



47 CFR Part 15 Subpart B

Electromagnetic Compatibility Test Report

For

Sigfox IoT Tracker

ORDER NO.: 200811K007

REPORT NO.: FC200811K007

ISSUED DATE: 22, September, 2020

MODEL NO.: NEXOTRACK - STARLIGHT

Nexo Technology Group Pty Ltd

Level 5, Nexus Building, 4 Columbia Court, Norwest, NSW 2153, Australia



Certificate #4068.03

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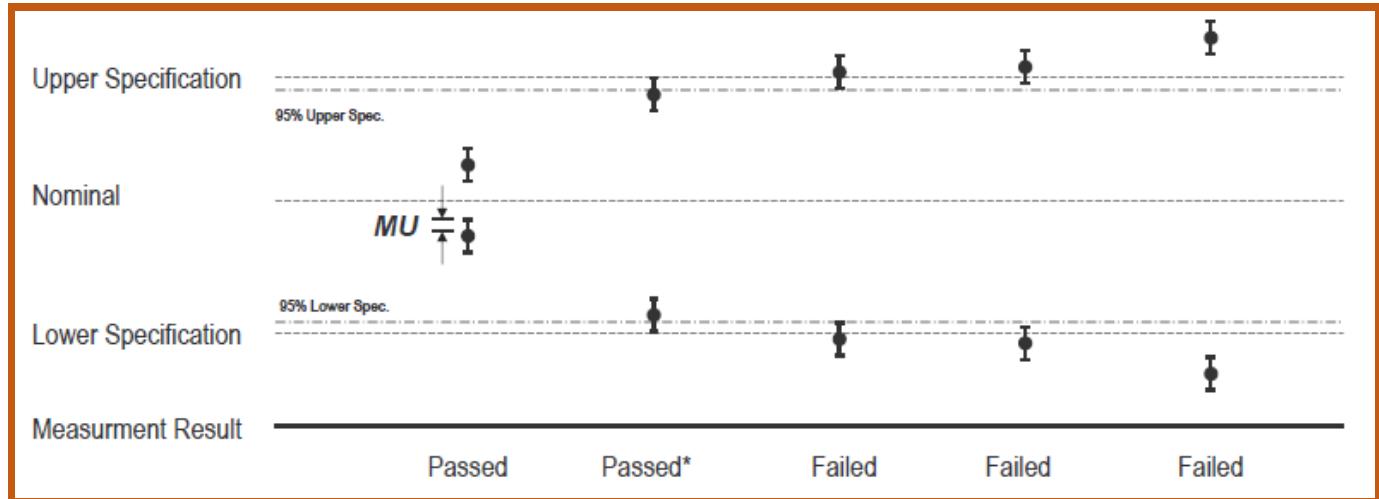
Test Report Details

Test Report No.	FC200811K007
Tests Performed By:	Bureau Veritas CPS ADT Korea Ltd. Innoplex No.2 106, Sinwon-ro 306, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Republic of Korea
Test site:	Bureau Veritas CPS ADT Korea Ltd. HeungAn-daero 49, DongAn-gu, Anyang-si, Gyeonggi-do, 11419 Republic of Korea
Applicant:	Nexo Technology Group Pty Ltd Level 5, Nexus Building, 4 Columbia Court, Norwest, NSW 2153, Australia
Manufacturer:	Sourceman International Pty Ltd Level 5, Nexus Building, 4 Columbia Court, Norwest, NSW 2153, Australia
Product Type:	Sigfox IoT Tracker
Model Number:	NEXOTRACK - STARLIGHT
FCC ID	2AW3N-NXTRKV3
Product standards:	47 CFR Part 15 Subpart B / ANSI C63.4-2014
FCC Classification	Class B
Sample Receive Date:	11, August, 2020
Testing Start Date:	26, August, 2020
Date Testing Complete:	28, August, 2020

This test report apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components Bureau Veritas CPS ADT Korea Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Bureau Veritas CPS ADT Korea Ltd. issued reports.

Overall Results

I. DECISION RULE FOR STATEMENT OF CONFORMITY



MU = 95% expanded measurement uncertainty

QUA-52 Decision Rule Applied

Step 1: Reference Check, Daily Check, Peripheral device Check

Step 2: Retest Procedure (Maximum 3, Different Test Engineer)

1) If the result of the first retest is the same as the initial test, the judgment is made based on the value.

2) If the results of the first retest differ from the initial test result, the second retest is carried out.

After completion of the second retest, the average of the three test results is determined as the final result.

If the deviation of three values is more than 5% of the reference value, Re check the system

II. Measurement uncertainty

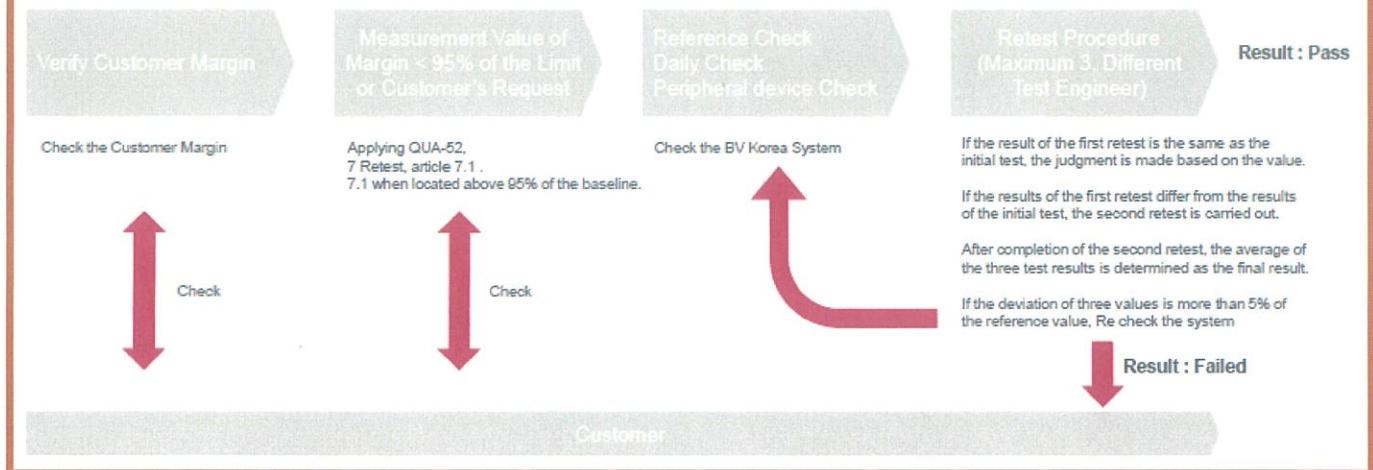
Test Item	Measurement uncertainty
Conducted emission	2.62 dB
Radiated emission (1GHz Below)	4.04 dB
Radiated emission (1GHz Over)	5.10 dB

Note 1: Measurement uncertainty is calculated in according with CISPR 16-4-2: 2011+A1:2014+A2:2018
The measurement uncertainty is given with a confidence of 95 % with the coverage factor, k=2.

III. FLOW CHART FOR DECISION RULE

The propose is to establish and apply a decision rule for calculating test result to ensure the validity of the test results and to inform the customer

Reference : ISO/IEC 17025 : 2017, BV CPS Quality Manual, QUA-52 Decision Rule for Statement of Conformity.



IV. FINAL DECISION

RELEASE CONTROL RECORD

REPORT NO.	REASON FOR CHANGE	DATE ISSUED
FC200811K007	Original release	22, September, 2020

This project has been tested and verified to comply with the requirements of Bureau Veritas CPS ADT Korea Ltd. Therefore, this certificate is issued.

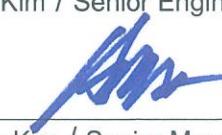
PREPARED BY :



Bob Kim / Senior Engineer

, DATE : 22. September, 2020

APPROVED BY :



Wan Kim / Senior Manager

, DATE : 22. September, 2020



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Table of Contents

1. EMC Result Conclusion (With Justification)	6
2. General Product Description.....	6
2.1 Equipment Description	6
2.2 Technical Data.....	6
3. Test Condition	7
3.1 Ancillary Equipment	7
3.2 Input/Output Ports	7
3.3 EUT Internal Operating Frequencies	7
3.4 Power Interface	7
3.5 Modes of Description	8
3.6 Configuration.....	8
4. Test Condition and Results	9
4.1 Radiated Emissions	9
Appendix A. Test site accreditations	14
Appendix B. Test Equipment	14
Appendix C. Test Set-up Photo	15
Appendix D. EUT Photos	17

1. EMC Result Conclusion (With Justification)

The following tests were performed on a sample submitted for evaluation of compliance with 47 CFR Part 15.109 (b) Class B

Test requirements	Standard	Results	Verdict
Emissions			
Radiated RF Emissions	ANSI C63.4	Pass	Complied
We tested the Sigfox IoT Tracker, Model: NEXOTRACK - STARLIGHT, to determine if it was in compliance with the relevant standards as marked on the EMC Verification Summary. We found that the unit met the requirement of 47 CFR Part 15 Subpart B / ANSI C63.4-2014 standards when tested as received. The production units are required to conform to the initial sample as received when the units are placed on the market.			

2. General Product Description

2.1 Equipment Description

NexoTrack is a wireless communication and tracking device which operates over Sigfox LPWAN network. It contains several environmental and motion sensors that measure data and send that data along with WiFi AP MAC Address details to the internet via Sigfox LPWAN backend. Additionally, the device has Passive BLE Beaconing and RFID Functionality. The device also has an LED which is used for device state monitoring by users. NexoTrack is ready for operation upon delivery and after activation, it starts performing its application/industry specific functions automatically as preprogrammed. The configuration of the device for its application is carried out at Firmware & backend level. There is no user input capabilities at device level.

2.2 Technical Data

- Dimensions (W x H x D): 122 x 42 x 43 mm
- Weight: 150g
- Sigfox Frequency band: 866.300 - 923.300MHz
- WiFi: 2.4GHz (802.11b/g/n)
- BLE Eddystone Beacon
- RFID: 860-960MHz
- Max Radiated power: 22 dBm
- IP69K
- Temperature range: -20°C to +80°C
- Maximum relative humidity: 90 %
- 1 x Battery A-size, 3.6V, 3.5Ah, Primary Lithium – Non-Rechargeable

The device contains receivers which tune and operating between 30 MHz to 960 MHz in the following bands:

- Sigfox RC2 (Uplink Center Frequency: 868.130 MHz / Downlink Center Frequency: 905.200 MHz)
- Sigfox RC4 (Uplink Center Frequency: 920.800 MHz / Downlink Center Frequency: 922.300 MHz)

3. Test Condition

3.1 Ancillary Equipment

Use*	Product Type	Manufacturer	Model	FCC ID
EUT	Sigfox IoT Tracker	Sourceman International Pty Ltd	NEXOTRACK - STARLIGHT	2AW3N-NXTRKV3
AE	Battery	-	-	-
AE	Notebook	LG Electronics Inc.	15ZD90N	DoC
AE	AC/DC Adaptor (For Notebook)	Shenzhen Honor Electronic Co., Ltd.	ADS-48MSP-1 9 19048EPK	DoC

* Note: EUT – Equipment Under Test, AE – Auxiliary/Associated Equipment, SIM – Simulator (Not Subjected to Test)

3.2 Input/Output Ports

Port #	Name	Type*	Cable (m) Max. >3 m	Cable Shielded	Comments
1	Power	DC	0.2	-	-
2	Control	I/O	0.8	-	-

* Note: * AC = AC Power Port, DC = DC Power Port, N/E = Non-Electrical, I/O = Signal Input or Output Port (Not Involved in Process Control), TP = Telecommunication Ports

3.3 EUT Internal Operating Frequencies

Frequency (MHz)	Description	Frequency (MHz)	Description
866.300 - 923.300	Sigfox	-	-

3.4 Power Interface

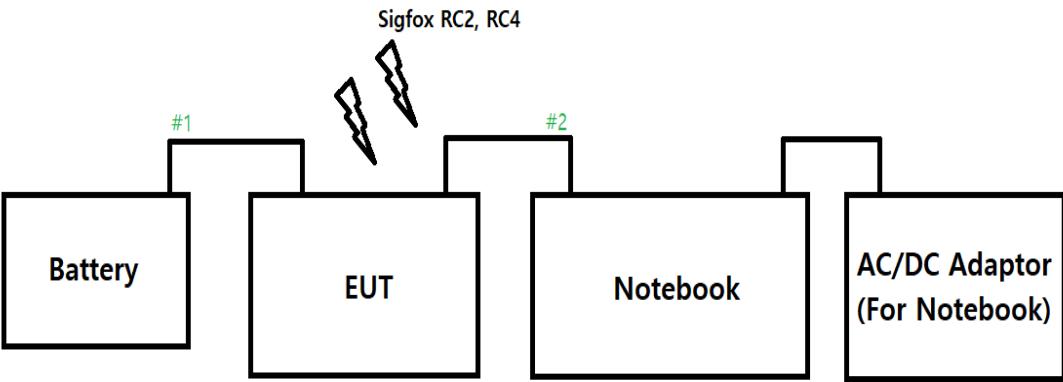
Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Comments
Rated	3.6	0.6	-	DC	EUT
1	3.6	0.6	-	DC	Battery

3.5 Modes of Description

Mode #	Mode	Comments
1	Sigfox RC2	Rx Status (Downlink Center Frequency: 905.200 MHz)
2	Sigfox RC4	Rx Status (Downlink Center Frequency: 922.300 MHz)

The test was conducted in 3 SFX_TEST_MODE_RX_PROTOCOL (2) mode. (Receiver Status)

3.6 Configuration

Description	
# 1	 <p>Sigfox RC2, RC4</p> <p>#1</p> <p>Battery</p> <p>EUT</p> <p>Notebook</p> <p>AC/DC Adaptor (For Notebook)</p> <p>#2</p> <p>#1: Power Line (DC) #2: Signal Line (EUT Control)</p>

4. Test Condition and Results

4.1 Radiated Emissions

TEST: Limits for radiated disturbance			
Method	Measurements were made in a 10-meter semi-anechoic chamber that complies to ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10-meter. The EUT was rotated 360° about its azimuth with the receive antenna located at 1, 2, 3 and 4 meter heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Parameters recorded during the test	Laboratory Ambient Temperature		20.9 °C
	Relative Humidity		46.3 %
Frequency range		Measurement Point	
Fully configured sample scanned over the following frequency range	30 MHz – 1 000 MHz		3 meter measurement distance
	1 000 MHz – 6 000 MHz		3 meter measurement distance
Limits – Class B			
Frequency (MHz)	Limit (dB μ V/m)		
Below 1 GHz	Quasi-Peak		Results
30 to 88	40		Pass
88 to 216	43.5		Pass
216 to 960	46		Pass
960 to 1 000	54		Pass
Above 1 GHz	Average	Peak	Result
1 000 to 10 000	54	74	Pass Pass
EUT Configuration Settings:			
Power Interface Mode # (See Section 3.3)	EUT Operation Mode # (See Section 3.4)		EUT Configurations Mode # (See Section 3.5)
1	1, 2		1

Note1) Two graphs measured for both Vertical and Horizontal of the Antenna are combined into one graph.

Note2) Formula

Final Value (PK and/or QP and/or CAV) = Reading Value (PK and/or QP and/or CAV) + Corr. (Antenna Factor + Cable Loss + Distance Correction - Amplifier Gain)

Margin (PK and/or QP and/or CAV) = Limit – Final Value (PK and/or QP and/or CAV)

PK = Peak, QP = Quasi-Peak, CAV = CISPR-Average, Corr. = Correction Factor

Note3) Distance (Antenna to Centre of Turntable), Antenna Height

Below 1 GHz, Distance = 3 m, Antenna Height = (1 to 4) m

Above 1 GHz, Distance = 4.5 m, Antenna Height (Considering size of EUT) = (1 to 4) m

Distance Correction = $20 \log (d_2 \text{ (m)} / d_1 \text{ (m)}) = 20 \log (4.5 / 3) = \underline{\underline{3.5}}$

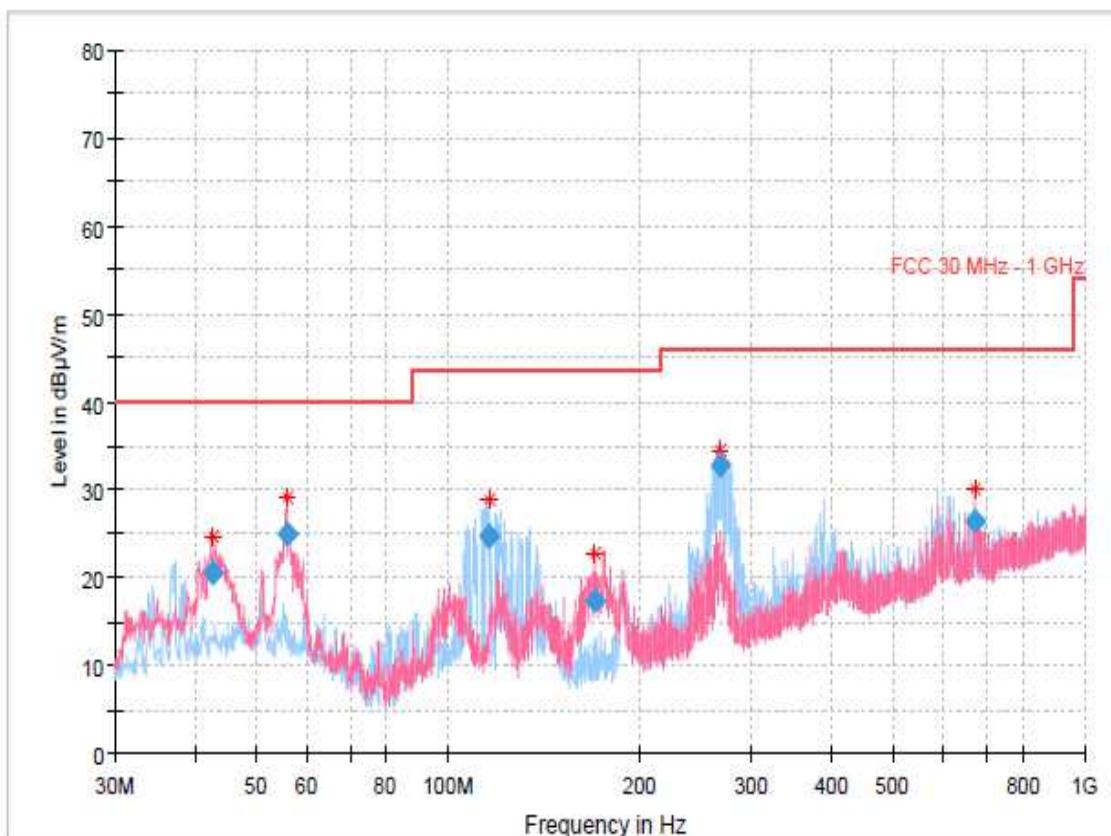
Table 1. Radiated emission Test data

Below 1 GHz (Mode1: Sigfox RC2)

Test Report

Common Information

Test Description: 200811K007
Operating Conditions: 10 m SAC
Operator Name: Below 1 GHz
Comment: 20.9 °C / 46.3 % R.H. / 100.0 kPa



Final Result

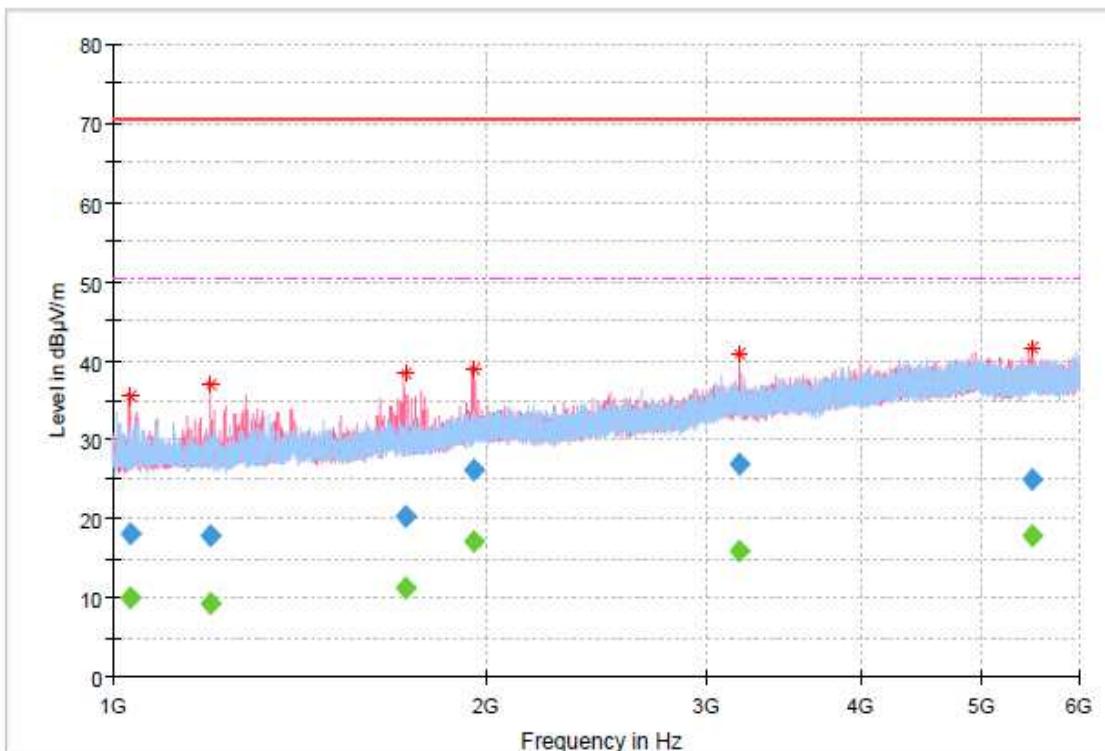
Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
42.895000	20.45	40.00	19.55	100.0	V	203.0	-20.0
56.090500	24.88	40.00	15.12	100.0	V	272.0	-20.5
115.968500	24.60	43.50	18.90	400.0	H	35.0	-23.5
170.113000	17.29	43.50	26.21	100.0	V	276.0	-24.8
267.200000	32.90	46.00	13.10	100.0	H	156.0	-20.2
673.597500	26.44	46.00	19.56	100.0	V	162.0	-12.0

Above 1 GHz (Mode1: Sigfox RC2)

Test Report

Common Information

Test Description: 200811K007
Operating Conditions: 10 m SAC
Operator Name: Above 1 GHz
Comment: 20.9 °C / 46.3 % R.H. / 100.0 kPa



Final Result

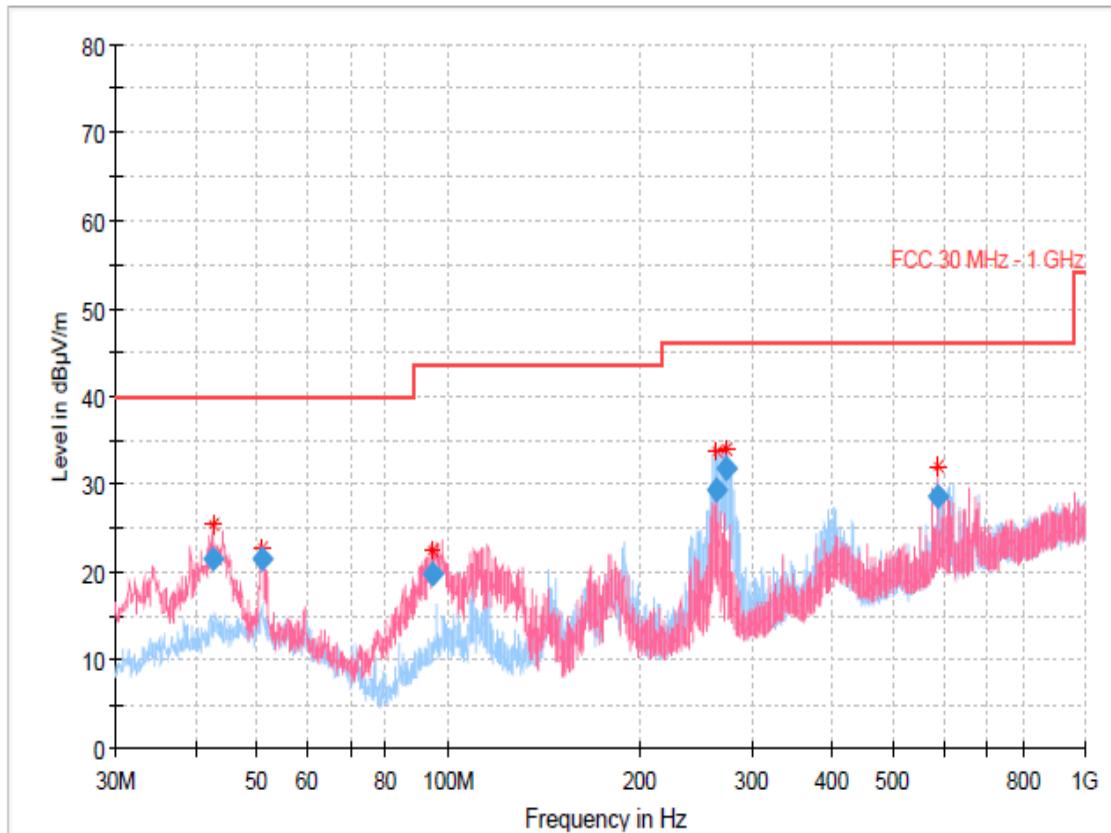
Frequency (MHz)	QuasiPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1031.450000	18.20	---	70.50	52.30	124.0	V	173.0	-11.7
1031.450000	---	9.98	50.50	40.52	124.0	V	173.0	-11.7
1199.875000	17.90	---	70.50	52.60	127.0	V	25.0	-11.3
1199.875000	---	9.24	50.50	41.26	127.0	V	25.0	-11.3
1721.550000	---	11.14	50.50	39.36	293.0	V	-1.0	-8.1
1721.550000	20.26	---	70.50	50.24	293.0	V	-1.0	-8.1
1951.550000	---	17.21	50.50	33.29	198.0	V	-2.0	-6.6
1951.550000	26.19	---	70.50	44.31	198.0	V	-2.0	-6.6
3197.400000	26.96	---	70.50	43.54	250.0	V	2.0	-1.5
3197.400000	---	15.91	50.50	34.59	250.0	V	2.0	-1.5
5499.975000	24.89	---	70.50	45.61	312.0	V	-17.0	4.1
5499.975000	---	17.78	50.50	32.72	312.0	V	-17.0	4.1

Below 1 GHz (Mode2: Sigfox RC4)

Test Report

Common Information

Test Description: 200811K007
Operating Conditions: 10 m SAC
Operator Name: Below 1 GHz
Comment: 20.9 °C / 46.3 % R.H. / 100.0 kPa



Final Result

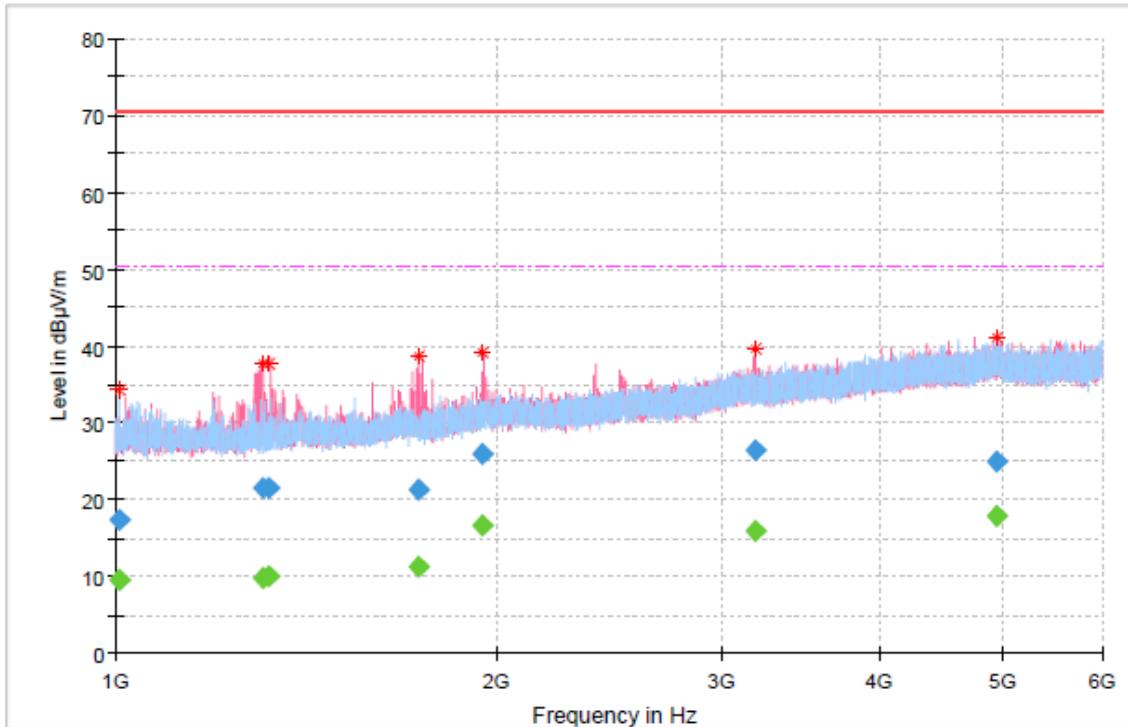
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
42.738500	21.49	40.00	18.51	100.0	V	233.0	-20.1
50.897500	21.64	40.00	18.36	100.0	V	314.0	-19.9
94.499000	19.94	43.50	23.56	100.0	V	301.0	-22.9
264.726500	29.44	46.00	16.56	200.0	H	2.0	-20.3
274.082500	31.68	46.00	14.32	100.0	H	355.0	-20.1
587.598500	28.68	46.00	17.32	100.0	V	272.0	-12.8

Above 1 GHz (Mode2: Sigfox RC4)

Test Report

Common Information

Test Description: 200811K007
Operating Conditions: 10 m SAC
Operator Name: Above 1 GHz
Comment: 20.9 °C / 46.3 % R.H. / 100.0 kPa



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1007.175000	17.48	---	70.50	53.02	114.0	H	200.0	-12.0
1007.175000	---	9.64	50.50	40.86	114.0	H	200.0	-12.0
1307.125000	21.57	---	70.50	48.93	126.0	V	27.0	-10.6
1307.125000	---	9.84	50.50	40.66	126.0	V	27.0	-10.6
1323.250000	21.55	---	70.50	48.95	142.0	V	38.0	-10.4
1323.250000	---	10.03	50.50	40.47	142.0	V	38.0	-10.4
1733.350000	---	11.17	50.50	39.33	150.0	V	4.0	-8.1
1733.350000	21.25	---	70.50	49.25	150.0	V	4.0	-8.1
1949.875000	25.85	---	70.50	44.65	196.0	V	-7.0	-6.6
1949.875000	---	16.70	50.50	33.80	196.0	V	-7.0	-6.6
3195.625000	---	15.87	50.50	34.63	250.0	V	-2.0	-1.5
3195.625000	26.32	---	70.50	44.18	250.0	V	-2.0	-1.5
4958.225000	---	17.89	50.50	32.61	190.0	V	14.0	3.5
4958.225000	25.03	---	70.50	45.47	190.0	V	14.0	3.5

Appendix A. Test site accreditations

Certificate	Nation	Agency	Code	Remark
Accreditation	USA	A2LA	4068.03	31 July, 2019
Accreditation	KOREA	RRA	KR0158	10 January, 2020
Registration	Japan	VCCI	4013	17 February, 2020
Accreditation	USA MRA	FCC	KR0158, 666061	17 March, 2020
Accreditation	CANADA MRA	ISED	KR0158, 25944	17 March, 2020
Accreditation	Vietnam MRA	MIC	KR0158	20 April, 2020

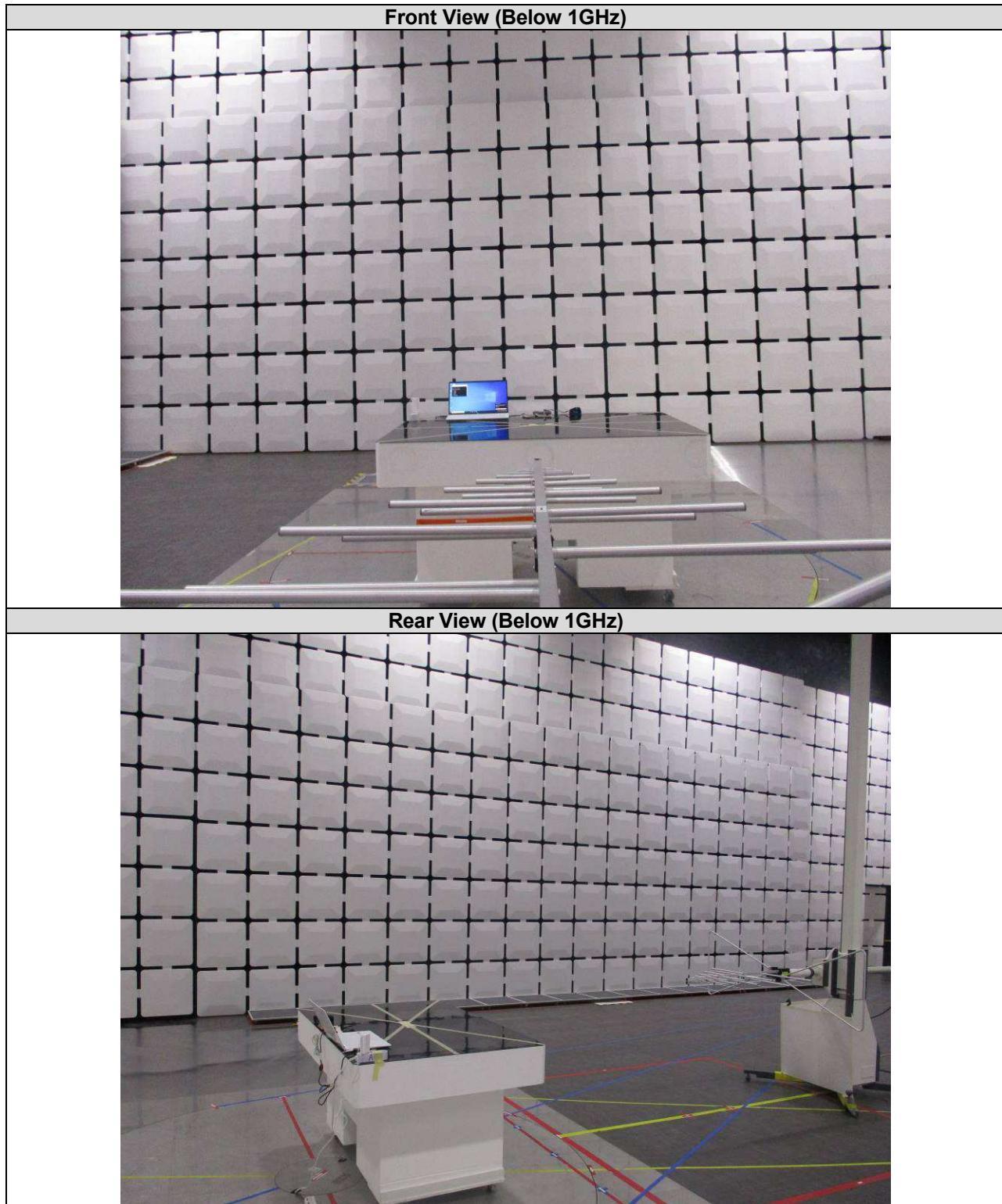
Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".

Appendix B. Test Equipment

Radiated emission					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESW44	101812	2019.03.20	2020.03.20
Trilog Antenna (with 6 dB ATT.)	Schwarzbeck	VULB 9163	01199	2019.04.03	2021.04.03
Horn Antenna	R&S	HF907	102773	2020.02.10	2021.02.10
Signal Conditioning Unit	R&S	SCU08F2	08400016	2019.12.30	2020.12.30
Signal Conditioning Unit	R&S	SCU-18F	180111	2019.12.30	2020.12.30
Software	R&S	EMC 32	Ver. 10.35.10	-	-

Appendix C. Test Set-up Photo

Figure 1. Radiated emission



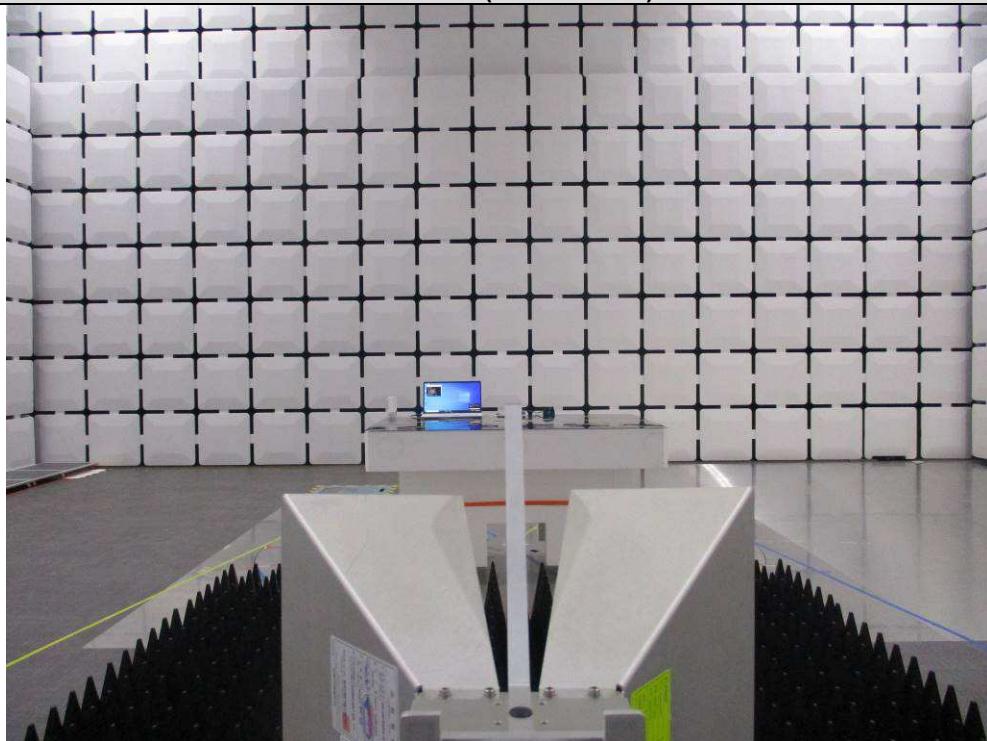
Report Number
Model Number

FC200811K007
NEXOTRACK - STARLIGHT

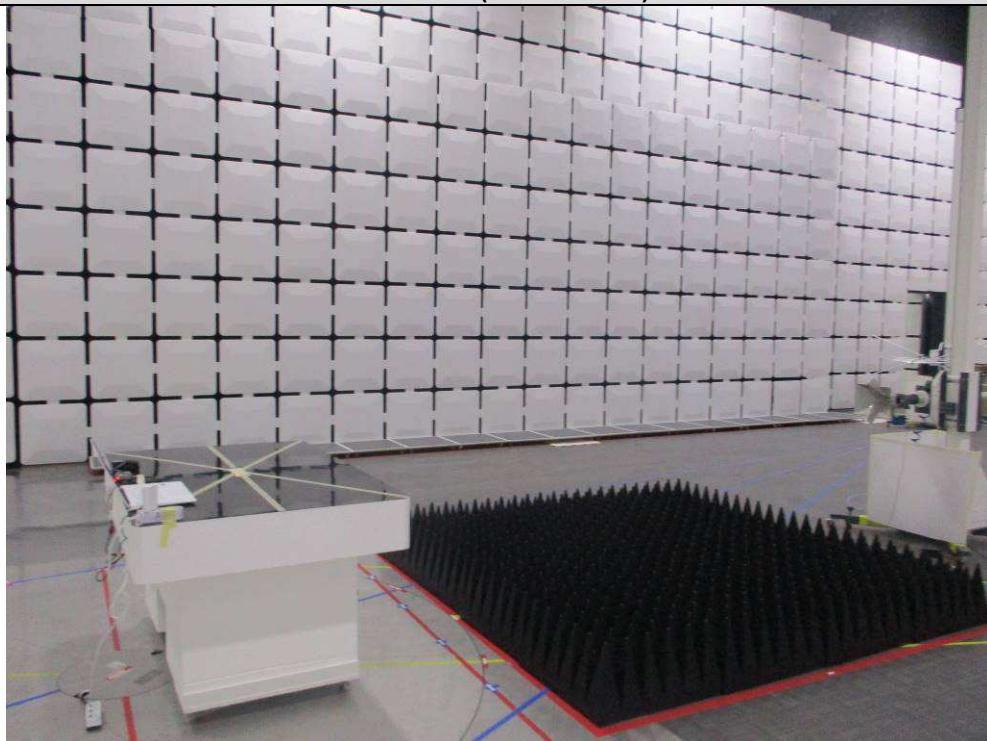


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Front View (Above 1GHz)



Rear View (Above 1GHz)



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Model Number

FC200811K007
NEXOTRACK - STARLIGHT



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Appendix D. EUT Photos

External View of EUT (1)



External View of EUT (2)



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Model Number

FC200811K007
NEXOTRACK - STARLIGHT

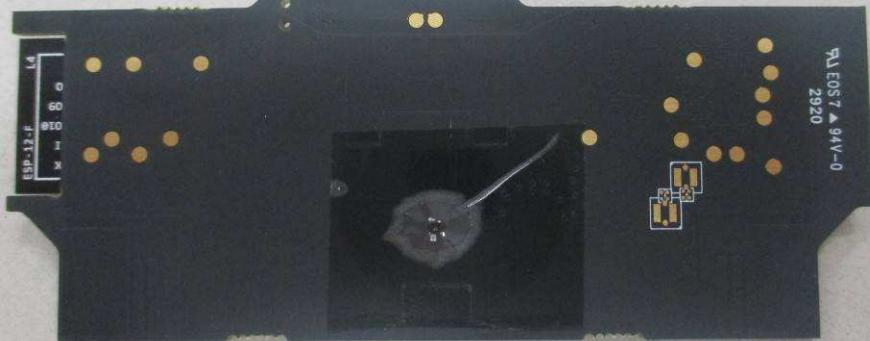


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View of Mainboard (1)



View of Mainboard (2)



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Model Number

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Battery

