FCC 47 CFR MPE REPORT

Changsha Benlei Technology Co., Ltd.

Smart Cutting Machine

Model Number: S301

Addition Model: S31

FCC ID: 2BEVY-S301

Applicant:	Changsha Benlei Technology Co., Ltd.
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Maximum Permissible Exposure

1. Applicable Standards

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 limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

1.1. Limits for Maximum Permissible Exposure (MPE)

(a) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-10000			5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-10000			1.o	30

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

1.2. MPE Calculation Method

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: Pd (W/m^2) = $\frac{E^2}{377}$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = $\frac{30 \times P \times G}{377 \times d^2}$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

2. Conducted Power Result

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
GFSK	2402	-1.53	0.703
	2441	-0.55	0.881
	2480	-0.18	0.959
π/4-DQ PSK	2402	-0.79	0.834
	2441	0.14	1.033
	2480	0.5	1.122
BLE 1M	2402	-1.71	0.675
	2440	-0.77	0.838
	2480	-0.4	0.912
BLE 2M	2402	-1.46	0.714
	2440	-0.53	0.885
	2480	-0.21	0.953

3. Calculated Result and Limit

Mode	Peak output power (dBm)	Target power (dBm)	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
				(dBi)	(Linear)			
2.4G Band								
GFSK	-0.18	0±1	1	2.64	1.837	0.00046	1	Complies
π/4-DQPSK	0.50	0±1	1	2.64	1.837	0.00046	1	Complies
BLE 1M	-0.4	0±1	1	2.64	1.837	0.00046	1	Complies
BLE 2M	-0.21	0±1	1	2.64	1.837	0.00046	1	Complies

For NFC:

Limit=180/13.56=13.27 mW/cm2
Field strength = 44.49dBuV/m@3m
$P=\{ [10^{(44.49/20)} /10^6 *3]^2/30 \}*1000mW = 0.0000084mW$
Pd=1.67x10^(-9) mW/cm2 < 13.27 mW/cm2

BT+NFC:
Ratio=0.00046/1+1.67x10^(-9)/13.27=1.26x10^(-10) <1

End of Test Report