



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR230600198906

Page: 1 of 13

RF EXPOSURE EVALUATION REPORT

Application No.:

SZCR2306001989AT

Applicant:

Guangzhou Changjia Electronic Co., Ltd.

Address of Applicant:

No.139 Zhouxing Street, Dongchong Town, Nansha District, Guangzhou, China

Manufacturer:

Guangzhou Changjia Electronic Co., Ltd.

Address of Manufacturer:

No.139 Zhouxing Street, Dongchong Town, Nansha District, Guangzhou, China

Factory:

Guangzhou Changjia Electronic Co., Ltd.

Address of Factory:

No.139 Zhouxing Street, Dongchong Town, Nansha District, Guangzhou, China

Equipment Under Test (EUT):

EUT Name: Smart interactive whiteboard

Model No.:

HN-IFDX86, CLEF86U, IFDX86, XXXXXXXX86XXXXXXXX (Where "X" can be any alphanumeric of A-Z or 0-9 or blank or -, indicates different client)

HN-IFDX65, CLEF65U, IFDX65, XXXXXXXX65XXXXXXXX (Where "X" can be any alphanumeric of A-Z or 0-9 or blank or -, indicates different client) ♣

♣

Please refer to section 3.2 of this report which indicates which model was actually tested and which were electrically identical.

FCC ID:

2A54R-IFDX

Standard(s) :

FCC Rules 47 CFR §2.1091

KDB 447498 D04 interim General RF Exposure Guidance v01

Date of Receipt:

2023-06-26

Date of Evaluation:

2023-06-28 to 2023-07-25

Date of Issue:

2023-07-27

Evaluation Result:

Pass*

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

Keny Xu

EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023-07-27		Original

Authorized for issue by:			
		 Frank Chen	
		Frank Chen/Project Engineer	
		 Eric Fu	
		Eric Fu/Reviewer	

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3 General Information

3.1 General Description of E.U.T.

Product Type:	<input type="checkbox"/> Portable device
	<input checked="" type="checkbox"/> Mobile device
	<input type="checkbox"/> Fixed device

3.2 Details of E.U.T.

Power Supply:	Input: 100-240Vac,50/60Hz
Cable(s):	AC cable:150cm Unshielded
For BT (For Module: NXP88W8997):	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0
Spectrum Spread Technology	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Antenna Type:	PIFA Antenna
Antenna Gain:	1.82 dBi
For BLE (For Module: NXP88W8997):	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	PIFA Antenna
Antenna Gain:	1.82 dBi
For 2.4G WIFI (For Module: SKIWB800DS2.1)	
Operation Frequency:	802.11b/g/n(HT20)/ax(HEW20): 2412MHz to 2462MHz; 802.11n(HT40)/ax(HEW40): 2422MHz to 2452MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK); 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Number of Channels:	802.11b/g/n(HT20)/ax(HEW20):11;



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	802.11n(HT40)/ax(HEW40):7															
Channel Spacing:	5MHz															
Antenna Type:	PIFA Antenna															
Antenna Gain:	2.45 dBi															
For 2.4G WIFI (For Module: NXP88W8997)																
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/n: OFDM (64QAM, 16QAM, QPSK, BPSK);															
Number of Channels:	802.11b/g/n(HT20):11; 802.11n(HT40):7															
Channel Spacing:	5MHz															
Antenna Type:	PIFA Antenna															
Antenna Gain:	ANT1: 1.82 dBi; ANT2: 0.48 dBi															
For 5G WIFI (For Module: NXP88W8997)																
Operation Frequency/Number of channels (20MHz):	U-NII-1: 5180-5240MHz (4 Channels); U-NII-2A: 5260-5320MHz (4 Channels); U-NII-2C: 5500-5700MHz (11 Channels); U-NII-3: 5745-5825MHz (5 Channels)															
Operation Frequency/Number of channels/(40MHz):	U-NII-1: 5190-5230MHz (2 Channels); U-NII-2A: 5270-5310MHz (2 Channels); U-NII-2C: 5510-5670MHz (5 Channels); U-NII-3: 5755-5795MHz (2 Channels)															
Operation Frequency/Number of channels (80MHz):	U-NII-1: 5210MHz (1 Channel); U-NII-2A: 5290MHz (1 Channels); U-NII-2C: 5530-5610MHz (2 Channels); U-NII-3: 5775MHz (1 Channel)															
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM); 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)															
Channel Spacing:	802.11a/n(HT20)/ac(VHT20): 20MHz; 802.11n(HT40)/ac(VHT40): 40MHz; 802.11ac(VHT80): 80MHz															
DFS Function:	Slave without Radar detection															
Antenna Type:	PIFA Antenna															
Antenna Gain:	<table border="1"> <tr> <td></td> <td>ANT 1</td> <td>ANT 2</td> </tr> <tr> <td>U-NII-1</td> <td>1.03dBi</td> <td>1.75 dBi</td> </tr> <tr> <td>U-NII-2A</td> <td>1.19 dBi</td> <td>2.2 dBi</td> </tr> <tr> <td>U-NII-2C</td> <td>0.86 dBi</td> <td>2.9 dBi</td> </tr> <tr> <td>U-NII-3</td> <td>-0.07 dBi</td> <td>2.44 dBi</td> </tr> </table>		ANT 1	ANT 2	U-NII-1	1.03dBi	1.75 dBi	U-NII-2A	1.19 dBi	2.2 dBi	U-NII-2C	0.86 dBi	2.9 dBi	U-NII-3	-0.07 dBi	2.44 dBi
	ANT 1	ANT 2														
U-NII-1	1.03dBi	1.75 dBi														
U-NII-2A	1.19 dBi	2.2 dBi														
U-NII-2C	0.86 dBi	2.9 dBi														
U-NII-3	-0.07 dBi	2.44 dBi														
For 5G WIFI (For Module: SKIWB800DS2.1)																
Operation Frequency/Number	U-NII-1: 5180-5240MHz (4 Channels)															



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of channels (20MHz):	
Operation Frequency/Number of channels/(40MHz):	U-NII-1: 5190-5230MHz (2 Channels)
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM); 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA(16QAM, 64QAM, 256QAM, 1024QAM, QPSK, BPSK)
DFS Function:	Slave without Radar detection
Antenna Type:	PIFA Antenna
Antenna Gain:	2.66 dBi

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Declaration of EUT Family Grouping:

Model No.:

HN-IFDX86, CLEF86U, IFDX86, XXXXXXXX86XXXXXXX (Where "X" can be any alphanumeric of A-Z or 0-9 or blank or -, indicates different client).

HN-IFDX65, CLEF65U, IFDX65, XXXXXXXX65XXXXXXX (Where "X" can be any alphanumeric of A-Z or 0-9 or blank or -, indicates different client)

Only the model HN-IFDX86 was fully tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used, internal wiring and functions were identical for all the above models, with only difference as follows:

Model No.	Difference
HN-IFDX86, CLEF86U, IFDX86, XXXXXXXX86XXXXXXX (Where "X" can be any alphanumeric of A-Z or 0-9 or blank or -, indicates different client)	only difference on model No.
HN-IFDX65, CLEF65U, IFDX65, XXXXXXXX65XXXXXXX (Where "X" can be any alphanumeric of A-Z or 0-9 or blank or -, indicates different client)	only difference on model No., the screen size and the power main board.

Remark:

For Model No. : HN-IFDX86, CLEF86U, IFDX86, XXXXXXXX86XXXXXXX (Where "X" can be any alphanumeric of A-Z or 0-9 or blank or -, indicates different client), only difference on model No..

For Model No. : HN-IFDX65, CLEF65U, IFDX65, XXXXXXXX65XXXXXXX (Where "X" can be any alphanumeric of A-Z or 0-9 or blank or -, indicates different client), only difference on model No..

For Model No. : HN-IFDX86 and HN-IFDX65, only difference on model No., the screen size and the power main board..



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3.3 Separation Distance

Minimum test separation distance: 20cm
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Remark: This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.

3.4 Test Location

All tests were performed at:

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

No tests were sub-contracted.

3.5 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 (Member No. 1937)**

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.

Shenzhen EMC laboratory 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: CN1336**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

- **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.

3.6 Deviation from Standards

None

3.7 Abnormalities from Standard Conditions

None



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4 FCC Radiofrequency radiation exposure limits

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.

4.1 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of §1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

The 1-mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph §1.1307(b)(3)(ii)(A).

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

4.2 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table B.1—Thresholds For Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency		Minimum Distance			Threshold ERP
f_L MHz	f_H MHz	$\lambda_L / 2\pi$	$\lambda_H / 2\pi$	W	
0.3	—	1.34	159 m	—	35.6 m
1.34	—	30	35.6 m	—	1.6 m
30	—	300	1.6 m	—	159 mm
300	—	1,500	159 mm	—	3.83 R ²
1,500	—	100,000	31.8 mm	—	0.0128 R ² f
Subscripts L and H are low and high; λ is wavelength.					
From §1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.					

The table applies to any RF source (i.e. single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least $\lambda/2\pi$. The thresholds are



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based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

For mobile devices that are not exempt per Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than $ERP_{20\text{cm}}$ in Formula (B.1) [repeated from §2.1091(c)(1); also in §1.1307(b)(1)(i)(B)].

$$P_{th} \text{ (mW)} = ERP_{20\text{cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole).

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

Limit calculation			
Frequency range	Frequency(MHz)	R($\lambda/2\pi$)(m)	Threshold ERP(W)
300~1500MHz	915	0.0522	0.032
1500~100000MHz	2480	0.0193	0.007

4.3 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of $\lambda/4$.

As for devices with antennas of length greater than $\lambda/4$ where the gain is not well defined, but always less than that of a half-wave dipole (length $\lambda/2$), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

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The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.

The SAR-based exemption formula of §1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B.2})$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1).

Example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance(mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

Limit calculation				
Frequency range(GHz)	Frequency(GHz)	X	Distance(cm)	Pth (mW)
0.3~1.5	0.915	1.474	0.5	8.133
1.5~6	2.48	1.905	0.5	2.717



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5 Measurement and Calculation

5.1 Maximum transmit power

Test Mode	Channel [MHz]	Gain(dBi)	EIRP(dBm)	EIRP (mW)	Limit[mW]	Ratio	Result
Module NXP88W8997 BT	2441	1.82	9.79	9.53	3060.00	0.003	PASS
	2402		7.00	5.01	3060.00	0.002	PASS
Module NXP88W8997 2.4 Wi-Fi	2412	1.82	13.48	22.28	3060.00	0.007	PASS
	2437		23.55	226.46	3060.00	0.074	PASS
Module SKIWB800DS2.1 2.4 Wi-Fi	5745	2.44	18.09	71.61	3060.00	0.021	PASS
	5190		10.15	10.35	3060.00	0.003	PASS

Note: The Power Data is based on the RF Test Report SZCR230600198902, SZCR230600198903, SZCR230600198904, SZCR230600198905.

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Exposure condition for simultaneous transmission operations

Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluated_k term) shall be used to determine exemption for simultaneous transmission according to Formula (C.1) [repeated from § 1.1307(b)(3)(ii)(B)].

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1 \quad (C.1)$$

Remark:

a -number of fixed, mobile, or portable RF sources claiming exemption using the § 1.1307(b)(3)(i)(B) formula for P_{th}, including existing exempt transmitters and those being added.

b -number of fixed, mobile, or portable RF sources claiming exemption using the applicable § 1.1307(b)(3)(i)(C) Table 1 formula for Threshold ERP, including existing exempt transmitters and those being added.

c -number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance.

P_i -the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

P_{th,i} -the exemption threshold power (P_{th}) according to the § 1.1307(b)(3)(i)(B) formula for fixed, mobile, or portable RF source i.

ERP_j -the available maximum time-averaged power or the ERP, whichever is greater, of fixed, mobile, or portable RF source j. ERP_{th,j} -exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$, according to the applicable § 1.1307(b)(3)(i)(C) Table 1 formula at the location in question.

Evaluated_k -the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation.

Exposure Limit_k -either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable sources, as applicable

The maximum sum of the ratios = Module NXP88W8997 (5G Wi-Fi) + For Module: SKIWB800DS2.1 (2.4 Wi-Fi) = 0.074+0.021=0.095< 1

Therefore, the device is to qualify for simultaneous transmission SAR test exemption, the exemption report is in lieu of the SAR report.

--End of the Report--



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