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Report No.: SZEM170700705802

Page: 1 of 7

RF Exposure Evaluation Report

Application No.: SZEM1707007058RG
Applicant: Alpheus Digital Co., Limited
Manufacturer: Alpheus Digital Co., Limited
Product Name: GATEWAY Panel
Model No.(EUT): GATEWAY-101
Trade Mark: BDS
FCC ID: OC7GATEWAY-101
Standards: 47 CFR Part 1.1310(2017)
47 CFR Part 2.1091(2017)
Date of Receipt: 2017-07-06
Date of Test: 2017-07-07 to 2017-07-13
Date of Issue: 2017-11-20

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

Authorized Signature:

Derek Yang
Wireless 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.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2017-11-20		Original

Authorized for issue by:				
				
				2017-11-20
		Mike Hu /Project Engineer		
				
				2017-11-20
		Jim Huang /Reviewer		



3 Contents

1	COVER PAGE.....	1
2	VERSION	2
3	CONTENTS	3
4	GENERAL DESCRIPTION OF EUT	4
4.1	TEST LOCATION	5
4.2	TEST FACILITY	5
4.3	DEVIATION FROM STANDARDS	5
4.4	ABNORMALITIES FROM STANDARD CONDITIONS	5
4.5	OTHER INFORMATION REQUESTED BY THE CUSTOMER	5
5	RF EXPOSURE EVALUATION	6
5.1	RF EXPOSURE COMPLIANCE REQUIREMENT	6
5.1.1	Limits	6
5.1.2	Test Procedure.....	6
5.1.3	EUT RF Exposure Evaluation.....	7

4 General Description of EUT

Product Name:	GATEWAY Panel
Model No.:	GATEWAY-101
For GSM850&1900 and WCDMA BII&BV:	
Operation Frequency:	GSM850: 824 to 849 MHz GSM1900: 1850 to 1910 MHz WCDMA BII: 1850 to 1910 MHz WCDMA BV: 824 to 849 MHz
Type of Modulation:	GSM850: GMSK,8PSK GSM1900: GMSK,8PSK WCDMA BII: QPSK WCDMA BV: QPSK
Antenna type:	FPC Antenna
Antenna gain	GSM850: 1dBi; GSM1900:1dBi WCDMA B5: 1dBi; WCDMA B2: 1dBi

4.1 Test Location

All tests were performed at:

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

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518057

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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 10m Semi-anechoic chamber and Shielded Room 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 –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.

- **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

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 47 CFR Part 1.1310

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

Friis Formula

Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

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 data at lowest, middle and highest channel individually.

5.1.3 EUT RF Exposure Evaluation

Output Power into Antenna & RF Exposure Evaluation Distance:

GSM850 (Antenna Gain: 1dBi):

Frequency (MHz)	Max. Conducted Power (include tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
836.6 MHz	33	1995.262	0.500	0.558	PASS

GSM1900 (Antenna Gain: 1dBi):

Frequency (MHz)	Max. Conducted Power (include tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
1850.2MHz	31	1258.925	0.315	1	PASS

WCDMA band V (Antenna Gain: 1dBi):

Frequency (MHz)	Max. Conducted Power (include tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
836.4 MHz	25	316.228	0.079	0.558	PASS

WCDMA band II (Antenna Gain: 1dBi):

Frequency (MHz)	Max. Conducted Power (include tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
1852.4MHz	24	251.189	0.063	1	PASS

Note: Refer to report No. SZEM170700705801 for EUT max. conducted power.

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