

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: ICON28

IC CERTIFICATION #: 8392A- ICON28
FCC ID: XFJICON28

APPLICANT: XP Metal Detectors
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TEST SITE(S): Element Materials Technology Fremont
AKA: NTS Labs, LLC
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IC SITE REGISTRATION #: 2845B-3; 2845B-4, 2845B-5, 2845B-7

PROJECT NUMBER: PR185702

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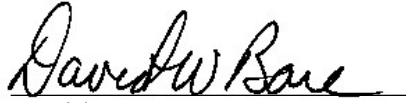


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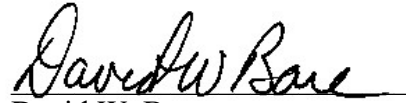
VALIDATING SIGNATORIES

PROGRAM MGR

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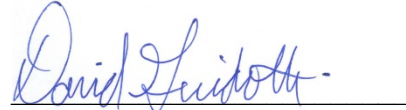
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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	January 16, 2025	First release	
1	September 29, 2025	Re-issued to separate report for 2.4GHz operation only, corrected ANSI C63.10 year, added modulation details and clarified power setting.	dwb
2	September 29, 2025	Re-issued to change the ANSI C63.10 year reference.	dwb

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SCOPE

An electromagnetic emissions test has been performed on the XP Metal Detectors model ICON28, 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”

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 C63.10-2020

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 ICON28 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”

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 ICON28 and therefore apply only to the tested sample(s). The sample(s) 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	506 kHz	>500kHz	Complies
15.247 (b) (3)	RSS 247 5.4 (4)	Output Power (multipoint systems)	2.0 dBm (0.0016 Watts) EIRP = 0.0009 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	47.5 dBμV/m @ 9904.3 MHz (-6.5 dB)	Refer to the limits section (p21) for restricted bands, all others < -20dBc	Complies
Note 1 EIRP calculated using antenna gains of -2.4 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
15.407(b) (9)	RSS-Gen Table 4	AC Conducted Emissions	29.7 dBμV @ 0.498 MHz (-16.3 dB)	Refer to page 21	Complies
15.247 (i) 15.407 (f)	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		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)	dB μ V/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dB μ V	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The XP Metal Detectors model ICON28 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, December 12, 13 and 16, 2024 and January 7, 2025. The following samples of the EUT were used during testing:

Company	Model	Description	Serial Number	FCC ID
XPLOER	ICON28	Metal detector	CE0003	XFJICON28
XPLOER	ICON28	Metal detector	D5002D	XFJICON28
XPLOER	ICON28	Metal detector	CE001B	XFJICON28
XPLOER	ICON28	Metal detector	CE001E	XFJICON28

ANTENNA SYSTEM

The antenna system consists of an integrated 28 cm loop for the detection radio and an integrated trace for the 2.4 GHz ISM band radio.

OTHER EUT INFORMATION

The detection radio in the EUT can operate from 4.1 – 45.5kHz. The 2.4GHz ISM radio can operate between 2404 and 2476MHz with a 2MHz channel separation.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 28 cm in diameter by 4.5 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 support equipment for testing:

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

or

Company	Model	Description	Serial Number	FCC ID
XPLOER	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 (F1D) on a selected channel in the 2.4 GHz ISM band at maximum power setting for rated power using the Control Box or transmit continuously an unmodeled signal (N0N) on a selected frequency from 4.1 to 45.5 kHz at maximum power setting for rated power using the DEUS II Remote Control. 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.

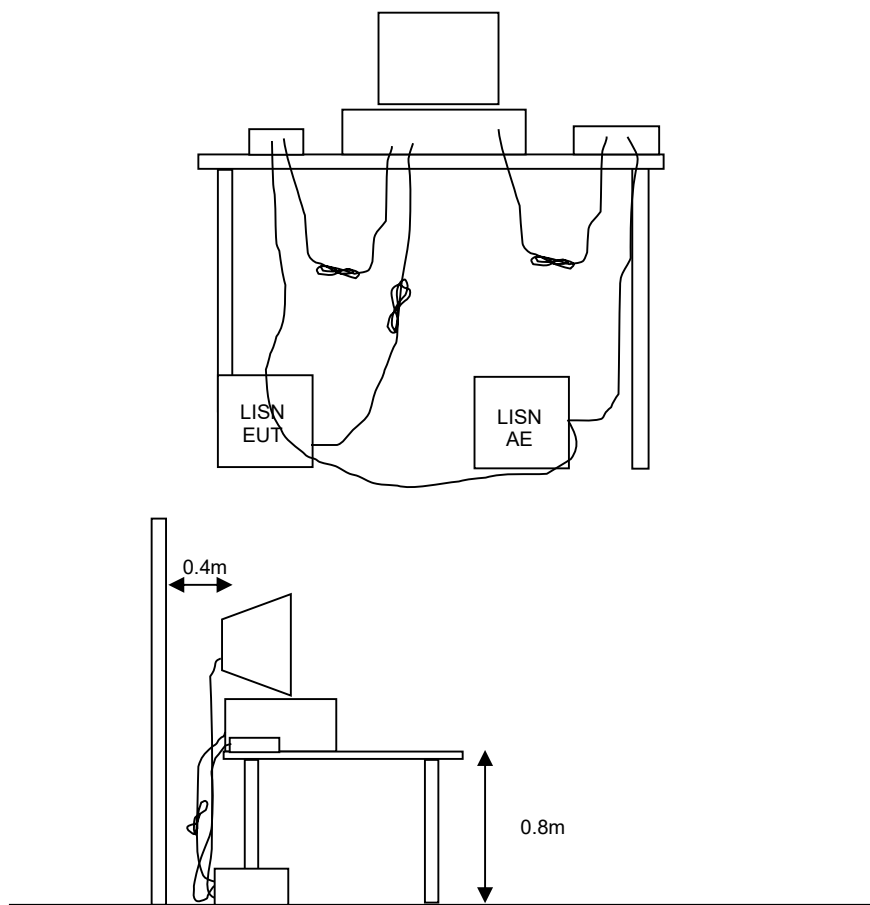


Figure 1 Typical Conducted Emissions Test Configuration

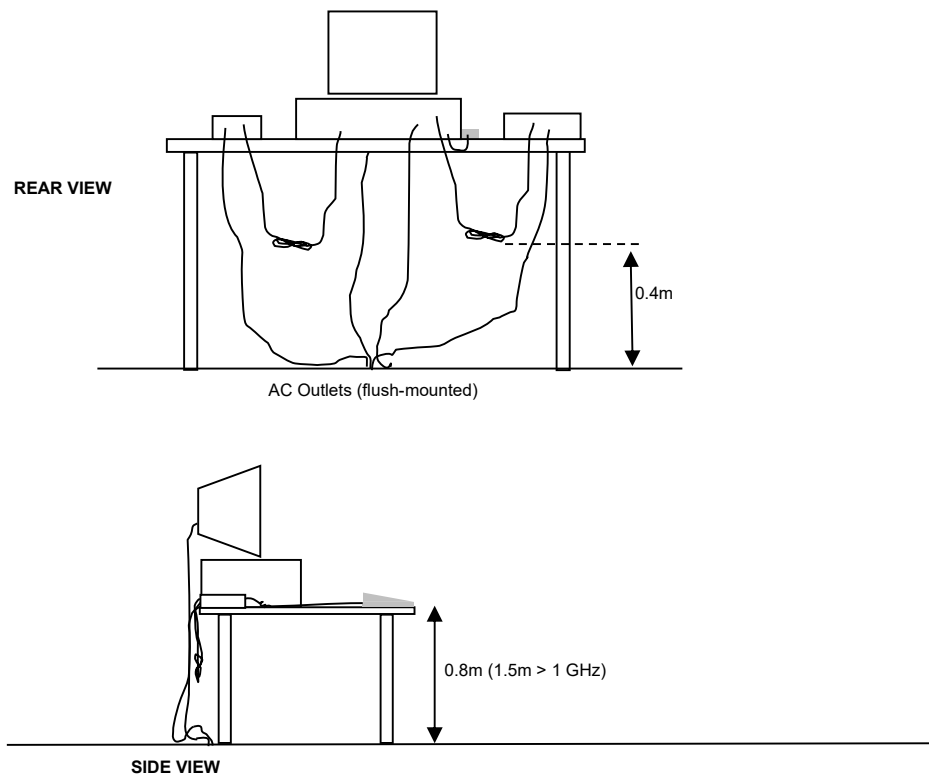
RADIATED EMISSIONS

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.

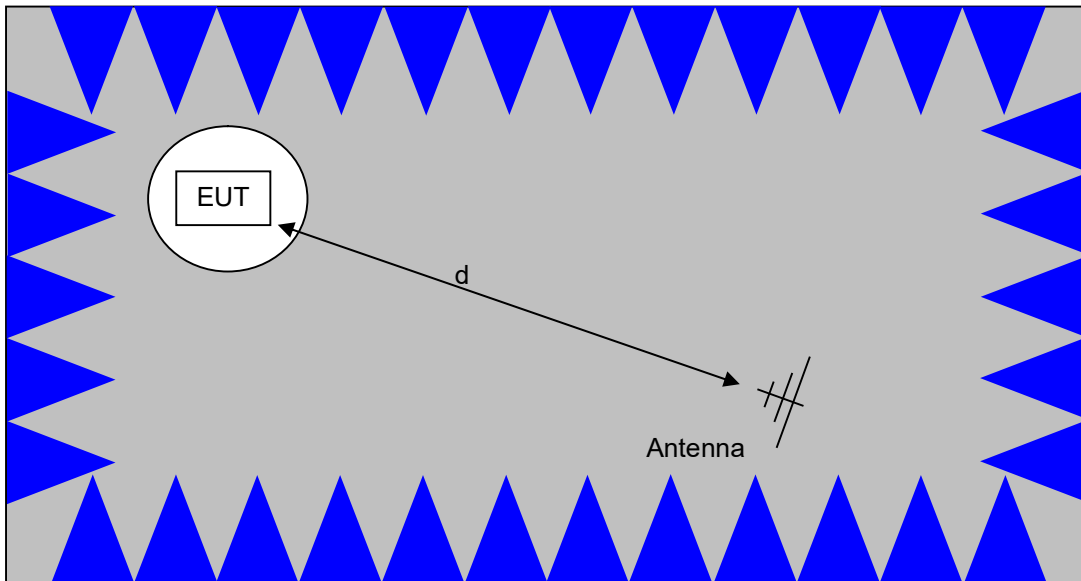
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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

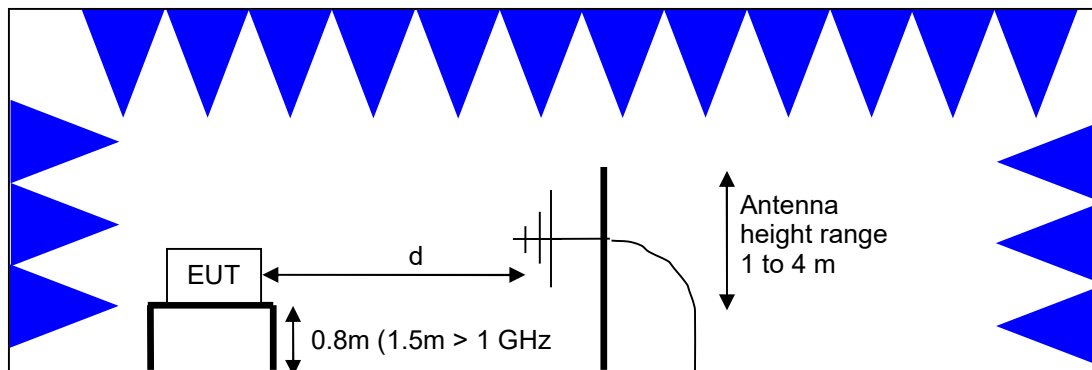


Typical Test Configuration for Radiated Field Strength Measurements



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

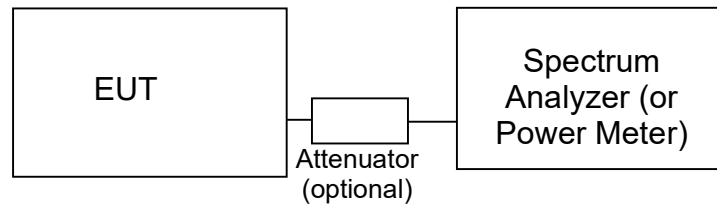
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

CONDUCTED EMISSIONS FROM ANTENNA PORT

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



Test Configuration for Antenna Port Measurements

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and 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 and for UNII \ LELAN devices below 1 GHz for FCC. See page **Error! Bookmark not defined..**

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{\text{KHz}} @ 300\text{m}$	$67.6-20*\log_{10}(F_{\text{KHz}}) @ 300\text{m}$
0.490-1.705	$24000/F_{\text{KHz}} @ 30\text{m}$	$87.6-20*\log_{10}(F_{\text{KHz}}) @ 30\text{m}$
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

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
Radiated Emissions, 1 - 25 GHz, 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
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
Hewlett Packard	Microwave Preamplifier Head, 18-40 GHz (Purple)	84125C Head	WC055610	6/12/2024	6/12/2025
A. H. Systems	Antenna, Horn, 18-40GHz	SAS-574	WC064555	8/28/2023	8/28/2025
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, Helix 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, 1,000 - 25,000 MHz, 01-Nov-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
ETS-Lindgren	EMC Chamber #7, Inner Dimensions (LxWxH): 24' x 38' x 20'	CH 7 (FACT-5)	WC055569	2/2/2023	8/8/2025

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Hewlett Packard	Spectrum Analyzer (Red)	8564E (84125C)	WC055584	7/29/2024	7/31/2025
EMCO	Antenna, Horn, 1-18 GHz	3115	WC064432	5/16/2023	5/16/2025
Hewlett Packard	High Pass filter, 3.5 GHz	84300-80038	WC064495	9/6/2024	9/6/2025
Agilent Technologies	Microwave Preamplifier, 1-26.5GHz	8449B	WC064574	4/18/2024	4/18/2025
Semflex Microwave Solutions	RF Coaxial Cable, 1 m blue	N1S3HPT19039 .4 (HPT 190)	WC064761	12/21/2023	12/21/2024
Semflex Microwave Solutions	RF Coaxial Cable, 3.5m blue	N1N1HPT30138 (HPT 305)	WC064769	4/4/2024	4/4/2025
Radiated Emissions, 1 - 11 GHz, Nov 19 and 21, 2024					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
ETS-Lindgren	EMC Chamber #7, Inner Dimensions (LxWxH): 24' x 38' x 20'	CH 7 (FACT-5)	WC055569	2/2/2023	8/8/2025
Rohde & Schwarz	Spectrum Analyzer	FSQ26	WC055662	12/28/2023	12/28/2024
EMCO	Antenna, Horn, 1-18 GHz	3115	WC064432	5/16/2023	5/16/2025
Hewlett Packard	High Pass filter, 3.5 GHz	84300-80038	WC064495	9/6/2024	9/6/2025
MITEQ	Preamplifier, 1-18 GHz	AFS44	WC071561	4/18/2024	4/18/2025
Radiated Emissions, 1 - 25 GHz, 12-Dec-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 (Red)	84125C EMI Test Head	WC055586	5/23/2024	5/23/2025
EMCO	Antenna, Horn, 1-18 GHz	3115	WC064417	9/10/2024	9/10/2026
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	WC064553	12/14/2022	12/14/2024
Agilent Technologies	Microwave Preamplifier, 1-26.5GHz	8449B	WC064574	4/18/2024	4/18/2025
Radio Antenna Port (Power and Spurious Emissions), 13-Dec-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	WC055670	10/14/2024	10/14/2025
Fairview Microwave	Attenuator 6dB 5Watt	SA18N5W-06	WC078729	N/A	
Radiated Emissions, 30 - 1,000 MHz, 16-Dec-24					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	WC064582	8/18/2022	3/24/2025
Rhode & Schwarz	EMI Test Receiver, 20Hz-26.5GHz	ESI	WC071498	7/17/2024	7/17/2025
Com-Power	Preamplifier, 1-1000MHz	PAM-103	WC080961	4/18/2024	4/18/2025
OTA, 07-Jan-25					
Rohde & Schwarz	Signal Analyzer OTA	FSV13	WC064873	10/10/2024	10/31/2025

Appendix B Test Data

TL185702-RA-ICON28 Pages 28 – 51



EMC Test Data

Client:	XPLORER	PR Number:	PR185702
Product	ICON28	T-Log Number:	TL185702-RA-ICON28
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

"EAR-Controlled Data"

These items are controlled by the U.S. Government and authorized for export only to the country of ultimate destination for use by the ultimate consignee or end-user(s) herein identified. They may not be resold, transferred, or otherwise disposed of, to any other country or to any person other than the authorized ultimate consignee or end-user(s), either in their original form or after being incorporated into other items, without first obtaining approval from the U.S. government or as otherwise authorized by U.S. law and regulations.

EMC Test Data

For The

XPLORER

Product

ICON28

Date of Last Test: 12/16/2024

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	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	22.7 dBµV @ 0.497 MHz (-23.4 dB)
2	CE, AC Power, 120V/60Hz	Class B	Pass	29.7 dBµV @ 0.498 MHz (-16.3 dB)

Modifications Made During Testing

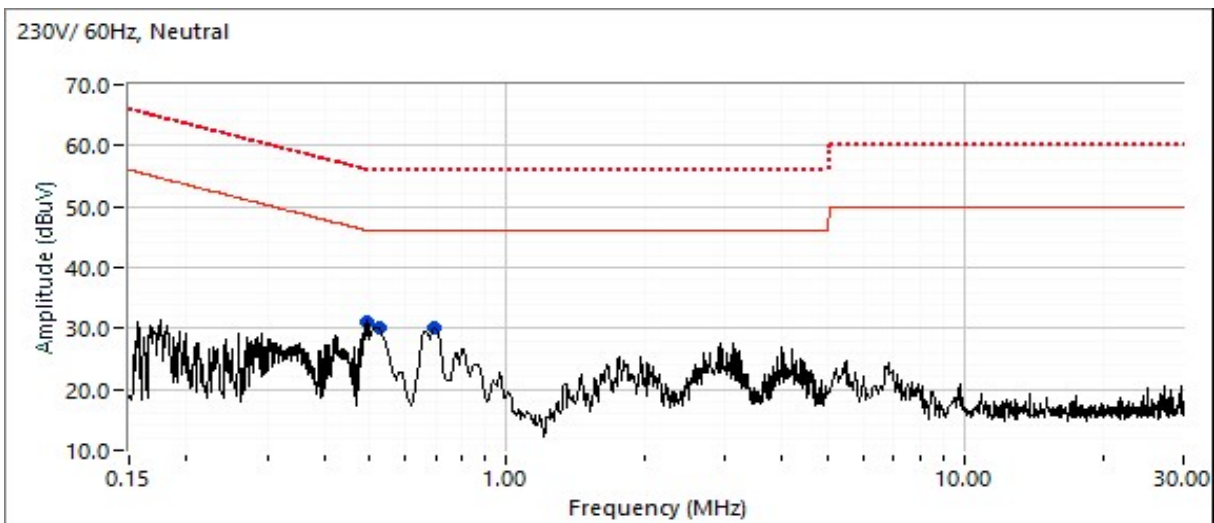
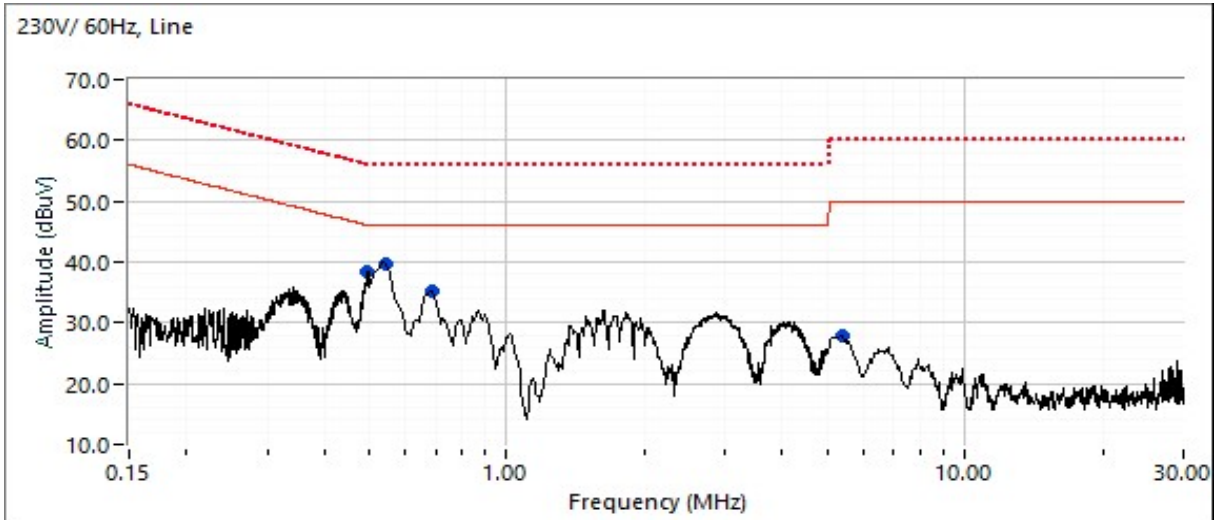
No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: -

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



Client: XPLOER

PR Number: PR185702

Model: ICON28

T-Log Number: TL185702-RA-ICON28

Contact: Huong Monnier

Project Manager: Christine Krebill

Standard: FCC Part 15, RSS-210, RSS-247

Project Engineer: David Bare

Class: -

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

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

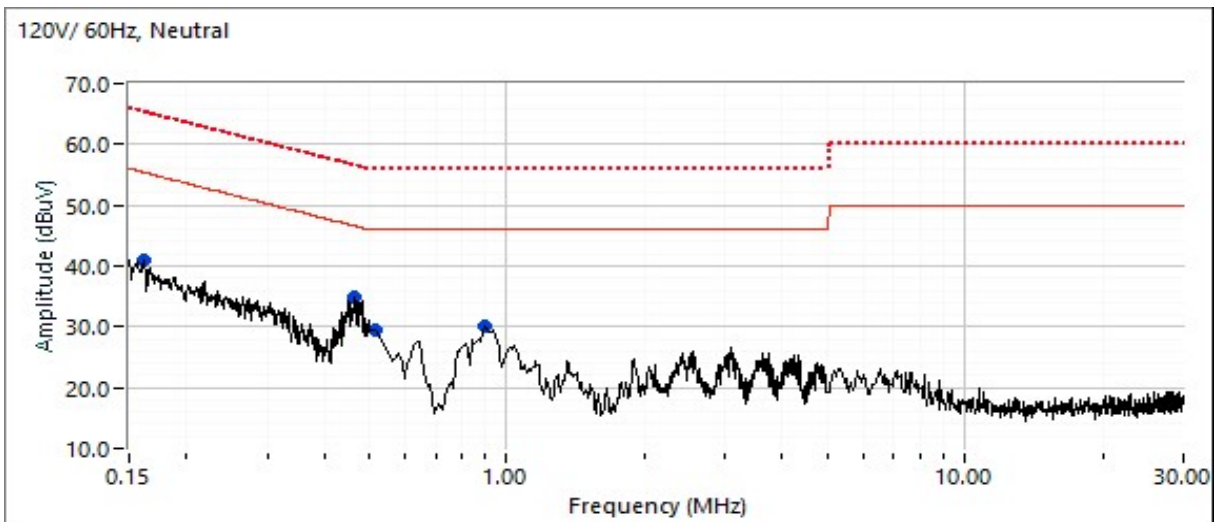
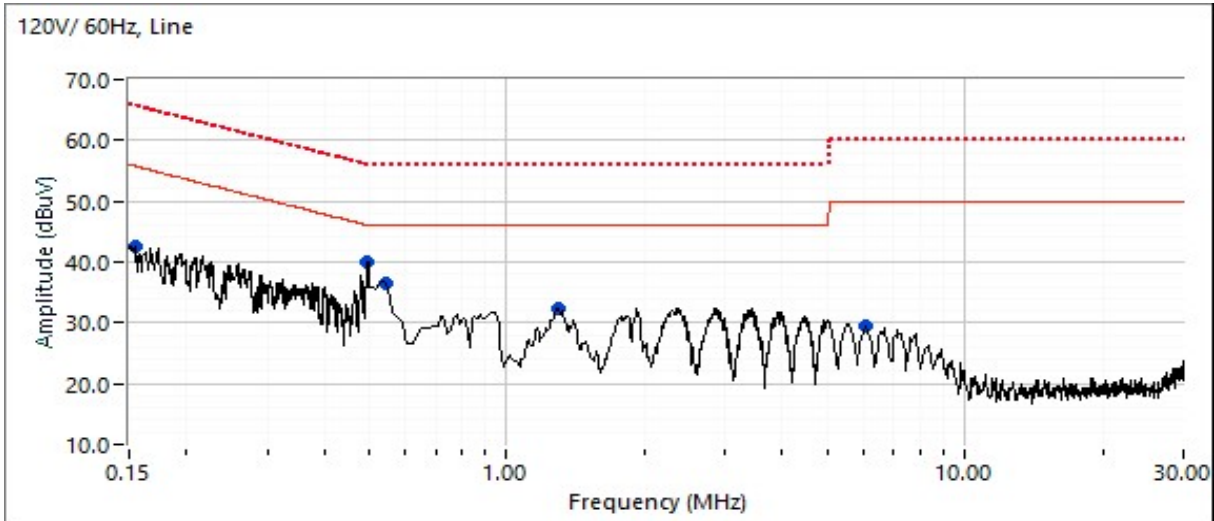
Frequency MHz	Level dB μ V	AC Line	Class A		Detector QP/AVG	Comments
			Limit	Margin		
0.494	31.2	Neutral	46.1	-14.9	Peak	
0.497	38.3	Line	46.1	-7.8	Peak	
0.527	30.1	Neutral	46.0	-15.9	Peak	
0.545	39.8	Line	46.0	-6.2	Peak	
0.689	35.1	Line	46.0	-10.9	Peak	
0.698	30.1	Neutral	46.0	-15.9	Peak	
5.401	27.8	Line	50.0	-22.2	Peak	

Final quasi-peak and average readings

Frequency MHz	Level dB μ V	AC Line	Class A		Detector QP/AVG	Comments
			Limit	Margin		
0.497	22.7	Line	46.1	-23.4	AVG	AVG (0.10s)
0.497	32.5	Line	56.1	-23.6	QP	QP (1.00s)
0.545	18.8	Line	46.0	-27.2	AVG	AVG (0.10s)
0.545	28.2	Line	56.0	-27.8	QP	QP (1.00s)
0.494	17.5	Neutral	46.1	-28.6	AVG	AVG (0.10s)
0.689	27.3	Line	56.0	-28.7	QP	QP (1.00s)
0.689	17.2	Line	46.0	-28.8	AVG	AVG (0.10s)
0.494	24.5	Neutral	56.1	-31.6	QP	QP (1.00s)
0.527	11.6	Neutral	46.0	-34.4	AVG	AVG (0.10s)
0.698	10.7	Neutral	46.0	-35.3	AVG	AVG (0.10s)
0.527	19.9	Neutral	56.0	-36.1	QP	QP (1.00s)
0.698	18.8	Neutral	56.0	-37.2	QP	QP (1.00s)
5.401	11.6	Line	50.0	-38.4	AVG	AVG (0.10s)
5.401	21.3	Line	60.0	-38.7	QP	QP (1.00s)

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: -

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



Client: XPLOER

PR Number: PR185702

Model: ICON28

T-Log Number: TL185702-RA-ICON28

Contact: Huong Monnier

Project Manager: Christine Krebill

Standard: FCC Part 15, RSS-210, RSS-247

Project Engineer: David Bare

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 MHz	Level dB μ V	AC Line	Class A		Detector QP/AVG	Comments
			Limit	Margin		
0.154	42.6	Line	55.8	-13.2	Peak	
0.162	40.8	Neutral	55.4	-14.6	Peak	
0.467	34.9	Neutral	46.6	-11.7	Peak	
0.498	39.9	Line	46.0	-6.1	Peak	
0.518	29.6	Neutral	46.0	-16.4	Peak	
0.545	36.6	Line	46.0	-9.4	Peak	
0.897	30.2	Neutral	46.0	-15.8	Peak	
1.294	32.5	Line	46.0	-13.5	Peak	
6.102	29.4	Line	50.0	-20.6	Peak	

Final quasi-peak and average readings

Frequency MHz	Level dB μ V	AC Line	Class A		Detector QP/AVG	Comments
			Limit	Margin		
0.498	29.7	Line	46.0	-16.3	AVG	AVG (0.10s)
0.498	37.7	Line	56.0	-18.3	QP	QP (1.00s)
0.545	22.0	Line	46.0	-24.0	AVG	AVG (0.10s)
0.518	21.3	Neutral	46.0	-24.7	AVG	AVG (0.10s)
0.467	21.2	Neutral	46.6	-25.4	AVG	AVG (0.10s)
0.545	29.4	Line	56.0	-26.6	QP	QP (1.00s)
0.154	38.4	Line	65.8	-27.4	QP	QP (1.00s)
1.294	28.3	Line	56.0	-27.7	QP	QP (1.00s)
0.467	28.7	Neutral	56.6	-27.9	QP	QP (1.00s)
1.294	17.8	Line	46.0	-28.2	AVG	AVG (0.10s)
0.518	27.1	Neutral	56.0	-28.9	QP	QP (1.00s)
0.162	35.7	Neutral	65.4	-29.7	QP	QP (1.00s)
0.897	25.5	Neutral	56.0	-30.5	QP	QP (1.00s)
0.897	14.8	Neutral	46.0	-31.2	AVG	AVG (0.10s)
0.154	22.6	Line	55.8	-33.2	AVG	AVG (0.10s)
0.162	17.5	Neutral	55.4	-37.9	AVG	AVG (0.10s)
6.102	11.4	Line	50.0	-38.6	AVG	AVG (0.10s)
6.102	19.7	Line	60.0	-40.3	QP	QP (1.00s)

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	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: 22 °C
Rel. Humidity: 42 %

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

Run #	Channel	Power Setting	Test Performed	Limit	Result / Margin
1	Low	0 dBm	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	46.4 dBμV/m @ 4808.1 MHz (-7.6 dB)
	Low	0 dBm	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	32.6 dBμV/m @ 2384.2 MHz (-21.4 dB)
	Center	0 dBm	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	45.1 dBμV/m @ 4880.1 MHz (-8.9 dB)
	High	0 dBm	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	47.5 dBμV/m @ 9904.3 MHz (-6.5 dB)
	High	0 dBm	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	63.1 dBμV/m @ 2484.2 MHz (-10.9 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.

Sample Notes

Sample S/N: CE001E

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	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 $\geq 98\%$ 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	83.9%	Yes	33.179	0.8	1.5	30

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 $\geq 98\%$, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 4:	Emission has constant duty cycle $< 98\%$, average measurement performed: RBW=1MHz, VBW $>1/T$ but not less than 10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear voltage correction factor
Note 5:	All three orientations were evaluated at low and center frequency. Only worse case (Side) was tested at high channel.
Note 6:	Scans made between 13 - 25 GHz with the measurement antenna moved around the EUT 30cm from the device indicated there were no significant emissions in this frequency range.
Note 7:	From 8-13GHz scan was performed at 1m and extrapolated to 3m. All final measurement were performed at 3m distance.

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz

Date of Test: 12/12/2024

Test Engineer: M. Birgani

Test Location: Fremont Chamber #7

Config. Used: 1

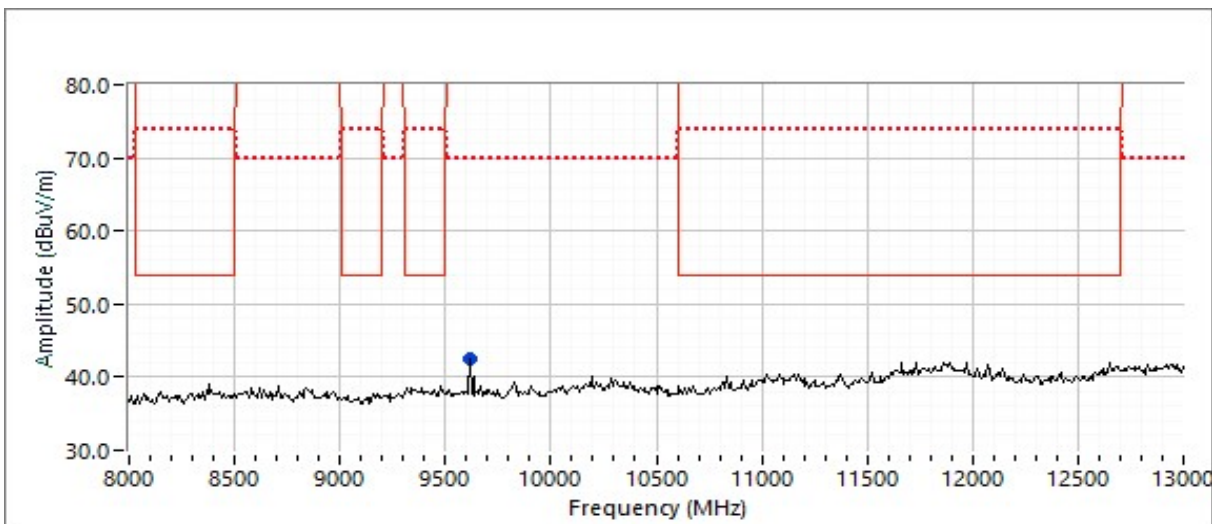
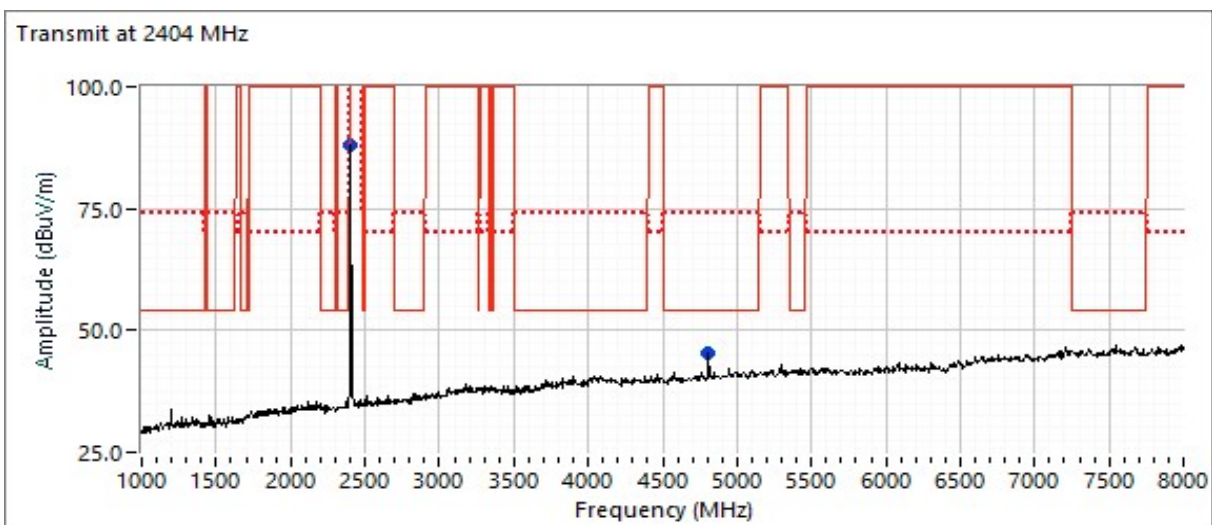
Config Change: None

EUT Voltage: Battery

Run #1a: Low Channel

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2404.000	89.1	H	-	-	Peak	187	1.4	Fundamental; Side
9616.410	40.6	V	54.0	-13.4	AVG	136	1.0	RB 1MHz;VB 30Hz;Note1,Side
9616.300	47.8	V	74.0	-26.2	PK	136	1.0	RB 1 MHz;VB 3 MHz;Note1,Side
4808.320	43.3	V	54.0	-10.7	AVG	118	2.5	RB 1MHz;VB 30Hz;Note4,Upright
4807.740	49.9	V	74.0	-24.1	PK	118	2.5	RB 1 MHz;VB 3 MHz;Upright
4808.090	45.9	H	54.0	-8.1	AVG	118	1.5	RB 1MHz;VB 30Hz;Note4,Side
4807.740	51.2	H	74.0	-22.8	PK	118	1.5	RB 1MHz;VB 3MHz;Side
4808.170	39.7	V	54.0	-14.3	AVG	360	1.4	RB 1MHz;VB 30Hz;Note4,Side
4807.920	48.7	V	74.0	-25.3	PK	360	1.4	RB 1MHz;VB 3MHz;Side
4808.100	46.4	V	54.0	-7.6	AVG	13	1.7	RB 1MHz;VB 30Hz;Note4,Flat
4807.340	50.9	V	74.0	-23.1	PK	13	1.7	RB 1MHz;VB 3MHz;Flat
4808.120	43.1	H	54.0	-10.9	AVG	360	1.5	RB 1MHz;VB 30Hz;Note4,Flat
4807.940	50.0	H	74.0	-24.0	PK	360	1.5	RB 1MHz;VB 3MHz;Flat

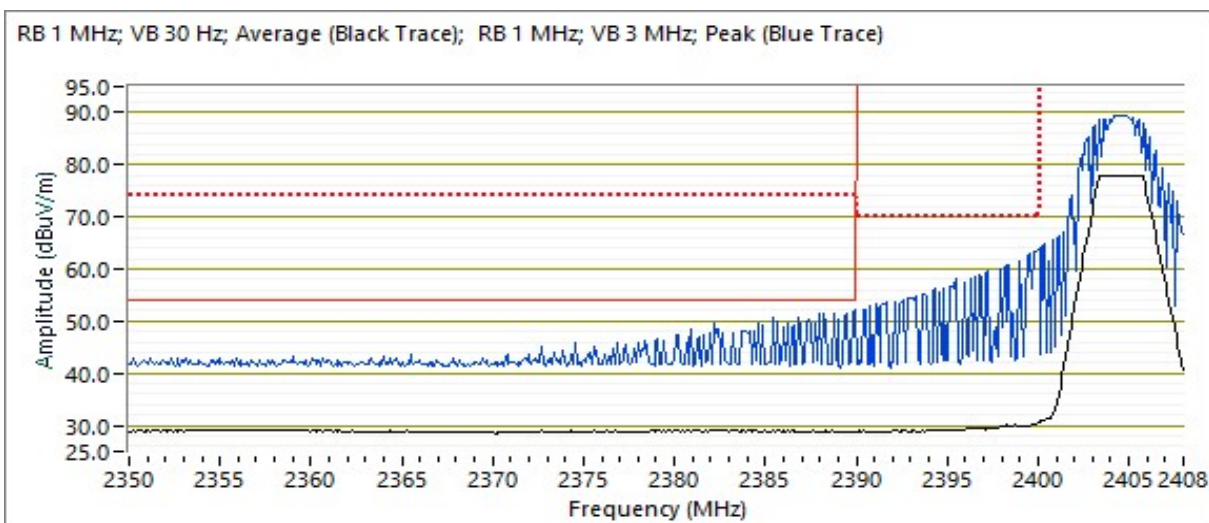
Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A



Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	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	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2384.160	32.6	V	54.0	-21.4	AVG	229	1.2	RB 1MHz;VB 30Hz;Note4;Side
2387.370	46.9	V	74.0	-27.1	PK	229	1.2	RB 1 MHz;VB 3 MHz;Side
2385.280	29.3	H	54.0	-24.7	AVG	186	1.4	RB 1MHz;VB 30Hz;Note4;Side
2385.420	52.6	H	74.0	-21.4	PK	186	1.4	RB 1 MHz;VB 3 MHz;Side
2385.270	29.3	V	54.0	-24.7	AVG	196	1.7	RB 1MHz;VB 30Hz;Note4;Upright
2386.140	49.9	V	74.0	-24.1	PK	196	1.7	RB 1 MHz;VB 3 MHz;Upright
2385.030	31.8	H	54.0	-22.2	AVG	290	1.3	RB 1MHz;VB 30Hz;Note4;Upright
2389.710	48.6	H	74.0	-25.4	PK	290	1.3	RB 1 MHz;VB 3 MHz;Upright
2385.960	29.1	V	54.0	-24.9	AVG	22	1.4	RB 1MHz;VB 30Hz;Note4;Flat
2386.840	51.2	V	74.0	-22.8	PK	22	1.4	RB 1 MHz;VB 3 MHz;Flat
2386.180	29.3	H	54.0	-24.7	AVG	123	1.5	RB 1MHz;VB 30Hz;Note4;Flat
2388.320	50.5	H	74.0	-23.5	PK	123	1.5	RB 1 MHz;VB 3 MHz;Flat





EMC Test Data

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

Run #1b: Center Channel

Date of Test: 12/12/2024

Test Engineer: M. Birgani

Test Location: Fremont Chamber #7

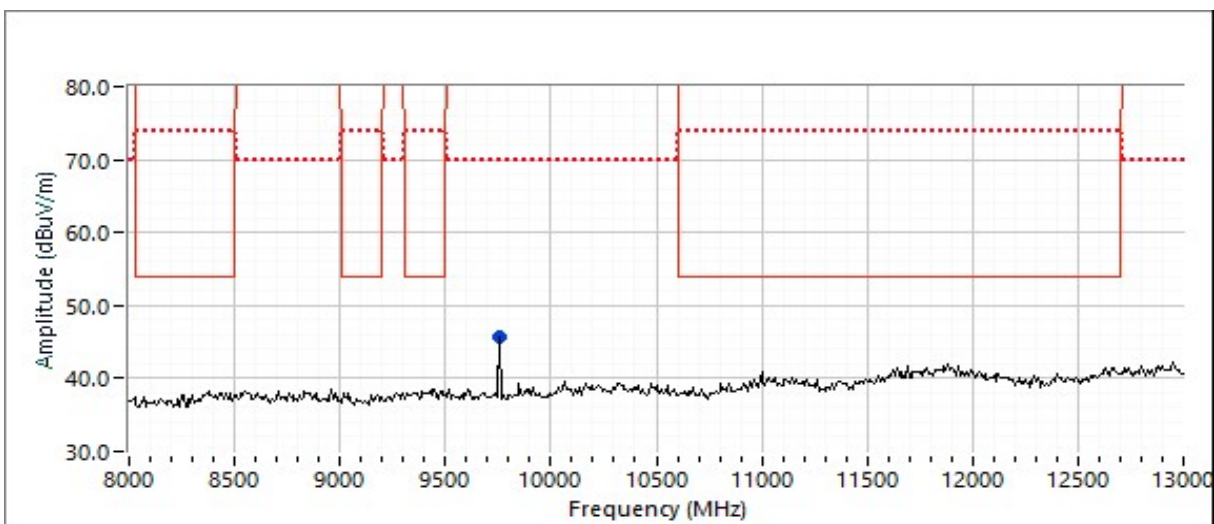
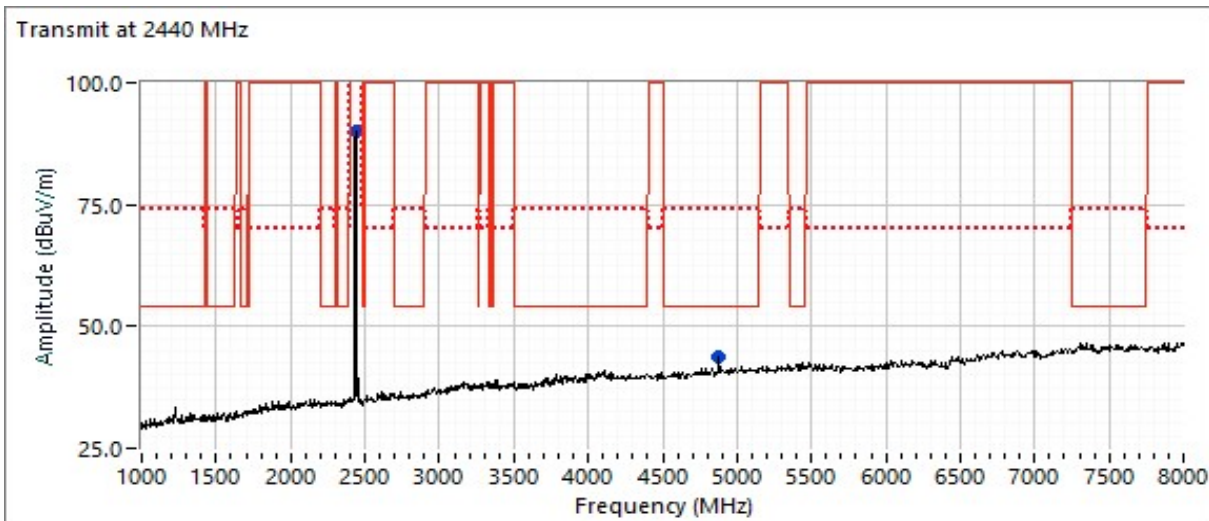
Config. Used: 1

Config Change: None

EUT Voltage: Battery

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2440.000	90.1	H	-	-	Peak	137	1.7	Fundamental; Side
4880.290	40.5	V	54.0	-13.5	AVG	186	1.7	RB 1 MHz;VB 30 Hz;Note 4;Upright
4879.810	48.2	V	74.0	-25.8	PK	186	1.7	RB 1 MHz;VB 3 MHz;Peak;Upright
4880.100	43.0	H	54.0	-11.0	AVG	224	1.5	RB 1 MHz;VB 30 Hz;Note 4;Upright
4879.600	49.7	H	74.0	-24.3	PK	224	1.5	RB 1 MHz;VB 3 MHz;Peak;Upright
4880.130	44.8	H	54.0	-9.2	AVG	198	1.5	RB 1 MHz;VB 30 Hz;Note 4;Side
4880.260	50.0	H	74.0	-24.0	PK	198	1.5	RB 1 MHz;VB 3 MHz;Peak;Side
4880.140	45.1	V	54.0	-8.9	AVG	235	1.7	RB 1 MHz;VB 30 Hz;Note 4;Side
4879.630	51.3	V	74.0	-22.7	PK	235	1.7	RB 1 MHz;VB 3 MHz;Peak;Side
4880.230	44.4	V	54.0	-9.6	AVG	340	1.6	RB 1 MHz;VB 30 Hz;Note 4;Flat
4879.820	50.1	V	74.0	-23.9	PK	340	1.6	RB 1 MHz;VB 3 MHz;Peak;Flat
4879.920	41.7	H	54.0	-12.3	AVG	47	1.1	RB 1 MHz;VB 30 Hz;Note 4;Flat
4879.500	49.2	H	74.0	-24.8	PK	47	1.1	RB 1 MHz;VB 3 MHz;Peak;Flat
9760.520	44.1	V	54.0	-9.9	AVG	150	1.6	RB 1MHz;VB 30Hz;Note1,Side
9759.860	49.7	V	74.0	-24.3	PK	150	1.6	RB 1MHz;VB 3MHz;Note1,Side

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

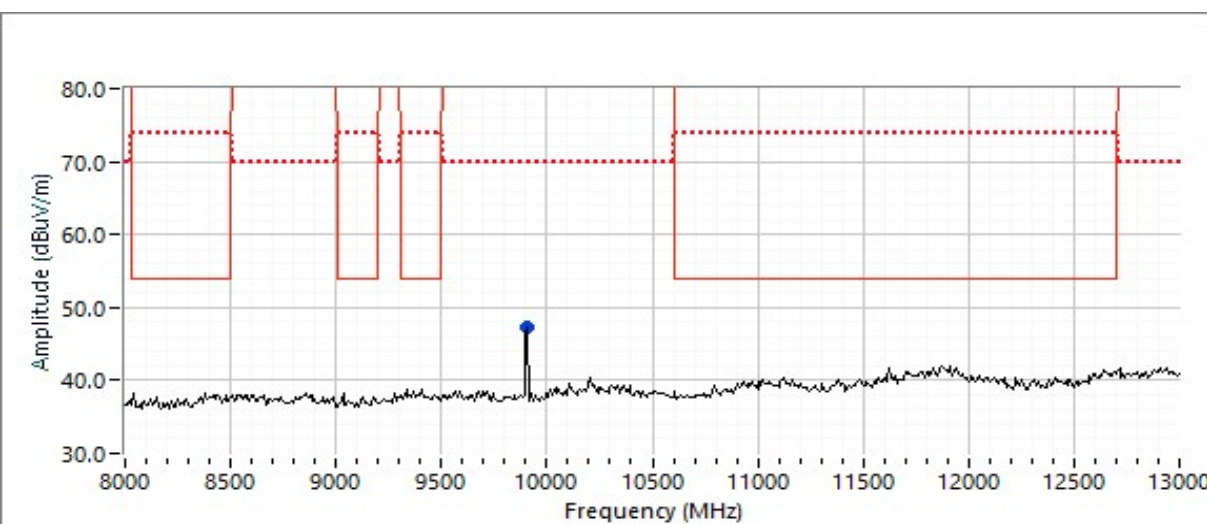
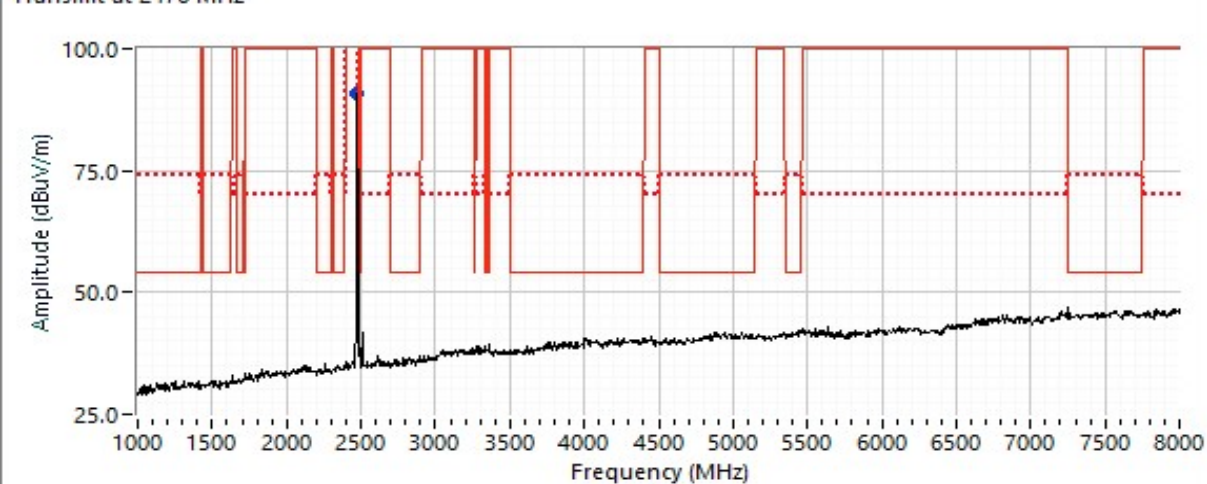


Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

Run #1c: High Channel

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2476.000	90.9	V	-	-	Peak	127	1.9	Fundamental; Side
9904.290	47.5	V	54.0	-6.5	AVG	122	1.6	RB 1 MHz;VB 30 Hz;Note1,Side
9902.990	51.8	V	74.0	-22.2	PK	122	1.6	RB 1 MHz;VB 3 MHz;Note1,Side

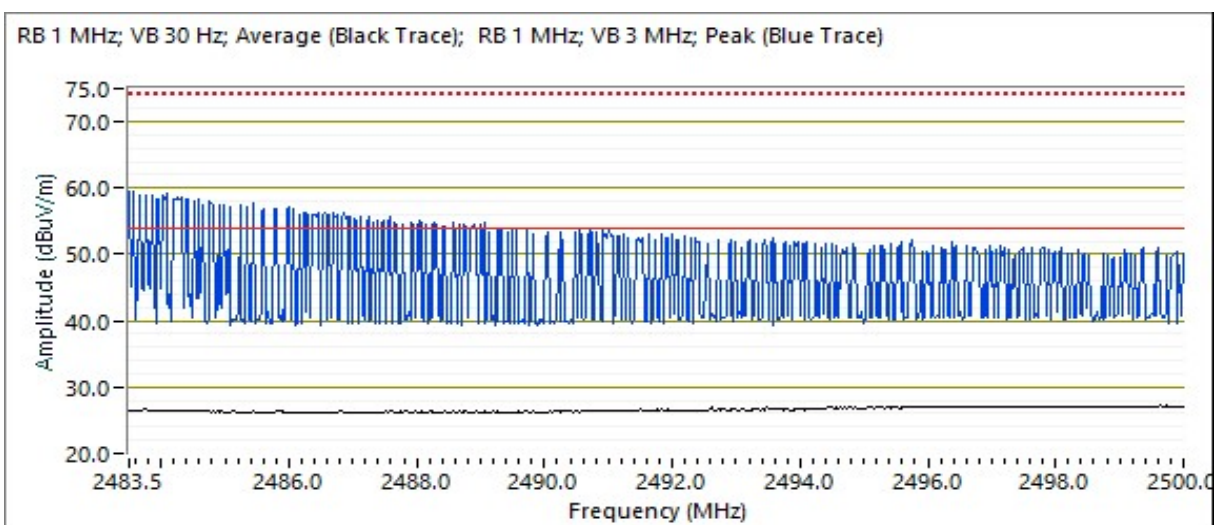
Transmit at 2476 MHz



Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	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	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.510	28.2	V	54.0	-25.8	AVG	26	1.3	RB 1MHz;VB 30Hz;Note4;Flat
2484.870	57.3	V	74.0	-16.7	PK	26	1.3	RB 1 MHz;VB 3 MHz;Flat
2483.750	30.2	H	54.0	-23.8	AVG	118	1.2	RB 1MHz;VB 30Hz;Note4;Flat
2483.530	59.4	H	74.0	-14.6	PK	118	1.2	RB 1 MHz;VB 3 MHz;Flat
2483.640	30.2	H	54.0	-23.8	AVG	204	1.6	RB 1MHz;VB 30Hz;Note4;Side
2484.220	63.1	H	74.0	-10.9	PK	204	1.6	RB 1 MHz;VB 3 MHz;Side
2483.980	29.1	V	54.0	-24.9	AVG	240	1.0	RB 1MHz;VB 30Hz;Note4;Side
2484.550	54.8	V	74.0	-19.2	PK	240	1.0	RB 1 MHz;VB 3 MHz;Side
2483.850	31.0	H	54.0	-23.0	AVG	256	1.1	RB 1MHz;VB 30Hz;Note4;Upright
2484.860	56.2	H	74.0	-17.8	PK	256	1.1	RB 1 MHz;VB 3 MHz;Upright
2483.550	29.7	V	54.0	-24.3	AVG	146	1.3	RB 1MHz;VB 30Hz;Note4;Upright
2483.630	60.8	V	74.0	-13.2	PK	146	1.3	RB 1 MHz;VB 3 MHz;Upright



Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

RSS-247 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: 12/13/2024
Test Engineer: 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	2.0 dBm
2	0	Minimum 6dB Bandwidth	15.247(a)	Pass	506 kHz
2	0	99% Bandwidth	RSS GEN	-	
3	0	Spurious emissions	15.247(b)	Pass	All signals were >20dB below 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.

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

Procedure Comments:

Measurements performed in accordance with ANSI C63.10

Sample Notes

Sample S/N: CE001B

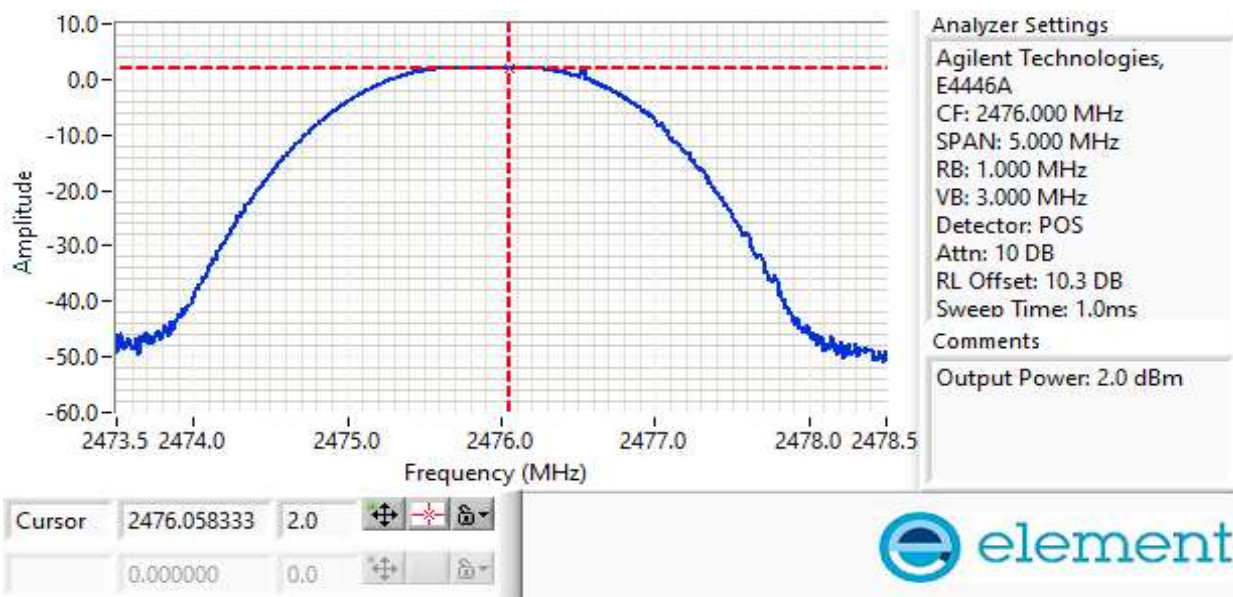
Modulation: GFSK

Run #1: Output Power

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) ¹	mW			dBm	W	(dBm) ³	mW
0	2404	0.8	1.2	-4.3	Pass	-3.5	0.0004		
0	2440	1.5	1.4	-3.3	Pass	-1.8	0.0007		
0	2476	2.0	1.6	-2.4	Pass	-0.4	0.0009		

Note 1: Output power measured using a spectrun analyzer (see plot below) with RBW $\geq$ OBW and VBW $\geq$ 3* RBW, Span $\geq$ 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.

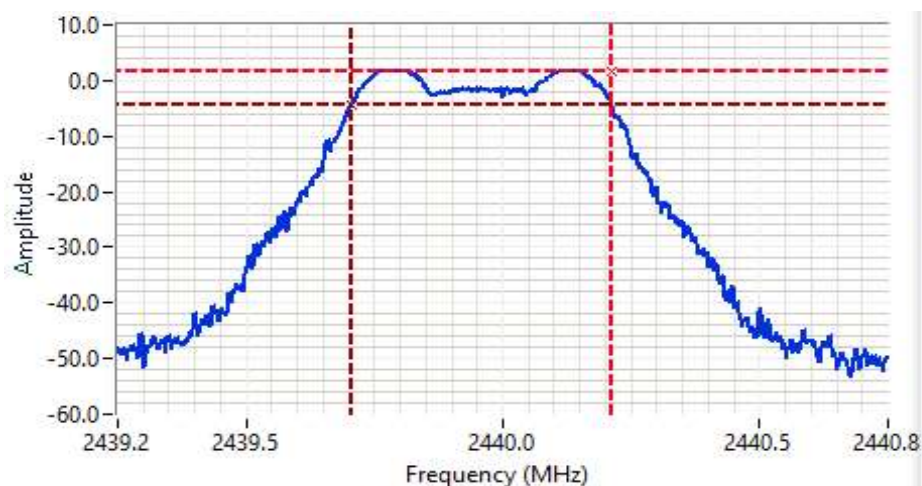
Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

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	508	507	100	20
0	2440	506	504	100	20
0	2476	553	507	100	20

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



Analyzer Settings

Agilent Technologies,
E4446A
CF: 2440.000 MHz
SPAN: 1.500 MHz
RB: 100 kHz
VB: 300 kHz
Detector: POS
Attn: 10 DB
RL Offset: 11.2 DB
Sweep Time: 1.1ms

Comments

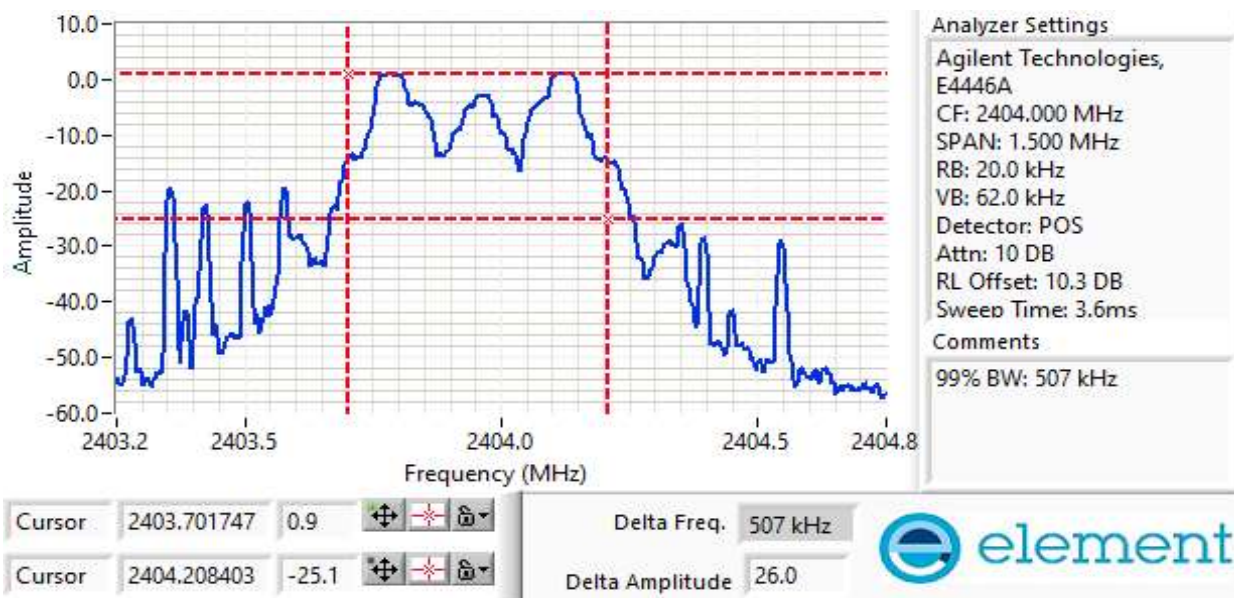
6dB BW: 506 kHz

Cursor	2440.212462	1.7	
Cursor	2439.706456	-4.3	

Delta Freq. 506 kHz

Delta Amplitude 6.0

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A



Run #3: Out of Band Spurious Emissions

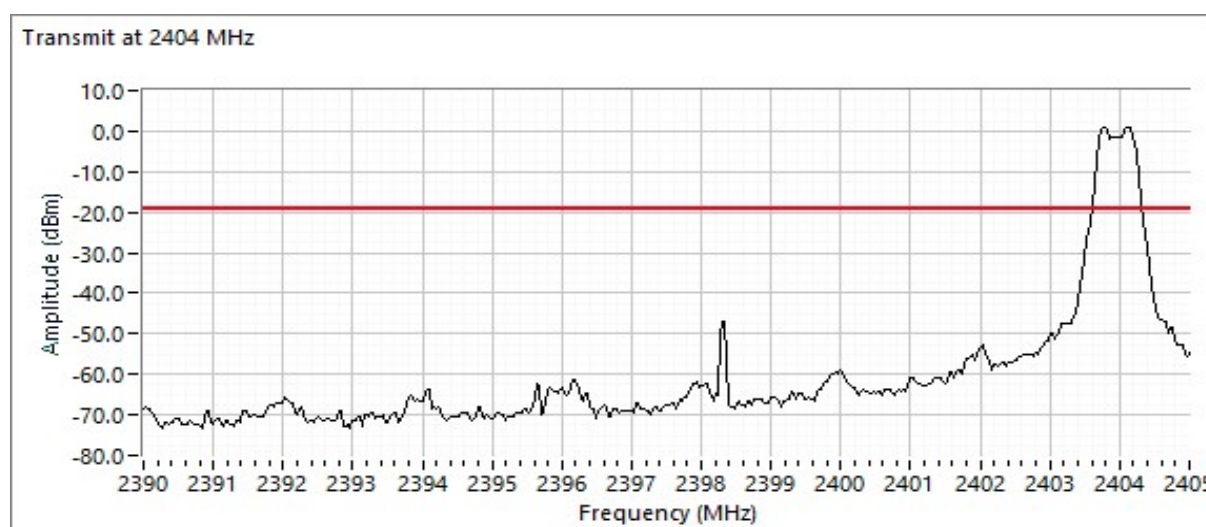
Frequency (MHz)	Power Setting		Limit	Result
2404	0		-20 dBc	Pass

RBW = 100 kHz and VBW = 300 kHz for all plots above 1GHz.
 RBW = 9 kHz and VBW = 30 kHz for all plots below 30 MHz.

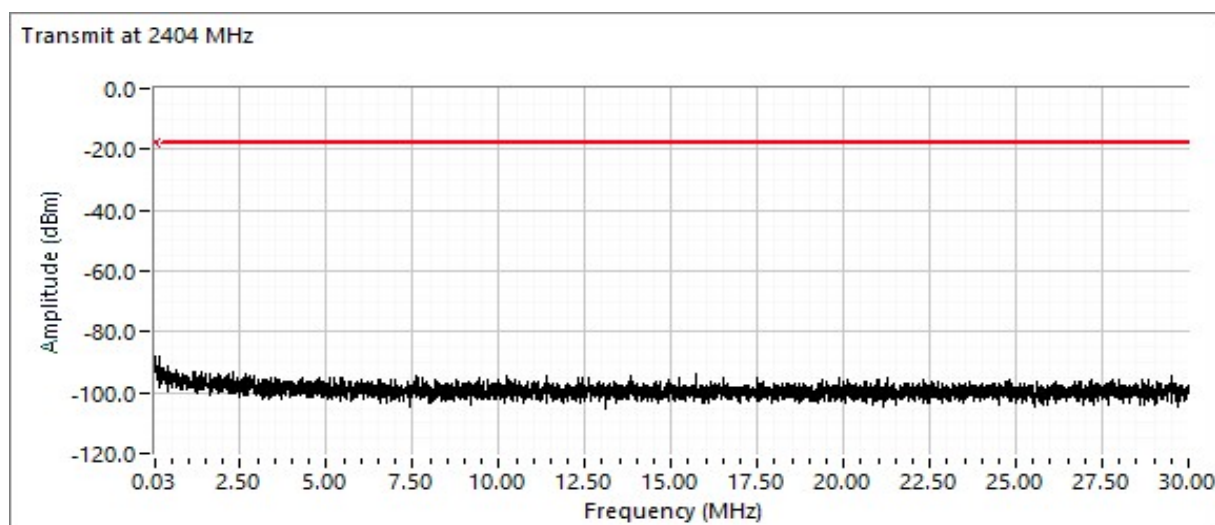
Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

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.



Additional plot showing compliance with limit from 30 kHz to 30 MHz.



Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

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: 12/16/2024
 Test Engineer: David Bare
 Test Location: Fremont Chamber #5

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: 20 °C
 Rel. Humidity: 44 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	Radiated Emissions 30 - 1000 MHz, Maximized	Class B	Pass	16.8 dBμV/m @ 30.00 MHz (-23.2 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: CE001E
 The unit was transmitting at center channel (side orientation).

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

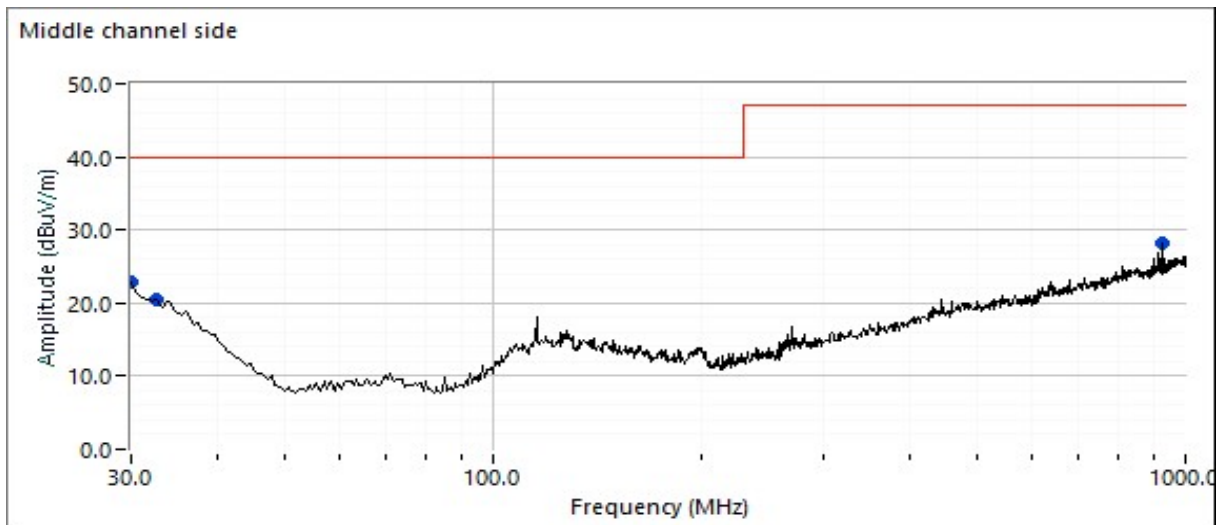
Client: XPLORER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A

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	dB μ V/m	v/h	Limit	Margin	PK/QP/AVG	degrees	meters	
30.000	22.9	V	40.0	-17.1	Peak	271	1.0	Noise floor
32.705	20.6	H	40.0	-19.4	Peak	224	4.0	Noise floor
928.457	28.2	H	47.0	-18.8	Peak	29	2.5	Noise floor



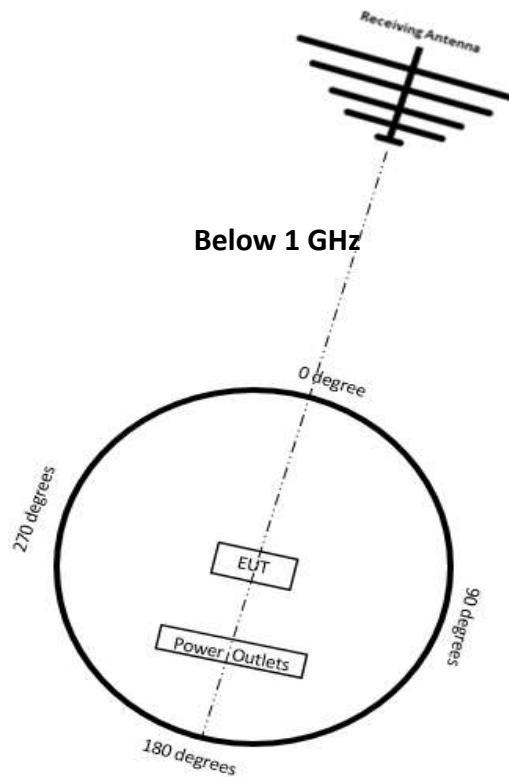
Run #2: Maximized Readings From Run #1

Maximized quasi-peak readings

Frequency	Level	Pol	Class B		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	PK/QP/AVG	degrees	meters	
30.000	16.8	V	40.0	-23.2	QP	270	1.0	QP (1.00s)
32.705	14.4	H	40.0	-25.6	QP	222	4.0	QP (1.00s)
928.457	20.5	H	47.0	-26.5	QP	27	2.5	QP (1.00s)

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

Client: XPLOER	PR Number: PR185702
Model: ICON28	T-Log Number: TL185702-RA-ICON28
Contact: Huong Monnier	Project Manager: Christine Krebill
Standard: FCC Part 15, RSS-210, RSS-247	Project Engineer: David Bare
	Class: N/A



End of Report

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