

Ushine Photonics Corporation

TEST REPORT

Model:

UP100-US915-USB-B, UP100-US915-USB,
UP100-US915-SPI-B, UP100-US915-SPI

REPORT NUMBER

220200295THC-001R1

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Radio Spectrum

TEST REPORT

Applicant:	Ushine Photonics Corporation No. 199, Sec. 3, Huanbei Rd., Zhubei City, Hsinchu County 302, Taiwan
Product:	LoRaWAN Gateway Module
Model No.:	UP100-US915-USB-B, UP100-US915-USB, UP100-US915-SPI-B, UP100-US915-SPI
FCC ID:	2A5CK-UP100
Test Method/ Standard:	47 CFR FCC Part 15.247 & ANSI C63.10 2020 KDB 558074 D01 v05r02
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 17, Ln. 246, Niupu S. Rd., Xiangshan Dist, Hsinchu City 300075, Taiwan



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Revision History

Report No.	Issue Date	Revision Summary
220200295THC-001	Mar. 23, 2022	Original report
220200295THC-001R1	Sep. 14, 2026	Add a monopole antenna. After engineer judgment and verified, the radiated above 1GHz test was considered necessary.

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Summary of Test Data

Test Requirement	Applicable Rule (Section 15.247)	Result
Emissions In Restricted Frequency Bands (Radiated emission measurements)	15.247(d), 15.205, 15.209	Pass

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	LoRaWAN Gateway Module
Model No.:	UP100-US915-USB-B
Operating Frequency:	903.0 MHz, 904.6 MHz, 906.2 MHz, 907.8 MHz, 909.4 MHz, 911.0 MHz, 912.6 MHz, 914.2 MHz, 923.3 MHz, 923.9 MHz, 924.5 MHz, 925.1 MHz, 925.7 MHz, 926.3 MHz, 926.9 MHz, 927.5 MHz,
Channel Number:	16 channels
Rated Power:	DC 5V
Power Cord:	N/A
Sample receiving date:	2026/07/22
Sample condition:	Workable
Test Date(s):	2026/07/30

1.2 Additional information about the EUT

The customer confirmed the models listed as below were series model to model UP100-US915-USB-B (EUT), the difference between main model and series model are listed as below.

Brand Name	Model Number	Different
Ushine	UP100-US915-USB	without IC(ATECC608A)
Ushine	UP100-US915-SPI-B	without MCU(STM32L412xx)
Ushine	UP100-US915-SPI	without MCU(STM32L412xx) and ATECC608A

1.3 Antenna description

Antenna Model	: RST-MB1-MC1-50-RP23M-H-001
Antenna Gain	: 2.15 dBi
Antenna Type	: Monopole antenna
Connector Type	: RP-SMA
Remark	: Antenna information provided by the client.

1.4 Operation mode

The EUT connected to Notebook USB port, executing “Tera Term” and enter command to select different frequency and modulation.

1.5 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.
Notebook PC	HP	HP ProBook 440 G3	5CD8021S9H
Adapter	Shen Zhen A-WIN	AW025WR-0500300JH	N/A
Host (Customer provided)	Ushine	UP100 TEST BOARD	N/A
Raspberry Pi 3 Model B SBC	Raspberry	Pi 3B	N/A

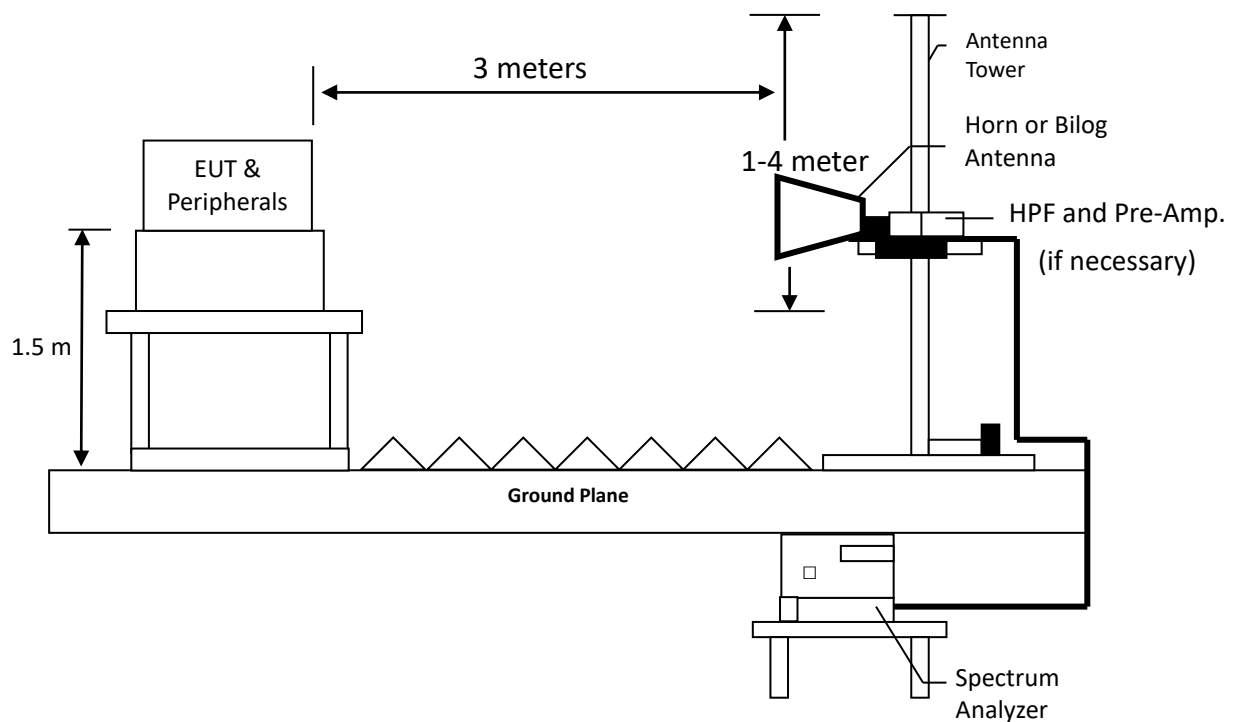
Peripherals name	Length	Shielded(Y/N)	Brand	Model No.
USB 2.0	1.8m	N	i-wiz	US-51

2. Emissions in Restricted Frequency Bands (Radiated emission measurements)

2.1 Instrument Setting

Receiver Function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak and Average
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz	1MHz
VBW	$\geq 3 \times \text{RBW}$	3MHz & 1/T minimum kHz
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation	Auto	Auto

2.2 Test setup & procedure



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Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 1/T minimum kHz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.

The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

2.3 Limit

Frequency(MHz)	Field Strength(uV/m)	Measurement distance(m)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

2.4 Test Result

Temperature (°C) :	23
Relative Humidity (%) :	74
Test date :	2026/07/30

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Channel Low	2709	PK	H	-12.12	49.40	37.28	74	-36.72
	2709	PK	V	-12.12	49.60	37.48	74	-36.52
	3612	PK	V	-9.79	50.11	40.32	74	-33.68
Channel Mid	2742.6	PK	H	-11.86	50.18	38.32	74	-35.68
	2742.6	PK	V	-11.86	49.45	37.59	74	-36.41
Channel High	2782.5	PK	H	-11.63	52.71	41.08	74	-32.92
	2782.5	PK	V	-11.63	51.00	39.37	74	-34.63

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
Spectrum analyzer	KEYSIGHT	N9020B	MY63450146	2026/01/30	2027/01/29
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-456	2025/12/02	2026/12/01
Pre-Amplifier	SGH	SGH118	20220105-1	2025/12/15	2026/12/14
Cable	SUHNER	SUCOFLEX 104	295105/4	2026/02/26	2027/02/25
Cable	SUHNER	SUCOFLEX 104P	CB0005	2026/02/26	2027/02/25
Cable	SUHNER	SUCOFLEX 104P	9403 / 4P	2025/11/21	2026/11/20
966-2_3m Semi-Anechoic Chamber	CHANCE MOST	CEM-966_2	N/A	2026/07/28	2027/07/27
Test software	Audix	e3	V9	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2.0$.

Item	Uncertainty
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	2.73 dB
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	3.91 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	3.49 dB
Vertically polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.71 dB
Horizontally polarized Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	3.71 dB
Vertically polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	3.26 dB
Horizontally polarized Radiated disturbances from 18GHz~40GHz in a semi-anechoic chamber at a distance of 3m	3.26 dB
Conducted Measurement	0.69 dB
AC Power Line Conducted Emission	1.31 dB