

RF EXPOSURE REPORT



Applicant: Quanta Computer Inc.
No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City
33377, Taiwan

Manufacturer: Quanta Computer Inc.
No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City
33377, Taiwan

Product Name: Clover Compact

Brand Name: Clover

Model No.: C801

Report Number: TESA2403000148E5

FCC ID HFS-C801

Issue Date: May 02, 2024

Date of EUT Received: Mar. 21, 2024

Approved By _____

John Yeh

We hereby certify that:

The above equipment was evaluate by SGS Taiwan Ltd. The evaluation in this report is in compliance with 47 CFR Part 2.1091,KDB 447498 D04 v01.

The results of this report relate to the specific sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History					
Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2403000148E5	00	Original	Apr. 22, 2024	Yami Kuo	
TESA2403000148E5	01	Revised chapter 1.4	Apr. 26, 2024	Yami Kuo	*
TESA2403000148E5	02	Revised chapter 1.4	May 02, 2024	Yami Kuo	*

Note:

- The remark "*" indicates modification of the report upon requests from certification body.

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 Product Description

Product Name:	Clover Compact
Brand Name:	Clover
Model No.:	C801
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	WLAN: C081UG40850176 WWAN: C081UG40850161
Power Supply:	12Vdc

1.2 Evaluation site

Laboratory	Site Address		FCC Designation number
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	<input type="checkbox"/>	No. 134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, 24803, Taiwan.	TW0027
	<input checked="" type="checkbox"/>	No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 333 Taiwan.	TW0028
	<input type="checkbox"/>	1F, No. 8, Alley 15, Lane 120, Sec. 1, Nei Hu Road, Nei Hu District, Taipei City, 222 Taiwan.	TW0029

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1.3 Antenna Information:

1.3.1 BT / WLAN 2.4GHz

Antenna Type	Supplier	Main / Aux	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)
PIFA	Advanced Wireless & Antenna INC.	Main	ALF6Y-100003	2.4GHz	-0.51

1.3.2 WLAN 5GHz

Antenna Type	Supplier	Antenna Part No.	Main / Aux	Note
PIFA	Advanced Wireless & Antenna INC.	ALF6Y-100003	Main	Ant 1

Operating Frequency (MHz)	Ant 1 Peak Gain (dBi)
5150.0 ~ 5250.0	1.75
5250.0 ~ 5350.0	1.75
5470.0 ~ 5725.0	1.75
5725.0 ~ 5850.0	1.75

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Antenna Type	Supplier	Antenna Part No.
PIFA	Advanced Wireless &Antenna INC.	ALF00-000024
Operating Frequency (MHz)		Ant 0 Peak Gain (dBi)
LTE-Band 2	1850 ~ 1910	0.4
LTE-Band 4	1710 ~ 1755	1.8
LTE-Band 5	824 ~ 849	-1.1
LTE-Band 12	699 ~ 716	-1.4
LTE-Band 13	777 ~ 787	-1.3
LTE-Band 17	704 ~ 716	-1.4
LTE-Band 66	1710 ~ 1780	0.4

Note: Antenna information is provided by the applicant.

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1.4 Rated Power

1.4.1 Bluetooth / WLAN 2.4GHz

Mode	Freq. Range (MHz)	Channels	Modulation Technology	Max Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Worst Case
BR+EDR	2402-2480	79	GFSK + $\pi/4$ DQPSK + 8DPSK	7.5	-0.51	6.99	
BLE	2402-2480	40	GFSK	1.5	-0.51	0.99	
802.11b/g/n_HT20	2412-2462	11	DSSS & OFDM	20	-0.51	19.49	V
Modulation type:		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM					

1.4.2 WLAN 5GHz:

802.11	Freq. Range (MHz)	Modulation Technology	Max. Output Power Include Tolerance (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Worst Case
a	5150~5250	OFDM	18.00	1.75	19.75	
	5250~5350		18.00	1.75	19.75	
	5470~5725		18.00	1.75	19.75	
	5725~5850		18.00	1.75	19.75	
n HT20 ac VHT20	5150~5250		19.00	1.75	20.75	V
	5250~5350		19.00	1.75	20.75	V
	5470~5725		19.00	1.75	20.75	V
	5725~5850		19.00	1.75	20.75	V
n HT40 ac VHT40	5150~5250		17.00	1.75	18.75	
	5250~5350		17.00	1.75	18.75	
	5470~5725		17.00	1.75	18.75	
	5725~5850		17.00	1.75	18.75	
ac VHT80	5150~5250		12.00	1.75	13.75	
	5250~5350		11.00	1.75	12.75	
	5470~5725		16.00	1.75	17.75	
	5725~5850		16.00	1.75	17.75	

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1.4.3 WWAN:

Operating Frequency (MHz)		Max. Output Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP (W)	FCC (NEW)			FCC Worst Case
						separation distance(m)	ERP _{th} (W)	ERP/ERP _{th}	
LTE-Band 2	1850 ~ 1910	25.00	0.40	23.25	0.21	0.2	0.77	0.27	
LTE-Band 4	1710 ~ 1755	25.00	1.80	24.65	0.29	0.2	0.77	0.38	
LTE-Band 5	824 ~ 849	25.00	-1.10	21.75	0.15	0.2	0.42	0.36	
LTE-Band 12	699 ~ 716	25.00	-1.40	21.45	0.14	0.2	0.36	0.39	V
LTE-Band 13	777 ~ 787	25.00	-1.30	21.55	0.14	0.2	0.40	0.35	
LTE-Band 17	704 ~ 716	25.00	-1.40	21.45	0.14	0.2	0.36	0.39	V
LTE-Band 66	1710 ~ 1780	25.00	0.40	23.25	0.21	0.2	0.77	0.27	

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2 DETERMINATION OF MPE EXEMPTION

2.1 Single RF Source

As per §1.1307(b)(3)(i),

- (A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);
- (B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Note: when 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption thresholds.

- (C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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Table 1 to § 1.1307(b)(3)(i)(C) –

Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)			Minimum Distance			Threshold ERP (W)
fL		fH	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	
0.3	-	1.34	159m	-	35.6m	1920 R ²
1.34	-	30	35.6m	-	1.6m	3450 R ² /f ²
30	-	300	1.6m	-	159mm	3.83 R ²
300	-	1500	159mm	-	31.8mm	0.0128 R ² f
1500	-	100000	31.8mm	-	0.5mm	19.2R ²

R= minimum separation distance in meter

f = frequency in MHz

2.2 Multiple RF Sources

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

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2.3 Single RF Source Evaluation Results

Chain 0	Frequency (MHz)	Max. tune-up power (dBm)	Peak gain (dBi)	ERP (dBm)	ERP (W)	Permissible Minimum separation distance ($\lambda/2\pi$) (m)	R = actual Minimum separation distance(m)	ERP _{th} (W)	ERP/ERP _{th}	Simultaneous transmission modes
BT	2402	7.5	-0.51	4.84	0.003	0.0199	0.200	0.768	0.004	V
WLAN 2.4G	2412	20	-0.51	17.34	0.054	0.0198	0.200	0.768	0.070	V
WLAN 5G	5470	19	1.75	18.6	0.072	0.0087	0.200	0.768	0.094	V
LTE-Band 12	699	25	-1.4	21.45	0.140	0.0683	0.200	0.358	0.391	V

NFC

Frequency (MHz)	E-FIELD dBuV/m	Test Distance (m)	EIRP (dBm)	EIRP (mW)
13.56	37.1	30	-38.05757	0.0001564

Note:

The EUT is transmitting with a very low field strength and has a very low calculated EIRP. For this operation frequency no limit exists

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the minimum separation distance of that band. All the single RF source results (P or ERP) are less than their corresponding threshold (P_{th} or ERP_{th}), so they are exempt from RF exposure testing.

2.4 Multiple RF Sources Evaluation Results

Simultaneous transmission modes	Σ ERP/ERP _{th}	Criteria
1	0.559	1

Note:

1. $\Sigma(ERP/ERP_{th})$: This is a summation of [(ERP of RF source / exemption threshold ERP for RF source)]. Considering the collocated transmitters, the aggregated (ERP/ERP_{th}) is smaller than 1, and MPE of collocated transmitters is compliant

~ End of Report ~

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