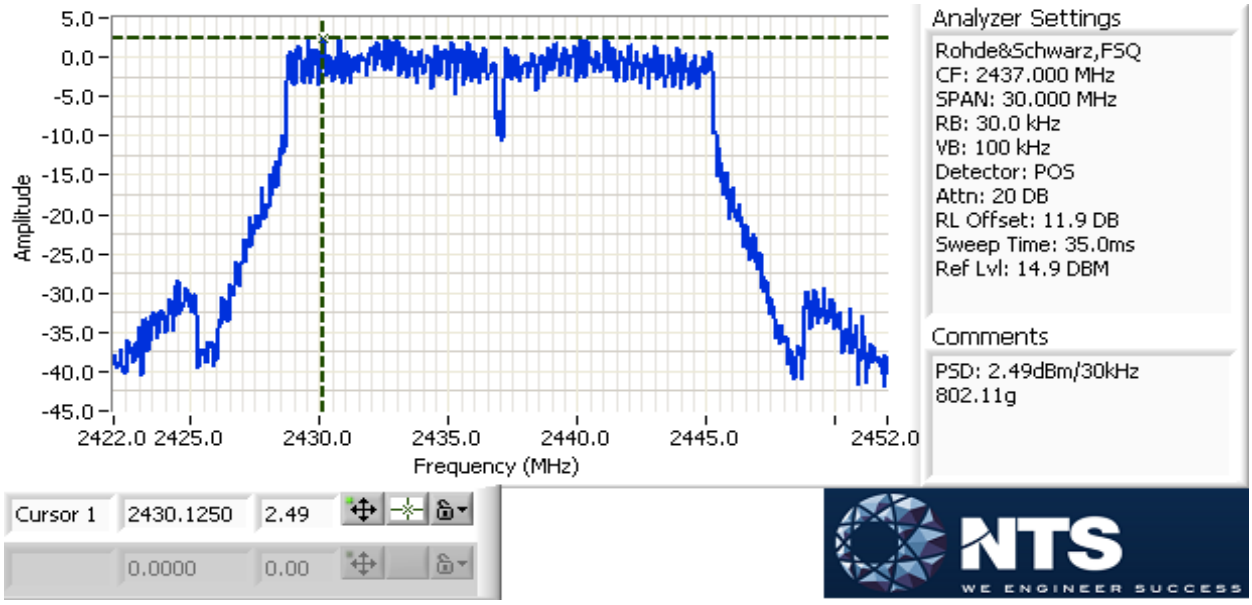
Note 1:	Test performed per method PKSPD, in KDB 558074. Power spectral density measured using: 3kHz ≤ RBW ≤ 100kHz, VBW=3*RBW, peak detector, span = 1.5*DTS BW, auto sweep time, max hold.
Note 2:	For multiple output modes, the total PSD was calculated per KDB 662911. The maximum PSD value for each output summed (in linear units).

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

802.11b Mode

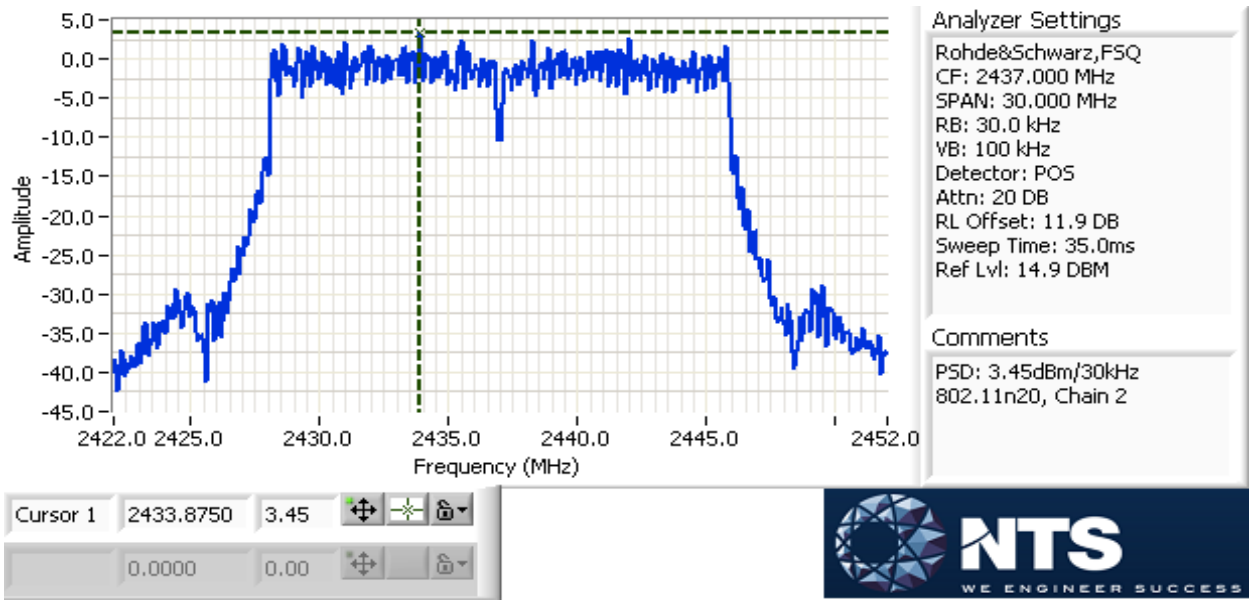


802.11g Mode



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

802.11n20 Mode



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #3: Signal Bandwidth

Mode: 11b

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (MHz)	
		6dB	99%	6dB	99%
20	2412	8.3	10.3	100kHz	300kHz
20	2437	8.1	10.3	100kHz	300kHz
20	2462	8.2	10.4	100kHz	300kHz

Mode: 11g

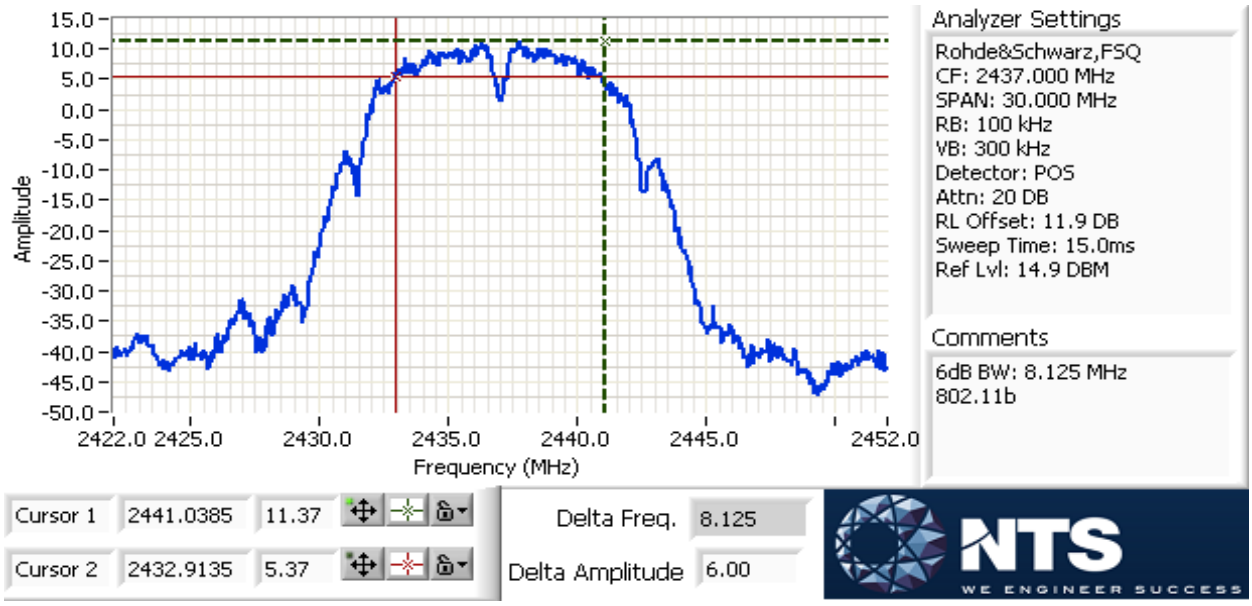
Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (MHz)	
		6dB	99%	6dB	99%
20	2412	16.3	17.0	100kHz	300kHz
20	2437	16.3	17.1	100kHz	300kHz
20	2462	16.4	17.2	100kHz	300kHz

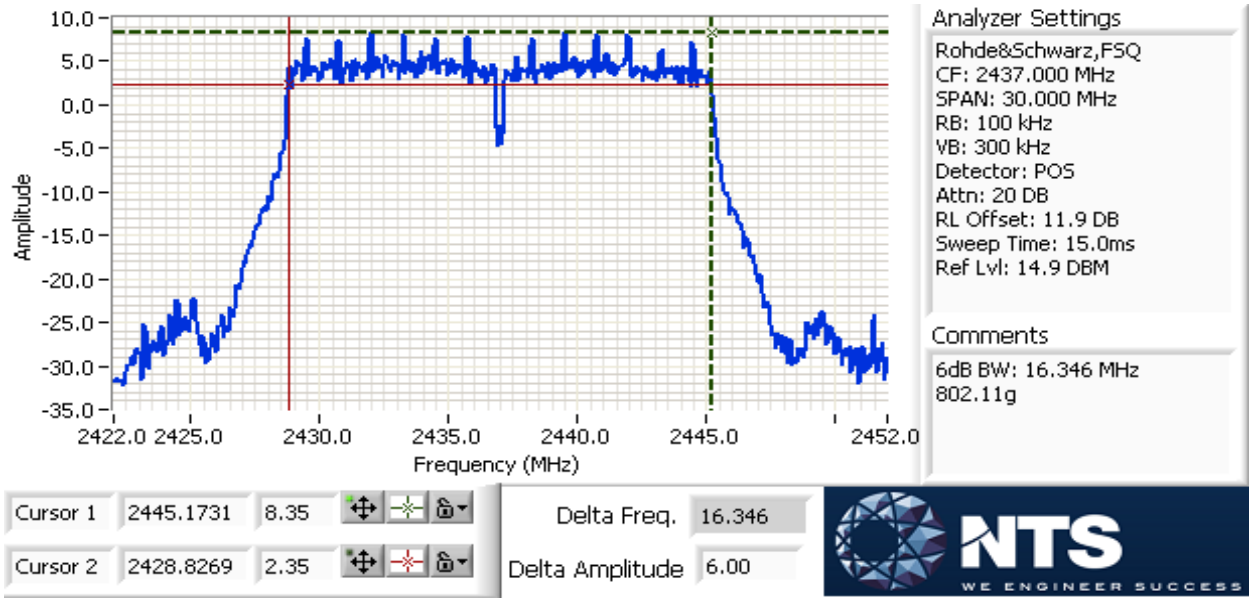
Mode: n20

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (MHz)	
		6dB	99%	6dB	99%
20	2412	17.6	18.1	100kHz	300kHz
20	2437	17.7	18.2	100kHz	300kHz
20	2462	17.6	18.1	100kHz	300kHz

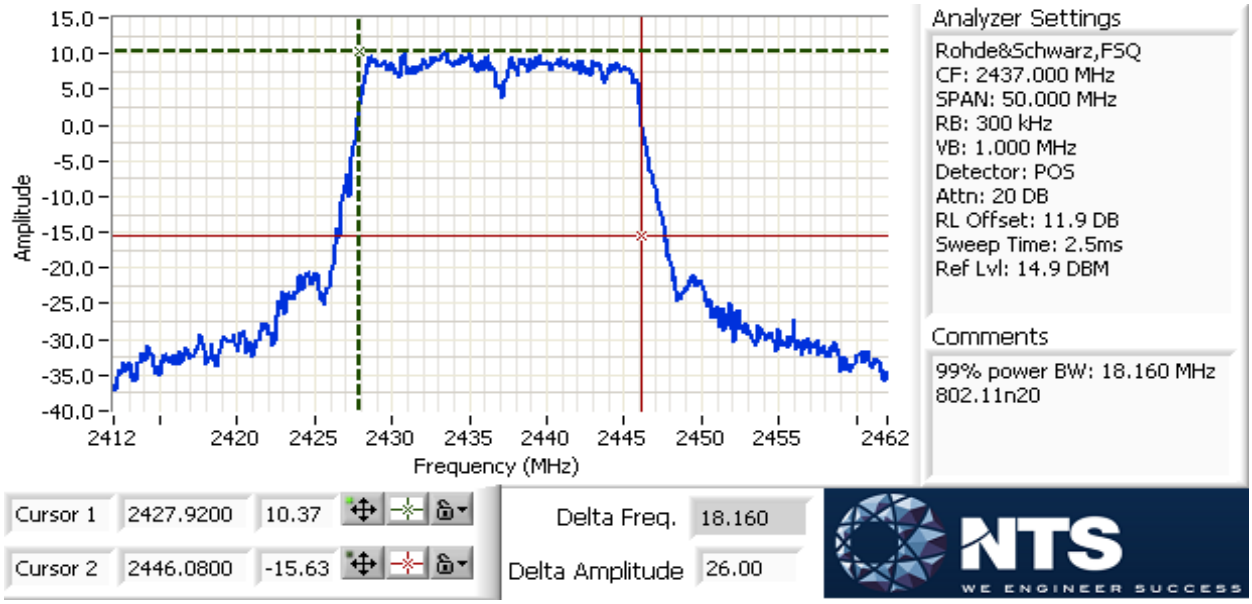
Note 1:	DTS BW: RBW=100kHz, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time. 99% BW: RBW=1-5% of of 99%BW, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time.
Note 2:	Measurements performed on chain 1

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A





Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #4a: Out of Band Spurious Emissions

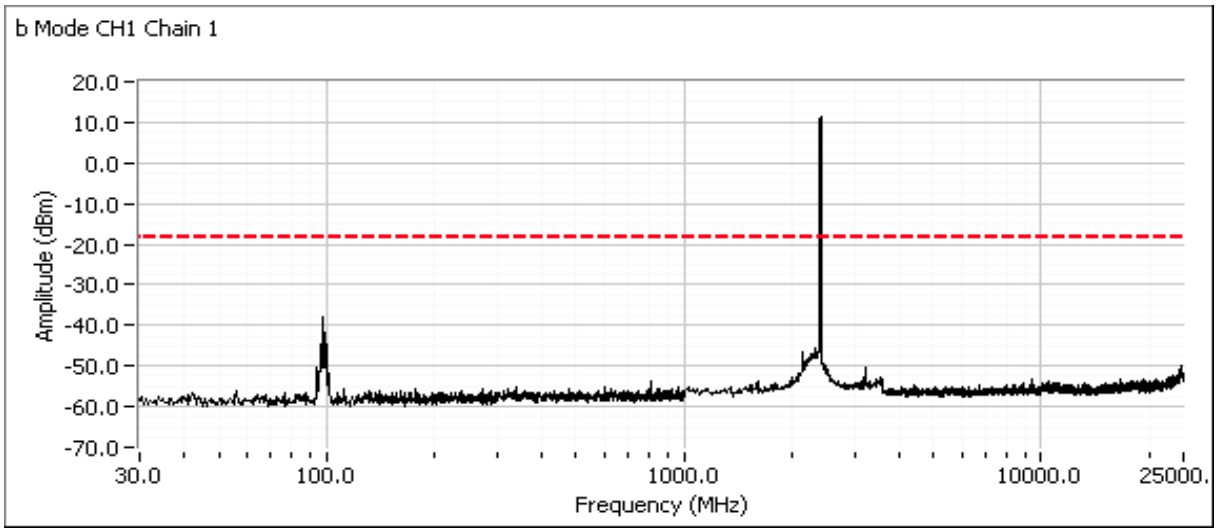
Power Setting Per Chain				Mode	Frequency (MHz)	Limit	Result
#1	#2	#3	#4				
20				b	2412	-30dBc	Pass
	20			b	2412	-30dBc	Pass
20				b	2437	-30dBc	Pass
	20			b	2437	-30dBc	Pass
20				b	2462	-30dBc	Pass
	20			b	2462	-30dBc	Pass
20				g	2412	-30dBc	Pass
	20			g	2412	-30dBc	Pass
20				g	2437	-30dBc	Pass
	20			g	2437	-30dBc	Pass
20				g	2462	-30dBc	Pass
	20			g	2462	-30dBc	Pass
20				n20	2412	-30dBc	Pass
20				n20	2437	-30dBc	Pass
20				n20	2462	-30dBc	Pass

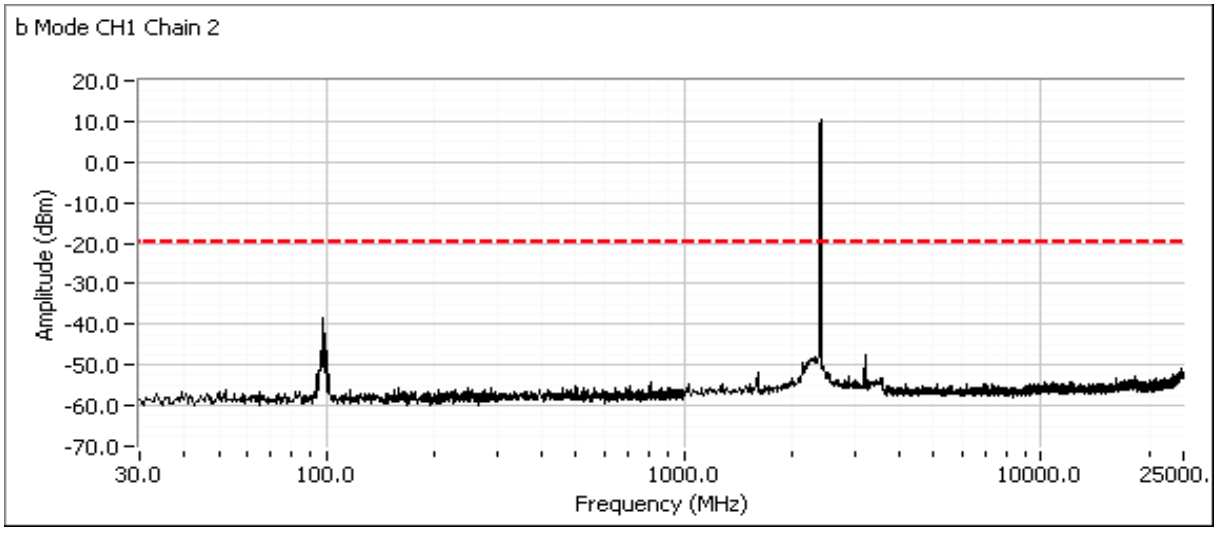
Note 1:	Measured on each chain individually
Notes:	All measurements performed with RBW=100kHz, VBW=300kHz, peak detector, max hold.
Notes:	Measurements on MIMO operating modes was performed KDB 662911 D01 E)3)b)

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

b mode

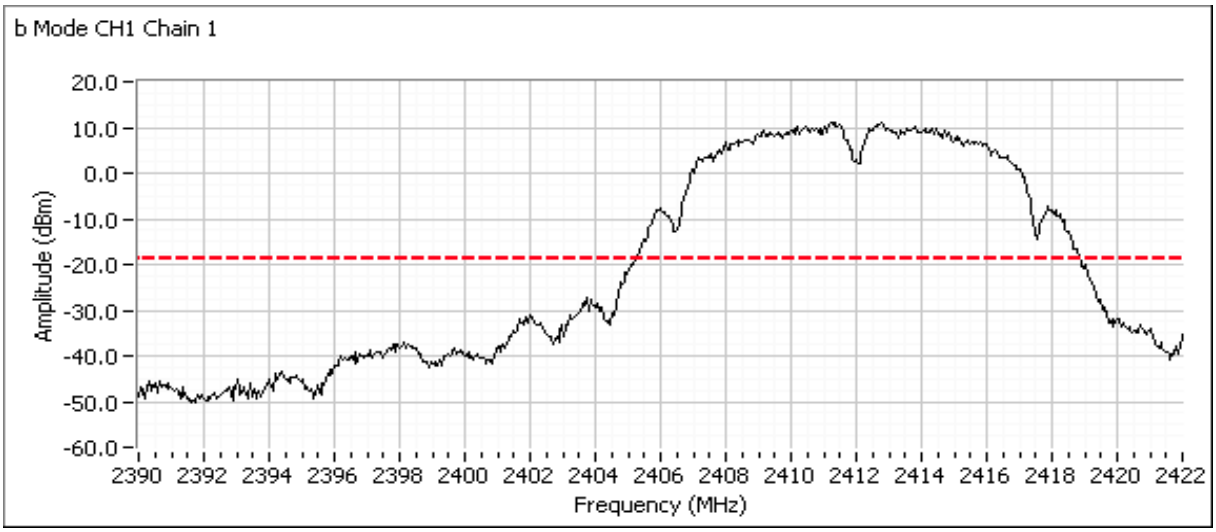
Plots for low channel

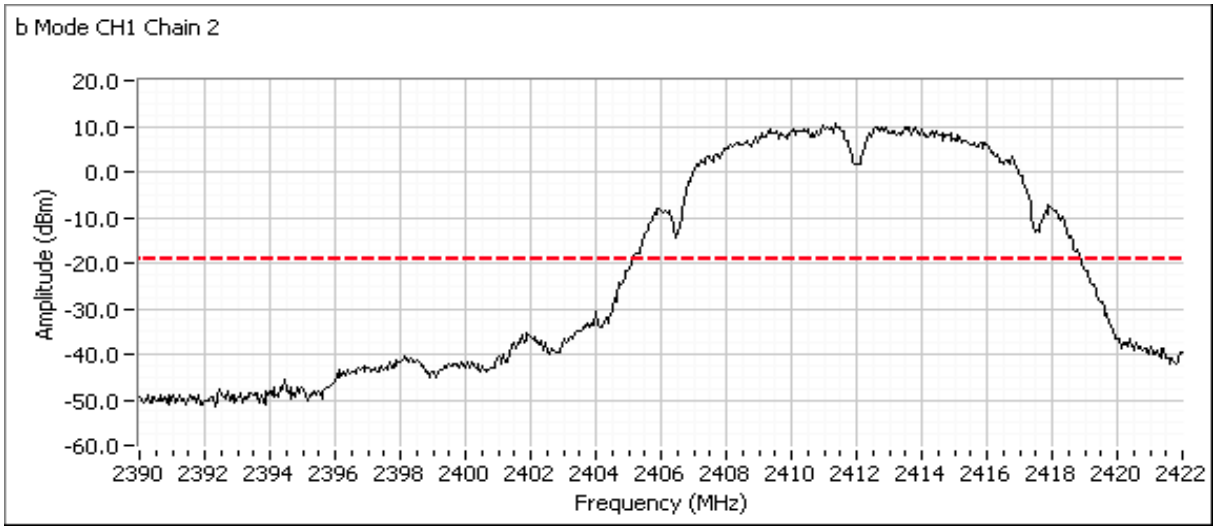




Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

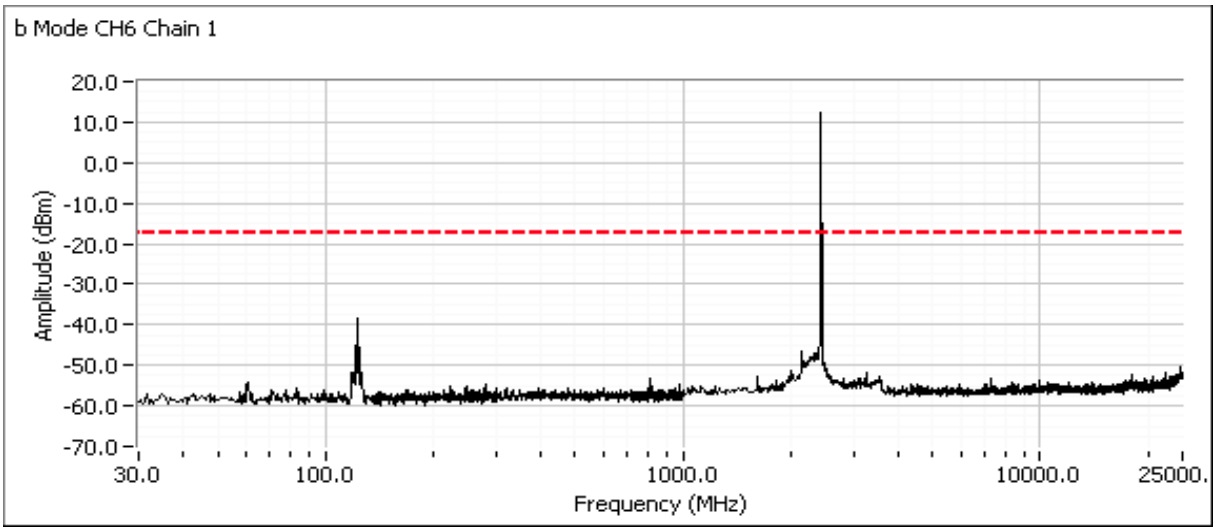
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

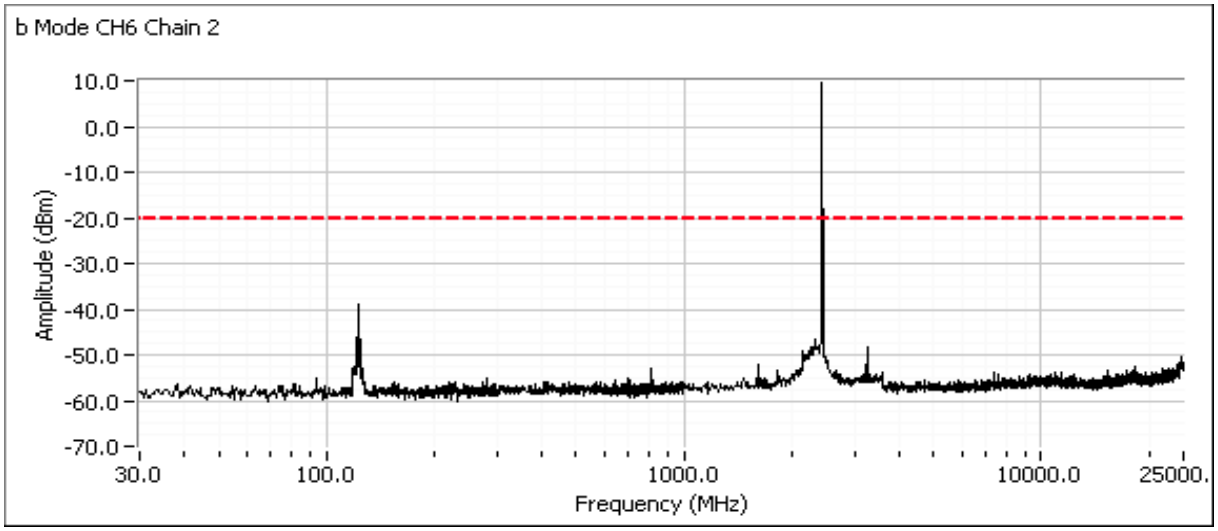




Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

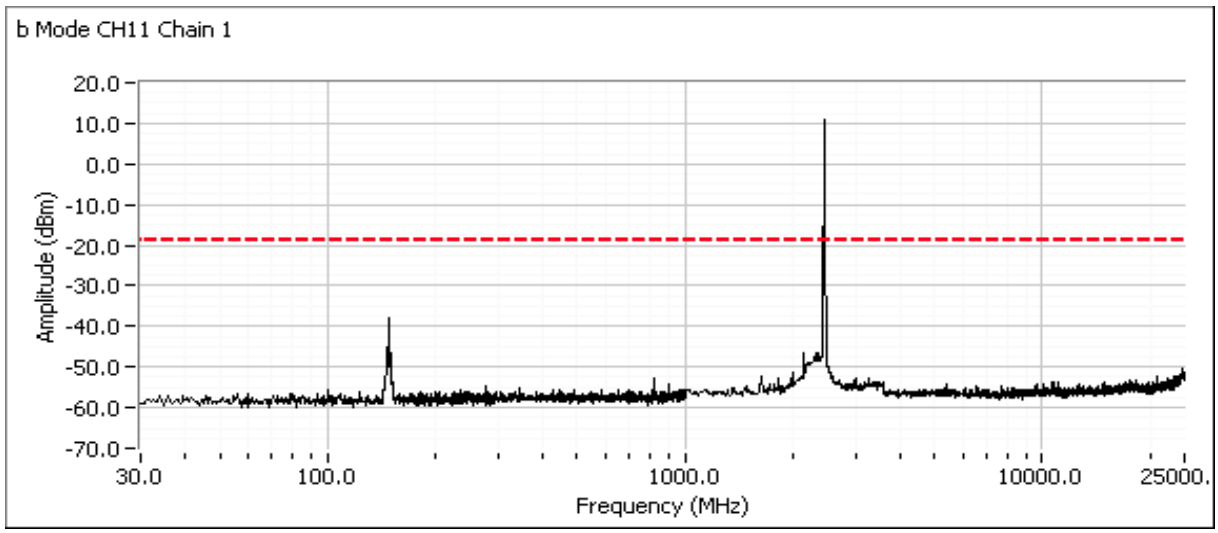
Plots for center channel

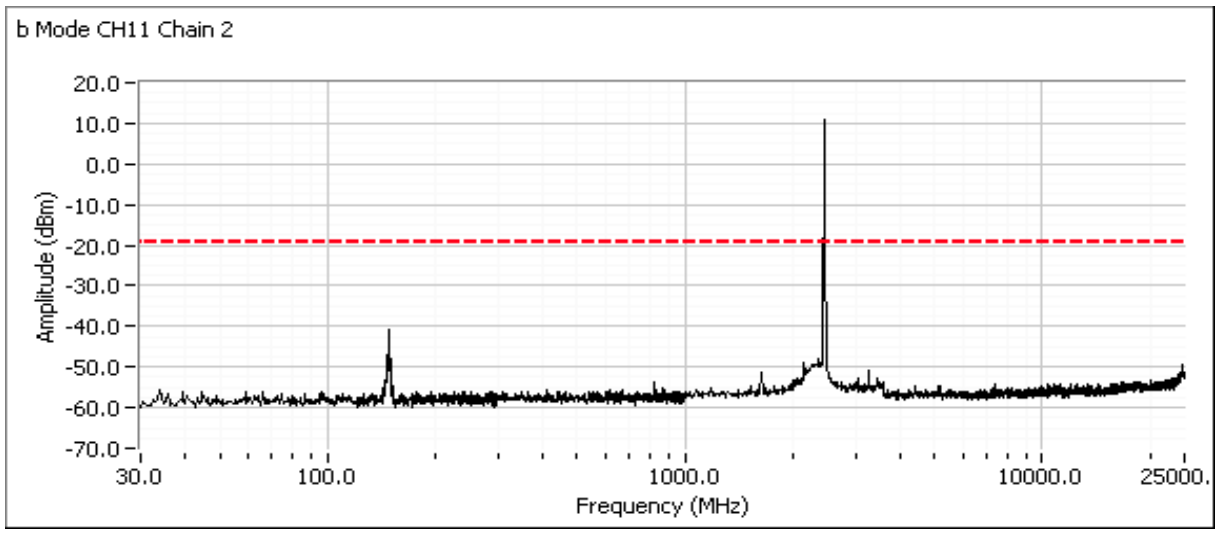




Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Plots for high channel

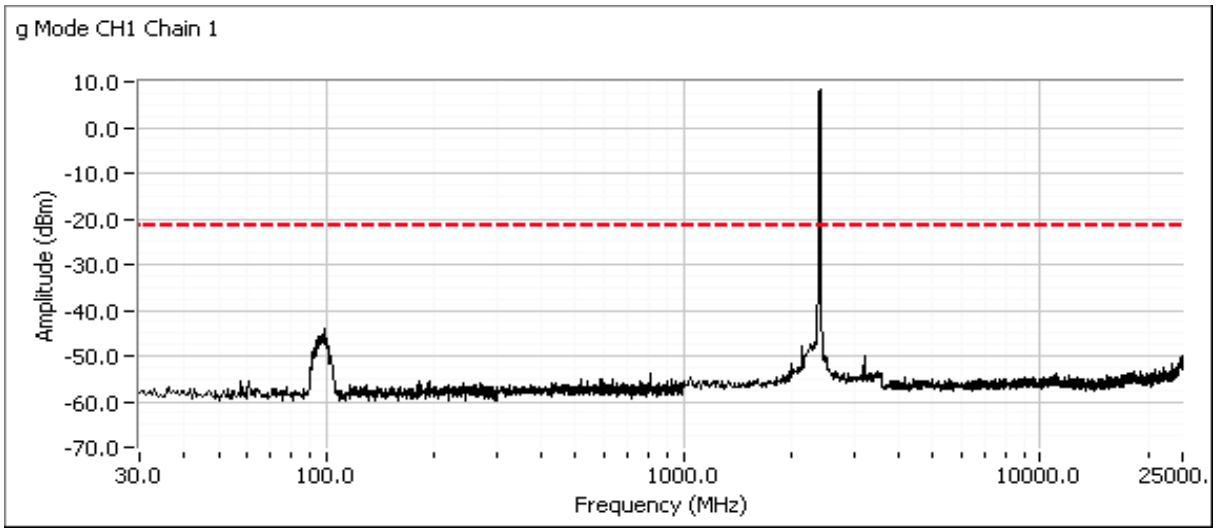


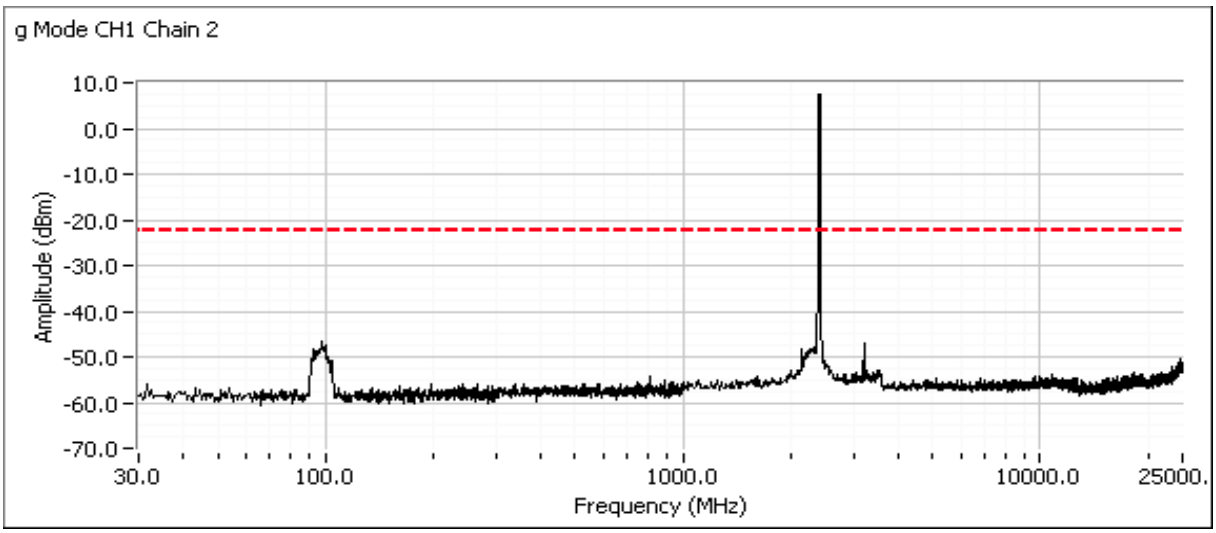


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

g mode

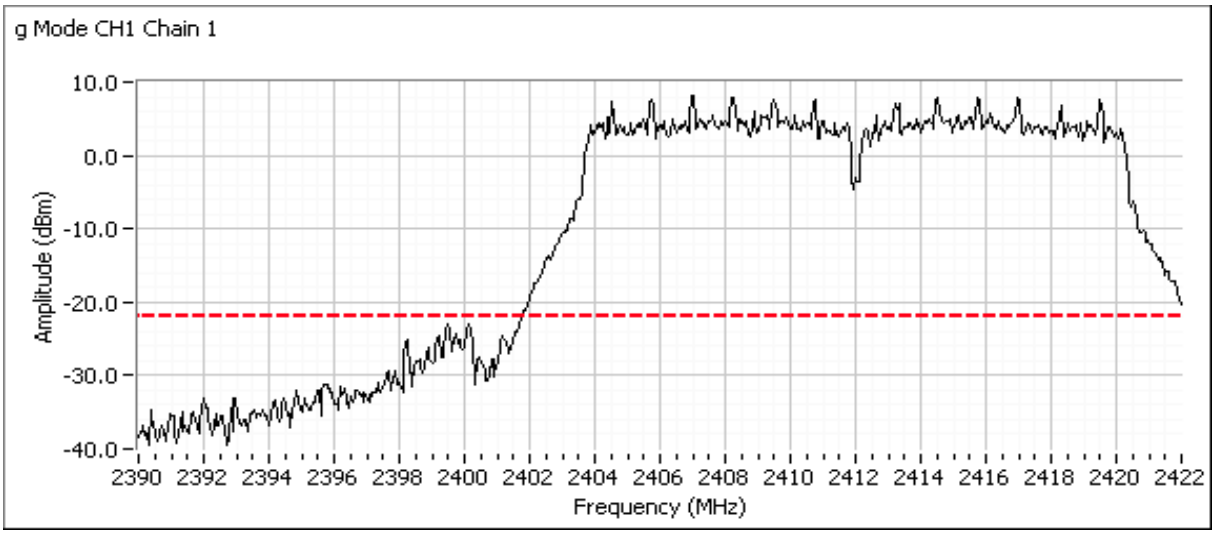
Plots for low channel

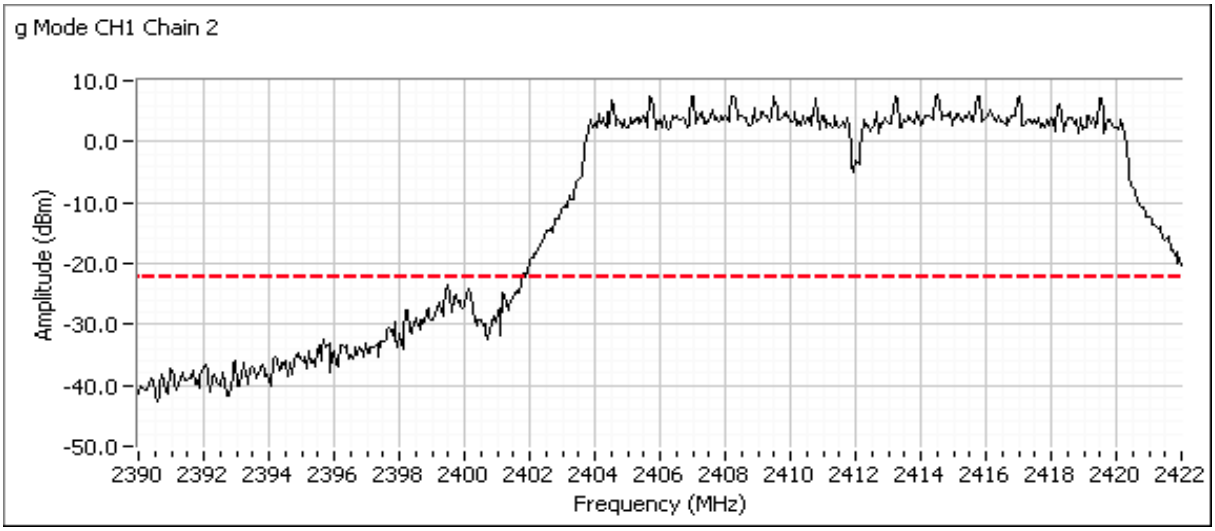




Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

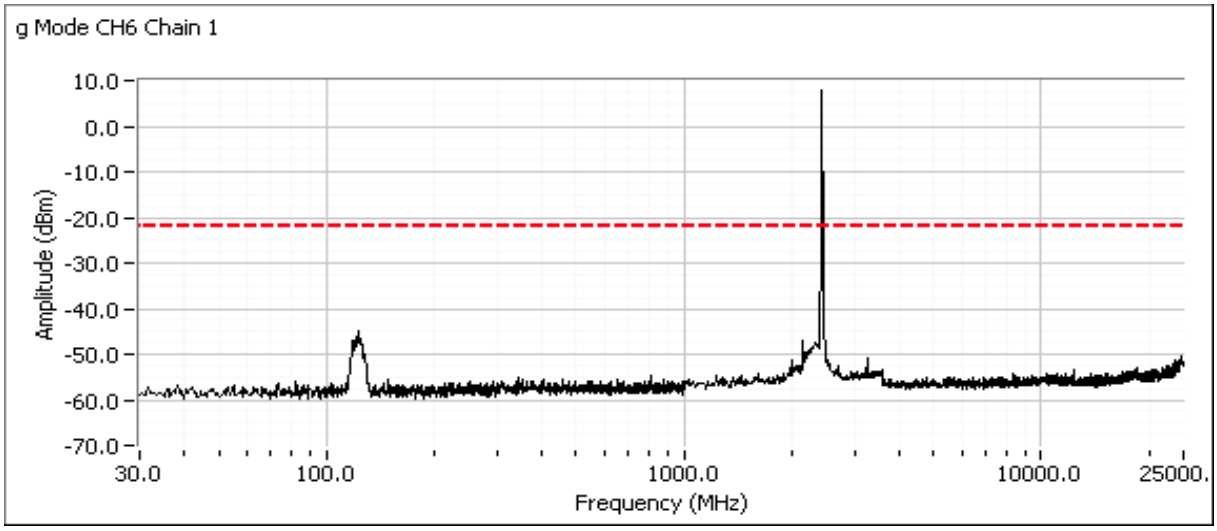
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

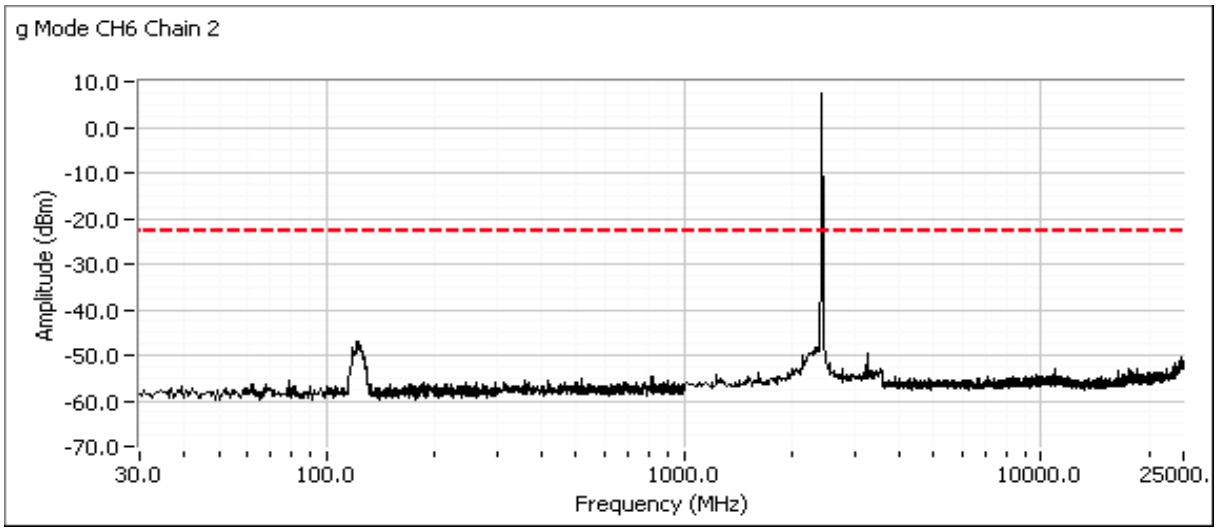




Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

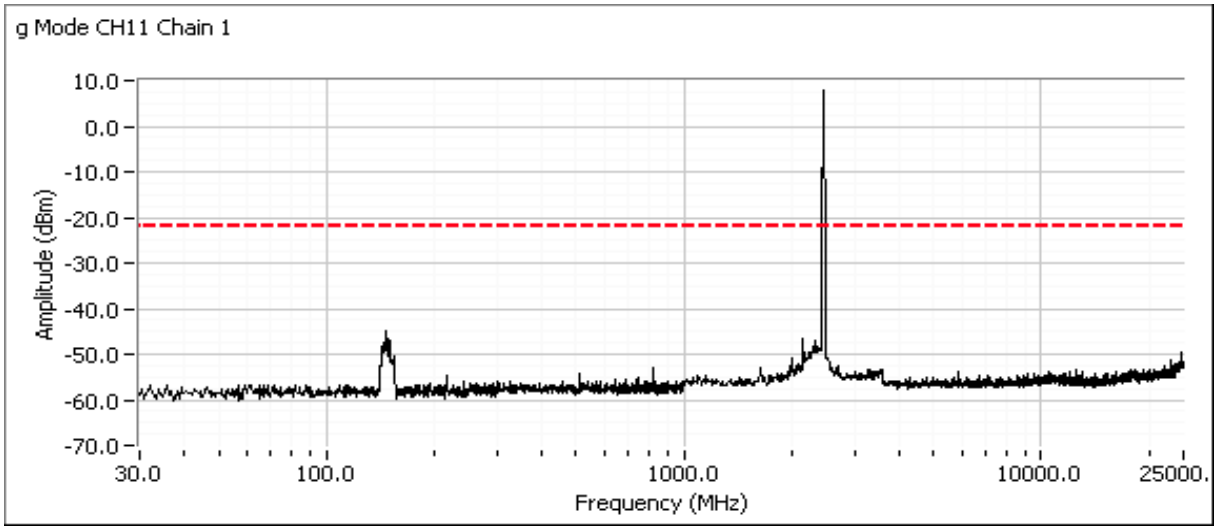
Plots for center channel

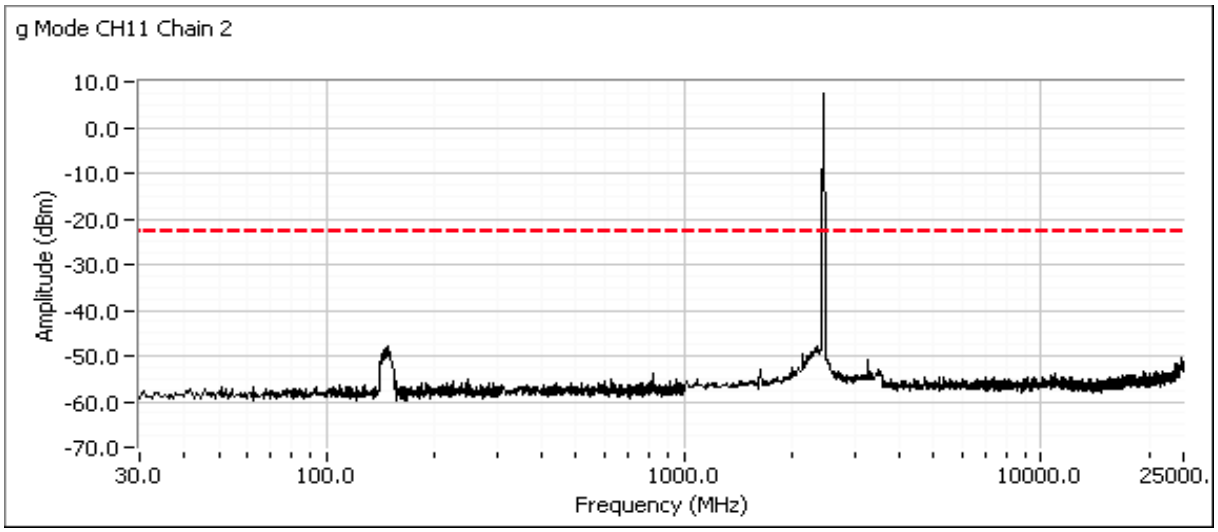




Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Plots for high channel

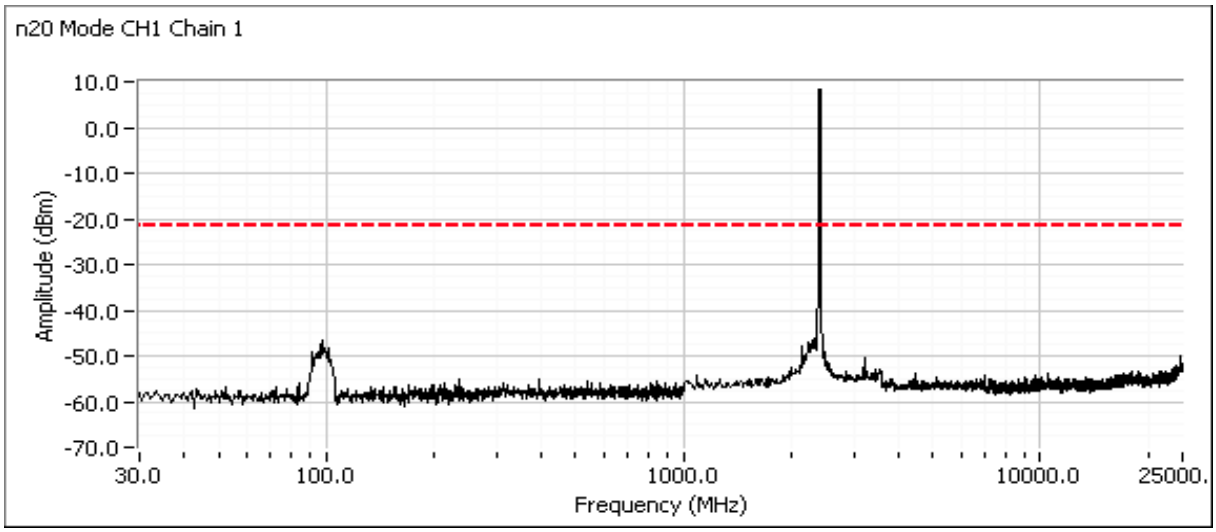


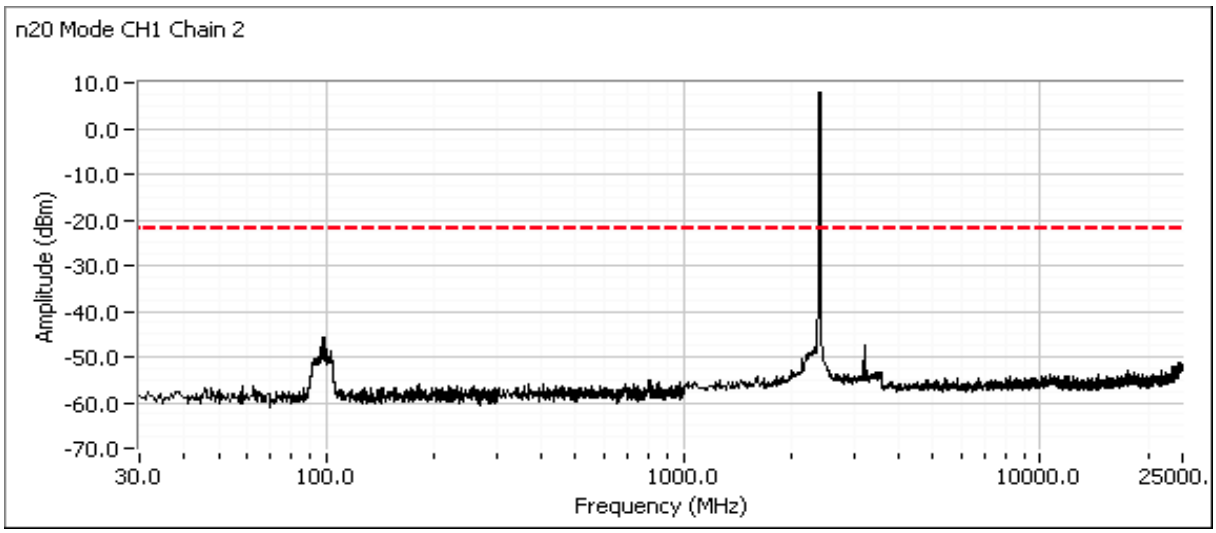


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

n20 mode

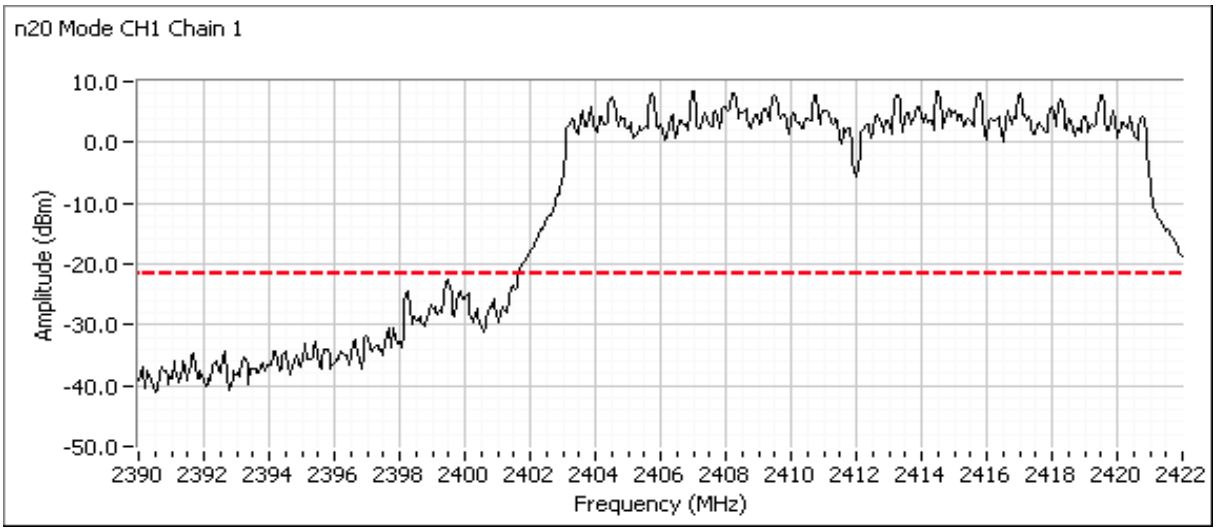
Plots for low channel

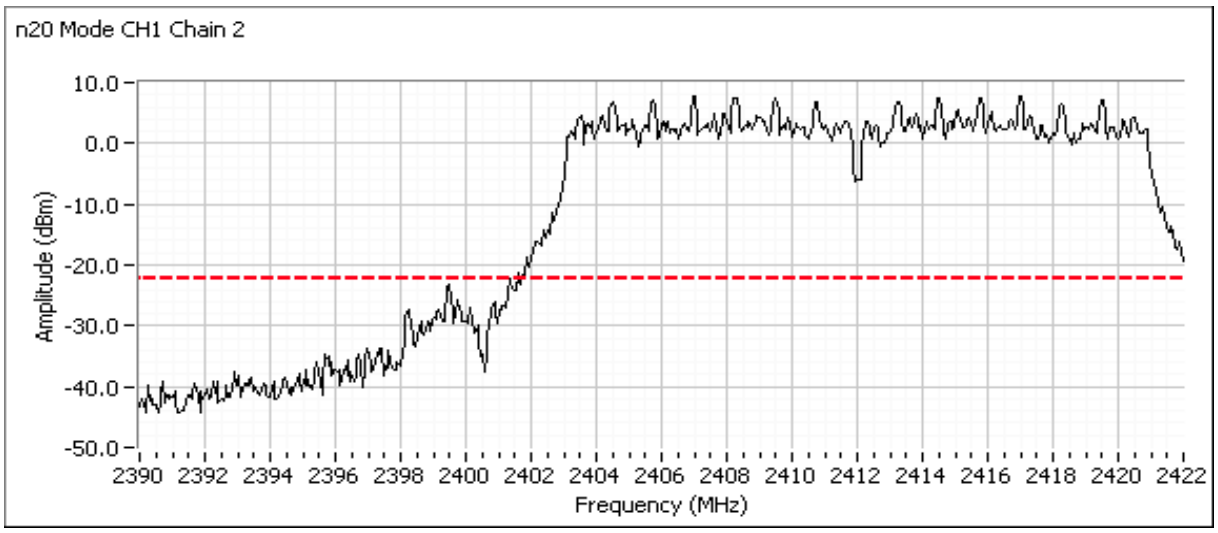




Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

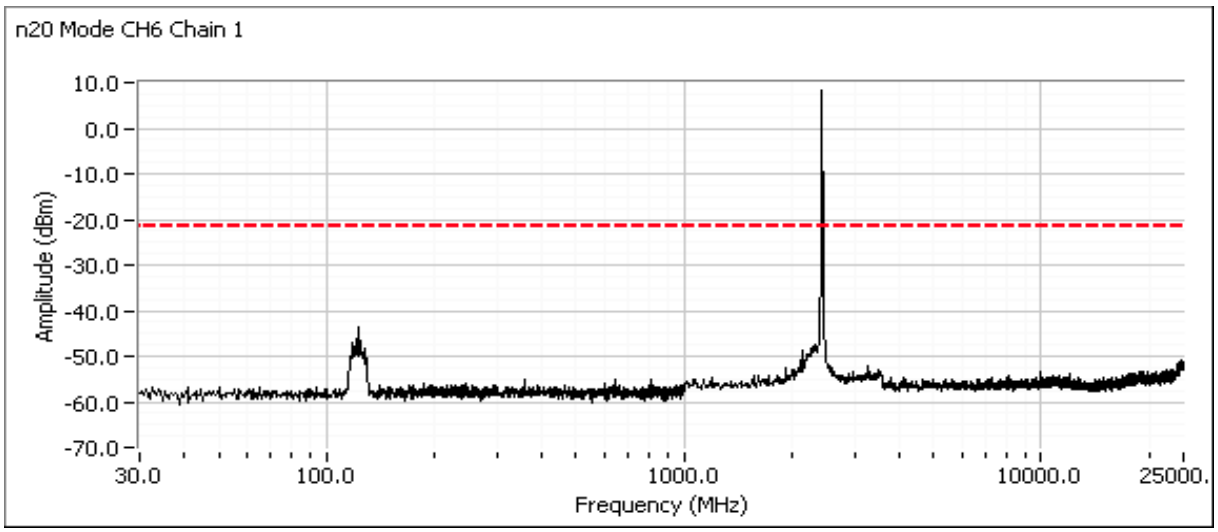
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.

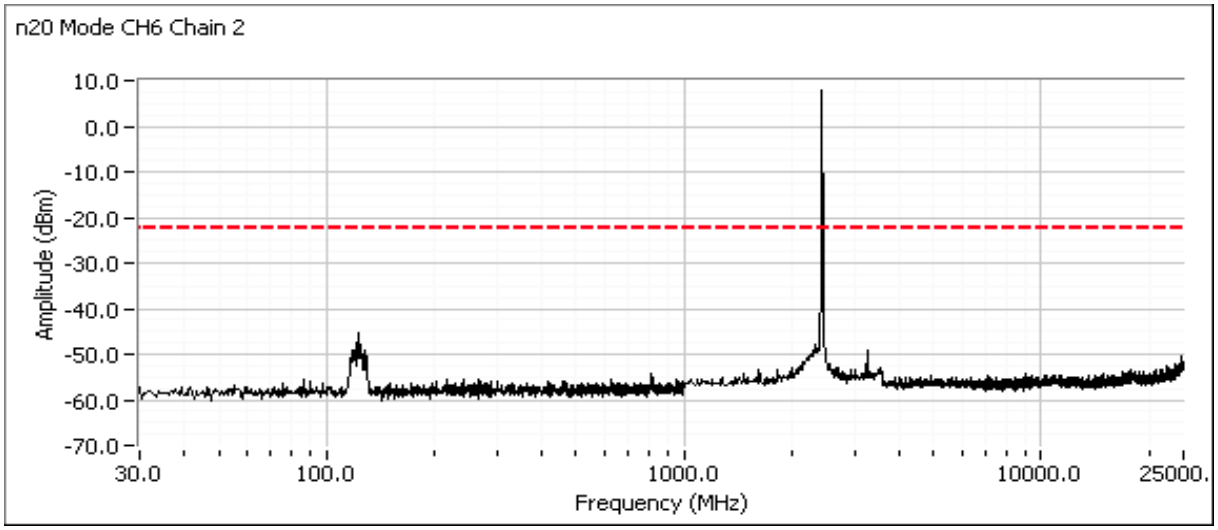




Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

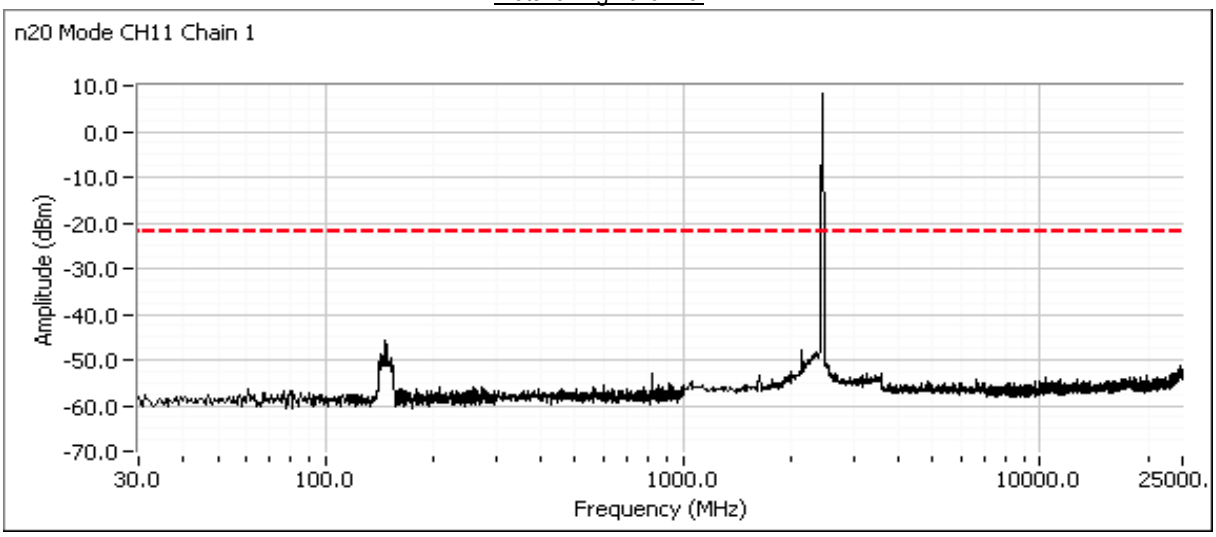
Plots for center channel

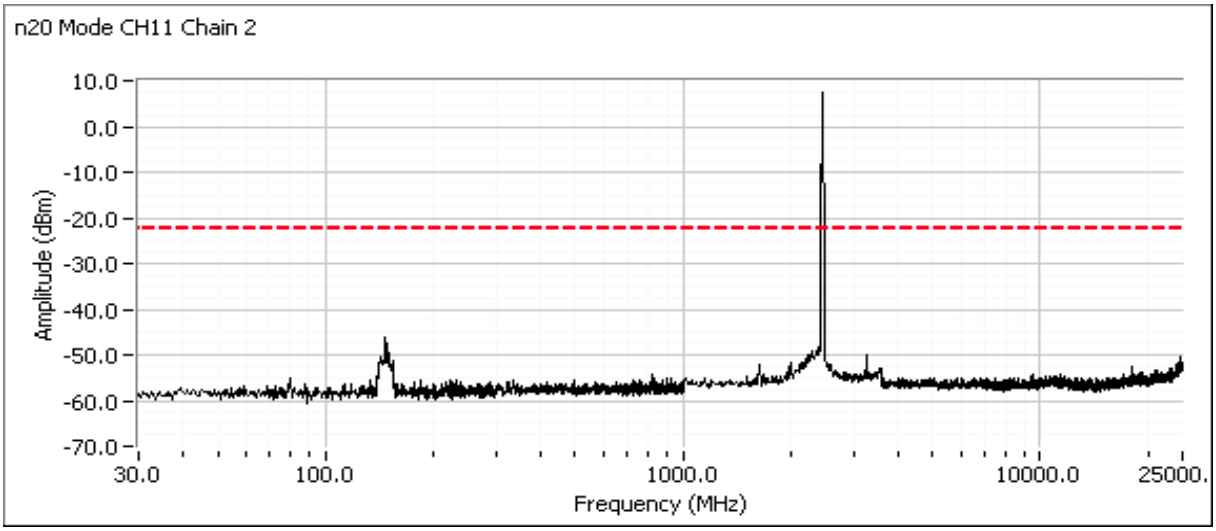




Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Plots for high channel





Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	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, unless otherwise noted.

Ambient Conditions:

Temperature: 21.4 °C
Rel. Humidity: 38 %

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

Run #	Mode	Channel	Target Power	Power Setting	Test Performed	Limit	Result / Margin
1	RF4CE	2405MHz	3	3	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	37.5 dBµV/m @ 2390.0 MHz (-16.5 dB)
	RF4CE	2475MHz	3	3	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	43.8 dBµV/m @ 2484.0 MHz (-10.2 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.

Sample Notes

Sample S/N: L044A505250029
Driver: 5.99 RC188.10
Antenna: PCB

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
RF4CE	-	100.00	Yes	-	0	0	-

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #1: Radiated Bandedge Measurements

Date of Test: 2/22/2015 Config. Used: 2

Test Engineer: Jack Liu Config Change: -

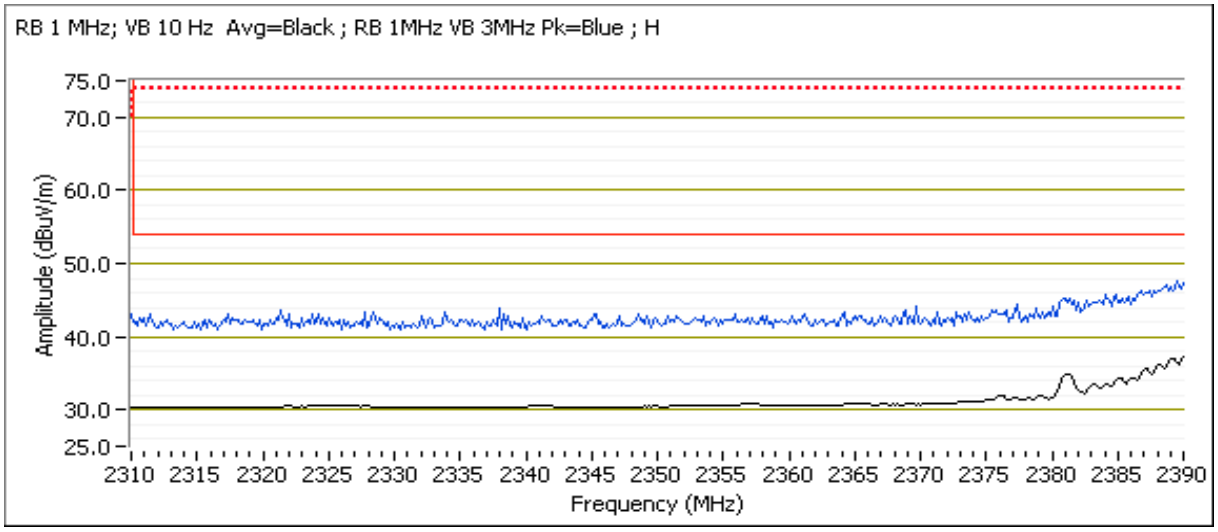
Test Location: FT Chamber#4 EUT Voltage: 120V/60Hz

Channel: 2405MHz Mode: RF4CE

Tx Chain: - Data Rate: -

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	
2390.000	37.5	H	54.0	-16.5	AVG	61	1.1	POS; RB 1 MHz; VB: 10 Hz
2389.840	47.3	H	74.0	-26.7	PK	61	1.1	POS; RB 1 MHz; VB: 3 MHz
2376.050	31.9	V	54.0	-22.1	AVG	341	1.0	POS; RB 1 MHz; VB: 10 Hz
2388.080	43.2	V	74.0	-30.8	PK	341	1.0	POS; RB 1 MHz; VB: 3 MHz

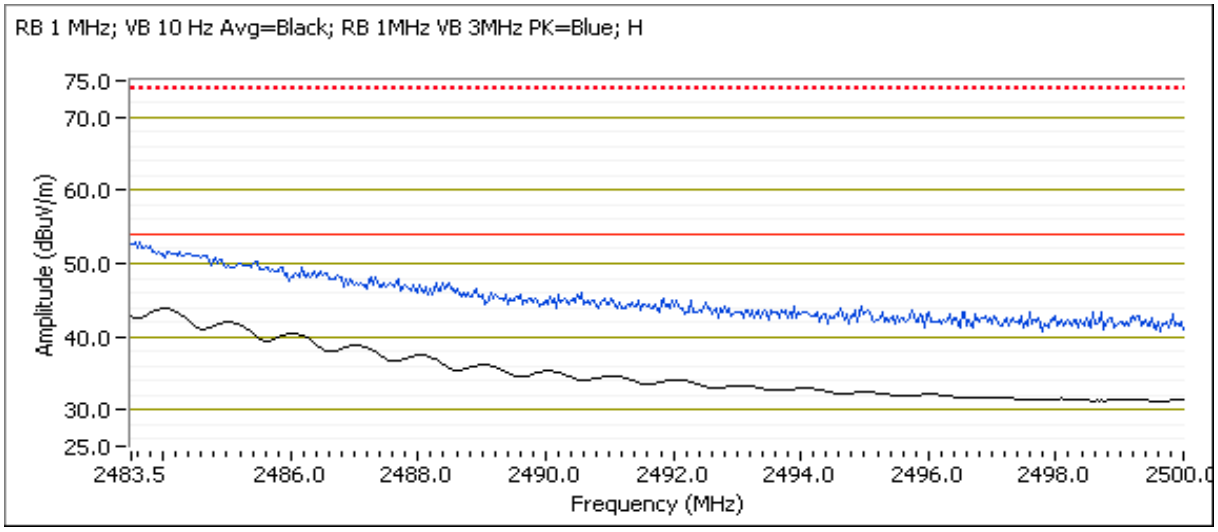


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Channel: 2475MHz Mode: RF4CE
Tx Chain: - Data Rate: -

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	
2484.000	43.8	H	54.0	-10.2	AVG	77	1.0	POS; RB 1 MHz; VB: 10 Hz
2483.730	52.4	H	74.0	-21.6	PK	77	1.0	POS; RB 1 MHz; VB: 3 MHz
2484.000	37.0	V	54.0	-17.0	AVG	97	1.3	POS; RB 1 MHz; VB: 10 Hz
2484.330	45.7	V	74.0	-28.3	PK	97	1.3	POS; RB 1 MHz; VB: 3 MHz



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	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, unless otherwise noted.

Ambient Conditions:

Temperature: 21.2 °C
Rel. Humidity: 39 %

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

Run #	Mode	Channel	Target Power	Passing Power Setting	Test Performed	Limit	Result / Margin
1	RF4CE	2405MHz	3	3	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	45.9 dBµV/m @ 4809.1 MHz (-8.1 dB)
	RF4CE	2450MHz	3	3	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	43.4 dBµV/m @ 7351.5 MHz (-10.6 dB)
	RF4CE	2475MHz	3	3	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	44.0 dBµV/m @ 7426.5 MHz (-10.0 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:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Sample Notes

Sample S/N: L044A505250029
Driver: 5.99 RC188.10
Antenna: PCB

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.
2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
RF4CE	-	100.00	Yes	-	0	0	-

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: RF4CE

Date of Test: 2/20/2015 0:00 Config. Used: 2

Test Engineer: Rafael Varelas Config Change: -

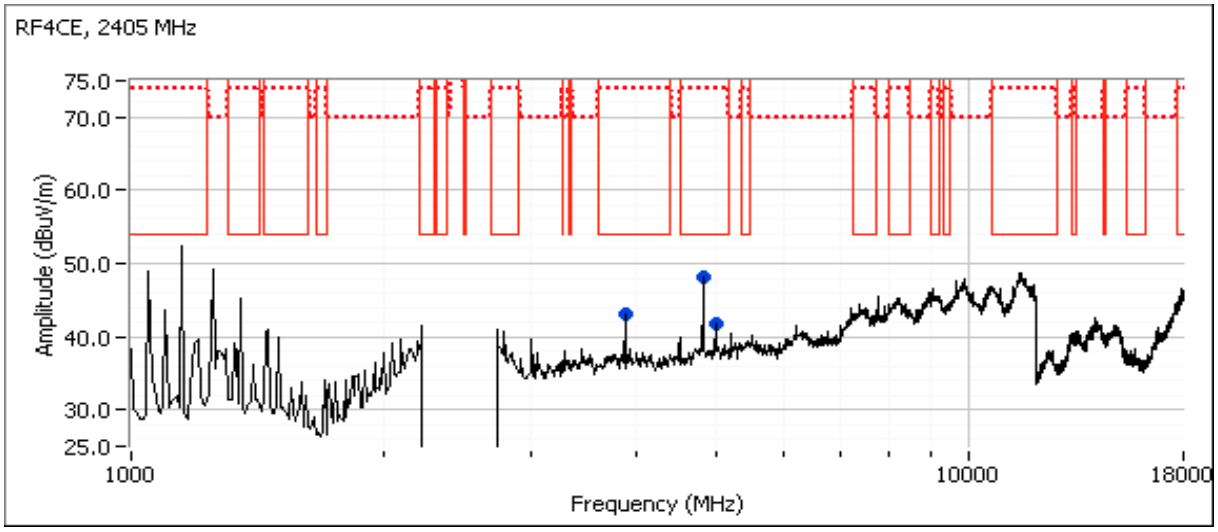
Test Location: FT Chamber# 4 EUT Voltage: 120V/60Hz

Run #1a: Low Channel

Channel: 2405MHz Mode: RF4CE

Tx Chain: - Data Rate: -

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4809.050	45.9	V	54.0	-8.1	AVG	259	1.4	RB 1 MHz;VB 10 Hz;Peak
4808.990	53.1	V	74.0	-20.9	PK	259	1.4	RB 1 MHz;VB 3 MHz;Peak
4968.010	39.2	V	54.0	-14.8	AVG	150	1.0	RB 1 MHz;VB 10 Hz;Peak
4968.000	46.4	V	74.0	-27.6	PK	150	1.0	RB 1 MHz;VB 3 MHz;Peak
3883.370	42.6	V	54.0	-11.4	AVG	274	1.0	RB 1 MHz;VB 10 Hz;Peak
3883.420	47.5	V	74.0	-26.5	PK	274	1.0	RB 1 MHz;VB 3 MHz;Peak



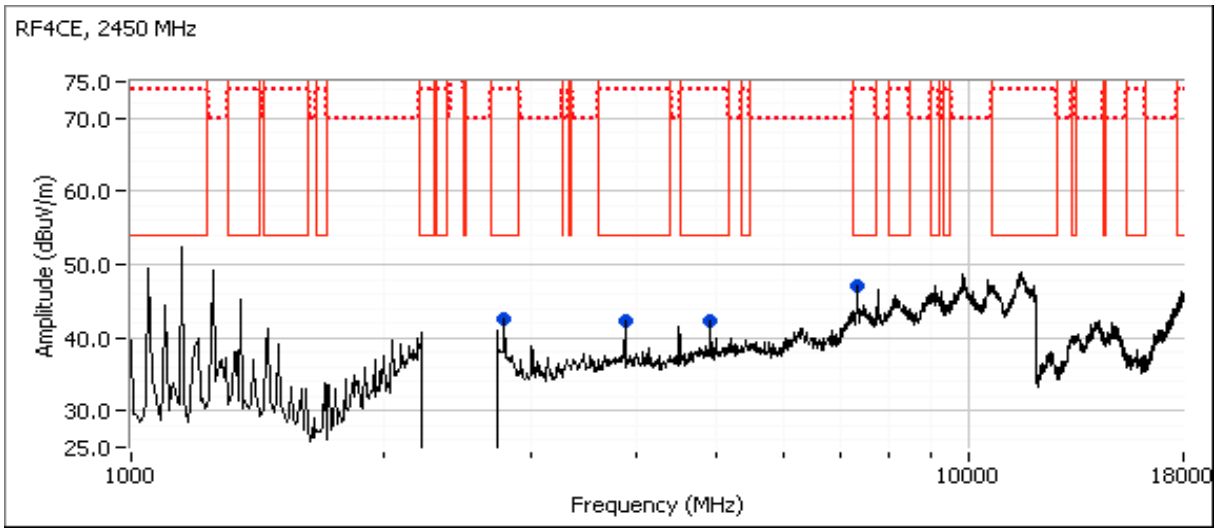
Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #1b: Center Channel

Channel: 2450MHz Mode: RF4CE
Tx Chain: - Data Rate: -

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7351.530	43.4	V	54.0	-10.6	AVG	339	1.7	RB 1 MHz;VB 10 Hz;Peak
7351.730	53.7	V	74.0	-20.3	PK	339	1.7	RB 1 MHz;VB 3 MHz;Peak
2782.650	41.6	V	54.0	-12.4	AVG	164	1.0	RB 1 MHz;VB 10 Hz;Peak
2782.780	49.1	V	74.0	-24.9	PK	164	1.0	RB 1 MHz;VB 3 MHz;Peak
4899.010	39.9	V	54.0	-14.1	AVG	237	1.6	RB 1 MHz;VB 10 Hz;Peak
4901.010	48.5	V	74.0	-25.5	PK	237	1.6	RB 1 MHz;VB 3 MHz;Peak
3883.340	43.1	V	54.0	-10.9	AVG	269	1.8	RB 1 MHz;VB 10 Hz;Peak
3883.360	47.9	V	74.0	-26.1	PK	269	1.8	RB 1 MHz;VB 3 MHz;Peak

Note:	Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range

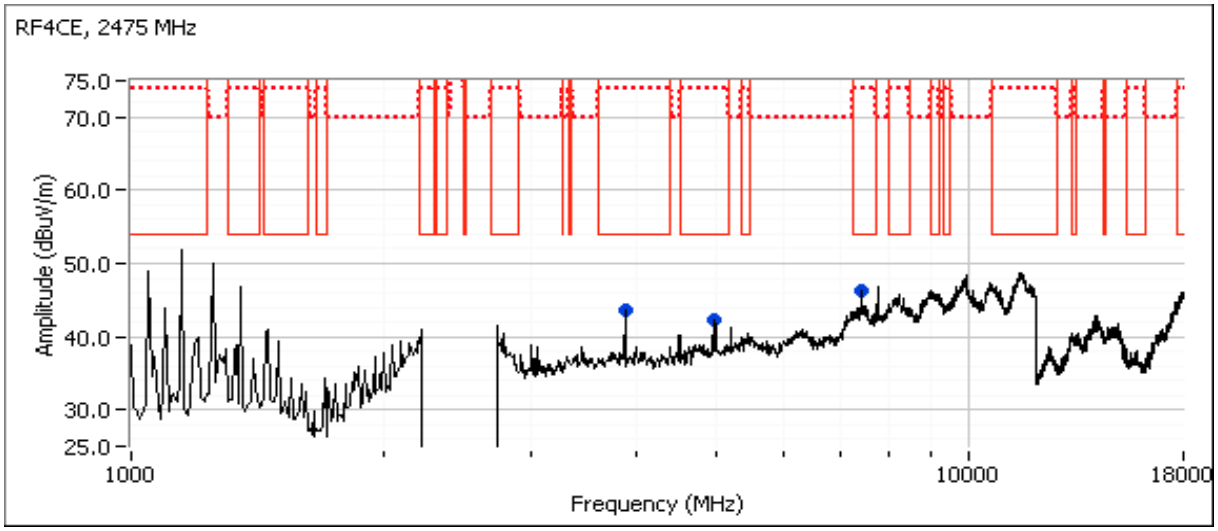


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #1c: High Channel

Channel: 2475MHz Mode: RF4CE
Tx Chain: - Data Rate: -

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7426.490	44.0	V	54.0	-10.0	AVG	334	1.6	RB 1 MHz;VB 10 Hz;Peak
7423.840	53.7	V	74.0	-20.3	PK	334	1.6	RB 1 MHz;VB 3 MHz;Peak
3883.360	42.7	V	54.0	-11.3	AVG	267	1.8	RB 1 MHz;VB 10 Hz;Peak
3883.100	48.1	V	74.0	-25.9	PK	267	1.8	RB 1 MHz;VB 3 MHz;Peak
4949.030	38.5	V	54.0	-15.5	AVG	187	1.3	RB 1 MHz;VB 10 Hz;Peak
4950.980	47.5	V	74.0	-26.5	PK	187	1.3	RB 1 MHz;VB 3 MHz;Peak



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	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: 2/22/2015
Test Engineer: Jack Liu / R. Varelas
Test Location: FT Chamber#4

Config. Used: 2
Config Change: -
EUT Voltage: 120V/60Hz

General Test Configuration

All measurements were performed radiated at a distance of 3m. All measurements have been corrected for the measurement system.

Ambient Conditions:

Temperature: 23 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	3		Output Power	15.247(b)	Pass	4.5dBm (0.003W)
2	3		Power spectral Density (PSD)	15.247(d)	Pass	1.2 dBm/100kHz
3	3		Minimum 6dB Bandwidth	15.247(a)	Pass	1.523 MHz
3	3		99% Bandwidth	RSS GEN	-	2.238 MHz
4	3		Spurious emissions	15.247(b)	Pass	All emissions are below 30dB the limit

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.

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
RF4CE	-	100.00	Yes	-	0	0	-

Sample Notes

Sample S/N: L044A505250029
Driver: 5.99 RC188.10
Antenna: PCB

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #1: Output Power

Mode: RF4CE

Power Setting[2]	Frequency (MHz)	Output Power (EIRP) (dBm)[1]	mW	Antenna Gain (dBi)	Result	Power dBm	W	Output Power (dBm)[3]	mW
Vertical									
3	2405	-4.3	0.4	3.0	Pass	-7.3	0.0002		
3	2450	-3.5	0.4	3.0	Pass	-6.5	0.0002		
3	2475	-3.5	0.4	3.0	Pass	-6.5	0.0002		
Horizontal									
3	2405	7.5	5.6	3.0	Pass	4.5	0.003		
3	2450	4.2	2.6	3.0	Pass	1.2	0.001		
3	2475	5.8	3.8	3.0	Pass	2.8	0.002		

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2405	87.3	V			Peak	268	1.7	POS; RB 100 kHz; VB: 300 kHz
2405	99.3	H			Peak	61	1.1	POS; RB 100 kHz; VB: 300 kHz
2450	88.4	V			Peak	97	1.0	RB 100kHz;VB 300kHz;Peak
2450	95.5	H			Peak	153	1.0	RB 100kHz;VB 300kHz;Peak
2475	87.9	V			Peak	97	1.3	RB 100kHz;VB 300kHz;Peak
2475	97.1	H			Peak	68	1.1	RB 100kHz;VB 300kHz;Peak

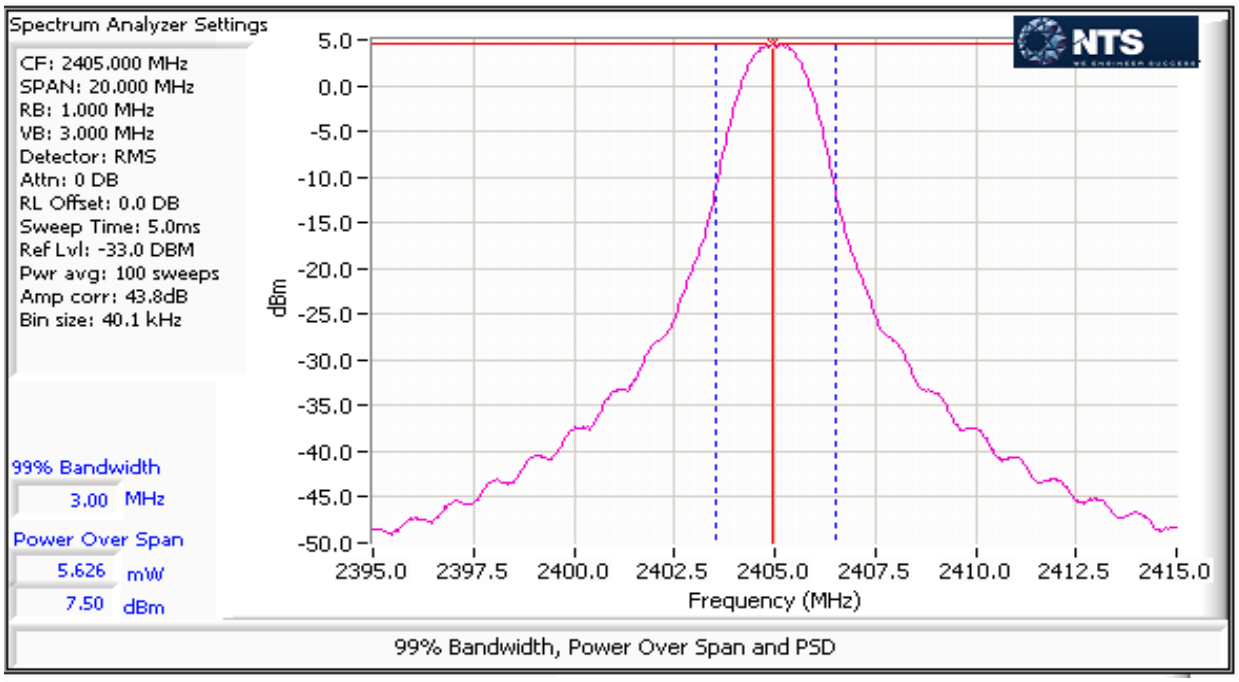
FCC15.247 Spurious Emission limit (non-restricted band)

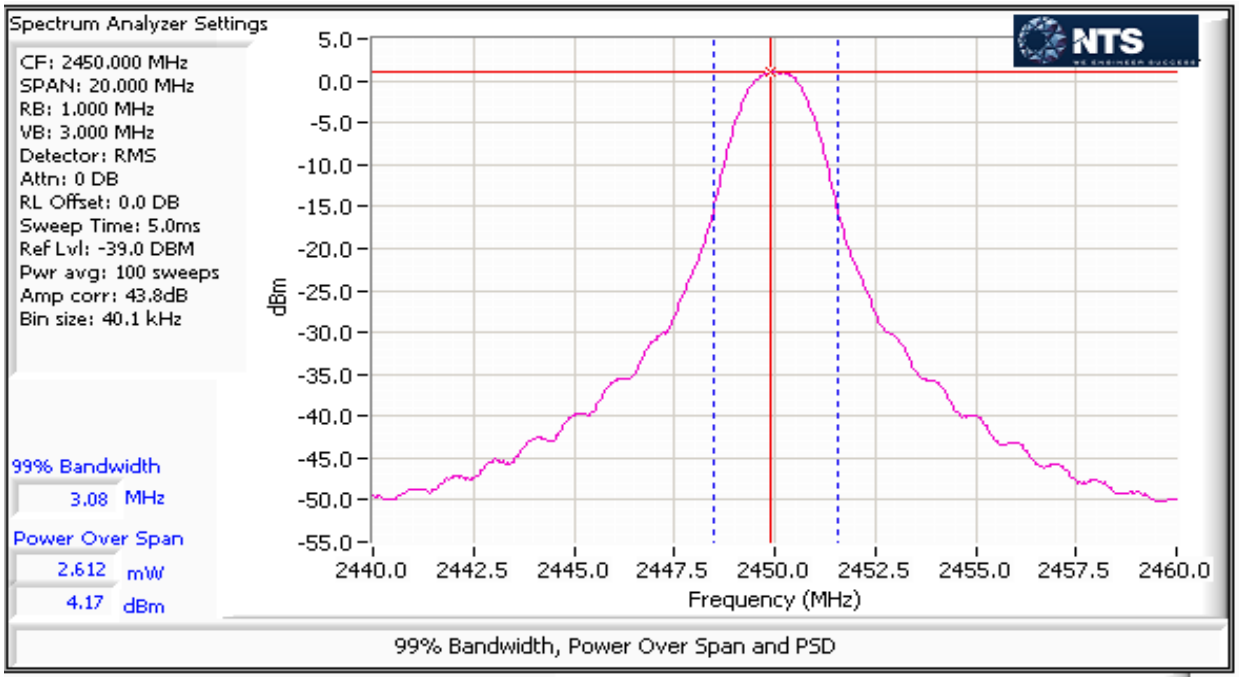
Peak Limit 79.3 dBuV

Avg Limit 69.3 dBuV

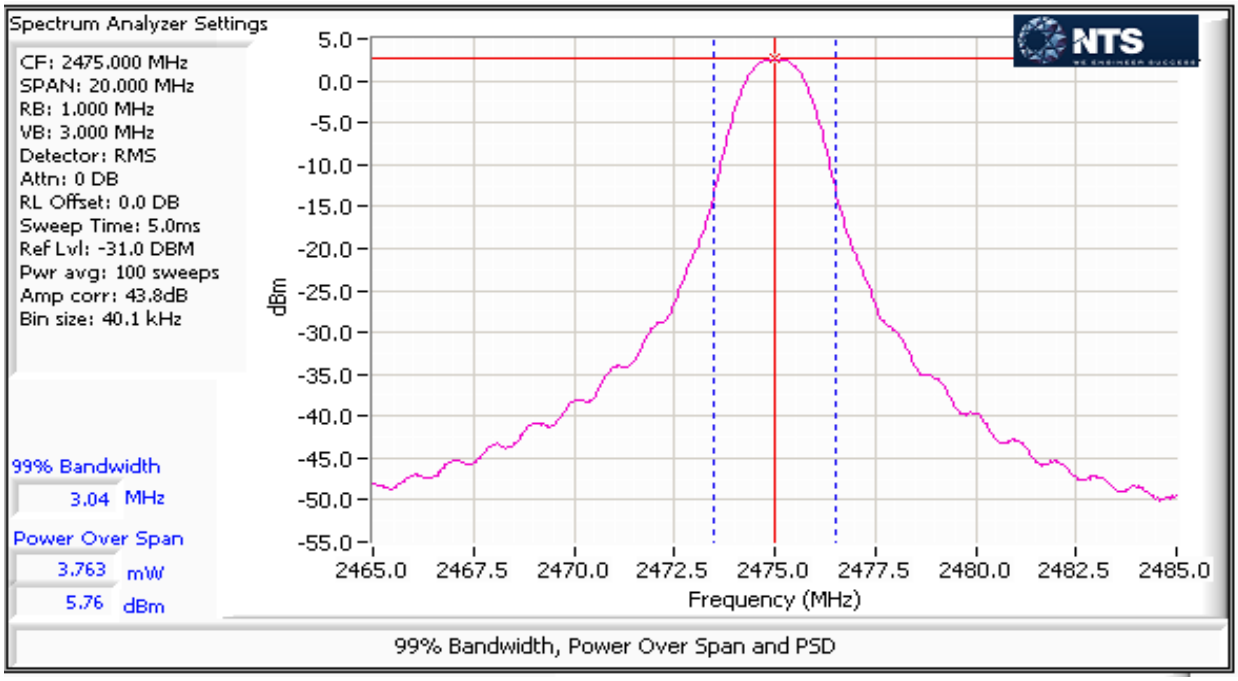
Note 1:	Duty Cycle ≥ 98%. Output power measured using a spectrum analyzer (see plots below) with RBW= 1-5% of OBW, VB≥3* RBW, RMS detector, power averaging on, and power integration over the OBW, trace average 100 traces (option AVGSA-1, in KDB 558074). Spurious limit becomes -30dBc.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Power measured using average power meter (non-gated) and is included for reference only.

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A





Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A



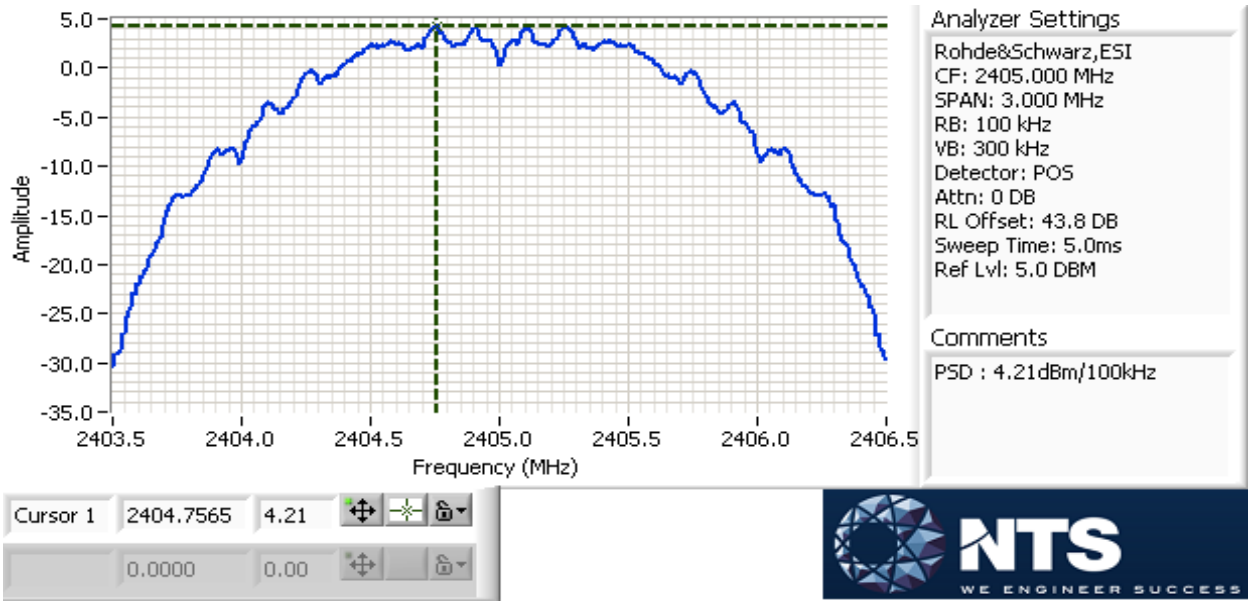
Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #2: Power spectral Density

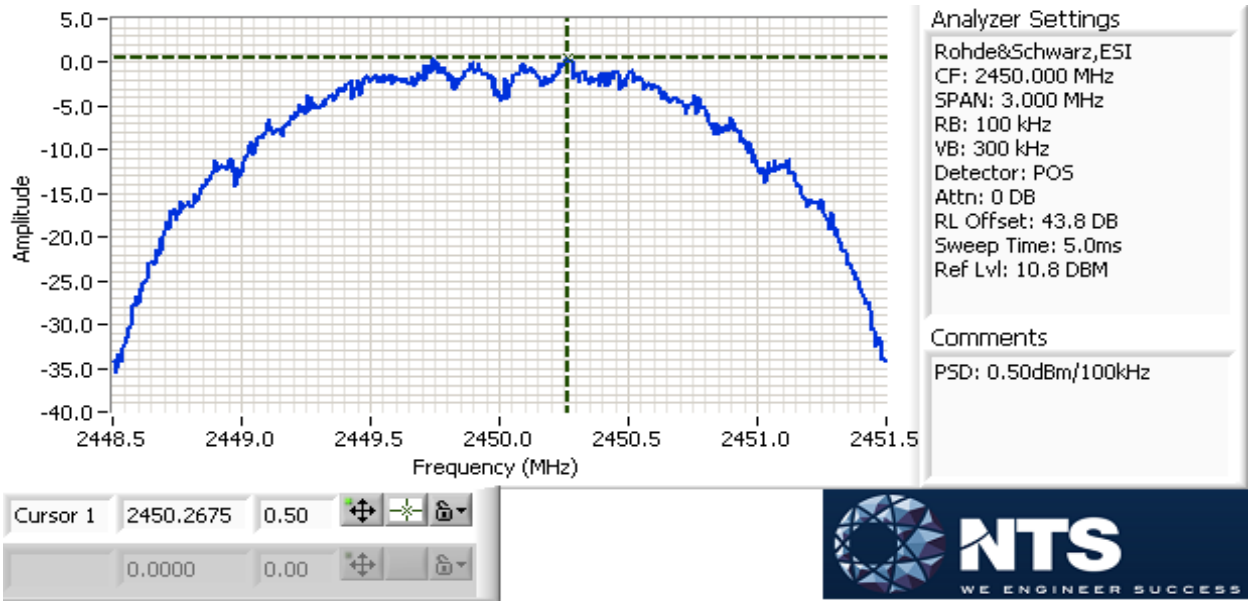
Mode: 11b

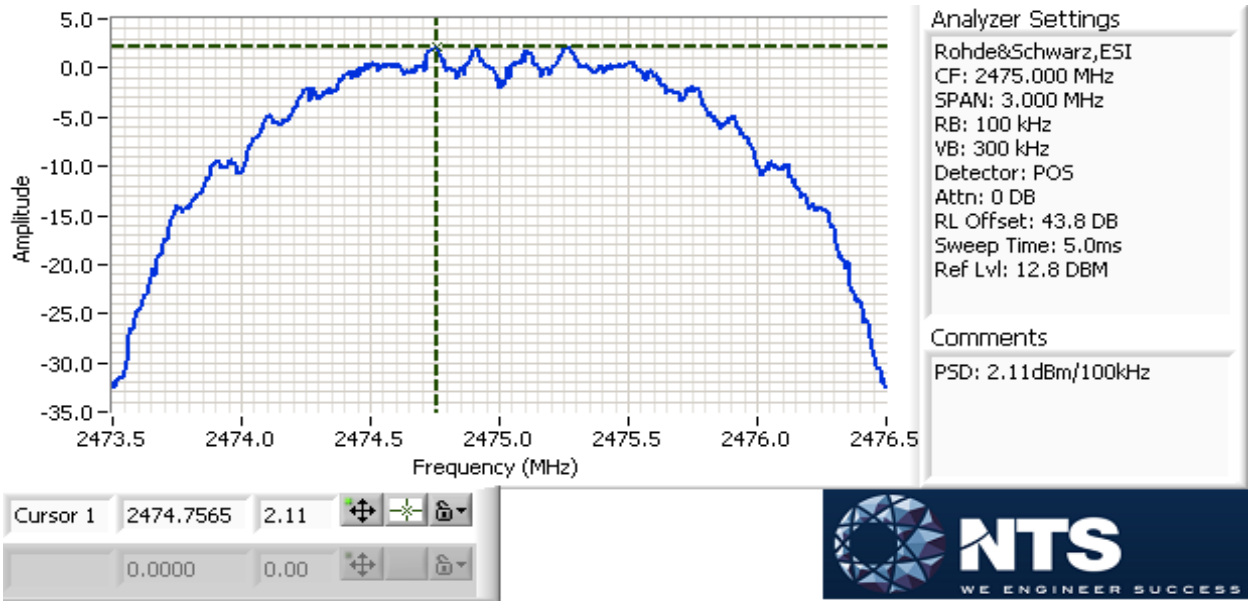
Power Setting	Frequency (MHz)	PSD (eirp) (dBm/100kHz) Note 1	Ant Gain (dBi)	PSD (dBm/100kHz) Note 1	Limit dBm/3kHz	Result
3	2405	4.2	3	1.2	8.0	Pass
3	2450	0.5	3	-2.5	8.0	Pass
3	2475	2.1	3	-0.9	8.0	Pass

Note 1:	Test performed per method PKSPD, in KDB 558074. Power spectral density measured using: 3kHz ≤ RBW ≤ 100kHz, VBW=3*RBW, peak detector, span = 1.5*DTS BW, auto sweep time, max hold.



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A





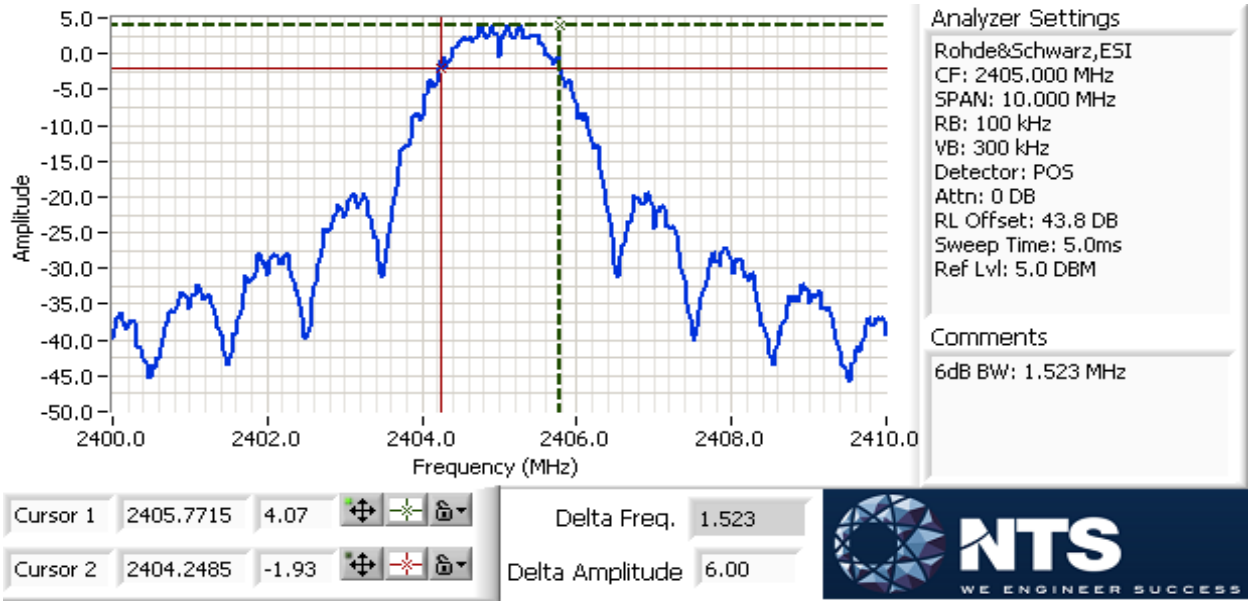
Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #3: Signal Bandwidth

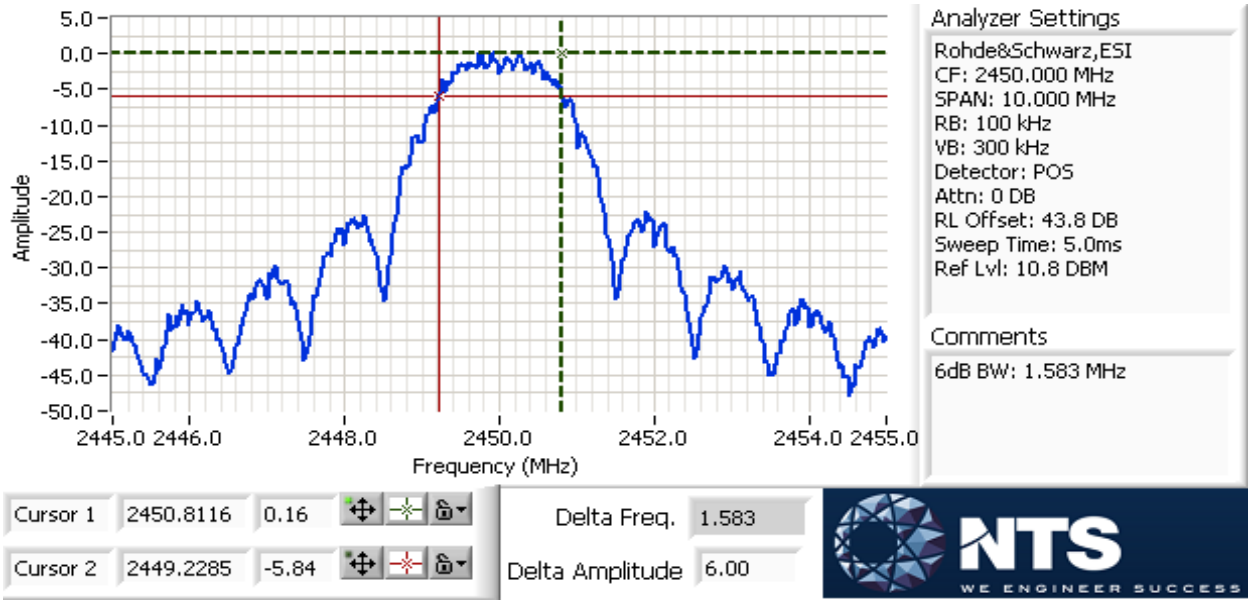
Mode: RF4CE

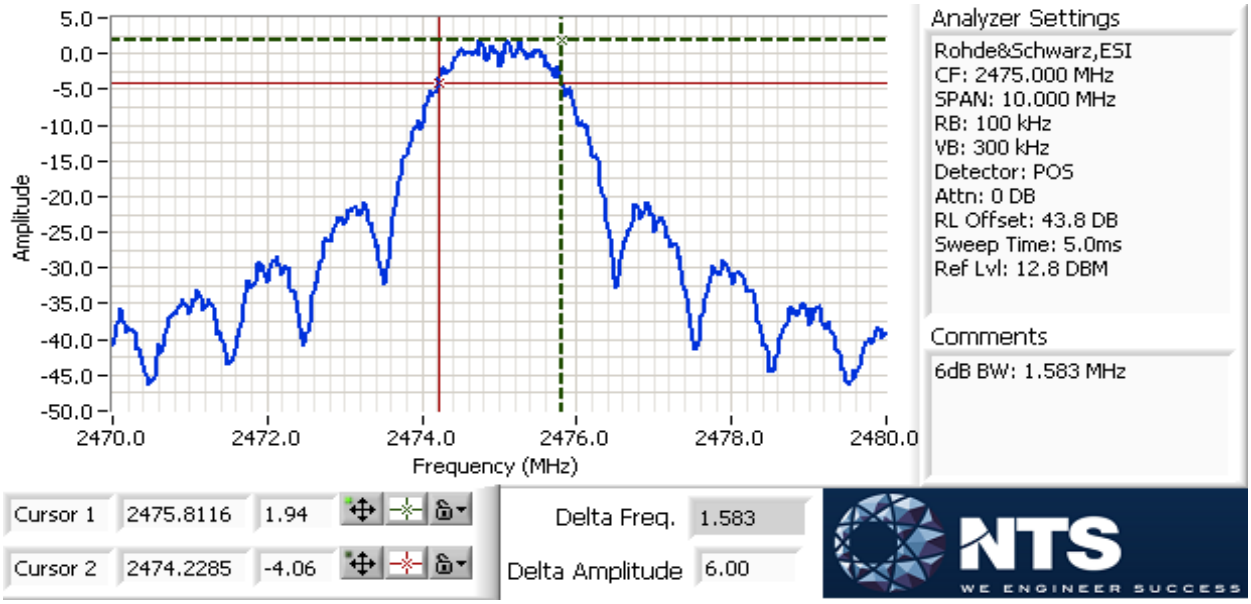
Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
3	2405	1.523	2.226	100	30
3	2450	1.583	2.238	100	30
3	2475	1.583	2.232	100	30

Note 1:	DTS BW: RBW=100kHz, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time. 99% BW: RBW=1-5% of of 99%BW, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time.

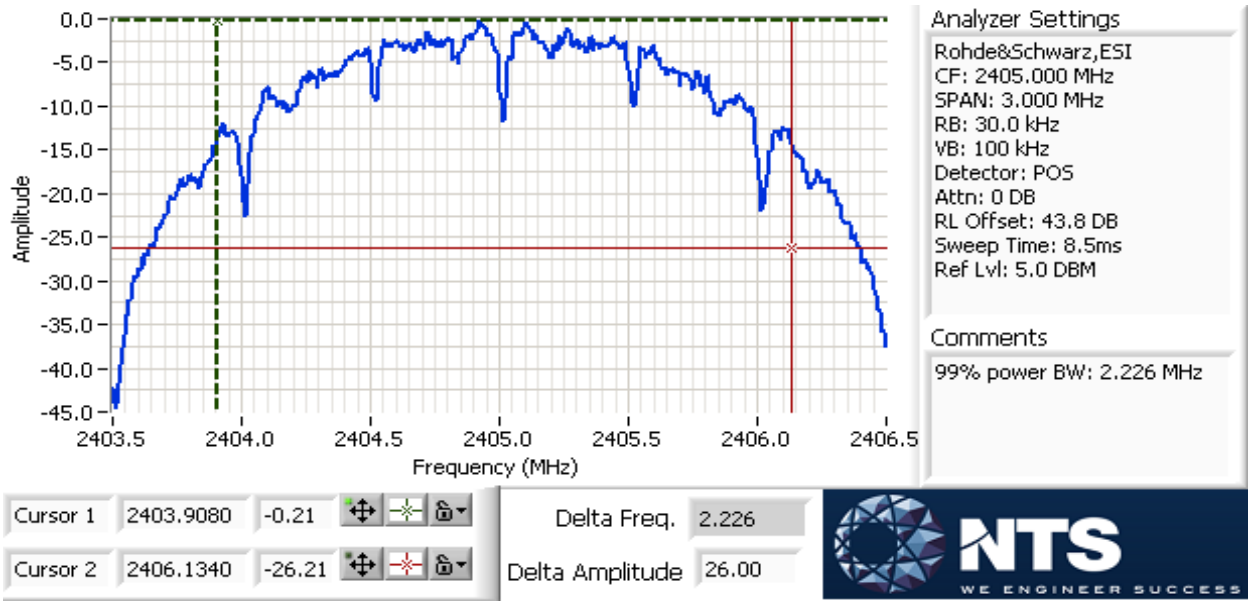


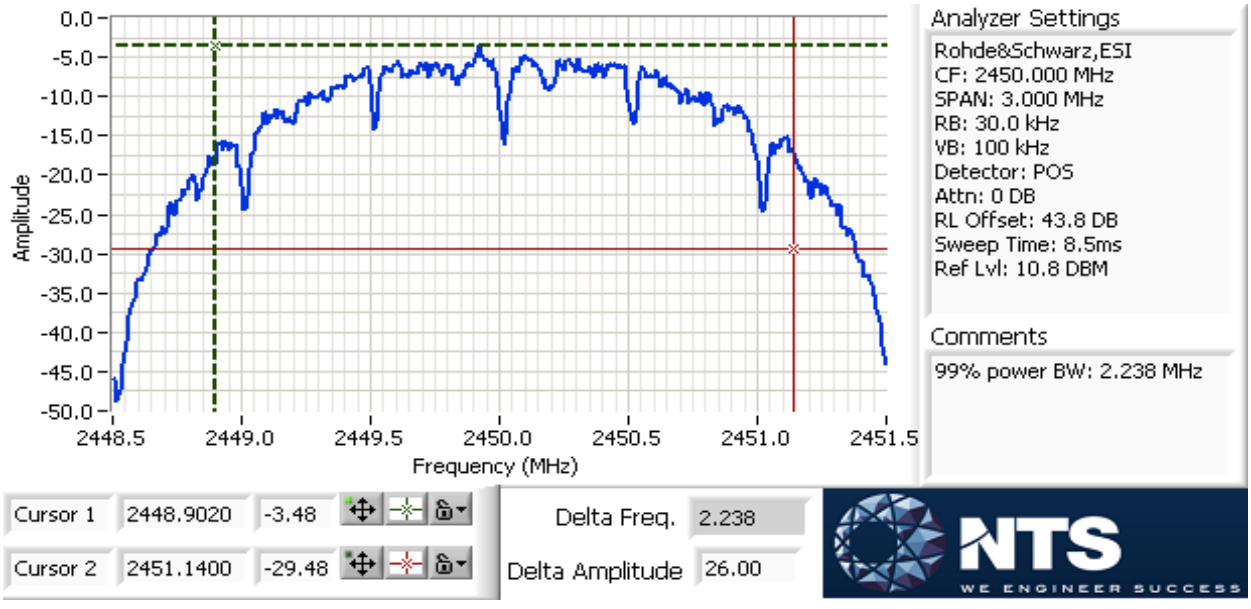
Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A



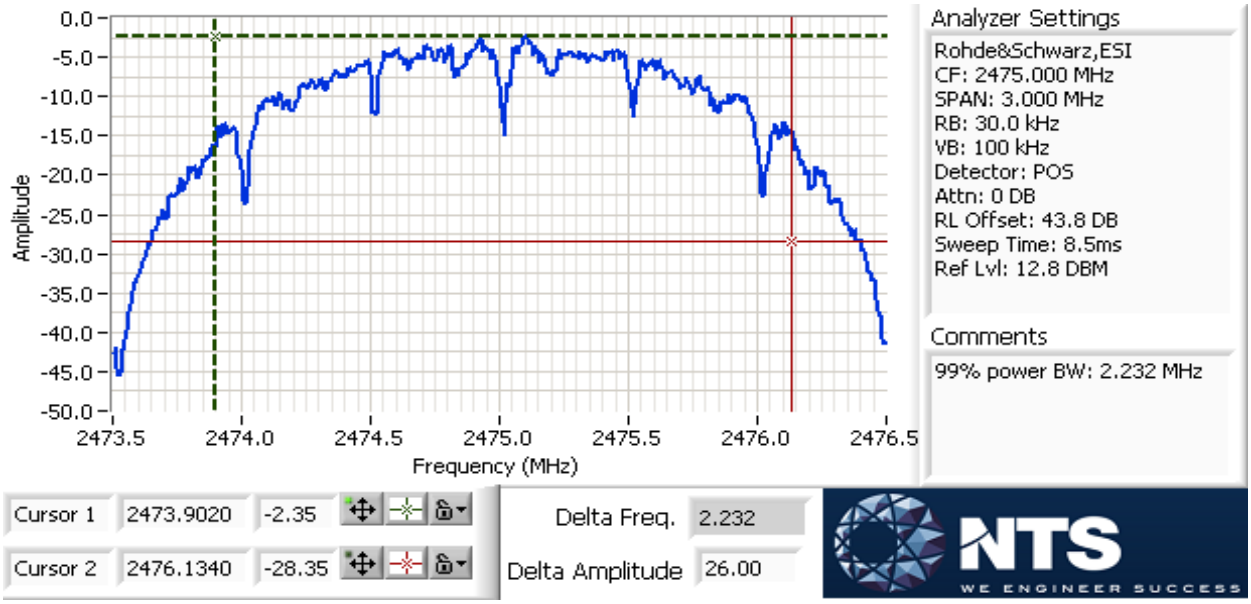


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A





Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

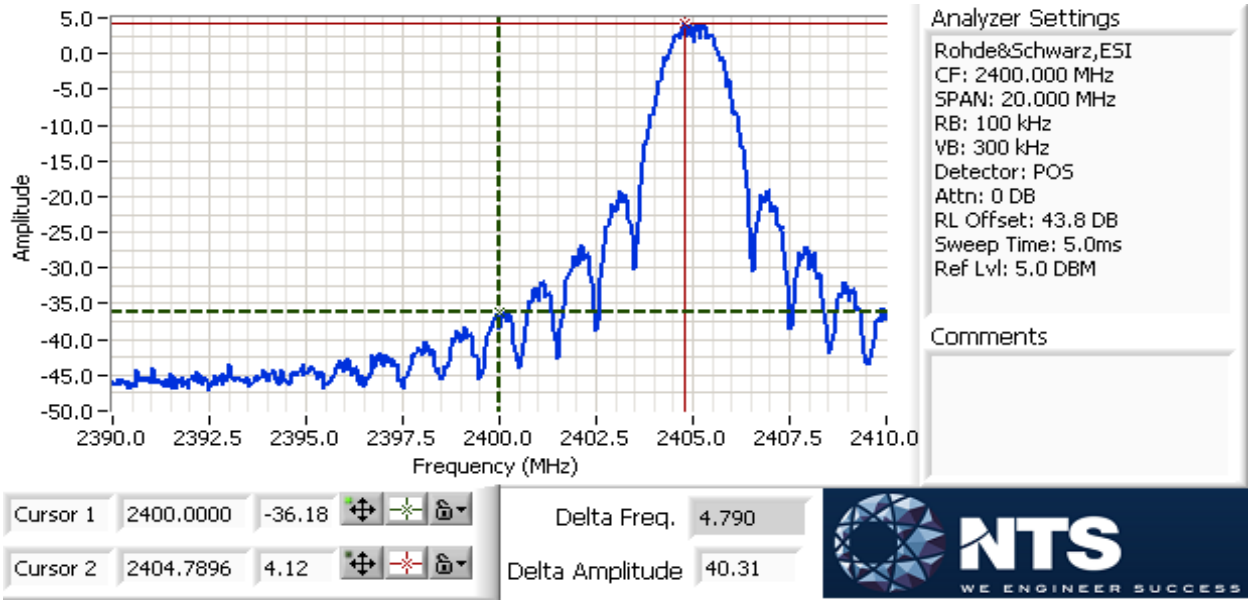


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #4a: Out of Band Spurious Emissions

Frequency (MHz)	Power Setting	Mode	Limit	Result
2405(2400 Band Edge)	3	-	-30dBc	Pass
2405		-	-30dBc	Refer to 2.4GHz RF4CE Spurious
2450		-	-30dBc	
2475		-	-30dBc	

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.



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	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, unless otherwise noted.

Ambient Conditions:

Temperature: 21.2 °C
Rel. Humidity: 39 %

Summary of Results - Intermodulation

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
Simultaneous Tx - RF4CE + Wifi - using the worse case 2.4GHz wifi channel and the worse case for RF4CE channel							
1	RF4CE + Worse case Wifi	b (Chain1) 11 - 2462 MHz & Zigbee CH11	-	20 / 3	Radiated Emissions 30MHz - 1000MHz	FCC 15.209 / 15.247	37.0 dBµV/m @ 1000.0 MHz (-17.0 dB)
			-		Radiated Emissions 1 - 25 GHz	FCC 15.209 / 15.247	51.9 dBµV/m @ 9848.0 MHz (-2.1 dB)
Simultaneous Tx - RF4CE + Wifi - using the worse case 5GHz wifi channel and the worse case for RF4CE channel							
2	RF4CE + Worse case Wifi	n20 CH165 - 5825 MHz & Zigbee CH11	-	20 / 3	Radiated Emissions 30MHz - 1000MHz	FCC 15.209 / 15 E	34.6 dBµV/m @ 971.99 MHz (-19.4 dB)
			-		Radiated Emissions 1 - 40 GHz	FCC 15.209 / 15 E	51.6 dBµV/m @ 5412.9 MHz (-2.4 dB)

Notes:

When determining worse case, non-radio spurious emissions were excluded

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

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.

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
n20	13	0.978	Yes	-	0.10	0.19	-
RF4CE	-	100.00	Yes	-	0	0	-
11b	2Mb/s	99.0%	Yes	-	0	0	-

Sample Notes

Wifi
Sample S/N: L044A505250029
Driver: 5.99 RC188.10
Antenna: Airgain N2420DS / N2415D2

RF4CE
Sample S/N: L044A505250029
Driver: 5.99 RC188.10
Antenna: PCB

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle < 98%, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabluar results for final measurements.

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 40,000 MHz.

Date of Test: 2/20/15, 2/22/15 Test Location: FT Chamber #4

Test Engineer: Rafael Varelas / Jack Liu EUT Voltage: 120V/60Hz

Channel: 11 Mode: b Power Setting: 20

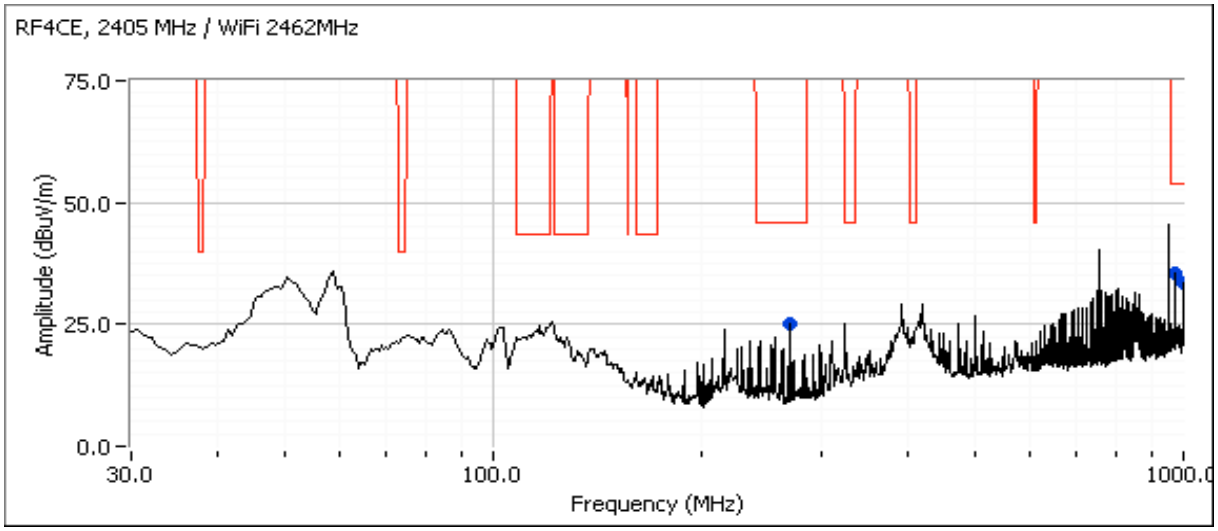
Tx Chain: 1 Data Rate: 2Mb/s

RF4CE: 2405 MHz Power Setting: 3

Tx Chain: -

30-1000MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
1000.000	37.0	V	54.0	-17.0	QP	257	1.1	QP (1.00s)
971.989	35.9	H	54.0	-18.1	QP	122	1.5	QP (1.00s)
269.993	26.1	H	46.0	-19.9	QP	155	1.1	QP (1.00s)

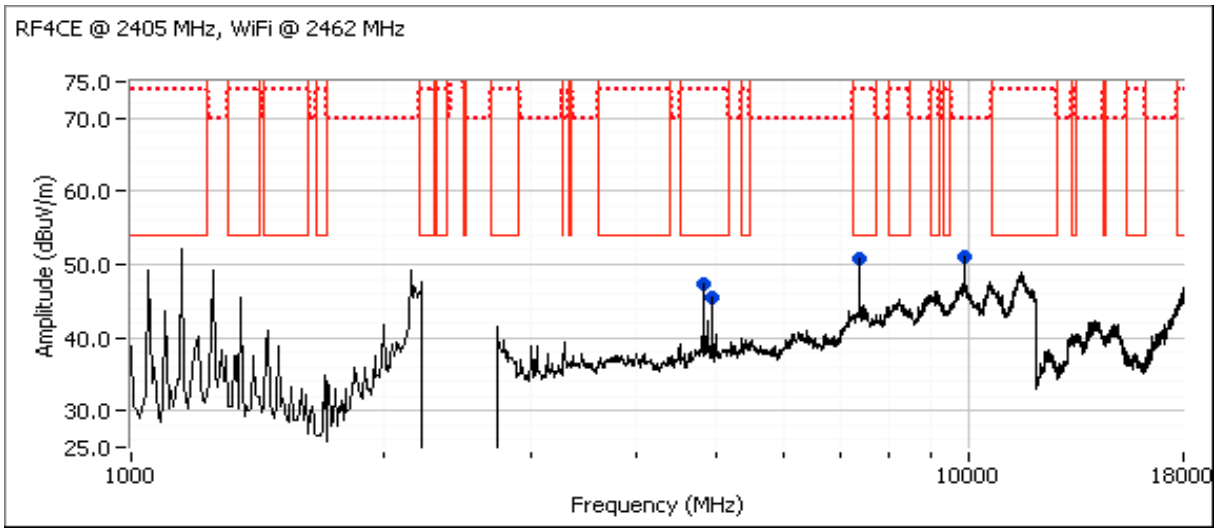


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

1000-25,000MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
9847.990	51.9	V	54.0	-2.1	AVG	57	1.4	Note 1;RB 1 MHz;VB 10 Hz;Peak
9848.190	58.0	V	74.0	-16.0	PK	57	1.4	Note 1;RB 1 MHz;VB 3 MHz;Peak
7385.110	49.6	V	54.0	-4.4	AVG	353	1.6	RB 1 MHz;VB 10 Hz;Peak
7386.590	56.6	V	74.0	-17.4	PK	353	1.6	RB 1 MHz;VB 3 MHz;Peak
4809.060	44.1	V	54.0	-9.9	AVG	220	1.5	RB 1 MHz;VB 10 Hz;Peak
4809.030	51.7	V	74.0	-22.3	PK	220	1.5	RB 1 MHz;VB 3 MHz;Peak
4923.960	45.7	V	54.0	-8.3	AVG	349	1.2	RB 1 MHz;VB 10 Hz;Peak
4924.060	51.1	V	74.0	-22.9	PK	349	1.2	RB 1 MHz;VB 3 MHz;Peak

Note:	Preliminary Scans made between 18 - 40 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device. No emissions observed. Plot not included.



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

Run #2: Radiated Spurious Emissions, 30 - 40,000 MHz.

Date of Test: 2/20/15, 2/22/15 Test Location: FT Chamber #4

Test Engineer: Rafael Varelas / Jack Liu EUT Voltage: 120V/60Hz

Channel: 165 Mode: n20 Power Setting: 20

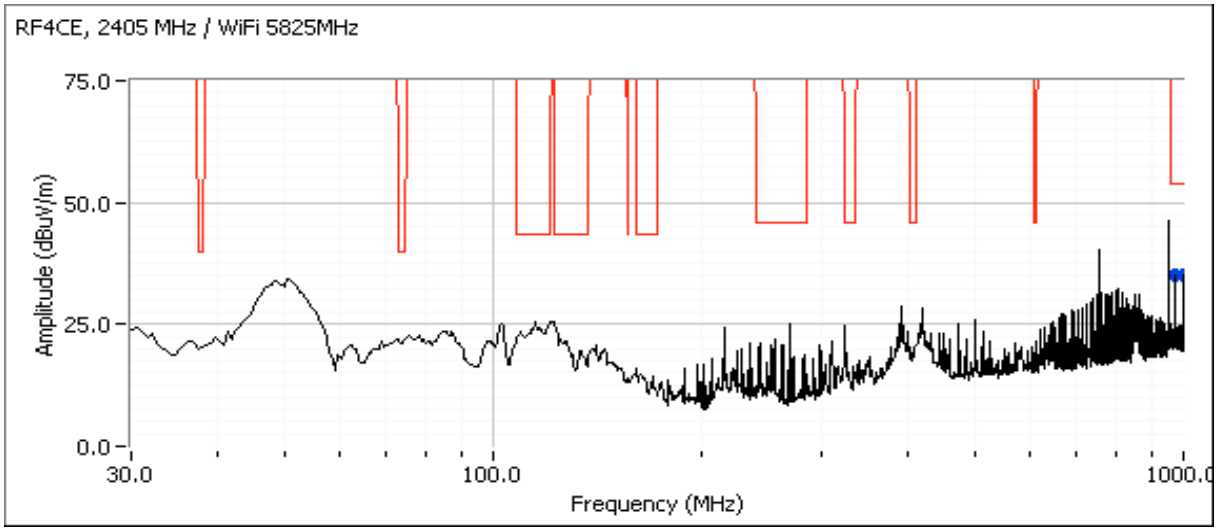
Tx Chain: 2x2 Data Rate: MCS1

RF4CE: 2405 MHz Power Setting: 3

Tx Chain: -

30-1000MHz

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
971.989	34.6	H	54.0	-19.4	QP	123	1.0	QP (1.00s)
999.989	31.8	V	54.0	-22.2	QP	112	1.0	QP (1.00s)

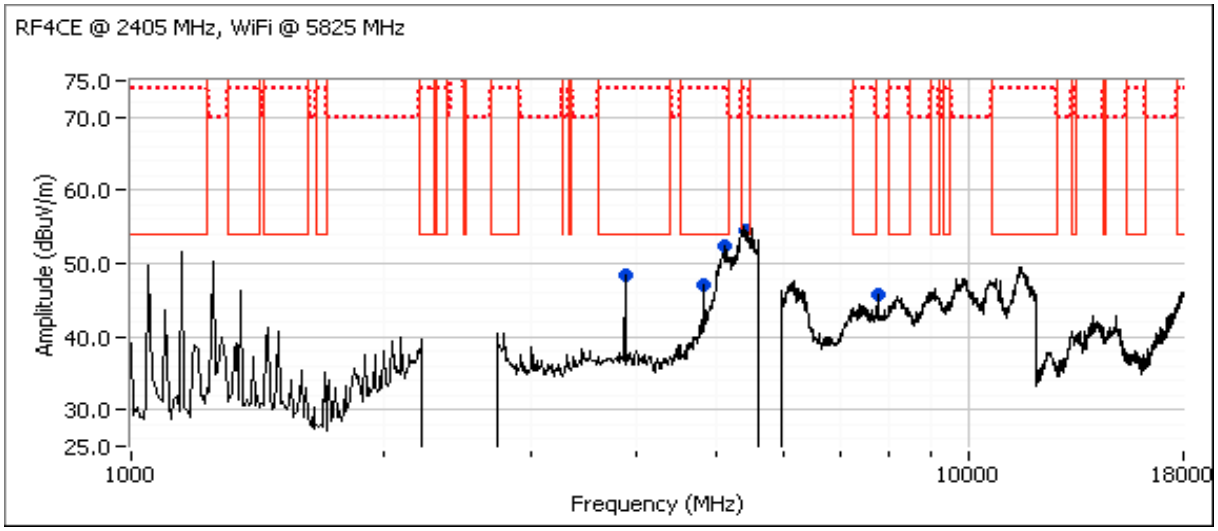


Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	N/A

1000-40,000MHz

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5412.930	51.6	H	54.0	-2.4	AVG	360	1.0	RB 1 MHz;VB 10 Hz;Peak
5413.200	62.9	H	74.0	-11.1	PK	360	1.0	RB 1 MHz;VB 3 MHz;Peak
3883.330	48.2	H	54.0	-5.8	AVG	174	1.2	RB 1 MHz;VB 10 Hz;Peak
3883.400	51.5	H	74.0	-22.5	PK	174	1.2	RB 1 MHz;VB 3 MHz;Peak
7766.640	44.8	V	54.0	-9.2	AVG	178	1.7	Note1,RB 1 MHz;VB 10 Hz;Peak
7766.690	51.6	V	74.0	-22.4	PK	178	1.7	Note 1,RB 1 MHz;VB 3 MHz;Peak
4809.040	45.8	V	54.0	-8.2	AVG	219	1.5	RB 1 MHz;VB 10 Hz;Peak
4811.020	53.1	V	74.0	-20.9	PK	219	1.5	RB 1 MHz;VB 3 MHz;Peak
5138.150	48.1	V	54.0	-5.9	AVG	249	1.6	RB 1 MHz;VB 10 Hz;Peak
5131.740	60.5	V	74.0	-13.5	PK	249	1.6	RB 1 MHz;VB 3 MHz;Peak

Note:	Preliminary Scans made between 18 - 40 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device. No emissions observed. Plot not included.
Note 2:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.3dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	B

Conducted Emissions

(NTS Silicon Valley, 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: 3/2/2015
Test Engineer: Alika Hirano
Test Location: Fremont Chamber #3
Config. Used: 3
Config Change: -
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 where routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Ambient Conditions:

Temperature: 22 °C
Rel. Humidity: 37 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	15.207	Pass	46.7 dBµV @ 0.444 MHz (-0.3 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

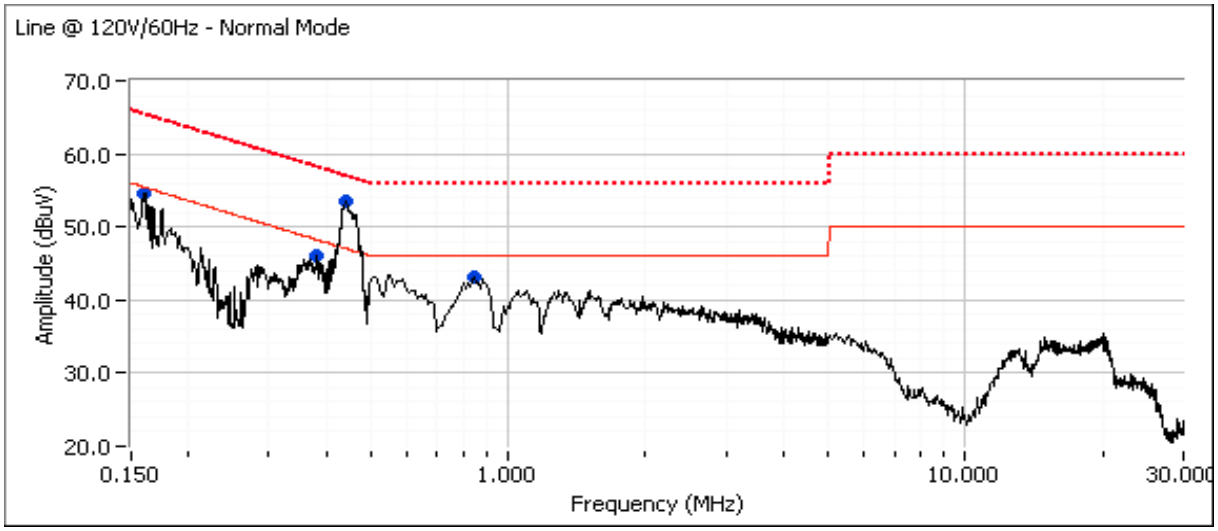
No deviations were made from the requirements of the standard.

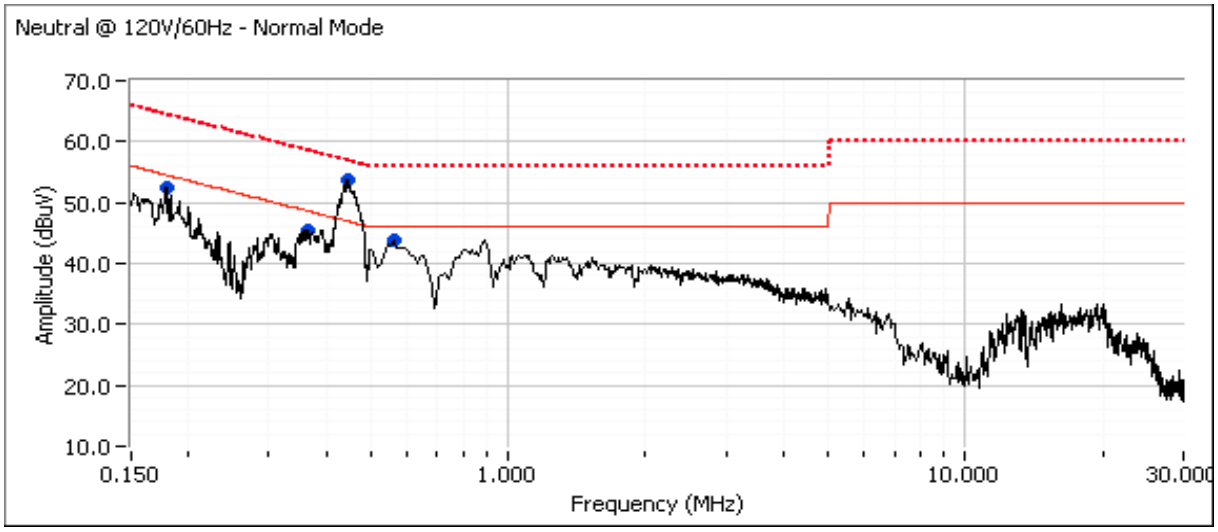
Sample Notes

Sample S/N:A44LA5BG100113
EUT was configured to transmit continuously on CH157, n20, maximum power. RF4CE was configured to continuous transmission at 2450MHz

Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	B

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





Client:	Technicolor USA, Inc.	Job Number:	J97449
Model:	H44-100	T-Log Number:	T97497
		Project Manager:	Christine Krebill
Contact:	Steven Hershberger	Project Coordinator:	-
Standard:	FCC 15.247/15.407/15.B	Class:	B

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

Frequency	Level	AC	15.207		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.159	54.6	Line 1	55.4	-0.8	Peak	
0.383	46.1	Line 1	48.2	-2.1	Peak	
0.443	53.4	Line 1	47.0	6.4	Peak	
0.842	43.2	Line 1	46.0	-2.8	Peak	
0.177	52.5	Neutral	54.5	-2.0	Peak	
0.365	45.4	Neutral	48.6	-3.2	Peak	
0.444	53.8	Neutral	47.0	6.8	Peak	
0.553	43.8	Neutral	46.0	-2.2	Peak	

Final quasi-peak and average readings

Frequency	Level	AC	15.207		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.444	46.7	Neutral	47.0	-0.3	AVG	AVG (0.10s)
0.443	46.4	Line 1	47.0	-0.6	AVG	AVG (0.10s)
0.444	53.6	Neutral	57.0	-3.4	QP	QP (1.00s)
0.443	53.3	Line 1	57.0	-3.7	QP	QP (1.00s)
0.365	36.8	Neutral	48.6	-11.8	AVG	AVG (0.10s)
0.842	33.0	Line 1	46.0	-13.0	AVG	AVG (0.10s)
0.365	45.2	Neutral	58.6	-13.4	QP	QP (1.00s)
0.553	32.0	Neutral	46.0	-14.0	AVG	AVG (0.10s)
0.553	41.8	Neutral	56.0	-14.2	QP	QP (1.00s)
0.383	33.9	Line 1	48.2	-14.3	AVG	AVG (0.10s)
0.383	43.9	Line 1	58.2	-14.3	QP	QP (1.00s)
0.177	40.0	Neutral	54.6	-14.6	AVG	AVG (0.10s)
0.842	41.1	Line 1	56.0	-14.9	QP	QP (1.00s)
0.159	39.8	Line 1	55.5	-15.7	AVG	AVG (0.10s)
0.177	48.9	Neutral	64.6	-15.7	QP	QP (1.00s)
0.159	49.7	Line 1	65.5	-15.8	QP	QP (1.00s)

End of Report

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