

RF Exposure Exemption

Applicant : REYAX TECHNOLOGY CO.,LTD.
 Product Name : LoRaWAN Transceiver Module
 Trade Name : REYAX
 Model Number : RYLR993
 Applicable Standard : 47 CFR § 2.1093
 Received Date : May 12, 2023
 Issued Date : Sep. 06, 2023

Issued by

Approved By : _____

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Revision History

Version	Issued Date	Revisions	Revised By
00	Sep. 06, 2023	Initial Issue	Rowan Hsieh

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1. General Information

1.1 Reference Applicable Standard

Standard	Description	Version
IEEE C95.1	American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 KHz to 100 GHz, New York.	1992
47 CFR § 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	-
47 CFR § 1.1310	Radiofrequency radiation exposure limits.	-
KDB 447498 D04	RF exposure procedures and equipment authorization policies for mobile and portable devices	v01

1.2 Testing Location

Lab Name: Eurofins E&E Wireless Taiwan Co., Ltd.

Site Address: No. 140-1, Changan Street, Bade District, Taoyuan City 334025, Taiwan (R.O.C.)

Site Address: No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan (R.O.C.)

2. Description of Equipment under Test (EUT)

Applicant	REYAX TECHNOLOGY CO.,LTD. 4F.-15, No.26, Ln. 321, Yangguang St., Neihu Dist. Taipei City Taiwan			
Product Name	LoRaWAN Transceiver Module			
Trade Name	REYAX			
Model Number	RYLR993			
FCC ID	QLYRYLR993			
Use Distance	20 cm			
Antenna Information	Trade Name	Model No.	Type	Gain
	REYAX	RYBF915	915 MHz DIPOLE Antenna	5.7 dBi
	REYAX	RYAI915	Helica Antenna	2.0 dBi

Note:

The above information of DUT was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

2.1 RF Specification

LoRa	
Operation Frequency	902.3~914.9 MHz
Modulation	CCS

3. RF Exposure Limit

For devices that operate at larger distances from persons, where there are minimal RF coupling interactions between a device and the user or nearby persons, RF exposure compliance using maximum permissible exposure (MPE) limits is applied. The limits for MPE is listed as below:

Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
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 / 1,500	30
1,500-100,000	-	-	1.0	30
Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1,842 / 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

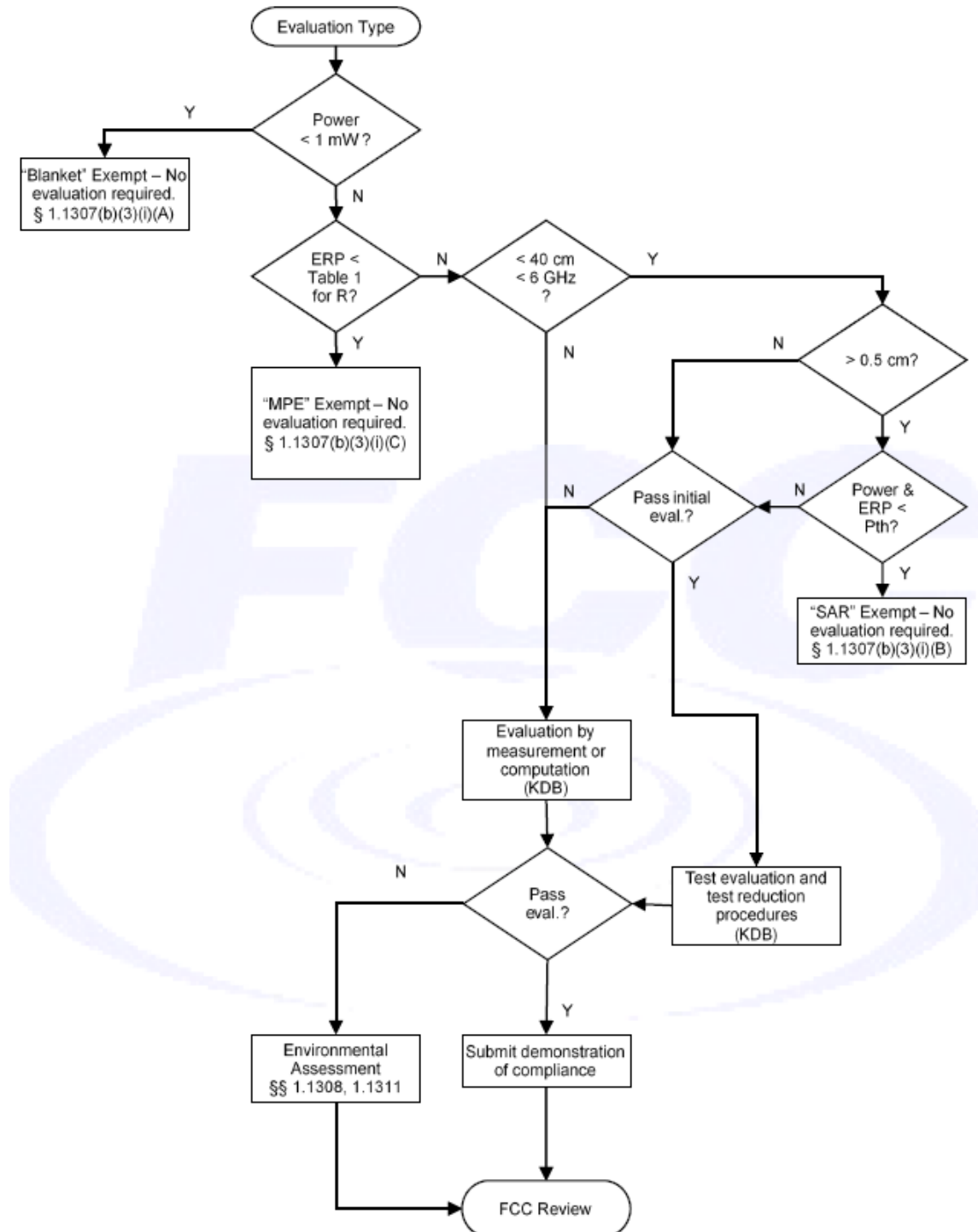
f = frequency in MHz. * = Plane-wave equivalent power density.

4. RF Exposure Assessment

4.1 Exemption Evaluation

Exemption evaluation was performed according to the appendix A and B in KDB447498 D04.

The General Sequence for Determination of Procedure demonstrated in Figure A.1 of KDB447498 D04 was applied.



4.2 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."

Exposure evaluation

$$S_{eip} = \frac{EIRP}{4\pi d^2} = \frac{PG}{4\pi d^2} (W / m^2)$$

Where

S: is the input power (W);

G: is the antenna gain;

d : is the distance between antennas and evaluation point (m).

5. Maximum Transmitting Mode Evaluation

Antenna transmission description
LoRa: 1Tx(Diversity)

6. Result

Band	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (mW)	ANT Gain (dBi)	ERP (W)	<§1.1307(b)(3)(i)(C)> Exemption Minimum Distance (m)	<§1.1307(b)(3)(i)(C)> Exemption Threshold ERP (W)	<§1.1307(b)(3)(i)(C)> Exemption considerations	<§1.1307(b)(3)(i)(C)> ERP / ERP _{th}
LoRa	902.3 - 914.9	15.71	37.24	5.70	0.084	0.053	0.468	Qualified	0.18

Note:

This device is qualified for exemption under §1.1307(b)(3)(i)(C).

7. Conclusion

The result shows that this device is qualified for MPE-Based Exemption in KDB447498. Therefore, MPE testing is not required.

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