MPE TEST REPORT

Test Report No.: 11624379H-D-R1

Applicant: OMRON Automotive Electronics Co. Ltd.

Type of Equipment: Wireless Charger

Model No.: GFM-H002

FCC ID: OUCGFM-H002

Test standard: KDB 680106 D01 RF Exposure Wireless Charging Apps V.2

***This test report has issued for MPE testing by wireless charger according to KDB 680106 D01 Ver.2.**

Test Result: Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above standard.
4. The test results in this test report are traceable to the national or international standards.
5. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
6. This report is a revised version of 11624379H-D. 11624379H-D is replaced with this report.

Date of test:

January 25 and 30, 2017

Representative test engineer:

Masafumi Niwa
Engineer
Consumer Technology Division

Approved by:

Tsubasa Takayama
Engineer
Consumer Technology Division

REVISION HISTORY

Original Test Report No.: 11624379H-D

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11624379H-D	February 20, 2017	-	-
1	11624379H-D-R1	March 28, 2017	P.4	Addition of note sentences in Clause 2.2
1	11624379H-D-R1	March 28, 2017	P.12	Correctrion of reference source

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SECTION 1 : Customer information

Company Name	:	OMRON Automotive Electronics Co. Ltd.
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Telephone Number	:	+81-568-78-6159
Facsimile Number	:	+81-568-78-7659
Contact Person	:	Kanako Teramoto

SECTION 2 : Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless Charger
Model No.	:	GFM-H002
Serial No.	:	Refer to Section 4, Clause 4.2
Receipt Date of Sample	:	January 24, 2017
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: GFM-H002 (referred to as the EUT in this report) is a Wireless Charger.

Operating Frequency	:	111 kHz, 114.5 kHz
Rated Output Power	:	5 W
Coil system	:	Multiple Coil
Charging distance	:	Contact
The maximum Coupling Surface area	:	14.6 * 8.44 = 123.224 cm^2

* Rated Output Power of EUT is 5 W as shown above information.
The EUT could not be complied for KDB 680106 D1 Section 5.
Therefore, the EUT is needed to submit the RF exposure evaluation.

SECTION 3 : Test specification, procedures and results

3.1 Test specification

Title : KDB 680106 D01 RF Exposure Wireless Charging Apps

Purpose of test : FCC rule §1.1310 Radiofrequency radiation exposure limits.

3.2 Procedures & results

Item	Test Procedure	Limits	Deviation	Worst Margin	Result
MPE Limit	-	Table 1(B)	N/A	Refer to section.5	Complied

*These tests were performed without any deviations from test procedure.

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.

Test limit was applied to the test limit of 100 kHz - 300 kHz based on FCC rule Section 1.1310, according to KDB 680106 D01 RF Exposure Wireless Charging Apps Clause 3.3).

KDB 680106 D01 RF Exposure Wireless Charging Apps requires following contents in order to exclude RF exposure evaluation.

a) Power transfer frequency is less that 1 MHz
b) Output power from each primary coil is less than 5 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
d) Client device is inserted in or placed directly in contact with the transmitter
e) The maximum coupling surface area of the transmit (charging) device is between 60 cm^2 and 400 cm^2.
f) Aggregate leakage fields at 10 cm surrounding the device from all simultaneous transmitting coils are demonstrated to be less than 30 % of the MPE limit.

Rated output power of the EUT is 5 W as shown in clause 2.2 of this report.
So, the EUT could not be complied above content b).

And the others were complied.

Also, Test data used Exposure Level Tester is complied KDB 680106 D01 RF Exposure Wireless Charging Apps Clause 3.3).

3.3 Confirmation

UL Japan, Inc. hereby confirms that E.U.T. , in the configuration tested, complies with the specifications KDB 680106 D01 RF Exposure Wireless Charging Apps.
And Model: GFM-H002 (referred to as the EUT in this report) is a Wireless Charger.

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor *k*=2.

Test distance	Radiated emission (+/-)
	9 kHz - 30 MHz
3 m	3.8 dB
10 m	3.7 dB

* Measurement distance

Polarity	Radiated emission (Below 1 GHz)			
	(3 m*)(+/-)		(10 m*)(+/-)	
	30 MHz - 200 MHz	200 MHz - 1000 MHz	30 MHz - 200 MHz	200 MHz - 1000 MHz
Horizontal	5.0 dB	5.3 dB	5.0 dB	5.0 dB
Vertical	4.7 dB	5.9 dB	5.0 dB	5.1 dB

Radiated emission (Above 1 GHz)				
(3 m*)(+/-)		(1 m*)(+/-)		(10 m*)(+/-)
1 GHz - 6 GHz	6 GHz - 18 GHz	10 GHz - 26.5 GHz	26.5 GHz - 40 GHz	1 GHz -18 GHz
5.2 dB	5.4 dB	5.5 dB	5.5 dB	5.4 dB

* Measurement distance

Radiated emission test
The data listed in this test report has enough margin, more than the site margin.

EMF
Electromagnetic fields
The uncertainty of the applied Electromagnetic field is within the tolerance specified by the standard.
The error of test level for this test system is less than ±0.95% for the level of standard.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
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Telephone : +81 596 24 8999 Facsimile : +81 596 24 8124

	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 m	-
No.6 measurement room	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	8.8 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

* Size of vertical conducting plane (for Conducted Emission test): 2.0 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4 : Operation of E.U.T. during testing

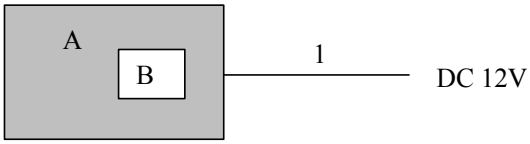
4.1 Operating modes

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use. Test configuration was adjusted maximum output power of EUT.

Test sequence is used: Charging (Operating Frequency: 111 kHz, 114.5 kHz)

Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals



*Cabling and setup were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Wireless Charger	GFM-H002	0000095	OMRON Automotive Electronics Co. Ltd.	EUT
B	Wireless Receiver	SM-G930U	358512070649233	SAMSUNG	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	2.0	Unshielded	Unshielded	-

SECTION 5 : MPE Limit [KDB 680106 D01 Section 5.2 f)]

5.1 Operating environment

This test was carried out in No.1 semi-anechoic chamber.

Date	:	January 30, 2017
Temperature	:	22 deg.C
Humidity	:	36 % RH
Engineer	:	Koji Yamamoto

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 1.0 m above the conducting ground plane.
The EUT was set on the center of the tabletop.
Test was made with the antenna positioned in 0 deg., 45 deg., 90 deg., and 180 deg..
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
Photographs of the set up are shown in Appendix 3.
*Refer to Figure 1 about Direction of the Loop Antenna.

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

5.3 Test conditions

Frequency range	:	0.009 MHz - 30 MHz
Test distance	:	3 m / 10 m
EUT position	:	Table top

5.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane at a distance of 3 m*.
* Measuring distance
☐ The boundary of the EUT is defined by an imaginary straight-line periphery describing a simple geometric configuration encompassing the EUT.
☐ The boundary of the EUT is defined by an imaginary circular periphery.
☒ This test repot use worse case for the setup.

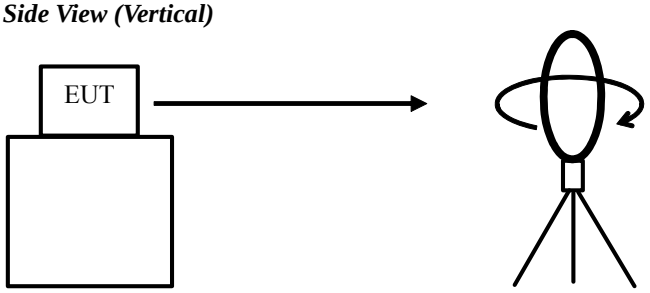
The height of antenna was fixed in 2 m.
EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed in 0 deg., 45 deg., 90 deg., 135 deg. and Horizontal with the Test Receiver.
The test was made with the detector (RBW) in the following table.

Frequency	9 kHz - 150 kHz	150 kHz - 30 MHz
Instrument used	Test Receiver	
IF Bandwidth	AV: 200 Hz	AV: 9 kHz

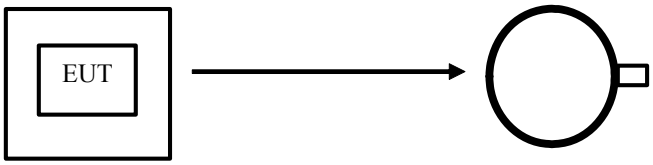
The test was performed by using above procedure.
Test results were the value converted into 10 cm distance from the result obtained in testing at 3 m distance.
Please refer to clause 5.5.

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

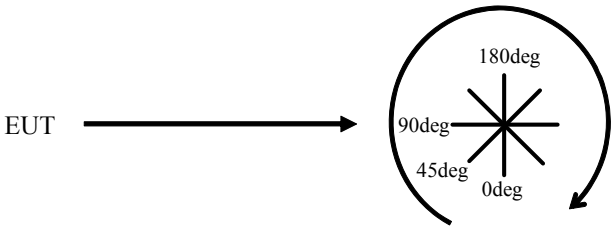


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

5.5 Results

Summary of the test results : Complied

Test result :
30 % of MPE limit for frequency renage 110 kHz and 114.5 kHz are 0.489 (A/m) and 184.2(V/m).

[Results]
***Oparation Freqency: 111 kHz**

Frequency	Electric field strength *1)	Tested distance	Separate distance	Extrapolation factor	Electric field strength at separate distance	Magnetic field strength at separate distance		Limit	Margin
[MHz]	[dBuV/m]	[m]	[m]	[dB]	[dBuV/m]	[dBuA/m]	[A/m]	[A/m]	[dB]
0.111	69.5	3	0.1	77.97	147.47	95.9	0.063	0.489	17.8

Frequency	Electric field strength *1)	Tested distance	Separate distance	Extrapolation factor	Electric field strength at separate distance		Limit	Margin
[MHz]	[dBuV/m]	[m]	[m]	[dB]	[dBuV/m]	[V/m]	[V/m]	[dB]
0.111	69.5	3	0.1	77.97	147.47	23.630	184.2	17.8

***Oparation Freqency: 114.5 kHz**

Frequency	Electric field strength *1)	Tested distance	Separate distance	Extrapolation factor	Electric field strength at separate distance	Magnetic field strength at separate distance		Limit	Margin
[MHz]	[dBuV/m]	[m]	[m]	[dB]	[dBuV/m]	[dBuA/m]	[A/m]	[A/m]	[dB]
0.1145	70	3	0.1	79.95	149.95	98.4	0.083	0.489	15.4

Frequency	Electric field strength *1)	Tested distance	Separate distance	Extrapolation factor	Electric field strength at separate distance		Limit	Margin
[MHz]	[dBuV/m]	[m]	[m]	[dB]	[dBuV/m]	[V/m]	[V/m]	[dB]
0.1145	70	3	0.1	79.95	149.95	31.430	184.2	15.4

Above datas were calculated by the followings;
Calculating formula:
■Electric field strength[dBuV/m] = Reading in APPENDIX 1[dBuV] *1)+Antenna factor[dB/m]+ATEEN [dB]-AMP. GAIN[dB]
*1)Reading in APPENDIX 1[dBuV] was chosen highest value in APPENDIX 1.
* APPENDIX 1 were referred from the Test Report (No. 11624379H-A; This is test report for FCC Part 18).
■Electric field strength at separate distance = Electric field strength + Extrapotion factor
■Magnetic field strength at separate distance = Electric field strength at separate distance - 20 * log(120*pi)
■Extrapolation factor = decade * log (Test distance / Separate distance)
*decade = (10 m Reading - 3 m Reading) / (log 3 m - log 10 m)
* 10m Reading is 56.6 dBµV, 3m Reading is 84.2 dBµV @ 111 kHz. *2)
10m Reading is 56.4 dBµV, 3m Reading is 84.7 dBµV @ 114.5 kHz. *2)
*2)Value in APPENDIX 1[dBuV] was chosen in APPENDIX 1.

SECTION 6 : MPE Limit [KDB 680106 Section 3.3) (FCC §1.1310)]

6 . 1 Operating environment

This test was carried out in No.6 shielded room
Date : January 25, 2017
Temperature : 25 deg.C
Humidity : 35% RH
Engineer : Masafumi Niwa

6. 2 Test configuration

The EUT was placed on a non-metalilic of 0.8m above the reference ground plane.
Worst position is shown in the photos in Appendix 1.

6. 3 Test conditions

EUT position : Table top

6. 4 Test procedure

The test of the weighted result has been performed using time domain evaluation.
Sensor locations : Around 10cm

6. 5 Results

Summary of the test results : Complied

Test result :
＊Worst Case Position
[Operating Frequency: 114.5 kHz]
・Magnetic field strength is 0.1506 (A/m)
MPE limit for frequency renage 100 kHz to 300 kHz is 1.63 (A/m)
・Electro-magnetic field strength is 56.76 (V/m)
MPE limit for frequency renage 100 kHz to 300 kHz is 614 (V/m)

[Operating Frequency: 111 kHz]
・Magnetic field strength is 0.1504 (A/m).
MPE limit for frequency renage 100 kHz to 300 kHz is 1.63 (A/m)
・Electro-magnetic field strength is 56.68 (V/m)
MPE limit for frequency renage 100 kHz to 300 kHz is 614 (V/m)

[Results]

・**Operating Frequency: 114.5 kHz.**

Top position

Test result of Magnetic density is 3.028 % from measurement tool ELT-400.
This value was caluculated by following fomula.

3.028 % = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.1893 [μT]
Result of magnetic field strength is 0.1506 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.1893*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.1506 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120 π =56.76 (V/m)

Front position

Test result of Magnetic density is 2.488% from measurement tool ELT-400.
This value was caluculated by following fomula.

2.488% = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.1555 [μT]
Result of magnetic field strength is 0.1237 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / 4 π *$10^{(-7)}$ = $0.1555*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.1237 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=46.64 (V/m)

Rear position

Test result of Magnetic density is 1.095% from measurement tool ELT-400.
This value was caluculated by following fomula.

1.095% = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.0684 [μT]
Result of magnetic field strength is 0.0544 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.0684*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.0544 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=20.53 (V/m)

Left position
Test result of Magnetic density is 1.251% from measurement tool ELT-400.
This value was caluculated by following fomula.

1.251% = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.0782 [μT]
Result of magnetic field strength is 0.0622 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.0782*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.0622 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=23.45 (V/m)

Right position
Test result of Magnetic density is 2.019% from measurement tool ELT-400.
This value was caluculated by following fomula.

2.019% = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.1262 [μT]
Result of magnetic field strength is 0.1004 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.1262*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.1004 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=37.85 (V/m)

・Operating Frequency: 111 kHz

Top position

Test result of Magnetic density is 3.024% from measurement tool ELT-400.
This value was caluculated by following fomula.

3.024% = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.1890 [μT]
Result of magnetic field strength is 0.1504 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.1890*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.1504 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=56.68 (V/m)

Front position

Test result of Magnetic density is 1.985% from measurement tool ELT-400.
This value was caluculated by following fomula.

1.985% = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.1241 [μT]
Result of magnetic field strength is 0.0987 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.1241*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.0987 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=37.21V/m)

Rear position

Test result of Magnetic density is 0.913% from measurement tool ELT-400.
This value was caluculated by following fomula.

0.913% = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.0571 [μT]
Result of magnetic field strength is 0.0454 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.0571*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.0454 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=17.11 (V/m)

Left position
Test result of Magnetic density is 0.850% from measurement tool ELT-400.
This value was caluculated by following fomula.

0.850% = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.0531 [μT]
Result of magnetic field strength is 0.0423 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.0531*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.0423 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=15.93 (V/m)

Right position
Test result of Magnetic density is 1.966% from measurement tool ELT-400.
This value was caluculated by following fomula.

1.966% = (Actual magnetic density*100) / 6.25
(*Where the value 6.25 is decided IEC 62233:2005 Annex B Table B.2)

Actual magnetic density is 0.1229 [μT]
Result of magnetic field strength is 0.0978 (A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.1229*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.0978 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=36.85 (V/m)

Data of MPE Value (at Operating Frequency: 114.5 kHz)

Top

Front

Right

Left

Rear

Data of MPE Value (at Operating Frequency: 111 kHz)

Top

Front

Right

Left

Rear

APPENDIX 1: Test data

Radiated Emission

(Below 30MHz)

UL Japan,Inc.
Ise EMC Lab.
No.1 Semi Anechoic Chamber

Company	:	OMRON Automotive Electronics Co.,Ltd	Report No	:	11624379H
Equipment	:	Wireless Charger	Regulation	:	KDB 680106 D01
Model	:	GFM-H002			
S/N	:	95	Data	:	01/30/2017
Power	:	DC 12V	Temperature	:	22 deg.C.
Mode	:	1.Charging	Humidity	:	36 % RH
Remark	:	Operating Frequency : 111kHz	Engineer	:	Koji Yamamoto
Detector	:	Average			

FREQ [MHz]	Reading (3m) [dBµV]	Reading (10m) [dBµV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBµV/m]	Limit (300 m) [dBµV/m]	Margin [dB]	Antenna [deg]
0.1110	84.2	56.6	19.7	40.4	6.0	-105.6	-36.1	23.5	59.6	0
0.1110	83.7	NS	19.7	40.4	6.0	-105.6	-36.6	23.5	60.1	45
0.1110	81.9	NS	19.7	40.4	6.0	-105.6	-38.4	23.5	61.9	90
0.1110	84.1	NS	19.7	40.4	6.0	-105.6	-36.2	23.5	59.7	180
0.1110	80.5	NS	19.7	40.4	6.0	-105.6	-39.8	23.5	63.3	Horizontal
0.2220	48.0	43.5	19.6	40.3	6.0	-17.2	16.1	23.5	7.4	0
0.2220	45.1	NS	19.6	40.3	6.0	-17.2	13.2	23.5	10.3	45
0.2220	43.2	NS	19.6	40.3	6.0	-17.2	11.3	23.5	12.2	90
0.2220	47.7	NS	19.6	40.3	6.0	-17.2	15.8	23.5	7.7	180
0.2220	38.5	NS	19.6	40.3	6.0	-17.2	6.6	23.5	16.9	Horizontal
0.3330	58.1	43.5	19.6	40.2	6.1	-55.8	-12.2	23.5	35.7	0
0.3330	56.5	NS	19.6	40.2	6.1	-55.8	-13.8	23.5	37.3	45
0.3330	55.0	NS	19.6	40.2	6.1	-55.8	-15.3	25.5	40.8	90
0.3330	58.0	NS	19.6	40.2	6.1	-55.8	-12.3	23.5	35.8	180
0.3330	40.3	NS	19.6	40.2	6.1	-55.8	-30.0	23.5	53.5	Horizontal
1.6650	41.6	39.0	19.6	40.3	6.3	-9.9	17.3	23.5	6.2	0
1.6650	39.7	NS	19.6	40.3	6.3	-9.9	15.4	24.5	9.1	45
1.6650	38.7	NS	19.6	40.3	6.3	-9.9	14.4	25.5	11.1	90
1.6650	39.6	NS	19.6	40.3	6.3	-9.9	15.3	23.5	8.2	180
1.6650	33.5	NS	19.6	40.3	6.3	-9.9	9.2	23.5	14.3	Horizontal
1.8870	41.9	39.0	19.6	40.3	6.3	-11.1	16.4	23.5	7.1	0
1.8870	40.6	NS	19.6	40.3	6.3	-11.1	15.1	23.5	8.4	45
1.8870	39.4	NS	19.6	40.3	6.3	-11.1	13.9	23.5	9.6	90
1.8870	41.5	NS	19.6	40.3	6.3	-11.1	16.0	23.5	7.5	180
1.8870	33.2	NS	19.6	40.3	6.3	-11.1	7.7	23.5	15.8	Horizontal
2.1090	40.8	39.0	19.6	40.4	6.3	-6.9	19.4	23.5	4.1	0
2.1090	39.2	NS	19.6	40.4	6.3	-6.9	17.8	23.5	5.7	45
2.1090	39.9	NS	19.6	40.4	6.3	-6.9	18.5	23.5	5.0	90
2.1090	39.5	NS	19.6	40.4	6.3	-6.9	18.1	23.5	5.4	180
2.1090	33.1	NS	19.6	40.4	6.3	-6.9	11.7	23.5	11.8	Horizontal

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = decade * Log (Test distance(3m) / Separate distance(300m))
decade = (10m reading - 3m reading) / (log 3m - log 10m)

NS : No-Signal
Except for the above table : adequate margin data below the limits.

10m Reading of Extrapolation Factor is used the value of 0 deg.
Worst direction of EUT was decided by test result performed on test distance at 3m, and test distance at 10m was performed worst direction.

Radiated Emission

(Below 30MHz)

UL Japan,Inc.
Ise EMC Lab.
No.1 Semi Anechoic Chamber

Company	:	OMRON Automotive Electronics Co.,Ltd	Report No	:	11624379H
Equipment	:	Wireless Charger	Regulation	:	KDB 680106 D01
Model	:	GFM-H002			
S/N	:	95	Data	:	01/30/2017
Power	:	DC 12V	Temperature	:	22 deg.C.
Mode	:	1.Charging	Humidity	:	36 % RH
Remark	:	Operating Frequency : 114.5kHz	Engineer	:	Koji Yamamoto
Detector	:	Average			

FREQ [MHz]	Reading (3m) [dBµV]	Reading (10m) [dBµV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBµV/m]	Limit (300 m) [dBµV/m]	Margin [dB]	Antenna [deg]
0.1145	84.7	56.4	19.7	40.4	6.0	-108.2	-38.2	23.5	61.7	0
0.1145	83.8	NS	19.7	40.4	6.0	-108.2	-39.1	23.5	62.6	45
0.1145	82.5	NS	19.7	40.4	6.0	-108.2	-40.4	23.5	63.9	90
0.1145	84.3	NS	19.7	40.4	6.0	-108.2	-38.6	23.5	62.1	180
0.1145	79.5	NS	19.7	40.4	6.0	-108.2	-43.4	23.5	66.9	Horizontal
0.2290	47.4	42.5	19.6	40.3	6.0	-18.7	14.0	23.5	9.5	0
0.2290	45.3	NS	19.6	40.3	6.0	-18.7	11.9	23.5	11.6	45
0.2290	45.7	NS	19.6	40.3	6.0	-18.7	12.3	23.5	11.2	90
0.2290	46.1	NS	19.6	40.3	6.0	-18.7	12.7	23.5	10.8	180
0.2290	37.6	NS	19.6	40.3	6.0	-18.7	4.2	23.5	19.3	Horizontal
0.3435	58.4	43.3	19.6	40.2	6.1	-57.8	-13.9	23.5	37.4	0
0.3435	56.8	NS	19.6	40.2	6.1	-57.8	-15.5	23.5	39.0	45
0.3435	55.2	NS	19.6	40.2	6.1	-57.8	-17.1	25.5	42.6	90
0.3435	58.3	NS	19.6	40.2	6.1	-57.8	-14.0	23.5	37.5	180
0.3435	40.3	NS	19.6	40.2	6.1	-57.8	-32.0	23.5	55.5	Horizontal
0.4580	45.1	40.8	19.5	40.1	6.1	-16.4	14.2	23.5	9.3	0
0.4580	43.6	NS	19.5	40.1	6.1	-16.4	12.7	24.5	11.8	45
0.4580	44.1	NS	19.5	40.1	6.1	-16.4	13.2	25.5	12.3	90
0.4580	44.9	NS	19.5	40.1	6.1	-16.4	14.0	23.5	9.5	180
0.4580	33.2	NS	19.5	40.1	6.1	-16.4	2.3	23.5	21.2	Horizontal
1.9465	41.7	39.1	19.6	40.4	6.3	-9.9	17.3	23.5	6.2	0
1.9465	39.5	NS	19.6	40.4	6.3	-9.9	15.1	23.5	8.4	45
1.9465	38.4	NS	19.6	40.4	6.3	-9.9	14.0	23.5	9.5	90
1.9465	41.3	NS	19.6	40.4	6.3	-9.9	16.9	23.5	6.6	180
1.9465	32.9	NS	19.6	40.4	6.3	-9.9	8.5	23.5	15.0	Horizontal
2.0610	41.2	39.1	19.6	40.4	6.3	-8.0	18.7	23.5	4.8	0
2.0610	39.0	NS	19.6	40.4	6.3	-8.0	16.5	23.5	7.0	45
2.0610	39.3	NS	19.6	40.4	6.3	-8.0	16.8	23.5	6.7	90
2.0610	39.8	NS	19.6	40.4	6.3	-8.0	17.3	23.5	6.2	180
2.0610	32.6	NS	19.6	40.4	6.3	-8.0	10.1	23.5	13.4	Horizontal

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = decade * Log (Test distance(3m) / Separate distance(300m))
decade = (10m reading - 3m reading) / (log 3m - log 10m)

NS : No-Signal
Except for the above table : adequate margin data below the limits.

10m Reading of Extrapolation Factor is used the value of 0 deg.
Worst direction of EUT was decided by test result performed on test distance at 3m, and test distance at 10m was performed worst direction.

Radiated Emission

(Above 30MHz)

UL Japan,Inc.
Ise EMC Lab.
No.1 Semi Anechoic Chamber

Company	:	OMRON Automotive Electronics Co.,Ltd	Report No	:	11624379H
Equipment	:	Wireless Charger	Regulation	:	KDB 680106 D01
Model	:	GFM-H002	Test Distance	:	3m
S/N	:	95	Data	:	01/30/2017
Power	:	DC 12V	Temperature	:	22 deg.C.
Mode	:	1.Charging	Humidity	:	36 % RH
Remark	:	Operating Frequency : 111kHz	Engineer	:	Koji Yamamoto
Detector	:	Average			

FREQ [MHz]	Reading (3m) [dBµV]	Reading (10m) [dBµV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBµV/m]	Limit (300 m) [dBµV/m]	Margin [dB]	Antenna Polarization
49.173	25.3	24.6	10.9	38.9	7.6	-2.7	2.2	23.5	21.3	Horizontal
57.387	24.6	23.5	8.2	39.0	7.8	-4.2	-2.6	23.5	26.1	Horizontal
65.490	28.2	27.6	6.7	39.1	7.9	-2.3	1.4	23.5	22.1	Horizontal
88.118	24.8	24.1	8.1	39.2	8.3	-2.7	-0.7	23.5	24.2	Horizontal
196.914	22.5	22.3	16.2	39.2	9.5	-0.8	8.2	23.5	15.3	Horizontal
306.804	21.6	21.4	13.6	38.8	10.5	-0.8	6.1	23.5	17.4	Horizontal
49.173	28.4	23.5	10.9	38.9	7.6	-18.7	-10.7	23.5	34.2	Vertical
57.387	43.8	34.4	8.2	39.0	7.8	-36.0	-15.2	23.5	38.7	Vertical
65.490	33.3	29.5	6.7	39.1	7.9	-14.5	-5.7	23.5	29.2	Vertical
88.118	31.1	25.6	8.1	39.2	8.3	-21.0	-12.7	23.5	36.2	Vertical
196.914	22.3	22.0	16.2	39.2	9.5	-1.1	7.7	23.5	15.8	Vertical
306.804	21.6	21.5	13.6	38.8	10.5	-0.4	6.5	23.5	17.0	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = decade * Log (Test distance(3m) / Separate distance(300m))
decade = (10m reading - 3m reading) / (log 3m - log 10m)

Except for the above table : adequate margin data below the limits.

Radiated Emission

(Above 30MHz)

UL Japan,Inc.
Ise EMC Lab.
No.1 Semi Anechoic Chamber

Company	:	OMRON Automotive Electronics Co.,Ltd	Report No	:	11624379H
Equipment	:	Wireless Charger	Regulation	:	KDB 680106 D01
Model	:	GFM-H002	Test Distance	:	3m
S/N	:	95	Data	:	01/30/2017
Power	:	DC 12V	Temperature	:	22 deg.C.
Mode	:	1.Charging	Humidity	:	36 % RH
Remark	:	Operating Frequency : 114.5kHz	Engineer	:	Koji Yamamoto
Detector	:	Average			

FREQ [MHz]	Reading (3m) [dBµV]	Reading (10m) [dBµV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Extrapolation Factor [dB]	Result (300 m) [dBµV/m]	Limit (300 m) [dBµV/m]	Margin [dB]	Antenna Polarization
49.235	25.5	24.8	10.9	38.9	7.6	-2.7	2.4	23.5	21.1	Horizontal
57.364	24.1	22.9	8.2	39.0	7.8	-4.6	-3.5	23.5	27.0	Horizontal
65.494	27.7	26.9	6.7	39.1	7.9	-3.1	0.1	23.5	23.4	Horizontal
88.509	25.3	24.1	8.1	39.2	8.3	-4.6	-2.1	23.5	25.6	Horizontal
196.826	22.0	22.0	16.2	39.2	9.5	0.0	8.5	23.5	15.0	Horizontal
306.631	21.8	21.8	13.6	38.8	10.5	0.0	7.1	23.5	16.4	Horizontal
49.235	27.4	23.2	10.9	38.9	7.6	-16.1	-9.1	23.5	32.6	Vertical
57.364	43.5	35.2	8.2	39.0	7.8	-31.7	-11.2	23.5	34.7	Vertical
65.494	33.4	28.8	6.7	39.1	7.9	-17.6	-8.7	23.5	32.2	Vertical
88.509	30.7	25.2	8.1	39.2	8.3	-21.0	-13.1	23.5	36.6	Vertical
196.826	22.1	22.1	16.2	39.2	9.5	0.0	8.6	23.5	14.9	Vertical
306.631	21.7	21.7	13.6	38.8	10.5	0.0	7.0	23.5	16.5	Vertical

CALCULATION(Result) : Reading + ANT Factor + Cable loss + Atten loss + Extrapolation Factor - AMP gain
Extrapolation Factor = decade * Log (Test distance(3m) / Separate distance(300m))
decade = (10m reading - 3m reading) / (log 3m - log 10m)

Except for the above table : adequate margin data below the limits.

APPENDIX 2: Test instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2016/09/30 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE	2017/01/20 * 12
MJM-25	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	RE	2016/06/25 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	836553/009	RE	2016/11/02 * 12
MCC-219	Coaxial Cable	UL Japan	-	-	RE	2016/11/10 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/ 3D-2W(7.5m)/ RG400u(1.5m)/ RFM-E421(Switcher)	-/01068 (Switcher)	RE	2016/06/29 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2016/03/24 * 12
MPA-20	Pre Amplifier	Elena	EPA-4020YA	030801	RE	2016/03/18 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2016/11/28 * 12
MMM-03	Digital Tester	Fluke	FLUKE 26-3	78030621	RE	2016/08/23 * 12
KBA-05	Biconical Antenna	Schwarzbeck	BBA9106	2513	RE	2016/11/23 * 12
MLA-21	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-190	RE	2017/01/05 * 12
MCC-02	Coaxial Cable	Suhner/storm/Agilent /TSJ	-	-	RE	2016/09/09 * 12
MPA-19	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	RE	2016/02/25 * 12
MOS-24	Thermo-Hygrometer	Custom	CTH-201	0005	EMF	2017/01/20 * 12
MMM-12	DIGITAL HiTESTER	Hioki	3805	060500120	EMF	2016/02/23 * 12
SMM-01	Exposure Level Tester	Narda	ELT-400	M-0163	EMF	2016/04/01 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:
RE: Radiated emission