APPLIED TEST LAB INC.

RADIATED AND CONDUCTED EMISSION TEST REPORT FCC PART 15 SUBPART B AND C AND INDUSTRY CANADA ICES-003

Limits Applied:Class B

Report#:B002E022-61

Manufacturer:Blackline Safety

Model:G7C-NA2

Serial Number:3571000055

EUT Received Date:2022-10-20

Test Start Date:2022-10-20

Test Completion Date:2022-10-25

Test Result: PASS

Report Issue Date:2023-03-23

Tested by	Approved by:
Jaeheon Yun, Test specialist	Adiseshu Nyshadham, Quality Prime
JaeHeon	AdiseshuN

Report Issued to	Report Issued by
Blackline Safety Unit 100, 803 24 Avenue SE Calgary, AB Canada, T2G 1P5	**Applied Test Lab Inc.** Unit 4174-3961 52 Ave NE Calgary, AB, T3J 0J8

Report Revision History

Rev	Description of Change	Date
Draft01	Initial	2022-10-26
Release	Title page and information(Page 1, 9, 19, 45)	2023-03-23

This report contains **47** pages

LABELING INFORMATION - FCC

Products subject to authorization under Verification procedures shall be labeled as follows: "This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation."

Where a device is constructed in two or more sections connected by wires and marketed together, the statement is required to be affixed only to the main control unit. When the device is so small or for such use that it is not practicable to place the statement on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

INFORMATION TO THE USER - FCC

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class A digital device or peripheral, the instructions furnished in the user manual shall include the following or similar statement, placed in a prominent location in the text of the manual:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

For a Class B digital device or peripheral, the instructions furnished in the user manual shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio
- TV technician for help

LABELING INFORMATION - Industry Canada

The manufacturer, importer or supplier shall meet the labeling requirements set out in this section for every ITE unit:

- Prior to marketing in Canada, for ITE manufactured in Canada, and
- Prior to importation into Canada, for imported ITE

The presence of the label on the ITE represents the manufacturer's or importer's Self-Declaration of Compliance (SDoC) to Industry Canada ICES-003. Each unit of an ITE model shall bear a label indicating the model's compliance with ICES-003.
The label shall be permanently affixed to the ITE or displayed electronically and its text must be clearly legible. When the dimension of the device is too small or it is otherwise not practical to place the label on the ITE, the label shall be placed in a prominent location in the user manual supplied with the ITE.

The user manual may be in an electronic format and must be readily available.

Industry Canada ICES-003 Compliance Label:
CAN ICES-3 (*)/NMB-3(*) (Insert either "A" or "B" but not both to identify the applicable Class of ITE.)

INFORMATION TO THE USER - Industry Canada

For a Class A/B digital device, the instructions furnished in the user manual shall include the following or similar statement, placed in English and French, in a prominent location in the text of the manual:
This Class A/B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.

Table of Contents

1.0 General

1.1 Purpose

The purpose of this report is to document conformance with FCC Part 15, ICES-003 and to detail the results of testing performed on the sample Model: **G7C-NA2** manufactured by **Blackline Safety**. The test sample was received in good condition. Testing began on **2022-10-20** and was completed on **2022-10-25**.

1.2 Relevant Standards and References

One or more of the following standards were used to evaluate the EUT:

1. **ANSI C63.4-2014:** American National Standard for Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9 kHz to 40 GHz
2. **US Code of Federal Regulations (CFR):** Part 15 Subpart B Title 47, Radio Frequency Devices - Unintentional Radiators
3. **US Code of Federal Regulations (CFR):** Part 15 Subpart C Title 47, Radio Frequency Devices - Intentional Radiators
4. **Industry Canada ICES-003 Issue 7:** Information Technology Equipment (ITE) - Limits and methods of measurement
5. **RSS-Gen: Issue 5 2021-02:** General Requirement for Compliance of Radio Apparatus
6. **CISPR 16-1-1 (Edition 2.2) 2007-10:** Specification for radio disturbance and immunity measuring apparatus and methods

1.3 Performance Requirement

FCC Part 15, ICES-003 prescribes two Classes of limits of radio noise for ITE: Class A limits for non-residential operation and the more stringent Class B limits for residential operation. FCC Part15.209, FCC Part15.207 and RSS-Gen prescribes limits of radio noise for intentional radiators. Only ITE intended strictly for non-residential use in commercial, industrial or business environments, and whose design or other characteristics strongly preclude the possibility of its use in a residential environment, shall be permitted to comply with the less stringent Class A limits.

An intentional or unintentional radiator shall be constructed in accordance with good engineering design and manufacturing practice. Emanations from the device shall be suppressed as much as practicable, but in no case shall the emanations exceed the levels specified in these rules.

Except as follows, an intentional or unintentional radiator must be constructed such that the adjustments of any control that is readily accessible by or intended to be accessible to the user will not cause operation of the device in violation of the regulations. Intentional radiator equipment shall comply with the applicable standards at the control adjustment that is employed. The measurement report used in support of an application for Certification and the user instructions for intentional radiator equipment shall clearly specify the user-or installer-control settings that are required for conformance with these regulations.

Parties responsible for equipment compliance should note that the limits specified in this part will not prevent harmful interference under all circumstances. Since the operators of part 15 devices are required to cease operation should harmful interference occur to authorized users of the radio frequency spectrum, the parties responsible for equipment compliance are encouraged to employ the minimum field strength necessary for communications to provide greater attenuation of unwanted emissions than required by these regulations, and to advise the user as to how to resolve harmful interference problems

The EUT is marketed as **Class B** equipment and must comply with the **Class B** emission limits.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increase emission levels should be checked and verified to ensure continuous compliance has been maintained (i.e., printed circuit board layout changes, changes to filter performance, power supply changes, I/O cable and interface changes, critical component changes etc.)

1.4 Measurement uncertainty

Test case	Measurement Uncertainty
Conducted Emission	+/- 1.50dB
Radiated Emission	+/- 3.44 dB

[NOTE] The measurement uncertainties are evaluated for tests performed on the EUT as specified in CISPR 16-4-2.
The measurement uncertainties reported above relates to the measurement setups and procedures.
It does not take into account EUT performance variations from sample to sample.

1.5 Test Results Summary

Test Case	Test Type	Basic Standard	Limit Applied	Modifications	Result
6.1	Conducted Emission	FCC Part 15, ICES-003	**Class B**	No	PASS
6.2	Radiated Emission	FCC Part 15, ICES-003	**Class B**	No	PASS
6.3-6.5	Radiated Emission	FCC Part 15.209, RSS-Gen	**-**	No	PASS

Note:
The above judgment is only based on the measurement data and does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.

The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the laboratory.

The compliance of the EUT is more probable than non-compliance in case that the margin is less than the measurement uncertainty in the laboratory.

1.6 Test Facility Information

Name	Applied Test Lab Inc.		
Address	Unit 4174-3961 52nd Avenue NE, Calgary, Alberta, T3J 0J8, Canada		
Telephone	403 590 8701	**Fax**	403 590 8570
Email	emctesting@appliedtestlab.com	**Website**	www.appliedtestlab.com
FCC Registration	950875	**IC Recognition**	10988A

1.7 Client Information

Name	**Blackline Safety**		
Address	Unit 100, 803 24 Avenue SE | Calgary, AB T2G 1P5		
Telephone	587 325 9764	**Website**	www.blacklinesafety.com
Contact Name	Scott Jacobsen	**Contact Email**	sjacobsen@blacklinesafety.com

2.0 Test Sample Information

The **G7C-NA2** was only operated and exercised in the mode(s) and configuration(s) described in this report. All inputs and outputs to and from support equipment associated with the **G7C-NA2** were provided or simulated under the direction and responsibility of **Blackline Safety**. A description of these signals and their provision is included in Appendix A.

2.1 Equipment Under Test (EUT)

Product Description	G7C-NA2 (LARA-R6001D cellular module)
Manufacturer	**Blackline Safety**
Trade Name	G7C-NA2
Model Number	**G7C-NA2**
Serial Number	**3571000055**
Model discrepancy/Variations	N/A
FCC ID	W77G7C2, Contains XPYUBX21BE01
IC ID	8255A-G7C2, Contains 8595A-UBX21BE01
Power Supply and Requirements	Charging power supply Input: 100-240VAC, 50-60Hz 0.3A Output: 5VDC 1A
Hardware Version	09
Firmware Version	3.465R2_LGR
Software Version	N/A
Antenna Type	ceramic chip, LDS trace
Antenna Connection Type	spring
Operating Frequency	699MHz, 2441MHz
Number of Channels	1
Modulation Type	16-QAM
Modulation Technology	N/A
Setup	N/A
Other Information	N/A
Product Manufacturing Status	☐Production Unit ☒Pre-Production Unit

2.2 Support Equipment and Details

☒**Applicable**

Manufacturer	Description	Model No.	Serial Number	Other Info
-	Power Supply	SAW06D-050-1000UB	-	-

2.3 I/O Ports and Details

☒**Applicable**

Port Type	Description	Filter Info	Shielding Info	Other Info
USB	USB B type	N/A	Shielded	-

2.4 I/O Cable Descriptions

☒**Applicable**

Cable Description	Length (m)	Port From	Port To	Cable Type	Remarks
USB cable	1	EUT	Power outlet	Unshielded	-

3.0 Test Facilities

Laboratory Location

The radiated and conducted emission test sites are located at the following address:

Applied Test Lab,
Unit 4174, 3961-52 Ave N.E., Calgary, AB T3J 0J8

Laboratory Accreditation/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site and Conducted Emission Site have been fully described, submitted to, and accepted by the FCC and Industry Canada for testing Interference by information technology equipment. In addition, ATL has implemented an interim in-house quality system which is based on the ISO 17025 standard and is actively pursuing to achieve its accreditation. The following certification numbers have been issued in recognition of the certifications:

FCC Registration Number: **950875**
Industry Canada Lab Code: **IC 10988A**

Country	Agency	Accreditation/Certification	LOGO
USA	FCC	3 (m) Semi-Anechoic Chamber to perform FCC Part 15/18 measurements	
Canada	Industry Canada	3 (m) Semi-Anechoic Chamber to perform ICES-004 and RSS measurements	Industry Canada Industrie Canada

Note: Unless otherwise specified, ATL performs the tests using standard test methods to evaluate the EUT for compliance to the defined International standards. However, the report is not to be used to claim compliance, certification or endorsement by FCC or Industry Canada or any other government agency unless specifically submitted to such agency for such purpose.

3.1 Semi-Anechoic Chamber Test Site Description

The Semi-Anechoic Chamber Test Site consists of a 6.24 x 9.144 x 5.79 (m) shielded enclosure. The chamber is lined with SAMWAH Ferrite Grid Absorber, model number SN-20. The ferrite tile grid is 100 x 100x 6.7 (mm) thick and weighs approximately 200 (grams). These tiles are mounted on steel panels and installed directly on the inner walls of the chamber. Inner side Wall is lined by 600H Foam Absorber with White Cap. Chamber is illuminated by set of 12 Incandescent Bulbs.

The turntable is 198 (cm) in diameter and is located 160 (cm) from the back wall of the chamber. The chamber is grounded via Utility Ground installed at the side of the back East wall, it is bound to the Chamber ground Stud using 1/2" copper braided cable.

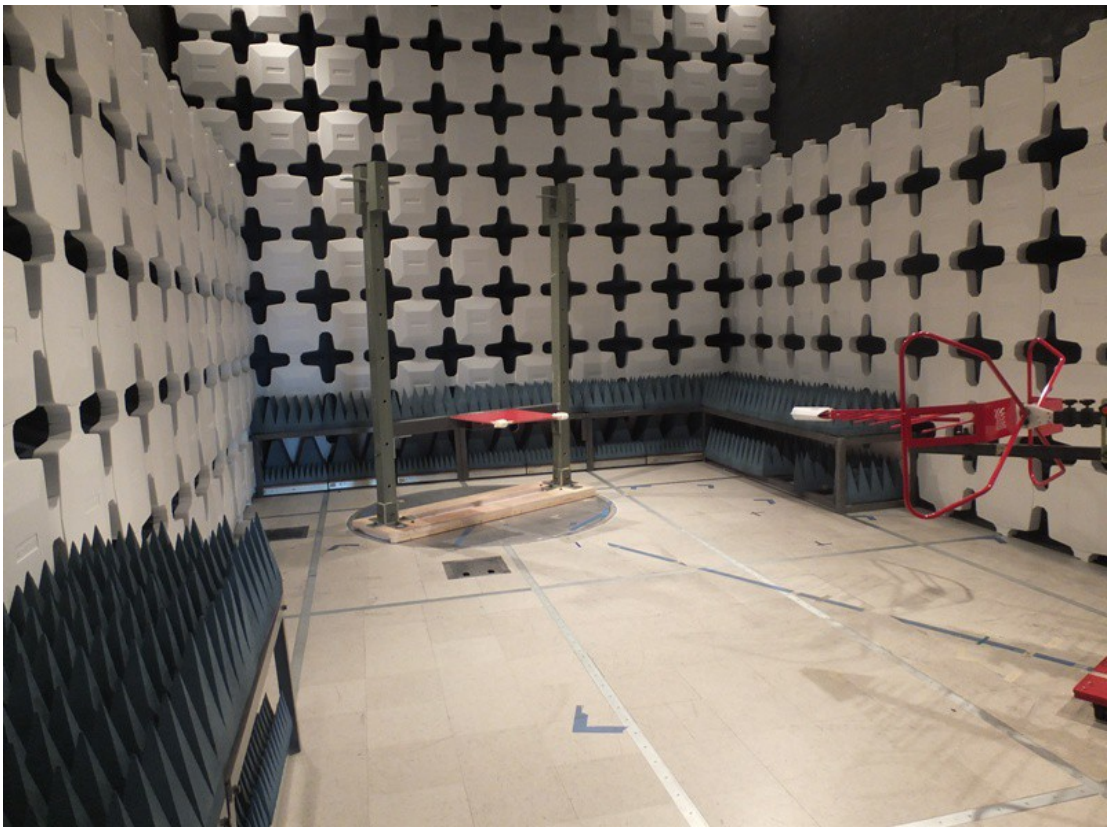

Figure 3.1 - Test Facility (Setup for 30MHz - 1000MHz)

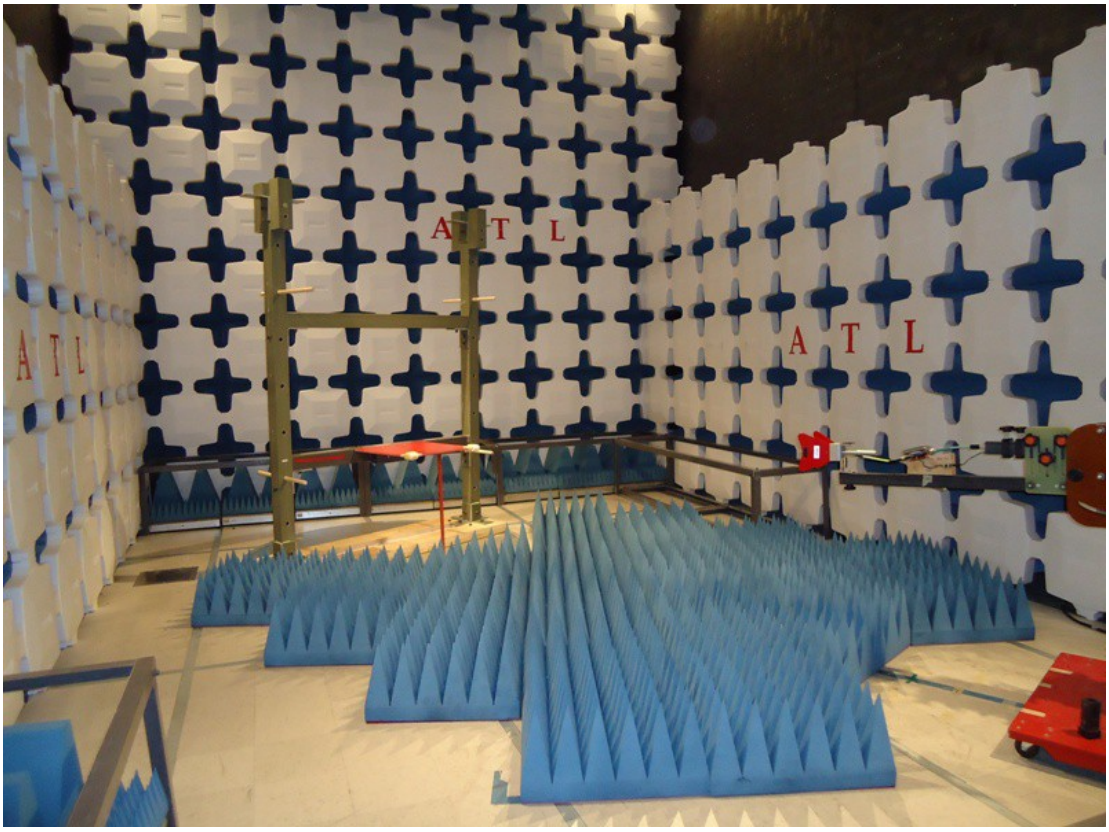

Figure 3.2 - Test Facility (Setup for above 1000MHz)

The turntable is all aluminum, flush mounted table installed in an all steel frame. The table is remotely operated from the control area located outside the Semi Anechoic Chamber. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

3.2 A diagram of the Semi-Anechoic Chamber Test Site

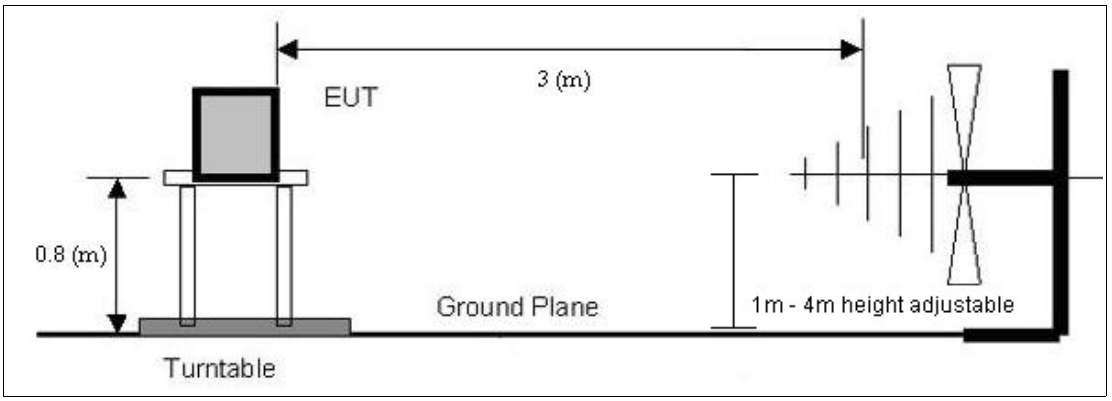

Figure 3.3 - Semi- Anechoic chamber diagram(30MHz - 1000MHz)

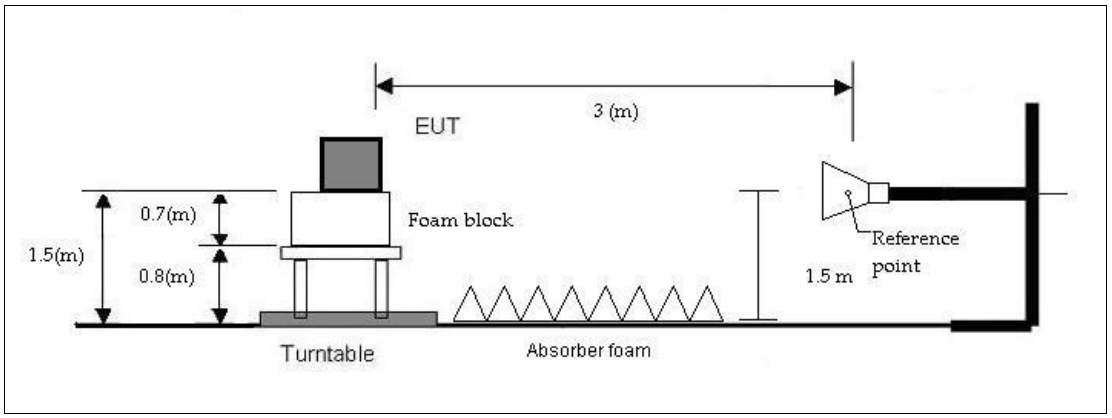

Figure 3.4 - Semi- Anechoic chamber diagram(above 1000MHz)

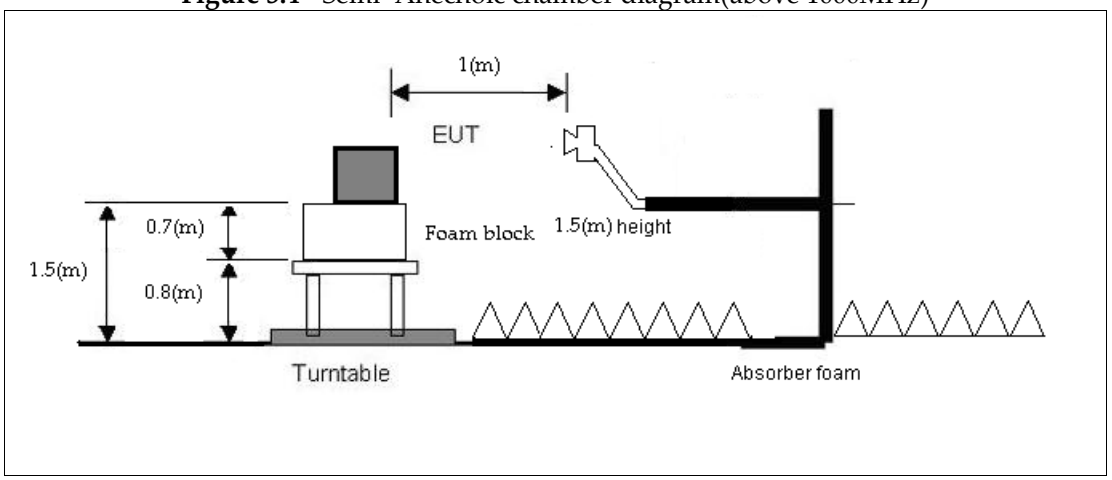

Figure 3.5 - Semi- Anechoic chamber diagram(18GHz – 26GHz)

3.3 Conducted Emission Test Site Description

The AC mains conducted EMI site is located in the main ATL EMC lab. It consists of a 2.04 x 2.04 (m) solid copper horizontal group reference plane (GRP) bonded to a 2.25 x 2.25 (m) vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.3 of ANSI C63.4. A diagram of the test site is shown figure below.

Figure 3.5 - Conducted Emission test setup

3.4 A diagram of the Conducted Emission Test Site

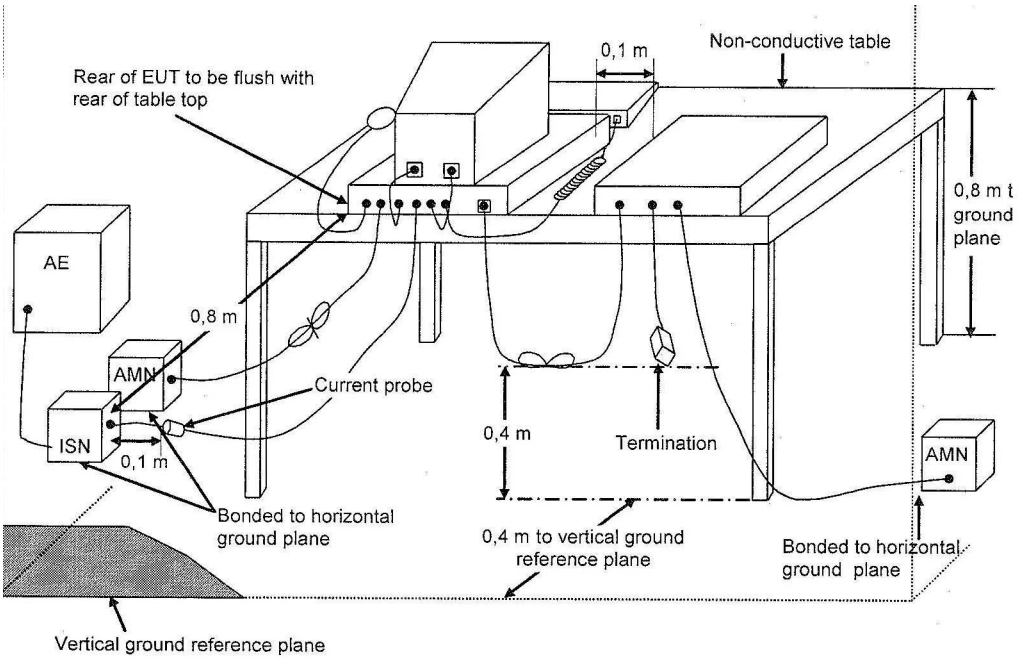

Figure 3.6 - Conducted Emission test setup diagram

3.5 Test Equipment List

Table 3.1 - Test Equipment used for Radiated Emission

Description	Manufacturer	Model Number	Serial Number	Next Cal
Bi-Log antenna	ETS Lindgren	3142E	144760	August 17, 2023
Double Ridged Horn	ETS Lindgren	3117	143094	March 23, 2023
Spectrum Analyzer	Hewlett Packard	Hp8593EM	3639A00172	April 24, 2023
EMI Receiver & RF filter section	Hewlett Packard	8546A, 85460A	3448A00267, 3448A00245	June 26, 2024
MXA Signal Analyzer	Keysight	N9020B-526	SG56080714	August 23, 2023
Cable	Micro Coax UTIFLEX	UFB293C	303	PV
Cable	Micro Coax UTIFLEX	UFB311A	SFC220863	PV
Turntable	ETS Lindgren	2187	NA	NCR
Antenna Bore-sight Mast	ETS Lindgren	2071B	136243	NCR
Multi Device Controller	ETS Lindgren	ETS 2090	148017	NCR
3 Meter chamber	ETS Lindgren	FACT 3-2.0	N/A	Dec 18, 2023
LNA	MITEQ	AMF-7D-01001800-22-10P	1782797	PV
DC power supply	Instek	PC-3030	9503310	PV
Test SW	DVT Solutions Inc	REDvtAtlV3p42.exe - (20221004)		

NCR: No Calibration required.
PV:Periodic Verification

Table 3.2 - Test Equipment used for Power line Conducted Emission

Description	Manufacturer	Model Number	Serial Number	Next Cal
LISN	Com-Power	LI-215A	191933	September 23, 2024
EMI Receiver & RF filter section	Hewlett Packard	8546A, 85460A	3545A00306, 3330A00109	June 26, 2024
Cable	ATL	N/A	N/A	PV
Transient Limiter	Com-Power	LIT-930	531577	PV
Test SW	DVT Solutions Inc	RECEDvtAtlV3p41.exe - (20190618)		

PV:Periodic Verification

4.0 Test Setup Description

4.1 EUT System Block Diagram and Support Equipment

☒**Applicable**

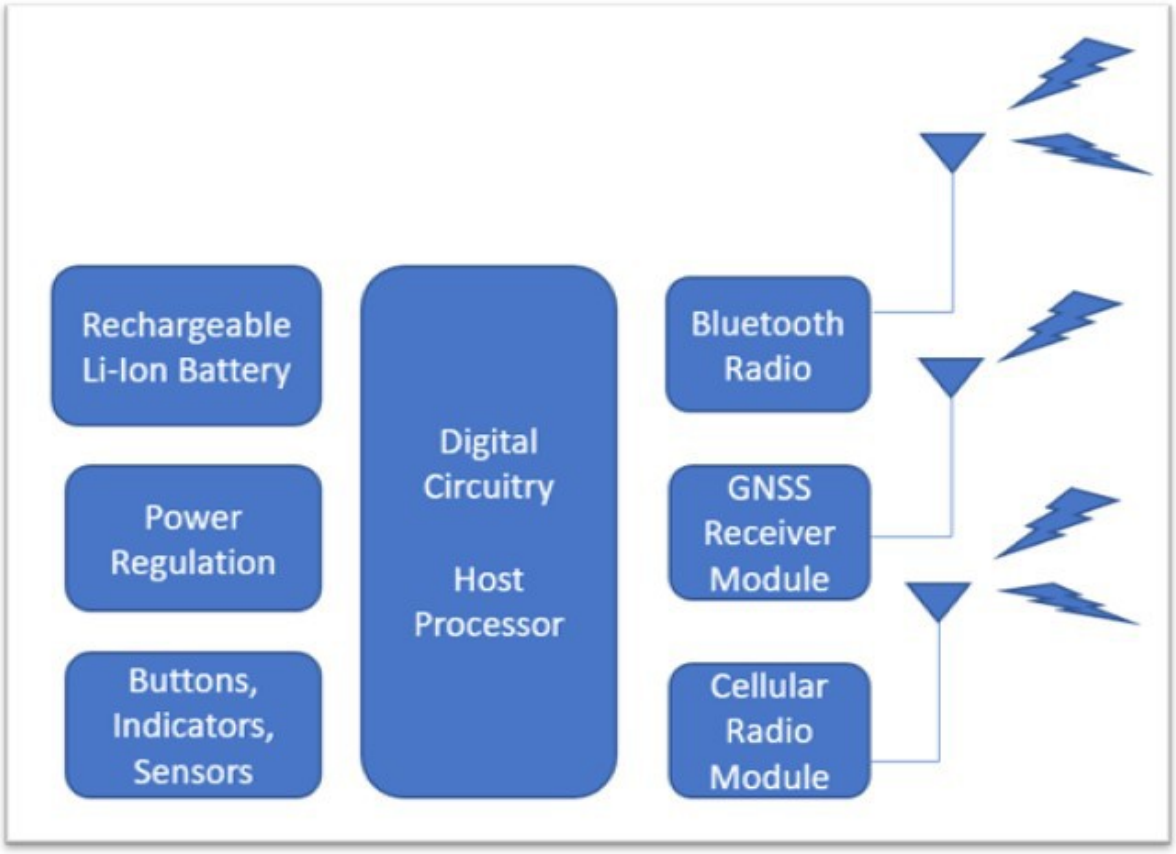

Figure 4.1 - EUT System Block Diagram and Support Equipment

4.2 Test Setup Photographs Conducted Emission (0.15MHz - 30MHz)

☒**Applicable**

Figure 4.2 - Conducted Emission Test Setup - Front View

Figure 4.3 - Conducted Emission Test Setup - Side View

4.3 Test Setup Photographs Radiated Emission (30MHz - 1000MHz)

☒**Applicable**

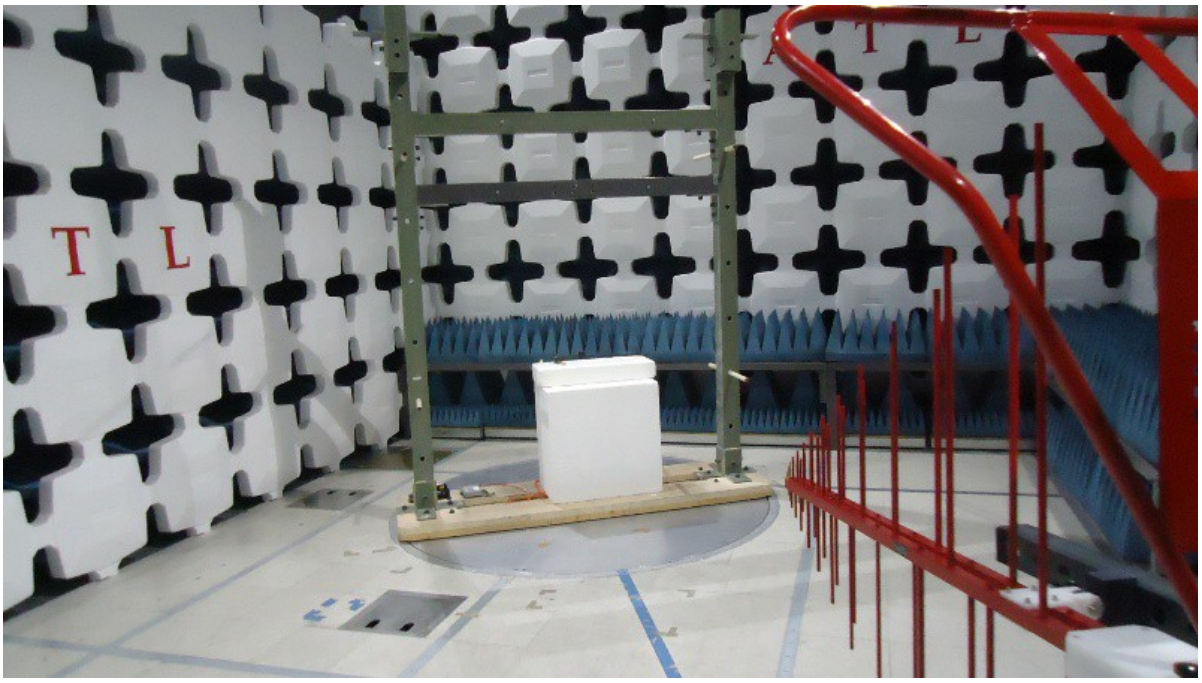

Figure 4.4 - Radiated Emission Test Setup - Front View

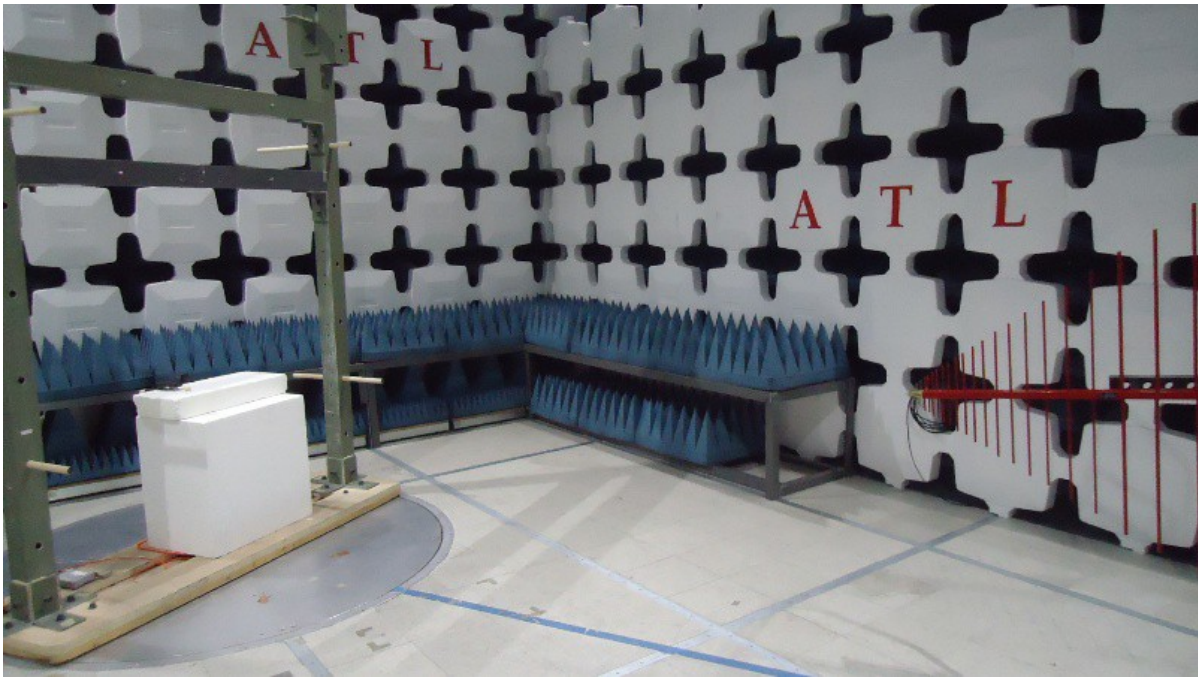

Figure 4.5 - Radiated Emission Test Setup - Side View

4.4 Test Setup Photographs Radiated Emission (1GHz - 18GHz)

☒**Applicable**

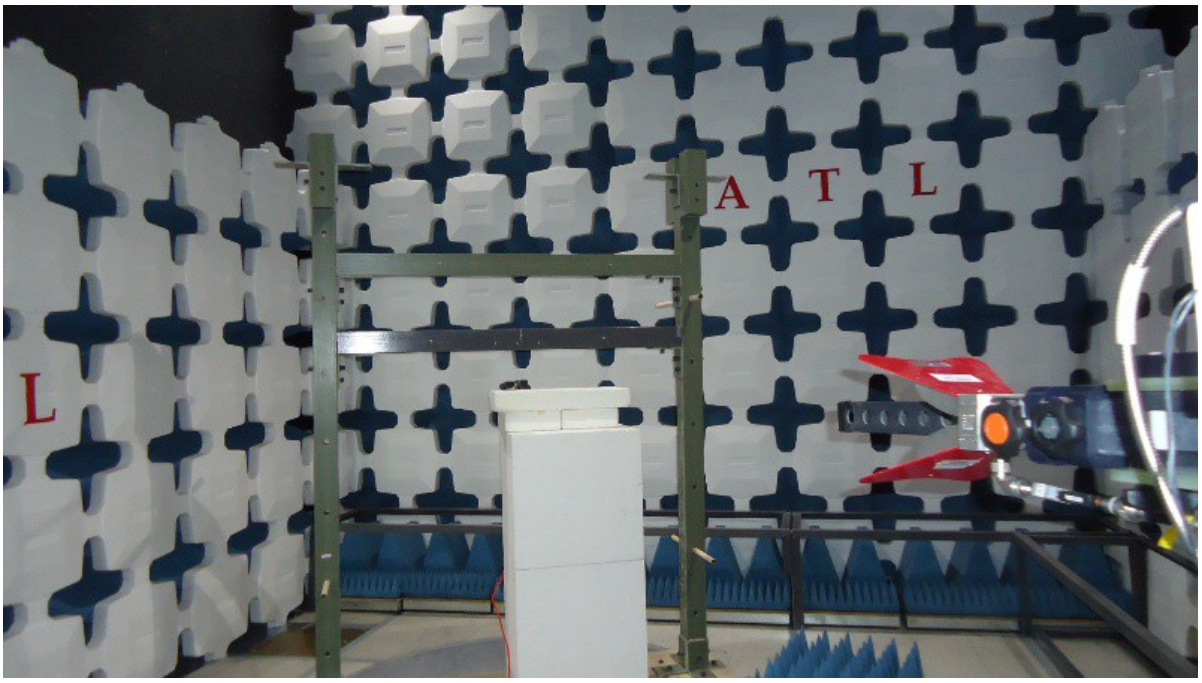

Figure 4.6 - Radiated Emission Test Setup - Front View

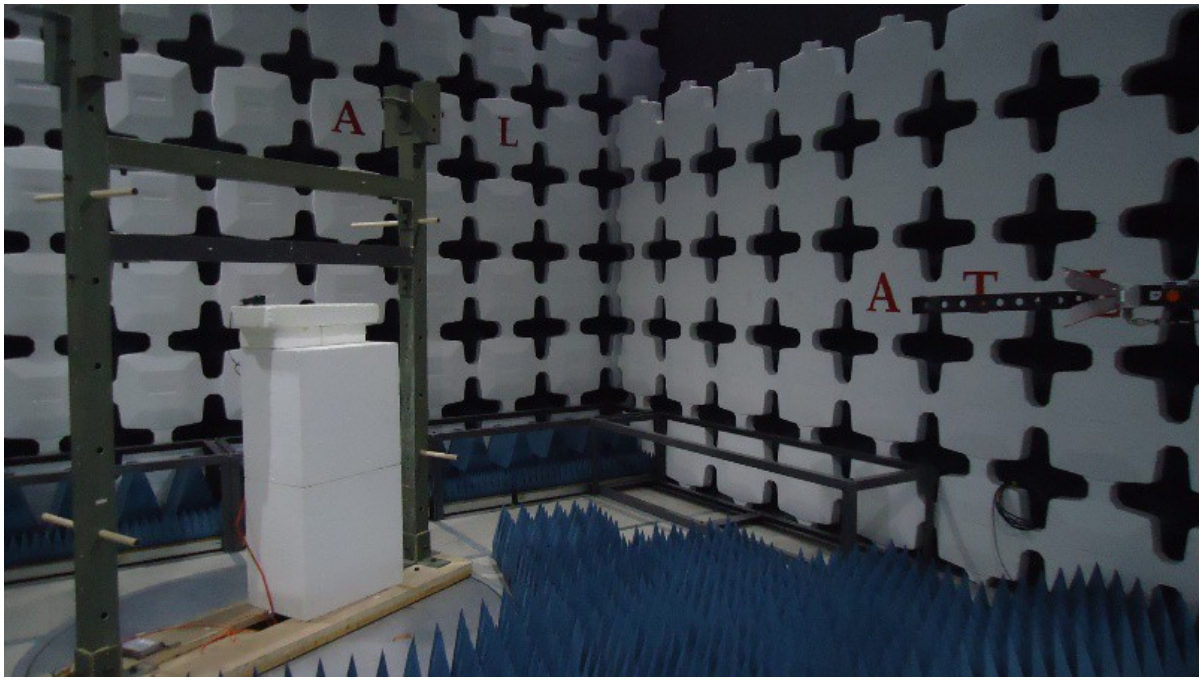

Figure 4.7 - Radiated Emission Test Setup - Side View

4.5 Test Setup Photographs Radiated Emission (18GHz - 26GHz)

☒**Applicable**

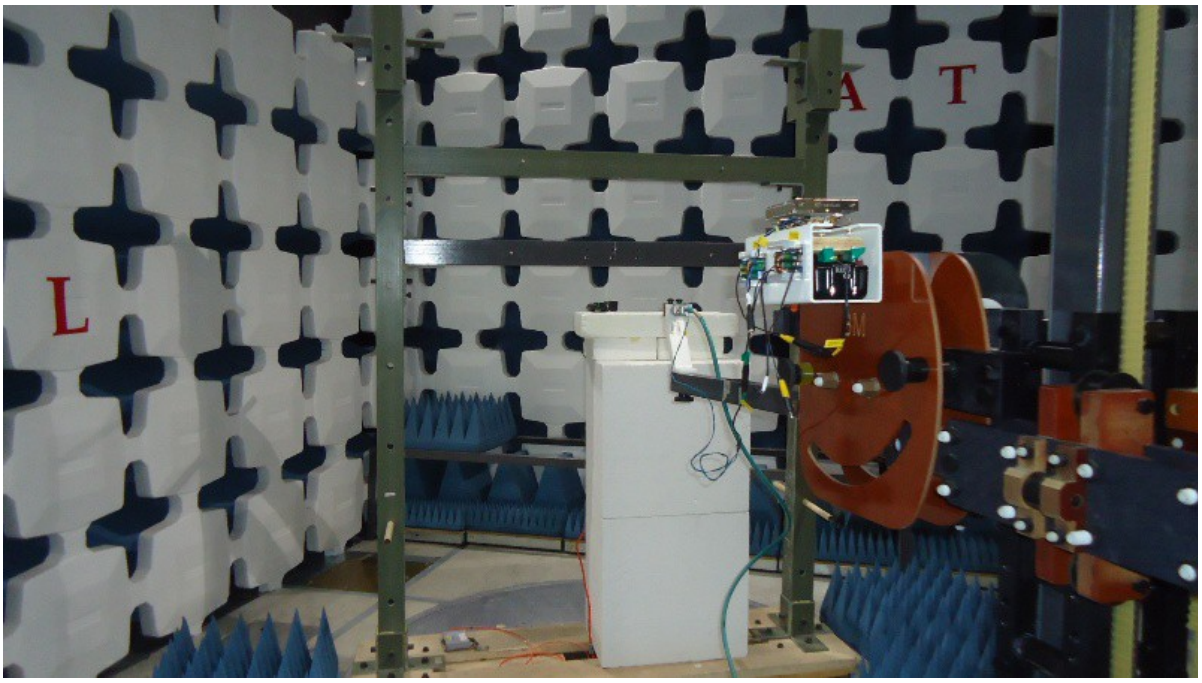

Figure 4.8 - Radiated Emission Test Setup - Front View

Figure 4.9 - Radiated Emission Test Setup - Side View

5.0 Test Methodology

5.1 Method of measurement of conducted disturbance

Conducted emission measurements were made over the frequency range of 150 (kHz) to 30 (MHz). The software is programmed to perform a peak sweep of the frequency band using the max hold function. This sweep is performed for every power conductor of the power line. During the sweep measurement the Spectrum Analyzer/Receiver's resolution bandwidth set to 9 (kHz) and the video bandwidth set to 30 (kHz). Although not a fully maximized scan, this type of scan provides emission data with a good indication of pass or fail.

Quasi- Peak measurements are taken with the Spectrum Analyzer/Receiver's resolution bandwidth set to 9 (kHz) and Video Bandwidth set to 30 (kHz). Average measurements are taken with the resolution bandwidth set to 9 (kHz) and the video bandwidth set to 30 (kHz): The calculation for the radiated emission field strength is as follows:

Corrected Reading (dBuV) = Analyzer/Receiver Reading(dBuV) + Correction Factor (dB)
Correction Factor (dB) = LISN Insertion Loss(dB) + Cable Insertion Loss(dB) + Transient Limiter Insertion Loss(dB)
Margin(dB) = Corrected Reading(dBuV) – Applicable Limit(dBuV)

5.2 Method of measurement of radiated disturbance

Measurement below 1 (GHz)

Measurements shall be made with a quasi-peak measuring receiver in the frequency range 30 (MHz) to 1000 (MHz). To reduce the testing time, a peak measuring receiver may be used instead of a quasi-peak measuring receiver. In case of dispute, measurement with a quasi-peak measuring receiver will take precedence.

The quasi-peak measuring receiver shall be in accordance with Clause 4 of CISPR 16-1-1. Receivers with peak detectors shall be in accordance with Clause 5 of CISPR 16-1-1 and shall have a 6 (dB) bandwidth in accordance with Clause 4 of CISPR 16-1-1. The antenna shall be a balanced dipole. For frequencies of 80 (MHz) or above, the antenna shall be resonant in length, and for frequencies below 80 (MHz) it shall have a length equal to the 80 (MHz) resonant length. Further detailed information is given in Clause 4 of CISPR 16-1-4.

Of those disturbances above (L – 20 dB), where L is the limit level in logarithmic units, record at least the disturbance levels and the frequencies of the six highest disturbances. Record the antenna polarization for each reported disturbance.

The software is programmed to perform a peak sweep of the frequency band using the max hold function. This sweep is performed every 22.5 (deg) in both horizontal and vertical polarities and at antenna heights of 100, 200 300 and 400 (cm). Although not a fully maximized scan, this type of scan provides emission data with a good indication of pass or fail.

Measurement above 1 (GHz)

The measurement instrumentation shall be as specified in CISPR 16-1-1.
The measuring antennas shall be as specified in 4.6 of CISPR 16-1-4.
The measuring site shall be as specified in 8 of CISPR 16-1-4.
The measurement method shall be as specified in 7.3 of CISPR 16-2-3.
The peak detector limits shall not be applied to disturbances produced by arcs or sparks that are high voltage breakdown events. Such disturbances arise when ITE devices contain or control mechanical switches that control current in inductors, or when ITE devices contain or control subsystems that create static electricity (such as paper handling devices). The average limits apply to disturbances from arcs or sparks, and both peak and average limits will apply to other disturbances from such ITE devices.

Compliance Scans

Radiated emission measurements were made over the frequency range of 30 (MHz) to 1000 (MHz). Quasi-peak measurements are taken with the Spectrum Analyzer/Receiver 's Resolution Bandwidth set to 120 (kHz) and Video Bandwidth set to 300 (kHz) for measurements below 1 (GHz). Average measurements are taken with the Resolution Bandwidth set to 1 (MHz) and the Video Bandwidth set to 1 (MHz) for measurements above 1000 (MHz). For unintentional radiators other than ITE, for each of the frequencies to which the device is tuned, the frequency and amplitude of the six highest radiated emissions relative to the limit and the operating frequency, or frequency to which the EUT is tuned (if appropriate), shall be reported unless such emissions are more than 20 (dB) below the limit. If less than the specified number (less than six) emissions are within 20 (dB) of the limit, the noise level of the measuring instrument at representative frequencies shall be reported.
The polarization of the measurement antenna (horizontal or vertical) shall be identified for each of the reported emissions. Radiated emission measurements taken at alternative distances are to be converted to the limit distance using the inverse distance relationship, unless data can be presented to validate a different conversion. At a reported frequency, the polarization with the highest level shall be reported. The calculation for the radiated emission field strength is as follows:

Corrected Reading (dBuV/m) = Analyzer/Receiver Reading(dBuV) + Correction Factor(dB/m)
Correction Factor (dB/m) = Cable Loss(dB) + Antenna Factor(dB/m)
Margin (dB) = Corrected Reading(dBuV/m) - Applicable Limit(dBuV/m)

5.3 Test Criteria

5.3.1 Conducted Emission Limits FCC/ICES-003

Class A: An ITE meeting the conditions for Class A operation shall comply with the Class A conducted limits set out in Table 5.1. ☐**Applicable**

Table 5.1 - Class A Conducted Emission Limits (FCC and ICES-003)

Emission Type	Frequency Range (MHz)	FCC (dBuV)		Industry Canada (ICES-003) (dBuV)	
		Quasi-peak	Average	Quasi-peak	Average
Conducted Emission	0.15 - 0.5	79	66	79	66
	0.5 - 30	73	60	73	60

Class B: An ITE meeting the conditions for Class B operation shall comply with the Class B conducted limits set out in Table 5.2. ☒**Applicable**

Table 5.2 - Class B Conducted Emission Limits (FCC and ICES-003)

Emission Type	Frequency Range (MHz)	FCC (dBuV)		Industry Canada (ICES-003) (dBuV)	
		Quasi-peak	Average	Quasi-peak	Average
Conducted Emission	0.15 - 0.5	66 linear to 56	56 linear to 46	66 linear to 56	56 linear to 46
	0.5 - 5	56	46	56	46
	5 - 30	60	50	60	50

5.3.2 Radiated Emission Limits FCC/ICES-003 at a distance of 3 (m)

Radiated Emission from an ITE shall be measured from the lowest frequency generated, or used, in the device or 30 (MHz), whichever is higher, up to the frequency determined in accordance with Table 5.3

Table 5.3 - Frequency Range of Measurement

Highest Frequency Generated or Used in Device	Upper Frequency of Radiated Measurement
Below 1.705 MHz	No radiated testing required
1.705 MHz - 108 MHz	1000 (MHz)
108 MHz - 500 MHz	2000 (MHz)
500 MHz - 1000 MHz	5000 (MHz)
Above 1000M Hz	5th harmonic of the highest frequency or 40000 (MHz), whichever is lower.

Class A: An ITE meeting the conditions for Class A operation defined in Section 1.3 shall comply with the Class A radiated limits set out in Table 5.4 determined at a distance of 3 (m).

☐**Applicable**

Table 5.4 - Class A Radiated Emission Limits(FCC and ICES-003)

Emission Type	Frequency Range (MHz)	FCC @ 3 (m) (dBuV/m)		ICES-003 @ 3 (m) (dBuV/m)	
		Quasi-peak	Average	Quasi-peak	Average
Radiated Emission	30 - 88	49.54	-	49.46	-
	88 - 216	53.98	-	53.96	-
	216 - 960	56.90	-	56.86	-
	960 - 1000	60	-	59.96	-
	Above 1000	-	60	-	59.96

Class B: An ITE that does not meeting the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 5.5 determined at a distance of 3 (m).

☒**Applicable**

Table 5.5 - Class B Radiated Emission Limits (FCC and ICES-003)

Emission Type	Frequency Range (MHz)	FCC @ 3 (m) (dBuV/m)		ICES-003 @ 3 (m) (dBuV/m)	
		Quasi-peak	Average	Quasi-peak	Average
Radiated Emission	30 - 88	40	-	40	-
	88 - 216	43.52	-	43.5	-
	216 - 960	46.02	-	46	-
	960 - 1000	53.98	-	54	-
	Above 1000	-	53.98	-	54

5.4 Method of measurement of Radiated Spurious Emissions

Below 30MHz：

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the test antenna (loop antenna). The test antenna is positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop is adjusted to 1 m above the ground. Additional tests are performed by placing the the loop antenna plane positioned horizontally at the specified distance from the EUT.

Above 30MHz：

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the test antenna. The maximal emission value is acquired by adjusting the antenna height, polarization and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarization Vertical (V) and Horizontal (H).

Table 5.6: FCC 15.209, RSS-GEN – Radiated Emission limits**.**

Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	67 – 20 x Log 10(F)	300
0.490 – 1.705	24000/F(kHz)	87 – 20 x Log 10(F)	30
1.705 – 30	30	29.5	30
30 – 88	100	40	3
88 – 216	150	43.5	3
216 – 960	200	46.0	3
Above 960	500	54.0	3

6.0 Test Results

6.1 Conducted Emission (0.15MHz – 30MHz) – Unintentional Radiators

☒**Applicable**

Table 6.1 - Conducted Emission information (FCC and ICES-003)

CLIENT:	**Blackline Safety**	**TEST STANDARD:**	**FCC and ICES-003**
MODEL NUMBER:	**G7C-NA2**	**PRODUCT:**	**G7C-NA2**
SERIAL NUMBER:	**3571000055**	**CLASS:**	**Class B**
TEMPERATURE:	23°C	**HUMIDITY:**	21%
TESTED BY:	Jaeheon Yun	**DATE OF TEST:**	22-10-25
TESTREFERENCE:	FCC part 15.107 and ICES-003		
TESTED RANGE:	0.15 MHz - 30 MHz		
TEST VOLTAGE:	120VAC 60Hz		
DECISION RULE	Decision rule support document: ☒Data obtained ☐Video ☐Email conversation ☐inherent in the requested specification standard ☐other		
RESULTS:	**Pass**		
CHANGES OR MODIFICATIONS:	N/A		

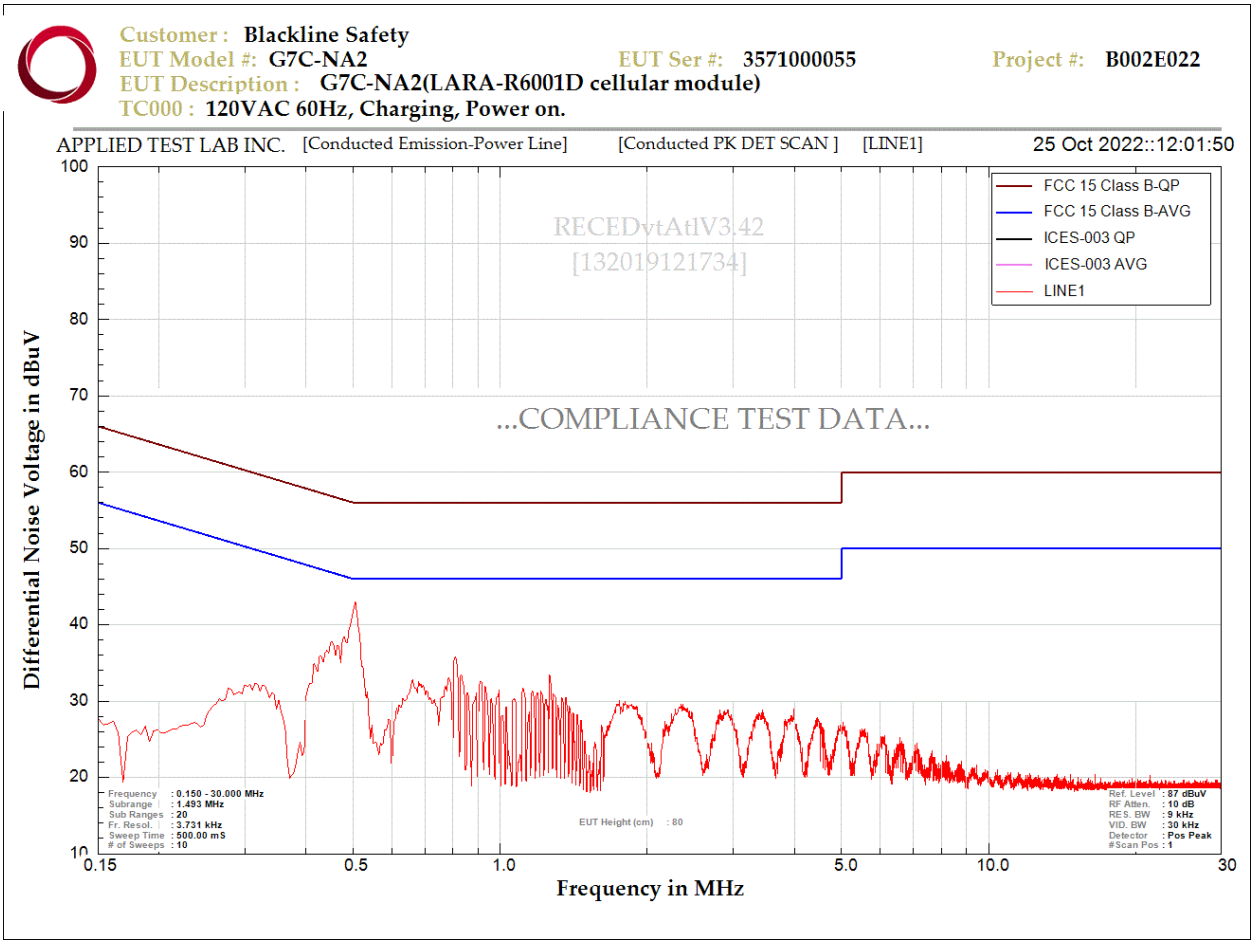

Figure 6.1 - Conducted Emission Scan Line 1 (Line L)

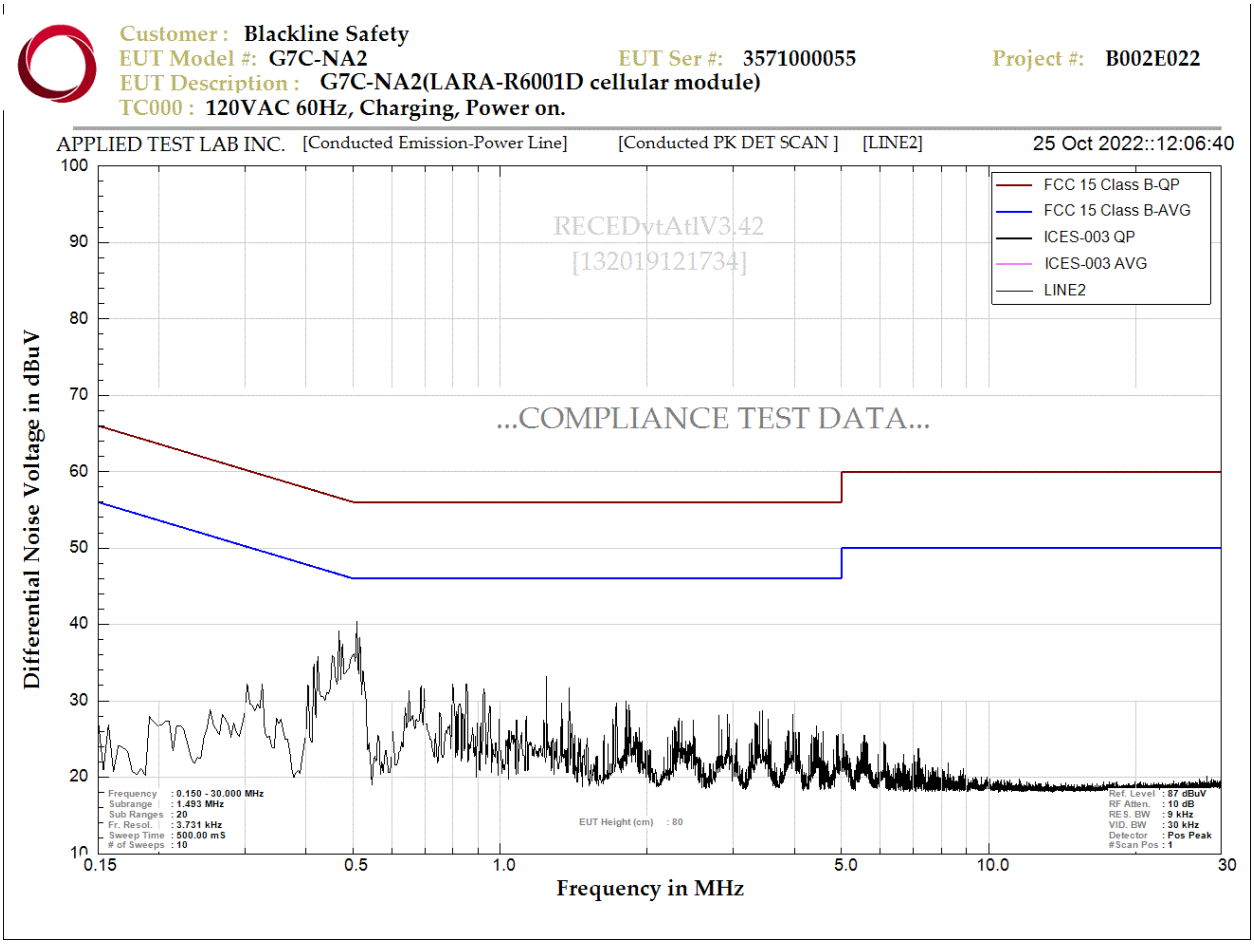

Figure 6.2 - Conducted Emission Scan Line 2 (Line N)

6.2 Radiated Emission (30MHz – 1000MHz) – Unintentional Radiators

Several pre-scans may have been performed in an effort to mitigate any non-compliance and ultimately to identify the six highest offending emission. The final compliance scan graph is shown below in figure 6.3 to figure 6.4.

☒**Applicable**

Table 6.2 - Radiated Emission information (FCC and ICES-003)

CLIENT:	**Blackline Safety**	**TEST STANDARD:**	**FCC and ICES-003**
MODEL NUMBER:	**G7C-NA2**	**PRODUCT:**	**G7C-NA2**
SERIAL NUMBER:	**3571000055**	**CLASS:**	**Class B**
TEMPERATURE:	23°C	**HUMIDITY:**	22%
TESTED BY:	Jaeheon Yun	**DATE OF TEST:**	22-10-20
TESTREFERENCE:	FCC part 15 and ICES-003		
TESTED RANGE:	30 MHz - 1000 MHz		
TEST VOLTAGE:	120VAC 60Hz		
DECISION RULE	Decision rule support document: ☒Data obtained ☐Video ☐Email conversation ☐inherent in the requested specification standard ☐other		
RESULTS:	**PASS**		
CHANGES OR MODIFICATIONS:	N/A		

Table 6.3 - Radiated Emission - **Vertical** Polarization Quasi-peak FCC

Frequency (MHz)	Azimuth Angle (deg)	Antenna Height (cm)	Measured Reading (dBuV)	Correction Factor (dB)	Corrected Reading (dBuV/m)	FCC Limit (dBuV/m)	Margin (dB)
30.805	94.9	111.4	3.17	21.96	25.13	40	-14.87
31.159	70.4	100	4.8	21.65	26.45	40	-13.55

Table 6.4 - Radiated Emission - **Vertical** Polarization Quasi-peak ICES-003

Frequency (MHz)	Azimuth Angle (deg)	Antenna Height (cm)	Measured Reading (dBuV)	Correction Factor (dB)	Corrected Reading (dBuV/m)	ICES-003 Limit (dBuV/m)	Margin (dB)
30.805	94.9	111.4	3.17	21.96	25.13	40	-14.87
31.159	70.4	100	4.8	21.65	26.45	40	-13.55

☒**Applicable**

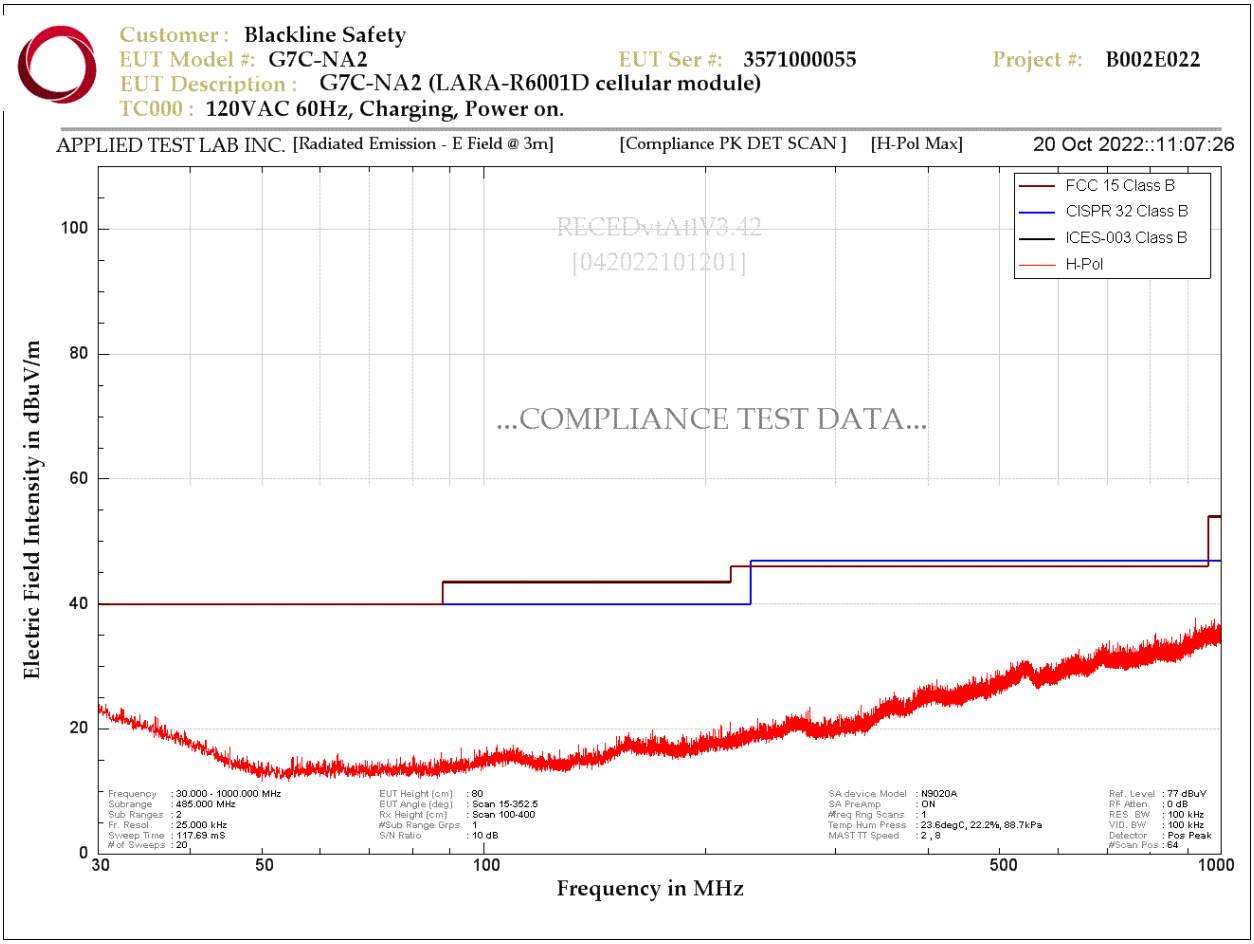

Figure 6.3 - Radiated Emission (FCC and ICES-003) - Scan Horizontal Polarization (30MHz - 1000MHz)

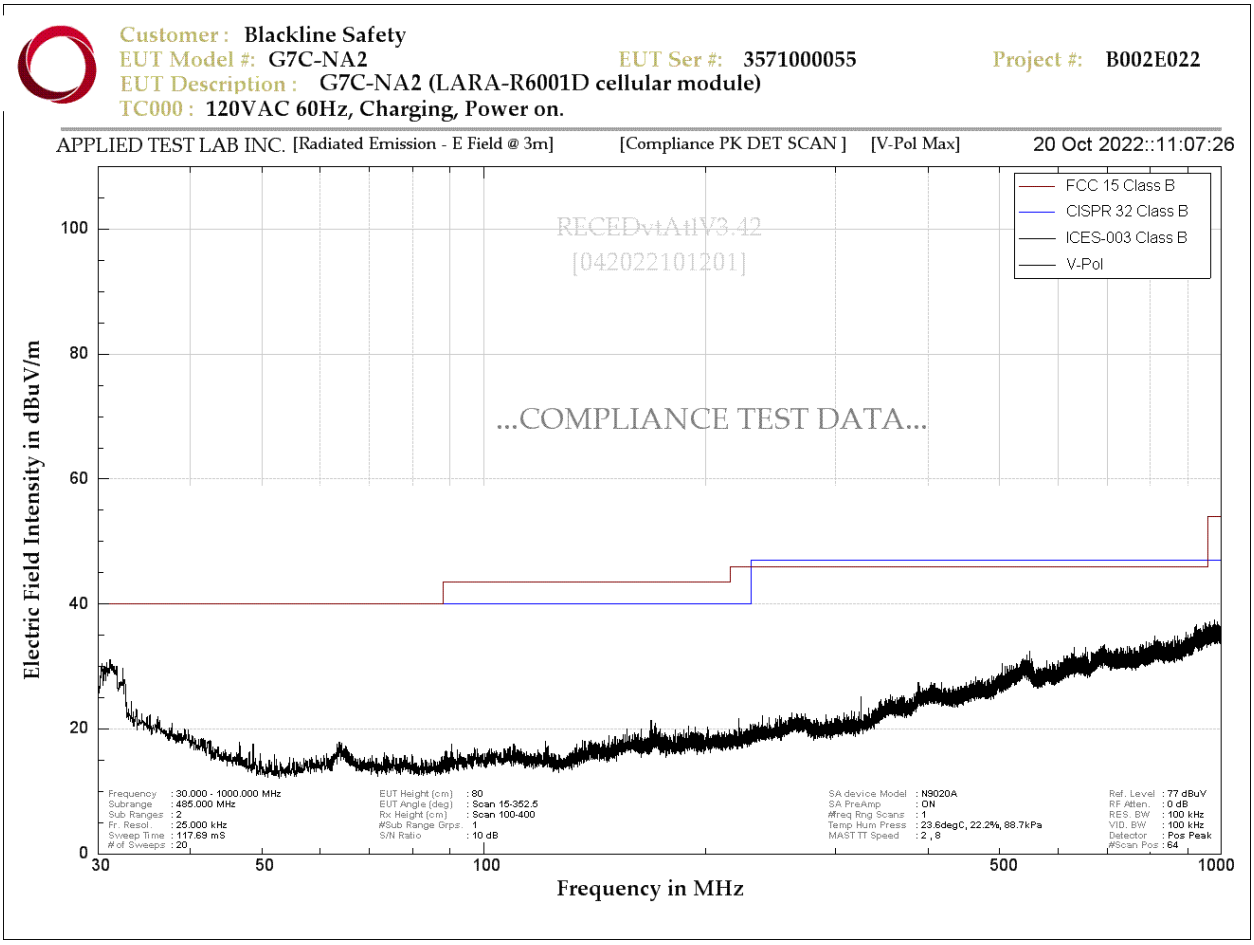

Figure 6.4 - Radiated Emission (FCC and ICES-003) - Scan Vertical Polarization (30MHz - 1000MHz)

6.3 Radiated Emission (30MHz – 1000MHz) – Intentional Radiators

Several pre-scans may have been performed in an effort to mitigate any non-compliance and ultimately to identify the six highest offending emission. The final compliance scan graph is shown below in figure 6.5 to figure 6.6.

☒**Applicable**

Table 6.5 - Radiated Emission information (FCC part 15.209, RSS-GEN)

CLIENT:	**Blackline Safety**	**TEST STANDARD:**	**FCC part 15.209, RSS-GEN**
MODEL NUMBER:	**G7C-NA2**	**PRODUCT:**	**G7C-NA2**
SERIAL NUMBER:	**3571000055**	**CLASS:**	**Class B**
TEMPERATURE:	23°C	**HUMIDITY:**	22.00%
TESTED BY:	Jaeheon Yun	**DATE OF TEST:**	22-10-21
TESTREFERENCE:	FCC part 15.209, RSS-GEN		
TX FREQUENCIES:	699MHz, 2441MHz		
TESTED RANGE:	30 MHz - 1000 MHz		
TEST VOLTAGE:	120VAC 60Hz		
DECISION RULE	Decision rule support document: ☒Data obtained ☐Video ☐Email conversation ☐inherent in the requested specification standard ☐other		
RESULTS:	**PASS**		
CHANGES OR MODIFICATIONS:	N/A		

☒**Applicable**

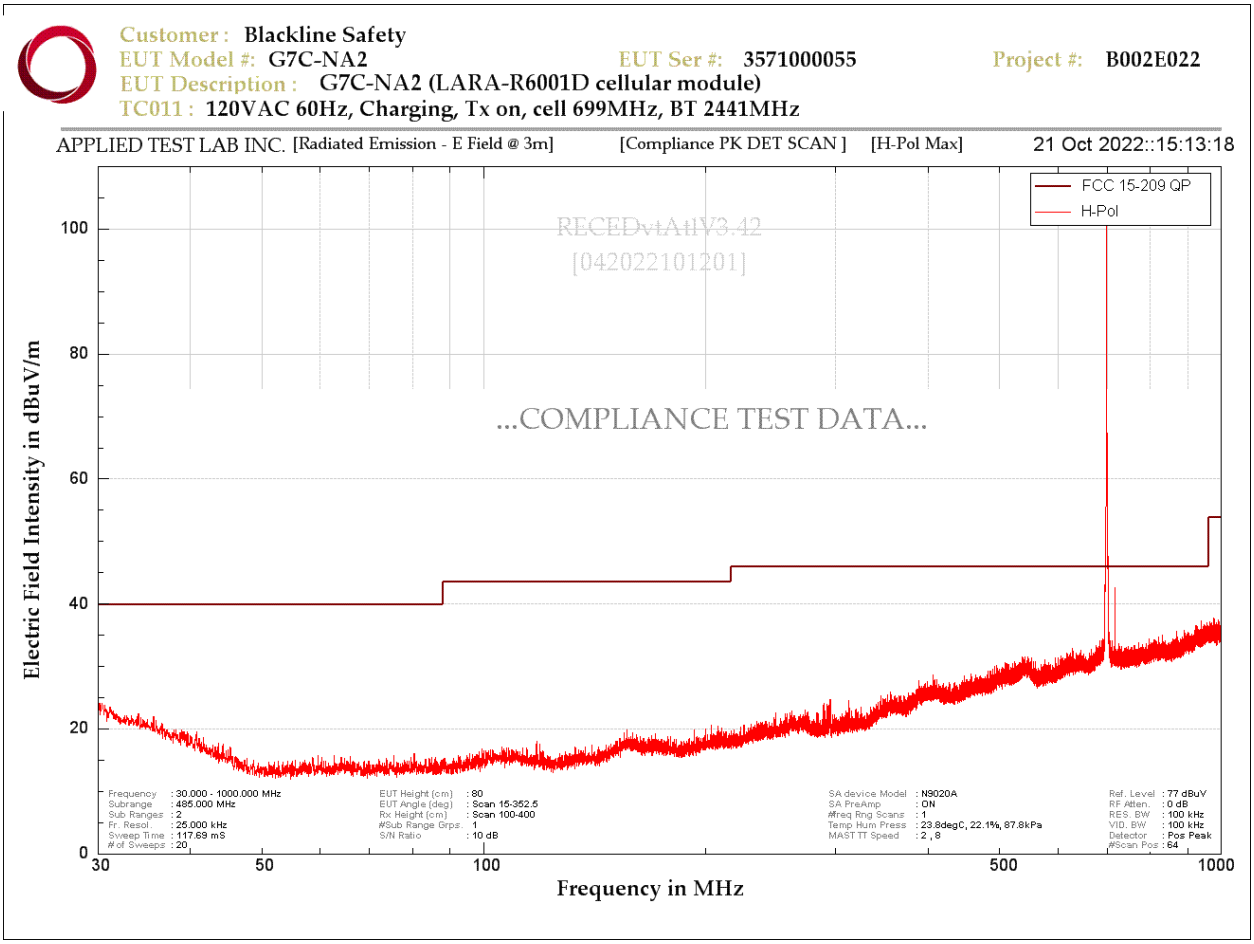

Figure 6.5 - Radiated Emission (FCC) - Scan Horizontal Polarization (30MHz - 1000MHz)

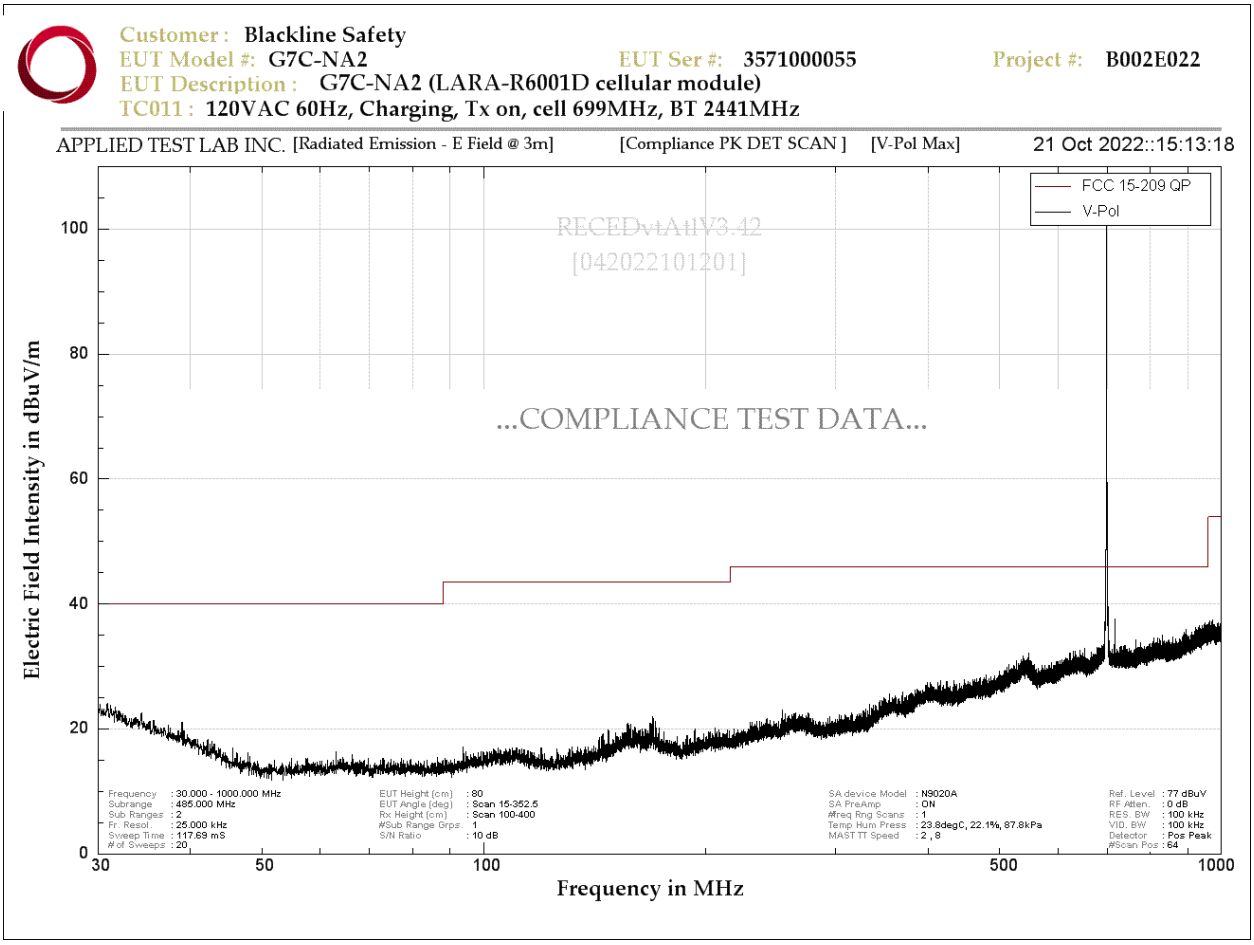

Figure 6.6 - Radiated Emission (FCC) - Scan Vertical Polarization (30MHz - 1000MHz)

6.4 Radiated Emission (1GHz - 18GHz) – Intentional Radiator

☒**Applicable**

Table 6.6 - Radiated Emission information (FCC part 15.209, RSS-GEN)

CLIENT:	**Blackline Safety**	**TEST STANDARD:**	**FCC part 15.209, RSS-GEN**
MODEL NUMBER:	**G7C-NA2**	**PRODUCT:**	**G7C-NA2**
SERIAL NUMBER:	**3571000055**	**CLASS:**	**Class B**
TEMPERATURE:	23°C	**HUMIDITY:**	21.00%
TESTED BY:	Jaeheon Yun	**DATE OF TEST:**	22-10-24
TESTREFERENCE:	FCC part 15.209, RSS-GEN		
TX FREQUENCIES:	699MHz, 2441MHz		
TESTED RANGE:	1GHz - 18GHz		
TEST VOLTAGE:	120VAC 60Hz		
DECISION RULE	Decision rule support document: ☒Data obtained ☐Video ☐Email conversation ☐inherent in the requested specification standard ☐other		
RESULTS:	**PASS**		
CHANGES OR MODIFICATIONS:	N/A		

Table 6.7 - Radiated Emission - **Vertical** Polarization AVG FCC

Frequency (MHz)	Azimuth Angle (deg)	Antenna Height (cm)	Measured Reading (dBuV)	Correction Factor (dB)	Corrected Reading (dBuV/m)	FCC Limit (dBuV/m)	Margin (dB)
2098.338	345.7	151.4	46.75	-21.98	24.77	53.98	-29.21

☒**Applicable**

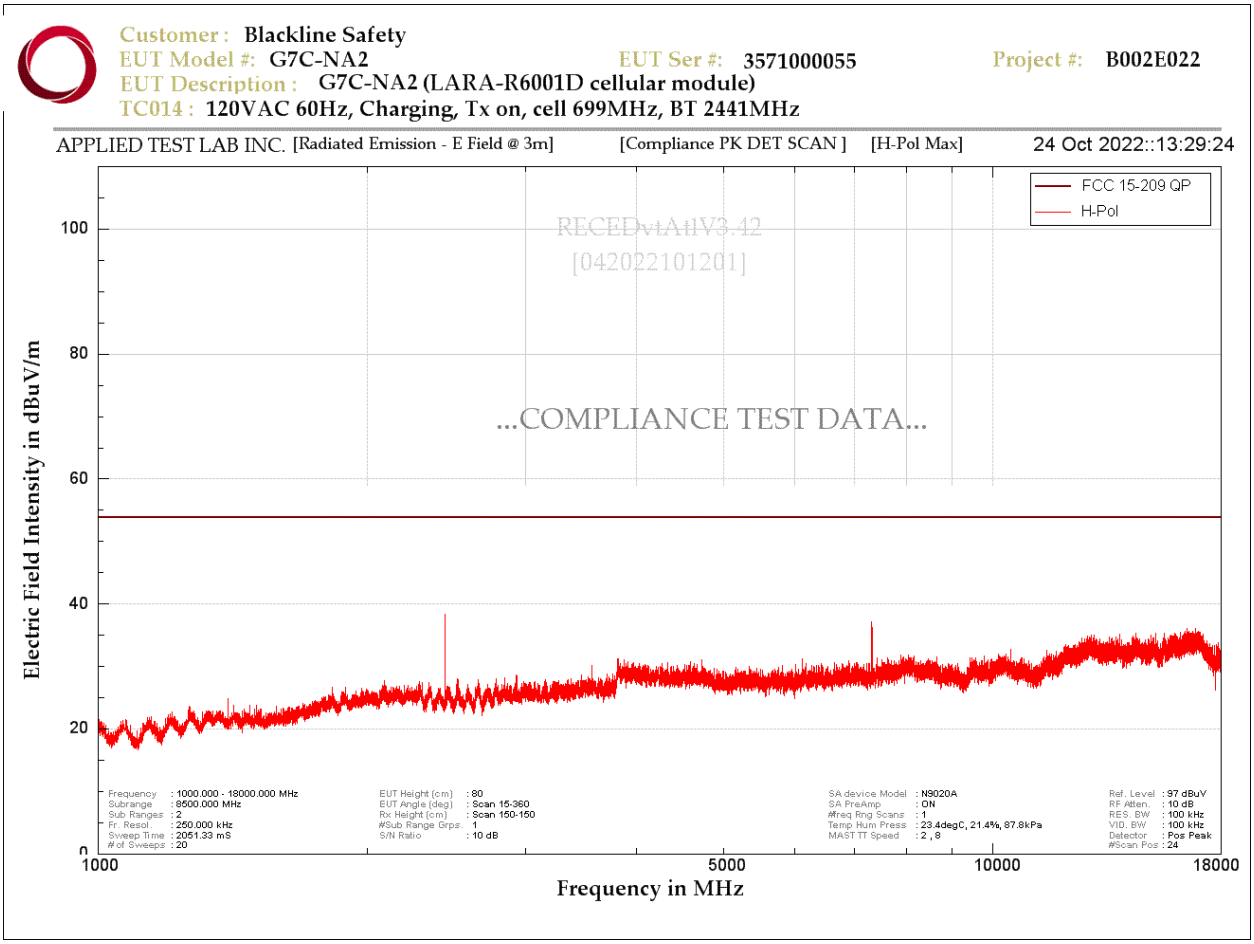

Figure 6.7 - Radiated Emission (FCC) - Scan Horizontal Polarization (1000MHz - 1000MHz)

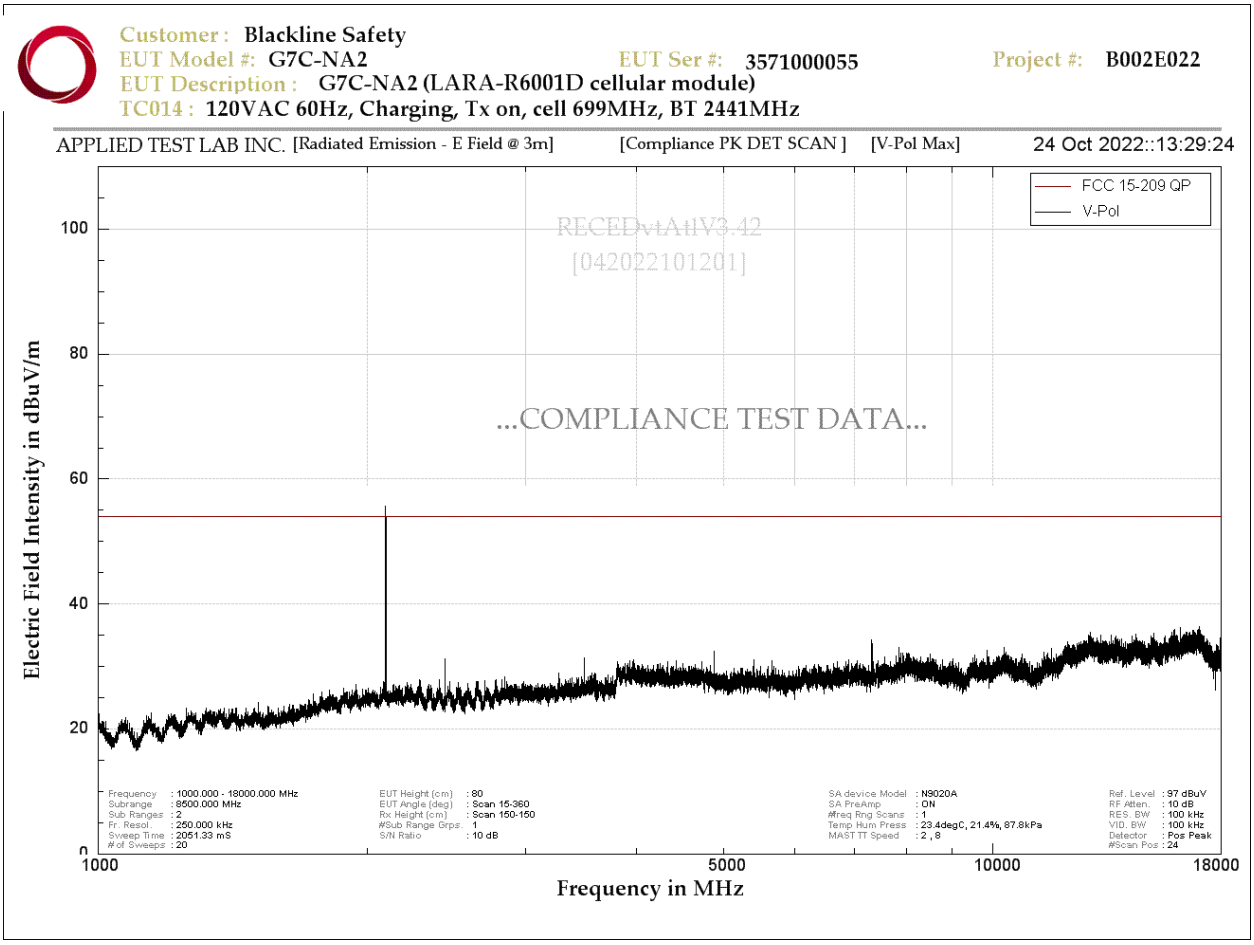

Figure 6.8 - Radiated Emission (FCC) - Scan Vertical Polarization (1000MHz – 10000MHz)

6.5 Radiated Emission (18GHz - 26GHz) – Intentional Radiator

☒**Applicable**

Table 6.8 - Radiated Emission information (FCC part 15.209, RSS-GEN)

CLIENT:	**Blackline Safety**	**TEST STANDARD:**	**FCC part 15.209, RSS-GEN**
MODEL NUMBER:	**G7C-NA2**	**PRODUCT:**	**G7C-NA2**
SERIAL NUMBER:	**3571000055**	**CLASS:**	**Class B**
TEMPERATURE:	23°C	**HUMIDITY:**	21.00%
TESTED BY:	Jaeheon Yun	**DATE OF TEST:**	22-10-25
TESTREFERENCE:	FCC part 15.209, RSS-GEN		
TX FREQUENCIES:	699MHz, 2441MHz		
TESTED RANGE:	18GHz - 26GHz		
TEST VOLTAGE:	120VAC 60Hz		
DECISION RULE	Decision rule support document: ☒Data obtained ☐Video ☐Email conversation ☐inherent in the requested specification standard ☐other		
RESULTS:	**PASS**		
CHANGES OR MODIFICATIONS:	N/A		

☒**Applicable**

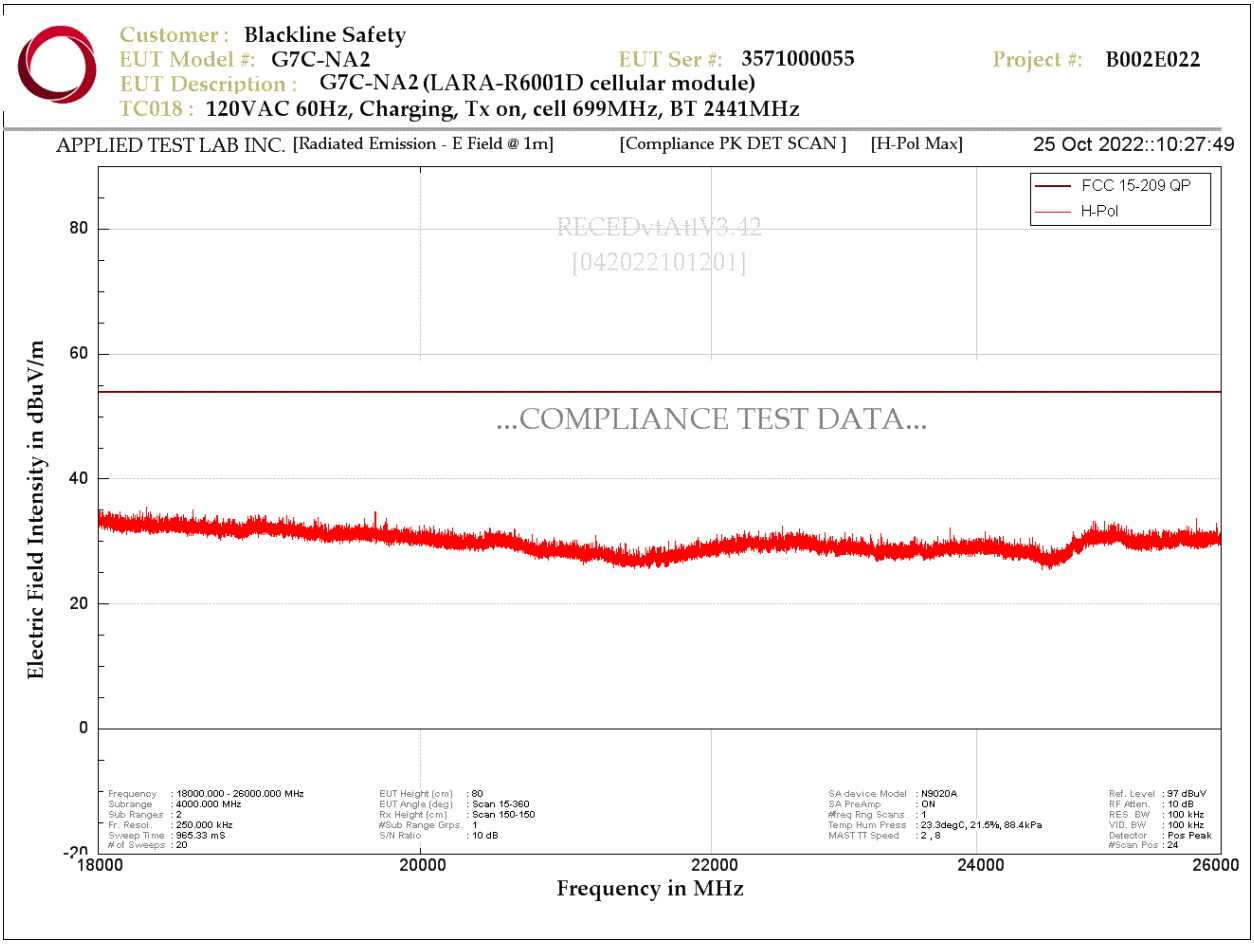

Figure 6.9 - Radiated Emission (FCC) - Scan Horizontal Polarization (18000MHz - 26000MHz)

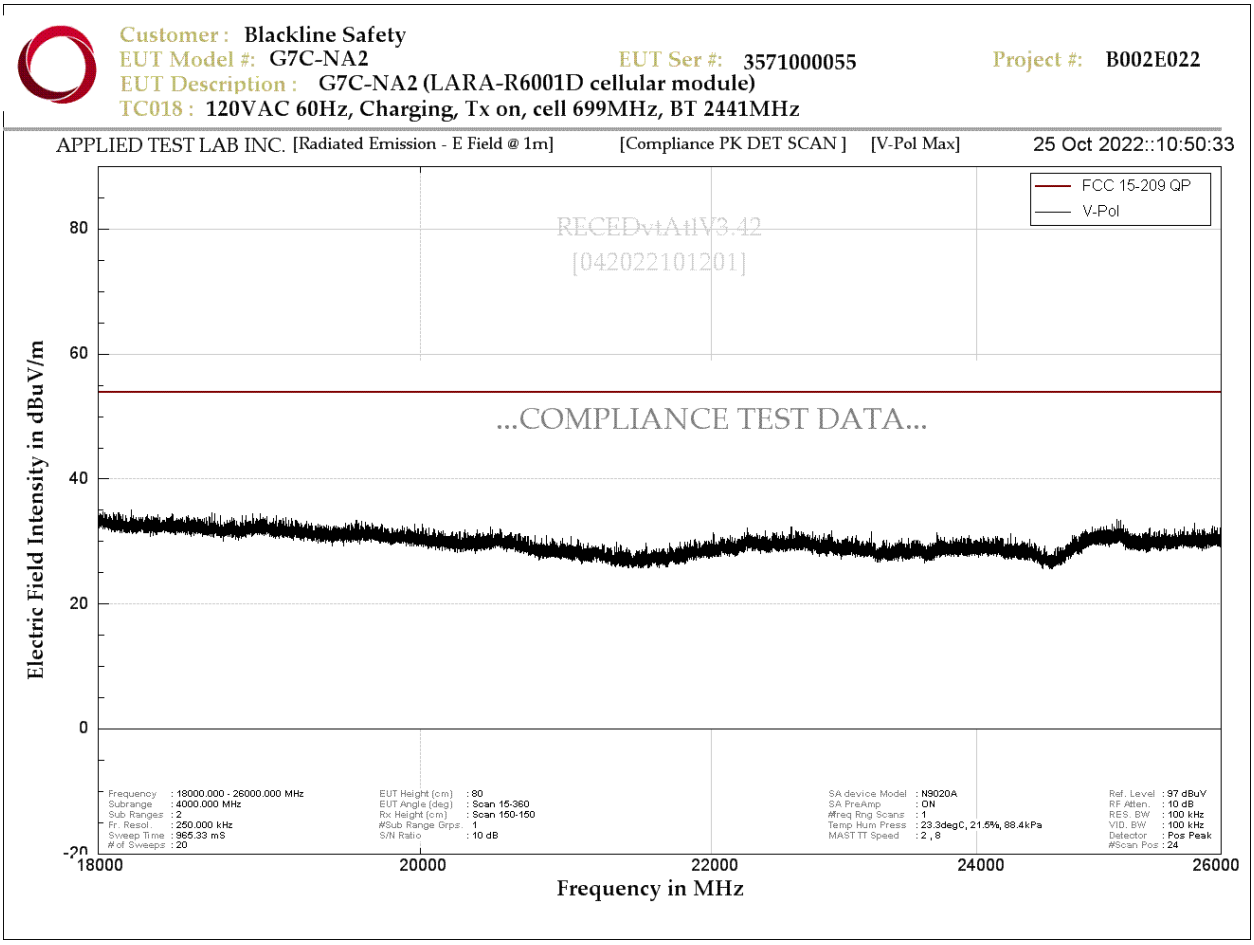

Figure 6.10 - Radiated Emission (FCC) - Scan Vertical Polarization (18000MHz – 26000MHz)

7.0 Appendix A – Test Sample Description

(From Data Provided by the Customer)

Wirelessly connected personal gas monitor

8.0 Appendix B – List of Abbreviations and Acronyms

Industrial, scientific and medical (ISM) applications (of radio frequency energy)
operation of equipment or appliances designed to generate and use locally radio frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications

ISM equipment and appliances
equipment or appliances designed to generate and/or use locally radio-frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications and information technology and other applications covered by other CISPR publications

Electromagnetic radiation

1. phenomenon by which energy in the form of electromagnetic waves emanates from a source into space
2. energy transferred through space in the form of electromagnetic waves

Boundary of the equipment under test
imaginary straight line periphery describing a simple geometric configuration encompassing the equipment under test. All interconnecting cables are included within this boundary

Electro-discharge machining (EDM) equipment
all the necessary units for the spark erosion process including the machine tool, the generator, control circuits, the working fluid container and integral devices

Spark erosion
removal of material in a dielectric working fluid by electro-discharges, which are separated in time and randomly distributed in space, between two electrically conductive electrodes (the tool electrode and the work piece electrode), and where the energy in the discharge is controlled

Arc welding equipment
equipment for applying current and voltage and having the required characteristics suitable for arc welding and allied processes

Equipment for resistance welding and allied processes
all equipment associated with carrying out the processes of resistance welding or allied processes consisting of e.g. power source, electrodes, tooling and associated control equipment, which may be a separate unit or part of a complex machine

Low voltage LV
a set of voltage levels used for the distribution of electricity and whose upper limit is generally accepted to be 1 000 V a.c.

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