Project #: 22861-15

Company: SuperDeker

EUT: SuperDeker Pro

Wireless Test Report

Prepared for:

SuperDeker
1905 Stone Myers Parkway
Grapevine, TX 76051

By

Nemko PTI, Inc.
1601 North A.W. Grimes Blvd., Suite B
Round Rock, Texas 78665

March 8, 2022

Written by

Shakil Murad
Wireless Engineer

Revision History

Revision Number	Description	Date
Draft01	Initial release for review	3/9/2022

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Compliance Certificate

FCC MRA Designation Number: US5270 NVLAP Accreditation Number: 200062-0

Applicant	Device & Test Identification
SuperDeker 1905 Stone Myers Parkway Grapevine, TX 76051	FCC ID: 2A4JVSD20PRO Industry Canada ID: 28603-SD20PRO Model(s): SuperDeker Pro

The device named above was tested utilizing the following standards and found to be in compliance with the required criteria:

Requirement	Reference	Detail
FCC 47 CFR Part 15 C	15.247	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
FCC 47 CFR Part 15 C	15.209	Radiated emission limits; general requirements.
FCC 47 CFR Part 15 C	15.205	Restricted Bands of Operation
KDB 558074 D01	DR01	DTS Measurement Guidance v03r02
KDB 412172	D01	Guidelines for Determining the ERP and EIRP of an RF Transmitting System
OET Bulletin 65*	Edition 97-01, and Supplement C, Ed. 01-01	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
RSS-247	Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-Gen	Issue 5 Amd 1	General Requirements and Information for the Certification of Radio Apparatus
RSS-102	Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

*MPE is reported separately from this document. **Corresponding RSS references are listed in the body of the report.

I, Shakil Murad, for Nemko PTI, Inc., being familiar with the above requirements and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.

NVLAP®
TESTING
NVLAP LAB CODE 200062-0

Shakil Murad
Wireless Engineer

This report has been reviewed and accepted by the Applicant**.** The undersigned is responsible for ensuring that this device will continue to comply with the requirements listed above.

_____
Representative of Applicant

Test Result Summary

Test	FCC Part 15 Rule Paragraphs	IC RSS References	Test Results
Antenna Requirement	15.203	RSS-Gen 8.3	Pass
Fundamental Power	15.247 (a)(3)	RSS-247 5.4 (d)	Pass
Duty Cycle	15.247 (a)(1)(3)	RSS-247 5.3 (a)	Pass
Power Spectral Density	15.247 (e)	RSS-247 5.2 (b)	Pass
Occupied Bandwidth	15.247 (a)(2), 2.1049	RSS-247 5.2 (a)	Pass
Band Edge	15.247 (d);15.205 (a)	RSS-247 5.5; RSS-Gen 4.9	Pass
Conducted Spurious Emissions	15.247 (d); 15.209 (a)	RSS-247 5.5	Pass
Transmitter Radiated Spurious Emissions	15.247 (d), 15.209 (a)	RSS-247 5.5; RSS-Gen 6.13 & 8.10	Pass
AC Conducted Emissions	15.107 (a)	ICES-003	Pass
Unintentional Radiated Emissions	15.109	ICES-003	Pass

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States and Canada.

Nemko PTI, Inc., follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing.

1.2 EUT Description

Manufacturer / Model	Serial #	Description
SuperDeker Model: SuperDeker Pro	10 and 11	2400-2483.5 MHz Bluetooth Low Energy radio protocols.

1.3 EUT Test Configuration

The EUT was exercised in a manner consistent with normal operations. The EUT is powered by +3.7 volts battery.

1.4 Modifications to Equipment

The PCB mounted chip antenna was removed, and a small coaxial cable was soldered in its place to facilitate conducted RF measurements.

1.5 Test Site

Measurements were made at the Nemko PTI semi-anechoic facility designated Site 45 (FCC 776781, IC 3036B-1) in Austin, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas 78758, while the main office is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665. CAB Identifier: US 0123.

1.6 Measurement Corrections

Parameter	From Sums Of
Radiated Field Strength	Raw Measured Level + Antenna Factor + Cable Losses – Amplifier Gain
Conducted Antenna Port	Raw Measured Level + Attenuator Factor + Cable Losses
Conducted Mains Port	Raw Measured Level + LISN Factor + Cable/Filter/Limiter Losses

Additionally, measurement distance extrapolation factors (such as 1/d above 30 MHz) are applied and documented where used.

1.7 Applicable Documents

Table 1.7.1: Applicable Documents

Document	Title
47 CFR	Part 15 – Radio Frequency Devices Subpart C -Intentional Radiators
RSS-247 Issue 1	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-Gen Issue 4	General Requirements and Information for the Certification of Radio Apparatus
ANSI C63.10 2020	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.0 AC Power-line Conducted Emissions

1.1 Test Criteria

AC Power-line Conducted Emissions Limit		
Frequency (MHz)	Quasi-Peak (dBuV)	Average (dBuV)
0.150 – 0.500	66 – 56 *	56 – 46 *
0.500 - 5	56	46
5 - 30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

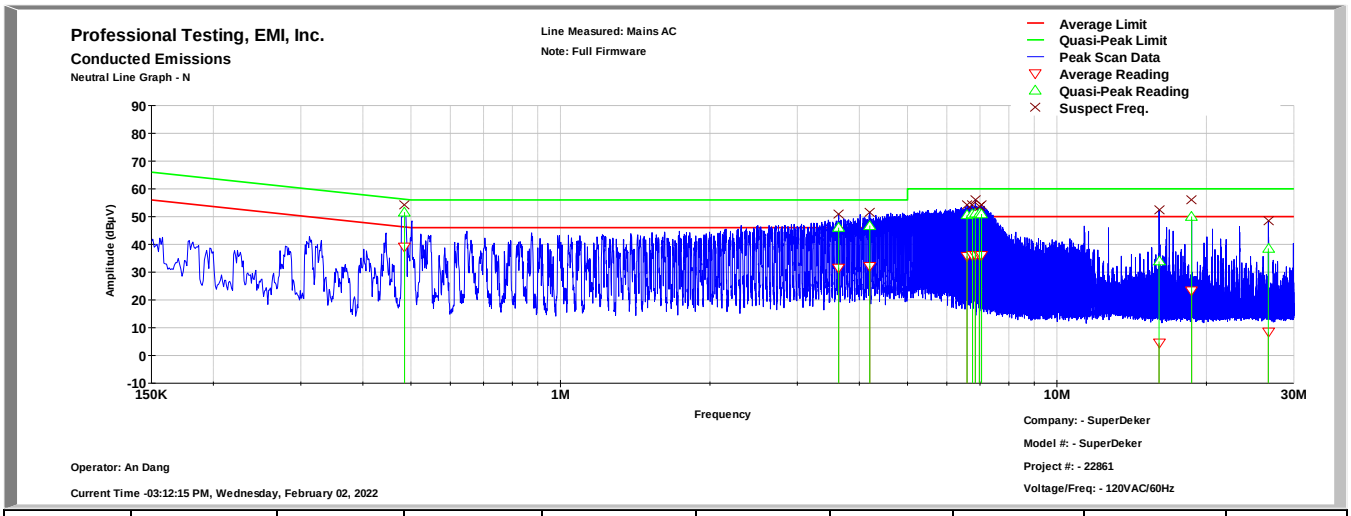
1.2 Test Results, AC Power-line Conducted Emissions

Table 1.2.1: Conducted Emissions Test Results – AC Mains

EUT Name	**SuperDeker**		**Model or Serial #**	**S/N: 11**	
EUT Line Voltage	**120**	**VAC**	**Frequency**	**60**	**Hz**
Emissions Limit Level	**FCC 15 Class B**		**EUT Test Mode or Configuration**	**Full Software**	
Frequency Range			**Line Tested**	**Test Results**	
150kHz to 30MHz			**Neutral Line**	**PASS**	
			Phase A (Line 1)	**PASS**	
Notes:					

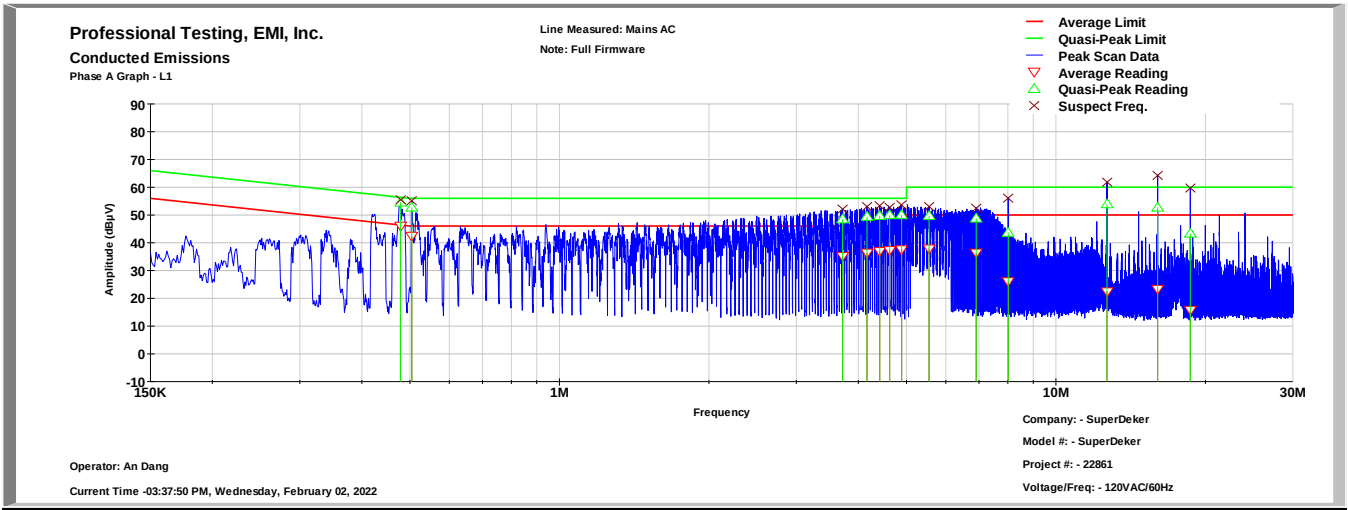
1.2.2 AC Power-line Conducted Emissions Test Data

Neutral Line Emissions Data



Frequency (MHz)	Quasi-peak Reading (dBµV)	Quasi-peak Limit (dBµV)	Quasi-peak Margin (dB)	Quasi-peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results	Peak Reading (dBµV)
(MHz)	(dBµV)	(dBµV)	(dB)	(Pass/Fail)	(dBµV)	(dBµV)	(dB)	(Pass/Fail)	(dBµV)
0.485	51.6	56.2	-4.6	PASS	39.1	46.2	-7.1	PASS	54.1
3.634	46.0	56.0	-10.0	PASS	31.6	46.0	-14.4	PASS	50.4
4.197	46.8	56.0	-9.2	PASS	32.3	46.0	-13.7	PASS	51.2
6.593	50.5	60.0	-9.5	PASS	35.7	50.0	-14.3	PASS	55.2
6.763	50.8	60.0	-9.2	PASS	36.0	50.0	-14.0	PASS	55.2
6.849	51.1	60.0	-8.9	PASS	36.1	50.0	-13.9	PASS	59.6
6.978	51.1	60.0	-8.9	PASS	36.2	50.0	-13.8	PASS	55.8
7.049	50.9	60.0	-9.1	PASS	36.0	50.0	-14.0	PASS	55.1
16.061	33.9	60.0	-26.1	PASS	4.5	50.0	-45.5	PASS	54.2
18.677	50.1	60.0	-9.9	PASS	23.4	50.0	-26.6	PASS	63.9
26.660	38.5	60.0	-21.5	PASS	8.4	50.0	-41.6	PASS	53.3

Line 1 Emissions Data



Frequency (MHz)	Quasi-peak Reading (dBµV)	Quasi-peak Limit (dBµV)	Quasi-peak Margin (dB)	Quasi-peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results	Peak Reading (dBµV)
(MHz)	(dBµV)	(dBµV)	(dB)	(Pass/Fail)	(dBµV)	(dBµV)	(dB)	(Pass/Fail)	(dBµV)
0.478	54.5	56.4	-1.8	PASS	46.0	46.4	-0.4	PASS	57.6
0.504	52.7	56.0	-3.3	PASS	42.3	46.0	-3.7	PASS	57.7
3.719	48.4	56.0	-7.6	PASS	35.3	46.0	-10.7	PASS	52.6
4.163	49.2	56.0	-6.8	PASS	36.4	46.0	-9.6	PASS	53.6
4.417	49.7	56.0	-6.3	PASS	36.9	46.0	-9.1	PASS	53.8
4.625	49.9	56.0	-6.1	PASS	37.4	46.0	-8.6	PASS	54.0
4.889	50.0	56.0	-6.0	PASS	37.7	46.0	-8.3	PASS	53.9
5.551	49.6	60.0	-10.4	PASS	37.9	50.0	-12.1	PASS	53.7
6.907	48.9	60.0	-11.1	PASS	36.3	50.0	-13.7	PASS	57.6
8.014	43.6	60.0	-16.4	PASS	26.2	50.0	-23.8	PASS	57.8
12.669	53.8	60.0	-6.2	PASS	22.5	50.0	-27.5	PASS	63.0
16.026	52.7	60.0	-7.3	PASS	23.4	50.0	-26.6	PASS	66.4
18.648	43.3	60.0	-16.7	PASS	15.9	50.0	-34.1	PASS	62.8

2.0 Fundamental Power

2.1 Test Procedure

The radio was connected directly to the spectrum analyzer for measurement. Low, mid, and high channel output power was measured.

2.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Conducted Power Limit
15.247(a)(3) // RSS-247 5.2	1 W peak (+30dBm) Limit Restated as Field: 125.23 dBµV/m @ 3 m

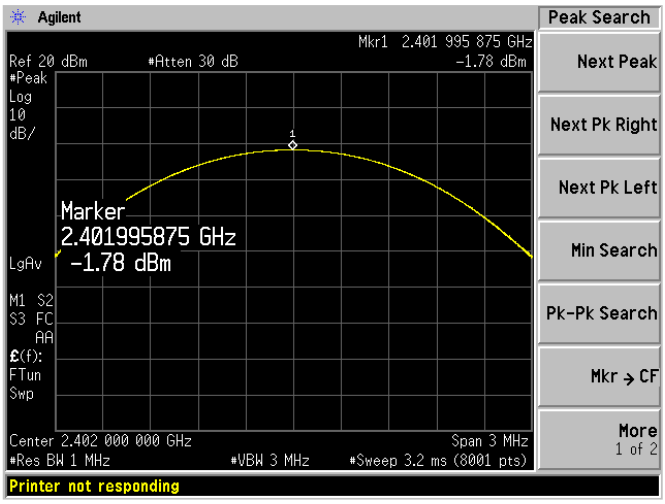
2.3 Test Results, Peak Power

Project Number:	22861-15					Test Date(s):	3/3/2022				
Environmental Conditions:	Temperature	22.2	°C	Humidity	46	RH	Barometric Pressure	30.11	in Hg		
EUT (6 dB) Bandwidth:	0.675	MHz									
Measurement Parameters:	RBW	1	MHz	VBW	3	MHz	Span	3	MHz	Detector	Peak

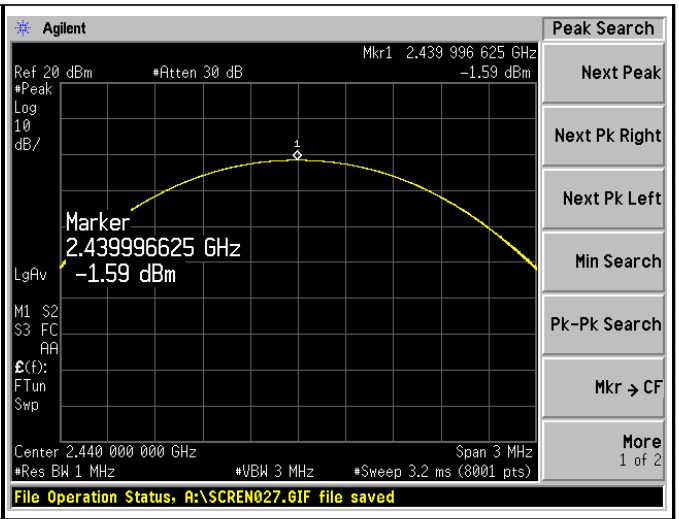
Channel	Frequency (MHz)	Measured Power (dBm)	Attenuator Factor (dB)	Corrected Power (dBm)	Limit (dBm)	Test Result
0	2402	-1.78	0	-1.78	30	Pass
19	2440	-1.59	0	-1.59	30	Pass
39	2480	-1.44	0	-1.44	30	Pass

The requirements were satisfied.

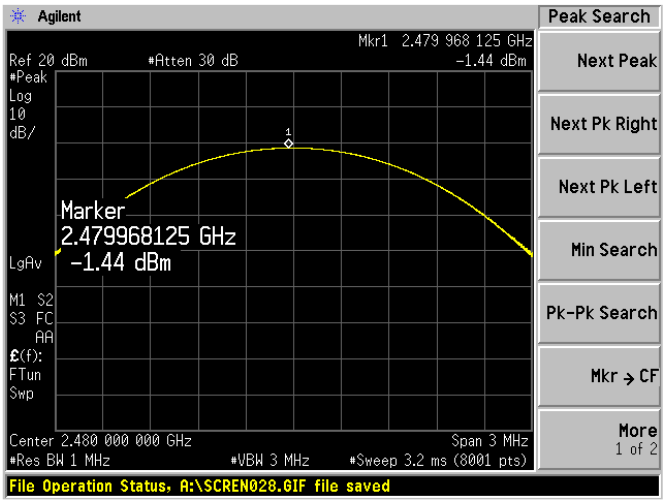
Peak output power test plots:



Low Channel



Mid Channel



High Channel

3.0 Occupied Bandwidth

3.1 Test Procedure

Bandwidth is measured and recorded. The bandwidth measurement is used to verify DTS characteristics and/or for general reporting for agency application.

3.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Bandwidth
15.247(a)(2), 2.1049 // RSS-247, RSS-Gen 4.6	6 dB 500 kHz minimum 99% (all methods)

In cases where the software function fails to find/mark the correct edge of the modulated envelope, a manual measurement (marker-delta over display line) is taken with the same spectrum analyzer settings.

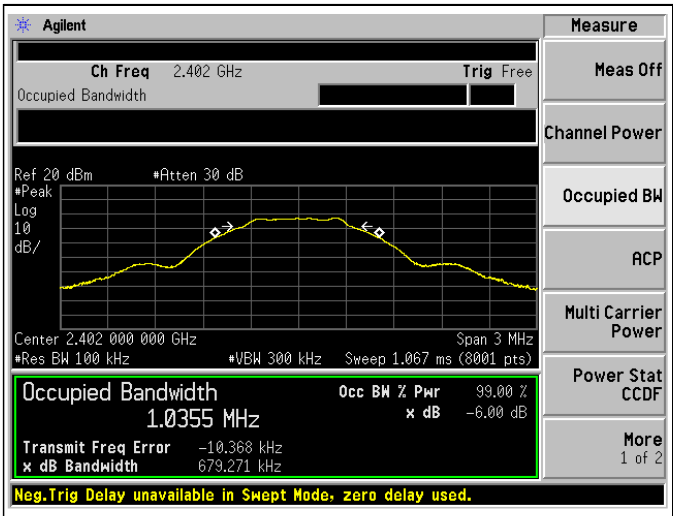
3.3 Test Results, Occupied Bandwidth

Project Number:	22861-15				Test Date(s):	3/3/2022							
Environmental Conditions:	Temperature	22.2	°C		Humidity	46	RH	Barometric Pressure	30.11	in Hg			
Measurement Parameters:	RBW	100	kHz		VBW	300	kHz	Span	3	MHz	Detector	Peak	
Measurement Bandwidth:		6	dB										

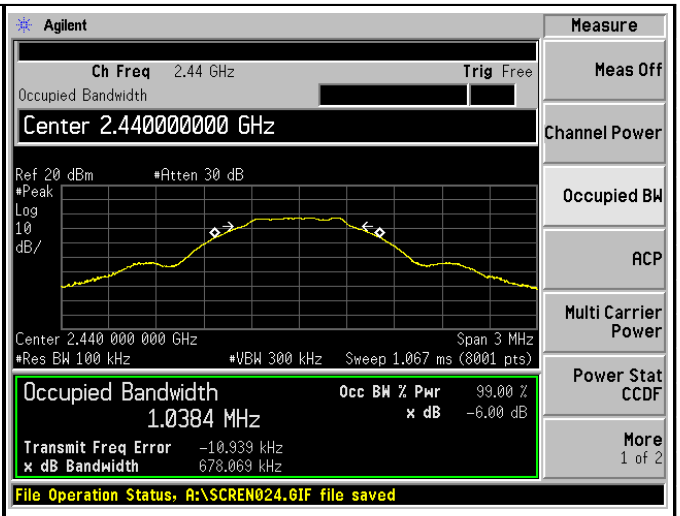
Channel	Frequency (MHz)	Measured Bandwidth (kHz)	Reported Minimum Bandwidth (kHz)
0	2402	679.271	675.061
19	2440	678.069	
39	2480	675.061	

The EUT met the requirements.

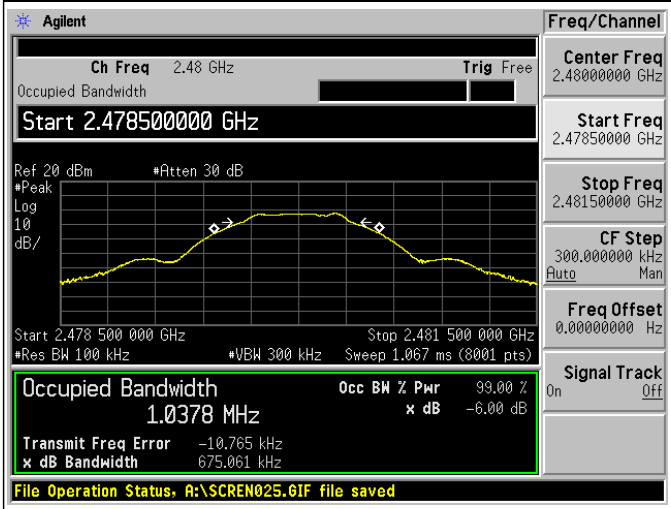
Occupied Bandwidth test plots, Recorded: 6 dB, 99% BW



Low Channel



Mid Channel



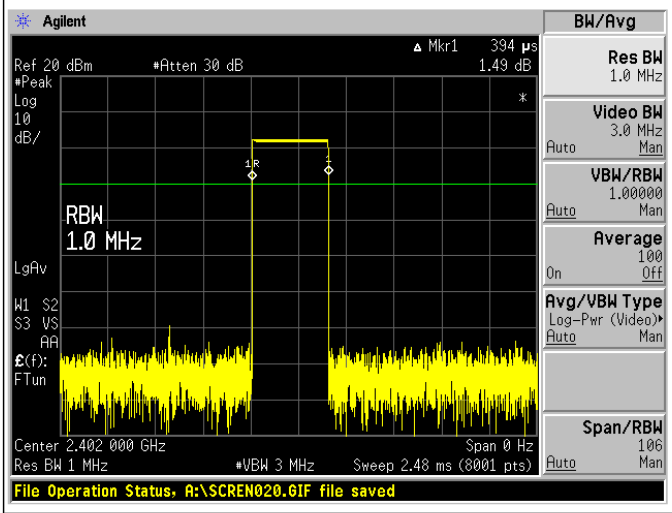
High Channel

4.0 Duty Cycle

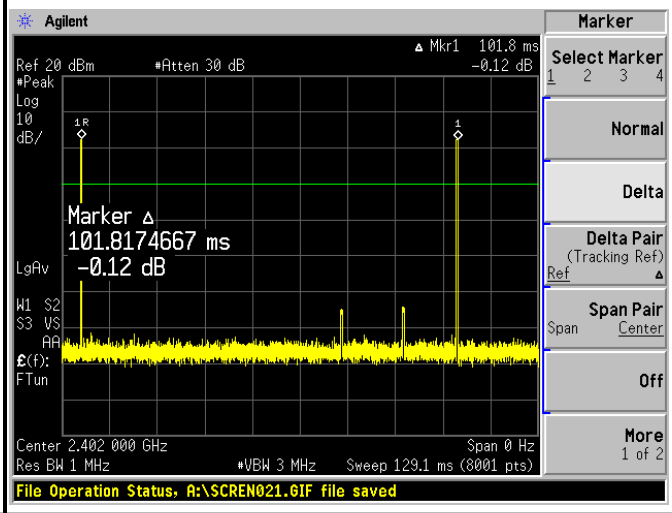
Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

Project Number:	22861-15				Test Date(s):	3/2/2022					
Environmental Conditions:	Temperature	24.2	°C	Humidity	30	RH	Barometric Pressure	30.11	in Hg		
Measurement Parameters:	RBW	1	MHz	VBW	3	MHz	Span	0	MHz	Detector	Peak

Measured On Time (ms)	Max On Time Allowed (ms)	On Time Result	Measured Time Interval (ms)	Duty Cycle Factor (dB) (20 * Log(On time/Interval)	Duty Cycle Factor Allowed (dB)
0.394	400	Pass	101.8	48.25	20
RF Exposure Duty Cycle Reduction Factor (10 * Log(On Time/Period), (dB)					24.1



Transmit Event Time



Time Interval (Return to channel time)

Duty Cycle Measurement

5.0 Power Spectral Density

5.1 Test Procedure

The radio was connected directly to the spectrum analyzer for measurement. Low, mid, and high channel was measured.

5.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Power Spectral Density, Conducted Limit
15.247(e) // RSS-247, 5.2	8 dBm / 3 kHz Restated as field strength: 103.23 dBµV/m at 3 m

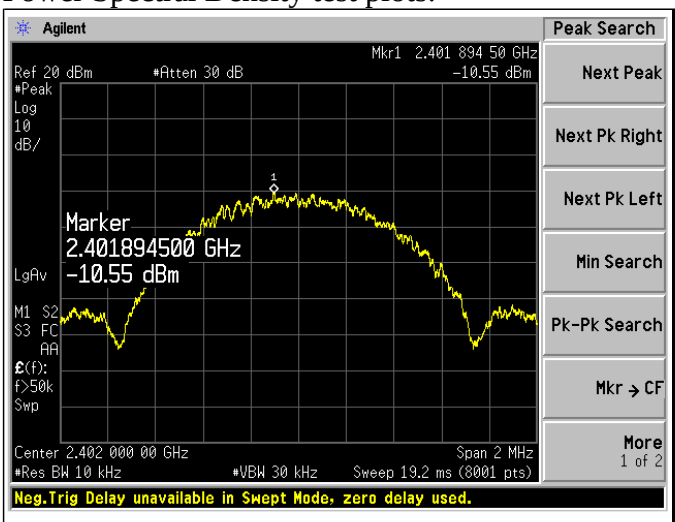
5.3 Test Results, Power Spectral Density

Project Number:	22861-15				Test Date(s):	3/3/2022					
Environmental Conditions:	Temperature	22.2	°C		Humidity	46	RH	Barometric Pressure	30.11	in Hg	
EUT Channel Bandwidth:	0.70	MHz									
Measurement Parameters:	RBW	10	kHz	VBW	30	kHz	Span	2	MHz	Detector	Peak

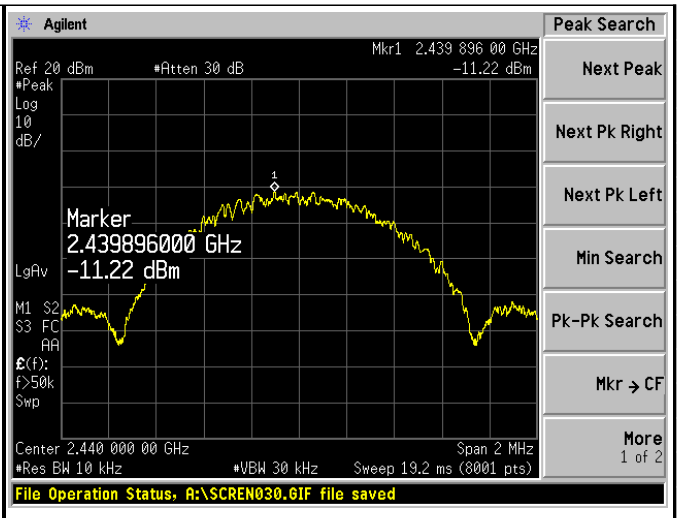
Channel	Frequency (MHz)	Measured Power (dBm)	Attenuator Factor (dB)	Corrected Power (dBm)	Limit (dBm)	Test Result
0	2402	-10.55	0	-10.55	8	Pass
19	2440	-11.22	0	-11.22	8	Pass
39	2480	-11.02	0	-11.02	8	Pass

The requirements were satisfied.

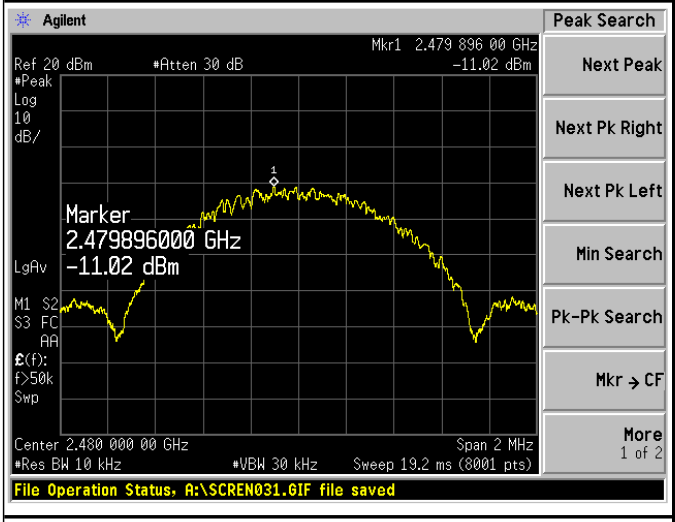
Power Spectral Density test plots:



Low Channel



Mid Channel



High Channel

6.0 Band Edge

6.1 Test Procedure

EUT is placed into normal transmit operation on the nearest band edge channel. The spectrum analyzer is approximately centered on the band edge frequency with span sufficient to include the peak of the adjacent fundamental signal. Measurement includes at least two standard bandwidths from the respective band edge. If required, the band-edge marker-delta method is utilized. The radio was connected directly to the spectrum analyzer for measurement.

6.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Unwanted Emissions
15.247, 15.205 // RSS-247 5.5; RSS-Gen 4.9	Emissions Adjacent to Authorized Band

6.3 Test Results

Measurements included fundamental and more than 2 standard bandwidths (standard bandwidth 1 MHz) beyond the band edges to provide a clear view of the fundamental and the declining emission levels. Beyond this point, the general emission limits are applied in the radiated emission tests reported elsewhere in the report.

This is a conducted measurement with limits derived from the general emission field strength limits. The far field path loss equation is utilized to convert the field strength limits to EIRP limits in dBm as follows:

Given EIRP = $E_{dB\mu V/m} + 20Log_{10}(d) - 104.8$

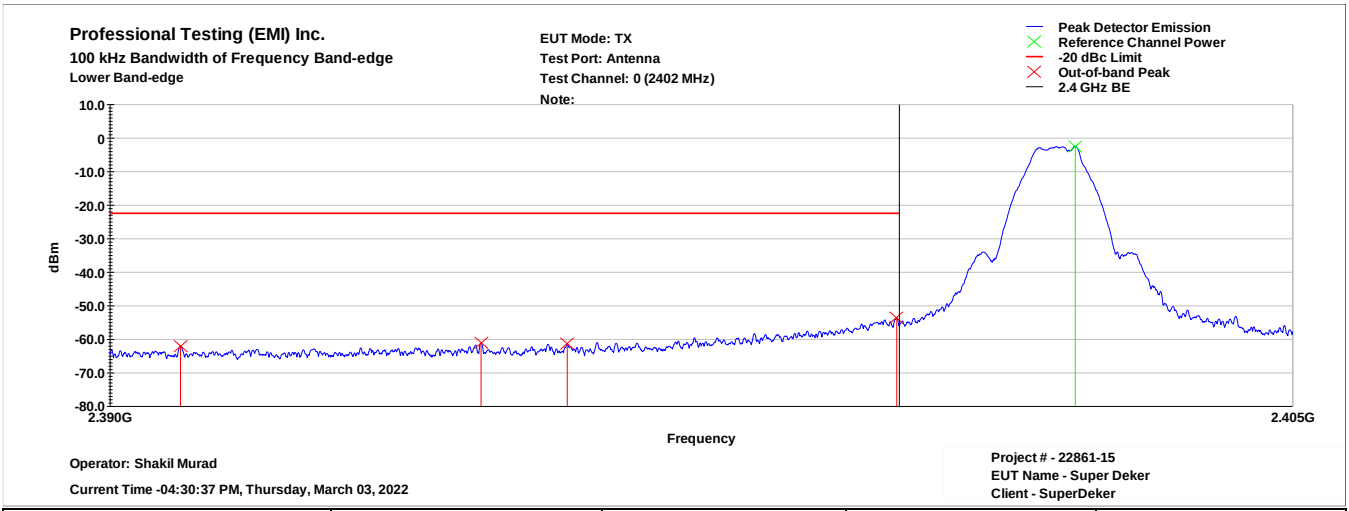
EIRP = 54 dBµV/m + $20Log_{10}$(3 m) – 104.8 dB = -41.25 dBm (commonly -41 dBm is applied)

Emissions below band were measured with peak detection in 100 kHz RBW.

Emissions above band measured with peak detection and 1 Hz video average in 1 MHz RBW if the peak emission exceeds the average limit.

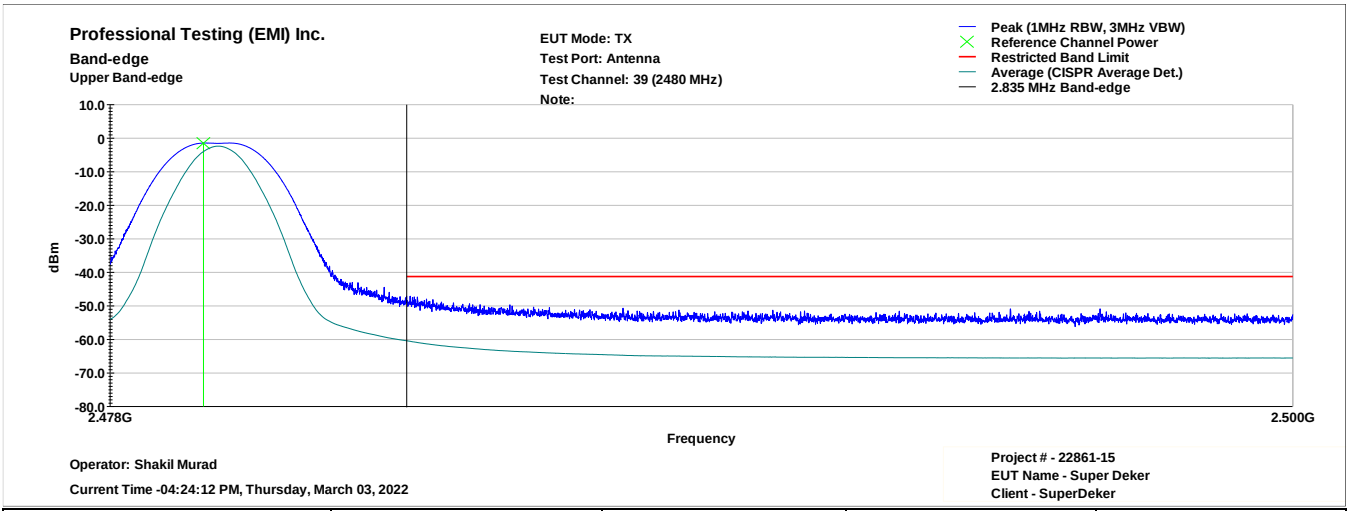
The requirement was satisfied. Plotted results appear on the following page.

Lower Band-edge



Frequency (MHz)	Corrected Reading (dBm)	Limit -20 dBc (dBm)	Margin (dB)	Results
2390.891	-62.017	-22.426	-39.591	PASS
2394.695	-61.012	-22.426	-38.586	PASS
2395.788	-61.357	-22.426	-38.931	PASS
2399.968	-53.557	-22.426	-31.131	PASS

Upper Band-edge



Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
2483.500	-60.401	-41.250	-19.151	PASS

7.0 Conducted Antenna Port Spurious Emissions, Transmit Mode

7.1 Test Procedure

Conducted antenna port emissions are measured with the EUT transmitting on the required frequencies.

Table 7.1.1: Test Parameters

30 MHz to 1 GHz	1 GHz to 18 GHz	18 GHz to 25 GHz
120kHz RBW / 300kHz VBW	1MHz RBW / 3MHz VBW	1MHz RBW / 3MHz VBW
Quasi-peak	Peak & Average	Peak & Average

7.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Unwanted Emissions
15.247, 15.209 // RSS-247 5.5, RSS-Gen 4.9 & 4.10	Antenna Port Conducted Spurious/Harmonic Emissions Transmit Mode

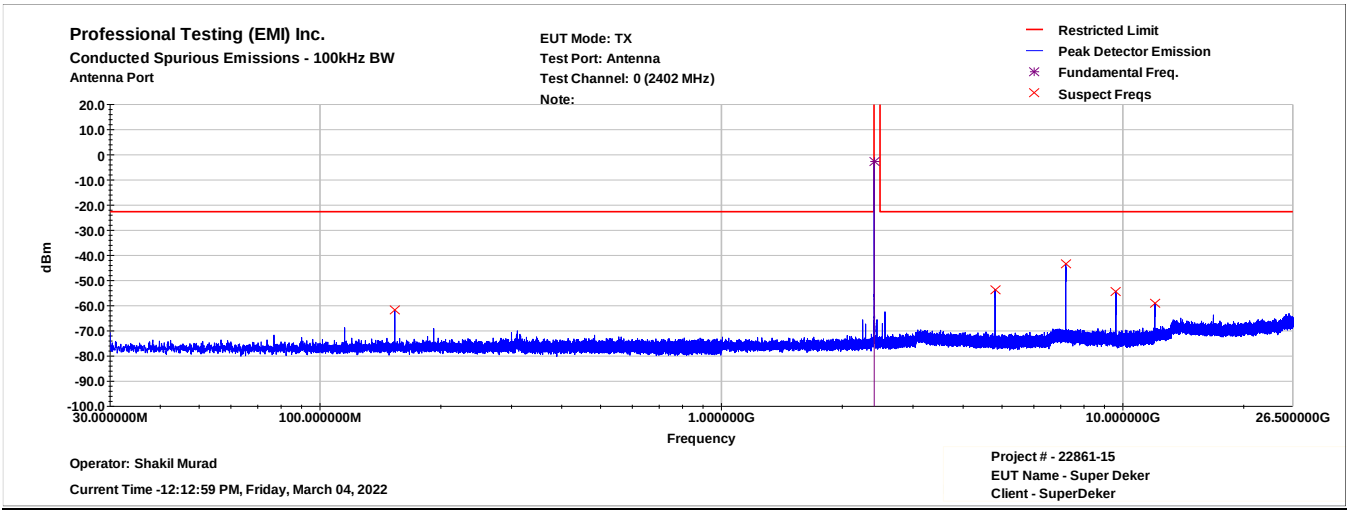
7.3 Test Results

Three channels were tested. EUT was transmitting continuously and unmodulated.

The top, middle and bottom channels were tested. 15.209 limits were applied to entire band for worst-case limits. The EUT satisfied the requirements.

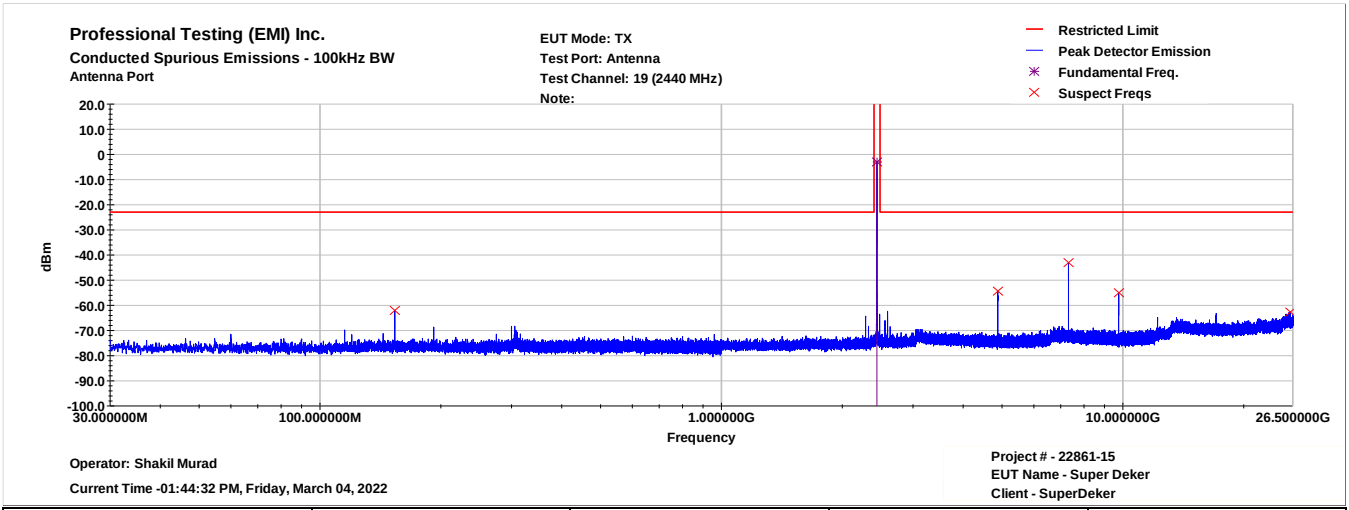
7.3.1 100 kHz Bandwidth Test data

Bottom Channel: 100 kHz Bandwidth



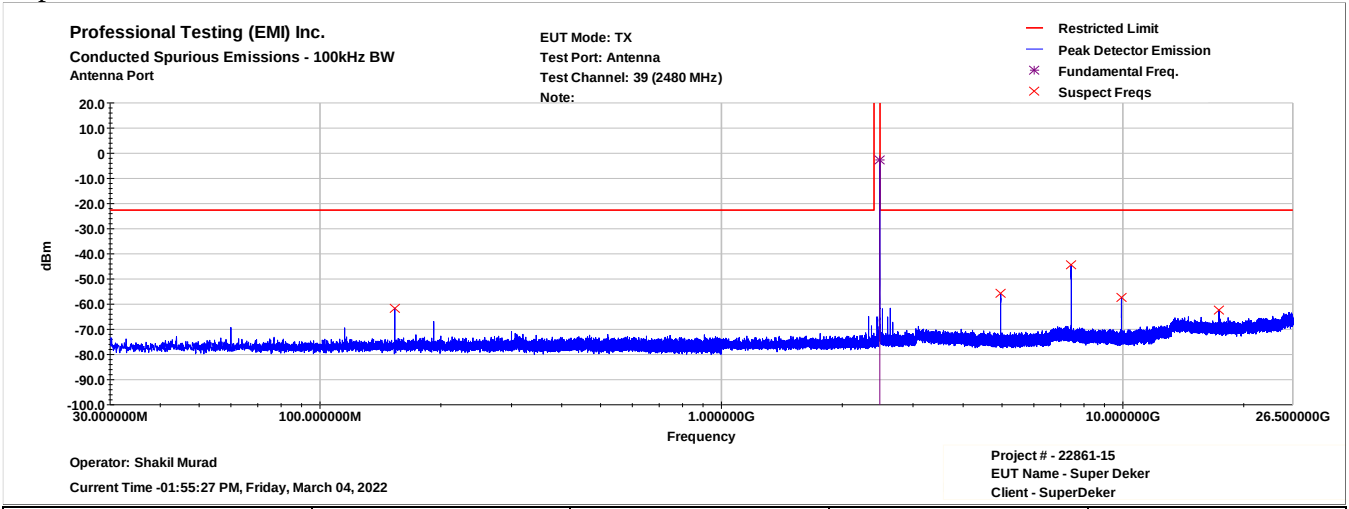
Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
153.594	-61.839	-22.635	39.204	PASS
4804.350	-53.547	-22.635	30.912	PASS
7206.750	-43.464	-22.635	20.829	PASS
9606.950	-54.247	-22.635	31.612	PASS
12008.458	-59.158	-22.635	36.523	PASS

Middle Channel: 100 kHz Bandwidth



Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
153.594	-61.954	-22.930	39.024	PASS
4880.525	-54.421	-22.930	31.491	PASS
7320.600	-43.121	-22.930	20.191	PASS
9760.950	-55.034	-22.930	32.104	PASS
26151.396	-62.638	-22.930	39.708	PASS

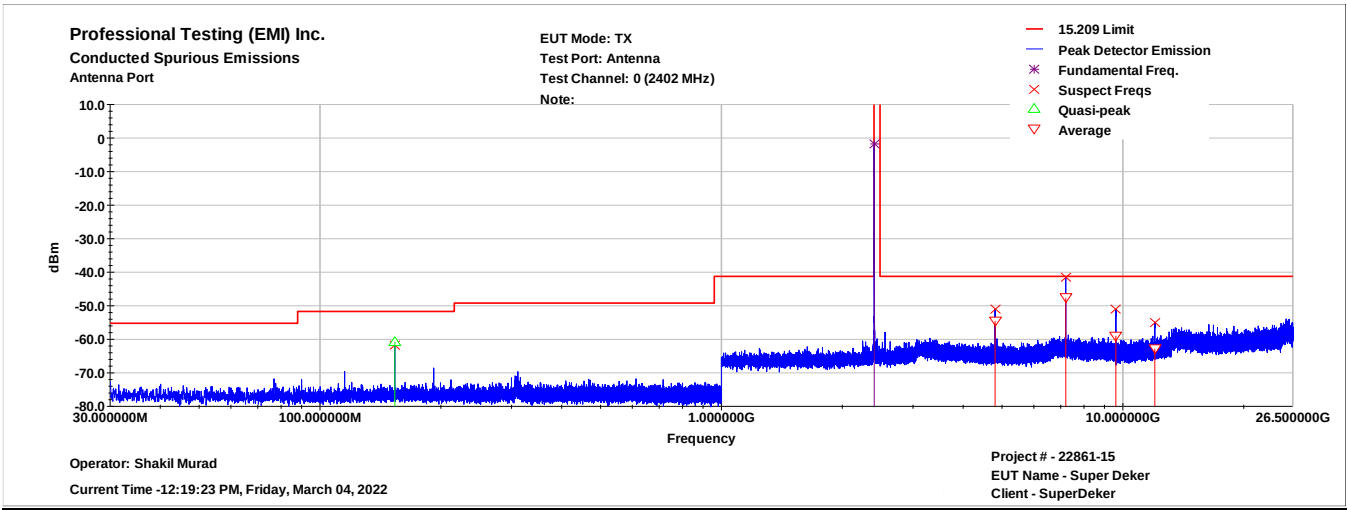
Top Channel: 100 kHz Bandwidth



Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
153.594	-61.581	-22.624	38.957	PASS
4960.550	-55.824	-22.624	33.200	PASS
7440.775	-44.328	-22.624	21.704	PASS
9921.000	-57.288	-22.624	34.664	PASS
17358.000	-62.310	-22.624	39.686	PASS

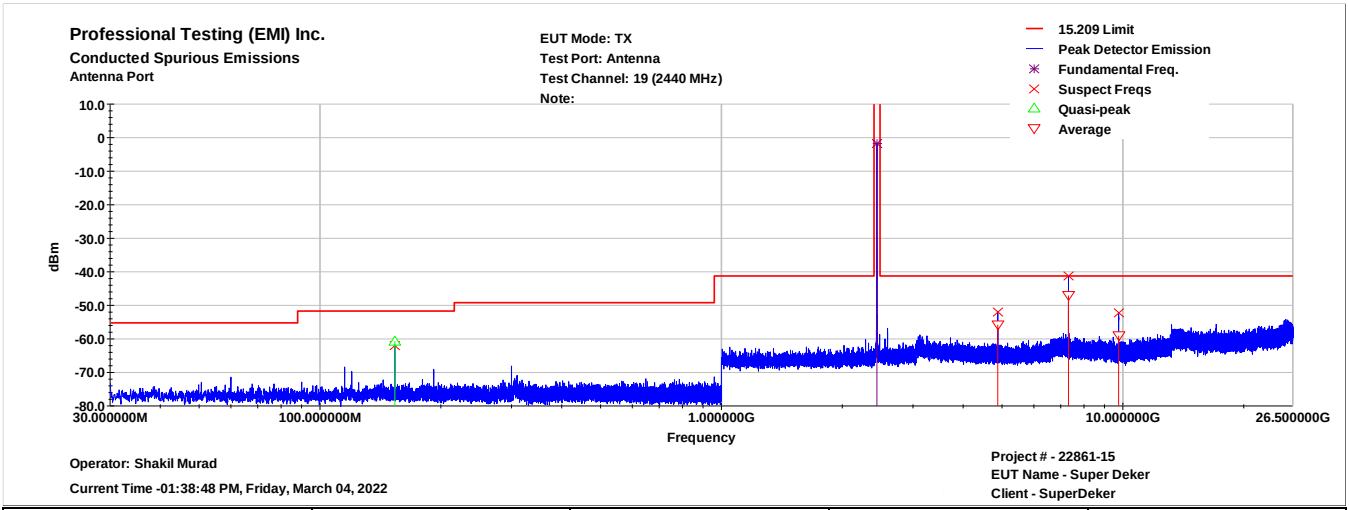
7.3.1 1 MHz Bandwidth Test data

Bottom Channel: 1 MHz Bandwidth



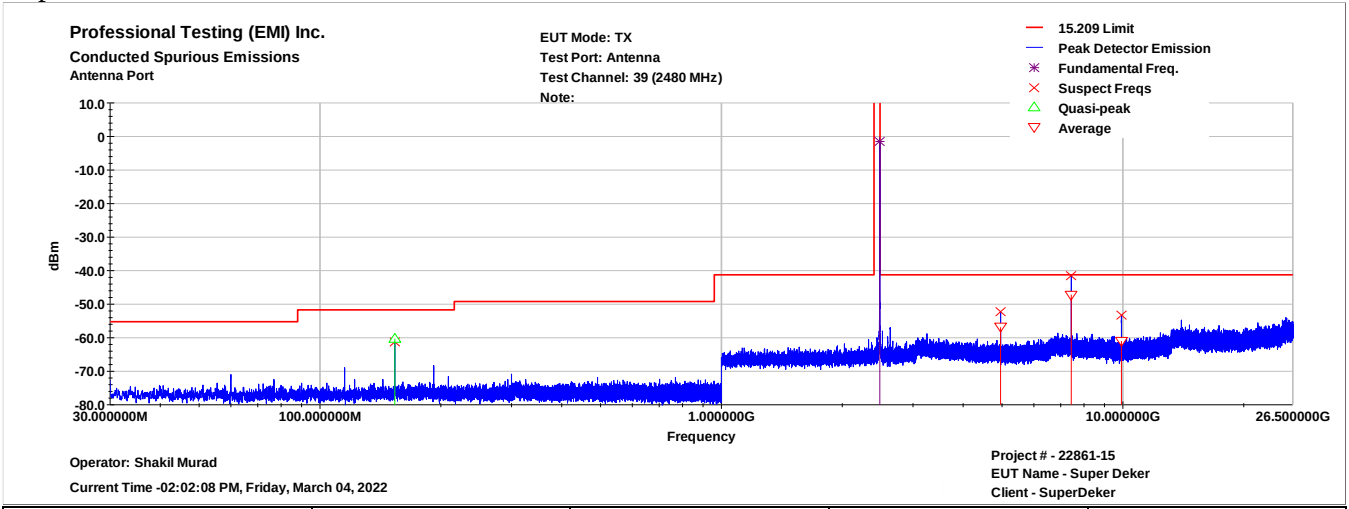
Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
153.604	-60.701	-51.710	8.991	PASS
4804.368	-54.515	-41.250	13.265	PASS
7206.656	-47.637	-41.250	6.387	PASS
9606.986	-58.946	-41.250	17.696	PASS
12011.289	-62.808	-41.250	21.558	PASS

Middle Channel: 1 MHz Bandwidth



Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
153.595	-60.709	-51.710	8.999	PASS
4880.449	-55.804	-41.250	14.554	PASS
7320.665	-47.056	-41.250	5.806	PASS
9759.072	-59.062	-41.250	17.812	PASS

Top Channel: 1 MHz Bandwidth



Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
153.604	-60.277	-51.710	8.567	PASS
4959.626	-56.875	-41.250	15.625	PASS
7440.627	-47.149	-41.250	5.899	PASS
9919.090	-60.990	-41.250	19.740	PASS

8.0 Transmitter Radiated Spurious Emissions

8.1 Test Procedure

Radiated emissions are measured with the EUT transmitting on the required frequencies.

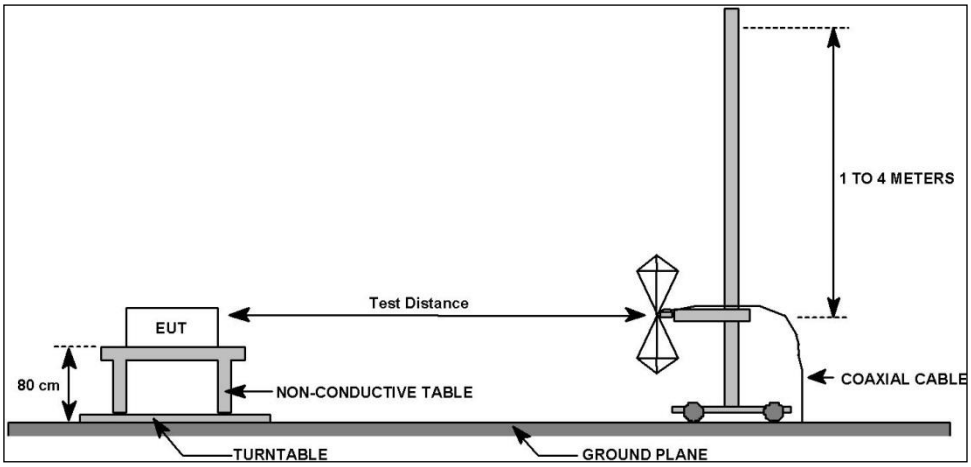


Table 8.1.1: Test Distance, Table Height, and Detection Method

30 MHz to 1 GHz	1 GHz to 18 GHz	18 GHz to 26.5 GHz
10 m, 80 cm	3 m, 1.5 m	1 m, 1.5 m
Quasi-peak	Peak & Average	Peak & Average

8.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Parameter
15.247(d), 15.205 // RSS-247 5.5, RSS-Gen 6.13 & 8.10	Field Strength of Radiated Spurious/Harmonic Emissions Transmit Mode

8.3 Test Results

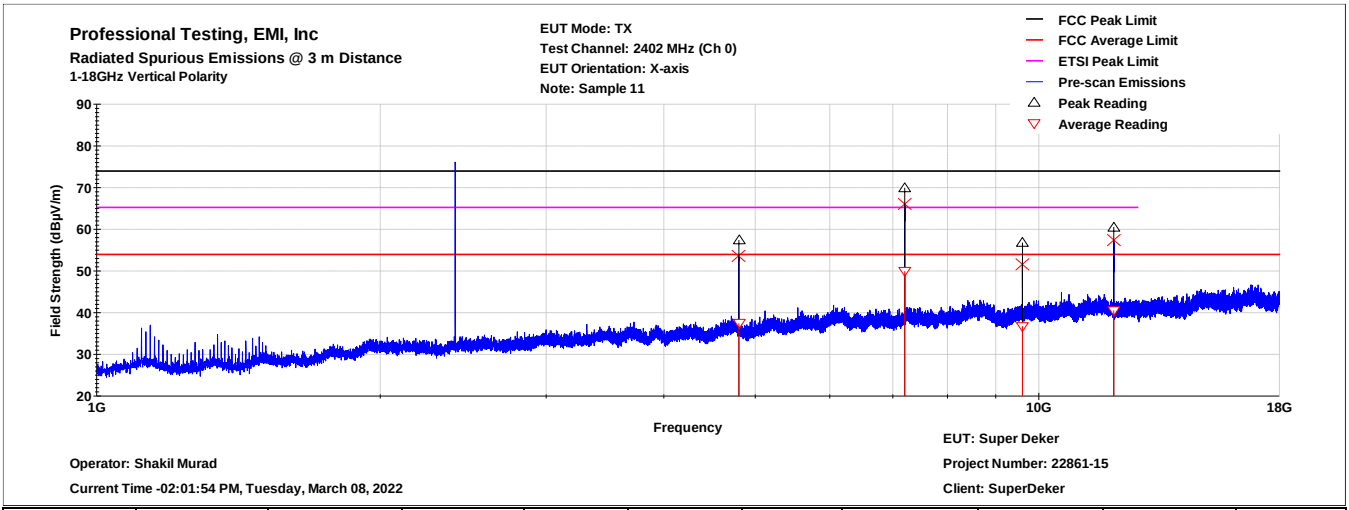
Three channels were tested. EUT was transmitting continuously unmodulated. Device tested in normal operational orientation.

Note: 20 dB duty cycle correction was applied to the peak reading (peak -20) to calculate average values.

The EUT satisfied the requirement. Graphical and tabular data appears below.

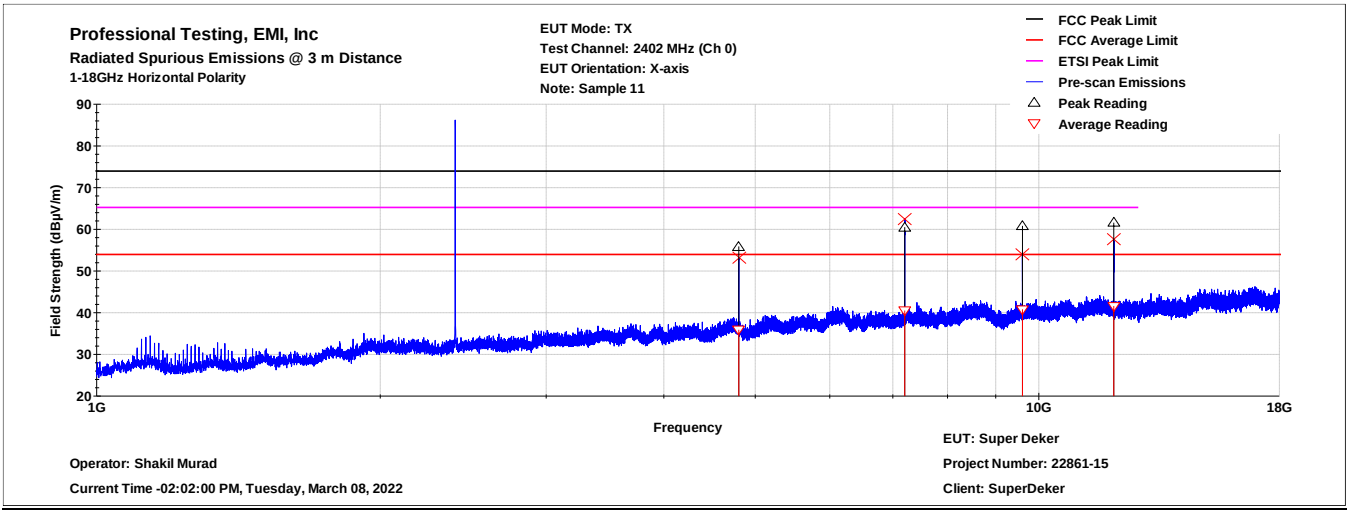
8.3.1 Bottom Channel, 1 GHz to 26.5 GHz

1GHz - 18GHz Vertical Polarity Emissions Data



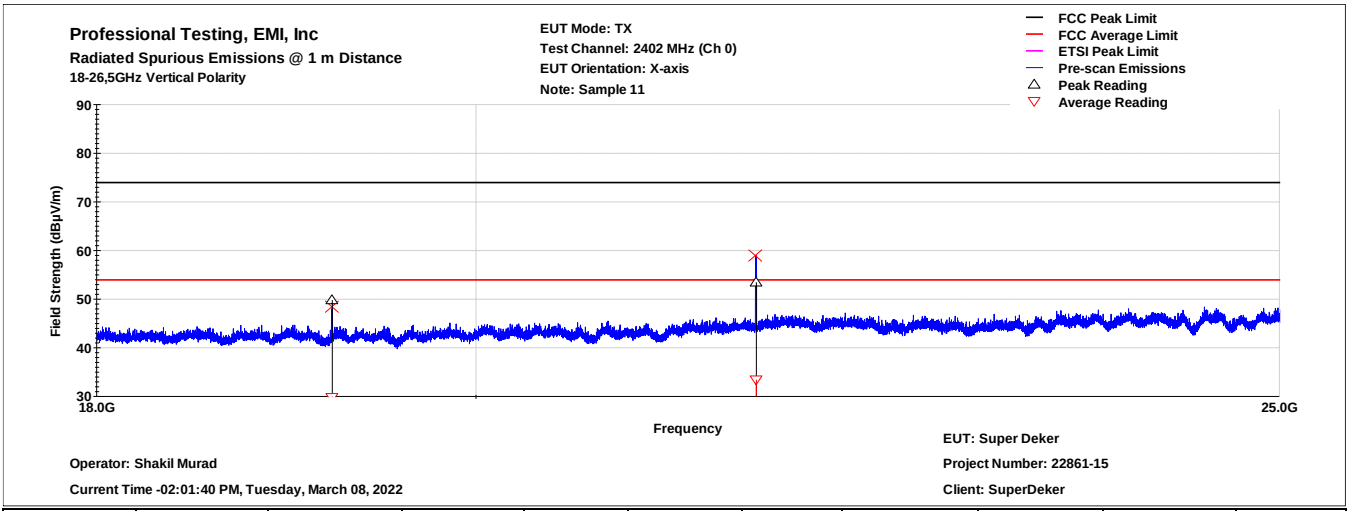
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
4804.29	212	102	57.402	73.958	-16.556	PASS	37.402	53.958	-16.556	PASS
7205.32	265	259	69.959	73.958	-3.999	PASS	49.959	53.958	-3.999	PASS
9608.91	56	140	56.767	73.958	-17.191	PASS	36.767	53.958	-17.191	PASS
12011.20	202	125	60.508	73.958	-13.450	PASS	40.508	53.958	-13.450	PASS

1GHz - 18GHz Horizontal Polarity Emissions Data



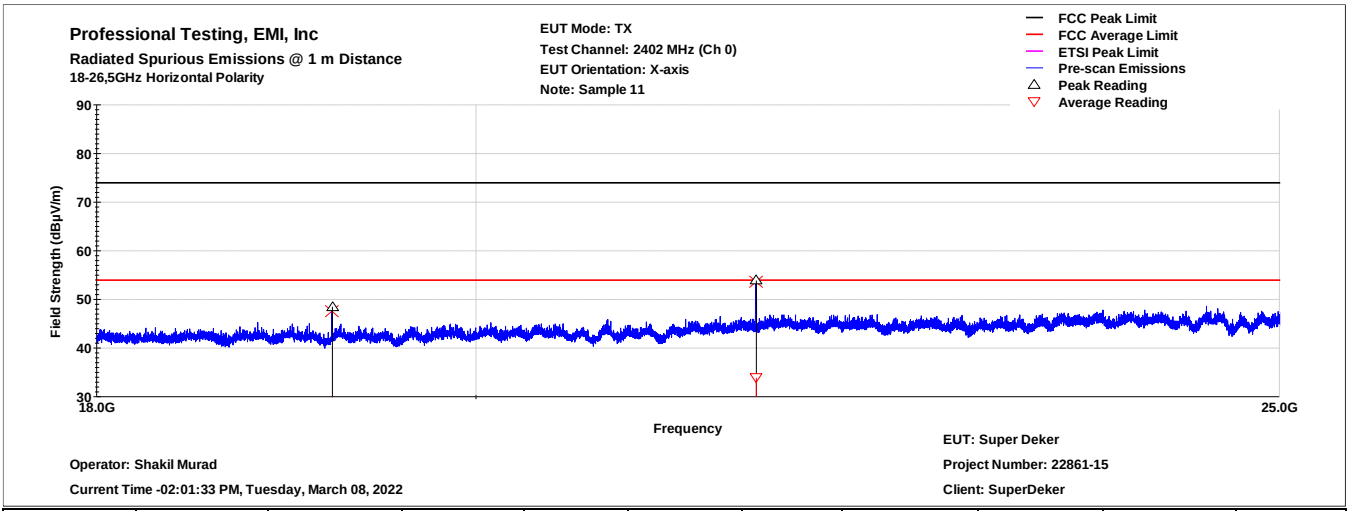
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
4803.67	150	124	55.890	73.958	-18.068	PASS	35.890	53.958	-18.068	PASS
7206.64	2	377	60.493	73.958	-13.465	PASS	40.493	53.958	-13.465	PASS
9609.02	160	362	60.811	73.958	-13.147	PASS	40.811	53.958	-13.147	PASS
12008.72	206	240	61.586	73.958	-12.372	PASS	41.586	53.958	-12.372	PASS

18GHz - 26.5GHz Vertical Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
19217.79	321	100.000	49.797	73.958	-24.161	PASS	29.797	53.958	-24.161	PASS
21620.24	301	100.000	53.465	73.958	-20.493	PASS	33.465	53.958	-20.493	PASS

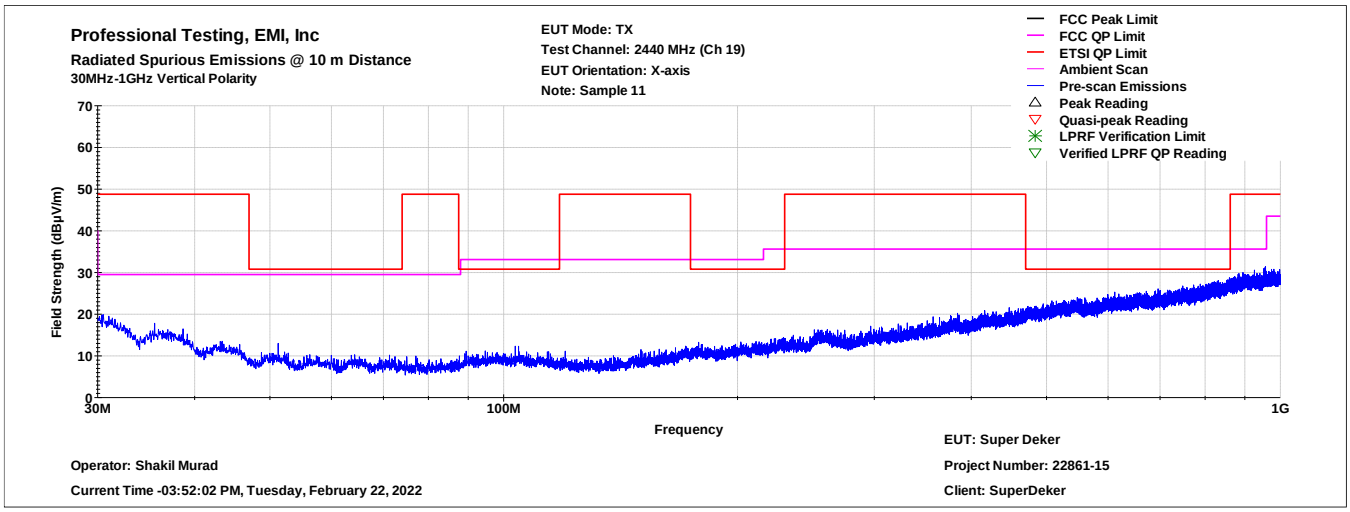
18GHz - 26.5GHz Horizontal Polarity Emissions Data



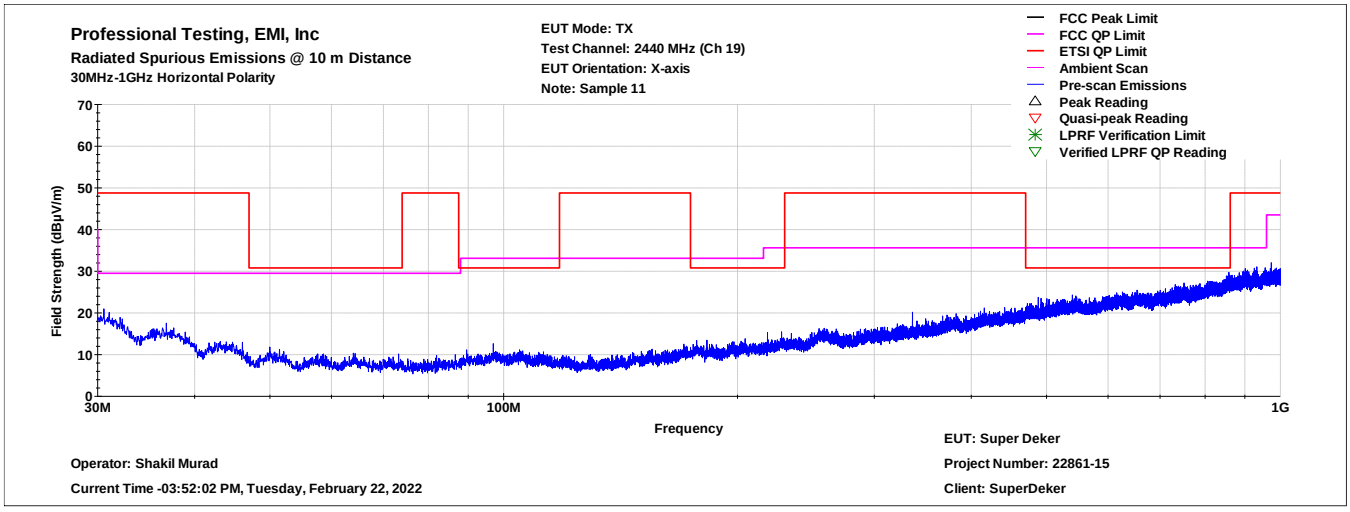
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
19217.92	0	100.000	48.482	73.958	-25.476	PASS	28.482	53.958	-25.476	PASS
21619.87	302	100.000	53.886	73.958	-20.072	PASS	33.886	53.958	-20.072	PASS

8.3.2 Middle Channel, 30 MHz to 26.5 GHz

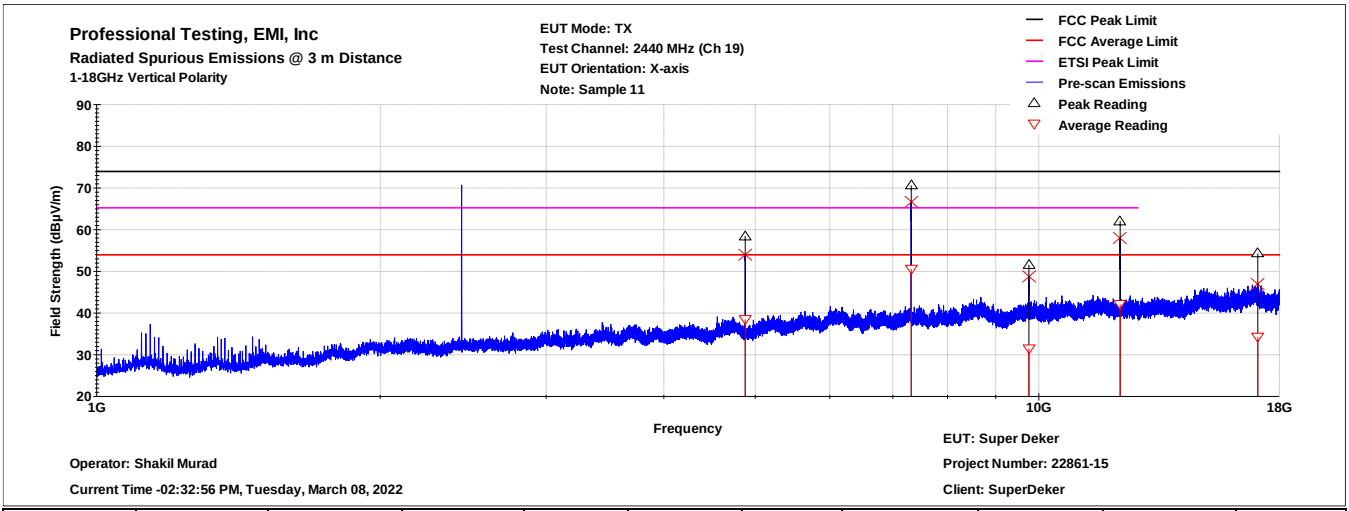
30MHz - 1GHz Vertical Polarity Emissions Data



30MHz - 1GHz Horizontal Polarity Emissions Data

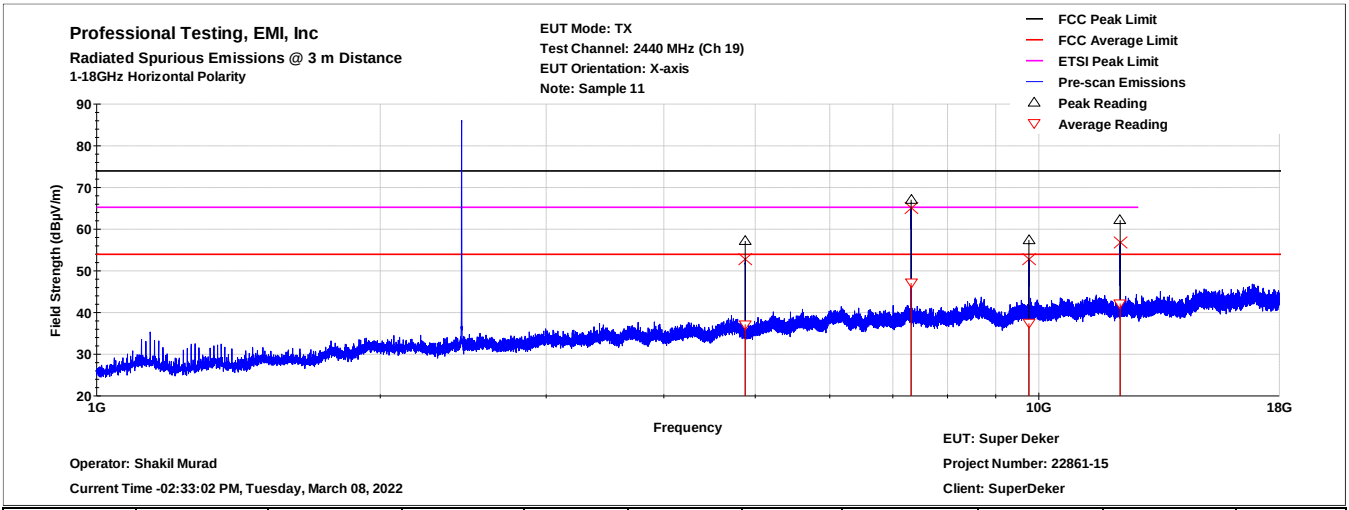


1GHz - 18GHz Vertical Polarity Emissions Data



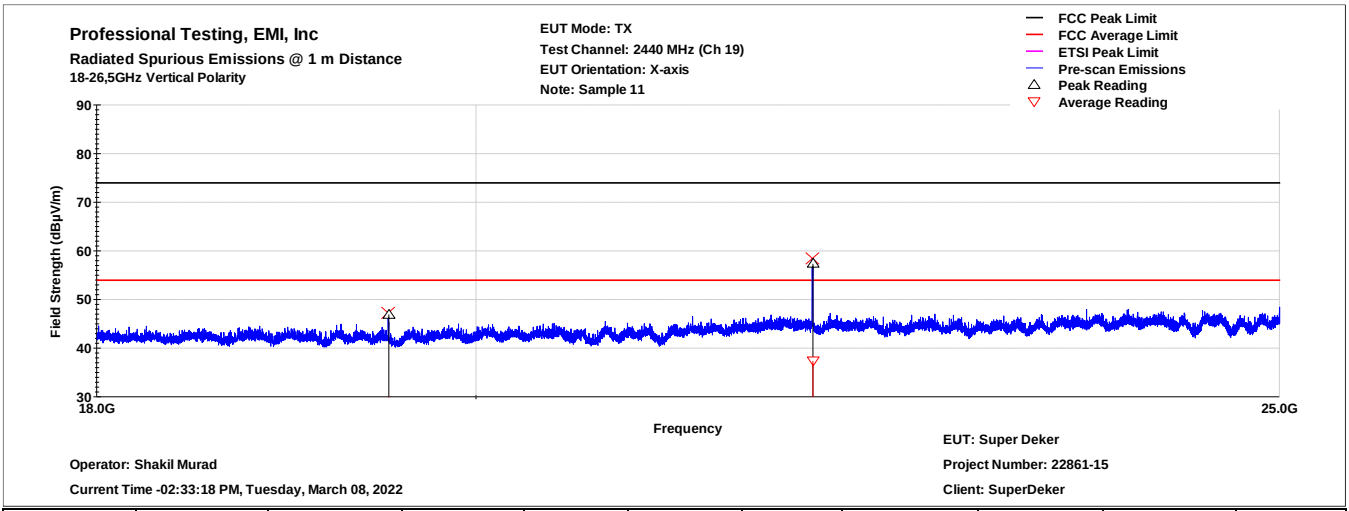
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
4879.50	140	345	58.476	73.958	-15.482	PASS	38.476	53.958	-15.482	PASS
7320.75	273	234	70.601	73.958	-3.357	PASS	50.601	53.958	-3.357	PASS
9761.05	16	369	51.532	73.958	-22.426	PASS	31.532	53.958	-22.426	PASS
12201.12	209	102	62.088	73.958	-11.870	PASS	42.088	53.958	-11.870	PASS
17078.24	357	376	54.299	73.958	-19.659	PASS	34.299	53.958	-19.659	PASS

1GHz - 18GHz Horizontal Polarity Emissions Data



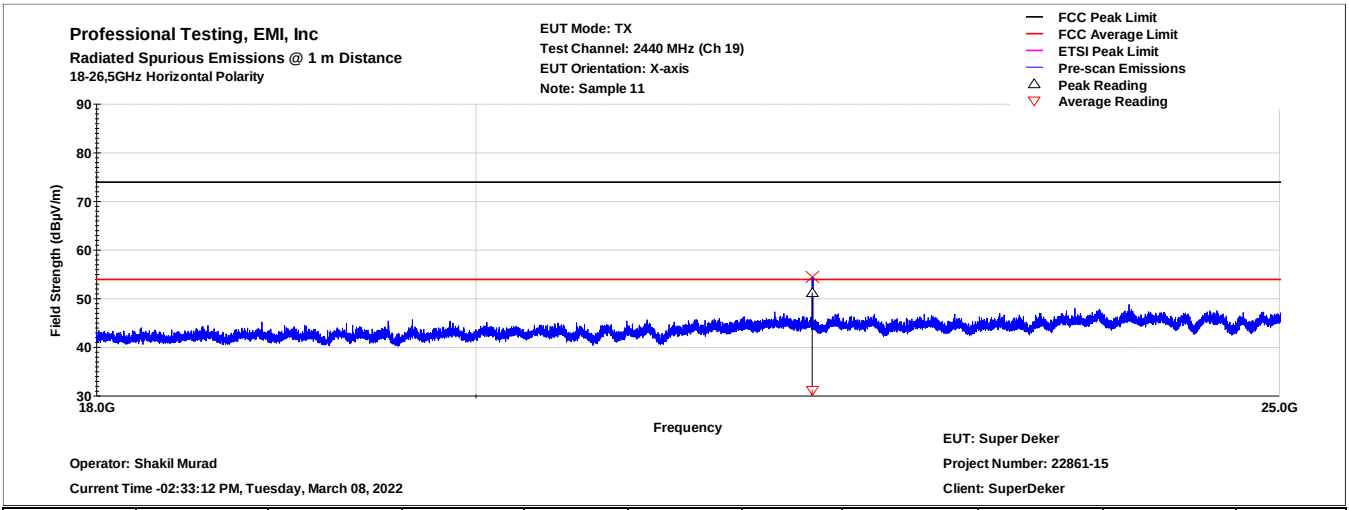
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
4879.68	152	102	57.153	73.958	-16.805	PASS	37.153	53.958	-16.805	PASS
7319.30	251	168	67.063	73.958	-6.895	PASS	47.063	53.958	-6.895	PASS
9760.99	161	206	57.413	73.958	-16.545	PASS	37.413	53.958	-16.545	PASS
12201.22	209	253	62.140	73.958	-11.818	PASS	42.140	53.958	-11.818	PASS

18GHz - 26.5GHz Vertical Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
19521.76	328	100.000	46.914	73.958	-27.044	PASS	26.914	53.958	-27.044	PASS
21962.17	293	100.000	57.332	73.958	-16.626	PASS	37.332	53.958	-16.626	PASS

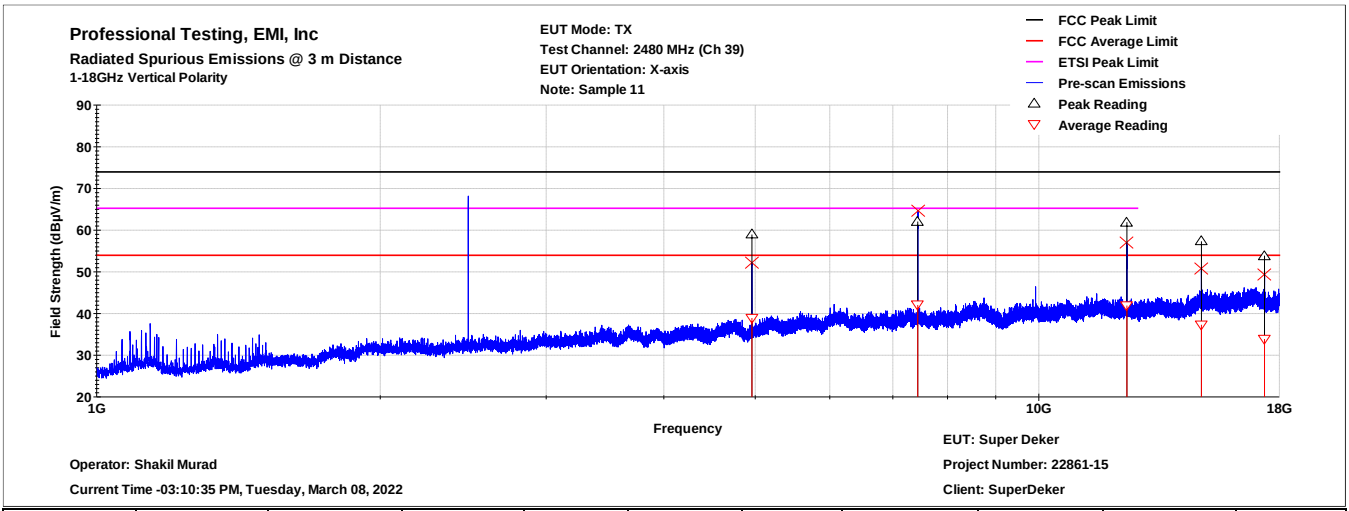
18GHz - 26.5GHz Horizontal Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
21957.97	309	100.000	51.261	73.958	-22.697	PASS	31.261	53.958	-22.697	PASS

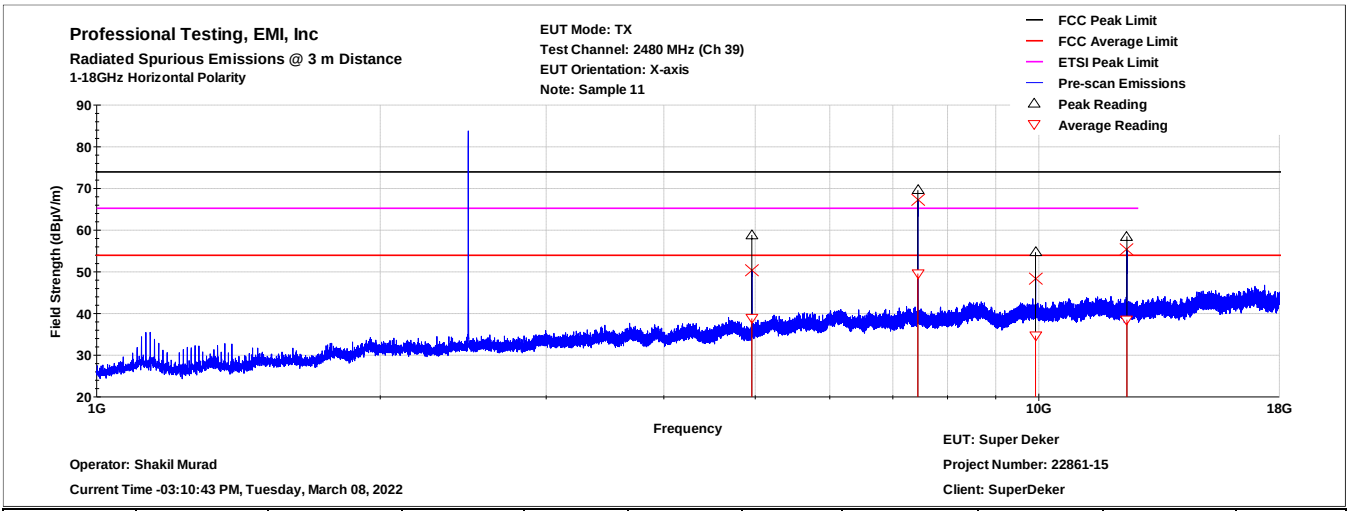
8.3.3 Top Channel, 1GHz to 26.5 GHz

1GHz - 18GHz Vertical Polarity Emissions Data



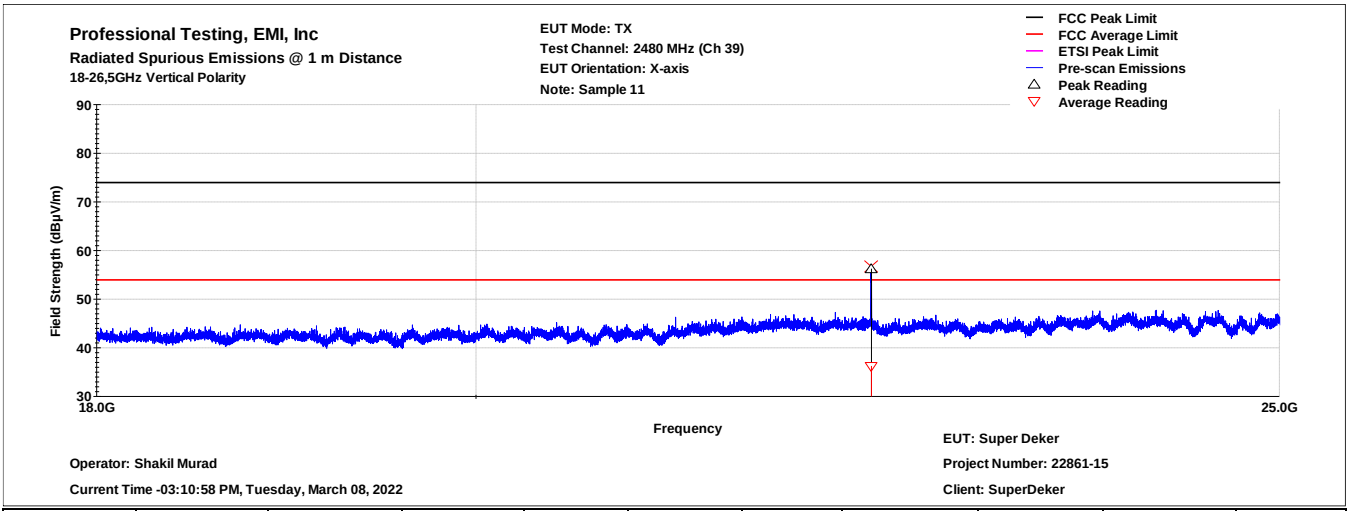
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
4960.46	207	307	58.928	73.958	-15.030	PASS	38.928	53.958	-15.030	PASS
7439.27	363	376	62.044	73.958	-11.914	PASS	42.044	53.958	-11.914	PASS
12401.06	215	171	61.904	73.958	-12.054	PASS	41.904	53.958	-12.054	PASS
14878.54	81	376	57.308	73.958	-16.650	PASS	37.308	53.958	-16.650	PASS
17358.45	222	257	53.882	73.958	-20.076	PASS	33.882	53.958	-20.076	PASS

1GHz - 18GHz Horizontal Polarity Emissions Data



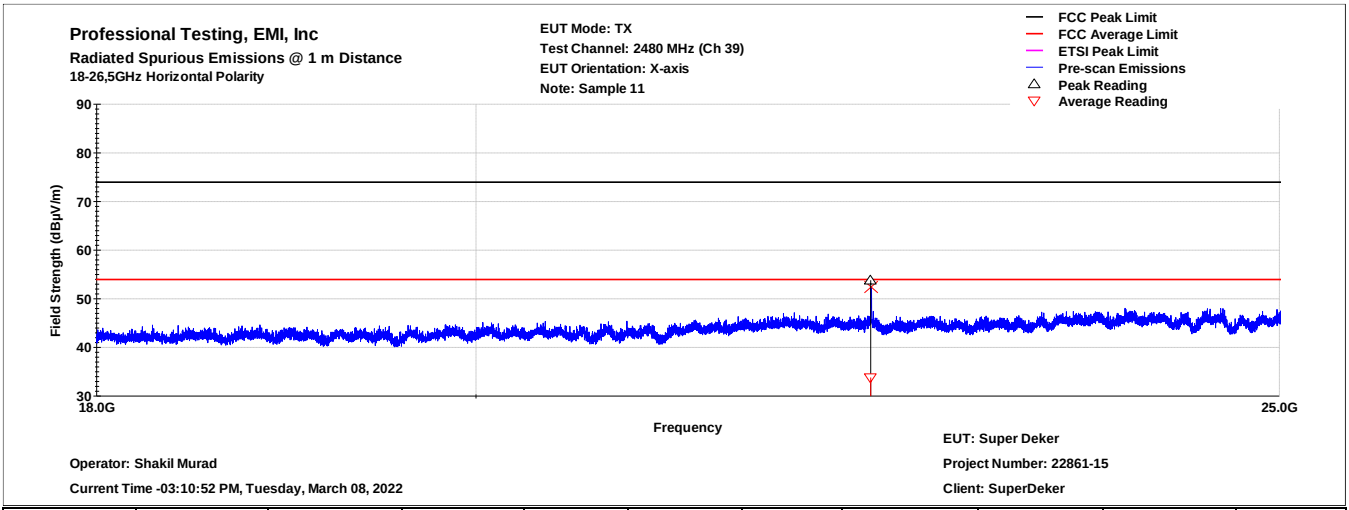
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
4959.60	231	371	58.820	73.958	-15.138	PASS	38.820	53.958	-15.138	PASS
7440.65	138	182	69.579	73.958	-4.379	PASS	49.579	53.958	-4.379	PASS
9919.02	254	229	54.689	73.958	-19.269	PASS	34.689	53.958	-19.269	PASS
12400.99	200	132	58.512	73.958	-15.446	PASS	38.512	53.958	-15.446	PASS

18GHz - 26.5GHz Vertical Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
22322.10	297	100.000	56.251	73.958	-17.707	PASS	36.251	53.958	-17.707	PASS

18GHz - 26.5GHz Horizontal Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
22317.88	318	100.000	53.803	73.958	-20.155	PASS	33.803	53.958	-20.155	PASS

9.0 Radiated Emissions

9.1 Test Procedure

Radiated emissions were tested in normal operation mode (Game mode) as a floor standing device.

9.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Parameter
15.247, 15.109 // ICES-003	Field Strength of Unintentional Radiated Emissions

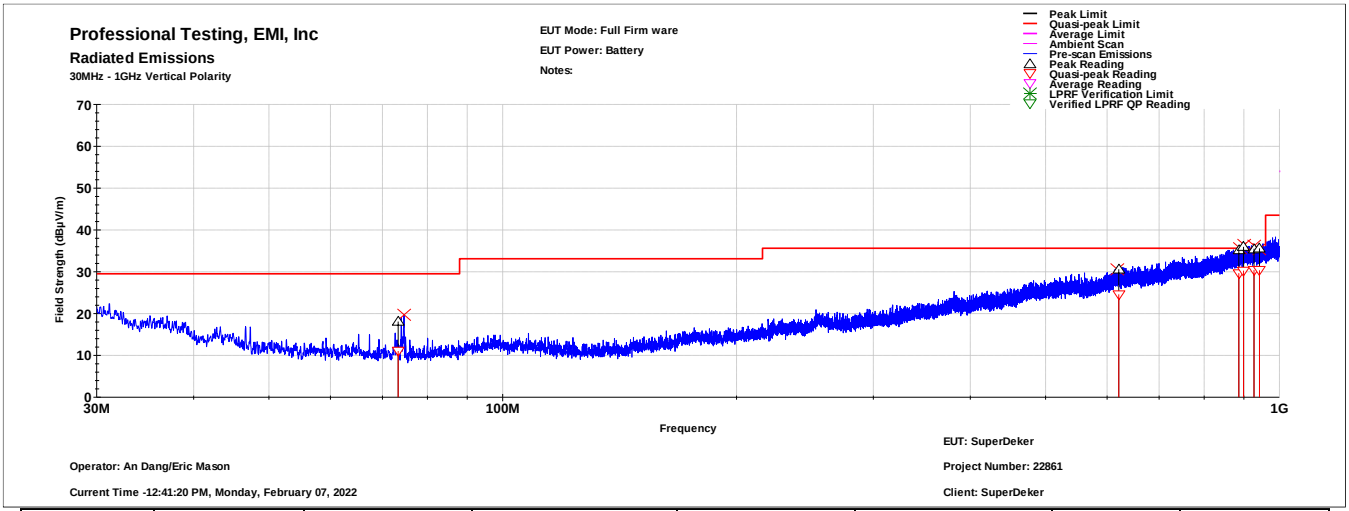
9.3 Radiated Emissions Test Results, Battery Mode

Table 9.3.1: Radiated Emissions Test Results Summary:

EUT Name	**Super Deker**		**Model or Serial #**	11	
EUT Line Voltage	**3.7**	**VDC**	**Frequency**		Hz
Emissions Limit Level	**FCC Part 15 Class B**		**EUT Test Mode or Configuration**	**Full Firmware Test**	
Frequency Range	**Test Distance (Meters)**		**Antenna Polarization**	**Test Results**	
30MHz to 1GHz	**10**		**Vertical**	**PASS**	
			Horizontal	**PASS**	
1GHz to 18GHz	**3**		**Vertical**	**PASS**	
			Horizontal	**PASS**	
Notes:					

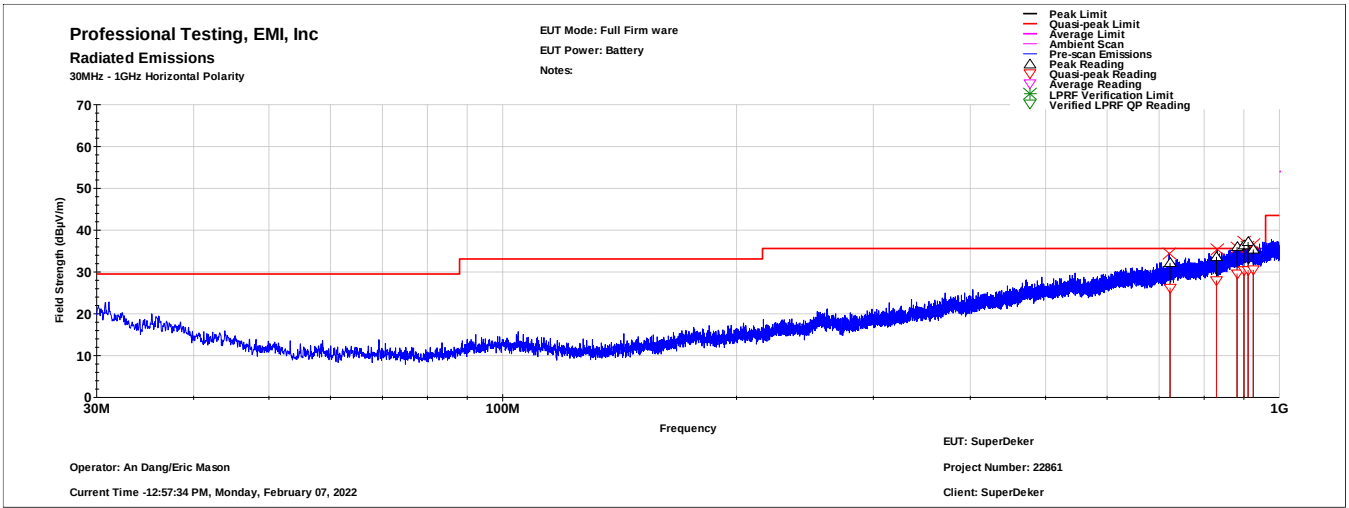
9.3.2 Radiated Emissions Test Data

30MHz - 1GHz Vertical Polarity Measured Emissions Data



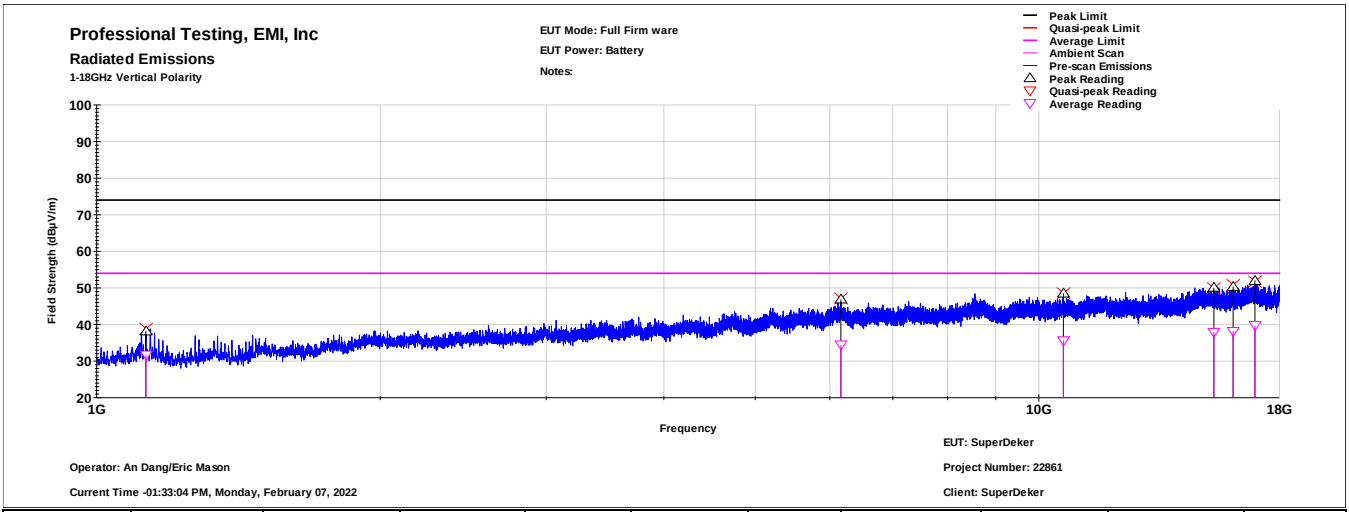
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Quasi-peak Reading (dBµV)	Quasi-peak Limit (dBµV)	Quasi-peak Margin (dB)	Quasi-peak Results	Peak Reading (dBµV)
73.341	43.000	167.000	11.036	29.500	-18.464	PASS	18.084
621.249	247.000	163.000	24.592	35.600	-11.008	PASS	30.584
886.649	332.000	149.000	29.651	35.600	-5.949	PASS	35.169
899.302	332.000	412.000	30.262	35.600	-5.338	PASS	35.942
927.485	13.000	126.000	30.392	35.600	-5.208	PASS	35.496
942.566	226.000	293.000	30.340	35.600	-5.260	PASS	35.585

30MHz - 1GHz Horizontal Polarity Measured Emissions Data



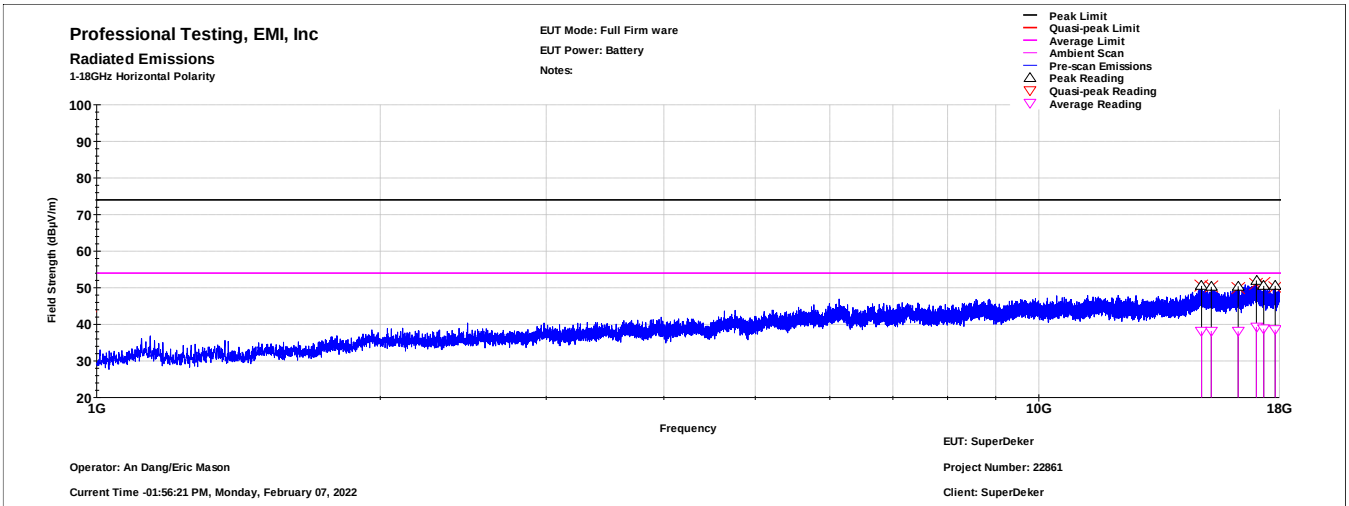
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Quasi-peak Reading (dBµV)	Quasi-peak Limit (dBµV)	Quasi-peak Margin (dB)	Quasi-peak Results	Peak Reading (dBµV)
723.198	356.000	398.000	26.239	35.600	-9.361	PASS	32.122
829.944	345.000	153.000	27.976	35.600	-7.624	PASS	33.623
881.922	13.000	241.000	29.615	35.600	-5.985	PASS	35.899
900.380	6.000	236.000	30.373	35.600	-5.227	PASS	36.325
911.564	276.000	143.000	30.438	35.600	-5.162	PASS	37.149
925.600	74.000	130.000	30.509	35.600	-5.091	PASS	35.347

1GHz - 18GHz Vertical Polarity Measured Emissions Data:



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
1127.95	343	180	38.169	74.000	-35.831	PASS	31.731	54.000	-22.269	PASS
6163.88	351	336	46.855	74.000	-27.145	PASS	34.421	54.000	-19.579	PASS
10615.61	356	330	48.505	74.000	-25.495	PASS	35.698	54.000	-18.302	PASS
15336.74	77	352	50.051	74.000	-23.949	PASS	37.935	54.000	-16.065	PASS
16076.00	81	366	50.322	74.000	-23.678	PASS	38.266	54.000	-15.734	PASS
16954.51	81	183	52.038	74.000	-21.962	PASS	39.758	54.000	-14.242	PASS

1GHz - 18GHz Horizontal Polarity Measured Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
14883.69	202	330	50.501	74.000	-23.499	PASS	38.090	54.000	-15.910	PASS
15242.43	275	241	50.231	74.000	-23.769	PASS	38.174	54.000	-15.826	PASS
16275.41	9	102	50.382	74.000	-23.618	PASS	38.081	54.000	-15.919	PASS
17017.79	340	200	51.982	74.000	-22.018	PASS	39.269	54.000	-14.731	PASS
17325.17	304	196	50.509	74.000	-23.491	PASS	38.746	54.000	-15.254	PASS
17815.16	81	344	50.498	74.000	-23.502	PASS	38.522	54.000	-15.478	PASS

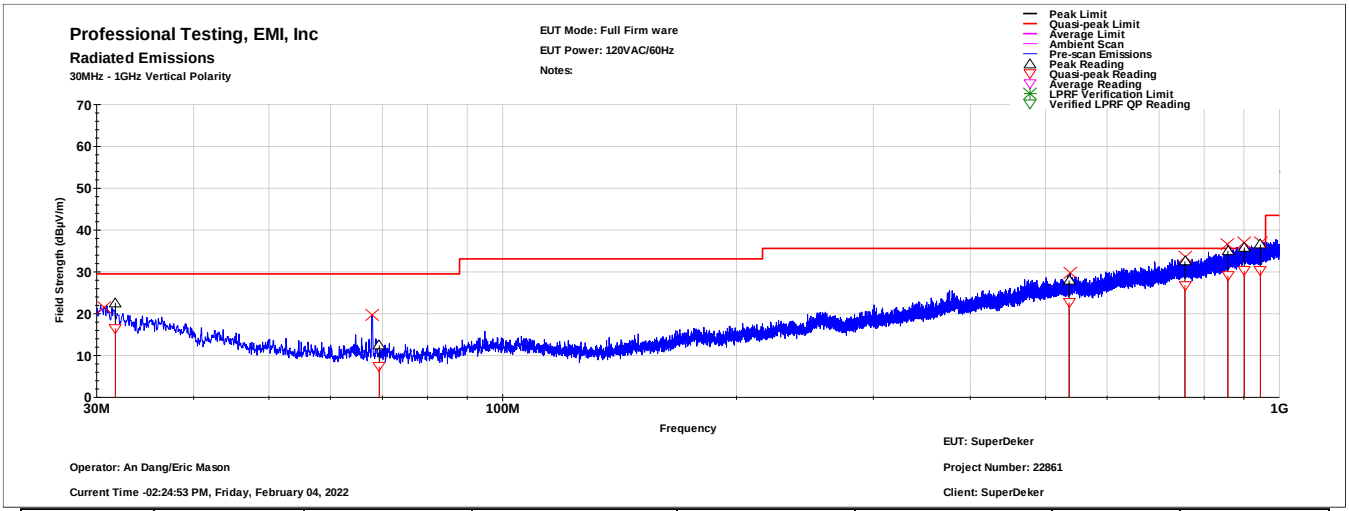
9.4 Radiated Emissions Test Results, AC Power Mode

Table 9.4.1: Radiated Emissions Test Results Summary:

EUT Name	**Super Deker**		**Model or Serial #**	11	
EUT Line Voltage	**120**	**VAC**	**Frequency**	60	Hz
Emissions Limit Level	**FCC Part 15 Class B**		**EUT Test Mode or Configuration**	**Full Firmware Test**	
Frequency Range	**Test Distance (Meters)**		**Antenna Polarization**	**Test Results**	
30MHz to 1GHz	**10**		**Vertical**	**PASS**	
			Horizontal	**PASS**	
1GHz to 18GHz	**3**		**Vertical**	**PASS**	
			Horizontal	**PASS**	

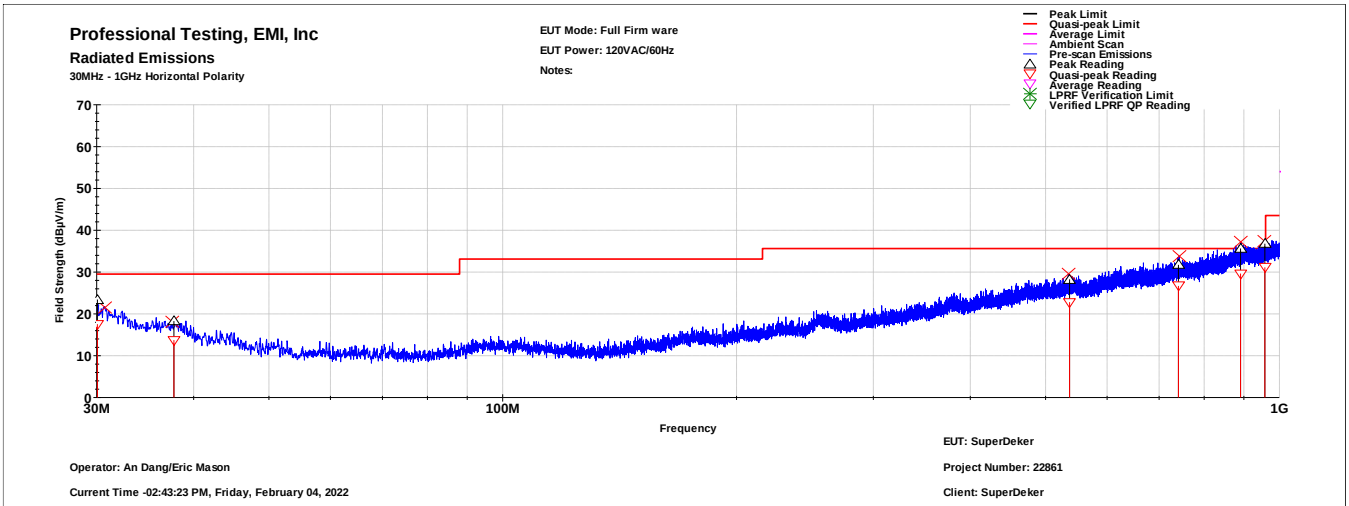
9.4.2 Radiated Emissions Test Data

30MHz - 1GHz Vertical Polarity Measured Emissions Data



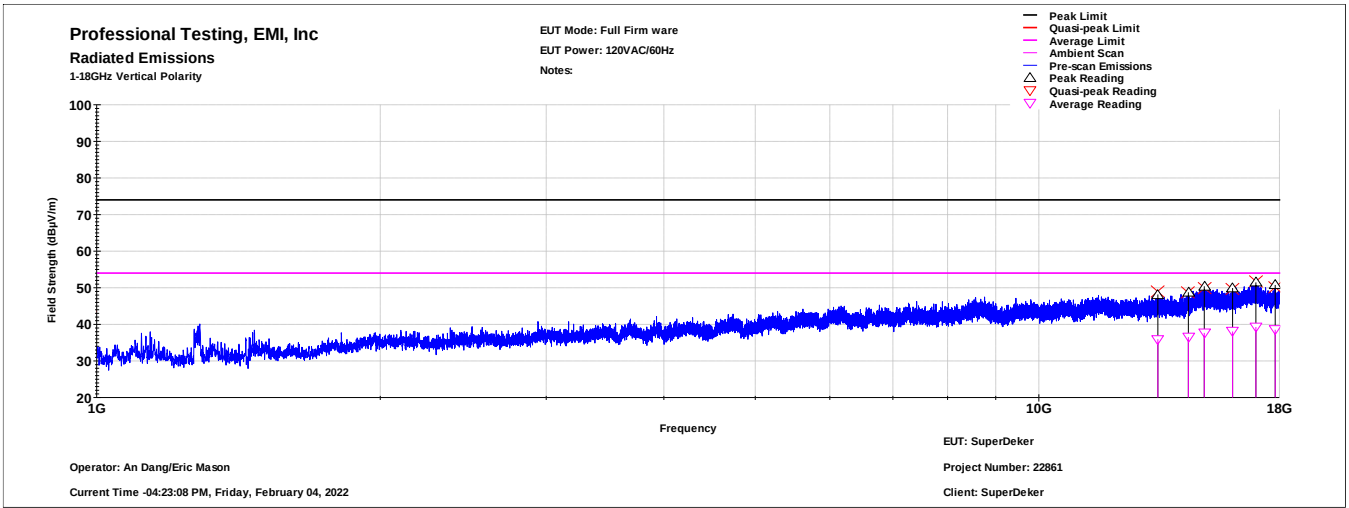
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Quasi-peak Reading (dBµV)	Quasi-peak Limit (dBµV)	Quasi-peak Margin (dB)	Quasi-peak Results	Peak Reading (dBµV)
31.712	227.000	117.000	16.465	29.500	-13.035	PASS	22.601
69.359	111.000	131.000	7.367	29.500	-22.133	PASS	12.426
536.173	192.000	117.000	22.690	35.600	-12.910	PASS	27.946
755.793	238.000	139.000	26.818	35.600	-8.782	PASS	32.501
858.368	40.000	179.000	29.071	35.600	-6.529	PASS	35.029
901.062	200.000	192.000	30.280	35.600	-5.320	PASS	35.840
945.310	34.000	168.000	30.373	35.600	-5.227	PASS	36.527

30MHz - 1GHz Horizontal Polarity Measured Emissions Data



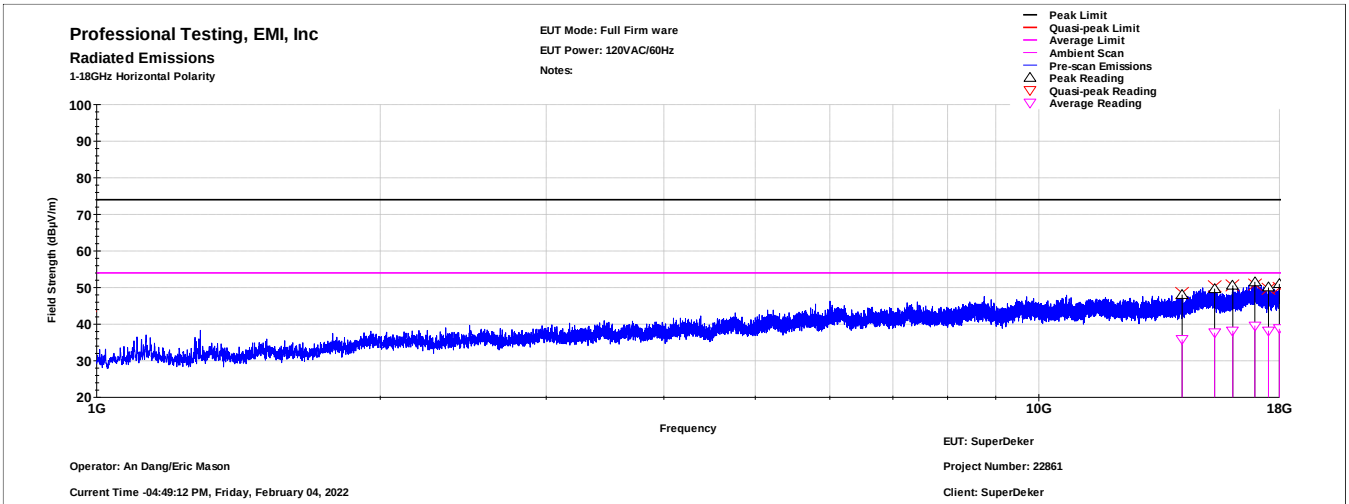
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Quasi-peak Reading (dBµV)	Quasi-peak Limit (dBµV)	Quasi-peak Margin (dB)	Quasi-peak Results	Peak Reading (dBµV)
30.068	3.000	325.000	17.544	29.500	-11.956	PASS	23.433
37.720	150.000	101.000	13.726	29.500	-15.774	PASS	18.264
536.889	308.000	378.000	22.788	35.600	-12.812	PASS	28.252
741.321	257.000	281.000	26.668	35.600	-8.932	PASS	31.720
891.375	66.000	200.000	29.627	35.600	-5.973	PASS	35.624
957.957	2.000	379.000	31.129	35.600	-4.471	PASS	36.772

1GHz - 18GHz Vertical Polarity Measured Emissions Data:



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
13375.19	311	274	48.144	74.000	-25.856	PASS	35.937	54.000	-18.063	PASS
14410.23	356	313	48.736	74.000	-25.264	PASS	36.503	54.000	-17.497	PASS
14981.62	66	377	50.377	74.000	-23.623	PASS	37.634	54.000	-16.366	PASS
16053.53	166	213	49.902	74.000	-24.098	PASS	38.048	54.000	-15.952	PASS
16993.81	3	321	51.447	74.000	-22.553	PASS	39.244	54.000	-14.756	PASS
17815.66	343	102	50.741	74.000	-23.259	PASS	38.499	54.000	-15.501	PASS

1GHz - 18GHz Horizontal Polarity Measured Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
14191.82	217	307	48.050	74.000	-25.950	PASS	35.813	54.000	-18.187	PASS
15366.61	223	330	49.693	74.000	-24.307	PASS	37.650	54.000	-16.350	PASS
16065.44	267	197	50.552	74.000	-23.448	PASS	38.162	54.000	-15.838	PASS
16953.10	356	113	51.576	74.000	-22.424	PASS	39.593	54.000	-14.407	PASS
17525.67	85	214	49.999	74.000	-24.001	PASS	38.184	54.000	-15.816	PASS
17998.30	134	210	51.010	74.000	-22.990	PASS	38.724	54.000	-15.276	PASS

10.0 Antenna Construction

10.1 Procedure

A direct examination of the antenna construction is performed and compared to rule criteria that prevent wireless device antennas from being modified by end users.

10.2 Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Antenna Construction
15.203, 15.247 // RSS-Gen 8.3	Type of Antenna(s) Type of Connector Gain

10.3 Results

Table 8.3.1 Antenna Construction Details
Chip Antenna
Manufacturer: Abracon Model/PN: AMCA72-2R470G-S1F-T4 Antenna peak gain: 2.7 dBi. No connector. Chip is soldered to circuit board.

User cannot substitute antenna.

Gain is under maximum limit of 6 dBi.

The requirement was satisfied.

11.0 Equipment

11.1 Fundamental Power, Bandwidth, Duty Cycle, Band Edge, Conducted Spurious Emissions

Asset#	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
2262	Keysight	E4440A	Spectrum Analyzer, 3 Hz - 26.5 GHz	MY42510155	11/8/2023

11.2 AC Power Conducted Emissions

Conducted Emissions Test Equipment List					
Tile! Software Version:	**Version: 7.1.2.17 (Jan 08, 2016 - 02:12:48 PM) or 4.1.A.0, April 14, 2009, 11:01:00PM**				
Test Profile:	**2020_CE_TILE7_v4**				
Asset #	**Manufacturer**	**Model**	**Equipment Nomenclature**	**Serial Number**	**Calibration Due Date**
1145	HP	8568B	Spectrum Analyzer 100Hz-1.5GHz	2517A01821	7/7/2022
2113	HP	85662A	Spec Anal Dsply for A/N 1842	2403A07470	N/A
990	HP	85685A	RF Preselector	3010A01119	7/9/2022
1279	HP	85650A	Quasi Peak Adapter	2521A00935	7/8/2022
C192	HP	none	Cable, RF, BNC-BNC, 0.2032m, Grey	None	1/14/2024
C107	Pomona	RG-223	Cable, BNC-BNC, 2.64m, RG-223 (black)	None	8/3/2022
1185	EMCO	3825/2	LISN, 10kHz-100MHz	1235	8/23/2022
1088	PTI	PTI-ALF4	Attenuator Limiter Filter	none	2/26/2023
1173	PTI	100k HPF	Filter, High Pass, 100kHz	none	2/11/2022

11.3 Unintentional Radiated Emissions

Radiated Emissions Test Equipment List					
Tile! Software Version:		**Version: 7.1.2.17 (Jan 08, 2016 - 02:12:48 PM) or 4.1.A.0, April 14, 2009, 11:01:00PM**			
Test Profile:		**2020_RE_Unintentional_TILE7_v4**			
Asset #	**Manufacturer**	**Model**	**Equipment Nomenclature**	**Serial Number**	**Calibration Due Date**
1509A	Braden	TDK 10M	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	4/9/2023
1425	Electro-Metrics	BPA-1000	Preamp, Broadband 10k-1GHz	123	3/13/2022
1937	Agilent	E4440A - AYZ	PSA , 3 Hz - 26.5 GHz, Opt. AYZ	MY44808298	11/12/2022
1926	ETS-Lindgren	3142D	Antenna, Biconilog, 26 MHz - 6 GHz	135454	4/20/2022
C027	none	RG214	Cable Coax, N-N, 25m, 25MHz - 1GHz	None	9/14/2022
1327	EMCO	1050	Controller, Antenna Mast	none	N/A
942	EMCO	11968D	Turntable, 4ft.	9510-1835	N/A
1969	HP	11713A	Attenuator/Switch Driver	3748A04113	N/A
1509B	Braden	TDK 10M	TDK 10M Chamber,sVSWR > 1 GHz	DAC-012915-005	4/9/2023
2004	Miteq	AFS44-00101800-2S-10P-44	Amplifier, 40dB, 100MHz-18GHz	None	1/14/2024
C030	none	none	Cable Coax, N-N, 30m, 1 - 18GHz	None	9/15/2022
1325	EMCO	1050	Controller, Antenna Mast	9003-1461	N/A
1780	ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz	110313	4/16/2023
C233	Sucoflex	None	Cable, SMA-SMA, 7.62m, 9kHz - 1.5 GHz, Purple	None	10/22/2023
C289	Pasternack	PE354-24	Cable, N-SMA, 0.610m Blue	1310	9/9/2022

11.4 Radiated Spurious Emissions

Radiated Emissions Test Equipment List					
Tile! Software Version:		Version: 7.1.2.17 (Jan 08, 2016 - 02:12:48 PM) or 4.1.A.0, April 14, 2009, 11:01:00PM			
Test Profile:		2020_RE_Unintentional_TILE7_v4			
Asset #	**Manufacturer**	**Model**	**Equipment Nomenclature**	**Serial Number**	**Calibration Due Date**
1509A	Braden	TDK 10M	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	4/9/2023
1969	HP	11713A	Attenuator/Switch Driver	3748A04113	N/A
942	EMCO	11968D	Turntable, 4ft.	9510-1835	N/A
1326	EMCO	1051-12	Controller, Antenna Mast	9101-1564	N/A
1244	EMCO	1050C	Controller, Antenna Mast	1100	N/A
C026A	none	RG-233U	Cable Coax, N-N, 0.914m, 9 kHz - 30 MHz	None	10/21/2022
C026	none	RG214	Cable Coax, N-N, 25m, 9 kHz - 30 MHz	None	9/8/2021
C027A	none	RG214	Cable Coax, N-N, 25m, 25MHz - 1GHz	None	9/9/2022
1293	EMCO	6502	Antenna, Loop, Active, .01-30MHz	2040	9/14/2022
C027	none	RG214	Cable Coax, N-N, 25m, 25MHz - 1GHz	None	9/14/2022
C233	Sucoflex	None	Cable, SMA-SMA, 7.62m, 9kHz - 1.5 GHz, Purple	None	10/22/2023
1926	ETS-Lindgren	3142D	Antenna, Biconilog, 26 MHz - 6 GHz	135454	4/20/2022
1425	Electro-Metrics	BPA-1000	Preamp, Broadband 10k-1GHz	123	3/13/2022
C289	Pasternack	PE354-24	Cable, N-SMA, 0.610m Blue	1310	9/9/2022
C030	none	none	Cable Coax, N-N, 30m, 1 - 18GHz	None	9/15/2022
C038	none	LMR-400	Cable Coax, N-N, 0.15m	None	N/A
1780	ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz	110313	4/16/2023
2004	Miteq	AFS44-00101800-2S-10P-44	Amplifier, 40dB, 100MHz-18GHz	None	1/14/2024
745	0	ZKL1500-1	Amplifier, 40dB, 0.1-1500MHz	618-00180	N/A
1326	EMCO	1051-12	Controller, Antenna Mast	9101-1564	N/A
1542	A.H. Systems	SAS-572	Antenna, Horn 18-26.5GHz, 20dB gain	225	N/A
1973	Agilent	83017A	Amplifier, Microwave 0.5-26.5 GHz	MY39500497	11/10/2022
1937	Agilent	E4440A - AYZ	PSA , 3 Hz - 26.5 GHz, Opt. AYZ	MY44808298	11/12/2022

12.0 Measurement Bandwidths

Radiated Emissions Spectrum Analyzer Bandwidth and Measurement Time - Peak Scan				
Frequency Band Start (MHz)	**Frequency Band Stop (MHz)**	**6 dB Bandwidth (kHz)**	**Number of Ranges Used**	**Measurement Time per Range**
0.009	0.15	0.3	2	Multiple Sweeps
0.15	30	9	6	Multiple Sweeps
30	1000	120	2	Multiple 800 mS Sweeps
1000	6000	1000	2	Multiple Sweeps
6000	18000	1000	2	Multiple Sweeps
18000	26500	1000	2	Multiple Sweeps

*Notes:
1. The settings above are specifically calculated for the E4440A series of spectrum analyzers, which have 8,000 data points per range.
2. The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 9-150 kHz.
3. The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.
4. The measurement receiver resolution bandwidth setting was 120 kHz for quasi-peak measurements from 30-1000 MHz.
5. The measurement receiver resolution bandwidth setting was 1 MHz for average measurements from 1-18 GHz.

Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11: 2007, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at Nemko PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of Nemko PTI measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1: Summary of Measurement Uncertainties for Site 45

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Mains Conducted Emissions	150 kHz to 30 MHz	N/A	2.9
Telecom Conducted Emissions	150 kHz to 30 MHz	N/A	2.8
Radiated Emissions	30 to 1,000 MHz	10 m	4.8
	1 to 18 GHz	3 m	5.7

End of Report