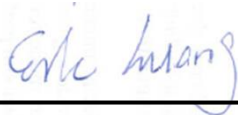


RF Exposure Evaluation Report

APPLICANT : Quanta Computer Inc.
EQUIPMENT : LTE M.2 Card
BRAND NAME : Quanta
MODEL NAME : LM17B
MARKETING NAME : LM17B
FCC ID : HFS-LM17B
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.



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA4D1128	Rev. 01	Initial issue of report	Jan. 09, 2015

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 Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	Quanta Computer Inc.
Address	211 Wen Hwa 2nd Rd., Kueishan, Taoyuan 33377, Taiwan

Manufacturer	
Company Name	1. Quanta Computer Inc. 2. Aptos Technology Inc.
Address	1. 211 Wen Hwa 2nd Rd., Kueishan, Taoyuan 33377, Taiwan 2. No.398, Youyi Rd., Jhunan Township, Miaoli County 350, Taiwan

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	LTE M.2 Card
Brand Name	Quanta
Model Name	LM17B
Marketing Name	LM17B
FCC ID	HFS-LM17B
Wireless Technology and Frequency Range	LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 13: 779.5MHz ~ 784.5 MHz
Mode	• LTE: QPSK, 16QAM
HW Version	LM17B/B1

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

LTE Band 13				
Modulation	BW (MHz)	RB size	Target MPR	Power
QPSK	10	≤ 12	0	23.50
QPSK	10	> 12	1	22.50
16QAM	10	≤ 12	1	22.50
16QAM	10	> 12	2	21.50
QPSK	5	≤ 8	0	23.50
QPSK	5	> 8	1	22.50
16QAM	5	≤ 8	1	22.50
16QAM	5	> 8	2	21.50

LTE Band 4				
Modulation	BW (MHz)	RB size	Target MPR	Power
QPSK	20	≤ 18	0	23.50
QPSK	20	> 18	1	22.50
16QAM	20	≤ 18	1	22.50
16QAM	20	> 18	2	21.50
QPSK	15	≤ 16	0	23.50
QPSK	15	> 16	1	22.50
16QAM	15	≤ 16	1	22.50
16QAM	15	> 16	2	21.50
QPSK	10	≤ 12	0	23.50
QPSK	10	> 12	1	22.50
16QAM	10	≤ 12	1	22.50
16QAM	10	> 12	2	21.50
QPSK	5	≤ 8	0	23.50
QPSK	5	> 8	1	22.50
16QAM	5	≤ 8	1	22.50
16QAM	5	> 8	2	21.50

LTE Band 2				
Modulation	BW (MHz)	RB size	Target MPR	Power
QPSK	20	≤ 18	0	23.50
QPSK	20	> 18	1	22.50
16QAM	20	≤ 18	1	22.50
16QAM	20	> 18	2	21.50
QPSK	15	≤ 16	0	23.50
QPSK	15	> 16	1	22.50
16QAM	15	≤ 16	1	22.50
16QAM	15	> 16	2	21.50
QPSK	10	≤ 12	0	23.50
QPSK	10	> 12	1	22.50
16QAM	10	≤ 12	1	22.50
16QAM	10	> 12	2	21.50
QPSK	5	≤ 8	0	23.50
QPSK	5	> 8	1	22.50
16QAM	5	≤ 8	1	22.50
16QAM	5	> 8	2	21.50



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 Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP (dBm)	Maximum ERP (W)	Maximum EIRP (dBm)	Maximum EIRP (W)	Maximum Output Power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
LTE Band 13	777	10.5	23.5	31.860	1.535	34.000	2.512	3.000	2511.886	0.500	0.518
LTE Band 4	1710	6.5	23.5	27.860	0.611	30.000	1.000	1.000	1000.000	0.199	1.000
LTE Band 2	1850	9.5	23.5	30.860	1.219	33.000	1.995	2.000	1995.262	0.397	1.000

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 Calculation

Note:

- This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN is less than or equal to 29dBm and for Bluetooth is less than or equal to 15dBm.
- A maximum antenna gain of 5 dBi for WLAN/BT has been assumed for all collocated antennas.

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
LTE Band 13	777	7.0	23.5	30.5	1.12	1122.02	0.223	0.518	0.431
LTE Band 4	1710	6.5	23.5	30.0	1.00	1000.00	0.199	1.000	0.199
LTE Band 2	1850	9.5	23.5	33.0	2.00	1995.26	0.397	1.000	0.397
WLAN2.4GHz Band	2412	5.0	29.0	34.0	2.51	2511.89	0.500	1.000	0.500
WLAN5GHz Band	5180	5.0	29.0	34.0	2.51	2511.89	0.500	1.000	0.500
Bluetooth	2402	5.0	15.0	20.0	0.10	100.00	0.020	1.000	0.020

<Collocated analysis>

Note:

- For collocation analysis, LTE B13 is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
- Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN + Bluetooth.
- Considering the WWAN module collocation with the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant

WLAN Power Density / Limit	Bluetooth Power Density / Limit	LTE B13 Power Density / Limit	Σ (Power Density / Limit) of WWAN+WLAN+Bluetooth
0.500	0.020	0.431	0.951



Conclusion:

Based on 47 CFR §2.1091, the analysis concludes that this product when transmitting in standalone within a host device, is compliant with the FCC RF exposure requirements in mobile exposure condition, provided the conducted power and antenna gain do not exceed the limits for each given frequency band per wireless technology as follow table:

Device	Technology	Band	Frequency (MHz)	Maximum Conducted Power (dBm)	Stanalone Maximum Antenna Gain (dBi)	Collocated Maximum Antenna Gain (dBi)
LTE M.2 Card	LTE	Band 13	777 - 787	23.5	10.5	7.0
		Band 4	1710 - 1755	23.5	6.5	6.5
		Band 2	1850 - 1910	23.5	9.5	9.5