

RF TEST REPORT

Test item : makeON Charging Stand
Model No. : MO-CS001
Order No. : DEMC1405-02001
Date of receipt : 2014-05-26
Test duration : 2014-06-20 ~ 2014-07-01
Date of issue : 2014-07-10
Use of report : FCC Original Grant

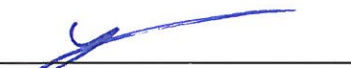
Applicant : Amorepacific Corporation
100, Cheonggyecheon-ro, Jung-gu, Seoul, South Korea

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

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

Tested by:



Engineer
KwiCheol, Yeom

Reviewed by:



Deputy General Manager
HongHee, Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1407-0913	Jul. 10, 2014	Initial issue

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1. Equipment information

1.1 Equipment description

FCC Equipment Class	Part 15 Low Power Transmitter Below 1705 kHz (DCD)
Equipment type	makeON Charging Stand
Equipment model name	MO-CS001
Equipment add model name	N/A
Equipment serial no.	Identical prototype
Frequency band	110 ~ 205kHz
Output power	Max : 2.1 W
Power	AC 120V 60Hz DC 5 V
Antenna type	Coil Antenna(single coil)

1.2 Support equipments

Equipment	Model No.	Serial No.	Manufacturer	Note
Travel Adapter	KBC-S240	N/A	Shenzhen Theone Electronic	-
-	-	-	-	-
-	-	-	-	-

Note: The above equipments were supported by manufacturer.

2. Information about test items

2.1 Test mode

This device has been tested with the below test modes and charging current conditions:

Charging Current	Support Equipment
300mA	Wireless Charging Cover
600mA	
1000mA(Max)	

2.2 Tested environment

Temperature	:	23 °C
Relative humidity content	:	35 ~ 40 % R.H.
Details of power supply	:	AC 120V 60Hz DC 5V

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 38, 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: 678747

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)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
Test Items					
2.1049	N/A	20 dB Bandwidth	N/A	Radiated	C
15.209	RSS-Gen [7.2.5]	Radiated Emission	FCC 15.209 limits		C ^{Note2}
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions	FCC 15.207 limits	AC Line Conducted	C ^{Note3}
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable Note 2: This test item was performed in each axis and the worst case data was reported. Note 3: Travel Adapter has been used in the test.					

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

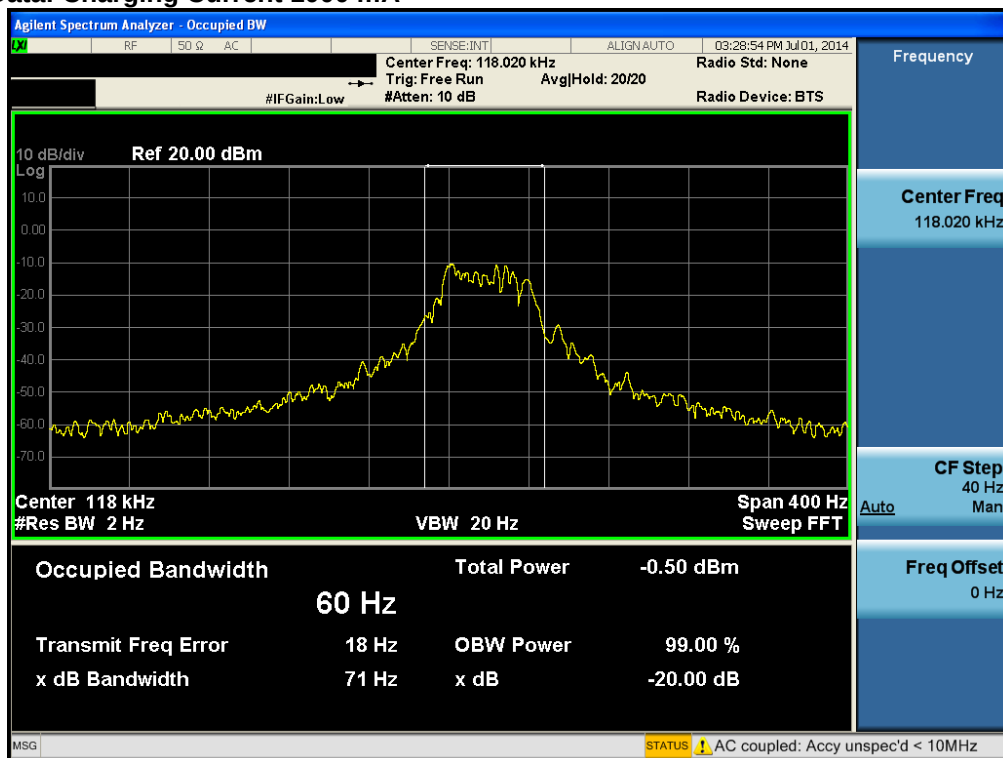
4.2 Transmitter requirements

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) & RSS-GEN, section 7.2.5

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 GHz, 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 GHz, 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. In order to find out the highest emission, the relative position of this EUT was rotated through three orthogonal axes.
5. 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.
6. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 10 dB 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 dB 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: Travel Adapter

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	0.118	PK	N/A	58.50	17.60	80	-3.90	26.17	30.07
	S	0.509	PK	N/A	37.70	17.60	40	15.30	33.47	18.17
	S	2.284	PK	N/A	21.00	17.80	40	-1.20	29.54	30.74
	S	33.880	QP	V	41.80	-5.80	0	36.00	40.00	4.00
	S	82.016	QP	V	43.70	-13.90	0	29.80	40.00	10.20
	S	84.562	QP	H	33.60	-13.40	0	20.20	40.00	19.80
Middle	F	0.155	PK	N/A	52.60	17.60	80	-9.80	23.80	33.60
	S	0.514	PK	N/A	39.80	17.60	40	17.40	33.38	15.98
	S	2.284	PK	N/A	19.90	17.80	40	-2.30	29.54	31.84
	S	33.759	QP	V	41.40	-5.80	0	35.60	40.00	4.40
	S	82.258	QP	V	43.90	-13.80	0	30.10	40.00	9.90
	S	83.592	QP	H	33.30	-13.60	0	19.70	40.00	20.30
Highest	F	0.194	PK	N/A	49.50	17.60	80	-12.90	21.85	34.75
	S	0.567	PK	N/A	34.20	17.60	40	11.80	32.53	20.73
	S	1.008	PK	N/A	26.30	17.70	40	4.00	27.54	23.54
	S	2.177	PK	N/A	21.80	17.80	40	-0.40	29.54	29.94
	S	33.759	QP	V	41.40	-5.80	0	35.60	40.00	4.40
	S	82.258	QP	V	43.40	-13.80	0	29.60	40.00	10.40
	S	86.138	QP	H	33.70	-13.00	0	20.70	40.00	19.30

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 below 30MHz and a Quasi-peak detector for above 30MHz.**Note 4.** Distance Correction Factor(D.C.F.)For 300m: $40 \times \log(300/3) = 80 \text{ dB}$ & For 30m: $40 \times \log(30/3) = 40 \text{ dB}$ **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 & RSS-GEN Issue 3, section 7.2.4**

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 maintain 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: Comply** (refer to the next page)

- Measurement Data (Graph): Charging Current 1000 mA

Results of Conducted Emission

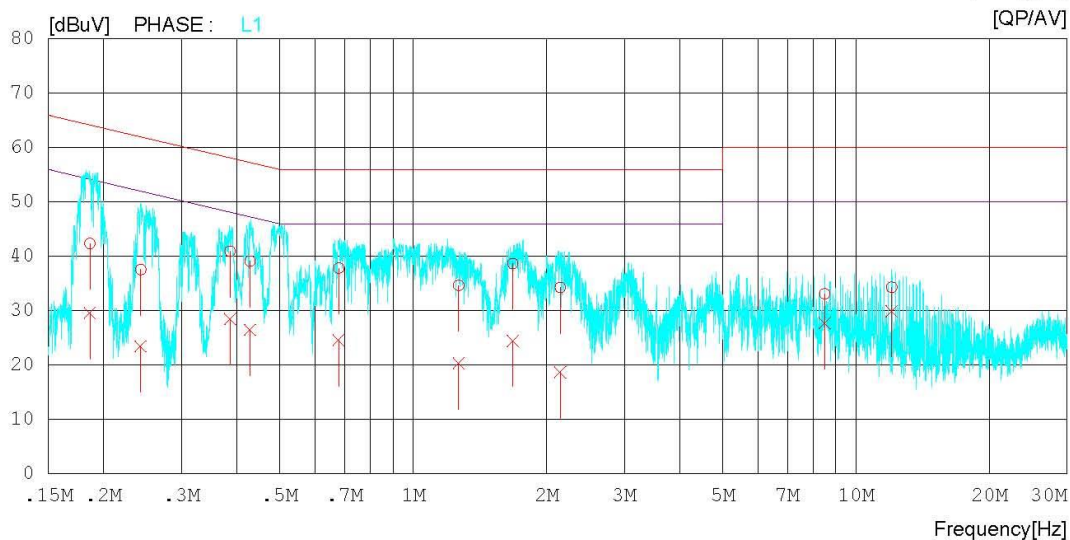
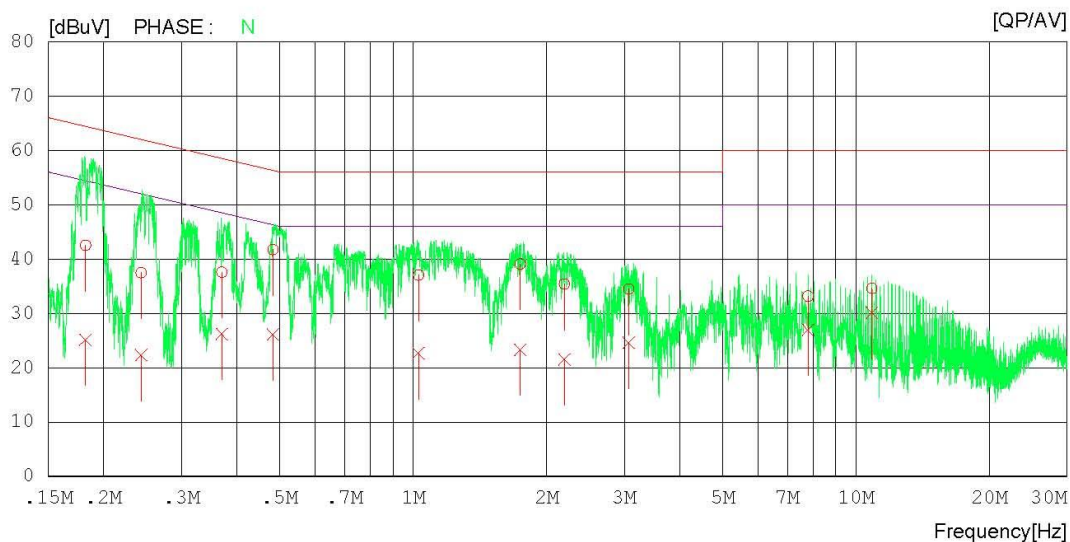
Digital EMC
Date : 2014-07-01

Model No. : MO-CS001
Type :
Serial No. : Identical prototype
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi. : 23 °C 35 % R.H.
Operator : K.C.YEOM

Memo :

LIMIT : FCC P15.207 QP
FCC P15.207 AV



- Measurement Data (List): Charging Current 1000 mA**Results of Conducted Emission**Digital EMC
Date : 2014-07-01

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 Type :
 Serial No. : Identical prototype
 Test Condition :

Reference No. :
 Power Supply : 120 V 60 Hz
 Temp/Humi. : 23 °C 35 % R.H.
 Operator : K.C.YEOM

Memo :

LIMIT : FCC P15.207 QP
 FCC P15.207 AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.18199	42.4	25.0	0.1	42.5	25.1	64.4	54.4	21.9	29.3	N
2	0.24295	37.4	22.2	0.1	37.5	22.3	62.0	52.0	24.5	29.7	N
3	0.36945	37.5	26.1	0.1	37.6	26.2	58.5	48.5	20.9	22.3	N
4	0.48231	41.6	26.0	0.1	41.7	26.1	56.3	46.3	14.6	20.2	N
5	1.02820	36.9	22.5	0.1	37.0	22.6	56.0	46.0	19.0	23.4	N
6	1.74600	38.9	23.1	0.2	39.1	23.3	56.0	46.0	16.9	22.7	N
7	2.19440	35.2	21.3	0.2	35.4	21.5	56.0	46.0	20.6	24.5	N
8	3.07200	34.1	24.3	0.3	34.4	24.6	56.0	46.0	21.6	21.4	N
9	7.79460	33.0	26.7	0.2	33.2	26.9	60.0	50.0	26.8	23.1	N
10	10.86660	34.4	29.9	0.2	34.6	30.1	60.0	50.0	25.4	19.9	N
11	0.18600	42.3	29.5	0.1	42.4	29.6	64.2	54.2	21.8	24.6	L1
12	0.24241	37.5	23.4	0.1	37.6	23.5	62.0	52.0	24.4	28.5	L1
13	0.38581	40.7	28.3	0.2	40.9	28.5	58.2	48.2	17.3	19.7	L1
14	0.42820	38.9	26.3	0.2	39.1	26.5	57.3	47.3	18.2	20.8	L1
15	0.67902	37.7	24.4	0.2	37.9	24.6	56.0	46.0	18.1	21.4	L1
16	1.26740	34.4	20.2	0.2	34.6	20.4	56.0	46.0	21.4	25.6	L1
17	1.67900	38.5	24.3	0.2	38.7	24.5	56.0	46.0	17.3	21.5	L1
18	2.14840	34.0	18.4	0.3	34.3	18.7	56.0	46.0	21.7	27.3	L1
19	8.50260	32.8	27.4	0.3	33.1	27.7	60.0	50.0	26.9	22.3	L1
20	12.04640	34.0	29.6	0.3	34.3	29.9	60.0	50.0	25.7	20.1	L1

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
BILOG ANTENNA	SCHAFFNER	CBL6112B	14/04/10	16/04/10	2737
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	8447E	14/01/08	15/01/08	2945A02865
EMI TEST RECEIVER	R&S	ESU	14/01/08	15/01/08	100014
EMI TEST RECEIVER	R&S	ESCI	14/02/27	15/02/27	100910
CVCF	EM TEST	NETWAVE 60-400	14/05/26	15/05/26	P1311115470
LISN	SCHWARZBECK	NNLK8121	13/08/12	14/08/12	NNLK8121-580
PULSE LIMITER	R&S	ESH3-Z2	14/01/08	15/01/08	101334