Electromagnetic Emission

FCC MEASUREMENT REPORT

CERTIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT	:	Nokia Portable Wireless Charging Plate DC-50
MODEL/Serial No.	:	DC-50 / Proto type
MULTIPLE MODEL	:	-
FCC ID	:	PYADC-50
IC	:	661V-DC50
APPLICANT	:	Nokia Corporation Joensuunkatu 7, 86, Salo, FIN-24100, Finland Attn.: Tero Lehtinen / Product Certification Officer
MANUFACTURER	:	Nokia Corporation Joensuunkatu 7, 86, Salo, FIN-24100, Finland
FCC CLASSIFICATION	:	DCD (Part 15 Low Power Transmitter Below 1705 kHz)
TYPE OF MODULATION	:	ASK
FREQUENCY	:	112 kHz – 205 kHz
ANTENNA TYPE	:	Integral Antenna (embedded coil Antenna)
RF POWER	:	65.80 dB(μV/m) (measured @ 3 m)
RULE PART(S)	:	FCC Part 15 Subpart C RSS-210 Issue 8
FCC PROCEDURE	:	ANSI C63.4-2003
TEST REPORT No.	:	ETLE130806.0885
DATES OF TEST	:	September 23, 2013 to September 24, 2013
REPORT ISSUE DATE	:	October 14, 2013
TEST LABORATORY	:	ETL Inc. (FCC Designation Number : KR0022)

The Nokia Portable Wireless Charging Plate DC-50, Model DC-50 has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 at the ETL Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart C section 15.247 and RSS-210 Issue 8 - Category I Equipment, Annex 8.
I attest to the accuracy of data. All measurement herein was performed by me or was made under my supervision and is correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Prepared by:
Jeong Hwan, Pyo (Test Engineer)
October 14, 2013

Reviewed by:
Kug Kyoung, Yoon (Chief Engineer)
October 14, 2013

ETL Inc.
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Tel: 82-2-858-0786 Fax: 82-2-858-0788

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FCC MEASUREMENT REPORT

Scope – *Measurement and determination of electromagnetic emission (EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

General Information

Applicant Name	**: Nokia Corporation**
Address	**: Joensuunkatu 7, 86, Salo, FIN-24100, Finland**
Attention	**: Tero Lehtinen / Product Certification Officer**

- **EUT Type** : Nokia Portable Wireless Charging Plate DC-50
- **Model Number** : DC-50
- **S/N** : Proto type
- **Frequency** : 112 kHz – 205 kHz
- **Modulation Technique** : ASK
- **Antenna Type** : Integral Antenna (embedded coil Antenna)
- **RF Power** : 65.80 dB(μV/m) (measured @ 3 m)
- **Environmental of Tests** : Temperature: (20.2 ± 1.9) °C
  : Humidity: (65.5 ± 15.5) % R.H.
  : Atmospheric Pressure: (100.95 ± 0.75) kPa
- **FCC Rule Part(s)** : FCC Part 15 Subpart C
  RSS-210 Issue 8
- **Test Procedure** : ANSI C63.4-2003
- **FCC Classification** : DCD (Part 15 Low Power Transmitter Below 1705 kHz)
- **IC Equipment Category** : RSS-210 Issue 8 - Category I Equipment, Annex 8
- **Place of Tests** : ETL Inc. Testing Lab.
  Radiated Emission test;
  #499-1, Sagot-ri, Seosin-myeon, Hwaseong-si, Gyeonggi-do, 445-882, Korea

  Conducted Emission test;
  ETL Inc. Testing Lab.
  371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea

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1. INTRODUCTION

The measurement test for radiated and conducted emission test was conducted at the ETL Inc. The site is constructed in conformance with the requirements of the ANSI C63.4-2003 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 m and 10 m site configurations. Detailed description of test facility was found to be in compliance with FCC Rules according to the ANSI C63.4-2003 and registered to the Federal Communications Commission (FCC Designation Number : KR0022).

The measurement procedure described in American National Standard for Method 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) was used in determining radiated and conducted emissions from the Nokia Corporation Model: DC-50

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2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the Nokia Portable Wireless Charging Plate DC-50 (model: DC-50).

The model DC-50 is basic model that was tested.

2.2 General Specification

Item	Specification
Power source	DC 5 V, 1.5 A (form AC Power adapter)
Transmit Frequency	112 kHz – 205 kHz
Antenna Type	Integral Antenna (embedded coil Antenna)
RF Output Power	65.80 dB(μV/m) (measured @ 3 m)
External Ports	DC Input
Dimension	116.5 mm (W) x 54.3 mm (H) x 6.78 mm (D)
Weight	52.66 g
High Internal Frequency	205 kHz

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3. DESCRIPTION OF TESTS

The tests documented in this report were performed in accordance with ANSI C63.4-2003 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.203, 15.207 and 15.209.
IC Equipment Category: RSS-210 Issue 8 - Category I Equipment, Annex 8

3.1 Radiated Emission Measurement

Radiated emission measurements were made in accordance with § 13 in ANSI C63.4-2003 "Measurement of Intentional radiators" The measurements were performed over the frequency range of 30 MHz to 40 GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak, Quasi-peak, Average" within a bandwidth of 120 kHz and above 1 GHz is 1 MHz.

Preliminary measurements were made at 3 m using broadband antennas, and spectrum analyzer to determine the frequency producing the maximum emission in shielded room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 MHz to 1 000 MHz using Log-Bicon antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site at 3 m. The test equipment was laced on a wooden turn-table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR Quasi-peak mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency of type of signal. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8 m high nonmetallic 1.0 m x 1.5 m table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 m to 4 m and stopped at the azimuth or height producing the maximum emission.

Varying the mode of operating frequencies of the EUT maximized each emission. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst-case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per section 15.31(f).

Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

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3.2 Occupied Bandwidth

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99 % emission bandwidth, as calculated or measured.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 % of the selected span as is possible without being below 1 %. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

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3.3 AC Power Line Conducted Emission Measurement

AC Power Line Conducted emissions measurements were made in accordance with section § 13 in ANSI C63.4-2003 “Measurement of Intentional radiators" The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to a Spectrum Analyzer or a Test Receiver. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 9 kHz or for "quasi-peak" within a bandwidth of 9 kHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1 m x 1.5 m x 0.8 m wooden table which is placed 0.4 m away from the vertical wall and 1.5 m away from the side wall of the chamber room. Two LISN are bonded to the shielded room. The EUT is powered from the LISN and the support equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the LISN. Non-inductive bundling to a 1 m length shortened all interconnecting cables more than 1 m. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the EMI Test Receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.15 MHz to 30 MHz. The bandwidth of the spectrum analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

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4. TEST CONDITION

4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following conditions and configurations were used.

4.2 Description of Test modes

- Setup #1: Wirelessly charge a cellular phone.

- Setup #2: The EUT was connected to an ac power adapter while wirelessly charge a cellular phone. And, Charge a Rechargeable battery of EUT from an AC power adapter. (Worst case)

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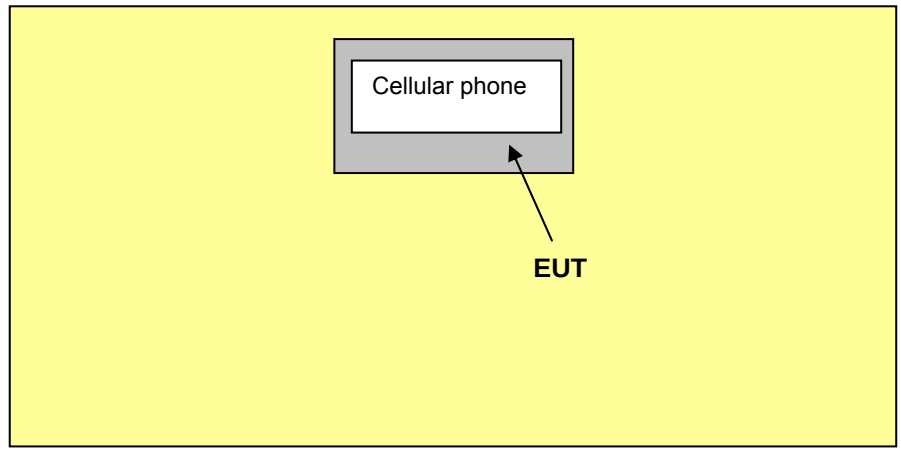
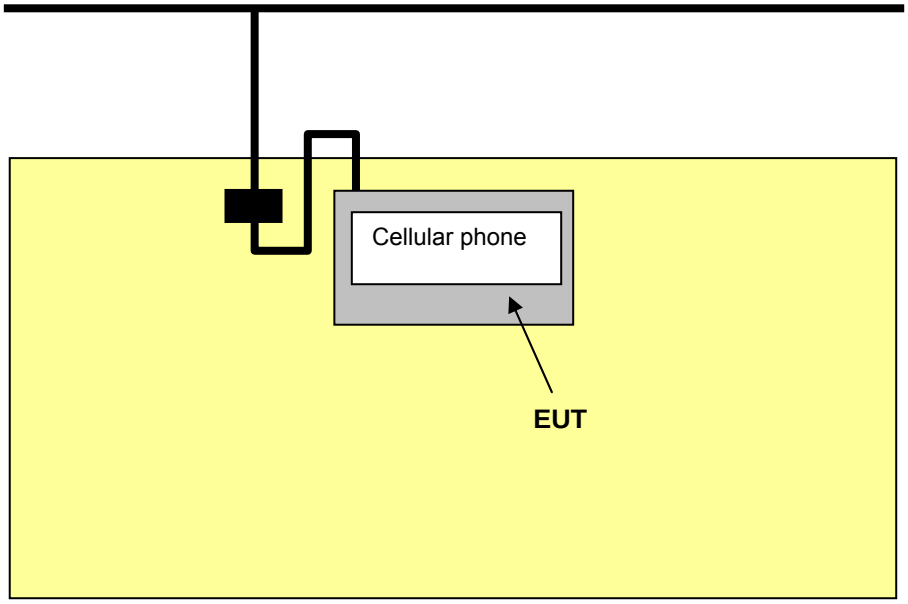
4.3 The setup drawing(s)

- Wirelessly charge a cellular phone.



- Wirelessly charge a cellular phone. (Charge a EUT from an AC power adapter.)



: Signal line

: Power line

: Adapter

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5. TEST RESULTS

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

47 CFR Part 15, Subpart C	RSS Standards	Measurement Required	Result
15.203	RSS-Gen 7.1.2	Antenna Requirement	**Pass**
15.209	RSS-Gen 7.2.5	Radiated Spurious Emissions	**Pass**
-	RSS-Gen 4.6.1	Occupied Bandwidth	**Pass**
15.207	RSS-Gen 7.2.4	AC Power Line Conducted Emissions	**Pass**

The data collected shows that the **Nokia Corporation / Nokia Portable Wireless Charging Plate DC-50 / DC-50** complied with technical requirements of above rules RSS-210, part 15.203, 15.207 and 15.209 Limits.

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

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5.2 Antenna Requirement

EUT	Nokia Portable Wireless Charging Plate DC-50 / DC-50
Limit apply to	FCC Part 15.203, RSS-Gen 7.1.2
Operating Condition	Wirelessly charge a cellular phone. (Charge a EUT from an AC power adapter.) (Worst case)
Result	Passed

FCC section 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221.

Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

- Test Results: PASS

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5.3 Radiated Spurious Emissions

EUT	Nokia Portable Wireless Charging Plate DC-50 / DC-50
Limit apply to	FCC Part 15.209, RSS-Gen 7.2.5
Test Date	September 23, 2013 to September 24, 2013
Environmental of Test	(19.05 ± 0.75) °C, (79 ± 2) % R.H., (100.35 ± 0.15) kPa
Operating Condition	Wirelessly charge a cellular phone. (Charge a EUT from an AC power adapter.) (Worst case)
Result	Passed

Limit

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequencies [MHz]	Field Strength [μV/m]	Measurement Distance [m]
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 MHz - 72 MHz, 76 MHz - 88 MHz, 174 MHz - 216 MHz or 470 MHz - 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

- Refer to see the measured plot in next page.

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5.3.1 Radiated Spurious Emissions (9 kHz to 30 MHz)

EUT	Nokia Portable Wireless Charging Plate DC-50 / DC-50
Limit apply to	FCC Part 15.209, RSS-Gen 7.2.5
Test Date	September 23, 2013
Environmental of Test	19.8 °C, 79 % R.H., 100.2 kPa
Operating Condition	Wirelessly charge a cellular phone. (Charge a EUT from an AC power adapter.) (Worst case)
Result	Passed by 41.50 dB

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.
Detector mode: CISPR Quasi-Peak mode (100 Hz, 9 kHz)

Frequency [kHz]	Reading [dB(μV) @ 3 m]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m) @ 3 m]	Limit [dB(μV/m) @ 3 m]	Margin [dB]
Peak Detector							
134.89	51.41	H	13.98	0.41	65.80	125.00	59.20
151.89	46.42	H	13.91	0.37	60.70	124.00	63.30
203.52	45.40	H	13.74	0.26	59.40	121.00	61.60
Average Detector							
134.89	47.71	H	13.98	0.41	62.10	105.00	42.90
151.89	42.22	H	13.91	0.37	56.50	104.00	47.50
203.52	42.70	H	13.74	0.26	56.70	101.00	44.30
Quasi-peak Detector							
134.89	49.11	H	13.98	0.41	63.50	105.00	41.50
151.89	40.82	H	13.91	0.37	55.10	104.00	48.90
203.52	43.20	H	13.74	0.26	57.20	101.00	43.80

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss
3. Margin = Limit - Result
4. The measurement was performed for the frequency range 9 kHz to 30 MHz according to FCC Part 15.209, RSS-Gen 7.2.5.

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5.3.2 Radiated Spurious Emissions (30 MHz to 1 GHz)

EUT	Nokia Portable Wireless Charging Plate DC-50 / DC-50
Limit apply to	FCC Part 15.209, RSS-Gen 7.2.5
Test Date	September 23, 2013
Environmental of Test	19.2 °C, 77 % R.H., 100.3 kPa
Operating Condition	Wirelessly charge a cellular phone. (Charge a EUT from an AC power adapter.) (Worst case)
Result	Passed by 8.00 dB

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 120 kHz)

Frequency [kHz]	Reading [dB(μV) @ 3 m]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m) @ 3 m]	Limit [dB(μV/m) @ 3 m]	Margin [dB]
36.10	17.49	V	11.03	0.98	29.50	40.00	10.50
123.55	20.98	V	10.82	1.50	33.30	43.50	10.20
136.62	21.70	V	12.26	1.54	35.50	43.50	8.00
145.45	17.06	H	12.57	1.57	31.20	43.50	12.30
152.85	18.99	H	12.50	1.61	33.10	43.50	10.40

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss
3. Margin value = Limit - Result
4. The measurement was performed for the frequency range above 30 MHz according to FCC Part 15.209, RSS-Gen 7.2.5.

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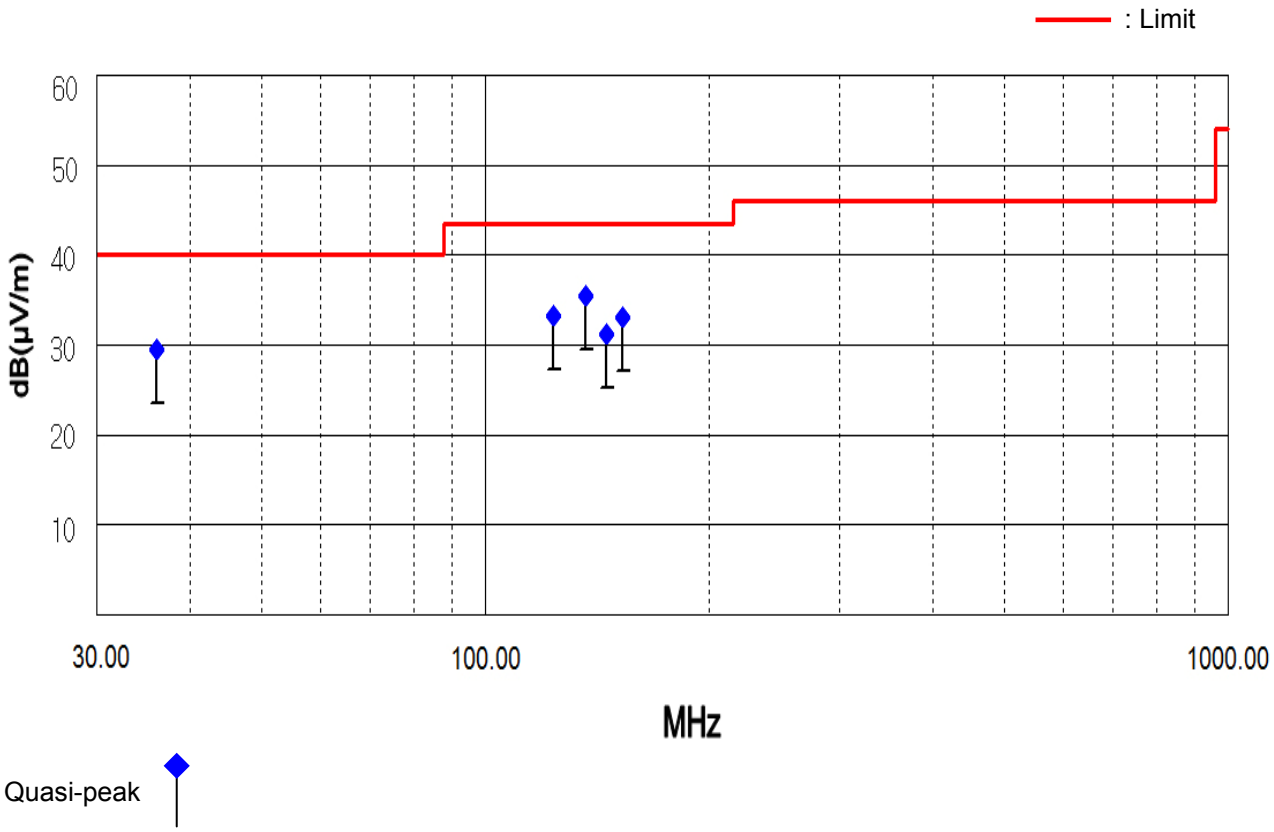

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5.3.3 Radiated Spurious Emissions (1 GHz to 6 GHz)

EUT	Nokia Portable Wireless Charging Plate DC-50 / DC-50
Limit apply to	FCC Part 15.209, RSS-Gen 7.2.5
Test Date	September 24, 2013
Environmental of Test	18.3 °C, 81 % R.H., 100.5 kPa
Operating Condition	Wirelessly charge a cellular phone. (Charge a EUT from an AC power adapter.) (Worst case)
Result	Passed

Frequency [MHz]	Reading [dB(μV)]		Polarity (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]		Limit [dB(μV/m)]		Margin [dB]	
	Peak	Average				Peak	Average	Peak	Average	Peak	Average
	Emission attenuated more than 20 dB below the limit are not reported.										

Result: No signal detect above second harmonic.

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Cable loss = Cable loss + Amp. Gain
3. Result = Reading + Antenna factor + Cable loss
4. Margin value = Limit - Result
5. Measuring frequencies from 1 GHz to the 10^{th} harmonic of highest fundamental frequency.
6. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded(ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
7. Spectrum setting:
   a. Peak Setting RBW = 1 MHz, VBW = 1 MHz, Sweep = Auto
   b. AV Setting RBW = 1 MHz, VBW = 10 Hz, Sweep = Auto

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5.4 Occupied Bandwidth

EUT	Nokia Portable Wireless Charging Plate DC-50 / DC-50
Limit apply to	RSS-Gen 4.6.1
Test Date	September 24, 2013
Environmental of Test	22.1 °C, 52 % R.H., 101.6 kPa
Operating Condition	Wirelessly charge a cellular phone. (Charge a EUT from an AC power adapter.) (Worst case)
Result	Passed

Test Results: PASS

Operating Frequency [kHz]	RBW [kHz]	99 % BW [kHz]	Limit [kHz]
134.891	0.300	0.758	-
151.895	0.300	0.663	-
203.522	0.300	0.719	-

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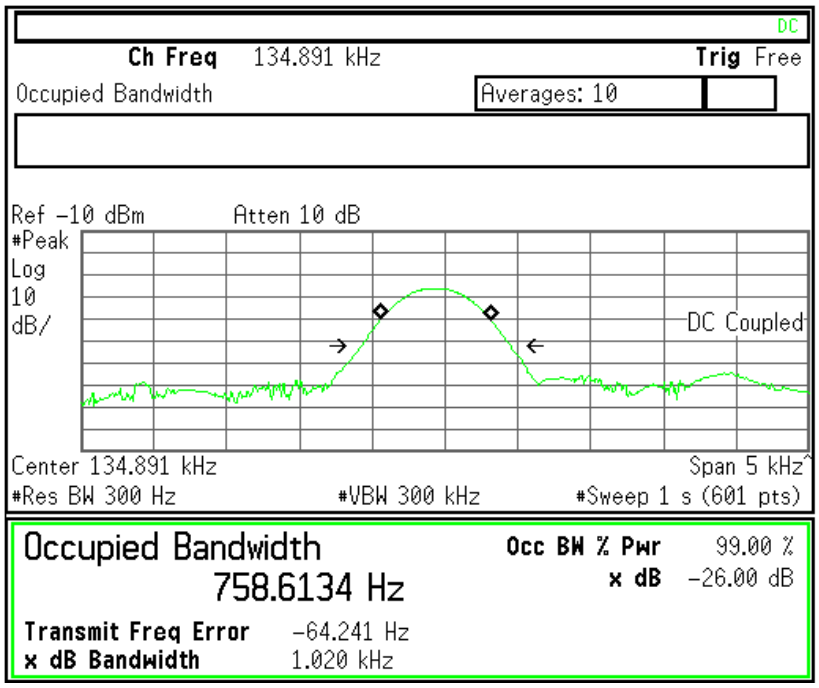
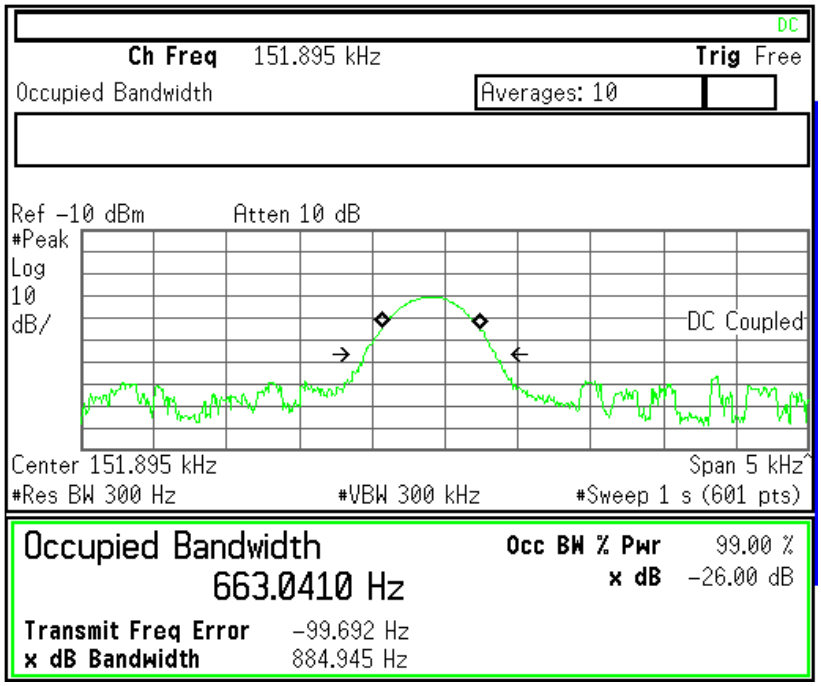
Plots of Occupied Bandwidth

[Low CH: 134.891 kHz]



[Mid CH: 151.895 kHz]



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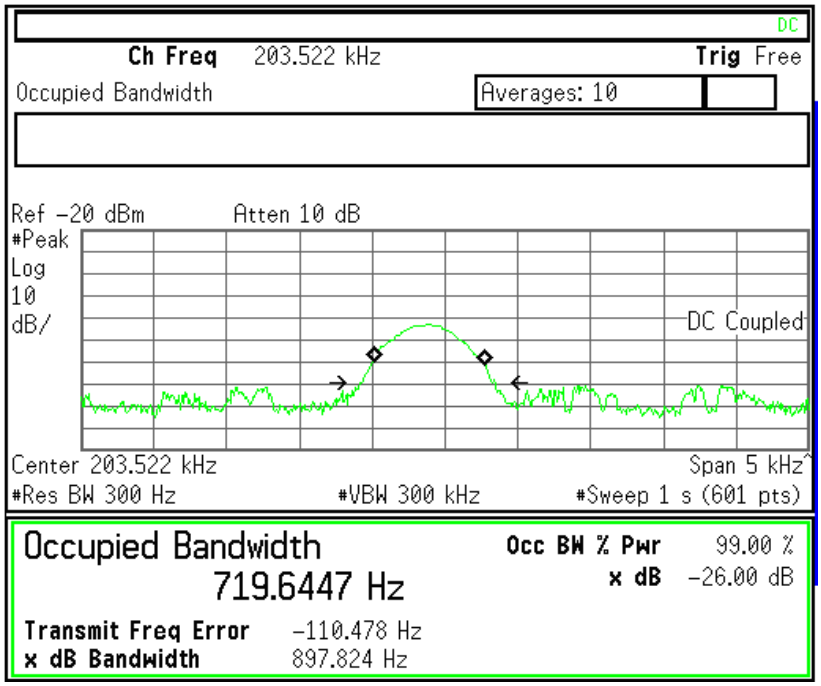
[High CH: 203.522 kHz]



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5.5 AC Power Line Conducted Emissions

EUT	Bar Speaker / STA750BT
Limit apply to	FCC Part 15.207, RSS-Gen 7.2.4
Test Date	September 24, 2013
Environmental of Test	21.2 °C, 50 % R.H., 101.7 kPa
Operating Condition	Wirelessly charge a cellular phone. (Charge a EUT from an AC power adapter.)
Result	Passed by 5.52 dB

Limit

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 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission [MHz]	Conducted limit [dB(μV)]	
	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.

Test Results

- Refer to see the measured plot in next page.

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Conducted Emission Test Data

The following data and graph shows the highest levels of conducted emissions on both polarizations of hot and neutral line.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 9 kHz)

NOTES:

1. Please see the measured data and graph in next page.
2. The Level (Result) value was included the reading, antenna factor and cable loss.
3. Delta (Margin) value = Limit - Level (Result)
4. Measurements were performed at the AC Power Inlet in the frequency band of 150 kHz ~ 30 MHz according to the FCC Part 15.207, RSS-Gen 7.2.4
5. If the average limit is met when using a Quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

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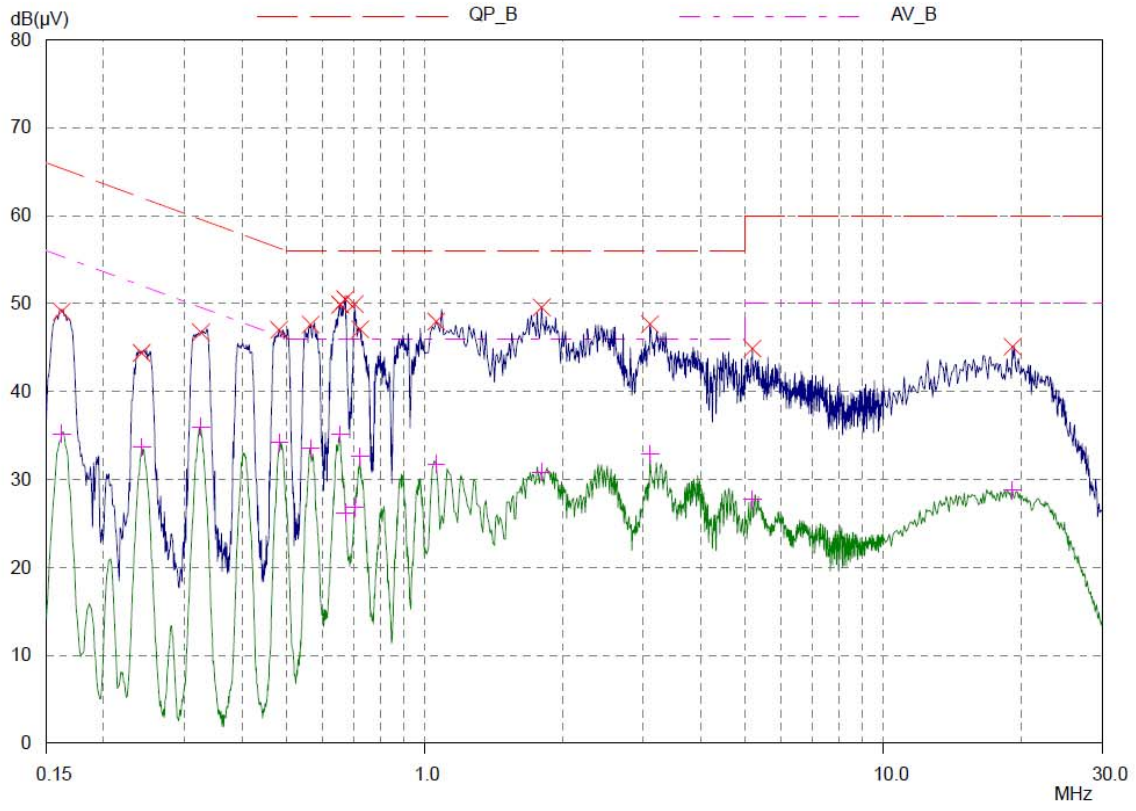
Line: HOT

ETL EMC Laboratory

Conducted Emission Test Result

EUT:	ETLE130806.0885
Manuf:	
Op Cond:	
Operator:	
Test Spec:	
Comment:	HOT

Prescan Measurement:	Detectors:	X PK / + AV
	Meas Time:	see scan settings
	Peaks:	16
	Acc Margin:	10 dB



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ETL EMC Laboratory

Conducted Emission Test Result

EUT: ETLE130806.0885
Manuf:
Op Cond:
Operator:
Test Spec:
Comment: HOT

Prescan Measurement: Detectors: X PK / + AV
Meas Time: see scan settings
Peaks: 16
Acc Margin: 10 dB

Peak Search Results

Frequency MHz	PK Level dB(µV)	PK Limit dB(µV)	PK Delta dB
0.162	49.10	65.36	16.26
0.242	44.36	62.03	17.67
0.326	46.72	59.55	12.83
0.482	47.00	56.30	9.30
0.565	47.59	56.00	8.41
0.655	49.85	56.00	6.15
0.672	50.48	56.00	5.52
0.704	49.93	56.00	6.07
0.724	47.06	56.00	8.94
1.06	47.96	56.00	8.04
1.8	49.56	56.00	6.44
3.1	47.65	56.00	8.35
5.18	44.87	60.00	15.13
19.1	45.07	60.00	14.93

Frequency MHz	AV Level dB(µV)	AV Limit dB(µV)	AV Delta dB
0.162	35.19	55.36	20.17
0.242	33.65	52.03	18.38
0.326	35.96	49.55	13.59
0.482	34.21	46.30	12.09
0.565	33.50	46.00	12.50
0.655	35.14	46.00	10.86
0.672	26.21	46.00	19.79
0.704	26.82	46.00	19.18
0.724	32.61	46.00	13.39
1.06	31.73	46.00	14.27
1.8	30.80	46.00	15.20
3.1	32.86	46.00	13.14
5.18	27.69	50.00	22.31
19.1	28.80	50.00	21.20

* limit exceeded

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Line: Neutral

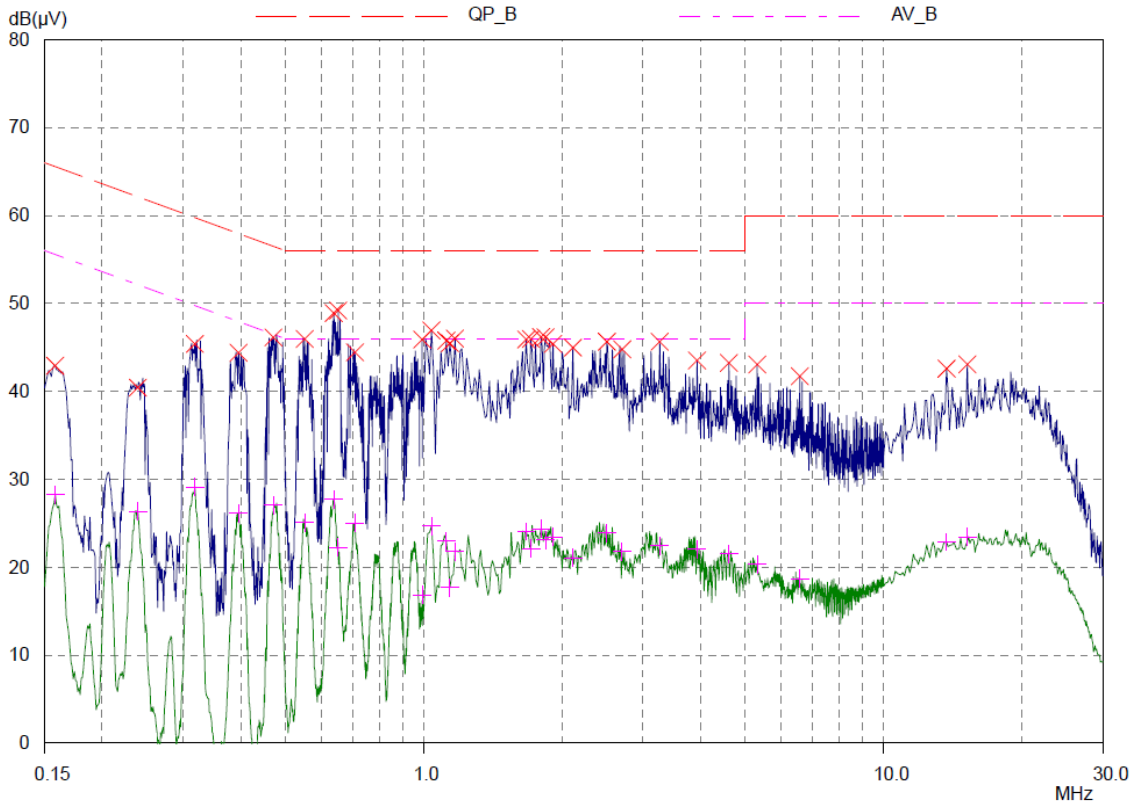
ETL EMC Laboratory

Conducted Emission Test Result

EUT: ETLE130806.0885
Manuf:
Op Cond:
Operator:
Test Spec:
Comment: NEUTRAL

Prescan Measurement:

Detectors:	X PK / + AV
Meas Time:	see scan settings
Peaks:	16
Acc Margin:	10 dB



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ETL EMC Laboratory

Conducted Emission Test Result

EUT: ETLE130806.0885
Manuf:
Op Cond:
Operator:
Test Spec:
Comment: NEUTRAL

Prescan Measurement: Detectors: X PK / + AV
Meas Time: see scan settings
Peaks: 16
Acc Margin: 10 dB

Peak Search Results

Frequency MHz	PK Level dB(µV)	PK Limit dB(µV)	PK Delta dB
0.158	42.91	65.57	22.66
0.239	40.42	62.13	21.71
0.318	45.39	59.76	14.37
0.396	44.39	57.94	13.55
0.471	46.13	56.50	10.37
0.551	45.95	56.00	10.05
0.637	48.90	56.00	7.10
0.652	49.19	56.00	6.81
0.709	44.43	56.00	11.57
0.992	45.90	56.00	10.10
1.04	46.93	56.00	9.07
1.12	45.76	56.00	10.24
1.14	45.47	56.00	10.53
1.17	46.00	56.00	10.00
1.67	45.89	56.00	10.11
1.71	45.95	56.00	10.05
1.8	46.17	56.00	9.83
1.84	46.16	56.00	9.84
1.91	45.39	56.00	10.61
2.11	44.97	56.00	11.03
2.5	45.64	56.00	10.36
2.7	44.79	56.00	11.21
3.26	45.64	56.00	10.36
3.93	43.50	56.00	12.50
4.61	43.24	56.00	12.76
5.31	43.06	60.00	16.94
6.57	41.72	60.00	18.28
13.7	42.58	60.00	17.42
15.2	43.07	60.00	16.93

* limit exceeded

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Peak Search Results (continued)

Frequency MHz	AV Level dB(μV)	AV Limit dB(μV)	AV Delta dB
0.158	28.23	55.57	27.34
0.239	26.35	52.13	25.78
0.318	29.12	49.76	20.64
0.396	26.12	47.94	21.82
0.471	27.06	46.50	19.44
0.551	25.07	46.00	20.93
0.637	27.72	46.00	18.28
0.652	22.24	46.00	23.76
0.709	25.00	46.00	21.00
0.992	16.84	46.00	29.16
1.04	24.66	46.00	21.34
1.12	22.99	46.00	23.01
1.14	17.68	46.00	28.32
1.17	21.75	46.00	24.25
1.67	24.05	46.00	21.95
1.71	22.13	46.00	23.87
1.8	24.38	46.00	21.62
1.84	23.11	46.00	22.89
1.91	23.43	46.00	22.57
2.11	21.04	46.00	24.96
2.5	23.89	46.00	22.11
2.7	21.79	46.00	24.21
3.26	22.45	46.00	23.55
3.93	22.07	46.00	23.93
4.61	21.51	46.00	24.49
5.31	20.32	50.00	29.68
6.57	18.67	50.00	31.33
13.7	22.87	50.00	27.13
15.2	23.45	50.00	26.55

* limit exceeded

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6. SAMPLE CALCULATION

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - PA

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
PA* = Preamplifier Factor

* PA is only be used for the measuring frequency above 1 GHz.

$dB(\mu V) = 20 \log_{10} (\mu V)$: Equation
$dB(\mu V) = dBm + 107$

Example : @ 136.62 MHz

Class B Limit = 43.50 dB(μV/m)

Reading = 21.70 dB(μV)

Antenna Factor + Cable Loss = 12.26 + 1.54 = 13.80 dB(μV/m)

Total = 35.50 dB(μV/m)

Margin = 43.50 – 35.50 = 8.00 dB

= 8.00 dB below Limit

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7. List of test equipments used for measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Date	Cal. Due Date
☒	EMI Test Receiver	ESVS 10	R&S	835165/001	13.03.18	14.03.18
☒	EMI Test Receiver	ESCS30	R&S	847793/005	13.03.18	14.03.18
☒	EMI Test Receiver	ESCI7	R&S	100851	13.09.05	14.09.05
☒	LISN	3825/2	EMCO	9006-1669	13.09.05	14.09.05
☒	Loop Antenna	AL-130	COM-POWER	121025	12.06.14	14.06.14
☒	LogBicon Antenna	VULB9160	Schwarzbeck	3082	13.07.25	15.07.25
☒	Horn Antenna	BBHA 9120D	Schwarzbeck	277	13.02.28	15.02.28
☒	Spectrum Analyzer	E7405A	H.P.	US41160290	13.09.05	14.09.05
☒	Amplifier	TK-PA18	TESTEK.	120020	12.12.15	13.12.15
☒	Turn-Table	TT 1.35 SI	SES	-	N/A	N/A
☒	Antenna Master	AM 4.5	SES	-	N/A	N/A

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