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Maximum Permissible Exposure Evaluation

FCC ID: PADWF154

IC: 10563A-WF154

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)

EUT Specification

Product Name:	KICKR
Trade Mark:	/
Model/Type reference:	WF154
Listed Model(s):	/
Frequency band (Operating)	ANT+: 2457MHz BT: 2402 MHz ~ 2480MHz WLAN: 2412MHz ~ 2462MHz
Device category	☐Portable (<5mm separation) ☐Mobile (>20cm separation) ☒Fixed (>20cm separation) ☐Others ___
Antenna diversity	☐Single antenna ☒Multiple antennas ☐Tx diversity ☐Rx diversity ☐Tx/Rx diversity
Antenna gain (Max)	BT/ANT+: 2.54dBi WLAN: 4.16dBi
Evaluation applied	☒MPE Evaluation ☐SAR Evaluation

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
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	30
1500-100000	--	--	1	30

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 the limit of MPE 1mW/cm^2. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, We will know the distance where the MPE limit is reached.

RF exposure evaluation Limits for IC

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Table 7: RF field strength and power density limits for devices used by the general public (uncontrolled environment)

Frequency range (MHz)	Electric field (V_{RMS}/m)	Magnetic field (A_{RMS}/m)	Power density (W/m^2)	Reference period (minutes)
10-20	27.46	0.0728	2	6
20-48	$58.07 / f^{0.25}$	$0.1540 / f^{0.25}$	$8.944 / f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142\ f^{0.3417}$	$0.008335\ f^{0.3417}$	$0.02619\ f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158\ f^{0.5}$	$4.21 \times 10^{-4}\ f^{0.5}$	$6.67 \times 10^{-5}\ f$	$616000/f^{1.2}$

Note: f is frequency in MHz.

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 the limit of MPE 5.35mW/cm^2. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, We will know the distance where the MPE limit is reached.

FCC Measurement Result

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Power Density at 20cm (mW/cm2)	Limit (mW/cm^2)	Verdict
BLE	2440	2.54	-0.10	0±1	1	0.00045	1.000	PASS
ANT+	2457	2.54	-16.30	-16±1	-15	0.00001	1.000	PASS
802.11b	2462	4.16	18.09	18±1	19	0.04119	1.000	PASS
802.11g	2437	4.16	17.46	17±1	18	0.03271	1.000	PASS
802.11n(HT20)	2462	4.16	17.05	17±1	18	0.03271	1.000	PASS
802.11n(HT40)	2412	4.16	16.67	16±1	17	0.02599	1.000	PASS

ANT+ The highest test data with is: 78.86dBuV/m @3m
EIRP = 78.86-104.7+20lg3 = -16.30dBm

The WLAN, BLE and ANT+ can transmit simultaneously

WLAN Power density at 20cm (mW/cm^2)	BLE Power density at 20cm (mW/cm^2)	ANT+ Power density at 20cm (mW/cm^2)	Total Power density at 20cm	Limit (mW/cm^2)	Verdict
0.04119	0.00045	0.00001	0.04165	1	PASS

IC Measurement Result

Band	Freq. (MHz)	Max. Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Ant. Gain (dBi)	E.I.R.P (dBm)	Power Density at 20cm (mW/cm2)	Limit (mW/cm^2)	Verdict
BLE	2440	-0.10	0±1	1	2.54	3.54	0.00081	5.35	PASS
ANT+	2457	/	/	/	/	-16.3	0.00001	5.35	PASS
802.11b	2462	18.09	18±1	19	4.16	23.16	0.10734	5.35	PASS
802.11g	2437	17.46	17±1	18	4.16	22.16	0.08526	5.35	PASS
802.11n (HT20)	2462	17.05	17±1	18	4.16	22.16	0.08526	5.35	PASS
802.11n (HT40)	2412	16.67	16±1	17	4.16	21.16	0.06772	5.35	PASS

ANT+ The highest test data with is: 78.86dBuV/m @3m

EIRP = 78.86-104.7+20lg3 = -16.30dBm

The WLAN, BLE and ANT+ can transmit simultaneously

WLAN Power density at 20cm (mW/cm^2)	BLE Power density at 20cm (mW/cm^2)	ANT+ Power density at 20cm (mW/cm^2)	Total Power density at 20cm	Limit (mW/cm^2)	Verdict
0.10734	0.00081	0.00001	0.10816	5.35	PASS

Note:

1. For a more detailed features description, Please refer to the RF Test Report.

**********THE END**********