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RF EXPOSURE REPORT

According to : FCC 47CFR part 1 subpart I and part 2 subpart J

KDB Inquiry : Tracking Number 830873

Test Report No.	:	CTK-2015-00214
Date of Issue	:	February 14, 2015
FCC ID	:	2ABS5-EWC-4000
Equipment Under Test	:	HLCRIO132
Kind of Product	:	Easy One Touch Wireless Qi Standard Charging Car Mount
Applicant	:	HSM CO., LTD.
Applicant Address	:	2F Yeong-jae Bldg., 40, Nonhyeon-ro 24gil, Gangnam-gu, Seoul, 135-855, Korea
Manufacturer	:	HSM CO., LTD.
Manufacturer Address	:	2F Yeong-jae Bldg., 40, Nonhyeon-ro 24gil, Gangnam-gu, Seoul, 135-855, Korea
Contact Person	:	Gyu Gwang, Choi / Project Manager
Telephone	:	+82-2-573-5466
Received Date	:	January 26, 2015
Test period	:	Start : January 26, 2015 End : February 14, 2015
Test Results	:	☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

Tested by

Y. T. Lee

Young-taek Lee
Test Engineer
Date: February 14, 2015

Reviewed by

Y. J. Park

Young-Joon, Park
Technical Manager
Date: February 14, 2015

REPORT REVISION HISTORY

Date	Revision	Page No
February 14, 2015	Issued (CTK-2015-00214)	All
		All

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1.0 General Product Description

Type of equipment	Easy One Touch Wireless Qi Standard Charging Car Mount
Equipment model name	HLCRIO132
Frequency Range	110 kHz – 205 kHz
Antenna type	Coil antenna
Coil Specification	Outer diameter : 42.0 mm ± 1.0 mm Inner diameter : 20.5 mm ± 0.5 mm Number of turns : 11
Power Source	CAR ADAPTER Input : DC 12 V - 24 V Output : DC 5 V, 2.0 A Test Voltage and Frequency : DC 5 V, -

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
CAR ADAPTER	HAEM Co., Ltd.	ECA-P10XBK	DW1D521DS/B-E	-
Test Jig	OPENTECH Inc.	-	-	-
Wireless Charging Receiver	OPENTECH Inc.	OWS-303R	-	-
Wireless Charging Cover	RFTech Co., Ltd.	EBC-1G6WWE	RT0C802AS/4-E	-
Mobile Phone	Samsung Electronics Co., Ltd.	SCH-I535	-	A3LSCHI535

1.4 EUT Operating Modes

Equipment under test was operated during the measurement under the following conditions:

☒ Charging and communication mode

Modulation Type : CW (Continuous Wave)

Output Power : Max. 10.48 dBuV/m (Frequency 115.4 kHz, Test Distance 3 m)

TX Duty Cycle : 100 % by measurement

1.5 Test Modes

This device has been tested below conditions:

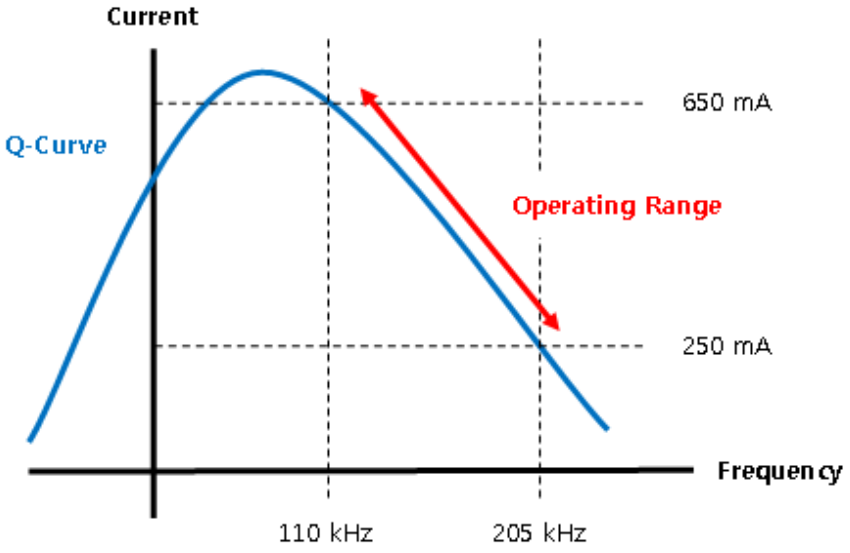
[Test Mode #1]

Frequency	Charging current	Note
110 kHz	650 mA	Low Frequency, Max. Load
157.5 kHz	425 mA	Middle Frequency, Medium Load
205 kHz	250 mA	High Frequency, Min. Load

This device has been tested with the various resistors to simulate the various load conditions of the client device. The charging current was controlled from 250 mA (Min.) to 650 mA (Max.) using the resistors and three types of Jig board with circular coil.

1) EUT has a range of the operating frequency from 110 kHz to 205 kHz and It has a range of the output current from 250 mA to 650 mA when output voltage is DC 5 V.

2) If the operating frequency is 110 kHz, the maximum output current is 650 mA and If the operating frequency is 205 kHz, the minimum output current is 250 mA.



3) To the simulation of the power transmission in from 110 kHz to 205 kHz. In the full range of the operating frequency, Normal operating condition, the test frequency is three which are the High, Middle and Low frequency of 110 kHz, 157.5 kHz and 205 kHz.

4) In order to operate EUT in three operating frequencies, three types of Test Jig were used.

5) The Wireless Charging Cover was used as Test Jig is actually used with the EUT.

6) The EUT to operate at a steady-state output current, the Wireless Charging Cover was not to combined with a smart phone. The DC output of the Wireless Charging Cover was connected to the resistor. As follows, the three types of Test Jig was prepared and tested.

7) Test Jig #1
Operating Frequency : 110 kHz, Output Voltage : DC 5 V, Output Current : 0.65 A
Calculation of resistor value : $I = \frac{V}{R}$, $0.65\,A = \frac{5\,V}{R}$, $R = \frac{5\,V}{0.65\,A}$, $R \approx 7.69\,\Omega$

8) Test Jig #2
Operating Frequency : 157.5 kHz, Output Voltage : DC 5 V, Output Current : 0.425 A
Calculation of resistor value : $I = \frac{V}{R}$, $0.425\,A = \frac{5\,V}{R}$, $R = \frac{5\,V}{0.425\,A}$, $R \approx 11.76\,\Omega$

9) Test Jig #3
Operating Frequency : 205 kHz, Output Voltage : DC 5 V, Output Current : 0.25 A
Calculation of resistor value : $I = \frac{V}{R}$, $0.25\,A = \frac{5\,V}{R}$, $R = \frac{5\,V}{0.25\,A}$, $R = 20\,\Omega$

[Test Mode #2]

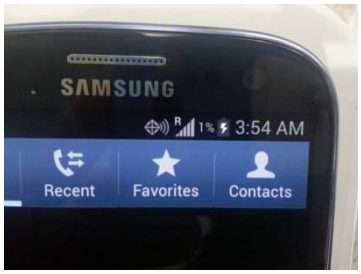
Support Equipment	Battery status	Note
Mobile Phone	< 1%	Max. Load
Mobile Phone	50 %	Medium Load

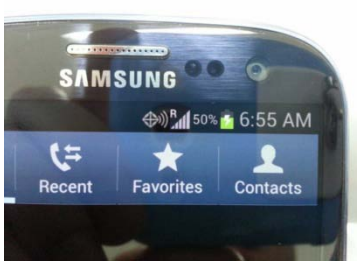
Note : The Charging is not operation when 100% fully charged status.

This device has been tested with the Mobile phone.

Mobile phone is on WWAN communicating.(**Worst Case : GPRS Class 10 2 Tx**)
WWAN communication was implemented using CMU200(Radio Communication Tester).

Mobile phone's battery status was checked by display battery percentage function.





1.6 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.7 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea.

1.8 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Registration Number	Logo
USA	FCC	FCC Part 15 & 18 EMI (Electromagnetic Interference / Emission)	805871	
JAPAN	VCCI	VCCI V-3 EMI (Electromagnetic Interference / Emission)	C-986 T-1843 R-3627 G-387	
KOREA	MSIP	EMI (Electromagnetic Interference / Emission) EMS (Electromagnetic Susceptibility / Immunity)	KR0025	

2.0 Summary of tests

FCC Part Section(s)	Parameter	Status (note 1)
1.1307(b), 1.1310	Radio frequency radiation exposure limits	Complies

2.1 Test Setup

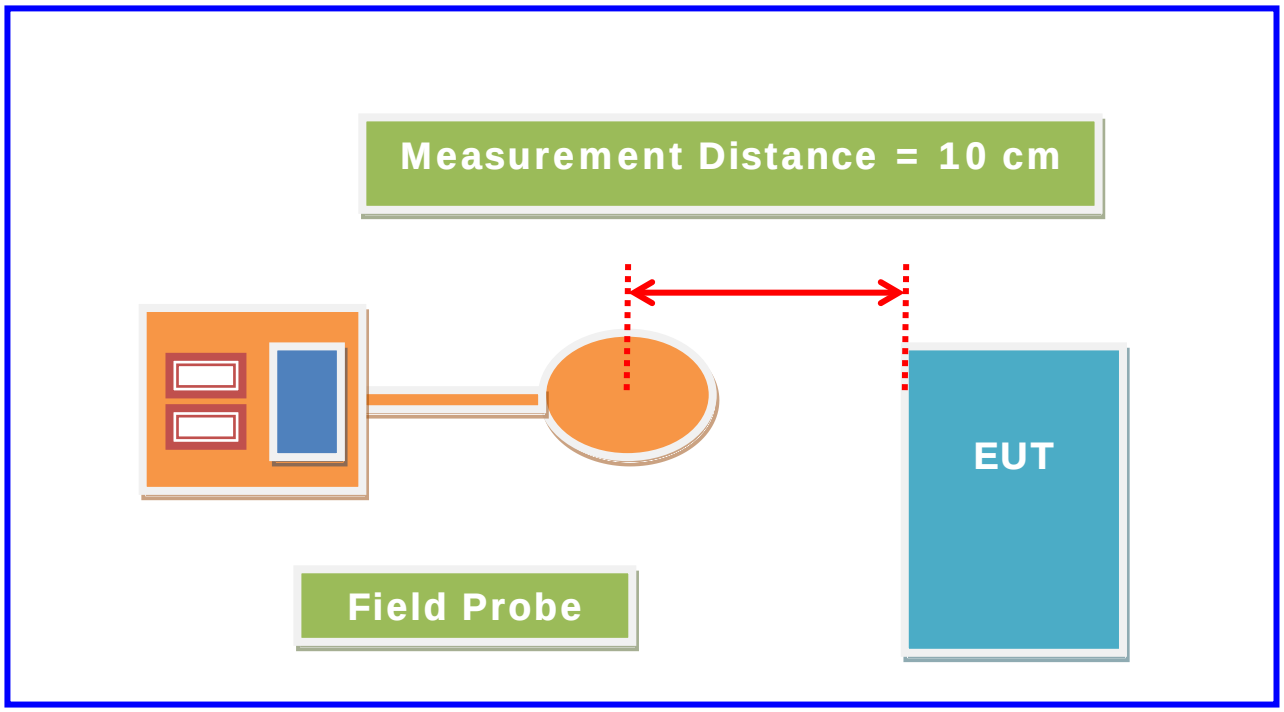
Test Location

Anechoic Chamber

Measurement distance information

Measurement distance = 10 cm

From EUT edge to the center of probe.



Measurements should be made from all sides and the top of the primary/client pair, with the 10 cm measured from the center of the probe(s) to the edge of the device.

2.2 Radio frequency radiation exposure limits

§ 1.1310 The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency(RF) radiation as specified in § 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of § 2.1093 of this chapter.

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 (minutes)
(A) Limits for Occupational/Controlled Exposures				
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
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	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
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

2.3 Test Results

EUT	Easy One Touch Wireless Qi Standard Charging Car Mount	Model	HLCRIO132
Frequency Range	110 kHz – 205 kHz	Test mode	TX

The requirements are:

☒ Complies

Test Data (E-Field) : FET #1 (CSD17308Q3, Texas Instruments)

[Test Mode #1]

Operating Freq. (kHz)	Charging Current Condition	Freq. (kHz)	Separation Distance (m)	E-Field (V/m)	E-Field Limit (V/m)
110	650 mA	112.25	0.1	2.98	614
157.5	425 mA	157.54	0.1	2.31	614
205	250 mA	204.44	0.1	1.95	614

[Test Mode #2]

Support Equipment	Charging Current Condition	Freq. (kHz)	Separation Distance (m)	E-Field (V/m)	E-Field Limit (V/m)
Mobile Phone	< 1% Battery Status	134.20	0.1	11.54	614
Mobile Phone	50 % Battery Status	161.20	0.1	11.02	614

Test Data (H-Field) : FET #1 (CSD17308Q3, Texas Instruments)

[Test Mode #1]

Operating Freq. (kHz)	Charging Current Condition	Freq. (kHz)	Separation Distance (m)	H-Field (A/m)	H-Field Limit (A/m)
110	650 mA	112.25	0.1	0.87	1.63
157.5	425 mA	157.54	0.1	0.77	1.63
205	250 mA	204.44	0.1	0.55	1.63

[Test Mode #2]

Support Equipment	Charging Current Condition	Freq. (kHz)	Separation Distance (m)	H-Field (A/m)	H-Field Limit (A/m)
Mobile Phone	< 1% Battery Status	134.20	0.1	0.42	1.63
Mobile Phone	50 % Battery Status	161.20	0.1	0.40	1.63

Measurements was made from all sides and the top of the primary/client pair, with the 10 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

Test Data (E-Field) : FET #2 (AON7200, Alpha & Omega Semiconductor)

[Test Mode #1]

Operating Freq. (kHz)	Charging Current Condition	Freq. (kHz)	Separation Distance (m)	E-Field (V/m)	E-Field Limit (V/m)
110	650 mA	115.3	0.1	2.68	614
157.5	425 mA	156.1	0.1	2.23	614
205	250 mA	203.6	0.1	2.01	614

[Test Mode #2]

Support Equipment	Charging Current Condition	Freq. (kHz)	Separation Distance (m)	E-Field (V/m)	E-Field Limit (V/m)
Mobile Phone	< 1% Battery Status	122.7	0.1	11.56	614
Mobile Phone	50 % Battery Status	160.2	0.1	11.33	614

Test Data (H-Field) : FET #2 (AON7200, Alpha & Omega Semiconductor)

[Test Mode #1]

Operating Freq. (kHz)	Charging Current Condition	Freq. (kHz)	Separation Distance (m)	H-Field (A/m)	H-Field Limit (A/m)
110	650 mA	115.3	0.1	1.09	1.63
157.5	425 mA	156.1	0.1	0.90	1.63
205	250 mA	203.6	0.1	0.78	1.63

[Test Mode #2]

Support Equipment	Charging Current Condition	Freq. (kHz)	Separation Distance (m)	H-Field (A/m)	H-Field Limit (A/m)
Mobile Phone	< 1% Battery Status	122.7	0.1	0.62	1.63
Mobile Phone	50 % Battery Status	160.2	0.1	0.60	1.63

Measurements was made from all sides and the top of the primary/client pair, with the 10 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	E-Field Probe	Schaffner	2244/90.20	R-0029	2015-10-24
2	EM Radiation Meter	Schaffner	EMC-20	R-0029	2015-10-24
3	B-Field Probe	Narda	2300/90.10	M-0626	2015-12-03
4	Exposure Level Meter	Narda	ELT-400	N-0181	2015-12-03
5	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2016-02-06