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Report No.: SZEM180400245807
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RF Exposure Evaluation Report

Application No: SZEM1804002458CR
Applicant: NGSTB Company Limited
Address of Applicant: F11,BLOCK B,ZhiYuan Bldg,No. 89 Industry 8th Road Nanshan District,
Shenzhen, 518067, China
Manufacturer: ABOX42 GmbH
Address of Manufacturer: 76227 Karlsruhe Germany
Factory: Aztech Communication Device (DG) Ltd
Address of Factory: Jiu Jiang Shui Village,Chang Ping Town,Dong Guan City,GUangdong
Province
Product Name: Set Top Box for Smart TV/OTT/Hybrid
Model No.(EUT): M30WL.11
Trade Mark: ABOX42 GmbH
FCC ID: 2APK9-M30WL11
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
RSS-102 Issue 5, March 2015
Date of Receipt: 2016-12-26
Date of Test: 2016-12-26 to 2017-03-03
Date of Issue: 2018-04-08

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

Authorized Signature:



Kenly Xu
EMC Laboratory Manager

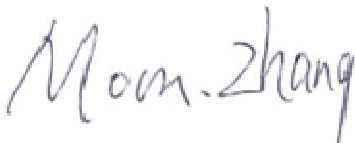
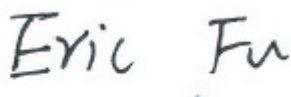
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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2018-04-08		Original

Authorized for issue by:				
				
		(Moon Zhang) /Project Engineer		
				
		(Eric Fu) /Reviewer		



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4 General Information

4.1 General Description of EUT

Power Supply:	AC/DC Adapter: MODEL: F18W6-050250SPAU INPUT:AC100-240V, 50/60Hz, 0.6A OUTPUT:DC 5V, 2.5A
Cable:	HDMI Cable: 150cm unsheilded LAN Cable: 200cm unsheilded
For 2.4G wifi mode:	
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 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n(HT20 and HT40): OFDM (64QAM, 16QAM, QPSK,BPSK)
Antenna Type:	Embedded Antenna
Antenna Gain:	5dBi (2x2 MIMO)

For 5G wifi mode:				
Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band I	IEEE 802.11a/n(HT20)/ac(HT20)	5180-5240	4
		IEEE 802.11n(HT40)/ac(HT40)	5190-5230	2
		IEEE 802.11ac(HT80)	5210	1
	UNII Band II-A	IEEE 802.11a/n(HT20)/ac(HT20)	5260-5320	4
		IEEE 802.11n(HT40)/ac(HT40)	5270-5310	2
		IEEE 802.11ac(HT80)	5290	1
	UNII Band II-C	IEEE 802.11a/n(HT20)/ac(HT20)	5500-5700	11
		IEEE 802.11n(HT40)/ac(HT40)	5510-5670	5
		IEEE 802.11ac(HT80)	5530	2
	UNII Band III	IEEE 802.11a/n(HT20)/ac(HT20)	5745-5825	5
		IEEE 802.11n(HT40)/ac(HT40)	5755-5795	2
IEEE 802.11ac(HT80)		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)			
Antenna Type:	Embedded Antenna			
Antenna Gain:	6dBi (2x2 MIMO)			
For BT mode:				
Bluetooth Version:	Bluetooth 4.0 dual			
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			
Antenna Type:	Embedded Antenna			
Antenna Gain:	5dBi			
For BLE mode:				
Operation Frequency:	2402MHz~2480MHz			
Bluetooth Version:	Bluetooth 4.0 dual			
Modulation Type:	GFSK			
Number of Channel:	40			
Antenna Type:	Embedded Antenna			
Antenna Gain:	5dBi			
For RF4CE mode:				



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Operation Frequency:	2405MHz~2480MHz
Modulation Type:	O-QPSK
Number of Channel:	16
Antenna Type:	PCB Antenna
Antenna Gain:	0dBi

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:

- **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 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.

- **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.

4.4 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 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

f = frequency in MHz

* = Plane-wave equivalent power density

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

For WiFi 2.4GHz

Antenna Gain: 5dBi

According to KDB 662911, the transmit signal is correlated,

So Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi = 5 + 3 = 8

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 6.31 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance: 20cm

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
Middle	2437	20.220	105.196	0.132	1	0.132	PASS

Note: Refer to report No. SZEM180400245802 for EUT test Max conducted power value.



For WiFi 5GHz

Band 5150 ~ 5250MHz

Antenna Gain: 6dBi

According to KDB 662911, the transmit signal is correlated,

So Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi = 6 + 3 = 9

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 7.94 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance: 20cm

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
48	5240	13.450	22.131	0.035	1	0.035	PASS

Note: Refer to report No. SZEM180400245803 for EUT test Max conducted power value.

For WiFi 5GHz

Band 5250 ~ 5350MHz

Antenna Gain: 6dBi

According to KDB 662911, the transmit signal is correlated,

So Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi = 6 + 3 = 9

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 7.94 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance: 20cm

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
64	5320	17.490	56.105	0.089	1	0.089	PASS

Note: Refer to report No. SZEM180400245803 for EUT test Max conducted power value.

For WiFi 5GHz

Band 5470 ~ 5725MHz

Antenna Gain: 6dBi

According to KDB 662911, the transmit signal is correlated,

So Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi = 6 + 3 = 9

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 7.94 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance: 20cm

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
134	5670	17.900	61.660	0.097	1	0.097	PASS

Note: Refer to report No. SZEM180400245803 for EUT test Max conducted power value.

For WiFi 5GHz

Band 5725 ~ 5850MHz

Antenna Gain: 6dBi

According to KDB 662911, the transmit signal is correlated,

So Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi = 6 + 3 = 9

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 7.94 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance: 20cm

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
149	5745	19.680	92.897	0.147	1	0.147	PASS

Note: Refer to report No. SZEM180400245803 for EUT test Max conducted power value.

For Bluetooth Classic

Antenna Gain: 5 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.16 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance: 20cm

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
00	2402	3.150	2.065	0.001	1	0.001	PASS

Note: Refer to report No. SZEM180400245804 for EUT test Max conducted power value.

For BLE mode:

Antenna Gain: 5 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.16 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance: 20cm

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
00	2402	5.540	3.581	0.002	1	0.002	PASS

Note: Refer to report No. SZEM180400245805 for EUT test Max conducted power value.

For RF4CE mode:

Antenna Gain: 0dBi

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

The maximum field strength of the fundamental is 96.35dBuV/m @ 3m. According to KDB 412172, $eirp = pt \times gt = (E \times d)^2 / 30 = 1.295mW$.

RF Exposure Evaluation Distance: 20cm

Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratios	Result
2440.4	1.295	0.0003	1	0.0003	PASS

Note: Refer to report No. SZEM180400245806 for EUT test Max conducted power value.

Exposure conditions for simultaneous transmission operations

Σ of ratios simultaneous transmitting= Wi-Fi 5G + RF4CE

Ratio of Power Density of Wi-Fi 5G at R = 20 cm	Ratio of Power Density of RF4CE at R = 20 cm	Total ratios simultaneous transmitting at R =20 cm	Limit	Result
0.147	0.0003	0.1473	1.0	PASS