

RF Exposure Lab

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CERTIFICATE OF COMPLIANCE SAR EVALUATION

Brady Corporation
6555 W. Good Hope Road
Milwaukee, WI 53223

Dates of Test: November 18, 2022
Test Report Number: SAR.20221110
Revision A
Lab Designation Number: US1195(FCC) & US0194(ISED)

Model(s):	M610
Contains BT Module:	Brady Corporation Model STM32WB5MMG FCC ID: NUC-STM32WB5M IC: 3287A-STM32WB5M
Equipment Type:	Wireless Printer
Classification:	Portable Transmitter
TX Frequency Range:	2402 -2480 MHz
Frequency Tolerance:	± 2.5 ppm
Maximum Conducted RF Output:	2450 MHz (BT) – 6.0 dBm Conducted
Signal Modulation:	GFSK
Antenna Type:	Internal
Application Type:	Certification
Standard(s):	47CFR1.1310, 47CFR2.1093, KDB447498 D04 Interim General RF Exposure Guidance v01, KDB248227 D01 v02r02, RSS-102 Issue 5, Safety Code 6
Separation Distance:	0 mm

This wireless portable device has been shown to be excluded for RF exposure testing for uncontrolled environment/general exposure limits specified in above listed standards for standalone SAR. The device has also been shown to meet the simultaneous requirements of each standard as well (See test report).

I attest to the accuracy of the data. I assume full responsibility for the completeness of these calculations and vouch for the qualifications of all persons making them.



Jay M. Moulton
Vice President



Certificate # 2387.01

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Comment/Revision	Date
Original Release	November 18, 2022
Revision A – Correct module owner to Brady & use the draft version of KDB447498	May 18, 2023

1. Introduction

This report shows exclusion calculations of the Brady Corporation Model M610 Wireless Printer with 47CFR1.1310, 47CFR2.1093, KDB447498 D04 Interim General RF Exposure Guidance v01, RSS-102 Issue 5, Safety Code 6.

2. Radiation Sources

Radio	Description	
BLE	Frequency Range (MHz)	2402 – 2480 MHz
	Maximum Power (dBm)	6.0 dBm
	Maximum Duty Cycle (%)	100%

3. Printer



The host printer can be carried next to the body by the handle. The minimum distance the BLE antenna is 40 mm for the body and 5 mm for the extremity.

4. RF Exposure Classifications

Device Types	
Fixed	A fixed device is defined as a device physically secured at one fixed location and cannot be easily re-located.
Mobile	A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. (47 CFR 2.1091)
Portable	A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. (47 CFR 2.1093)

Exposure Categories	
Occupational / Controlled	Limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
General population / uncontrolled	Exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

5. RF Exposure Limits Standalone

FCC Requirements

The FCC SAR test exclusion for standalone SAR is determined for each operating configuration and exposure condition the device can operate.

$$P_{th}(\text{mW}) = \begin{cases} ERP_{20\text{cm}}(d/20\text{ cm})^x & 0.5\text{ cm} \leq d \leq 20\text{ cm} \\ ERP_{20\text{cm}} & 20\text{ cm} < d \leq 40\text{ cm} \end{cases}$$

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

$$ERP_{20\text{cm}}(\text{mW}) = \begin{cases} 2040f & 0.3\text{ GHz} \leq f \leq 1.5\text{ GHz} \\ 3060 & 1.5\text{ GHz} < f \leq 6.0\text{ GHz} \end{cases}$$

d = separation distance (cm)

ISED Requirements

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance^{4,5}

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

6. BT Modem Specifications

The maximum power including the antenna gain for the STMicroelectronics modem is 6.0 dBm maximum TX power. Therefore, the radiated power level (6 dBm) is used to calculate the exclusion.

7. Standalone SAR Exclusion Assessment

FCC Requirements

The maximum power levels for each transmitter is listed below. The maximum power allowed to be excluded are shown below as well.

BLE Power = 4.0 mW

For the FCC, the calculation in section 5 above gives an exclusion power of 143 mW for the body and 7.5 mW for the extremities for the BLE antenna.

Therefore, the BLE transmitter is excluded from standalone SAR evaluations.

ISED Requirements

The maximum power levels for each transmitter is listed below. The maximum power allowed to be excluded are shown below as well.

BLE Power = 4.0 mW

Based on the table in RSS-102, the BLE transmitter must be less than 173 mW to be excluded from body SAR and 10 mW to be excluded from extremity SAR. The transmitter is less than the required power level to be excluded. Therefore, the transmitter is excluded from SAR testing.

Note: For both the FCC and ISED extremity limits, the limit for body is multiplied by 2.5.