



TEST REPORT

FCC Part 15C



Equipment under test Wireless Charger
Model name KWS-220
FCC ID 2ACCKWS-220
Applicant KOMATECH Co.,Ltd.
Manufacturer KOMATECH Co.,Ltd.
Date of test(s) 2014.06.14 ~ 2014.06.16
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Issued to

KOMATECH Co.,Ltd.
62-16 19th st. Gamjeong-ro,
Gimpo-si, Gyeonggi-do, Korea
Tel: +82-31-999-3940 / Fax: +82-31-997-7900

Issued by

KES Co., Ltd.
C-3701, Simin-daero 365-40, Dongan-gu, Anyang-si,
Gyeonggi-do, 431-716, Korea
473-29, Gayeo-ro, Yeosu-si, Gyeonggi-do, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450

Test and report completed by :	Report approval by :
	
Byeong-Geol Chu Test engineer	Jeff Do Technical manager

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KES Co., Ltd.

C-3701, Simin-daero 365-401,
Dongan-gu, Anyang-si, Gyeonggi-do, 431-716, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:
KES-RF-14T0032-R1
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Revision history

Revision	Date of issue	Test report No.	Description
-	2014.05.29	KES-RF-14T0032	Initial
R1	2014.06.17	KES-RF-14T0032-R1	Re-test of Radiated emission

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1. General information

1.1. EUT description

Equipment under test	Wireless Charger
Model name	KWS-220
Serial number	N/A
Frequency Range	121 kHz ~150 kHz
Modulation technique	ASK
Antenna type	Internal type(Coil antenna)
Power source	AC 110 V Adapter
Note	This EUT has separate two charging coils

1.2. Test frequency

	Frequency Range
Frequency (kHz)	121 kHz ~150 kHz

1.3. Information about derivative model

N/A

1.4. Device modifications

N/A

1.5. Device information



1.6. Test facility

C-3701, Simin-daero 365-40, Dongan-gu, Anyang-si, Gyeonggi-do,431-716, Korea
473-29, Gayeo-ro, Yeosu-si, Gyeonggi-do, Korea

The open area test site is constructed in conformance with the requirements ANSI C63.4-2003/2009.

1.7. Laboratory accreditations and listings

Country	Agency	Scope of accreditation	Certificate No.
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	343818
KOREA	KC	EMI (10 meter Open Area Test Site and two conducted sites) Radio (3 & 10 meter Open Area Test Sites and one conducted site)	KR0100
CANADA	IC	3 & 10 meter Open Area Test Sites and one conducted site	4769B-1

2.1 Summary of tests

FCC Part Sections	RSS Sections	Parameter	Test results
15.209	RSS-Gen [7.2.5]	Radiated spurious emission	Pass
15.207	RSS-Gen [7.2.4]	AC conducted emissions	Pass

Statement;

The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2003) were used in the measurement of the DUT.

2.2 Test mode

Mode	Charging current	Description
Charging mode With load	220 mA	Using Max load
	470 mA	Using Mid load
	950 mA	Using Min load
Charging mode With Mobile Phone	-	< 1% of Battery status
	-	50% of Battery status

2.3 Battery status during charging

< 1% of Battery, 50 % of Battery

2.4 Fundamental emission comparison

The level of call connecting of GSM850 mode was more than airplane mode, charging with Mobile Phone in standby mode and charging with Mobile Phone turned off mode. So GSM850 mode was selected.

3. Test results

3.1. Radiated spurious emission

Test location

Testing was performed at a test distance of 3 meter Open Area Test Site

Test procedures

[9 kHz to 30 MHz]

The EUT was placed on the top of a rotating table 0.8 meter 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. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Quasi-peak function and specified bandwidth with maximum hold mode.

The spectrum analyzer is set to:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 200 Hz / 300 Hz for peak detection (PK) at frequency below 9 kHz~ 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 9 kHz / 10 kHz for peak detection (PK) at frequency below 150 kHz~ 30 MHz.
3. For the frequency bands 9~ 90 kHz, 110~490 kHz the radiated emission limits are based on measurements employing an average detector.

[30 MHz to 1 GHz]

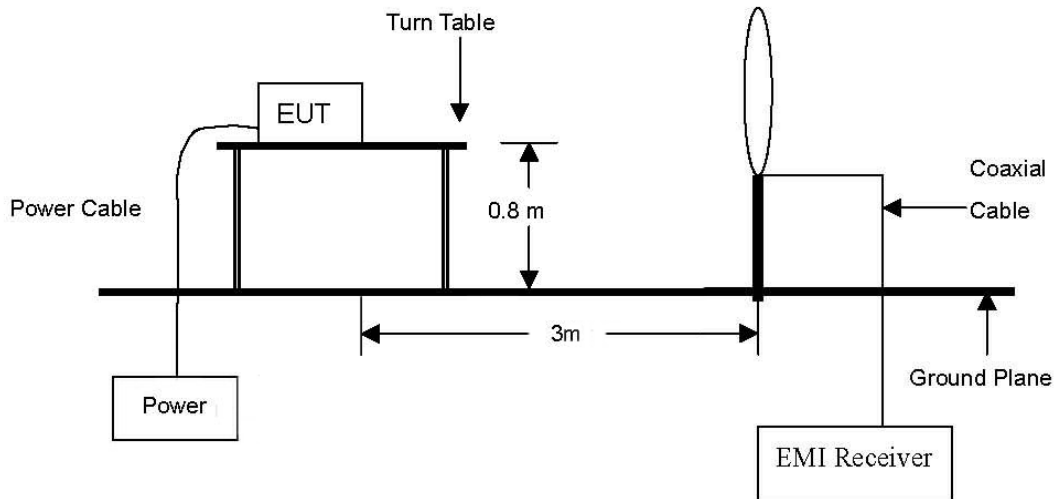
The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

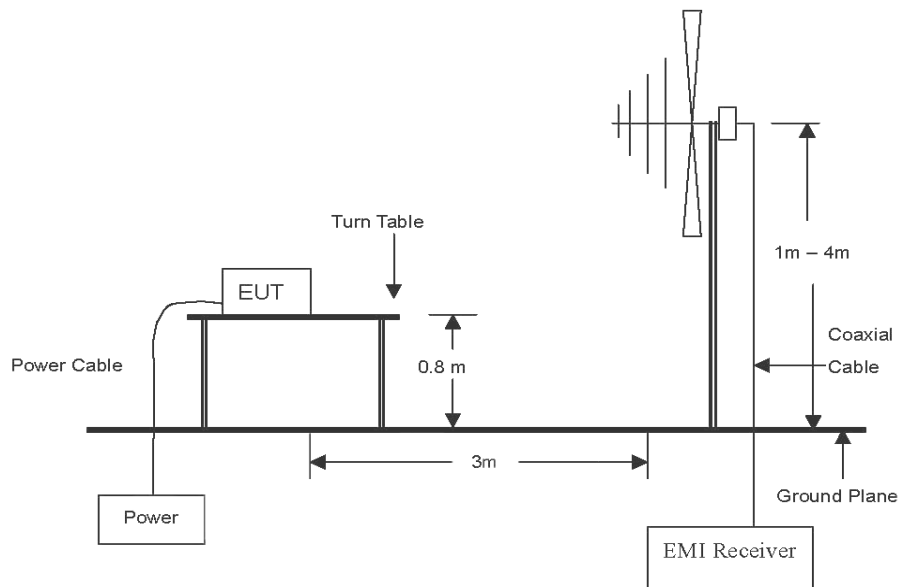
The spectrum analyzer is set to:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

Frequency (MHz)	Distance (Meters)	Radiated ($\mu\text{V/m}$)
0.009 ~ 0.490	300	2400 / F(kHz)
0.490 ~ 1.705	30	24000 / F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

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

Test results (Below 30 MHz)

The frequency spectrum from 9 kHz to 30 MHz was investigated.

- Coil 1_Charging with load (Max)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 9*	Peak	27.68	19.70	0.02	-80	-32.60	23.10	-55.70
	-	-				-	-	-
0.133 2**	Peak	51.37	19.68	0.03	-80	-8.92	28.02	-36.94
	Avg	51.08				-9.21	18.02	-27.23
0.177 7	Peak	44.20	19.66	0.04	-80	-16.10	23.51	-39.61
	Avg	43.97				-16.33	13.51	-29.84
0.399 5	Peak	30.55	19.60	0.08	-80	-29.77	16.01	-45.78
	Avg	30.32				-30.00	6.01	-36.01
0.532 5	Peak	31.00	19.60	0.11	-40	10.71	45.07	-34.36
	-	-				-	-	-

- Coil 1_Charging with load (Mid)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 3*	Peak	26.85	19.70	0.02	-80	-33.43	23.23	-56.66
	-	-				-	-	-
0.129 9**	Peak	52.43	19.69	0.03	-80	-7.85	28.48	-36.33
	Avg	52.28				-8.00	18.48	-26.48
0.177 5	Peak	45.90	19.66	0.04	-80	-14.40	23.52	-37.92
	Avg	45.74				-14.56	13.52	-28.08
0.388 9	Peak	31.71	19.60	0.08	-80	-28.61	16.17	-44.78
	Avg	31.54				-28.78	6.17	-34.95
0.532 4	Peak	30.74	19.60	0.11	-40	10.45	45.08	-34.63
	-	-				-	-	-

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- Coil 1_Charging with load (Min)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 4*	Peak	26.74	19.70	0.02	-80	-33.54	23.21	-56.75
	-	-				-	-	-
0.121 2**	Peak	58.57	19.69	0.02	-80	-1.72	29.80	-31.52
	Avg	58.41				-1.88	19.80	-21.68
0.176 8	Peak	52.36	19.66	0.04	-80	-7.94	23.57	-31.51
	Avg	52.29				-8.01	13.57	-21.58
0.363 5	Peak	34.83	19.60	0.07	-80	-25.50	16.60	-42.10
	Avg	34.69				-25.64	6.60	-32.24
0.531 5	Peak	30.63	19.60	0.11	-40	10.34	45.16	-34.82
	-	-				-	-	-

- Coil 1_Charging with Mobile Phone (< 1% of Battery)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 2*	Peak	25.73	19.70	0.02	-80	-34.55	23.26	-57.81
	-	-				-	-	-
0.129 4**	Peak	59.40	19.69	0.03	-80	-0.88	28.55	-29.43
	Avg	59.27				-1.01	18.55	-19.56
0.176 1	Peak	50.39	19.66	0.04	-80	-9.91	23.63	-33.54
	Avg	50.21				-10.09	13.63	-23.72
0.387 9	Peak	33.90	19.60	0.08	-80	-26.42	16.19	-42.61
	Avg	33.71				-26.61	6.19	-32.80
0.537 2	Peak	30.20	19.60	0.11	-40	9.91	44.68	-34.77
	-	-				-	-	-

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- Coil 1_Charging with Mobile Phone (50% of Battery)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 3*	Peak	24.15	19.70	0.02	-80	-36.13	23.23	-59.36
	-	-				-	-	-
0.129 8**	Peak	57.30	19.69	0.03	-80	-2.98	28.49	-31.47
	Avg	57.15				-3.13	18.49	-21.62
0.177 4	Peak	49.50	19.66	0.04	-80	-10.80	23.53	-34.33
	Avg	49.28				-11.02	13.53	-24.55
0.401 4	Peak	37.32	19.60	0.08	-80	-23.00	15.98	-38.98
	Avg	37.10				-23.22	5.98	-29.20
0.674 9	Peak	29.43	19.60	0.14	-40	9.17	35.56	-26.39
	-	-				-	-	-

※ Remark

1. “*” means Fundamental frequency of the restricted of 90~110 kHz.
2. Measurement distance : 3 m.
3. Actual = Reading + Ant. factor + Cable loss + F_d
4. F_d = 40log(D_m / D_s)

Where:

F_d = Distance factor in dB

D_m = Measurement distance in meters

D_s = Specification distance in meters

For 300m: 40log(300/3) = 80 dB for frequency band 0.009 MHz to 0.490 MHz

For 30m: 40log(30/3) = 40 dB for frequency band 0.490 MHz to 30 MHz



KES Co., Ltd.

C-3701, Simin-daero 365-401,
Dongan-gu, Anyang-si, Gyeonggi-do, 431-716, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

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- Coil 2_Charging with load (Max)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 9*	Peak	25.08	19.70	0.02	-80	-35.20	23.10	-58.30
	-	-				-	-	-
0.152 3**	Peak	50.32	19.67	0.03	-80	-9.98	25.76	-35.74
	Avg	50.14				-10.16	15.76	-25.92
0.177 2	Peak	44.25	19.66	0.04	-80	-16.05	23.54	-39.59
	Avg	44.07				-16.23	13.54	-29.77
0.442 9	Peak	32.29	19.60	0.09	-80	-28.02	15.42	-43.44
	Avg	32.07				-28.24	5.42	-33.66
0.541 0	Peak	30.47	19.60	0.11	-40	10.18	44.36	-34.18
	-	-				-	-	-

- Coil 2_Charging with load (Mid)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 5*	Peak	25.27	19.70	0.02	-80	-35.01	23.19	-58.20
	-	-				-	-	-
0.132 0**	Peak	53.20	19.68	0.03	-80	-7.09	28.18	-35.27
	Avg	52.97				-7.32	18.18	-25.50
0.177 4	Peak	44.31	19.66	0.04	-80	-15.99	23.53	-39.52
	Avg	44.10				-16.20	13.53	-29.73
0.401 4	Peak	35.11	19.60	0.08	-80	-25.21	15.98	-41.19
	Avg	34.84				-25.48	5.98	-31.46
0.526 1	Peak	31.41	19.60	0.11	-40	11.12	45.62	-34.50
	-	-				-	-	-

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- Coil 2_Charging with load (Min)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 3*	Peak	24.02	19.70	0.02	-80	-36.26	23.23	-59.49
	-	-				-	-	-
0.128 0**	Peak	57.20	19.69	0.03	-80	-3.08	28.75	-31.83
	Avg	56.93				-3.35	18.75	-22.10
0.177 1	Peak	45.22	19.66	0.04	-80	-15.08	23.55	-38.63
	Avg	45.03				-15.27	13.55	-28.82
0.379 1	Peak	36.24	19.60	0.08	-80	-24.08	16.33	-40.41
	Avg	36.09				-24.23	6.33	-30.56
0.535 7	Peak	32.24	19.60	0.11	-40	11.95	44.80	-32.85
	-	-				-	-	-

- Coil 2_Charging with Mobile Phone (< 1% of Battery)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 7*	Peak	26.34	19.70	0.02	-80	-33.94	23.14	-57.08
	-	-				-	-	-
0.121 9**	Peak	61.30	19.69	0.02	-80	1.01	29.69	-28.68
	Avg	61.15				0.86	19.69	-18.83
0.177 1	Peak	44.81	19.66	0.04	-80	-15.49	23.55	-39.04
	Avg	44.69				-15.61	13.55	-29.16
0.368 2	Peak	37.11	19.60	0.07	-80	-23.22	16.52	-39.74
	Avg	36.82				-23.51	6.52	-30.03
0.529 4	Peak	31.20	19.60	0.11	-40	10.91	45.33	-34.42
	-	-				-	-	-

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- Coil 2_Charging with Mobile Phone (50% of Battery)

Radiated emissions			Correction factors			Total	Limit	
Frequency (MHz)	Detect	Reading (dB μ V)	Ant. factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.103 8*	Peak	26.06	19.70	0.02	-80	-34.22	23.12	-57.34
	-	-				-	-	-
0.125 6**	Peak	59.20	19.69	0.03	-80	-1.08	29.11	-30.19
	Avg	58.98				-1.30	19.11	-20.41
0.177 4	Peak	45.39	19.66	0.04	-80	-14.91	23.53	-38.44
	Avg	45.12				-15.18	13.53	-28.71
0.382 6	Peak	35.10	19.60	0.08	-80	-25.22	16.27	-41.49
	Avg	34.84				-25.48	6.27	-31.75
0.531 7	Peak	31.26	19.60	0.11	-40	10.97	45.14	-34.17
	-	-				-	-	-

※ Remark

1. “*” means Fundamental frequency of the restricted of 90~110 kHz.
2. Measurement distance : 3 m.
3. Actual = Reading + Ant. factor + Cable loss + F_d
4. F_d = 40log(D_m / D_s)

Where:

- F_d = Distance factor in dB
- D_m = Measurement distance in meters
- D_s = Specification distance in meters

For 300m: 40log(300/3) = 80 dB for frequency band 0.009 MHz to 0.490 MHz

For 30m: 40log(30/3) = 40 dB for frequency band 0.490 MHz to 30 MHz



Test results (Below 1 000 MHz)

The frequency spectrum from 30 MHz to 1 000 MHz was investigated.

- Coil 1_Charging with load (Max)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							

- Coil 1_Charging with load (Med)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							

- Coil 1_Charging with load (Min)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							



- Coil 1_Charging with Mobile Phone (< 1% of Battery)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							

- Coil 1_Charging with Mobile Phone (50% of Battery)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							

※ Remark

1. Actual = Reading + Ant. factor + Cable loss



- Coil 2_Charging with load (Max)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							

- Coil 2_Charging with load (Med)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							

- Coil 2_Charging with load (Min)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							



KES Co., Ltd.

C-3701, Simin-daero 365-401,
Dongan-gu, Anyang-si, Gyeonggi-do, 431-716, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
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- Coil 2_Charging with Mobile Phone (< 1% of Battery)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							

- Coil 2_Charging with Mobile Phone (50% of Battery)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No emissions were detected at a level greater than 20 dB below limit							

※ Remark

1. Actual = Reading + Ant. factor + Cable loss

3.2. AC conducted emissions

Frequency range of measurement

150 kHz to 30 MHz

Instrument settings

IF Band Width: 9 kHz

Test procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m. Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

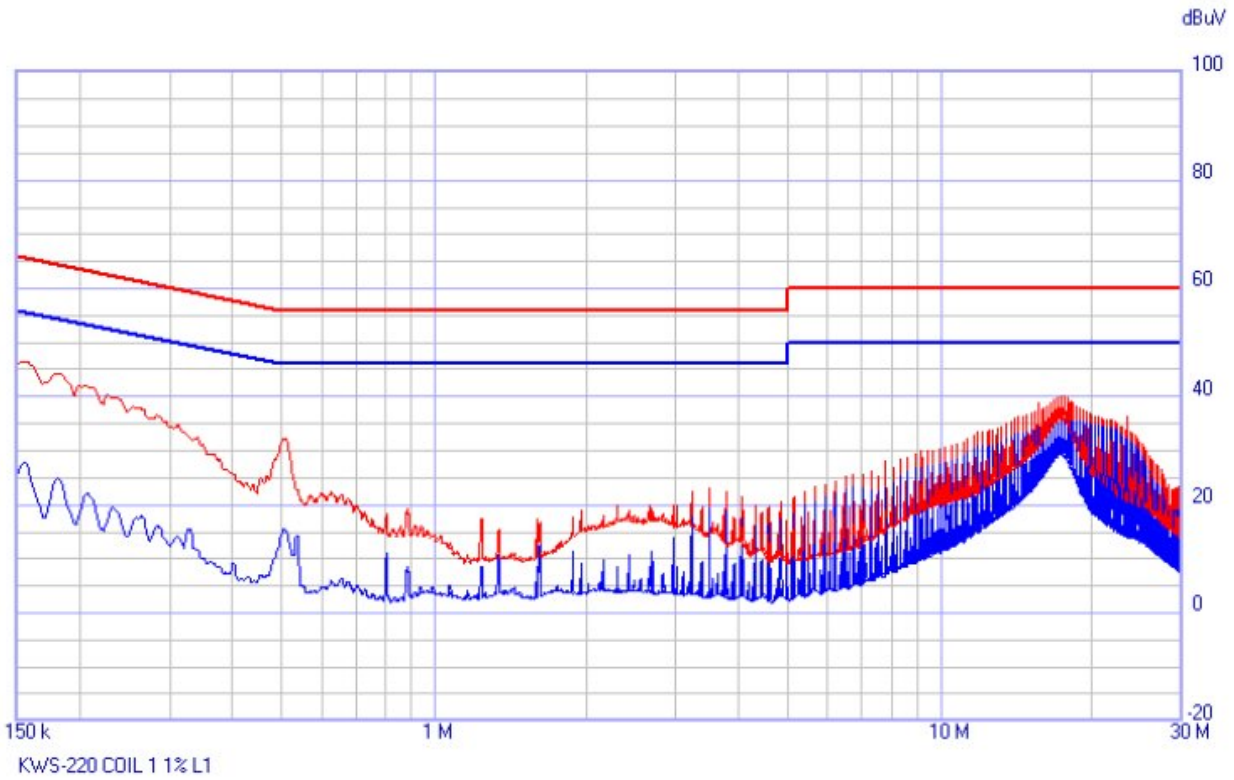
According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted limit (dB μ V/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

※ Remark

1. Decreases with the logarithm of the frequency.

Test results

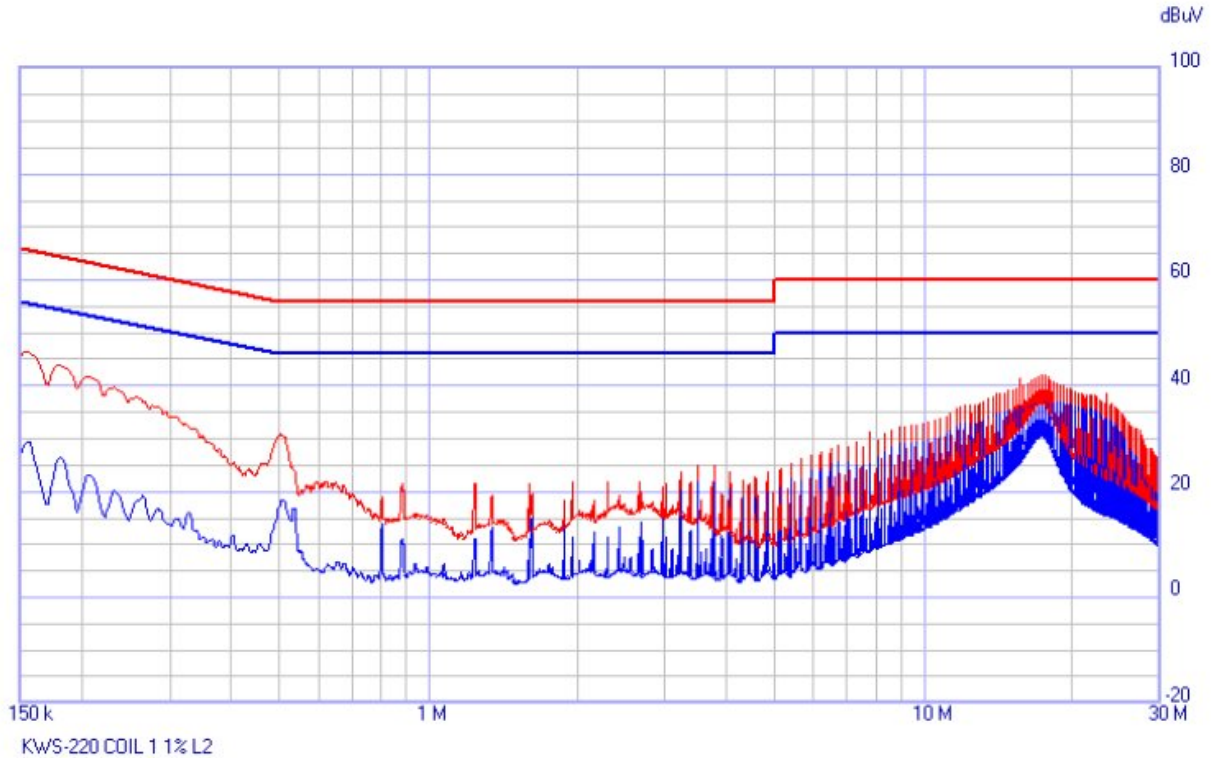


Mode: < 1% of Battery status (Coil 1)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1540	46.51	27.83
0.1806	44.08	24.95
0.5078	31.99	15.29
3.4894	23.00	19.34
12.8923	33.96	31.17
17.7267	39.68	35.37

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

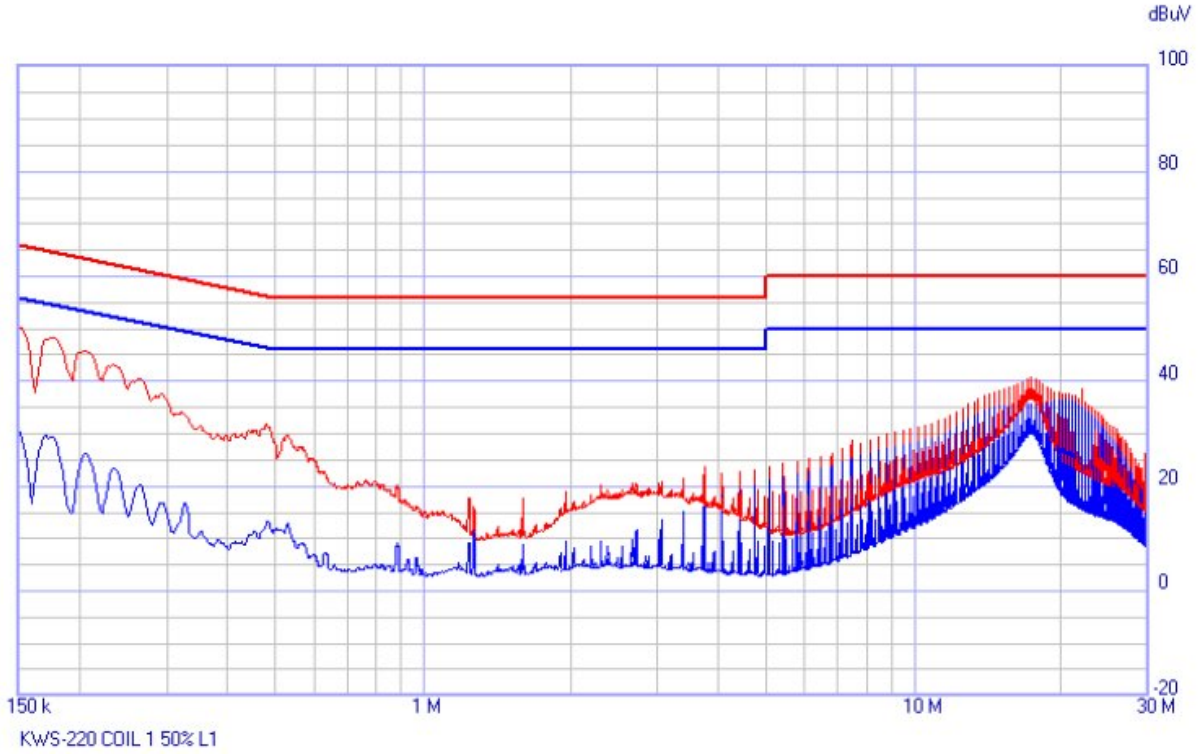


Mode: < 1% of Battery status (Coil 1)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1540	46.35	29.43
0.1806	43.90	26.53
0.5037	30.96	18.36
4.8330	23.53	19.89
13.4261	37.48	33.95
17.4527	42.02	37.00

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

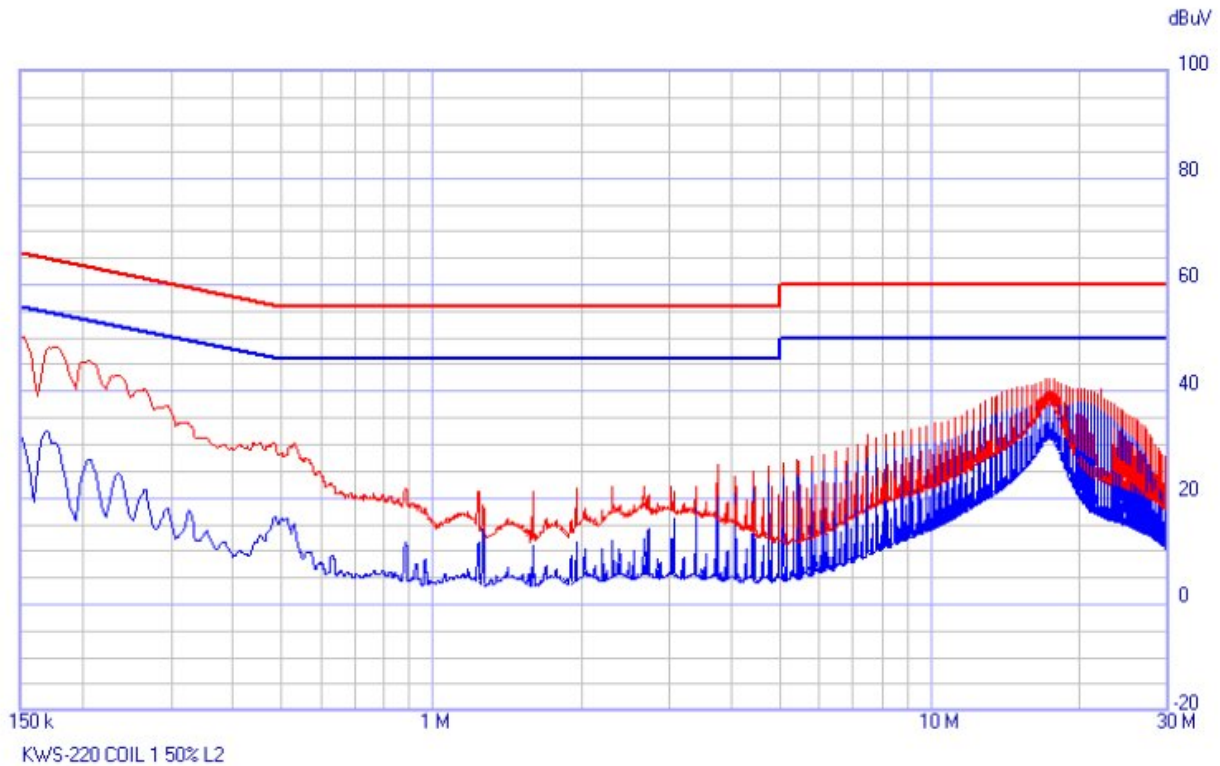


Mode: 50% of Battery status (Coil 1)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1500	50.36	30.91
0.1704	48.10	29.64
0.5262	29.54	12.42
3.7144	23.59	17.04
13.1746	36.13	33.44
17.2298	40.60	35.71

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

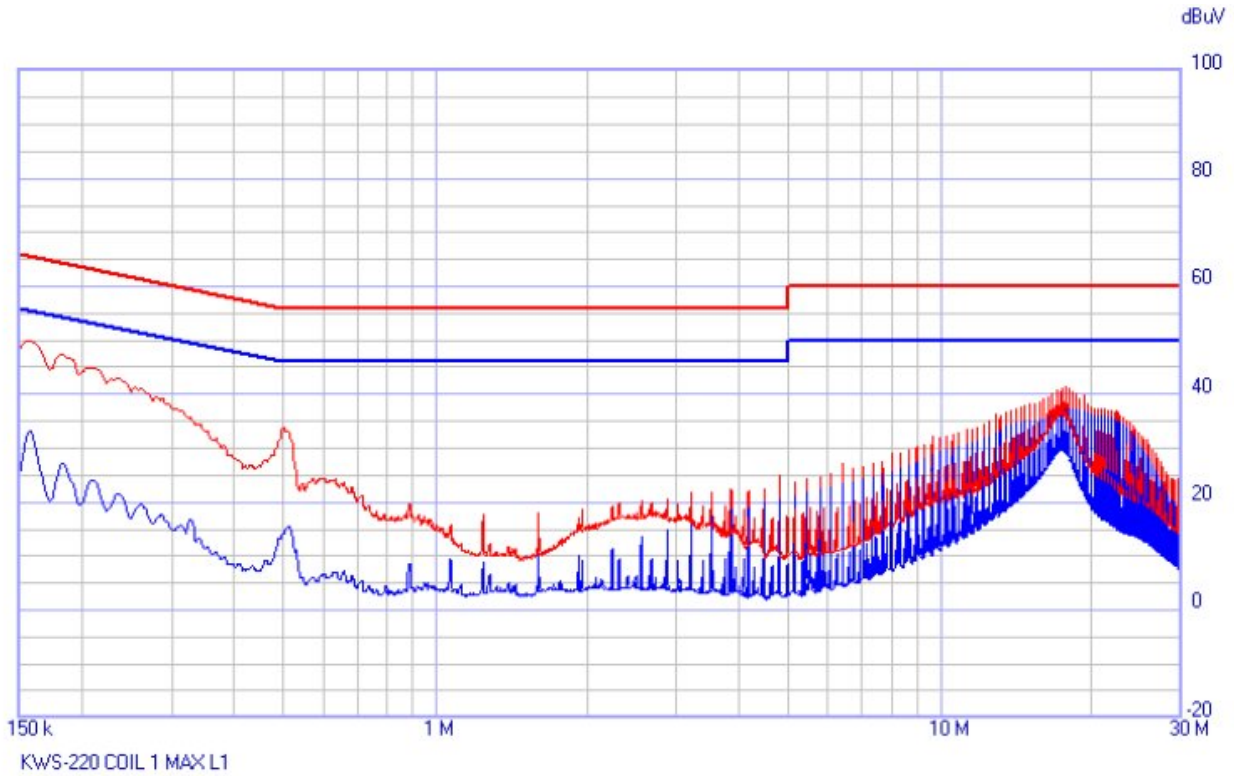


Mode: 50% of Battery status (Coil 1)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1500	50.34	31.80
0.1684	47.80	32.67
0.5324	29.85	14.45
3.7164	26.33	20.13
13.1786	38.71	35.29
17.5713	42.40	37.17

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

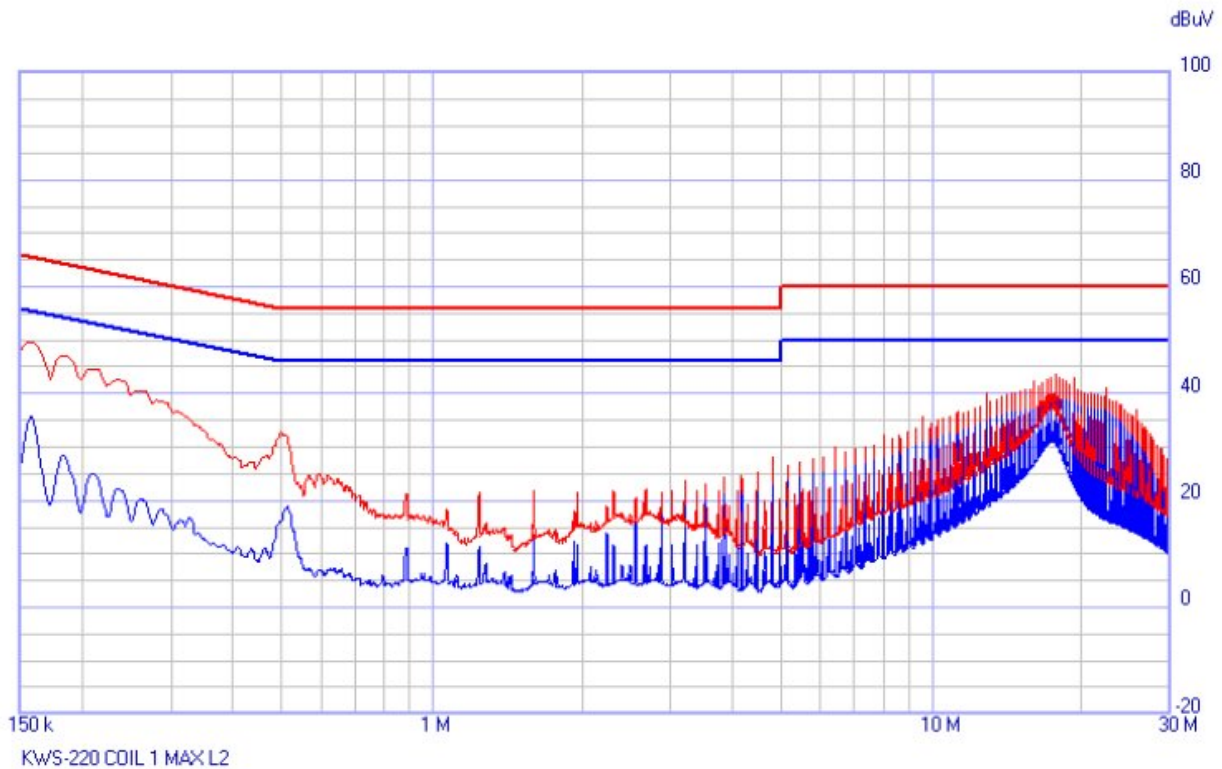


Mode: Using Max Load (Coil 1)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1561	49.93	33.11
0.1806	47.26	26.72
0.5099	33.27	15.38
4.7901	25.05	20.48
13.0968	36.04	33.54
18.2093	40.40	37.30

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

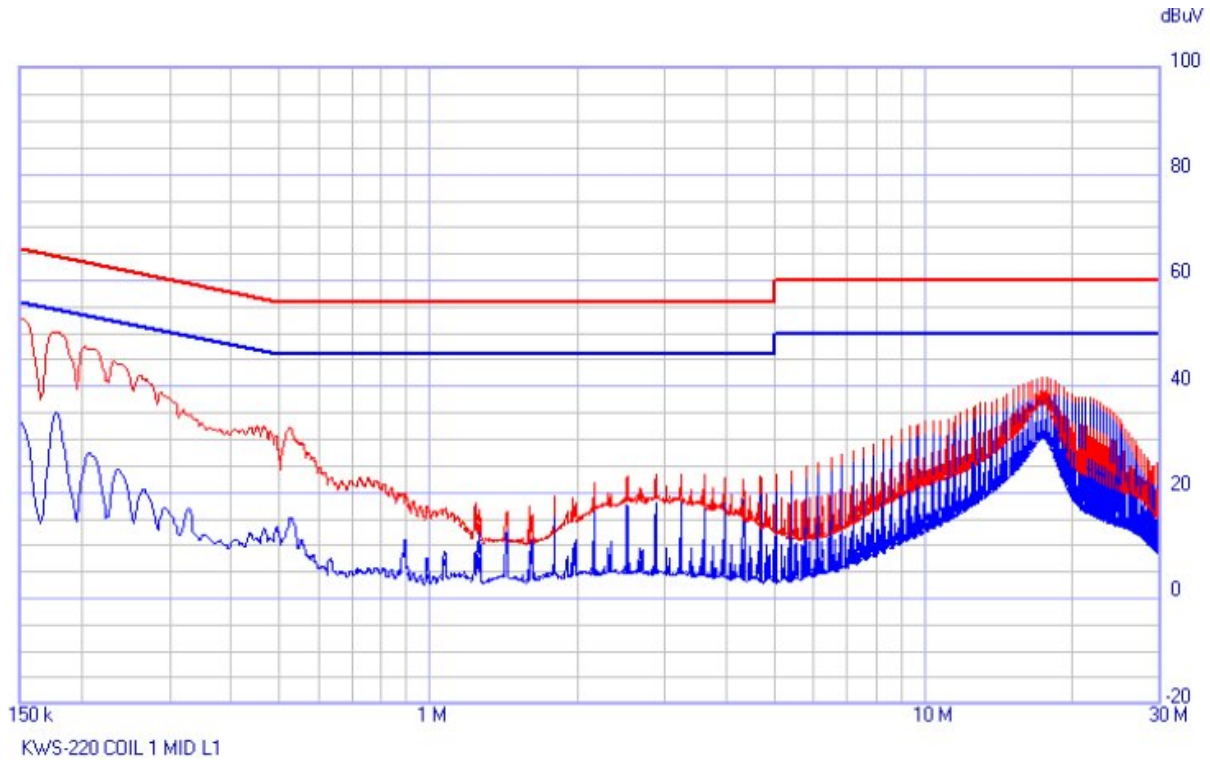


Mode: Using Max Load (Coil 1)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1581	49.67	35.72
0.1827	47.00	28.37
0.5037	32.35	17.42
4.7860	28.10	23.11
13.0846	38.56	35.30
17.5529	43.53	38.64

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

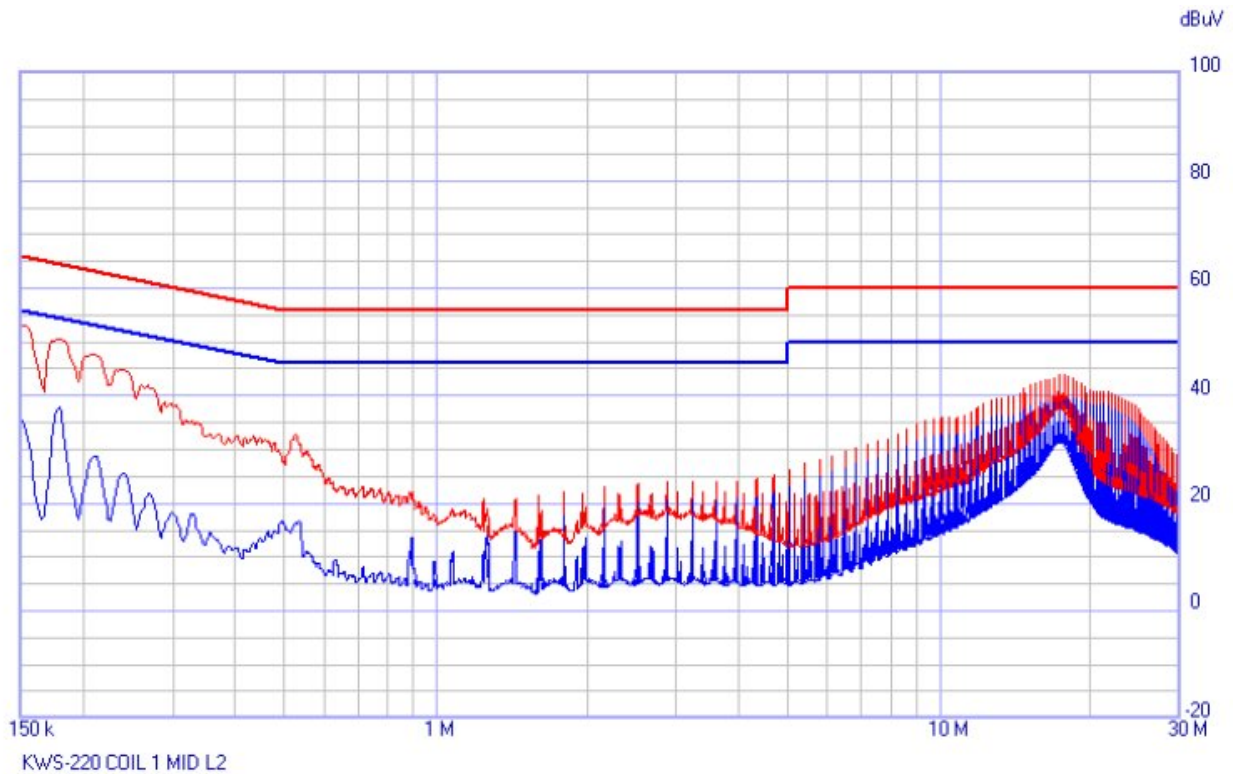


Mode: Using Mid Load (Coil 1)

Frequency (MHz)	Result	
	QP (dBμV)	C-AVG (dBμV)
0.1500	52.49	33.37
0.1765	50.16	34.92
0.5262	32.10	15.30
4.6592	22.91	19.54
13.2666	36.97	34.43
17.9292	41.44	37.95

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

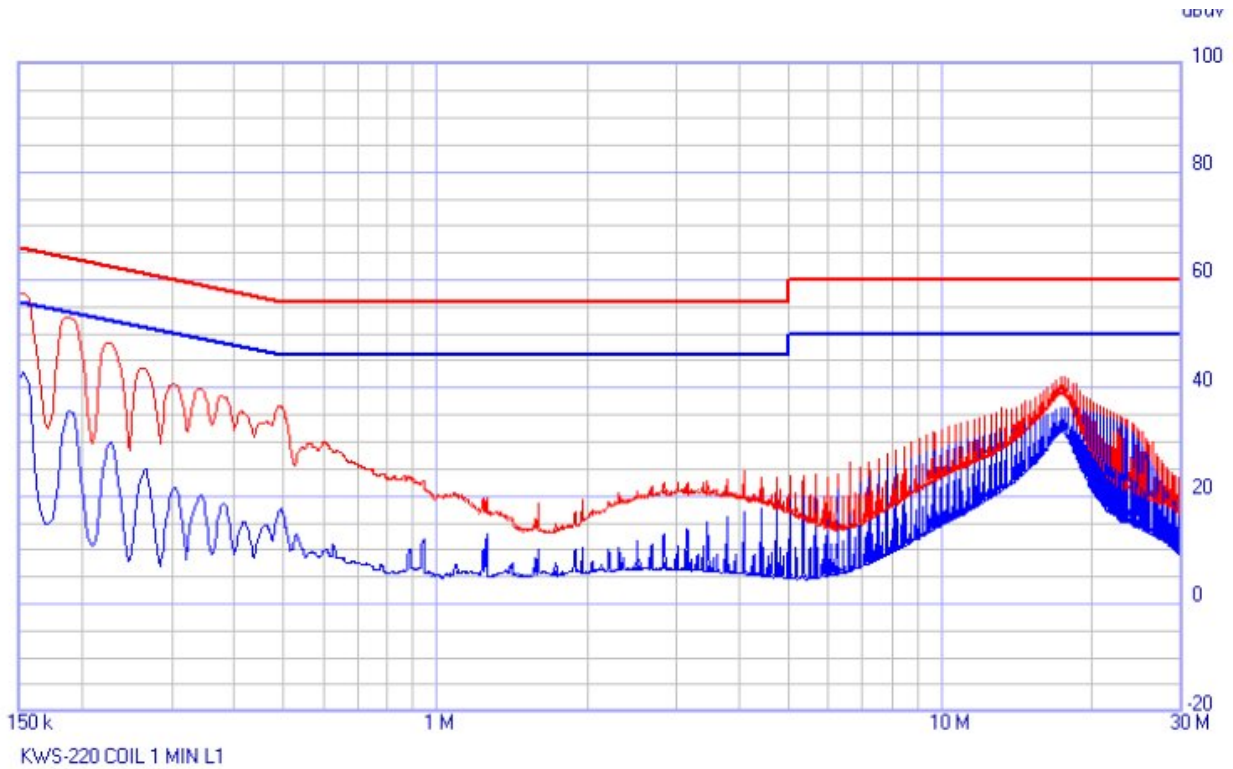


Mode: Using Mid Load (Coil 1)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1500	52.84	35.53
0.1786	50.67	37.75
0.5242	32.46	16.26
4.6633	25.33	22.20
12.9169	39.46	36.22
17.5815	43.74	39.13

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

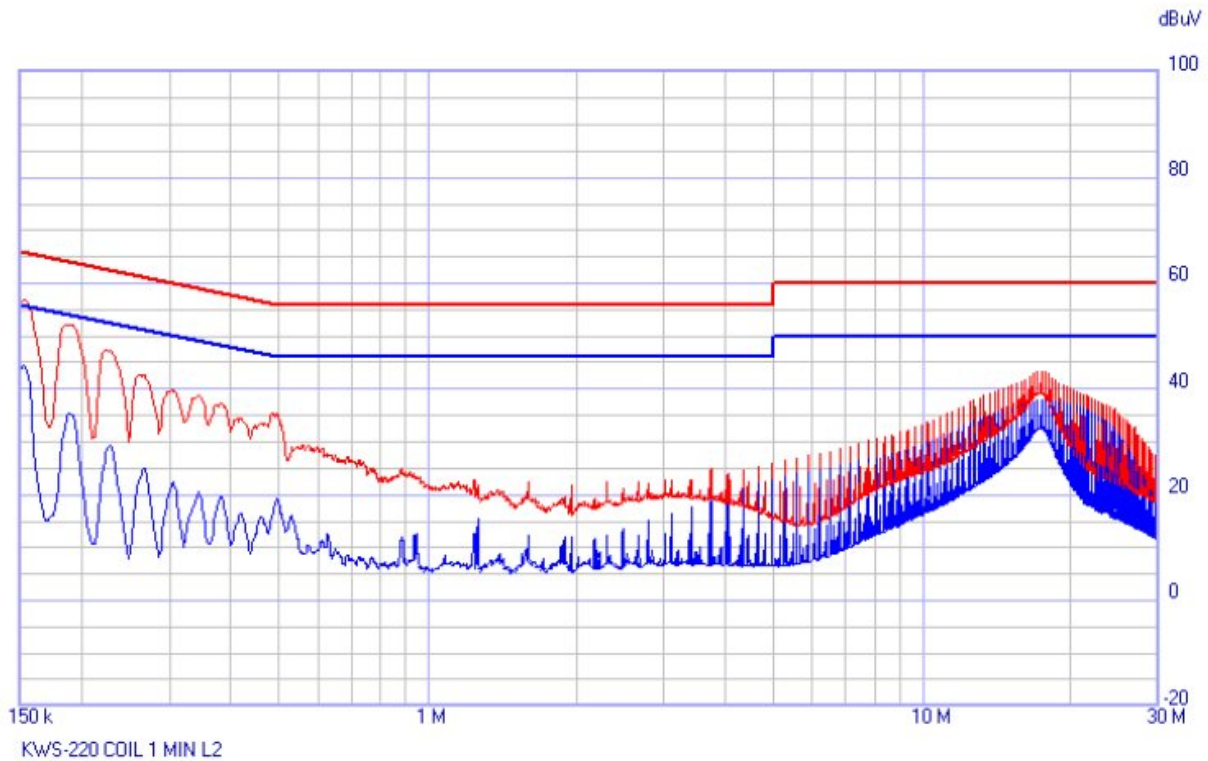


Mode: Using Min Load (Coil 1)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1520	57.60	42.83
0.1888	53.12	35.67
0.4956	36.55	17.40
4.6980	23.44	18.55
13.4281	35.87	32.00
17.4875	41.86	36.39

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

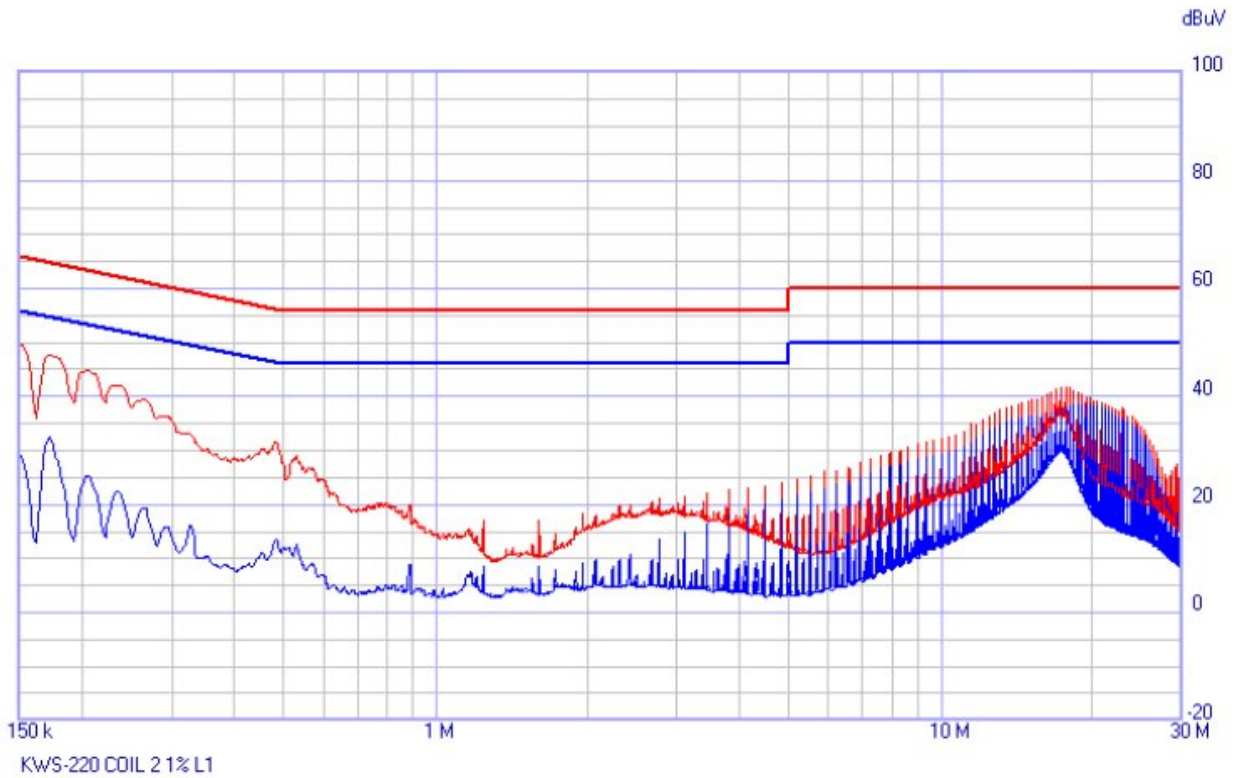


Mode: Using Min Load (Coil 1)

Frequency (MHz)	Result	
	QP (dBµV)	C-AVG (dBµV)
0.1520	56.73	44.42
0.1888	52.11	35.41
0.4935	35.23	18.94
4.6387	25.13	22.04
13.3013	38.73	34.82
17.6327	43.21	37.99

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

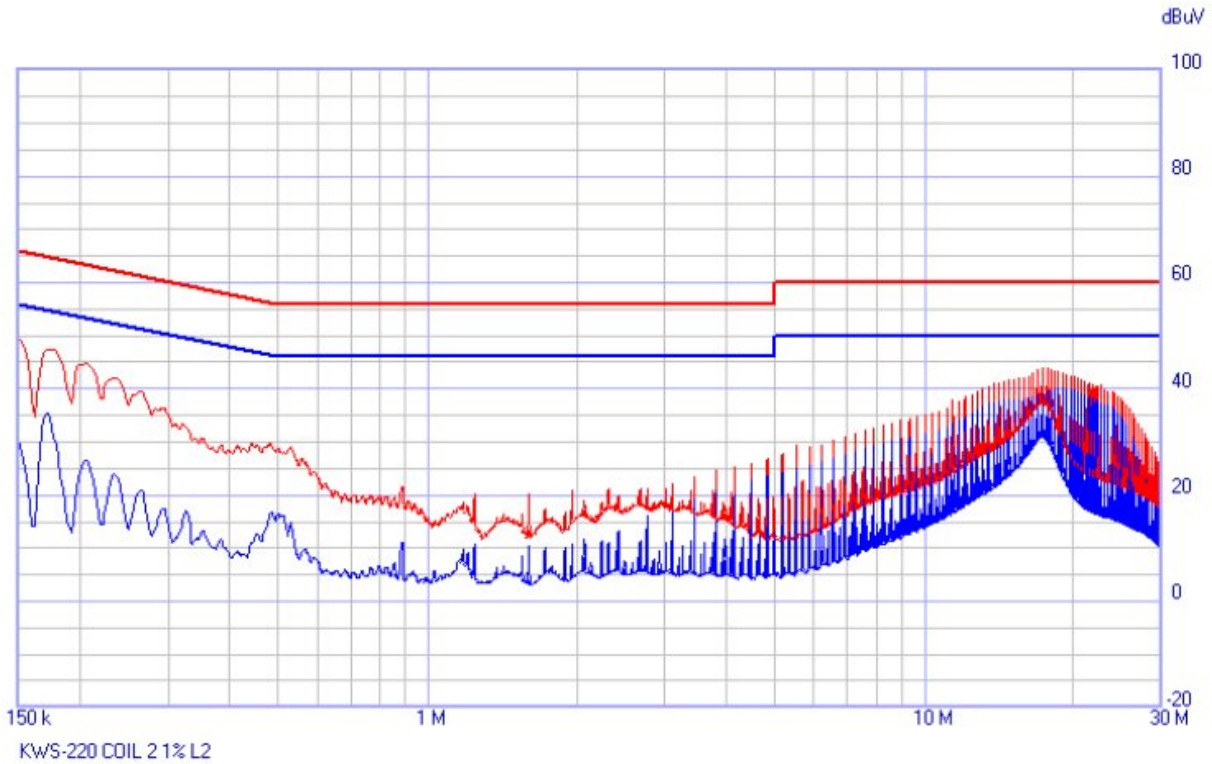


Mode: < 1% of Battery status (Coil 2)

Frequency (MHz)	Result	
	QP (dBμV)	C-AVG (dBμV)
0.1500	49.53	29.70
0.1704	47.59	31.95
0.4833	31.55	13.46
4.8187	23.92	20.89
13.4261	37.87	35.23
17.9046	41.55	38.22

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

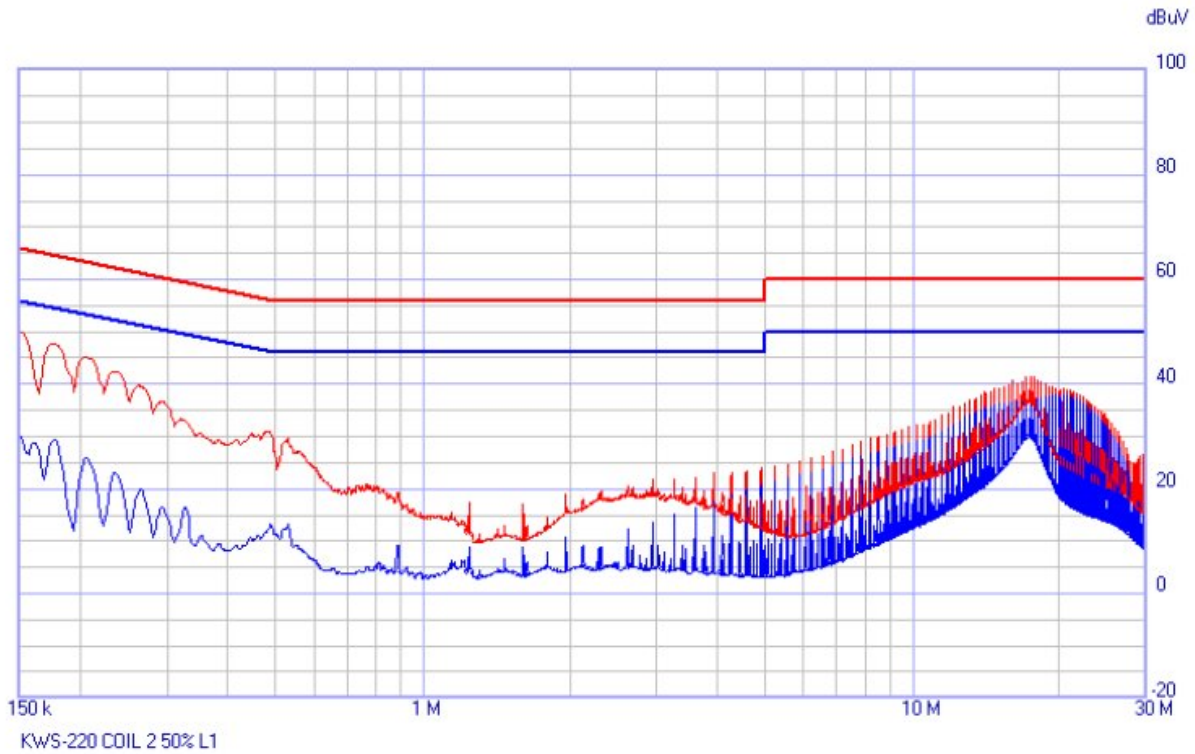


Mode: < 1% of Battery status (Coil 2)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1500	49.14	30.55
0.1724	47.46	35.46
0.5078	27.82	16.03
4.8126	26.89	23.53
13.4097	40.49	37.11
17.8801	43.71	39.63

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

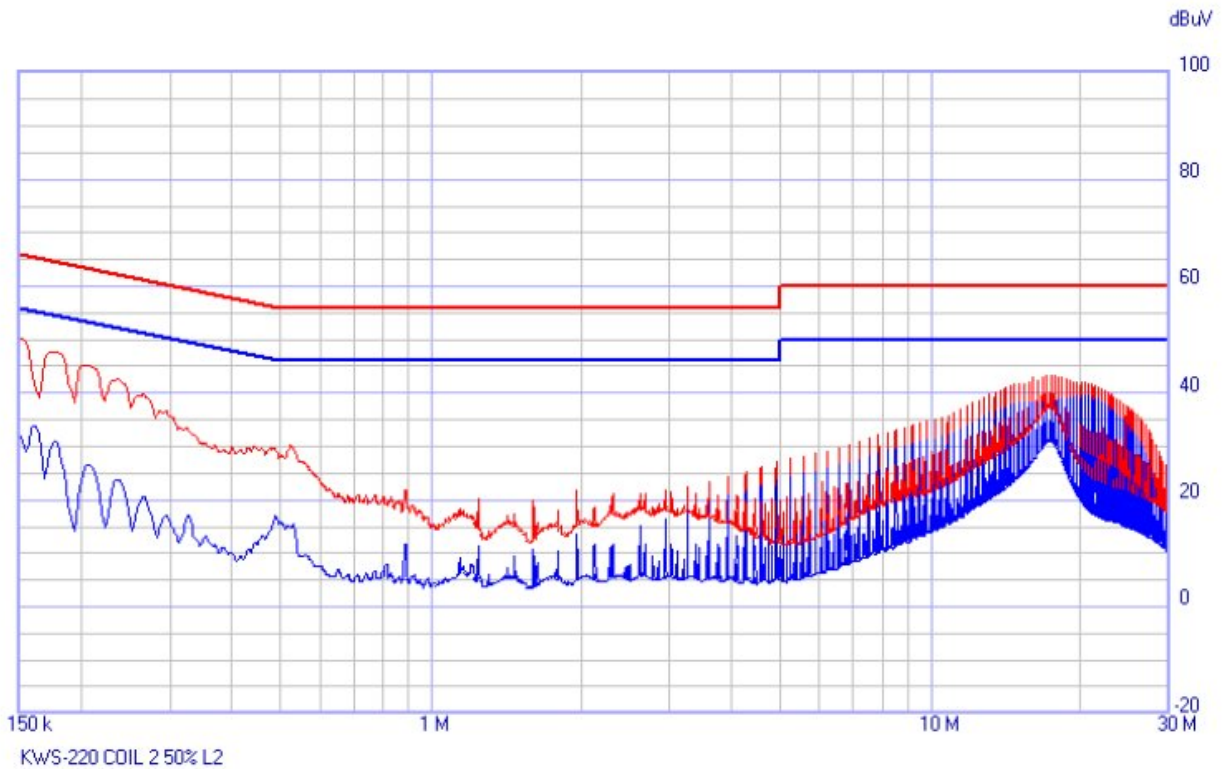


Mode: 50% of Battery status (Coil 2)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1520	49.80	29.16
0.1765	47.61	29.43
0.5283	29.54	13.34
4.8923	23.95	20.80
13.3750	37.38	34.70
17.6143	41.35	37.08

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

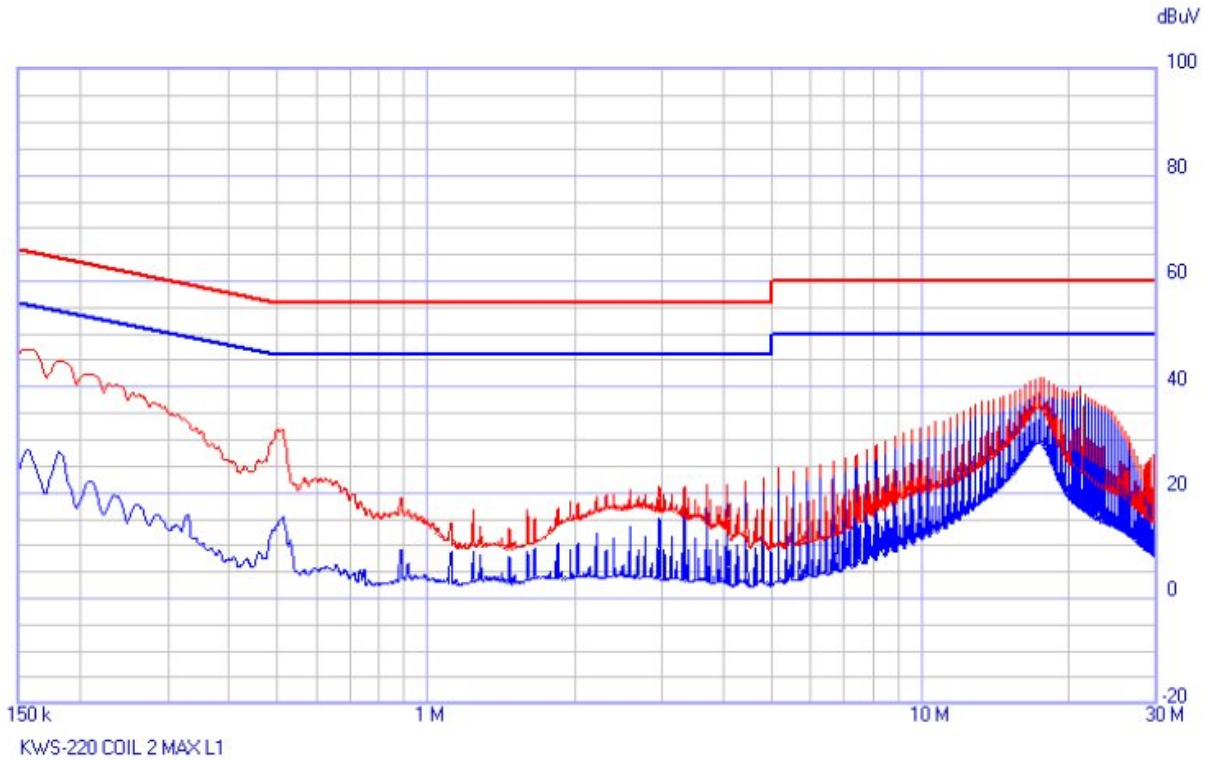


Mode: 50% of Battery status (Coil 2)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1500	50.04	32.41
0.1765	47.71	30.98
0.5262	30.03	14.71
4.8923	27.03	23.65
13.7042	40.51	37.09
17.2911	43.42	38.61

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

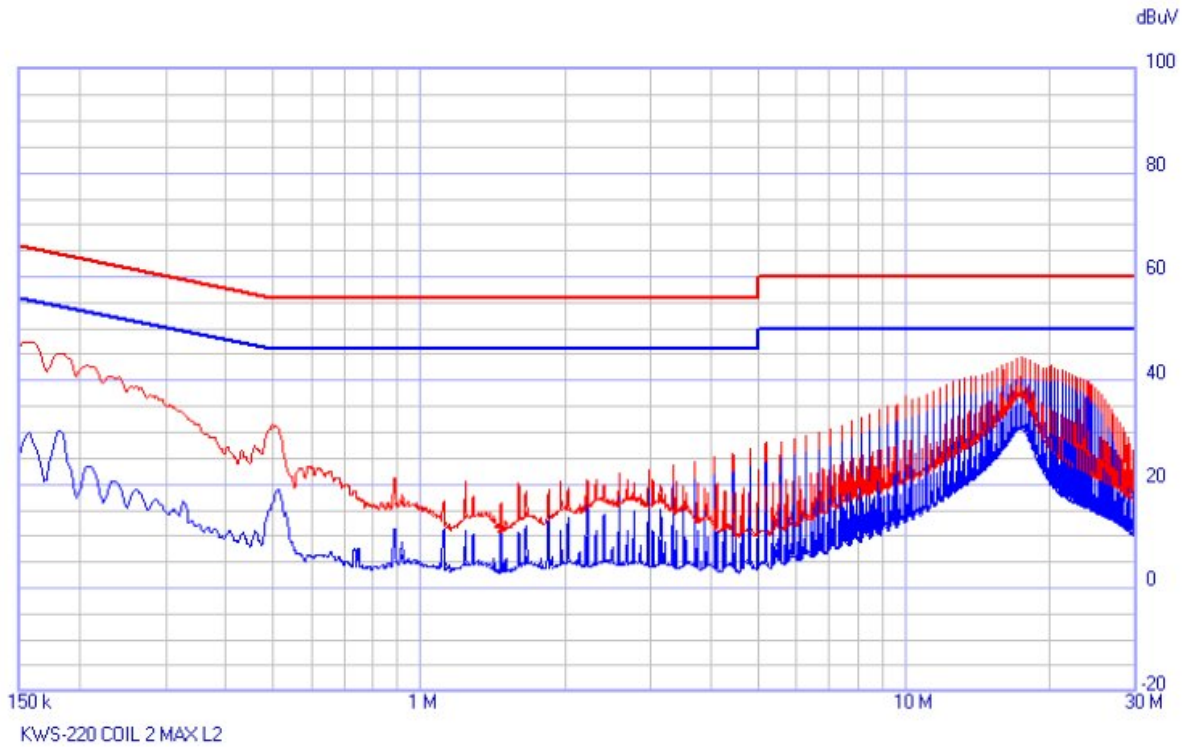


Mode: Using Max Load (Coil 2)

Frequency (MHz)	Result	
	QP (dBμV)	C-AVG (dBμV)
0.1581	47.14	27.76
0.1806	44.84	27.65
0.5099	31.85	15.28
4.7778	22.69	19.79
13.2359	37.14	34.54
17.2809	41.81	38.08

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

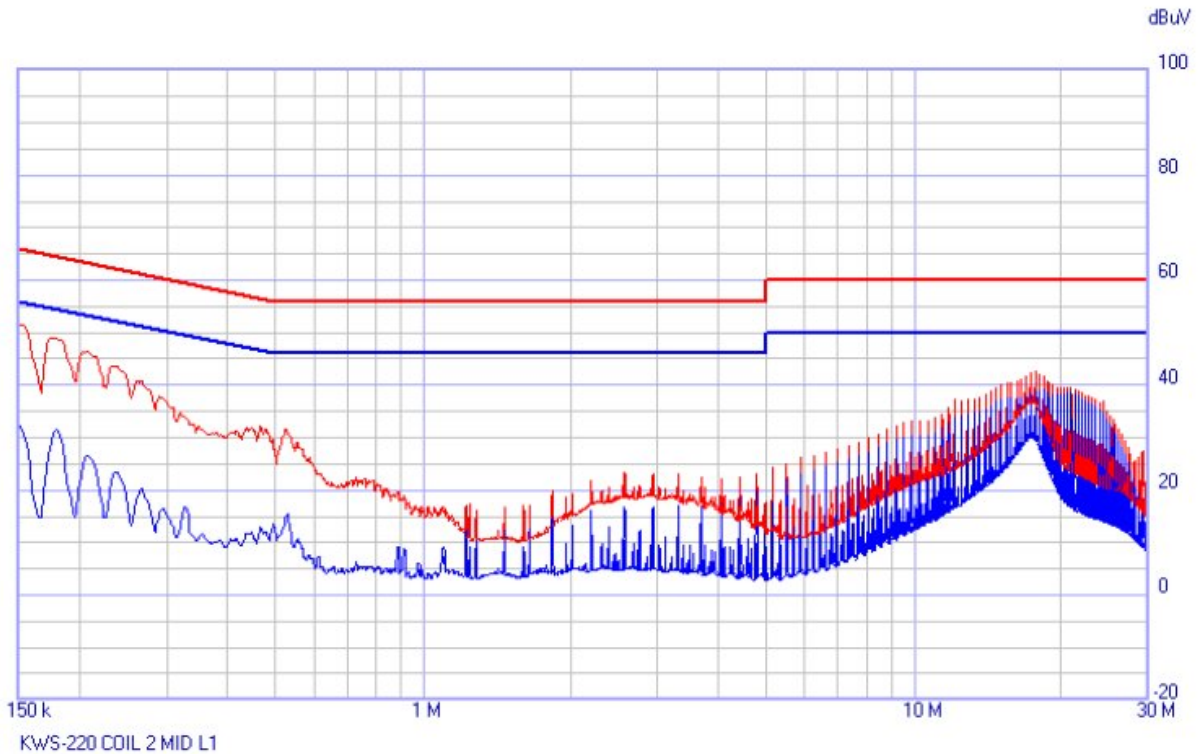


Mode: Using Max Load (Coil 2)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1561	47.51	29.95
0.1827	45.26	30.35
0.5119	30.62	19.01
4.7901	26.76	23.37
13.2645	40.56	37.18
17.6879	44.22	40.12

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

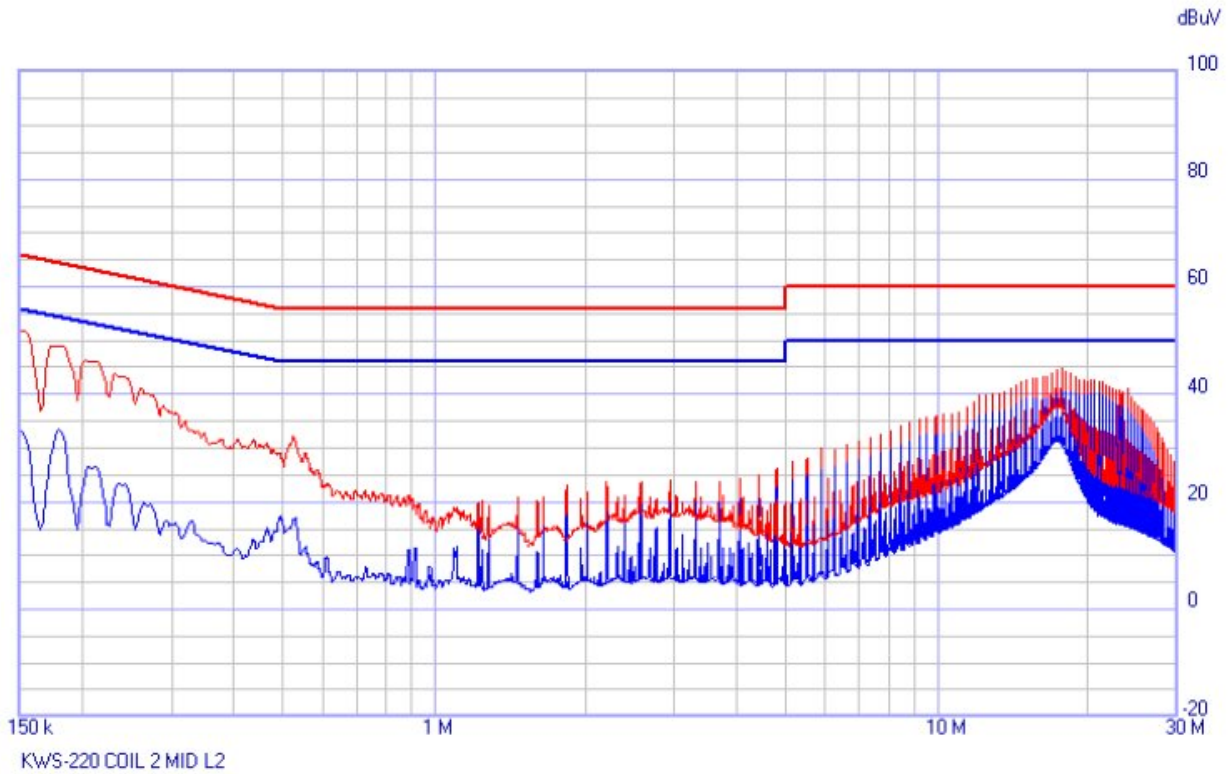


Mode: Using Mid Load (Coil 2)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1500	51.15	32.72
0.1786	48.91	31.73
0.5262	31.44	15.21
4.7573	23.20	19.81
12.0784	37.18	33.70
17.5713	42.49	38.78

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

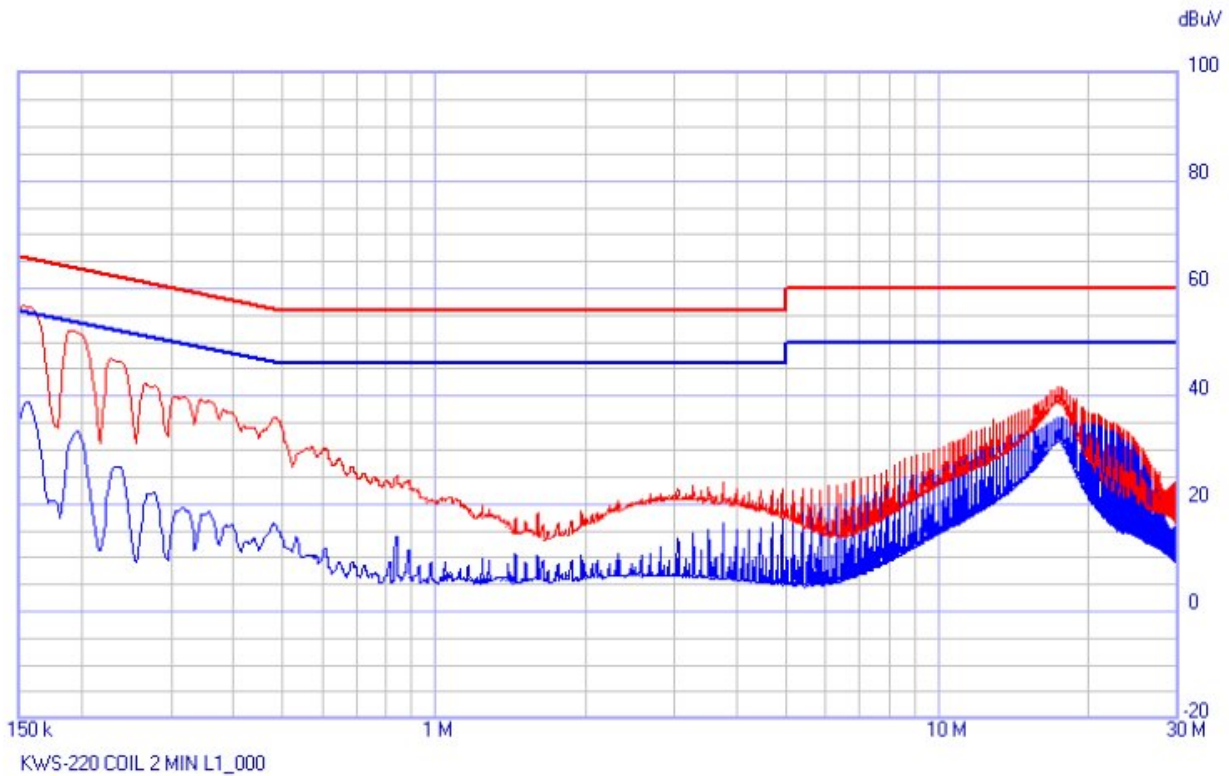


Mode: Using Mid Load (Coil 2)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1500	51.52	33.29
0.1786	48.92	33.35
0.5242	32.26	16.77
4.7614	26.21	22.82
13.1868	40.15	36.68
17.9496	44.36	40.54

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

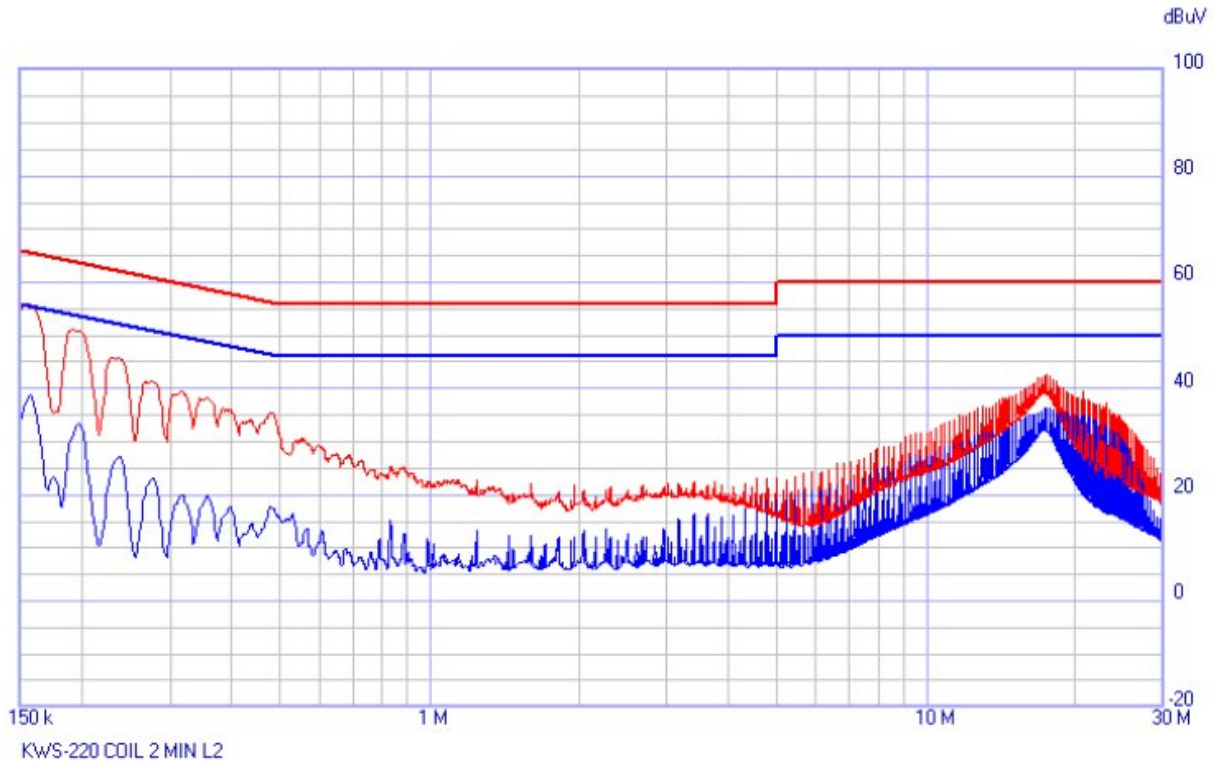


Mode: Using Min Load (Coil 2)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1561	56.51	38.93
0.1929	51.98	33.23
0.4853	36.00	15.80
3.7348	23.91	16.46
12.8024	35.64	30.35
17.6879	41.39	35.99

Note; Hot Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).



Mode: Using Min Load (Coil 2)

Frequency (MHz)	Result	
	QP (dB μ V)	C-AVG (dB μ V)
0.1561	55.76	38.75
0.1970	50.98	33.63
0.4833	35.30	17.49
4.9741	22.94	18.90
13.1193	36.46	31.72
17.4200	42.52	36.38

Note; Neutral Line

Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

Appendix A. Measurement equipment

Equipment	Manufacturer	Model	Serial number	Cal Interval	Calibration due.
Spectrum analyzer	R&S	FSV30	101389	1 year	2015.04.30
Vector signal generator	R&S	SMBV2100A	1407.6004K02	1 year	2015.01.06
Radio Communication Tester	R&S	CMU200	107627	1 year	2014.12.27
Loop antenna	R&S	HFH2-Z2.335.4711.52	826532	2 years	2015.04.25
Trilog-broadband antenna	Schwarzbeck	VULB 9168	9168-385	2 years	2015.05.09
Preamplifier	HP	8447F	2805A02570	1 year	2015.04.30
AC power supply	HP	6813A	전-3-5-1292	1 year	2014.08.05
EMI Test Receiver	LIG NEX1	ISA-80	L0912K014	1 year	2014.11.15
EMI Receiver/Signal Analyzer	Narda S.T.S / PMM	PMM 9010F	020WW31006	1 year	2015.04.04
LISN	R&S	ENV216	101137	1 year	2015.02.21

Peripheral device

Device	Manufacturer	Model No.	Note
Wireless Charging Cover(with load)	KOMATECH Co.,Ltd.	N/A	-
Mobile Phone	SAMSUNG ELECTRONICS CO., LTD.	SHV-E210S (FCC ID : A3LSHVE210S)	-

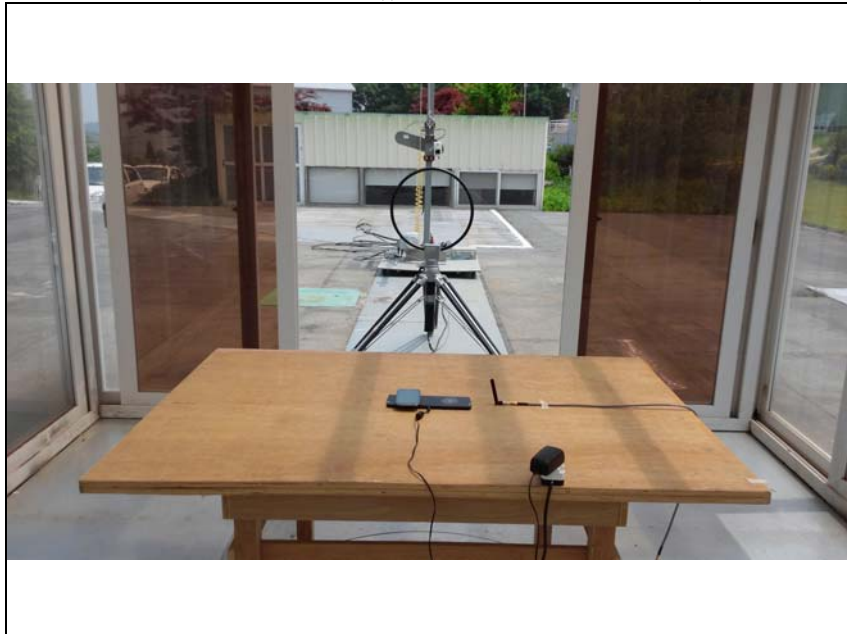
-The above devices were supported by manufacturer.

Appendix B. Test setup photo

Radiated Emission (below 30 MHz_with Load)



Radiated Emission ((below 30 MHz_with Phone)



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Radiated Emission (below 1 GHz_with Load)

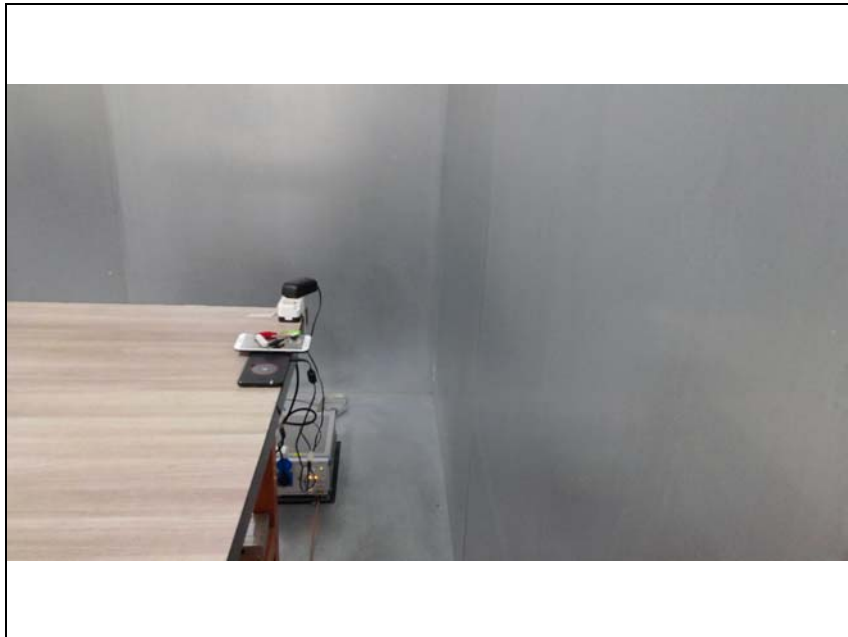


Radiated Emission ((below 1 GHz_with Phone)



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AC conducted Emission (with Load)



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AC conducted Emission (with Phone)



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