



Engineering Solutions & Electromagnetic Compatibility Services

**RF Exposure Report
for
Controlled and Uncontrolled Environments
FCC Part 1.1307, 1.1310, 2.1091, 2.1093; IC RSS-102**

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

Model: XL-85M VHF MHz Land Mobile Radio

**FCC ID: OWDTR-0176-E
IC: 3636B-0176**

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RF Exposure FCC Part 1.1307, 1.1310, 2.1091, 2.1093; IC 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 7 and for a controlled environment is specified in FCC 1.1310, Table A and RSS-102, Issue 6, Table 8.

Table 1: 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)
LMR	136 -174	0.2	0.13	1.0	0.8
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 within the above frequency ranges produced the most conservative limit (when the limit is based on frequency) and was used to calculate the limits, where applicable.

Table 2: LMR Antennas

Antenna Type	Part No.	Frequency (MHz)	Gain (dBi)
Yagi	AN-025137-011	136-174	8.15
Non-Yagi	AN-225002-004	136-174	4.55

Table 3: Maximum Powers - Yagi Antenna

Technology	Transmit Frequencies (MHz)	Duty Cycle (%)	Max Conducted Power (W)	Max Antenna Gain (dBi)	Tune-up Adjustment (dB)	Max Avg. EIRP (W)
LMR	136-174	50	50	8.15	+1	205.6

Table 4: Calculated Minimum Safe Distance from LMR Antenna (based on Maximum Gain of Yagi Antenna) - Mobile Command Center applications

Technology	Transmit Frequencies (MHz)	Uncontrolled Exposure		Controlled Exposure	
		United States (cm)	Canada (cm)	United States (cm)	Canada (cm)
LMR	136-174	286.1	354.9	127.9	143.0

Note: The application report includes an MPE Report of the measured safe distance with the LMR antennas.

Table 5: Bluetooth and Wi-Fi SAR Test Exclusion Max Channel Power

Technology	Transmit Frequencies (MHz)	Channel Average Power (W)	Worst-case Antenna Gain (dBi)	Tune-up Tolerance (dB)	Max Channel Power (W)
Bluetooth	2402 – 2480	0.006	-3.4	+1	0.004
2.4 GHz Wi-Fi	2412 – 2462	0.03	-3.4	+1	0.02
5 GHz Wi-Fi	5150 – 5825	0.007	-5.2	+1	0.003

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

This XL-85M UHF-L radio configuration includes the Control Head and the radio's main body (VCH). The Control Head logic includes circuitry with serial communication, and its keyboard contains a Bluetooth and a Wi-Fi transceiver, as well as a single antenna.

The VCH includes the LMR transceiver circuitry, which utilizes an antenna located some distance away from both the Control Head and the VCH, such as one mounted on the roof or vehicle trunk.

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 Bluetooth/Wi-F 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 regulations and ISED standards.

RF exposure evaluation. Note that the Control Head's physical construction provides a minimum separation distance of at least 22 mm, which is used in the following calculations.

Note: An MPE Report with the measured safe distances is included in the application for the XL-85M VHF MHz, FCC ID: OWDTR-0176-E; IC: 3636B-0176.

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 or less 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 maximum channel power is 20 mW for the 802.11b Wi-Fi transmitter operating at 2412 MHz.

General RF Exposure = $(20 \text{ mW} / 22 \text{ mm}) \times \sqrt{2.412 \text{ GHz}} = 1.4$

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 (20 mW represents the worst-case channel power) are below the exemption limits in RSS-102 Issue 6, Table 11, at 41.6 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.