

MPE Evaluation

Approved By:



Fox Lane,
EMC Test Engineer

Summary and Operating Condition:

EUT	A04109
IC	IPH-04109
FCC ID	1792A-04109
EUT Received	3 March 2023
EUT Tested	3 March 2023- 17 April 2023
Serial No.	FF7 (Radiated Measurements) 010966 (Lab Assigned Serial Number) (Conducted Measurements)
Operating Band	2400 – 2483.5 MHz
Device Type	☒ GMSK ☐ GFSK ☐ BT BR ☐ BT EDR 2MB ☐ BT EDR 3MB ☐ 802.11x
Power Supply / Voltage	30VDC lithium battery pack

NOTE: For more detailed features description, please refer to the manufacturer's specifications or user's manual.

FCC

Maximum exposure limits from CFR 47, FCC Part 1.1310:

Table 1—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

Table 1 - Power Density Calculations, FCC

Occupational/Controlled			☐					
General Population/uncontrolled			☒					
FCC Power Density Calculations								
Frequency	Radiated Power	Antenna Gain	Peak Power EIRP	Peak Power EIRP +10% for Tolerance	Power Density	Limit at specified distance	% of limit	Result
MHz	mW	numerical	mW	mW	mW/cm^2	mW/cm^2	%	
2402	2.54	1.28	3.25	3.58	0.001	1.00	0.071	PASS
2440	2.22	1.28	2.84	3.13	0.001	1.00	0.062	PASS
2480	1.88	1.28	2.41	2.65	0.001	1.00	0.053	PASS

Distance (d)	20	cm
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$S = (P \times G)/(4 \times \pi \times d^2)$ – used to calculate exposure at "d" cm

$EIRP = P \times G$, measured as field strength

$d = \sqrt{(S/(P \times G) \times 4 \times \pi)}$ – used to calculate minimum distance to meet limits

Note: The user's manual will stipulate that a 20cm minimum distance from the user is to be maintained.
EIRP values in mW were multiplied by 1.1 to account for a 10% tolerance.

S= power density

P = transmitter conducted power (in mW)

G = antenna numeric gain

d = distance to radiation center (20 cm)

IC / ISED

Using RSS-102, Issue 5, Section 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{(0.6834)}$ W (adjusted for tune-up tolerance), where f is in MHz.
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance). In these cases, the information contained in the RF exposure.

Table 2 - Power Density Calculations, IC/ISED

IPH-04109						
Frequency	Conducted Power	Antenna Gain Numerical	Peak EIRP Power	EIRP +10% Tolerance	Exemption Limit	Result
MHz	mW	Num.	mW	mW	mW	
2402.00	2.82	1.28	3.61	3.97	2676.42	PASS
2440.00	2.53	1.28	3.24	3.56	2676.42	PASS
2480.00	2.00	1.28	2.56	2.82	2676.42	PASS