

**Engineering Test Report No. 2000515-03**

Report Date	March 26, 2020
Manufacturer Name	Chamberlain Group, Inc.
Manufacturer Address	300 Windsor Dr Oak Brook, IL 60523
Product Name Brand/Model No.	B6765T
Date Received	February 10, 2020
Test Dates	February 10 – 14 & 18, 2020
Specifications	RF Radiated Emissions Multi-Transmitter Test for FCC Part 15.247
Test Facility	Elite Electronic Engineering, Inc. 1516 Centre Circle, Downers Grove, IL 60515
Signature	
Tested by	Tylar Jozefczyk
Signature	
Approved by	Raymond J. Klouda, Registered Professional Engineer of Illinois – 44894

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Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC Part 15.247 test specification. The data presented in this test report pertains to the EUT on the test date(s) specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification. This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

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1. Report Revision History

Revision	Date	Description
–	26 March 2020	Initial Release of Engineering Test Report No. 2000515-03

2. Introduction

This document presents the results of a series of electromagnetic compatibility (EMC) tests that were performed on one (1) MyQ Garage Door Opener (hereinafter referred to as the Equipment Under Test (EUT)). The EUT was identified as follows:

Description	Part #	S/N
MyQ Garage Door Opener	B6765T	N/A

The EUT listed above was used throughout the test series.

The EUT was submitted for testing along with the following support equipment:

Item	Description
Laptop	Used to place the EUT in test mode.
LCD Wall Control	Accessory acting as a load on the board.
Photoeyes	Accessory acting as a load on the board. Also used to provide continuous modes for some testing.

3. Test Specification(s)

The tests were performed to selected portions of, and in accordance with the RF Radiated Emissions Multi-Transmitter Test specification(s).

Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart B

ANSI C63.4-2014, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"

KDB 996369 D04 Module Integration Guide v01, February 1, 2019

4. Laboratory Conditions

The temperature at the time of the test was 22.4°C and the relative humidity was 19%.

5. Summary

The following EMC test was performed and the result is shown below:

Test Description	Results
RF Radiated Emissions Multi-Transmitter Test	Conforms

6. Test Plan

No test plan was provided. Instructions were provided by personnel from Chamberlain Group, Inc. and used in conjunction with the FCC Part 15.247 specification.

7. Grounding

The EUT was grounded only through the third wire of its input power cord.

8. Firmware/Software

For all tests the EUT requires the following firmware versions:

- 900MHz Module: Firmware Revision 3.3
- Wi-Fi Module: Test Code Firmware Revision B.2

9. Modifications Made to EUT

No modifications were made to the EUT during the testing.

10. Deviations from Specification(s)

No deviations from the specification(s) were made during the testing.

11. Modes of Operation

The EMC tests were performed with the EUT operating in multiple test modes at once. This includes the 900MHz Logic board, the Phoenix Wi-Fi/Bluetooth Logic board (transmitting in the 2.4GHz range), and the camera (which is capable of 2.4GHz Wi-Fi/BLE and 5GHz Wi-Fi). For all test combinations, the 900MHz board was set to transmit at 902.25MHz. The following combinations were used:

Combination	Description
1	<ul style="list-style-type: none">- BLE: 2480MHz- Camera – BLE: 2402MHz
2	<ul style="list-style-type: none">- BLE: 2480MHz- Camera – Wi-Fi: 2437MHz (802.11b (Data rate CCK 11Mbps; Power at 18dBm))
3	<ul style="list-style-type: none">- Wi-Fi: 2462MHz (802.11b (Data rate CCK 11Mbps; Power at 18dBm))- Camera – BLE: 2402MHz
4	<ul style="list-style-type: none">- Wi-Fi: 2462MHz (802.11b (Data rate CCK 11Mbps; Power at 18dBm))- Camera – Wi-Fi: 2437MHz (802.11b (Data rate CCK 11Mbps; Power at 18dBm))
5	<ul style="list-style-type: none">- Wi-Fi: 2462MHz (802.11b (Data rate CCK 11Mbps; Power at 18dBm))- Camera – Wi-Fi: 5200MHz (802.11a (Data rate 6Mbps))
6	<ul style="list-style-type: none">- Wi-Fi: 2462MHz (802.11b (Data rate CCK 11Mbps; Power at 18dBm))- Camera – Wi-Fi: 5785MHz (802.11n (Data rate 6Mbps))

12. Test Method

The tests were performed using the referenced methods described in the FCC Part 15.247 specification. The specific test sections and specification references are listed in the individual test sections.

13. Sample Calculations

For Radiated Emissions:

The resultant field strength (FS) is a summation in decibels (dB) of the receiver meter reading (MTR), the antenna correction factor (AF), and the cable loss factor (CF). If an external preamplifier is used, the total is reduced by its gain (-PA). If a distance correction (DC) is required, it is added to the total.

$$\text{Formula 1: FS (dB}\mu\text{V/m)} = \text{MTR (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CF (dB)} + (-\text{PA (dB)}) + \text{DC (dB)}$$

To convert the Field Strength dB μ V/m term to μ V/m, the dB μ V/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in μ V/m terms.

$$\text{Formula 2: FS (\mu V/m)} = \text{AntiLog} [(\text{FS (dB}\mu\text{V/m)})/20]$$

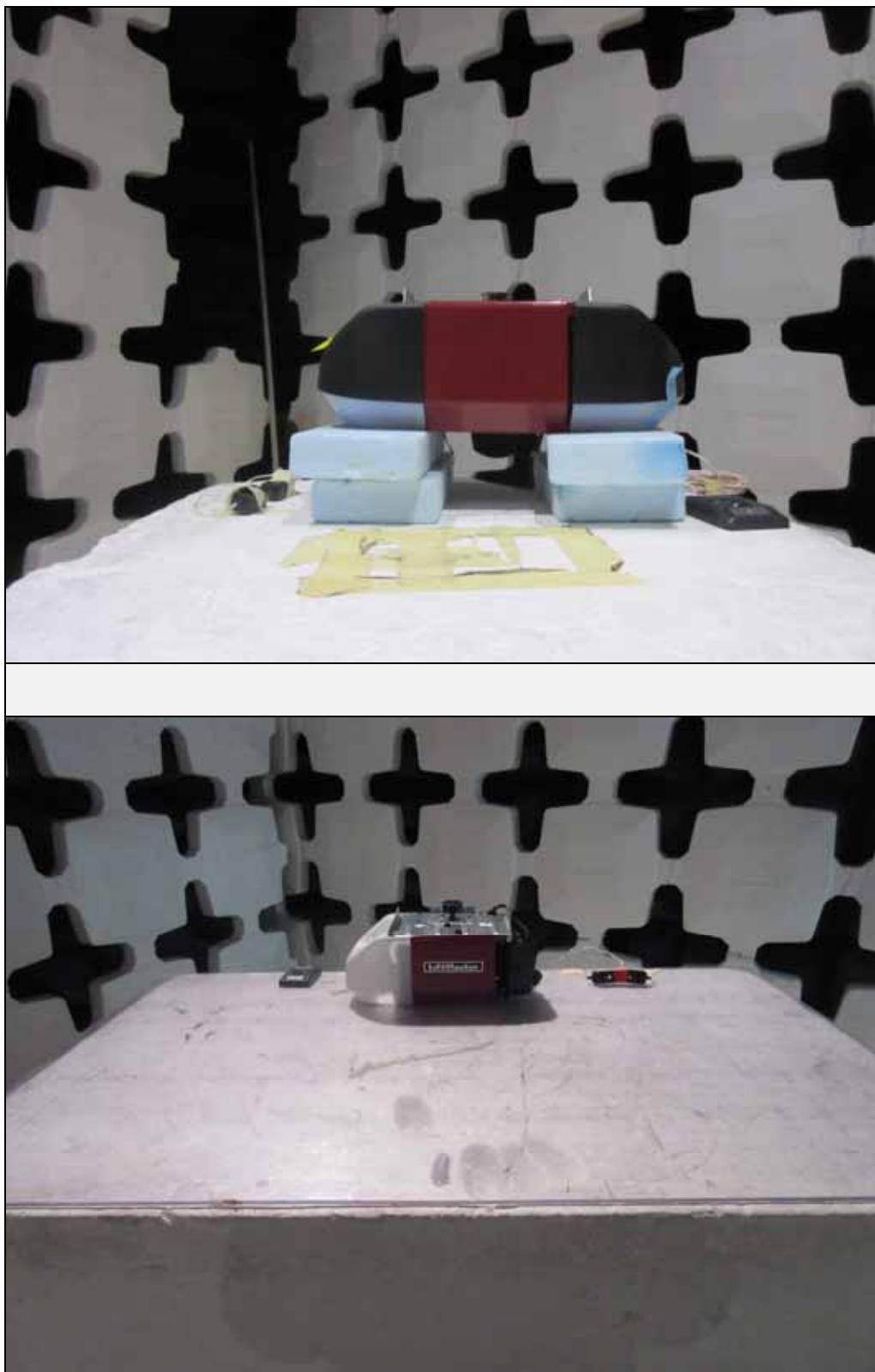
14. Statement of Conformity

The Chamberlain Group, Inc. MyQ Garage Door Opener, Model No. B6765T did fully conform to the selected requirements of FCC Part 15.247.

15. Certification

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC Part 15.247 test specification. The data presented in this test report pertains to the EUT on the test date specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

16. Photographs of EUT



17. Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
CDW5	DESKTOP COMPUTER	ELITE	PENTIUM 4	006	3.8GHZ	N/A	
CDY0	WORKSTATION	ELITE	WORKSTATION		WINDOWS 7	N/A	
GRB0	1MHZ, LISN SIGNAL CHECKER	ELITE	LISNCHKR1M	1	1MHZ	1/9/2019	1/9/2021
GRE1	SIGNAL GENERATOR	AGILENT	E4438C	MY42081749	250KHZ-6GHZ	2/25/2020	2/25/2021
NDQ0	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	311	400-1000MHZ	5/8/2018	5/8/2020
NTA3	BILOG ANTENNA	TESEQ	6112D	32853	25-1000MHz	10/10/2019	10/10/2020
NWQ2	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS LINDGREN	3117	66659	1GHZ-18GHZ	3/22/2018	3/22/2020
PLF2	CISPR16 50UH LISN	ELITE	CISPR16/70A	002	.15-30MHz	4/23/2019	4/23/2020
PLF4	CISPR16 50UH LISN	ELITE	CISPR16/70A	003	.15-30MHz	4/23/2019	4/23/2020
RBG3	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101592	2HZ-44GHZ	2/20/2019	3/20/2020
RBJ3	EMI RECEIVER	ROHDE & SCHWARZ	ESW8	100984	2HZ-8GHZ	3/2/2020	3/2/2021
SHC2	Power Supplies	HENGFU	HF60W-SL-24	A11372702	24V	NOTE 1	
T1E4	10DB 25W ATTENUATOR (RM 11)	WEINSCHEL	46-10-43	AV5805	DC-18GHZ	4/24/2018	4/24/2020
T2B2	20DB, 2W ATTENUATOR	HEWLETT PACKARD	8491A	11341	DC-12.4GHZ	9/5/2019	9/5/2021
T2F4	20DB, 100W ATTENUATOR	WEINSCHEL	48-20-33	BA0696	DC-18GHZ	6/5/2018	6/5/2020
VBR8	CISPR EN FCC CE VOLTAGE.exe					N/A	
VBV2	CISPR EN FCC ICES RE.EXE	ELITE	CISPR EN FCC ICES RE.EXE	---	---	N/A	
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	

N/A: Not Applicable

I/O: Initial Only

CNR: Calibration Not Required

NOTE 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

18. RF Radiated Emissions Multi-Transmitter Test

EUT Information	
Manufacturer	Chamberlain Group, Inc.
Product	MyQ Garage Door Opener
Model	B6765T
Mode	Tx, Wi-Fi, and Bluetooth

Information	
Setup Format	Tabletop
Type of Test Site	Semi-anechoic chamber
Type of Antennas Used	Below 1GHz: Bilog (or equivalent) Above 1GHz: Double-ridged waveguide (or equivalent)
Highest Measurement Frequency:	18GHz
Notes	The cables were manually maximized during the preliminary emissions sweeps. The cable arrangement which resulted in the worst-case emissions was utilized.

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1
Radiated disturbance (electric field strength on an open area test site or alternative test site) (6 GHz – 18 GHz)	3.2
Radiated disturbance (electric field strength on an open area test site or alternative test site) (18 GHz – 26.5 GHz)	3.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (26.5 GHz – 40 GHz)	3.4

Procedures

Since a quasi-peak detector and an average detector requires a long integration times, it is not practical to automatically sweep through the quasi-peak and average levels. Therefore, radiated emissions from the EUT were first scanned using a peak detector and automatically plotted. The frequencies where significant emission levels were noted were then remeasured using the quasi-peak detector or average detector.

The broadband measuring antenna was positioned at a 3 meter distance from the EUT. The frequency range from 30MHz to 1GHz was investigated using a peak detector function with the bilog antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The frequency range above 1 GHz was investigated using a peak detector function with the double ridged waveguide antenna at several heights, horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The maximum levels for each antenna polarization were plotted.

Per FCC KDB 996369 D04 Module Integration Guide v01 February 1, 2019:

Testing of the host product with all the transmitters installed is recommended to verify that the host product meets all the applicable FCC rules. The radio spectrum is to be investigated with all the transmitters in the final host product functioning to determine that no emissions exceed the highest limit permitted for any one individual transmitter as required by Section 2.947(f).

The testing shall also check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. No emissions exceed the highest limit permitted for any one individual transmitter as required by Section 2.947(f).

Final radiated emissions were performed on all significant broadband and narrowband emissions found in the exploratory sweeps using the following methods:

- 1) Measurements from 30MHz to 1GHz were made using a quasi-peak detector and a broadband bilog antenna. Measurements above 1GHz were made using an average detector and a broadband double ridged waveguide antenna.
- 2) To ensure that maximum or worst case, emission levels were measured, the following steps were taken:
 - a) The EUT was rotated so that all sides were exposed to the receiving antenna.
 - b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - c) The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.



Test Setup for Radiated Emissions: 30MHz to 1GHz, Horizontal Polarization



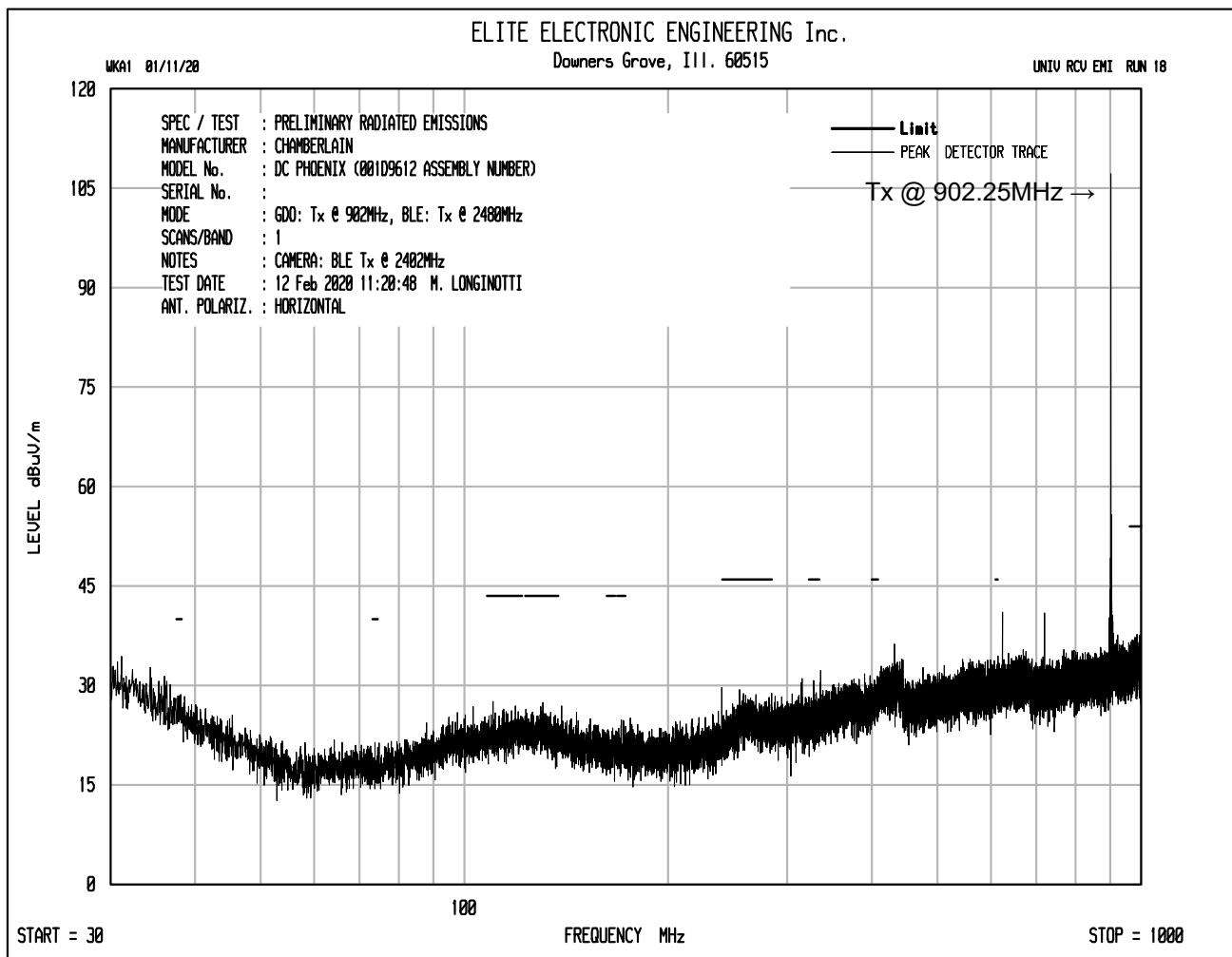
Test Setup for Radiated Emissions: 30MHz to 1GHz, Vertical Polarization



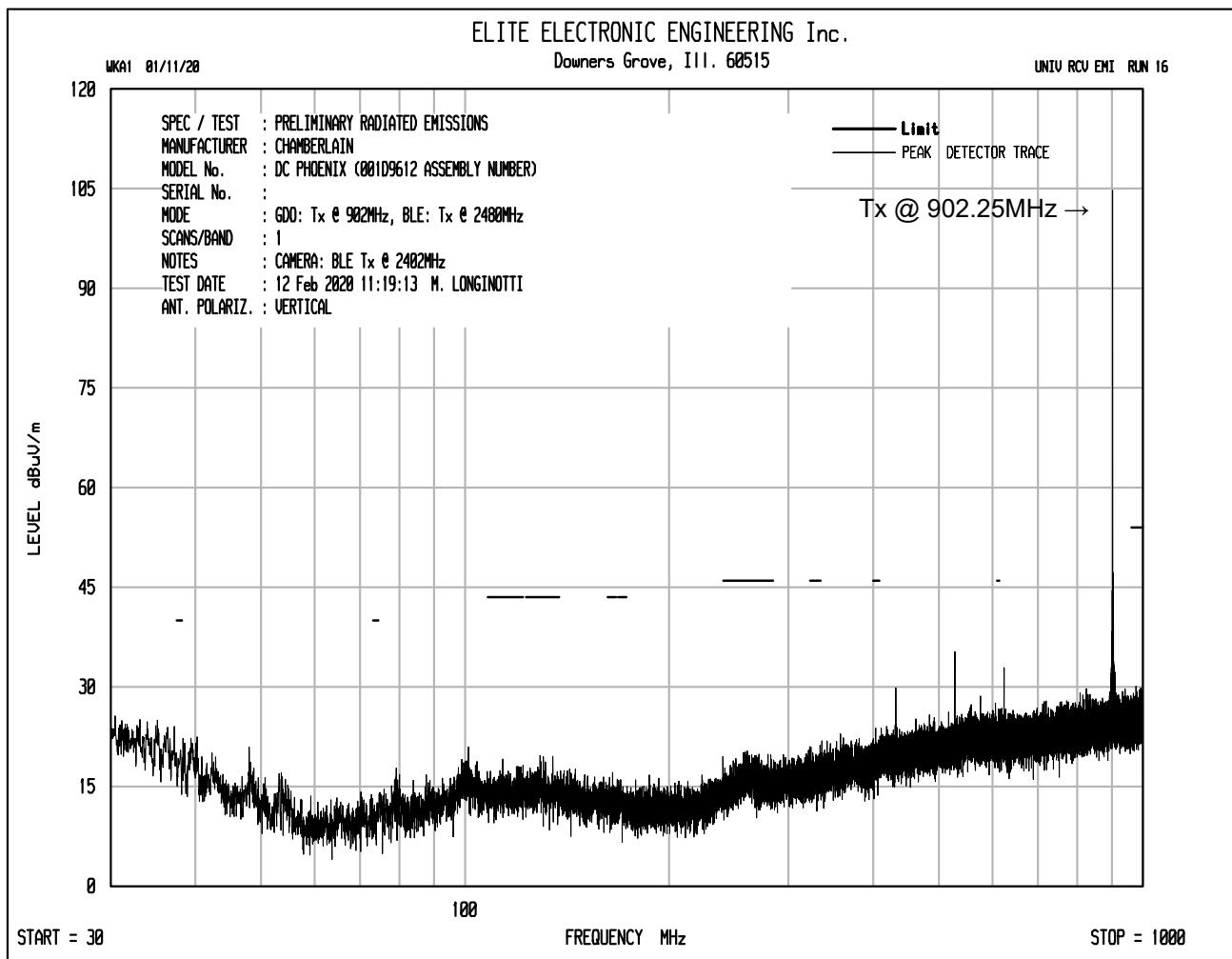
Test Setup for Radiated Emissions: 1 to 18GHz, Horizontal Polarization



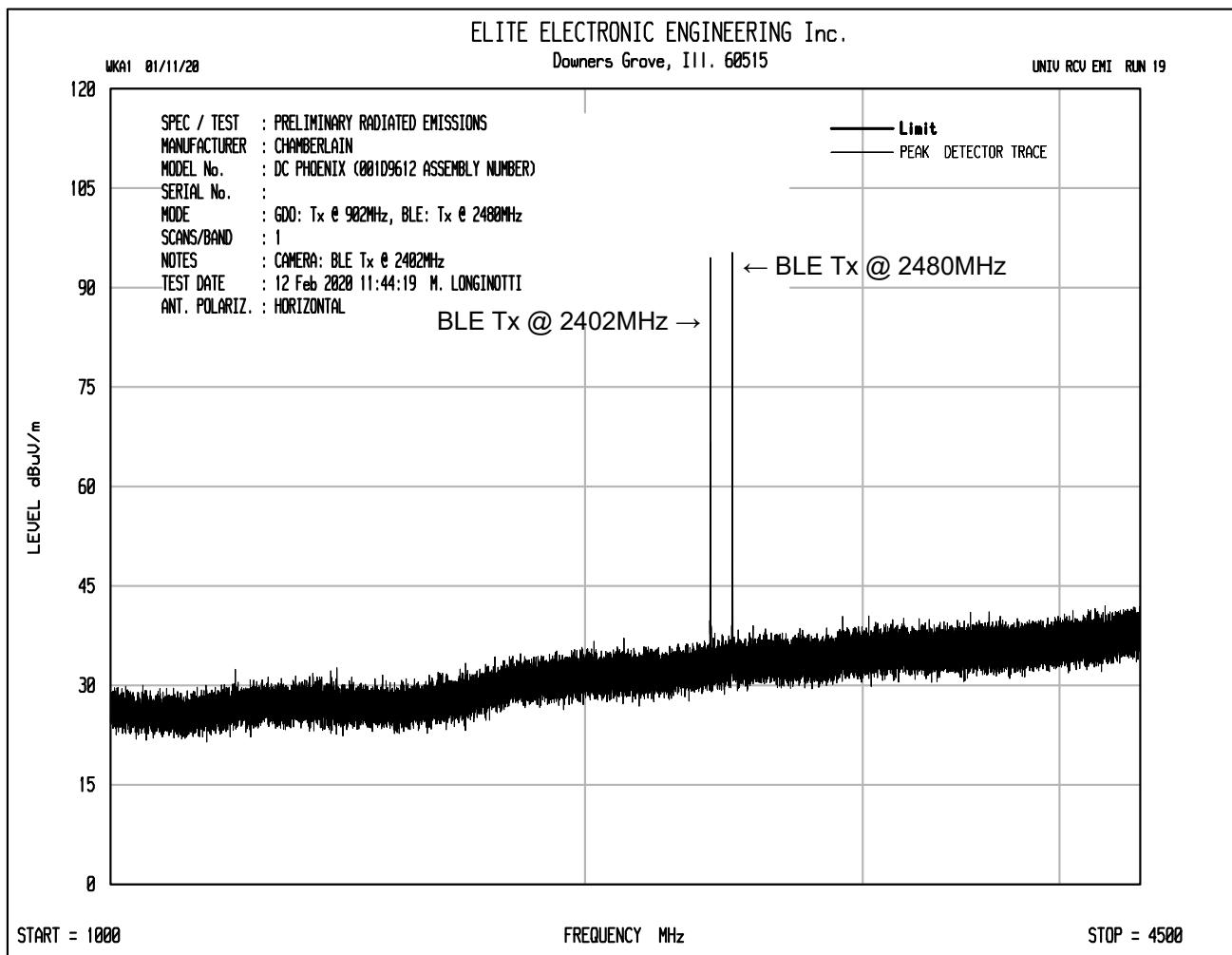
Test Setup for Radiated Emissions: 1 to 18GHz, Vertical Polarization



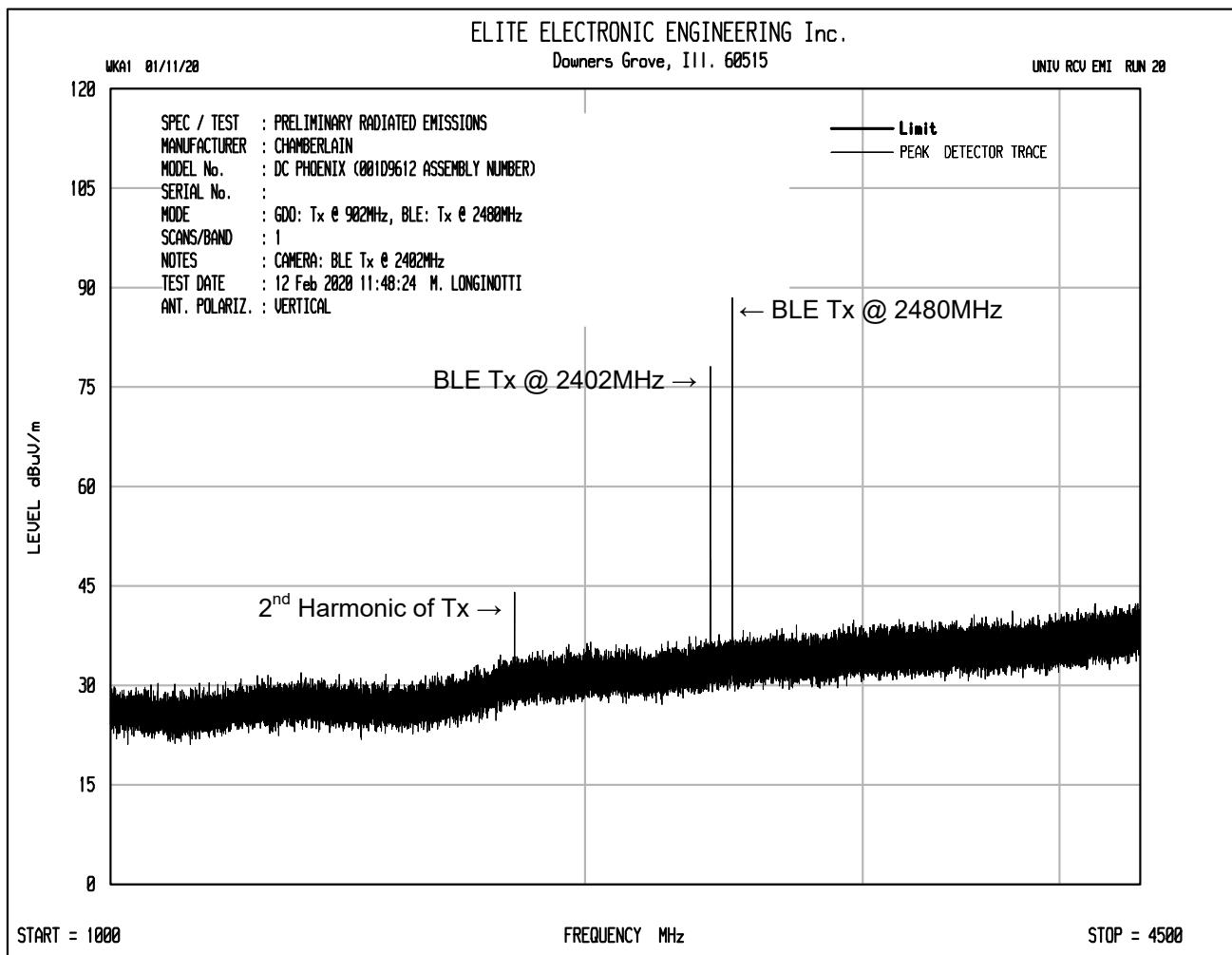
Note	Description
1	Plot shows emissions at 902.25MHz.



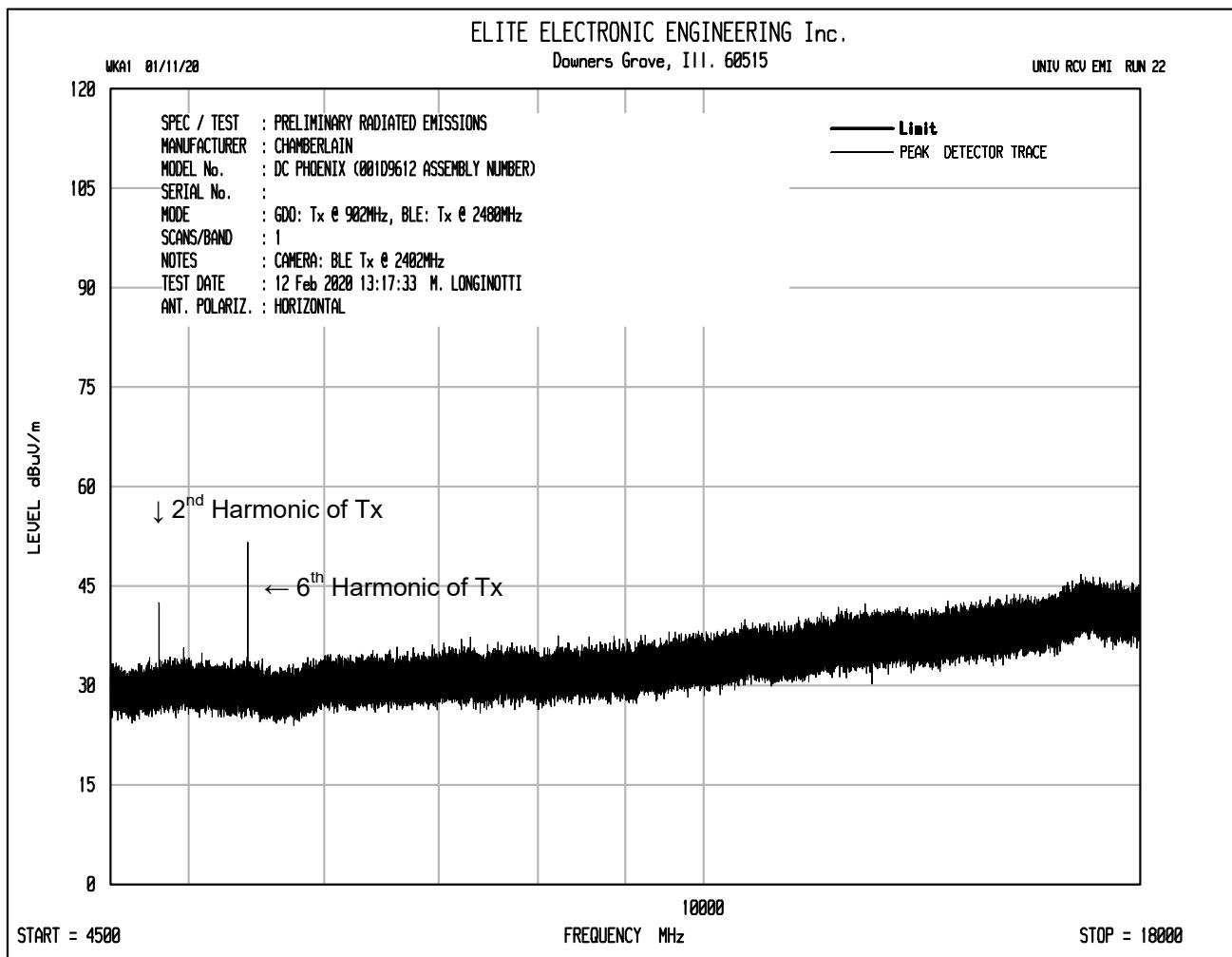
Note	Description
1	Plot shows emissions at 902.25MHz.



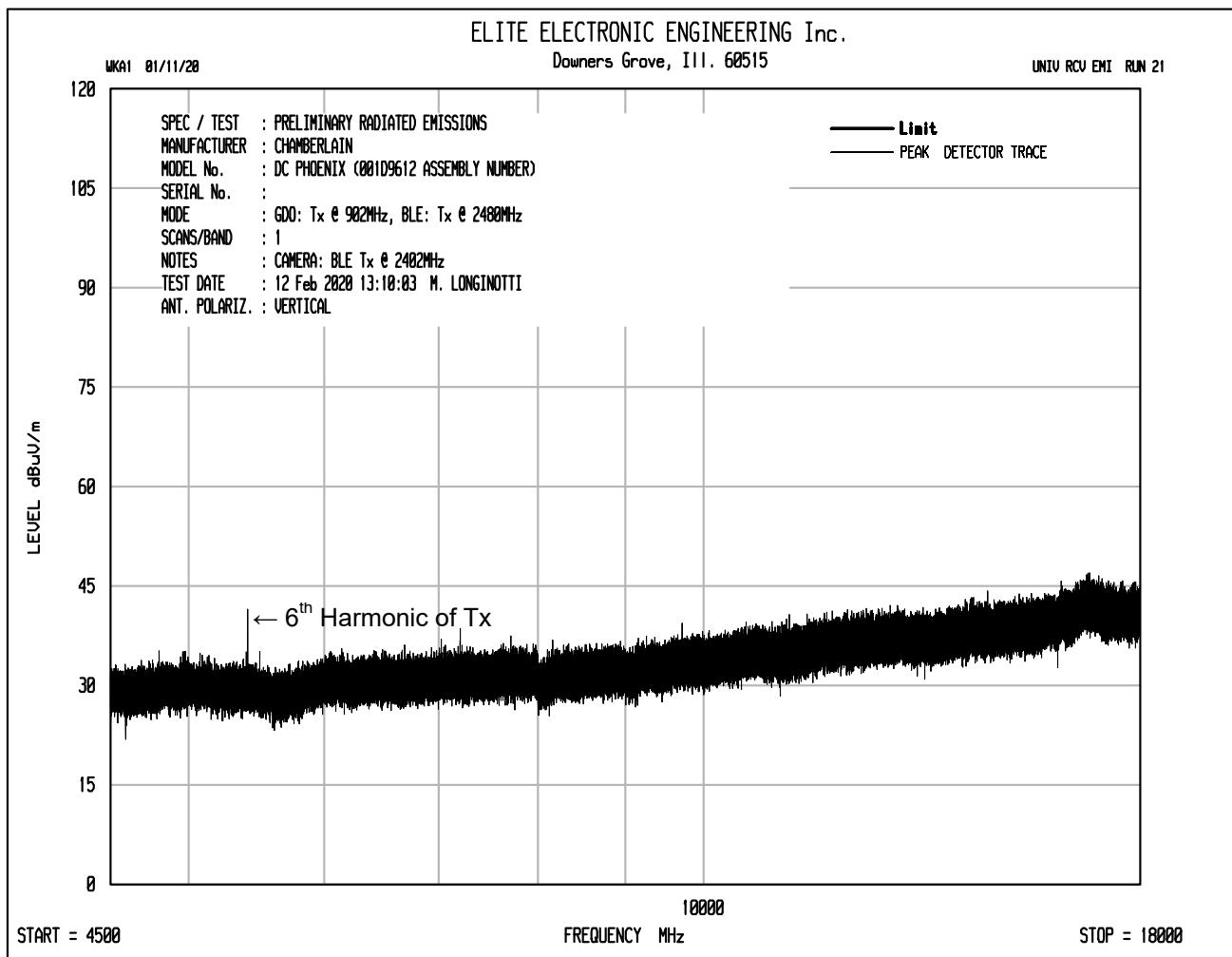
Note	Description
1	Plot shows BLE emissions from the camera at 2402MHz.
2	Plot shows BLE emissions at 2480MHz.



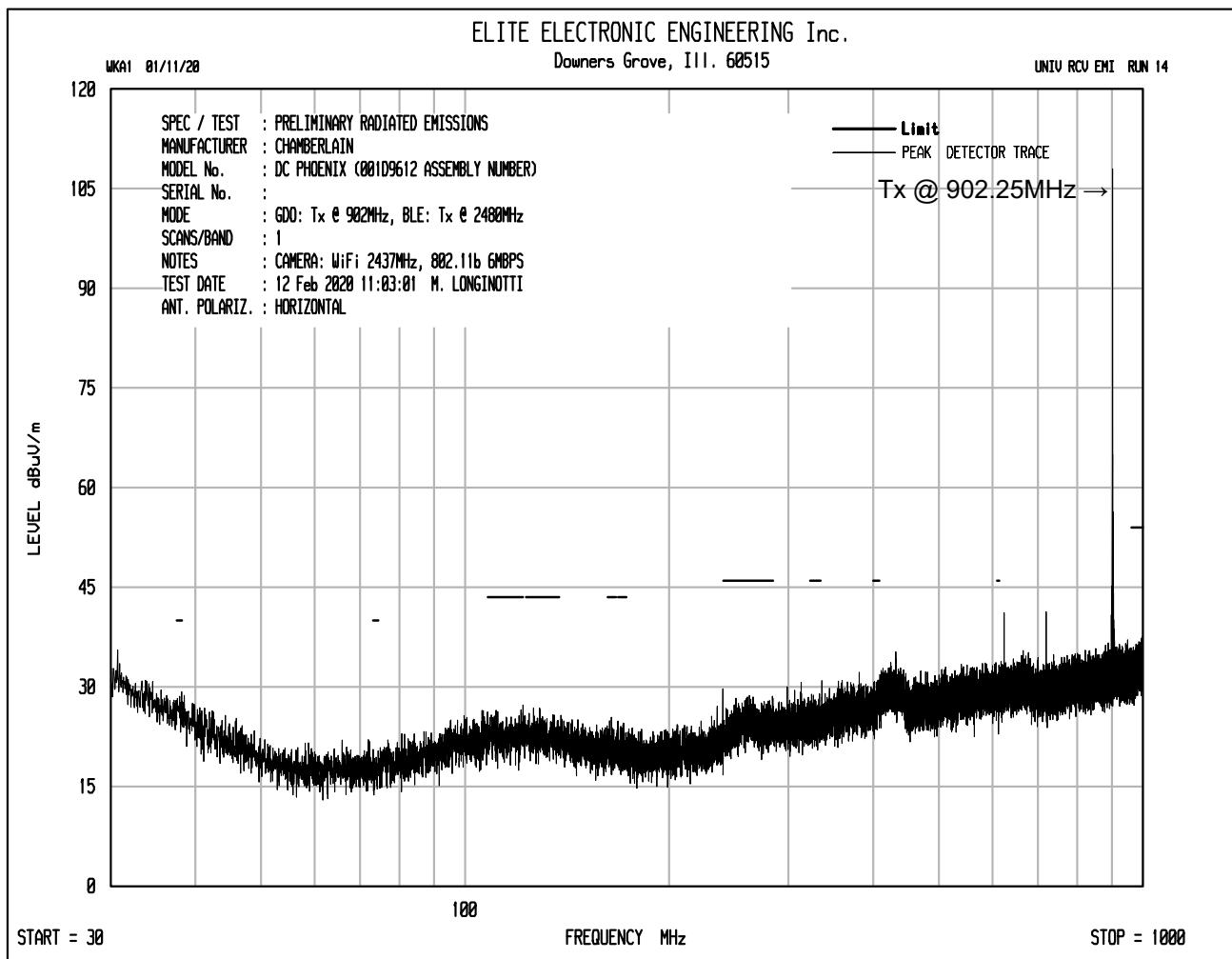
Note	Description
1	Plot shows harmonic at 1804.5MHz (2 nd harmonic of 902.25MHz).
2	Plot shows BLE emissions from the camera at 2402MHz.
3	Plot shows BLE emissions at 2480MHz.



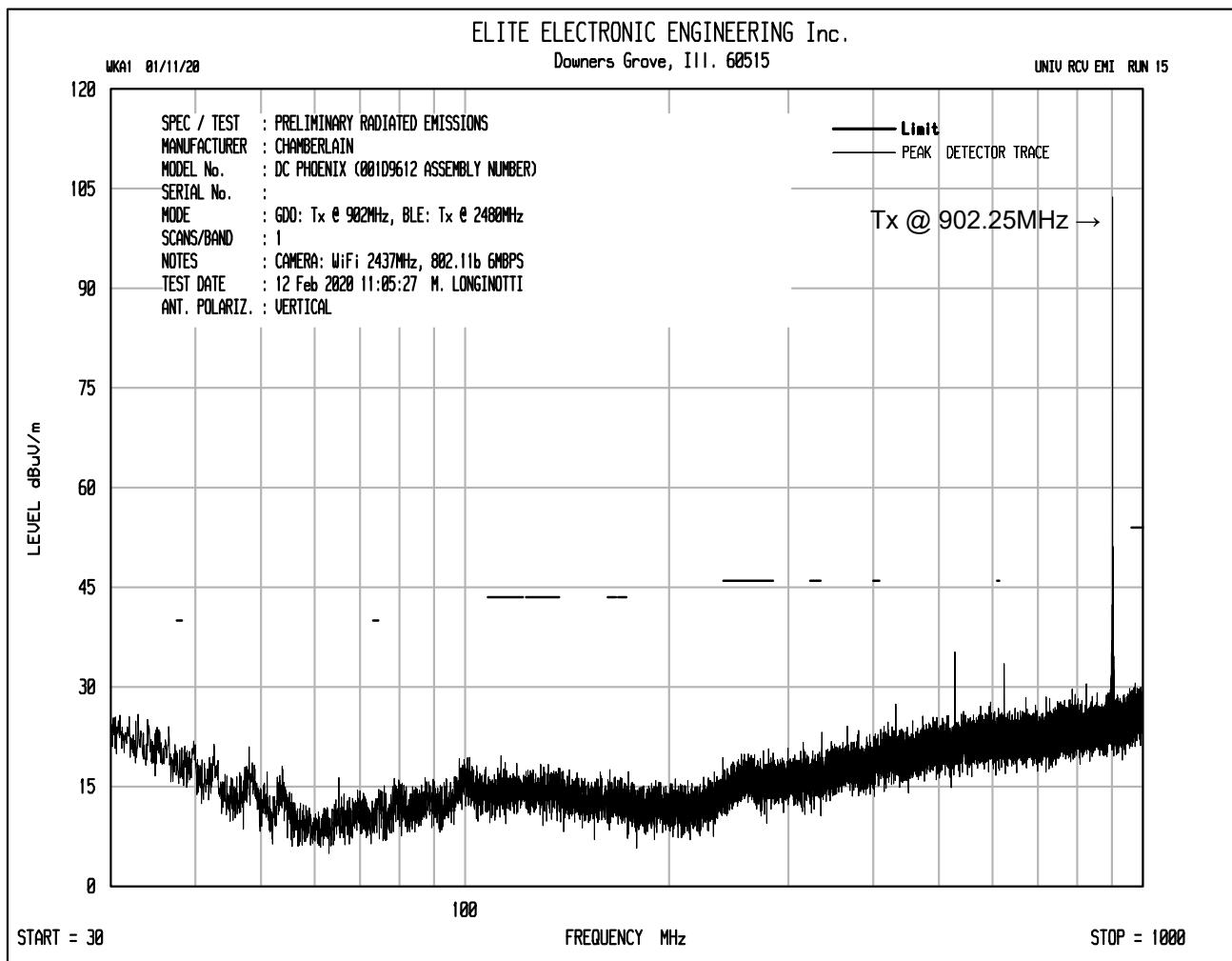
Note	Description
1	Plot shows the 2 nd harmonic of 2402MHz (4804MHz).
2	Plot shows the 6 th harmonic of 902.25MHz (5413.5MHz).



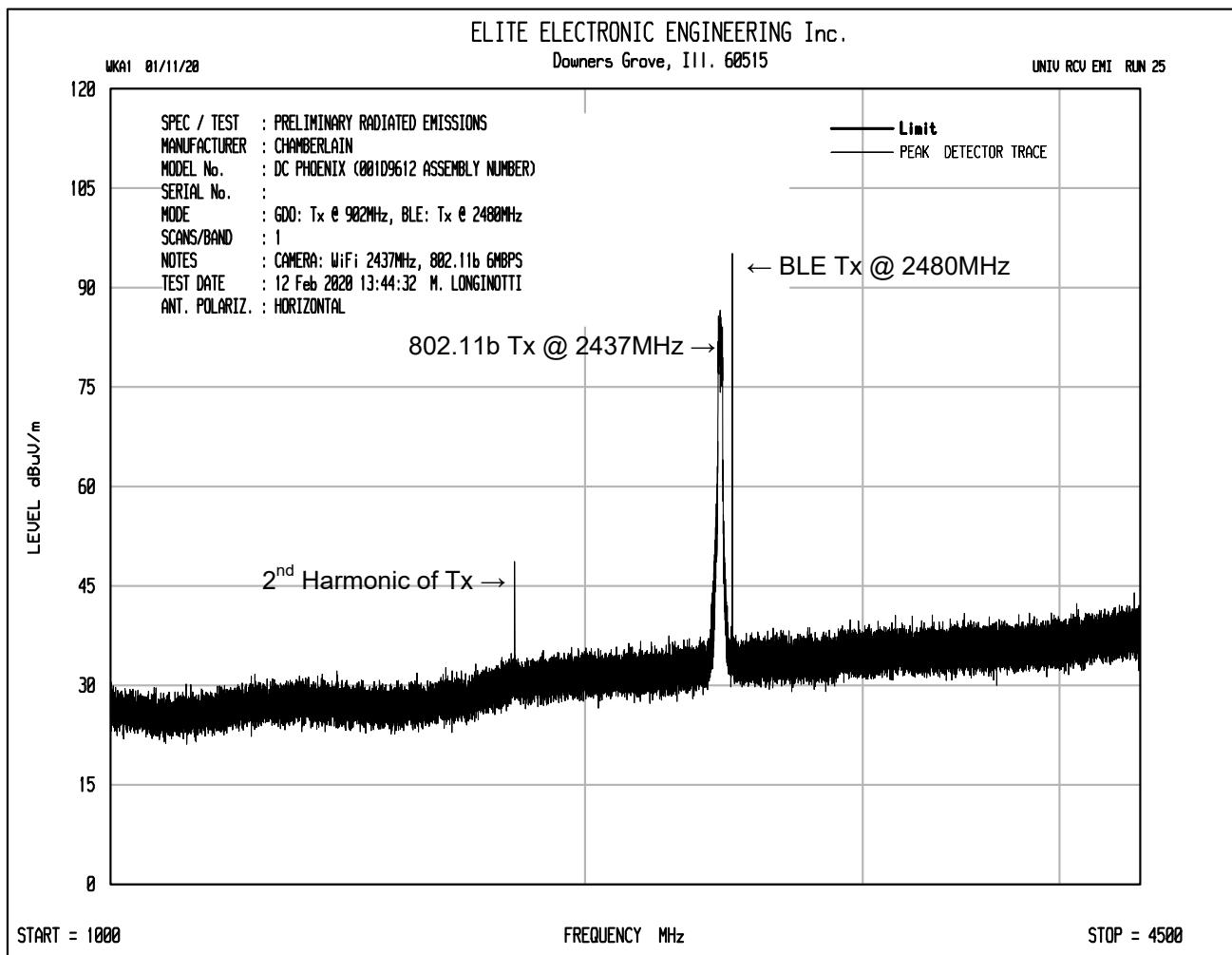
Note	Description
1	Plot shows the 6 th harmonic of 902.25MHz (5413.5MHz).



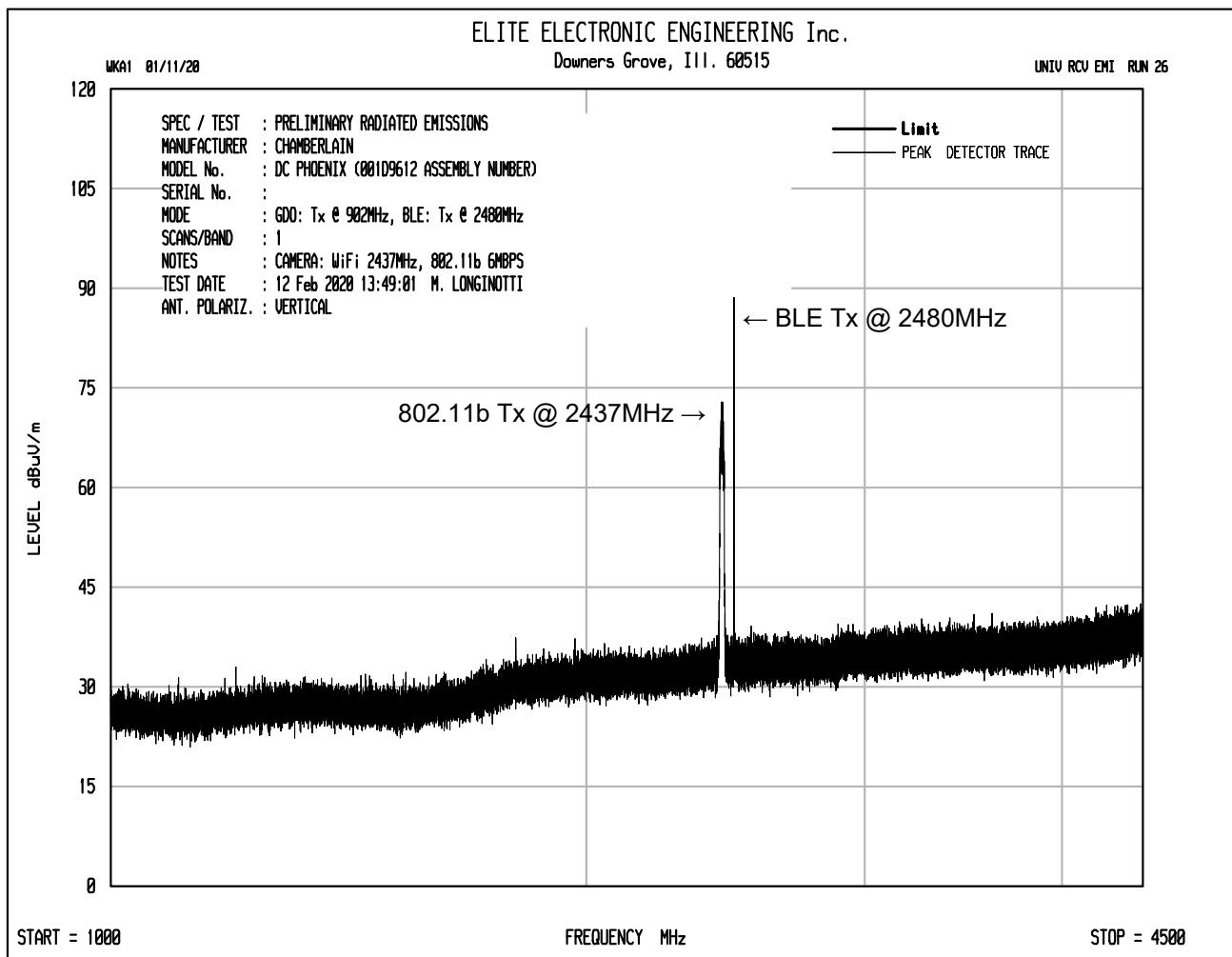
Note	Description
1	Plot shows emissions at 902.25MHz.



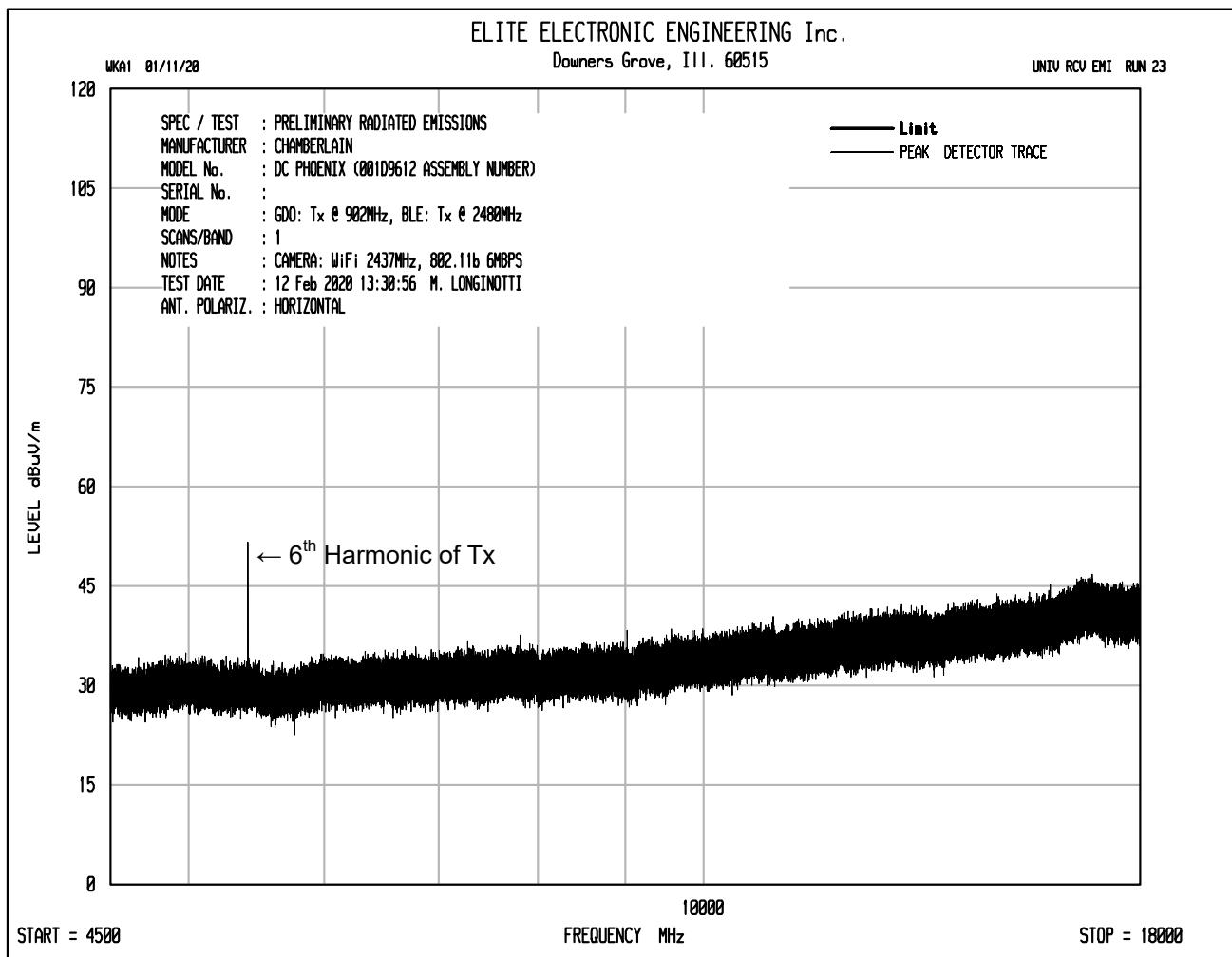
Note	Description
1	Plot shows emissions at 902.25MHz.



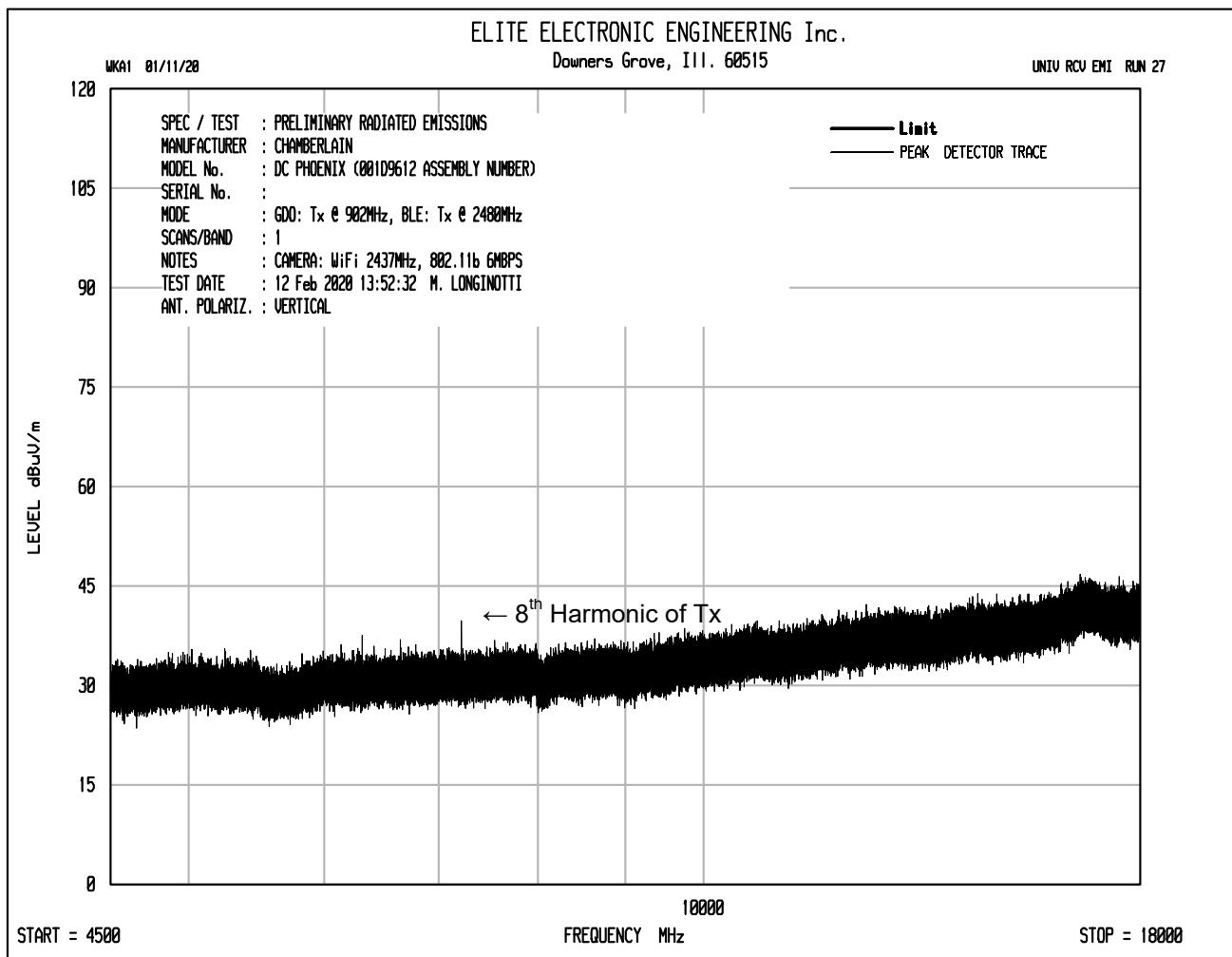
Note	Description
1	Plot shows the 2 nd harmonic of 902.25MHz (1804.5MHz).
2	Plot shows Wi-Fi emissions from the camera at 2437MHz.
3	Plot shows BLE emissions at 2480MHz.



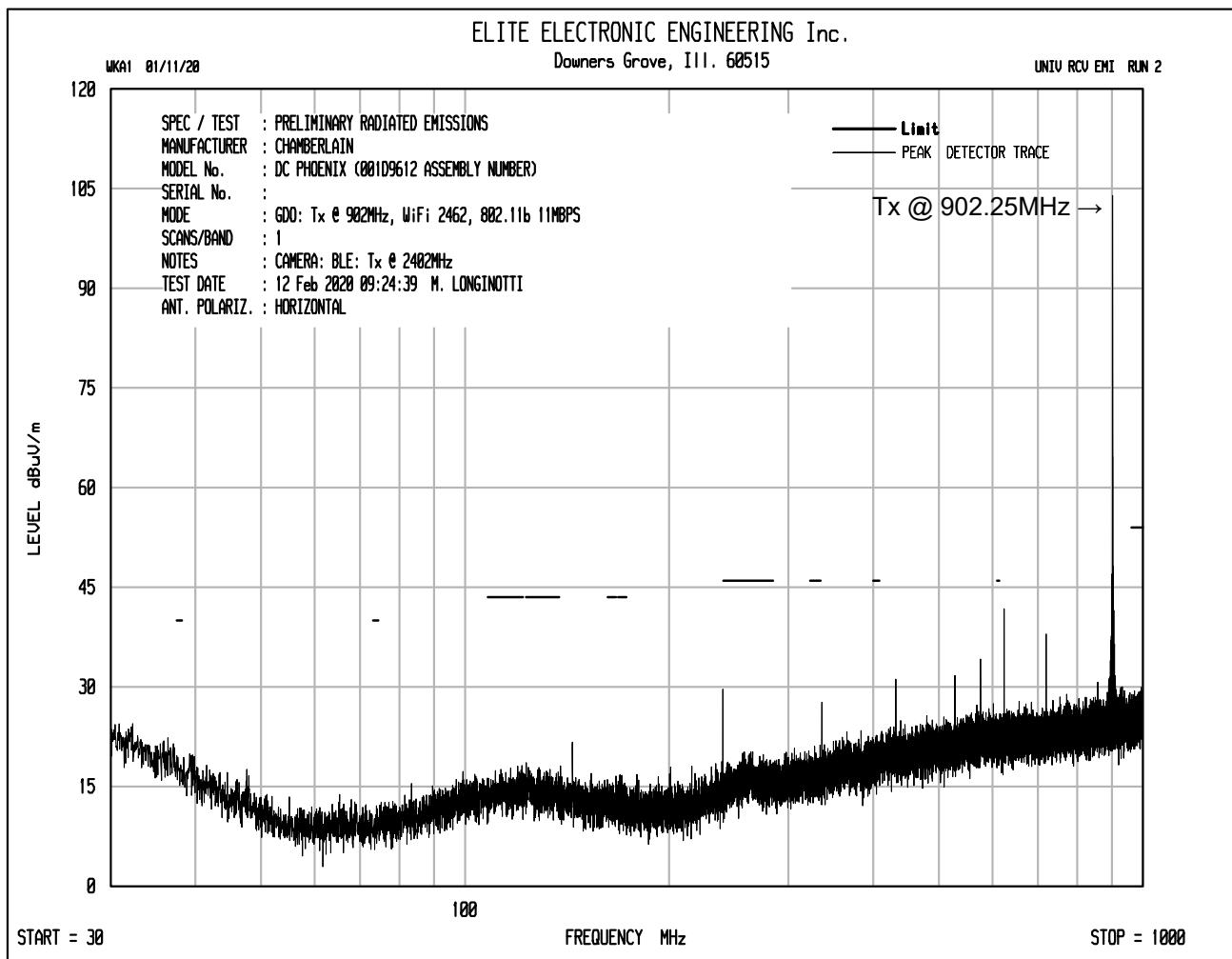
Note	Description
1	Plot shows Wi-Fi emissions from the camera at 2437MHz.
2	Plot shows BLE emissions at 2480MHz.



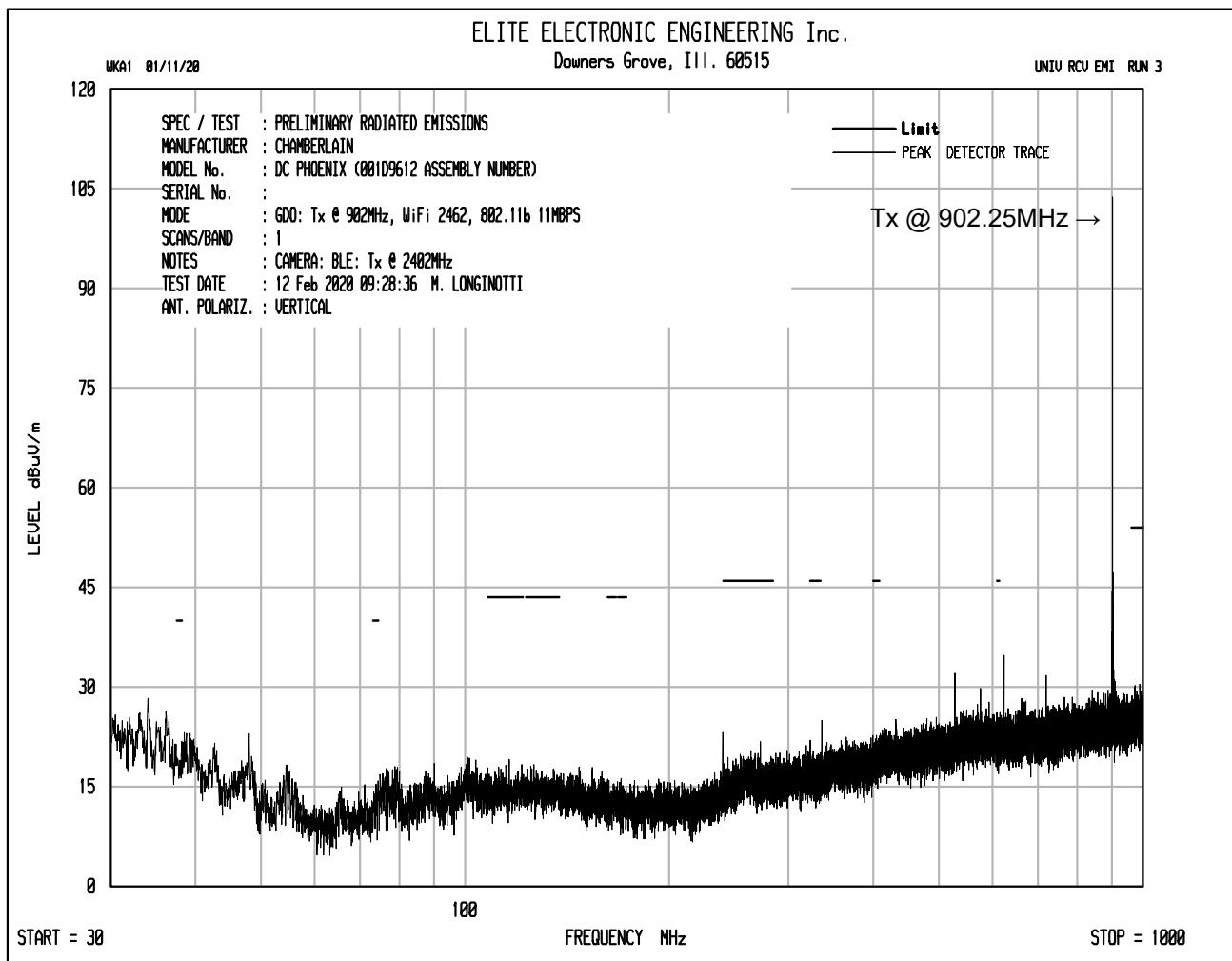
Note	Description
1	Plot shows the 6 th harmonic of 902.25MHz (5413.5MHz).



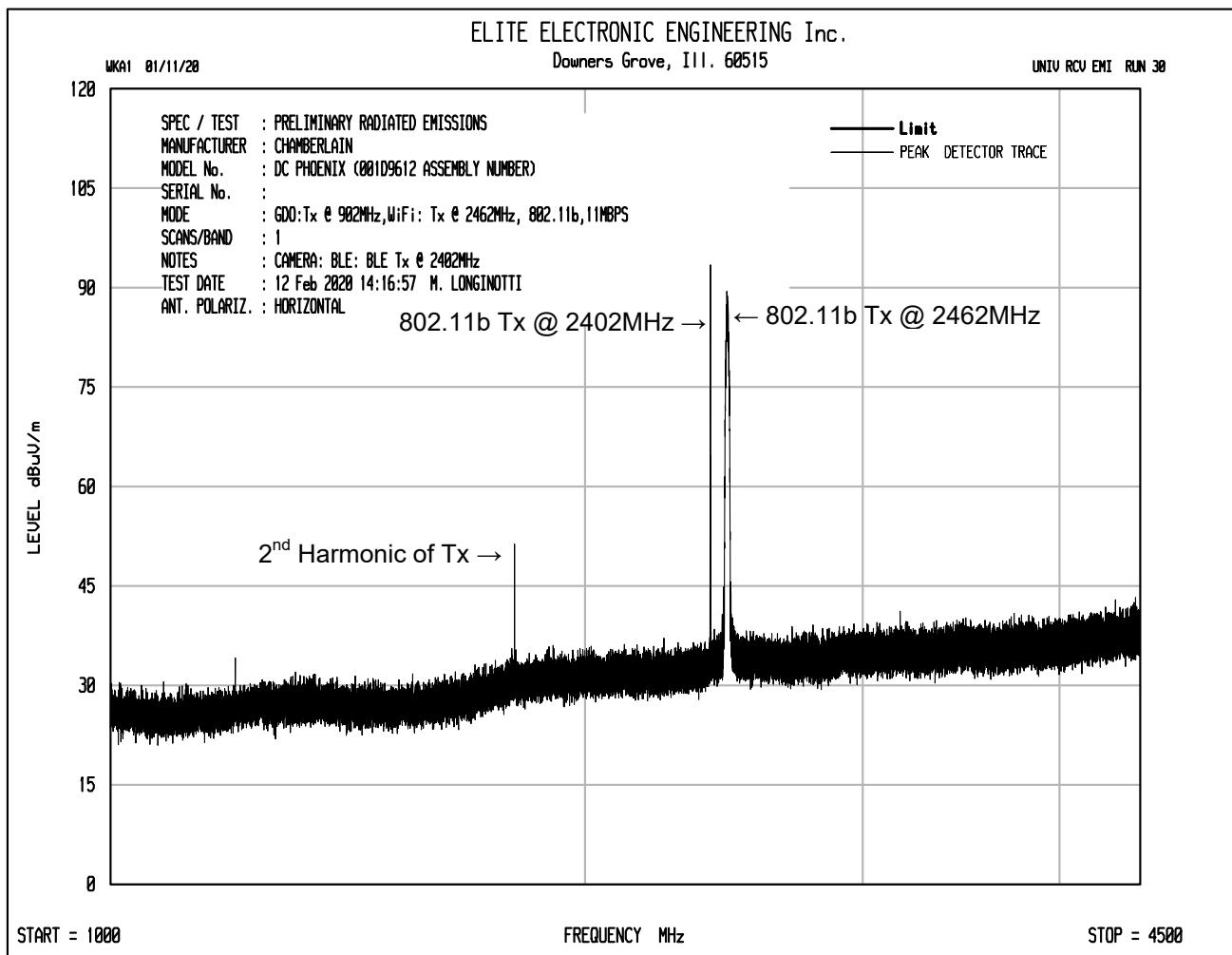
Note	Description
1	Plot shows the 8 th harmonic of 902.25MHz (7218MHz).



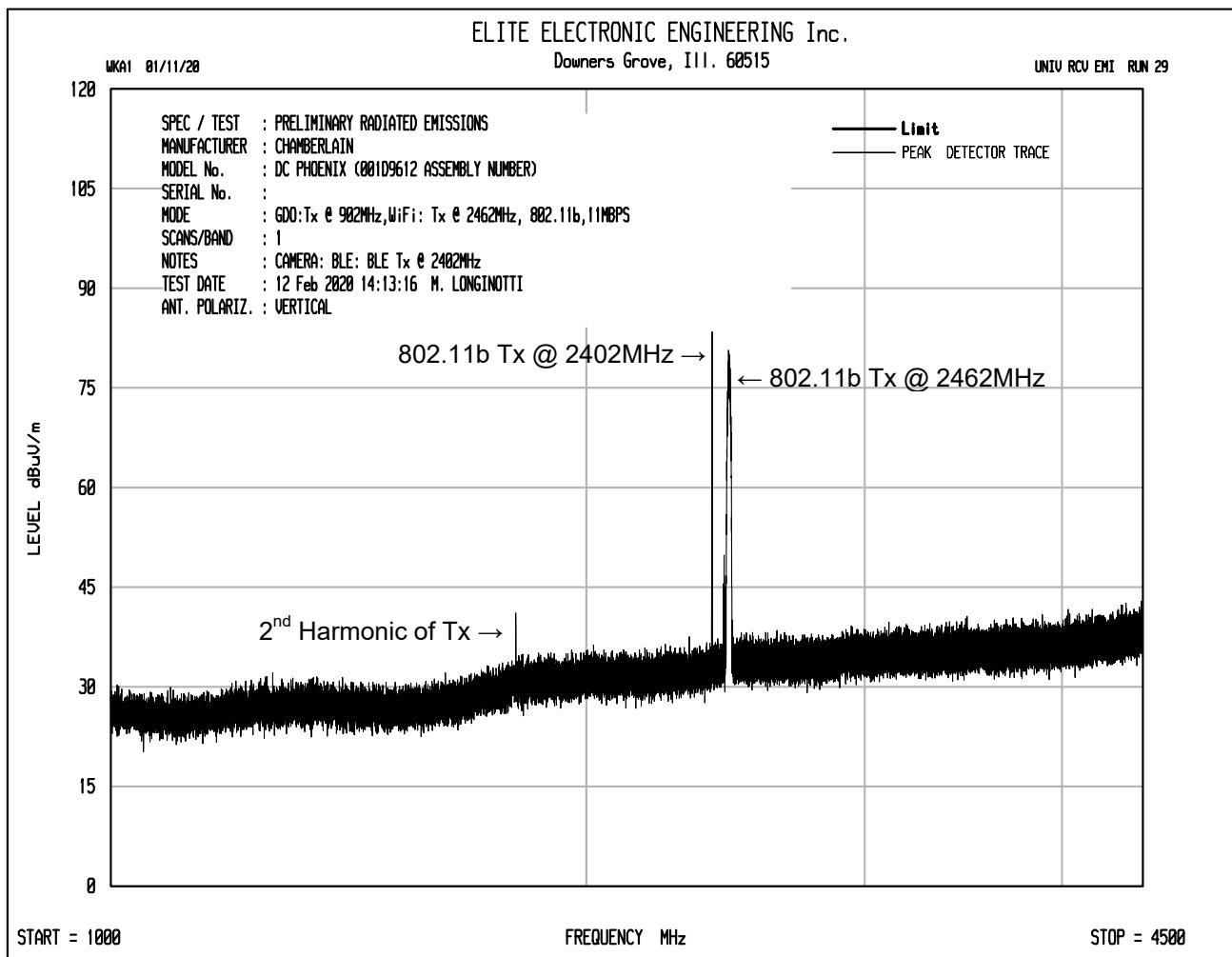
Note	Description
1	Plot shows emissions at 902.25MHz.



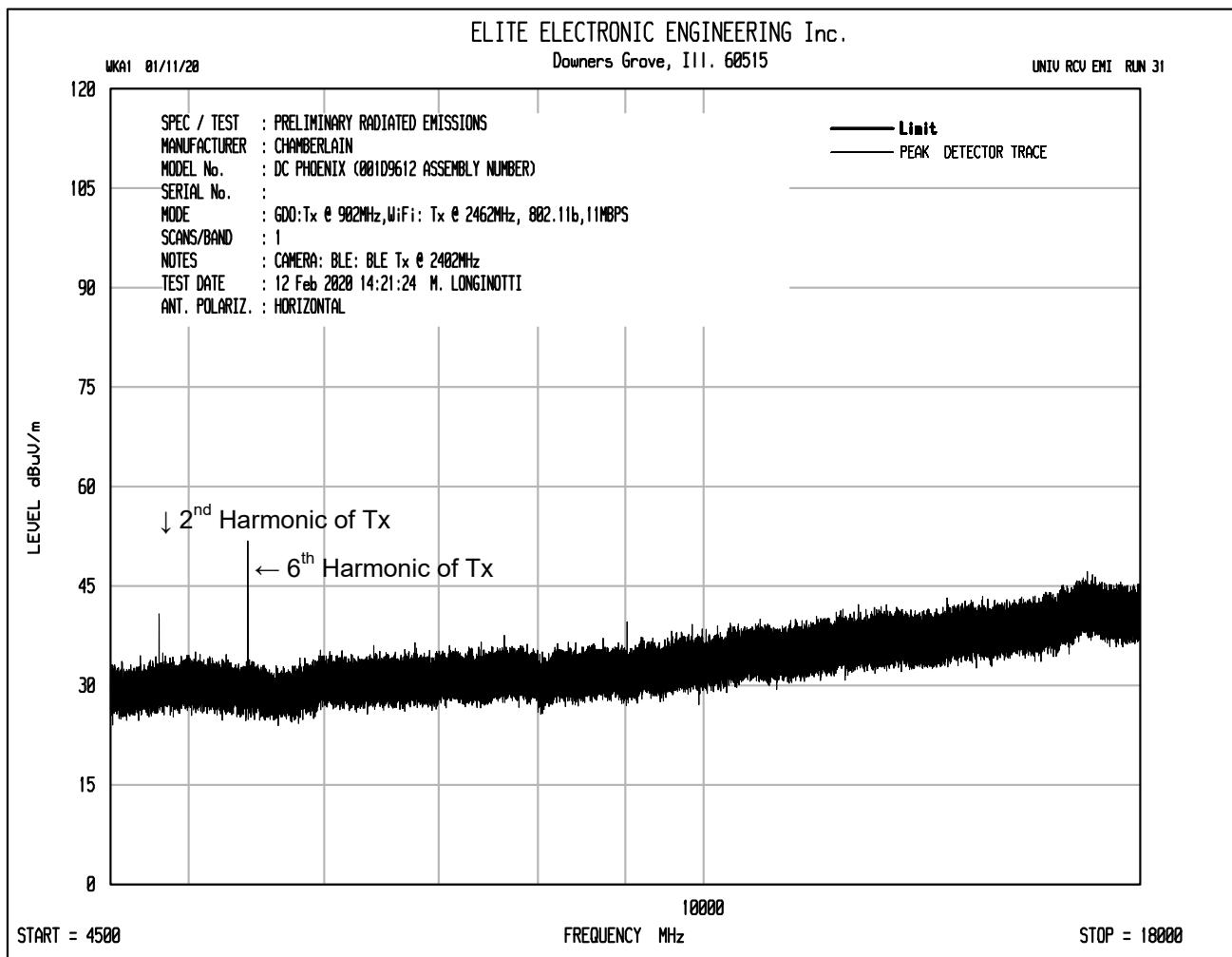
Note	Description
1	Plot shows emissions at 902.25MHz.



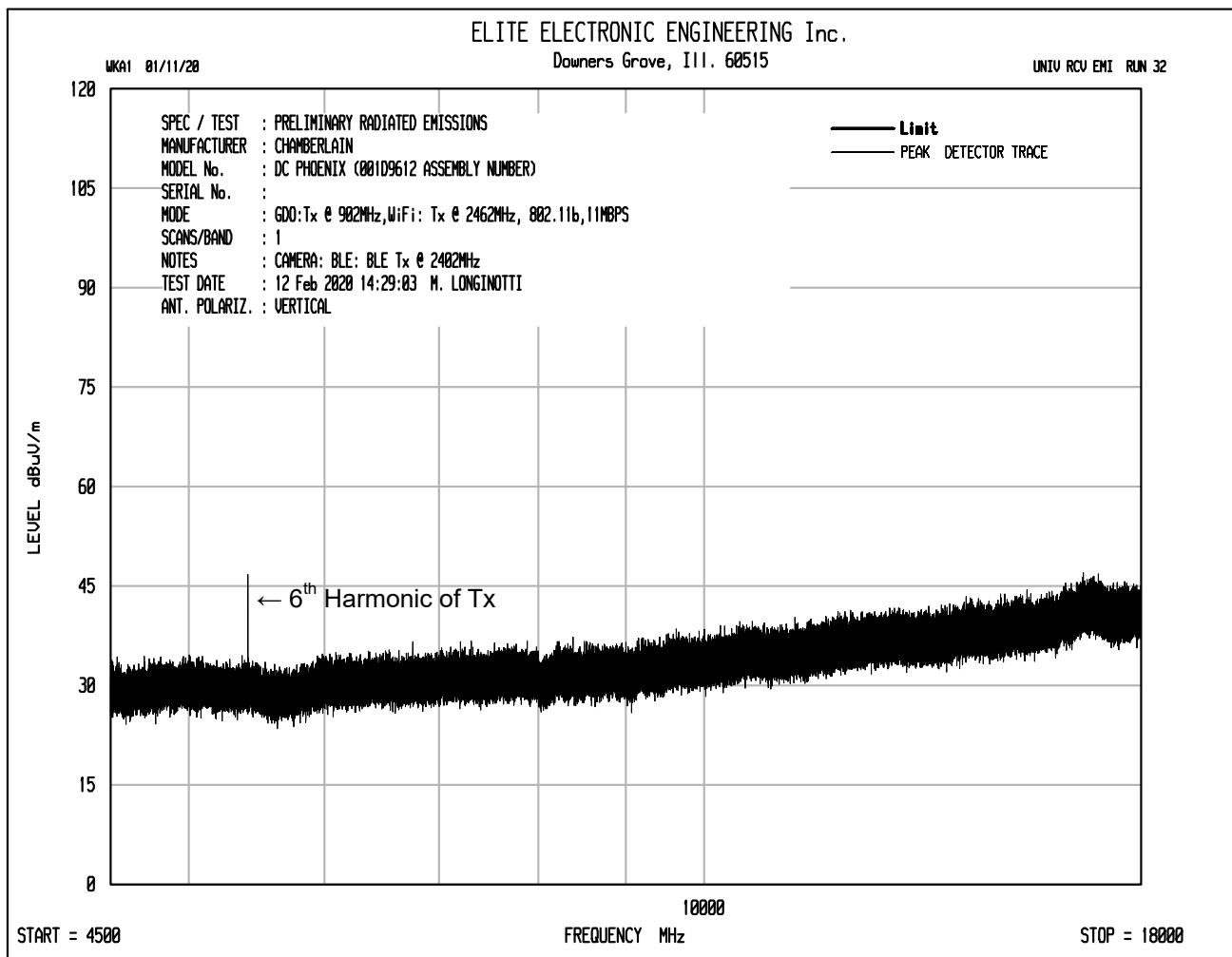
Note	Description
1	Plot shows the 2 nd harmonic of 902.25MHz (1804.5MHz).
2	Plot shows Wi-Fi emissions from the camera at 2402MHz.
3	Plot shows Wi-Fi emissions at 2437MHz.



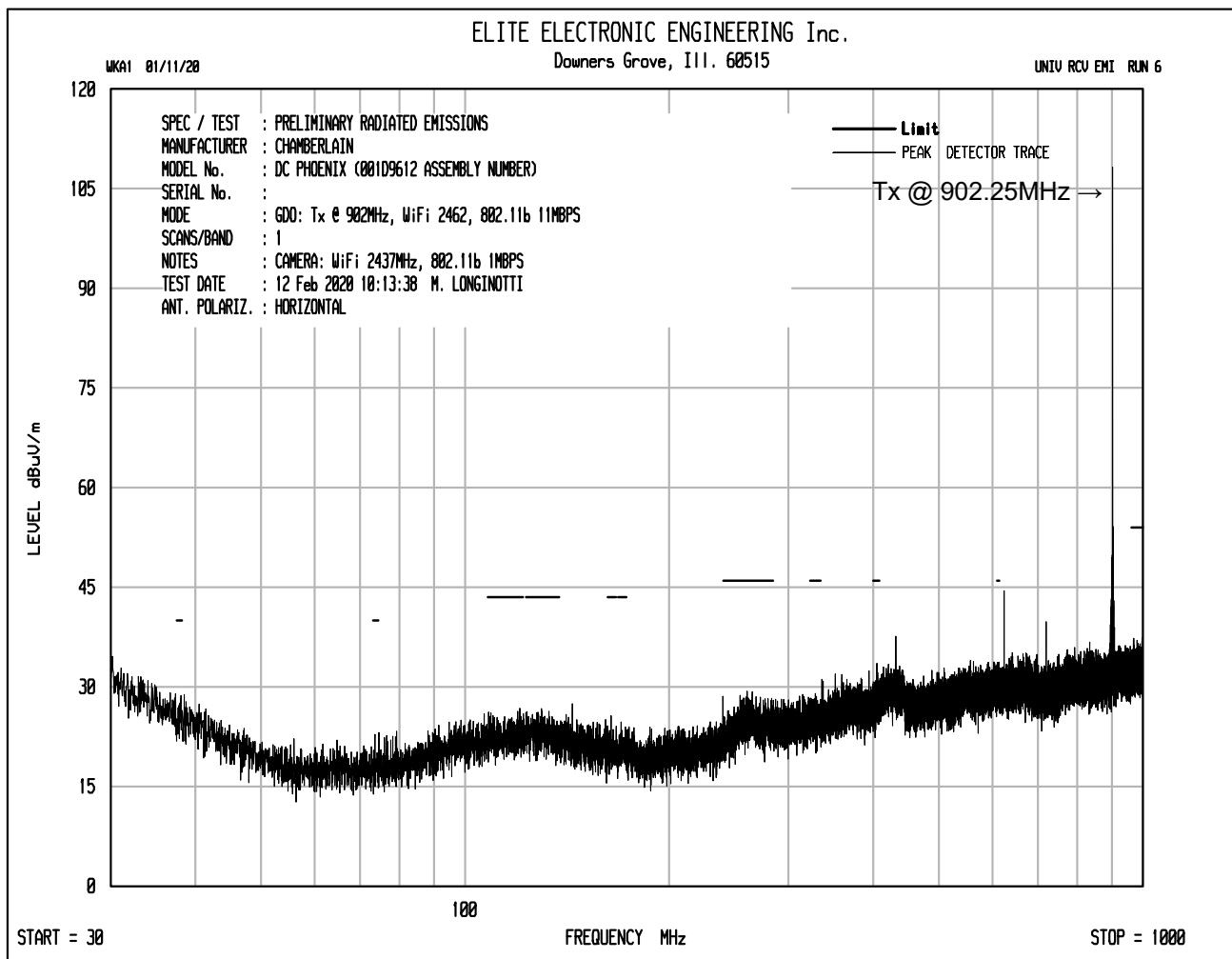
Note	Description
1	Plot shows the 2 nd harmonic of 902.25MHz (1804.5MHz).
2	Plot shows Wi-Fi emissions from the camera at 2402MHz.
3	Plot shows Wi-Fi emissions at 2437MHz.



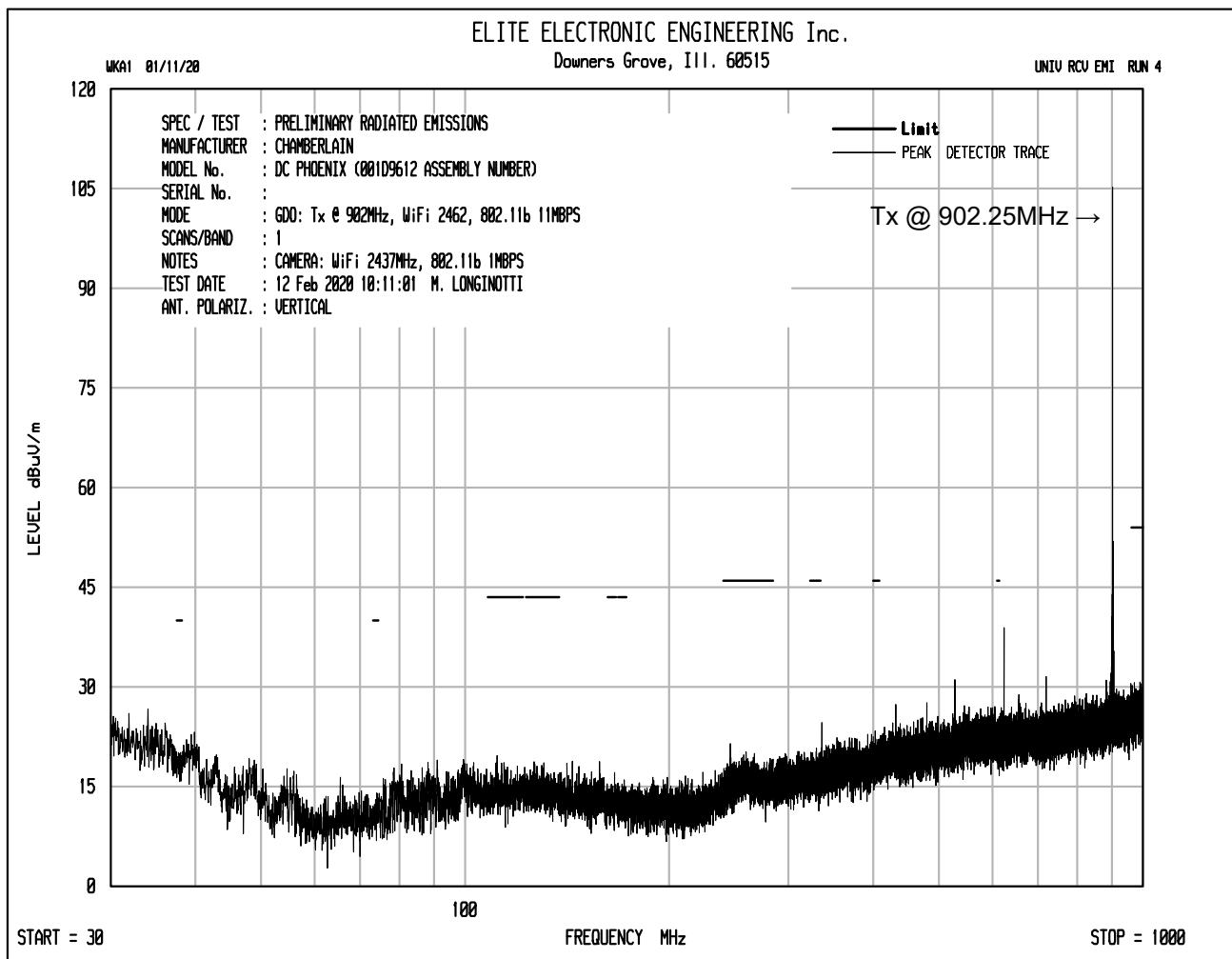
Note	Description
1	Plot shows the 2 nd harmonic of 2402MHz (4804MHz).
2	Plot shows the 6 th harmonic of 902.25MHz (5413.5MHz).



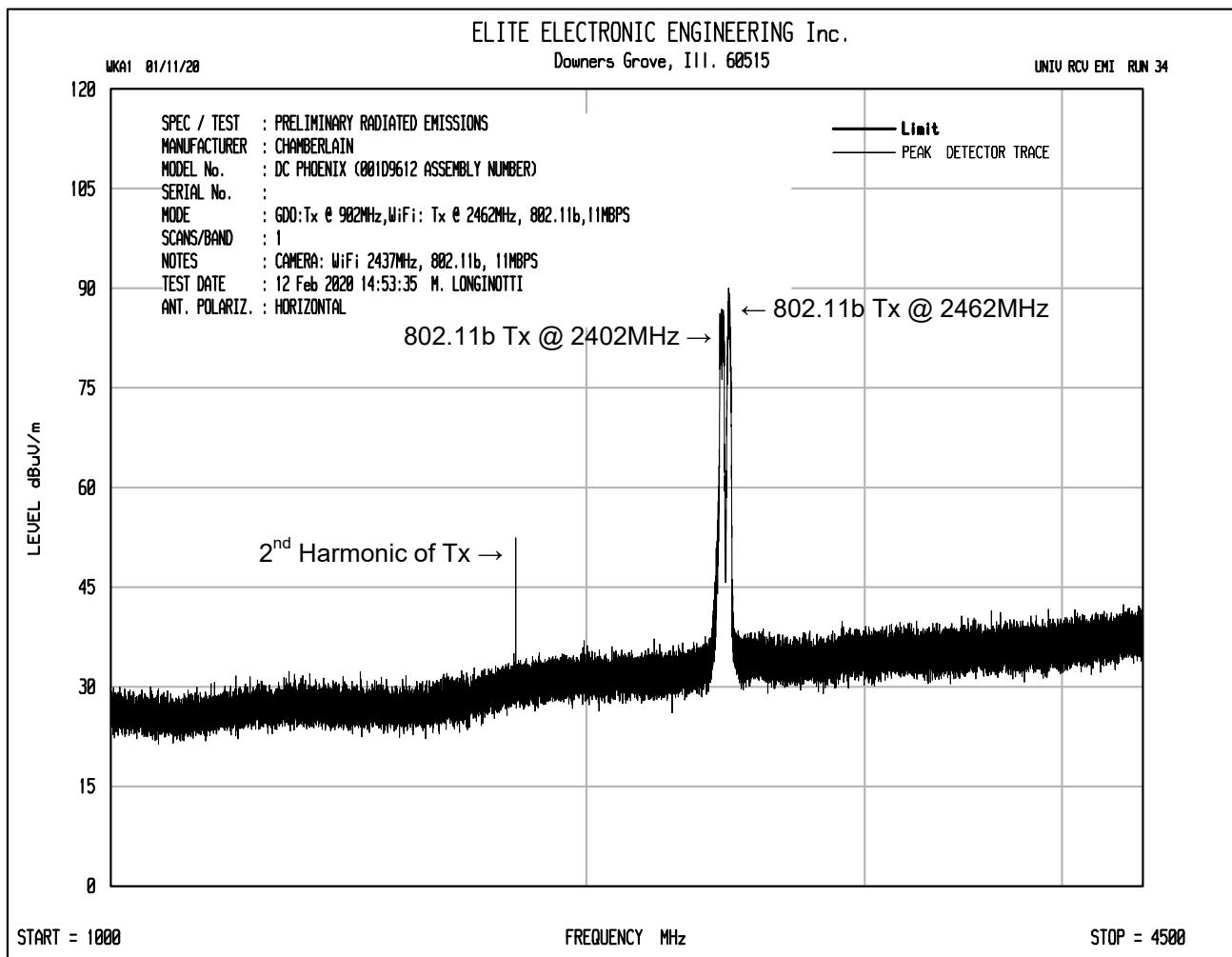
Note	Description
1	Plot shows the 6 th harmonic of 902.25MHz (5413.5MHz).



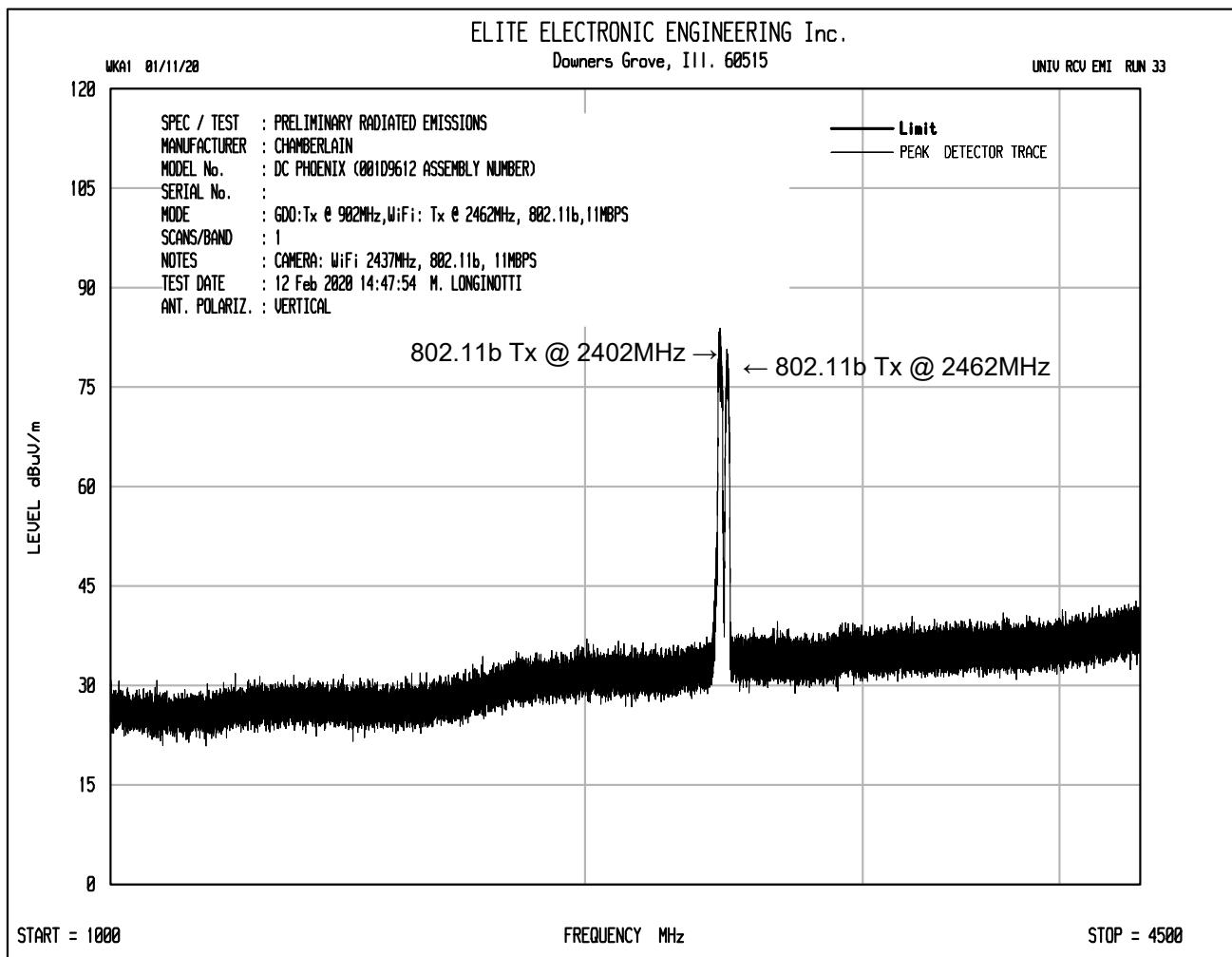
Note	Description
1	Plot shows emissions at 902.25MHz.



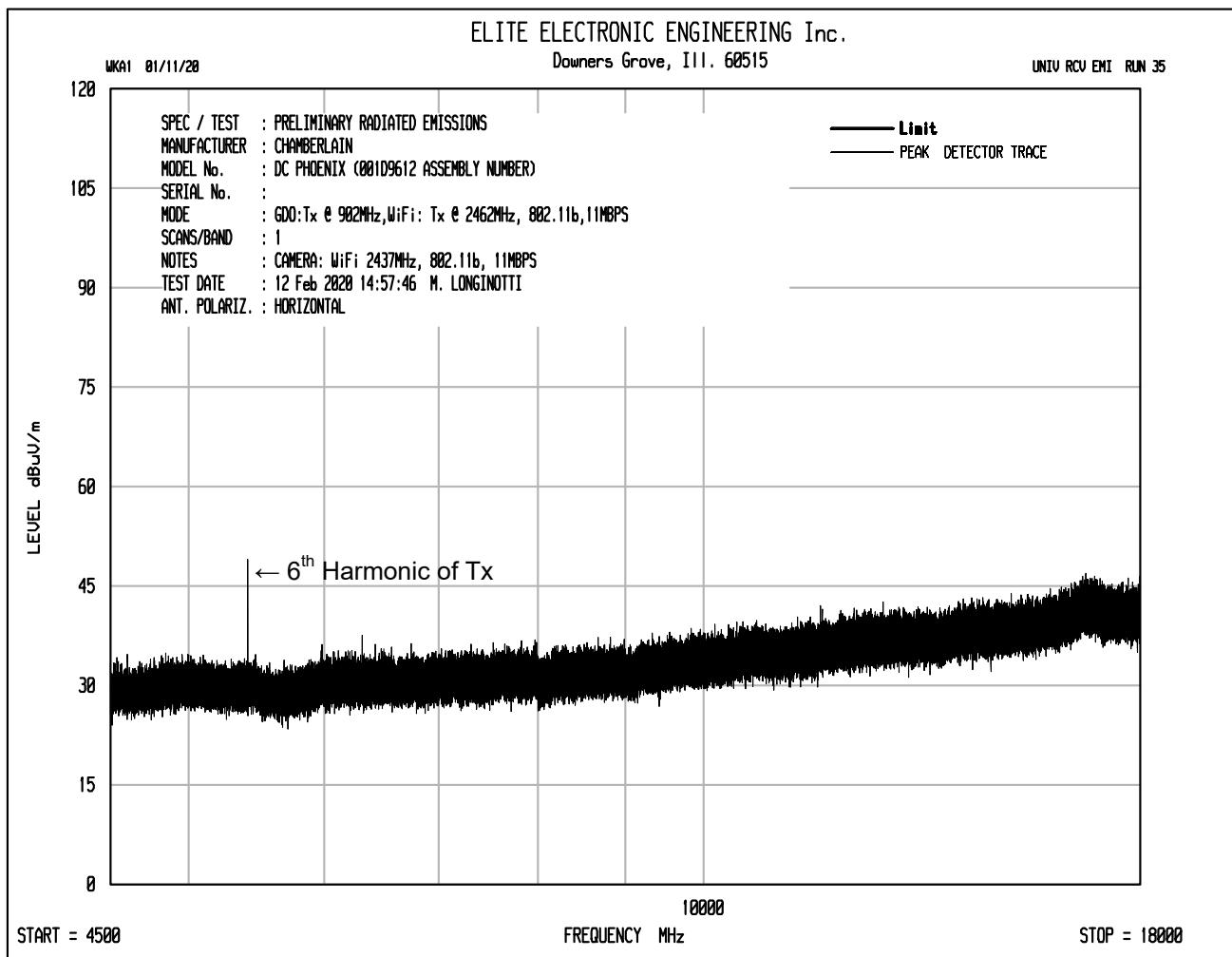
Note	Description
1	Plot shows emissions at 902.25MHz.



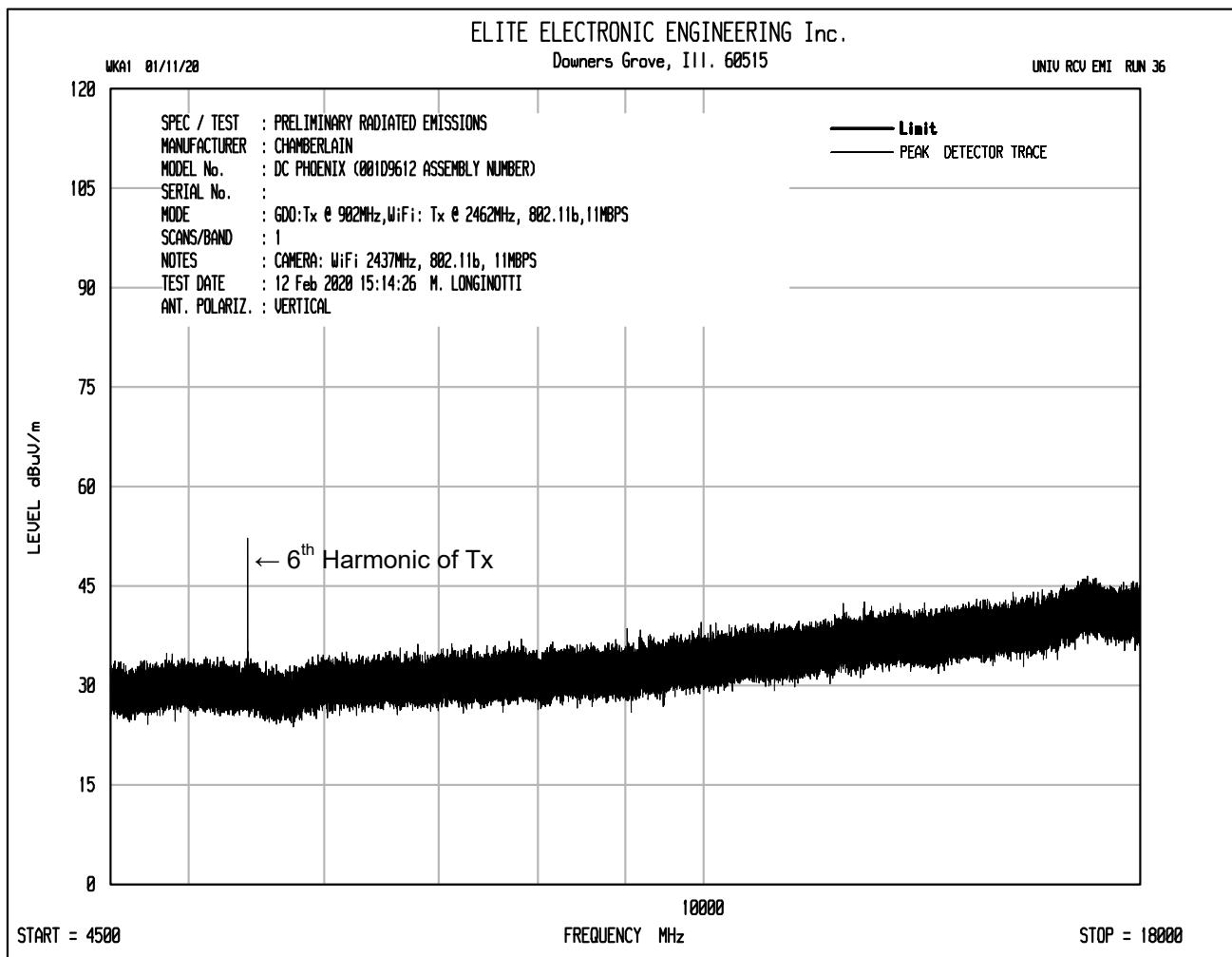
Note	Description
1	Plot shows the 2 nd harmonic of 902.25MHz (1804.5MHz).
2	Plot shows Wi-Fi emissions from the camera at 2402MHz.
3	Plot shows Wi-Fi emissions at 2462MHz.



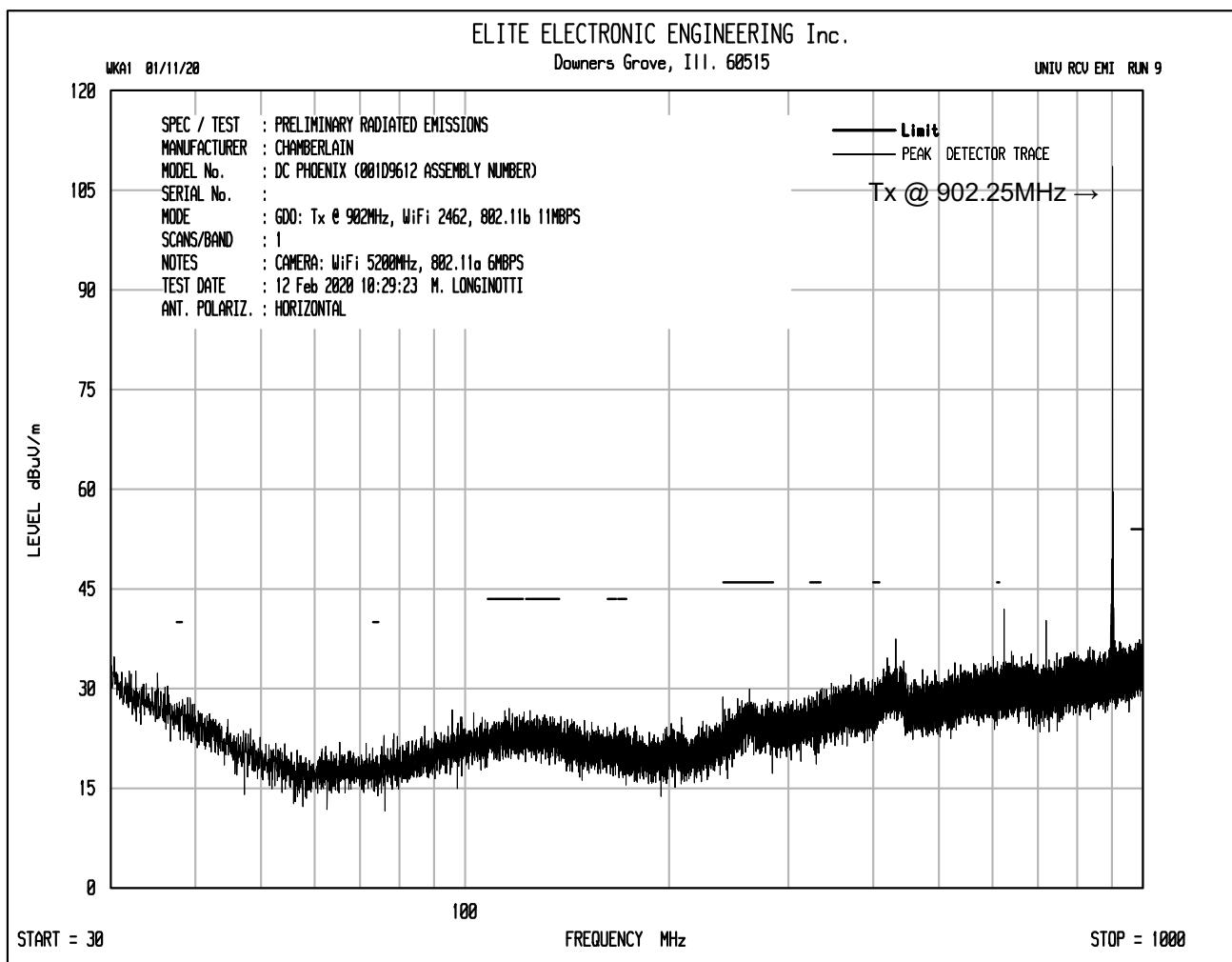
Note	Description
1	Plot shows Wi-Fi emissions from the camera at 2402MHz.
2	Plot shows Wi-Fi emissions at 2462MHz.



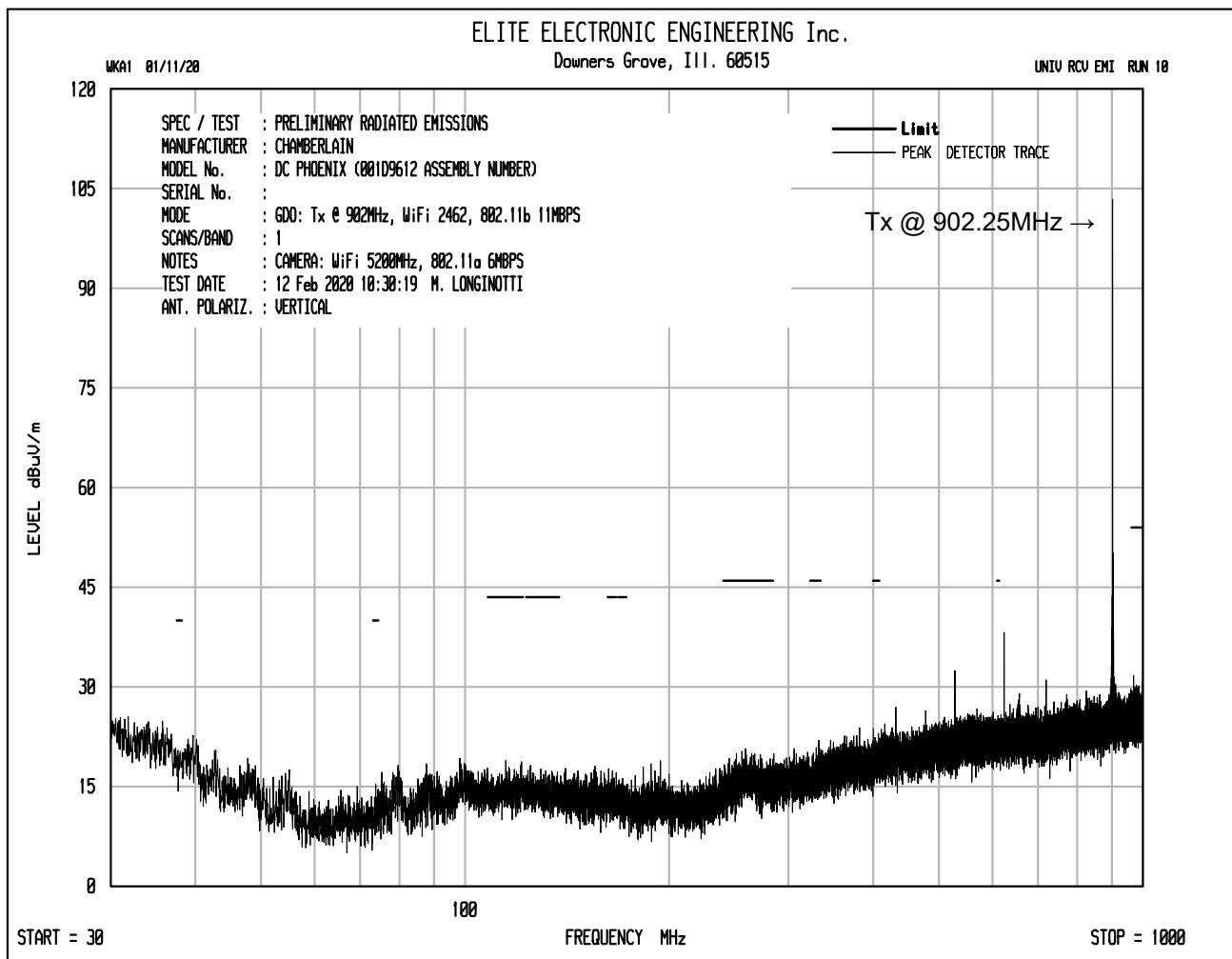
Note	Description
1	Plot shows the 6 th harmonic of 902.25MHz (5413.5MHz).



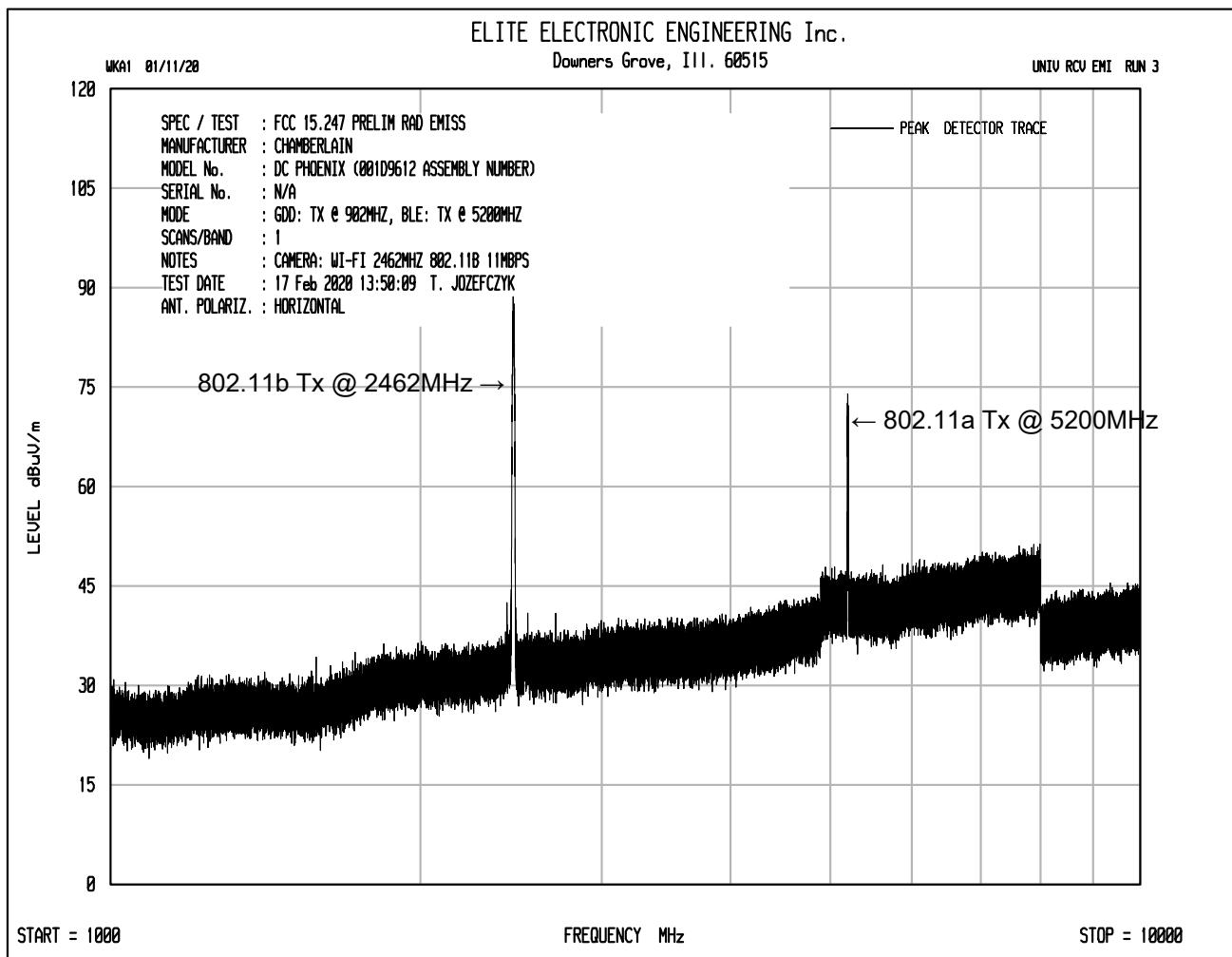
Note	Description
1	Plot shows the 6 th harmonic of 902.25MHz (5413.5MHz).



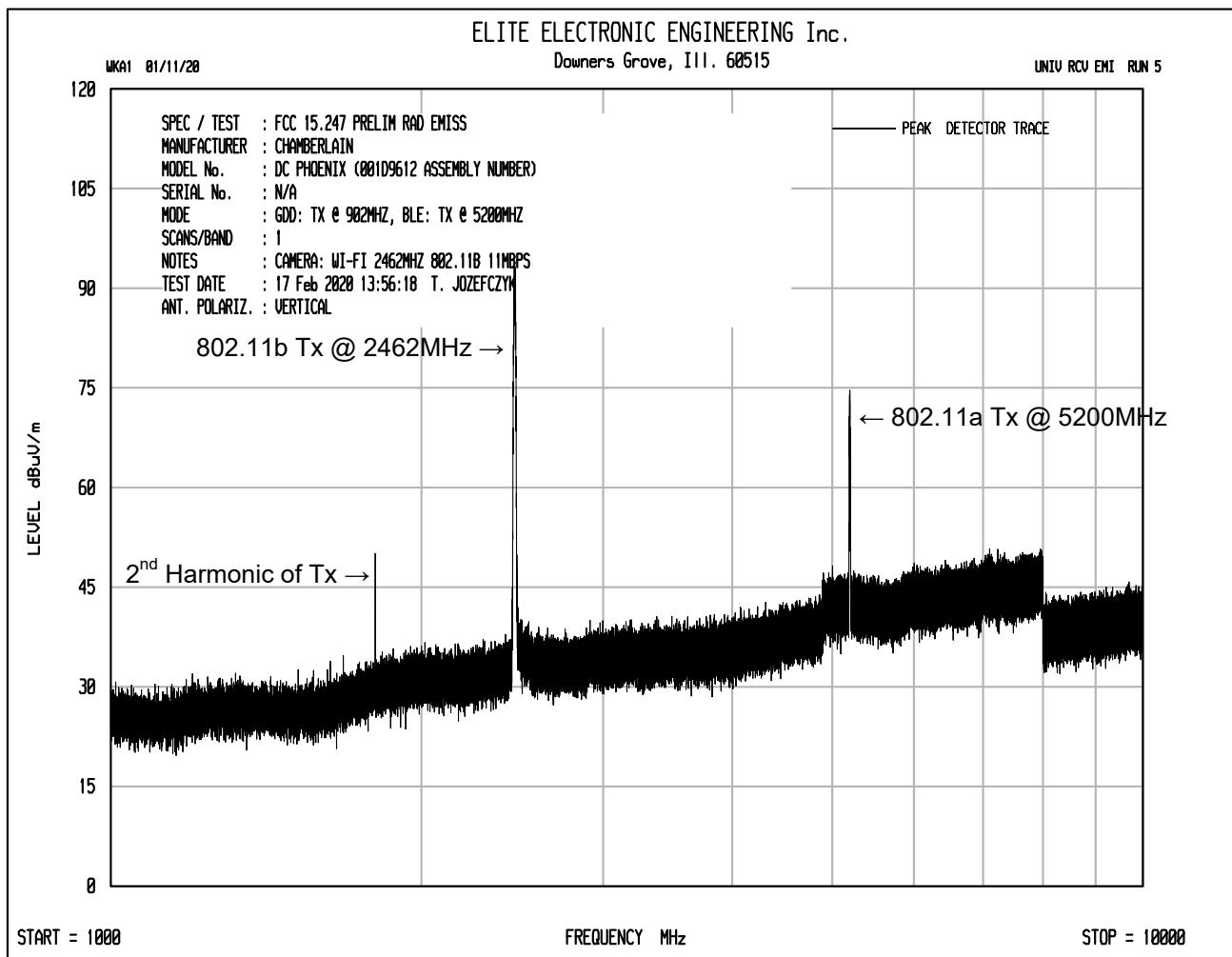
Note	Description
1	Plot shows emissions at 902.25MHz.



Note	Description
1	Plot shows emissions at 902.25MHz.



Note	Description
1	Plot shows Wi-Fi emissions at 2462MHz.
2	Plot shows Wi-Fi emissions from the camera at 5200MHz.



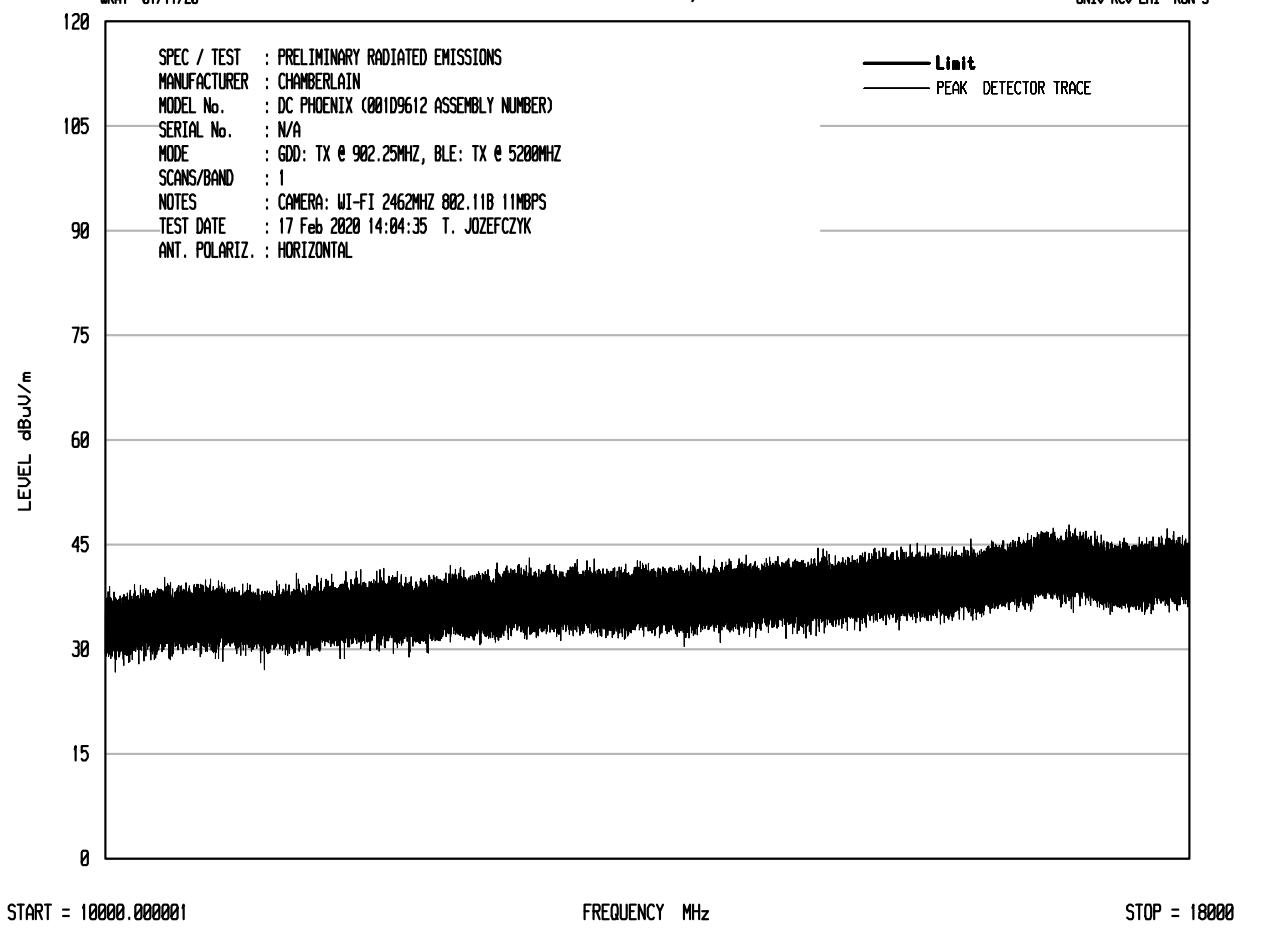
Note	Description
1	Plot shows the 2 nd harmonic of 902.25MHz (1804.5MHz).
2	Plot shows Wi-Fi emissions at 2462MHz.
3	Plot shows Wi-Fi emissions from the camera at 5200MHz.

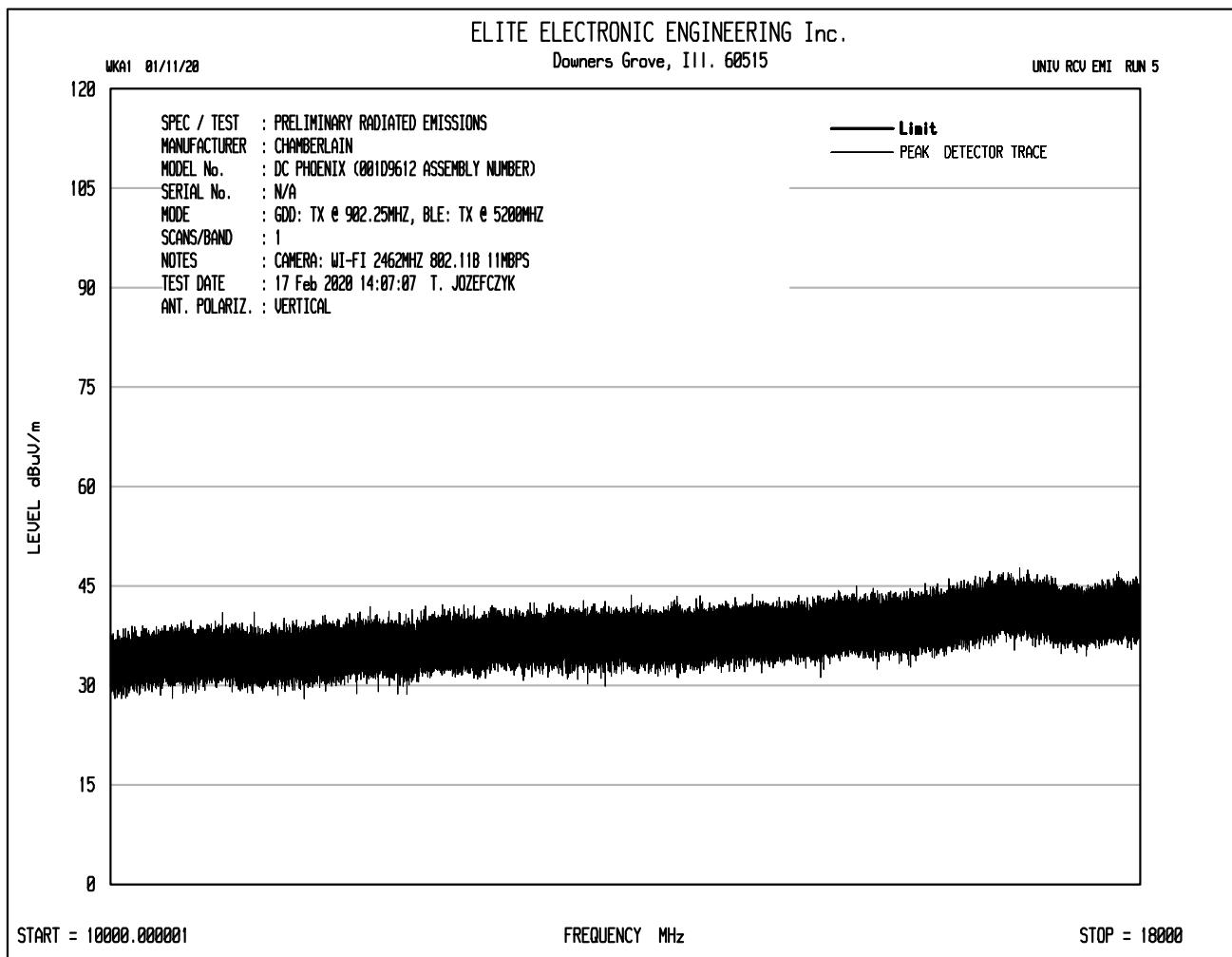
ELITE ELECTRONIC ENGINEERING Inc.

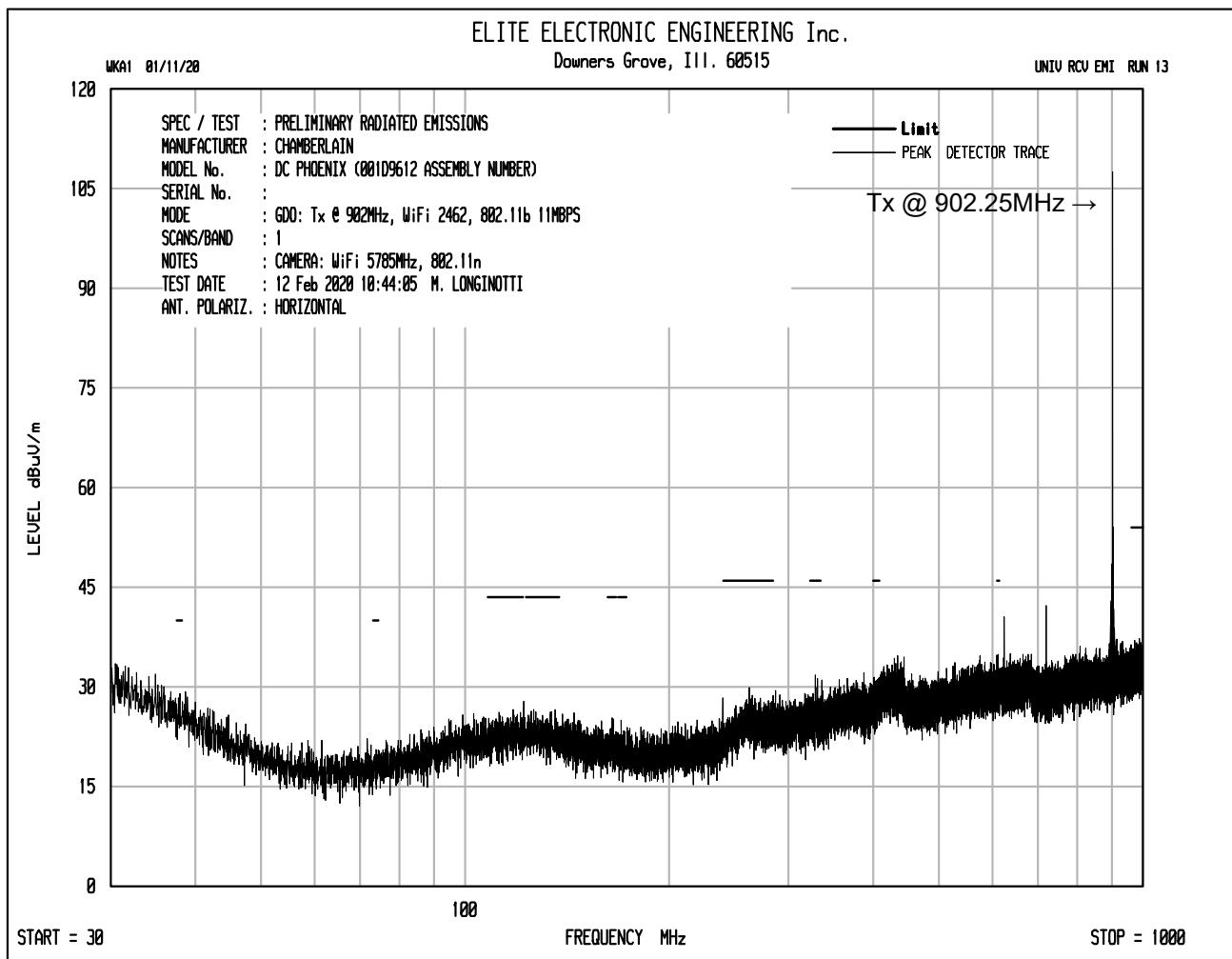
Downers Grove, Ill. 60515

UNIV RCV EMI RUN 3

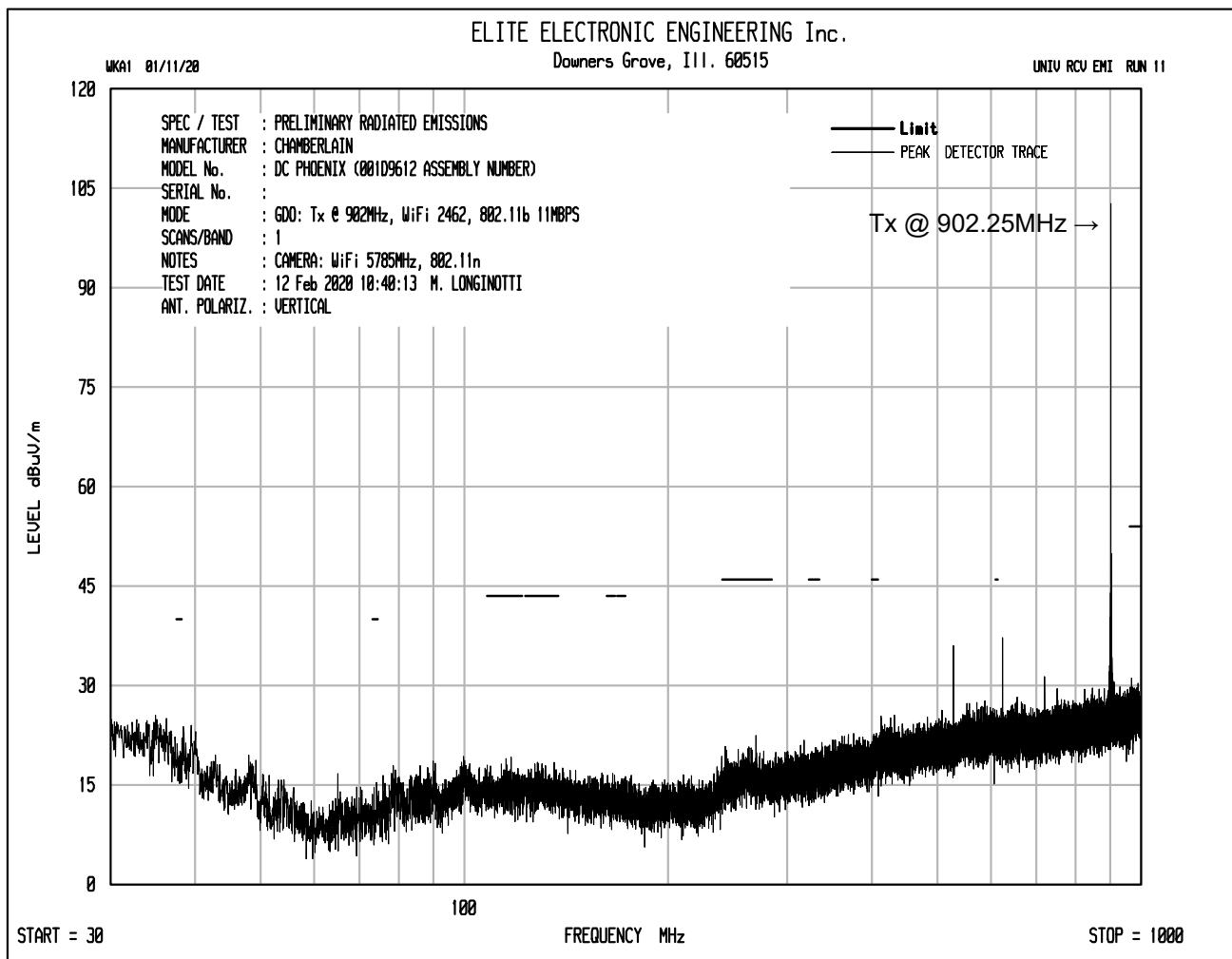
WKA1 01/11/28



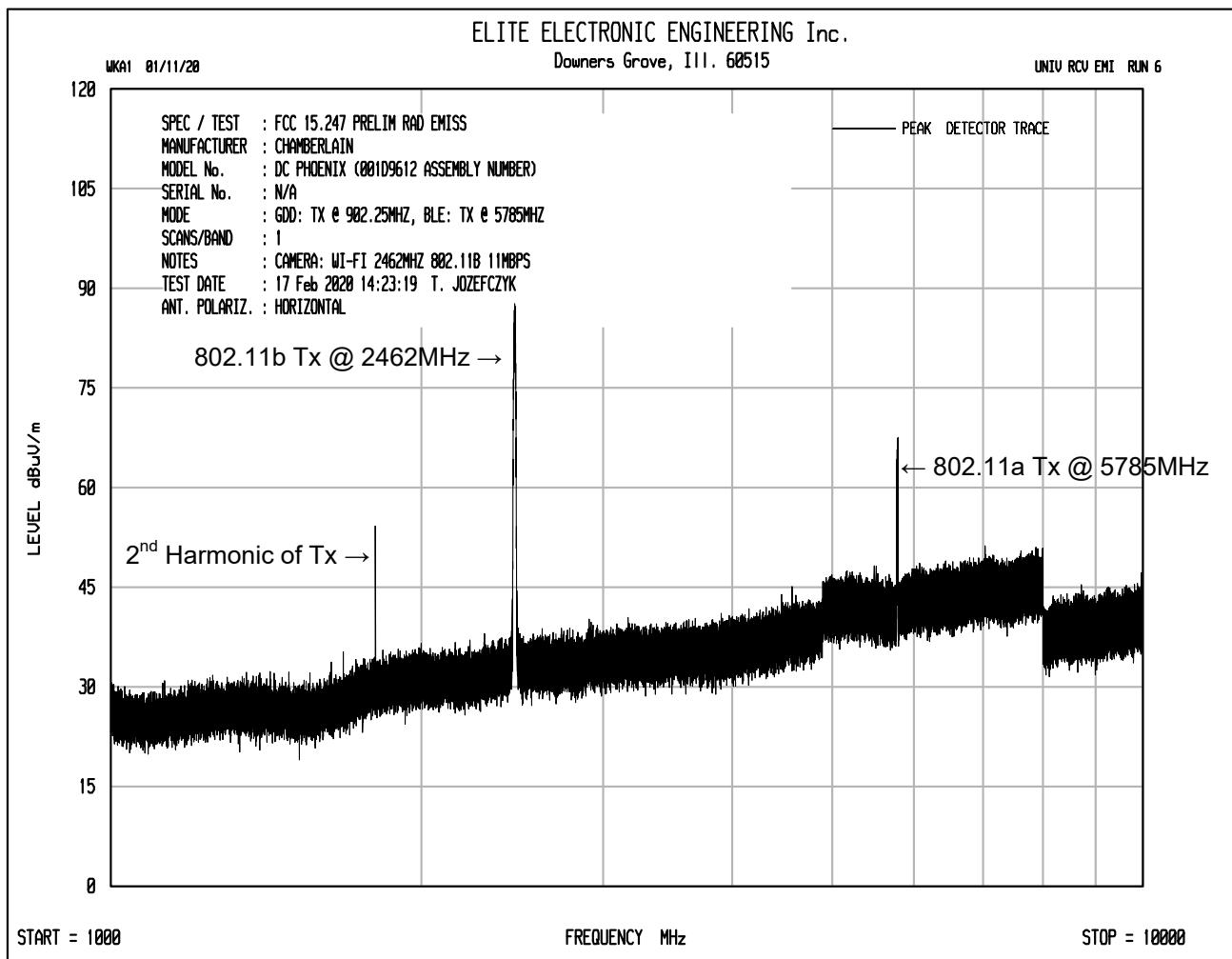




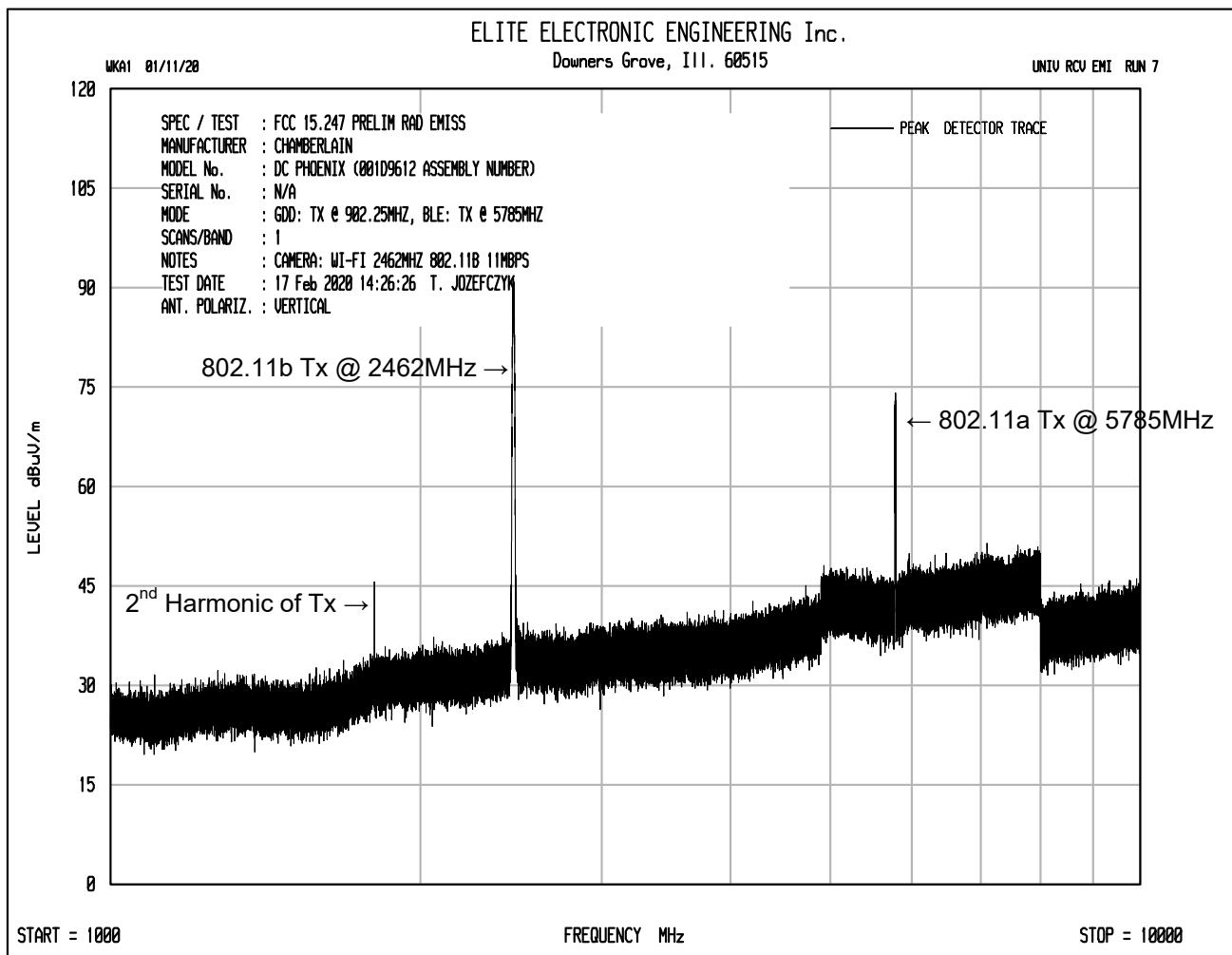
Note	Description
1	Plot shows emissions at 902.25MHz.



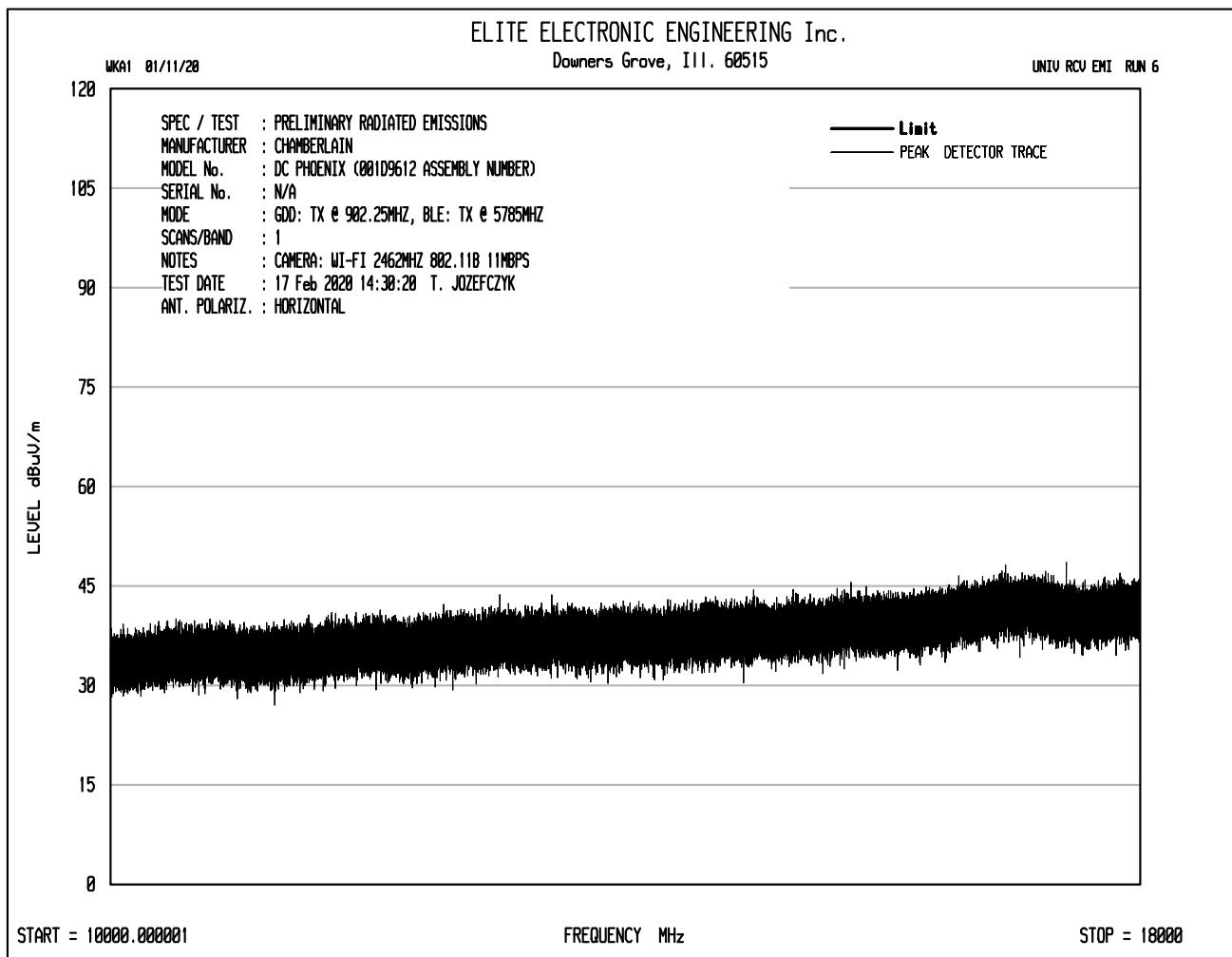
Note	Description
1	Plot shows emissions at 902.25MHz.

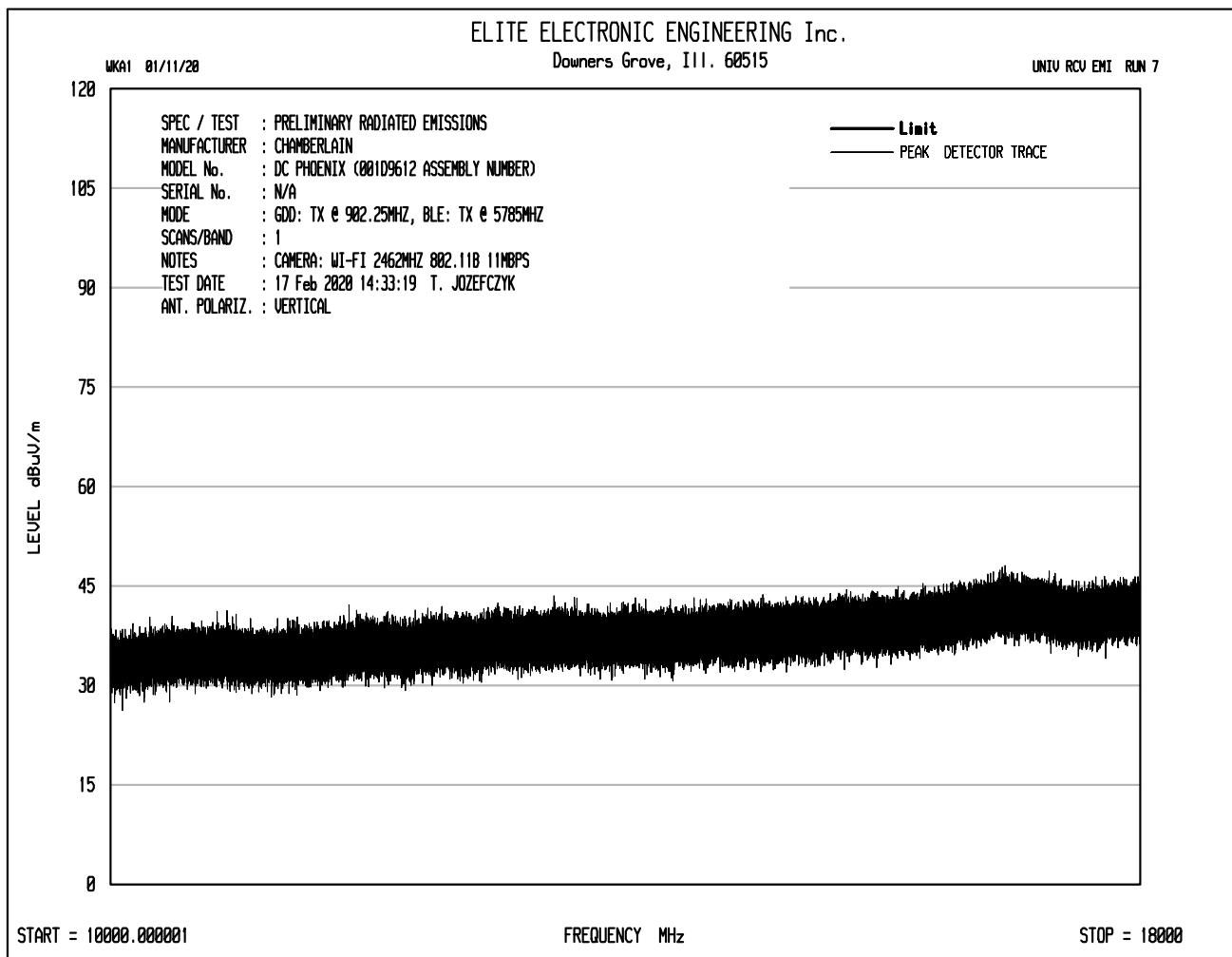


Note	Description
1	Plot shows the 2 nd harmonic of 902.25MHz (1804.5MHz).
2	Plot shows Wi-Fi emissions at 2462MHz.
3	Plot shows Wi-Fi emissions from the camera at 5785MHz.



Note	Description
1	Plot shows the 2 nd harmonic of 902.25MHz (1804.5MHz).
2	Plot shows Wi-Fi emissions at 2462MHz.
3	Plot shows Wi-Fi emissions from the camera at 5785MHz.





19. Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELITE ELECTRONIC ENGINEERING, INC.
1516 Centre Circle
Downers Grove, IL 60515
Robert Bugielski (QA Manager) Phone: 630 495 9770 ext. 168
Email: rbugielski@elitetest.com
Craig Fanning (EMC Lab Manager) Phone: 630 495 9770 ext. 112
Email: cfanning@elitetest.com
Stanley Dolecki (Automotive Team Leader) Phone: 630 495 9770 ext. 103
Email: sdolecki@elitetest.com
Website: www.elitetest.com

ELECTRICAL

Valid to: June 30, 2021

Certificate Number: 1786.01

In recognition of the successful completion of the A2LA Accreditation Program evaluation process, accreditation is granted to this laboratory to perform the following automotive electromagnetic compatibility and other electrical tests:

Test Technology:Test Method(s)¹:*Transient Immunity*

ISO 7637-2 (including emissions); ISO 7637-3;
ISO 16750-2:2012, Sections 4.6.3 and 4.6.4;
CS-11979, Section 6.4; CS.00054, Section 5.9;
EMC-CS-2009.1 (CI220); FMC1278 (CI220, CI221, CI222);
GMW 3097, Section 3.5;
SAE J1113-11; SAE J1113-12

Electrostatic Discharge (ESD)

ISO 10605 (2001, 2008);
CS-11979 Section 7.0; CS.00054, Section 5.10;
EMC-CS-2009.1 (CI 280); FMC1278 (CI280); SAE J1113-13;
GMW 3097 Section 3.6

Conducted Emissions

CISPR 25 (2002, 2008), Sections 6.2 and 6.3;
CISPR 25 (2016), Sections 6.3 and 6.4;
CS-11979, Section 5.1; CS.00054, Sections 5.6.1 and 5.6.2;
GMW 3097, Section 3.3.2;
EMC-CS-2009.1 (CE 420); FMC1278 (CE420, CE421)

Radiated Emissions Anechoic

CISPR 25 (2002, 2008), Section 6.4;
CISPR 25 (2016), Section 6.5;
CS-11979, Section 5.3; CS.00054, Section 5.6.3;
GMW 3097, Section 3.3.1;
EMC-CS-2009.1 (RE 310); FMC1278 (RE310)

Vehicle Radiated Emissions

CISPR 12; ICES-002

(A2LA Cert. No. 1786.01) 08/08/2019



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5202 Presidents Court, Suite 220 | Frederick, MD 21703-8515 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

<u>Test Technology:</u>	<u>Test Method(s)¹:</u>
<i>Bulk Current Injection (BCI)</i>	ISO 11452-4; CS-11979, Section 6.1; CS.00054, Section 5.8.1; GMW 3097, Section 3.4.1; SAE J1113-4; EMC-CS-2009.1 (RI112); FMC1278 (RI112)
<i>Bulk Current Injections (BCI) (Closed Loop Method)</i>	ISO 11452-4; SAE J1113-4
<i>Radiated Immunity Anechoic (Including Radar Pulse)</i>	ISO 11452-2; ISO 11452-5; CS-11979, Section 6.2; CS.00054, Section 5.8.2; GMW 3097, Section 3.4.2; EMC-CS-2009.1 (RI114); FMC1278 (RI114); SAE J1113-21
<i>Radiated Immunity Magnetic Field</i>	ISO 11452-8
<i>Radiated Immunity Reverberation</i>	ISO/IEC 61000-4-21; GMW 3097, Section 3.4.3; EMC-CS-2009.1 (RI114); FMC1278 (RI114); ISO 11452-11
<i>Radiated Immunity (Portable Transmitters)</i>	ISO 11452-9; EMC-CS-2009.1 (RI115); FMC1278 (RI115)
<i>Vehicle Radiated Immunity (ALSE)</i>	ISO 11451-2
<i>Electrical Loads</i>	ISO 16750-2, Sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.11, and 4.12
<i>Dielectric Withstand Voltage</i>	MIL-STD-202, Method 301; EIA-364-20D
<i>Insulation Resistance</i>	MIL-STD-202, Method 302; SAE/USCAR-2, Revision 6, Section 5.5.1; EIA-364-21D
<i>Contact Resistance</i>	MIL-STD-202, Method 307; SAE/USCAR-2, Revision 6, Section 5.3.1; EIA/ECA-364-23C; USCAR21-3 Section 4.5.3
<i>DC Resistance</i>	MIL-STD-202, Method 303
<i>Contact Chatter</i>	MIL-STD-202, Method 310; SAE/USCAR-2, Revision 6, Section 5.1.9
<i>Voltage Drop</i>	SAE/USCAR-2, Revision 6, Section 5.3.2; USCAR21-3 Section 4.5.6

<u>Test Technology:</u>	<u>Test Method(s)¹:</u>
Emissions Radiated and Conducted (3m Semi-anechoic chamber, up to 40 GHz)	47 CFR, FCC Part 15 B (using ANSI C63.4:2014); 47 CFR, FCC Part 18 (using FCC MP-5:1986); ICES-001; ICES-003; ICES-005; IEC/CISPR 11, Ed. 4.1 (2004-06); AS/NZS CISPR 11 (2004); IEC/CISPR 11 Ed 5 (2009-05) + A1 (2010); KN 11 (2008-5) with RRL Notice No. 2008-3 (May 20, 2008); CISPR 11; EN 55011; KN 11; CNS 13803 (1997, 2003); CISPR 14-1; EN 55014-1; AS/NZS CISPR 14.1; KN 14-1; IEC/CISPR 22 (1997); EN 55022 (1998) + A1(2000); EN 55022 (1998) + A1(2000) + A2(2003); EN 55022 (2006); IEC/CISPR 22 (2008-09); AS/NZS CISPR 22 (2004); AS/NZS CISPR 22, 3rd Edition (2006); KN 22 (up to 6 GHz); CNS 13438 (up to 6 GHz); VCCI V-3 (up to 6 GHz); CISPR 32; EN 55032; KN 32
Current Harmonics	IEC 61000-3-2; EN 61000-3-2; KN 61000-3-2
Flicker and Fluctuations	IEC 61000-3-3; EN 61000-3-3; KN 61000-3-3
Immunity Electrostatic Discharge	IEC 61000-4-2, Ed. 1.2 (2001); IEC 61000-4-2 (1995) + A1(1998) + A2(2000); EN 61000-4-2 (1995); EN 61000-4-2 (2009-05); KN 61000-4-2 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-2; EN 61000-4-2; KN 61000-4-2; IEEE C37.90.3 2001
Radiated Immunity	IEC 61000-4-3 (1995) + A1(1998) + A2(2000); IEC 61000-4-3, Ed. 3.0 (2006-02); IEC 61000-4-3, Ed. 3.2 (2010); KN 61000-4-3 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-3; EN 61000-4-3; KN 61000-4-3; IEEE C37.90.2 2004
Electrical Fast Transient/Burst	IEC 61000-4-4, Ed. 2.0 (2004-07); IEC 61000-4-4, Ed. 2.1 (2011); IEC 61000-4-4 (1995) + A1(2000) + A2(2001); KN 61000-4-4 (2008-5); RRL Notice No. 2008-5 (May 20, 2008); IEC 61000-4-4; EN 61000-4-4; KN 61000-4-4
Surge	IEC 61000-4-5 (1995) + A1(2000); IEC 61000-4-5, Ed 1.1 (2005-11); EN 61000-4-5 (1995) + A1(2001); KN 61000-4-5 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-5; EN 61000-4-5; KN 61000-4-5; IEEE C37.90.1 2012

<u>Test Technology:</u>	<u>Test Method(s)¹:</u>
Immunity (cont'd) Conducted Immunity	IEC 61000-4-6 (1996) + A1(2000); IEC 61000-4-6, Ed 2.0 (2006-05); IEC 61000-4-6 Ed. 3.0 (2008); KN 61000-4-6 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); EN 61000-4-6 (1996) + A1(2001); IEC 61000-4-6; EN 61000-4-6; KN 61000-4-6
Power Frequency Magnetic Field Immunity	IEC 61000-4-8 (1993) + A1(2000); IEC 61000-4-8 (2009); EN 61000-4-8 (1994) + A1(2000); KN 61000-4-8 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-8; EN 61000-4-8; KN 61000-4-8
Voltage Dips, Short Interrupts, and Line Voltage Variations	IEC 61000-4-11, Ed. 2 (2004-03); KN 61000-4-11 (2008-5); RRL Notice No. 2008-4 (May 20, 2008); IEC 61000-4-11; EN 61000-4-11; KN 61000-4-11
Ring Wave	IEC 61000-4-12, Ed. 2 (2006-09); EN 61000-4-12:2006; IEC 61000-4-12; EN 61000-4-12; KN 61000-4-12
Generic and Product Specific EMC Standards	IEC/EN 61000-6-1; AS/NZS 61000-6-1; KN 61000-6-1; IEC/EN 61000-6-2; AS/NZS 61000-6-2; KN 61000-6-2; IEC/EN 61000-6-3; AS/NZS 61000-6-3; KN 61000-6-3; IEC/EN 61000-6-4; AS/NZS 61000-6-4; KN 61000-6-4; EN 50130-4; IEC 61326-1; IEC/CISPR 14-2; EN 55014-2; AS/NZS CISPR 14.2; KN 14-2; IEC/CISPR 24; AS/NZS CISPR 24; EN 55024; KN 24; IEC 60601-1-2; JIS T0601-1-2
<i>TxRx EMC Requirements</i>	EN 301 489-1; EN 301 489-3; EN 301 489-9; EN 301 489-17; EN 301 489-19; EN 301 489-52;
<i>European Radio Test Standards</i>	ETSI EN 300 086-1; ETSI EN 300 086-2; ETSI EN 300 113-1; ETSI EN 300 113-2; ETSI EN 300 220-1; ETSI EN 300 220-2; ETSI EN 300 330-1; ETSI EN 300 330-2; ETSI EN 300 440-1; ETSI EN 300 440-2; ETSI EN 300 422-1; ETSI EN 300 422-2; ETSI EN 300 328; ETSI EN 301 893; ETSI EN 301 511; ETSI EN 301 908-1; ETSI EN 908-2; ETSI EN 908-13; ETSI EN 301 413; ETSI EN 302 502

Test Technology:
Canadian Radio Tests
Test Method(s)¹:

RSS-102 (RF Exposure Evaluation only); RSS-111; RSS-112; RSS-117; RSS-119; RSS-123; RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133; RSS-134; RSS-135; RSS-137; RSS-139; RSS-140; RSS-141; RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192; RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210; RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222; RSS-236; RSS-238; RSS-243; RSS-244; RSS-246; RSS-247; RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-GEN

Mexico Radio Tests

IFT-008; NOM-208-SCFI

Japan Radio Tests

Radio Law No. 131, Ordinance of MPT No. 37, 1981, MIC Notification No. 88:2004, Table No. 22-11; ARIB STD-T66, Regulation 18

Taiwan Radio Tests

LP-0002

Australia/New Zealand Radio Tests

AS/NZS 4268; Radiocommunications (Short Range Devices) Standard (2014)

Hong Kong Radio Tests

HKCA 1039 Issue 6; HKCA 1042; HKCA 1033 Issue 7; HKCA 1061; HKCA 1008; HKCA 1043; HKCA 1057; HKCA 1073

Korean Radio Test Standards

KN 301 489-1; KN 301 489-3; KN 301 489-9; KN 301 489-17; KN 301 489-52

*Unlicensed Radio Frequency Devices
(3 Meter Semi-Anechoic Room)*

47 CFR FCC Part 15C, 15D, 15E, 15F, 15G, 15H (using ANSI C63.10:2013, ANSI C63.17:2013 and FCC KDB 905462 D02 (v02))

Licensed Radio Service Equipment

47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95, 96, 97, 101; ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015;

*Electrical Measurements and
Simulation*
AC Voltage / Current

FAA AC 150/5345-10H

(1mV to 5kV) 60 Hz
(0.1V to 250V) up to 500 MHz
(1µA to 150A) 60 Hz

FAA AC 150/5345-43J

FAA AC 150/5345-44K

FAA AC 150/5345-46E

FAA AC 150/5345-47C

FAA EB 67D

DC Voltage / Current

(1mV to 15-kV) / (1µA to 10A)

Power Factor / Efficiency / Crest Factor

(Power to 30kW)

Resistance

(1mΩ to 4000MΩ)

Surge

(Up to 10 kV / 5 kA) (Combination Wave and Ring Wave)

(A2LA Cert. No. 1786.01) 08/08/2019



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On the following products and materials:

Telecommunications Terminal Equipment (TTE), Radio Equipment, Network Equipment, Information Technology Equipment (ITE), Automotive Electronic Equipment, Automotive Hybrid Electronic Devices, Maritime Navigation and Radio Communication Equipment and Systems, Vehicles, Boats and Internal Combustion Engine Driven Devices, Automotive, Aviation, and General Lighting Products, Medical Electrical Equipment, Motors, Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment, Household Appliances, Electric Tools, Low-voltage Switchgear and Control gear, Programmable Controllers, Electrical Equipment for Measurement, Control and Laboratory Use, Base Materials, Power and Data Transmission Cables and Connectors

¹ When the date, revision or edition of a test method standard is not identified on the scope of accreditation, the laboratory is expected to be using the current version within one year of the date of publication, per part C, Section 1 of A2LA R101 - *General Requirements - Accreditation of ISO-IEC 17025 Laboratories*.

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1²

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
<u>Unintentional Radiators</u>		
Part 15B	ANSI C63.4:2014	40000
<u>Industrial, Scientific, and Medical Equipment</u>		
Part 18	FCC MP-5 (February 1986)	40000
<u>Intentional Radiators</u>		
Part 15C	ANSI C63.10:2013	40000
<u>Unlicensed Personal Communication Systems Devices</u>		
Part 15D	ANSI C63.17:2013	40000
<u>U-NIII without DFS Intentional Radiators</u>		
Part 15E	ANSI C63.10:2013	40000
<u>U-NIII with DFS Intentional Radiators</u>		
Part 15E	FCC KDB 905462 D02 (v02)	40000
<u>UWB Intentional Radiators</u>		
Part 15F	ANSI C63.10:2013	40000
<u>BPL Intentional Radiators</u>		
Part 15G	ANSI C63.10:2013	40000
<u>White Space Device Intentional Radiators</u>		
Part 15H	ANSI C63.10:2013	40000

Testing Activities Performed in Support of FCC Declaration of Conformity and Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1²

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
<u>Commercial Mobile Services (FCC Licensed Radio Service Equipment)</u>		
Parts 22 (cellular), 24, 25 (below 3 GHz), and 27	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
<u>General Mobile Radio Services (FCC Licensed Radio Service Equipment)</u>		
Parts 22 (non-cellular), 90 (below 3 GHz), 95, 97, and 101 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
<u>Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment)</u>		
Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
<u>Maritime and Aviation Radio Services</u>		
Parts 80 and 87	ANSI/TIA-603-E; ANSI C63.26:2015	40000
<u>Microwave and Millimeter Bands Radio Services</u>		
Parts 25, 30, 74, 90 (above 3 GHz), 97 (above 3 GHz), and 101	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
<u>Broadcast Radio Services</u>		
Parts 73 and 74 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
<u>Signal Boosters</u>		
Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters)	ANSI C63.26:2015	40000
Section 90.219		

²Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (<https://apps.fcc.gov/oetcf/eas/>) for a listing of FCC approved laboratories.



Accredited Laboratory

A2LA has accredited

ELITE ELECTRONIC ENGINEERING INC.

Downers Grove, IL

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to Joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 8th day of August 2019.



Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1786.01
Valid to June 30, 2021

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.