

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: 2AEUPRB38001)

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. 3.6 dBi for BLE, Max -1.52 dBi for DTSS and FHSs), 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	Measured Peak Power		Antenna Gain (dBi)	Measured e.i.r.p (mW)		$S_{(mW/cm^2)} = \frac{PG}{4\pi R^2}$
	(dBm)	(W)		(dBm)	(W)	
DTSS#1(BLE)	4.50	0.0028	3.63	8.13	0.0065	0.0013
DTSS#2	21.19	0.1315	-1.52	19.67	0.0927	0.0184
DTSS#3	22.34	0.1714	-1.52	20.82	0.1208	0.0240
DTSS#4	22.26	0.1683	-1.52	20.74	0.1186	0.0236
FHSs#1	21.25	0.1334	-1.52	19.73	0.0940	0.0187
FHSs#2	20.72	0.1180	-1.52	19.2	0.0832	0.0166
FHSs#3	20.75	0.1189	-1.52	19.23	0.0838	0.0167
FHSs#4	20.63	0.1156	-1.52	19.11	0.0815	0.0162
FHSs#5	20.37	0.1089	-1.52	18.85	0.0767	0.0153

b) EUT RF Exposure Evaluation simultaneous transmission operations

Simultaneous transmission mode	The sum of the ratios	Result
BLE + DTSSs	$0.0013/1 + 0.0240/1 < 1$	Pass
BLE + FHSs	$0.0013/1 + 0.0187/1 < 1$	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: 20271-RB38001)

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 DTSSs and FHSs: 1.37 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)
DTSSs#1(BLE)	4.50	0.0028	3.63	8.13	0.0065
DTSSs#2	21.19	0.1315	-1.52	19.67	0.0927
DTSSs#3	22.34	0.1714	-1.52	20.82	0.1208
DTSSs#4	22.26	0.1683	-1.52	20.74	0.1186
FHSs#1	21.25	0.1334	-1.52	19.73	0.0940
FHSs#2	20.72	0.1180	-1.52	19.2	0.0832
FHSs#3	20.75	0.1189	-1.52	19.23	0.0838
FHSs#4	20.63	0.1156	-1.52	19.11	0.0815
FHSs#5	20.37	0.1089	-1.52	18.85	0.0767

b) EUT RF Exposure Evaluation simultaneous transmission operations

Simultaneous transmission mode	The sum of the ratios	Result
BLE + DTSSs	$0.0065/2.67 + 0.1208/1.37 < 1$	Pass
BLE + FHSs	$0.0065/2.67 + 0.0940/1.37 < 1$	Pass

The e.i.r.p. for BLE, DTSSs and FHSs 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.”