

TEST REPORT

Application No.: HKEM2502000085HS
Applicant: Black Diamond Equipment
Address of Applicant: 2084 E 3900 S, Salt Lake City, Utah 84124, USA
Equipment Under Test (EUT):
EUT Name: Consumer Use Battery Operated Light
Model No.: BD062832 MEGAWATT HEADLAMP REMOTE
FCC ID: REMBD062832
Standard(s) : 47 CFR Part 1.1307; 47 CFR Part 2.1093
KDB447498D04 General RF Exposure Guidance v01
Date of Receipt: 2025-02-19
Date of Test: 2025-02-19
Date of Issue: 2025-02-19

Test Result:	The submitted sample was found to comply with the test requirement
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Law Man Kit
EMC Manager

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Revision Record			
Revision No.	Date	Report superseded	Remark

Authorized for issue by:				
				
		Chan Chun Lok /Test Engineer		Date: 2025-02-19
				
		Law Man Kit /Reviewer		Date: 2025-02-19

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
RF Exposure	47 CFR Part 1.1307, 47 CFR Part 2.1093,	KDB447498D04	KDB447498D04	PASS

Declaration of EUT Family Grouping:

N/A

Abbreviation:

Tx: In this whole report Tx (or tx) means Transmitter.
 Rx: In this whole report Rx (or rx) means Receiver.
 RF: In this whole report RF means Radiated Frequency.
 CH: In this whole report CH means channel.
 Volt: In this whole report Volt means Voltage.
 Temp: In this whole report Temp means Temperature.
 Humid: In this whole report Humid means humidity.
 Press: In this whole report Press means Pressure.
 N/A: In this whole report not application.

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4 General Information

4.1 Details of E.U.T.

Power supply:	RC: DC 3 V ('CR2032' size battery x 1)
Test voltage:	RC: DC 3 V
Cable:	N/A
Antenna Gain:	0 dBi
Antenna Type:	PCB Antenna
Modulation Type:	FSK
Number of Channels:	1
Operation Frequency:	433.86MHz

Frequency List:

Channel	Frequency (MHz)
1	433.86

The frequencies under test are bolded.

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Modulation Configuration

RF software:	N/A			
Modulation	Packet	Packet Type	Packet Size	Power
FSK	Default	Default	Default	Default
Remark: 1. Default value was set in test software as maximum output power setting.				

4.4 Test Location

All tests were performed at:

SGS Hong Kong Limited
Unit 2 and 3, G/F, Block A, Po Lung Centre,
11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong
Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.5 Test Facility

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

• **IAS Accreditation (Lab Code: TL-817)**

SGS Hong Kong Limited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

• **FCC Recognized Accredited Test Firm(CAB Registration No.: 514599)**

SGS Hong Kong Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0015, Test Firm Registration Number: 514599.

• **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS Hong Kong Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0015, Site Registration Number: 26103.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Radio Spectrum Technical Requirement

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.

5.1 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of §1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

The 1-mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph §1.1307(b)(3)(ii)(A).

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

5.2 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table B.1—Thresholds For Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	—	1.34	159 m	—	35.6 m	1,920 R ²
1.34	—	30	35.6 m	—	1.6 m	3,450 R ² /f ²
30	—	300	1.6 m	—	159 mm	3.83 R ²
300	—	1,500	159 mm	—	31.8 mm	0.0128 R ² f
1,500	—	100,000	31.8 mm	—	0.5 mm	19.2R ²
Subscripts L and H are low and high; λ is wavelength.						
From §1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

The table applies to any RF source (i.e. single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least $\lambda/2\pi$. The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

For mobile devices that are not exempt per Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from §2.1091(c)(1); also in §1.1307(b)(1)(i)(B)].

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

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

Limit calculation			
Frequency range	Frequency(MHz)	$R(\lambda/2\pi)(\text{m})$	Threshold ERP(W)
300~1500MHz	915	0.0522	0.032
1500~100000MHz	2480	0.0193	0.007

5.3 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of $\lambda/4$.

As for devices with antennas of length greater than $\lambda/4$ where the gain is not well defined, but always less than that of a half-wave dipole (length $\lambda/2$), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.

The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.

The SAR-based exemption formula of §1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

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

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).

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

5.4 EUT RF Exposure Evaluation

The Antenna Gain: 0dBi

Test Channel	Maximum Field Strength (dBuV/m)	E.I.R.P (mW)
433MHz	67.8*	0.002

The maximum EIRP[mW] was 0.002 mW is less than Limit and then the device exempt from the SAR evaluation.

Remark:

$EIRP[dBm] = E[dBuV/m] - 95.2$, for $d = 3$ m for E-field.

$= 67.8 - 95.2$

$= -27.4$ dBm

$= 10^{(-27.4/10)}$

$= 0.002$ mW

Note: $E[dBuV/m]$ is 67.8 dBuV/m as worse case was derived from test report HKEM250200008502.

5.5 RF Exposure Calculation

The Max EIRP is 0.002mW.

Remark: we used the maximum power between the conducted power and ERP/EIRP to perform RF exposure exemption evaluation.

	Evaluation method	Exempt Limit(mW)	Verdict
☐	Blanket 1 mW Blanket Exemption	1mW	N/A
☐	MPE-based Exemption(ERP)	7mW(ERP)	N/A
☒	SAR-based Exemption(P_{th})	2.7mW	Yes

So, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report.

6 Photographs

6.1 EUT Constructional Details (EUT Photos)

Refer to the appendices external, internal and setup photos.

- End of the Report -