MPE TEST REPORT

Test Report No.: 10759120Y-B-R5

Applicant:	**OMRON Automotive Electronics Co. Ltd.**
Type of Equipment:	**WIRELESS CHARGER**
Model No.:	**GFM-H001**
FCC ID:	**OUCGFM-H001**
Test standard:	**KDB 680106 D01 RF Exposure Wireless Charging Apps**
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 10759120Y-B-R4. 10759120Y-B-R4 is replaced with this report.

Date of test:

April 22, 2015

Representative test engineer:

Hiroyuki Furutaka
Engineer
Consumer Technology Division

Approved by:

Takashi Nakazawa
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REVISION HISTORY

Original Test Report No.: 10759120Y-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10759120Y-B	May 18, 2015	-	-
1	10759120Y-B-R1	June 16, 2015	All pages	Addition of FCC ID.
1	10759120Y-B-R1	June 16, 2015	P. 6	Correction of reference test report No.
2	10759120Y-B-R2	June 29, 2015	P. 6	Correction of sentence of Clause 3.3
2	10759120Y-B-R2	June 29, 2015	P. 6	Correction of Uncertainty.
2	10759120Y-B-R2	June 29, 2015	P. 6	Change of Reference.
2	10759120Y-B-R2	June 29, 2015	P. 8-12	Change of test method.
2	10759120Y-B-R2	June 29, 2015	P. 13-16	Addition of Appendix.
3	10759120Y-B-R3	July 1, 2015	P. 4	Addition of Rated output power.
3	10759120Y-B-R3	July 1, 2015	P. 6	Addition of sentence about RF exposure evaluation.
3	10759120Y-B-R3	July 1, 2015	P. 9	Deletion of *1)
4	10759120Y-B-R4	July 3, 2015	P. 5	Addition of sentence to Clause 3.2.
4	10759120Y-B-R4	July 3, 2015	P. 6	Correction of sentence about RF exposure evaluation.
4	10759120Y-B-R4	July 3, 2015	P. 7	Correction of Uncertainty.
4	10759120Y-B-R4	July 3, 2015	P. 9-11	Change of test method.
4	10759120Y-B-R4	July 3, 2015	P. 12, 15	Correction of Appendix 1 and 3.
4	10759120Y-B-R4	July 3, 2015	P. 13, 14	Addition of test data.
5	10759120Y-B-R5	July 6, 2015	P. 4	Addition of clock frequency.
5	10759120Y-B-R5	July 6, 2015	P. 3, 6, 7, 12-18, 20, 24	Addition of items about test for [KDB 680106 Section 3.3) (FCC §1.1310)]
5	10759120Y-B-R5	July 6, 2015	P.3, 9	Correction of title of Section 5
5	10759120Y-B-R5	July 6, 2015	P. 19	Correction of title of test item

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CONTENTS

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Section 1 : Customer information

Company Name	:	OMRON Automotive Electronics Co. Ltd.
Brand Name	:	OMRON
Address	:	3-19-15 Motoimaizumi Utsunomiya, Tochigi-ken, 321-0954 Japan
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Contact Person	:	Takayuki Kamijima

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

2 . 1 Identification of E.U.T.

Type of equipment	:	WIRELESS CHARGER
Trade name	:	OMRON
Model No.	:	GFM-H001
Serial No.	:	2
Rating	:	DC 12 V
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Size	:	133 x 176 x 32 (Width x Length x Height (mm))
Receipt Date of Sample	:	April 21, 2015

2 . 2 Product description

Model: GFM-H001 (referred to as the EUT in this report) is a wireless charger in vehicle.
The clock frequencies used in the EUT: 8 MHz, 20 MHz

The power transfer frequency range used in the EUT is 111 kHz and 114.5 kHz.
Rated output power: 20 W

This product can charge with various mobile devices in the WPC compliant products.

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 20 W as shown in clause 2.2 of this report.
So, the EUT could not be complied above content b).

Magnetic field strength and electric field strength were demonstrated to be less than 30 % of MPE limit as shown in clause 5.5 of this report.
Therefore, the EUT could be complied above content f).

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 GFM-H001 (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.

	Open area test site			Shielded room			
	No.1	No.2	No.3	No.1	No.2	No.3	No.7
	(±)	(±)	(±)	(±)	(±)	(±)	(±)
Radiated disturbance							
3 m 9 kHz - 30 MHz	3.4 dB	4.4 dB	3.7 dB	-	-	-	-
30 MHz - 300 MHz	5.0 dB	5.1 dB	5.0 dB	-	-	-	-
300 MHz - 1000 MHz	5.1 dB	5.2 dB	5.1 dB	-	-	-	-
1 GHz - 18 GHz	5.9 dB	6.0 dB	5.7 dB	-	-	-	-

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

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Telephone number : +81 596 24 8750
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	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 open area test site	2973A-1	-	40 x 20	-
No.2 open area test site	2973A-2	-	20 x 18	-
No.3 open area test site	2973A-3	-	20 x 18	-
No.1 shielded room	-	5.5 x 6.4 x 2.7	5.5 x 6.4	-
No.2 shielded room	-	4.5 x 3.6 x 2.7	4.5 x 3.6	-
No.3 shielded room	-	3.6 x 7.2 x 2.4	3.6 x 7.2	-
No.4 shielded room	-	5.5 x 5.0 x 2.4	4.35 x 3.35	-
No.5 shielded room	-	5.5 x 4.3 x 2.5	5.54 x 3.0	-
No.6 shielded room	-	5.2 x 3.2 x 2.9	5.2 x 3.2	-
No.7 shielded room	-	9.3 x 3.4 x 2.7	9.3 x 3.4	-
No.1 EMS lab. (Full-anechoic chamber)	-	5.0 x 8.0 x 3.5	-	-
No.2 EMS lab. (Full-anechoic chamber)	-	4.0 x 7.0 x 3.5	-	-

3 . 6 Test setup & Test instruments

Refer to Appendix.

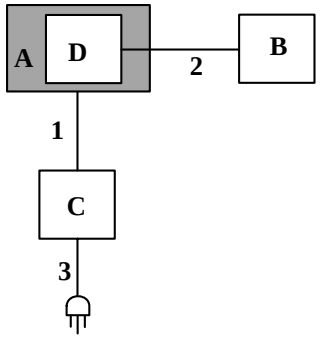
Section 4 : Operation of E.U.T. during testing

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 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-H001	2	OMRON Automotive Electronics Co. Ltd.	EUT
B	Dummy Load	-	-	-	-
C	DC Power Supply	PAD55-20L	10041675	Kikusui	-
D	Wireless Receiver	HPA764 REV C	bp51013BEVM -764	Texas Instruments	-

List of cables used

No.	Name	Length (m)	Cable Shield	Connector Shield	Remark
1	DC Cable	1.3	Unshielded	Unshielded	-
2	DC Cable	0.12	Unshielded	Unshielded	-
3	AC Cable	3.0	Unshielded	Unshielded	3 wire

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

5 . 1 Operating environment

This test was carried out in No.1 open area test site.
Date : April 22, 2015
Temperature : 24 deg.C
Humidity : 37% RH
Engineer : Hiroyuki Furutaka

5 . 2 Test configuration

EUT was placed on a table which was consisted by wooden, polyethylene foam and polycarbonate of nominal size, 1 m by 2 m raised 1m above the conducting ground plane.
The rear of EUT and its peripherals was aligned and flushed with rear of tabletop.
Test was made with the antenna positioned in 0 deg., 45 deg., 90 deg., 135 deg. and Horizontal position.
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
*Refer to Figure 1 about Direction of the Loop Antenna.

5 . 3 Test conditions

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

5 . 4 Test procedure

The Radiated Electric Field Strength intensity has been measured on an open test site 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.

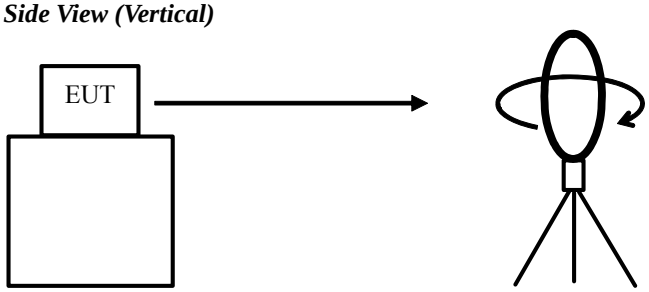
Pre check measurements were performed in shielded room with a search coil at 9kHz-30MHz to distinguish disturbances of EUT from the ambient noise.
The height of antenna was fixed in 2 m.
EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements 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

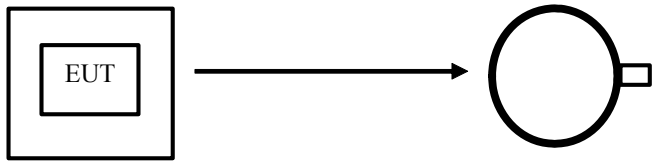
The test was performed by using above procedure.
Test results were the value converted into 10 cm distance from the result obtained in testing at 3 m distance.
Please refer to clause 5.5.

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

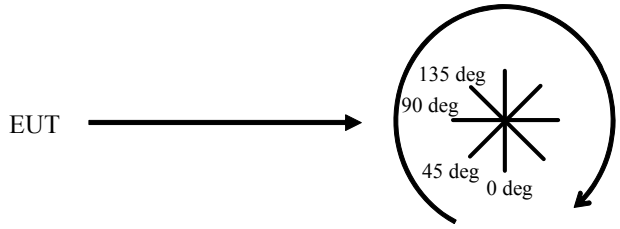


Top View (Horizontal)



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	84.5	3	0.1	59.38027	143.88027	92.4	0.041	0.489	21.4

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]
0.111	84.5	3	0.1	59.38027	143.88027	15.632	184.2	21.4

***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	81.6	3	0.1	48.745	130.345	78.8	0.009	0.489	35.0

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	81.6	3	0.1	48.745	130.345	3.290	184.2	35.0

Extrapolation factor = decade * log (Test distance / Separate distance)
decade = (30 m Reading - 3 m Reading) / (log 3 m - log 30 m)
∗ 30m Reading is 47.3 dBμV, 3m Reading is 87.5 dBμV @ 111 kHz. *2)
30m Reading is 51.6 dBμV, 3m Reading is 84.6 dBμV @ 114.5 kHz. *2)
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)

*1) This value is max of the Result in Appendix 2.
*2) This value is max of the Reading in Appendix 2.

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

6 . 1 Operating environment

This test was carried out in No.7 shielded room
Date : April 22, 2015
Temperature : 24 deg.C
Humidity : 40% RH
Engineer : Hiroyuki Furutaka

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 1.561(A/m)
MPE limit for frequency renage 100 kHz to 300 kHz is 1.63 (A/m)
・Electro-magnetic field strength is 588.483(V/m)
MPE limit for frequency renage 100 kHz to 300 kHz is 614 (V/m)

[Operating Frequency: 111 kHz]
・Magnetic field strength is 1.449(A/m).
MPE limit for frequency renage 100 kHz to 300 kHz is 1.63 (A/m)
・Electro-magnetic field strength is 546.260(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 31.39% from measurement tool ELT-400.
This value was caluculated by following fomula.

31.39% = (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 1.962 [μT]
Result of magnetic field strength is 1.561(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $1.962*10^{(-6)}$ /($1.257*10^{(-6)}$) = 1.561 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120 π =588.483(V/m)

Front position

Test result of Magnetic density is 14.74% from measurement tool ELT-400.
This value was caluculated by following fomula.

14.74% = (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 0.921 [μT]
Result of magnetic field strength is 0.733(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.921*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.733 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=276.334(V/m)

Rear position

Test result of Magnetic density is 22.75% from measurement tool ELT-400.
This value was caluculated by following fomula.

22.75% = (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 1.422 [μT]
Result of magnetic field strength is 1.131(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $1.422*10^{(-6)}$ /($1.257*10^{(-6)}$) = 1.131 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=426.377(V/m)

Left position
Test result of Magnetic density is 10.34% from measurement tool ELT-400.
This value was caluculated by following fomula.

10.34% = (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 0.646 [μT]
Result of magnetic field strength is 0.514(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.646*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.514 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=193.773(V/m)

Right position
Test result of Magnetic density is 10.11% from measurement tool ELT-400.
This value was caluculated by following fomula.

10.11% = (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 0.632 [μT]
Result of magnetic field strength is 1.131(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.632*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.503 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=189.627(V/m)

・Operating Frequency: 111 kHz

Top position

Test result of Magnetic density is 29.15% from measurement tool ELT-400.
This value was caluculated by following fomula.

29.15% = (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 1.822 [μT]
Result of magnetic field strength is 0.733(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $1.822*10^{(-6)}$ /($1.257*10^{(-6)}$) = 1.449 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=546.260(V/m)

Front position

Test result of Magnetic density is 13.1% from measurement tool ELT-400.
This value was caluculated by following fomula.

13.1% = (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 0.819 [μT]
Result of magnetic field strength is 0.652(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.819*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.652 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=245.798V/m)

Rear position

Test result of Magnetic density is 19.15% from measurement tool ELT-400.
This value was caluculated by following fomula.

19.15% = (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 1.197 [μT]
Result of magnetic field strength is 0.952(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $1.197*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.952 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=358.896(V/m)

Left position
Test result of Magnetic density is 9.272% from measurement tool ELT-400.
This value was caluculated by following fomula.

9.272% = (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 0.580 [μT]
Result of magnetic field strength is 0.461(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.580*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.461 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=173.793(V/m)

Right position
Test result of Magnetic density is 8.816% from measurement tool ELT-400.
This value was caluculated by following fomula.

8.816% = (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 0.551 [μT]
Result of magnetic field strength is 0.438(A/m)

*Magnetic field strength [A/m]= Magnetic densty / $4\pi*10^{(-7)}$ = $0.551*10^{(-6)}$ /($1.257*10^{(-6)}$) = 0.438 (A/m)
*Electlo-magnetic field strength[V/m]= Magnetic field strength*120π=165.122(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 2: Data of Radiated Emission

Data of Radiated Emission

UL Japan,Inc.
Yokowa EMC Lab.
No.1 Open area test site

Report No : 10759120Y-B-R5
Regulation : KDB680106 D01
RF Exposure Wireless Charging Apps
Data : 04/22/2015
Temperature : 24deg.C.
Humidity : 37% RH
Engineer : Hiroyuki.Furutaka

Power : DC 12V
Mode : 1.Charging
Remark : Operating Frequency : 111kHz
Detector : Average

FREQ [MHz]	Reading (3m) [dBμV]	Reading (30m) [dBμV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Result (3m) [dBμV/m]	Antenna [deg]
0.11086	87.5	47.3	20.7	29.7	6.0	84.5	0
0.11086	87.3	NS	20.7	29.7	6.0	84.3	45
0.11086	83.5	NS	20.7	29.7	6.0	80.5	90
0.11086	87.0	NS	20.7	29.7	6.0	84.0	135
0.11086	83.0	NS	20.7	29.7	6.0	80.0	Horizontal
0.22240	53.4	34.0	20.6	29.5	6.1	50.6	0
0.22240	52.4	NS	20.6	29.5	6.1	49.6	45
0.22240	51.0	NS	20.6	29.5	6.1	48.2	90
0.22240	52.0	NS	20.6	29.5	6.1	49.2	135
0.22240	47.7	NS	20.6	29.5	6.1	44.9	Horizontal
0.33258	57.6	34.0	20.6	29.4	6.1	54.9	0
0.33258	56.5	NS	20.6	29.4	6.1	53.8	45
0.33258	55.2	NS	20.6	29.4	6.1	52.5	90
0.33258	55.0	NS	20.6	29.4	6.1	52.3	135
0.33258	55.1	NS	20.6	29.4	6.1	52.4	Horizontal
1.66304	29.3	24.5	20.5	29.1	6.4	27.1	0
1.66304	29.7	NS	20.5	29.1	6.4	27.5	45
1.66304	28.0	NS	20.5	29.1	6.4	25.8	90
1.66304	27.6	NS	20.5	29.1	6.4	25.4	135
1.66304	26.4	NS	20.5	29.1	6.4	24.2	Horizontal
1.88488	26.9	21.4	20.4	29.1	6.5	24.7	0
1.88488	26.1	NS	20.4	29.1	6.5	23.9	45
1.88488	24.5	NS	20.4	29.1	6.5	22.3	90
1.88488	23.5	NS	20.4	29.1	6.5	21.3	135
1.88488	24.6	NS	20.4	29.1	6.5	22.4	Horizontal
2.54963	30.0	21.0	20.4	29.1	6.6	27.9	0
2.54963	29.2	NS	20.4	29.1	6.6	27.1	45
2.54963	28.7	NS	20.4	29.1	6.6	26.6	90
2.54963	28.0	NS	20.4	29.1	6.6	25.9	135
2.54963	27.2	NS	20.4	29.1	6.6	25.1	Horizontal

CALCULATION(Result) : 3m Reading + ANT Factor + Cable loss + Atten loss - AMP gain

NS : Non-Signal

Worst direction of EUT was decided by test result performed on test distance at 3m, and test distance at 30m was performed worst direction.

Data of Radiated Emission

UL Japan,Inc.
Yokowa EMC Lab.
No.1 Open area test site

Report No : 10759120Y-B-R5
Regulation : KDB680106 D01
RF Exposure Wireless Charging Apps
Data : 04/22/2015
Temperature : 24deg.C.
Humidity : 37% RH
Engineer : Hiroyuki.Furutaka

Power : DC 12V
Mode : Charging
Remark : Operating Frequency : 114.5kHz
Detector : Average

FREQ [MHz]	Reading (3m) [dBµV]	Reading (30m) [dBµV]	ANT Factor [dB/m]	AMP gain [dB]	Atten + Cable loss [dB]	Result (3 m) [dBµV/m]	Antenna [deg]
0.11441	84.6	51.6	20.7	29.7	6.0	81.6	0
0.11441	82.8	NS	20.7	29.7	6.0	79.8	45
0.11441	80.0	NS	20.7	29.7	6.0	77.0	90
0.11441	81.0	NS	20.7	29.7	6.0	78.0	135
0.11441	83.0	NS	20.7	29.7	6.0	80.0	Horizontal
0.22897	47.4	32.0	20.6	29.5	6.1	44.6	0
0.22897	47.0	NS	20.6	29.5	6.1	44.2	45
0.22897	46.8	NS	20.6	29.5	6.1	44.0	90
0.22897	47.1	NS	20.6	29.5	6.1	44.3	135
0.22897	43.0	NS	20.6	29.5	6.1	40.2	Horizontal
0.34327	56.3	35.8	20.6	29.4	6.1	53.6	0
0.34327	55.0	NS	20.6	29.4	6.1	52.3	45
0.34327	53.3	NS	20.6	29.4	6.1	50.6	90
0.34327	54.5	NS	20.6	29.4	6.1	51.8	135
0.34327	53.7	NS	20.6	29.4	6.1	51.0	Horizontal
0.57211	47.0	31.4	20.5	29.2	6.2	44.5	0
0.57211	46.5	NS	20.5	29.2	6.2	44.0	45
0.57211	46.0	NS	20.5	29.2	6.2	43.5	90
0.57211	45.5	NS	20.5	29.2	6.2	43.0	135
0.57211	43.1	NS	20.5	29.2	6.2	40.6	Horizontal
1.94497	26.6	21.0	20.4	29.1	6.5	24.4	0
1.94497	25.5	NS	20.4	29.1	6.5	23.3	45
1.94497	24.0	NS	20.4	29.1	6.5	21.8	90
1.94497	25.0	NS	20.4	29.1	6.5	22.8	135
1.94497	24.5	NS	20.4	29.1	6.5	22.3	Horizontal
2.17389	27.0	21.4	20.4	29.1	6.5	24.8	0
2.17389	25.8	NS	20.4	29.1	6.5	23.6	45
2.17389	25.3	NS	20.4	29.1	6.5	23.1	90
2.17389	26.5	NS	20.4	29.1	6.5	24.3	135
2.17389	24.0	NS	20.4	29.1	6.5	21.8	Horizontal

CALCULATION(Result) : 3m Reading + ANT Factor + Cable loss + Atten loss - AMP gain

NS : Non-Signal

Worst direction of EUT was decided by test result performed on test distance at 3m, and test distance at 30m was performed worst direction.

Test Report No :10759120Y-B-R5

Appendix 3
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
APSPA06	Spectrum Analyzer	Advantest	R3265A	55060177	RE	2014/04/02 * 12
TR-11	EMI Test Receiver	Rohde & Schwarz	ESU-8	100181/008	RE	2014/09/23 * 12
APANT08	Loop Antenna	Rohde & Schwarz	HFH2-Z2	842906/011	RE	2014/10/04 * 12
APPRA04	Pre Amplifier	Advantest	R14601	73120037	RE	2014/06/05 * 12
AT-40	Attenuator	Anritsu	MP721B	6201150481	RE	2014/10/06 * 12
CC-30M	Yokowa No.1 open coaxial(0.009-1000MHz)	UL Japan	CC-11,CC-12,CC-14,CC-15,CC-16,SW-11,SW-12,CC-17	YO0102	RE	2014/10/08 * 12
YOATS-01(NSA)	Open area test site	JSE	3m、10m、30m	1	RE	2014/04/05 * 12
OS-03	Digital Humidity Indicator	SATO	PC-5000TRH-II	04A05	RE	2015/03/05 * 12
DM-01	Tester	SANWA	PC500	7019221	RE	2014/06/09 * 12
YJM-12	Measure	Rubber KOMBE	GW-3H99W	-	RE	-
SC-01	Search Coil	UL Japan	-	-	RE	-
COTS-YW-EMI-TSJ	EMI measurement program	TSJ	TEPTO-DV	-	RE	-

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards.
Test Item :
RE: Radiated emission

Test Report No :10759120Y-B-R5

Appendix 3
Test Instruments

EMF test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
DM-06	Tester	SANWA	PC500	7019239	EMF	2015/06/11 * 12
OS-06	Digital Humidity Indicator	SATO	PC-5000TRH	B-06	EMF	2015/04/28 * 12
COTS-YW-AT	Software for Antenna Terminal Voltage	TOYO Corporation	-	-	EMF	-
ELT400	Exposure Level Tester	Narda	ELT-400	C-0002	EMF	2014/08/28 * 12

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards .
Test Item :
EMF: Electromagnetic fields

End of Report