FCC §1.1310 & §2.1093 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE)

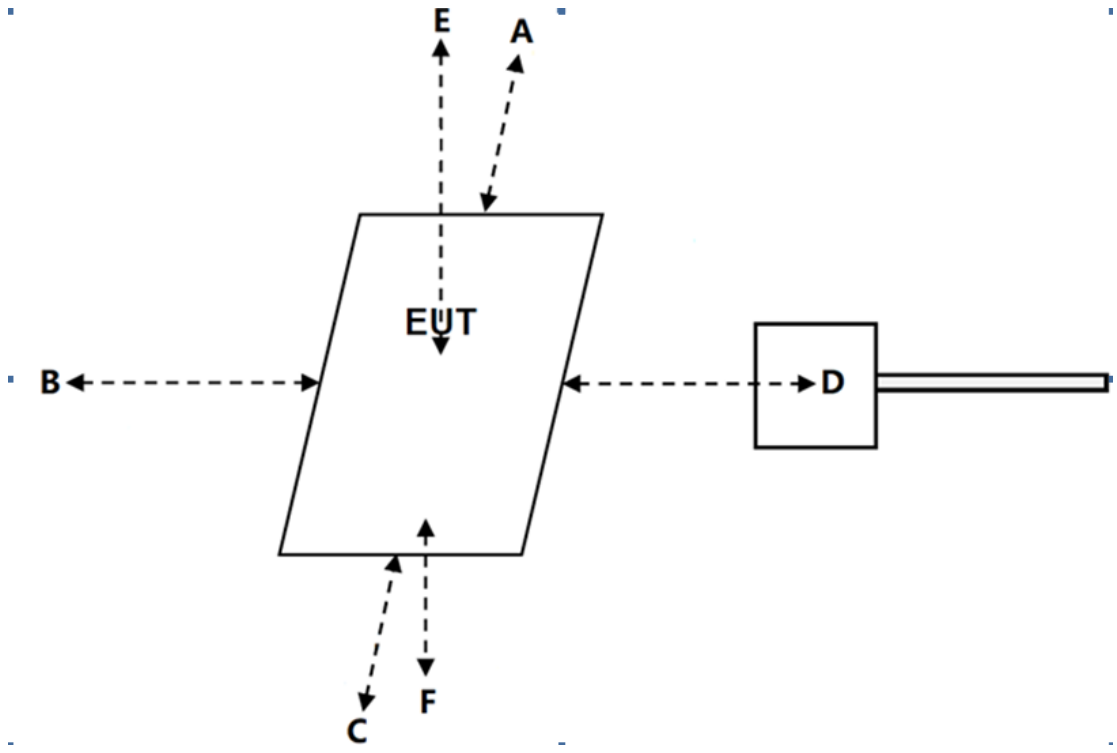
(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

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

According with 680106 D01 Wireless Power Transfer v04 clause 3.2

Accordingly, for § 2.1091-Mobile devices, the MPE limits between 100 kHz to 300 kHz are to be considered the same as those at 300 kHz in Table 1 of § 1.1310, that is, 614 V/m and 1.63 A/m, for the electric field and magnetic field, respectively. For § 2.1093-Portable devices below 4 MHz and down to 100 kHz, the MPE limits in § 1.1310 (with the 300 kHz limit applicable all the way down to 100 kHz) can be used for the purpose of equipment authorization in lieu of SAR evaluations.

Block Diagram of Test Setup



MAGPy Probe Information

The full MAGPy-8H3D+E3D V2 probe consists of eight isotropic H-field subprobes and one isotropic E-field subprobe that are all integrated inside the probe head with a flat tip. Each isotropic H-field subprobe comprises three concentric orthogonal loop coil sensors. The isotropic E-field subprobe is composed of three orthogonal sensors (x and y sensors are dipoles and the sensor measuring the z component is a monopole). In total, the MAGPy-8H3D+E3D V2 probe is thus composed of nine subprobes and 27 single sensors that measure in the time-domain. The flat-tip probe design brings the sensors closer to the tip (e.g., the closest H-field sensors are now 7.5mm from the tip). The probe specifications are provided in Table 2.1.

Parameter	Specs
PROBE DESIGN	
Diameter	60 mm
8 isotropic H-field sensors	concentric loops of 1 cm^2 arranged at the corner of a cube of 22 mm side length
1 isotropic E-field sensor	orthogonal dipole/monopole (arm length: 50 mm)
Measurement center	18.5 mm from the probe tip
Temperature range	0–40 °C
Dimensions	110 × 635 × 35 mm (MAGPy-8H3D+E3D V2 & MAGPy-DAS V2)
H-FIELD SPECIFICATION	
Frequency range	3 kHz–10 MHz
Measurement range	0.1–3200 A/m, 0.12 µT–4 mT
Gradient range	0–80 T/m/T
E-FIELD SPECIFICATION	
Frequency range	3 kHz–10 MHz
Measurement range	0.08–2000 V/m

Table 2.1: MAGPy-8H3D+E3D V2 probe specifications

Test Procedures

1) The measuring distance from the center of the probe to the tip of the probe is 1.85cm, so the minimum measurement distance is 1.85cm. To obtain the H-field and E-field at 0cm, perform the following steps.
2) Perform H-field and E-field measurements for each all sides of the EUT surface at 3cm, along all the principal axes defined with respect to the orientation of the transmitting element (e.g., coil or antenna). Compare the test data of all the sides to get the worst position.
3) At the worst position, test the H-field and E-field at the distance from 2cm to 6cm. If the worst position is the top side, then test from 3cm to 7cm. As the load (Phone) has some thickness. The test step is 1cm.
4) The highest emission level was recorded.
5) According to the measurement data, the curve is fitted with the measured distance as the horizontal coordinate and the measured H-field or E- field as the vertical coordinate.
6) The fitted curve needs to be validated through the probe measurements for the two closest points to the device surface. The difference needs to be less than 30%.
7) The H-field or E-field at 0cm is estimated from the fitted curve and compared with limit.

Test Data

Environmental Conditions

Temperature:	24.7~26.1 ℃
Relative Humidity:	44~62 %
ATM Pressure:	101.1~101.5 kPa

The testing was performed by Rainbow Zhu on 2025-02-12.

Test mode: Wireless charging

H-Field Strength

Test Frequency (kHz)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Position F (A/m)	Limit (A/m)
110.5-205	0.2	0.21	0.13	0.31	0.44	0.26	1.63

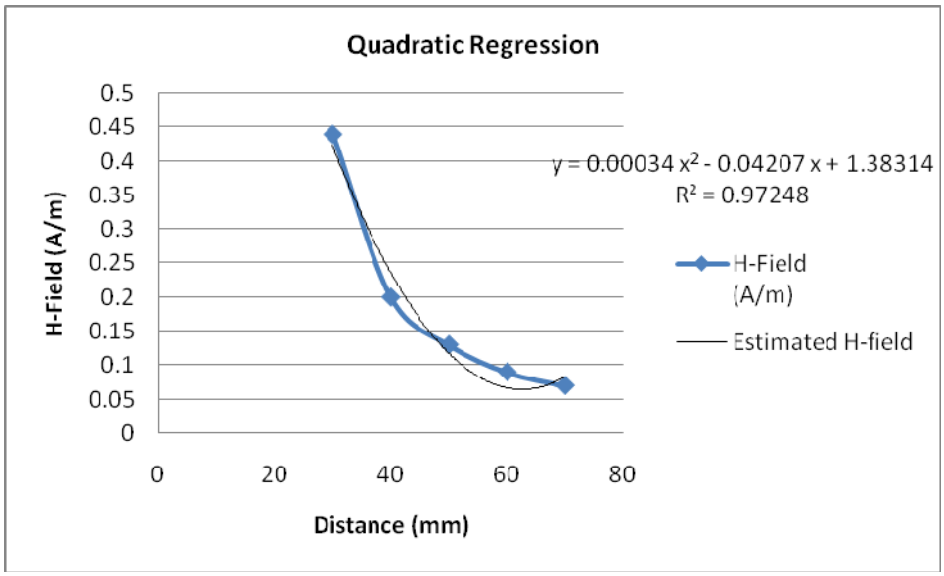
E-Field Strength

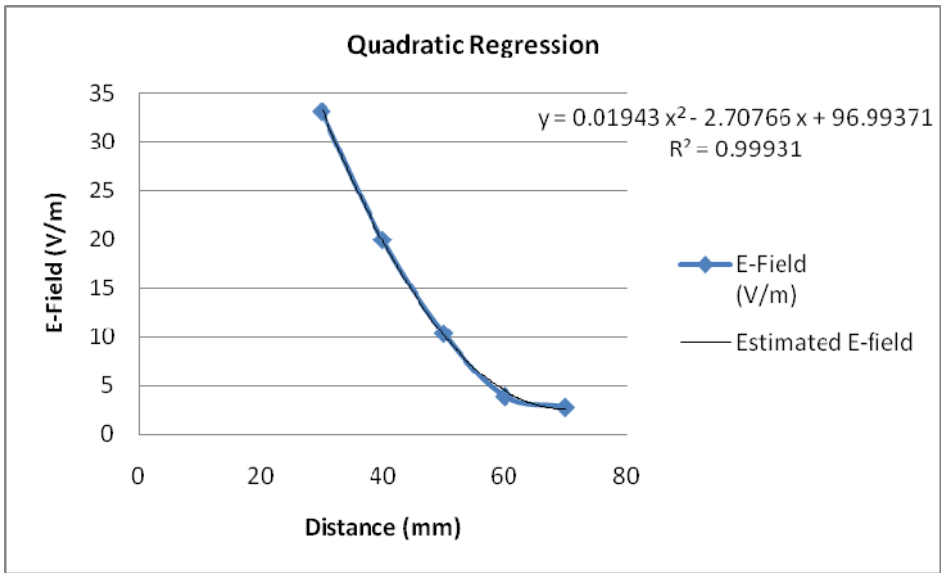
Test Frequency (kHz)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Position F (V/m)	Limit (V/m)
110.5-205	21.3	4.16	11.1	11.2	33.1	23.5	614

Note 1: The test distance is 30mm from the center of the probe to the EUT edge.
Note 2: The worst position is E side according to the above data table. So we perform the curve fitting at the position E.

Test Frequency (kHz)	Measuring Position	Measuring Distance (mm)	H-Field (A/m)	E-Field (V/m)
110.5-205	E	30	0.44	33.10
		40	0.20	20.00
		50	0.13	10.40
		60	0.09	3.96
		70	0.07	2.88

Curve Fitting





Verify the fitting curve

Measuring Position	Measuring Distance (mm)	Estimated H-Field (A/m)	Measured H-Field (A/m)	Agreement Between Estimated and Measured (%)	Limit (%)
E	30	0.43	0.44	-2.27	±30
	40	0.24	0.20	20.00	±30

Measuring Position	Measuring Distance (mm)	Estimated E-Field (V/m)	Measured E-Field (V/m)	Agreement Between Estimated and Measured (%)	Limit (%)
E	30	33.25	33.1	0.45	±30
	40	19.78	20.0	-1.10	±30

Conclusion: The validation is considered sufficient, because within 30% agreement between the estimated model and the (E-Field and H-Field) probe measurements is demonstrated.

Result: The estimated result at 0mm is **1.38A/m (H-field), 96.99V/m (E-Field)**, which below the limit: 1.63A/m (H-field), 614V/m (E-Field). So it is compliance.