



Radio Frequency Exposure Evaluation Report

FOR:

Smith & Nephew Medical, Ltd.

Model Number:

66803060

Product Description:

LEAF Patient sensor is a wireless, disposable patient monitoring sensor that continuously monitors the patient's orientation and movements.

FCC ID: 2AWH9-LEAFS

Applied Rules and Standards:

CFR 47 Part 2 (2.1093),

FCC KDB 447498 D01 General RF Exposure Guidance v06

ISEDC RSS-102 Issue 5

Report number: EMC_SMITH-013-20001_FCC_ISED_SAR_EX_Rev2

DATE: 2021-09-29



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1. Assessment

The following device was evaluated against the limits for general population uncontrolled exposure specified in CFR 47 Part 2.1093 according to SAR evaluation exclusion requirements specified in FCC regulation as listed in KDB 447498, and ISEDC RSS-102 Issue 5.

The device meets the requirements for SAR exclusion as stipulated by the above given FCC/ISEDC rules.

| Company | Description | Model # |
|------------------------------|---|----------|
| Smith & Nephew Medical, Ltd. | LEAF Patient sensor is a wireless, disposable patient monitoring sensor that continuously monitors the patient's orientation and movements. | 66803060 |

Responsible for Testing Laboratory:

| 2021-09-29 | Compliance | Kevin Wang (EMC Lab Manager) |
|------------|------------|---------------------------------|
| Date | Section | Name |

Responsible for the Report:

| 2021-09-29 | Compliance | Cheng Song (EMC Engineer) |
|------------|------------|------------------------------|
| Date | Section | Name |

The test results of this test report relate exclusively to the test item specified in Section 3.

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2. Administrative Data

2.1. Identification of the Testing Laboratory Issuing the Test Report

| | |
|------------------------------------|-----------------------------------|
| Company Name: | CETECOM Inc. |
| Department: | Compliance |
| Street Address: | 411 Dixon Landing Road |
| City/Zip Code | Milpitas, CA 95035 |
| Country | USA |
| Telephone: | +1 (408) 586 6200 |
| Fax: | +1 (408) 586 6299 |
| Lab Manager: | Kevin Wang |
| Responsible Project Leader: | Cathy Palacios, Akanksha Baskaran |

2.2. Identification of the Client / Manufacturer

| | |
|------------------------|------------------------------|
| Client's Name: | Smith & Nephew Medical, Ltd. |
| Street Address: | 101 Hessle Road |
| City/Zip Code | Hull, HU3 2BN |
| Country | United Kingdom |

| | |
|-------------------------------|---|
| Manufacturer's Name: | Celestica De Monterrey |
| Manufacturers Address: | Calle Octava #102 Parque Industrial Monterrey Apodaca, N.L., 66600 |
| Country | Mexico |

3. Equipment under Assessment

| | |
|---|---|
| Model No | 66803060 |
| HW Version | 101-PCBA-000009-B |
| SW Version | 3.70 |
| FCC-ID | 2AWH9-LEAFS |
| PMN | LEAF Patient Sensor |
| Product Description | LEAF Patient sensor is a wireless, disposable patient monitoring sensor that continuously monitors the patient's orientation and movements. |
| Radios included in the device: | <u>IEEE 802.15.4:</u> <ul style="list-style-type: none">• Manufacturer: Nordic Semiconductor Soc nRF52833• Modes of operation: Transmitter mode on channel 15, 2.425GHz. |
| Antenna Information as Declared: | <u>Main Antenna:</u> <ul style="list-style-type: none">• Type: SMT chip antenna 2450AT42E010BE• Location: Internal• Maximum Gain: 2 dBi• Frequency Band: 2.4 GHz |
| Modes of Operation / Declared Output power | -1.72 dBm |
| Minimum distance of antenna or radiating parts to user | 5mm |
| Power Supply/ Rated Operating Voltage Range | 3 VDC internal battery |
| Operating Temperature Range | 5 °C to 36 °C |
| Other Radios included in the device | N/A |
| Co-located Transmitters / Antennas | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Sample Revision | <input type="checkbox"/> Prototype <input checked="" type="checkbox"/> Production <input type="checkbox"/> Pre-Production |
| Exposure Category | <input type="checkbox"/> Occupational/ Controlled <input checked="" type="checkbox"/> General Population/ Uncontrolled |

4. FCC and ISED Exemption Limits for Routine Evaluation

4.1. FCC SAR test exclusions per KDB 447498

KDB 447498 D01 General RF Exposure Guidance v06 Section: 4.3.1.

Standalone SAR test exclusion considerations states

- 4) For 100 MHz to 6 GHz and test separation distances \leq 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR, and } \leq 7.5 \text{ for 10-g extremity SAR, 30 where}$$

- $f(\text{GHz})$ 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*.

The test exclusions are applicable only when the minimum *test separation distance* is \leq 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 according to 4.1 f) is applied to determine SAR test exclusion.

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and \leq 50 mm

| MHz | 5 | 10 | 15 | 20 | 25 | mm |
|------|-----|-----|-----|-----|-----|--|
| 150 | 39 | 77 | 116 | 155 | 194 | <i>SAR Test Exclusion Threshold (mW)</i> |
| 300 | 27 | 55 | 82 | 110 | 137 | |
| 450 | 22 | 45 | 67 | 89 | 112 | |
| 835 | 16 | 33 | 49 | 66 | 82 | |
| 900 | 16 | 32 | 47 | 63 | 79 | |
| 1500 | 12 | 24 | 37 | 49 | 61 | |
| 1900 | 11 | 22 | 33 | 44 | 54 | |
| 2450 | 10 | 19 | 29 | 38 | 48 | |
| 3600 | 8 | 16 | 24 | 32 | 40 | |
| 5200 | 7 | 13 | 20 | 26 | 33 | |
| 5400 | 6 | 13 | 19 | 26 | 32 | |
| 5800 | 6 | 12 | 19 | 25 | 31 | |
| MHz | 30 | 35 | 40 | 45 | 50 | mm |
| 150 | 232 | 271 | 310 | 349 | 387 | <i>SAR Test Exclusion Threshold (mW)</i> |
| 300 | 164 | 192 | 219 | 246 | 274 | |
| 450 | 134 | 157 | 179 | 201 | 224 | |
| 835 | 98 | 115 | 131 | 148 | 164 | |
| 900 | 95 | 111 | 126 | 142 | 158 | |
| 1500 | 73 | 86 | 98 | 110 | 122 | |
| 1900 | 65 | 76 | 87 | 98 | 109 | |
| 2450 | 57 | 67 | 77 | 86 | 96 | |
| 3600 | 47 | 55 | 63 | 71 | 79 | |
| 5200 | 39 | 46 | 53 | 59 | 66 | |
| 5400 | 39 | 45 | 52 | 58 | 65 | |
| 5800 | 37 | 44 | 50 | 56 | 62 | |

5. Stand-alone Transmission SAR Exclusion Evaluation

5.1. Justification for using the 5 mm Distance

The device is intended to be used on human body. The conservative distance of 5 mm is an estimate of how close a human body can be to the device in its typical application.

5.2. Justification for use of load based time averaging

The worst case loading for each of the radios was determined from the following information provided by the manufacturer:

EUT Operating Conditions

The device is only transmitting on 2425MHz single channel.

5.3. SAR Exclusion Calculation Table

| FCC Standalone Transmission SAR Exclusion Calculations | | | | | | | | | | | |
|--|-----------------|---------------------------------|--------------------|-------------------------------|-------------------------|--|---------------|---------------------------------------|-----------------------------------|---------------|-----------------------------------|
| Band | Frequency (GHz) | Max Conducted Output Power(dBm) | Antenna Gain (dBi) | Max.Measured Output Power(mW) | Source Based Duty Cycle | Load based duty cycle based on Maximum payload | Distance(mm) | Effective Time Average Max Power [mW] | P1/D*SQRT(F) at $\leq 5\text{mm}$ | Limit 1-g SAR | Standalone SAR Exclusion (Yes/No) |
| 2425MHz Single Chennel | 2.425 | 0 | 2 | 1.58 | 1.00 | 1 | 5 | 1.58 | 0.49 | 3.0 | Yes |

Note 1: According to the Operational Description, the maximum possible output power is 0 dBm.

Note 2: Maximum possible source based duty cycle and load based duty cycle are used for calculation, which is 100%.

6. Revision History

| Date | Report Name | Changes to report | Report prepared by |
|-------------|---|--------------------------|---------------------------|
| 2021-09-09 | EMC_SMITH-013-20001_FCCISED_SAR_EX | Initial version | Cheng Song |
| 2021-09-28 | EMC_SMITH-013-20001_FCCISED_SAR_EX_Rev1 | Updated Section 5.3 | Cheng Song |
| 2021-09-29 | EMC_SMITH-013-20001_FCCISED_SAR_EX_Rev2 | Updated Section 5.1 | Cheng Song |