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Wabash Heartland Innovation Network MPE REPORT

SCOPE OF WORK
MPE CALCULATION
ON THE WHIN_WAN GATEWAY

REPORT NUMBER
105270108LEX-003

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1/27/2022

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Non-Specific EMC Report Shell Rev. December 2017

MPE TEST REPORT

Report Number: 105270108LEX-003
Project Number: G105270108

Report Issue Date: 1/27/2022

Product Name: WHIN_WAN Gateway

Standards: FCC Part 1.1310 Limits for Maximum Permissible Exposure (MPE)

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Drive
Lexington, KY 40510
USA

Client:
Wabash Heartland Innovation Network
1281 WIN HENTSCHEL BOULEVARD Suite 2161
West Lafeyette, IN 47906
USA

Report prepared by

David Perry, Engineer

Report reviewed by

Brian Lackey, Team Leader

Table of Contents

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
8	FCC Part 1.1310 Limits for Maximum Permissible Exposure (MPE) (Limits for General Population / Uncontrolled Exposure)	Pass

3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	Wabash Heartland Innovation Network
Address:	1281 WIN HENTSCHEL BOULEVARD Suite 2161 West Lafeyette, IN 47906 USA
Contact:	Gary Gentry
Telephone:	3179875058
Email:	gary@estk-design.com
Manufacturer Information	
Manufacturer Name:	Wabash Heartland Innovation Network
Manufacturer Address:	1281 WIN HENTSCHEL BOULEVARD Suite 2161 West Lafeyette, IN 47906 USA

4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	WHIN_WAN Gateway
Model Number	WHIN-WAN-GW
Serial Number	Unit 1
Supported Transmit Bands	902 MHz – 915 MHz
Antenna Gain (measured)	7.47 dBi
Maximum Output Power Including Tune Up Tolerance[1]	17 dBm
Receive Date	12/27/2022
Test Start Date	12/27/2022
Test End Date	1/6/2022
Device Received Condition	Good
Test Sample Type	Production
Power Ratings	6V DC
Description of Equipment Under Test (provided by client)	
LoRaWAN Weather Station Gateway #6612	

4.1 Variant Models:

There were no variant models covered by this evaluation.

[1] Compliance is based on nominal maximum output power, including tune up tolerance, provided by the client. Intertek does not make any claim of compliance for values other than shown here.

5 Antenna Gain

Wireless Technology	Frequency	Antenna Gain (dBm)
LoRa	902.3 – 914.9	7.47

Antenna gain was calculated using the EIRP and maximum peak output power as measured in Intertek report 105270108LEX-003.

6 FCC Limits

§ 1.1310: The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

Part 1.1310 Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) 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
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

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

NOTE 1 TO TABLE 1: 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.

NOTE 2 TO TABLE 1: 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 can not exercise control over their exposure.

7 Test Procedure

An MPE evaluation for was performed in order to show that the device was compliant with the general population exposure limits from FCC §2.1091. 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:

$$ConductedPower_{mW} = 10^{ConductedBwer(dBm)/10}$$

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

8 Results:

The calculated maximum power density at 20cm distance was equal to or less than the required limits for general population exposure for FCC Part 1.1310.

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 (mW/cm^2)	MPE Limit (mW/cm^2)	Margin to Limit (mW/cm^2)	MPE / Limit Ratio (for Co-Location)
LoRa Continuous Modulation	902.3	17	17.00	7.47	0.0557	0.6015	0.5458	0.0926

9 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	1/27/2022	105270108LEX-003			Original Issue