RF Exposure evaluation

FCCID:2ACF2ST-3000

According to 447498 D01 General RF Exposure Guidance v06

4.3. General SAR test exclusion guidance

4.3.1. Standalone SAR test exclusion considerations

a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following: [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, [30] where
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation31
   - The result is rounded to one decimal place for comparison
   - The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

   The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

[30] This is equivalent to the formula written as: [(max. power of channel, including tune-up tolerance, mW)/(60/√f(GHz) mW)]·[20 mm/(min. test separation distance, mm)] ≤ 1.0 for 1-g SAR; also see Appendix A for approximate exclusion threshold numerical values at selected frequencies and distances.

eirp = pt x gt = $(EXd)^2/30$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, --- $10((dBuV/m)/20)/10^6$

d = measurement distance in meters (m)---3m

So pt = $(EXd)^2/30$ x gt

RF Exposure evaluation

Copied from the FCC test report: clause9.4 Maximum Peak Output Power

Test Result:

For GFSK

For GFSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	-1.10	0.78	1000
Middle Channel	2441	1.65	1.46	1000
High Channel	2480	2.80	1.91	1000

For Pi/4 QDPSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	-3.88	0.41	1000
Middle Channel	2441	0.01	0.10	1000
High Channel	2480	1.10	1.29	1000

For 8DPSK

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	-3.16	0.48	1000
Middle Channel	2441	0.41	0.11	1000
High Channel	2480	1.34	1.36	1000

Note: the antenna gain of 1dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

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Then we choose Normal mode channel as the worst case of Maximum Peak Output Power:

Channel	Frequency MHz	Measured Value dBm	Output Power mW	Limit mW
Low Channel	2402	-1.10	0.78	1000
Middle Channel	2441	1.65	1.46	1000
High Channel	2480	2.80	1.91	1000

EIRP/ dBm= Conducted Max Output Power/ dBm+ Antenna gain /dBi.

Since the distance from the internal BT-antenna to the outer is more than 10mm, we choose the min. test separation distance = 5mm

General RF Exposure:
(0.78mW)/5.0mm)x √2.402 GHz = 0242
(1.46mW)/5.0mm)x √2.441 GHz = 0.456
(1.91mW)/5.0mm)x √2.480 GHz = 0.602

SAR requirement: S=3.0

General RF Exposure<3
Then SAR evaluation is not required