Human Exposure Report

Application No.:	KSCR2310001799AU
FCC ID:	EMJWP00001122
Applicant:	Primax Electronics LTD
Address of Applicant:	669,Ruey Kuang Road,Neihu 114 Taipei,Taiwan
Manufacturer:	Dongguan Primax Electronic & Telecommunication Products Ltd.
Address of Manufacturer:	No. #135, Keji East Road, Shijie Town, Dongguan City, Guangdong Province, 523290, China
Equipment Under Test (EUT):	
EUT Name:	Wireless Charger
Model No.:	P00001122
Trade Mark:	ZOOX
Standards:	47 CFR PART 1, Subpart I, Section 1.1310 KDB 680106 D01 v04
Date of Receipt:	2023-10-13
Date of Test:	2024-01-10 to 2024-07-10
Date of Issue:	2024-07-17
Test Result :	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

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Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2024-07-17	/

Authorized for issue by:				
Tested By		Eric Liu		
		Eric_Liu/Project Engineer		
Approved By		Terry Hou		
		Terry Hou /Reviewer		

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3 General Information

3.1 Details of E.U.T.

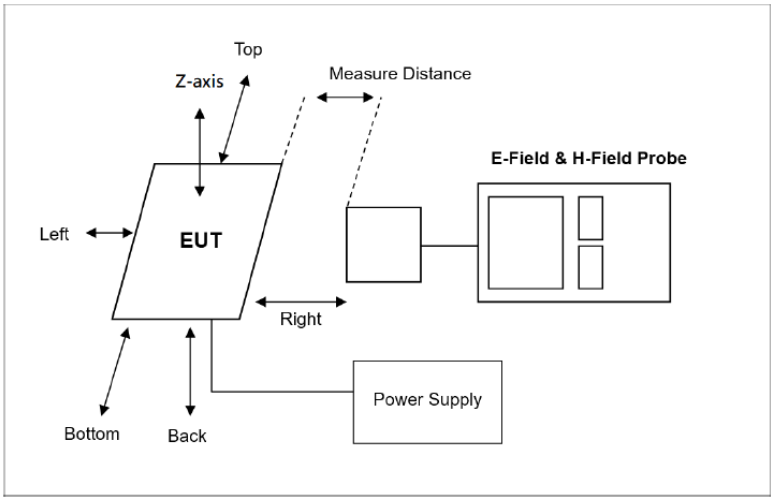
WPC

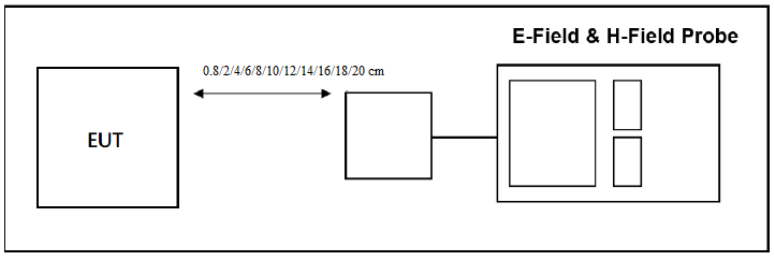
Power supply:	DC 12V
Operation frequency:	127.72-132.72kHz
Modulation type:	Load modulation
Antenna type:	Inductive Loop Coil Antenna
Wireless Output Power:	15W*2

3.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Load	--	--	--

3.3 Description of Product installation location





The device is intended for installation inside a vehicle as shown in the figure above. We test left side, right side, top side, bottom side and front side(Z-axis) of the device at a test distance of 0.8cm, 2cm, 4cm, 6cm, 8cm, 10cm, 12cm, 14cm, 16cm, 18cm, 20cm.

3.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.
No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.
Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc) is provided by the applicant. (if applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (if applicable).
3. Sample source: sent by customer.

3.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• FCC

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• ISED

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

• VCCI

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

3.6 Deviation from Standards

None

3.7 Abnormalities from Standard Conditions

None

4 Equipments Used during Test

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal date	Cal. Due date
1	Electromagnetic Field Probe	Narda	EHP-200AC	KSEM0907	2023-03-28	2024-03-27
2	Electromagnetic Field Probe	Narda	EHP-200AC	KSEM0907	2024-03-21	2025-03-20
3	3m Semi-Anechoic Chamber	ST	N/A	KSEM078-2	2023-07-20	2026-07-19
4	Test Software	Narda	EHP-200TS	N/A	N/A	N/A

5 RF Exposure Test Results

Test Requirement: 47 CFR PART 1, Subpart I, Section 1.1310

Measurement Distance: 0.8/2/4/6/8/10/12/14/16/18/20cm

Limit:

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f^2)	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6
Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f^2)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density

RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

5.1 Operating Environment

Temperature: 24.0 °C Humidity: 52 % RH Atmospheric Pressure: 1015 mbar

5.2 EUT Operation

This device has been charge at zero charge, intermediate charge, and full charge. The Maximum value has been recorded in the below table

5.3 Test Data and Field Estimated

5.3.1 Test Data using Dummy Load

M1	Transfer Zones Charging_The load shall be set at full load (15W*2) respectively. The two clients were placed on the EUT and the two coils are transmitting at same time

H-field Emissions

Test Distance (cm)	Test Position	Test Data (A/m)	Limit (A/m)
0.8	Front side	22.366	1.63
	Left side	1.536	
	Right side	1.461	
	Top side	0.537	
	Bottom side	0.449	
2	Front side	13.827	1.63
	Left side	1.216	
	Right side	1.111	
	Top side	0.359	
	Bottom side	0.316	
4	Front side	7.091	1.63
	Left side	0.919	
	Right side	0.775	
	Top side	0.281	
	Bottom side	0.262	
6	Front side	4.063	1.63
	Left side	0.583	
	Right side	0.571	
	Top side	0.227	
	Bottom side	0.219	
8	Front side	2.329	1.63
	Left side	0.441	
	Right side	0.426	
	Top side	0.209	
	Bottom side	0.202	
10	Front side	1.562	1.63
	Left side	0.295	
	Right side	0.273	
	Top side	0.183	
	Bottom side	0.185	
12	Front side	1.041	1.63
	Left side	0.246	
	Right side	0.232	
	Top side	0.176	
	Bottom side	0.178	

14	Front side	0.746	1.63
	Left side	0.201	
	Right side	0.194	
	Top side	0.171	
	Bottom side	0.169	
16	Front side	0.526	1.63
	Left side	0.182	
	Right side	0.186	
	Top side	0.166	
	Bottom side	0.162	
18	Front side	0.373	1.63
	Left side	0.175	
	Right side	0.173	
	Top side	0.164	
	Bottom side	0.160	
20	Front side	0.29	1.63
	Left side	0.169	
	Right side	0.171	
	Top side	0.158	
	Bottom side	0.157	

Note:

1. For loop/coil emitting structures (dominant H-field near field emission), only H-field measurements are acceptable for MPE limit compliance.

H-field and SAR simulation results refer to report: SZCR231200422201.

5.3.2 Field Estimated Data

Our dataset includes testing distances (X, unit: cm) and corresponding H-field measred values and calculated data for all three models (Y, unit: A/m) as bwlow:

Operation frequency	Test Distance (cm)	H-field measured level(A/m)	Quadratic Polynomial model	Cubic polynomial model	Exponential model
		From side	From side	From side	From side
127.76KHz	0.8	22.366	22.519	22.022	15.715
	2.0	13.827	13.336	13.830	10.486
	4.0	7.091	7.518	8.016	6.997
	6.0	4.063	4.102	4.188	4.669
	8.0	2.329	2.282	1.954	3.115
	10.0	1.562	1.419	0.920	2.079
	12.0	1.041	1.032	0.693	1.387
	14.0	0.746	0.802	0.881	0.926
	16.0	0.526	0.572	1.090	0.618
	18.0	0.373	0.345	0.928	0.412
	20.0	0.290	0.287	0.002	0.275

5.3.2.1 Model Selection and Fitting

We have chosen quadratic, cubic, and Exponential models to fit this dataset.

They are as follows:

1) Quartic polynomial model: $y = ax^4 + bx^3 + cx^2 + dx + e$
2) Cubic polynomial model: $y = ax^3 + bx^2 + cx + d$
3) Exponential model: $y = ae^{bx} + c$

5.3.2.2 Fitting Results and Analysis

Based on the computational results, we obtained the fitting functions and associated parameters for each model using Curve fitting tool and Regression model analysis tool in excel. Additionally, we generated comparison plots showing the fitting curves of all models alongside the original data, as well as separate comparison plots for each model showing the fitting curves and data, which can be seen from figure 1 to figure 3.

The following fitting functions are generated by importing the measured H-filed into Curve fitting tool in excel

Fitting Results of the Quartic polynomial Model:

$y = 0.0004202542x^4 - 0.0264786762x^3 + 0.6216036801x^2 - 6.5580485633x + 27.3805149240$, SE = 0.23

Fitting Results of the Cubic polynomial Model:

$y = -0.0081852904x^3 + 0.3661267774x^2 - 5.3266352603x + 26.0535345828$, SE =0.52

Fitting Results of the Exponential Model:

$y = 18.4759065641e^{-0.2022889961x}$, RMSE =0.77

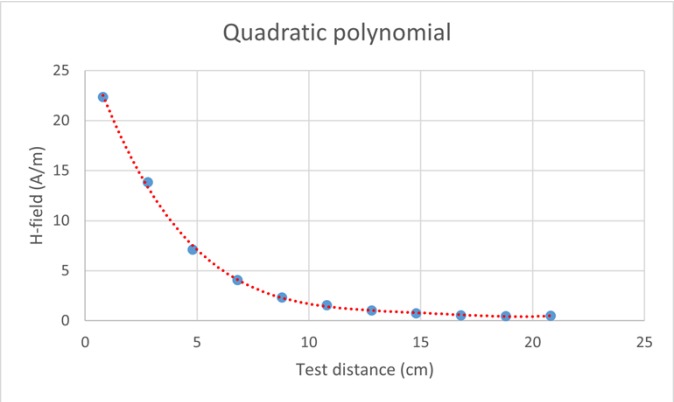


Figure 1 Quartic polynomial model

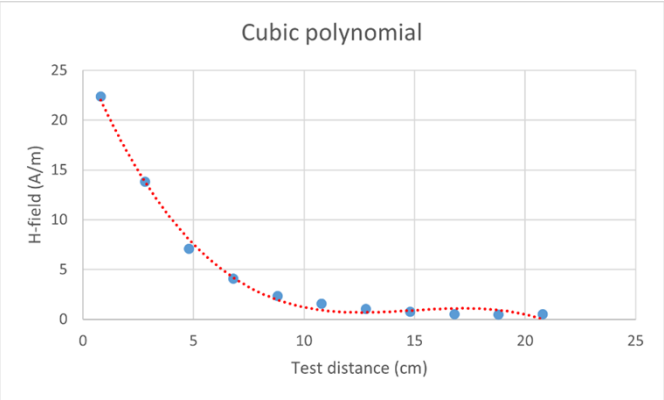


Figure 2 Cubic polynomial model

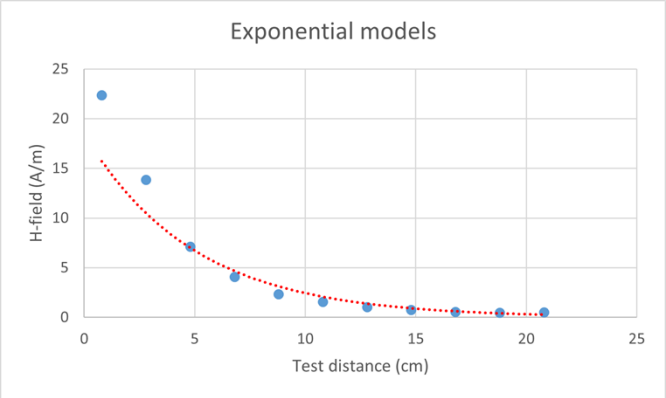


Figure 3 Exponential model

5.3.3 Analyzing Results

After completing the 3 regression models, we compared the output of each model, as is shown in table 1 below:

Table 1 - Comparison of the data from the 3 regression models

Parameter	Cubic polynomial model	Quadratic polynomial model	Exponential model
Multiple R	0.998	0.9995	0.989
R Square	0.995	0.999	0.978
Adjusted R Square	0.995	0.999	0.976
Standard Error (S)	0.521	0.23	0.77
Number of data points used	11	11	11
Estimated magnetic field strength at touch position (A/m)	26.054	**27.381**	18.476

Remark: the value of the table 1 can be obtained by using regression model analysis tool in excel.

Based on the fitting performance and parameter analysis, we can draw the following conclusions:

The Quartic polynomial Model had the best fitting performance, with the lowest standard error, and is below the minimum standard error threshold of 30% that prescribe.

5.3.4 Conclusion

Test Distance (cm)	Test Position	Test Data (A/m)	Estimates Data (A/m)	Limit (A/m)
0	Front side	N/A	27.381	1.63
0.8		22.366	22.519	
2		13.827	13.336	
4		7.091	7.518	
6		4.063	4.102	
8		2.329	2.282	
10		1.562	1.419	
12		1.041	1.032	
14		0.746	0.802	
16		0.526	0.572	
18		0.373	0.345	
20		0.29	0.287	

Remark: The value of the table were obtained by using function of Quadratic polynomial model mentioned above.

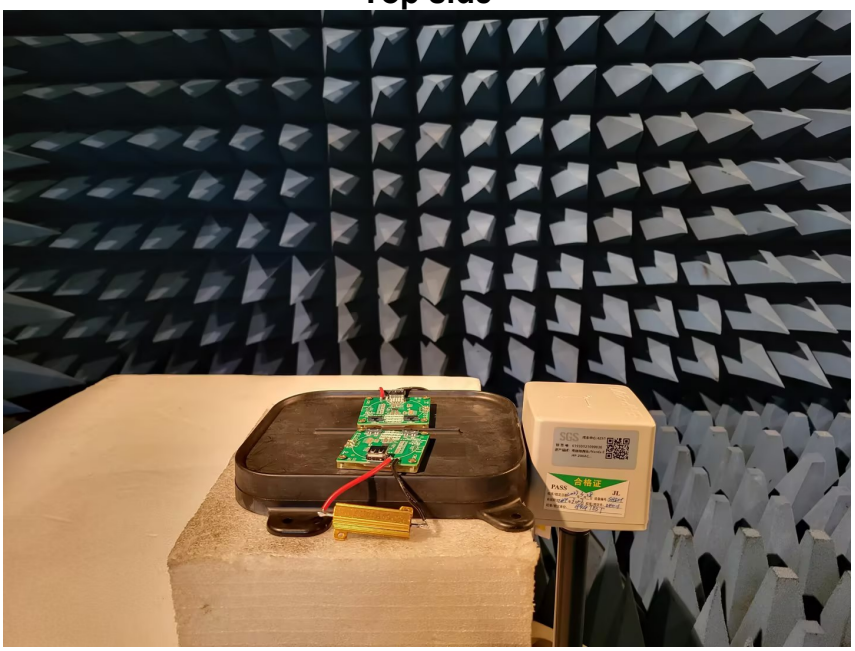
6 Test photos

Front side

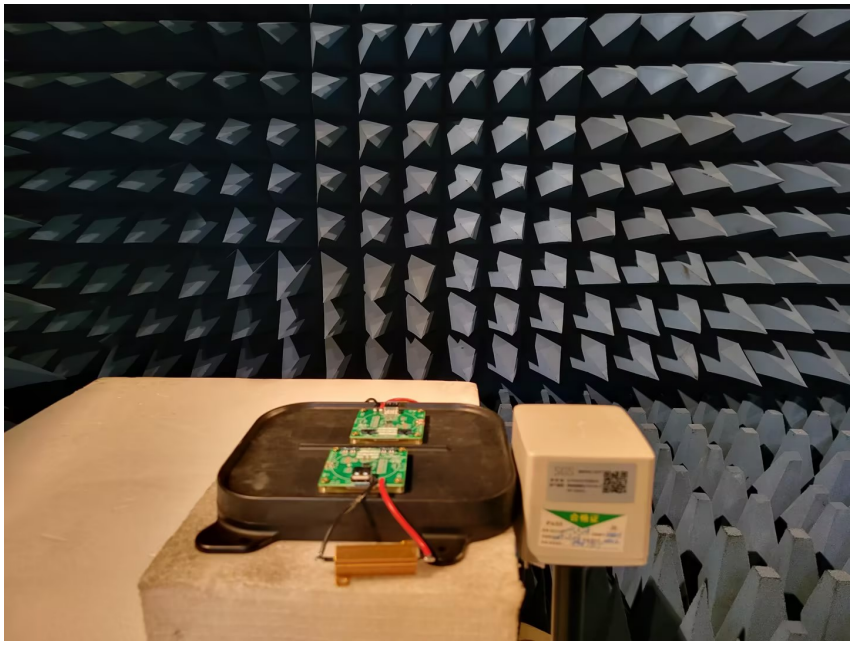
Left side

Right side

Top side



Bottom side



- End of the Report -