



Shenzhen Huaxia Testing Technology Co., Ltd

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640
Fax: +86-755-26648637
Website: www.cqa-cert.com

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RF Exposure Evaluation Report

Report No.: CQASZ20201001302E-04
Applicant: ACOUSTMAX INTERNATIONAL CO., LTD
Address of Applicant: Unit D16/F Cheuk Nang Plaza 250 Hennessy Road WanchaiHongKong.
Equipment Under Test (EUT):
EUT Name: MONSTER TORCH
Model No.: MNTORCH, MNTORCH-2, MNTORCH-C, MNTORCH-X
Test Model No.: MNTORCH
Brand Name: Monster
FCC ID: 2AAIN-MNTORCH
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2020-10-30
Date of Test: 2020-10-30 to 2020-11-16
Date of Issue: 2020-11-16
Test Result: PASS*

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

Tested By:

Martin Lee

(Martin Lee)

Reviewed By:

Sheek, Luo

(Sheek Luo)

Approved By:

Jack Ai
(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20201001302E-04	Rev.01	Initial report	2020-11-16

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3 General Information

3.1 Client Information

Applicant:	ACOUSTMAX INTERNATIONAL CO., LTD
Address of Applicant:	Unit D16/F Cheuk Nang Plaza 250 Hennessy Road WanchaiHongKong.
Manufacturer:	ACOUSTMAX INTERNATIONAL CO., LTD
Address of Manufacturer:	Unit D16/F Cheuk Nang Plaza 250 Hennessy Road WanchaiHongKong.
Factory:	Shenzhen AngSi Technology Co., LTD
Address of Factory:	B-602, LingYun Buiding, Honglang North NO 2.Road, Baoan District, Shenzhen, China

3.2 General Description of EUT

Product Name:	MONSTER TORCH
Model No.:	MNTORCH, MNTORCH-2, MNTORCH-C, MNTORCH-X
Test Model No.:	MNTORCH
Trade Mark:	Monster
Hardware Version:	V01
Software Version:	V01
Test sample No:	CQASZ20201001302E#1
Power Supply:	lithium battery: DC11.1V, 2200mAh, Charge by DC15V SWITCHING ADAPTER Model No:GQ24-150150-AU Input:100-240V~50/60Hz 1.0A Max Output:15V 1.5A

3.3 General Description of BT

Operation Frequency:	2402MHz~2480MHz
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK
Transfer Rate:	1Mbps/2Mbps
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Product Type:	☐ Mobile ☒ Portable ☐ Fix Location
Test Software of EUT:	FCCAssist 2.4(manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	0dBi

3.4 General Description of BLE

Operation Frequency:	2402MHz~2480MHz
Modulation Type:	GFSK
Transfer Rate:	1Mbps
Number of Channel:	40

Product Type:	☐ Mobile ☒ Portable ☐ Fix Location
Test Software of EUT:	SSCOM V5.12.1(manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	0dBi

3.5 General Description of 5.8G

Frequency Range:	5736MHz
Modulation Type:	QPSK
Number of Channels:	1 (declared by the client)
Product Type:	☐ Mobile ☒ Portable ☐ Fix Location
Test Software of EUT:	RF test (manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	4.0dBi

Note:

Model No.: MNTORCH, MNTORCH-2, MNTORCH-C, MNTORCH-X

Only the model MNTORCH was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

4.1.2 Limits

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\left[\frac{\text{max. power of channel, including tune-up tolerance, mW}}{[\sqrt{f(\text{GHz})}]} \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where} \right.$$

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation¹⁷

The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 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

4.1.3 EUT RF Exposure

1) For BT

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-6.070	-7.0±1	-6.0	0.251
Middle(2441MHz)	-3.550	-4.5±1	-3.5	0.447
Highest(2480MHz)	-2.610	-3.5±1	-2.5	0.562
$\pi/4$ DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	-4.930	-5.5±1	-4.5	0.355
Middle(2441MHz)	-2.380	-3.0±1	-2.0	0.631
Highest(2480MHz)	-1.480	-2.0±1	-1.0	0.794

Worst case: $\pi/4$ DQPSK						
Channel	Maximum Peak Conducted Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune- up Power		Calculated value	Exclusion threshold
			(dBm)	(mW)		
Lowest (2402MHz)	-4.930	-5.5±1	-4.5	0.355	0.110	3.0
Middle (2441MHz)	-2.380	-3.0±1	-2.0	0.631	0.197	
Highest (2480MHz)	-1.480	-2.0±1	-1.0	0.794	0.250	
Conclusion: the calculated value ≤ 3.0 , SAR is exempted.						

Remark: The Max Conducted Peak Output Power data refer to report Report No.: CQASZ20201001302E-01

2) For BLE

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.32	-0.5±1	0.5	1.122
Middle(2440MHz)	1.01	0.5±1	1.5	1.413
Highest(2480MHz)	1.00	0.5±1	1.5	1.413

Worst case: GFSK mode						
Channel	Maximum Peak Conducted Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune- up Power		Calculated value	Exclusion threshold
			(dBm)	(mW)		
Lowest (2402MHz)	0.32	-0.5±1	0.5	1.122	0.348	3.0
Middle (2440MHz)	1.01	0.5±1	1.5	1.413	0.441	
Highest (2480MHz)	1.00	0.5±1	1.5	1.413	0.445	
Conclusion: the calculated value ≤3.0, SAR is exempted.						

Remark: The Max Conducted Peak Output Power data refer to report Report No.: CQASZ20201001302E-02
BDR and BLE can not simultaneous transmitting at same time.

3) For 5.8G

$$e_{\text{irp}} = p_{\text{t}} \times g_{\text{t}} = (E \times d)^2 / 30$$

where:

p_{t} = transmitter output power in watts,

g_{t} = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, $10^{((\text{dB}\mu\text{V}/\text{m})/20)/10^6}$,

d = measurement distance in meters (m)---3m,

$$\text{So } p_{\text{t}} = (E \times d)^2 / 30 / g_{\text{t}}$$

The worst case (refer to report CQASZ20201001302E-03) is below:

Antenna polarization: Horizontal		
Frequency (MHz)	Level (dBuV/m)	Polarization
5736	95.06	Peak
5736	89.97	Average

For 5736MHz wireless:

Field strength = 95.06dBuV/m @3m

Ant. gain 4.0dBi; so Ant numeric gain=2.51

$$\text{So } p_{\text{t}} = \{ [10^{(95.06/20)} / 10^6 \times 3]^2 / 30 / 2.51 \} \times 1000\text{mW} = 0.383\text{mW}$$

$$\text{So } (0.383\text{mW}/5\text{mm}) \times \sqrt{5.736\text{GHz}} = 0.183,$$

$$0.183 < 3.0 \text{ for 1-g SAR}$$

So the SAR report is not required.