



Canada

Exhibit: RF Exposure – FCC

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Client	Cognitive Systems Corp.	 Canada
Product	fyrefly	
Standard(s)	FCC Part 15 Subpart 15.247:2016 FCC KDB 447498:2015	

RF Exposure – FCC

The device is a mobile device intended to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure and the body of the user or nearby persons.

The EUT also contains a modularly certified transmitter (FCC ID: Z64-WL18DBMOD). The software guarantees simultaneous operation of the two radios will not occur and therefore, antenna co-location testing is not applicable.

General SAR test exclusion guidance:

As per FCC KDB 447498 Section 4.3.1 b), the SAR Test Exclusion Threshold for 100 MHz to 6 GHz at test separation distances > 50 mm is determined by:

- 1) {[Power allowed at *numeric threshold* for 50 mm]} + [(test separation distance – 50 mm) $(f_{(MHz)}/150)]} \text{ mW, for 100 MHz to 1500 MHz}$
- 2) {[Power allowed at *numeric threshold* for 50 mm]} + [(test separation distance – 50 mm)*10] \text{ mW, for > 1500 MHz and } \leq 6 \text{ GHz}

Where:

Power allowed at *numeric threshold* for 50 mm (for 1-g SAR) is given by:

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] [\sqrt{f_{(GHz)}}] \leq 3.0$$

$$(\text{max power of channel, including tune-up tolerance, mW}) \leq [3.0 / \sqrt{f_{(GHz)}}] * [\text{min. test separation distance, mm}]$$

$f_{(GHz)}$ is the RF channel transmit frequency in GHz

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SAR Calculations: 2412 – 2462 MHz DTS transmitter

Power allowed at *numeric threshold* for 50 mm:

(max power of channel, including tune-up tolerance, mW) $\leq [3.0 / \sqrt{2.462 \text{ GHz}}] * [50 \text{ mm}]$

(max power of channel, including tune-up tolerance, mW) $\leq 95.6 \text{ mW}$

Therefore, SAR Exclusion for 200 mm test distance is:

{[Power allowed at *numeric threshold* for 50 mm] + [(test separation distance – 50 mm)*10]} mW, for > 1500 MHz and $\leq 6 \text{ GHz}$

$$\begin{aligned} &= [95.6 \text{ mW}] + [(200 \text{ mm} - 50 \text{ mm}) * 10] \\ &= 1596 \text{ mW} \end{aligned}$$

The EUT meets the SAR Exclusion Threshold. Peak conducted power of DTS transmitter was measured to be 102.33 mW which is below the 1596mW threshold.

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Radiofrequency Radiation Exposure Evaluation: Mobile Devices

Mobile devices shall be evaluated for RF radiation exposure according to the provisions of FCC §2.1091 and the MPE guidelines identified in FCC §1.1310.

As per FCC §1.1310 Table 1(B), the limit for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields for General Population/Uncontrolled Exposure in the frequency range of 300 MHz to 1.5 GHz is $f/1500 \text{ mW/cm}^2$ and in the frequency range of 1.5GHz to 100GHz is 1.0 mW/cm^2 . Where f = frequency in MHz.

The power density formula is given by:

$$P_d = (P_{\text{out}} * G) / (4 * \pi * R^2)$$

Where,

P_d = Power density in mW/cm^2

P_{out} = Conducted output power to antenna in mW

G = Numeric Antenna Gain

π = 3.1416

R = Separation distance in cm

MPE Calculation: 2412 – 2462 MHz DTS transmitter

The DTS transmitter has a maximum conducted output power of 20.10dBm or 102.33mW and an antenna gain of 1.2dBi or 1.3 numerically.

For a distance of 20cm, the power density is:

$$P_d = (102.33 \text{ mW} * 1.3) / (4 * 3.1416 * (20 \text{ cm})^2)$$

$$P_d = 0.027 \text{ mW/cm}^2$$

The device passes the requirement. The calculated power density of 0.027 mW/cm^2 is below the 1.0 mW/cm^2 limit.