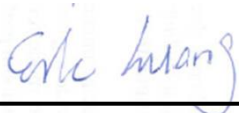


RF Exposure Evaluation Report

APPLICANT : Texas Instruments Incorporated
EQUIPMENT : 2.4GHz Wi-Fi® Module
BRAND NAME : Texas Instruments
MODEL NAME : CC3220MODASF12MON
CC3220MODASM2MON
CC3220MODSF12MOB
CC3220MODSM2MOB
IC : 451I-CC3220MOD
STANDARD : IC RSS-102 Issue 5

We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with IC RSS-102 Issue 5, 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 / Manager



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
CA731625	Rev. 01	Initial issue of report	Jun. 09, 2017



1. Administration Data

1.1. Testing Laboratory

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	Texas Instruments Incorporated
Address	12500 TI BLVD., Dallas Texas, 75243

Manufacturer	
Company Name	Texas Instruments Incorporated
Address	12500 TI BLVD., Dallas Texas, 75243

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	2.4GHz Wi-Fi® Module
Brand Name	Texas Instruments
Model Name	CC3220MODASF12MON CC3220MODASM2MON CC3220MODSF12MOB CC3220MODSM2MOB
IC	451I-CC3220MOD
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz
Mode	802.11b/g/n HT20
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.

Antenna List				
	Brand	Antenna Type	Model	2.4GHz gain
1	FoxCon	PCB	T77H533	2.5dBi
2	Ethertronics	Dipole	1000423	-0.6dBi
3	LSR	Rubber Whip / Dipole	001-0012	2dBi
4			080-0013	2dBi
5			080-0014	2dBi
6		PIFA	001-0016	2.5dBi
7			001-0021	2.5dBi
8	Laird	PCB	CAF94504	2dBi
9			CAF9405	2dBi
10	ACX	Multilayer Chip	AT3216-BR2R7HAA	0.5dBi
11			AT312-T2R4PAA	1.5dBi
12	TDK	Multilayer Ceramic Chip Antenna	ANT016008LCD2442MA1	1.6dBi
13			ANT016008LCD2442MA2	2.5dBi
14	Mitsubishi Material	Chip Antenna	AM03DP-ST01	1.6dBi
15		Antenna Unit	UB18CP-100ST01	-1.0dBi
16	Taiyo Yuden	Chip Antenna / Herical Monopole	AF216M245001	1.5dBi
17		Chip Antenna /Monopole Type	AH212M245001	1.3dBi
18			AH316M245001	1.9dBi
19	Antenna Technology	Dipole	AA2402SPU	2.0dBi
20			AA2402RSPU	2.0dBi
21			AA2402A-UFLLP	2.0dBi
22			AA2402AU-UFLLP	2.0dBi
23	Staf	Mono-pole	1019-016	2.14dBi
24			1019-017	2.14dBi
25			1019-018	2.14dBi
26			1019-019	2.14dBi
27	Map Electronics	Rubber Whip	MEIWX-2411SAXX-2400	2.0dBi
28			MEIWX-2411RSXX-2400	2.0dBi
29			MEIWX-282XSAXX-2400	2.0dBi
30			MEIWX-282XRSXX-2400	2.0dBi
31			MEIWF-HP01RS2X-2400	2.0dBi
32	Yageo	Chip	ANT3216A063R2400A	1.69dBi
33	Mag Layers Scientific	Chip	LTA-3216-2G4S3-A1	1dBi
34			LTA-3216-2G4S3-A3	2dBi
35	Advantech	Rubber Whip / Dipole	AN2450-5706RS	2.38dBi

3. Maximum RF average output power among production units

Band / Frequency (MHz)		IEEE 802.11 Average Power (dBm)		
		11b	11g	HT20
2.4GHz WLAN	2412	17.0	12.0	12.5
	2437	17.0	16.5	16.5
	2462	17.0	12.0	12.0

4. RF Exposure Limit Introduction

IC has adopted the RF field strength limits established in Health Canada's RF exposure guideline. The limits are shown in Table 4 below per RSS-102.

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ⁻²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i> ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}
Note: <i>f</i> is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

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 Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (W/m ²)	Limit (W/m ²)
2.4GHz WLAN	2412.0	2.5	17.0	19.500	0.089	89.125	0.177	5.366

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

Conclusion:

According to IC RSS-102 Issue 5, the RF exposure analysis concludes that the RF Exposure is IC compliant.