



Certificate # 3331.02



Test Report – Products
Prüfbericht - Produkte

Test Report No.: Prüfbericht-Nr.:	US22OQOX 002 Rev.: 02	Order No.: Auftrags-Nr.:	P00678298 234190362	Page 1 of 31 Seite 1 von 31
Client Reference No.: Kunden-Referenz-Nr.:	2383105	Order date: Auftragsdatum:	4/29/2022	
Client: Auftraggeber:	Schindler Elevator Corporation 20 Whippany Road Morristown, NJ 07960			
Test item: Prüfgegenstand:	IoT Gateway Device			
Identification/ Type No.: Bezeichnung / Typ-Nr.	Cube Plus Global NA GCM			
Order content: Auftrags-Inhalt:	Electromagnetic Compatibility (EMC) Test Report			
Test specification: Prüfgrundlage:	FCC Part 15 Subpart B:2022			
Date of sample receipt: Wareneingangsdatum:	6/20/2022	See Test Setup Exhibit for Photos		
Test sample No.: Prüfmuster-Nr.:	A1NACPG1QA2205000001			
Testing period: Prüfzeitraum:	8/19/2022- 8/19/2022			
Testing laboratory: Prüflaboratorium:	TUV Rheinland of North America 5015 Brandin Ct. Fremont, CA 94538			
Test result*: Prüfergebnis*:	Pass			
compiled by: geprüft von:	authorized by: / genehmigt von:			
Date: 8/31/2022 Datum:	Issue Date: 8/31/2022 Ausstellungsdatum:			
Position / Stellung:	Expert	Position / Stellung:	Expert	
Others / Sonstiges:				
Condition of the test item at delivery: Zustand des Prüfgegenstandes bei Anlieferung: Test sample complete and undamaged				
* Legend: P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested * Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet				
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark. Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.				

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Absatz <i>Clause</i>	Anforderungen - Prüfungen / <i>Requirements - Tests</i>	Messergebnisse – Bemerkungen / <i>Measuring results - Remarks</i>	Ergebnis <i>Result</i>
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1	The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request. <i>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</i> <i>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</i>
2	As contractually agreed, this document has been signed digitally only. TÜV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TÜV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. <i>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben.</i>
3	Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report. <i>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</i> <i>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</i>
4	The test results contained in this report refer exclusively to the product(s) presented for testing. No liability may be assumed for models or products not referred to herein. This test report may not be published or duplicated in part without permission of the testing body. This test report by itself does not constitute authorization for the use of any TÜV Rheinland test mark. The report must not be used by the client to claim product certification, approval, or endorsement by A2LA.
5	TÜV Rheinland testing laboratories apply the Zero Guard Band rule unless otherwise required by the accreditation, standard, or requested by the customer as part of the quotation. For the Zero Guard Band rule, the measurement uncertainty is not considered and will also not be declared in the test report. Should the measurement uncertainty be used to provide guard band, these values will be declared in the test report.
6	Electromagnetic Compatibility Emissions Test Report. The above product was found to be Compliant to the above test standard(s).

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Product description
Produktbeschreibung

1	Product details: <i>Produktdetails:</i>	Cube Plus Global NA GCM is a router/gateway designed to connect elevators and escalators to the Internet via mobile network. Data is collected from the connected device and sent securely to the Schindler IoEE cloud where it is processed. Along with controller and sensor data, video, pictures or digital signage content can also be transmitted bidirectionally. Voice communication is another important feature to comply with US Regulations. Voice calls initiated by an EN81-28 compliant alarm device is routed either through the GSM mobile network or through the Internet using VoIP. The configuration and diagnostic application on the iPhone communicates through BLE with the Cube Plus Global NA device and ensures efficient set up and error diagnostics of the connected devices (inside) and the services (outside). The device has the following ports: 4 Gbit ethernet ports 1 USB host 1 RS232-0 serial 1 RS232-1 serial 1 FXS port - Power input (8-28 Vdc) 1 RS485 serial 1 Digital I&O 2 Antenna Connector ports Peak Antenna Gain (dBi): - SharkFin Antenna: 0.25 dBi - Dipole Antenna: 4.6 dBi FCC IDs: 2AVFL-50701019, RI17LE910CXNF, 2AC7Z-ESPWROOM32E
2	Dimensions / Weight: <i>Maße / Gewicht:</i>	134 mm x 150 mm x 48 mm / 0.3 kg
3	Operating elements: <i>Bedienelemente:</i>	Powered at 24Vdc by an external power supply. Not part of assembly.
4	Equipment / Accessories: <i>Ausstattung / Zubehör:</i>	Cellular Antennas. Part of assembly under test.
5	Used materials: <i>Verwendete Materialien:</i>	NA
6	Other: <i>Sonstiges:</i>	Test sample(s), as well sample information, description, product details and intended usage was provided by customer.
7	Test sample obtaining: <i>Prüfmusterbereitstellung:</i>	☒ Sending by customer ☐ Sampling by TÜV Rheinland Group ☐ others:

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Revisions

Date mm/dd/yy	Name	Page Number of Change	Describe Change
08/22/22	Christopher Lee	3, 7, 12, 14, 19, 25	Added FCC ID to footer and to Product details. Removed all photos (to be shown separately) and added a note about this to section 1.3. Added updated radiated emissions data, conducted emissions data, and antenna gain.

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1 General Information

1.1 Scope

This report is intended to document the status of conformance based on the results of testing performed on the IoT Gateway Device, Model Number: Cube Plus Global NA GCM , manufactured by Schindler Elevator Corporation. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT (Equipment Under Test) in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

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1.3 Summary of Test Results

Applicant:	Schindler Elevator Corporation 20 Whippany Road Morristown, NJ 07960	Tel:	+1(862) 812-2799	Contact:	Christopher Mason
		Fax:	N/A	e-mail:	Christopher.mason@schindler.com
Description:	IoT Gateway Device	Test Voltage/Freq.:		24Vdc provided by external power supply	
Model Number:	Cube Plus Global NA GCM				
Serial Number:	A1NACPG1QA2205000001	Test Engineer:		Matthew Riego de Dios,	
Standards	Description	Severity Level or Limit		Criteria	Test Result
FCC Part 15 Subpart B:2022 Product Family Standard Emissions	Emissions Description	See Basic Standards Below		See Below	Complies
FCC Part 15 Subpart B:2022, ICES-003 Issue 7 (2020)	Radiated Emissions	Class A, 30 - 1000 MHz Class A, 1000 - 18000 MHz		Limit	Complies
FCC Part 15 Subpart B:2022, ICES-003 Issue 7 (2020)	Conducted Emissions	Class A, 150 kHz - 30 MHz		Limit	Complies

Note: Power Supply will not be marketed and included with the EUT.

Note: Photos not included in report body and provided separately.

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont Ca., 94538, are recognized by the Commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Pleasanton Registration No. US1131, Fremont Registration No. US1131). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

2.1.2 A2LA

TUV Rheinland of North America EMC test facilities are accredited by the American Association for Laboratory Accreditation (A2LA). The laboratories have been assessed and accredited by A2LA in accordance with ISO Standard 17025:2017 (Testing Certificate #3331.02). The Scope of Laboratory Accreditation includes emission and immunity testing. The accreditations are updated annually.

2.1.3 Industry Canada

The Pleasanton 5-meter Semi-Anechoic Chamber, Registration No. 2932M, has been accepted by Industry Canada to perform testing to 3 and 5 meters based on the test procedures described in ANSI C63.4-2014. The Fremont 10-meter Semi-Anechoic Chamber, Registration No. 2932D, has been accepted by Industry Canada to perform testing to 3 and 10 meters based on the test procedures described in ANSI C63.4-2014.

2.1.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont Ca., 94538, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0399

VCCI Registration No. for Fremont: A-0398

2.1.1 BSMI

Registration No.: SL2-IN-E-1150R. The BSMI accreditation was obtained by NIST MRA with the BSMI

2.1.2 Korea

(Designation No.: US0185). Recognized by National Radio Research Agency (RRA) as an accredited Conformity Assessment Body (CAB) under the terms for Korea Phase I of the APEC TEL.

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2.2 Test Software

Manufacturer	Name	Version	Test
Rohde & Schwarz	EMC32	10.50.00	Radiated & Conducted Emissions
Voltech	IEC61000-3	1.26.13	Harmonic and Flicker Emissions
CEWare	CEWare32	4	Surge, EFT, and VDI
ETS-Lindgren	Tile	V 7.1.4.10	Radiated Immunity

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or co-variances of these other quantities weighted according to how the measurement result varies with changes in these quantities. The term standard uncertainty is the result of a measurement expressed as a standard deviation.

The Expanded Uncertainty defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand. The fraction may be viewed as the coverage probability or level of confidence of the interval.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{\text{dB}\mu\text{V} / \text{m}}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

$$25 \text{ dBuV/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dBuV/m}$$

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2.3.2 Measurement Uncertainty Emissions

Per CISPR 16-4-2	U_{lab}	U_{cisp}
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB
Disturbance Power		

Voltech PM6000A

The estimated combined standard uncertainty for harmonic current and flicker measurements is $\pm 5.0\%$.	Per CISPR 16-4-2
--	------------------

2.3.3 Measurement Uncertainty Immunity

The estimated expanded uncertainty for ESD immunity measurements is $\pm 8.2\%$.	Per IEC 61000-4-2
The estimated expanded uncertainty for radiated immunity measurements is ± 4.10 dB.	Per IEC 61000-4-3
The estimated expanded uncertainty for EFT fast transient immunity measurements is $\pm 5.84\%$.	Per IEC 61000-4-4
The estimated expanded uncertainty for surge immunity measurements is $\pm 5.84\%$.	Per IEC 61000-4-4
The estimated expanded uncertainty for conducted immunity measurements with CDN is ± 3.66 dB	Per IEC 61000-4-6
The estimated expanded uncertainty for power frequency magnetic field immunity is $\pm 11.6\%$.	Per IEC 61000-4-8
The estimated expanded uncertainty for voltage variation and interruption measurements is $\pm 3.48\%$.	Per IEC 61000-4-11

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard ISO IEC 17025:2017. Equipment calibration records are kept on file at the test facility.

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2.5 Measurement Equipment Identification



Measurement Equipment List

Service Start Date 08/19/2022
Service End Date 08/19/2022

Cost Center 33016
Deliverable/Report Number US22OQOX 002
AMEL ID 0234190362B00080

Client Schindler Elevator Corp
Product IoT Gateway Device
Comment

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Equip.	Description	Model	Manufacturer	Last Date MM/DD/YYYY	Due Date MM/DD/YYYY
G1700060	Preamplifier, 9 kHz -1 GHz (N-Type Conne	310N	Sonoma Instrument	03/02/2022	03/02/2024
G1700040	Antenna, Bilog, 30-3000 MHz; Attenuator	JB3; UNAT-4+	Sunol Sciences; Mini-Circuits	02/18/2021	02/18/2023
9022667	Preamplifier, 1 - 18 GHz, Miteq	AMF70010018003010PL	Miteq	03/01/2022	03/01/2023
G1700882	Receiver, EMI, 20 Hz - 40 GHz	ESIB40	Rohde & Schwarz	03/02/2022	03/02/2023
G1700106	Attenuator, 6 dB, 100 W	100-A-FFN-06	Bird	03/02/2022	03/02/2023
G1700111	Network, Coupling/Decoupling, Power Line	FCC-801-M3-32A	Fischer Custom Comm	03/02/2022	03/02/2024
9038283	Antenna, Horn, 1 - 18 GHz	3115	EMCO	07/29/2021	07/29/2023
G1704164	ESW44 EMI Test Receiver 2 Hz to 44 GHz	ESW44	Rohde & Schwarz	12/03/2021	02/03/2023
G1700113	LISN, 150 kHz - 30 MHz	FCC-LISN-50-100-4-02	Fischer Custom Comm	03/02/2022	03/02/2023

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3 Product Information

3.1 Test Plan

The EUT product information, test configuration, mode of operation, test types, test procedures, test levels, pass/failure criteria, in this report were carried out per the product test plan located in appendix A of this report.

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4 Emissions

4.1 Radiated Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT that radiated from the EUT and may affect the performance of other nearby electronic equipment.

4.1.1 Over View of Test

Results	Complies (as tested per this report)				Date	08/19/2022	
Standard	FCC Part 15 Subpart B:2022, ICES-003 Issue 7 (2020)						
Product Model	Cube Plus Global NA GCM			Serial#	A1NACPG1QA2205000001		
Configuration	See test plan for details.						
Test Set-up	Tested at 3 meters in semi- anechoic chamber placed on turn-table, see test plans for details. Due to the small size of the EUT, testing was performed in a 3 meter semi-anechoic chamber.						
EUT Powered By	24Vdc provided by external power supply	Temp	24C	Humidity	40%	Pressure	1015 mbar
Frequency Range	30 - 1000 MHz @ 3 meters 1000 – 18000 MHz @ 3 meters						
Perf. Criteria	Class A (Below Limit)		Perf. Verification		Readings Under Limit		
Mod. to EUT	None		Test Performed By		Matthew Riego de Dios		

4.1.2 Test Procedure

Radiated emissions tests were performed using the procedures of CISPR 16 and/or ANSI C63.4 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration. Further radiated emission tests were performed per the procedures stated in the other emissions standards listed in this report.

The frequency range 30 – 18000 MHz investigated for radiated emissions.

Note: Due to the small size of the EUT, testing was performed in a 3 meter semi-anechoic chamber.

4.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the radiated emission test.

4.1.4 Final Test

All final radiated emissions measurements were below (in compliance) the limits.

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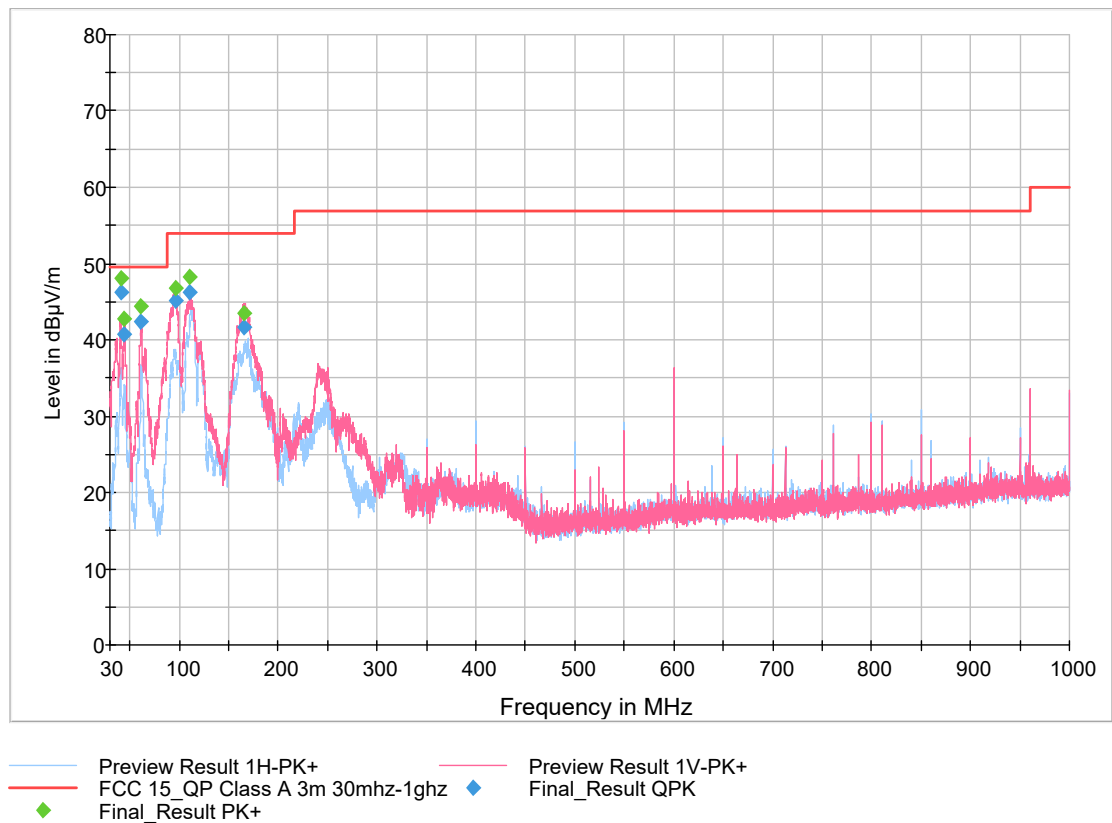
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4.1.5 Final Graphs

NOTES: 24Vdc, SharkFin Antenna

Radiated Emissions 30 – 1000 MHz
Vertical/Horizontal



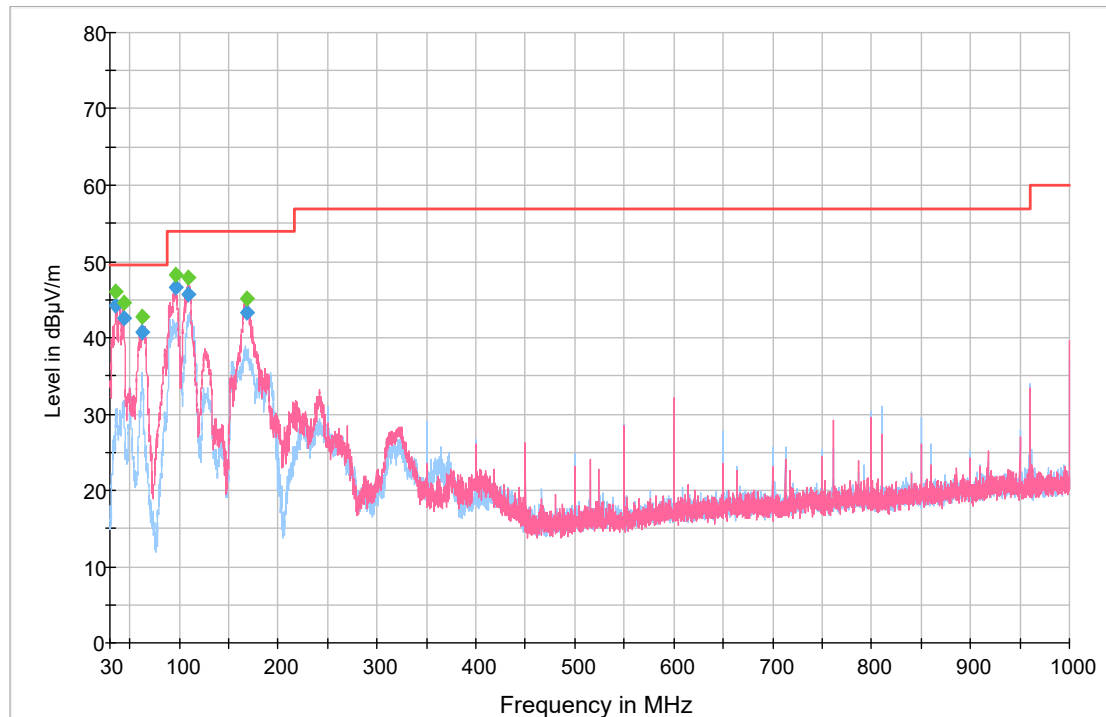
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NOTES: 24Vdc, Dipole Antenna

**Radiated Emissions 30 – 1000 MHz
Vertical/Horizontal**



— Preview Result 1H-PK+ — Preview Result 1V-PK+
— FCC 15_QP Class A 3m 30mhz-1ghz ◆ Final_Result QPK
◆ Final_Result PK+

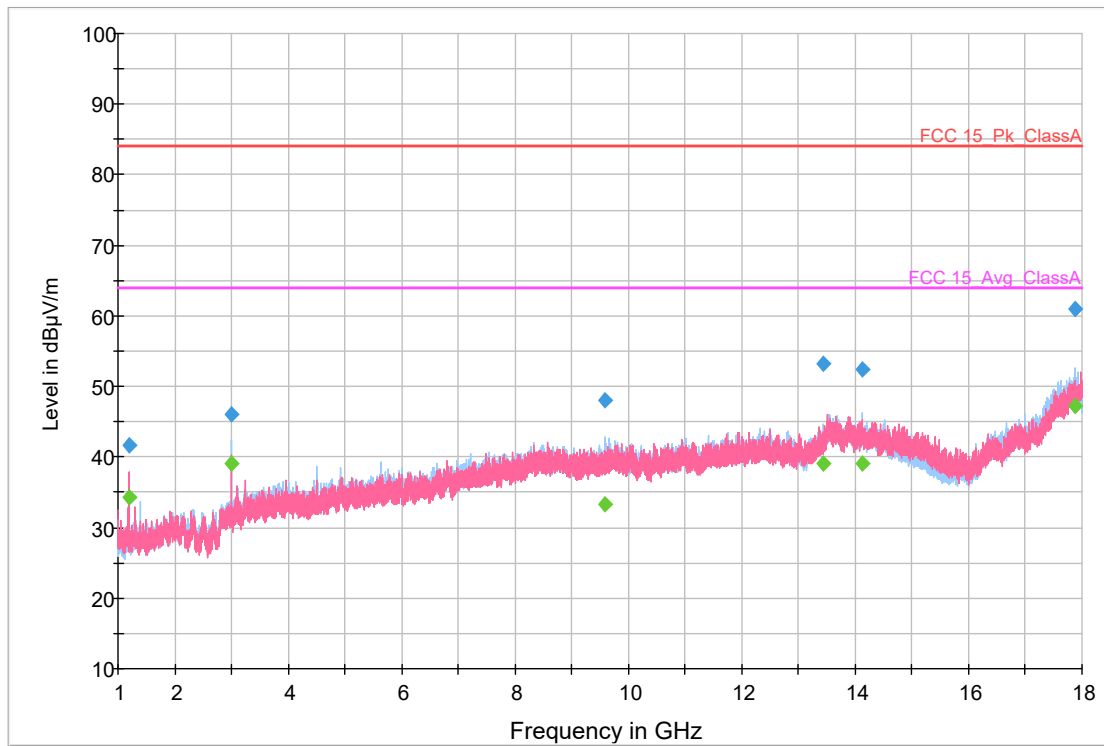
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NOTES: 24Vdc, SharkFin Antenna

Radiated Emissions 1 – 18 GHz
Vertical/Horizontal



Preview Result 1H-PK+ Preview Result 1V-PK+ FCC 15_Pk_ClassA
FCC 15_Avg_ClassA Final Result PK+ Final Result AVG

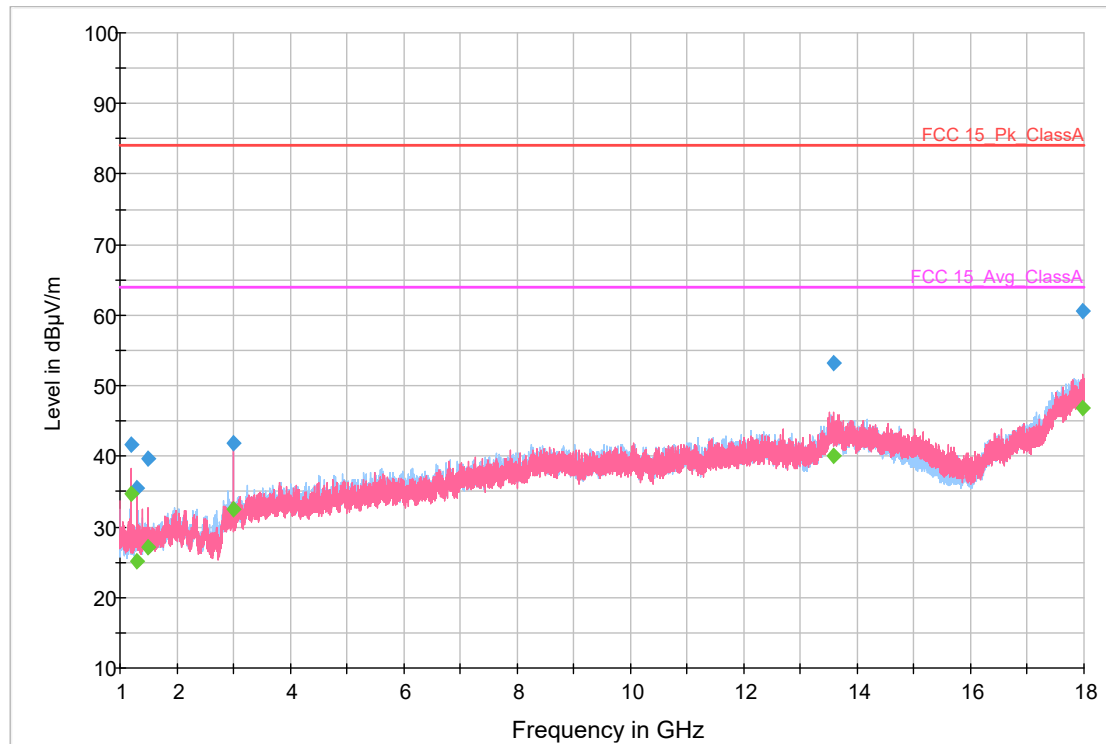
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NOTES: 24Vdc, Dipole Antenna

**Radiated Emissions 1 – 18 GHz
Vertical/Horizontal**



Preview Result 1H-PK+ Preview Result 1V-PK+ FCC 15_Pk_ClassA
FCC 15_Avg_ClassA Final_Result PK+ Final_Result AVG

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4.1.6 Final Tabulated Data

30-1000 MHz –

24Vdc, SharkFin Antenna

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
40.970180	---	48.02	---	---	1000.0	120.000	100.0	V	61.0	-11.1
40.970180	46.18	---	49.54	3.36	1000.0	120.000	100.0	V	61.0	-11.1
44.650000	---	42.70	---	---	1000.0	120.000	100.0	V	246.0	-10.4
44.650000	40.65	---	49.54	8.89	1000.0	120.000	100.0	V	246.0	-10.4
61.692300	---	44.36	---	---	1000.0	120.000	155.0	V	243.0	-12.1
61.692300	42.33	---	49.54	7.21	1000.0	120.000	155.0	V	243.0	-12.1
96.060000	---	46.88	---	---	1000.0	120.000	104.0	V	154.0	-14.0
96.060000	45.19	---	53.97	8.78	1000.0	120.000	104.0	V	154.0	-14.0
110.992000	46.32	---	53.97	7.65	1000.0	120.000	100.0	V	151.0	-13.3
110.992000	---	48.17	---	---	1000.0	120.000	100.0	V	151.0	-13.3
165.492340	41.69	---	53.97	12.28	1000.0	120.000	100.0	V	112.0	-16.1
165.492340	---	43.49	---	---	1000.0	120.000	100.0	V	112.0	-16.1

24Vdc, Dipole Antenna

Frequency (MHz)	QuasiPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
35.823000	44.24	---	49.54	5.30	1000.0	120.000	100.0	V	238.0	-12.8
35.823000	---	46.02	---	---	1000.0	120.000	100.0	V	238.0	-12.8
43.879700	42.63	---	49.54	6.91	1000.0	120.000	100.0	V	118.0	-10.5
43.879700	---	44.52	---	---	1000.0	120.000	100.0	V	118.0	-10.5
62.158220	---	42.74	---	---	1000.0	120.000	176.0	V	274.0	-12.3
62.158220	40.75	---	49.54	8.79	1000.0	120.000	176.0	V	274.0	-12.3
96.248080	---	48.31	---	---	1000.0	120.000	100.0	V	181.0	-13.9
96.248080	46.58	---	53.97	7.39	1000.0	120.000	100.0	V	181.0	-13.9
108.567000	45.61	---	53.97	8.36	1000.0	120.000	100.0	V	181.0	-13.1
108.567000	---	47.81	---	---	1000.0	120.000	100.0	V	181.0	-13.1
168.319000	43.27	---	53.97	10.70	1000.0	120.000	100.0	V	137.0	-16.0
168.319000	---	45.17	---	---	1000.0	120.000	100.0	V	137.0	-16.0

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1-18 GHz –

24Vdc, SharkFin Antenna

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1200.000000	41.69	---	84.00	42.31	1000.000	100.0	V	23.0	-7.1
1200.000000	---	34.37	64.00	29.63	1000.000	100.0	V	23.0	-7.1
3000.000000	46.03	---	84.00	37.97	1000.000	100.0	H	59.0	-0.6
3000.000000	---	39.01	64.00	24.99	1000.000	100.0	H	59.0	-0.6
9598.500000	48.02	---	84.00	35.98	1000.000	100.0	H	112.0	10.3
9598.500000	---	33.26	64.00	30.74	1000.000	100.0	H	112.0	10.3
13441.000000	---	39.06	64.00	24.94	1000.000	100.0	H	160.0	14.8
13441.000000	53.23	---	84.00	30.77	1000.000	100.0	H	160.0	14.8
14118.000000	---	39.10	64.00	24.90	1000.000	150.0	H	204.0	15.5
14118.000000	52.47	---	84.00	31.53	1000.000	150.0	H	204.0	15.5
17885.500000	60.99	---	84.00	23.01	1000.000	100.0	H	289.0	22.9
17885.500000	---	47.32	64.00	16.68	1000.000	100.0	H	289.0	22.9

24Vdc, Dipole Antenna

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1200.000000	---	34.68	64.00	29.32	1000.000	103.0	V	25.0	-7.1
1200.000000	41.59	---	84.00	42.41	1000.000	103.0	V	25.0	-7.1
1300.000000	---	25.05	64.00	38.95	1000.000	355.0	V	56.0	-6.9
1300.000000	35.55	---	84.00	48.45	1000.000	355.0	V	56.0	-6.9
1500.000000	39.71	---	84.00	44.29	1000.000	103.0	V	25.0	-6.8
1500.000000	---	27.17	64.00	36.83	1000.000	103.0	V	25.0	-6.8
3000.000000	---	32.51	64.00	31.49	1000.000	354.0	V	228.0	-1.1
3000.000000	41.84	---	84.00	42.16	1000.000	354.0	V	228.0	-1.1
13572.500000	---	40.13	64.00	23.87	1000.000	350.0	V	87.0	14.6
13572.500000	53.28	---	84.00	30.72	1000.000	350.0	V	87.0	14.6
17974.000000	60.64	---	84.00	23.36	1000.000	103.0	V	326.0	22.7
17974.000000	---	46.85	64.00	17.15	1000.000	103.0	V	326.0	22.7

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4.2 Conducted Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT on the AC power line that may affect the performance of other nearby electronic equipment.

4.2.1 Over View of Test

Results	Complies (as tested per this report)					Date	08/19/2022	
Standard	FCC Part 15 Subpart B:2022, ICES-003 Issue 7 (2020)							
Product Model	Cube Plus Global NA GCM				Serial#	A1NACPG1QA2205000001		
Configuration	See test plan for details.							
Test Set-up	Tested in shielded room, EUT placed on table. See test plans for details.							
EUT Powered By	24Vdc provided by external power supply	Temp	24°C	Humidity	40%	Pressure	1015 mbar	
Frequency Range	150 kHz - 30 MHz							
Perf. Criteria	Class A (Below Limit)	Perf. Verification		Readings Under Limit for L1 & Neutral				
Mod. to EUT	None	Test Performed By		Matthew Riego de Dios				

4.2.2 Test Procedure

Conducted and emissions tests were performed using the procedures of FCC Part 15 Subpart B:2022, ICES-003 Issue 7 (2020) and/or ANSI C63.4 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration. Further conducted emission tests were performed per the procedures stated in the other emissions standards listed in this report.

The frequency range from 150 kHz - 30 MHz was investigated for conducted emissions.

Conducted Emissions measurements were performed in the shielded room using procedures specified in the test plan and standard.

4.2.3 Deviations

There were no deviations from the test methodology listed in the test plan for the conducted emission test.

4.2.4 Final Test

All final conducted emissions measurements were below (in compliance) the limits.

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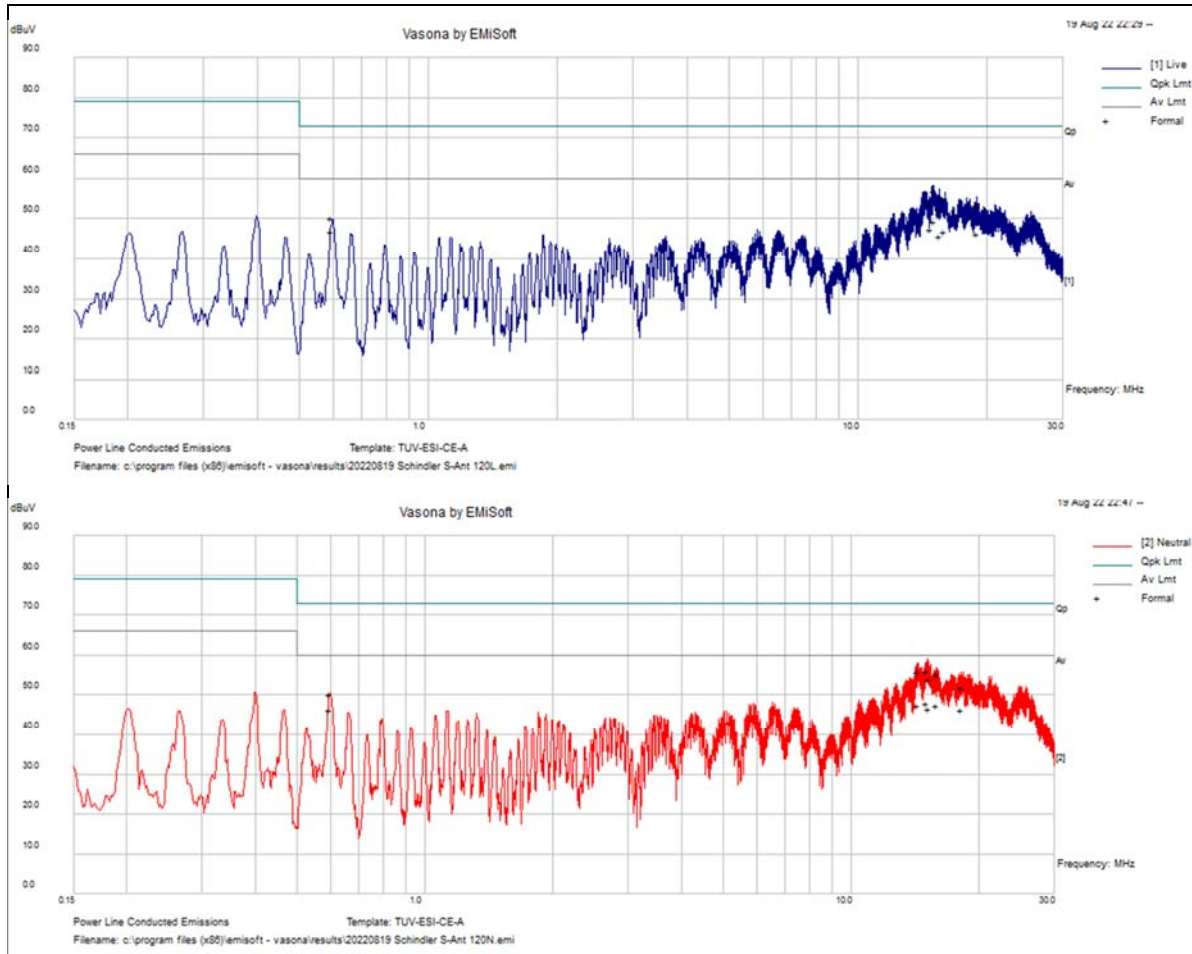
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4.2.5 Final Graphs

NOTES: SharkFin Antenna

Conducted Emissions @ 120V/60Hz Line/Neutral



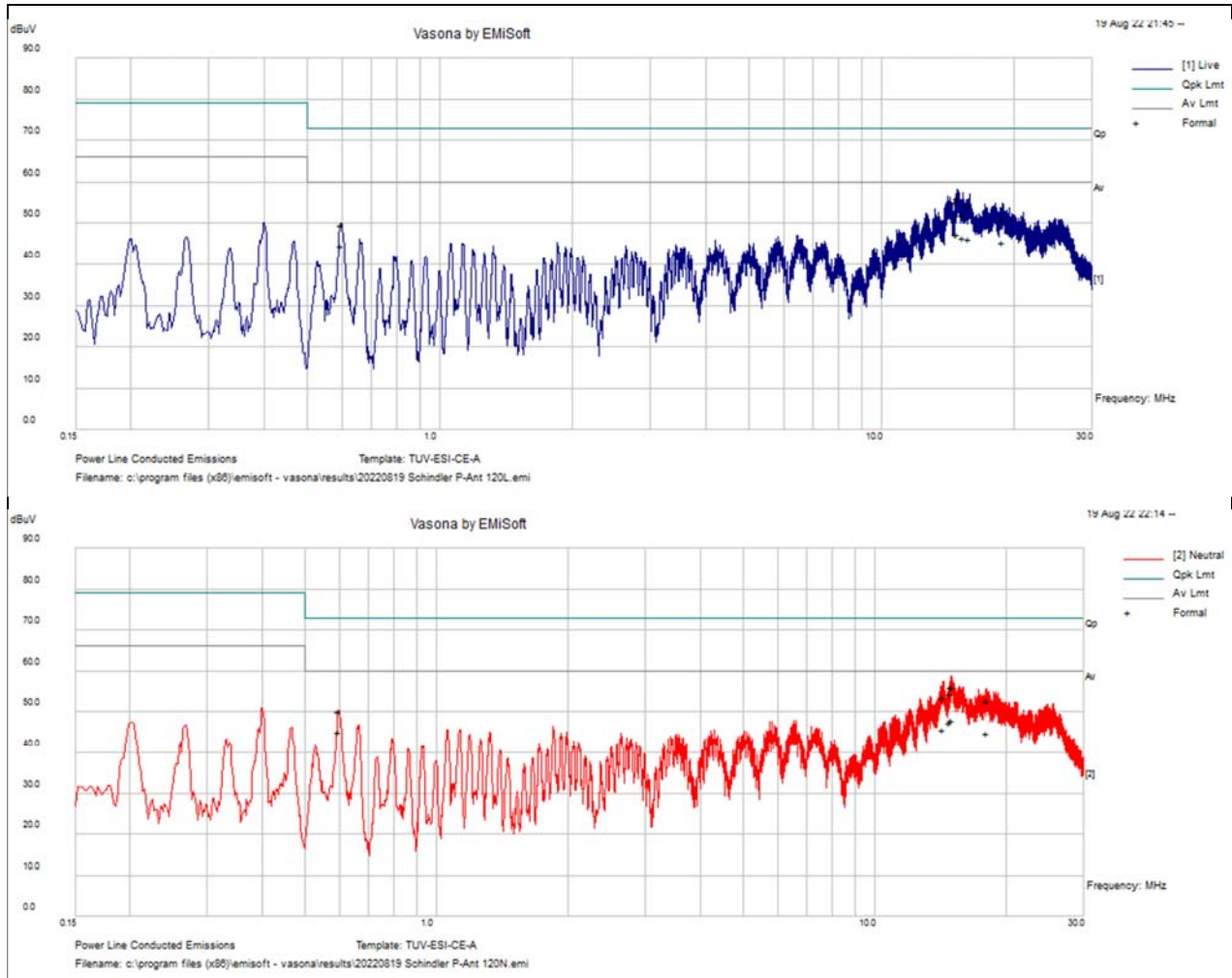
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NOTES: Dipole Antenna

**Conducted Emissions @ 120V/60Hz
Line/Neutral**



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4.2.6 Final Tabulated Data at 120V/60Hz

Line –

SharkFin Antenna

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB
15.00161	46.44	10.43	0.02	56.89	Quasi Peak	Live	73	-16.11
14.79439	43.34	10.42	0.02	53.78	Quasi Peak	Live	73	-19.22
15.4674	41.83	10.44	0.03	52.3	Quasi Peak	Live	73	-20.7
15.92306	44.45	10.45	0.03	54.93	Quasi Peak	Live	73	-18.07
18.89916	42.74	10.5	0.08	53.31	Quasi Peak	Live	73	-19.69
0.594832	40.08	10.12	0.03	50.22	Quasi Peak	Live	73	-22.78
15.00161	38.87	10.43	0.02	49.32	Average	Live	60	-10.68
14.79439	36.83	10.42	0.02	47.28	Average	Live	60	-12.72
15.4674	35.17	10.44	0.03	45.64	Average	Live	60	-14.36
15.92306	36.36	10.45	0.03	46.84	Average	Live	60	-13.16
18.89916	35.73	10.5	0.08	46.31	Average	Live	60	-13.69
0.594832	36.5	10.12	0.03	46.65	Average	Live	60	-13.35

Dipole Antenna

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB
14.79346	44.82	10.42	0.02	55.27	Quasi Peak	Live	73	-17.73
14.86533	45.58	10.43	0.02	56.02	Quasi Peak	Live	73	-16.98
15.32585	41.68	10.43	0.03	52.14	Quasi Peak	Live	73	-20.86
15.78928	43.79	10.44	0.03	54.26	Quasi Peak	Live	73	-18.74
18.79011	40.47	10.5	0.07	51.04	Quasi Peak	Live	73	-21.96
0.596882	39.41	10.12	0.03	49.56	Quasi Peak	Live	73	-23.44
14.79346	36.97	10.42	0.02	47.42	Average	Live	60	-12.58
14.86533	36.98	10.43	0.02	47.42	Average	Live	60	-12.58
15.32585	36.1	10.43	0.03	46.56	Average	Live	60	-13.44
15.78928	35.66	10.44	0.03	46.14	Average	Live	60	-13.86
18.79011	34.81	10.5	0.07	45.38	Average	Live	60	-14.62
0.596882	34.52	10.12	0.03	44.66	Average	Live	60	-15.34

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Neutral –

SharkFin Antenna

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB
15.07439	45.69	10.43	0.02	56.14	Quasi Peak	Neutral	73	-16.86
14.27916	45.29	10.41	0.02	55.72	Quasi Peak	Neutral	73	-17.28
15.22651	43.32	10.43	0.02	53.78	Quasi Peak	Neutral	73	-19.22
15.85759	44.75	10.45	0.03	55.23	Quasi Peak	Neutral	73	-17.77
18.13526	41.31	10.49	0.07	51.87	Quasi Peak	Neutral	73	-21.13
0.596727	40.08	10.12	0.03	50.22	Quasi Peak	Neutral	73	-22.78
15.07439	37.58	10.43	0.02	48.03	Average	Neutral	60	-11.97
14.27916	36.97	10.41	0.02	47.4	Average	Neutral	60	-12.6
15.22651	35.94	10.43	0.02	46.39	Average	Neutral	60	-13.61
15.85759	36.82	10.45	0.03	47.3	Average	Neutral	60	-12.7
18.13526	35.57	10.49	0.07	46.12	Average	Neutral	60	-13.88
0.596727	36.11	10.12	0.03	46.25	Average	Neutral	60	-13.75

Dipole Antenna

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB
14.93731	45.67	10.43	0.02	56.11	Quasi Peak	Neutral	73	-16.89
15.00137	45.75	10.43	0.02	56.2	Quasi Peak	Neutral	73	-16.8
14.88183	43.81	10.43	0.02	54.25	Quasi Peak	Neutral	73	-18.75
14.29719	43.01	10.41	0.02	53.45	Quasi Peak	Neutral	73	-19.55
17.97947	42.14	10.48	0.06	52.69	Quasi Peak	Neutral	73	-20.31
0.597068	39.9	10.12	0.03	50.05	Quasi Peak	Neutral	73	-22.95
14.93731	37.38	10.43	0.02	47.83	Average	Neutral	60	-12.17
15.00137	37.36	10.43	0.02	47.81	Average	Neutral	60	-12.19
14.88183	36.77	10.43	0.02	47.22	Average	Neutral	60	-12.78
14.29719	35.09	10.41	0.02	45.53	Average	Neutral	60	-14.47
17.97947	34.24	10.48	0.06	44.79	Average	Neutral	60	-15.21
0.597068	35	10.12	0.03	45.15	Average	Neutral	60	-14.85

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Appendix A

5 Test Plan

This test report is intended to follow the test plan outlined herein unless otherwise stated. The test plan provides product information, reference standards, and testing details. The product information below came via client, product manual, product itself and or the internet. Test procedure information will reference standards or internal TUV Rheinland NA procedures.

5.1 General Information

Client	Schindler Elevator Corporation
Address 1	20 Whippany Road
Address 2	Morristown, NJ 07960
Contact Person	Christopher Mason
Telephone	+1(862) 812-2799
Fax	N/A
e-mail	Christopher.mason@schindler.com

5.2 Model(s) Name

Cube Plus Global NA GCM

5.3 Type of Product

IoT Gateway Device

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5.4 Equipment Under Test (EUT) Description

Cube Plus Global NA GCM is a router/gateway designed to connect elevators and escalators to the Internet via mobile network. Data is collected from the connected device and sent securely to the Schindler IoEE cloud where it is processed. Along with controller and sensor data, video, pictures or digital signage content can also be transmitted bidirectionally. Voice communication is another important feature to comply with US Regulations. Voice calls initiated by an EN81-28 compliant alarm device is routed either through the GSM mobile network or through the Internet using VoIP. The configuration and diagnostic application on the iPhone communicates through BLE with the Cube Plus Global NA device and ensures efficient set up and error diagnostics of the connected devices (inside) and the services (outside). The device has the following ports:

- 4 Gbit ethernet ports
- 1 USB host
- 1 RS232-0 serial
- 1 RS232-1 serial
- 1 FXS port
- Power input (8-28 Vdc)
- 1 RS485 serial
- 1 Digital I&O
- 2 Antenna Connector ports

5.5 Wireless

☒	Yes	☐	No
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5.6 Testing Preparation

Schindler supplied two sets of antennas (One set of sharkfin and one set of Dipole), two samples of the “Cube Plus Global NA GCM”, one SIM card, one power cable with connectors for two units and a 110VAC to 24VDC power supply.

The Schindler supplied 110VAC power supply is not for testing and must not be located on the test bench.



Antennas should be spaced 1 meter apart from each other to ensure correct operation of the EUT.

Ethernet PORT may be wired as needed by TUV to connect to a laptop and directly access the device.

1. Connect antenna ports - Select one antenna type and connect that pair, installing them one meter apart
2. Sim Card (insert sim card if requiring debug – insert sim and inform us. We can remotely debug the device if required)
3. Power connection – 24VDC

5.7 General Product Information

Size	H	48 mm	W	150 mm	L	134 mm
Weight	0.3 kg		Fork-Lift Needed	No		
Notes						

5.8 Modifications

None.

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5.9 EUT Electrical Power Information

5.9.1 Electrical Power Type

☐	AC	☒	DC	☐	Batteries	☐	Host -
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5.9.2 Electrical Power Information

Name	Type	Voltage		Frequency	Current	Notes
		min	max			
N/A						
Notes	External Power supply provides necessary power (excluded from test scope).					

5.10 EUT Modes of Operation during Testing

The EUT only has one mode of operation. Once powered it is expected to operate as a cellular IoT Gateway. Providing the SIM card is inserted, and the antennas are installed it will continuously transmit to and receive data from our backend systems.

Some of the LEDs on the top left corner will blink or be constantly lit. This is not relevant for the testing of the device. See picture on previous page.

5.11 EUT Clock/Oscillator Frequencies

Please specify the maximum clock frequency used in the product – _____

In the table below, please specify other clock frequencies and sensitive operating frequencies in the product.

Clock Frequencies & Sensitive Frequencies
1 GHz for the CPU

5.12 Electrical Support Equipment

Type	Manufacturer	Model	Connected To
N/A			

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5.13 Non - Electrical Support Equipment

Item	Notes
Cellular Antennas	Part of assembly under test

5.14 EUT Equipment/Cabling Information

EUT Port	Connected To	Location	Length	Shielded / Unshielded
N/A				

5.15 Monitoring of EUT during Testing

Immunity testing was not performed.

5.16 EUT Configuration

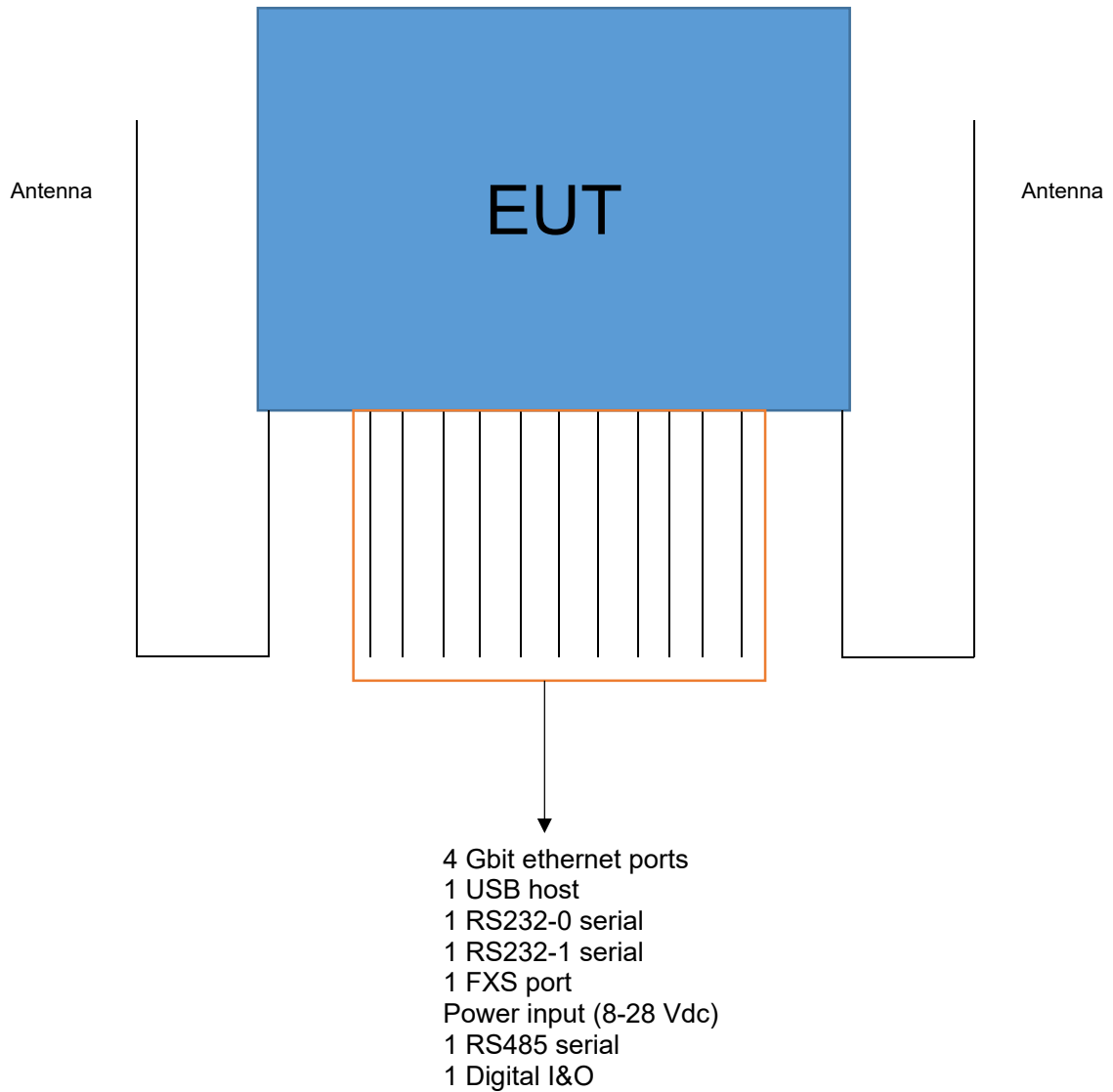
Configuration		Description
N/A		
Notes	All configurations are the same except as noted above	

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5.17 Block Diagram



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