



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

SZEMC-TRF-01 Rev. A/1

Report No.: SZCR250400168307

Page: 1 of 12

RF EXPOSURE EVALUATION REPORT

Application No.:

SZCR2504001683TL

Applicant:

KE2 Therm Solutions, Inc.

Address of Applicant:

12 Chamber Drive, Washington, MO, 63090, United States

Manufacturer:

KE2 Therm Solutions, Inc.

Address of Manufacturer:

12 Chamber Drive, Washington, MO, 63090, United States

Equipment Under Test (EUT):

EUT Name: KE2 Edge Manager Cell 2

Model No.: KE2-EM Cell 2

Trade Mark:



KE2 Therm™

FCC ID: 2AOPR-22245

Standard(s) : FCC Rules 47 CFR §2.1091

KDB 447498 D04 interim General RF Exposure Guidance v01

Date of Receipt: 2025-04-28

Date of Evaluation: 2025-05-07 to 2025-05-14

Date of Issue: 2025-06-18

Evaluation Result:	Pass*
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* In the configuration evaluated, the EUT complied with the standards specified above.

Keny Xu

EMC Laboratory Manager



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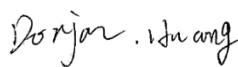
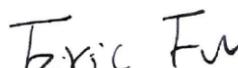
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Revision Record

Version	Chapter	Date	Modifier	Remark
01		2025-06-18		Original

Authorized for issue by:

		 Donjon Huang/Project Engineer		
		 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:	Adapter Model: ICP30A-120-2500 Input: AC 100-240V 50/60Hz 0.8A Output: DC 12V 2.5A.
Cable(s):	DC cable:100cm unshielded Network cable:70cm unshielded
For BLE:	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 LE
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	Dipole Antenna
Antenna Gain:	1.6dBi
Antenna Number:	1
For 2.4G WIFI:	
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: OFDM/OFDMA (BPSK, QPSK, 16QAM, 64QAM,256QAM, 1024QAM)
Number of Channels:	802.11b/g/n(HT20)/ax(HEW20): 11, 802.11n(HT40)/ax(HEW40):7
Channel Spacing:	5MHz
Antenna Type:	For ANT1: Dipole Antenna; For ANT2: FPC Antenna
Antenna Gain:	ANT1: 1.63dBi; ANT2: 1.7dBi; Directional Gain:4.71dBi
Antenna Number:	2



For 5G WIFI:	
Operation Frequency/Number of channels (20MHz):	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):	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):	5210MHz (1 Channel); U-NII-2A: 5290MHz (1 Channels); U-NII-2C: 5530-5610MHz (2 Channels); U-NII-3: 5775MHz (1 Channel)
Modulation Type:	OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM); 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM); 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024-QAM)
Channel Spacing:	802.11a/n/ac/ax 20: 20MHz; 802.11n/ac/ax 40: 40MHz; 802.11ac/ax 80: 80MHz; 802.11ac/ax 160: 160MHz
DFS Function:	Master
TPC Function:	Support TPC function
Antenna Type:	For ANT1: Dipole Antenna; For ANT2 & ANT3: FPC Antenna
Antenna Gain:	ANT1: 2.5dBi; ANT2: 3.5dBi; ANT3: 3.65dBi; Directional Gain: 7.67dBi.
Antenna Number:	3
For 3G	
Sample Type:	Mobile product
Support Network:	RMC, HSDPA, HSUPA
Operation Frequency Band:	UMTS FDD Band II/IV/V
Modulation Type:	QPSK, 16QAM(DL only)
Supported Channel Bandwidth:	5MHz for WCDMA
UMTS Power Class:	Level 3
Antenna Type:	Dipole Antenna
Antenna Gain:	WCDMA B2: 4.6dBi, B4: 4.6dBi, B5: 2.4dBi



For 4G:	
Sample Type:	Mobile product
LTE Operation Frequency Band:	LTE B2/4/5/7/12/13/14/25/30/38/41/66
Modulation Type:	QPSK, 16QAM
LTE Power Class:	Level 3
Antenna Type:	Dipole Antenna
Antenna Gain:	LTE B2: 4.6dBi, B4: 4.6dBi, B5: 2.4dBi, B7: 1.5dBi, B12: 2.0dBi, B13: 2.0dBi, B14: 2.0dBi, B25: 4.6dBi, B30: 1.1dBi, B38: 1.5dBi, B41: 1.5dBi, B66: 4.6dBi,

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3.3 Separation Distance

Minimum test separation distance:	20cm
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.	



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3.4 Test Location

All tests were performed at:

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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)].

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

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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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

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max Conducted Power (dBm)	EIRP(ERP) (dBm)	EIRP(ERP) Limit (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Gain according to EIRP(ERP) (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion	MPE Ratio
WCDMA Band 2	1852.4	4.6	25.00	29.60	33.01	0.1814	1.0000	8.01	12.01	8.01	Pass	0.1814
WCDMA Band 4	1712.4	4.6	25.00	29.60	33.00	0.1814	1.0000	8.00	12.01	8.00	Pass	0.1814
WCDMA Band 5	826.4	2.4	25.00	25.25	30.00	0.0666	0.5509	7.15	9.42	7.15	Pass	0.121
LTE Band 2	1850.7	4.6	25.00	29.60	33.01	0.1814	1.0000	8.01	12.01	8.01	Pass	0.1814
LTE Band 4	1710.7	4.6	25.00	29.60	30.00	0.1814	1.0000	5.00	12.01	5.00	Pass	0.1814
LTE Band 5	824.7	2.4	25.00	25.25	38.45	0.0666	0.5498	15.60	9.41	9.41	Pass	0.1212
LTE Band 7	2502.5	1.50	25.00	26.50	33.01	0.0889	1.0000	8.01	12.01	8.01	Pass	0.0889
LTE Band 12	699.7	2.00	25.00	24.85	34.77	0.0608	0.4665	11.92	8.70	8.70	Pass	0.1303
LTE Band 13	779.5	2.00	25.00	24.85	34.77	0.0608	0.5197	11.92	9.16	9.16	Pass	0.117
LTE Band 14	706.5	2.00	25.00	24.85	34.77	0.0608	0.4710	11.92	8.74	8.74	Pass	0.129
LTE Band 25	1850.7	4.60	25.00	29.60	33.01	0.1814	1.0000	8.01	12.01	8.01	Pass	0.1814
LTE Band 30	814.7	1.10	25.00	23.95	50.00	0.0494	0.5431	27.15	9.36	9.36	Pass	0.091
LTE Band 38	824.7	1.50	25.00	24.35	38.45	0.0542	0.5498	15.60	9.41	9.41	Pass	0.0985
LTE Band 41	2498.5	1.50	25.00	26.50	33.01	0.0889	1.0000	8.01	12.01	8.01	Pass	0.0889
LTE Band 66	1710.7	4.60	25.00	29.60	30.00	0.1814	1.0000	5.00	12.01	5.00	Pass	0.1814
BLE	2402.0	1.60	15.57	17.17	N/A	0.0104	1.0000	N/A	21.44	21.44	Pass	0.0104
2.4G Wi-Fi	2462.0	4.71	18.99	23.70	N/A	0.0466	1.0000	N/A	18.02	18.02	Pass	0.0466
5G Wi-Fi	5785.0	7.67	20.58	28.25	N/A	0.1330	1.0000	N/A	16.43	16.43	Pass	0.133

MPE Calculation

According to the formula $S=P/4\pi R^2$, we can calculate S which is MPE.

Note:

1) P (mW)

2) R = distance to the center of radiation of antenna (in centimeter)

3) MPE limit = 1mW/cm²

Exposure condition for simultaneous transmission operations

The Max. sum of the simultaneous transmission ratio:

BT+5G WIFI+WWAN= 0.0104 +0.133 +0.1814 = 0.3248 < 1

2.4 WIFI+5G WIFI+WWAN= 0.0466 +0.133 +0.1814 = 0.361 < 1

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

So, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report.



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No.1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch Inspection & Testing Services Laboratory
中国·广东·深圳市南山区科技园中区M-10栋1号厂房 邮编:518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

6 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for SZCR2504001683TL

-End of the Report-



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SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch 1000m² ELC Laboratory
No.1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·广东·深圳市南山区科技园中区M-10栋1号厂房 邮编:518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com