RF TEST REPORT

Test item	:	UMa Wireless Charger
Model No.	:	C6F76AC001
Order No.	:	DEMC1407-03093
Date of receipt	:	2014-07-25
Test duration	:	2014-09-01 ~ 2014-09-11
Date of issue	:	2014-09-22
Use of report	:	FCC Original Grant

Applicant : MCNEX CO., LTD.
Hanshin IT Tower 2, 60-18, Gasan-dong, Geumcheon-gu, Seoul, Korea

Test laboratory : DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification	:	FCC Part 15 Subpart C
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

Tested by:

Engineer
KwiCheol, Yeom

Reviewed by:

Technical Manager
HongHee, Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1409-1206	Sep. 22, 2014	Initial issue

CONTENTS

1. Equipment information

1.1 Equipment description

FCC Equipment Class	Part 15 Low Power Transmitter Below 1705 kHz (DCD)
Equipment type	UMa Wireless Charger
Equipment model name	C6F76AC001
Equipment add model name	C6F76AC010
Equipment serial no.	Identical prototype
Frequency band	110 ~ 205 kHz
Output power	Max : 5 W
Power	DC 12V
Antenna type	Coil Antenna X 3ea[Note]

Note: This device has 3 coil antennas but only one antenna is used for transmitting at a time after selection of the best coil antenna,.

1.2 Support equipments

Equipment	Model No.	Serial No.	Manufacturer	Note
Wireless Charging Cover	MWC-R511T	0943	M.Cloud	-

Note: The above equipments were supported by manufacturer.

2. Information about test items

2.1 Test mode

This device has been tested in all the configurations of charging mode with each coil antenna.

Charging Current	Support Equipment
100mA	Wireless Charging Cover
500mA	
1000mA(Max)	

2.2 Tested environment

Temperature	:	23 ~ 24 °C
Relative humidity content	:	35 ~ 42 % R.H.
Details of power supply	:	DC 12 V

2.3 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

3. FACILITIES AND ACCREDITATIONS

3.1 FACILITIES

The semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements.

- Semi anechoic chamber registration Number: FCC (596748), IC (5740A-2)

3.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of antennas: loop, tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

4. Test Report

4.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status Note 1
Test Items				
2.1049	20 dB Bandwidth	N/A	Radiated	**C**
15.209	Radiated Emission	FCC 15.209 limits		**C**
15.207	AC Conducted Emissions	FCC 15.207 limits	AC Line Conducted	**NA** Note2

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: The supplying power of this device is DC 12V from a Car Battery.

The sample was tested according to the following specification:
ANSI C-63.4 2009

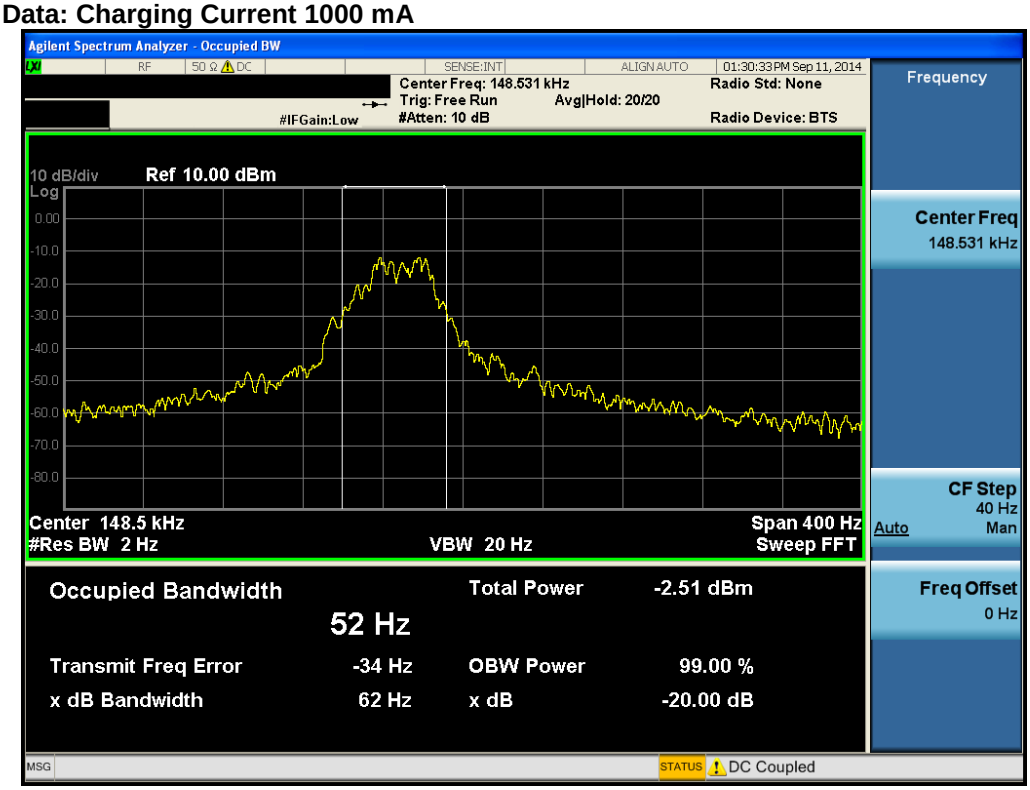
4.2 Transmitter requirements

4.2.1 20dB Bandwidth

- Procedure:

The 20 dB bandwidth is measured with a spectrum analyzer connected via a receiving antenna placed near the EUT while the EUT is operating.

- Measurement Data: Charging Current 1000 mA



4.2.2 Radiated Emissions

- Limit: FCC Part 15.209(a)

Frequency [MHz]	Field Strength [uV/m]	Measurement Distance [Meters]
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

- Procedure: ANSI C63.4 2009

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. During performing radiated emission below 1 ㎓, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 ㎓, the EUT was set 3 meter away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 ㏈ lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 ㏈ margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- Measurement Data: Comply (refer to the next page)

- Measurement Data: Wireless Charging Cover

Measurement Distance : **3 Meters**

Tested Frequency	Note.1	Freq. [MHz]	Det. Mode	ANT Pol.	Reading [dBuV]	T.F [dB/m]	D.C.F.	Field Strength [dBuV/m]	Limit [dBuV/m]	Margin [dB]
Lowest	F	0.129	PK	N/A	67.10	19.20	80	6.30	25.39	19.09
	S	0.388	PK	N/A	40.50	19.30	80	-20.20	15.83	36.03
	S	0.640	PK	N/A	31.10	19.20	40	10.30	31.48	21.18
	S	2.294	PK	N/A	10.70	19.50	40	-9.80	29.54	39.34
	S	56.190	PK	V	43.30	-17.40	0	25.90	40.00	14.10
	S	107.600	PK	H	44.10	-18.80	0	25.30	43.50	18.20
Middle	F	0.139	PK	N/A	63.00	19.30	80	2.30	24.74	22.44
	S	0.975	PK	N/A	28.80	19.40	40	8.20	27.82	19.62
	S	1.741	PK	N/A	13.30	19.50	40	-7.20	29.54	36.74
	S	51.340	PK	V	45.40	-17.00	0	28.40	40.00	11.60
	S	199.750	PK	H	42.00	-19.10	0	22.90	43.50	20.60
Highest	F	0.149	PK	N/A	59.80	19.30	80	-0.90	24.14	25.04
	S	0.742	PK	N/A	24.20	19.30	40	3.50	30.20	26.70
	S	1.925	PK	N/A	11.30	19.50	40	-9.20	29.54	38.74
	S	48.430	PK	H	36.70	-16.90	0	19.80	40.00	20.20
	S	56.190	PK	V	43.80	-17.40	0	26.40	40.00	13.60

Note 1. The worst case data were reported.
And no other spurious and harmonic emissions were reported greater than listed emissions above table.

Note 2. "F" = Fundamental **/** "S" = Spurious **/** "*" = Noise Floor

Note 3. All measurements were recorded using a spectrum analyzer employing a peak detector for blew 30MHz and a Quasi-peak detector for above 30MHz.

Note 4. Distance Correction Factor(D.C.F.)
For 300m: 40*log(300/3) = 80 dB & For 30m: 40*log(30/3) = 40 dB

Note 5. Sample calculation
T.F = AF + CL – AG **/** Field Strength = Reading + T.F - D.C.F.
Margin = Limit – Field Strength
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain
D.C.F = Distance Correction Factor

4.2.3 AC Line Conducted Emissions

- Minimum Standard: FCC Part 15.207

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

- Procedure: ANSI C63.4 2009

1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to main tain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

- Measurement Data: N/A

The supplying power of this device is DC 12V from a Car Battery.

APPENDIX I

TEST EQUIPMENT FOR TESTS

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	N9020A	14/03/28	15/03/28	MY50200816
Loop Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
Regulated DC Power Supply	Smtechno	SDP 30-5D	14/02/10	15/02/10	305DLJ204
BILOG ANTENNA	SCHAFFNER	VULB9160	14/04/04	16/04/04	3357
Thermohygrometer	BODYCOM	BJ5478	14/05/13	15/05/13	120612-2
Vector Signal Generator	Rohde Schwarz	SMJ100A	14/01/07	15/01/07	100148
Amplifier (22dB)	H.P	MLA-010K01-B01-27	14/04/09	15/04/09	1844538
EMI TEST RECEIVER	R&S	ESU	14/02/07	15/02/07	100538