



CTC Laboratories, Inc.

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Maximum Permissible Exposure Evaluation

FCC ID: XRH-NPE105

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	GEM3
Model	GEMSRB03
Listed Model	N/A
Frequency band (Operating)	<input checked="" type="checkbox"/> ANT+: 2457MHz, 2472MHz <input checked="" type="checkbox"/> BLE: 2.402GHz ~ 2.480GHz <input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> RLAN: 5.190GHz ~ 5.230GHz <input type="checkbox"/> RLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others:
Device category	<input type="checkbox"/> Portable (<20cm 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/cm2) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm2)
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Antenna gain (Max)	5.46dBi
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

ANT+							
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)
ANT+	2457	0.16	1	1	5.46	0.0009	1
	2472	0.72	1	1	5.46	0.0009	1

BLE/4.2							
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	1.56	2	2	5.46	0.0011	1
	2440	0.51	1	1	5.46	0.0009	1
	2480	-0.9	0	0	5.46	0.0007	1

Note

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

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