

# Safety Human Exposure

## 1.1 Radio Frequency Exposure Compliance

### 1.1.1 Electromagnetic Fields

RESULT:

Pass

<b>Report No.</b>	: CN23DK47 002
<b>Test Specification</b>	
Test item	: I/O Module
Identification / Type No.	: IQ5-IO-4DO-B, IQ5-IO-4DO-G-B
FCC ID	: 2A8LT-IQ5IODO
IC	: 1609A-IQ5IODO
HVIN	: 601006
PMN	: IQ5-IO-4DO-B, IQ5-IO-4DO-G-B
Test standard	: CFR47 FCC Part 2: Section 2.1091 CFR47 FCC Part 1: Section 1.1310 RSS-102 Issue 5

This device is mobile device, and the applicant declares that the minimum separation distance is greater than 20cm. Therefore MPE measurement or computational modelling should be used to determine compliance.

MPE Calculation is based on the conducted power, and considering maximum power and Antenna gain. The following formula is used to MPE evaluation.

$$Pd = \frac{P_{out} * G}{4R^2\pi}$$

Where

$P_d$  = power density in mW/cm<sup>2</sup> or W/m<sup>2</sup>

$P_{out}$  = output power to antenna in mW or W

$G_{num}$  = Antenna gain in numeric

$\pi$  = 3.14159

R = Distance between observation point and the center of radiator in cm or m

➤ **FCC Part 1.1310, Part 2.1091**

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

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

**Results of RF Exposure Calculations for FCC**

Operating Mode	Measured Output Power incl. tune-up (dBm)	Antenna Gain (dBi)	Distance (cm)	MPE (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Verdict
BLE	9.50	1.76	20	0.0026	1.0	Pass

Compliant

➤ **RSS-102 section 2.5.2. Exemption Limits for Routine Evaluation – RF Exposure Evaluation**

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $4.49/f^{0.5}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

**Table 1: Test Results of RF Exposure Calculations for ISED**

Operating Mode	Measured Output Power incl. tune-up (dBm)	Antenna Gain (dBi)	Distance (cm)	Maximum EIRP (W)	Threshold power (W)	Verdict
BLE	9.50	1.76	20	0.013	2.68	Pass
Note: The maximum EIRP much lower than the threshold power in section 2.5.2, thus compliant.						