



RF Exposure Evaluation Report

Application No.: SZEM2008007542CR
Applicant: NZS Inc.
Address of Applicant: 8168 Miramar Road San Diego, CA 92126 United States
Manufacturer: Shenzhen Smart Device Technology Co., LTD
Address of Manufacturer: 17th-18th floor, Guoshi Mansion, Shahe West Road 1801, Nanshan, Shenzhen, China

Equipment Under Test (EUT):

Product Name: Smart Pass Management Module
Model No.: GS-1(Q)
FCC ID: 2AXDQ-GS-1Q
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
47 CFR Part 2.1091
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2020-08-05
Date of Test: 2020-08-06 to 2020-08-24
Date of Issue: 2020-08-26

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

Keny Xu

Keny Xu
EMC Laboratory Manager



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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-08-26		Original

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



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3 Contents

	Page
.....	1
2 VERSION	2
3 CONTENTS	3
4 GENERAL INFORMATION	4
4.1 GENERAL DESCRIPTION OF EUT	4
4.2 TEST LOCATION	5
4.3 TEST FACILITY	5
4.4 DEVIATION FROM STANDARDS	5
4.5 ABNORMALITIES FROM STANDARD CONDITIONS	5
4.6 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 Information

4.1 General Description of EUT

Power adapter:	DC 12V Power by AC adapter Model: TEKA036-1203000XX
Rated voltage:	120V~60Hz of the adapter

BT

Operation Frequency:	2402MHz to 2480MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Bluetooth Version:	V4.2 Classic
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Channel Spacing:	1MHz
Number of Channels:	79
Antenna Type:	FPC Antenna
Antenna Gain:	-1.12dBi

WiFi 2.4G

Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n20: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20): 11 802.11n(HT40):7
Channel Spacing:	5MHz
Antenna Type:	FPC Antenna
Antenna Gain:	-1.12dBi

NFC

Operation Frequency:	13.56MHz
Modulation Type:	ASK
Antenna Type:	Loop antenna





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.



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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.

5.1.3 EUT RF Exposure Evaluation

Antenna Gain: -1.12dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0.77 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

BT:

Channel	Frequency (MHz)	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
Middle	2441	7.44	5.55	0.0009	1.0	PASS

WiFi

Channel	Frequency (MHz)	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
Lowest	2412	15.73	37.41	0.0058	1.0	PASS

NFC

The Max. power (including tune-up tolerance) is: (*)

Frequency (MHz)	Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
13.56	-48.86	0.000013	0.0000000026	0.98	PASS

(*) Refer to test report SZEM200800754204 for EUT test Max Conducted Peak Output Power(including tune-up tolerance) value.

E=EIRP-20logD+104.7

E=35.84dBuV/m(Refer to test report SZEM200800754204)

D=10m

EIRP=35.84-(-20log(10)+104.7)

EIRP=-48.86dBm(0.000013mW)

Exposure conditions for simultaneous transmission operations

Simultaneous transmission MPE test is not required, because the Max. sum of the MPE ratios for BT or WiFi is $0.0058/1+0.0000000026/0.98 \approx 0.0058 < 1$

Note: Refer to report No. SZEM200800754202, SZEM200800754203 and SZEM200800754204 for EUT test Max Conducted Peak Output Power value, due to BT and WiFi with same antenna then they can't simultaneous transmit the signal so the WiFi was selected for this evaluation.

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

- End of the Report -