



# A Test Lab Techno Corp.

Changan Lab : No. 140 -1, Changan Street, Bade City, Taoyuan County, Taiwan R.O.C.  
Tel : 886-3-271-0188 / Fax : 886-3-271-0190



## MPE Report

Test Report No.	:	1302FS12
Applicant	:	LITE-ON TECHNOLOGY CORP.
Manufacturer	:	electric imp, inc.
Product Type	:	imp
Trade Name	:	electric imp
Model Number	:	IMP002
Date of Received	:	Feb. 05, 2013
Test Period	:	Mar. 08, 2013
Date of Issued	:	Mar. 13, 2013
Test Specification	:	47 CFR § 2.1091 47 CFR §1.1310 ANSI / IEEE Std.C95.1-1992 H46-2/99-237E
Location of Test Lab.	:	Chang-an Lab.

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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4. This document may be altered or revised by A Test Lab Techno. Corp. personnel only, and shall be noted in the revision section of the document.

Approved By : Yung-Tan Tsai Tested By : Bill Hu  
(Yung Tan Tsai) (Bill Hu)



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## 1. Description of Equipment under Test (EUT)

Applicant	LITE-ON TECHNOLOGY CORP.			
Applicant Address	4F, 90, Chien 1 Road, Chung Ho, Taipei Hsien 235, Taiwan, R.O.C.			
Manufacturer	electric imp, inc.			
Manufacturer Address	5050 El Camino Real, STE 221, Los Altos, CA94022, USA			
Product Type	imp			
Trade Name	electric imp			
Model Number	IMP002			
FCC ID	PPQ-IMP002			
IC	4491A-IMP002			
Frequency Range	IEEE 802.11b / IEEE 802.11g / 802.11n 2.4GHz (20MHz): 2412 ~ 2462 MHz			
Transmit Power (AVG. Conducted Power)	IEEE 802.11 b: 0.037 W / 15.74 dBm IEEE 802.11 g: 0.019 W / 12.89 dBm IEEE 802.11n 2.4GHz (20MHz): 0.014 W / 11.61 dBm			
Antenna used	Manufacturer	Model Number	Antenna Type	Antenna Gain
	MAG.LAYERS SCIENTIFIC-TECHNICS	EDA-8709-2G4R2-A37	External Antenna	2.00 dBi
	Lite-On Technology Corp.	none	PIFA Antenna	2.86 dBi
Temperature Range	-30 ~ +70°C			

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 & 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties



## 2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR §1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons." This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

### Exposure evaluation

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.

Note: For evaluated 2G system, the transmission power P + G should be consider duty cycle.



### 3. RF Output Power

Band	Data Rate	CH	Frequency (MHz)	Conducted power (dBm)		Worst Case
				Avg.	Peak	
IEEE 802.11b	1 M	01	2412	15.40	19.24	<input type="checkbox"/>
		06	2437	15.54	19.26	<input type="checkbox"/>
		11	2462	<b>15.74</b>	19.32	<input checked="" type="checkbox"/>
IEEE 802.11g	6 M	01	2412	12.66	22.31	<input type="checkbox"/>
		06	2437	12.82	22.51	<input type="checkbox"/>
		11	2462	<b>12.89</b>	22.56	<input checked="" type="checkbox"/>
IEEE 802.11n 2.4GHz (20MHz)	6.5 M	01	2412	11.40	22.13	<input type="checkbox"/>
		06	2437	11.41	22.20	<input type="checkbox"/>
		11	2462	<b>11.61</b>	22.25	<input checked="" type="checkbox"/>

### 4. Test Result

Band	Data Rate	Frequency (MHz)	Limit (mw/cm <sup>2</sup> )	Distance [R] (cm)	Tune-up power [P] (dBm)	ANT Gain [G] (dBi)	[P]+ [G] [TP] (W)	Duty Cycle	[TP] with duty cycle (W)	Power Density [S] (mw/cm <sup>2</sup> )	Min. distance (cm)
IEEE 802.11b	1 M	2412	1.000	20	18.00	2.86	0.122	1	0.122	0.024	20cm
		2437	1.000	20	18.00	2.86	0.122	1	0.122	0.024	20cm
		2462	1.000	20	18.00	2.86	0.122	1	0.122	0.024	20cm
IEEE 802.11g	6 M	2412	1.000	20	15.50	2.86	0.069	1	0.069	0.014	20cm
		2437	1.000	20	15.50	2.86	0.069	1	0.069	0.014	20cm
		2462	1.000	20	15.50	2.86	0.069	1	0.069	0.014	20cm
IEEE 802.11n 2.4GHz (20MHz)	6.5 M	2412	1.000	20	14.25	2.86	0.051	1	0.051	0.010	20cm
		2437	1.000	20	14.25	2.86	0.051	1	0.051	0.010	20cm
		2462	1.000	20	14.25	2.86	0.051	1	0.051	0.010	20cm

Note 1: The Power [P] is max tune-up power (upper limit).

Note 2: For mobile or fixed location transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.

Note 3: The device evaluated by worst case antenna (2.86dBi) and max tune-up power.