

# Test report

351215-1TRFWL

Date of issue: May 9, 2018

Applicant:

Xplore Technologies

Product:

Rugged Tablet PC

Model

iX101L1

Derivative model

iX101L2


Specifications:

- ◆ FCC 47 CFR Part 15, Subpart C – §15.207
- ◆ FCC 47 CFR Part 15, Subpart C – §15.209

#### Lab and test locations

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Company name	Nemko USA Inc.
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City	Carlsbad
State	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
FCC Site Number	Test Firm Registration Number: 392943 Designation Number: US5058
ISED Test Site	2040B-3

Tested by	Nikolay Shtin, Senior Wireless Engineer
Reviewed by	Juan Manuel Gonzalez, EMC & Wireless Business Development Manager
Review date	May 9, 2018
Reviewer signature	

#### Limits of responsibility

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Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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## Section 1 Report summary

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### 1.1 Test specifications

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FCC 47 CFR Part 15, Subpart C – §15.207	Conducted emission limits; general requirements.
FCC 47 CFR Part 15, Subpart C – §15.209	Radiated emission limits; general requirements.

### 1.2 Test methods

ANSI C64.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
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### 1.3 Exclusions

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None

### 1.4 Statement of compliance

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In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

### 1.5 Test report revision history

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**Table 1.5-1: Test report revision history**

Revision #	Details of changes made to test report
TRF	Original report issued

Notes: 1TRFWL: Remove Laptop from support equipment in table 3.6-3. Remove USB-laptop Inter-connection from table 3.6-4. Added derivative model: iX101L2

## Section 2 Summary of test results

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### 2.1 Radiated Emissions in simultaneous transmission.

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*Table 2.1-1: FCC 47 CFR Part 15, Subpart C §15.207 & §15.209*

Test description	Verdict
FCC 15.209 - Radiated disturbance	Pass
FCC 15.109 - Conducted disturbance	Pass

Notes: Class B Multi-Transmitter testing.

## Section 3 Equipment under test (EUT) details

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### 3.1 Applicant

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Company name	Xplore Technologies Corp. of America
Address	14000 Summit Drive Suite 900
City	Austin
State	TX
Postal/Zip code	78728
Country	U.S.A.

### 3.2 Manufacturer

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Company name	Xplore Technologies Corp. of America
Address	14000 Summit Drive Suite 900
City	Austin
State	TX
Postal/Zip code	78728
Country	U.S.A.

### 3.3 Sample information

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Receipt date	April 30, 2018
Nemko sample ID number	351215

### 3.4 EUT information

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Product name	Rugged Tablet PC
Model	iX101L1
Model variant	iX101L2
Serial number	Engineering Sample
Power requirements	12VDC, 2Amps Switch Mode Power Supply.
Description/theory of operation	The iX101L1 is a portable rugged Tablet PC with a certified Intel WL-AC8265 (Model: 8265NGW FCC IC: PD98265NG) Dual Band Wi-Fi b/g/n 2.4 GHz and Wi-Fi a/n/ac 5Ghz, Bluetooth (BLE/BDR/EDR2.1) and a certified Sierra Wireless Air Prime (Model: EM7565 FCC ID: N7NEM7565 ) with LTE/WCDMA and GNSS. EUT will be mainly used by tech support to troubleshoot video output from Cable Box at a customer's residence.
Operational frequencies	Dual Band Wi-Fi b/g/n 2.4 GHz - Wi-Fi a/n/ac 5Ghz - Bluetooth (BLE/BDR/EDR2.1) LTE: B1-5, B7, B8, B9, B12, B13, B18, B19, B20, B26, B28, B29, B30, B32, B41, B42, B43, B46, B48, B66 WCDMA: B1-6, B8, B9 & B19 GNSS: (GPS, GLONASS, BeiDou, and Galileo)
Software details	Default production V1.0

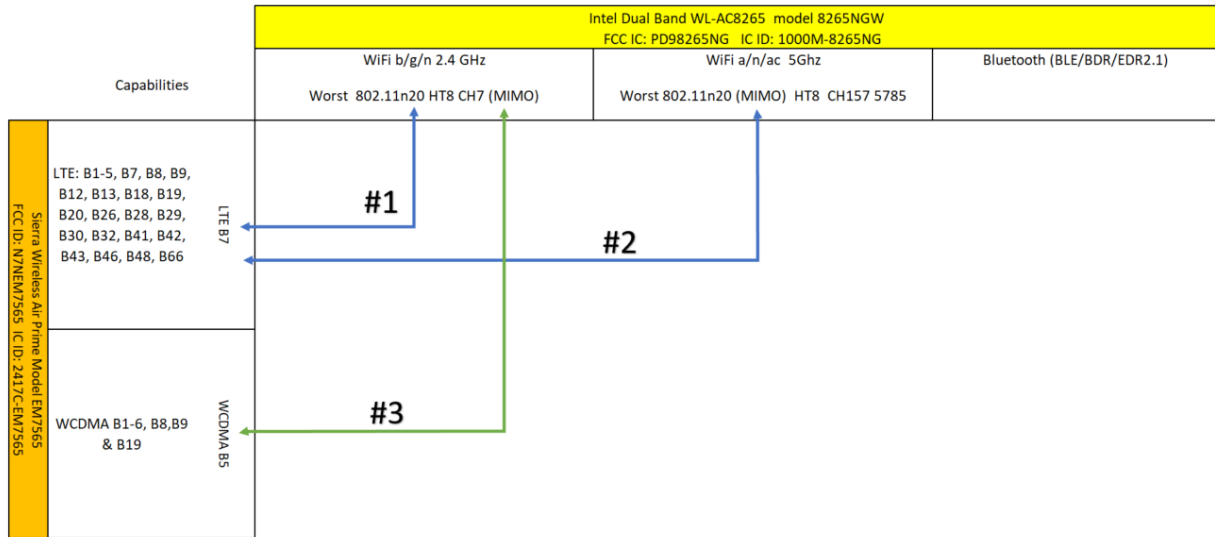
### 3.5 EUT exercise and monitoring details

For intentional Multi-Transmitter emissions, the EUT was tested under 3 possible worst-case scenarios under the following frequencies ranges: 30MHz-1GHz, 1GHz-18GHz, 18GHz-26GHz and 26GHz-40GHz.

First case, the Wi-Fi module set to “n mode CH7” and LTE Band 7.

Second case, Wi-Fi module set to “n Mode CH157” and LTE Band 7.

Third case, the Wi-Fi module set to “n mode CH7” and WCDMA Band 5.



### 3.6 EUT setup details

Table 3.6-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number
Power Supply	Power	Delta Electronics	ADP-65JH

Table 3.6-2: EUT interface ports

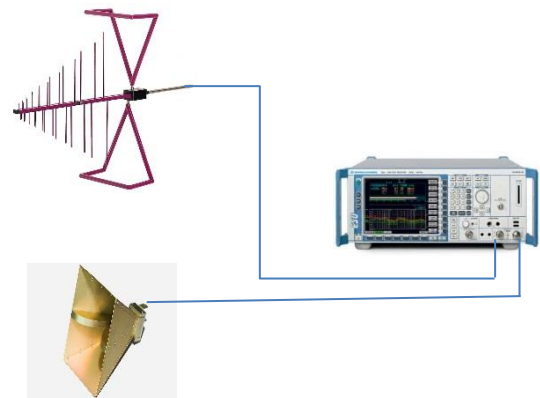
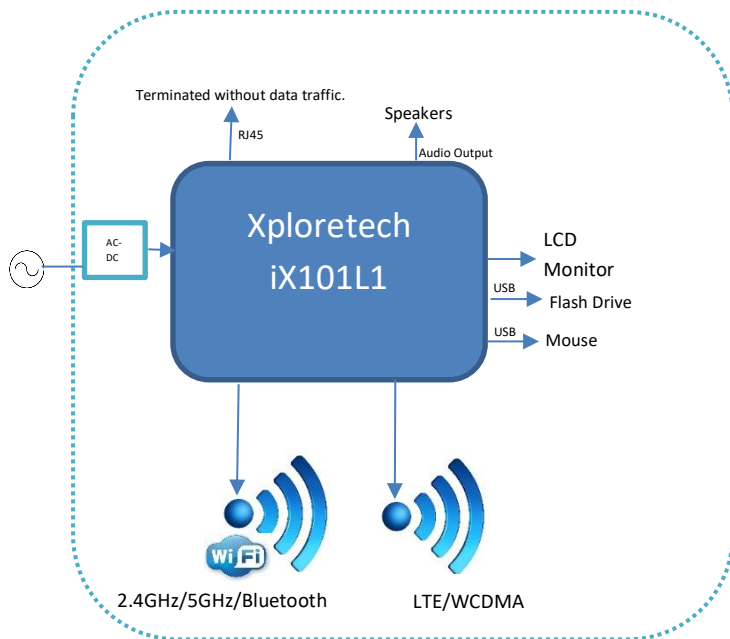
Description	Qty.				
Ethernet	1				
USB 2.0	2				
HDMI	1				
Auxiliary Headphone Jack	1				
R&S CMW500	Rohde and Schwarz	CMW500	Loaner	----	----

Table 3.6-3: Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
Laptop Computer				N/A
LCD Monitor	Dell	SE2717HR	----	N/A
Speakers	RadioShack	058J4M	----	N/A
Modem	Buffalo	WHR-30DHP2	----	N/A
Mouse	Logitech	M-8Z105A	----	N/A

Table 3.6-4: Inter-connection cables

Cable description	From	To	Length (m)
Ethernet CAT5e UTP	EUT	Router-PC	10m
HDMI	EUT	LCD Monitor	1m





## Section 4 Engineering considerations

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### 4.1 Modifications incorporated in the EUT

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There were no modifications performed to the EUT during this assessment.

### 4.2 Technical judgment

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None

### 4.3 Deviations from laboratory tests procedures

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No deviations were made from laboratory procedures.

## Section 5 Test conditions

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### 5.1 Atmospheric conditions

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Temperature	19.9 °C
Relative humidity	58.7 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

### 5.2 Power supply range

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The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages  $\pm 5\%$ , for which the equipment was designed.

## Section 6 Measurement uncertainty

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### 6.1 Uncertainty of measurement

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Nemko USA Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of  $K=2$  with 95% certainty.

## Section 7 Terms and definitions

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### 7.1.1 Equipment type

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Multimedia Equipment (MME)	Equipment that is information technology equipment, audio equipment, video equipment, broadcast receiver equipment, entertainment lighting control equipment or combinations of these.
Information technology equipment [ITE]	Equipment having a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control of data and/or telecommunication messages and which may be equipped with one or more ports typically for information transfer. <ul style="list-style-type: none"> <li>- Examples include data processing equipment, office machines, electronic business equipment and telecommunication equipment.</li> </ul>
Audio equipment	Equipment which has a primary function of either (or a combination of) generation, input, storage, play, retrieval, transmission, reception, amplification, processing, switching or control of audio signals
Video equipment	Equipment which has a primary function of either (or a combination of) generation, input, storage, display, play, retrieval, transmission, reception, amplification, processing, switching, or control of video signals.
Broadcast receiver equipment	Equipment containing a tuner that is intended for the reception of broadcast services <ul style="list-style-type: none"> <li>- These broadcast services are typically television and radio services, including terrestrial broadcast, satellite broadcast and/or cable transmission.</li> </ul>
Entertainment lighting control equipment	Equipment generating or processing electrical signals for controlling the intensity, color, nature or direction of the light from a luminaire, where the intention is to create artistic effects in theatrical, televisual or musical productions and visual presentations.

## 7.2 General definitions, continued

### 7.1.2 Port type

AC mains power port	<p>Port used to connect to the mains supply network</p> <ul style="list-style-type: none"> <li>- Equipment with a DC power port which is powered by a dedicated AC/DC power converter is defined as AC mains powered equipment</li> </ul>
Antenna port	<p>Port, other than a broadcast receiver tuner port (3.1.8), for connection of an antenna used for intentional transmission and/or reception of radiated RF energy.</p>
Broadcast receiver tuner port	<p>Port intended for the reception of a modulated RF signal carrying terrestrial, satellite and/or cable transmissions of audio and/or video broadcast and similar services</p> <ul style="list-style-type: none"> <li>- This port may be connected to an antenna, a cable distribution system, a VCR or similar device.</li> </ul>
DC network power port	<p>Port, not powered by a dedicated AC/DC power converter and not supporting communication, that connects to a DC supply network.</p> <ul style="list-style-type: none"> <li>- Equipment with a DC power port which is powered by a dedicated AC/DC power converter is considered to be AC mains powered equipment.</li> <li>- DC power ports supporting communications are considered to be wired networks ports, for example Ethernet ports which include Power Over Ethernet (POE).</li> </ul>
Enclosure port	<p>Physical boundary of the EUT through which electromagnetic fields may radiate.</p>
Optical fiber port	<p>Port at which an optical fiber is connected to an equipment.</p>
RF modulator output port	<p>Port intended to be connected to a broadcast receiver tuner port to transmit a signal to the broadcast receiver.</p>
Signal/control port	<p>Port intended for the interconnection of components of an equipment under test, or between an equipment under test and local associated equipment and used in accordance with relevant functional specifications (for example for the maximum length of cable connected to it)</p> <ul style="list-style-type: none"> <li>- Examples include RS-232, Universal Serial Bus (USB), High-Definition Multimedia Interface (HDMI), IEEE Standard 1394 ("Fire Wire")</li> </ul>
Wired network port	<p>Point of connection for voice, data and signaling transfers intended to interconnect widely-dispersed systems by direct connection to a single-user or multi-user communication network (for example CATV, PSTN, ISDN, xDSL, LAN and similar networks)</p> <ul style="list-style-type: none"> <li>- These ports may support screened or unshielded cables and may also carry AC or DC power where this is an integral part of the telecommunication specification.</li> </ul>

## Section 8 Testing data

### 8.1 Radiated emission limits; Intentional Radiators.

#### 8.1.1 References

Title 47 → Chapter I → Subchapter A → Part 15 → Subpart C → §15.209 / ANSI C63.4: 2014

- (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

\*\*Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(e) The provisions in §§15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

(f) In accordance with §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in §15.109 that are applicable to the incorporated digital device.

### 8.1.2 Test summary

Verdict	Pass		
Test date	May 1, 2018	Temperature	21°C
Test engineer	Nikolay Shtin, SR. Wireless Engineer	Air pressure	1001 mbar
Test location	10m semi anechoic chamber	Relative humidity	49 %

### 8.1.3 Notes

None

### 8.1.4 Setup details

EUT setup configuration	Table top
Test facility	3 m Semi anechoic chamber
Measuring distance	3 m
Antenna height variation	1–4 m
Turn table position	0–360°
Measurement details	A preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated and antenna adjusted to maximize radiated emission. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver/spectrum analyzer settings for frequencies below 1 GHz:

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	– Peak (Preview measurement) – Quasi-peak (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak preview measurement) – 1000 ms (Quasi-peak final measurement)

Receiver/spectrum analyzer settings for frequencies above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak (Preview measurement) Peak and CAverage (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak preview measurement) – 100 ms (Peak and CAverage final measurement)

8.1.4 Setup details, continued

**Table 8.1-1: Radiated disturbance equipment list**

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMC Test Receiver	Rohde & Schwarz	ESU 40	E1131	2 yr.	08-14-2018
Antenna, Bilog	Schaffner-Chase	CBL6111C	1763	2 yr.	11-28-2018
Antenna, Horn	ETS	3117-PA	E1139	2 yr.	01-25-2020
Antenna, Horn	Sage	SAR-2309-42-S2	E1143	2 yr.	03-05-2020
Antenna, Horn	Sage	SAR-2309-28-S2	E1148	2 yr.	03-13-2020

Notes: None

**Table 8.1-2: Radiated disturbance test software details**

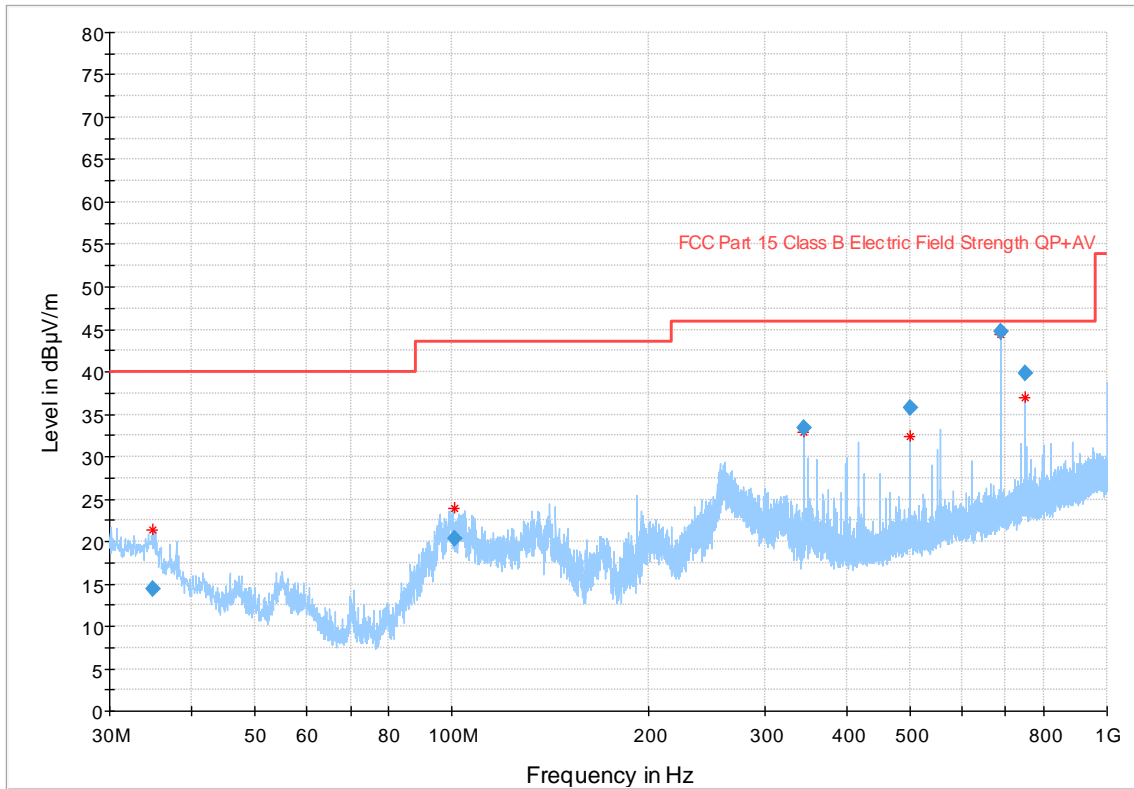
Manufacturer of Software	Details
R&S	EMC32 V10.00.00

Notes: None



8.1.5 Test data Radiated Emissions 30MHz-1GHz (Case #1 Wi-Fi b/g/n 2.4GHz, LTE B7)

Full Spectrum



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

**Radiated disturbance spectral plot 10m (30MHz to 1GHz) 120VAC 60Hz**

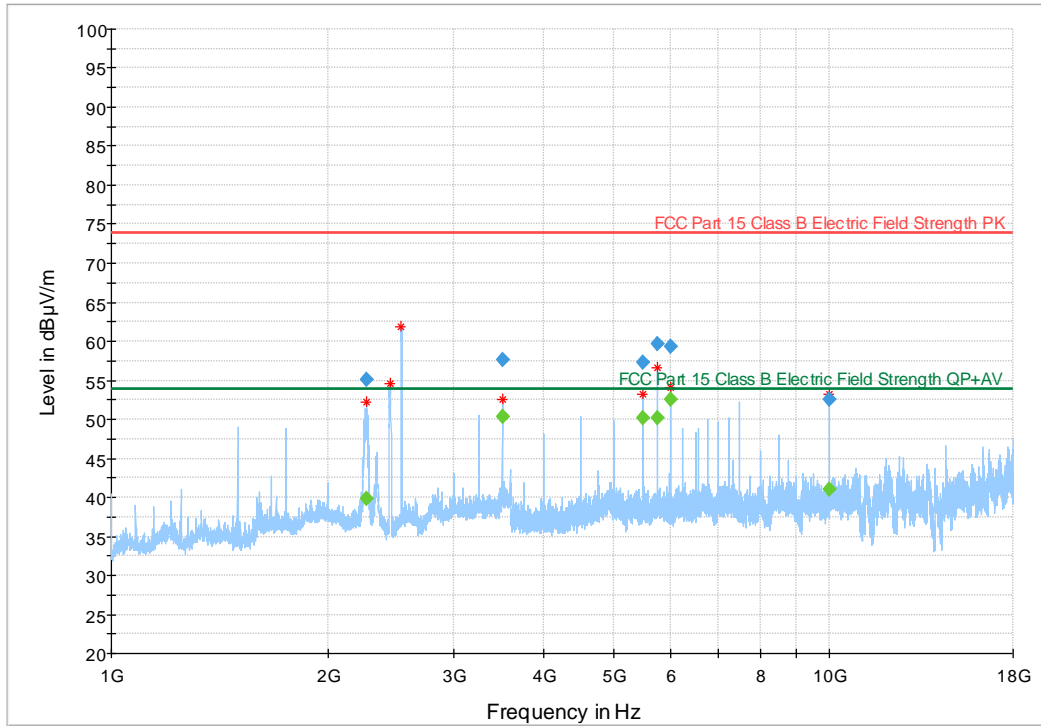
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.938500	14.43	40.00	25.57	5000.0	120.000	315.5	V	26.0	18.0
100.845000	20.28	43.50	23.22	5000.0	120.000	169.8	V	64.0	11.9
344.077500	33.38	46.00	12.62	5000.0	120.000	100.0	V	29.0	17.5
500.013500	35.78	46.00	10.22	5000.0	120.000	127.2	H	116.0	21.3
688.105000	44.69	46.00	1.31	5000.0	120.000	109.3	H	124.0	24.5
749.982500	39.87	46.00	6.13	5000.0	120.000	109.4	V	124.0	25.6
34.938500	14.43	40.00	25.57	5000.0	120.000	315.5	V	26.0	18.0
100.845000	20.28	43.50	23.22	5000.0	120.000	169.8	V	64.0	11.9
344.077500	33.38	46.00	12.62	5000.0	120.000	100.0	V	29.0	17.5

**Radiated disturbance (Quasi-Peak) 10m results 120VAC 60Hz**

- Notes:
- <sup>1</sup> Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
  - <sup>2</sup> Correction factors = antenna factor ACF (dB) + cable loss (dB)
  - <sup>3</sup> The maximum measured value observed over a period of 15 seconds was recorded.

8.1.6 Test data Radiated Emissions 1GHz-18GHz (Case #1 Wi-Fi b/g/n 2.4GHz, LTE B7)

Full Spectrum



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators). A 2.4GHz Notch filter was used.

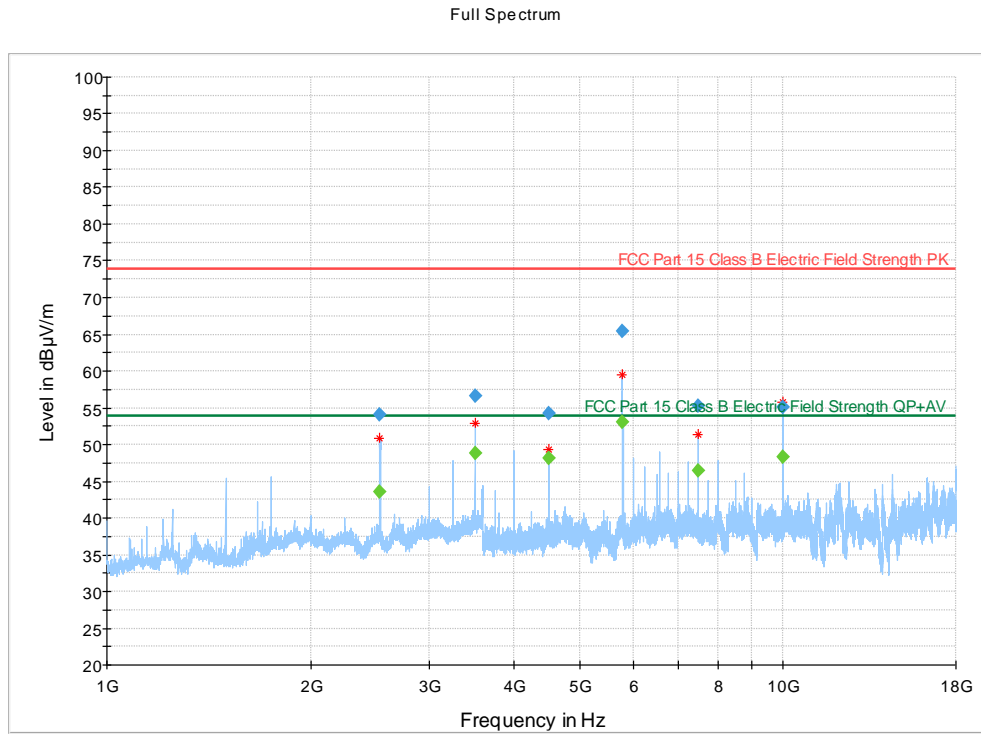
Radiated disturbance spectral plot 3m (1GHz to 18GHz) 120VAC 60Hz

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2265.133333	55.05	---	73.90	18.85	5000.0	1000.000	100.0	H	224.0	-10.4
2265.133333	---	39.78	53.90	14.12	5000.0	1000.000	100.0	H	224.0	-10.4
2440.433333	Fundamental				5000.0	1000.000	127.5	V	309.0	-9.5
2440.433333	Fundamental				5000.0	1000.000	127.5	V	309.0	-9.5
2531.700000	Fundamental				5000.0	1000.000	100.0	V	81.0	-9.3
2531.700000	Fundamental				5000.0	1000.000	100.0	V	81.0	-9.3
3499.966667	57.71	---	73.90	16.19	5000.0	1000.000	110.8	H	56.0	-6.1
3499.966667	---	50.33	53.90	3.57	5000.0	1000.000	110.8	H	56.0	-6.1
5499.900000	57.31	---	73.90	16.59	5000.0	1000.000	148.3	V	54.0	-2.7
5499.900000	---	50.14	53.90	3.76	5000.0	1000.000	148.3	V	54.0	-2.7
5749.800000	---	50.19	53.90	3.71	5000.0	1000.000	120.8	V	42.0	-1.7
5749.800000	59.65	---	73.90	14.25	5000.0	1000.000	120.8	V	42.0	-1.7
6000.100000	---	52.53	53.90	1.37	5000.0	1000.000	140.5	V	55.0	-1.2
6000.100000	59.35	---	73.90	14.55	5000.0	1000.000	140.5	V	55.0	-1.2
9999.966667	52.50	---	73.90	21.40	5000.0	1000.000	109.2	H	311.0	3.1
9999.966667	---	41.08	53.90	12.82	5000.0	1000.000	109.2	H	311.0	3.1

Table 8.1-2: Radiated disturbance (Quasi-Peak) 3m results 120VAC 60Hz

- Notes: <sup>1</sup> Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
- <sup>2</sup> Correction factors = antenna factor ACF (dB) + cable loss (dB)
- <sup>3</sup> The maximum measured value observed over a period of 15 seconds was recorded.

8.1.7 Test data Radiated Emissions 1GHz-18GHz (Case #2 Wi-Fi a/n/ac 5.0GHz, LTE B7)



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators). A 2.4GHz and 5.0GHz Notch filters were used.

**Radiated disturbance spectral plot 3m (1GHz to 18GHz) 120VAC 60Hz**

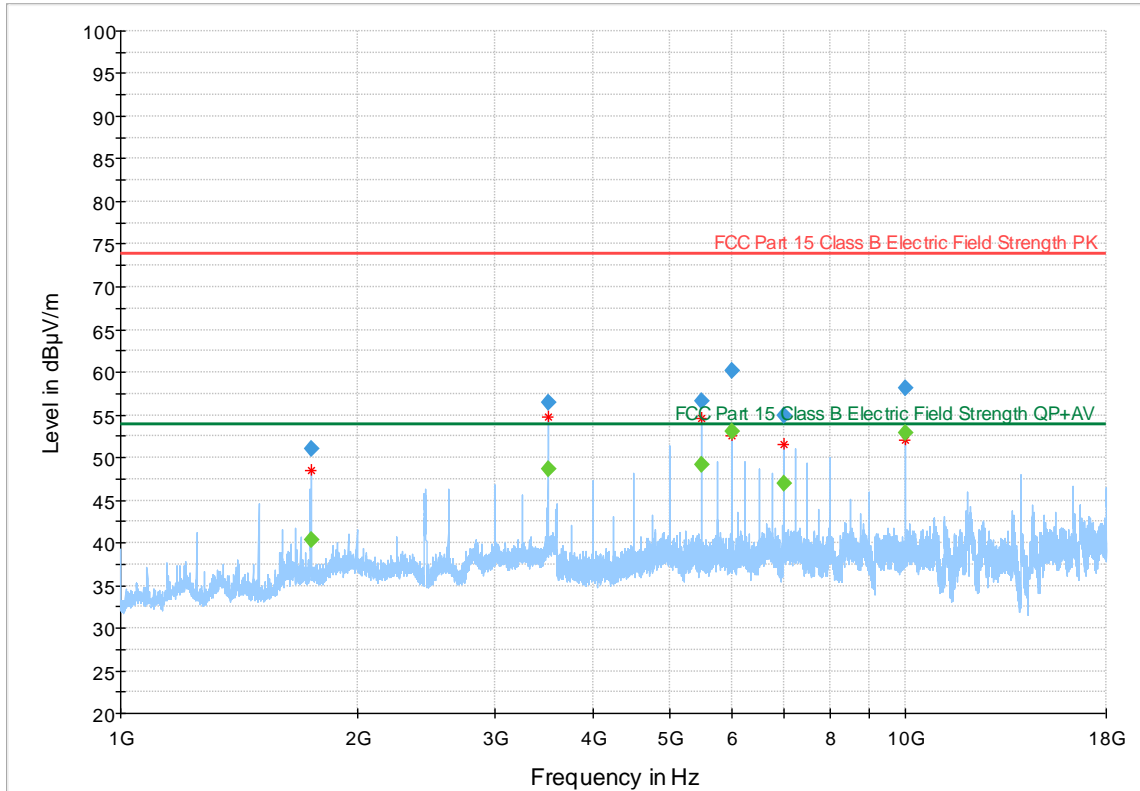
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2534.900000	---	43.48	53.90	10.42	5000.0	1000.0	248.	H	32.0	-9.3
2534.900000	53.99	---	73.90	19.91	5000.0	1000.0	248.	H	32.0	-9.3
3499.966667	56.53	---	73.90	17.37	5000.0	1000.0	114.	H	55.0	-6.1
3499.966667	---	48.83	53.90	5.07	5000.0	1000.0	114.	H	55.0	-6.1
4500.133333	54.26	---	73.90	19.64	5000.0	1000.0	109.	H	71.0	-2.7
4500.133333	---	48.18	53.90	5.72	5000.0	1000.0	109.	H	71.0	-2.7
5787.600000	Fundamental				5000.0	1000.0	149.	H	172.0	-1.4
5787.600000					5000.0	1000.0	149.	H	172.0	-1.4
7499.833333	55.32	---	73.90	18.58	5000.0	1000.0	100.	V	63.0	0.5
7499.833333	---	46.52	53.90	7.38	5000.0	1000.0	100.	V	63.0	0.5
10000.200000	---	48.30	53.90	5.60	5000.0	1000.0	110.	H	24.0	3.1
10000.200000	55.02	---	73.90	18.88	5000.0	1000.0	110.	H	24.0	3.1

**Radiated disturbance results 3m (Quasi-Peak) 120VAC 60Hz**

- Notes:
- <sup>1</sup> Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
  - <sup>2</sup> Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)
  - <sup>3</sup> The maximum measured value observed over a period of 15 seconds was recorded.

8.1.8 Test data Radiated Emissions 1GHz-18GHz (Case #3 Wi-Fi b/g/n 2.4GHz, WCDMA B5)

Full Spectrum



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators. 2.4 GHz signal (Wi-Fi fundamental) is Out of the scope of this FCC 15.209 evaluation (FCC 15.247 limits apply). A 2.4GHz Notch filter was used.

**Radiated disturbance spectral plot 3m (1GHz to 18GHz) 120Vac 60Hz**

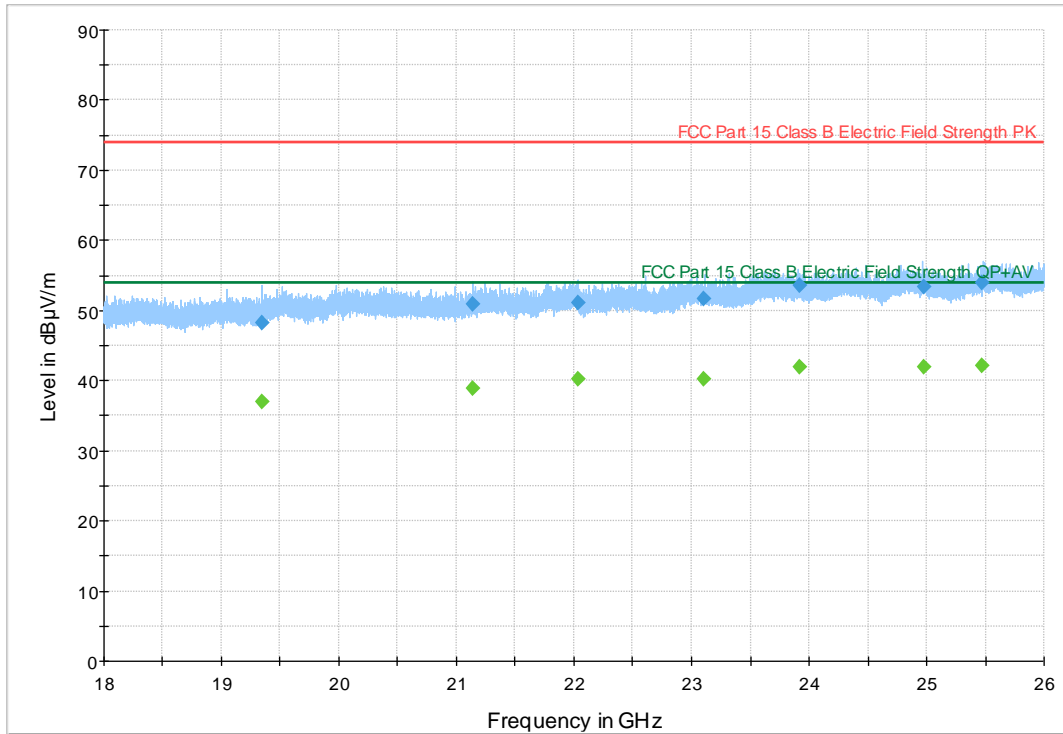
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1750.100000	---	40.40	53.90	13.50	5000.0	1000.000	161.2	V	354.0	-12.2
1750.100000	50.94	---	73.90	22.96	5000.0	1000.000	161.2	V	354.0	-12.2
3499.966667	56.48	---	73.90	17.42	5000.0	1000.000	111.0	H	64.0	-6.1
3499.966667	---	48.66	53.90	5.24	5000.0	1000.000	111.0	H	64.0	-6.1
5499.900000	---	49.12	53.90	4.78	5000.0	1000.000	100.0	V	42.0	-2.7
5499.900000	56.65	---	73.90	17.25	5000.0	1000.000	100.0	V	42.0	-2.7
5999.866667	60.10	---	73.90	13.80	5000.0	1000.000	98.0	V	56.0	-1.2
5999.866667	---	53.06	53.90	0.84	5000.0	1000.000	98.0	V	56.0	-1.2
7000.100000	---	46.89	53.90	7.01	5000.0	1000.000	110.7	H	42.0	0.2
7000.100000	54.90	---	73.90	19.00	5000.0	1000.000	110.7	H	42.0	0.2
9999.966667	---	52.85	53.90	1.05	5000.0	1000.000	149.0	V	56.0	3.1
9999.966667	58.09	---	73.90	15.81	5000.0	1000.000	149.0	V	56.0	3.1

**Radiated disturbance results 3m (Peak and Average) 120VAC 60Hz**

- Notes:
- <sup>1</sup> Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
  - <sup>2</sup> Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)
  - <sup>3</sup> The maximum measured value observed over a period of 15 seconds was recorded.

8.1.9 Test data Radiated Emissions 18GHz - 26GHz (Case #1 Wi-Fi b/g/n 2.4GHz, LTE B7)

Full Spectrum



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators). A 2.4GHz Notch filter was used.

**Radiated disturbance spectral plot 3m (18GHz to 26GHz) 120VAC 60Hz**

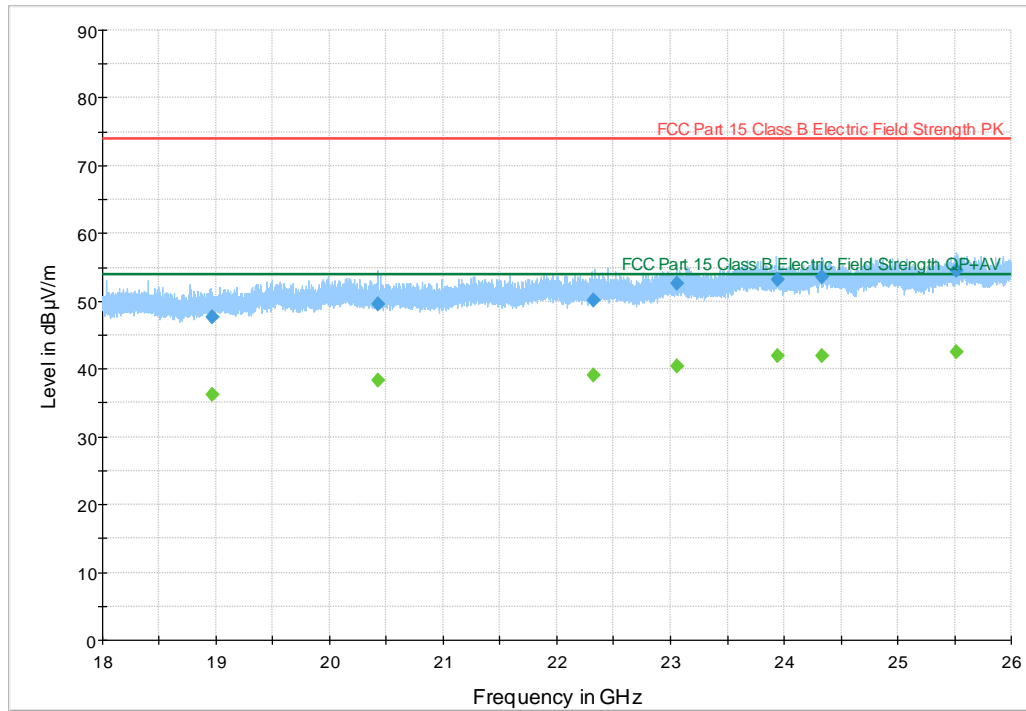
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
19347.283333	48.17	---	73.90	25.73	10.0	1000.000	160.3	V	271.0	38.5
19347.283333	---	37.05	53.90	16.85	10.0	1000.000	160.3	V	271.0	38.5
21134.550000	50.89	---	73.90	23.01	10.0	1000.000	113.0	V	253.0	39.2
21134.550000	---	38.91	53.90	14.99	10.0	1000.000	113.0	V	253.0	39.2
22031.216667	---	40.14	53.90	13.76	10.0	1000.000	172.7	V	267.0	39.5
22031.216667	51.18	---	73.90	22.72	10.0	1000.000	172.7	V	267.0	39.5
23107.466667	51.59	---	73.90	22.31	10.0	1000.000	150.3	V	23.0	40.0
23107.466667	---	40.31	53.90	13.59	10.0	1000.000	150.3	V	23.0	40.0
23919.550000	53.65	---	73.90	20.25	10.0	1000.000	115.5	H	23.0	40.3
23919.550000	---	41.97	53.90	11.93	10.0	1000.000	115.5	H	23.0	40.3
24979.416667	53.34	---	73.90	20.56	10.0	1000.000	133.0	H	287.0	40.6
24979.416667	---	41.91	53.90	11.99	10.0	1000.000	133.0	H	287.0	40.6
25469.833333	53.91	---	73.90	19.99	10.0	1000.000	172.5	V	289.0	40.7
25469.833333	---	42.16	53.90	11.74	10.0	1000.000	172.5	V	289.0	40.7

**Radiated disturbance (Quasi-Peak) 3m results 120VAC 60Hz**

- Notes:
- <sup>1</sup> Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
  - <sup>2</sup> Correction factors = antenna factor ACF (dB) + cable loss (dB)
  - <sup>3</sup> The maximum measured value observed over a period of 15 seconds was recorded.

8.1.10 Test data Radiated Emissions 18GHz - 26GHz (Case #2 Wi-Fi a/n/ac 5.0GHz, LTE B7)

Full Spectrum



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators). A 2.4GHz and 5.0GHz Notch filters were used.

Radiated disturbance spectral plot 3m (18GHz to 26GHz) 120VAC 60Hz

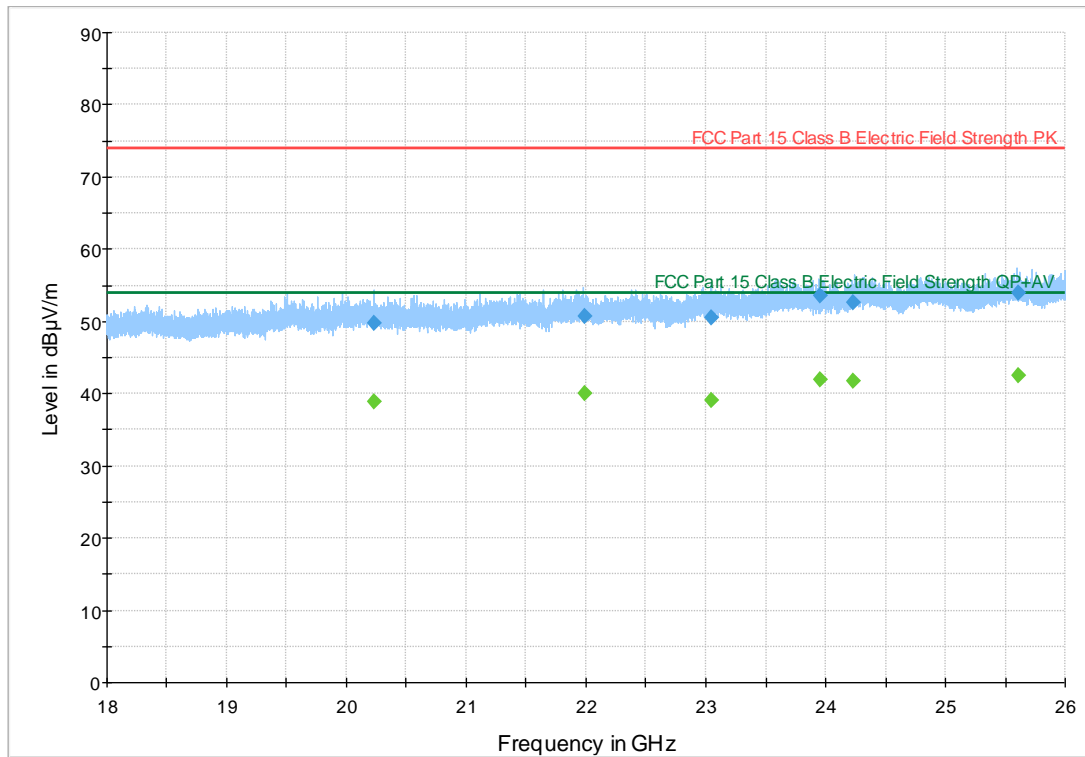
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
18966.216667	---	36.18	53.90	17.72	10.0	1000.000	107.0	H	73.0	38.3
18966.216667	47.59	---	73.90	26.31	10.0	1000.000	107.0	H	73.0	38.3
20426.033333	---	38.28	53.90	15.62	10.0	1000.000	133.8	V	243.0	38.9
20426.033333	49.51	---	73.90	24.39	10.0	1000.000	133.8	V	243.0	38.9
22317.133333	50.15	---	73.90	23.75	10.0	1000.000	164.6	H	18.0	39.5
22317.133333	---	39.01	53.90	14.89	10.0	1000.000	164.6	H	18.0	39.5
23062.950000	52.59	---	73.90	21.31	10.0	1000.000	107.3	V	23.0	40.0
23062.950000	---	40.36	53.90	13.54	10.0	1000.000	107.3	V	23.0	40.0
23939.016667	---	41.92	53.90	11.98	10.0	1000.000	172.7	H	93.0	40.4
23939.016667	53.22	---	73.90	20.68	10.0	1000.000	172.7	H	93.0	40.4
24329.216667	53.51	---	73.90	20.39	10.0	1000.000	125.0	H	245.0	40.3
24329.216667	---	42.02	53.90	11.88	10.0	1000.000	125.0	H	245.0	40.3
25520.000000	54.52	---	73.90	19.38	10.0	1000.000	125.0	H	134.0	40.7
25520.000000	54.52	---	73.90	19.38	10.0	1000.000	125.0	H	134.0	40.7

Radiated disturbance (Quasi-Peak) 3m results 120VAC 60Hz

- Notes:
- <sup>1</sup> Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
  - <sup>2</sup> Correction factors = antenna factor ACF (dB) + cable loss (dB)
  - <sup>3</sup> The maximum measured value observed over a period of 15 seconds was recorded.

## 8.1.11 Test data Radiated Emissions 18GHz - 26GHz (Case #3 Wi-Fi b/b/n 2.4GHz, WCDMA B5)

Full Spectrum



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators). A 2.4GHz Notch filter was used.

Radiated disturbance spectral plot 3m (18GHz to 26GHz) 120VAC 60Hz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
20233.583333	49.77	---	73.90	24.13	10.0	1000.000	158.2	V	-1.0	38.8
20233.583333	---	38.90	53.90	15.00	10.0	1000.000	158.2	V	-1.0	38.8
21990.033333	---	39.97	53.90	13.93	10.0	1000.000	110.1	H	218.0	39.5
21990.033333	50.64	---	73.90	23.26	10.0	1000.000	110.1	H	218.0	39.5
23048.166667	---	39.09	53.90	14.81	10.0	1000.000	166.5	H	27.0	40.0
23048.166667	50.50	---	73.90	23.40	10.0	1000.000	166.5	H	27.0	40.0
23949.983333	---	41.91	53.90	11.99	10.0	1000.000	156.6	V	313.0	40.4
23949.983333	53.50	---	73.90	20.40	10.0	1000.000	156.6	V	313.0	40.4
24228.300000	---	41.68	53.90	12.22	10.0	1000.000	134.7	H	4.0	40.3
24228.300000	52.57	---	73.90	21.33	10.0	1000.000	134.7	H	4.0	40.3
25610.283333	53.98	---	73.90	19.92	10.0	1000.000	103.7	V	243.0	40.8
25610.283333	---	42.61	53.90	11.29	10.0	1000.000	103.7	V	243.0	40.8

Radiated disturbance results 3m (Quasi-Peak) 120VAC 60Hz

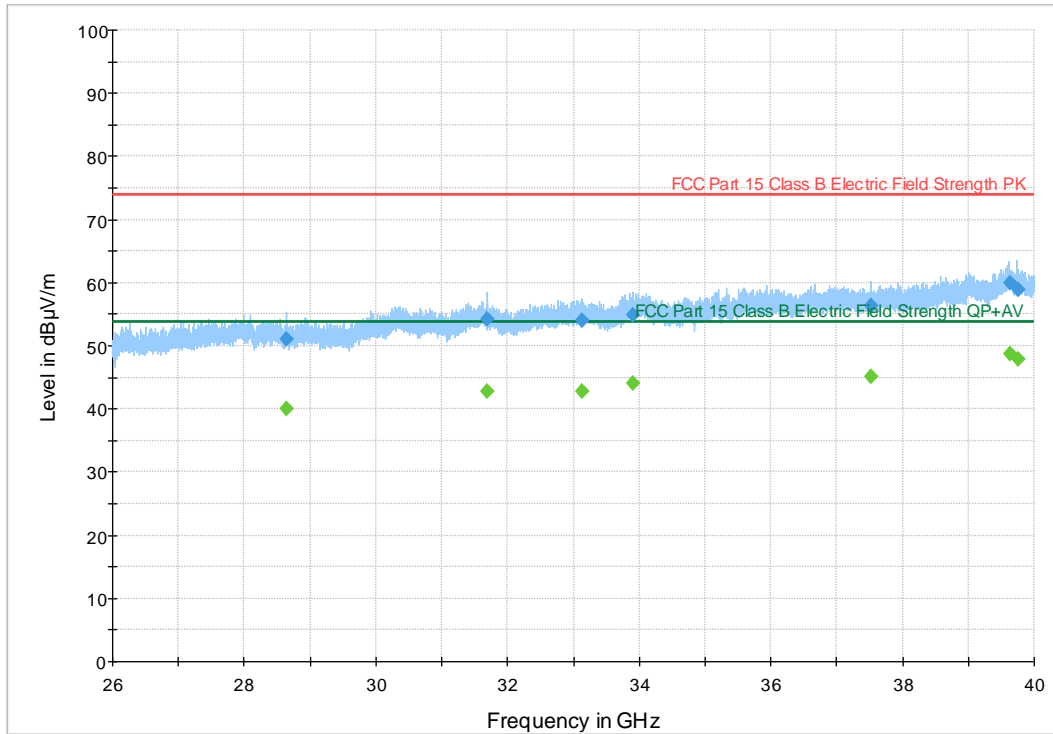
Notes: <sup>1</sup> Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

<sup>2</sup> Correction factors = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (dB)

<sup>3</sup> The maximum measured value observed over a period of 15 seconds was recorded.

8.1.12 Test data, Radiated Emissions 26GHz-40GHz (Case #2 Wi-Fi a/n/ac 5.0GHz, LTE B7)

Full Spectrum



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators. 2.4 GHz signal (Wi-Fi fundamental) is Out of the scope of this FCC 15.209 evaluation (FCC 15.247 limits apply). A 2.4GHz and 5.0GHz Notch filters were used.

Radiated disturbance spectral plot 3m (26GHz to 40GHz) 120Vac 60Hz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
28642.450000	---	39.99	53.90	13.91	10.0	1000.000	165.9	V	241.0	37.2
28642.450000	51.01	---	73.90	22.89	10.0	1000.000	165.9	V	241.0	37.2
31694.150000	---	42.80	53.90	11.10	10.0	1000.000	109.3	H	166.0	38.0
31694.150000	54.21	---	73.90	19.69	10.0	1000.000	109.3	H	166.0	38.0
33135.883333	54.07	---	73.90	19.83	10.0	1000.000	108.6	V	223.0	38.4
33135.883333	---	42.79	53.90	11.11	10.0	1000.000	108.6	V	223.0	38.4
33895.783333	54.83	---	73.90	19.07	10.0	1000.000	148.0	H	23.0	38.5
33895.783333	---	43.98	53.90	9.92	10.0	1000.000	148.0	H	23.0	38.5
37520.400000	---	45.18	53.90	8.72	10.0	1000.000	99.9	V	181.0	39.6
37520.400000	56.41	---	73.90	17.49	10.0	1000.000	99.9	V	181.0	39.6
39640.783333	59.92	---	73.90	13.98	10.0	1000.000	151.3	H	220.0	40.1
39640.783333	---	48.65	53.90	5.25	10.0	1000.000	151.3	H	220.0	40.1
39760.416667	58.84	---	73.90	15.06	10.0	1000.000	175.0	V	12.0	40.1
39760.416667	---	47.91	53.90	5.99	10.0	1000.000	175.0	V	12.0	40.1

Radiated disturbance results 3m (Peak and Average) 120VAC 60Hz

- Notes:
- <sup>1</sup> Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
  - <sup>2</sup> Correction factors = antenna factor ACF (dB) + cable loss (dB) - amplifier gain (dB)
  - <sup>3</sup> The maximum measured value observed over a period of 15 seconds was recorded.

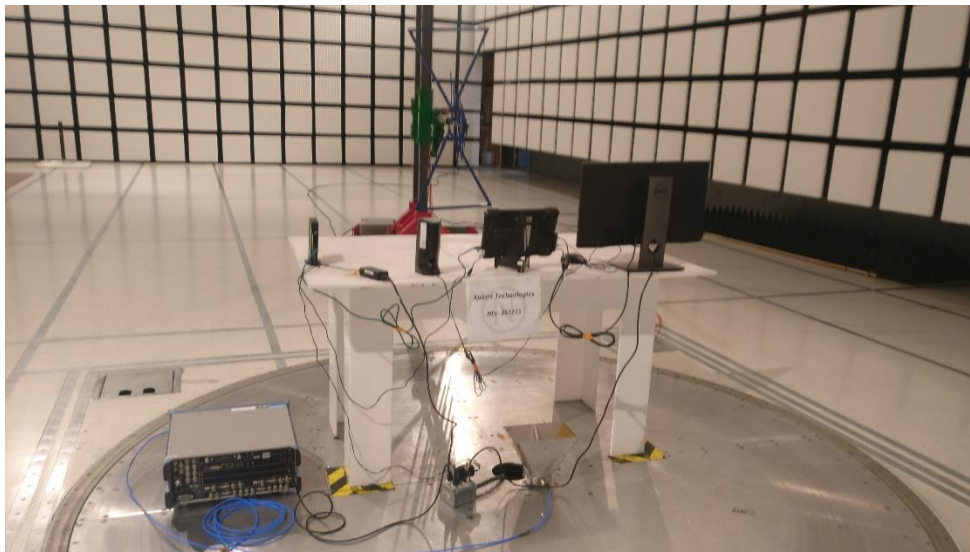


8.1.13 Radiated Emissions Setup photos

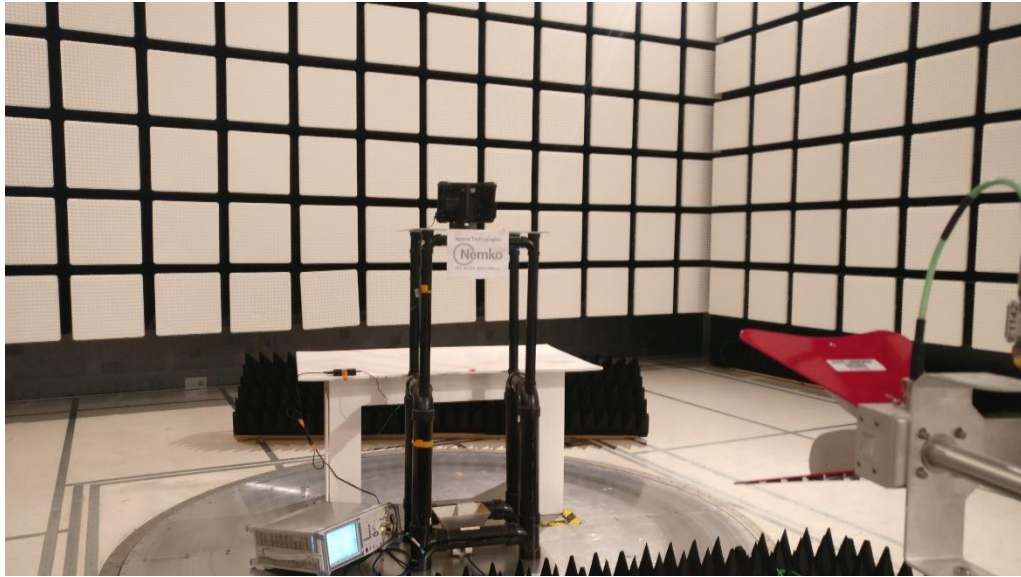
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**Front Radiated disturbance 30MHz - 1GHz**



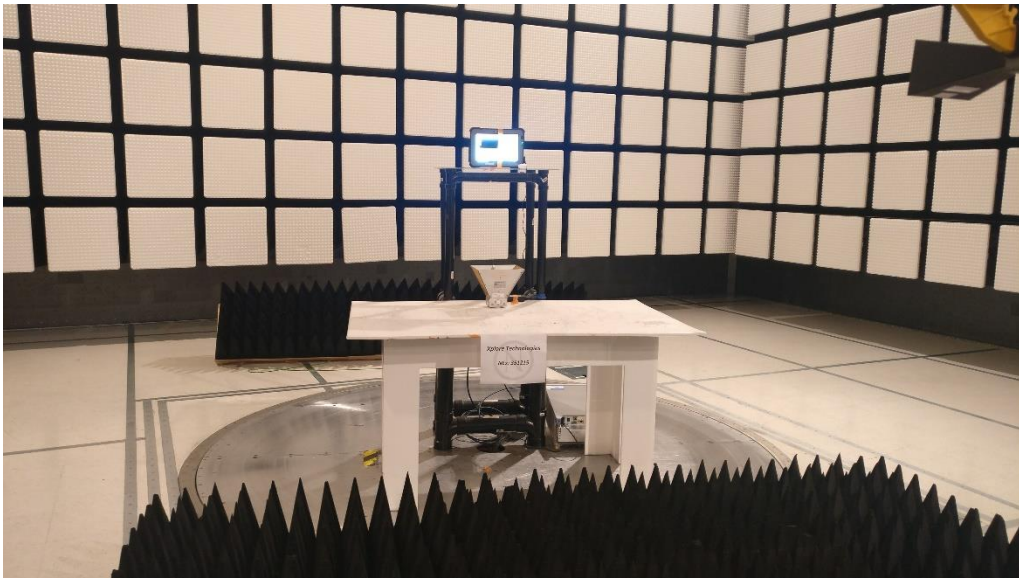
**Back Radiated disturbance 30MHz - 1GHz**



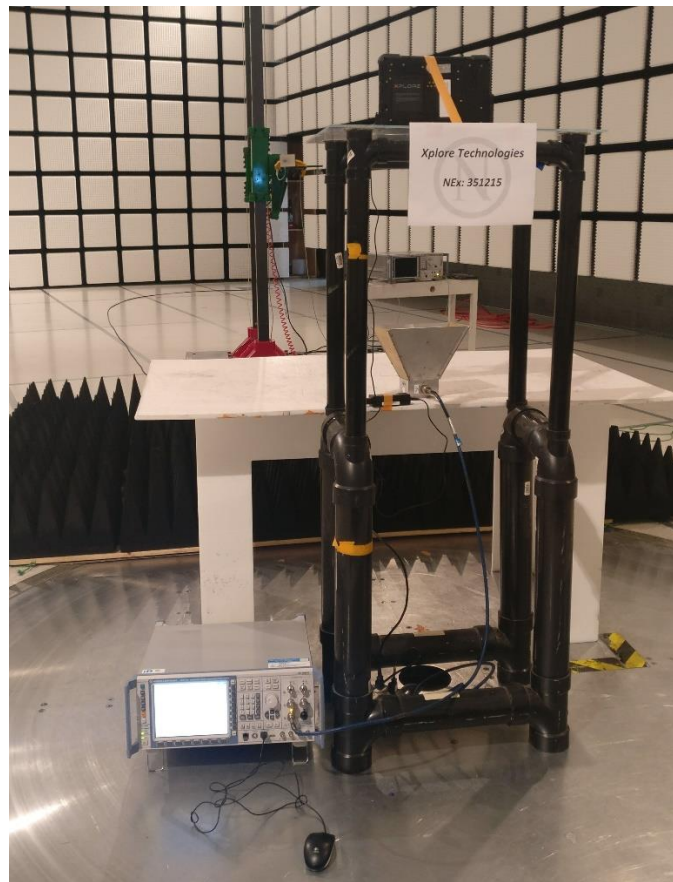
**Front Radiated disturbance 1GHz - 18GHz**



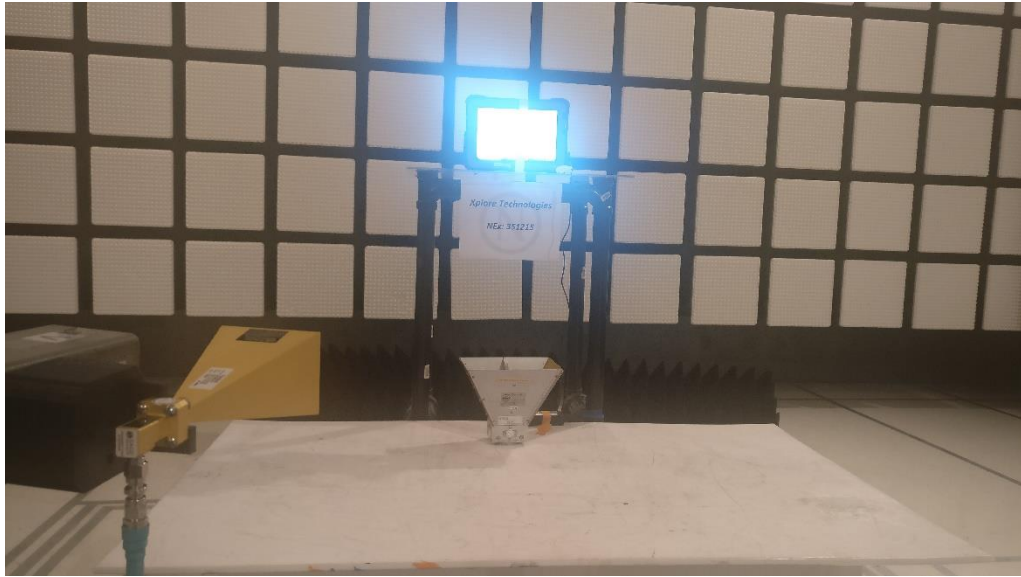
**Back Radiated disturbance 1GHz - 18GHz**



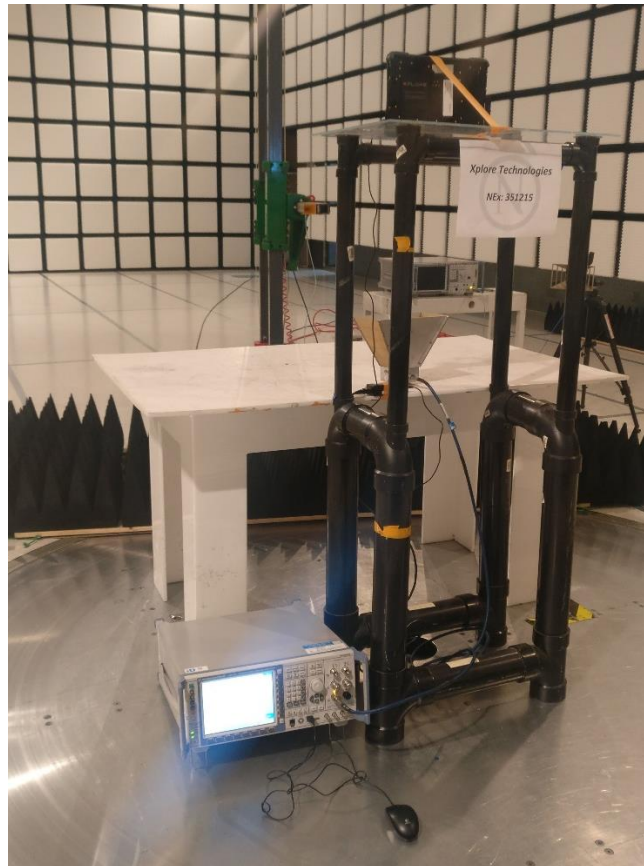
**Front Radiated disturbance 18GHz – 26GHz**



**Back Radiated disturbance 18GHz – 26GHz**



**Front Radiated disturbance 26GHz – 40GHz**



**Back Radiated disturbance 26GHz – 40GHz**

## 8.2 Conducted emission limits; Intentional Radiators.

### 8.2.1 References

Title 47 → Chapter I → Subchapter A → Part 15 → Subpart C → §15.207 / ANSI C63.4: 2014

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

- (1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
- (2) For all other carrier current systems: 1000  $\mu$ V within the frequency band 535-1705 kHz, as measured using a 50  $\mu$ H/50 ohms LISN.
- (3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

8.2.2 8.2.2 Conducted Emissions Test summary

Verdict	Pass		
Test date	April 26, 2018	Temperature	23 °C
Test engineer	Nikolay Shtin, SR. Wireless Engineer	Air pressure	1000 mbar
Test location	Ground Plane	Relative humidity	56

8.2.3 Notes

None

8.2.4 Setup details

Port under test	AC Mains Input
EUT setup configuration	Floor standing
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver settings:

Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Detector mode	<ul style="list-style-type: none"> <li>- Peak and Average (Preview measurement)</li> <li>- Quasi-peak and CAverage (Final measurement)</li> </ul>
Trace mode	Max Hold
Measurement time	<ul style="list-style-type: none"> <li>- 100 ms (Peak and Average preview measurement)</li> <li>- 1000 ms (Quasi-peak final measurement)</li> <li>- 160 ms (CAverage final measurement)</li> </ul>

**Table 8.2-1: Conducted disturbance at mains port equipment list**

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESCI 7	E1026	5/23/2017	5/23/2018
Two Line V-Network	Rohde & Schwarz	ENV216	E1019	6/27/2017	6/27/2018

Notes: None

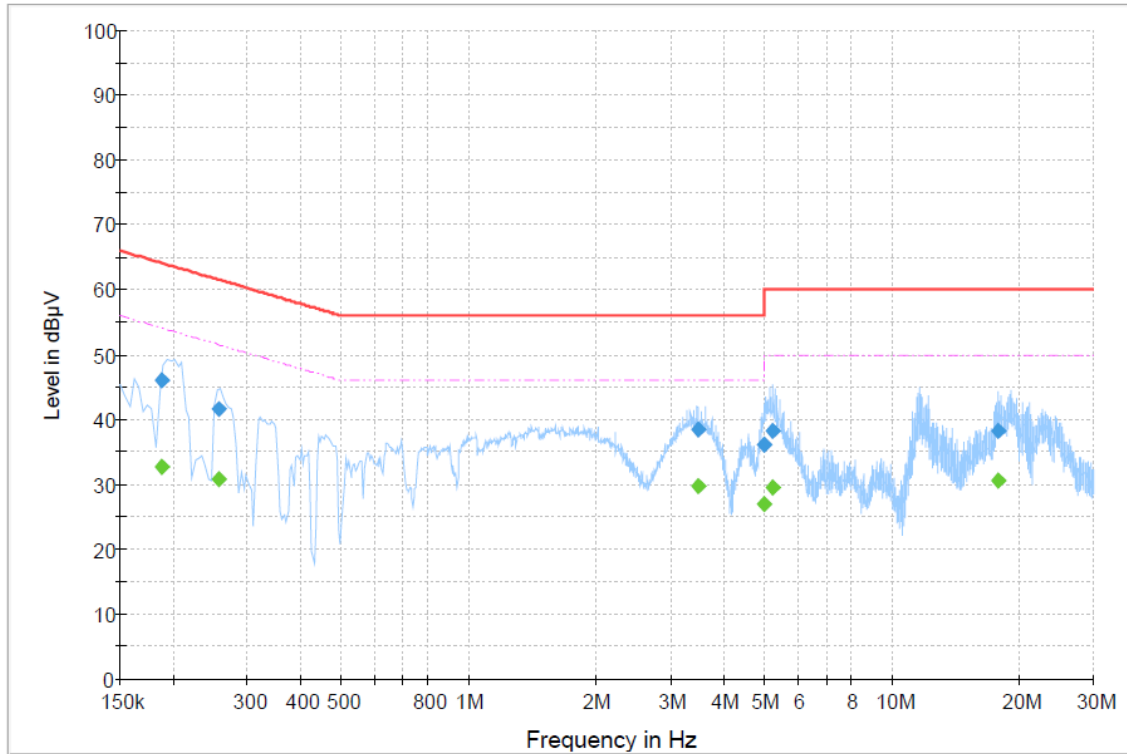
**Table 8.2-2: Conducted disturbance at mains port test software details**

Manufacturer of Software	Details
Rohde-Schwarz	EMC 32 V10.0

Notes: None

8.2.5 Conducted Emissions Test data

Full Spectrum



The spectral plot has been corrected with transducer factors. (i.e. cable loss, LISN factors, and attenuators)

**Conducted disturbance at mains port spectral plot on phase and neutral line**

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.188500	---	32.72	54.10	21.39	5000.0	9.000	L1	ON	19.5
0.188500	46.15	---	64.10	17.95	5000.0	9.000	L1	ON	19.5
0.256500	41.68	---	61.54	19.87	5000.0	9.000	N	ON	19.5
0.256500	---	30.81	51.54	20.73	5000.0	9.000	N	ON	19.5
3.476500	38.40	---	56.00	17.60	5000.0	9.000	L1	ON	19.5
3.476500	---	29.82	46.00	16.18	5000.0	9.000	L1	ON	19.5
4.988500	---	27.03	46.00	18.97	5000.0	9.000	N	ON	19.5
4.988500	36.14	---	56.00	19.86	5000.0	9.000	N	ON	19.5
5.216500	---	29.49	50.00	20.51	5000.0	9.000	N	ON	19.5
5.216500	38.18	---	60.00	21.82	5000.0	9.000	N	ON	19.5
17.808500	---	30.49	50.00	19.51	5000.0	9.000	N	ON	19.8
17.808500	38.20	---	60.00	21.80	5000.0	9.000	N	ON	19.8

**Conducted disturbance at mains port (Quasi-Peak and Average) results for AC Power Main**

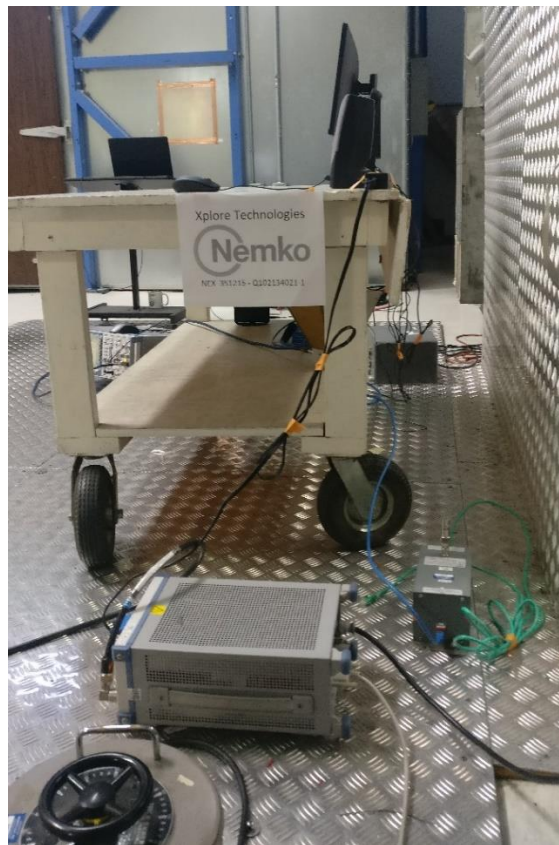
- Notes:
- <sup>1</sup> Result (dBµV) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
  - <sup>2</sup> Correction factor (dB) = LISN factor IL (dB) + cable loss (dB) + attenuator (dB)
  - <sup>3</sup> The maximum measured value observed over a period of 15 seconds was recorded.

Sample calculation: 63.5 dBµV (result) = 44 dBµV (receiver reading) + 19.5 dB (Correction factor)

8.2.6 Conducted Emissions Setup photos



*Front Conducted disturbance at mains port setup photo*



*Back Conducted disturbance at mains port setup photo*



## Section 9 EUT photos

### 9.1 External photos

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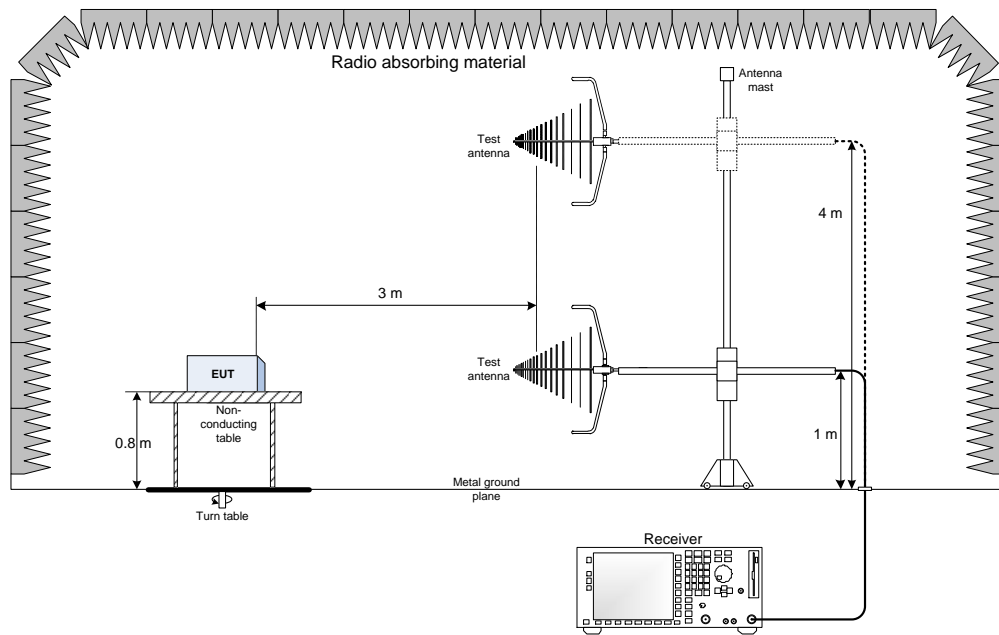


Xplore EUT

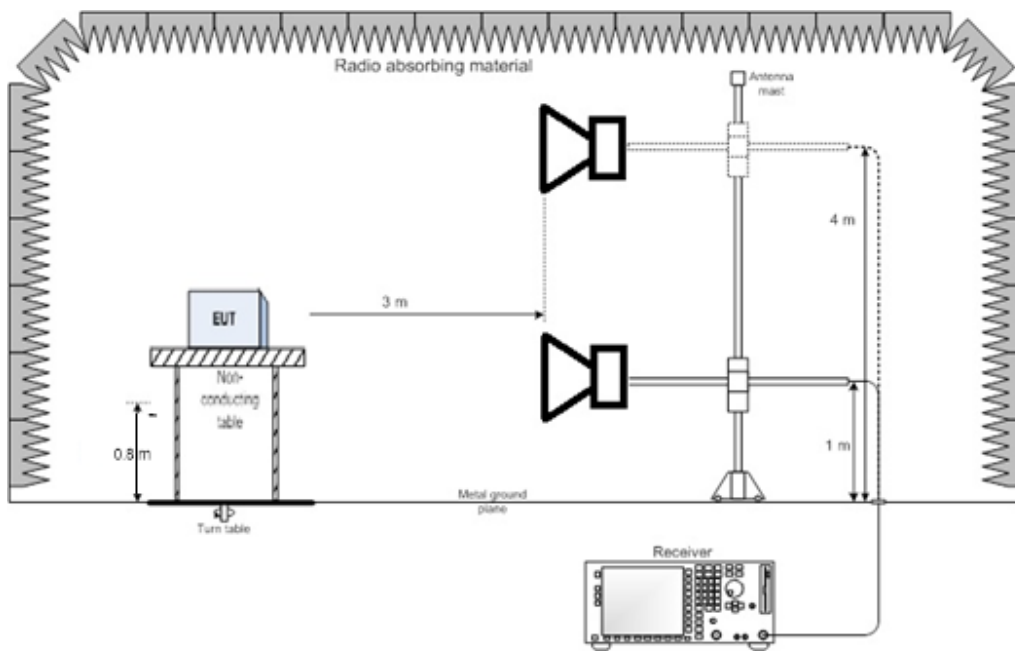


Power Charger

### Section 10 Block diagrams of test set-ups



30-1000MHz Setup



Above 1GHz Setup

Thank you for choosing

