RF EXPOSURE EVALUATION

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)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

MPE Calculation Method

E (V/m) = $\frac{\sqrt{30 * P * G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = Average RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = $\frac{30 * P * G}{377 * D^2}$

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

Measurement Result

Single TX

Band	conducted power (dBm)	Tune-up power (dBm)	Antenna Gain (dBi)	Duty cycle (100%)	Separation distance (cm)	Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
GSM850	32.08	33	1.71	12.5	20	0.073573	0.565867
GSM1900	28.89	29	2.32	12.5	20	0.033707	1
LTE Band 2	24.19	25	2.32	100	20	0.013419	1
LTE Band 4	23.42	24	1.57	100	20	0.008969	1
LTE Band 12	24.09	25	2.83	100	20	0.015091	0.476867
LTE Band 13	23.95	24	2.83	100	20	0.011987	0.523867
BLE	6.442	7	2	100	20	0.000198	1
2.4G Wi-FI	12.91	13	2	100	20	0.000787	1

Note: GSM and LTE Test data reference to FCC ID XPYUBX18ZO01.

Simultaneous TX

Band	conducted power (dBm)	Tune-up power (dBm)	Antenna Gain (dBi)	Duty cycle (100%)	Separation distance (cm)	Evaluation result (mW/cm^2)	Power density Limits (mW/cm^2)	Simultaneous TX result (mW/cm^2)	Simultaneous TX Limits (mW/cm^2)
GSM850	32.08	33	1.71	12.5	20	0.073573	0.565867	0.130805	1
2.4G Wi-FI	12.91	13	2	100	20	0.000787	1		
GSM1900	28.89	29	2.32	12.5	20	0.033707	1	0.034494	1
2.4G Wi-FI	12.91	13	2	100	20	0.000787	1		
LTE Band 2	24.19	25	2.32	100	20	0.013419	1	0.014206	1
2.4G Wi-FI	12.91	13	2	100	20	0.000787	1		
LTE Band 4	23.42	24	1.57	100	20	0.008969	1	0.009756	1
2.4G Wi-FI	12.91	13	2	100	20	0.000787	1		
LTE Band 12	24.09	25	2.83	100	20	0.015091	0.476867	0.032433	1
2.4G Wi-FI	12.91	13	2	100	20	0.000787	1		
LTE Band 13	23.95	24	2.83	100	20	0.011987	0.523867	0.023669	1
2.4G Wi-FI	12.91	13	2	100	20	0.000787	1		
GSM850	32.08	33	1.71	12.5	20	0.073573	0.565867	0.130216	1
BLE	6.442	7	2	100	20	0.000198	1		
GSM1900	28.89	29	2.32	12.5	20	0.033707	1	0.033905	1
BLE	6.442	7	2	100	20	0.000198	1		
LTE Band 2	24.19	25	2.32	100	20	0.013419	1	0.013617	1
BLE	6.442	7	2	100	20	0.000198	1		
LTE Band 4	23.42	24	1.57	100	20	0.008969	1	0.009167	1
BLE	6.442	7	2	100	20	0.000198	1		
LTE Band 12	24.09	25	2.83	100	20	0.015091	0.476867	0.031844	1
BLE	6.442	7	2	100	20	0.000198	1		
LTE Band 13	23.95	24	2.83	100	20	0.011987	0.523867	0.02308	1
BLE	6.442	7	2	100	20	0.000198	1		

Note: NO simultaneous transmissions are possible for this device of BLE and 2.4G Wi-Fi.

Conclusion:

For the max result : 0.130805mW/cm^2 ≤ 1.0mW/cm^2 for Power Density Limits, compliance RF exposure.

Signature: **Date:** 2020-07-15

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