



FCC LISTED, REGISTRATION
NUMBER: 2764.01

ISED LISTED REGISTRATION
NUMBER: 23595-1

Test report No:
4052ERM.001A2

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (2023): Radio Frequency Devices

FCC Rules and Regulations CFR 47, Part 18, Subpart C (2020): Industrial, Scientific, and Medical Equipment

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ICES-001 Issue 5 - July (2020): Industrial, Scientific and Medical Equipment (ISM)

ICES-003 Issue 7 - October (2020): Information Technology Equipment

RSS 216 Issue 2 - January (2016): Wireless Power Transfer Devices

RSS Gen Issue 5 - April (2018): Wireless Power Transfer Devices

(*) Identification of item tested	Qi 1.3 Wireless Charger with NFC
(*) Trademark	Panasonic
(*) Model and /or type reference tested	WCPM2
(*) Derived model not tested	-
Other identification of the product	FCC ID: ACJ932A-WCPM2 IC ID: 216A-WCPM2 Hw version: PP2 Sw version: v6.2
(*) Features	Qi 1.3 and NFC
Manufacturer	PANASONIC AUTOMOTIVE 776 Hwy 74 South, Peachtree City, GA, 30269 USA
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (2023) FCC Rules and Regulations CFR 47, Part 18, Subpart C (2020) ICES-001 Issue 5 - July (2020) ICES-003 Issue 7 - October (2020) RSS 216 Issue 2 - January (2016) RSS Gen Issue 5 - April (2018)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager
Date of issue	04-03-2024
Report template No	FDT08_23 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01

DEKRA Certification Inc. is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Certification Inc. has a calibration and maintenance program for its measurement equipment.

DEKRA Certification Inc. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification at the time of performance of the test.

DEKRA Certification Inc. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Certification internal document PODT000.

	Frequency (MHz)	U (k=2)	Units
Radiated emission	30 - 1000	5.94	dB
	1000-18000	5.89	dB

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of Qi 1.3 Wireless Charger with NFC.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples used for the test have been selected by **The Client**.

Sample S/01 is composed of the following elements, accessories and auxiliary equipment:

Id	Control Number	Description	Manufacturer / Model	Serial N°	Date of Reception	Application
S/01	4052/07	Wireless Charger with NFC	Panasonic / WCPM2	101577	2023-05-26	Element Under Test
S/01	4052/13	Laptop	Dell / Latitude 7490	GL85MQ2	2023-05-26	Accessory
S/01	4052/17	Harness	Panasonic	-	2023-05-26	Element Under Test
S/01	4052/18	Vehicle Network Interfaces with OBDII, DB9, DB25 and USB Type A interface cable to the PC	Intrepid Control Systems / ValueCAN 4-2EL	VE6792	2023-05-26	Accessory

1. Sample S/01 was used for the test(s): All test(S) indicated in appendix A.

Sample S/02 is composed of the following elements, accessories and auxiliary equipment:


Id	Control Number	Description	Manufacturer / Model	Serial N°	Date of Reception	Application
S/02	4052/07	Wireless Charger with NFC	Panasonic / WCPM2	101577	2023-05-26	Element Under Test
S/02	4052/10	4mm Spacer	Panasonic	-	2023-05-26	Accessory
S/02	4052/13	Laptop	Dell / Latitude 7490	GL85MQ2	2023-05-26	Accessory
S/02	4052/17	Harness	Panasonic	-	2023-05-26	Element Under Test
S/02	4052/18	Vehicle Network Interfaces with OBDII, DB9, DB25 and USB Type A interface cable to the PC	Intrepid Control Systems / ValueCAN 4-2EL	VE6792	2023-05-26	Accessory
S/02	4052/19	Resistance box	Panasonic		2023-06-15	Accessory
S/02	4052/20	Load	Panasonic		2023-06-15	Accessory

2. Sample S/02 was used for the test(s): All test(S) indicated in appendix B.

Test sample description

Test Sample description (compulsory information for EMC and RF testing services)

Ports..... :	Port name and description		Cable				
			Specified length [m]	Attached during test	Shielded	Coupled to patient	
	1 - BATT+		3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	2 - CANFD+		3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	3 - CANFD-		3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	4 - LIN		3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	5 - NC		-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	6 - GND		3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Supplementary information to the ports..... :	Setting for CANFD and LIN are already set by included test software						
Rated power supply :	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	DC: 13.5Vdc nom.; 9Vdc min, 16Vdc max					
<input type="checkbox"/>	DC:						
Rated Power..... :	15W						
Clock frequencies..... :	MCU crystal - 20MHz; NFC crystal - 27.12MHz						
Other parameters..... :	No Data Provided						
Software version..... :	v6.2						
Hardware version..... :	PP2						
Dimensions (W x H x D)..... :	9.8 x 9.2 x 4.9						
Mounting position..... :	<input type="checkbox"/>	Table top equipment					
	<input type="checkbox"/>	Wall/Ceiling mounted equipment					
	<input type="checkbox"/>	Floor standing equipment					
	<input type="checkbox"/>	Hand-held equipment					
	<input checked="" type="checkbox"/>	Other: Automotive center console					
Modules/parts :	Module/parts of test item		Type		Manufacturer		
	68516749AC		DUT		Panasonic		
Accessories (not part of the test item) :	Description		Type		Manufacturer		
	NA						

Documents as provided by the applicant	Description	File name	Issue date
	Declaration Equipment Data	FDT30_18 Declaration Equipment Data_PASA_20230705	07/05/2023
	WCPM2 Compliance Testing Setup.docx	setup	06/14/2023
	WCPM2 Compliance Testing Operation.docx	operation	06/14/2023
Copy of marking plate:			
			

Identification of the client

PANASONIC AUTOMOTIVE
776 Hwy 74 South,
Peachtree City, GA, 30269
USA

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	07-05-2023
Date (finish)	07-06-2023

Document history

Report number	Date	Description
4052ERM.001	08-31-2023	First release
4052ERM.001A1	10-24-2023	Second release. Typo in the year of the CFR 47, Part 18, Subpart C standard was corrected in the cover page. This modification of the test report cancels and replaces the test report 4052ERM.001.
4052ERM.001A2	04-03-2024	Third release. Occupied bandwidth (or 99% emission bandwidth) test case is added in this report. Radiated results were added for 127kHz. This modification of test report cancels and replaces the test report 4052ERM.001A1.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the semi-anechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

- The tests have been performed by the technical personnel: Yuri Barone, Qi Zhang, Koji Nishimoto, and Victor Albrecht.

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

Emission Test - Unintentional Radiators FCC Rules and Regulations CFR 47, Part 15, Subpart B / ICES 003			
Report Section	Requirement – Test case	Verdict	Remark
A.1	Radiated Emission Electromagnetic Field (30 MHz – 1000 MHz)	P	N/A
-	Radiated Emission Electromagnetic Field (1 GHz – 18 GHz)	N/A	Refer 1
-	Radiated Emission Electromagnetic Field (18 GHz – 40 GHz)	N/A	Refer 1
-	Continuous Conducted Emission on Power Leads (150 kHz to 30 MHz)	N/A	Refer 2, 3
Supplementary information and remarks:			
<p>1) According with the requirements of FCC Rules and Regulations, title 47, Chapter I, Subchapter A, Part 15, Subpart A, §15.33 Frequency range of radiated measurements, (b) for unintentional radiators, (1) due to The Highest frequency generated or used in the device in the range of 1.705 -108MHz, The Upper frequency of measurement range is up to 1000MHz.</p> <p>2) According with the requirements of FCC Rules and Regulations, title 47, Chapter I, Subchapter A, Part 15, Subpart B, §15.107 Conducted limits, (d) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation, and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.</p> <p>3) Exemptions from the scope of ICES-003, clause 1.5.1 ICES-003 does not apply to the following types of equipment (a) ITE or digital apparatus factory-installed in vehicles, boats or devices equipped with internal combustion engines, traction batteries or both (subject to ICES-002). ITE or digital apparatus not factory-installed in vehicles, boats or devices equipped with internal combustion engines, traction batteries or both do not qualify for this exemption.</p>			

Emission Test - Intentional Radiators FCC Rules and Regulations CFR 47, Part 18, Subpart C / ICES 001			
Report Section	Requirement – Test case	Verdict	Remark
B.1	Radiated emission electromagnetic field test (0.009-30 MHz)	P	N/A
B.1	Radiated emission test (30 MHz – 1000 MHz)	P	N/A
-	Radiated emission test (1 GHz – 18 GHz)	N/A	Refer 1
-	Conducted emission test (150 kHz to 30 MHz)	N/A	Refer 2
B.2	Occupied bandwidth (or 99% emission bandwidth)	P	N/A
Supplementary information and remarks:			
<p>1) According with the requirements of FCC Rules and Regulations, title 47, Chapter I, Subchapter A, Part 18, Subpart C, §18.309 Frequency range of measurements, (a) For field strength measurements, due to the frequency band in which device operates below 500 MHz, the highest frequency of measurement range is 10th harmonic or 1,000 MHz, whichever is higher.</p> <p>2) According with the requirements of FCC Rules and Regulations, title 47, Chapter I, Subchapter A, Part 18, Subpart C, §18.307 Conduction limits, for the equipment 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 shall not exceed the limits in the tables (a) All Induction cooking ranges and ultrasonic equipment, (b) All other part 18 consumer devices, (c) RF lighting devices. 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 using a 50 µH/50 ohms line impedance stabilization network (LISN).</p>			

List of equipment used during the test

Radiated Emission Equipment

Control Number	Description	Manufacturer	Model	Last Calibration	Next Calibration
1012	ESR26 EMI Test Receiver	Rohde & Schwarz	ESR26	2022/04	2024/02
1062	Active Loop antenna	ETS Lindgren	6502	2020/07	2023/07
1065	Biconical log Antenna	ETS Lindgren	3142E	2020/08	2023/08
1108	Ethernet SNMP Thermometer- CR Room	HW Group	HWg-STE Plain	2022/10	2024/10
1111	Ethernet SNMP Thermometer- SAC	HW Group	HWg-STE Plain	2022/10	2024/10
1179	Semi-Anechoic Chamber	Frankonia	SAC 3plus 'L'	N/A	N/A
1217	Frankonia Transparent Test Table 1	Frankonia	FFT-Square	N/A	N/A
1314	Wireless measurement software EMC 32	Rohde & Schwarz	-	N/A	N/A

Appendix A:

Test results FCC Part 15 / ICES-003

Appendix A Content

DESCRIPTION OF THE OPERATION MODES 12

A.1. RADIATED EMISSION ELECTROMAGNETIC FIELD (30 MHZ – 1000 MHZ)..... 13

DESCRIPTION OF THE OPERATION MODES

The operation modes described in this paragraph represent functionalities of the sample under test.

The following operation modes of the samples were used during the test executions:

OPERATION MODE	DESCRIPTION
OM/01(*)	DUT ON. WPT charger and NFC in standby mode. Powered by 13.5Vdc.

* Worst configuration detected

A.1. RADIATED EMISSION ELECTROMAGNETIC FIELD (30 MHz – 1000 MHz)

LIMITS:	Product standard:	FCC CFR 47, Part 15, Subpart B (2018), Secs. 15.109 & ICES-003 Issue 7 – October (2021)
	Test standard:	FCC CFR 47, Part 15, Subpart B (2018), Secs. 15.109 & ICES-003 Issue 7 – October (2020); ANSI C63.4 (2014)

Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, in the frequency range 30 MHz to 40 GHz for class B equipment, according with the requirements of:

FCC Rules and Regulations 47 CFR Part 15, Subpart B, Secs. 15.109 (a).

[54 FR 17714, Apr. 25, 1989, as amended at 56 FR 373, Jan. 4, 1991; 58 FR 51249, Oct. 1, 1993; 66 FR 19098, Apr. 13, 2001; 67 FR 48993, July 29, 2002; 69 FR 2849, Jan. 21, 2004; 80 FR 33447, June 12, 2015]

Frequency range (MHz)	QP Limit for 3 m	
	($\mu\text{V/m}$)	(dB $\mu\text{V/m}$)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46
Above 960	500	54

Frequency range (MHz)	AVG Limit for 3 m		PK Limit for 3 m (1)
	($\mu\text{V/m}$)	(dB $\mu\text{V/m}$)	(dB $\mu\text{V/m}$)
Above 1000	500	54	74

(1) Frequencies above 1 GHz, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test, as per §15.35(b)

ICES-003 Issue 7, Secs 3.2.2, table 2 & 4 (October 2020).

Frequency range (MHz)	QP Limit for 3 m	
	($\mu\text{V/m}$)	(dB $\mu\text{V/m}$)
30 to 88	100	40
88 to 216	150	43.5
216 to 230	200	46
230 to 960	224	47
Above 960	500	54

Frequency range (MHz)	AVG Limit for 3 m		PK Limit for 3 m (1)
	($\mu\text{V/m}$)	(dB $\mu\text{V/m}$)	(dB $\mu\text{V/m}$)
Above 1000	500	54	74

TEST SETUP

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30-1000 MHz (Bilog antenna).

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

TEST SETUP (CONT.)

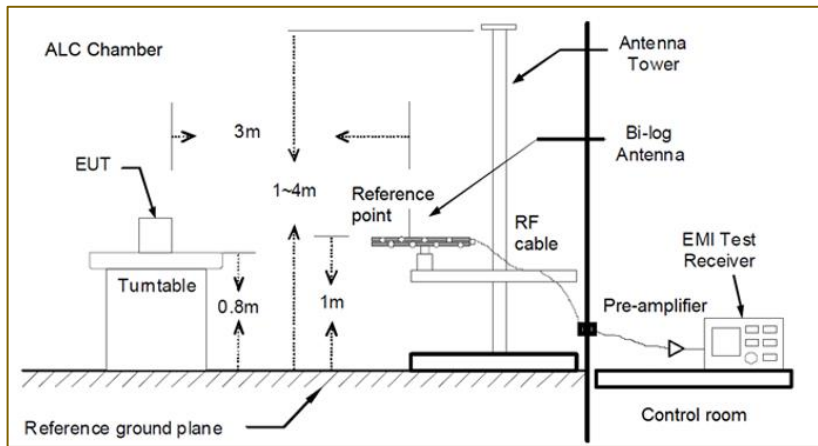


Fig A1: Generic setup for measurements from 30 to 1000MHz

TESTED SAMPLES:

S/01

TESTED CONDITIONS MODES:

OM/01

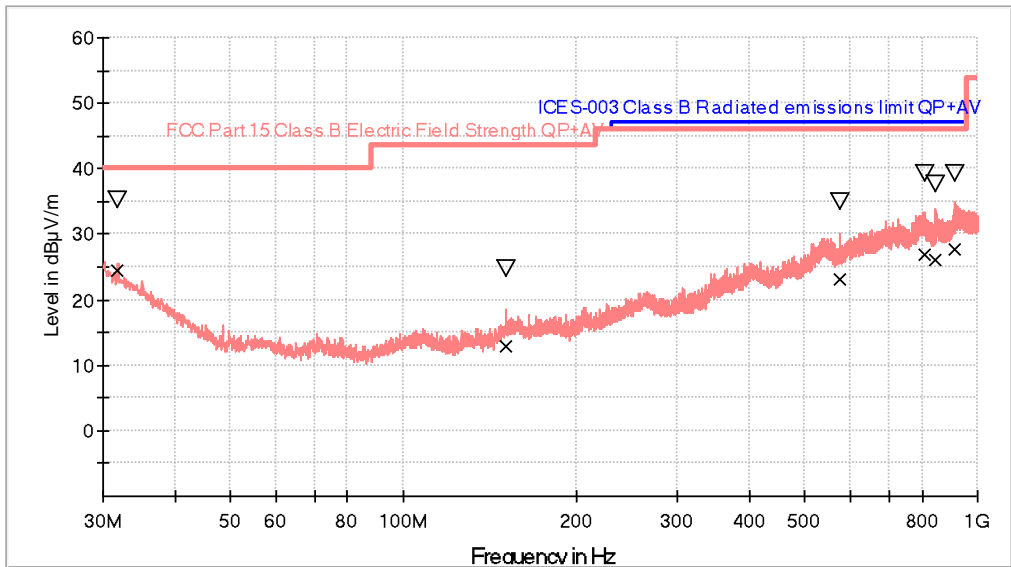
TEST RESULTS:

CRmmnnxx_PP: CR: Radiation Condition, mm: Sample number, nn: Operation mode, xx: Range, PP: Polarization

CRmmnnxx	Description	Result
CR0101LR_PH	Range: 30 MHz - 1000 MHz Horizontal Polarization	P
CR0101LR_PV	Range: 30 MHz - 1000 MHz Vertical Polarization	P

TEST RESULTS (Cont.):

CR0101LR



- ICES-003 Class B Radiated emissions limit QP+AV
- Preview Result 1-PK+
- FCC Part 15 Class B Electric Field Strength QP+AV
- x Final Result QPK
- v Final Result PK+

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)
31.843495	24.39	35.31	40.00	15.61	H	22.0
150.716060	12.87	24.76	40.00	27.13	V	-54.0
573.684665	23.12	35.04	47.00	23.88	V	11.0
807.067777	26.94	39.33	47.00	20.06	V	78.0
910.711980	27.79	39.38	47.00	19.21	V	84.0
31.843495	24.39	35.31	40.00	15.61	H	22.0

Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time
30 MHz - 1 GHz	48.5 kHz	PK+	100 kHz	1 s

Appendix B:

Test results FCC Part 18 / ICES-001 / RSS-216

Appendix B Content

DESCRIPTION OF THE OPERATION MODES18

B.1. RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE19

B.2. OCCUPIED BANDWIDTH (OR 99% EMISSION BANDWIDTH).....27

DESCRIPTION OF THE OPERATION MODES

The operation modes described in this paragraph represent functionalities of the sample under test.

The following operation modes of the samples were used during the test executions:

OPERATION MODE	DESCRIPTION
OM/01	DUT ON. WPT in charging mode. Powered by 13.5Vdc.

B.1. RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

LIMITS:	Product standard:	FCC CFR 47, Part 18, Subpart C (2018) and ICES-001 Issue 5 – July (2020)/ RSS – 216.
	Test standard:	FCC CFR 47, Part 18, Subpart C (2018) and ICES-001 Issue 5 – July (2020)/ RSS – 216.

Limits of interference

The applied limit for radiated emissions, according to the requirements of:

- a) **FCC Rules and Regulations 47 CFR Part 18: Industrial, Scientific, and Medical Equipment, Subpart C: Technical Standards, Secs. 18.305 (b):** [50 FR 36070, Sept. 5, 1985, as amended at 51 FR 17970, May 16, 1986; 52 FR 43197, Nov. 10, 1987].

Equipment	Operating frequency	RF Power generated by equipment (Watts)	Field strength limit (μV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 25 × SQRT (power/500)	300 300 ⁽¹⁾
	Any non-ISM frequency	Below 500 500 or more	15 15 × SQRT (power/500)	300 300 ⁽¹⁾
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 (2)	1,600 (2)
Medical diathermy	Any ISM frequency	Any	25	300
	Any non-ISM frequency	Any	15	300
Ultrasonic	Below 490 kHz	Below 500 500 or more	2,400/F (kHz) 2,400/F (kHz) × SQRT (power/500)	300 300 ⁽³⁾
	490 to 1,600 kHz	Any	24,000/F (kHz)	30
	Above 1,600 kHz	Any	15	30
Induction cooking ranges	Below 90 kHz	Any	1500	30 ⁽⁴⁾
	On or above 90 kHz	Any	300	30 ⁽⁴⁾

1: Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

2: Reduced to the greatest extent possible.

3: Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

4: Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment

Note 1: Limit 3m (dBμV/m) = Limit 300m (dBμV/m) + 40log(300m/3m) (Below 30MHz) according to 15.31

Note 2: Limit 3m (dBμV/m) = Limit 300m (dBμV/m) + 20log(300m/3m) (Above 30MHz) according to 15.31

Note 3: This product is a wireless charger which operates at (105 kHz - 115kHz, 110kHz nominal). So, the limit of miscellaneous with non-ISM frequency is applied.

- b) **RSS-216 Issue 2, clause 6.2.2.2 (January 2016), Radiated Emissions limits mentioned as below:**
The magnetic field radiated emissions within 9 kHz – 30 MHz from the WPT subassembly of WPT source and client devices and WPT systems shall comply with the limits applicable to induction cooking equipment, asset out in ICES-001.
- c) **ICES-001 Issue 5, clause 3.3.4.1, table 2 (July 2020).**

Table 2: Magnetic field strength radiated emission limits for induction cooking appliances

Frequency range (MHz)	QP Limit at 3 m	
	(dBμA/m)	(dBμV/m)
0.009 - 0.07	69	120.5
0.07 - 0.15	69 - 39*	120 - 90.5*
0.15 - 30	39 - 7*	90.5 - 58.5*

The limit level decreases linearly with the logarithm of frequency.

- According to ICES-001 Issue 5 - July (2020), clause 3.3.2, Instrumentation, test methods and test facilities, The instrumentation, test methods and test facilities used to demonstrate compliance with the limits defined in sections 3.3.3 and 3.3.4 shall be in accordance with the requirements set out in CSA CISPR 11:19 and in its normative references, as listed therein (specifically CISPR 16-1-1, CISPR 16-1-2, **CISPR 16-1-4**, CISPR 16-2-1 and CISPR 16-2-3 of editions as listed in CSA CISPR 11:19).
- According to **CISPR 16-1-4**, clause C.6.3, NOTE 2: For disturbance level calculations, CISPR uses the magnetic field strength H in dB(μA/m) instead of electric field strength E in dB(μV/m). In this context, the relation between H and E is given by Equation (C.4): $E = H + 51,5$

$$\text{dB}\mu\text{V/m} = \text{dB}\mu\text{A/m} + 51.5$$

d) ICES-001 Issue 5, clause 3.3.4.1, table 4 (July 2020).

Table 4: Electric field strength radiated emission limits for induction cooking appliances

Frequency range (MHz)	QP Limit at 3 m	Note:
	(dB μ V/m)	Limits for OATS or SAC*
30 - 230	40	*OATS = open-area test site
230 - 1000	47	*SAC = semi-anechoic chamber

Limits according to ICES-001 Issue 5, are equal or more stringent than those of FCC Part 18 Part C.

TEST SETUP

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency ranges of 9kHz to 30MHz (loop Antenna) and 30-1000 MHz (Bilog antenna).

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. EUT was also rotated 360°.

For Bilog antenna; the antenna height was varied from 1 to 4 meters to find the maximum radiated emission. Measurements were made in both horizontal and vertical planes of polarization.

For Loop antenna; The antenna orientation was varied along X, Y and Z axes to find maximum radiated emissions. The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

TEST RESULTS (Cont.):

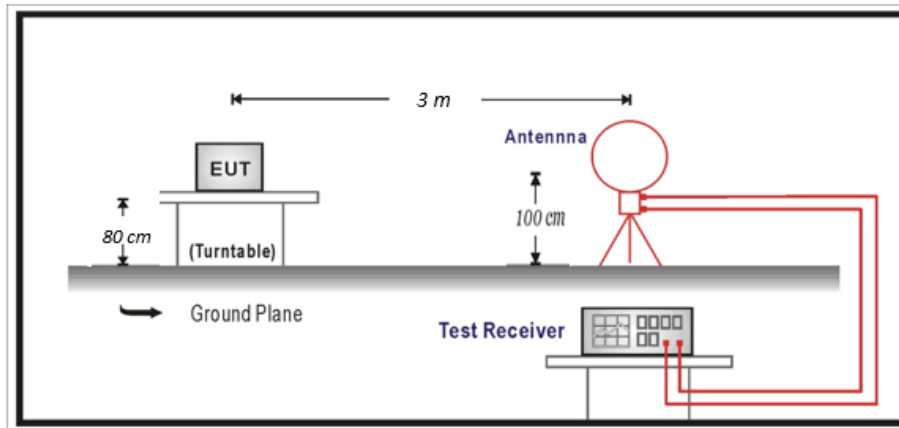


Fig B1: Generic setup for measurements from 9kHz to 30MHz

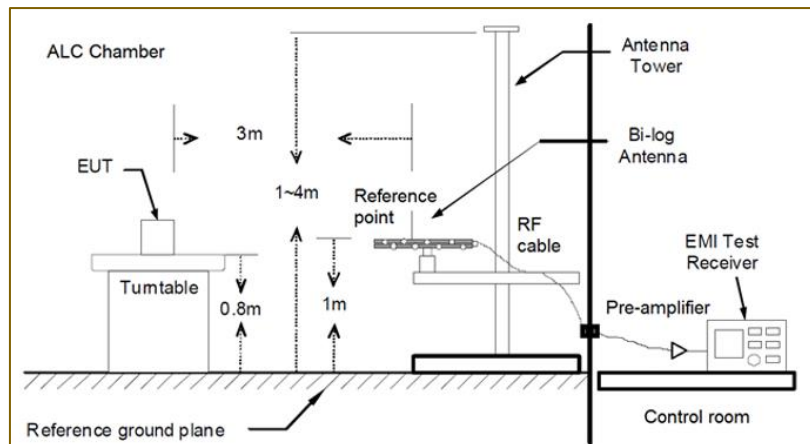


Fig B2: Generic setup for measurements from 30 to 1000MHz

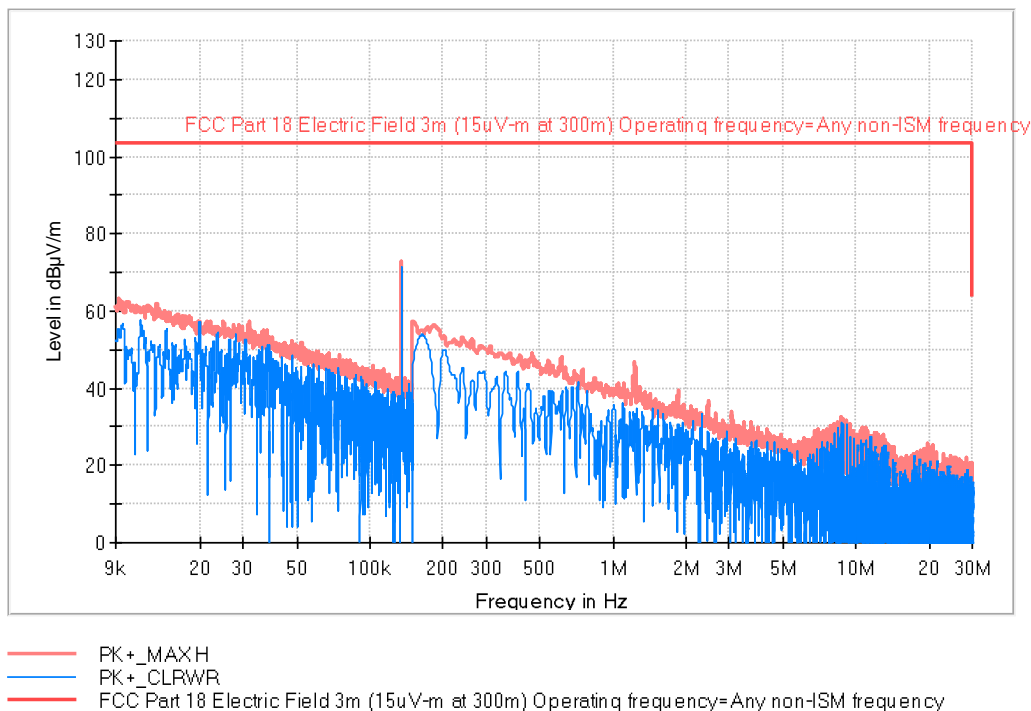
TESTED SAMPLE	S/02
TESTED OPERATION MODES:	OM/01
TEST RESULTS:	CRmmnnxx_PP: CR: Radiation Condition, mm: Sample number, nn: Operation mode, xx: Range, PP: Polarization

CRmmnnRR_PP	Description	Result
CR0201LR_OX	Range : 9 kHz -30 MHz, Orientation X	P
CR0201LR_OY*	Range : 9 kHz -30 MHz, Orientation Y	P
CR0201LR_OZ	Range : 9 kHz -30 MHz, Orientation Z	P
CR0201LR	Range: 30 MHz - 1000 MHz Horizontal/Vertical Polarization	P

*Worst case orientation observed, and the plot is shown below

TEST RESULTS (Cont.):

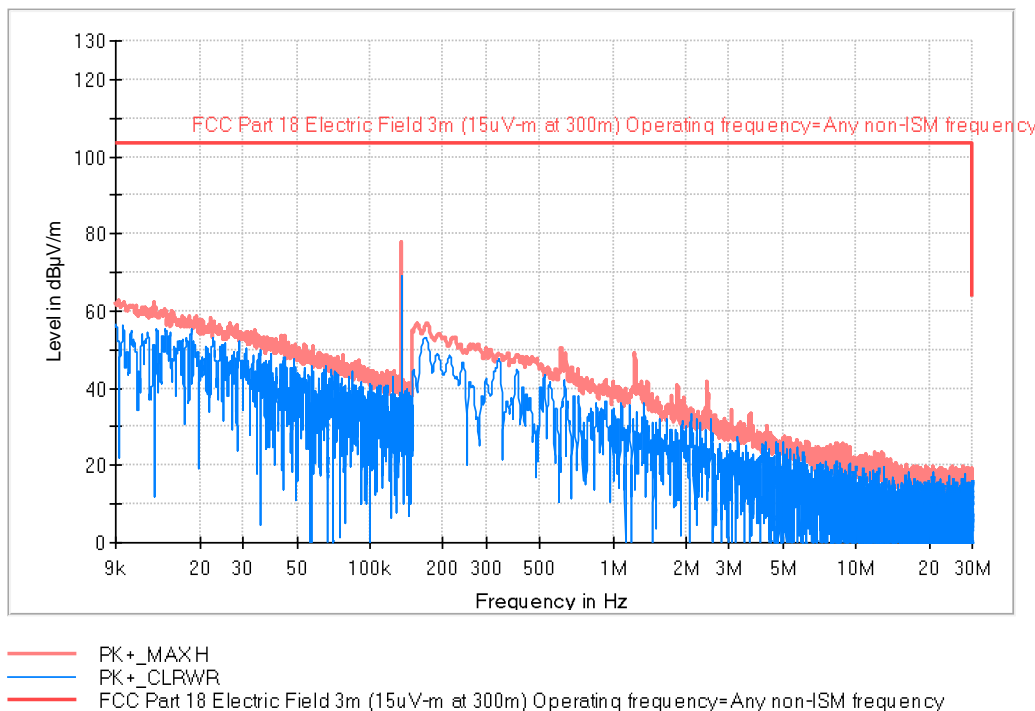
CR0201LR_OX



Frequency (MHz)	PK+_CLRWR (dBµV/m)	PK+_MAXH (dBµV/m)	Pol	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
0.134908	71.5	72.7	H	30.8	103.5
0.615660	39.3	47.8	H	55.7	103.5
1.232560	33.4	46.4	H	57.1	103.5
1.856425	28.7	39.3	H	64.2	103.5
8.632375	30.7	32.0	H	71.5	103.5
19.812195	19.1	25.7	H	77.8	103.5

TEST RESULTS (Cont.):

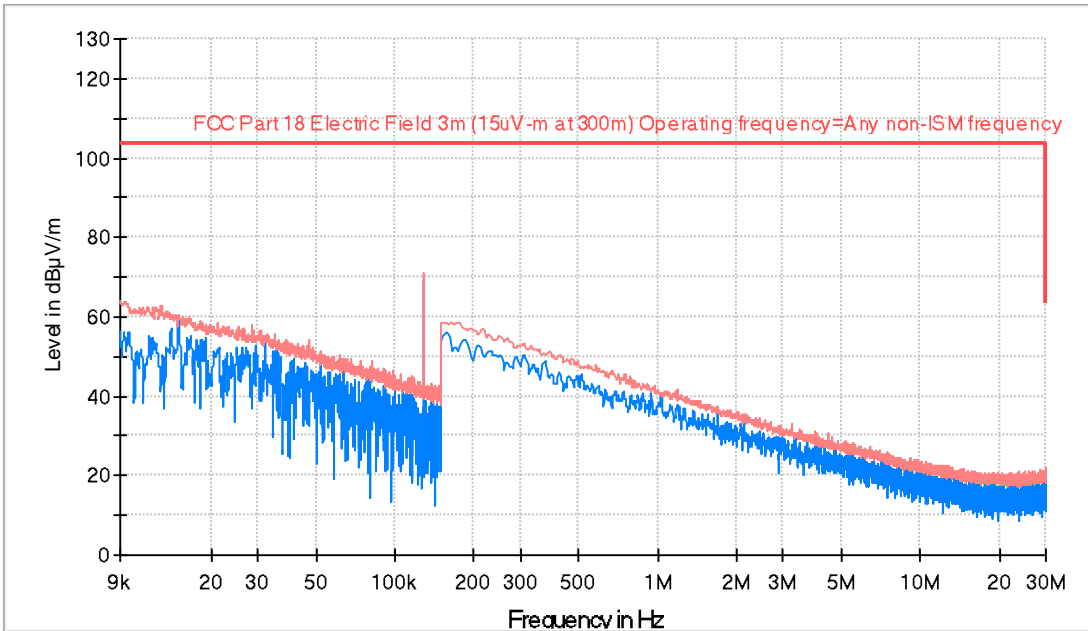
CR0201LR_OY



Frequency (MHz)	PK+_CLRWR (dBμV/m)	PK+_MAXH (dBμV/m)	Pol	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
0.134908	69.2	77.7	H	25.8	103.5
0.172885	51.9	56.6	H	46.9	103.5
0.614665	35.7	50.6	H	52.9	103.5
1.230570	17.9	48.7	H	54.8	103.5
2.439495	22.6	41.8	H	61.7	103.5
3.705135	16.0	33.2	H	70.3	103.5

TEST RESULTS (Cont.):

CR0201LR_OY

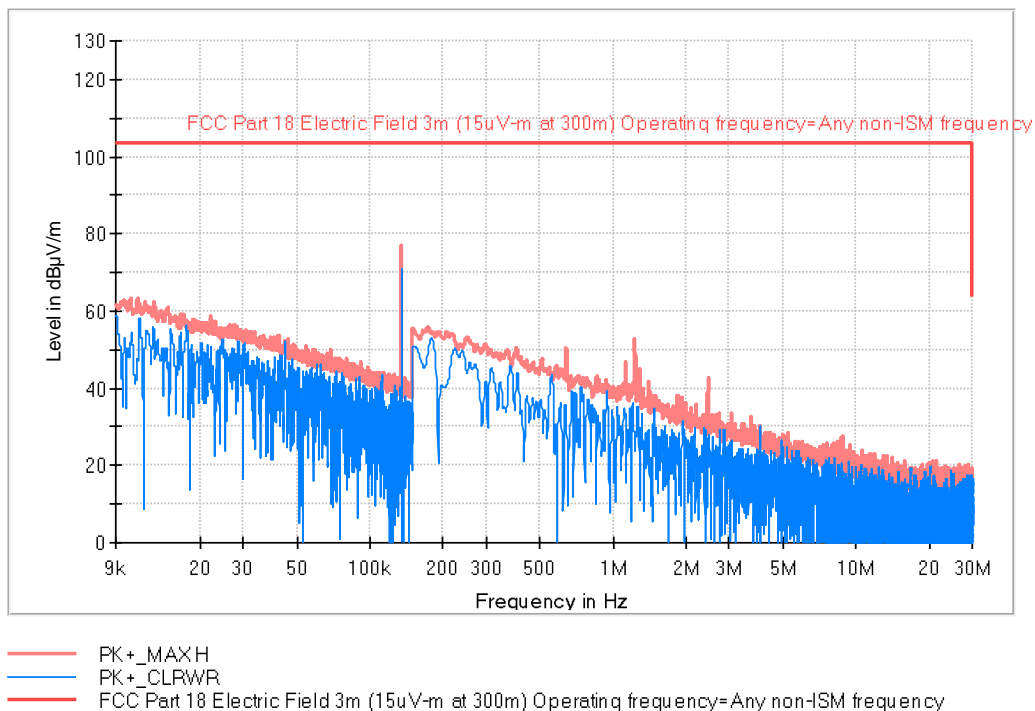


- FCC Part 18 Consumerequipment Electric Field Strength
- FCC Part 18 Electric Field 3m (15uV-m at 300m) Operating frequency=Any non-ISM frequency
- PK+_CLRWR
- PK+_MAXH

Frequency (MHz)	PK+_CLRWR (dBμV/m)	PK+_MAXH (dBμV/m)	Pol	Margin - PK+ (dB)	Limit - PK+ (dBμV/m)
0.028641	43.3	58.0	H	60.2	103.5
0.127793	69.2	71.0	H	34.5	103.5
3.239475	27.0	32.9	H	76.6	103.5

TEST RESULTS (Cont.):

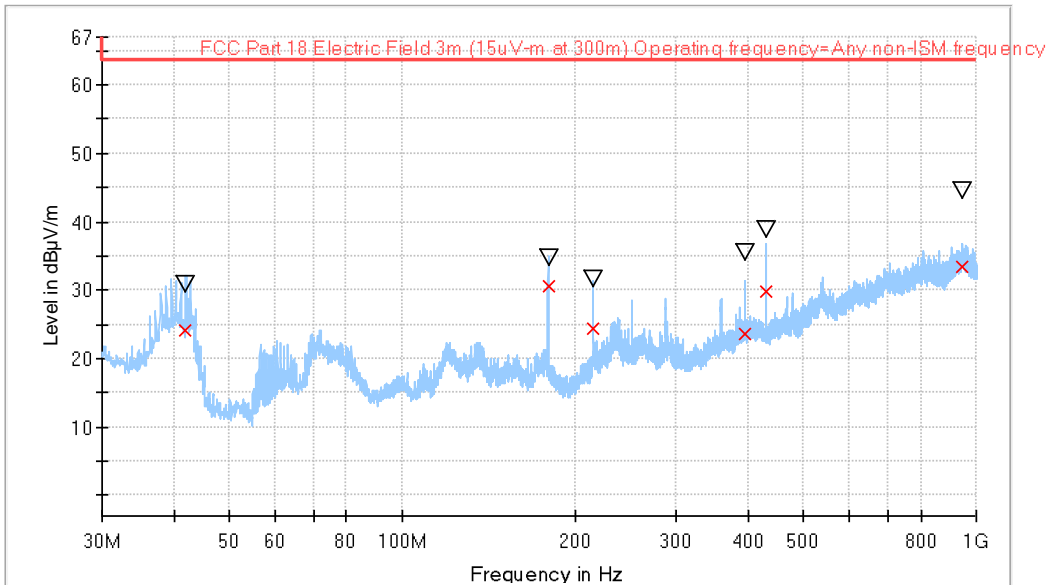
CR0201LR_OZ



Frequency (MHz)	PK+_CLRWR (dBµV/m)	PK+_MAXH (dBµV/m)	Pol	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
0.134913	71.2	76.7	H	26.8	103.5
0.645510	28.3	50.1	H	53.4	103.5
1.130075	28.5	46.4	H	57.1	103.5
1.233555	25.0	52.5	H	51.0	103.5
2.467355	27.1	42.5	H	61.0	103.5
8.904010	16.4	27.5	H	76.0	103.5

TEST RESULTS (Cont.):

CR0201LR



— Preview Result 1-PK+
— FCC Part 18 Electric Field 3m (15uV-m at 300m) Operating frequency=Any non-ISM frequency
× Final_Result QPK
▽ Final_Result PK+

Frequency (MHz)	QuasiPeak (dBμV/m)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Azimuth (deg)
41.979712	24.11	30.71	63.52	39.41	V	70.0
179.525908	30.49	34.79	63.52	33.03	V	-171.0
215.560790	24.41	31.67	63.52	39.11	V	40.0
395.107676	23.51	35.54	63.52	40.01	V	24.0
431.047387	29.87	38.84	63.52	33.65	V	61.0
941.944990	33.33	44.59	63.52	30.19	V	-168.0

B.2. OCCUPIED BANDWIDTH (OR 99% EMISSION BANDWIDTH)

Limits

RSS Gen Issue 5 – April, clause 6.7 (2018).

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

Compliance with RSS-Gen and the limits set out in the applicable RSS shall be demonstrated using the methods of measurement specified in section 3 of the Std. RSS-Gen Issue 5 (April 2018).

Verdict

Pass

Attachments

Operation mode: DUT ON. WPT in charging mode. Powered by 13.5Vdc.

Freq (kHz)	Bandwidth (kHz)	Occ Ch BW (Hz)
127	1	657.90
135	1	652.40