

1 Safety Human Exposure

1.1 Radio Frequency Exposure Compliance

1.1.1 Electromagnetic Fields

RESULT:
Pass
Test Specification

Test standard

 : CFR47 FCC Part 2: Section 2.1091
 CFR47 FCC Part 1: Section 1.1310
 FCC KDB Publication 447498 v06, section 7
 RSS-102 Issue 5 March 2015, section 2.5.2

 ➤ **FCC requirements**

FCC requirement: Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20cm normally can be maintained between the user and the device.

MPE Calculation Method according to KDB 447498 v06

 Power Density: $S_{(mW/cm^2)} = PG/4\pi R^2$ or $EIRP/4\pi R^2$

Where:

 S = power density (mW/cm²)

P = power input to the antenna (mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm)

From the peak RF output power, the minimum mobile separation distance, d=20 cm, as well as the antenna gain, the RF power density can be calculated as below:

$$S_{(mW/cm^2)} = PG/4\pi R^2$$

a) EUT RF Exposure Evaluation standalone operations

Protocol	Measured e.i.r.p		$S_{(mW/cm^2)} = PG/4\pi R^2$	Limit (mW/cm ²)
	(dBm)	(mW)		
IDP (1626.5-1660.5 MHz)	32.085	1616.2	0.322	1.0
BLE (2402-2480MHz)	11.12	12.94	0.0026	1.0

b) EUT RF Exposure Evaluation simultaneous transmission operations

Simultaneous transmission mode	The sum of the ratios	Result
BLE + IDP	0.0026/1 + 0.322/1 < 1	Pass

➤ **IC requirements:** The EUT shall comply with the requirement of RSS-102 section 2.5.2.

Exemption from Routine Evaluation Limits – 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:

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;

- RF exposure evaluation exempted power for BLE: 2.670 W
- RF exposure evaluation exempted power for IDP: 2.05 W

a) EUT RF Exposure Evaluation standalone operations:

Protocol	Measured e.i.r.p	
	(dBm)	(mW)
IDP (1626.5-1660.5 MHz)	32.085*	1616.2
BLE (2402-2480MHz)	11.12**	12.94

*IDP Power, please refer to RF report ULRTC568821300000005F.
 **BLE power cited from module FCC ID: QOQ11, IC ID: 5123A-11

b) EUT RF Exposure Evaluation simultaneous transmission operations

Simultaneous transmission mode	The sum of the ratios	Result
BLE + IDP	$0.01294/2.67 + 1.6162/2.05=0.793 < 1$	Pass

The e.i.r.p. are less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.

“RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”