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RF Exposure Evaluation Report

Report No.: CQASZ20201001196E-02
Applicant: Chengdu Ebyte Electronic Technology Co., Ltd.
Address of Applicant: Building B5, Mould Industrial Park, 199# Xiqu Ave, West High-tech Zone, Chengdu, 611731, Sichuan, China
Equipment Under Test (EUT):
Product: Wireless transceiver
Model No.: E180-ZG120B
Brand Name: EBYTE
FCC ID: 2ALPH-E180ZG120B
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2020-10-13
Date of Test: 2020-10-13 to 2020-10-23
Date of Issue: 2020-10-23
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
CQASZ20201001196E-02	Rev.01	Initial report	2020-10-23

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3 General Information

3.1 Client Information

Applicant:	Chengdu Ebyte Electronic Technology Co., Ltd.
Address of Applicant:	Building B5, Mould Industrial Park, 199# Xiqu Ave, West High-tech Zone, Chengdu, 611731, Sichuan, China
Manufacturer:	Chengdu Ebyte Electronic Technology Co., Ltd.
Address of Manufacturer:	Building B5, Mould Industrial Park, 199# Xiqu Ave, West High-tech Zone, Chengdu, 611731, Sichuan, China

3.2 General Description of EUT

Product Name:	Wireless transceiver
Model No.:	E180-ZG120B
Trade Mark:	EBYTE
Hardware version:	v1.0
Software version:	v1.0
Operation Frequency:	2405MHz~2480MHz
Channel Numbers:	16
Channel Separation:	5MHz
Type of Modulation:	O-QPSK
Product Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Test Software of EUT:	RF Test (manufacturer declare)
Antenna Type:	External antenna
Antenna Gain:	0dBi
Power Supply:	DC 3.3V

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure

1) For Zigbee

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

O-QPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2405MHz)	13.32	12.5±1	13.5	22.387
Middle(2445MHz)	13.26	12.5±1	13.5	22.387
Highest(2480MHz)	14.95	14.5±1	15.5	35.481

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
35.481	0	0.0071	1.0	PASS

Note: 1) Refer to report No. CQASZ20201001196E-01 for EUT test Max Conducted peak Output Power value.

$$2) P_d = (P_{out} * G) / (4 * \pi * R^2) = (35.481 * 1.0) / (4 * 3.1416 * 20^2) = 0.0071$$