



A Test Lab Techno Corp.

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MPE Report

Test Report No.	: 1705FS12-01
Applicant	: Kiwi Technology Inc.
Product Type	: LoRa wireless module
Trade Name	: Kiwi Technology Inc.
Model Number	: TLM991
Date of Received	: Apr. 24, 2017
Test Period	: May 04, 2017
Date of Issued	: Jun. 09, 2017
Test Specification	: ANSI / IEEE Std.C95.1-1992 / IEEE Std. 1528-2013 47 CFR § 2.1091 47 CFR § 1.1310
Location of Test Lab.	: Chang-an Lab.
Test Firm MRA designation number	: TW0010

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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Approved By : Bill Hu
(Bill Hu)

Tested By : Mark Duan
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1. Description of Equipment under Test (EUT)

Applicant	Kiwi Technology Inc. 4F., No.158, Sec. 1, Wenxing Rd., Zhubei City, Hsinchu County 302, Taiwan (R.O.C.)	
Manufacturer	FIRST CREATION INDUSTRY CO. No. 45, Heping Road, Panchiao City, Taipei County, 3rd Floor	
Product Type	LoRa wireless module	
Trade Name	Kiwi Technology Inc.	
Model Number	TLM991	
FCC ID	2AKIBTLM991	
Frequency Range	Operate Band	Frequency Range (MHz)
	LoRa	902 - 928
Antenna information	Type	Max. Gain (dBi)
	Dipole Antenna	2
Antenna Delivery	1TX + 1RX	
Temperature Range	-40 ~ +85°C	
RF Evaluation	0.435 mW/cm ²	

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties



2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device 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 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. " This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

Exposure evaluation

$$S = \frac{PG}{4\pi R^2}$$

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.

3. RF Output Power

The conducted power turn-up tolerance reference manufacturer specification.

Band	Frequency (MHz)	Modulation	Average Conducted power (dBm)
LoRa	902.5	SF7	25.27
	915.0	SF7	25.33
	927.5	SF7	25.20
	915.0	SF8	24.42
	915.0	SF9	24.24
	915.0	SF10	24.05
	915.0	SF11	23.33
	915.0	SF12	22.83

4. Test Result

Band	Modulation	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
LoRa	SF7	902.5	0.602	20	25.40	8.00	6.31	1	2187.910	0.435
		915.0	0.61	20	25.40	8.00	6.31	1	2187.910	0.435
		927.5	0.618	20	25.40	8.00	6.31	1	2187.910	0.435

Note:

- 1.Mobile or fixed location transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.
- 2.Each band max power which perform MPE of any configurations.
- 3.The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.
- 4.The device not support simultaneous transmission.