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RF Exposure Evaluation Report

Report No.: CQASZ20221202120E-03
Applicant: TOPDON TECHNOLOGY Co., Ltd.
Address of Applicant: Unit 2005, No.3040 Xinghai, Qianhai Shimaoh, Qianhai Shenzhen-Hong Kong Cooperation Zone Shenzhen China

Equipment Under Test (EUT):
EUT Name: Battery Tester
Model No.: BT100W
Test Model No.: BT100W
Brand Name: **TOPDON**[®]
FCC ID: 2AVYW-BT100W
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498 D04 Interim General RF Exposure Guidance v01

Date of Receipt: 2022-12-09
Date of Test: 2022-12-09 to 2022-12-27
Date of Issue: 2023-01-09
Test Result: **PASS***

*In the configuration tested, the EUT complied with the standards specified above.

Tested By: Lewis Zhou
(Lewis Zhou)

Reviewed By: Timo Lei
(Timo Lei)

Approved By: Jack Ai
(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20221202120E-03	Rev.01	Initial report	2023-01-09

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3 General Information

3.1 Client Information

Applicant:	TOPDON TECHNOLOGY Co., Ltd.
Address of Applicant:	Unit 2005, No.3040 Xinghai, Qianhai Shimao, Qianhai Shenzhen-Hong Kong Cooperation Zone Shenzhen China
Manufacturer:	TOPDON TECHNOLOGY Co., Ltd.
Address of Manufacturer:	Unit 2005, No.3040 Xinghai, Qianhai Shimao, Qianhai Shenzhen-Hong Kong Cooperation Zone Shenzhen China
Factory:	TOPDON TECHNOLOGY Co., Ltd.
Address of Factory:	Unit 2005, No.3040 Xinghai, Qianhai Shimao, Qianhai Shenzhen-Hong Kong Cooperation Zone Shenzhen China

3.2 General Description of EUT

Product Name:	Battery Tester
Model No.:	BT100W
Test Model No.:	BT100W
Trade Mark:	TOPDON [®]
Software Version:	V1.0
Hardware Version:	V1.0
Power Supply:	Power by DC 12V for lead-acid batteries

3.3 General Description of BLE

Operation Frequency:	2402MHz~2480MHz
Modulation Type:	GFSK
Transfer Rate:	1Mbps
Number of Channel:	40
Product Type:	<input type="checkbox"/> Mobile <input checked="" type="checkbox"/> Portable
Antenna Type:	PCB antenna
Antenna Gain:	-1.36dBi

3.4 General Description of BT

Operation Frequency:	2402MHz~2480MHz
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Transfer Rate:	1Mbps/2Mbps/3Mbps
Number of Channel:	79
Product Type:	<input type="checkbox"/> Mobile <input checked="" type="checkbox"/> Portable
Antenna Type:	PCB antenna
Antenna Gain:	-1.36dBi

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Standard Requirement

447498 D04 Interim General RF Exposure Guidance v01

3.2. SAR Test Reduction Guidance

SAR test reduction procedures [Glossary] allow using a particular set of test data as representative of other, similar, test conditions. This may be applied for data within different test positions (e.g. body, head, extremity), wireless modes (e.g. Wi-Fi, cellular), and frequency bands. This test reduction process provides for the use of test data for one specific channel, while referencing to those data for demonstrating compliance in other required channels for each test position of an exposure condition, within the operating mode of a frequency band. This is limited specifically to when the reported 1-g or 10-g SAR for the mid-band or highest output power channel meets any of the following conditions.

4.1.2 Limits

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).
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

4.1.3 EUT RF Exposure

1) For BLE

Measurement Data

Channel	EIRP (dBm)	ERP (dBm)	Maximum tune-up Power (mW)	Exclusion threshold (mW)
Lowest (2402MHz)	-2.38	-4.53	0.352	3.0
Middle (2440MHz)	-0.96	-3.11	0.489	
Highest (2480MHz)	-2.26	-4.41	0.362	

Remark: The Max Conducted Peak Output Power data refer to report Report No.: CQASZ20221202120E-02

2) For BT

Measurement Data

Channel	EIRP (dBm)	ERP (dBm)	Maximum tune-up Power (mW)	Exclusion threshold (mW)
Lowest (2402MHz)	-4.32	-6.47	0.23	3.0
Middle (2441MHz)	-3.09	-5.24	0.30	
Highest (2480MHz)	-4.3	-6.45	0.23	

Remark: The Max Conducted Peak Output Power data refer to report Report No.: CQASZ20221202120E-01

*** END OF REPORT ***