RF Exposure Evaluation declaration

Product Name : FLIC HUB

Model No. : FLIC HUB

FCC ID : 2ACR9-FLHB

Applicant : Shortcut Labs AB

Address : Drottning Kristinas Vag 41, 11428, Stockholm, Sweden

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Testing Laboratory
3023

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	FLIC HUB
Model No.	FLIC HUB
Trade Name	DEXATEK
FCC ID	2ACR9-FLHB
Contain Module	Realtek / RTL8723DS-CG (WLAN + BT)
Contain Module	Nordic / nRF52810 (BLE)
Frequency Range	WLAN: 2412-2462MHz for 802.11b/g/n-20BW, 2422-2452MHz for 802.11n-40BW Bluetooth: 2402-2480MHz
Number of Channels	WLAN: 802.11b/g/n-20MHz: 11, n-40MHz: 7 Bluetooth: 79 , BLE: 40
Data Speed	WLAN: 802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 150Mbps Bluetooth: 3Mbps , BLE: 1Mbps
Type of Modulation	WLAN: 802.11b:DSSS (DBPSK, DQPSK, CCK) WLAN: 802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM) Bluetooth: FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

1.2. Antenna List :

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	ACX (WLAN + BT)	AT3216-T2R4PAA	Chip Antenna	1.8 dBi for 2.4 GHz
2	LYNwave (BLE)	SA-7506	Printed on PCB Antenna	1.35 dBi for 2.4 GHz

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: 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 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	30
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4*Pi*R^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd is the limit of MPE, 1 mW/cm^2. 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.

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0

2.2. Test Result of RF Exposure Evaluation

Product : FLIC HUB
Test Item : RF Exposure Evaluation
Test Site : N/A

WLAN + Bluetooth (Realtek / RTL8723DS-CG):

Operation Frequency	2412MHz-2462MHz 2422MHz-2452MHz 2402MHz-2480MHz
Maximum Conducted output power	22.45 dBm
Antenna gain	1.8 dBi

Output Power Into Antenna & RF Exposure Evaluation Distance:

Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)
175.7924	0.052933

Power density is lower than the limit (1 mW/cm^2).

BLE (Nordic / nRF52810):

Operation Frequency	2402MHz-2480MHz
Maximum Conducted output power	1.25 dBm
Antenna gain	1.35 dBi

Output Power Into Antenna & RF Exposure Evaluation Distance:

Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)
1.3335	0.000362

Power density is lower than the limit (1 mW/cm^2).

2.3. calculations for Multi-Transsmitter

Mode	Exposure Calculations	result	Limit	Pass/Fail
WLAN	0.052933	0.053295	1	Pass
BT	0.000362			