

RF TEST REPORT

Test item : Wireless Charging Pad
Model No. : WCP-500
Order No. : DEMC1207-01102
Date of receipt : 2012-07-10
Test duration : 2012-08-24 ~ 2012-09-05, 2012-12-10
Date of issue : 2012-12-10
Use of report : FCC Original Grant

Applicant : LG Electronics USA.
1000 Sylvan Avenue Englewood Cliffs, NJ 07632

Test laboratory : Digital EMC Co., Ltd.
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea

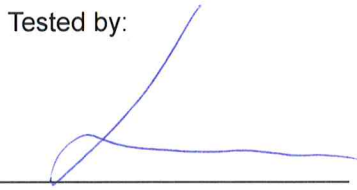
Test specification : FCC Part 15 Subpart C

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 DIGITAL EMC CO., LTD.

Tested by:

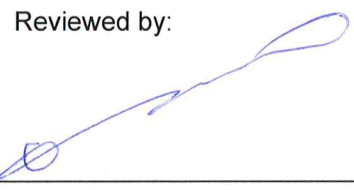


Engineer
SunKyu RYU

Witnessed by:

N/A

Reviewed by:



Deputy General Manager
WonJung Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1209-0452	Sep. 05, 2012	Final version for approval
DRTFCC1209-0452(1)	Dec. 10, 2012	Modification of Bandwidth result

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1. Equipment information

1.1 Equipment description

FCC Equipment Class	Part 15 Low Power Transmitter Below 1705 kHz (DCD)
IC Category Equipment	Category I Equipment
Equipment type	Wireless Charging Pad
Equipment model name	WCP-500
Equipment add model name	N/A
Equipment serial no.	Identical prototype
Power	AC-DC Adaptor: AC 120V 60Hz
Antenna type	Internal Loop Antenna(Circular coil)

1.2 Ancillary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Adapter	PSTA-D01WT	TA250000013	LG Electronics	-
-	-	-	-	-

2. Information about test items

2.1 Operating mode

Operating Mode 1 (OP 1)	Charging and DATA packet communication mode Continuously transmission mode
Operating Mode 2 (OP 2)	Analog/Digital ping mode (Transmitting a short pulse to find a client device) Non continuously transmission mode

2.2 Test mode

This device has been tested below conditions:

Charging current	TM-X Series
0mA	TM-X-0
100mA	TM-X-1
200mA	TM-X-2
300mA	TM-X-3
400mA	TM-X-4
500mA	TM-X-5
600mA	TM-X-6
700mA	TMX-7
800mA	TM-X-8
900mA	TM-X-9
1000mA	TM-X-10

Note 1.: "X" = Positions of client device on the DUT(Refer to test setup photo.)
(C = Center, T = Top, B= Bottom, L = Left, R= Right)

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Client Device (rectangular coil)	WCC-920-REV03	N/A	LG Electronics Inc.	-

Note: This client device was supported by manufacturer.

And they declared that the client device will be installed in mobile phones for charging the phone.

2.4 Tested environment

Temperature	: 23 ~ 26 °C
Relative humidity content	: 46 ~ 57 % R.H.
Details of power supply	: AC 120V 60Hz

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing

→ None

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Test Condition	Status Note 1
Test Items			
2.1049	Occupied Bandwidth	Radiated	C
15.209	Radiated Emission		C
15.207	AC Conducted Emissions	AC Line Conducted	C
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable			

The sample was tested according to the following specification:
ANSI C-63.4-2003, RSS-GEN Issue 3

3.2 Transmitter requirements

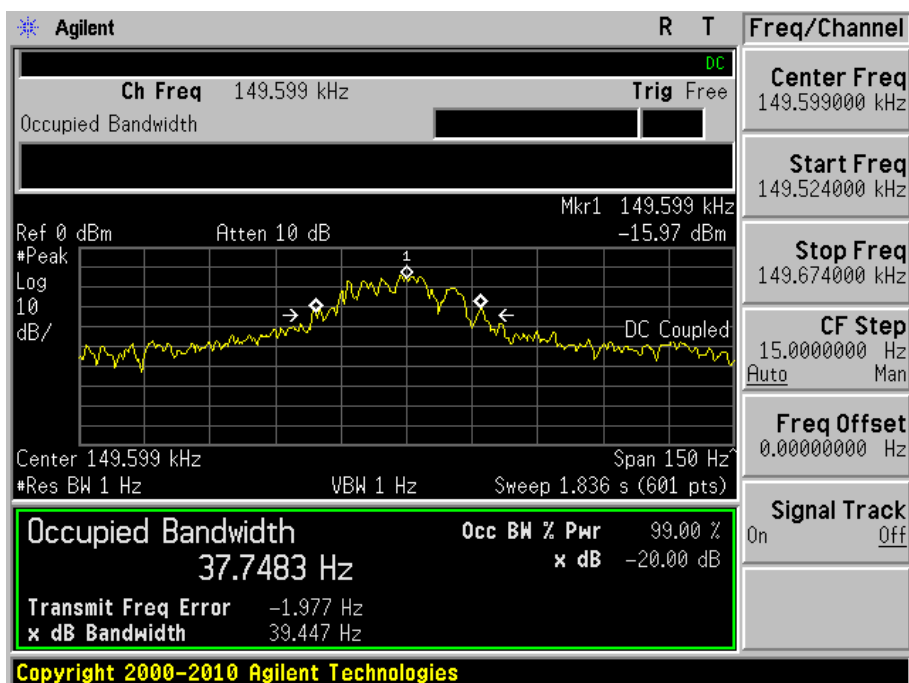
3.2.1 20dB Bandwidth & Occupied Bandwidth Measurement

- Procedure:

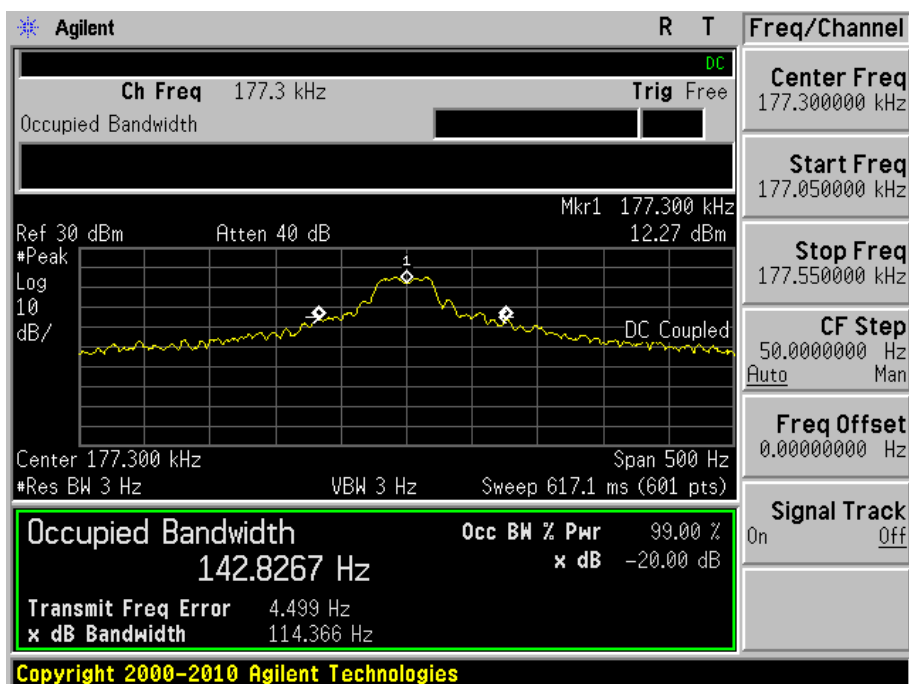
The 20dB bandwidth and occupied bandwidth(99% emission bandwidth) are measured with a spectrum analyzer connected via a receiving antenna placed near the EUT while the EUT is operating.

- Measurement Data:

▪ Operating Mode 1



▪ Operating Mode 2



3.2.2 Radiated Emissions

- Limit: FCC Part 15.209(a) & RSS-GEN Issue 3, section 7.2.2 and 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

- Procedure: ANCI C63.4

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. 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 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:Measurement Distance : 3 Meters

OP	TM	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]
1	TM-R-1	F	0.111	PK	N/A	76.80	11.40	80	8.20	26.70	18.50
		S	0.554	PK	N/A	66.70	-13.00	40	13.70	32.73	19.03
		S	40.756	QP	N/A	35.80	-8.90	N/A	26.90	40.00	13.10
		S	62.357	QP	N/A	38.00	-14.80	N/A	23.20	40.00	16.80
		S	187.720	QP	N/A	41.20	-11.80	N/A	29.40	43.50	14.10
	TM-C-2	F	0.150	PK	N/A	89.10	-12.60	80	-3.50	24.08	27.58
		S	0.756	PK	N/A	61.10	-13.00	40	8.10	30.03	21.93
		S	40.475	QP	N/A	41.90	-8.70	N/A	33.20	40.00	6.80
		S	71.059	QP	N/A	35.00	-14.30	N/A	20.70	40.00	19.30
		S	186.559	QP	N/A	37.30	-11.80	N/A	25.50	43.50	18.00
	TM-C5	F	0.197	PK	N/A	84.30	-12.70	80	-8.40	21.71	30.11
		S	1.464	PK	N/A	51.70	-13.10	40	-1.40	24.29	25.69
		S	40.902	QP	N/A	39.50	-9.00	N/A	30.50	40.00	9.50
		S	62.499	QP	N/A	39.80	-14.80	N/A	25.00	40.00	15.00
		S	187.054	QP	N/A	43.00	-11.80	N/A	31.20	43.50	12.30
2	N/A	F ^{Note5}	0.113	PK	N/A	72.40	11.40	80	3.80	26.55	22.75
		F ^{Note5}	0.173	PK	N/A	88.50	-12.60	80	-4.10	22.84	26.94
		S	0.523	PK	N/A	67.10	-12.90	40	14.20	33.23	19.03

Note 1. “ F ” = Fundamental

“ S ” = Spurious

“ * ” = Noise Floor

Note 2. Distance Correction Factor(D.C.F.)For 300m: $40 \cdot \log(300/3) = 80\text{dB}$ For 30m: $40 \cdot \log(30/3) = 40\text{dB}$ **Note 3.** No other spurious and harmonic emissions were reported greater than listed emissions above table.**Note 4.** 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

Note 5. During this mode, this device transmits a short pulses(analog and digital ping signal) to find a client device.

Analog ping = 113KHz

Digital ping mode = 173KHz

3.2.3 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:

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): Operating mode 1 & TM-R-1



Results of Conducted Emission

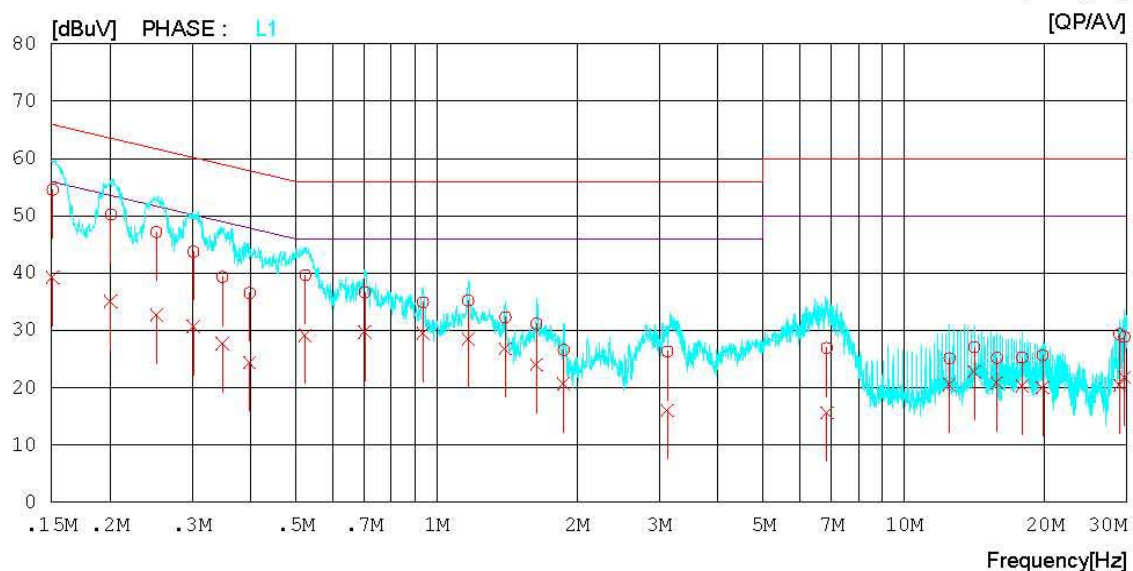
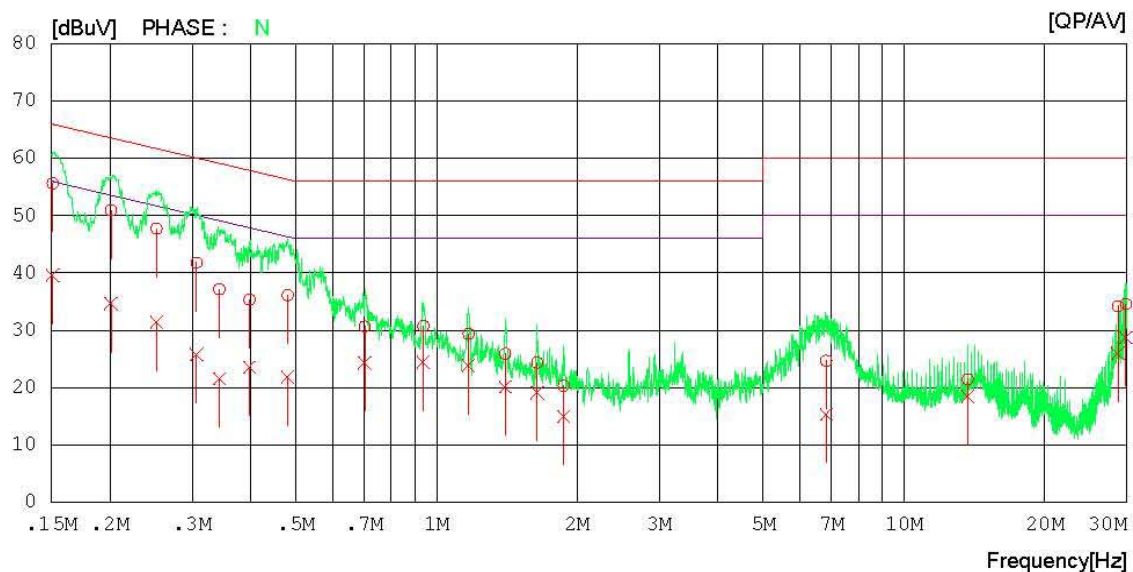
Digital EMC
Date : 2012-09-04

Standard : FCC Part15.C
Model No. : WCP-500
Serial No. : N/A
Test Condition : Low channel

Reference No. :
Power Supply : 120V 60Hz
Temp/Humi. : 26°C 54% R.H.
Operator : S.K. Ryu

Memo :

LIMIT : CISPR22_B QP
CISPR22_B AV



- Measurement Data(List) : Operating mode 1 & TM-R-1

Results of Conducted EmissionDigital EMC
Date : 2012-09-04Standard : FCC Part15.C
Model No. : WCP-500
Serial No. : N/A
Test Condition : Low channelReference No. :
Power Supply : 120V 60Hz
Temp/Humi. : 26°C 54% R.H.
Operator : S.K. Ryu

Memo :

LIMIT : CISPR22_B QP
CISPR22_B 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	0.15098	55.3	39.3	0.3	55.6	39.6	65.9	55.9	10.3	16.3	N
2	0.20114	50.7	34.4	0.2	50.9	34.6	63.6	53.6	12.7	19.0	N
3	0.25194	47.5	31.2	0.2	47.7	31.4	61.7	51.7	14.0	20.3	N
4	0.30673	41.6	25.6	0.2	41.8	25.8	60.1	50.1	18.3	24.3	N
5	0.34315	36.9	21.2	0.3	37.2	21.5	59.1	49.1	21.9	27.6	N
6	0.39805	35.0	23.2	0.3	35.3	23.5	57.9	47.9	22.6	24.4	N
7	0.48064	35.9	21.7	0.2	36.1	21.9	56.3	46.3	20.2	24.4	N
8	0.70230	30.5	24.1	0.2	30.7	24.3	56.0	46.0	25.3	21.7	N
9	0.93693	30.5	24.1	0.3	30.8	24.4	56.0	46.0	25.2	21.6	N
10	1.17100	29.1	23.5	0.3	29.4	23.8	56.0	46.0	26.6	22.2	N
11	1.40250	25.6	19.8	0.3	25.9	20.1	56.0	46.0	30.1	25.9	N
12	1.64100	24.1	18.8	0.3	24.4	19.1	56.0	46.0	31.6	26.9	N
13	1.87050	20.0	14.7	0.3	20.3	15.0	56.0	46.0	35.7	31.0	N
14	6.82000	24.3	14.9	0.4	24.7	15.3	60.0	50.0	35.3	34.7	N
15	28.68850	32.9	24.7	1.3	34.2	26.0	60.0	50.0	25.8	24.0	N
16	29.85600	33.2	27.4	1.3	34.5	28.7	60.0	50.0	25.5	21.3	N
17	13.69450	20.5	17.5	0.9	21.4	18.4	60.0	50.0	38.6	31.6	N
18	0.15103	54.2	39.0	0.3	54.5	39.3	65.9	55.9	11.4	16.6	L1
19	0.20096	50.0	34.9	0.2	50.2	35.1	63.6	53.6	13.4	18.5	L1
20	0.25163	47.0	32.5	0.2	47.2	32.7	61.7	51.7	14.5	19.0	L1
21	0.30199	43.6	30.5	0.2	43.8	30.7	60.2	50.2	16.4	19.5	L1
22	0.34845	39.0	27.4	0.3	39.3	27.7	59.0	49.0	19.7	21.3	L1
23	0.39833	36.3	24.1	0.3	36.6	24.4	57.9	47.9	21.3	23.5	L1
24	0.52384	39.5	29.0	0.2	39.7	29.2	56.0	46.0	16.3	16.8	L1
25	0.70208	36.5	29.5	0.2	36.7	29.7	56.0	46.0	19.3	16.3	L1
26	0.93589	34.6	29.2	0.3	34.9	29.5	56.0	46.0	21.1	16.5	L1
27	1.16900	34.9	28.3	0.3	35.2	28.6	56.0	46.0	20.8	17.4	L1
28	1.40350	32.0	26.5	0.3	32.3	26.8	56.0	46.0	23.7	19.2	L1
29	1.63650	30.9	23.7	0.3	31.2	24.0	56.0	46.0	24.8	22.0	L1
30	1.87100	26.3	20.4	0.3	26.6	20.7	56.0	46.0	29.4	25.3	L1
31	3.11900	26.0	15.7	0.4	26.4	16.1	56.0	46.0	29.6	29.9	L1
32	6.84000	26.6	15.3	0.4	27.0	15.7	60.0	50.0	33.0	34.3	L1
33	12.51800	24.4	19.8	0.8	25.2	20.6	60.0	50.0	34.8	29.4	L1
34	14.15050	26.2	22.0	0.9	27.1	22.9	60.0	50.0	32.9	27.1	L1
35	15.81000	24.2	19.9	1.0	25.2	20.9	60.0	50.0	34.8	29.1	L1
36	17.91800	24.2	19.3	1.1	25.3	20.4	60.0	50.0	34.7	29.6	L1
37	19.79050	24.5	18.9	1.1	25.6	20.0	60.0	50.0	34.4	30.0	L1
38	28.92350	28.1	19.2	1.3	29.4	20.5	60.0	50.0	30.6	29.5	L1
39	29.62100	27.6	20.5	1.3	28.9	21.8	60.0	50.0	31.1	28.2	L1

- Measurement Data(Graph) : Operating mode 2

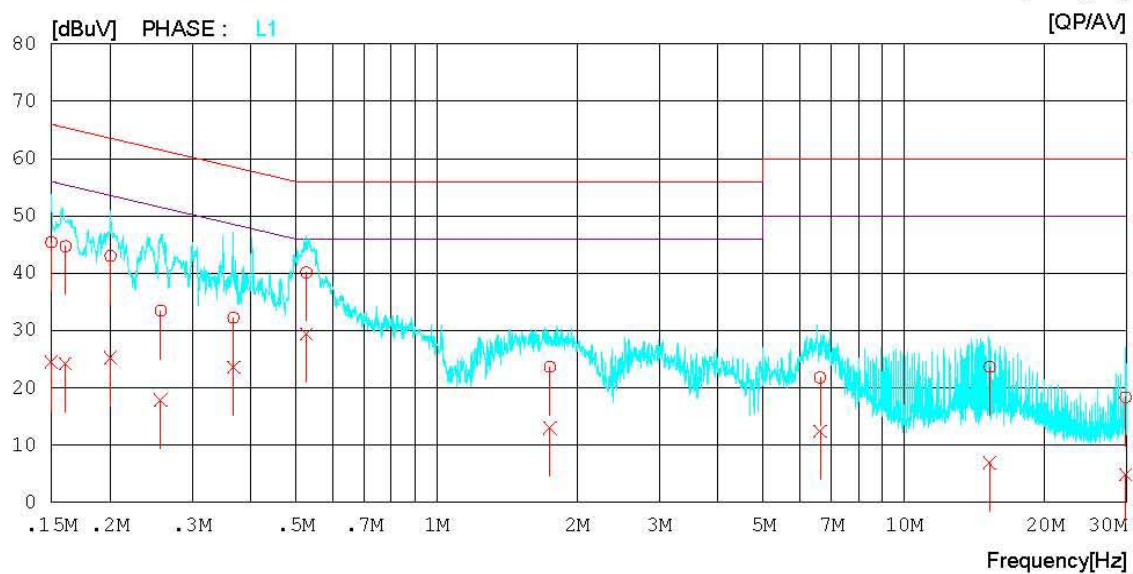
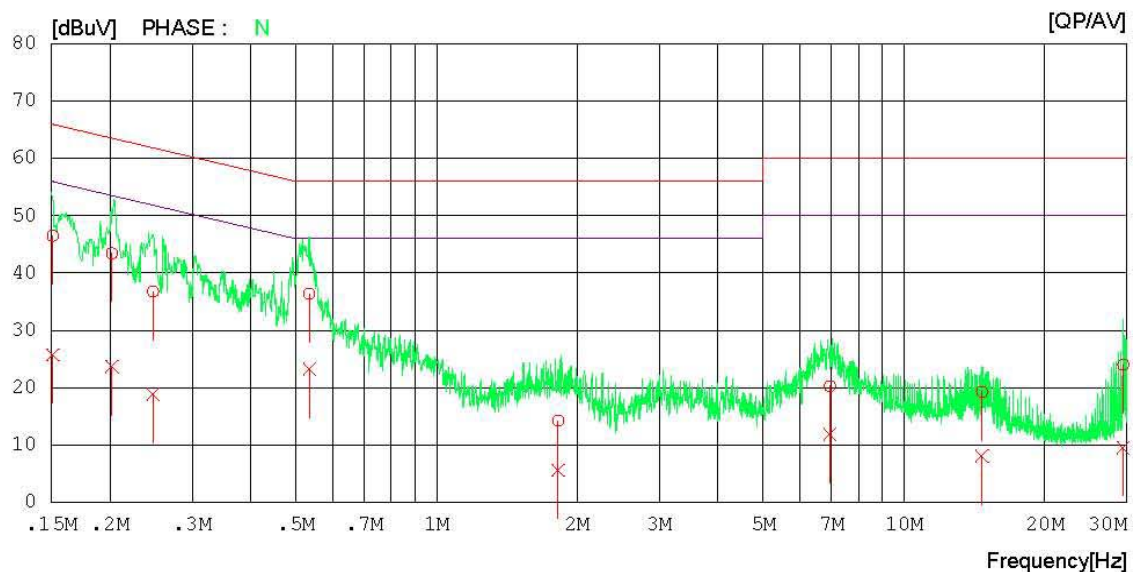
Results of Conducted Emission

Digital EMC
Date : 2012-09-04

Standard : FCC Part15.C
Model No. : WCP-500
Serial No. : N/A
Test Condition : Analog Piong Mode

Reference No. :
Power Supply : 120V 60Hz
Temp/Humi. : 26°C 54% R.H.
Operator : S.K. Ryu

Memo :

LIMIT : CISPR22_B QP
CISPR22_B AV

- Measurement Data(List) : Operating mode 2

Results of Conducted EmissionDigital EMC
Date : 2012-09-04

Standard : FCC Part15.C
 Model No. : WCP-500
 Serial No. : N/A
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 Power Supply : 120V 60Hz
 Temp/Humi. : 26°C 54% R.H.
 Operator : S.K. Ryu

Memo :

LIMIT : CISPR22_B QP
 CISPR22_B 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	0.15104	46.2	25.4	0.3	46.5	25.7	65.9	55.9	19.4	30.2	N
2	0.20225	43.2	23.5	0.2	43.4	23.7	63.5	53.5	20.1	29.8	N
3	0.24758	36.6	18.6	0.2	36.8	18.8	61.8	51.8	25.0	33.0	N
4	0.53429	36.1	23.0	0.2	36.3	23.2	56.0	46.0	19.7	22.8	N
5	1.82050	13.9	5.3	0.3	14.2	5.6	56.0	46.0	41.8	40.4	N
6	6.94350	19.9	11.4	0.4	20.3	11.8	60.0	50.0	39.7	38.2	N
7	14.68850	18.3	7.2	0.9	19.2	8.1	60.0	50.0	40.8	41.9	N
8	29.46050	22.7	8.2	1.3	24.0	9.5	60.0	50.0	36.0	40.5	N
9	0.15000	45.1	24.2	0.3	45.4	24.5	66.0	56.0	20.6	31.5	L1
10	0.16069	44.4	23.9	0.3	44.7	24.2	65.4	55.4	20.7	31.2	L1
11	0.20083	42.8	25.1	0.2	43.0	25.3	63.6	53.6	20.6	28.3	L1
12	0.25703	33.3	17.7	0.2	33.5	17.9	61.5	51.5	28.0	33.6	L1
13	0.36781	32.0	23.4	0.3	32.3	23.7	58.6	48.6	26.3	24.9	L1
14	1.74850	23.4	12.7	0.3	23.7	13.0	56.0	46.0	32.3	33.0	L1
15	6.61750	21.4	12.0	0.4	21.8	12.4	60.0	50.0	38.2	37.6	L1
16	15.24800	22.8	6.0	0.9	23.7	6.9	60.0	50.0	36.3	43.1	L1
17	29.80700	17.1	3.6	1.3	18.4	4.9	60.0	50.0	41.6	45.1	L1
18	0.52670	39.9	29.2	0.2	40.1	29.4	56.0	46.0	15.9	16.6	L1

APPENDIX I

TEST EQUIPMENT FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
☐	MXA Signal Analyzer	Agilent	N9020A	12/01/09	13/01/09	MY49100833
☒	Spectrum Analyzer	Agilent	E4440A	11/09/30	12/09/30	MY45304199
☒	EMI TEST RECEIVER	R&S	ESU	12/01/09	13/01/09	100014
☒	Attenuator (3dB)	WEINSCHL	56-3	11/09/30	12/09/30	Y2342
☐	AC Power supply	DAEKWANG	5KVA	12/03/05	13/03/05	20060321-1
☐	DC Power Supply	HP	6622A	12/03/05	13/03/05	3448A03760
☒	LOOP Antenna	ETS	6502	10/10/29	12/10/29	3471
☒	BILOG ANTENNA	SCHAFFNER	CBL 6112D	10/12/21	12/12/21	22609
☒	Amplifier (22dB)	H.P	8447E	12/01/09	13/01/09	2945A02865
☒	EMI TEST RECEIVER	R&S	ESCI	12/03/06	13/03/06	100364
☒	LISN	R&S	ESH2-Z5	11/09/30	12/09/30	8287391006
☒	AC Power Supply	KIKUSUI	PCR1000L	2011.09.15	2012.09.15	14110610
☐	Spectrum Analyzer(CE)	H.P	8591E	12/03/05	13/03/05	3649A05889
☐	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	12/07/02	13/07/02	4N-170-3
☐	LISN	Kyoritsu	KNW-407	12/01/09	13/01/09	8-317-8
☐	50 ohm Terminator	HME	CT-01	12/01/09	13/01/09	N/A
☐	CVCF	NF Electronic	4420	11/09/15	12/09/15	304935/4420023
☐	Thermo hygrometer	BODYCOM	BJ5478	12/01/13	13/01/13	090205-3
☐	Thermo hygrometer	BODYCOM	BJ5478	12/01/13	13/01/13	090205-2