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RF-EXPOSURE REPORT					
FCC 47 CFR Part 2.1091 Maximum permissible exposure					
Report Reference No	G0M-2411-2825-TFC091MP01-V02				
Testing Laboratory	Eurofins Product Service GmbH				
Address	Storkower Str. 38c 15526 Reichenwalde Germany				
Accreditation	A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Test Firm Designation Number: DE0008				
Applicant	senTec Elektronik GmbH				
Address	Robert-Bosch-Ring 2 98693 Ilmenau GERMANY				
Test Specification	According to FCC rules				
Standard	FCC 47 CFR 2.1091				
Non-Standard Test Method	None				
Equipment under Test (EUT):					
Product Description	Radio Module				
Model(s)	Modul VIII				
Additional Model(s)	None				
Brand Name(s)	None				
Hardware Version(s)	Release 1.5				
Software Version(s)	Version 8.0				
FCC-ID	2BB4J-WM08A				
Test Result	PASSED				

Possible test case verdicts:				
required by standard but not tested	N/T			
not required by standard		N/R		
test object does meet the requirement		P(PASS)		
test object does not meet the requirement		F(FAIL)		
Testing:				
Test Lab Temperature		20 °C - 30 °C		
Test Lab Humidity		25 % - 55 %		
Date of performance		2025-04-14		
Date of receipt of test item		See test samp	ble identification table on page 7	
Report:				
Compiled by	Ehsan Sohrabi			
Tested by (+ signature) (Responsible for Test)	Stephan Liebich		Allaller	
Approved by (+ signature) (Senior Radio Expert)	Radwan Jaafar		Reflacter	
Date of Issue	2025-04-14			
Total number of pages	14			
General Remarks:				
 The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. The above equipment has been tested by Eurofins Product Service GmbH, and found compliance with the requirements of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report. Compliance of electromagnetic emission from electronic and electrical equipment with the basic restrictions usually is determined by measurements and, in some cases, calculation of the exposure level. If the electrical power used by or radiated by the equipment is sufficiently low, the electromagnetic fields emitted will be incapable of producing exposures that exceed the basic restrictions. Any relevant compliance assessment procedure which is consistent with the state of the art, reproducible and gives valid results can be used. 				
-				



For transmitters intended for use with more than one antenna configuration option, the combination of transmitter and antenna(s) which generates the highest available antenna power and/or average total radiated power shall be assessed.

Additional Comments:

RF-Exposure calculation is based on measurement results from reference documents.



VERSION HISTORY

Version History				
Version	Issue Date	Remarks	Revised By	
01	2025-02-26	Initial Release		
02	2025-04-14	 Replaced document: G0M-2411-2825-TFC091MP01-V01 Replaced by: G0M-2411-2825-TFC091MP01-V02 Reason: Replacement of the conducted test samples (EUTs). Calculation according to the conducted power of new samples. 	E. Sohrabi	



ABBREVIATIONS AND ACRONYMS

Acronyms			
Acronym	Description		
EIRP	Equivalent Isotropic Radiated Power		
EUT	Equipment Under Test		
MPE	Maximum Permissible Exposure		



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1 Equipment (Test Item) Under Test

Description	Radio Module				
Model	Modul VIII	Modul VIII			
Additional Model(s)	None				
Brand Name(s)	None				
	EUT #	Sample-ID	Serial Number	Date of receipt	
Sample Identification	See reference documents	See reference documents	See reference documents	See reference documents	
Hardware Version(s)	Release 1.5				
Software Version(s)	Version 8.0				
FCC ID	2BB4J-WM08A				
Equipment type	End Product				
Number of antenna ports	1				
Number of radios	1				
	Type SRD				
	Model	Modul VIII			
Padia Madula	Manufacturer	senTec			
	HW Version	Release 1.5			
	SW Version	Version 8.0			
	FCC-ID	2BB4J-WM08A			
	Туре	Integrated antenr	na		
Antonna	Model	PCB antenna			
Antenna	Manufacturer	Silicon Labs			
	Gain	-3.6 dBi (Antenna	a data sheet)		
Supply Voltage	VNOM	NOM 3.3 V DC via External rechargeable lithium battery or via power supply			
Dedicated AC/DC-Adaptor	None				
Environment	General public				



1.1 Reference Documents

Document Type	Document No.	Issued by	Date
Test Report	G0M-2411-2825- TFC247DT01-V02	Eurofins Product Service GmbH	2025-04-14
Data Sheet	AntSpec_WES0118-01- APL915S-01	SILICON LABS	



1.2 Power density radiation sources

Mode	Operating Frequency [MHz]	Maximum conducted power [dBm]	Maximum radiated power [dBm EIRP]	Maximum duty cycle [%]	Tune-up tolerance [dB]	Maximum antenna gain [dBi]	Maximum antenna diameter [cm]
	903.50	16.99	13.39	100	2.0	-3.6	N/A
SRD 915 MHz	915.50	16.99	13.39	100	2.0	-3.6	N/A
	927.50	16.62	13.02	100	2.0	-3.6	N/A
Comment: All conducted and radiated power values in this and all further tables are adjusted by given tune-up tolerance. The higher value of conducted and radiated power is chosen for evaluation.							

1.3 Field strength radiation sources

None

1.4 Concurrent Sources

No concurrent radiation sources



2 Result Summary

FCC MPE Evaluation - Single radiation sources						
Product Standard Reference	Requirement	Reference Method	Mode	Distance [m]	Verdict	
47 CFR 2.1091	Maximum permissible exposure	FCC KDB 447498	SRD 915 MHz	0.2	PASS	
Comment:						



3 RF-Exposure classification

RF-Exposure Categories			
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.		
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.		

RF-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.		



4 **RF-Exposure limits**

FCC Limits – General Population / Uncontrolled Exposure					
Frequency range [MHz]	Electric field strength [V/M]	Magnetic field strength [A/M]	Power density [W/m ²]	Averaging time [min]	
0.3 – 1.34	614	1.63	1000	30	
1.34 – 30	824/f	2.19/f	1800/f ²	30	
30 - 300	27.5	0.073	2	30	
300 - 1500	-	-	f/150	30	
1500 - 100000	-	-	10.0	30	

FCC Limits – Occupational / Controlled Exposure							
Frequency range [MHz]	Electric field strength [V/M]	Magnetic field strength [A/M]	Power density [W/m ²]	Averaging time [min]			
0.3 – 3.0	614	1.63	1000	6			
3.0 - 30	1842/f	4.89/f	9000/f ²	6			
30 - 300	61.4	0.163	10.0	6			
300 – 1500	-	-	f/30	6			
1500 - 100000	-	-	50	6			

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5 RF-Exposure Evaluation

Evaluation Relations				
$\lambda[m] = \frac{c\left[\frac{m}{s}\right]}{f[Hz]}; R_{FF}[m] \ge \frac{2 \cdot D[m]^2}{\lambda[m]}$				
$S[W/m^{2}] = \frac{P_{EJ,R,P.}[W]}{4\pi R[m]^{2}}; R[m] = \sqrt{\frac{P_{EJ,R,P.}[W]}{4\pi S[W/m^{2}]}}$				
$DCC \ [dB] = 10 \cdot Log_{10} \left(\frac{DC[\%]}{100} \right)$				
$\sum_{i=1}^{N} \frac{S_i \left[\frac{W}{m^2}\right]}{S_{Li} \left[\frac{W}{m^2}\right]} + \sum_{j=1}^{M} \left(\frac{E_j \left[\frac{V}{m}\right]}{E_{Lj} \left[\frac{V}{m}\right]}\right)^2 + \sum_{k=1}^{O} \left(\frac{H_k \left[\frac{A}{m}\right]}{H_{Lk} \left[\frac{A}{m}\right]}\right)^2 < 1$				

Evaluation Procedure

Standalone operation evaluation:

For each radio and frequency band the worst case transmission mode with the highest peak conducted or radiated power is evaluated at the frequency that results in the most restrictive rf-exposure limit. From the peak power values, antenna gains and duty cycles taken from the reference documents, the source average radiated power values are calculated. From the average radiated power the power densities at antenna far-field distance is calculated. The distance from the radiation source for compliance power density is calculated. If the separation distance is lower than the far-field distance, the far-field distance is given as compliance separation distance because the plane wave power density assessment is only valid in the far-field of the radiation source.

For radiation sources for which the average electric and magnetic fields are measured using field probes, the measured field strength values are compared to the reference limits. For those sources no calculations are performed. Compliance with the reference values is determined with the near field measurements.

Concurrent operation evaluation:

First the evaluation distance is set to an appropriate value. For all radiation sources for which power densities are calculated, the power densities at the evaluation distance are calculated and for all other sources the electric or magnetic field strengths are measured using field probes. Finally the ratios of the power densities and/or field strength values and the corresponding limits are calculated and summed and the sum is compared to the maximum of 1.



6 Single Source Evaluation Results - FCC

SRD 915 MHz							
Transmission Mode							
Transmission Frequency (f) [MHz]	903.5	915.5	927.5				
Antenna far-field distance							
Maximum antenna diameter (D) [m]	N/A	N/A	N/A				
Transmission wavelength (λ) [m]	N/A	N/A	N/A				
Antenna far-field distance (RFF) [m]	N/A	N/A	N/A				
Source average power							
Peak conducted power (PR) [dBm EIRP]	16.99	16.99	16.62				
Maximum transmission duty cycle (DC)	1.00	1.00	1.00				
Duty cycle correction (DCC) [dB]	0.00	0.00	0.00				
Average conducted power (PRAVG) [dBm EIRP]	16.99	16.99	16.62				
Power density							
Compliance power density limit [W/m ²]	6.023	6.103	6.183				
Power density (S) @ Antenna far-field distance [W/m ²]	N/A	N/A	N/A				
Power density (S) @ 0.20 m [W/m ²]	0.099	0.099	0.091				
Power density ratio @ 0.20 m	0.02	0.02	0.01				
Distance for compliance power density (S=SL) [m]	0.026	0.026	0.024				
Compliance							
Verdict	PASS	PASS	PASS				
Comment:							

=== End of test report ===