

RF EXPOSURE REPORT



FCC Applicant: Wacom Co., Ltd.
2-510-1 Toyonodai, Kazo-shi, Saitama 349-1148 Japan

Product Name: Pen Tablet

Brand Name: Wacom

Model No.: CTC4110WL

Model Difference: N/A

Marketing Name: CTC4110WL***** (“*” may be English Alphabet a to z or digital numeral serial no, 0-9 or blank)

Report Number: TESA2302000049E5

FCC ID HV4CTC4110WL

Issue Date: Mar. 20, 2023

Approved By

John Yeh

We hereby certify that:

The above equipment was evaluated by SGS Taiwan Ltd. Central RF Lab. The evaluation in this report is in compliance with FCC KDB 447498 D01v06.

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

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2302000049E5	00	Original	Mar. 20, 2023	Cindy Chou	

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:	Pen Tablet
Brand Name:	Wacom
Model No.:	CTC4110WL
Model Difference:	N/A
Marketing Name:	CTC4110WL ***** (“*” may be English Alphabet a to z or digital numeral serial no, 0-9 or blank)

1.2 Reference Test Report

Test Lab:	SGS Taiwan Ltd. Central RF Lab
Report Number:	TERF2302000198ER, TERF2302000199ER

1.3 Antenna Information:

Antenna Type	Supplier	Antenna Part No.	Freq.	Peak Antenna Gain (dBi)
printed antenna	RENESAS	DA14531MOD	2.4GHz	-0.50

The antenna information is provided by the applicant.

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2 RF EXPOSURE EVALUATION FOR PORTABLE CONDITIONS

2.1 KDB 447498 D01 4.3.1:

Step a: For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [nf(\text{GHz})] \leq 3.0$ for 1-g Head & Body SAR and ≤ 7.5 for 10-g extremity Hand SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as numeric thresholds in **step b)** below

Step b: For 100 MHz to 6 GHz and test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following (also illustrated in Appendix B):

- 1) $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f(\text{MHz})/150)]\}$ mW, for 100 MHz to 1500 MHz
- 2) $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot 10]\}$ mW, for > 1500 MHz and ≤ 6 GHz

Step c: For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):

- 1) For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by $[1 + \log(100/f(\text{MHz}))]$
- 2) For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$
- 3) SAR measurement procedures are not established below 100 MHz

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2.2 Standalone test exclusion for BLE:

Step a:

This is a portable device and the max. output power including tune-up tolerance is 1.66 (mW), lower than the threshold given and derived as formula given above, where

$$=1.66(\text{mW})/5(\text{mm})*\sqrt{2.48(\text{GHz})} = 0.523 < 3.0$$

Frequency (MHz)	Max. output power including tune-up tolerance(dBm)	Max. output power including tune-up tolerance(mW)	Distance (mm)	Result	≤ 3.0 for 1-g SAR
2480	2.2	1.66	5	0.523	TRUE

From above, standalone BLE can be excluded from SAR testing.

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2.3 Standalone test exclusion for EMR:

Based on KDB447498D01v06 4.3.1 c), SAR test exclusion threshold for EMR (0.5625MHz) shall be evaluated as below,

- For *test separation distances* ≤ 50 mm, the power threshold determined by the equation in 4.3.1 c) 1) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$
- The power threshold at 50mm/100 MHz in 4.3.1 b) is multiplied by $[1 + \log(100/f(\text{MHz}))]$ where f is 0.5625MHz
- The power threshold in 4.3.1 b) is $[\text{Power allowed at numeric threshold for 50 mm in 4.3.1 a)} + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f(\text{MHz})/150)] \text{ mW}$, for 100 MHz to 1500 MHz where test separation distance is 50mm, frequency is 100MHz.
- Power allowed at numeric threshold for 50 mm in 4.3.1 a) is $[3/\sqrt{f(\text{GHz})}] \cdot (\text{test separation distance})$

Hence, SAR test exclusion threshold is calculated in reverse sequence:

- $[3/\sqrt{0.1}] \cdot 50 = 474.3416\text{mW}$
- $474.3416 + (50-50) \cdot (100/150) = 474.3416\text{mW}$
- $474.3416 \cdot [1 + \log(100/0.5625)] = 1541.552\text{mW}$
- $1541.552 \cdot 0.5 = 770.776\text{mW}$

So the SAR test exclusion power threshold for EMR(0.5625MHz) is 770.776mW(equal to 28.87dBm).

Also, the maximum power of EMR is -85.52dBm (converted from 9.64 dBuV/m at 3m) and it is far below the exclusion threshold (28.87dBm), so SAR test for EMR can be excluded.

EMR

Frequency (MHz)	E-FIELD dBuV/m	Test Distance (m)	EIRP (dBm)	EIRP (mW)	Threshold (mW)
0.5625	9.64	3	-85.52	0.00000000281	770.776

Note:

$$\text{EIRP (dBm)} = (\text{E-FIELD(dBuV/m)} + 20\log(d(\text{m})) - 104.7$$

$$\text{EIRP(mW)} = (10^{(\text{EIRP(dBm)}/10)})$$

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3 SIMULTANEOUS TRANSMISSION ANALYSIS

3.1 Simultaneous Transmission Scenarios:

Simultaneous Transmit Configurations
BLE + EMR

3.2 Estimated SAR calculation

According to KDB447498 D01v06 – When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$$\text{Estimated SAR} = \frac{\text{Max. tune up power (mW)}}{\text{Min. test separation distance(mm)}} \times \frac{\sqrt{f(\text{GHz})}}{7.5}$$

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

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3.3 Estimated SAR for BLE and EMR

Based on KDB447498D01v06 4.3.2 b), when an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:

1) $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})/x}] \text{ W/kg}$, for test separation distances $\leq 50 \text{ mm}$, where $x = 7.5$ for 1-g SAR and $x = 18.75$ for 10-g SAR.

BLE:

Mode	Max. tune-up power(dBm)	Max. tune-up power(mW)	Test separation distance (mm)	Calculation value	Exclusion thresholds	Require SAR testing?	Estimated SAR (W/kg)
BLE	2.2	1.660	5	0.523	3.000	NO	0.070

EMR:

Using the most conservative test separation distance 5mm, so the estimated 1g-SAR for EMR would be 0.00000000000178 W/Kg.

$[0.00000000281/5] \cdot [\sqrt{0.0005625/7.5}] = 0.00000000000178 \text{ W/Kg}$

3.4 Simultaneous transmission evaluation

FCC Reported SAR		Scenario 1
1	2	
BLE	EMR	1+2
1g estimate SAR (W/kg)	1g estimate SAR (W/kg)	Summed
0.070	0.00000000000178	1g SAR (W/kg)
		0.070

3.5 Conclusion

The simultaneous transmission is compliant because the SAR sum is less than the corresponding criteria.

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