



RF Exposure Evaluation Report

Application No.: SZEM2009008725CR
Applicant: Zhuhai Pantum Electronics Co., Ltd
Address of Applicant: Area A, 3rd floor, Building No.1, No.3883, Zhuhai Avenue, Zhuhai, Guangdong, China 519060
Manufacturer: Zhuhai Pantum Electronics Co., Ltd.
Address of Manufacturer: Area A, 3rd floor, Building No. 1, No. 3883, Zhuhai Avenue, Zhuhai, Guangdong, China
Factory: Zhuhai Pantum Electronics Co., Ltd.
Address of Factory: Area A, 3rd floor, Building No. 1, No. 3883, Zhuhai Avenue, Zhuhai, Guangdong, China
Equipment Under Test (EUT):
EUT Name: WIFI Module
Model No.: CDW-G4822BU-01
Trade mark: PANTUM
FCC ID: 2AEGO4020WM
Standards: 47 CFR Part 1.1310
 47 CFR Part 2.1091
Date of Receipt: 2020-09-02
Date of Test: 2020-09-05 to 2020-11-20
Date of Issue: 2020-12-12

Test Result :	PASS*
----------------------	--------------

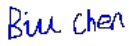

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
 EMC Laboratory Manager



2 Version

<i>Revision Record</i>				
<i>Version</i>	<i>Chapter</i>	<i>Date</i>	<i>Modifier</i>	<i>Remark</i>
01		2020-12-12		Original

Authorized for issue by:			
			
		<hr/> Bill Chen/Project Engineer	
			
		<hr/> Eric Fu/Reviewer	



3 Contents

	Page
1 COVER PAGE	1
2 VERSION.....	2
3 CONTENTS.....	3
4 GENERAL INFORMATION	4
4.1 GENERAL DESCRIPTION OF EUT.....	4
4.2 TEST LOCATION	6
4.3 TEST FACILITY	6
4.4 DEVIATION FROM STANDARDS	6
4.5 ABNORMALITIES FROM STANDARD CONDITIONS	6
4.6 OTHER INFORMATION REQUESTED BY THE CUSTOMER	6
5 RF EXPOSURE EVALUATION.....	7
5.1 RF EXPOSURE COMPLIANCE REQUIREMENT.....	7
5.1.1 <i>Limits</i>	7
5.1.2 <i>Test Procedure</i>	7
4.1.3 EUT RF EXPOSURE EVALUATION.....	8-9



4 General Information

4.1 General Description of EUT

Power supply:	DC 5V 1A			
For 2.4G:				
Number of Channels:	802.11b/g/n(HT20): 11, 802.11n(HT40):7			
Channel Spacing:	5MHz			
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK), 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)			
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz, 802.11n(HT40): 2422MHz to 2452MHz			
Channel Spacing:	5MHz			
Sample Type:	Fixed production			
Antenna Type:	Integral			
Antenna Gain:	Antenna 1: -2dBi Antenna 2: -2dBi			
For 5G:				
Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band 1	IEEE 802.11a	5180-5240	4
		IEEE 802.11n/ac 20MHz	5180-5240	4
		IEEE 802.11n/ac 40MHz	5190-5230	2
		IEEE 802.11ac 80MHz	5210	1
	UNII Band 2A	IEEE 802.11a	5260-5320	4
		IEEE 802.11n/ac 20MHz	5260-5320	4
		IEEE 802.11n/ac 40MHz	5270-5310	2
		IEEE 802.11ac 80MHz	5290	1
	UNII Band 2C	IEEE 802.11a	5500-5700	11
		IEEE 802.11n/ac 20MHz	5500-5700	11
		IEEE 802.11n/ac 40MHz	5510-5670	5
		IEEE 802.11ac 80MHz	5530-5610	2
	UNII Band 3	IEEE 802.11a	5745-5825	5
		IEEE 802.11n/ac 20MHz	5745-5825	5
		IEEE 802.11n/ac 40MHz	5755-5795	2
IEEE 802.11ac 80MHz		5775	1	
Type of Modulation:	IEEE 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM)			





	IEEE 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)
Sample Type:	Fixed production
DFS Function:	Slave without Radar detection
Antenna Type:	Integral Antenna
Antenna Gain:	Antenna 1: 2dBi Antenna 2:1.5dBi



4.2 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

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

No tests were sub-contracted.

4.3 Test Facility

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

- **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.

4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d 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.



4.1.3 EUT RF Exposure Evaluation

For 2.4G:

Antenna Gain: Antenna 1:-2dBi Antenna 2:-2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0.631 in linear scale.

SISO:

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
2412	-2	11.25	13.335	0.002	1.0	PASS

MIMO:

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
2412	-2	13.76	23.768	0.003	1.0	PASS

Note: Refer to report No. SZEM200900872501 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.



For 5G:

Antenna Gain: Antenna 1:2dBi Antenna 2:1.5dBi

Antenna Gain:

Antenna 1:The maximum Gain measured in fully anechoic chamber is 1.585 in linear scale.

Antenna 2:The maximum Gain measured in fully anechoic chamber is 1.413 in linear scale.

SISO:

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
5670	1	13.93	24.717	0.008	1.0	PASS

MIMO:

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
5700	1+2	16.43	43.954	0.014	1.0	PASS

Note: Refer to report No. SZEM200900872502 for EUT test Max Conducted Peak Output Power value. The distance r (4th column) calculated from the Friis transmission formula is far greater than 20 cm separation requirement.

- End of the Report -

