SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

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RF Exposure Evaluation Report

Application No.:	SZEM1808008045CR
Applicant:	Oxford Nanopore Technologies Limited
Address of Applicant:	Gosling Building, Oxford Science Park, Oxford OX4 4DQ United Kingdom
Manufacturer:	Oxford Nanopore Technologies Limited
Address of Manufacturer:	Gosling Building, Oxford Science Park, Oxford OX4 4DQ United Kingdom
Factory:	Oxford Nanopore Technologies Ltd
Address of Factory:	Gosling Building, Edmund Hally Road, Oxford Science Park, Oxford OX4 4DQ. United Kingdom
EUT Name:	MinIT
Model No.:	MNT-001
FCC ID:	2ARGS-MNT-001
Standards:	47 CFR Part 1.1307 47 CFR Part 1.1310
Date of Receipt:	2018-09-03
Date of Test:	2018-09-27 to 2018-10-22
Date of Issue:	2018-11-05
Test Result :	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

2 Version

Revision Record				
Version	***Chapter***	***Date***	***Modifier***	***Remark***
01		*2018-11-05*		*Original*

Authorized for issue by:				
				
		Leo Lai /Project Engineer		
				
		Eric Fu /Reviewer		

3 Contents

4 General Description of EUT

Power supply:	DC 15V from AC/DC adapter Adapter Model No.: DYS650-150336W-K Input: 100-240V~50/60Hz 1.3A MAX Output: DC 15V 3.36A

For BT:	
Frequency Range:	2402MHz to 2480MHz
Bluetooth Version:	4.1
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channels:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Receiver Category:	2
Antenna Type:	FPC Antenna
Antenna Gain:	3.73dBi
For BLE:	
Frequency Range:	2402MHz to 2480MHz
Bluetooth Version:	4.1 BLE
Modulation Type:	GFSK
Number of Channels:	40
Receiver Category:	2
Antenna Type:	FPC Antenna
Antenna Gain:	3.73dBi
For 2.4G wifi:	
Modulation Type	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels	802.11b/g/n(HT20):11 802.11n(HT40):7
Operation Frequency	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz
Channel Spacing	5MHz
Antenna Type	FPC Antenna
Antenna Gain	ANT 1: 3.73dBi; ANT 2: 3.73dBi Two antennas can simultaneous transmission.

<table>
<tr><td>For 5G wifi:</td><td colspan="4"></td></tr>
<tr><td>Modulation Type:</td><td colspan="4">802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)</td></tr>
<tr><td>Operation Frequency:</td><td colspan="4"><table>
<tr><td>Band</td><td>Mode</td><td>Frequency Range(MHz)</td><td>Number of channels</td></tr>
<tr><td rowspan="4">UNII Band I</td><td>IEEE 802.11a</td><td>5180-5240</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac 20MHz</td><td>5180-5240</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac 40MHz</td><td>5190-5230</td><td>2</td></tr>
<tr><td>IEEE 802.11ac 80MHz</td><td>5210</td><td>1</td></tr>
<tr><td rowspan="4">UNII Band III</td><td>IEEE 802.11a</td><td>5745-5825</td><td>5</td></tr>
<tr><td>IEEE 802.11n/ac 20MHz</td><td>5745-5825</td><td>5</td></tr>
<tr><td>IEEE 802.11n/ac 40MHz</td><td>5755-5795</td><td>2</td></tr>
<tr><td>IEEE 802.11ac 80MHz</td><td>5775</td><td>1</td></tr>
</table></td></tr>
<tr><td>DFS Function</td><td colspan="4">Not support</td></tr>
<tr><td>Antenna Type</td><td colspan="4">FPC Antenna</td></tr>
<tr><td>Antenna Gain</td><td colspan="4">ANT 1: 5.18dBi; ANT 2: 5.18dBi
Two antennas can simultaneous transmission.</td></tr>
</table>

4.1 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC

Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.
IC#: 4620C.

4.3 Deviation from Standards

None.

4.4 Abnormalities from Standard Conditions

None.

4.5 Other Information Requested by the Customer

None.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

5.1.3 EUT RF Exposure Evaluation

Remark: Bluetooth and WiFi can simultaneous transmission at the same time.

For BT/BLE

Ant 2: 3.73dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.36 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	Result
8.97	7.889	0.004	1.0	PASS

For 2.4G WIFI

ANT 1: 3.73dBi; ANT 2: 3.73dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.36 / 2.36 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Sum of Power Density (mW/cm^2)	Limit	Result
24.17	261.216	0.123	0.247	1	PASS
24.20	263.027	0.124			

For 5GHz

ANT 1: 5.18dBi; ANT 2: 5.18dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.30 / 3.30 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Sum of Power Density (mW/cm^2)	Limit	Result
16.98	49.888	0.033	0.074	1	PASS
18.01	63.241	0.041			

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

exposure conditions for simultaneous transmission operations

The EUT has one module: BCM4354, the Bluetooth and the WiFi can simultaneous transmission at the same time.

For BCM4354 module:

1. The Bluetooth only support one antenna to transmit.
2. The WIFI has two antennas to transmit and they can simultaneous transmission.
3. The antenna of Bluetooth and antennas of WIFI can simultaneous transmission.

So, Simultaneous transmission SAR test is not required, because the Max. sum of the MPE ratios is 0.247+0.004=0.251<1.

- End of the Report -