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Maximum Permissible Exposure Evaluation

FCC ID: WNA-LK02

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:	DIRECTV 4K RECEIVER
Trade Mark:	DIRECTV
Model/Type reference:	LK02
Listed Model(s):	HYS001, HYS0A, LK02-O-800, LK02-A-800, LK02-T-800, LK02-C-800
Model Difference:	All these models are identical in the same PCB, layout and electrical circuit. The difference is the model number.
Frequency band (Operating)	<input checked="" type="checkbox"/> BT: 2.402GHz ~ 2.480GHz <input checked="" type="checkbox"/> BLE: 2.402GHz ~ 2.480GHz <input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> RLAN: 5.150GHz ~ 5.250GHz <input checked="" type="checkbox"/> RLAN: 5.250GHz ~ 5.350GHz <input checked="" type="checkbox"/> RLAN: 5.470GHz ~ 5.725GHz <input checked="" type="checkbox"/> RLAN: 5.725GHz ~ 5.850GHz <input type="checkbox"/> Others ____
Device category	<input type="checkbox"/> Portable (<5mm separation) <input type="checkbox"/> Mobile (>20cm separation) <input checked="" type="checkbox"/> Fixed (>20cm separation) <input type="checkbox"/> Others ____
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S=5mW/cm ²) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antenna <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Antenna gain (Max)	BT ANT: 1.0dBi 2.4G WIFI ANT1: 3.5dBi, ANT2: 3.5dBi 5G WIFI ANT1: 3.0dBi, ANT2: 2.3dBi
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> 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	6
1500-100000	--	--	1	30

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Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = Power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d 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.

Measurement Result

Only show the value of the worst antenna

BLE - Worst case						
Type	Channel Frequency (MHz)	Max. Measured Power (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
GFSK	2402	-2.68	-2.00	1.0	0.000158	1

EDR - Worst case						
Type	Channel frequency (MHz)	Max. Measured Power (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
8-DPSK	2441	0.44	1.00	1.0	0.000315	1

2.4G WIFI - Worst case								
Type	Channel Frequency (MHz)	Antenna	Max. Measured Power (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm^2)	Total Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
802.11 G	2437	Ant1	18.48	19.00	3.5	0.035379	0.075075	1
	2437	Ant2	19.02	19.50	3.5	0.039696		

5G WIFI U-NII-1(5150-5250MHz) - Worst case								
Type	Channel Frequency (MHz)	Antenna	Max. Measured Power (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm^2)	Total Power density at 20cm (mW/cm^2)	Power density Limits (mW/cm^2)
802.11 A	5180	Ant1	17.95	18.50	3.0	0.028102	0.052021	1
	5180	Ant2	17.84	18.50	2.3	0.023919		



5G WIFI U-NII-2A(5250-5350MHz) - Worst case								
Type	Channel Frequency (MHz)	Antenna	Max. Measured Power (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm ²)	Total Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11 A	5320	Ant1	17.13	17.50	3.0	0.022323	0.041323	1
	5320	Ant2	16.58	17.50	2.3	0.019000		

5G WIFI U-NII-2C(5470-5725MHz) - Worst case								
Type	Channel Frequency (MHz)	Antenna	Max. Measured Power (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm ²)	Total Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11 A	5700	Ant1	18.28	18.50	3.0	0.028102	0.049420	1
	5700	Ant2	17.59	18.00	2.3	0.021318		

5G WIFI U-NII-3(5725-5850MHz) - Worst case								
Type	Channel Frequency (MHz)	Antenna	Max. Measured Power (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm ²)	Total Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11 A	5745	Ant1	18.31	18.50	3.0	0.028102	0.052021	1
	5745	Ant2	17.97	18.50	2.3	0.023919		

The BT and WIFI can transmit simultaneously.

Worst case					
Type	Frequency (MHz)	Antenna Gain (dBi)	Power density at 20cm (mW/cm ²)	BT+WIFI Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
8-DPSK	2441	1.0	0.000315	0.127411	1
802.11 G	2437	Ant1: 3.5 Ant2: 3.5	0.075075		
802.11 A	5745	Ant1: 3.0 Ant2: 2.3	0.052021		

Note:

1. Calculate by Worst-case mode
2. Max. Tune Up Power by Manufacturer's Declaration, and Max. Tune Up Power is used to calculate.
3. For a more detailed features description, please refer to the RF Test Report.

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

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