41039 Boyce Road
Fremont, CA. 94538
510-578-3500 Phone

EMC Test Report-EAR Controlled Data

Application for FCC Grant of Equipment Authorization
Canada Certification

Innovation, Science and Economic Development Canada
RSS-Gen Issue 5 / RSS-247 Issue 3
FCC Part 15 Subpart C

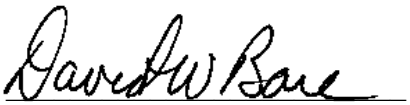
Model: DELLFMFHP

IC CERTIFICATION #:	8392A- DELLFMFHP
FCC ID:	XFJDELLFMFHP
APPLICANT:	XP Metal Detectors 8 rue du développement ZI de VIC 31320 Castanet-Tolosan, France
TEST SITE(S):	Element Materials Technology Fremont AKA: NTS Labs, LLC 41039 Boyce Road Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-5 & 2845B-7
PROJECT NUMBER:	PR185702
REPORT DATE:	January 16, 2025
RE-ISSUED DATE:	April 28, 2025
FINAL TEST DATES:	October 23, 28, November 1, 6, 7 and December 9, 2024 and January 7, 2025
TOTAL NUMBER OF PAGES:	54

ACCREDITED
Testing Cert #0214.26

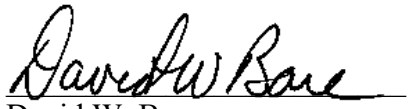
VALIDATING SIGNATORIES

PROGRAM MGR



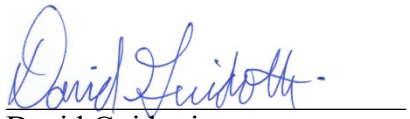
David W. Bare
Chief Engineer

TECHNICAL REVIEWER:



David W. Bare
Chief Engineer

FINAL REPORT PREPARER:



David Guidotti
Senior Technical Writer

QUALITY ASSURANCE DELEGATE

Gary Izard
Senior Technical Writer

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	January 16, 2025	First release	
1	April 24, 2025	Re-issued as separate report for 2.4GHz operation only, corrected ANSI C63.10 year	dwb
2	April 28, 2025	Updated references in summary table. Added modulation details and clarified power setting.	dwb

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the XP Metal Detectors model DELLFMFHP, pursuant to the following rules:

RSS-GEN Issue 5 " General Requirements for Compliance of Radio Apparatus"
RSS 247 Issue 3 "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices"
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 Element Materials Technology Fremont test procedures:

ANSI C63.10-2013
FCC DTS Measurement Guidance KDB558074 D01

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.

Element Materials Technology Fremont is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise.

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 XP Metal Detectors model DELLFMFHP complied with the requirements of the following regulations:

RSS-GEN Issue 5 " General Requirements for Compliance of Radio Apparatus"
RSS 247 Issue 3 "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices"
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 XP Metal Detectors model DELLFMFHP and therefore apply only to the tested samples. The samples were selected and prepared by Huong Monnier of XP Metal Detectors.

DEVIATIONS FROM THE STANDARDS

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

TEST RESULTS SUMMARY

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 247 5.2	Digital Modulation	Systems uses GFSK modulation	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 247 5.2 (1)	6dB Bandwidth	518 kHz	>500kHz	Complies
15.247 (b) (3)	RSS 247 5.4 (4)	Output Power (multipoint systems)	2.2 dBm (0.0017 Watts) EIRP = 0.0015 W Note 2	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	Not measured as output power < 8 dBm	8dBm/3kHz	Complies
15.247(d)	RSS 247 5.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	< -20dBc	< -20dBc	Complies
15.247(d) / 15.209	RSS 247 5.5	Radiated Spurious Emissions 30MHz – 25 GHz	51.1 dBµV/m @ 4880.0 MHz (-2.9 dB)	Refer to the limits section (p20) for restricted bands, all others < -20dBc	Complies

Note 1 EIRP calculated using antenna gain of 0.5 dBi for the highest EIRP system.
Note 2 Pass/Fail criteria defined by standards listed above.

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Integral antennas	Unique or integral antenna required	Complies
15.207	RSS-Gen Table 4	AC Conducted Emissions	21.6 dBµV @ 0.499 MHz (-24.4 dB)	Refer to page 20	Complies
15.247 (i)	RSS 102	RF Exposure Requirements	Refer to MPE calculations and NS measurements in separate exhibit, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSS-Gen 6.8	User Manual	Integrated antennas	Statement for products with detachable antenna	N/A
-	RSS-Gen 8.4	User Manual		Statement for all products	Complies
-	RSP-100 RSS-Gen 6.7	Occupied Bandwidth	542 kHz	Information only	N/A

Note 1 Pass/Fail criteria defined by standards listed above.

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 XP Metal Detectors model DELLFMFHP is a metal detector that is designed to be used with a remote control unit for locating metal objects. Since the EUT could be placed in any position during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 3.7 VDC supplied by an internal rechargeable battery.

The samples were received on October 18, 2024 and tested on October 23, 28, November 1, 6, 7 and December 9, 2024 and January 7, 2025. The following samples of the EUT were used during testing:

Company	Model	Description	Serial Number	FCC ID
XPLORER	DELLFMFHP	Metal detector	4C000D	XFJDELLFMFHP
XPLORER	DELLFMFHP	Metal detector	CE000E	XFJDELLFMFHP
XPLORER	DELLFMFHP	Metal detector	CE001D	XFJDELLFMFHP

ANTENNA SYSTEM

The antenna system consists of an integrated 24 x13 cm loop for the detection radio and an integrated trace for the 2.4 GHz ISM band radio.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 24 cm wide by 13 cm deep by 5 cm high.

OTHER EUT INFORMATION

The detection radio in the EUT can operate from 8.8 – 90kHz or 110 - 120.3kHz. The 2.4GHz ISM radio can operate between 2404 and 2476MHz with a 2MHz channel separation.

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 support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
XPLORER	None	Control Box	None	-

or

Company	Model	Description	Serial Number	FCC ID
XPLORER	DEUS II	Remote Control	020FFS	XFJRSW

No remote support equipment was used during testing.

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Charge	Not connected			

EUT OPERATION

During emissions testing the EUT was configured to transmit continuously a GFSK modulated signal on a selected channel in the 2.4 GHz ISM band at maximum power setting for rated power using the Control Box or to transmit continuously an unmodulated signal on a selected frequency from 8.8 to 120.3 kHz using the DEUS II Remote Control at maximum power setting for rated power. Note that this radio does not have sweep capability. The Control Box was disconnected after programming the EUT for testing.

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 6.2 of RSS-GEN, NTS has been recognized as an accredited test laboratory by the Commission and Innovation, Science and Economic Development Canada. A description of the facilities employed for testing is maintained by NTS.

Site	Company / Registration Numbers		Location
	FCC	Canada	
Chamber 5 & 7	US1031	2845B (Wireless Test Lab #US0027)	41039 Boyce Road Fremont, CA 94538-2435

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. Results from testing performed in this chamber have been correlated with results from an open area test site. 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

Software is used to view and convert 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 software used for radiated and conducted emissions measurements is NTS EMI Test Software (rev 2.10)

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 for testing below 1 GHz and 1.5m for testing above 1 GHz. 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.

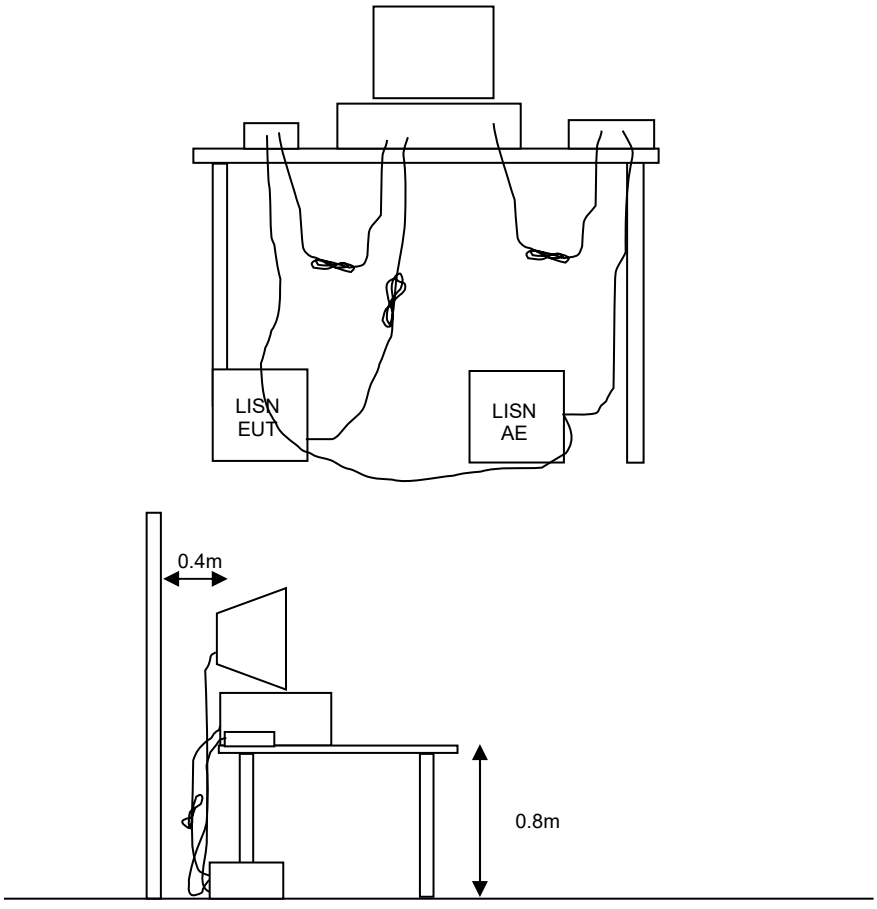


Figure 1 Typical Conducted Emissions Test Configuration

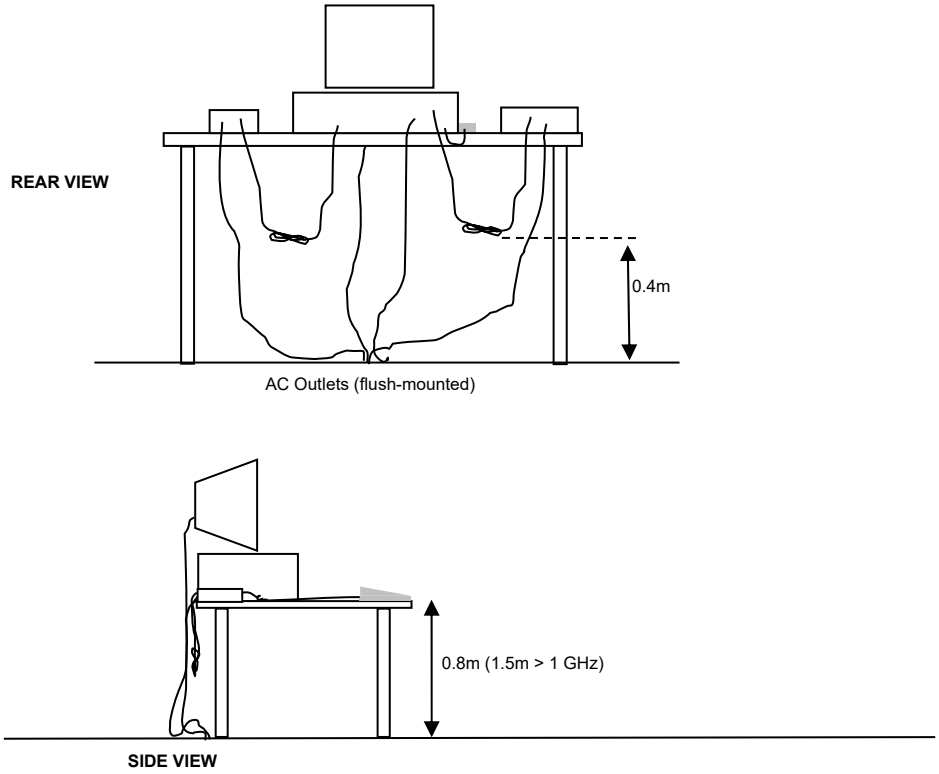
RADIATED EMISSIONS

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.

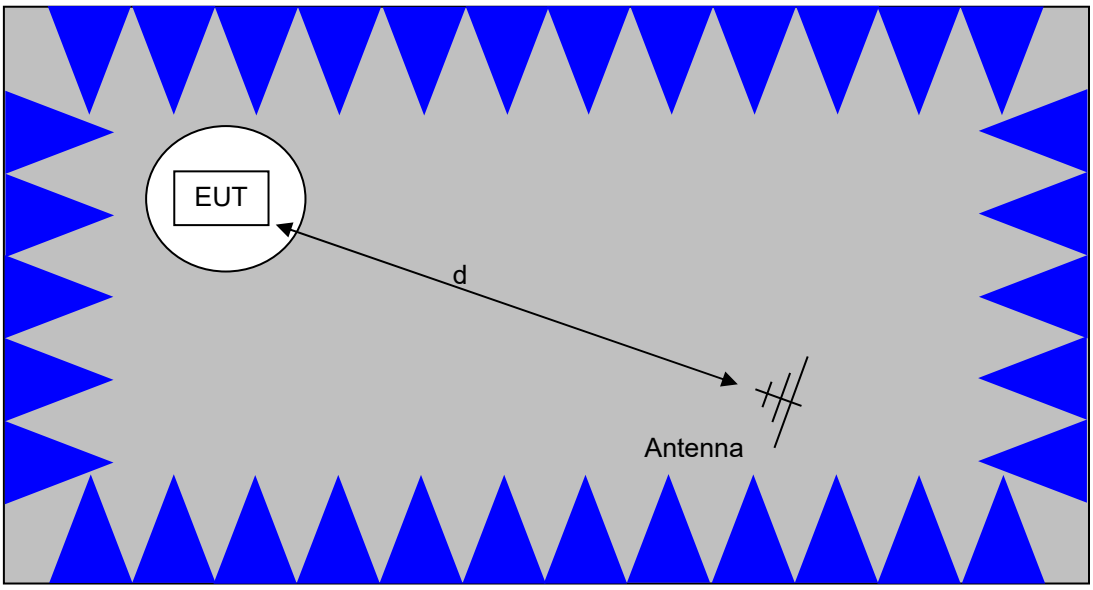
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

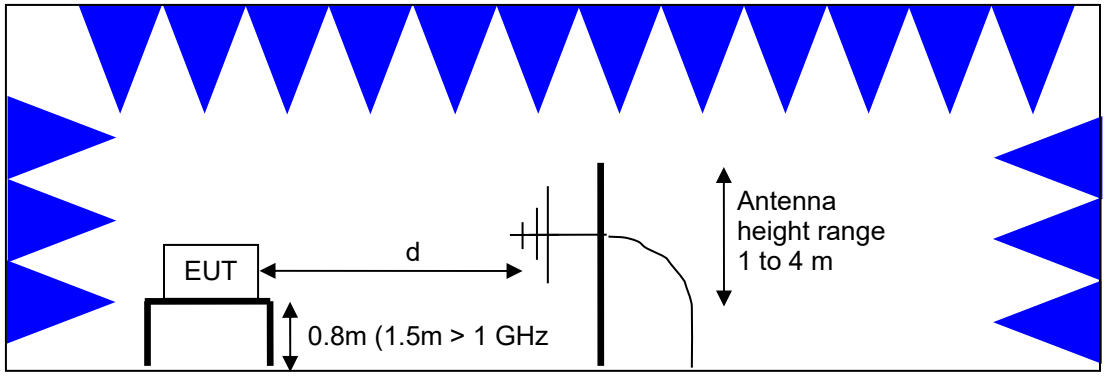


Typical Test Configuration for Radiated Field Strength Measurements



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.

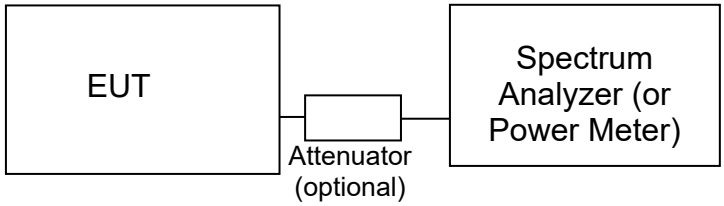
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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; 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 bands1.

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

Below 30 MHz, the RSS-Gen general field strength limits are expressed in terms of magnetic field in uA/m equivalent to the electric field limits in the table assuming free space conditions.

[1] The restricted bands are detailed in FCC §15.205 and RSS-Gen Table 7

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

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

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

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. For FCC, fixed point to point applications using the 2400-2483.5 MHz band may use antennas with more than 6 dBi gain but output power is reduced by 1 dB for every 3dB that the antenna gain exceeds 6 dBi. For Canada, fixed point-to-point applications using the 2400-2483.5 MHz band are not subject to this restriction. Fixed point-to-point applications using the 5725 – 5850 MHz band are also not subject to this restriction. Certification of DTS systems operating in the 5725-5850 MHz band is no longer allowed under FCC Rules per §15.37(h).

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 GEN. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - S = M$$

where:
R_r = Receiver Reading in dBuV
S = Specification Limit in dBuV
M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

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

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

where:
F_d = Distance Factor in dB
D_m = Measurement Distance in meters
D_s = Specification Distance in meters

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

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

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:
R_r = Receiver Reading in dBuV/m
F_d = Distance Factor in dB
R_c = Corrected Reading in dBuV/m
L_s = Specification Limit in dBuV/m
M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 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 - 18 GHz, 22-Oct-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
ETS-Lindgren	EMC Chamber #5, Inner Dimensions (LxWxH): 24' x 38' x 20'	CH 5 (FACT-5)	WC055567	5/24/2024	5/24/2027
Hewlett Packard	Spectrum Analyzer (Purple)	8564E	WC055660	6/7/2024	6/30/2025
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	WC064416	10/7/2024	10/7/2025
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blue)	3115	WC064442	11/18/2022	11/18/2024
Hewlett Packard	High Pass filter, 3.5 GHz	84300-80038	WC064495	9/6/2024	9/6/2025
Semflex Microwave Solutions	RF Coaxial Cable, 1 m blue	N1S3HPT19039 .4 (HPT 190)	WC064542	4/12/2024	4/12/2025
Semflex Microwave Solutions	RF Coaxial Cable, 3.5m blue	N1N1HPT30138 (HPT 305)	WC064587	3/11/2024	3/11/2025
Conducted Emissions - AC Power Ports, 23-Oct-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
ETS-Lindgren	EMC Chamber #5, Inner Dimensions (LxWxH): 24' x 38' x 20'	CH 5 (FACT-5)	WC055567	5/24/2024	5/24/2027
EMCO	LISN, 10 kHz-100 MHz	3825/2	WC064399	1/25/2024	1/25/2025
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	WC064445	6/21/2024	6/21/2025
Andrew	LDF4-50A, Heliax 17m	Cable Assembly	WC064471	2/8/2024	2/8/2025
Coleman Company	RG223, Coax, 4.0m	Cable Assembly	WC064824	3/11/2024	3/11/2025
Belden	RG214, coaxial cable, 4.0 m	Cable Assembly	WC064843	4/12/2024	4/12/2025
Rhode & Schwarz	EMI Test Receiver, 20Hz-26.5GHz	ESI	WC071498	7/17/2024	7/17/2025
Radiated Emissions, 9 kHz - 30,000 MHz, 28-Oct-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
ETS-Lindgren	EMC Chamber #5, Inner Dimensions (LxWxH): 24' x 38' x 20'	CH 5 (FACT-5)	WC055567	5/24/2024	5/24/2027
Rhode & Schwarz	Loop Antenna	HFH2-Z2	WC062457	1/24/2024	1/24/2026
Rhode & Schwarz	EMI Test Receiver, 20Hz-26.5GHz	ESI	WC071498	7/17/2024	7/17/2025
Radiated Emissions, 1 - 25 GHz, 01-Nov-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Hewlett Packard	Spectrum Analyzer (Red)	8564E (84125C)	WC055584	7/29/2024	7/31/2025
Hewlett Packard	Microwave Preamplifier Head, 18-40 GHz (Purple)	84125C Head	WC055610	6/12/2024	6/12/2025
Hewlett Packard	Spectrum Analyzer (Purple)	8564E	WC055660	6/7/2024	6/30/2025
EMCO	Antenna, Horn, 1-18 GHz	3115	WC064432	5/16/2023	5/16/2025

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Hewlett Packard	High Pass filter, 3.5 GHz	84300-80038	WC064495	9/6/2024	9/6/2025
A. H. Systems	Antenna, Horn, 18-40GHz	SAS-574	WC064555	8/28/2023	8/28/2025
Agilent Technologies	Microwave Preamplifier, 1-26.5GHz	8449B	WC064574	4/18/2024	4/18/2025
Radiated Emissions, 1 - 25 GHz, 05-Nov-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Hewlett Packard	Microwave Preamplifier Head, 18-40 GHz (Purple)	84125C Head	WC055610	6/12/2024	6/12/2025
Hewlett Packard	Spectrum Analyzer (Purple)	8564E	WC055660	6/7/2024	6/30/2025
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	WC064416	10/7/2024	10/7/2025
EMCO	Antenna, Horn, 1-18 GHz	3115	WC064417	9/10/2024	9/10/2026
A. H. Systems	Antenna, Horn, 18-40GHz	SAS-574	WC064555	8/28/2023	8/28/2025
Hewlett Packard	High Pass filter, 3.5 GHz	84300-80038	WC064495	9/6/2024	9/6/2025
Radio Antenna Port (Power and Spurious Emissions), 06-Nov-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
National Technical Systems	NTS Capture Analyzer Software (rev 4.0)	N/A	WC022706	N/A	
National Technical Systems	EMC Lab #4A	None	WC055574	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055650	11/10/2023	11/30/2024
Fairview Microwave	Attenuator 6dB 5Watt	SA18N5W-06	WC078729	N/A	
Radiated Emissions, 30 - 1,000 MHz, 07-Nov-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	WC064478	1/18/2024	1/18/2026
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB 7	WC064989	12/28/2023	12/28/2024
Com-Power	Preamplifier, 1-1000MHz	PAM-103	WC080961	4/18/2024	4/18/2025
Radio Antenna Port (Power and Spurious Emissions), 19-Nov-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
National Technical Systems	NTS Capture Analyzer Software (rev 4.0)	N/A	WC022706	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055670	10/14/2024	10/14/2025
Radio Antenna Port (Bandwidth), 09-Dec-24					
National Technical Systems	NTS Capture Analyzer Software (rev 4.0)	N/A	WC022706	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055670	10/14/2024	10/14/2025

OTA, 07-Jan-25

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Rohde & Schwarz	Signal Analyzer OTA	FSV13	WC064873	10/10/2024	10/31/2025

Appendix B Test Data

TL185702-RA-HF2-2413 Pages 27 – 53

Client:	XPLORER	PR Number:	PR185702
Product	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-2413
System Configuration:		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Emissions Standard(s):	FCC Part 15, RSS-210, RSS-247	Class:	-
Immunity Standard(s):	-	Environment:	Any

EMC Test Data

For The

XPLORER

Product

DELLFMFHP

Date of Last Test: 12/13/2024

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	-

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: 10/23/2024
Test Engineer: M. Birgani
Test Location: Fremont Chamber #5

Config. Used: 1
Config Change: None
EUT Voltage: Refer to individual run

General Test Configuration

The EUT was located on a foam table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN.

Ambient Conditions:

Temperature: 24-25 °C
Rel. Humidity: 36-37 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 230V/50Hz	Class B	Pass	23.3 dBµV @ 0.503 MHz (-22.7 dB)
2	CE, AC Power,120V/60Hz	Class B	Pass	21.6 dBµV @ 0.499 MHz (-24.4 dB)

Modifications Made During Testing

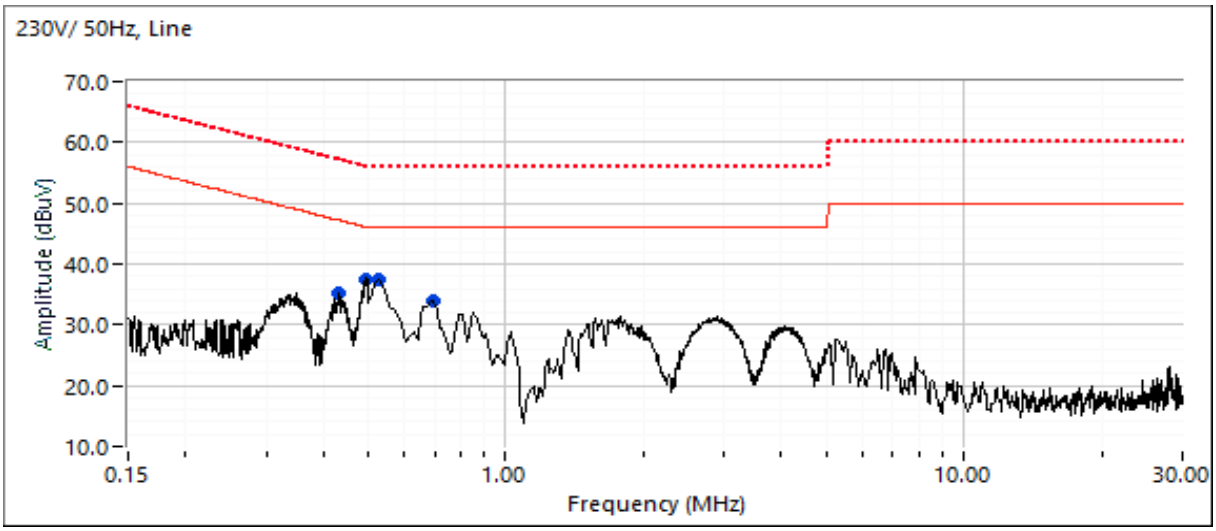
No modifications were made to the EUT during testing

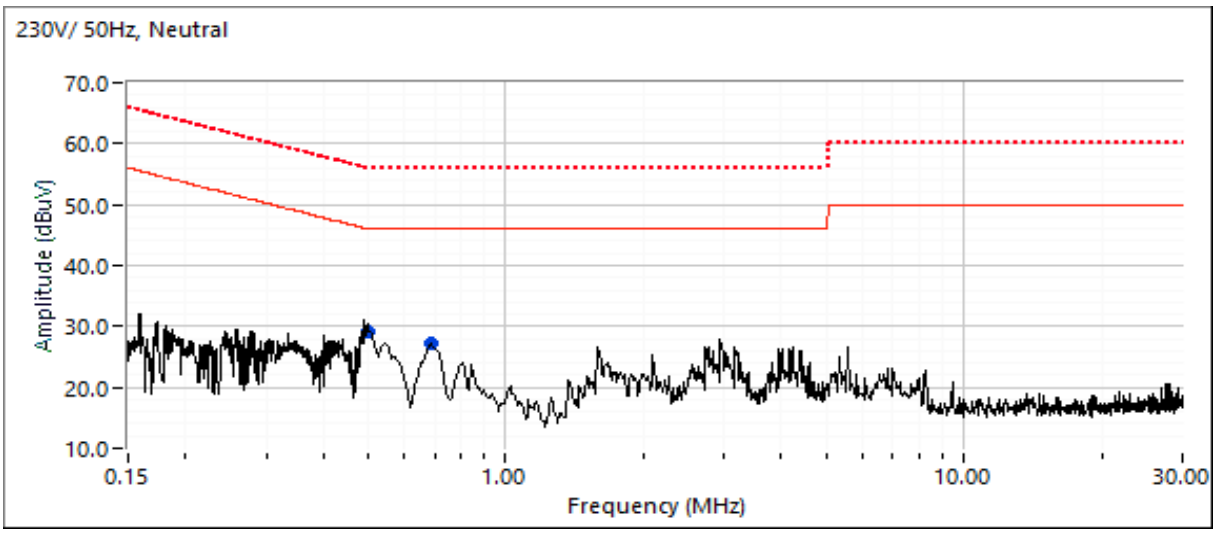
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz





element

EMC Test Data

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz

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

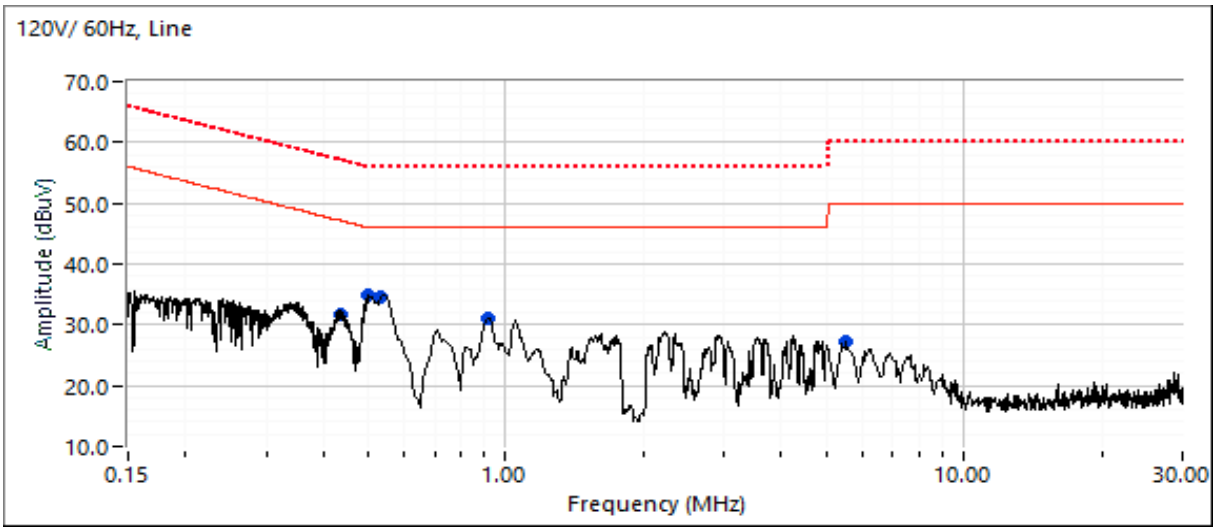
Frequency MHz	Level dBµV	AC Line	Class A Limit	Class A Margin	Detector QP/AVG	Comments
0.433	35.1	Line	47.2	-12.1	Peak	
0.495	37.5	Line	46.1	-8.6	Peak	
0.500	31.2	Neutral	46.0	-14.8	Peak	
0.500	29.2	Neutral	46.0	-16.8	Peak	
0.503	37.3	Line	46.0	-8.7	Peak	
0.672	33.8	Line	46.0	-12.2	Peak	
0.689	27.2	Neutral	46.0	-18.8	Peak	

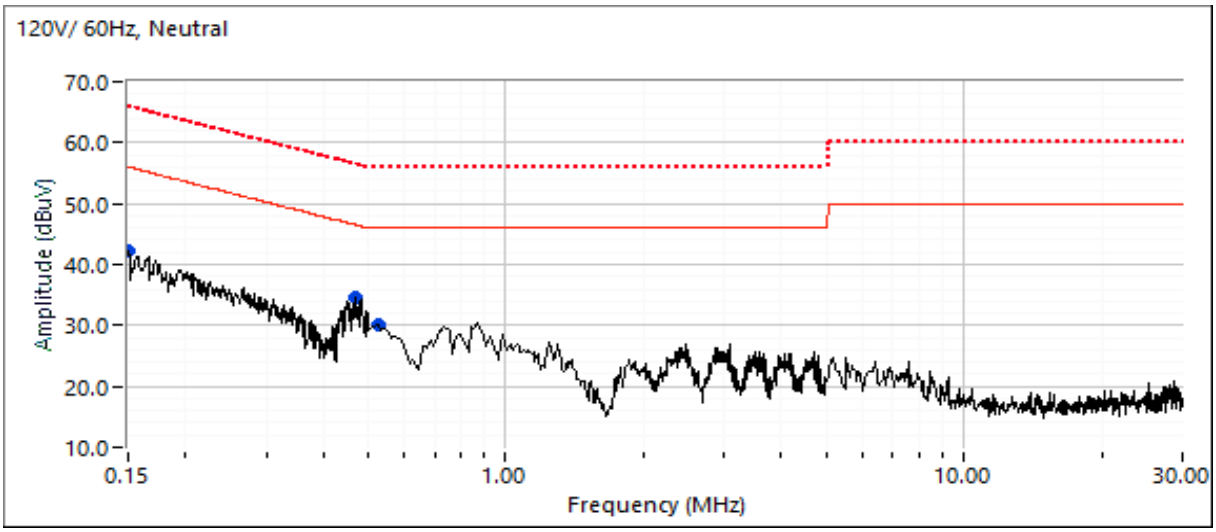
Final quasi-peak and average readings

Frequency MHz	Level dBµV	AC Line	Class A Limit	Class A Margin	Detector QP/AVG	Comments
0.503	**23.3**	Line	46.0	**-22.7**	AVG	AVG (0.10s)
0.503	33.0	Line	56.0	-23.0	QP	QP (1.00s)
0.495	22.4	Line	46.1	-23.7	AVG	AVG (0.10s)
0.495	32.2	Line	56.1	-23.9	QP	QP (1.00s)
0.672	28.8	Line	56.0	-27.2	QP	QP (1.00s)
0.672	18.6	Line	46.0	-27.4	AVG	AVG (0.10s)
0.500	18.6	Neutral	46.0	-27.4	AVG	AVG (0.10s)
0.500	18.5	Neutral	46.0	-27.5	AVG	AVG (0.10s)
0.433	19.6	Line	47.2	-27.6	AVG	AVG (0.10s)
0.433	28.9	Line	57.2	-28.3	QP	QP (1.00s)
0.500	25.3	Neutral	56.0	-30.7	QP	QP (1.00s)
0.500	25.2	Neutral	56.0	-30.8	QP	QP (1.00s)
0.689	12.3	Neutral	46.0	-33.7	AVG	AVG (0.10s)
0.689	20.0	Neutral	56.0	-36.0	QP	QP (1.00s)

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	-

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz





Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	-

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

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

Frequency	Level	AC	Class A		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/AVG	
0.151	42.2	Neutral	56.0	-13.8	Peak	
0.438	31.7	Line	47.1	-15.4	Peak	
0.468	34.5	Neutral	46.5	-12.0	Peak	
0.499	34.9	Line	46.0	-11.1	Peak	
0.527	30.2	Neutral	46.0	-15.8	Peak	
0.536	34.6	Line	46.0	-11.4	Peak	
0.915	31.1	Line	46.0	-14.9	Peak	
5.551	27.2	Line	50.0	-22.8	Peak	

Final quasi-peak and average readings

Frequency	Level	AC	Class A		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/AVG	
0.499	**21.6**	Line	46.0	**-24.4**	AVG	AVG (0.10s)
0.499	29.6	Line	56.0	-26.4	QP	QP (1.00s)
0.438	18.6	Line	47.1	-28.5	AVG	AVG (0.10s)
0.438	26.0	Line	57.1	-31.1	QP	QP (1.00s)
0.536	14.8	Line	46.0	-31.2	AVG	AVG (0.10s)
0.915	13.2	Line	46.0	-32.8	AVG	AVG (0.10s)
0.536	22.5	Line	56.0	-33.5	QP	QP (1.00s)
0.915	22.4	Line	56.0	-33.6	QP	QP (1.00s)
0.527	11.0	Neutral	46.0	-35.0	AVG	AVG (0.10s)
0.468	10.7	Neutral	46.5	-35.8	AVG	AVG (0.10s)
0.151	29.1	Neutral	66.0	-36.9	QP	QP (1.00s)
0.527	19.0	Neutral	56.0	-37.0	QP	QP (1.00s)
0.468	17.8	Neutral	56.5	-38.7	QP	QP (1.00s)
5.551	11.2	Line	50.0	-38.8	AVG	AVG (0.10s)
5.551	19.4	Line	60.0	-40.6	QP	QP (1.00s)
0.151	12.4	Neutral	56.0	-43.6	AVG	AVG (0.10s)

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

RSS-247 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: 23-24 °C
Rel. Humidity: 45-47 %

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

Run #	Channel	Power Setting	Test Performed	Limit	Result / Margin
1a	Mid	0 dBm	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	51.1 dBµV/m @ 4880.0 MHz (-2.9 dB)
1b	Low	0 dBm	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	34.0 dBµV/m @ 2389.9 MHz (-20.0 dB)
		0 dBm	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	51.1 dBµV/m @ 4808.0 MHz (-2.9 dB)
1c	High	0 dBm	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	64.7 dBµV/m @ 2485.7 MHz (-9.3 dB)
		0 dBm	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	51.1 dBµV/m @ 4641.1 MHz (-2.9 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:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

Procedure Comments:

Measurements performed in accordance with ANSI C63.10
Measurements performed from 1-4GHz with preamp and no filter was used.
Measurements performed from 4-11 GHz with preamp and 3.5GHz high pass filter were used.
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 voltage average, 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)
-	1Mbps	99.6%	Yes	33.179	0	0	10

Sample Notes

Sample S/N: CE000D

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 3:	Emission has a duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces

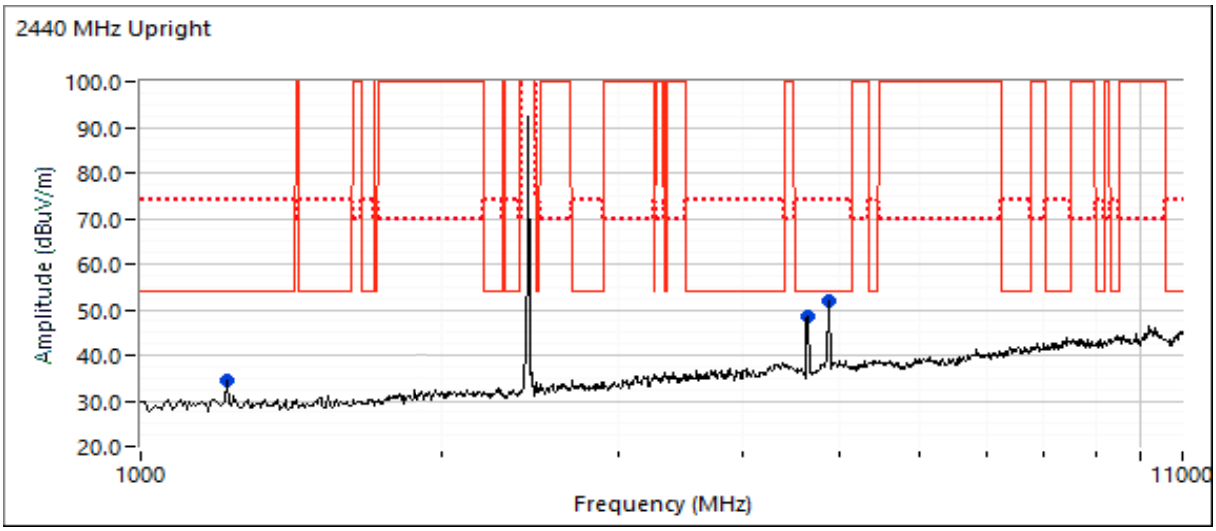
Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

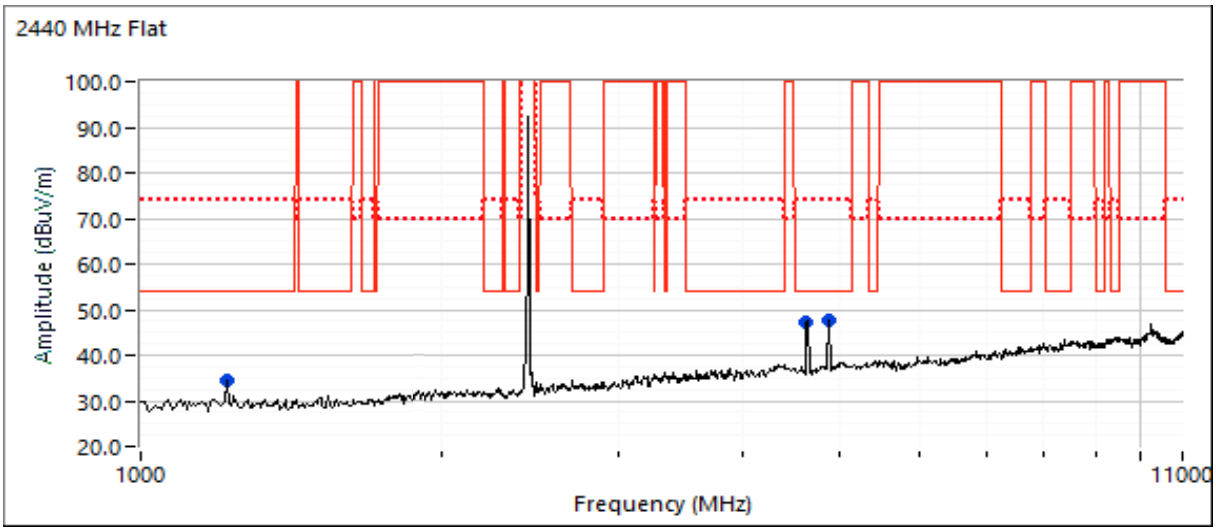
Run #1: Radiated Spurious Emissions, 1000 - 25000 MHz

Date of Test: 11/1 and 11/6/2024
Test Engineer: M. Birgani & Davd Bare
Test Location: Fremont Chamber #7

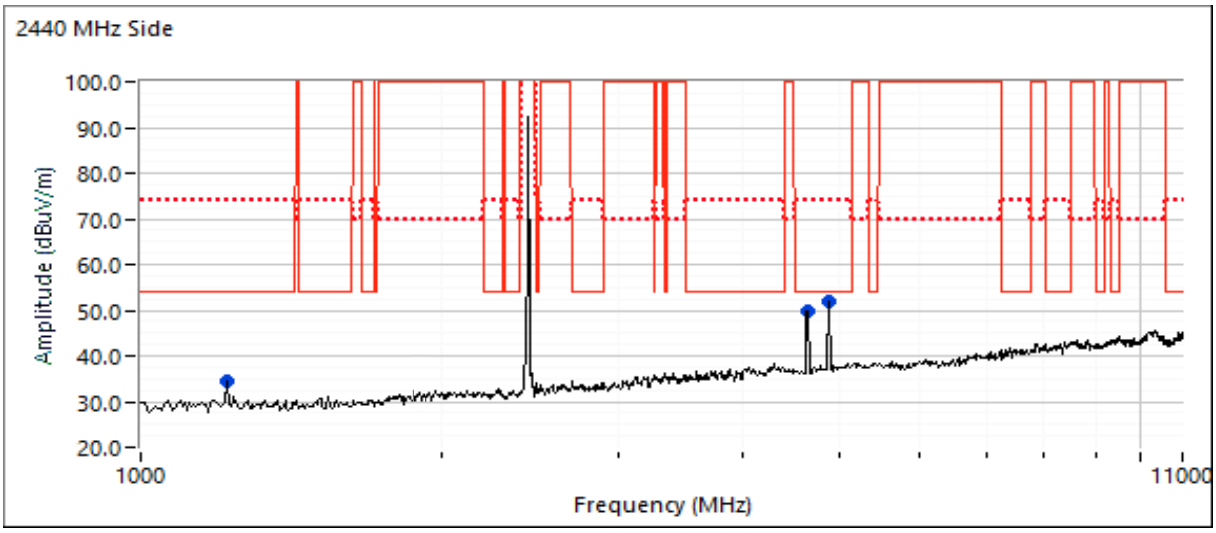
Config. Used: 1
Config Change: None
EUT Voltage: Battery

Run #1a: Center Channel @ 2440 MHz





Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

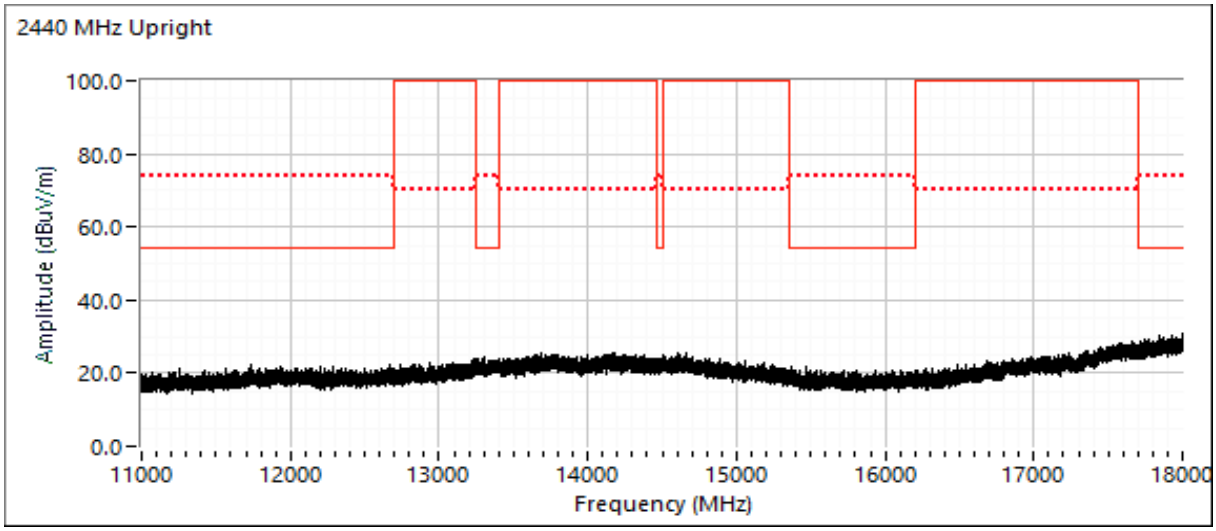


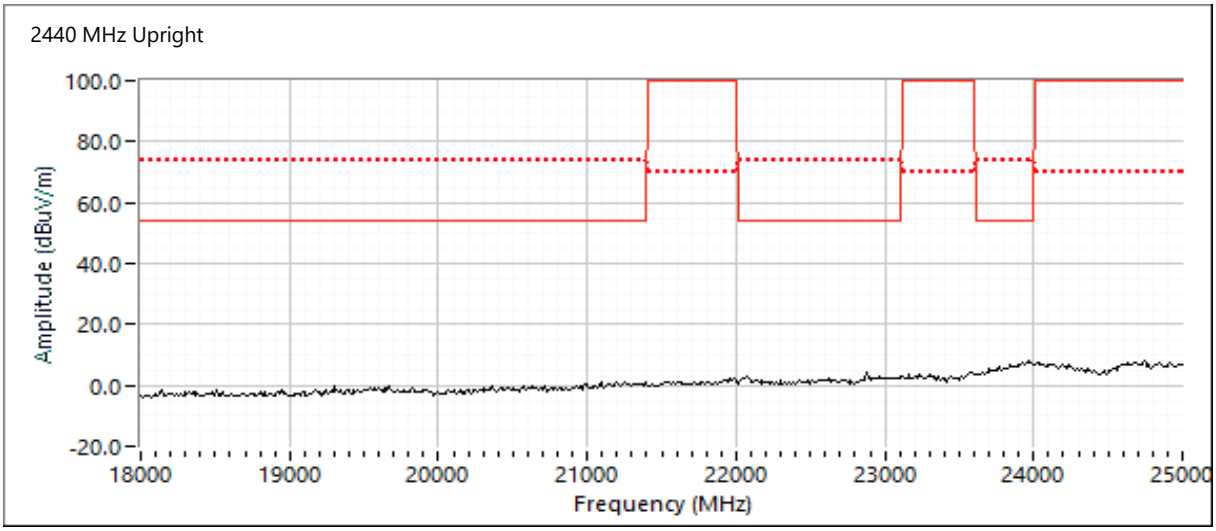
Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
1220.000	34.5	V	54.0	-19.5	Peak	346	1.0	Pk reading with Avg limit, Upright
4641.150	48.5	H	54.0	-5.5	AVG	9	1.8	RB 1 MHz;VB 10 Hz;Upright
4641.120	52.1	H	74.0	-21.9	PK	9	1.8	RB 1 MHz;VB 3 MHz;Upright
4880.020	51.1	V	54.0	-2.9	AVG	184	1.6	RB 1 MHz;VB 10 Hz;Upright
4880.270	55.1	V	74.0	-18.9	PK	184	1.6	RB 1 MHz;VB 3 MHz;Upright
4879.920	43.8	H	54.0	-10.2	AVG	216	1.7	RB 1 MHz;VB 10 Hz;Upright
4879.980	50.7	H	74.0	-23.3	PK	216	1.7	RB 1 MHz;VB 3 MHz;Upright
4641.160	47.2	H	54.0	-6.8	AVG	190	2.5	RB 1 MHz;VB 10 Hz;Flat
4641.250	51.3	H	74.0	-22.7	PK	190	2.5	RB 1 MHz;VB 3 MHz;Flat
4880.020	46.3	V	54.0	-7.7	AVG	186	1.5	RB 1 MHz;VB 10 Hz;Flat
4880.170	51.5	V	74.0	-22.5	PK	186	1.5	RB 1 MHz;VB 3 MHz;Flat
4880.000	47.4	H	54.0	-6.6	AVG	304	1.7	RB 1 MHz;VB 10 Hz;Flat
4879.880	52.7	H	74.0	-21.3	PK	304	1.7	RB 1 MHz;VB 3 MHz;Flat
4641.150	48.3	H	54.0	-5.7	AVG	12	1.8	RB 1 MHz;VB 10 Hz;Side
4641.120	51.8	H	74.0	-22.2	PK	12	1.8	RB 1 MHz;VB 3 MHz;Side
4879.960	45.8	V	54.0	-8.2	AVG	222	1.7	RB 1 MHz;VB 10 Hz;Side
4879.870	51.5	V	74.0	-22.5	PK	222	1.7	RB 1 MHz;VB 3 MHz;Side
4879.980	51.1	H	54.0	-2.9	AVG	176	1.6	RB 1 MHz;VB 10 Hz;Side
4879.690	55.1	H	74.0	-18.9	PK	176	1.6	RB 1 MHz;VB 3 MHz;Side

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

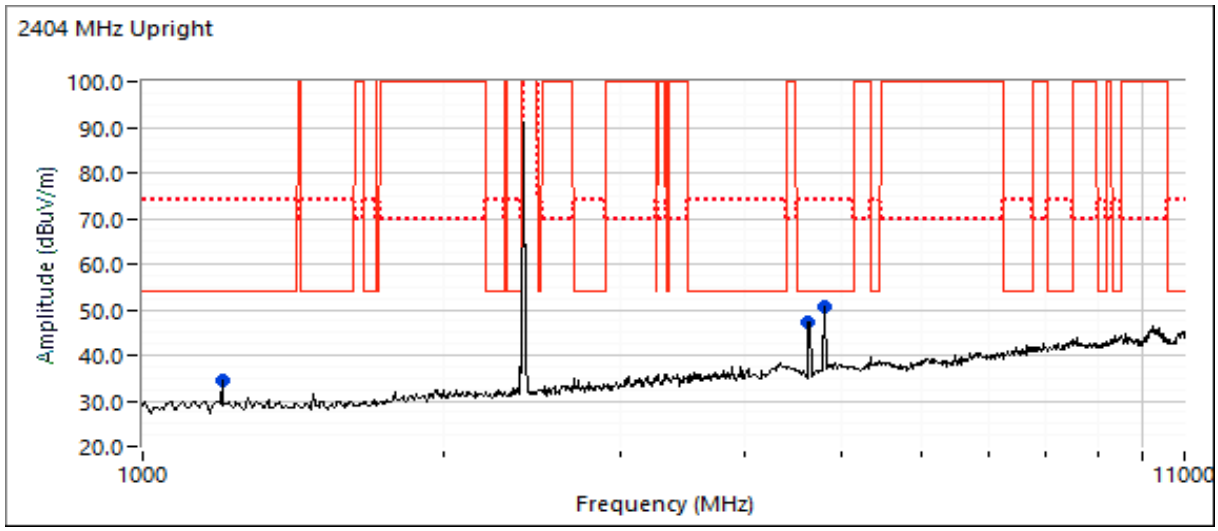
Note:	Scans made between 11 - 25 GHz with the measurement antenna moved around the EUT 30cm from the device indicated there were no significant emissions in this frequency range.





Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

Run #1b: Low Channel @ 2404 MHz



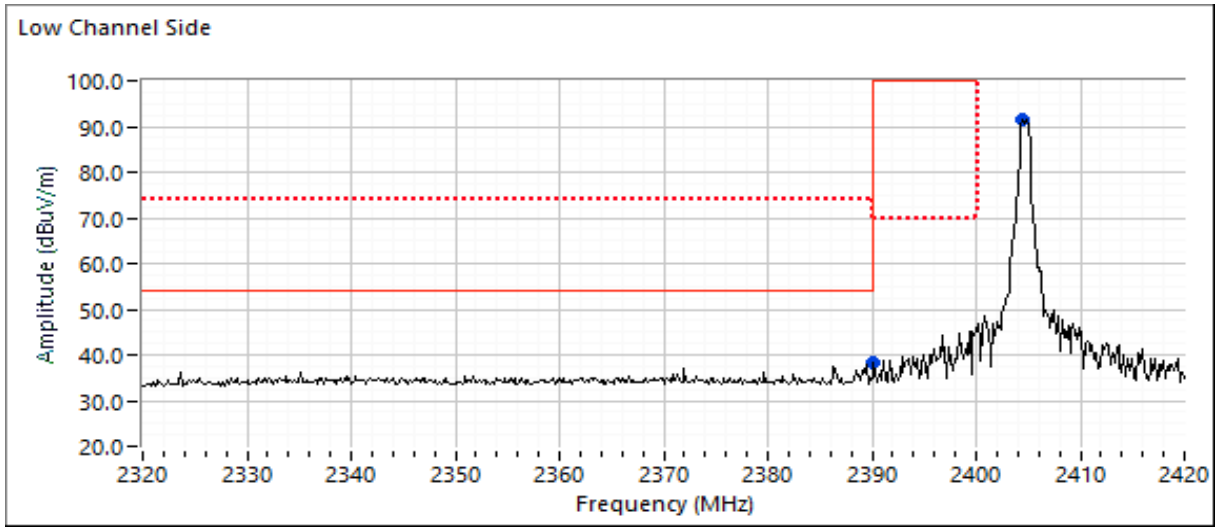
Spurious Emissions

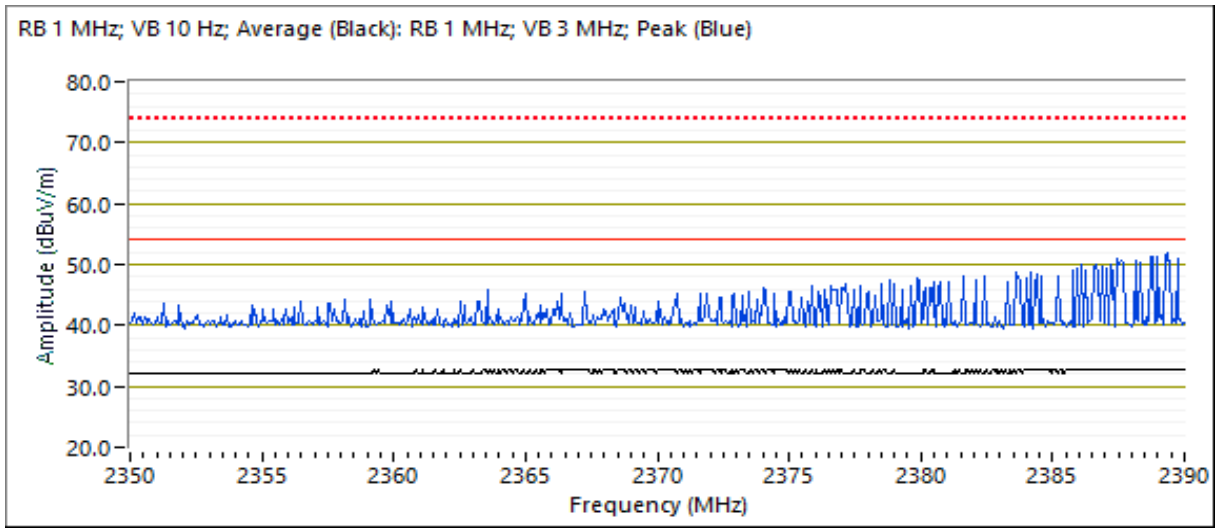
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
1202.060	32.1	V	54.0	-21.9	AVG	9	1.3	RB 1 MHz;VB 10 Hz
1201.760	40.6	V	74.0	-33.4	PK	9	1.3	RB 1 MHz;VB 3 MHz
4641.130	49.9	H	54.0	-4.1	AVG	6	2.5	RB 1 MHz;VB 10 Hz
4640.960	52.8	H	74.0	-21.2	PK	6	2.5	RB 1 MHz;VB 3 MHz
4807.920	42.4	H	54.0	-11.6	AVG	215	1.4	RB 1 MHz;VB 10 Hz
4807.950	50.3	H	74.0	-23.7	PK	215	1.4	RB 1 MHz;VB 3 MHz
4807.990	51.1	V	54.0	-2.9	AVG	178	1.6	RB 1 MHz;VB 10 Hz
4808.250	55.1	V	74.0	-18.9	PK	178	1.6	RB 1 MHz;VB 3 MHz

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

Band Edge Signal Field Strength - Direct measurement of field strength

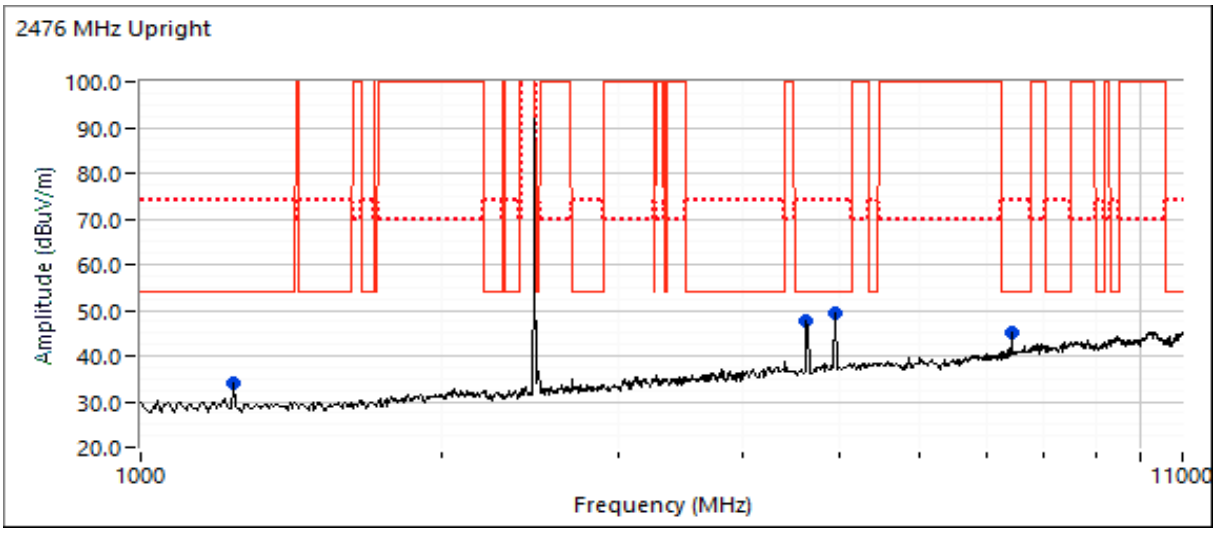
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.940	34.0	V	54.0	-20.0	AVG	4	1.3	RB 1 MHz;VB 10 Hz;Side
2389.220	52.0	V	74.0	-22.0	PK	4	1.3	RB 1 MHz;VB 3 MHz;Side





Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

Run #1c: High Channel @ 2476 MHz



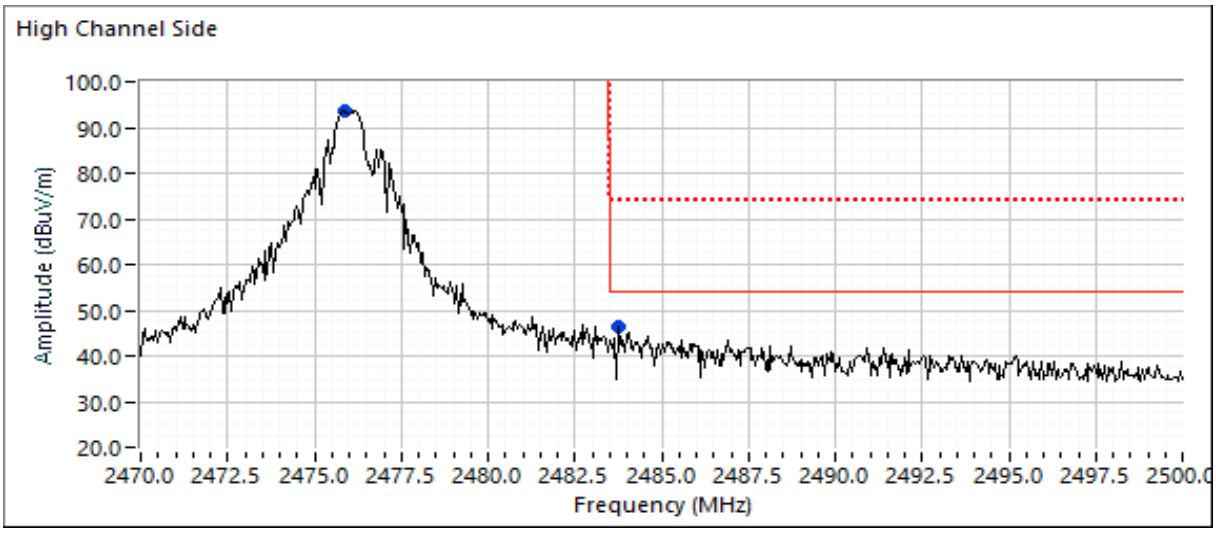
Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
1238.040	33.7	V	54.0	-20.3	AVG	2	1.8	RB 1 MHz;VB 10 Hz;Peak
1238.040	41.1	V	74.0	-32.9	PK	2	1.8	RB 1 MHz;VB 3 MHz;Peak
4641.140	51.1	H	54.0	-2.9	AVG	5	2.5	RB 1 MHz;VB 10 Hz;Peak
4640.940	54.2	H	74.0	-19.8	PK	5	2.5	RB 1 MHz;VB 3 MHz;Peak
4951.940	48.5	V	54.0	-5.5	AVG	186	1.5	RB 1 MHz;VB 10 Hz;Peak
4952.160	53.1	V	74.0	-20.9	PK	186	1.5	RB 1 MHz;VB 3 MHz;Peak
4951.850	40.6	H	54.0	-13.4	AVG	208	1.6	RB 1 MHz;VB 10 Hz;Peak
4952.310	50.0	H	74.0	-24.0	PK	208	1.6	RB 1 MHz;VB 3 MHz;Peak
7427.690	45.3	V	54.0	-8.7	AVG	82	1.1	RB 1 MHz;VB 10 Hz;Peak
7427.480	54.9	V	74.0	-19.1	PK	82	1.1	RB 1 MHz;VB 3 MHz;Peak

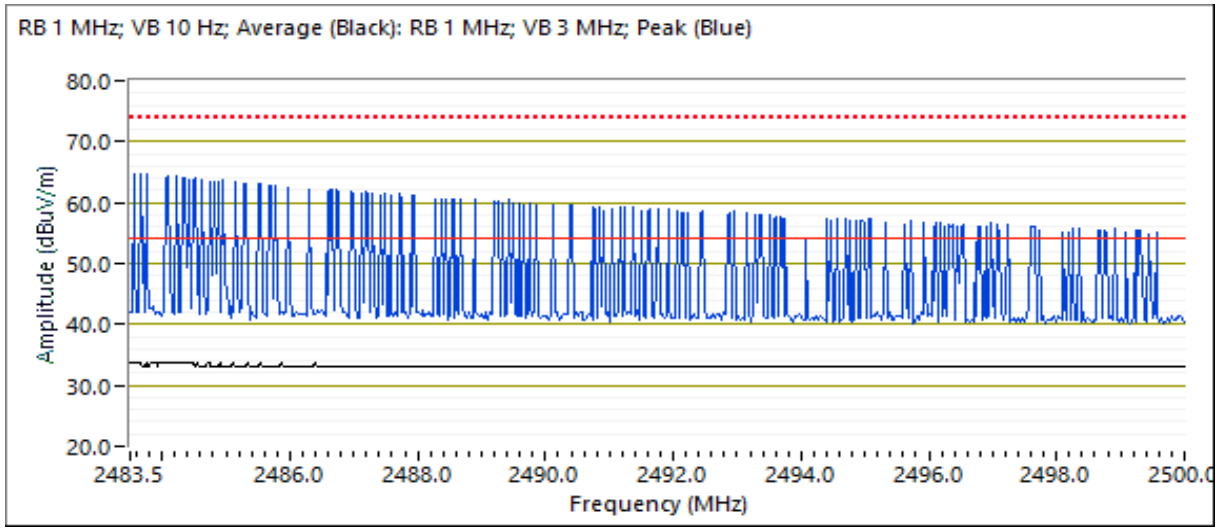
Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

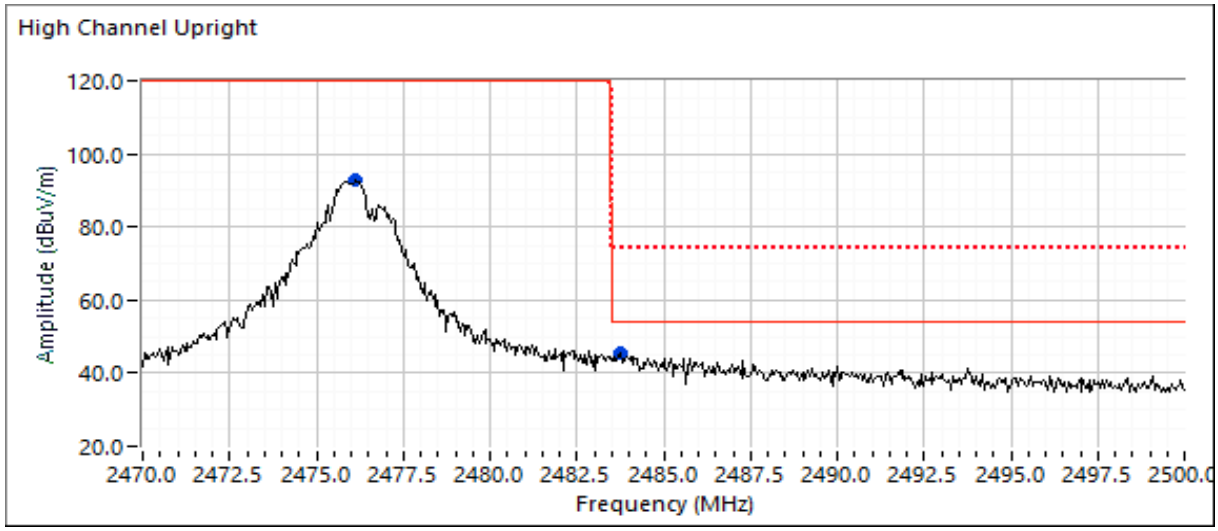
Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.630	35.1	H	54.0	-18.9	AVG	294	1.3	RB 1 MHz;VB 10 Hz;Side
2485.740	64.7	H	74.0	-9.3	PK	294	1.3	RB 1 MHz;VB 3 MHz;Side
2483.850	34.3	H	54.0	-19.7	AVG	30	1.2	RB 1 MHz;VB 10 Hz;Upright
2484.270	61.1	H	74.0	-12.9	PK	30	1.2	RB 1 MHz;VB 3 MHz;Upright
2483.620	34.3	V	54.0	-19.7	AVG	10	2.2	RB 1 MHz;VB 10 Hz;Flat
2486.220	60.5	V	74.0	-13.5	PK	10	2.2	RB 1 MHz;VB 3 MHz;Flat

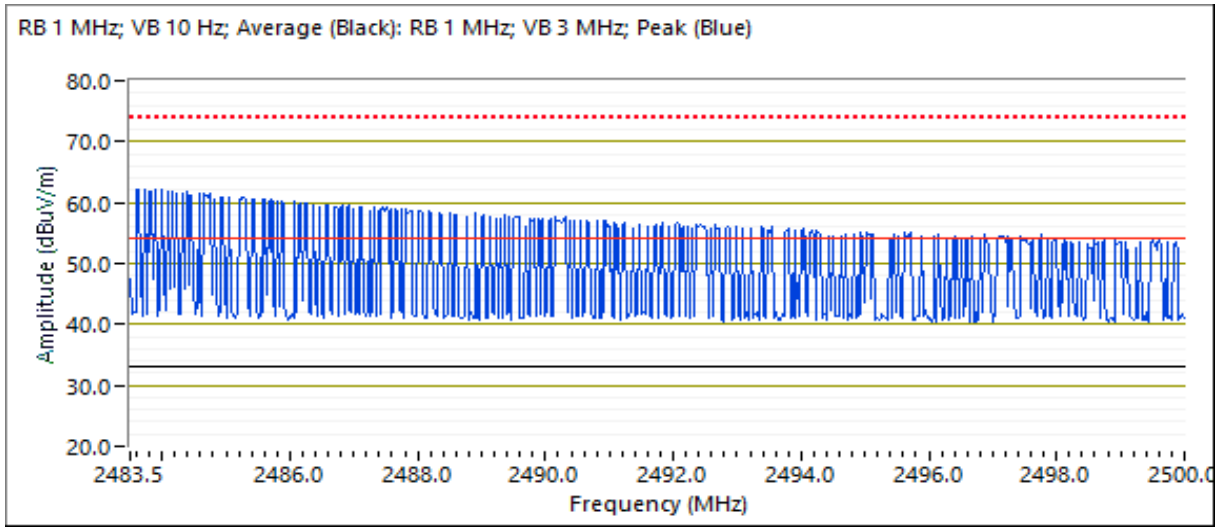


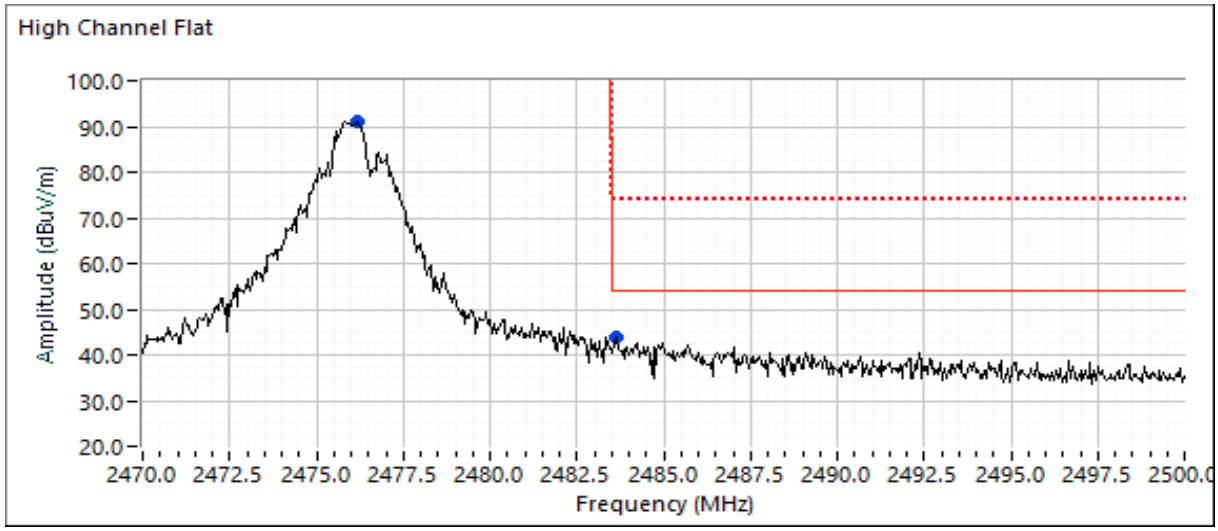
Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A



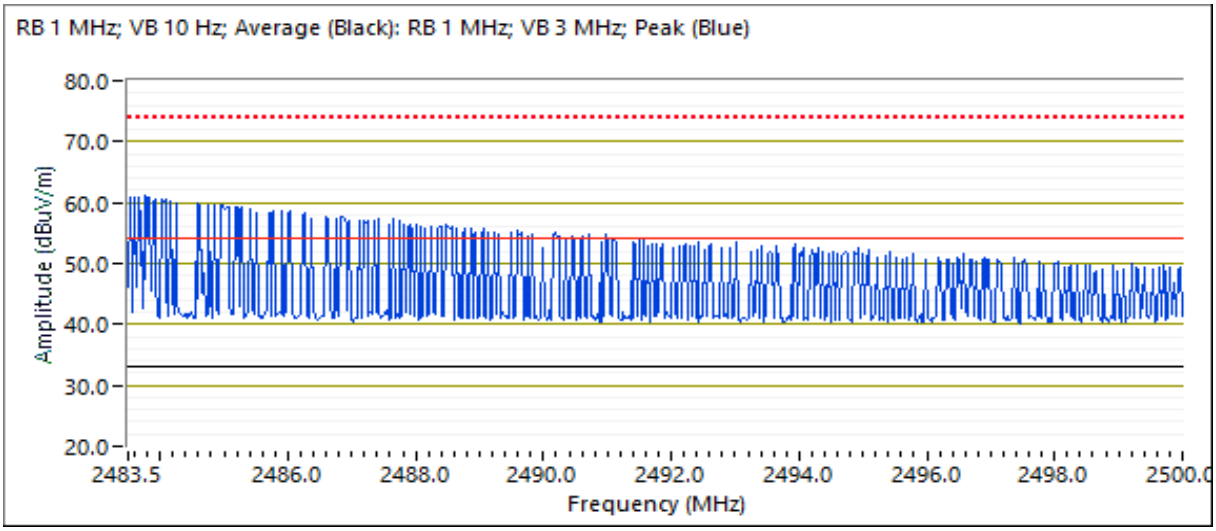


Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A





Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A



Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	-

Radiated 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: 11/7/2024
Test Engineer: David Bare
Test Location: Fremont Chamber #5 & #7

Config. Used: 1
Config Change: None
EUT Voltage: Battery

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.
The test distance and extrapolation factor (if applicable) are detailed under each run description.
Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 24-25 °C
Rel. Humidity: 36-37 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class B	Pass	17.5 dBµV/m @ 30.00 MHz (-22.5 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.

The unit was transmitting at center channel.

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	3	3	0.0

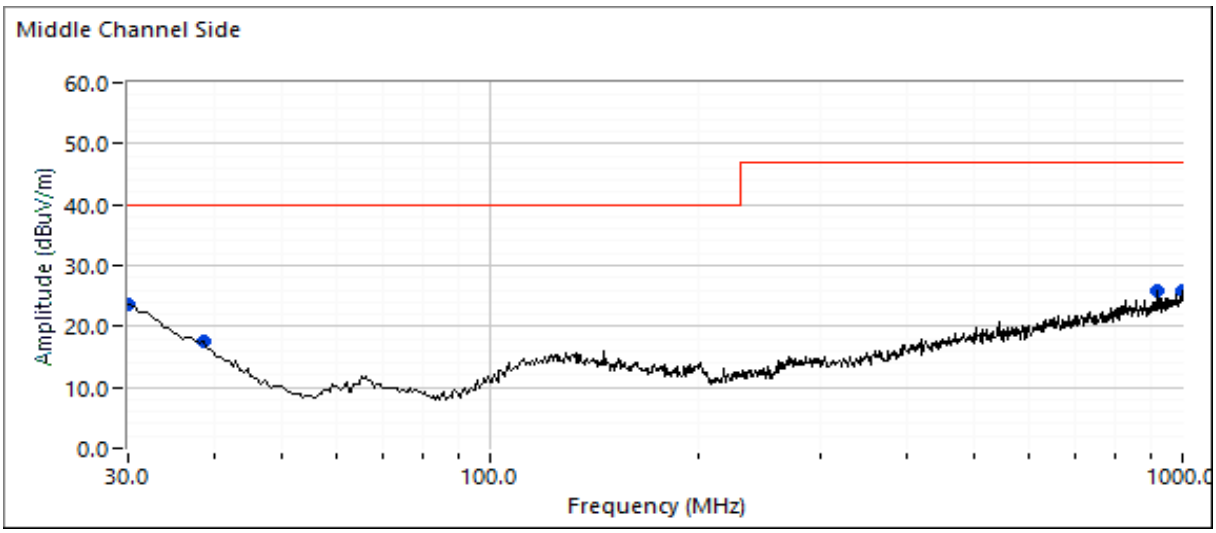
element

EMC Test Data

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	-

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz
Peak readings captured during pre-scan
worst case limit of CISPR 32, FCC and ICES used

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	PK/QP/AVG	degrees	meters	
30.000	23.7	V	40.0	-16.3	Peak	349	3.5	Noise floor
38.657	17.4	V	40.0	-22.6	Peak	232	4.0	Noise floor
920.040	25.9	V	46.0	-20.1	Peak	231	1.0	Noise floor
998.597	25.7	V	47.0	-21.3	Peak	155	1.0	Noise floor

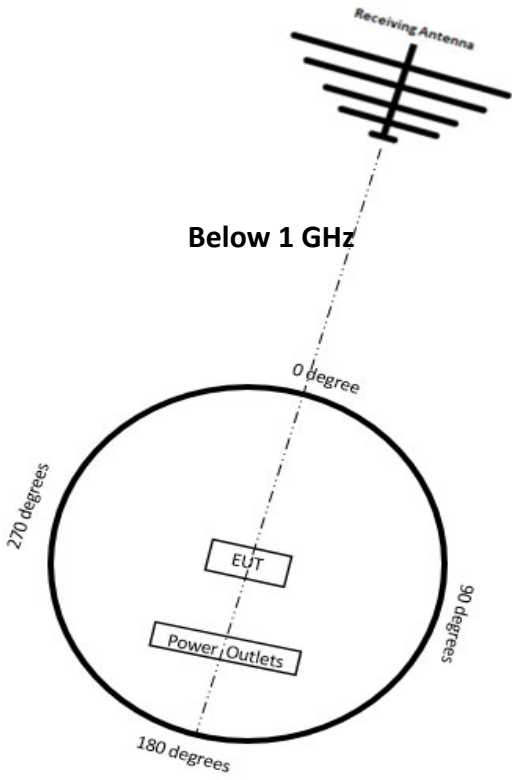


Run #2: Maximized Readings From Run #1
Maximized quasi-peak readings

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	PK/QP/AVG	degrees	meters	
30.000	17.5	V	40.0	-22.5	QP	349	3.2	QP (1.00s)
38.657	11.1	V	40.0	-28.9	QP	232	3.4	QP (1.00s)
920.040	19.5	V	46.0	-26.5	QP	256	1.0	QP (1.00s)
998.597	20.4	V	47.0	-26.6	QP	170	1.0	QP (1.00s)

Note 1:	No emissions were observed above the noise fllloor of the measurement equipment. Additional testing at other orientations and channels are not necessary for demponstrating complaince.

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HF2-
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	-



Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

RSS-247 and FCC 15.247 (DTS) Antenna Port Measurements

Power, 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: 11/6 & 12/9/2024
Test Engineer: David Bare & M. Birgani
Test Location: Fremont EMC Lab #4

Config. Used: 1
Config Change: None
EUT Voltage: Battery

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: 22-23 °C
Rel. Humidity: 27-28 %

Summary of Results

Run #	Pwr setting	Test Performed	Limit	Pass / Fail	Result / Margin
1	0	Output Power	15.247(b)	Pass	2.2 dBm
2	0	Minimum 6dB Bandwidth	15.247(a)	Pass	518 kHz
2	0	99% Bandwidth	RSS GEN	-	542 kHz
3	0	Spurious emissions	15.247(b)	Pass	All < -20dBc

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:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

Procedure Comments:

Measurements performed in accordance with ANSI C63.10

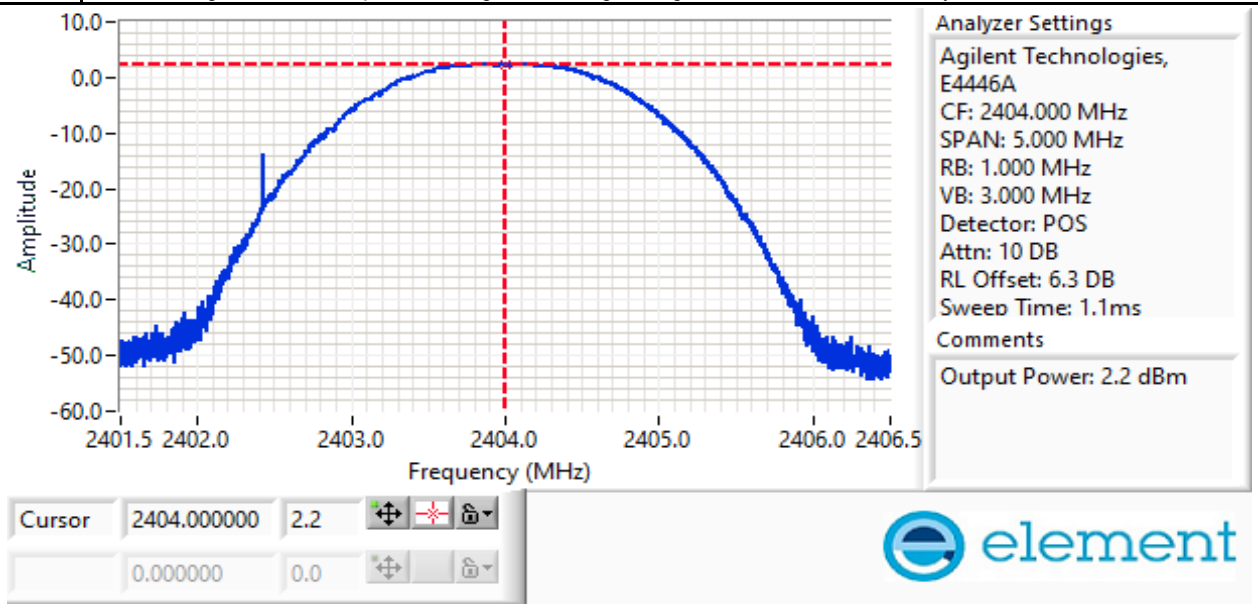
Sample Notes

Sample S/N: CE000E or CE001D

Run #1: Output Power

Power Setting[2]	Frequency (MHz)	Output Power (dBm)[1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W	Output Power (dBm)[3]	Output Power mW
0	2404	2.2	1.7	-2.9	Pass	-0.7	0.0008		
0	2440	1.9	1.5	-1.1	Pass	0.8	0.0012		
0	2476	1.3	1.3	0.5	Pass	1.8	0.0015		

Note 1:	Output power measured using a spectrun analyzer (see plot below) with RBW≥ OBW and VBW≥3* RBW, Span ≥ 2 times OBW, auto sweep time, Peak detector, Max hold, spurious limit is **-20 dBc**.
Note 2:	Power setting - the software power setting used during testing, included for reference only.



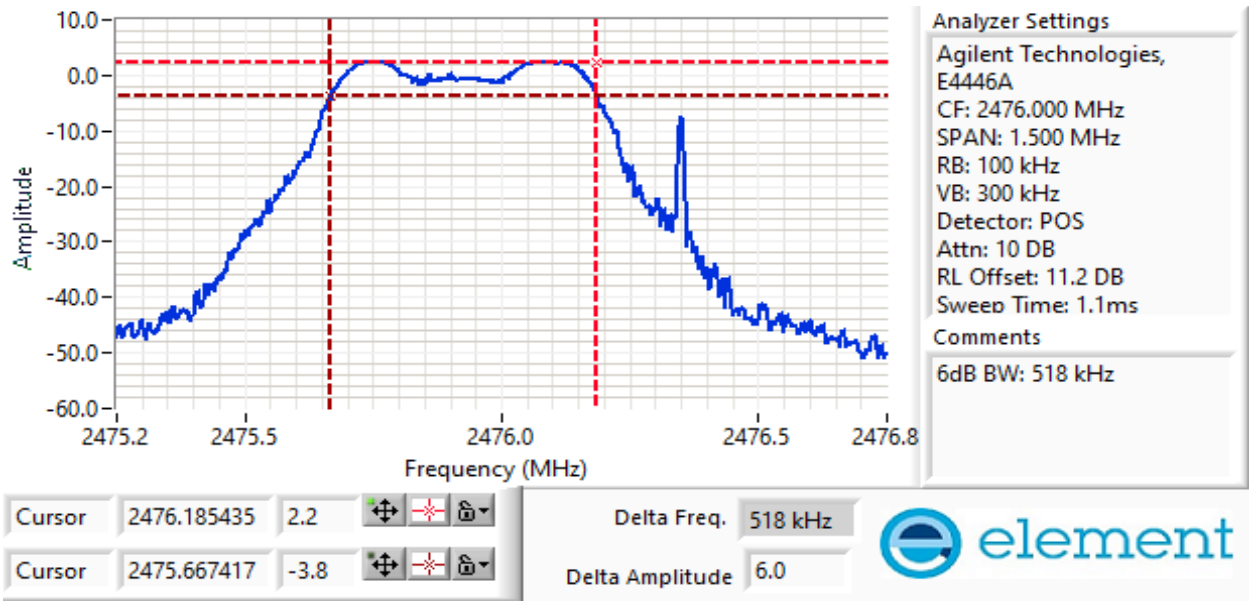
Note:	PSD not performed as total power was less than 8 dBm.

Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

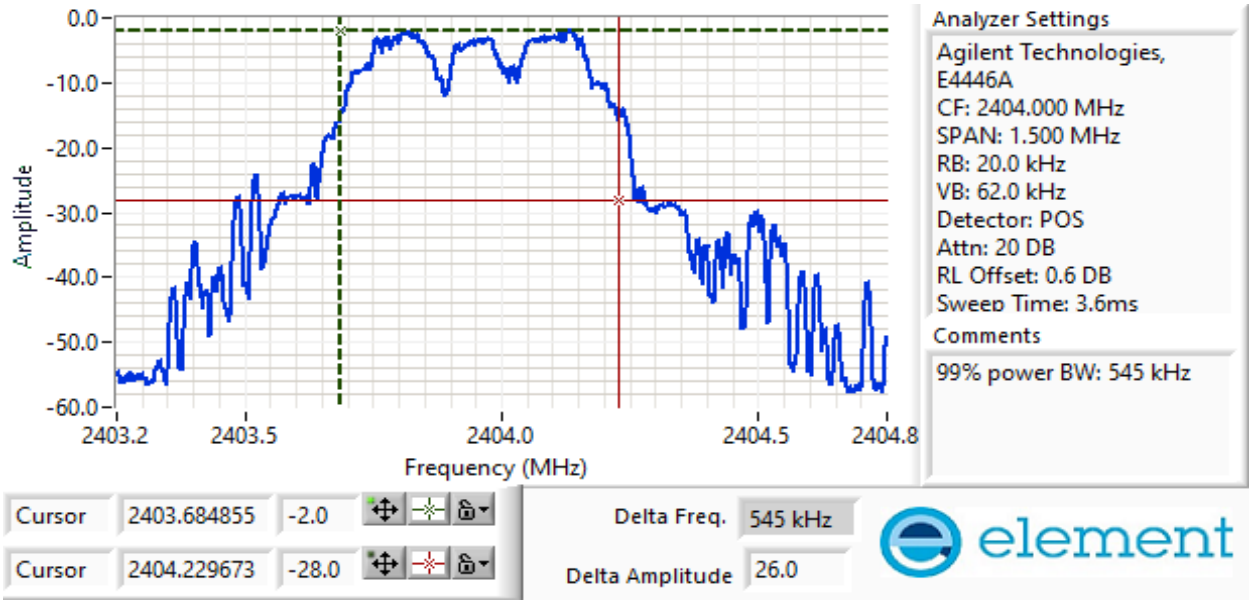
Run #2: Signal Bandwidth Performed 12/9/2024 on sample S/N: CE001D

Power Setting	Frequency (MHz)	Bandwidth (kHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
0	2404	520	545	100	20
0	2440	530	508	100	20
0	2476	518	506	100	20

Note 1:	DTS BW: RBW=100 kHz, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time, Span 2-5 times measured BW. 99% BW: RBW=1-5% of 99%BW, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time. Span 1.5-5 times OBW.



Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A



Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A

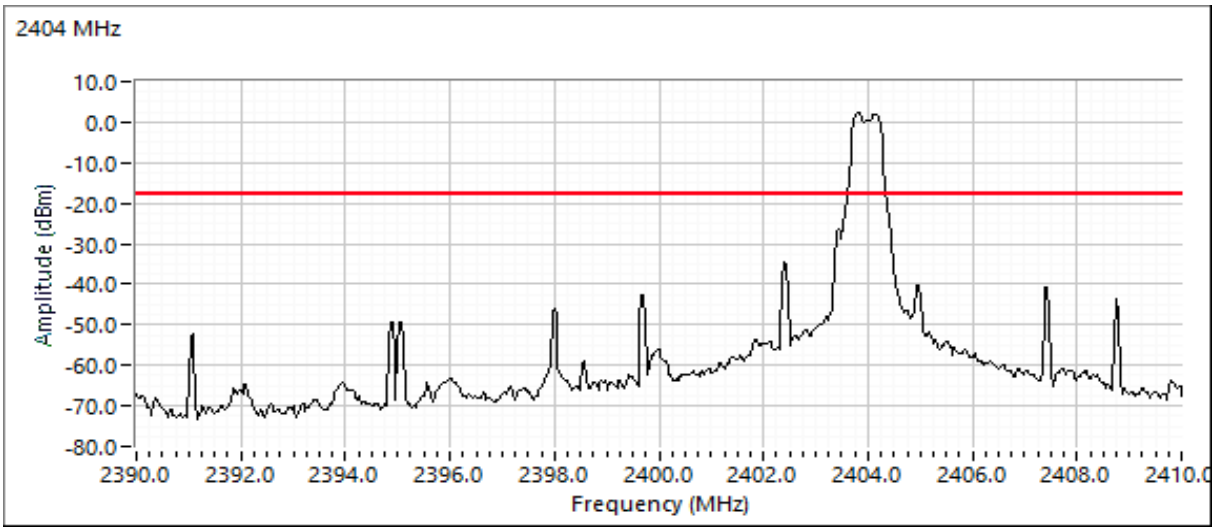
Run #3: Out of Band Spurious Emissions

Frequency (MHz)	Power Setting		Limit	Result
2404	0		-20 dBc	Pass

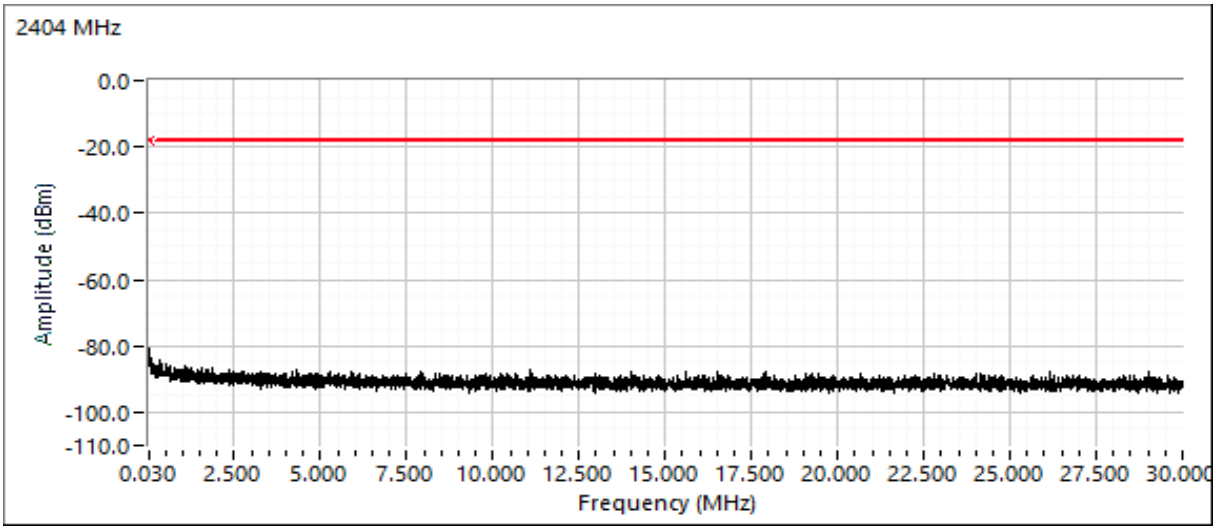
RBW = 100 kHz and VBW = 300 kHz for all plots.
RBW = 9 kHz and VBW = 30 kHz for all plots below 30 MHz.

Plots for low channel

Additional plot showing compliance with -20 dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



Client:	XPLORER	PR Number:	PR185702
Model:	DELLFMFHP	T-Log Number:	TL185702-RA-HP2-2413
		Project Manager:	Christine Krebill
Contact:	Huong Monnier	Project Engineer:	David Bare
Standard:	FCC Part 15, RSS-210, RSS-247	Class:	N/A



End of Report

This page is intentionally blank and
marks the last page of this test report.