



MPE TEST REPORT

for the

LMI SOLUTIONS

FCC ID: 2BVF2-00301

WLL REPORT# 19531-01 REV 0

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Testing Certificate AT-1448



MPE Test Report

for the

LMI Solutions
Series 300 Module

FCC ID: 2BVF2-00301

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WLL Report# 19531-01 Rev 0

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Abstract

This report has been prepared on behalf of LMI Solutions to document the findings of the maximum permissible exposure evaluation on the Series 300 Module. The information provided in this report is only applicable to the device herein documented as the EUT.

The purpose of this evaluation is to establish a minimum safe distance as per the RF exposure requirements as defined in FCC §1.1307 & §1.1310.

This report documents the results of testing to the requirements of:

- CFR Title 47 Volume 1 Practice and Procedure; (1.1307) Environmental Assessments

Washington Laboratories, Ltd., is located at 4840 Winchester Boulevard, Suite 5., Frederick, MD 21703. Washington Laboratories has been accepted and designated by the FCC under Test Firm Number US3001. Washington Laboratories is approved by the ANSI National Accreditation Board (ANAB), as an independent test laboratory under ISO/IEC 17025:2017. Please refer to Certificate Number AT-1448. The Washington Laboratories, Ltd. ISED Canada Number is 3035A.

Revision History	Description of Change	Date
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1 Introduction

This report has been prepared on behalf of LMI Solutions for the Series 300 Module to show compliance with the RF exposure requirements as defined in FCC §1.1307 & §1.1310.

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2 Requirements

2.1 Transmitter Categories

2.1.1 Fixed Installations

A fixed location means that the device, including its antenna, is physically secured at a permanent location and is not able to be easily moved to another location. Additionally, distance to humans from the antenna is maintained to at least 2 meters.

2.1.2 Mobile Devices

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located, such as a wireless modem operating in a laptop computer, are considered mobile devices if they meet the 20-centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR §2.1091.

2.1.3 Portable Devices

A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. Portable device requirements are found in Section 2.1093 of the FCC's Rules (47 CFR §2.1093).



2.2 Exposure Categories

The limits for exposure are determined by the type of situation in which the individual is exposed. Table 1 lists the limits for the particular environment.

2.2.1 Occupational/Controlled Exposure

In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program. If appropriate, warning signs and labels can also be used to establish such awareness by providing prominent information on the risk of potential exposure and instructions on methods to minimize such exposure risks.

2.2.2 General Population/Uncontrolled Exposure

The general population / uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general-public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category and the general population/uncontrolled exposure limits apply to these devices.



Table 1: MPE Limits (FCC)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1	6
300–1500	N/A	N/A	f/300	6
1500–100,000	N/A	N/A	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	N/A	N/A	f/1500	30
1500–100,000	N/A	N/A	1	30



3 Device Summary

The table below summarizes the criteria used to evaluate the EUT.

Table 2: EUT Transmitter Device Summary (Series 300 Module)

Transmitter Category:	Unlicensed
Exposure Category:	General Public
FCC ID:	2BVF2-00301
Antenna Gain:	+1.73 dBi (worst-case)
Power Output:	+7.686 dBm (0.0059 Watts)
Tune-up Tolerance:	±1.0 dB
Evaluation Distance:	20 cm
Frequency Range:	2405MHz to 2480MHz
FCC Limit:	1.0 mW/cm ²

The output power list is conducted at the antenna port. The EUT employs a PCB trace antenna with +1.73dBi of gain. The manufacturer has declared the transmitter tune-up tolerance to be ±1.0 dB.

Power is calculated from the following:

$$\text{EIRP} = P + G + \text{tune-up adjustment}$$

$$\text{EIRP} = 7.686 + 1.73 + 1.0 = 10.416 \text{ dBm (adjusted for tune-up)}$$

where,

P is the transmitter peak conducted output power at the antenna port in dBm

G is the peak antenna gain in dBi

EIRP is the peak Effective Isotropic Radiated Power in dBm



4 Radio Frequency Radiation Exposure Evaluation

The highest RF output power of the unit was measured and recorded. According to §1.1310 of the FCC rules, the power density limit for General Population/Uncontrolled Exposure is 1mW/cm². According to §1.1310 of the FCC rules, the power density limit for Occupational/Controlled Exposure is 5mW/cm².

The MPE shall be calculated at 20cm to show compliance with the power density limit. The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at the Antenna Terminals

G = Gain of Transmit Antenna (linear gain-isotropic)

R = Distance from Transmitting Antenna



Table 2: Transmitter MPE Calculation Summary (FCC)

One Transmitter, FCC				
Frequency	2405	MHz		
Limit	1.000	mW/cm ²		
Distance (cm), R =	20	cm		
Power (dBm), P =	8.686	dBm		
TX Ant Gain (dBi), G =	1.73	dB		
Power Density:	0.002	mW/cm ²	Separation < 20 cm	
Minimum Distance:	0.9	cm		