

RF EXPOSURE CONSIDERATIONS FOR LOW POWER CONSUMER WIRELESS POWER TRANSFER APPLICATIONS

FCC ID: 2AFR8F1754A

Requirements:

According to FCC KDB 680106 D01 v03 Section 2(d):

Although categorically excluded from routine RF exposure evaluation, Part 18 devices are not exempted from RF exposure compliance. When exposure concerns arise; for example, due to evolving products and operations, RF exposure evaluation may be requested under the provisions of Sections 1.1307 (c) and (d) to determine compliance. Because of significant variations in design and operating characteristics, the procedures required to evaluate RF exposure compliance for wireless power transfer are considered according to the exposure potentials of individual implementations.

According to FCC KDB 680106 D01 v03 Section 3(c):

For devices designed for typical desktop applications, such as wireless charging pads, RF exposure evaluation should be conducted assuming a user separation distance of 15 cm. E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m. A KDB inquiry is required to determine the applicable exposure limits below 100 kHz.

Table 1—Limits for Maximum Permissible Exposure (MPE)

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			5	6
(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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

RF Exposure Evaluation:

Model(s) Tested:		<ul style="list-style-type: none"> • Custom Davinci S-Pen Horizontal Recoiler • Custom Davinci S-Pen Vertical Recoiler
Model(s) Covered:		<ul style="list-style-type: none"> • Custom Davinci S-Pen Horizontal Recoiler • Custom Davinci S-Pen Vertical Recoiler
EUT Specifications:	Primary Power as Tested:	4.75 to 5.25 VDC
	FCC ID:	2AFR8F1754A
	Equipment Code:	8CC
	Primary Transfer Frequency:	531 KHz – 562 KHz
	Analysis:	The results obtained relate to the items tested.
Temperature:		21.5 degree Celsius
Humidity:		41%
Barometric Pressure:		101kPa
Evaluated by:		Deepak Giri
Report Date:		August 15, 2019

Test Setup:

Measurements were performed at 15cm away from the EUT. EUT was setup to run in normal operation with continuous transmission. Electric and magnetic field probe was placed 15cm away

from the EUT and electric field and magnetic field were measured. Measurements were taken on all side of the EUT. The time average used from the measurement was 6 minutes. Measurements were performed on two models: horizontal model and vertical model. Please refer the setup photos.

Frequency MHz	Total V/m	X V/m	Y V/m	Z V/m	Limit V/m
0.531	0.1119	0.0678	0.059	0.66	614
0.556	0.11	0.069	0.059	0.067	614

EUT Back E-Field 15cm Vertical Model

Frequency MHz	Total A/m	X A/m	Y A/m	Z A/m	Limit A/m
0.531	0.013	0.008	0.007	0.008	1.63
0.556	0.013	0.008	0.006	0.008	1.63

EUT Back H-Field 15cm Vertical Model

Frequency MHz	Total V/m	X V/m	Y V/m	Z V/m	Limit V/m
0.531	0.136	0.081	0.058	0.092	614
0.556	0.134	0.081	0.059	0.088	614

EUT Front E-Field 15cm Vertical model

Frequency MHz	Total A/m	X A/m	Y A/m	Z A/m	Limit A/m
0.531	0.012	0.008	0.006	0.006	1.63
0.556	0.012	0.008	0.006	0.006	1.63

EUT Front H-Field 15cm Vertical Model

Frequency MHz	Total V/m	X V/m	Y V/m	Z V/m	Limit V/m
0.531	0.146	0.074	0.11	0.177	614
0.561	0.073	0.059	0.216	0.177	614

EUT Side E-Field 15cm Vertical Model

Frequency MHz	Total A/m	X A/m	Y A/m	Z A/m	Limit A/m
0.531	0.012	0.008	0.006	0.006	1.63
0.556	0.012	0.008	0.006	0.006	1.63

EUT Side H-Field 15cm Vertical Model

Frequency MHz	Total V/m	X V/m	Y V/m	Z V/m	Limit V/m
0.531	0.365	0.233	0.218	0.177	614
0.556	0.364	0.233	0.216	0.177	614

EUT Back E-Field 15 cm Horizontal Model

Frequency MHz	Total A/m	X A/m	Y A/m	Z A/m	Limit A/m
0.531	0.013	0.008	0.007	0.007	1.63
0.556	0.012	0.008	0.007	0.007	1.63

EUT Back H-Field 15cm Horizontal Model

Frequency MHz	Total V/m	X V/m	Y V/m	Z V/m	Limit V/m
0.531	0.116	0.073	0.065	0.063	614
0.556	0.117	0.073	0.066	0.063	614

EUT Front E-Field 15cm Horizontal Model

Frequency MHz	Total A/m	X A/m	Y A/m	Z A/m	Limit A/m
0.531	0.013	0.008	0.006	0.008	1.63
0.556	0.013	0.008	0.006	0.007	1.63

EUT Front H-Field 15cm Horizontal Model

Frequency MHz	Total V/m	X V/m	Y V/m	Z V/m	Limit V/m
0.531	0.116	0.073	0.063	0.064	614
0.556	0.116	0.074	0.064	0.062	614

EUT Side E-Field 15cm Horizontal Model

Frequency MHz	Total A/m	X A/m	Y A/m	Z A/m	Limit A/m
0.531	0.012	0.008	0.006	0.007	1.63
0.556	0.012	0.008	0.006	0.006	1.63

EUT Side H-Field 15cm Horizontal Model

Equipment List

Asset	Equipment	Manufacturer	Model	Calibration Date	Calibration Due Date	Calibration Type
1T7845	Electric and Magnetic field probe-analyzer	Narda S.T.S./PMM	EHP 200A	11/06/2018	11/06/2019	Standard
1T4503	Shielded Room	Universal Shielding Corp	N/A			Not Required

Set Up Photos



Horizontal Model Set up Photo



Vertical Model Set up Photo