

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
FCC KDB Publication 865664 D01 v01r04
FCC KDB Publication 865664 D02 v01r02
RSS-102 Issue 5 March 2015

1.1.1.1 RF Exposure Compliance Requirement for FCC (FCC ID: VLJ-LUX64BU)

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 (Max. 0.0 dBi for 2.4GHz FHSS, 0.0 dBi for Wi-Fi 802.11 b/g/n), 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

Test Mode	Antenna Gain	Measured e.i.r.p		Maximum conducted output power		$S_{(mW/cm^2)} = \frac{e.i.r.p}{4\pi R^2}$
	(dBi)	(dBm)	(mW)	(dBm)	(mW)	
2.4GHz FHSS	0	18.60	72.44	19.00	79.43	0.0158
Wi-Fi 802.11 b/g/n	0	18.80	75.86	19.00	79.43	0.0158

b) EUT RF Exposure Evaluation simultaneous transmission operations

Simultaneous transmission mode	The sum of the ratios	Result
2.4GHz FHSS + Wi-Fi 802.11 b/g/n	$\frac{0.0158}{1} + \frac{0.0158}{1} < 1$	Pass

Limits for Maximum Permissible Exposure (MPE) according to FCC Part 1.1310:

1.0 mW/cm²

1.1.1.2 RF Exposure Compliance Requirement for IC (IC: 4522A-LUX64BU)

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 FHSS: 2.676 W
- RF exposure evaluation exempted power for Wi-Fi 802.11 b/g/n: 2.684 W

a) EUT RF Exposure Evaluation standalone operations:

Test Mode	Measured Peak Power		Antenna Gain (dBi)	Measured e.i.r.p (mW)	
	(dBm)	(W)		(dBm)	(W)
2.4GHz FHSS	18.60	0.7244	0	18.60	0.7244
Wi-Fi 802.11 b/g/n	18.80	0.7586	0	18.80	0.7586

b) EUT RF Exposure Evaluation simultaneous transmission operations

Simultaneous transmission mode	The sum of the ratios	Result
2.4GHz FHSS + Wi-Fi 802.11 b/g/n	$0.7244/2.676 + 0.7586/2.684 < 1$	Pass

The e.i.r.p. for FHSS and Wi-Fi 802.11 b/g/n 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.”