



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 Corporation
221 Jefferson Ridge Parkway
Lynchburg, VA 24501**

Model: XL-85M 7/800 MHz Land Mobile Radio

**FCC ID: OWDTR-0170-E
IC: 3636B-0170**

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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 4.

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	763 - 776	0.51	0.24	2.5	1.8
LMR	793 - 806	0.51	0.24	2.5	1.8
LMR	806 - 825	0.51	0.24	2.5	1.8
LMR	851 - 870	0.51	0.24	2.5	1.8
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 of the above frequency ranges in the above 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)
Element, 700/800 MHz	AN-225001-001	764-870	5.15
Element, 800/900 MHz	14050-6611-01	806-870	7.15
Yagi	AN-025137-007	700	12.15
Yagi	AN-025137-008	800	12.15

Table 3: Maximum Powers - Yagi Antennas

Technology	Transmit Frequencies (MHz)	Duty Cycle (%)	Max Conducted Power (W)	Max Antenna Gain (dBi)	Tune-up Adjustment (dB)	Max EIRP (W)
LMR	763 - 776	50	30	12.15	+1	626.8
LMR	793 - 806	50	30	12.15	+1	626.8
LMR	806 - 825	50	35	12.15	+1	731.3
LMR	851 - 870	50	35	12.15	+1	731.3

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

Technology	Transmit Frequencies (MHz)	Uncontrolled Exposure		Controlled Exposure	
		United States (cm)	Canada (cm)	United States (cm)	Canada (cm)
LMR	763 - 776	313	457	142	167
LMR	793 - 806	313	457	142	167
LMR	806 - 825	338	493	153	180
LMR	851 - 870	338	493	153	180

Note: An MPE Report of the measured safe distance with the LMR antennas is included with the application.

Table 5: Maximum Powers – 800/900 MHz Antenna - Highest Gain

Technology	Transmit Frequencies (MHz)	Duty Cycle (%)	Max Conducted Power (W)	Max Antenna Gain (dBi)	Tune-up Adjustment (dB)	Max EIRP (W)
LMR	763 - 776	50	30	7.15	+1	195.9
LMR	793 - 806	50	30	7.15	+1	195.9
LMR	806 - 825	50	35	7.15	+1	228.6
LMR	851 - 870	50	35	7.15	+1	228.6

Table 6: Calculated Minimum Safe Distance from LMR Antenna (based on Maximum Gain of 800/900 MHz Antenna)

Technology	Transmit Frequencies (MHz)	Uncontrolled Exposure		Controlled Exposure	
		United States (cm)	Canada (cm)	United States (cm)	Canada (cm)
LMR	763 - 776	175	255	79	93
LMR	793 - 806	175	255	79	93
LMR	806 - 825	148	275	85	101
LMR	851 - 870	148	275	85	101

Note: An MPE Report of the measured safe distance with the LMR antennas is included with the application.

Table 7: Maximum Powers – 700/800 MHz Antenna - Highest Gain

Technology	Transmit Frequencies (MHz)	Duty Cycle (%)	Max Conducted Power (W)	Max Antenna Gain (dBi)	Tune-up Adjustment (dB)	Max EIRP (W)
LMR	763 - 776	50	30	5.15	+1	123.6
LMR	793 - 806	50	30	5.15	+1	123.6
LMR	806 - 825	50	35	5.15	+1	144.2
LMR	851 - 870	50	35	5.15	+1	144.2

Table 8: Calculated Minimum Safe Distance from LMR Antenna (based on Maximum Gain of 700/800 MHz Antenna)

Technology	Transmit Frequencies (MHz)	Uncontrolled Exposure		Controlled Exposure	
		United States (cm)	Canada (cm)	United States (cm)	Canada (cm)
LMR	763 - 776	140	205	64	75
LMR	793 - 806	140	205	64	75
LMR	806 - 825	150	219	67	80
LMR	851 - 870	150	219	67	80

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

Table 9: Bluetooth and WiFi 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	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

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

The VCH includes the LMR transceiver circuitry, which uses an antenna some distance away from both the Control Head and the VCH, e.g., 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 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; IC: 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.