CETECOM GmbH, Mündelheimer Weg 35, 40472 Düsseldorf (Germany)

SUMMATION REPORT

No.20-1-0081501T02

☒ **FINAL** CETECOM / EMC ☐ TEMPORARY

Product	: **Telematics device**	Written by	: P. Scheer
Type	: **Globehopper Crossmodal 3.0 Ex**		
Manufacturer	: **Nexxiot AG** **Hardstrasse 201** **8005 Zürich (Switzerland)**	Date	: 2021-Jan-04
Attn.	: **Mr. Dominik Dumancic**	mailed on :	emailed on :
Copy:	:		

Examination				Test report		
product related approval and Lab.No.	passed	not passed	passed with below mentioned modification	issued	Mark	date of issue
CETECOM						
20-1-0081501T02a	☒	☐	☐	☒		2021-Jan-04
20-1-0081501T02b	☒	☐	☐	☒		2021-Jan-04
20-1-0081501T02c	☒	☐	☐	☒		2021-Jan-04

Report / Remark : The above mentioned product was tested in according to the following standards:

Emission:

EN 50121-3-2:2016 including tests according to :

EN 61000-6-4:2007 +A1:2011

Immunity

EN 50121-3-2:2016 and 50155:2017* including tests according to :

EN 61000-4-2:2009, EN 61000-4-3:2006 + A1:2007 +A2:2010

Enclosures: Test Plan PP20-1-0081501T02, Test Reports TR20-1-0081501T02a to c

**Remark: EN 50155 tested concerning the electromagnetic compatibility exclusively - chapter 13.4.8 referring to the applicable test cases of EN 50121-3-2*

..... reviewed by *V. Briddigkeit*

..... prepared by P. Scheer

Test schedule and results – EMC - Immunity and Emission

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12047-01-01 D-PL-12047-01-03 D-PL-12047-01-04	cetecom Accredited EMC-Test Laboratory

Type of device		**Telematics device**
Type name		**Globehopper Crossmodal 3.0 Ex**
Manufacturer		**Nexxiot AG** **Hardstrasse 201** **8005 Zürich (Switzerland)**
Applicant		**Nexxiot AG** **Hardstrasse 201** **8005 Zürich (Switzerland)**
Test Standards	**Immunity:**	**EN 50121-3-2:2016 & EN 50155:2017*** **include tests according to :** EN 61000-4-2:2009 EN 61000-4-3:2006 + A1:2008 + A2:2010 **Remark: EN 50155 tested concerning the electromagnetic compatibility exclusively - chapter 13.4.8 referring to the applicable test cases of EN 50121-3-2*
	Emission:	**EN 50121-3-2:2016** **include tests according to :** EN 61000-6-4:2007 + A11:2011
Configuration and operation mode		See Test reports
Performance Criteria (Immunity)		According to EN 50121-3-2

Performance criterion A

The equipment shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

Test schedule and results – EMC - Immunity and Emission

Immunity:

Environmental phenomena	Basic standard	Test specification and units	Ports	required Performance criteria	Test results	Performed at
ESD	EN 61000-4-2	Direct & Indirect Contact disch. 6 kV	Enclosure (metallic parts)	B	**A / OK**	**CETECOM Test report No.: 20-1-0081502T01c**
ESD	EN 61000-4-2	Air discharge 8 kV	Enclosure (conducted area)	B	**A / OK**	**CETECOM Test report No.: 19-1-0081502T01c**
Radiated RF-Fields	EN 61000-4-3	80 -1000 MHz 20 V/m AM 80% (1 kHz)	Enclosure and connected cords	A	**A / OK**	**CETECOM Test report No.: 19-1-0081502T01b**
Radiated RF-Fields	EN 61000-4-3	1.4 -2.7 GHz 10 V/m AM 80% (1 kHz)	Enclosure and connected cords	A	**A / OK**	**CETECOM Test report No.: 19-1-0081502T01b**
Radiated RF-Fields	EN 61000-4-3	5.1 -6.0 GHz 3 V/m AM 80% (1 kHz)	Enclosure and connected cords	A	**A /OK**	**CETECOM Test report No.: 19-1-0081502T01b**

Emission:

Radiated Emission	EN 61000-6-4 + CISPR 16-3-2	30 - 1000 MHz	Enclosure 3 m Test site	Limits of EN 50121-3-2	**complied**	**CETECOM Test report No.: 20-1-0081501T02a**
Radiated Emission	EN 61000-6-4 + CISPR 16-3-2	1 - 6 GHz	Enclosure 3 m Test site	Limits of EN 50121-3-2	**complied**	**CETECOM Test report No.: 20-1-0081501T02a**

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Prüfbericht Nr.: 20-1-0081501T02a

Test report no.

Auftraggeber: **Nexxiot AG**
Applicant **Hardstrasse 201, 8005 Zürich (Switzerland)**

Prüfort: **CETECOM GmbH**
Test location **Mündelheimer Weg 35, 40472 Düsseldorf (Germany)**

Geräteart: **Telematics device**
Type of device

Typenbezeichnung des Prüfmusters: **Globehopper Crossmodal 3.0 Ex**
Type name of the sample

Herstellerwerk: **Nexxiot AG**
Manufacturer: **Hardstrasse 201, 8005 Zürich (Switzerland)**

Eingang des Prüfmusters: **2020-Nov-18** Musternummer : **20-1-00815S03_C01**
Arrival of the sample *Sample number*

Prüfgrundlage: **EN 50121-3-2:2016**
Bahnanwendungen – Elektromagnetische Verträglichkeit – Teil 3-2: Bahnfahrzeuge - Geräte
Applied Standard Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock - Apparatus

Prüfergebnis: ☒ **OK** ☐ **NG**
Test result

Abkürzungen: OK = entspricht der Prüfgrundlage / NG = entspricht nicht der Prüfgrundlage
Abbreviations : OK = complies to the standard / NG = does not comply to the standard

Überprüfung auf sachliche Richtigkeit :
Factual correctness examined

Geprüft durch: SOz
Tested by

Geprüft am: **2020-Dec-15**
Date of test

2021-Jan-04	*V. Briddigkeit*	**2021-Jan-04**	*P. Scheer*
Datum , *Date*	Unterschrift, *V. Briddigkeit* Test Lab Manager *signature*	Datum , *Date*	Unterschrift, *P. Scheer* Test Manager *signature*

Sonstiges : **Prüfaufbau nach EN 61000-6-4 mit den Grenzwerten der Tabelle 3 der EN 50121-3-2**
Others ***Test in accordance to EN 61000-6-4 with the limits of table 3 of EN 50121-3-***

Aufbewahrungsort des Prüflings : **Auftraggeber**
Place of deposit ***Applicant***

Die Prüfergebnisse beziehen sich ausschließlich auf den oben genannten Prüfgegenstand!
The test results relate exclusively to the abovementioned test object!

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I. Test Setup:

a) Measurement of the mains conducted emission in the frequency range of 0.15 up to 30 MHz
Not applicable for the EUT – DC powered device

The measurement of mains conducted emission has performed within a screened room according to EN 55016-2-1 chapter 7.4. One wall of the screened room served as the ground plane. The EUT has placed 0.4 m from the ground plane and connected to the artificial mains network.

b) Measurement of the radiated emission in the frequency range of 30 MHz up to 1 GHz
Applicable for the EUT: ☒

The measurement of radiated emission has performed according to EN 55016-2-3 chapter 7.6 in a test distance of 3 m within a semi-anechoic-chamber. The EUT has placed on a non-conducted turntable 0.8 m above the ground plane. The highest level of the electromagnetic radiation at each frequency, at both horizontal and vertical polarization, detected by fully rotating the turntable and by adjusting the height of the measurement antenna to maximum, has recorded as the level test result.

c) Measurement of the radiated emission in the frequency range of 1 GHz up to 6 GHz
Applicable for the EUT: ☒

The measurement of radiated emission has performed according to EN 55016-2-3 in a test distance of 3 m from an imaginary straight-line periphery describing a simple geometric configuration encompassing the EUT within a semi-anechoic-chamber. The EUT has placed on a wooden table 0.8 m above the ground plane. The highest level of the electromagnetic radiation at each frequency, at both horizontal and vertical polarisation, detected by fully rotating the turntable and by adjusting the height of the measurement antenna to maximum, has recorded as the radiation level test result.

II. Test Equipment:

type	model	ident-no.	next calibration
Semi anechoic chamber	Albatross Projects	25358	Internal verification (NSA) 07 / 2021
EMI Test Receiver 9 kHz - 7 GHz	Rohde & Schwarz ESR 7	25370	03 / 2021
Ultra-broadband antenna 30 MHz - 6 GHz	Rohde & Schwarz HL562E	25403	06 / 2021
Double Rigid Horn Antenna	Rohde & Schwarz HF907 800 MHz - 18 GHz	25310	07 / 2021
RF Cable (Entire Path)	GigaLane EMI Path 10 kHz – 18 GHz	C28, C35	Internal verification (NSA) 07 / 2021
Test Software	Rohde & Schwarz EMC32 Vers. 10.4	25235	- -
Antenna Tower & Controller	Maturo MAM 4.5P NCD	25360 25361	- -

III. Configuration of EUT:

During the measurements, the following external cables were equipped to EUT:

none external cables	

IV. Operating mode of EUT:

During the test of radiated emission, the EUT has driven with the following power supply specification:

Supply type		*Voltage*	*Firmware. Vers.*	*HW Vers.*
☐ AC, Frequency: - - Hz ☐ single-phase ☐ three-phase ☐ PE connector	☒ DC	2.4 V powered by internal rechargeable battery	EMC_RED_Test	AX.3A
Dimensions of EUT (L x W x H): 310 mm x 110 mm x 50 mm				

Tested mode: All Systems (LTE, GSM, GNSS, BT) active

V. Environnemental conditions during the tests:

During radiated emission test:

Temperature:	**21.5 °C**
Rel. Humidity:	**39 %**
Air Pressure:	**1006 hPa**

VI Test Results:

This Test Report documents that the EUT is tested and measured against defined specifications. Measurement results are located usually in the corresponding interval with a probability of approx. 95% (coverage factor k=2).

The measurement uncertainties for the entire test site has calculated with following value:

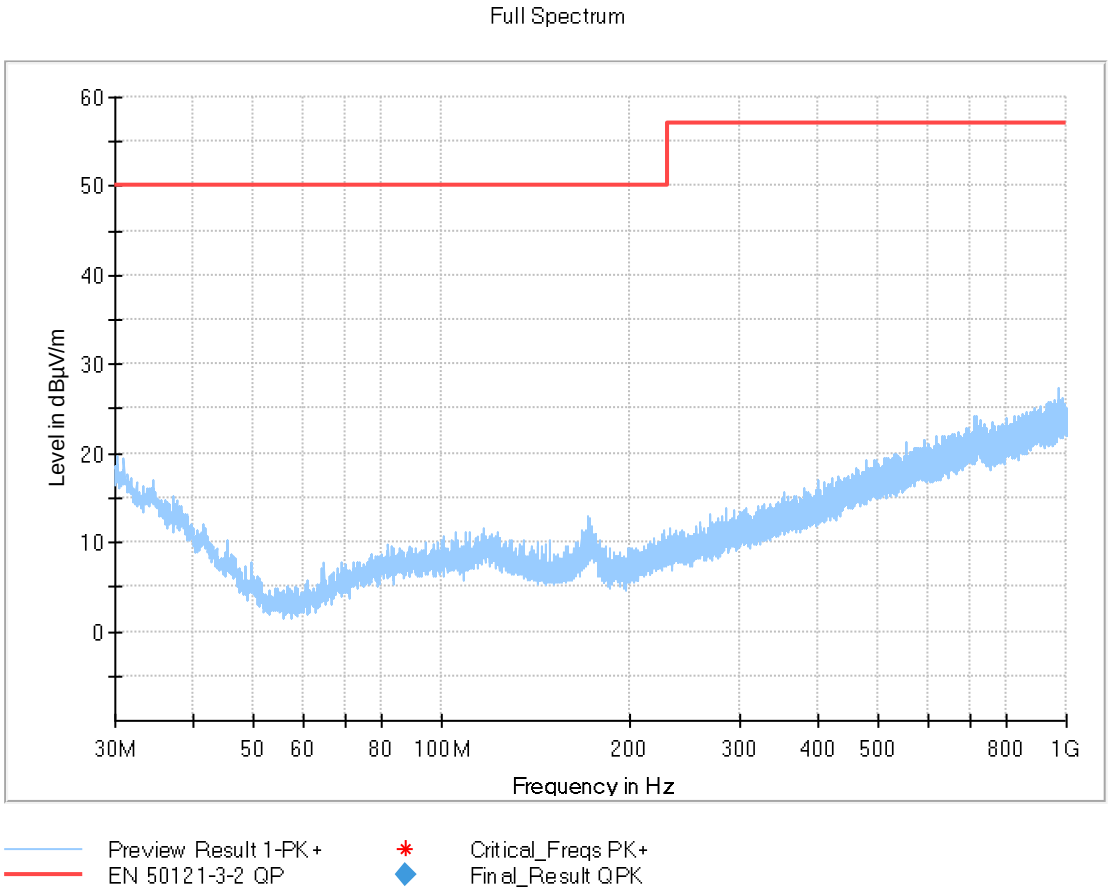
Radiated emission:	30 – 300 MHz	= 4.28 dB
	300 -1000 MHz	= 4.18 dB
	1 – 6 GHz	= 4.6 dB / SVSWR = < 4 dB
	Antenna R&S HL562E / Test distance = 3 m	
	w = > 3.46 m – 1 GHz / > 1.89 m – 2 GHz / > 1.89 – 4 GHz / >1.44 – 6 GH	

VI.a Radiated emission in 3 meter test distance within semi-anechoic chamber

VI.a.1 Scan in the frequency range from *30 MHz up to 1000 MHz* with horizontal and vertical antenna polarisation

The Scan test results were measured with the following test-receiver adjustments:

Detector:	Peak	QPeak
Attenuation:	0 dB	0 dB
Resolution bandwidth:	120 kHz	120 kHz
Step Size:	40 kHz	selected frequency
Detector Meas-Time:	10 ms	1 s
Preamp:	on	on



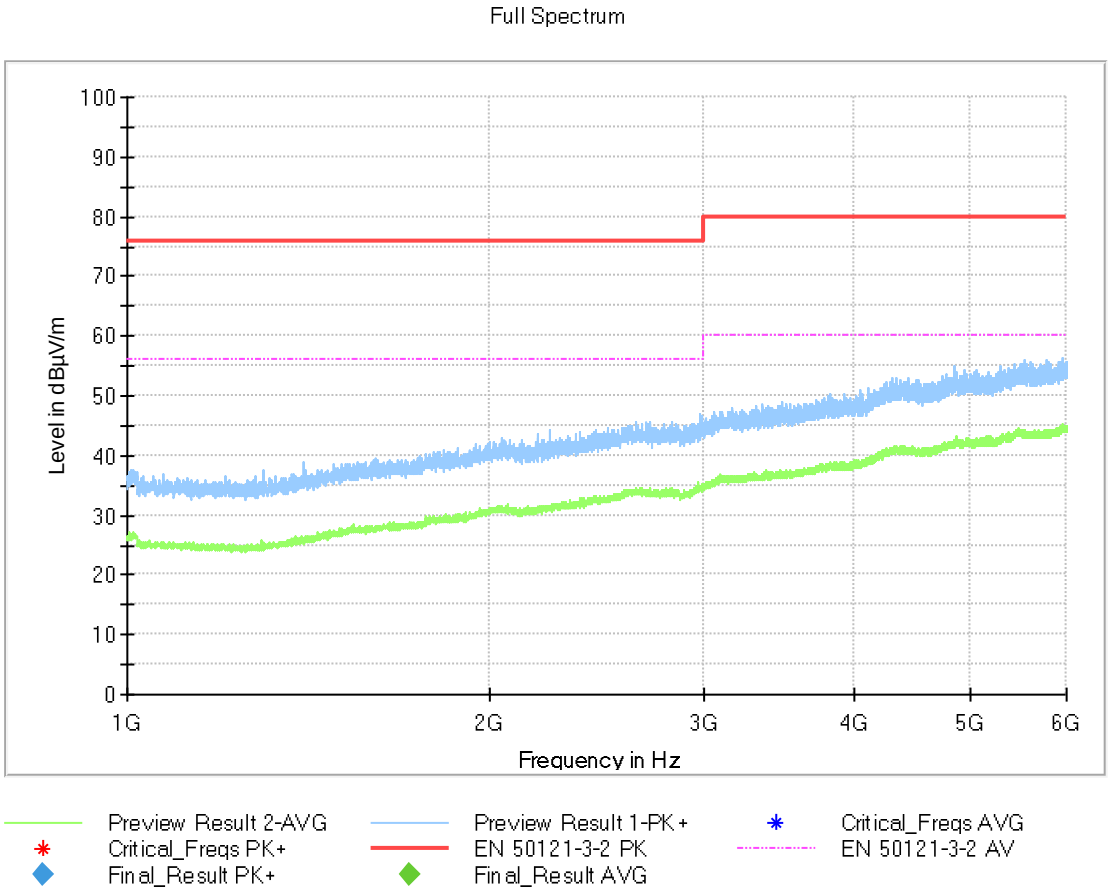
Final QP measurement of conspicuous Peak frequency

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
No furconspicuous frequency found – margin to limit > 10 dB (Peak)								

VI.a.2 Scan in the frequency range from *1000 MHz up to 6000 MHz* with horizontal & vertical antenna polarisation

The Scan test results were measured with the following test-receiver adjustments:

Detector:	Peak	Average
Attenuation:	10 dB	10 dB
Resolution bandwidth:	1 MHz	1 MHz
Step Size:	400 kHz	400 kHz
Detector Meas-Time:	10 ms	10 ms
Preamp (20 dB):	on	on



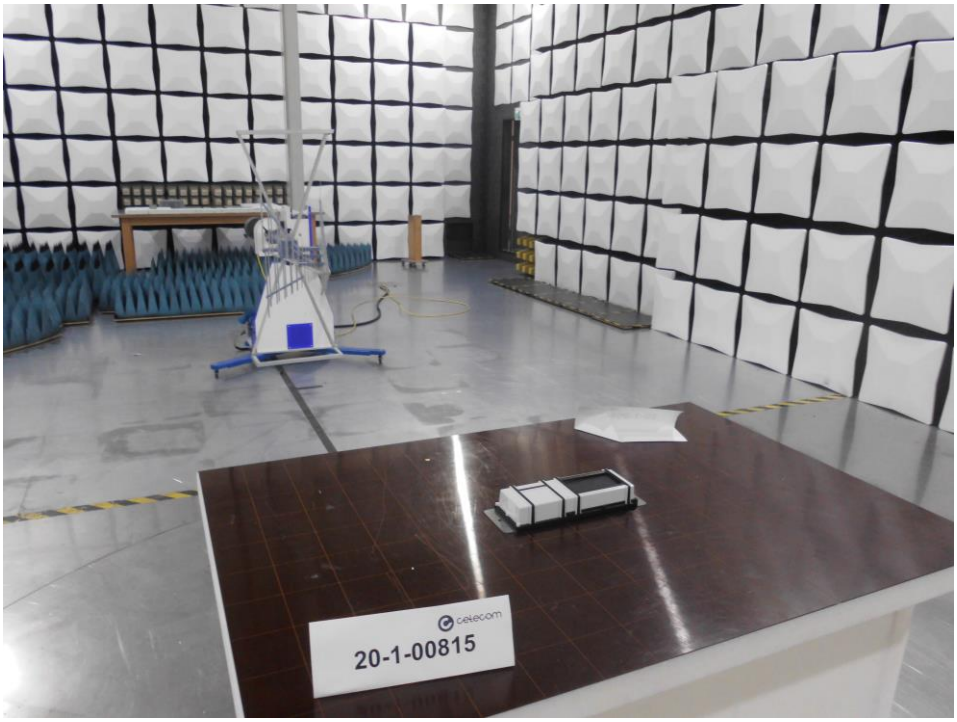
Final result of conspicuous Peak & Average frequency

Frequency (MHz)	MaxPeak (dBµV/m	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
No conspicuous frequency detected – Margin to limit > 10 dB (Peak / Average)									

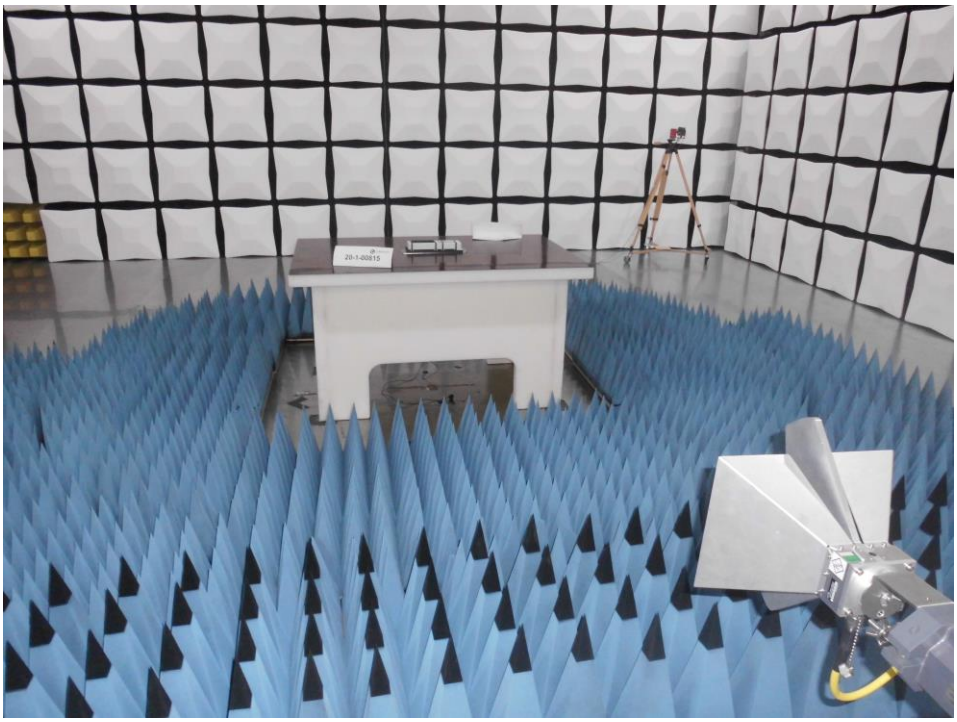
VII. Pictures:

Picture 1: Radiated Emission 30 MHz - 1 GHz – Setup front side view

Picture 2: Radiated Emission 30 MHz - 1 GHz – Setup rear side view



Picture 3: Setup Radiated emission > 1 GHz - front side view



Picture 4: Setup Radiated emission > 1 GHz - rear side view

VIII. Revision Status of Report:

Version	Reason of revision / History	Date
-	Initial Report	2021-Jan-04
-	-	-

----------End of Report----------

Prüfbericht Nr.: 20-1-0081501T02b

Test report no.

Auftraggeber: **Nexxiot AG**
Applicant **Hardstrasse 201, 8005 Zürich (Switzerland)**

Prüfort: **CETECOM GmbH**
Test location **Mündelheimer Weg 35, 40472 Düsseldorf (Germany)**

Geräteart: **Telematics device**
Type of device

Typenbezeichnung des Prüfmusters: **Globehopper Crossmodal 3.0 Ex**
Type name of the sample

Herstellerwerk: **Nexxiot AG**
Manufacturer: **Hardstrasse 201, 8005 Zürich (Switzerland) (France)**

Eingang des Prüfmusters: **2020-Nov-18** Musternummer : **20-1-00815S03_C01**
Arrival of the sample *Sample number*

Prüfgrundlage: **EN 61000-4-3:2006 +A1:2008 +A2:2010**
Störfestigkeit gegen hochfrequente elektromagnetische Felder
Applied Standard *IEC 61000-4-3:2006 + A1:2007 +A2:2010*
Radiated, radio-frequency electromagnetic field immunity test

Prüfergebnis: ☒ **OK** ☐ **NG**
Test result

Abkürzungen: OK = entspricht der Prüfgrundlage / NG = entspricht nicht der Prüfgrundlage
Abbreviations : OK = complies to the standard / NG = does not comply to the standard

Überprüfung auf sachliche Richtigkeit :
Factual correctness examined

Geprüft durch: SOz
Tested by
Geprüft am: **2020-Dec-15**
Date of test

2021-Jan-04	V. Briddigkeit	**2020-Jan-04**	P. Scheer
Datum , *Date*	Unterschrift, *V. Briddigkeit Test Lab Manager signature*	Datum , *Date*	Unterschrift, *P. Scheer Test Manager signature*

Sonstiges : **Prüfung gemäß den Anforderungen nach EN 50121-3-2:2016**
Others ***Test performed in accordance to EN 50121-3-2:2016***

Aufbewahrungsort des Prüflings : **Auftraggeber**
Place of deposit ***Applicant***

Die Prüfergebnisse beziehen sich ausschließlich auf den oben genannten Prüfgegenstand!
The test results relate exclusively to the abovementioned test object!

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I. Test Setup:

I.a Radiated electromagnetic field immunity test in the frequency range from 80 MHz to 6 GHz - General set up

The radiated electromagnetic field immunity test has performed on a 3 m test site within a semi anechoic chamber according to EN 61000-4-3. The EUT has placed on a non-metallic turn-table 0.8 m above the ground plane. An area of 2.4 m x 2.4 m absorbing ferrite material has placed between the antenna and the turn-table to reduce reflections from the ground plane. The EUT has tested at each side (front, right, left, rear) with both horizontal and vertical antenna polarisation, after a previous reference field verification.

Remark: High field strength in lower frequency range (< 300 MHz) need special absorber layout (placing of add. ferrite tiles)

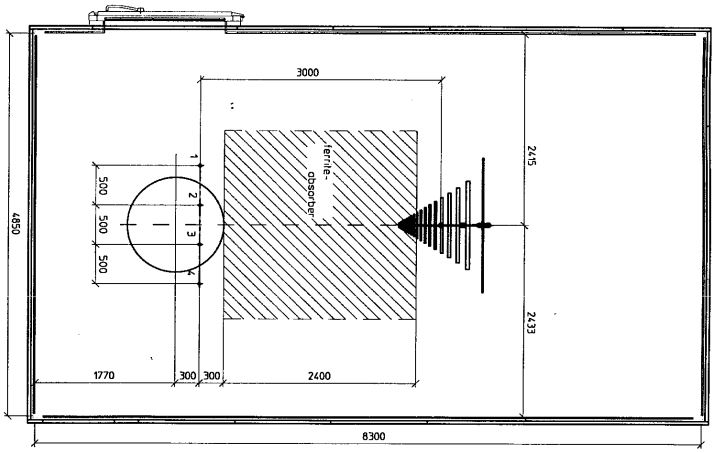


Figure 1: Test facility set up for the radiated em-field immunity test

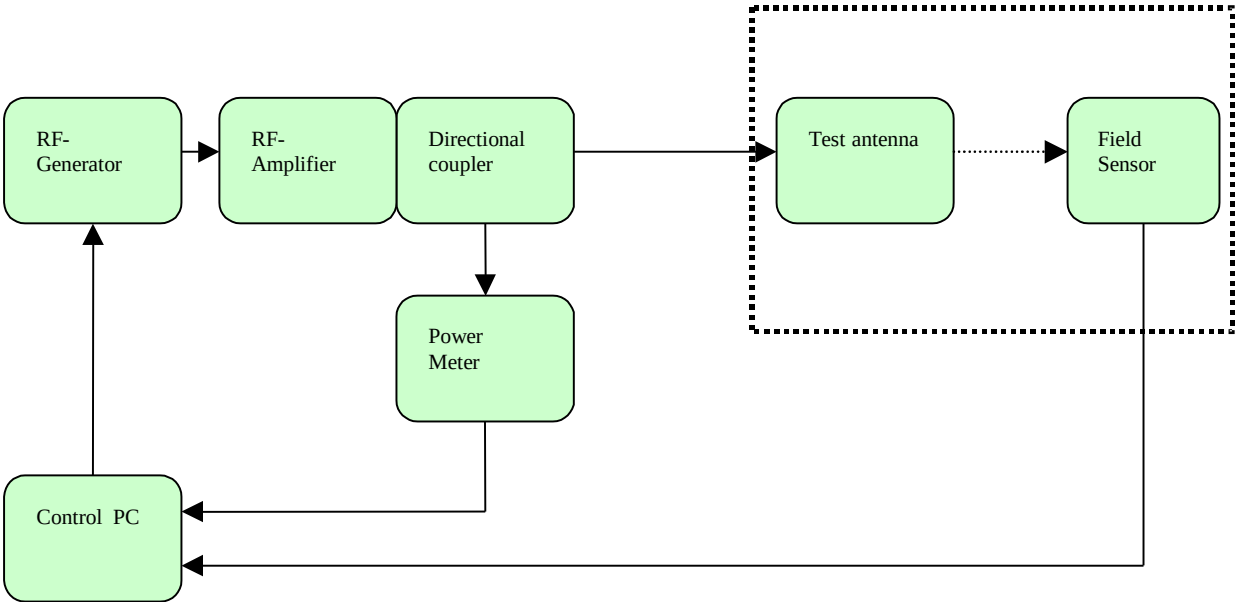


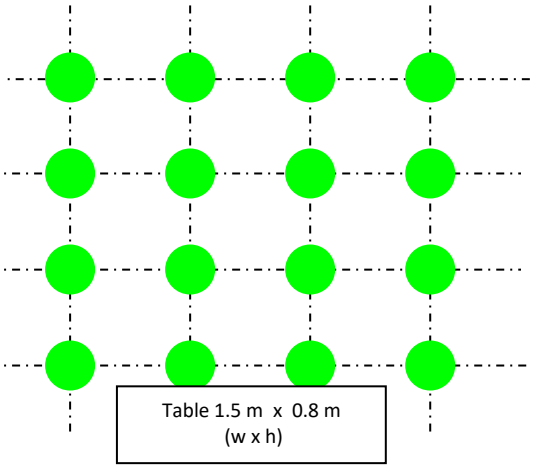
Figure 2: Test equipment set up for the radiated em-field uniformity verification

I.b Verification of uniform area with horizontal & vertical polarisation in the frequency range 80 MHz to 1000 MHz

I.b.1 selected parameters for the verification

Frequency range:	80 MHz to 1000 MHz
Step width:	1 %
Modulation:	none
Field strength used for verification	36 V/m

I.b.2 analyzed uniform area

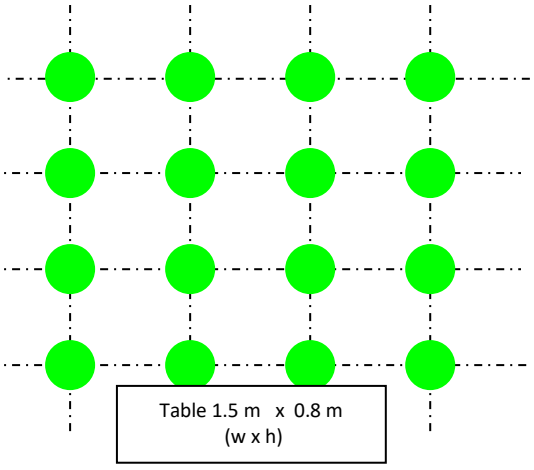


I.c Verification of uniform area with horizontal & vertical polarisation in the frequency range 1000 MHz to 6000 MHz

I.c.1 selected parameters for the verification

Frequency range:	1000 MHz to 6000 MHz
Step width:	1 %
Modulation:	none
Field strength used for verification	18 V/m

I.c.2 analyzed uniform area



II. Test equipment:

Type	model	ident-no.	next verification
Semi anechoic chamber	Albatross Projects	25358	Internal verification (FU) 12 / 2021
Signal Generator	Rohde & Schwarz SMB 100A 9 kHz - 6 GHz	25312	07 / 2021
HF-Amplifier 1 with Directional Coupler (FWD/REV)	Rohde & Schwarz BBA 150 – Band A/B 80 MHz - 1 GHz / 250 W	25351	Verification before each test
HF-Amplifier 2 with Directional Coupler (FWD/REV)	Rohde & Schwarz BBA 150 – Band C 800 MHz - 3 GHz / 110 W	25349	Verification before each test
HF-Amplifier 3 with Directional Coupler (FWD/REV)	Rohde & Schwarz BBA 150- Band D 2.5 GHz - 6 GHz / 100 W	25350	Verification before each test
Ultra-Broadband Antenna (used for 80 MHz – 3 GHz)	Rohde & Schwarz HL562E 80 MHz - 6 GHz	25403	07 / 2021
Double Rigid Horn Antenna (used for 3 – 6 GHz)	Rohde & Schwarz HF907 800 MHz - 18 GHz	25310	07 / 2021
RF Power Meter	Rohde & Schwarz NRP DC – 18 GHz	25353	05 / 2021
RF Probe FWD PWR	NRP-Z91 DC – 18 GHz Rohde & Schwarz	25354	05 / 2021
RF Probe REV PWR	NRP-Z91 DC – 18 GHz Rohde & Schwarz	26355	05 / 2021
Switch Matrix	OSP DC – 18 GHz ETS-Lindgren	25352	Verification before each test
RF Field Sensor	HI-6005 100 kHz – 6 GHz	25248	07 / 2022
RF Cable (Entire Path)	GigaLane Entire EMS Path 10 kHz – 6 GHz	C18, C31	07 / 2021
Test Software	Rohde & Schwarz EMC32 Vers. 10.4	25235	- -
Antenna Tower & Controller	Maturo MAM 4.5P NCD	25360 25361	- -

III. Configuration of EUT:

During the measurements, the following external cables were equipped to EUT:

none external cables	

IV. Operating mode of EUT:

During the test of radiated immunity, the EUT has driven with the following power supply specification:

Supply type		*Voltage*	*SW. Vers.*	*HW Vers.*
☐ AC, Frequency: - - Hz ☐ single-phase ☐ three-phase ☐ PE connector	☒ DC	2.4 V powered by internal rechargeable battery	EMC_RED_Test	AX.3A
Dimensions of EUT (L x W x H): 310 mm x 110 mm x 50 mm				

Tested mode: All Systems (LTE, GSM, GNSS, BT) active
Monitoring: All Systems were checked via customer Laptop and Software, after each rotation of the dish and after each change of the antenna polarization

Required performance criteria (A): No degradation of function permitted

V. Environnemental conditions during the tests:

Temperature: **21.5 °C**
Rel. Humidity: **39.0 %**
Air Pressure: **1006 hPa**

VI. Test results:

VI.a – Result – Test 80 - 1000 MHz – Mode: LTE

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	20 V/m	80 MHz to 1 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.b – Result – Test 1.4 – 2.7 GHz – Mode: LTE

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	10 V/m	1.4 – 2.7 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.c – Result – Test 5.1 - 6 GHz – Mode: LTE

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	3 V/m	5.1 – 6 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.d – Result – Test 80 - 1000 MHz – Mode: GSM

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	20 V/m	80 MHz to 1 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.e – Result – Test 1.4 – 2.7 GHz – Mode: GSM

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	10 V/m	1.4 – 2.7 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.f– Result – Test 5.1 - 6 GHz – Mode: GSM

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	3 V/m	5.1 – 6 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.g – Result – Test 80 - 1000 MHz – Mode: GNSS

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	20 V/m	80 MHz to 1 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.h – Result – Test 1.4 – 2.7 GHz – Mode: GNSS

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	10 V/m	1.4 – 2.7 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.i– Result – Test 5.1 - 6 GHz – Mode: GNSS

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	3 V/m	5.1 – 6 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.j – Result – Test 80 - 1000 MHz – Mode: BT

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	20 V/m	80 MHz to 1 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.k – Result – Test 1.4 – 2.7 GHz – Mode: BT

Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	10 V/m	1.4 – 2.7 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VI.l– Result – Test 5.1 - 6 GHz – Mode: BT

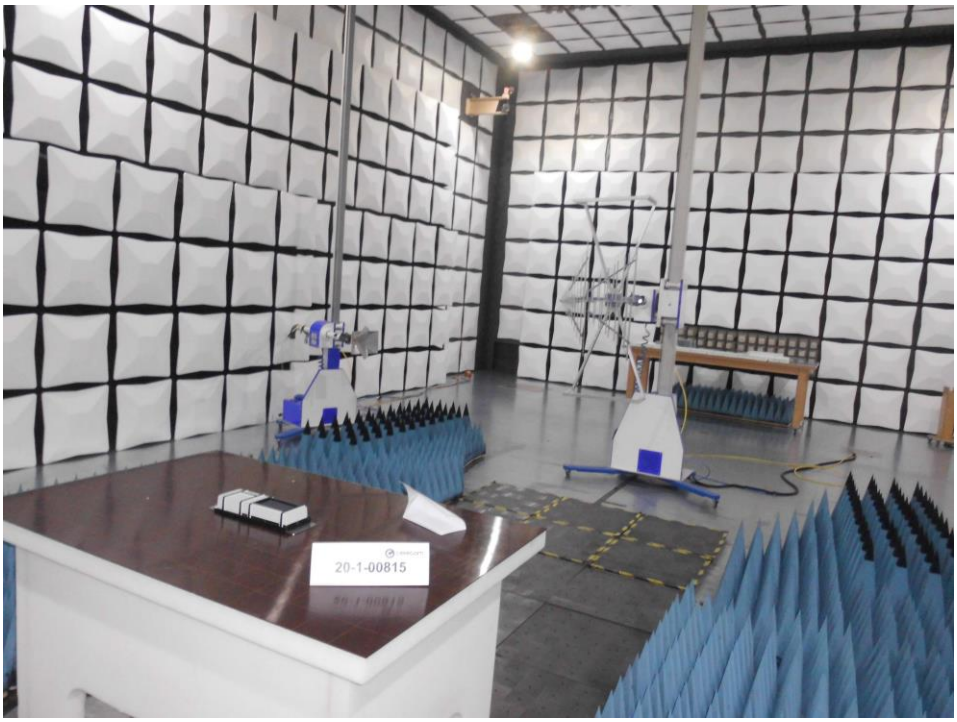
Test condition	Field strength	Frequency range	Step size	Modulation
Dwell time 1s	3 V/m	5.1 – 6 GHz	1%[1)]	80% AM, 1kHz

[1)] The frequency range has passed through in steps of 1% of the starting frequency and after that 1% of the preceding frequency

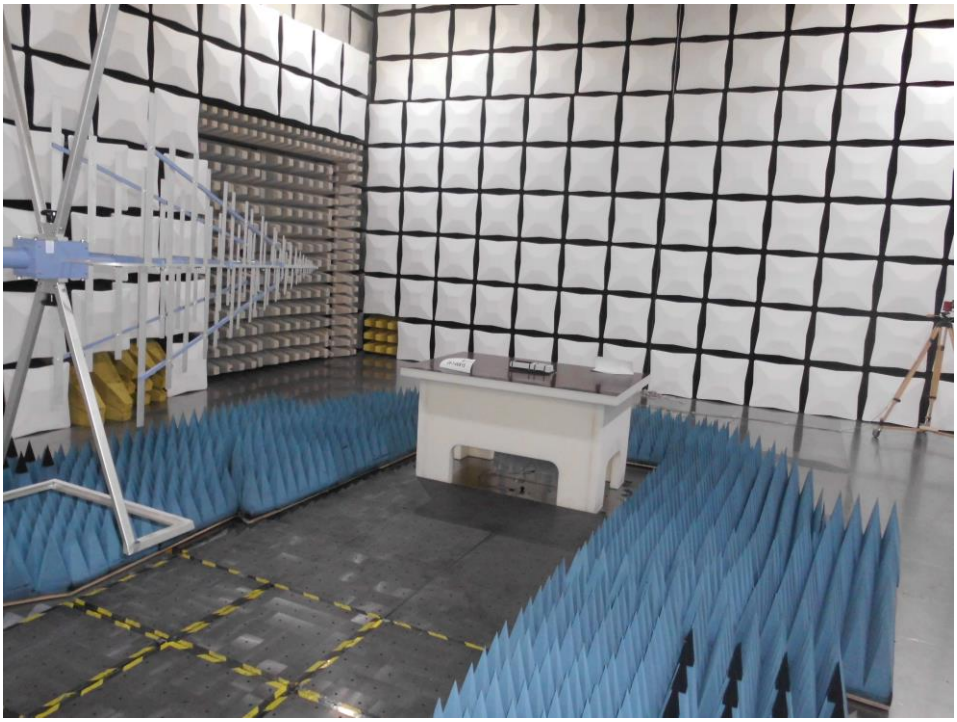
Polarization	Radiated Surface	Comment	Performance criteria	Test result
V	Front side	**No reaction recognized**	A	A
V	Right side	**No reaction recognized**	A	A
V	Rear side	**No reaction recognized**	A	A
V	Left side	**No reaction recognized**	A	A
H	Front side	**No reaction recognized**	A	A
H	Right side	**No reaction recognized**	A	A
H	Rear side	**No reaction recognized**	A	A
H	Left side	**No reaction recognized**	A	A

VII. Pictures:

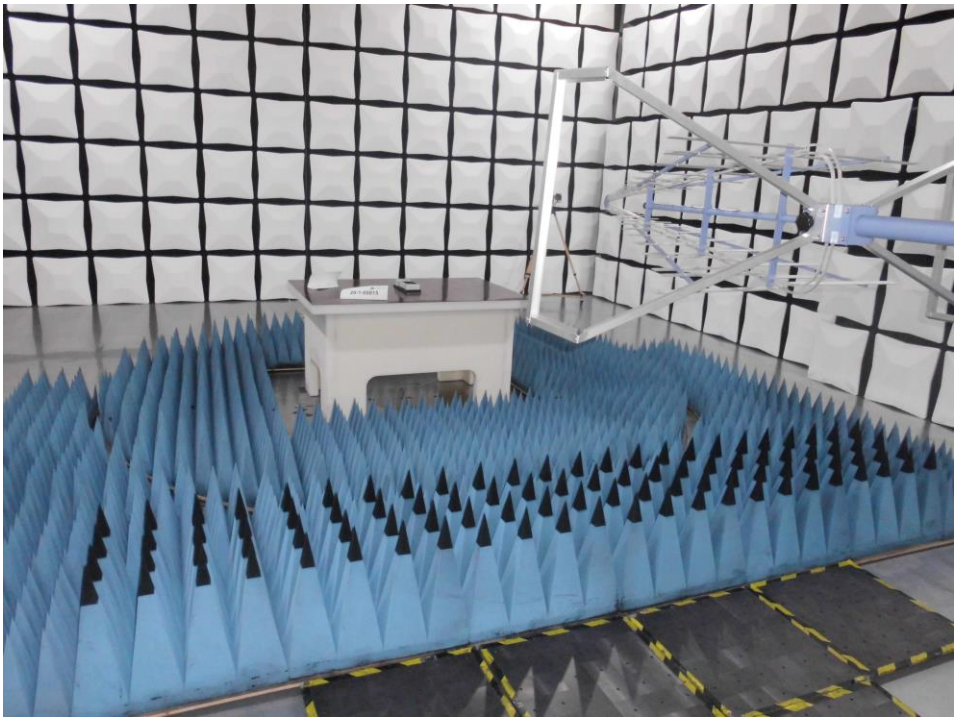
Picture 1: Test setup RF fields Immunity Test 80 MHz to 300 MHz (setup rear side view)



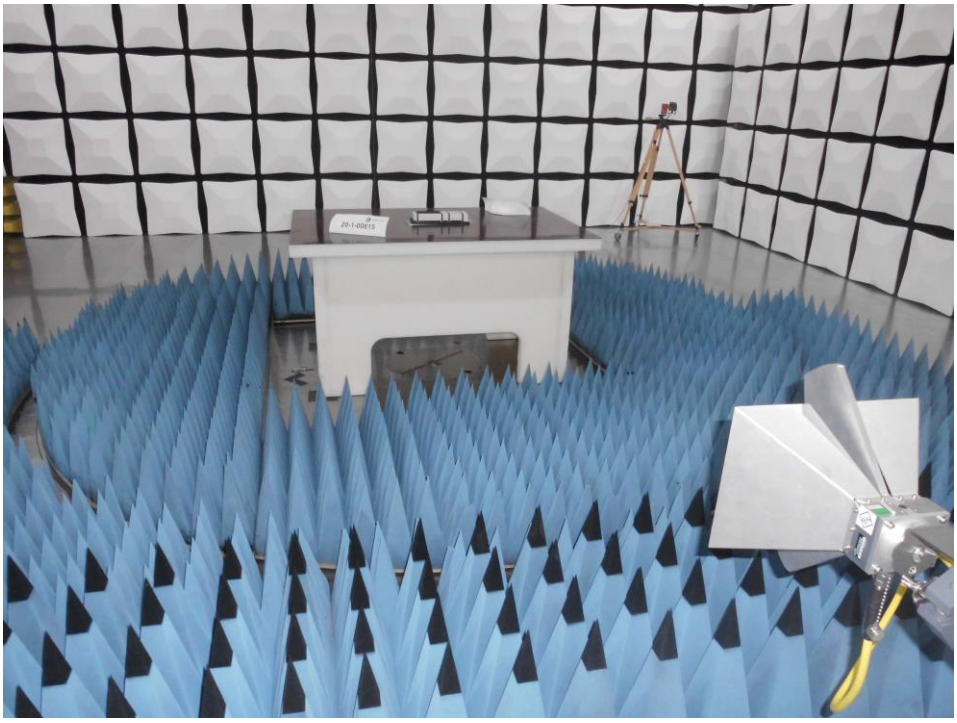
Picture 2: Test setup RF fields Immunity Test 80 MHz to 300 MHz (setup front side view)



Picture 3: Test setup RF fields Immunity Test 300 MHz to 2700 MHz (setup front side view)



Picture 4: Test setup RF fields Immunity Test 5.1 – 6 GHz (setup front side view – test with 3 V/m)



Picture 5: Test setup RF fields Immunity Test 5.1 – 6 GHz (setup rear side view – test with 3 V/m)

VIII. Revision Status of Report:

Version	Reason of revision / History	Date
-	Initial Report	2021-Jan-04
-	-	-

----------End of Report----------

Prüfbericht Nr.: 20-1-0081501T02c

Test report no.

Auftraggeber: **Nexxiot AG**
Applicant **Hardstrasse 201, 8005 Zürich (Switzerland)**

Prüfort: **CETECOM GmbH**
Test location **Mündelheimer Weg 35, 40472 Düsseldorf (Germany)**

Geräteart: **Telematics device**
Type of device

Typenbezeichnung des Prüfmusters: **Globehopper Crossmodal 3.0 Ex**
Type name of the sample

Herstellerwerk: **Nexxiot AG**
Manufacturer: **Hardstrasse 201, 8005 Zürich (Switzerland)**

Eingang des Prüfmusters: **2020-Nov-18** Musternummer : **20-1-00815S03_C01**
Arrival of the sample *Sample number*

Prüfgrundlage: **EN 61000-4-2:2009**
Prüfung der Störfestigkeit gegen die Entladung statischer Elektrizität
Applied Standard *IEC 61000-4-2:2008*
Electrostatic discharge immunity test

Prüfergebnis: ☒ **OK** ☐ **NG**
Test result

Abkürzungen: OK = entspricht der Prüfgrundlage / NG = entspricht nicht der Prüfgrundlage
Abbreviations : OK = complies to the standard / NG = does not comply to the standard

Überprüfung auf sachliche Richtigkeit :
Factual correctness examined

Geprüft durch: SOz
Tested by
Geprüft am: **2020-Dec-16**
Date of test

Datum ,	Unterschrift, *V. Briddigkeit*	Datum ,	Unterschrift, *G. Wege*
	Test Lab Manager		*Test Manager*
Date	*signature*	*Date*	*signature*
2021-Jan-04		**2021-Jan-04**	

Sonstiges : **Prüfung gemäß den Anforderungen nach EN 50121-3-2:2016**
Others ***Test performed in accordance to EN 50121-3-2:2016***

Aufbewahrungsort des Prüflings : **Auftraggeber**
Place of deposit ***Applicant***

Die Prüfergebnisse beziehen sich ausschließlich auf den oben genannten Prüfgegenstand!
The test results relate exclusively to the abovementioned test object!

cetecom GmbH
Mündelheimer Weg 35
40472 Düsseldorf
Tel. +49 (0) 211 171 497 0
Fax +49 (0) 211 171 497 27

I. Test Setup:

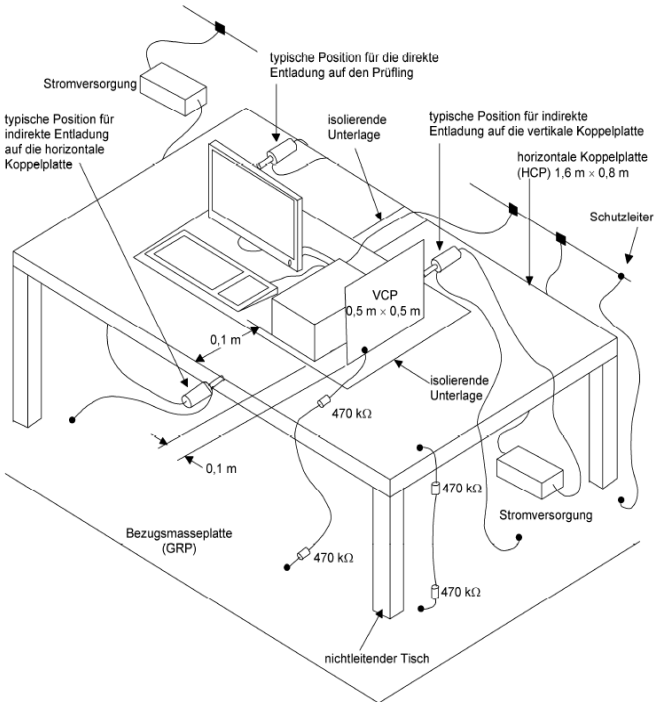
ESD

EN 61000-4-2 (ESD) chapter 7.2.1☒

The EUT has placed on a 1.6 m x 0.8 m horizontal coupling plane (HCP) according to EN 61000-4-2:2009 insulated by a 0.5 mm insulation support. The vertical coupling plane (VCP) has realized by a 0.5 m x 0.5 m metal plate that has located 0.1 m surround the EUT. The EUT has exposed to 40 discharges: 10 discharges to each of 4 sensitive test points.

II. Test equipment:

type	model	ident-no.	next calibration
ESD-Generator	EM Test ESD 30	25255	05 / 2021



III. Configuration of EUT:

During the measurements, the following external cables were equipped to EUT:

none external cables	

IV. Operating mode of EUT:

During the ESD test, the EUT has driven with the following power supply specification:

Supply type		*Voltage*	*SW. Vers.*	*HW Vers.*
☐ AC, Frequency: - - Hz ☐ single-phase ☐ three-phase ☐ PE connector	☒ DC	2.4 V powered by internal rechargeable battery	EMC_RED_Test	AX.3A
Dimensions of EUT (L x W x H): 310 mm x 110 mm x 50 mm				

Tested mode: All Systems (LTE, GSM, GNSS, BT) active
Monitoring: All Systems were checked via customer Laptop and software after each Test

Required performance min. criteria (B): No continuous degradation of function permitted – self recovering

V. Environnemental conditions during the tests:

Temperature:	**20.7 °C**
Rel. Humidity:	**46.0 %**
Air Pressure:	**1003 hPa**

VI. Test Result:

Table a / EN 61000-4-2 – Immunity against electrostatic discharges on the EUT
Mode : LTE

Examination	Level (+/- [kV]) and test result	Required performance criteria	Comment
ESD - Air discharge	+ 2 kV / A	B	No reaction recognized
	- 2 kV / A	B	No reaction recognized
	+ 4 kV / A	B	No reaction recognized
	- 4 kV / A	B	No reaction recognized
	+ 8 kV / A	B	No reaction recognized
	- 8 kV / A	B	No reaction recognized
ESD- Contact	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized
ESD –Indirect (HCP)	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized
ESD-Indirect (VCP)	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized

.

Table b / EN 61000-4-2 – Immunity against electrostatic discharges on the EUT
Mode: GSM

Examination	Level (+/- [kV]) and test result	Required performance criteria	Comment
ESD - Air discharge	+ 2 kV / A	B	No reaction recognized
	- 2 kV / A	B	No reaction recognized
	+ 4 kV / A	B	No reaction recognized
	- 4 kV / A	B	No reaction recognized
	+ 8 kV / A	B	No reaction recognized
	- 8 kV / A	B	No reaction recognized
ESD- Contact	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized
ESD –Indirect (HCP)	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized
ESD-Indirect (VCP)	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized

Table c / EN 61000-4-2 – Immunity against electrostatic discharges on the EUT
Mode: GNSS

Examination	Level (+/- [kV]) and test result	Required performance criteria	Comment
ESD - Air discharge	+ 2 kV / A	B	No reaction recognized
	- 2 kV / A	B	No reaction recognized
	+ 4 kV / A	B	No reaction recognized
	- 4 kV / A	B	No reaction recognized
	+ 8 kV / A	B	No reaction recognized
	- 8 kV / A	B	No reaction recognized
ESD- Contact	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized
ESD –Indirect (HCP)	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized
ESD-Indirect (VCP)	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized

Table d / EN 61000-4-2 – Immunity against electrostatic discharges on the EUT
Mode: BT

Examination	Level (+/- [kV]) and test result	Required performance criteria	Comment
ESD - Air discharge	+ 2 kV / A	B	No reaction recognized
	- 2 kV / A	B	No reaction recognized
	+ 4 kV / A	B	No reaction recognized
	- 4 kV / A	B	No reaction recognized
	+ 8 kV / A	B	No reaction recognized
	- 8 kV / A	B	No reaction recognized
ESD- Contact	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized
ESD –Indirect (HCP)	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized
ESD-Indirect (VCP)	+ 6 kV / A	B	No reaction recognized
	- 6 kV / A	B	No reaction recognized

Discharge location: Air discharge – all touchable plastic parts and display (so far available)
Contact discharge - all touchable metal parts and push button
Point of discharge marked with dots. Pulse repetition rate set to 5 second

VII. Pictures:

Picture 1: ESD test: direct contact discharge on metallic parts

Picture 2: ESD test: indirect contact discharge - VCP

Picture 3: ESD test: indirect contact discharge - HCP

Picture 4: ESD test: Air discharge

VIII. Revision Status of Report:

Version	Reason of revision / History	Date
-	Initial Report	2021-Jan-04
-	-	-

----------End of Report----------