



Engineering Solutions & Electromagnetic Compatibility Services

RF Exposure Report for Controlled and Uncontrolled Environments

**L3Harris Corporation
221 Jefferson Ridge Parkway
Lynchburg, VA 24501**

Model: XL-CH2 Control Head

**FCC ID: OWDTR-0171-E
IC: 3636B-0171**

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This report replaces Report R1.0.*

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RF Exposure FCC Part 1.1307, 1.1310, 2.1091, 2.1093; ISED RSS-102

MPE Calculations Including Co-location Considerations

The maximum permissible RF exposure for an uncontrolled environment is specified in FCC 1.1310 Table 1B and RSS-102 Issue 6 Table 4.

RF Exposure Limits

Technology	Transmit Frequencies (MHz)	Uncontrolled Exposure		Controlled Exposure	
		FCC Limit (mW/cm ²)	ISED Limit (mW/cm ²)	FCC Limit (mW/cm ²)	ISED Limit (mW/cm ²)
Bluetooth	2402 – 2480	1.0	0.54	5.0	3.2
2.4 GHz Wi-Fi	2412 – 2462	1.0	0.54	5.0	3.2
5 GHz Wi-Fi	5150 – 5825	1.0	0.90	5.0	4.6

Note: The lowest frequency of the above frequency ranges produced the most conservative limit (when the limit is based on frequency) and was used to calculate the limits above, where applicable.

Bluetooth-WiFi Antenna

Antenna Type	Frequency (MHz)	Gain (dBi)
Bluetooth	2402 – 2480	2
2.4 GHz Wi-Fi	2412 – 2462	2
5 GHz Wi-Fi	5150 – 5825	-0.2

Maximum Powers - Bluetooth-WiFi Antenna

Technology	Transmit Frequencies (MHz)	Duty Cycle (%)	Max Conducted Power (W)	Worst-case Max Antenna Gain (dBi)	Tune-up Adjustment (dB)	Max EIRP (W)
Bluetooth	2402 – 2480	100	0.007	2	+1	0.140
2.4 GHz Wi-Fi	2412 – 2462	100	0.141	2	+1	0.281
5 GHz Wi-Fi	5150 – 5825	100	0.064	-0.2	+1	0.08

Calculated Minimum Safe Distance from Bluetooth-WiFi Antenna

Technology	Transmit Frequencies (MHz)	Uncontrolled Exposure		Controlled Exposure	
		United States (cm)	Canada (cm)	United States (cm)	Canada (cm)
Bluetooth	2402 – 2480	3.3	5.4	1.5	1.9
2.4 GHz Wi-Fi	2412 – 2462	4.7	6.4	2.1	2.6
5 GHz Wi-Fi	5150 – 5825	2.5	3.4	1.1	1.4

Bluetooth and WiFi SAR Test Exclusion Max Channel Power

Technology	Transmit Frequencies (MHz)	Channel Average Power (W)	Worst-case Max Antenna Gain (dBi)	Tune-up Tolerance (dB)	Max Channel Power (W)
Bluetooth	2402 – 2480	0.006	2	+1	0.008
2.4 GHz Wi-Fi	2412 – 2462	0.03	2	+1	0.038
5 GHz Wi-Fi	5150 – 5825	0.007	-0.2	+1	0.084

Note: To determine SAR exclusion, the average channel power measurement was adjusted with the 1 dB tune-up tolerance to determine the maximum channel power in the SAR exclusion calculation.

Co-location Considerations

The Control Head consists of logic and a Keyboard. The Keyboard contains a Bluetooth and Wi-Fi transceiver and a single antenna. The Control Head logic includes other circuitry, such as serial communication, which, when combined, makes the Control Head a standalone unit. The Control Head can be used with other Harris LMR radios with the correct interface, including the XL-85M LMR radio.

Based on the distance between the Control Head and the LMR antenna, one could say that these transceivers are not “co-located.” However, even if these transceivers were considered co-located, based upon inspection, one can see that the power density contributions of the Control Head BT/Wi-Fi transmitter are negligible compared to the power density of the LMR transmitter.

The Bluetooth and Wi-Fi transmitters (considered “stand-alone”) would be exempt from both FCC and ISED. RF exposure evaluation. Note that the Control Head’s physical construction provides a minimum separation distance of at least 22 mm; this distance is used below.

Note: An MPE Report with the measured safe distances is included in the application for the XL-85M 7/800 MHz; FCC ID: OWDTR-0170-E, ISED ID: 3636B-0170.

FCC Exemption Calculation

Per KDB 447498 D02 General RF Exposure Guidance v06, Standalone SAR test exclusion considerations, unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body, and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

Limits

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where:

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before the calculation
- The result is rounded to one decimal place for comparison

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 is applied to determine SAR test exclusion.

EUT RF Exposure

The max channel power is 38 mW for the 802.11b WiFi transmitter operating at 2412 MHz.

General RF Exposure = $(38 \text{ mW} / 22 \text{ mm}) \times \sqrt{2.412 \text{ GHz}} = 2.7$

Therefore, a SAR test is not required since the result is below the ≤ 3.0 1-g SAR limit.

ISED Exemption Statement

The Bluetooth and Wi-Fi output powers (38 mW represents the worst-case channel power) are below the exemption limits in RSS-102 Issue 6 Table 11 of 41.4 mW at a separation distance of 22 mm. The frequency and power were linearly interpolated to calculate the SAR exemption power limit. A worst-case frequency of 2462 MHz was used for the frequency interpolation.