FCC REPORT
(LoRa)

Applicant:	DORJI INDUSTRIAL GROUP CO., LTD
Address of Applicant:	Rm210, Yuanxiong building, Tongxin Rd.26, Bantian street, Bantian, Longgang district, Shenzhen, China
Equipment Under Test (EUT)	
Product Name:	LoRa Module
Model No.:	DRF1262T
FCC ID:	2AS5Y-62T
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	19 Apr., 2019
Date of Test:	19 Apr., to 17 May, 2019
Date of report issued:	20 May, 2019
Test Result:	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	*20 May, 2019*	*Original*
01	*05 Jun., 2019*	*Update 5.4 chapters and test photos, external and internal photos*

Tested by: Carey Chen ***Date:*** *20 May, 2019*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *20 May, 2019*

Project Engineer

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4 Test Summary

Test Items	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
6dB Emission Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Conducted and radiated Spurious Emission	15.205/15.209	Pass
Remark: *Pass: Meet the requirement. N/A: Not Applicable for Non-adaptive equipment.*		

5 General Information

5.1 Client Information

Applicant:	DORJI INDUSTRIAL GROUP CO., LTD
Address:	Rm210, Yuanxiong building, Tongxin Rd.26, Bantian street, Bantian, Longgang district, Shenzhen, China
Manufacturer/Factory:	DORJI INDUSTRIAL GROUP CO., LTD
Address:	Rm210, Yuanxiong building, Tongxin Rd.26, Bantian street, Bantian, Longgang district, Shenzhen, China

5.2 General Description of E.U.T.

Product Name:	LoRa Module
Model No.:	DRF1262T
Operation Frequency:	902-928 MHz
Channel numbers:	26
Channel separation:	1 MHz
Modulation technology:	Lora
Antenna Type:	External Antenna
Antenna gain:	2.5 dBi
Power supply:	DC 3.3V
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
0	902.5MHz	10	912.5MHz	20	922.5MHz
1	903.5MHz	11	913.5MHz	21	923.5MHz
2	904.5MHz	12	914.5MHz	22	924.5MHz
3	905.5MHz	13	915.5MHz	23	925.5MHz
4	906.5MHz	14	916.5MHz	24	926.5MHz
5	907.5MHz	15	917.5MHz	25	927.5MHz
6	908.5MHz	16	918.5MHz		
7	909.5MHz	17	919.5MHz		
8	910.5MHz	18	920.5MHz		
9	911.5MHz	19	921.5MHz		

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test. Channel No. 0, 13 & 25 were selected as Lowest, Middle and Highest channel.

5.3 Test environment and test mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Transmitting mode	Keep the EUT in continuous transmitting with modulation
The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. Duty cycle setting during the transmission is 100% with maximum power setting for all modulations.	

5.4 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
DORJI	Test suite	SX126x	N/A	N/A
Nucleo	Test suite	MB1136	N/A	N/A
Remarks：Use the above auxiliary equipment to build a test environment.				

5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.54 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.84 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±3.36 dB (k=2)

5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Registration No.: 727551**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

5.8 Test Instruments list

Radiated Emission:

Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2018	11-20-2019
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-18-2019	03-17-2020
Pre-amplifier	CD	PAP-1G18	11804	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-18-2019	03-17-2020
Simulated Station	Anritsu	MT8820C	6201026545	03-18-2019	03-17-2020
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-18-2019	03-17-2020
Cable	MICRO-COAX	MFR64639	K10742-5	03-18-2019	03-17-2020
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-18-2019	03-17-2020

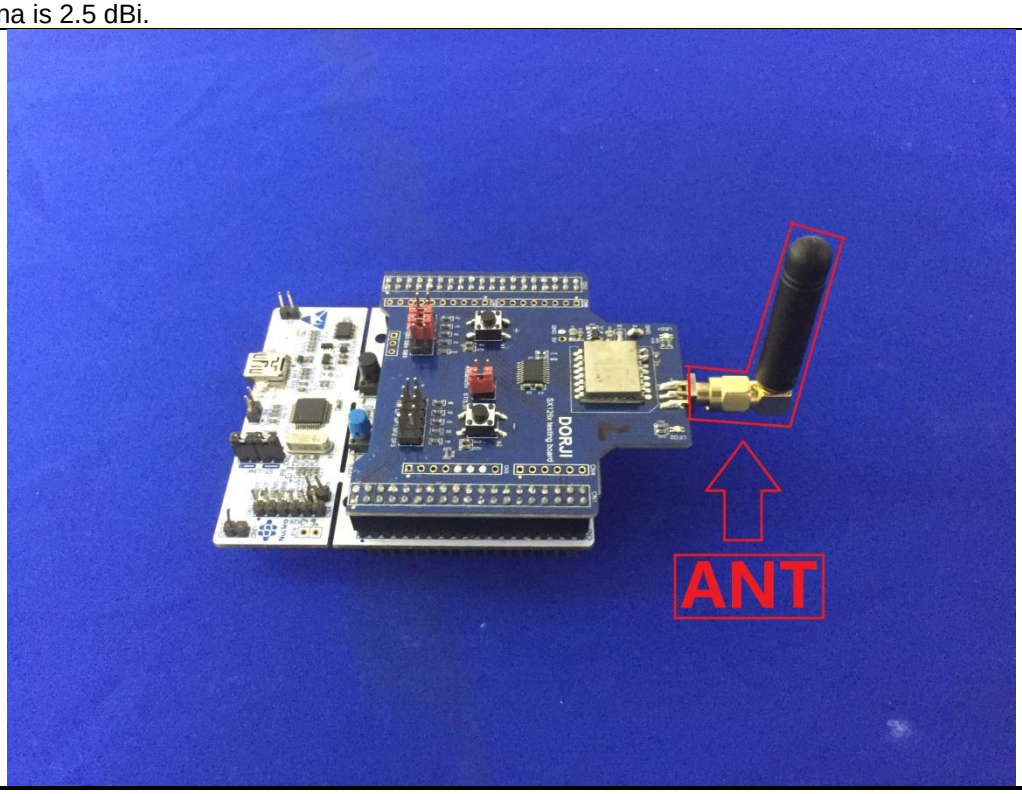
Conducted Emission:

Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-18-2019	03-17-2020
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-18-2019	03-17-2020
LISN	CHASE	MN2050D	1447	03-18-2019	03-17-2020
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2019
Cable	HP	10503A	N/A	03-18-2019	03-17-2020
EMI Test Software	AUDIX	E3	Version: 6.110919b		

6 Test results and Measurement Data

6.1 Antenna requirement:

Standard requirement:	FCC Part 15 C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
E.U.T Antenna:	
The antenna is an External antenna which cannot replace by end-user, the best-case gain of the antenna is 2.5 dBi.	



6.2 Conducted Emission

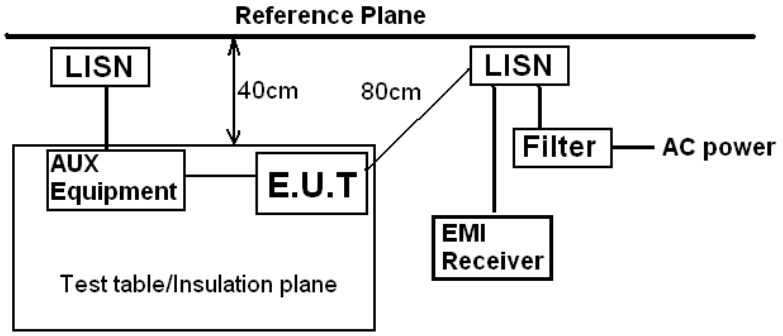
Test Requirement:	FCC Part 15 C Section 15.207
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	150 kHz to 30 MHz
Class / Severity:	Class B
Receiver setup:	RBW=9kHz, VBW=30kHz
Limit:	

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

Test procedure

1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Test setup:

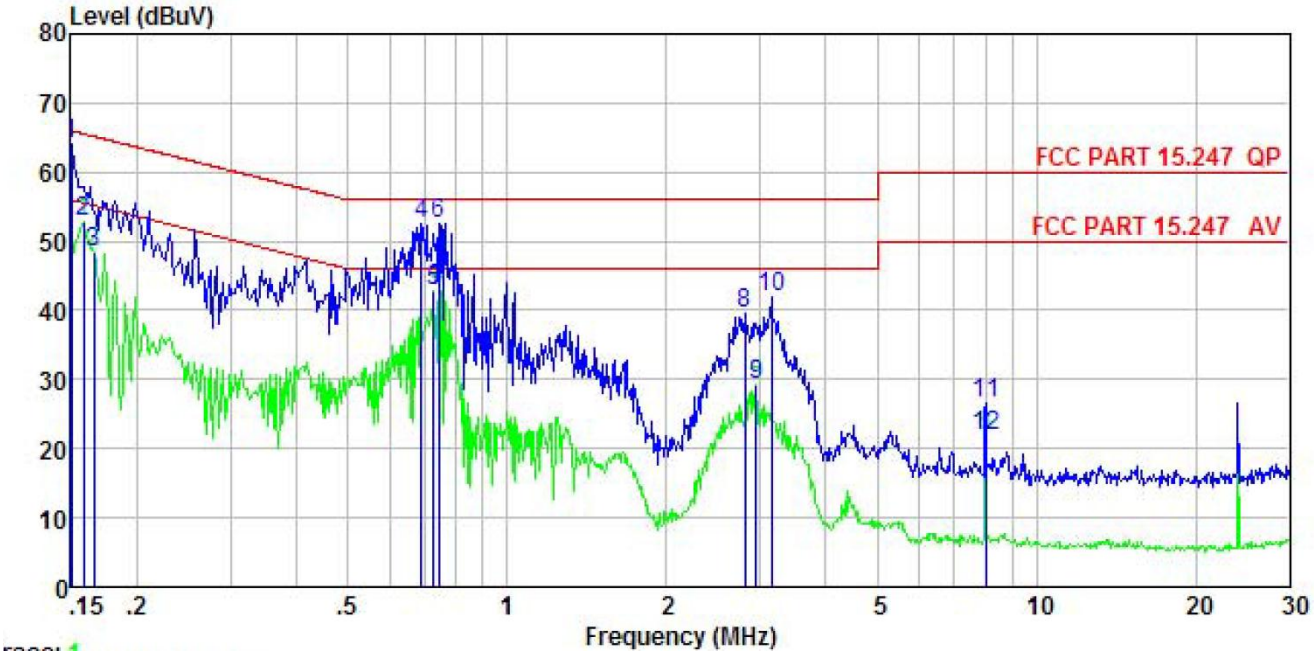


Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

Product name:	LoRa Module	**Product model:**	DRF1262T
Test by:	Carey	**Test mode:**	Tx mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Line
Test voltage:	AC 120 V/60 Hz	**Environment:**	Temp: 22.5℃ Huni: 55%

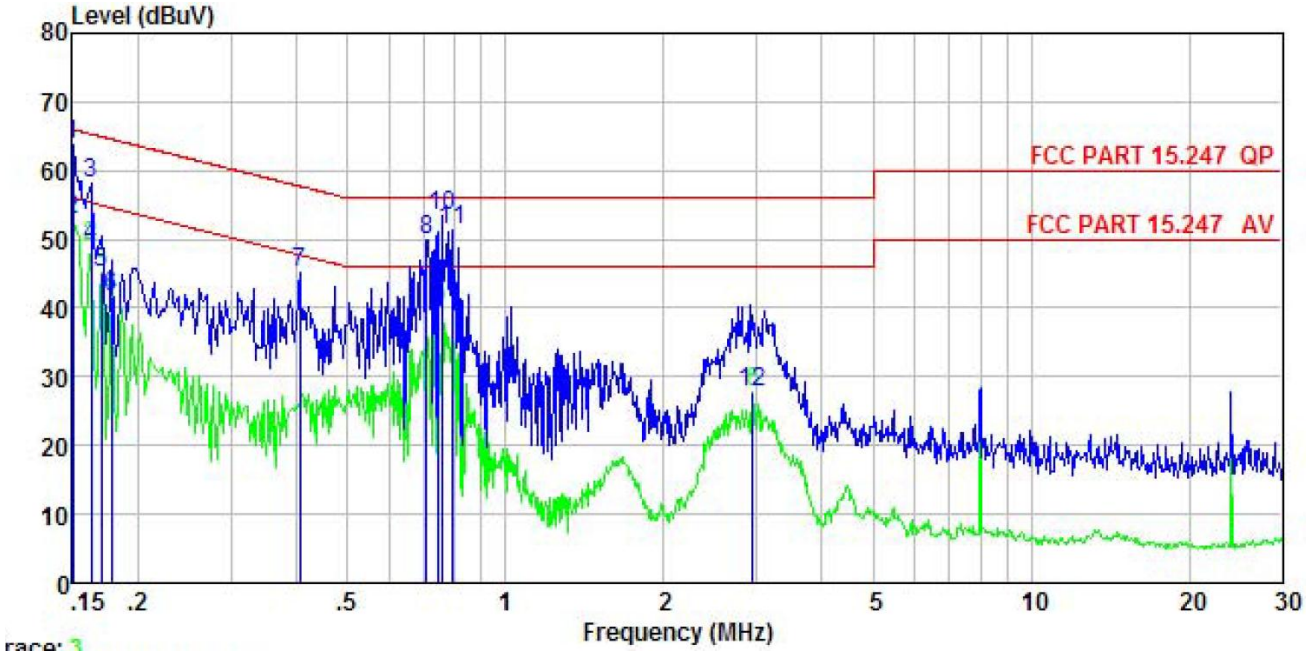


	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	53.64	-0.45	10.78	63.97	66.00	-2.03	QP
2	0.158	42.43	-0.44	10.77	52.76	55.56	-2.80	Average
3	0.166	38.16	-0.44	10.77	48.49	55.16	-6.67	Average
4	0.690	42.15	-0.38	10.77	52.54	56.00	-3.46	QP
5	0.727	32.33	-0.38	10.78	42.73	46.00	-3.27	Average
6	0.743	42.23	-0.38	10.79	52.64	56.00	-3.36	QP
7	0.743	32.58	-0.38	10.79	42.99	46.00	-3.01	Average
8	2.809	29.01	-0.44	10.93	39.50	56.00	-16.50	QP
9	2.946	18.80	-0.44	10.92	29.28	46.00	-16.72	Average
10	3.156	31.32	-0.44	10.91	41.79	56.00	-14.21	QP
11	8.020	16.28	-0.56	10.85	26.57	60.00	-33.43	QP
12	8.020	11.53	-0.56	10.85	21.82	50.00	-28.18	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss.*

Product name:	LoRa Module	**Product model:**	DRF1262T
Test by:	Carey	**Test mode:**	Tx mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Neutral
Test voltage:	AC 120 V/60 Hz	**Environment:**	Temp: 22.5℃ Huni: 55%

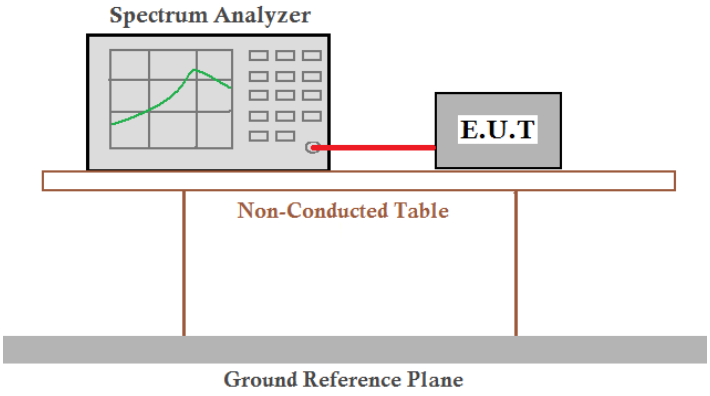


	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	53.53	-0.68	10.78	63.63	66.00	-2.37	QP
2	0.150	42.88	-0.68	10.78	52.98	56.00	-3.02	Average
3	0.162	47.99	-0.68	10.77	58.08	65.34	-7.26	QP
4	0.162	39.04	-0.68	10.77	49.13	55.34	-6.21	Average
5	0.170	35.20	-0.68	10.77	45.29	54.94	-9.65	Average
6	0.178	31.64	-0.69	10.77	41.72	54.59	-12.87	Average
7	0.406	35.12	-0.64	10.72	45.20	57.73	-12.53	QP
8	0.708	39.89	-0.64	10.77	50.02	56.00	-5.98	QP
9	0.747	29.63	-0.64	10.79	39.78	46.00	-6.22	Average
10	0.755	43.36	-0.64	10.79	53.51	56.00	-2.49	QP
11	0.792	41.05	-0.64	10.81	51.22	56.00	-4.78	QP
12	2.946	17.37	-0.67	10.92	27.62	46.00	-18.38	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss.*

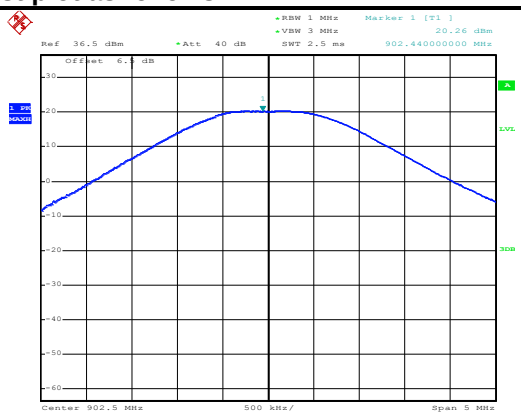
6.3 Conducted Output Power

Test Requirement:	FCC Part 15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

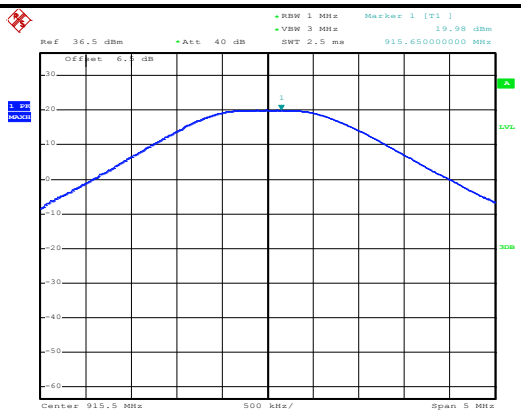
Test CH	Maximum Conducted Output Power (dBm)	Limit(dBm)	Result
Lowest	20.26	30.00	Pass
Middle	19.98		
Highest	19.69		

Test plot as follows:



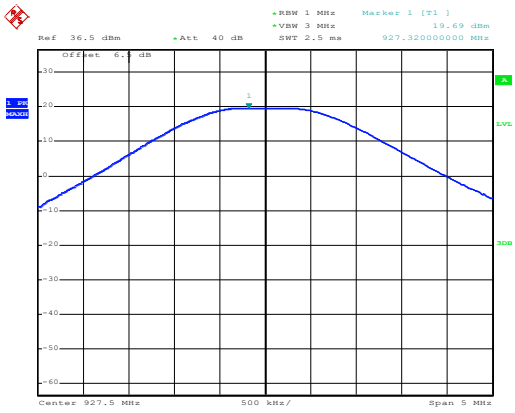
Date: 15.MAY.2019 10:24:10

Lowest channel



Date: 15.MAY.2019 10:24:57

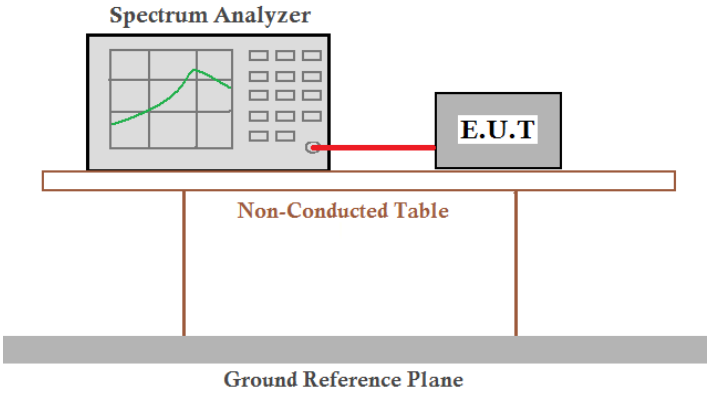
Middle channel



Date: 15.MAY.2019 10:23:36

Highest channel

6.4 Occupy Bandwidth

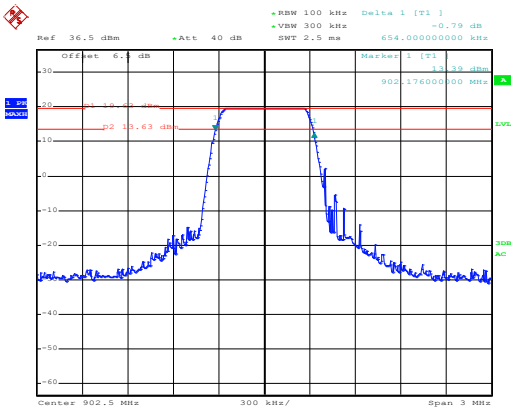
Test Requirement:	FCC Part 15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	>500kHz
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

Test CH	6dB Emission Bandwidth (MHz)	Limit(kHz)	Result
Lowest	0.654	>500	Pass
Middle	0.648		
Highest	0.654		
Test CH	99% Occupy Bandwidth (MHz)	Limit(kHz)	Result
Lowest	0.660	N/A	N/A
Middle	0.660		
Highest	0.660		

Test plot as follows:

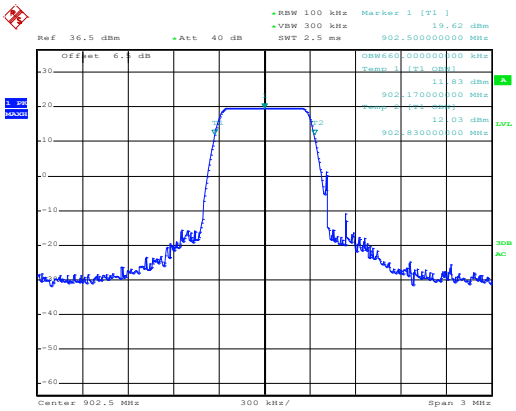
6dB EBW



Date: 15.MAY.2019 09:48:15

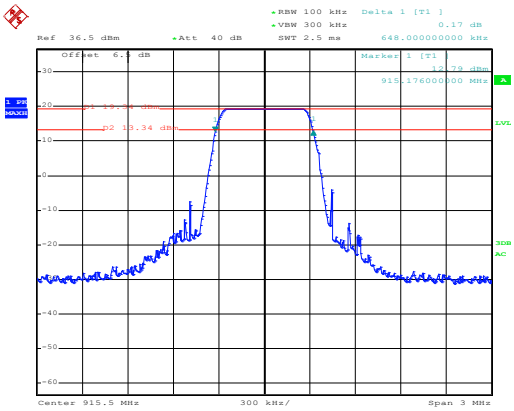
Lowest channel

99% OBW



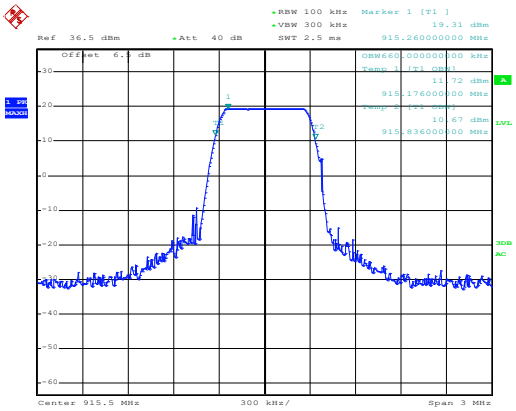
Date: 15.MAY.2019 09:50:06

Lowest channel



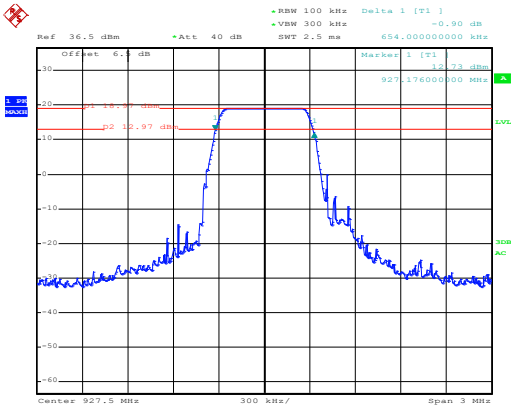
Date: 15.MAY.2019 09:39:40

Middle channel



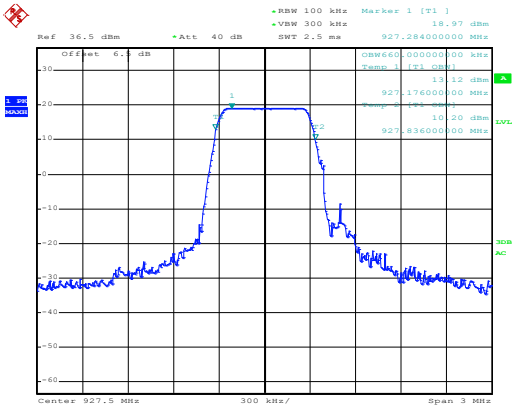
Date: 15.MAY.2019 09:49:44

Middle channel



Date: 15.MAY.2019 09:48:58

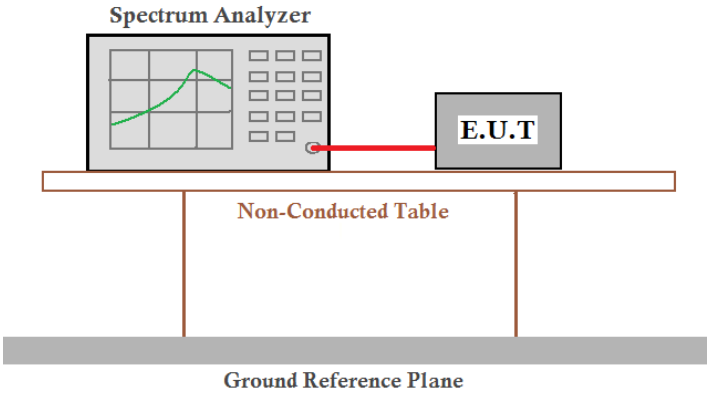
Highest channel



Date: 15.MAY.2019 09:49:24

Highest channel

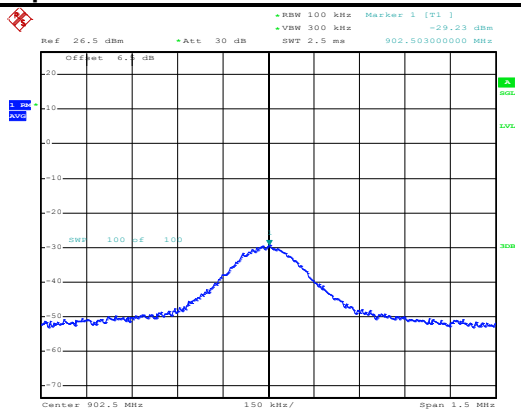
6.5 Power Spectral Density

Test Requirement:	FCC Part 15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	8 dBm
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

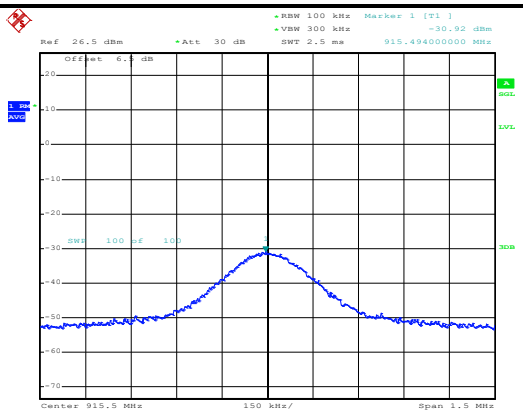
Test CH	Power Spectral Density (dBm)	Limit(dBm)	Result
Lowest	-29.23	8.00	Pass
Middle	-30.92		
Highest	-32.24		

Test plots as follow:



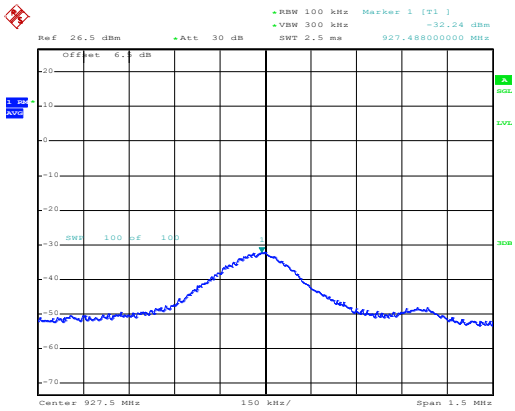
Date: 24.APR.2019 18:36:03

Lowest channel



Date: 24.APR.2019 18:35:12

Middle channel

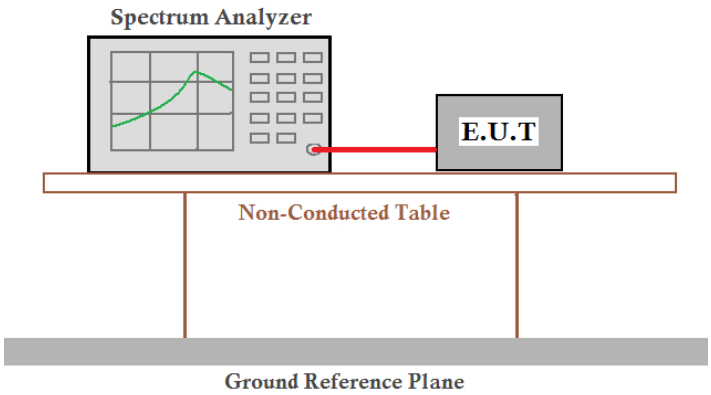


Date: 24.APR.2019 18:37:59

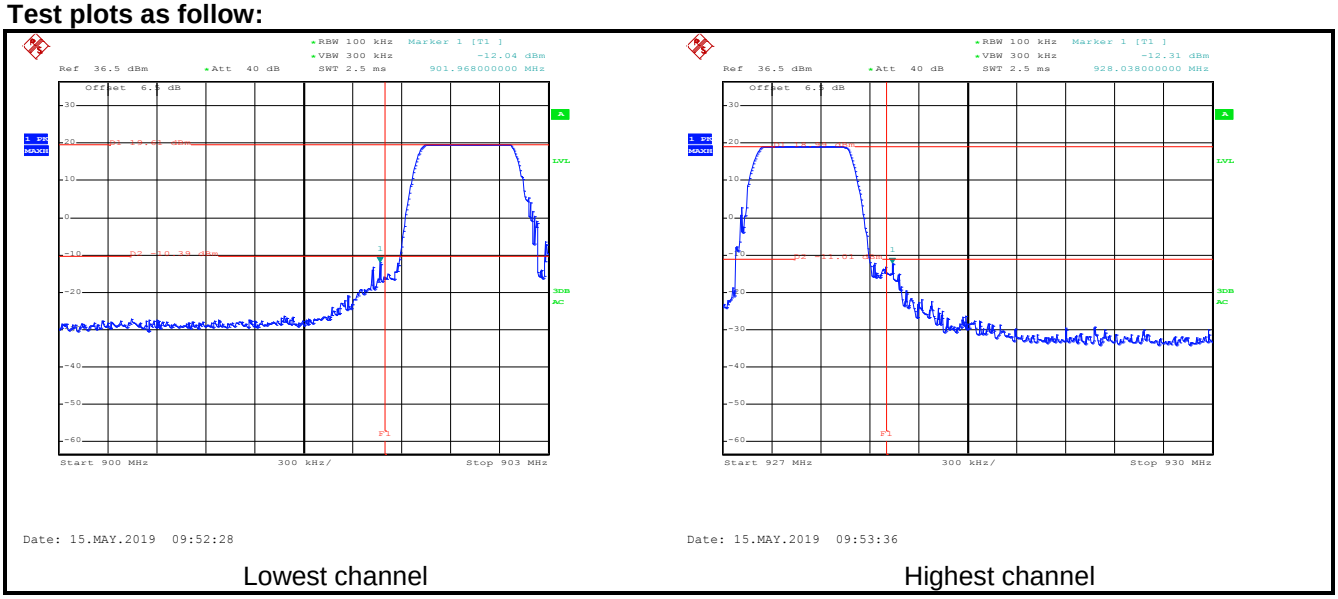
Highest channel

6.6 Band Edge

6.6.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plots as follow:



Lowest channel Highest channel

6.6.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013 and KDB 558074
Test Frequency Range:	960MHz to 1.240GHz
Test site:	Measurement Distance: 3m

Receiver setup:

Frequency	Detector	RBW	VBW	Remark
960MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	RMS	1MHz	3MHz	Average Value

Limit:

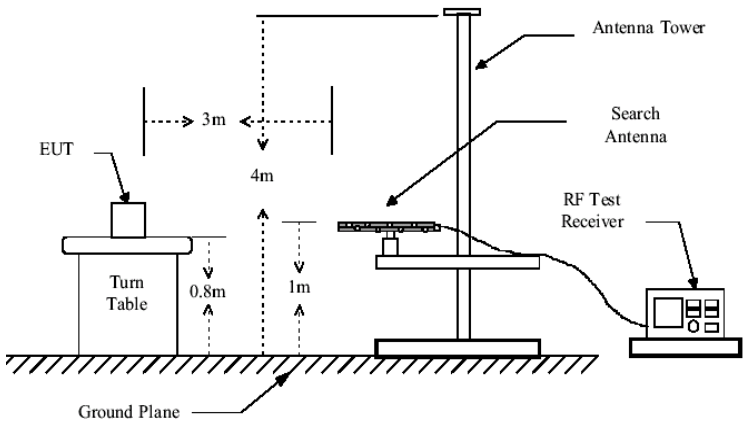
Frequency	Limit (dBuV/m @3m)	Remark
960MHz-1GHz	54.00	Quasi-peak Value
Above 1GHz	54.00	Average Value
	74.00	Peak Value

Test Procedure:

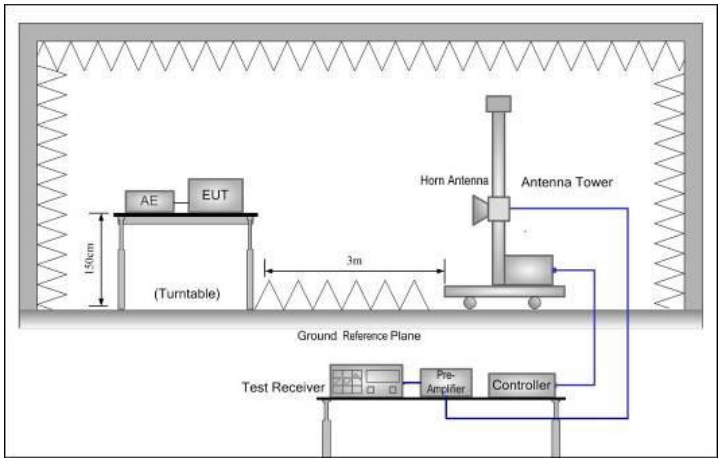
1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz) /1.5m(above 1GHz) above the groundat a 3 meter chamber.The table was rotated 360 degrees todetermine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, whichwas mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and thenthe antenna was tuned to heights from 1 meter to 4 meters and the rotatablewas turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and SpecifiedBandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limitspecified, then testing could be stopped and the peak values of the EUT wouldbe reported. Otherwise the emissions that did not have 10dB margin would bere-tested one by one using peak, quasi-peak or average method as specified andthen reported in a data sheet.

Test setup:

Below 1GHz

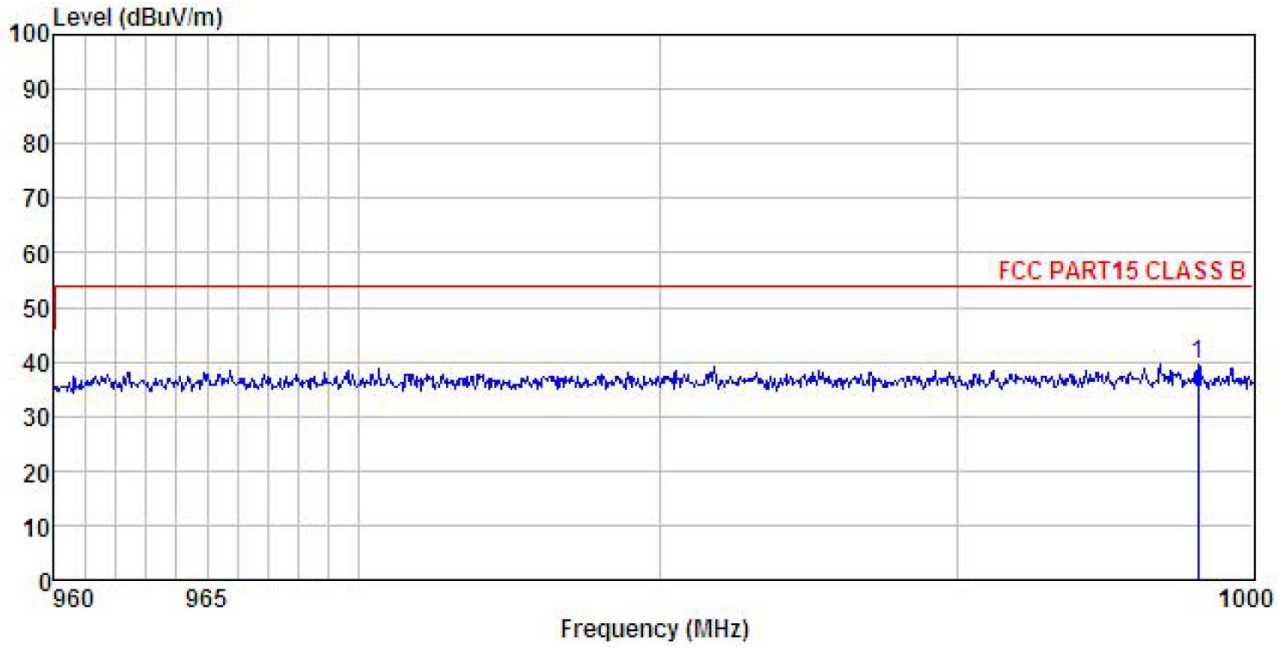


Above 1GHz

	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Below 1GHz:

Product Name:	LoRa Module	**Product Model:**	DRF1262T
Test By:	Carey	**Test mode:**	Tx mode
Test Channel:	Highest channel	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%

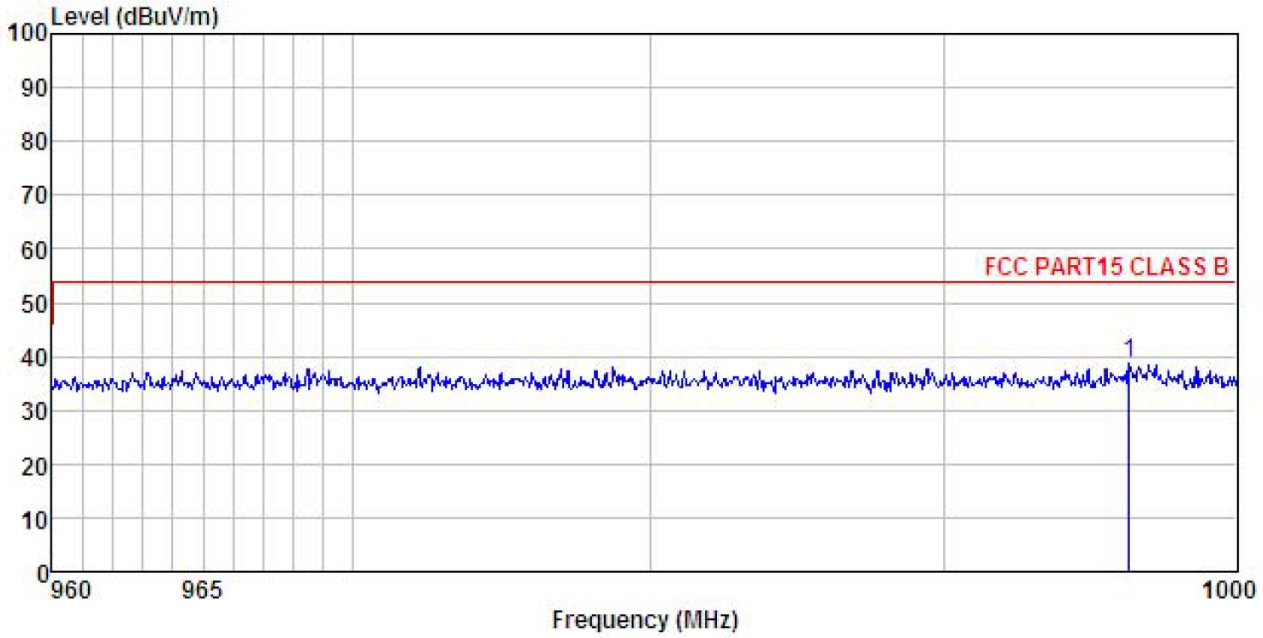


	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	998.124	12.22	22.80	4.46	0.00	39.48	54.00	-14.52	

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	LoRa Module	**Product Model:**	DRF1262T
Test By:	Carey	**Test mode:**	Tx mode
Test Channel:	Highest channel	**Polarization:**	Horizontal
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%



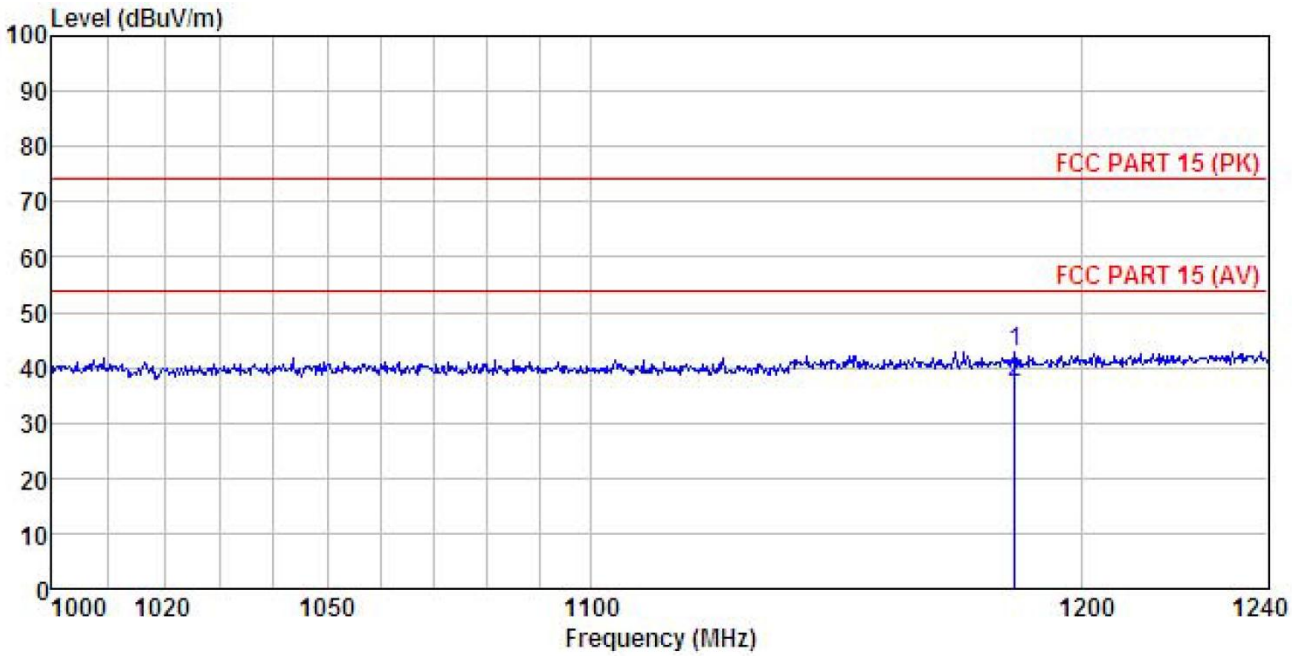
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	996.292	11.59	22.79	4.45	0.00	38.83	54.00	-15.17	

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Above 1GHz:

Product Name:	LoRa Module	**Product Model:**	DRF1262T
Test By:	Carey	**Test mode:**	Tx mode
Test Channel:	Highest channel	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%

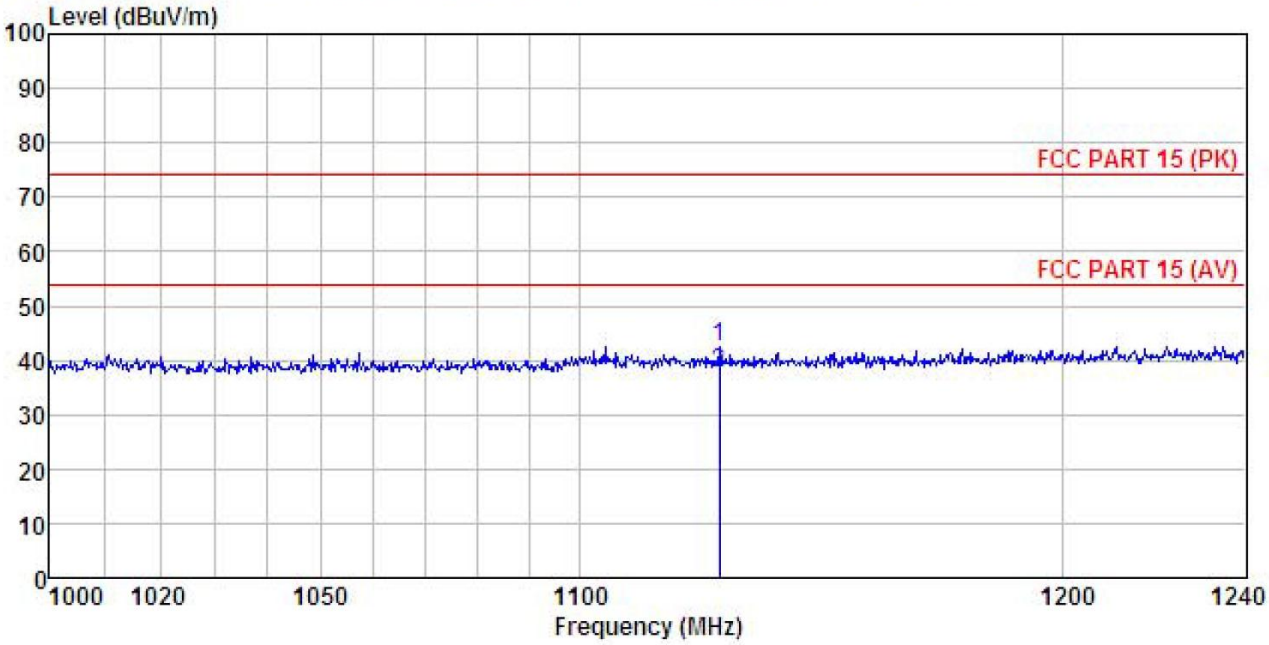


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1185.741	15.07	24.58	3.29	0.00	42.94	74.00	-31.06	Peak
2	1185.741	9.41	24.58	3.29	0.00	37.28	54.00	-16.72	Average

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	LoRa Module	**Product Model:**	DRF1262T
Test By:	Carey	**Test mode:**	Tx mode
Test Channel:	Highest channel	**Polarization:**	Horizontal
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%



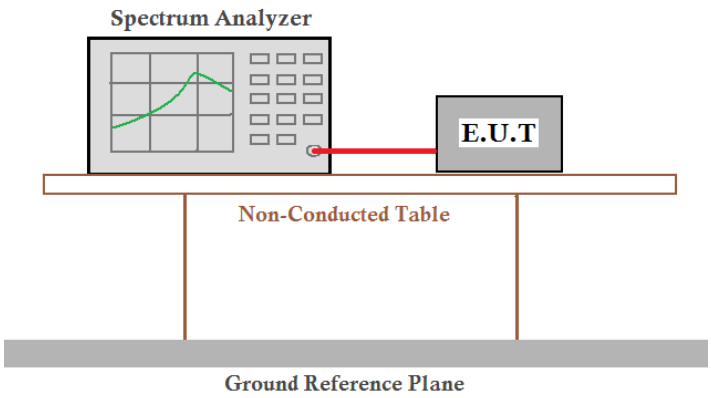
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1128.018	14.70	24.50	3.21	0.00	42.41	74.00	-31.59	Peak
2	1128.018	9.84	24.50	3.21	0.00	37.55	54.00	-16.45	Average

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

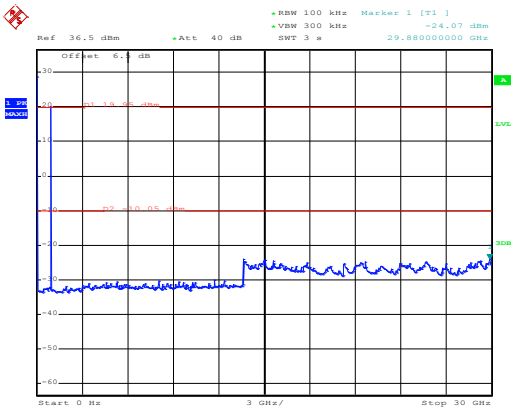
6.7 Spurious Emission

6.7.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plot as follows:

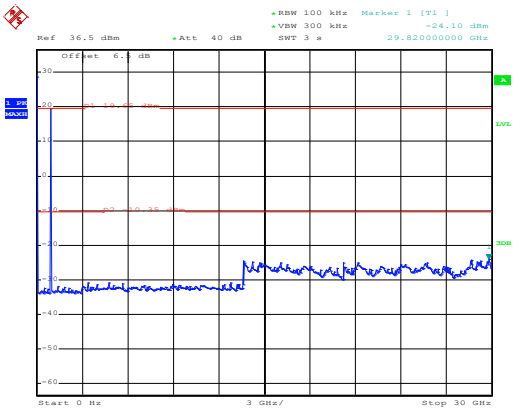
Lowest channel



Date: 15.MAY.2019 10:20:41

30MHz~25GHz

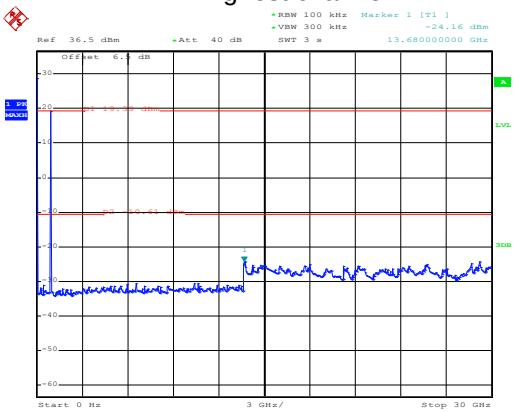
Middle channel



Date: 15.MAY.2019 10:21:43

30MHz~25GHz

Highest channel



Date: 15.MAY.2019 10:22:31

30MHz~25GHz

6.7.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test Distance:	3m

Receiver setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	RMS	1MHz	3MHz	Average Value

Limit:

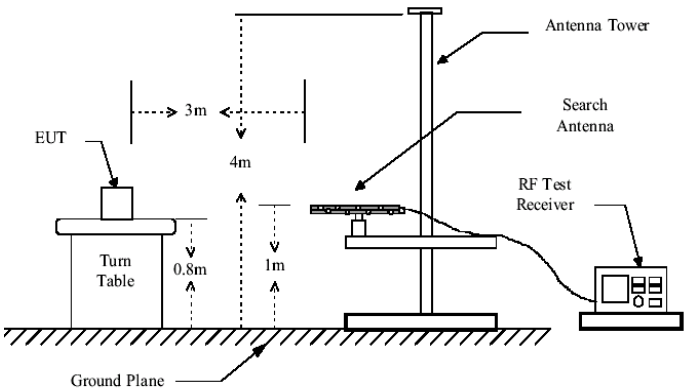
Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test Procedure:

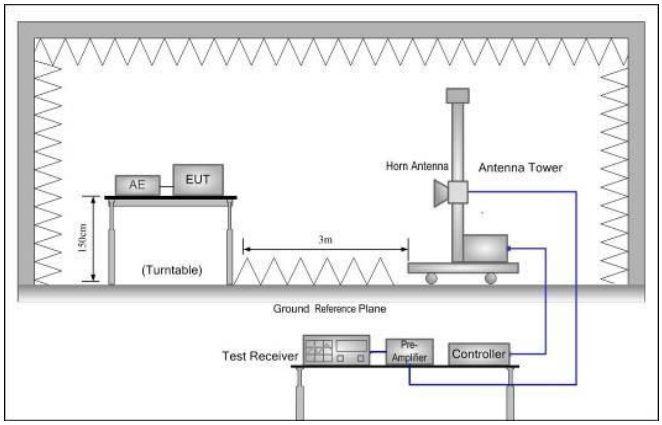
1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Test setup:

Below 1GHz



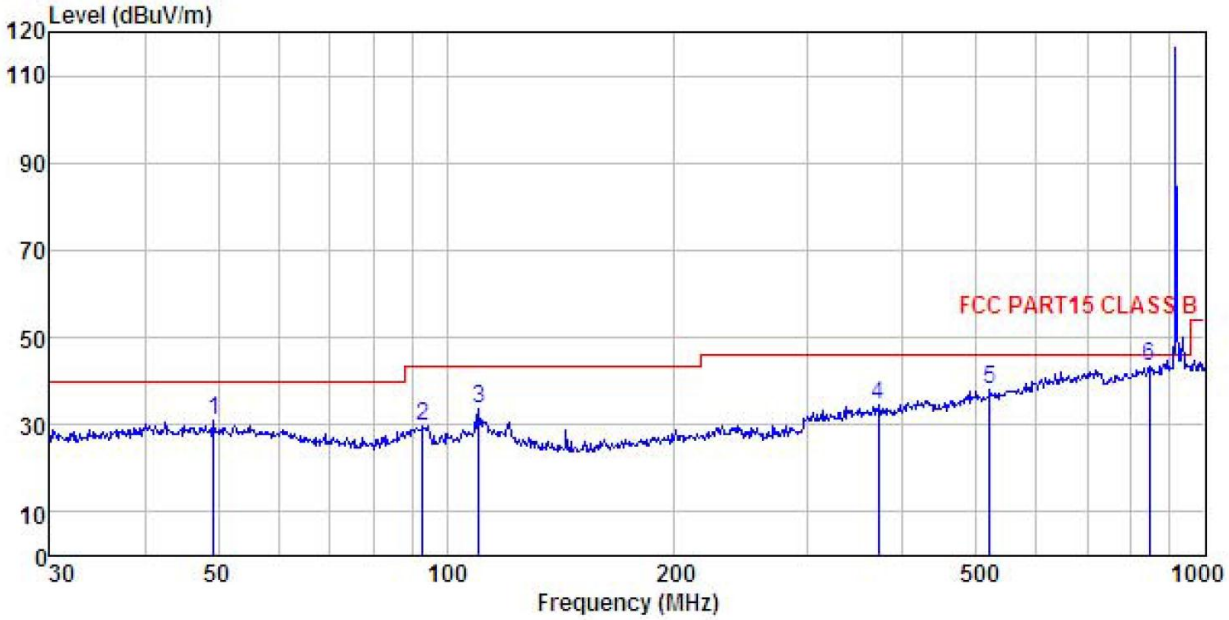
Above 1GHz

	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case. 2. 9 kHz to 30MHz is too low, so only shows the data of above 30MHz in this report.

Measurement Data (worst case):

Below 1GHz:

Product Name:	LoRa Module	**Product Model:**	DRF1262T
Test By:	Carey	**Test mode:**	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%

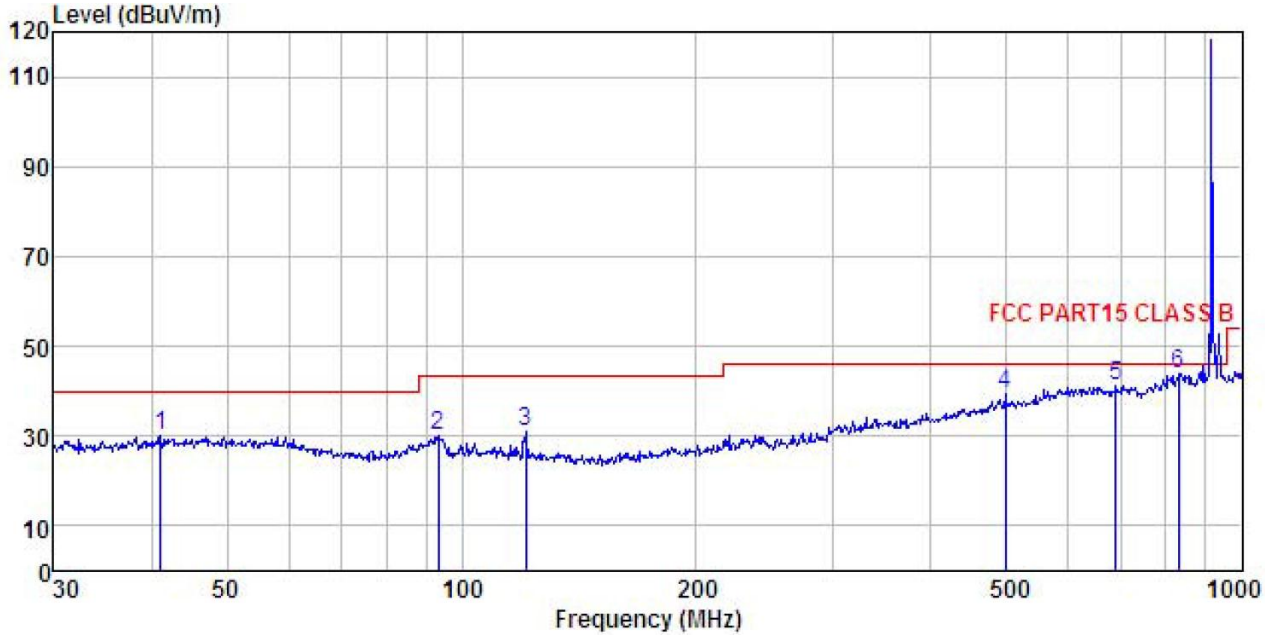


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	49.359	17.40	12.12	1.26	0.00	30.78	40.00	-9.22	QP
2	93.113	16.97	10.87	2.02	0.00	29.86	43.50	-13.64	QP
3	110.182	19.78	11.64	2.05	0.00	33.47	43.50	-10.03	QP
4	370.702	16.40	14.91	3.09	0.00	34.40	46.00	-11.60	QP
5	520.888	16.28	18.29	3.73	0.00	38.30	46.00	-7.70	QP
6	845.088	16.65	22.52	4.21	0.00	43.38	46.00	-2.62	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	LoRa Module	**Product Model:**	DRF1262T
Test By:	Carey	**Test mode:**	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Horizontal
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%



	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	41.132	16.33	12.38	1.24	0.00	29.95	40.00	-10.05	QP
2	93.440	16.96	10.98	2.02	0.00	29.96	43.50	-13.54	QP
3	120.699	17.98	10.85	2.18	0.00	31.01	43.50	-12.49	QP
4	497.677	17.62	18.13	3.60	0.00	39.35	46.00	-6.65	QP
5	689.565	16.92	20.24	4.11	0.00	41.27	46.00	-4.73	QP
6	830.400	17.58	22.21	4.25	0.00	44.04	46.00	-1.96	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Above 1GHz:

Test channel: Lowest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1805.00	62.65	25.60	4.12	41.21	51.16	74.00	-22.84	Vertical
1805.00	60.58	25.60	4.12	41.21	49.09	74.00	-24.91	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1805.00	60.21	25.60	4.12	41.21	48.72	54.00	-5.28	Vertical
1805.00	58.19	25.60	4.12	41.21	46.70	54.00	-7.30	Horizontal
Test channel: Middle channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1831.00	55.74	25.63	4.15	41.27	44.25	74.00	-29.75	Vertical
1831.00	57.49	25.63	4.15	41.27	46.00	74.00	-28.00	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1831.00	52.41	25.63	4.15	41.27	40.92	54.00	-13.08	Vertical
1831.00	53.96	25.63	4.15	41.27	42.47	54.00	-11.53	Horizontal
Test channel: Highest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1855.00	53.54	25.66	4.18	41.34	42.04	74.00	-31.96	Vertical
1855.00	54.15	25.66	4.18	41.34	42.65	74.00	-31.35	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1855.00	50.29	25.66	4.18	41.34	38.79	54.00	-15.21	Vertical
1855.00	50.84	25.66	4.18	41.34	39.34	54.00	-14.66	Horizontal

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*