TEST REPORT

FCC Part 15C

Equipment under test Wireless Phone Charger

Model name D7F76-AC000

FCC ID TQ8-D7F76AC000

Applicant Hyundai Mobis Co., Ltd.

Manufacturer DONGYANG E&P Inc.

Date of test(s) 2019.10.07~2019.10.17

Date of issue 2019.10.17

Issued to

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Test and report completed by :	**Report approval by :**
	
Won-Jun Sim Test engineer	Hyeon-Su Jang Technical manager

Revision history

Revision	Date of issue	Test report No.	Description
-	2019.10.17	KES-RF-19T0154	Initial

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1. General information

Applicant	Hyundai Mobis Co., Ltd.
Applicant address	203, Teheran-Ro, Gangnam-Gu, Seoul, 135-977, Korea
Test site	KES Co., Ltd.
Test site address	3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea 473-21, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea
Test Facility	FCC Accreditation Designation No.: KR0100, Registration No.: 444148
FCC rule part(s):	Part 15C
FCC ID:	TQ8-D7F76AC000
Test device serial No.	☒ Production ☐ Pre-production ☐ Engineering

1.1. EUT description

Equipment under test	Wireless Phone Charger
Frequency	0.110 ㎒ ~ 0.205 ㎒
Modulation type	AM
Model:	D7F76-AC000
Antenna specification	Internal type(Coil antenna)
Power source	DC 12V

1.2. Test configuration

The **Hyundai Mobis Co.,Ltd. Wireless Phone Charger FCC ID: TQ8-D7F76AC000** was tested according to the specification of EUT, the EUT must comply with following standards and KDB documents.

FCC Part 15C
ANSI C63.10-2013

1.3. Test frequency

		Frequency Range
Power source	DC 12 V	0.110 ㎒ ~ 0.205 ㎒

1.4. Test mode

Mode	Description
Charging mode With Client device	100% full charging of Battery.
	Less than 50% of Battery
	Less than 1% of Battery

1.5. Information about derivative model

N/A

1.6. Device modifications

N/A

1.7. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
-	-	-	-	-

1.8. Measurement Uncertainty

Test Item		Uncertainty
Uncertainty for Conduction emission test		2.62 dB
Uncertainty for Radiation emission test (include Fundamental emission)	9㎑ - 30㎒	4.54 dB
	30㎒ - 1㎓	4.36 dB
	Above 1㎓	5.00 dB
Note. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		

2. Summary of tests

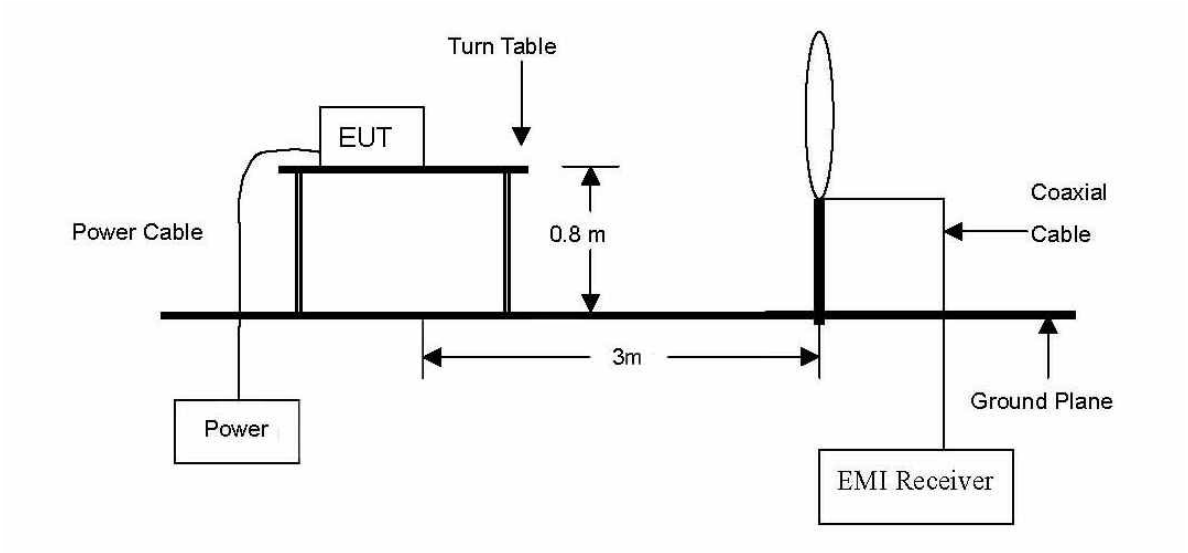
FCC Part Sections	Parameter	Test results
15.209	Radiated spurious emission	Pass
-	20dB Bandwidth	Pass

3. Test results

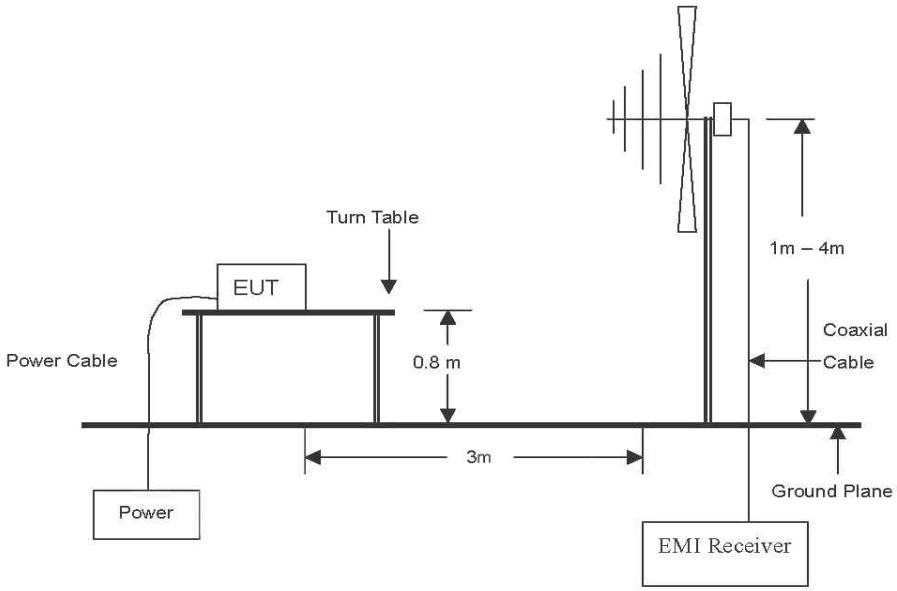
3.1. Radiated spurious emission

Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



Test procedure

[9 ㎑ to 30 ㎒]

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel, ground parallel and perpendicular of the antenna are set to make the measurement. It was determined that **parallel** was worst-case orientation; therefore, all final radiated testing was performed with the EUT in **parallel.**
3. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test-receiver system was set to average or quasi peak detect function and Specified Bandwidth with Maximum hold mode.

The spectrum analyzer is set to:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 200 ㎐ / 300 ㎐ for peak detection (PK) at frequency below 9 ㎑~ 150 ㎑.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 9 ㎑ / 10 ㎑ for peak detection (PK) at frequency below 150 ㎑~ 30 ㎒.
3. For the frequency bands 9~ 90 ㎑, 110~490 ㎑ the radiated emission limits are based on measurements employing an average detector.

[30 ㎒ to 1 ㎓]

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity.
The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 120 ㎑ for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 ㎓.

Note:

1. According to exploratory test no any obvious emission were detected from 9 ㎑ to 30 ㎒. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
2. Measurement distance : 3 m.
3. Field strength = Level + Correction factor + F_d
4. $F_d = 40\log(D_m / D_s)$
   Where:
   F_d = Distance factor in dB
   D_m = Measurement distance in meters
   D_s = Specification distance in meters
   For 300m: 40log(300/3) = 80 dB for frequency band 0.009 ㎒ to 0.490 ㎒
   For 30m: 40log(30/3) = 40 dB for frequency band 0.490 ㎒ to 30 ㎒
5. No significant emissions were found in the 90 - 110㎑ restricted band.

Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (㎒)	Distance (Meters)	Radiated (㎶/m)
0.009 ~ 0.490	300	2400 / F(㎑)
0.490 ~ 1.705	30	24000 / F(㎑)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

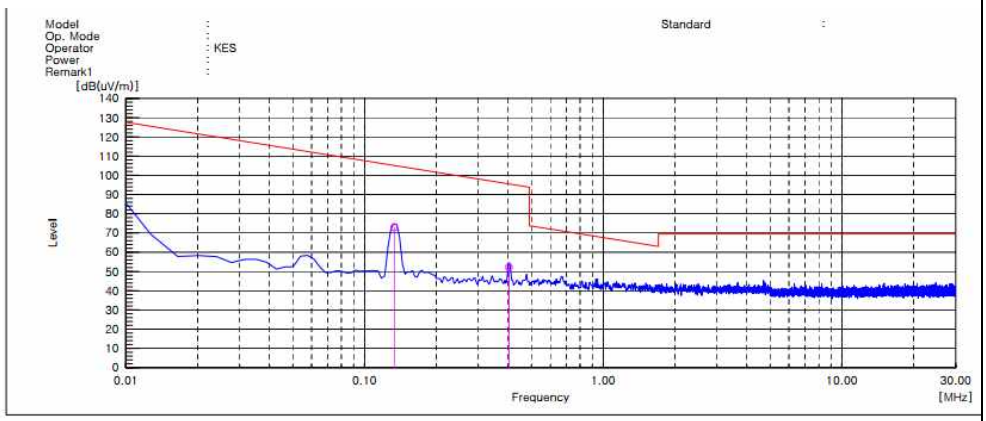
**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 ㎒, 76 ~ 88 ㎒, 174 ~ 216 ㎒ or 470 ~ 806 ㎒. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

Test results (Below 30 ㎒)

Mode: 15W // 1 % charger

Distance of measurement: 3 meter

Parallel



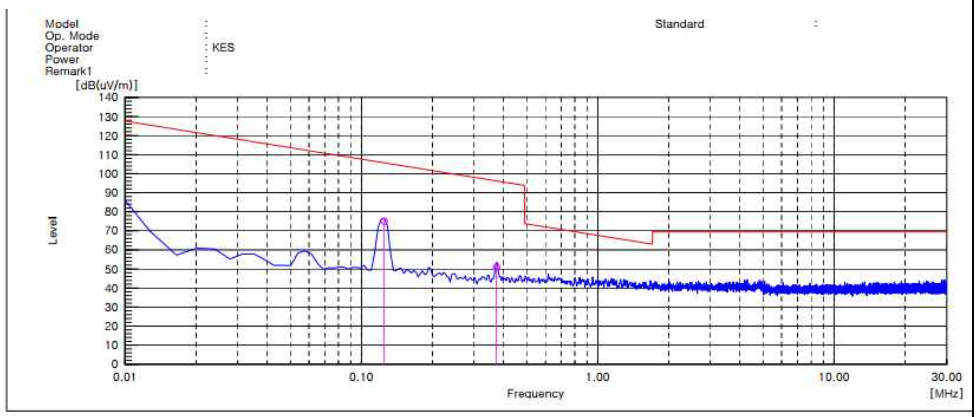
Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	0.133	H	53.8	19.1	72.9	105.1	32.2	100.0	207.0	
2	0.403	H	32.5	19.7	52.2	95.5	43.3	100.0	199.0	

Mode: 15W // 50 % charge

Distance of measurement: 3 meter

Parallel



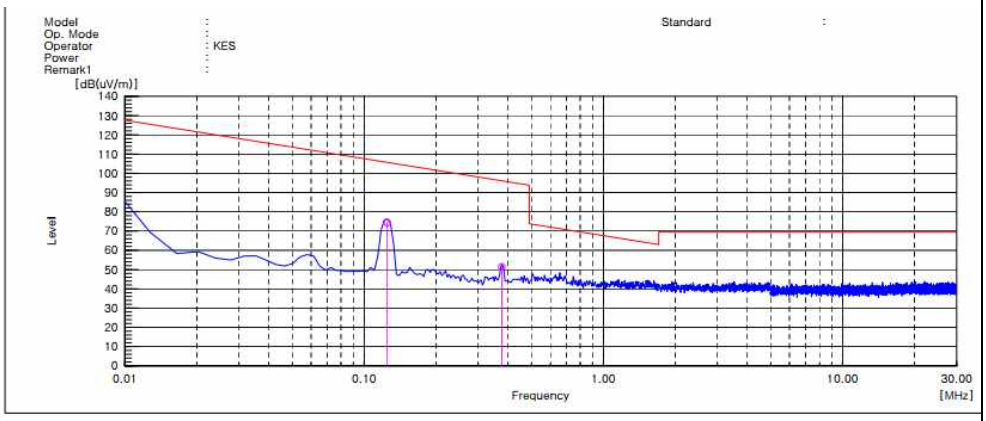
Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	0.125	H	55.9	19.1	75.0	105.7	30.7	100.0	207.0	
2	0.373	H	31.4	19.6	51.0	96.2	45.2	100.0	207.0	

Mode: 15W // 100 % charge

Distance of measurement: 3 meter

Parallel



Final Result

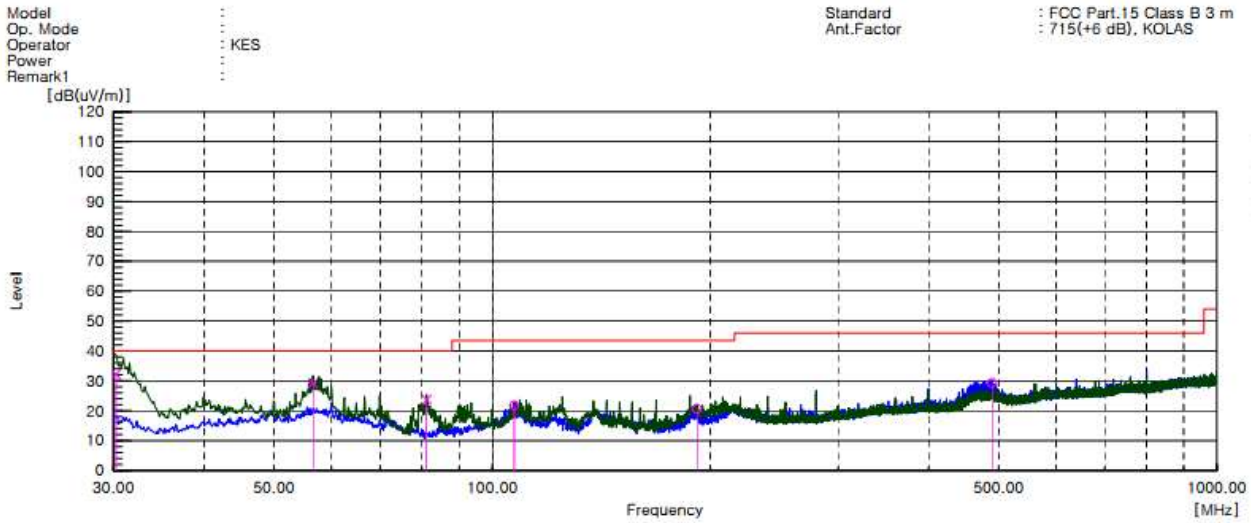
No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	0.125	H	55.2	19.1	74.3	105.7	31.4	100.0	185.0	
2	0.376	H	31.8	19.6	51.4	96.1	44.7	100.0	232.0	

Test results (Below 1 000 ㎒)

Mode: 15W // 50 % charge (Worst Case)

Distance of measurement: 3 meter

Horizontal // Vertical

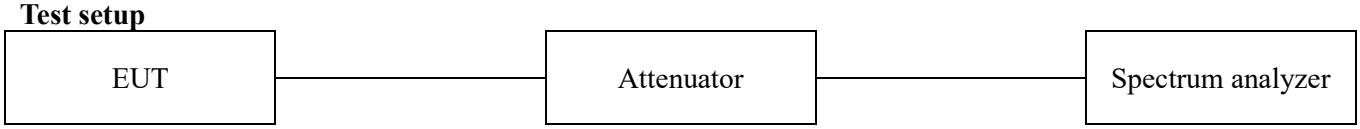


Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	30.243	V	57.9	-25.7	32.2	40.0	7.8	100.0	238.0	
2	56.554	V	51.8	-22.6	29.2	40.0	10.8	100.0	174.0	
3	81.168	V	51.9	-28.2	23.7	40.0	16.3	152.0	158.0	
4	107.236	H	45.2	-23.4	21.8	43.5	21.7	384.0	241.0	
5	191.626	H	44.3	-23.7	20.6	43.5	22.9	266.0	243.0	
6	489.416	H	44.0	-14.7	29.3	46.0	16.7	173.0	20.0	

3.2. 20dB Bandwidth

Test setup



Test procedures

The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the emission bandwidth. The VBW is set to ≥RBW. The sweep time is coupled.

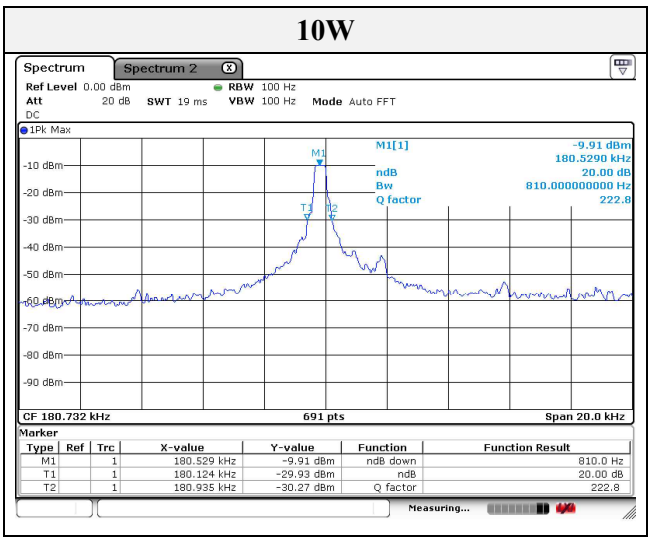
Limit

None; for reporting purposes only.

Test results

Power source(W)	Frequency(㎒)	Measured bandwidth(㎑)
15	0.180 732	0.810

10W



Note.

Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

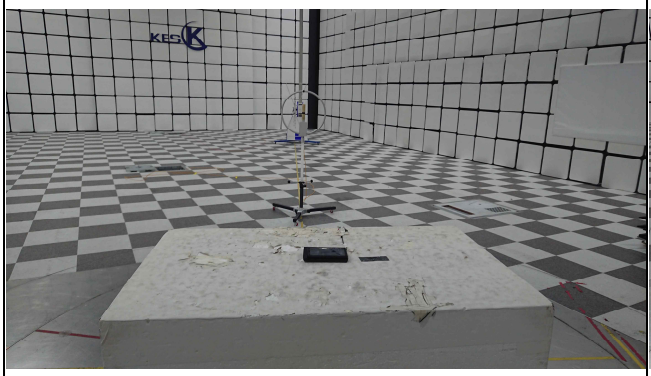
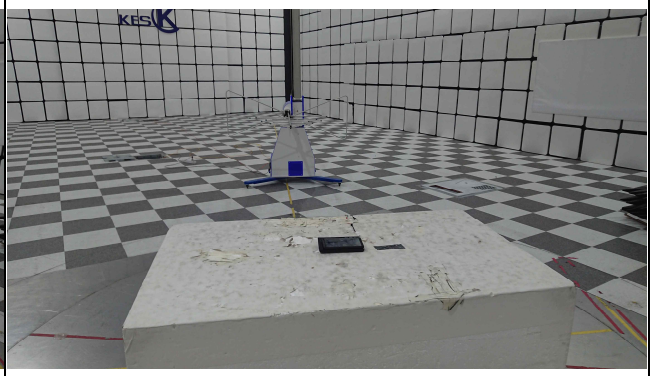
Appendix A. Measurement equipment

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
Spectrum Analyzer	R&S	FSV40	101002	1 year	2020.06.24
Loop Antenna	Schwarzbeck	FMZB1513	225	2 years	2021.02.15
Trilog-broadband antenna	SCHWARZBECK	VULB 9163	714	2 years	2020.11.26
Amplifier	R&S	SCU 01	100603	1 year	2019.11.26
Preamplifier	AGILENT	8449B	3008A01742	1 year	2020.01.08
EMI Test Receiver	R&S	ESU26	100551	1 year	2020.04.09

Peripheral device

Device	Manufacturer	Model No.	Note
Client device	Samsung	SM-N950N	Mobile Phone

Appendix B. Test setup photo

Below 30 ㎒	Below 1 000 ㎒
	

The end of test report.