



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

SZEMC-TRF-01 Rev. A/1

Report No.: SZCR240800323406

Page: 1 of 14

## RF Exposure Report

**Application No.:**

SZCR2408003234AT

**Applicant:**

ZK Technology LLC DBA ZK Teco

**Address of Applicant:**

200 Centennial Ave, Suite 211 Piscataway New Jersey 08854 United States

**Manufacturer:**

ZK Technology LLC DBA ZK Teco

**Address of Manufacturer:**

200 Centennial Ave, Suite 211 Piscataway New Jersey 08854 United States

**Equipment Under Test (EUT):**

**EUT Name:** DATA COLLECTION TERMINAL

**Model No.:** Please refer to section 2



**Trade Mark:**

Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.

**FCC ID:**

2AUC7-ULT0G2

**Standard(s) :**

FCC Rules 47 CFR §2.1091

KDB 447498 D04 interim General RF Exposure Guidance v01

**Date of Receipt:**

2024-08-20

**Date of Test:**

2024-08-29 to 2024-10-21

**Date of Issue:**

2024-10-24

**Test Result:**

Pass\*

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

Keny Xu  
EMC Laboratory Manager



SGS-CSTC Standards Technical Services Co., Ltd.  
Shenzhen Branch Inspection & Testing Services Laboratory

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2024-10-24		Original

Authorized for issue by:			
		Edison Li/Project Engineer	
		Eric Fu/Reviewer	

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## 2 General Information

### 2.1 General Description of E.U.T.

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

### 2.2 Details of E.U.T.

Power supply:	Powered by Lithium-ion Polymer Battery Model: 786166P Capacity: 7.4V, 7600mAh, 56.24Wh Charging by DC 12V from external power supply Model: ADS-40SI-12-3 12036E Input: AC 100-240V, 50/60Hz, Max 1.0A Output: DC 12V, 3.0A, 36W
Cable(s):	DC Cable from adapter 1.8m unshielded with one core AC Cable from adapter 1.8m unshielded
For 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/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Channel Spacing:	5MHz
Number of Channels:	802.11b/g/n(HT20): 11, 802.11n(HT40): 7
Antenna Type:	FPC Antenna
Antenna Gain:	2.69dBi
For 5G:	
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)
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM);

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	802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing:	802.11a/n/ac 20: 20MHz; 802.11n/ac 40: 40MHz
DFS Function:	Slave without Radar detection
TPC Function:	Without TPC function
Antenna Type:	FPC Antenna
Antenna Gain:	3.18dBi
For 125kHz:	
Operation frequency:	125kHz
Modulation type:	ASK
Antenna type:	Loop Antenna
For NFC 13.56MHz:	
Operation frequency:	13.56MHz
Modulation type:	ASK
Antenna type:	Loop Antenna

## 2.3 Details of LTE Module\*:

Operation Frequency Band:	WCDMA Band 2/4/5. LTE Band: 2/4/5/7/12/13/14/17/25/26/41/66/71.
Modulation Type:	WCDMA: QPSK LTE: QPSK, 16QAM
Antenna Type:	FPC Antenna
Antenna Gain:	WCDMA Band 2/LTE Band 2: 1.33dBi WCDMA Band 4/LTE Band 4: 1.33dBi WCDMA Band 5/LTE Band 5: 0.25dBi LTE Band 7: 1.29dBi, LTE Band 12: 0.25dBi, LTE Band 13: 0.25dBi, LTE Band 14: 0.25dBi, LTE Band 17: 0.25dBi, LTE Band 25: 1.33dBi, LTE Band 26: 0.25dBi, LTE Band 41: 1.29dBi, LTE Band 66: 1.33dBi, LTE Band 71: 0.25dBi

\*: The LTE module approval by FCC(FCC ID:XMR2019SC600NA), Grant at 07/18/2019.

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**Remark:**

Model No.: ULTIMA 10, ULTIMA 10 BASE, ULTIMA 10 Face, ULTIMA 10 Portable, ULTIMA 10 G2, ULTIMA 10 G3, ULTIMA 10 Pro, ULTIMA 10 FAM33, ULTIMA 10 Face VL Pro, ULTIMA 1000, CRNOUS 10, CRNOUS 10 BASE, CRNOUS 10 Face, CRNOUS 10 Portable, CRNOUS 10 G2, CRNOUS 10 G3, CRNOUS 10 Pro, CRNOUS 10 FAM33, CRNOUS 10 Face VL Pro, CRNOUS 1000, ULT10, ULT10 BASE, ULT10 LFP, ULT10 LUM, ULT10 M210, ULT10 ZFP, ULT10 FP, ULT10 MT30, ULT10 MT30F, ULT10 MTR30, ULT10 MTR30P, ULT10 PRO, ULT10 MTPRO, ULT10 MTR10, ULT10 ID, ULT10 RFID, ULT10 MAG, ULT10 BAR, ULT10 POE+, ULT10 RELAY, ULT10 CAMERA, ULT10 BATTERY, ULT10 FACE, ULT10 FACE VL PRO, ULT10 F33, ULT10 FAM33, ULT10 P, ULT10 PORTABLE, ULT10 G3, ULT10 G2, ULT1000, ULT1000-G3, FLEXTOUCH, FLEXTOUCH4.0, WTPURULT10, TCPTC10, ORION10, OEMTC10

Only the model ULTIMA 10 was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on color, appearance and model No..

## 2.4 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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### 2.5 Test Location

All tests were performed at:

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No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

### 2.6 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.

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### 3 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.

#### 3.1 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.

#### 3.2 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 <sup>2</sup>
1,500	—	100,000	31.8 mm	—	0.0128 R <sup>2</sup> f
Subscripts L and H are low and high; $\lambda$ 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)	$R(\lambda/2\pi)(\text{m})$	Threshold ERP(W)
300~1500MHz	<b>915</b>	0.0522	0.032
1500~100000MHz	<b>2480</b>	0.0193	0.007

### 3.3 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.

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.



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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	2.44	1.901	0.5	2.753

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## 4 Measurement and Calculation

### 4.1 Maximum transmit power

#### Standalone transmission

Test Mode	Frequency (MHz)	Maximum Conducted power [dBm]	Maximum Conducted power (mW)	Limit(mw)	Ratio	Verdict
2.4G WIFI	2437	15.3	33.88	3060	0.01107	Pass

Test Mode	Frequency (MHz)	Maximum EIRP power [dBm]	Maximum EIRP power (mW)	Limit(mw)	Ratio	Verdict
2.4G WIFI	2437	17.99	62.95	3060	0.02057	Pass

Test Mode	Frequency (MHz)	Maximum Conducted power [dBm]	Maximum Conducted power (mW)	Limit(mw)	Ratio	Verdict
5G WIFI	5300	14.11	25.76	3060	0.00842	Pass

Test Mode	Frequency (MHz)	Maximum EIRP power [dBm]	Maximum EIRP power (mW)	Limit(mw)	Ratio	Verdict
5G WIFI	5300	17.29	53.58	3060	0.01751	Pass

Note 1: Applying a factor of 2.5 to the SAR-based exemption thresholds

Note 2: 2.4G WIFI Power Data is based on the RF Test Report SZCR240800323402.

3. 5G WIFI Power Data is based on the RF Test Report SZCR240800323403.

3. Use the maximum power between the conducted power and ERP/EIRP to perform RF exposure exemption evaluation.

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Test Mode	Frequency (MHz)	Field Strength of the Fundamental Signal [dBuV/m]	ERP (mW)	Limit(mw)	Ratio	Verdict
125kHz	0.125	65.73	0.000684	97.5	0.000007	Pass
NFC	13.56	56.40	0.000080	1.17	0.000068	Pass

Remark: 5mm ERP is below above-mentioned data, so we use above ERP value shows in this report.

Note 1: 125kHz field strength of fundamental signal based on the RF Test Report SZCR240800323405.

Note 2: NFC field strength of fundamental signal based on the RF Test Report SZCR240800323404.

Note 3: Applying a factor of 2.5 to the SAR-based exemption thresholds.

Note 4: Limit for 125kHz is based on power thresholds of 300MHz.

Note 5: ERP calculation formula:

$$\text{ERP} = \text{EIRP}/1.64 = (E \times d)^2 / (30 \times 1.64) = (E \times d)^2 / 49.2$$

E is the electric field strength in V/m

d is the measurement distance in meters(m)

$V/m = 10^{(((dBuV/m) - 120) / 20)}$

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Type	Test Freq. (MHz)	Max Antenna Gain (dBi)	Max Cond. power (dBm)	Max Cond. power (mW)	Max EIRP (dBm)	Max EIRP (mW)	Limit (mw)	Cond. Ratio	EIRP Ratio	Result
WCDMA B2	1852.4	1.33	25	316.23	26.33	429.54	3060.00	0.10334	0.14037	PASS
WCDMA B4	1712.4	1.33	25	316.23	26.33	429.54	3060.00	0.10334	0.14037	PASS
WCDMA B5	826.4	0.25	25	316.23	25.25	334.97	3060.00	0.10334	0.10947	PASS
LTE B2	1850.7	1.33	25	316.23	26.33	429.54	3060.00	0.10334	0.14037	PASS
LTE B4	1710.7	1.33	25	316.23	26.33	429.54	3060.00	0.10334	0.14037	PASS
LTE B5	824.7	0.25	25	316.23	25.25	334.97	3060.00	0.10334	0.10947	PASS
LTE B7	2502.5	1.29	25	316.23	26.29	425.60	3060.00	0.10334	0.13908	PASS
LTE B12	699.7	0.25	25	316.23	25.25	334.97	3060.00	0.10334	0.10947	PASS
LTE B13	779.5	0.25	25	316.23	25.25	334.97	3060.00	0.10334	0.10947	PASS
LTE B14	790.5	0.25	25	316.23	25.25	334.97	3060.00	0.10334	0.10947	PASS
LTE B17	706.5	0.25	25	316.23	25.25	334.97	3060.00	0.10334	0.10947	PASS
LTE B25	1850.7	1.33	25	316.23	26.33	429.54	3060.00	0.10334	0.14037	PASS
LTE B26	814.7	0.25	25	316.23	25.25	334.97	3060.00	0.10334	0.10947	PASS
LTE B41	2498.5	1.29	25	316.23	26.29	425.60	3060.00	0.10334	0.13908	PASS
LTE B66	1710.7	1.33	25	316.23	26.33	429.54	3060.00	0.10334	0.14037	PASS
LTE B71	665.0	0.25	25	316.23	25.25	334.97	3060.00	0.10334	0.10947	PASS

## Simultaneous transmission

Test Mode	125kHz	NFC	2.4G/5G WiFi	WCDMA/LTE	Total Ratio	Limit	Result
Ratio	0.000007	0.000068	0.02057	0.14037	N/A	N/A	N/A
Scenario 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0.161015	1.0	Pass

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## 4.2 RF Exposure Calculation

**Remark:** we used the maximum power between the conducted power and ERP/EIRP to perform RF exposure exemption evaluation.

The Max. EIRP Power is 429.54mW, the best case gain of the Antenna: 3.18dBi.

	Evaluation method	Exempt Limit(mW)	Verdict
<input type="checkbox"/>	Blanket 1 mW Blanket Exemption	1mW	N/A
<input type="checkbox"/>	MPE-based Exemption(ERP)	7mW(ERP)	N/A
<input checked="" type="checkbox"/>	SAR-based Exemption( $P_{th}$ )	3060	Yes

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

--End of the Report--



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