






TEST REPORT

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<p>1. Client</p> <ul style="list-style-type: none"> ◦ Name : Mobee-K Co., LTD ◦ Address : 10, Seongnam-daro 926beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea ◦ Date of Receipt : 2020-07-01 <p>2. Use of Report : Certification</p> <p>3. Name of Product / Model : Smart Watch Wireless Charger / MS230</p> <p>4. Manufacturer / Country of Origin : Mobee-K Co., LTD / Korea</p> <p>5. FCC ID : 2AUP9MS230</p> <p>6. Date of Test : 2020-09-03 to 2020-09-10</p> <p>7. Location of Test : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing (Address: Address of testing location)</p> <p>8. Test method used : 47 CRF Part 1.1310</p> <p>9. Test Result : Refer to the test result in the test report</p>		
<p>Affirmation</p>	<p>Tested by Name : Hosung Lee  (Signature)</p>	<p>Technical Manager Name : Heesu Ahn  (Signature)</p>
<p style="text-align: right;">2020-12-23</p> <p style="text-align: center;">KCTL Inc.</p> <p>As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.</p>		

REPORT REVISION HISTORY

Date	Revision	Page No
2020-11-20	Originally issued	-
2020-12-10	Updated	9, 10
2020-12-23	Updated	8, 9, 10

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Note. The report No. KR20-SRF0296-A is superseded by the report No. KR20-SRF0296-B.

General remarks for test reports

Nothing significant to report.

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1. General information

Client : Mobee-K Co., LTD
 Address : 10, Seongnam-daro 926beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
 Manufacturer : Mobee-K Co., LTD
 Address : 10, Seongnam-daro 926beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
 Factory : KO-MTECH
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 Accreditations : FCC Site Designation No: KR0040, FCC Site Registration No: 687132
 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056
 Industry Canada Registration No. : 8035A
 KOLAS No.: KT231

2. Device information

Equipment under test : Smart Watch Wireless Charger
 Model : MS230
 Frequency range : 2 402 MHz ~ 2 480 MHz (Bluetooth Low Energy)
 110 kHz ~ 129 kHz(WPT)
 Modulation technique : GFSK(Bluetooth Low Energy)
 FSK(WPT)
 Number of channels : 40 ch(Bluetooth Low Energy)
 Power source : DC 5 V
 Antenna specification : Pattern Antenna(Bluetooth Low Energy)
 Loop Coil Antenna(WPT)
 Antenna gain : -28.747 dBi (Bluetooth Low Energy)
 Software version : 1.0
 Hardware version : 1.0
 Test device serial No. : N/A
 Operation temperature : -10 °C ~ 50 °C

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
N/A	-	-	-	-

2.2. Frequency/channel operations

This device contains the following capabilities:

Bluetooth Low Energy, WPT

Ch.	Frequency (MHz)
00	2 402
.	.
19	2 440
.	.
39	2 480

Table 2.2.1. Bluetooth Low Energy

Frequency (kHz)
110 ~ 129

Table 2.2.2. WPT

3. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty (\pm)	
Conducted RF power	1.3 dB	
E-Field	3 kHz ~ 10 MHz	11.04 %
H-Field	3 kHz ~ 10 MHz	13.80 %

4. RF Exposure

Regulation

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC rules and Regulations.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(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 [minute]
(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 ~ 15 000	/	/	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/1 500	30
1 500 ~ 15 000	/	/	1.0	30

f=frequency in MHz, *=*plane-wave equivalent power density*

Per the guidance of KDB 680106, the E-field and H-field limits shown in the table above are extended down to 100 kHz

Test results**MPE (Maximum Permissible Exposure) Prediction**

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad (\Rightarrow R = \sqrt{PG/4\pi S})$$

S = power density [mW/cm²]

P = Power input to antenna [mW]

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna [cm]

Calculation Result of RF exposure

Maximum tune-up tolerance

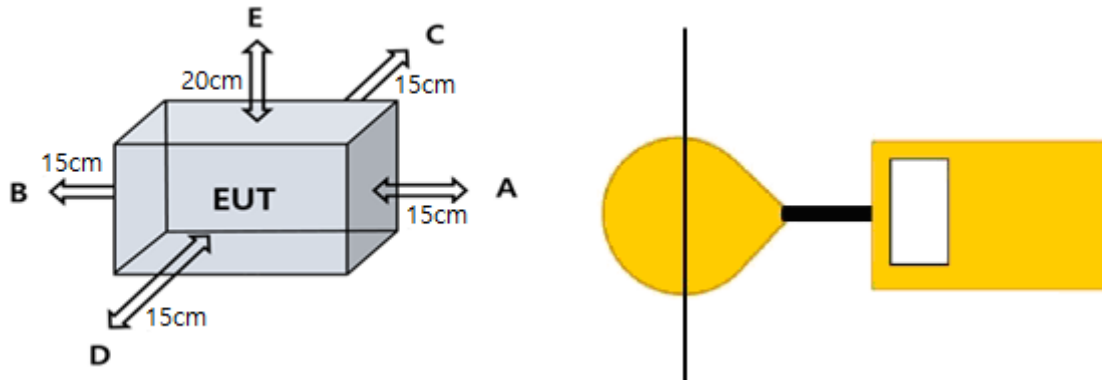
Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Max Tune-up Power [mW]	Ant Gain [dBi]	Power density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
BLE/1 Mbps	2 402	-4.00	0.40	-28.75	0.000 000 11	1.00

Note.

- The power density P_d (5th column) at a distance of 20 cm calculated from the friis transmission Formula is far below the limit of 1 mW/cm².

5. WPT(Wireless Power Transfer)

Test setup



Test configurations

In order to check configurations, EUT was evaluated charging condition.
The EUT information was declared by the manufacturer.

Measurement Procedure

- The RF exposure test was performed on the table in anechoic chamber.
Testing was performed with a calibrated field probe.
- The measurement was investigated between the edge of the charger and center of the field probe in the closest state.
- Maximum E-field and H-field measurements were made on each of five sides of the EUT that could come in contact with a user. Five sides are defined as follows:
Right (B), Top (E), Left (A), Rear (D) and Front (C).
Refer to the test position diagram above.
- According to the guidance of KDB 680106 D01 v03 test distance was 15 cm on the surrounding sides from the EUT.

Equipment Approval Considerations item 5.b) of KDB 680106 D01 v03

a) Power transfer frequency is less than 1 MHz.

- ▶ This device is operates at a frequency of 111 kHz, 119 kHz, 129 kHz.

b) Output power from each primary coil is less than or equal to 15 watts.

- ▶ DC 5.0 V condition / Output power from each primary coil : 0.03 watts.

c) The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.

- ▶ The transfer system includes only single primary and secondary coils.

d) Client device is placed directly in contact with the transmitter.

- ▶ The client device is placed directly in contact with the transmitter.

e) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion)

- ▶ This device is mobile exposure condition.

f) The aggregate H-field strengths at 15cm surrounding the device and 20cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.

- ▶ The EUT field strength levels < 50 % of the MPE limit 1.63 A/m
0.798 0 A/m (Max) < 0.815 A/m

Test results

The probe was positioned at the location where there is maximum field strength on each side of the EUT.

Test mode : H-field

Frequency [MHz]	Corrected H-field [V/m]					Limits [A/m]
	EUT sides					
	A	B	C	D	E	
0.111	0.674 0	0.668 0	0.676 0	0.678 0	0.798 0	1.63
0.119	0.624 0	0.612 0	0.620 0	0.630 0	0.692 0	1.63
0.129	0.628 0	0.630 0	0.616 0	0.624 0	0.788 0	1.63

Test mode : E-field

Frequency [MHz]	Corrected H-field [V/m]					Limits [A/m]
	EUT sides					
	A	B	C	D	E	
0.111	4.574 0	4.542 0	4.560 0	4.598 0	4.608 0	614
0.119	4.320 0	4.348 0	4.332 0	4.272 0	4.418 0	614
0.129	4.278 0	4.322 0	4.300 0	4.348 0	4.534 0	614

6. Measurement Equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
E&H Field Probe	narda	EHP-200A	170WX81015	21.02.19

End of test report