

RF-EXPOSURE REPORT					
	FCC 47 CFR Part 2.1091				
Ма	ximum permissible exposure				
Report Reference No	G0M-2401-2383-TFC091MP-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 ISED Testing Laboratory site: 3470A				
Applicant	Haltian Oy				
Address	Yrttipellontie 1 D 90230 Oulu Finland				
Test Specification	According to FCC rules				
Standard	FCC 47 CFR 2.1091				
Non-Standard Test Method	None				
Equipment under Test (EUT):					
Product Description	Haltian RADAR senses warehouse loading dock or parking slot occupancy status and sends this information via Wirepas mesh network to Thingsee Gateway and from there to Cloud.				
Model(s)	DRA				
Additional Model(s)	None				
Brand Name(s)	Haltian RADAR				
Hardware Version(s)	DRA_03				
Software Version(s)	2023_11_17				
FCC-ID	2AEU3HARADAR				
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		2024-04-05		
Date of receipt of test item		2024-01-09		
Report:				
Compiled by	Burkhard Pudell			
Tested by (+ signature) (Responsible for Test)	Burkhard Pudell		B. Rudell	
Approved by (+ signature) (Test Lab Engineer)	Radwan Jaafar		Athing	
Date of Issue	2024-05-29			
Total number of pages	13			
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. Additional Comments:				
Total number of pages 13 General Remarks:				



VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2024-04-09	Initial Release	
02	2024-05-29	Replaced document: G0M-2401-2383-TFC091MP-V01 Replaced by: G0M-2401-2383-TFC091MP-V02 Changes: Page 9 / 13: • Mode correction	St. Liebich



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	Haltian RADAR senses warehouse loading dock or parking slot occupancy status and sends this information via Wirepas mesh network to Thingsee Gateway and from there to Cloud.				
Model	DRA				
Additional Model(s)	None				
Brand Name(s)	Haltian RADAR				
O - martin televitika eti - m	EUT #	Sample-ID	Serial Number		
Sample Identification	EUT 1	See Ref-Doc	See Ref-Doc		
Hardware Version(s)	DRA_03				
Software Version(s)	2023_11_17				
FCC ID	2AEU3HARADAR				
Equipment type	End Product				
Environment	Workers	Workers			



1.1 Reference Documents

Document Type	Document No.	Issued by	Date
Test-Report	3897RER004	Eurofins Electric & Electronics Finland Oy	2024-03-18
Test-Report	USRC23D128001	Eurofins E&E Wireless Taiwan Co., Ltd.	2024-01-17



1.2 Power density radiation sources

Mode	Operating Frequency [MHz]	Maximum conducted power [dBm]	Maximum radiated power [dBm EIRP]	Maximum duty cycle [%]	Maximum antenna gain [dBi]	Maximum antenna diameter [cm]
Bluetooth LE	2402	-1.00	0.75	100	1.75	N/A
Radar	60500	-27.07	-5.67	3.7	21.4	N/A
Comment:						

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	Bluetooth LE	0.20	PASS
47 CFR 2.1091	Maximum permissible exposure	FCC KDB 447498	Radar	0.20	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 Electric field Magnetic field Power density Averaging tim [MHz] strength [V/M] strength [A/M] [W/m²] [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

Bluetooth LE				
Transmission Mode				
Transmission Frequency (f) [MHz]	2402			
Antenna far-field distance				
Maximum antenna diameter (D) [m]	N/A			
Transmission wavelength (λ) [m]	N/A			
Antenna far-field distance (RFF) [m]	N/A			
Source average power				
Peak radiated power (PR) [dBm EIRP]	0.75			
Maximum transmission duty cycle (DC)	1.00			
Duty cycle correction (DCC) [dB]	0.00			
Average radiated power (PRAVG) [dBm EIRP]	0.75			
Power density				
Compliance power density limit [W/m ²]	50.000			
Power density (S) @ Antenna far-field distance [W/m ²]	N/A			
Power density (S) @ 0.20 m [W/m ²]	0.002			
Power density ratio @ 0.20 m	0.00			
Distance for compliance power density (S=SL) [m]	0.001			
Compliance				
Verdict	PASS			
Comment:				

Radar				
Transmission Mode				
Transmission Frequency (f) [MHz]	60500			
Antenna far-field distance				
Maximum antenna diameter (D) [m]	N/A			
Transmission wavelength (λ) [m]	N/A			
Antenna far-field distance (RFF) [m]	N/A			
Source average power				
Peak radiated power (PR) [dBm EIRP]	-5.67			
Maximum transmission duty cycle (DC)	0.04			
Duty cycle correction (DCC) [dB]	-14.32			
Average radiated power (PRAVG) [dBm EIRP]	-19.99			
Power density				
Compliance power density limit [W/m ²]	50.000			
Power density (S) @ Antenna far-field distance [W/m ²]	N/A			
Power density (S) @ 0.20 m [W/m ²]	0.000			
Power density ratio @ 0.20 m	0.00			
Distance for compliance power density (S=SL) [m]	0.000			
Compliance				
Verdict	PASS			
Comment:				

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