



FCC RF EXPOSURE REPORT

Tivo Technologies Pte Ltd

Gaming Mouse

Model Number: EX1

Additional Model: V18, GM560, GM580

FCC ID: 2BMK5-EXONE

Applicant:	Tivo Technologies Pte Ltd
Address:	#05-15, 514 Chai Chee Ln, Singapore 469029, Singapore
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China
Tel: 86-769-83081888-808	

Report Number:	ESTE-R2412216
Date of Test:	Dec. 13, 2024~ Dec. 26, 2024
Date of Report:	Dec. 30, 2024

1. Applicable Standards

FCC Part 2(Section 2.1093)

FCC KDB 447498 D04 Interim General RF Exposure Guidance v01

2. Exposure Evaluation of Portable or Mobile Devices

Human exposure to RF emissions from portable devices (47 CFR §2.1093), as defined by the FCC, must be evaluated with respect to the FCC-adopted limits for SAR. Evaluation of mobile devices, as defined by the FCC, may also be performed with respect to SAR limits, but in such cases it is usually simpler and more cost-effective to evaluate compliance with respect to field strength or power density limits. For certain devices that are designed to be used in both mobile and portable configurations similar to those described in 47 CFR §2.1091(d)(4), such as certain desktop phones and wireless modem modules, compliance for mobile configurations is also satisfied when the same device is evaluated for SAR compliance in portable configurations.

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B.2})$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20 \text{ cm}}$ is per Formula (B.1). The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)										
	5	10	15	20	25	30	35	40	45	50	
	300	39	65	88	110	129	148	166	184	201	217
	450	22	44	67	89	112	135	158	180	203	226
	835	9	25	44	66	90	116	145	175	207	240
	1900	3	12	26	44	66	92	122	157	195	236
	2450	3	10	22	38	59	83	111	143	179	219
	3600	2	8	18	32	49	71	96	125	158	195
	5800	1	6	14	25	40	58	80	106	136	169

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 300 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

3. Evaluation Results

Mode	CH	Peak output Power (dBm)	Antenna Gain (dBi)	effective radiated power (dBm)	Target power (dBm)	Max. Target power (mW)	SAR Test Exemption Limit (mW)
BLE 1M	2402	3.29	-0.71	0.43	3±1	2.512	2.72
	2440	3.42	-0.71	0.56	3±1	2.512	2.72
	2480	3.19	-0.71	0.33	3±1	2.512	2.72
BLE 2M	2402	3.42	-0.71	0.56	3±1	2.512	2.72
	2440	3.39	-0.71	0.53	3±1	2.512	2.72
	2480	3.23	-0.71	0.37	3±1	2.512	2.72

Note:

1. Limited= $3060 \cdot (0.5/20)^x$, $x = -\log(60/(3060 \cdot \sqrt{f}))$.

2. We choose $f=2.48\text{GHz}$ (Highest frequency operate at bluetooth) to calculate MPE limit as higher frequency will have lower MPE limits.

3. SAR Test Exclusion Thresholds is 2.72mW for separation distance 5mm. Therefore, SAR test is not required.

For 2.4G SRD

Field strength = 87.84dBuV/m@3m

$$P = \{ [10^{(87.84/20)} / 10^6 \cdot 3]^2 / 30 \} \cdot 1000\text{mW} = 0.18\text{mW} < 2.72\text{mW}$$

End of Test Report