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TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR24-SRF0016-A Page (1) of (13)	eurofins KCTL

1. Client

- Name : KOREIT CO.,LTD.
- Address : 103, Chungjusandan 3-ro, Chungju-si, Chungcheongbuk-do, Republic of Korea
- Date of Receipt : 2023-12-14

2. Use of Report : Certification

3. Name of Product / Model : EM EAS-System / Evolve-K4300 System

4. Manufacturer / Country of Origin : KOREIT CO.,LTD. / Korea

5. FCC ID : 2BEFN-EVOLVE-K4300

6. Date of Test : 2023-12-28 to 2024-01-24

7. Location of Test : ■ Permanent Testing Lab ☐ On Site Testing
(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

8. Test method used : 47 CRF Part 1.1310

9. Test Result : Refer to the test result in the test report

Affirmation	Tested by Name : Minki Kim (Signature)	Technical Manager Name : Heesu Ahn (Signature)

2024-03-12

Eurofins KCTL Co.,Ltd.

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 Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2024-03-06	Originally issued	-
2024-03-12	Updated	3-13

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Note. The report No. KR24-SRF0016 is superseded by the report No. KR24-SRF0016-A.

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

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1. General information

Client	:	KOREIT CO.,LTD.
Address	:	103, Chungjusandan 3-ro, Chungju-si, Chungcheongbuk-do, Republic of Korea
Manufacturer	:	KOREIT CO.,LTD.
Address	:	103, Chungjusandan 3-ro, Chungju-si, Chungcheongbuk-do, Republic of Korea
Laboratory	:	Eurofins KCTL Co.,Ltd.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132
		VCCI Registration No. : R-20080, G-20078, C-20059, T-20056
		CAB Identifier: KR0040
		ISED Number: 8035A
		KOLAS No.: KT231

2. Device information

Equipment under test	:	EM EAS-System
Model	:	Evolve-K4300 System
Modulation technique	:	ASK
Frequency range	:	12.5 ㎑
Power source	:	AC 115 ~ 220 V
Antenna specification	:	Coil Loop Antenna
Software version	:	FT3.110
Hardware version	:	MONO-ELECTRONIC REV.E
Test device serial No.	:	09103848 01E 363 3 001
Operation temperature	:	0 ℃ ~ 85 ℃

2.1. Companion device information

Equipment	Manufacturer	Model	Serial No.
Tag System	EM EAS-System	N/A	N/A

2.2. Frequency/channel operations

This device contains the following capabilities:

Frequency (㎑)
12.5

Table 2.2.1. 12.5 ㎑

2.3. Normal and extreme test conditions

- Ambient Conditions

Item	Temperature [℃]	Relative humidity [%]
Requirement for tests	15 to 35	20 to 75
Ambient Conditions	21	51

- Test Conditions

Test Condition	Temperature [℃]	Voltage [V]
NTNV	21	AC 115 ~ 220

Note 1 : N:Normal T:Temperature V:Voltage

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 indicated a 95 % level of confidence. The measurement data shown herein meets of 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 (±)
Conducted RF power	0.9 dB
E-Field	1.0 %
H-Field	1.3 %

4. RF Exposure

4.1. FCC 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 (㎒)	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [㎽/㎠]	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 ㎒, *= 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 ㎑

Furthermore, consistent with FCC's equipment authorization RF exposure guidance, any device (both portable and mobile) operating at frequencies below 100 ㎑ is considered compliant for the purpose of equipment authorization when the external (unperturbed) temporal peak field strengths do not exceed the following reference levels:

83 V/m for the electric field strength (E)

and

90 A/m for the magnetic field strength (H).

These data may be provided through measurements and/or numerical simulations, and for all the positions in space relevant for any possible body exposure.

For all the cases mentioned above, E and H measurements should be made from all sides of the transmitter, along all the principal axes defined with respect to the orientation of the transmitting element (e.g., coil or antenna). When clearly demonstrated, symmetry considerations may be used to reduce the amount of testing. Furthermore, for “low-frequency” loop/coil emitting structures that lead to dominant H-field near-field emissions (i.e., with E/H ratio less than 1/10 of the 377-ohm free space wave impedance, typically frequencies less than 1 ㎒), only H-field[1] measurements are sufficient for demonstrating MPE limit compliance.

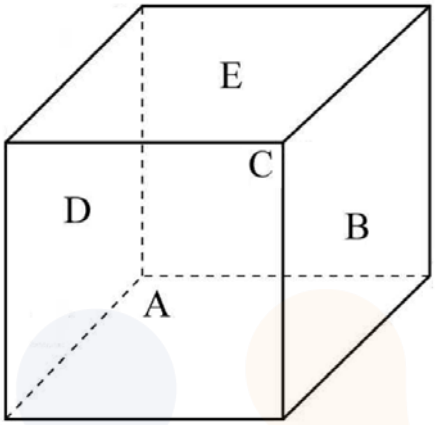
It should be also noted that if numerical modeling is used to support compliance data for certification, the application is subject to PAG, related to the NUMSIM item in the PAG list of KDB Publication 388624-D02.

[1)]In this document the terms “E-field” and “H-field” refer to “electric field strength” and “magnetic field strength,” respectively.

4.2. Test Set-up

4.2.1. Isotropic Probe test setup

The measurement probe (EHP-200A) is a regular hexahedron and supports 3-axis (X, Y and Z) isotropic probe.



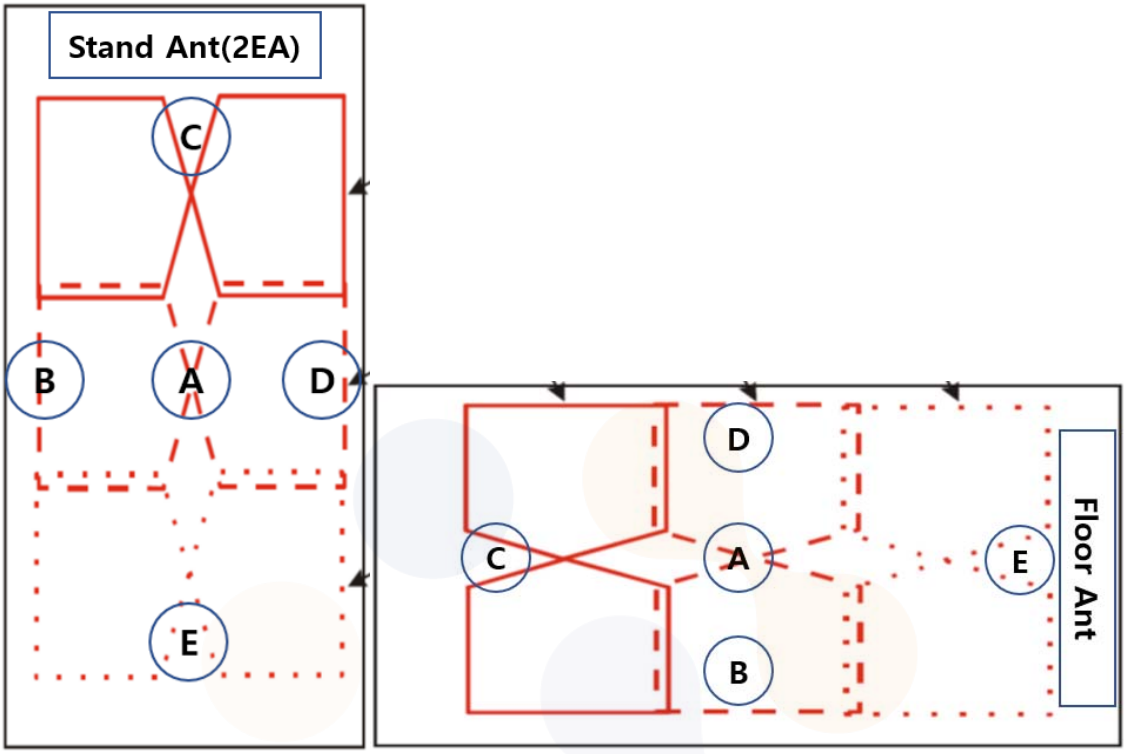
A: Front of measurement probe
B: Right of measurement probe
C: Rear of measurement probe
D: Left of measurement probe
E: Top of measurement probe
*Bottom of measurement probe is not used to measure RF exposure condition owing to connection with a stick.

At 0 cm distance, measurement isotropic probe was investigated by rotating the probe through various angles for one of the EUT's sides as below.

Measurement Point	**A**	**B**	**C**	**D**	**E**
Direction	Front	Right	Rear	Left	Top
Measurement Point	**A to B**	**B to C**	**C to D**	**D to A**	**N/A**
Direction	Front to Right	Right to Rear	Rear to Left	Left to Front	-
Measurement Point	**A to E**	**B to E**	**C to E**	**D to E**	**N/A**
Direction	Front to Top	Right to Top	Rear to Top	Left to Top	-

When the worst angle among all angles was found, RF exposure measurement should be adjusted from worst angle.

4.2.2. EUT Test setup



1) Testing was performed with a calibrated field probe.
2) Measurement was performed on each point of the EUT as described per below table.
3) As a result of the pre-test, point A had the highest output value, so the test was conducted with point A.

A	B	C	D	E
Center	Left	Top	Right	Bottom

Measurement Probe	EHP-200A (Manufacturer: Narda)
Measurement Distance	Surface of the EUT to the center of the probe.

Equipment approval considerations item 5.b) of KDB 680106 D01 v04

(1) Power transfer frequency is less than 1 ㎒.

► This device is operates at a frequency of 12.5 ㎑

(2) The output power from each transmitting element (e.g., coil) is less than or equal to 15 watts.

► AC 115 ~ 220 V condition / Output power from each primary coil

(3) A client device providing the maximum permitted load is placed in physical contact with the transmitter
(i.e., the surfaces of the transmitter and client device enclosures need to be in physical contact)

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

(4) Only § 2.1091-Mobile exposure conditions apply
(i.e., this provision does not cover § 2.1093-Portable exposure conditions).

► N/A

(5) The E-field and H-field strengths, at and beyond 20 ㎝ surrounding the device surface, are demonstrated to be less than 50% of the applicable MPE limit, per KDB 447498, Table 1. These measurements shall be taken along the principal axes of the device, with one axis oriented along the direction of the estimated maximum field strength, and for three points per axis or until a 1/d (inverse distance from the emitter structure) field strength decay is observed. Symmetry considerations may be used for test reduction purposes. The device shall be operated in documented worst-case compliance scenarios (i.e., the ones that lead to the maximum field components), and while all the radiating structures (e.g., coils or antennas) that by design can simultaneously transmit are energized at their nominal maximum power.

► The EUT field strength MPE limit : 83 V/m(E), 90 A/m(H)

(6) For systems with more than one radiating structure, the conditions specified in (5) must be met when the system is fully loaded (i.e., clients absorbing maximum power available), and with all the radiating structures operating at maximum power at the same time, as per design conditions. If the design allows one or more radiating structures to be powered at a higher level while other radiating structures are not powered, then those cases must be tested as well. For instance, a device may use three RF coils powered at 5 W, or one coil powered at 15 W: in this case, both scenarios shall be tested.

► N/A

4.3. Test Result

4.3.1. Test mode: Test result of EUT's sides about the distance

Distance : EUT A Point Position, 20㎝ above the top surface.

- E-field measurement results(Sides of probe)

Frequency [㎑]	E-field Measurement [V/m]						Limits [V/m]
	Probe Rotation						
	A	B	C	D	E	F	
12.50	21.513 0	21.705 0	21.663 0	21.380 0	**23.014 0**	15.844 0	83.00

- H-field measurement results(Sides of probe)

Frequency [㎑]	H-field Measurement [A/m]						Limits [A/m]
	Probe Rotation						
	A	B	C	D	E	F	
12.50	**4.737 9**	4.716 4	4.690 0	4.607 1	2.548 5	2.302 8	90.00

Note:

- Above RF exposure measurement was performed considering worst position (E-field : E-side, H-field : A-side) of isotropic probe.

- E-field measurement results(Rotation of probe)

Frequency [㎑]	E-field Measurement [V/m]												Limits [V/m]
	Probe Rotation												
	A to C	A to D	A to E	A to F	B to C	B to D	B to E	B to F	C to E	C to F	D to E	D to F	
12.50	**1.7046**	1.1265	1.2758	1.1062	0.4097	0.4200	0.4323	0.4421	1.2878	0.4016	0.4586	0.5103	83.00

- H-field measurement results(Rotation of probe)

Frequency [㎑]	H-field Measurement [A/m]												Limits [A/m]
	Probe Rotation												
	A to C	A to D	A to E	A to F	B to C	B to D	B to E	B to F	C to E	C to F	D to E	D to F	
12.50	5.5177	5.4531	**5.6802**	5.5865	2.8022	2.7859	2.7760	2.7526	0.1679	0.1543	3.1839	3.2739	90.00

Note:

- Above RF exposure measurement was performed considering worst position (E-field : A to C-side, H-field : A to E-side) of isotropic probe.

5. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
E&H Field Probe	narda	EHP-200A	170WX81015	25.01.30

End of test report