RF Exposure Evaluation Report

Date of Report:	29/07/2025	**Client's Contact person:**	Timo Hakala
Number of pages:	11	**Responsible Test engineer:**	Ilari Kinnunen
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Tested device:	**WSI module**		
Related reports:	-		
Testing has been carried out in accordance with:	**47CFR §2.1093** Radiofrequency Radiation Exposure Evaluation: Portable Devices **447498 D01 General RF Exposure Guidance v06**		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory		
Test Results:	**The EUT complies with the requirements in respect of all parameters subject to the test.** The test results relate only to devices specified in this document		
Date and signatures:	29.07.2025 Miia Nurkkala **Laboratory Manager**		

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1. EVALUATION SUMMARY

1.1 Test Details

Device under Test (DUT):

Product:	WSI module
Manufacturer:	GE Healthcare
Model:	WSI01
Hardware Version:	1
FCC ID:	2AO8L-WSI01
FCC Test Firm Designation Number:	FI0005
Document ID:	FCC_RF Exposure Evaluation_WSI module_ID6894_29072025.docx
Document History and changes:	This test report replaces report "FCC_RF Exposure Evaluation_WSI module _ID6894_03022025". Head and body-worn configuration added.

1.2 Evaluation Results

1.2.1 Standalone Exposure

The device conforms to the requirements of the standards without SAR testing when the maximum output power is less than or equal to the Test Exclusion Threshold Limit.

Head/Body SAR

Mode of Operation	Maximum Power* [mW]	Test Exclusion Threshold Limit [mW]	Separation Distance [mm]	Evaluation Result
MBAN	8	9.5	5	PASS
NFC	1	442.7	5	PASS

*Maximum time-averaged power

Extremity SAR

Mode of Operation	Maximum Power* [mW]	Test Exclusion Threshold Limit [mW]	Separation Distance [mm]	Evaluation Result
MBAN	8	23.7	<5	PASS
NFC	1	1107.6	<5	PASS

*Maximum time-averaged power

1.2.2 Simultaneous Transmission Exposure

The device conforms to the requirements of the standards without SAR testing when the highest simultaneous transmission SAR is less than or equal to the SAR limit specified in FCC 47 CFR part 2 (2.1093). The SAR limit for Head and Body-worn configuration SAR_{1g} is 1.6 mW/g and for extremity configuration SAR_{10g} is 4.0 mW/g.

Head/Body SAR

Highest Simultaneous Transmission SAR_{10}	$\sum SAR_{1g}$ [mW/g]	Separation Distance [mm]	SAR_{1g} Limit [mW/g]	Result
MBAN + NFC	0.35	5	1.6	PASS

Extremity SAR

Highest Simultaneous Transmission SAR_{10}	$\sum SAR_{10g}$ [mW/g]	Separation Distance [mm]	SAR_{10g} Limit [mW/g]	Result
MBAN + NFC	0.14	<5	4.0	PASS

1.2.3 Simultaneous Transmission Exposure with other modules

1.2.3.1 Head/Body SAR

The estimated SAR_{1g} of the WSI module is 0.35 mW/g. To maintain compliance, the module can be implemented to GEHC radio product and have SAR_{1g} contribution ≤ 1.25 mW/g from other radio modules.

1.2.3.2 Extremity SAR

The estimated SAR_{10g} of the WSI module is 0.14 mW/g. To maintain compliance, the module can be implemented to GEHC radio product that are used solely by extremities and have SAR_{10g} contribution ≤ 3.86 mW/g from other radio modules.

2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

The WSI module is a GEHC radio product that enables a host device to communicate with GEHC wireless sensors. The operation utilizes GEHC's proprietary MBAN radio technology for patient data transfer and NFC radio technology for device pairing. The WSI module is connected to a host device through the PCI-SIG M.2 interface. Figure 1 shows a photo of the WSI module.

Figure 1. Overview of the DUT

MBAN RF signal is connected to the antenna connectors ANT0 and ANT1 through a switch, only one antenna can be active at a time.

NFC and MBAN can transmit simultaneously.

Exposure Environment	General population, uncontrolled

2.1 Supported Frequency Bands and Operational Modes

TX Frequency bands	Modes of Operation	Transmitter Frequency Range [MHz]	Maximum Specified Output Power** [mW]
	MBAN	2360 – 2500*	16
	NFC	13.57	1089

* Used frequency depends on regional regulation.
**Duty cycles not considered

3. TEST EXCLUSIONS

3.1 MBAN

3.1.1 Head/Body SAR

FCC SAR test exclusion based on 5mm separation distance, was calculated according to KDB 447498 D01 General RF Exposure Guidance v06, section 4.3.1, equation (a).

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0

Transmitter Frequency Range (MHz)	SAR test exclusion thresholds 5mm (mW)
2500	9.5

According to the manufacturer, the maximum MBAN output power is 16mW and the maximum duty cycle of the transmission is 50.0%. This leads to time averaged maximum output power of 8mW which is below the test exclusion threshold.

3.1.2 Extremity SAR

FCC SAR test exclusion based on <5mm separation distance, was calculated according to KDB 447498 D01 General RF Exposure Guidance v06, section 4.3.1, equation (a).

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 7.5

Transmitter Frequency Range (MHz)	SAR test exclusion thresholds < 5mm (mW)
2500	23.7

According to the manufacturer, the maximum MBAN output power is 16mW and the maximum duty cycle of the transmission is 50.0%. This leads to time averaged maximum output power of 8mW which is below the test exclusion threshold.

3.2 NFC

3.2.1 Head/Body SAR

FCC SAR test exclusion based on <50mm separation distance, was calculated according to KDB 447498 D01 General RF Exposure Guidance v06, section 4.3.1, equation (c)2.

((3.0*dist_mm/√(F1_GHz)) + (dist_mm – 50) * (F2_MHz / 150)) * [1 + log(100/F3_MHz)] * 0.5

Transmitter Frequency Range (MHz)	SAR test exclusion thresholds < 50mm (mW)
13.56	442.7

According to the manufacturer, the maximum NFC output power is 1089mW and the maximum duty cycle of the transmission is 0.069%. This leads to time averaged maximum output power of 1 mW which is below the test exclusion threshold.

3.2.2 Extremity SAR

FCC SAR test exclusion based on <50mm separation distance, was calculated according to KDB 447498 D01 General RF Exposure Guidance v06, section 4.3.1, equation (c)2.

((7.5*dist_mm/√(F1_GHz)) + (dist_mm – 50) * (F2_MHz / 150)) * [1 + log(100/F3_MHz)] * 0.5

Transmitter Frequency Range (MHz)	SAR test exclusion thresholds < 50mm (mW)
13.56	1107.6

According to the manufacturer, the maximum NFC output power is 1089mW and the maximum duty cycle of the transmission is 0.069%. This leads to time averaged maximum output power of 1 mW which is below the test exclusion threshold.

4. RESULTS

Both MBAN and NFC transmitters are exempt from SAR testing.

4.1 Estimated SAR values

For simultaneous transmission evaluation MBAN and NFC standalone SAR value is estimated according to by using equation 4.3.2 b) 1)

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)/x] W/kg, x = 7.5 for 1g SAR, x = 18.75 for 10g SAR

Mode of Operation	Estimated SAR_{1g}[mW/g]
MBAN	0.34
NFC	0.003

Mode of Operation	Estimated SAR_{10g}[mW/g]
MBAN	0.13
NFC	0.001

4.2 Simultaneous transmission

When the sum of SAR_{1g} and SAR_{10g} of all simultaneously transmitting antennas is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

The sum of NFC and MBAN SAR_{1g} is 0.34mW/g + 0.003mW/g = 0.343mW/g.

The sum of NFC and MBAN SAR_{10g} is 0.13mW/g + 0.001mW/g = 0.131mW/g.

FCC SAR limit for head and body-worn configuration is 1.6mW/g and for extremity configuration limit is 4mW/g thus simultaneous transmission is exempt from SAR testing.

4.3 Simultaneous transmission with other modules

4.3.1 Head/Body SAR

The maximum estimated SAR_{1g} value that the WSI module can cause is 0.343mW/g. When the module is implemented to a GEHC radio product, with other radio modules, to maintain compliance, the maximum summed SAR_{1g} value of other modules can be 1.6 mW/g – 0.35 mW/g= 1.25 mW/g.

4.3.2 Extremity SAR

The maximum estimated SAR_{10g} value that the WSI module can cause is 0.131mW/g. When the module is implemented to a GEHC radio product, with other radio modules, to maintain compliance, the maximum summed SAR_{10g} value of other modules can be 4.0 mW/g – 0.14 mW/g= 3.86 mW/g.

