



CTC Laboratories, Inc.

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Maximum Permissible Exposure Evaluation

FCC ID: 2AK29-DS2002

The tests were performed according to following standards:

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) [RSS-102 Issue 5](#) — Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

EUT Specification

Product Name:	Smart Plug
Trade Mark:	N/A
Model/Type reference:	DS2002
Listed Model(s):	N/A
Frequency band (Operating)	☐ BT: 2.402GHz ~ 2.480GHz ☒ BLE: 2.402GHz ~ 2.480GHz ☒ WLAN: 2.412GHz ~ 2.462GHz ☐ RLAN: 5.180GHz ~ 5.240GHz ☐ RLAN: 5.745GHz ~ 5.825GHz ☐ Others
Device category	☐ Portable (<5mm separation) ☐ Mobile (>20cm separation) ☒ Fixed (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S=5mW/cm ²) ☒ General Population/Uncontrolled exposure (S=1mW/cm ²)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Antenna gain (Max)	3.7dBi
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	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/cm²

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/cm². 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

BLE							
Type	Channel frequency (MHz)	Max. Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
GFSK	2402	-0.74	-1±1	0	3.7	0.00039	1
	2440	-1.04	-1±1	0	3.7	0.00037	1
	2480	-0.91	-1±1	0	3.7	0.00038	1

2.4G WIFI							
Type	Channel frequency (MHz)	Max. Measured Power (dBm)	Tune up tolerance (dBm)	Max. Tune up Power (dBm)	Antenna Gain (dBi)	Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
802.11 b	2412	24.97	24±1	25	3.7	0.14647	1
	2437	24.68	24±1	25	3.7	0.13701	1
	2462	24.21	24±1	25	3.7	0.12295	1
802.11g	2412	23.58	23±1	24	3.7	0.10635	1
	2437	23.34	23±1	24	3.7	0.10063	1
	2462	22.99	23±1	24	3.7	0.09284	1
802.11n(HT20)	2412	24.72	24±1	25	3.7	0.13827	1
	2437	24.43	24±1	25	3.7	0.12934	1
	2462	23.99	24±1	25	3.7	0.11688	1
802.11n(HT40)	2422	24.46	24±1	25	3.7	0.13024	1
	2437	23.04	23±1	24	3.7	0.09392	1
	2452	22.85	23±1	24	3.7	0.08990	1

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The WIFI or Bluetooth can transmit simultaneously

WIFI Power density at 20cm (mW/cm ²)	BLE Power density at 20cm (mW/cm ²)	Total Power density at 20cm (mW/cm ²)	Power density Limits (mW/cm ²)
0.14647	0.00039	0.14686	1

Note

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

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