

FCC RF EXPOSURE REPORT

FCC ID: VOB-P2897

Project No. : 1602C038E
Equipment : SHIELD Android TV Game Console
Test Model : P2897
Series Model : N/A
Applicant : NVIDIA Corporation
Address : 2788 San Tomas Expressway, Santa Clara,
California 95051, United States

According : FCC Guidelines for Human Exposure IEEE
C95.1 & FCC Part 2.1091

B T L I N C .

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Certificate #5123.02

1. GENERAL SUMMARY

Equipment : SHIELD Android TV Game Console
 Brand Name : NVIDIA
 Test Model : P2897
 Series Model : N/A
 Applicant : NVIDIA Corporation
 Manufacturer : NVIDIA Corporation
 Address : 2788 San Tomas Expressway, Santa Clara, California 95051, United States
 Date of Test : Nov. 21, 2017 ~ Apr. 09, 2018
 Oct. 30, 2018 ~ Mar. 18, 2019
 Test Sample : Engineering Sample No.: D181009693
 Standards : FCC Title 47 Part 2.1091, OET Bulletin 65 Supplement C

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-6-1602C038E) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of A2LA according to the ISO/IEC 17025 quality assessment standard and technical standard(s).

2. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi^2} = \frac{EIRP}{4\pi^2}$$

where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Table for Filed Antenna

For BT /LE:

Ant.	Brand/Mfr.	Model Name	Antenna Type	Connector	Gain(dBi)
1	NVIDIA Corporation	N/A	Monopole Antenna	IPEX	2.70

For WLAN 2.4G:

Ant.	Brand/Mfr.	Model Name	Antenna Type	Connector	Gain (dBi)
1	NVIDIA Corporation	N/A	Monopole Antenna	IPEX	2.70
2	NVIDIA Corporation	N/A	Monopole Antenna	N/A	2.80

Note: This EUT supports MIMO 2X2, any transmit signals are correlated with each other, so Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots 10^{GN/20})^2 / N]$ dBi, that is Directional gain = $10\log[(10^{2.70/20} + 10^{2.80/20})^2 / 2]$ dBi = 5.76.

For RLAN 5G:

Ant.	Brand/Mfr.	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	NVIDIA Corporation	N/A	Monopole Antenna	IPEX	4.50	UNII-1
2	NVIDIA Corporation	N/A	Monopole Antenna	N/A	4.43	UNII-1

Ant.	Brand/Mfr.	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	NVIDIA Corporation	N/A	Monopole Antenna	IPEX	4.31	UNII-2A
2	NVIDIA Corporation	N/A	Monopole Antenna	N/A	4.43	UNII-2A

Ant.	Brand/Mfr.	P/N	Antenna Type	Connector	Gain (dBi)	Note
1	NVIDIA Corporation	N/A	Monopole Antenna	IPEX	4.92	UNII-2C
2	NVIDIA Corporation	N/A	Monopole Antenna	N/A	6.57	UNII-2C

Ant.	Brand/Mfr.	P/N	Antenna Type	Connector	Gain (dBi)	Note
1	NVIDIA Corporation	N/A	Monopole Antenna	IPEX	5.23	UNII-3
2	NVIDIA Corporation	N/A	Monopole Antenna	N/A	6.75	UNII-3

- The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R). all transmit signals are correlated, then,
- Direction gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2/N]$, that are
 UNII-1 Directional gain = $10 \log[(10^{4.50/20} + 10^{4.43/20})^2/2] = 7.49 \text{ dBi}$
 UNII-2A Directional gain = $10 \log[(10^{4.31/20} + 10^{4.43/20})^2/2] = 7.39 \text{ dBi}$
 UNII-2C Directional gain = $10 \log[(10^{4.92/20} + 10^{6.57/20})^2/2] = 8.80 \text{ dBi}$
 UNII-3 Directional gain = $10 \log[(10^{5.23/20} + 10^{6.75/20})^2/2] = 9.05 \text{ dBi}$

The UNII-1 Output Power limit is $24 - 7.49 + 6 = 22.51 \text{ dBm}$
 The UNII-2A Output Power limit is $24 - 7.39 + 6 = 22.61 \text{ dBm}$
 The UNII-2C Output Power limit is $24 - 8.80 + 6 = 21.20 \text{ dBm}$
 The UNII-3 Output Power limit is $30 - 9.05 + 6 = 26.95 \text{ dBm}$

The UNII-1 PSD limit is $11 - 7.49 + 6 = 9.51 \text{ dBm/MHz}$
 The UNII-2A PSD limit is $11 - 7.39 + 6 = 9.61 \text{ dBm/MHz}$
 The UNII-2C PSD limit is $11 - 8.80 + 6 = 8.20 \text{ dBm/MHz}$
 The UNII-3 PSD limit is $30 - 9.05 + 6 = 26.95 \text{ dBm/500kHz}$.

3. TEST RESULTS

For BT:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Max. Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.70	1.8621	8.98	7.9068	0.00293	1	Complies

For LE:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Max. Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2.70	1.8621	5.88	3.8726	0.00144	1	Complies

For 2.4GHz:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5.76	3.7670	26.2	416.8694	0.31257	1	Complies

For 5GHz UNII-1:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
7.49	5.6105	20.69	117.2195	0.13090	1	Complies

For 5GHz UNII-2A:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
4.31	2.6977	19.47	88.5116	0.04753	1	Complies

For 5GHz UNII-2C:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
4.92	3.1046	19.52	89.5365	0.05533	1	Complies

For 5GHz UNII-3:

Directional gain (dBi)	Directional gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
9.05	8.0353	21.91	155.2387	0.24828	1	Complies

For the max simultaneous transmission MPE:

Power Density (S) (mW/cm ²)	Power Density (S) (mW/cm ²)	Power Density (S) (mW/cm ²)	Power Density (S) (mW/cm ²)	Total	Limit of Power Density (S) (mW/cm ²)	Test Result
BT	LE	2.4GHz	5GHz			
0.00293		0.31257		0.31550	1	Complies
0.00293			0.24828	0.25121	1	Complies
	0.00144	0.31257		0.31401	1	Complies
	0.00144		0.24828	0.24972	1	Complies

Note: The calculated distance is 20 cm.

End of Test Report