

RF Exposure Lab

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CERTIFICATE OF COMPLIANCE SAR EXCLUSION

Milwaukee Tool
433 W. Van Buren St., Suite 450
Chicago, IL 60607

Dates of Test: February 20, 2025
Test Report Number: SAR.20250205
Lab Designation Number: US1195

FCC ID:	P36-2835
Model(s):	2835
Contains WiFi/BT Module:	Silicon Labs Model BGM220SC22HNA2
Equipment Type:	Handheld Power Tool
Classification:	Portable Transmitter
TX Frequency Range:	2402 -2480 MHz
Frequency Tolerance:	± 2.5 ppm
Maximum Conducted RF Output:	2450 MHz (BT) – 6 dBm Conducted
Signal Modulation:	GFSK
Antenna Type:	PCB Trace Antenna, 2.3 dBi Gain (2.4 – 2.5 GHz)
Application Type:	Exclusion Evaluation
Standard(s):	47CFR1.1310, 47CFR2.1093, KDB447498 D01 v06
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
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1. Introduction

This report shows exclusion calculations of the Milwaukee Tool Model(s) 2835 Handheld Power Tool with 47CFR1.1310, 47CFR2.1093, KDB447498 D01 v06.

2. Radiation Sources

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

3. Handheld Power Tool



The host Handheld Power Tool is used next to the extremity. The minimum distance the antenna can be from the extremity is 10 mm for the BT antenna.

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.

The 1-g and 10-g SAR test exclusion thresholds for **100 MHz to 6 GHz** at *test separation distances ≤ 50 mm* are determined by:

$$\frac{\text{max. power of channel [mW]}}{\text{min. test separation distance [mm]}} \cdot \sqrt{f[\text{GHz}]} \leq \begin{cases} 3.0 & 1g \text{ SAR} \\ 7.5 & 10g \text{ SAR} \end{cases}$$

- f [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 test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

For simultaneous evaluation, the sum of the individual SAR values of each of the transmitters must be less than the limit to comply. If the transmitter is excluded from SAR testing, the SAR value is estimated based on the formula below.

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f_{(\text{GHz})}}/x] \text{ W/kg}$, for test separation distances ≤ 50 mm;

Where $x = 7.5$ for 1-g SAR and 18.75 for 10-g SAR

6. BT Modem Specifications

The maximum power for the Milwaukee Tool BT modem is 6.0 dBm maximum conducted TX power. The antenna gain for the BT transmitter is 2.3 dBi. Therefore, the radiated power level of 8.3 dBm (6.8 mW) is used to calculate the exclusion.

7. Standalone SAR Exclusion Assessment

FCC Requirements

Based on the formula in section 5, the exclusion calculation for the transmitter is listed below.

$$BT - (6.8 \text{ mW} / 10 \text{ mm}) * \sqrt{2.48} = 1.1 \text{ which is less than } 7.5$$

Therefore, the transmitter is excluded from standalone SAR evaluations.

8. Simultaneous SAR Exclusion Assessment

FCC Requirements

There is only one transmitter in the device. Therefore, no simultaneous evaluation is required.