

11/21/2023

Synergen Technology Labs
3131 McKinney Ave., Ste. 602
Dallas, TX 75204
USA

Dear Sunil Konda,

Enclosed is the EMC test report for testing of the Synergen Technology Labs, Halsa Smart Hub tested to the requirements of FCC Part 2.1091 and RSS-102 Issue 5

Thank you for using the services of Eurofins E&E North America. If you have any questions regarding these results or if MET can be of further service to you, please do feel free to contact me.

Sincerely,



Nancy LaBrecque
Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: WIRA109927 – MPE_R1



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**RF Exposure Criteria
Test Report
Using Maximum Permissible Exposure (MPE) Calculations**

for the

**Synergen Technology Labs
Halsa Smart Hub**

Tested under

FCC Part 2.1091 and RSS-102 Issue 5

Report: WIRA109927 – MPE_R1

11/21/2023



Bryan Taylor, Wireless Team Lead
Electromagnetic Compatibility Lab



Nancy LaBrecque
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules Part 15.247 under normal use and maintenance.



Matthew Hinojosa
EMC Manager, Austin Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
0	11/21/2023	Initial Issue.

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List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dBμA	Decibels above one microamp
dBμV	Decibels above one microvolt
dBμA/m	Decibels above one microamp per meter
dBμV/m	Decibels above one microvolt per meter
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	Frequency
CISPR	Comite International Special des Perturbations Radioelectriques (International Special Committee on Radio Interference)
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kiloHertz
kPa	kiloPascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	MegaHertz
μH	microHenry
μF	microFarad
μs	microseconds
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
V/m	Volts per meter
VCP	Vertical Coupling Plane

1.0 Requirements Summary

Page Number	Test Name	Result
12	RSS-102 Issue 5 MPE Limits (For General Public Exposure)	Compliant
12	FCC Part 2.1091 MPE Limits (For General Public Exposure)	Compliant

Table 1. Summary of Test Results

2.0 Equipment Configuration

2.1 Overview

Eurofins MET Labs was contracted by Synergen Technology Labs to perform testing on the Halsa Smart Hub, under Synergen Technology Labs's purchase order number 20092601.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Synergen Technology Labs Halsa Smart Hub.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	Halsa Smart Hub	
Model(s) Covered:	Halsa Smart Hub	
EUT Specifications:	Primary Power: 5VDC via 120VAC USB Wall Adapter	
	Type of Modulations:	WiFi: 802.11b, 802.11g, 802.11n (20MHz Channels), 802.11 (40MHz Channels) BLE Module: GFSK
	Equipment Code:	DTS
	Peak RF Output Power:	WiFi: 12.6dBm BLE Module: 8.36dBm
	EUT Frequency Ranges:	WiFi: 2412-2462 MHz BLE Module: 2402-2480 MHz
	Antenna Gain (declared by Synergen Technology Labs)	WiFi: 3.5dBi BLE Module: 0.6dBi
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Bryan Taylor	
Test Date(s):	6/13/2023 through 7/14/2023	

Table 2. EUT Summary Table

2.2 Test Site

All testing was performed at Eurofins E&E North America, Austin, TX. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

2.3 References

RSS-102: Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
FCC Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.

Table 3. References

2.4 Description of Test Sample

Halsa Smart Hub device is the central point of the communication. Halsa Smart Hub handles and maintains the connection in between the Halsa Smart Sensor device via BLE and, with router via Wi-Fi. It is the point which make the local alerts based on the processed data. Halsa Smart Hub is always powered with connected power. This also acts as the charging dock for the Halsa Smart Sensor device. Halsa Smart hub contains the following features · Customizable Night Light; Customizable and Intelligent Sound Machine and Music; Touch sensor; Touch sensitive Quick Control for Presets; Audio Monitor · Two way communication from the App; Alexa/Google home integration · Environmental sensor for humidity and temperature; Easy snap on charging for the wearable · Vitals out of range Alarms/Alerts; Bluetooth low energy, Wi-Fi 2.4GHz · Connected power through USB wall adapter; Input: AC110-240V 50-60Hz 0.6A; Max Output: DC 5.0V-3.0A

2.5 Modifications

2.5.1 Modifications to EUT

No modifications were made to the EUT.

2.5.2 Modifications to Test Standard

No modifications were made to the test standard.

2.6 Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Synergen Technology Labs upon completion of testing.

Name / Description	Manufacturer	Model Number	Customer Supplied Calibration Data
Power Adapter	DongguanXie Yang Electronics Co. LTD.	XY-0029	None

Table 4. Support Equipment

3.0 Maximum Permissible Exposure

3.1 RSS-102 RF Exposure Limits

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
 * Based on nerve stimulation (NS).
 ** Based on specific absorption rate (SAR).

3.2 FCC Exposure Limits

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density.

Test Procedure:

An MPE evaluation for was performed in order to show that the device was compliant with the general population exposure limits. The maximum power density was calculated for each transmitter band at a separation distance of 20cm using the maximum declared output power including tune up tolerance.

For each transmitter the maximum RF exposure at a 20 cm distance using the formula:

$$\text{ConductedPower}_{mW} = 10^{\frac{\text{ConductedPower}(dBm)}{10}}$$
$$\text{PowerDensity} = \frac{\text{ConductedPower}_{mW} \times \text{Ant.Gain}}{4\pi \times (20_{cm})^2}$$

For transmitters that could operate simultaneously, the MPE to limit ratio for each was calculated and then summed. If the sum of the MPE to limit ratios was less than 1, that specific combination of transmitters was deemed to comply.

Test Results:

The Halsa Smart Hub was **compliant** with FCC Part 2.1091 and RSS-102 Issue 5. The calculated maximum power density at 20cm distance was equal to or less than the required limits for general population exposure for FCC Part 2.1091 and RSS-102 Issue 5.

Additionally, the sum of the limit to MPE ratios for all of the radios that can transmit simultaneously was less than 1. Therefore the Halsa Smart Hub was also compliant with the simultaneous transmission MPE criteria.

Test Data:

Duty Cycle		100 (%)							
Separation Dist.		20 (cm)							
Operating Mode	Frequency (MHz)	Declared Max Cond. Power (Inc. Tolerance) (dBm)	Duty Cycle Adjusted Cond. Output Power (dBm)	Antenna Gain (dB)	MPE Value (mW/cm ²)	MPE Limit (mW/cm ²)	Margin to Limit (mW/cm ²)	MPE / Limit Ratio (for Co-Location)	
WiFi	2412	12.6	12.60	3.5	0.0081	1.0000	0.9919	0.0081	
BLE (From Module)	2402	8.36	8.36	0.6	0.0016	1.0000	0.9984	0.0016	
							Sum:	0.0097	

FCC MPE Data

Duty Cycle		100 (%)							
Separation Dist.		20 (cm)							
Operating Mode	Frequency (MHz)	Declared Max Cond. Power (Inc. Tolerance) (dBm)	Duty Cycle Adjusted Cond. Output Power (dBm)	Antenna Gain (dB)	MPE Value (W/m ²)	MPE Limit (W/m ²)	Margin to Limit (W/m ²)	MPE / Limit Ratio (for Co-Location)	
WiFi	2412	12.6	12.60	3.5	0.0810	5.3660	5.2850	0.0151	
BLE (From Module)	2402	8.36	8.36	0.6	0.0157	5.3508	5.3351	0.0029	
							Sum:	0.0180	

ISED MPE Data
Test Engineer(s): Bryan Taylor

Test Date(s): 6/28/2023