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FCC SAR Evaluation Report

Report No. : SA130513C11
Applicant : Quanta Computer Inc.
Address : No. 188, Wen Hwa 2nd RD., Kuei Shan Hsiang, Tao Yuan Shien, Taiwan
Product : Laptop
FCC ID : HFS-Y contain PKRNVWE396
Model No. : CB2U
Standards : FCC 47 CFR Part 2 (2.1093) / IEEE C95.1:1991 / IEEE 1528:2003
FCC OET Bulletin 65 Supplement C (Edition 01-01)
KDB 447498 D01 v05 / KDB 616217 D04 v01

CERTIFICATION: The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch - Taiwan HwaYa Lab**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by TAF or any government agencies.

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Release Control Record

Issue No.	Reason for Change	Date Issued
R01	Initial release	Jun. 20, 2013

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1. Summary of Maximum SAR Value

Equipment Class	Mode	Highest Reported Body SAR _{1g} (0.0 cm Gap) (W/kg)
PCB	GSM850	N/A
	GSM1900	N/A
	WCDMA II	N/A
	WCDMA IV	N/A
	WCDMA V	N/A
DTS	2.4G WLAN	N/A
	5.8G WLAN	N/A
NII	5.2G WLAN	N/A
	5.3G WLAN	N/A
	5.6G WLAN	N/A
DSS	Bluetooth	N/A
Highest Simultaneous Transmission SAR		Body (W/kg)
PCB+DTS		0.80
PCB+NII		0.80
PCB+DSS		0.80

Note:

- The SAR limit (**Head & Body: SAR_{1g} 1.6 W/kg**) for general population / uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1991.

2. Description of Equipment Under Test

EUT Type	Laptop
FCC ID	HFS-Y contain PKRNWWE396
Model Name	CB2U
Tx Frequency Bands (Unit: MHz)	GSM850 : 824.2 ~ 848.8 GSM1900 : 1850.2 ~ 1909.8 WCDMA Band II : 1852.4 ~ 1907.6 WCDMA Band IV : 1712.4 ~ 1752.6 WCDMA Band V : 826.4 ~ 846.6 WLAN : 2412 ~ 2462, 5180 ~ 5240, 5260 ~ 5320, 5500 ~ 5700, 5745 ~ 5825 Bluetooth : 2402 ~ 2480
Uplink Modulations	GPRS : GMSK EDGE : 8PSK WCDMA : QPSK 802.11b : DSSS 802.11a/g/n : OFDM Bluetooth : GFSK
Maximum Tune-up Conducted Power (Unit: dBm)	GSM850 : 33.8 GSM1900 : 30.8 WCDMA Band II : 25.0 WCDMA Band IV : 25.0 WCDMA Band V : 25.0 WLAN 2.4G : 14.5 WLAN 5.2G : 11.3 WLAN 5.3G : 12.0 WLAN 5.6G : 13.7 WLAN 5.8G : 13.4 Bluetooth : 8.3
Antenna Type	PIFA Antenna
EUT Stage	Identical Prototype

Note:

- The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

List of Accessory:

Li-ion Battery	Brand Name	SMP
	Model Name	SQU-1208
	Power Rating	11.1Vdc, 2700mAh
WWAN Module	Brand Name	NOVATEL
	Model Name	E396U
WLAN + Bluetooth	Brand Name	AZUREWAVE
	Model Name	AW-AH397
Camera	Brand Name	Lite-on
	Model Name	12P2SF004
11.6" LCD Panel	Brand Name	LG
	Model Name	LP116WH6
Battery Pack	Brand Name	SMP
	Model Name	SQU-1208
CPU	Brand Name	Samsung
	Model Name	Exynos 5250
Memory Capacity	Remark	2GB

3. SAR Measurement Evaluation

3.1 EUT Testing Position

According to KDB 447498, SAR testing for laptop PC is required for bottom surface. This EUT was tested in the base of EUT directly against the flat phantom.

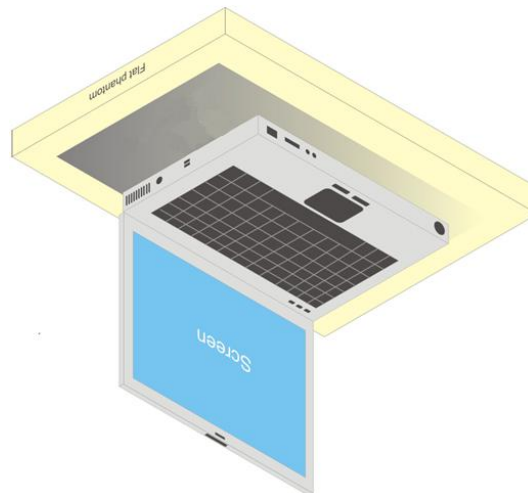


Fig-4.1 Illustration for Laptop Setup

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According to KDB 447498 D01v05, the SAR test exclusion condition is based on source-based time-averaged maximum conducted output power, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The SAR exclusion threshold is determined by the following formula.

1. For the test separation distance ≤ 50 mm

$$\frac{\text{Max. Tune up Power}_{(mW)}}{\text{Min. Test Separation Distance}_{(mm)}} \times \sqrt{f_{(GHz)}} \leq 3.0$$

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

2. For the test separation distance > 50 mm, and the frequency at 100 MHz to 1500 MHz

$$\left[(\text{Threshold at 50 mm in Step 1}) + (\text{Test Separation Distance} - 50 \text{ mm}) \times \left(\frac{f_{(MHz)}}{150} \right) \right]_{(mW)}$$

3. For the test separation distance > 50 mm, and the frequency at > 1500 MHz to 6 GHz

$$[(\text{Threshold at 50 mm in Step 1}) + (\text{Test Separation Distance} - 50 \text{ mm}) \times 10]_{(mW)}$$

Mode	Frequency (MHz)	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Rear Face		
				Ant. to Surface (mm)	Exclusion Threshold (mW)	Require SAR Testing?
GSM850	0.849	26.5	447	177	882	No
GSM1900	1.91	23.5	224	177	1379	No
WCDMA II	1.908	25.0	316	177	1379	No
WCDMA IV	1.753	25.0	316	177	1383	No
WCDMA V	0.847	25.0	316	177	880	No
WLAN 2.4G	2.462	14.5	28	78	376	No
WLAN 5.2G	5.24	11.3	13	78	346	No
WLAN 5.3G	5.32	12.0	16	78	345	No
WLAN 5.6G	5.7	13.7	23	78	343	No
WLAN 5.8G	5.825	13.4	22	78	342	No
BT	2.48	8.3	7	78	375	No



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3.2 Maximum Output Power

3.2.1 Maximum Conducted Power

The maximum conducted power (Unit: dBm) including tune-up tolerance is shown as below.

Mode	GSM850	GSM1900
GPRS 8 (GMSK, 1 Uplink)	33.8	30.8
GPRS 10 (GMSK, 2 Uplink)	32.5	29.5
EDGE 8 (8PSK, 1 Uplink)	27.0	25.5
EDGE 10 (8PSK, 2 Uplink)	27.0	25.5

Mode	WCDMA Band II	WCDMA Band IV	WCDMA Band V
RMC 12.2K	25.0	25.0	25.0

Mode	Tx Antenna	2.4G WLAN	5.2G WLAN	5.3G WLAN	5.6G WLAN	5.8G WLAN
802.11b	0	13.2	N/A	N/A	N/A	N/A
	1	14.5	N/A	N/A	N/A	N/A
802.11g	0	9.0	N/A	N/A	N/A	N/A
	1	9.0	N/A	N/A	N/A	N/A
802.11a	0	N/A	8.0	8.0	10.1	10.0
	1	N/A	8.2	9.3	10.0	10.5
802.11n HT20	0	9.1	8.0	8.0	10.0	10.0
	1	9.0	8.2	9.1	10.0	10.5
	0+1	12.0	11.3	11.6	12.4	12.8
802.11n HT40	0	9.2	8.0	9.0	11.3	10.1
	1	9.3	9.0	10.3	11.2	10.7
	0+1	12.0	11.3	12.0	13.7	13.4

Mode	Bluetooth
All	8.3

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3.3 SAR Testing Results

3.3.1 SAR Results for Body

Standalone SAR for this device is not required.

3.3.2 Simultaneous Multi-band Transmission Evaluation

<Estimated SAR Calculation>

According to KDB 447498 D01v05, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR was estimated according to following formula to result in substantially conservative SAR values of ≤ 0.4 W/kg to determine simultaneous transmission SAR test exclusion.

$$\text{Estimated SAR} = \frac{\text{Max. Tune up Power}_{(mW)}}{\text{Min. Test Separation Distance}_{(mm)}} \times \frac{\sqrt{f_{(GHz)}}}{7.5}$$

If the minimum test separation distance is < 5 mm, a distance of 5 mm is used for estimated SAR calculation. When the test separation distance is > 50 mm, the 0.4 W/kg is used for SAR-1g.

Mode / Band	Frequency (GHz)	Max. Tune-up Power (dBm)	Test Position	Separation Distance (mm)	Estimated SAR (W/kg)
GSM850	0.849	26.5 (Max Frame-Averaged Power)	Body	177	0.4
GSM1900	1.91	23.5 (Max Frame-Averaged Power)	Body	177	0.4
WCDMA II	1.908	25.0	Body	177	0.4
WCDMA IV	1.753	25.0	Body	177	0.4
WCDMA V	0.847	25.0	Body	177	0.4
WLAN (DTS)	2.462	14.5	Body	78	0.4
WLAN (NII)	5.7	13.7	Body	78	0.4
BT (DSS)	2.48	8.3	Body	78	0.4

Note:

1. The separation distance is determined from the antenna location to the user.
2. When standalone SAR testing is not required, an estimated SAR can be applied to determine simultaneous transmission SAR test exclusion.

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<SAR Summation Analysis>

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. When the sum of SAR_{1g} of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR_{1g} 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR_{1g} is greater than the SAR limit (SAR_{1g} 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

No.	Conditions (SAR1 + SAR2)	Exposure Condition	Test Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR Analysis
1	WWAN + WLAN (DTS)	Body	Bottom Surface	0.4 (Estimated SAR)	0.4 (Estimated SAR)	0.80	Σ SAR < 1.6, Not required
2	WWAN + WLAN (NII)	Body	Bottom Surface	0.4 (Estimated SAR)	0.4 (Estimated SAR)	0.80	Σ SAR < 1.6, Not required
3	WWAN + BT (DSS)	Body	Bottom Surface	0.4 (Estimated SAR)	0.4 (Estimated SAR)	0.80	Σ SAR < 1.6, Not required

Test Engineer : Ulysses Liu



4. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The road map of all our labs can be found in our web site also.

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