R F – T E S T R E P O R T

- Human Exposure -

Type / Model Name	:	WCM9116
Product Description	:	Wi-Fi module
Applicant	:	Draeger Medical Systems, Inc.
Address	:	6 Tech Drive
		ANDOVER, MA 01810, USA
Manufacturer	:	Silicon Laboratories Finland Oy
Address	:	Alberga Business Park, Bertel Jungin aukio 3
		ESPOO, 02600, FINLAND

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Test Report No. : 80175389-10 Rev_0	12. December 2024 Date of issue

Deutsche Akkreditierungsstelle D-PL-12030-01-00

CSA Group Bayern GmbH
Straubinger Strasse 100 · 94447 PLATTLING · GERMANY
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Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations

Part 1, Subpart I, Section 1.1310	Radiofrequency radiation exposure limits
Part 2, Subpart J, Section 2.1093	Radiofrequency radiation exposure evaluation: portable devices.
KDB 447498 D01 V06	General RF Exposure Guidance

ISED Canada Rules and Regulations

RSS-102, Issue 6	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according his/her instructions.

2.3 Photo documentation of the EUT – See ATTACHMENT A

2.4 Equipment type, category

WLAN - Client, portable equipment.

2.5 Short description of the equipment under test (EUT)

The EUT is a WLAN/BT module integrated in a vital signs patient monitor with local alarm functionality 'Infinity M540 V2'. It supports both wired and wireless data transmission. When used on transport the wireless mode is enabled, using an embedded WLAN client. WLAN disabled when in docking station.
The EUT is compatible with 802.11b, g, a, n HT20 Standard. It supports the 2.4 GHz and 5 GHz frequency band.
In the host device the Bluetooth and WLAN nHT40 is deactivated by firmware.

Number of tested samples:	1
Serial number:	DSRA-0678 (Wi-Fi module), 5615561776 (patient monitor)
Firmware version:	2.7
HVIN:	MS40251
FCC ID:	URA-MS40251
IC ID:	5895B-MS40251

2.6 Variants of the EUT

There are no variants.

2.7 Operation frequency and channel plan

Operating range 1: 2400 MHz to 2483.5 MHz.

Channel plan WLAN Standard 802.11b, g, n HT 20:

Channel	Frequency (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

Operating range 2: 5150MHz to 5850 MHz

Channel plan WLAN Standard 802.11a, n HT20:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	100	5500	149	5745
40	5200	104	5520	153	5765
44	5220	108	5540	157	5785
48	5240	112	5560	161	5805
52	5260	116	5580	165	5825
56	5280	120	5600		
60	5300	124	5620		
64	5320	128	5640		
		132	5660		
		136	5680		
		140	5700		

2.8 Transmit operating modes

The EUT use DSSS or OFDM modulation and may operate under operating mode 2 and provide following data rates with auto-fall-back:

- 802.11b mode 11, 5.5, 2, 1 Mbps (Mbps = *megabits per second)*
- 802.11g mode 54, 48, 36, 24, 18, 12, 9, 6 Mbps (Mbps = *megabits per second)*
- 802.11a 54, 48, 36, 24, 18, 12, 9, 6 Mbps (Mbps = *megabits per second)*
- 802.11n HT20 MCS 0 - 7

Rate	Mbps	data	duty cycle
1	1.00E+06	1.40E+05	14.00%
2	2.00E+06	1.40E+05	7.00%
5.5	5.50E+06	1.40E+05	2.55%
6	6.00E+06	1.40E+05	2.33%
9	9.00E+06	1.40E+05	1.56%
11	1.10E+07	1.40E+05	1.27%
12	1.20E+07	1.40E+05	1.17%
18	1.80E+07	1.40E+05	0.78%
24	2.40E+07	1.40E+05	0.58%
36	3.60E+07	1.40E+05	0.39%
48	4.80E+07	1.40E+05	0.29%
54	5.40E+07	1.40E+05	0.26%
MCS0	6.50E+06	1.40E+05	2.15%
MCS1	1.30E+07	1.40E+05	1.08%
MCS2	1.95E+07	1.40E+05	0.72%
MCS3	2.60E+07	1.40E+05	0.54%
MCS4	3.90E+07	1.40E+05	0.36%
MSC5	5.20E+07	1.40E+05	0.27%
MCS6	5.85E+07	1.40E+05	0.24%
MCS7	6.50E+07	1.40E+05	0.22%

2.9 Antennas

The following PCB antenna is used in the EUT:

Number	Characteristic	Plug	Name	Frequency band	Gain
1	Omni	U.Fl	Antenova CU5006-2	2.4 – 2.5 GHz 4.9 – 5.9 GHz	3.10 dBi 3.78 dBi

2.10 Power supply system utilised

Power supply voltage, V_{nom} : 7.2 V/DC (lithium-ion battery)

2.11 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- Laptop Model : DELL (Dräger 25204)
- _____ Model : _____

3 TEST RESULT SUMMARY

WLAN device using digital modulation:

Operating in the 2400 MHz – 2483.5 MHz and 5150 MHz – 5850 MHz band:

FCC Rule Part	RSS Rule Part	Description	Result
KDB 447498, 7.1	RSS-102, 6.6	MPE	not applicable[1]
KDB 447498, 4.3.1	RSS-102, 6.3	SAR exclusion consideration	passed
KDB 447498, 7.2	RSS-102, 7.1.5	Co-location, Co-transmission	not applicable[2]

Note: [1] Not applicable, because the EUT is portable equipment.
[2] Not applicable, because the EUT is only equipped with one transmitter.

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80175389-03	0	28 November 2023	Initial test report
80175389-10	0	12 December 2024	1. Update to RSS-102 Issue 6; 2.5: FCC ID, IC ID, HVIN added; 2.9 antenna gain updated; 5.1.2 / 5.2.2 update output power + antenna gain

The test report with the highest revision number replaces the previous test reports.

3.2 Final assessment

The equipment under test fulfils the requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 21 November 2023

Testing concluded on : 21 November 2023

Checked by:

Jürgen Pessinger

Jürgen Pessinger
Radio Team

Tested by:

Christopher Thaller
2024.12.12
13:53:25 +01'00'

Christopher Thaller
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15 - 35 °C
Humidity:	30 - 60 %
Atmospheric pressure:	86 - 106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor k = 2. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule (w = 0).
Details can be found in the procedure CSA_B_V50_29.

5 HUMAN EXPOSURE

5.1 SAR test exclusion considerations

5.1.1 Applicable standard

According to RF exposure guidance:
Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

5.1.2 Determination of the standalone SAR test exclusion threshold

For WLAN device:

The minimum separation distance results from the application of the EUT which is handled by hand. This distance is assumed to ≤ 50 mm from antenna to the hand of the user.
The hand of the user is the nearest extremity of a human being therefore the threshold for 10-g is determined.

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm :

The formula under 4.3.1 1) for 100 MHz to 6 GHz for standalone equipment is used:
[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]*[√f(GHz)] ≤ 7.5;

The max conducted average power is according the equipment (WLAN module):

2.4 GHz Modulation b:

Rated output power A:	77.6	mW	18.9	dBm
Tune-up tolerance:	2.00	dB		
Maximum output power:	20.9	dBm	123.0	mW
Antenna gain max:	3.1	dBi		
Duty Cycle:	14%	DC-Correction:	-17.1	dB
Max A - DC-Cor:	3.8	dBm	**2.4**	**mW**
Minimum distance r:	11.0	mm		

Channel frequency (MHz)	A (mW)	Threshold level	Limit 10g	Margin 10g
2412	2.4	0.34	7.5	-7.16
2437	2.4	0.34	7.5	-7.16
2462	1.9	0.27	7.5	-7.23

2.4 GHz Modulation nHT20:

Rated output power A:	371.5	mW	25.7	dBm
Tune-up tolerance:	2.00	dB		
Maximum output power:	27.7	dBm	588.8	mW
Antenna gain max:	3.1	dBi		
Duty Cycle:	2%	DC-Correction:	-34.0	dB
Max A - DC-Cor:	-6.3	dBm	**0.2**	**mW**
Minimum distance r:	11.0	mm		

Channel frequency (MHz)	A (mW)	Threshold level	Limit 10g	Margin 10g
2412	0.1	0.01	7.5	-7.49
2437	0.2	0.03	7.5	-7.47
2462	0.1	0.02	7.5	-7.48

5 GHz Modulation nHT20:

Rated output power A:	18.6	mW	12.7	dBm
Tune-up tolerance:	2.00	dB		
Maximum output power:	14.7	dBm	29.5	mW
Antenna gain max:	3.78	dBi		
Duty Cycle:	2%	DC-Correction:	-34.0	dB
Max A - DC-Cor:	-19.3	dBm	**0.012**	**mW**
Minimum distance r:	11.0	mm		

Channel frequency (MHz)	A (mW)	Threshold level	Limit 10g	Margin 10g
5180	0.019	0.004	7.5	-7.496
5320	0.028	0.006	7.5	-7.494
5500	0.026	0.006	7.5	-7.494
5700	0.022	0.005	7.5	-7.495
5745	0.009	0.002	7.5	-7.498
5825	0.010	0.002	7.5	-7.498

Conclusion: The Threshold level is lower than the limit, SAR measurement is NOT necessary.

The requirements are **FULFILLED.**

Remarks: The RF output power is taken from the test reports 80175389-08 and 80175389-09 issued by CSA Group Bayern GmbH.

5.2 Exemption limits for routine evaluation - SAR evaluation

5.2.1 Applicable standard

According to RSS-102, section 6.3:
Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

Table 11: Power limits for exemption from routine SAR evaluation based on the separation distance

Frequency (MHz)	**Exemption Limits (mW)**				
	≤5 mm	10 mm	15 mm	20 mm	25 mm
300	45	116	139	163	189
450	32	71	87	104	124
835	21	32	41	54	72
1900	6	10	18	33	57
2450	3	**7**	16	32	56
3500	2	6	15	29	50
5800	1	**5**	13	23	32

Frequency (MHz)	**Exemption Limits (mW)**				
	30 mm	35 mm	40 mm	45 mm	≥50 mm
≤ 300	216	246	280	319	362
450	147	175	208	248	296
835	96	129	172	228	298
1900	92	138	194	257	323
2450	89	128	170	209	245
3500	72	94	114	134	158
5800	41	54	74	102	128

The exemption limits in table 11 Table 11 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 50 mm from a flat phantom, which provides a SAR value of approximately 0.4 W/kg for 1 g of tissue.

For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluation in table 11 are multiplied by a factor of 2.5.

For controlled-use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 11 are multiplied by a factor of 5.

5.2.2 Cunclusion according RSS-102.

2.4 GHz WLAN (Mod b):

Rated output power A:	77.6	mW	18.9	dBm
Tune-up tolerance:	2.00	dB		
Maximum output power:	20.9	dBm	123.0	mW
Antenna gain max:	3.1	dBi		
Duty Cycle:	14%	DC-Correction:	-17.1	dB
Maximum EIRP:	24.0	dBm	251.2	mW
Max EIRP - DC-Cor:	6.9	dBm	**4.9**	**mW**
Minimum distance r:	11.0	mm		

5 GHz WLAN (Mod nHT20):

Rated output power A:	18.6	mW	12.7	dBm
Tune-up tolerance:	2.00	dB		
Maximum output power:	14.7	dBm	29.5	mW
Antenna gain max:	3.78	dBi		
Duty Cycle:	2%	DC-Correction:	-34.0	dB
Maximum EIRP:	18.5	dBm	70.5	mW
Max EIRP - DC-Cor:	-15.5	dBm	**0.028**	**mW**
Minimum distance r:	11.0	mm		

Maximum output power at 2450 MHz, **4.9 mW** is < 7 mW;

Maximum output power at 5800 MHz, **0.028 mW** is < 5 mW;

For the EUT SAR measurement is NOT necessary

The requirements are **FULFILLED.**

Remarks: The RF output power is taken from the test reports 80175389-08 and 80175389-09 issued by CSA Group Bayern GmbH.