



RF Exposure Evaluation Report

APPLICANT : Texas Instruments Incorporated
EQUIPMENT : WiFi and Bluetooth Module
BRAND NAME : Texas Instruments
MODEL NAME : WL1835MODGA
FCC ID : Z64-WL1835MOD
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



Table of Contents

1. ADMINISTRATION DATA 4

 1.1. Testing Laboratory 4

 1.2. Applicant 4

 1.3. Manufacturer 4

2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) 5

3. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS 5

4. RF EXPOSURE LIMIT INTRODUCTION 6

5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION 7

 5.1. Standalone Power Density Calculations 7

 5.2. Collocated Power Density Calculations 7



Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA383067	Rev. 01	Initial issue of report	Nov. 04, 2013
FA383067	Rev. 02	Update equipment name	Nov. 06, 2013



1. Administration Data

1.1. Testing Laboratory

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

1.2. Applicant

Company Name	Texas Instruments Incorporated
Address	12500 TI Boulevard M/S 8751. Dallas, TX 75243.

1.3. Manufacturer

Company Name	Jorjin Technologies Inc.
Address	17F, No.239, Sec. 1, Datong Rd, Xizhi Dist. New Taipei City 221, Taiwan. R.O.C.

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	WiFi and Bluetooth Module
Brand Name	Texas Instruments
Model Name	WL1835MODGA
FCC ID	Z64-WL1835MOD
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	<ul style="list-style-type: none"> • 802.11b/g/n HT20/HT40 • Bluetooth v3.0+EDR , Bluetooth v4.0+LE
Antenna Type	WLAN: Chip Antenna Bluetooth: Chip Antenna
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

3. Maximum RF average output power among production units

Mode / Band	Average Power (dBm)			
	1Mbps (GFSK)	2Mbps (π/4-DQPSK)	3Mbps (8-DPSK)	BT4.0-LE (GFSK)
2.4 GHz Bluetooth	13.0	9.0	9.0	10.0

Band / Frequency (MHz)		IEEE 802.11 Average Power (dBm)								
		Ant 0				Ant 1				Ant 0+1
		11b	11g	HT20	HT40	11b	11g	HT20	HT40	HT20
2.4GHz Band	2412		17.0							
	2422				15.0					
	2437	19.0	19.0	17.0	17.0	16.5	16.0	15.5	14.5	18.0
	2452				15.0					
	2462		17.0							



4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

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	1.0	6
300-1500			f/300	6
1500-100,000			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			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm 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 Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculations

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WLAN2.4GHz Band	2412.0	1.20	19.0	0.02	1.00	0.02
Bluetooth	2402.0	1.20	13.0	0.01	1.00	0.01

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band

5.2. Collocated Power Density Calculations

Mode	WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WLAN+Bluetooth
WLAN2.4GHz Band	0.02		0.03
Bluetooth 2.4GHz Band		0.005	

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.