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Report No.: SZEM141100618206
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RF Exposure Evaluation Report

Application No.: SZEM1411006182CR
Applicant: NVIDIA Corporation
Manufacturer: NVIDIA Corporation
Factory MEGAFORCE CORP
Product Name: Development Platform
Model No.(EUT): P1860
Trade Mark: NVIDIA
FCC ID: VOB-P1860
Standards: 47 CFR Part 1.1307 (2014)
47 CFR Part 1.1310 (2014)
Date of Receipt: 2014-11-13
Date of Test: 2015-02-09 to 2015-02-15
Date of Issue: 2015-03-25

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang
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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2015-03-25		Original

Authorized for issue by:			
Tested By	 _____ (Chris Zhong) /Project Engineer	2015-02-15	Date
Prepared By	 _____ (Vivi Zhou) /Clerk	2015-03-25	Date
Checked By	 _____ (Owen Zhou) /Reviewer	2015-03-25	Date



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4 General Information

4.1 Client Information

Applicant:	NVIDIA Corporation
Address of Applicant:	2701 San Tomas Expressway, Santa Clara, CA 95050, USA
Manufacturer:	NVIDIA Corporation
Address of Manufacturer:	2701 San Tomas Expressway, Santa Clara, CA 95050, USA
Factory:	MEGAFORCE CORP
Address of Factory:	2035 OTOOLE AVE, San Jose CA 95131-1301, USA

4.2 General Description of EUT

Product Name:	Development Platform
Model No.:	P1860
Trade Mark:	NVIDIA
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Mobile production
Product Description:	Development Platform
Power Supply:	Input: AC100-240V 50/60Hz 1.2A Output: DC12V 6.25A MAX
EUT Cables & Ports:	AC cable:140cm unshielded DC cable:120cm unshielded with 2 ferrite core. USB cable: 150cm shielded
For Bluetooth	
Frequency Range:	2402MHz to 2480MHz
Bluetooth Version:	4.0+HS
Antenna Gain:	2.2dBi



1) Classic mode	
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
2) BLE mode	
Modulation Type:	GFSK
Number of Channel:	40
For Wi-Fi	
1) 2.4GHz	
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n(HT20): 11 Channels IEEE 802.11n(HT40): 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Gain:	2.2dBi
2) 5GHz	
Operation Frequency:	IEEE 802.11a/ n(HT20/40): 5150MHz to 5250MHz IEEE 802.11a/ n(HT20/40): 5725MHz to 5850MHz
Type of Modulation:	IEEE for 802.11a: OFDM (BPSK/ QPSK/ 16QAM/ 64QAM) IEEE for 802.11n : OFDM (BPSK/ QPSK/ 16QAM/ 64QAM)
Antenna Gain:	4dBi
Number of Transmitter Chains:	1

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4.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab
No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.4 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.

- **VCCI**

The 10m Semi-anechoic chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

- **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

- **Industry Canada (IC)**

Two 3m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1 & 4620C-2.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 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: $Pd = (Pout \cdot G) / (4 \cdot \pi \cdot R^2)$

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 is 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.

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5.1.3 EUT RF Exposure Evaluation

For Bluetooth

1) Classic mode

Antenna Gain: 2.2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.660 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Middle	2441	7.36	5.445	1.7x10 ⁻³	1.0	PASS

Note: Refer to report No. SZEM141100618204 for EUT test Max Conducted Peak Output Power value.

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

1) BLE mode

Antenna Gain: 2.2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.660 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Middle	2440	4.85	3.055	1.0x10 ⁻³	1.0	PASS

Note: Refer to report No. SZEM141100618203 for EUT test Max Conducted Peak Output Power value.

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

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For Wi-Fi

1) 2.4GHz

Antenna Gain: 2.2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.660 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Highest	2462	20.17	103.992	3.4x10 ⁻²	1.0	PASS

Note: Refer to report No. SZEM141100618201 for EUT test Max Conducted Peak Output Power value.

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

2) 5GHz

Antenna Gain: 4dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.512 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Lowest	5180	6.27	4.24	0.002	1.0	PASS

Note: Refer to report No. SZEM141100618205 for EUT test Max Conducted Peak Output Power value.

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