



RF EXPOSURE EVALUATION

EUT Specification

EUT	M18™ PACKOUT™ RADIO + CHARGER
Model Number	Cat. No. 2950-20, WSR1806
FCC ID	2ABL5M18PACKOUT
Antenna gain (Max)	0dBi
Operation Frequency	2402-2480MHz
Input Rating	AC 120V/60Hz and 18V from battery
Modulation	GFSK, $\pi/4$ -DQPSK for BR+EDR GFSK for BLE
Max. output power	-3.18dBm(0.004808W) for BR+EDR -1.35dBm(0.007328W) for BLE

Test Requirement:

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
(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

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

Where

P_d = Power density in mW/cm²

P_{out} =output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

π =3.1416

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

Find the limit of MPE, $1\text{mW}/\text{cm}^2$. 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.

11.2 Measurement Result

Antenna gain: 0 dBi

BR+EDR:

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm^2)	Power density Limits (mW/cm^2)
GFSK	2402	-5.28	-5 ± 1	-4	1	0.000079	1
GFSK	2441	-4.30	-4 ± 1	-3	1	0.000100	1
GFSK	2480	-4.16	-4 ± 1	-3	1	0.000100	1
$\pi/4$ -DQPSK	2402	-4.56	-4 ± 1	-3	1	0.000100	1
$\pi/4$ -DQPSK	2441	-3.29	-3 ± 1	-2	1	0.000126	1
$\pi/4$ -DQPSK	2480	-3.18	-3 ± 1	-2	1	0.000126	1

BLE:

Mode	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm^2)	Power density Limits (mW/cm^2)
GFSK	2402	-2.18	-2 ± 1	-1	1	0.000158	1
GFSK	2440	-1.35	-1 ± 1	0	1	0.000199	1
GFSK	2480	-3.06	-3 ± 1	-2	1	0.000126	1

Signature:



Alan He

Date: 2019-08-10