

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

Applicant Name:
SNPowercom Co. Ltd.

Address:
961, Gosaek-dong, Gwonseon-gu, Suwon-si,
Gyeonggi-do

Date of Issue:

October 23, 2013

Test Site/Location:

HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon,
Icheon-si, Kyunggi-Do, Korea

Report No.: HCTR1310FR05-1

HCT FRN: 0005866421

FCC ID : 2AAZ7-S110BT

APPLICANT : SNPowercom Co. Ltd.

FCC Model(s): S110BT

EUT Type: Wireless Charging Pad

Max. RF Output Power: 1.23 uV/m

Frequency Range: 112 kHz ~ 205 kHz

FCC Classification: FCC Part 15 Low Power Transmitter Below 1705 kHz

FCC Rule Part(s): Part 15 subpart C 15.209

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S.C. 853(a)



Report prepared by
: Jong Seok Lee
Test Engineer of RF Team



Approved by
: Kyung Houn Seo
Manager of RF Team

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FCC PT. 15.209 TEST REPORT		FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1310FR05-1	Date of Issue: October 23, 2013	EUT Type: Wireless Charging Pad	FCC ID: 2AAZ7-S110BT	

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1310FR05	October 17, 2013	- First Approval Report
HCTR1310FR05-1	October 23, 2013	- Revise notes in page 11-13 - Correct the unit in page 1,4, 11-13

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1. GENERAL INFORMATION

Applicant: SNPowercom Co. Ltd.
Address: 961, Gosaek-dong, Gwonseon-gu, Suwon-si, Gyeonggi-do
FCC ID: 2AAZ7-S110BT
EUT Type: Wireless Charging Pad
Model name(s): S110BT
Date(s) of Tests: September 13, 2013 ~ September 23, 2013
Place of Tests: HCT Co., Ltd.
105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, KOREA.
(IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	Wireless Charging Pad
FCC Model Name	S110BT
Power Supply	DC 5.0 V
Frequency Range	112 kHz ~ 205 kHz
Transmit Power	1.23 uV/m(at 300 m)

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3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.10-2009).

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2009) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.3 of ANSI C63.10. (Version: 2009).

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

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5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated June 21, 2011 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and 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."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

* The antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

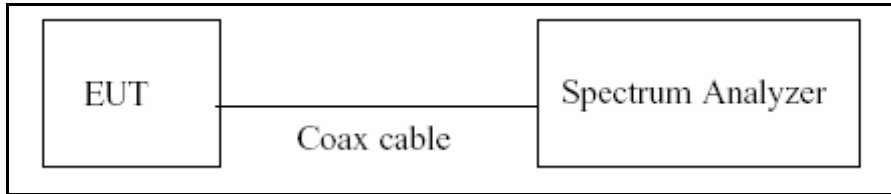
FCC PT. 15.209 TEST REPORT	FCC CERTIFICATION REPORT		www.hct.co.kr
Test Report No. HCTR1310FR05-1	Date of Issue: October 23, 2013	EUT Type: Wireless Charging Pad	FCC ID: 2AAZ7-S110BT

7. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
Occupied Bandwidth	§2.1049	NA	CONDUCTED	NA
AC Power line Conducted Emissions	§15.207(a)	cf. Section 8.7		PASS
Radiated Spurious Emissions	§15.205,15.209	cf. Section 8.6.2	RADIATED	PASS

8. 20 dB BANDWIDTH & OCCUPIED BANDWIDTH(99 % BW)

TEST CONFIGURATION



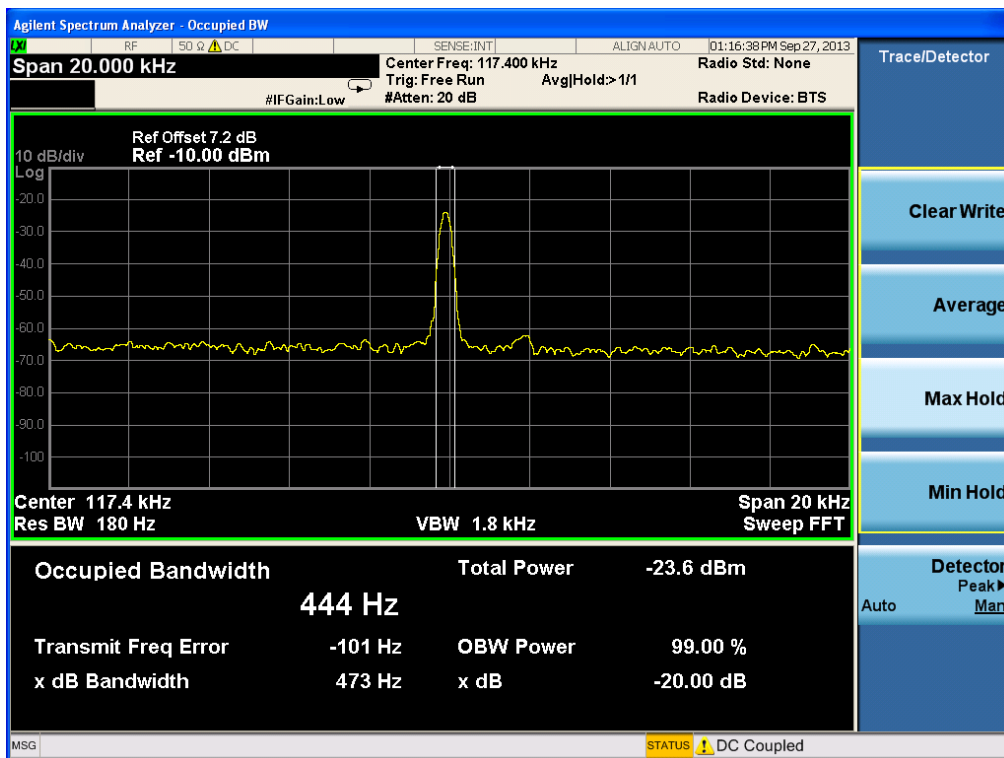
TEST PROCEDURE

The 20 dB 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.

Test Data

20dB Bandwidth (Hz)
473
Occupied Bandwidth (99% BW)
99% BW (Hz)
444

Test Plot



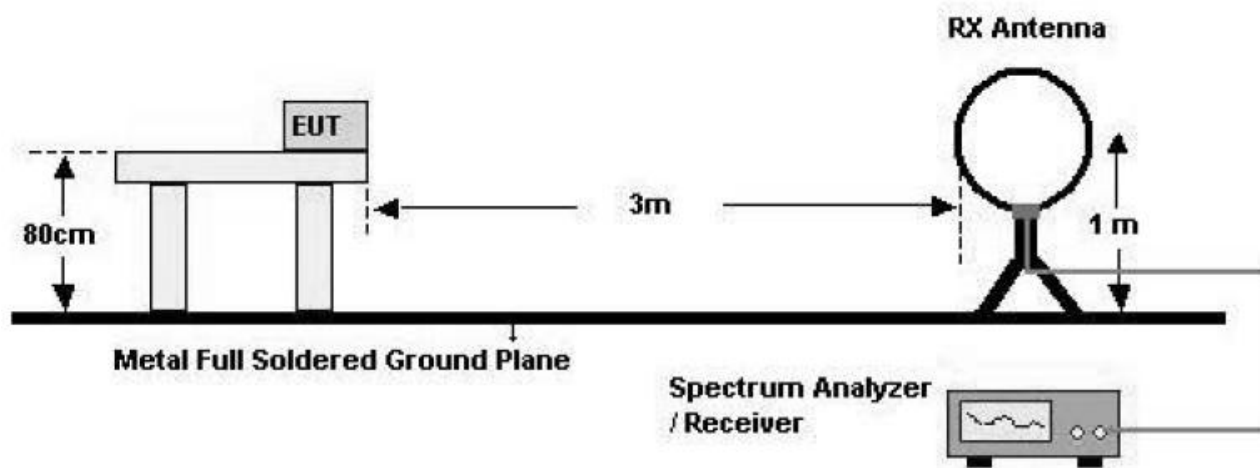
9. RADIATED SPURIOUS EMISSIONS

LIMIT : FCC Part 15.209(a)

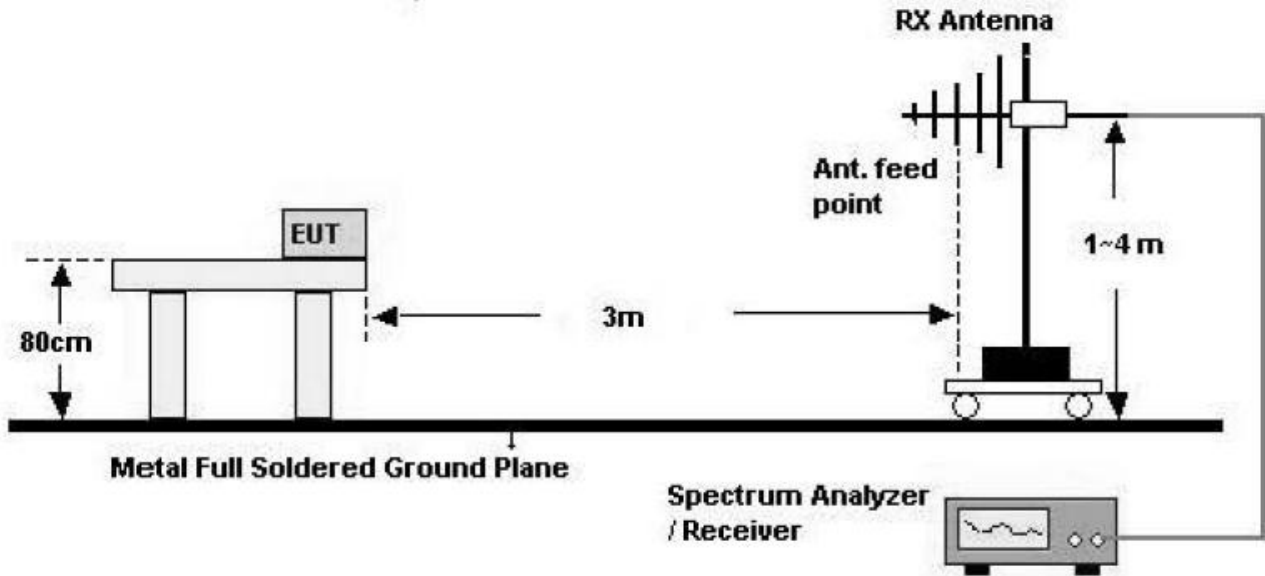
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

TEST CONFIGURATION

Below 30 MHz



30 MHz - 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

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TEST RESULTS

Measurement Distance : 3 m

Battery 0 %

Frequency [kHz]	Reading dBuV	※A.F+CL [dB]	D.C.F [dB]	ANT. POL [H/V]	Total		Limit [uV/m]	Margin [dB]	Detect
					[dBuV/m]	[uV/m]			
*117.4	72.43	9.4	-80	H	1.83	1.23	20.44	19.20	PK
351.2	46.71	9.2	-80	H	-24.09	0.06	6.83	6.76	PK
583.0	37.91	9.2	-40	H	7.11	2.27	41.17	38.90	QP
817.5	32.13	9.2	-40	H	1.33	1.17	29.36	28.19	QP
1050.6	27.76	9.2	-40	H	-3.04	0.70	22.84	22.13	QP

Notes:

1. PK : Peak, QP : CISPR quasi-peak, D.C.F : Distance Correction Factor
2. Measuring frequencies from 9 kHz to the 30MHz.
3. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
4. D.C.F. = $40 \log (\text{specific distance} / \text{test distance})$ (dB)
 $40 \log (300/3) = 80$ (for 0.009 MHz – 0.490 MHz)
 $40 \log (30/3) = 40$ (for 0.490 MHz – 30 MHz)
5. This test is performed with hopping off.
6. We have done x planes in EUT and horizontal and vertical polarization in detecting antenna.
7. ‘*’ is fundamental frequency.
8. We performed radiated test using the peak detect mode for Frequency 117.4 kHz and 351.2 kHz.
Because peak detect mode is the worst case against average detect mode.

Measurement Distance : 3 m

Battery 50 %

Frequency [kHz]	Reading dBuV	※A.F+CL [dB]	D.C.F [dB]	ANT. POL [H/V]	Total		Limit [uV/m]	Margin [dB]	Detect
*117.4	72.43	9.4	-80	H	1.83	1.23	20.44	19.20	PK
351.2	46.71	9.2	-80	H	-24.09	0.06	6.83	6.76	PK
583.0	37.91	9.2	-40	H	7.11	2.27	41.17	38.90	QP
817.5	32.13	9.2	-40	H	1.33	1.17	29.36	28.19	QP
1050.6	27.76	9.2	-40	H	-3.04	0.70	22.84	22.13	QP

Notes:

1. PK : Peak, QP : CISPR quasi-peak, D.C.F : Distance Correction Factor
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4. D.C.F. = $40 \log (\text{specific distance} / \text{test distance})$ (dB)
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 $40 \log (30/3) = 40$ (for 0.490 MHz – 30 MHz)
5. This test is performed with hopping off.
6. We have done x planes in EUT and horizontal and vertical polarization in detecting antenna.
7. ‘*’ is fundamental frequency.
8. We performed radiated test using the peak detect mode for Frequency 117.4 kHz and 351.2 kHz.
Because peak detect mode is the worst case against average detect mode.

Measurement Distance : 3 m

Battery Near 100 %

Frequency [kHz]	Reading dBuV	※A.F+CL [dB]	D.C.F [dB]	ANT. POL [H/V]	Total		Limit [uV/m]	Margin [dB]	Detect
					[dBuV/m]	[uV/m]			
*117.4	72.43	9.4	-80	H	1.83	1.23	20.44	19.20	PK
351.2	46.71	9.2	-80	H	-24.09	0.06	6.83	6.76	PK
583.0	37.91	9.2	-40	H	7.11	2.27	41.17	38.90	QP
817.5	32.13	9.2	-40	H	1.33	1.17	29.36	28.19	QP
1050.6	27.76	9.2	-40	H	-3.04	0.70	22.84	22.13	QP

Notes:

1. PK : Peak, QP : CISPR quasi-peak, D.C.F : Distance Correction Factor
2. Measuring frequencies from 9 kHz to the 30MHz.
3. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
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5. This test is performed with hopping off.
6. We have done x planes in EUT and horizontal and vertical polarization in detecting antenna.
7. ‘*’ is fundamental frequency.
8. We performed radiated test using the peak detect mode for Frequency 117.4 kHz and 351.2 kHz.
Because peak detect mode is the worst case against average detect mode.

10. POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which 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 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

RESULT PLOTS:

Conducted Emissions (Line 1)

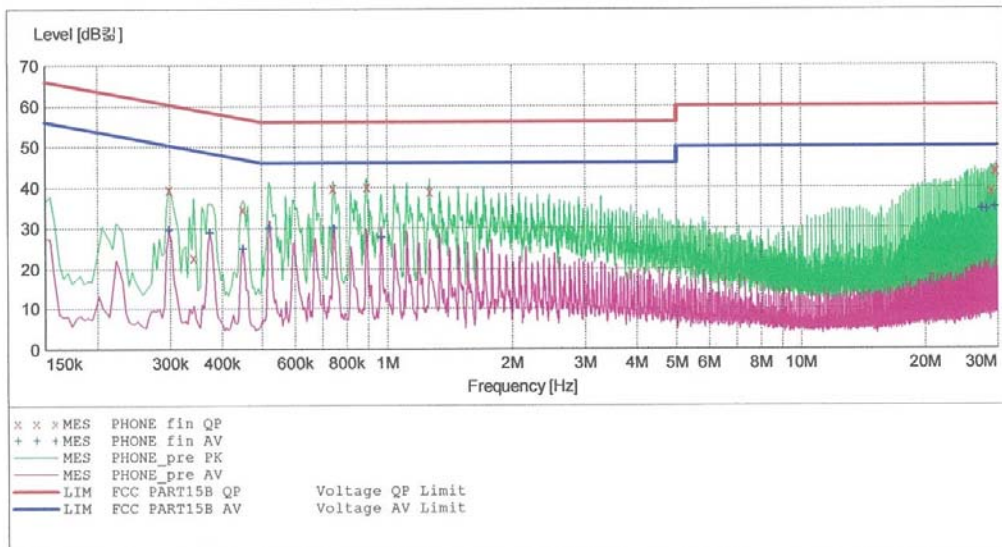
HCT

EMC

EUT: S110BT
 Manufacturer: SNPowercom. co., Ltd
 Operating Condition: WIRELESS CHARGE MODE
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15 B
 Comment: H

SCAN TABLE: "FCC CLASS B(H)"

Short Description:		KN22 CLASS B					
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
Frequency	Frequency	Width					
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				



MEASUREMENT RESULT: "PHONE_fin QP"

2013-09-23 10:17오전

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.298001	39.40	9.8	60	20.9	---	---
0.342001	22.80	9.8	59	36.4	---	---
0.450001	34.60	9.8	57	22.3	---	---
0.744000	39.80	9.8	56	16.2	---	---
0.896000	40.10	9.8	56	15.9	---	---
1.268000	39.00	9.9	56	17.0	---	---
29.048000	39.00	11.3	60	21.0	---	---
29.560000	44.10	11.4	60	15.9	---	---
29.808000	43.80	11.4	60	16.2	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2013-09-23 10:17오전

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.298001	29.50	9.8	50	20.8	---	---
0.374001	28.90	9.8	48	19.5	---	---
0.450001	25.00	9.8	47	21.9	---	---
0.520000	29.90	9.8	46	16.1	---	---
0.748000	29.90	9.8	46	16.1	---	---
0.972000	27.70	9.8	46	18.3	---	---
27.536000	34.50	11.3	50	15.5	---	---
28.292000	34.20	11.3	50	15.8	---	---
29.556000	34.90	11.4	50	15.1	---	---

Conducted Emissions (Line 2)

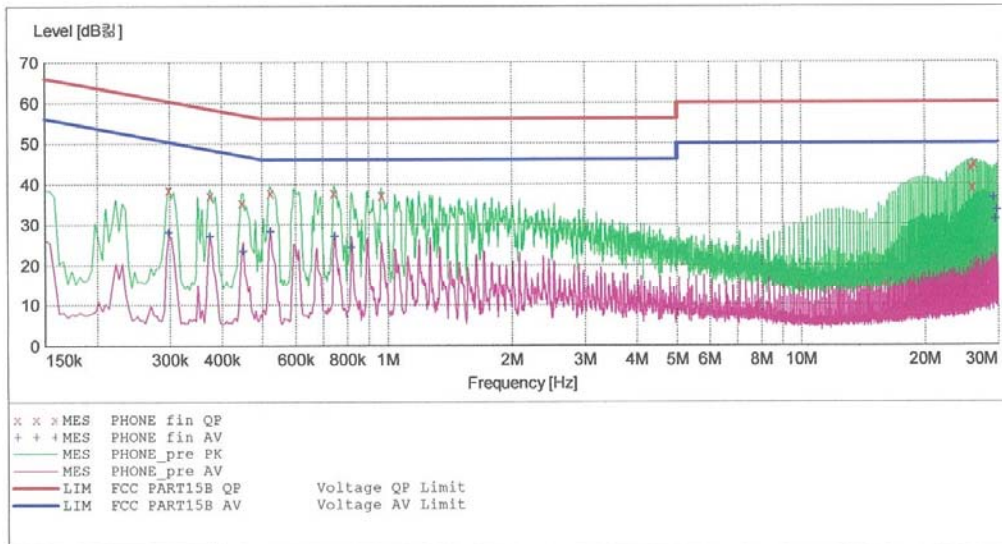
HCT

EMC

EUT: S110BT
 Manufacturer: SNPowercom. co., Ltd
 Operating Condition: WIRELESS CHARGE MODE
 Test Site: SHIELD ROOM
 Operator: JS LEE
 Test Specification: FCC PART15 B
 Comment: N

SCAN TABLE: "FCC CLASS B(N)"

Short Description:			KN22 CLASS B			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "PHONE_fin QP"

2013-09-23 10:07오전

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.298001	38.50	10.0	60	21.8	---	---
0.374001	37.10	10.0	58	21.3	---	---
0.446001	35.40	10.0	57	21.5	---	---
0.524000	37.90	10.0	56	18.1	---	---
0.744000	37.80	10.0	56	18.2	---	---
0.968000	37.20	10.0	56	18.8	---	---
25.808000	44.10	11.6	60	15.9	---	---
26.064000	39.10	11.6	60	20.9	---	---
26.312000	44.90	11.6	60	15.1	---	---

MEASUREMENT RESULT: "PHONE_fin AV"

2013-09-23 10:07오전

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.298001	28.00	10.0	50	22.3	---	---
0.374001	27.10	10.0	48	21.3	---	---
0.450001	23.50	10.0	47	23.4	---	---
0.524000	28.30	10.0	46	17.7	---	---
0.748000	27.10	10.0	46	18.9	---	---
0.820000	24.30	10.0	46	21.7	---	---
29.348000	36.40	11.8	50	13.6	---	---
29.604000	31.00	11.8	50	19.0	---	---
29.856000	33.40	11.8	50	16.6	---	---

11. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ENV216/ LISN	Annual	02/06/2014	100073
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	12/17/2014	3150
Rohde & Schwarz	ESI 40 / EMI TEST RECEIVER	Annual	04/16/2014	831564103
Agilent	E4440A/ Spectrum Analyzer	Annual	04/25/2014	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	Annual	05/14/2014	MY51110063
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/10/2014	10094
MITEQ	AMF-6B-180265-35-10P / POWER AMP	Annual	04/16/2014	667624
CERNEX	CBL26405040 / POWER AMP	Annual	04/16/2014	19660
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	10/17/2013	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	Biennial	10/30/2014	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	02/08/2014	839117/011
Agilent	E4416A /Power Meter	Annual	11/07/2013	GB41291412
Agilent	E9327A /POWER SENSOR	Annual	04/16/2014	MY4442009
Wainwright Instrument	WHF3.0/18G-10EF / High Pass Filter	Annual	02/08/2014	F6
Wainwright Instrument	WHNX6.0/26.5G-6SS / High Pass Filter	Annual	04/16/2014	1
Wainwright Instrument	WHNX7.0/18G-8SS / High Pass Filter	Annual	04/16/2014	29
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	03/19/2014	1
Hewlett Packard	11636B/Power Divider	Annual	11/07/2013	11377
Agilent	87300B/Directional Coupler	Annual	12/24/2013	3116A03621
Hewlett Packard	11667B / Power Splitter	Annual	05/29/2014	05001
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	11/07/2013	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	11/07/2013	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	Annual	04/24/2014	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	04/25/2014	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/11/2014	9009-2536
CERNEX	CBLU1183540 / POWER AMP	Annual	07/24/2014	21691
Agilent	8493C / Attenuator(10 dB)	Annual	07/24/2014	76649
WEINSCHL	2-3 / Attenuator(3 dB)	Annual	11/07/2013	BR0617