TEST REPORT

Product	:	Control Panel LTE-M 915
Trade mark	:	Rentokil Initial
Model/Type reference	:	5000010R
Serial Number	:	N/A
Report Number	:	EED32Q80900001
FCC ID	:	2AK3P-5000010R
Date of Issue	:	Jun. 26, 2024
Test Standards	:	47 CFR Part 15 Subpart C
Test result	:	PASS

Prepared for:

Rentokil Initial 1927 plc
Compass House, Manor Royal, Crawley, West Sussex,
RH10 9PY, United Kingdom

Prepared by:

Centre Testing International Group Co., Ltd.
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Compiled by: Frazer Li — Frazer Li

Reviewed by: Tom Chen — Tom Chen

Approved by: Aaron Ma — Aaron Ma

Date of Issue: Jun. 26, 2024

Check No.:1845310822

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Version No.	Date	Description
00	Jun. 26, 2024	Original

3 Test Summary

Test Item	Test Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	PASS
Maximum Conducted Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(1)	PASS
20dB Emission Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	PASS
Carrier Frequency Separation	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	PASS
Number of Hopping Channels	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	PASS
Time of Occupancy	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	PASS
Pseudorandom Frequency Hopping Sequence	47 CFR Part 15, Subpart C Section 15.247(b)(4)	PASS
Band Edge Measurements	47 CFR Part 15, Subpart C Section 15.247(d)	PASS
Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	PASS
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	PASS
Restricted bands around fundamental frequency	47 CFR Part 15, Subpart C Section 15.205/15.209	PASS

Remark:
This test report (Ref. No.:EED32Q80900001) is only valid with the original test report (Ref. No.: EED32P80727401).
Review this report and original report, this report just added FCC ID,all test data refer to the report of EED32P80727401.
Company Name and Address shown on Report, the sample(s) and sample Information were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.

4 General Information

4.1 Client Information

Applicant:	Rentokil Initial 1927 plc
Address of Applicant:	Compass House, Manor Royal, Crawley, West Sussex, RH10 9PY, United Kingdom
Manufacturer:	Rentokil Initial 1927 plc
Address of Manufacturer:	Compass House, Manor Royal, Crawley, West Sussex, RH10 9PY, United Kingdom
Factory:	UK Circuits & Electronics Solutions Ltd
Address of Factory:	Greengate Industrial Estate, Greenside Way, Middleton, Manchester M24 1SW, United Kingdom

4.2 General Description of EUT

Product Name:	Control Panel LTE-M 915	
Model No.:	5000010R	
Trade Mark:	Rentokil Initial	
Product Type:	Fix Location	
Operation Frequency:	915.25MHz~927.5MHz	
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)	
Modulation Type:	FSK Chirp	
Number of Channel:	50	
Hopping Channel Type:	Adaptive Frequency Hopping systems	
Antenna Type:	Internal antenna	
Antenna Gain:	1.10dBi	
Power Supply:	Adapter:	Model：DYS812-050210W-K Input：100-240V~50/60Hz,0.35A MAX Output：5.0V,2.1A,10.5W
Test Voltage:	AC120V	
Sample Received Date:	Sep. 01, 2022	
Sample tested Date:	Jan. 11, 2023 to Jan.16, 2023	

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency(MHz)	Channel	Frequency (MHz)
1	915.25	14	918.50	27	921.75	40	925.00
2	915.50	15	918.75	28	922.00	41	925.25
3	915.75	16	919.00	29	922.25	42	925.50
4	916.00	17	919.25	30	922.50	43	925.75
5	916.25	18	919.50	31	922.75	44	926.00
6	916.50	19	919.75	32	923.00	45	926.25
7	916.75	20	920.00	33	923.25	46	926.50
8	917.00	21	920.25	34	923.50	47	926.75
9	917.25	22	920.50	35	923.75	48	927.00
10	917.50	23	920.75	36	924.00	49	927.25
11	917.75	24	921.00	37	924.25	50	927.50
12	918.00	25	921.25	38	924.50		
13	918.25	26	921.50	39	924.75		

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, and the selected channel see below:

Channel	Frequency(MHz)
The Lowest channel	915.25
The Middle channel	921.25
The Highest channel	927.50

4.3 Test Configuration

EUT Test Software Settings:		
Software:	putty.exe (manufacturer declare)	
EUT Power Grade:	Default(Power level is built-in set parameters and cannot be changed and selected)	
Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.		
Mode	Channel	Frequency(MHz)
BW125KHz	CH1	915.25
	CH25	921.25
	CH50	927.50

4.4 Test Environment

Operating Environment:	
Radiated Spurious Emissions:	
Temperature:	22~25.0 °C
Humidity:	50~55 % RH
Atmospheric Pressure:	1010mbar
RF Conducted:	
Temperature:	22~25.0 °C
Humidity:	50~55 % RH
Atmospheric Pressure:	1010mbar

4.5 Description of Support Units

The EUT has been tested with associated equipment below.

support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Notebook	DELL	DELL 3490	FCC ID and DOC	CTI

4.6 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd
Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China
Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385
No tests were sub-contracted.
FCC Designation No.: CN1164

4.7 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-40GHz)
3	Radiated Spurious emission test	3.3dB (9kHz-30MHz)
		4.3dB (30MHz-1GHz)
		4.5dB (1GHz-18GHz)
		3.4dB (18GHz-40GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

4.8 Equipment List

RF test system					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Communication test set	R&S	CMW500	107929	07-06-2022	07-05-2023
Signal Generator	R&S	SMBV100A	1407.6004K02-262149-CV	09-09-2022	09-08-2023
Spectrum Analyzer	R&S	FSV40	101200	07-29-2022	07-28-2023
RF control unit(power unit)	MWRF-test	MW100-RFCB	MW220620CTI-42	07-06-2022	07-05-2023
high-low temperature test chamber	Dong Guang Qin Zhuo	LK-80GA	QZ20150611879	12-19-2022	12-18-2023
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	06-16-2022	06-15-2023
BT&WI-FI Automatic test software	MWRF-test	MTS 8310	2.0.0.0	---	---

3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber & Accessory Equipment	TDK	SAC-3	---	05/22/2022	05/21/2025
Receiver	R&S	ESCI7	100938-003	09/28/2022	09/27/2023
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	9163-618	05/22/2022	05/21/2023
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-15-2021	04-14-2024
Multi device Controller	maturo	NCD/070/10711112	---	---	---
Horn Antenna	ETS-LINGREN	BBHA 9120D	9120D-1869	04/15/2021	04/14/2024
Microwave Preamplifier	Agilent	8449B	3008A02425	06/20/2022	06/19/2023

3M full-anechoic Chamber					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
RSE Automatic test software	JS Tonscend	JS36-RSE	10166	---	---
Receiver	Keysight	N9038A	MY57290136	03-01-2022	03-28-2023
Spectrum Analyzer	Keysight	N9020B	MY57111112	02-23-2022	02-22-2023
Spectrum Analyzer	Keysight	N9030B	MY57140871	02-23-2022	02-22-2023
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	9163-1148	04-30-2021	04-29-2024
Horn Antenna	Schwarzbeck	BBHA 9170	9170-832	04-17-2021	04-16-2024
Communication Antenna	Schwarzbeck	CLSA 0110L	1014	---	---
Horn Antenna	ETS-LINDGREN	3117	57407	07-04-2021	07-03-2024
Preamplifier	EMCI	EMC184055SE	980596	04-20-2022	04-19-2023
Communication test set	R&S	CMW500	102898	12-23-2022	12-22-2023
Preamplifier	EMCI	EMC001330	980563	04-01-2022	03-31-2023
Preamplifier	JS Tonscend	980380	EMC051845SE	12-23-2022	12-22-2023
Temperature/ Humidity Indicator	biaozhi	GM1360	EE1186631	04-11-2022	04-10-2023
Fully Anechoic Chamber	TDK	FAC-3	---	01-16-2021	01-15-2024
Signal Generator	KEYSIGHT	E8257D	MY53401106	12-19-2022	12-18-2023
Cable line	Times	SFT205-NMSM-2.50M	394812-0001	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0002	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0003	---	---
Cable line	Times	SFT205-NMSM-2.50M	393495-0001	---	---
Cable line	Times	EMC104-NMNM-1000	SN160710	---	---
Cable line	Times	SFT205-NMSM-3.00M	394813-0001	---	---
Cable line	Times	SFT205-NMNM-1.50M	381964-0001	---	---
Cable line	Times	SFT205-NMSM-7.00M	394815-0001	---	---
Cable line	Times	HF160-KMKM-3.00M	393493-0001	---	---

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C 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(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
EUT Antenna:	Please see Internal photos
The antenna is Internal antenna. The best case gain of the antenna is 1.10dBi.	

5.2 Conducted Emissions

Test Requirement: RSS-Gen Section 8.8

Test Method: ANSI C63.10: 2013

Test Frequency Range: 150kHz to 30MHz

Limit:

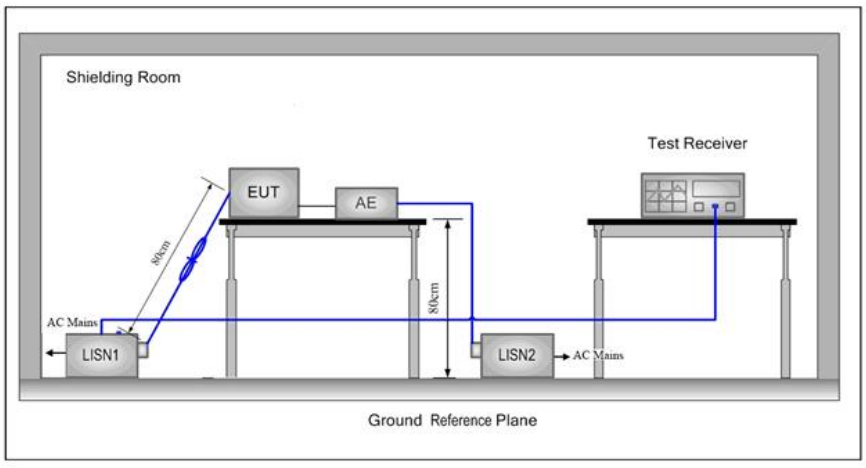
Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Procedure:

1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.

Test Setup:

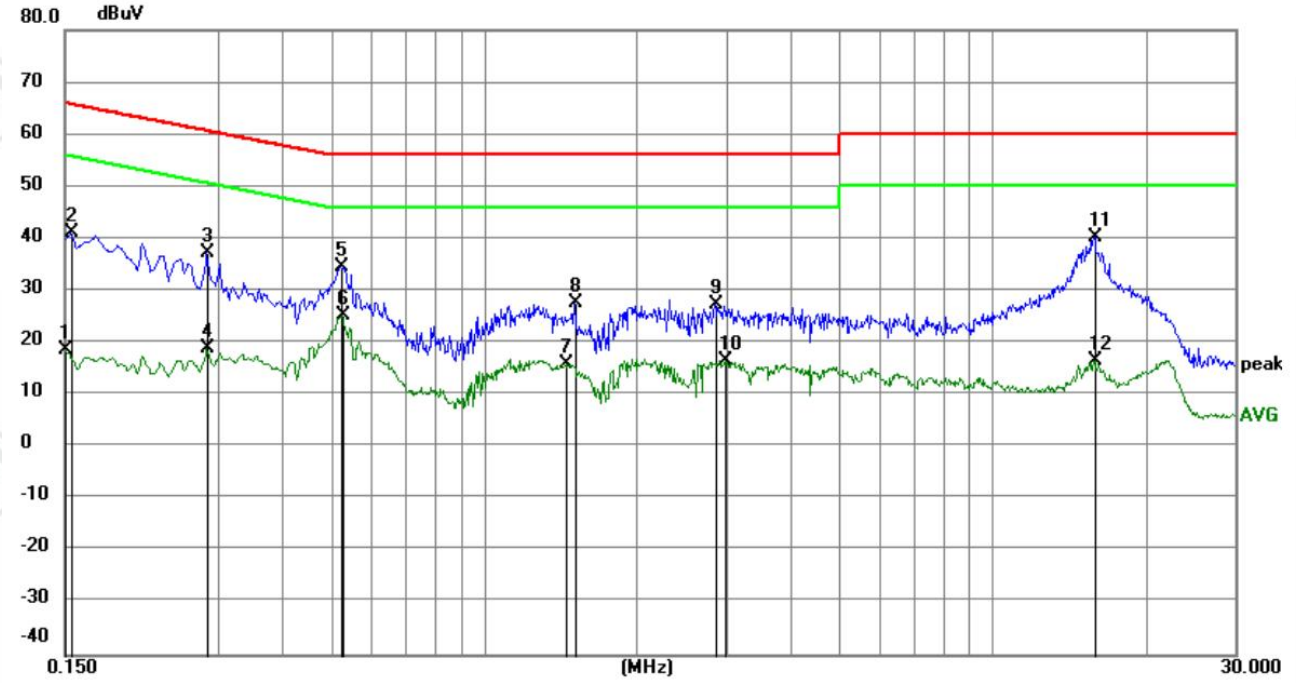


Test Mode: Transmitting mode

Test Results: Pass

Measurement Data

Live line:

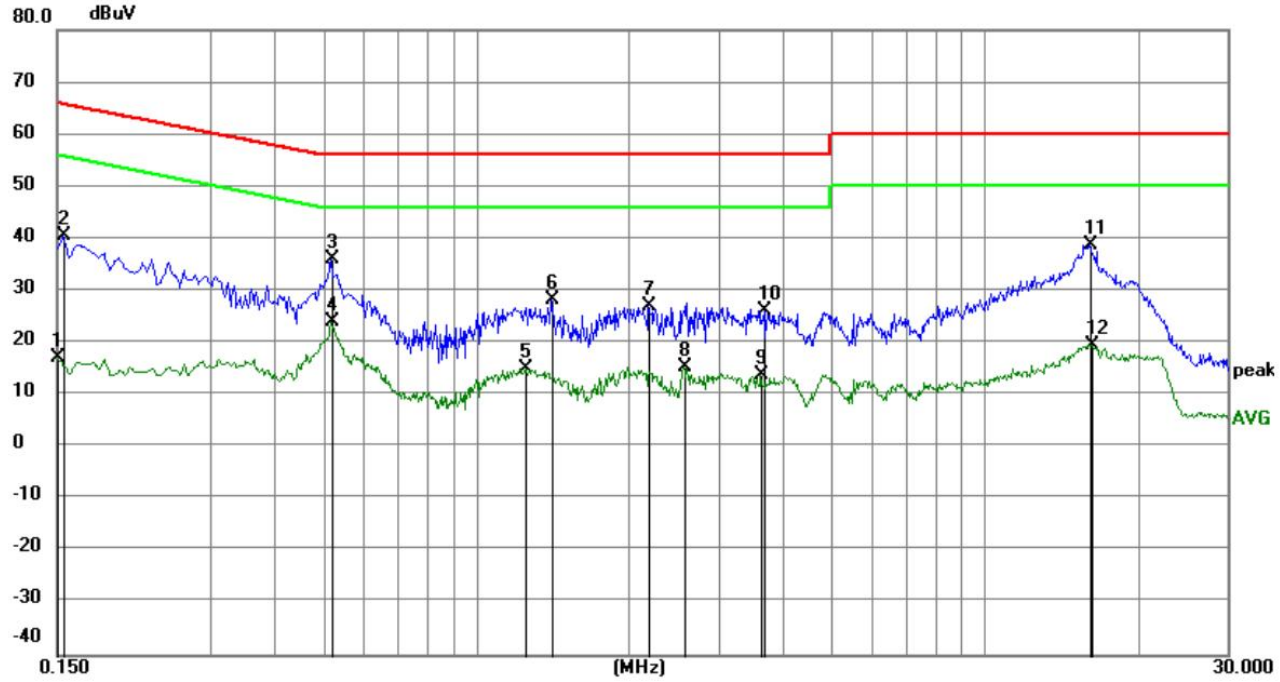


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	8.82	9.87	18.69	56.00	-37.31	AVG	
2		0.1544	31.20	9.87	41.07	65.76	-24.69	QP	
3		0.2850	27.19	10.04	37.23	60.67	-23.44	QP	
4		0.2850	8.99	10.04	19.03	50.67	-31.64	AVG	
5		0.5234	24.43	9.98	34.41	56.00	-21.59	QP	
6		0.5279	15.23	9.98	25.21	46.00	-20.79	AVG	
7		1.4504	6.13	9.81	15.94	46.00	-30.06	AVG	
8		1.5089	17.73	9.81	27.54	56.00	-28.46	QP	
9		2.8455	17.62	9.79	27.41	56.00	-28.59	QP	
10		2.9805	6.89	9.79	16.68	46.00	-29.32	AVG	
11	*	15.9270	30.38	9.94	40.32	60.00	-19.68	QP	
12		15.9270	6.66	9.94	16.60	50.00	-33.40	AVG	

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral line:

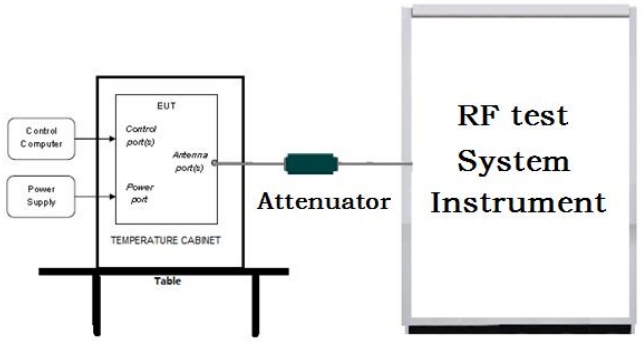


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	7.31	9.87	17.18	56.00	-38.82	AVG	
2		0.1545	30.56	9.87	40.43	65.75	-25.32	QP	
3	*	0.5190	26.06	9.97	36.03	56.00	-19.97	QP	
4		0.5190	14.00	9.97	23.97	46.00	-22.03	AVG	
5		1.2525	5.34	9.82	15.16	46.00	-30.84	AVG	
6		1.4100	18.58	9.81	28.39	56.00	-27.61	QP	
7		2.1840	17.36	9.79	27.15	56.00	-28.85	QP	
8		2.5574	5.59	9.79	15.38	46.00	-30.62	AVG	
9		3.6285	4.16	9.78	13.94	46.00	-32.06	AVG	
10		3.6960	16.45	9.78	26.23	56.00	-29.77	QP	
11		16.1250	28.73	9.94	38.67	60.00	-21.33	QP	
12		16.2015	9.72	9.94	19.66	50.00	-30.34	AVG	

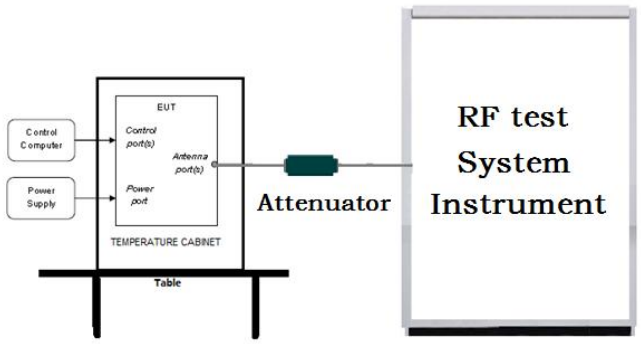
Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

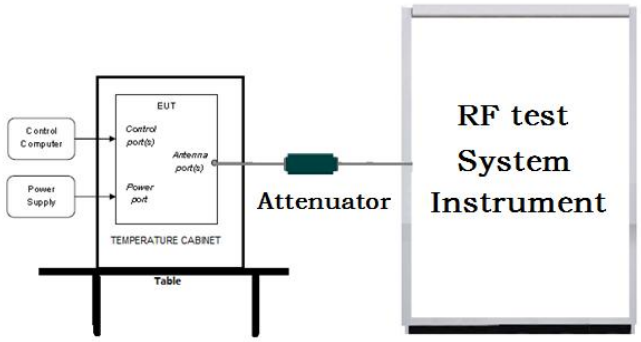
5.3 Maximum Conducted Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Test Procedure:	Use the following spectrum analyzer settings: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW > the 20 dB bandwidth of the emission being measured VBW ≥ RBW Sweep = auto Detector function = peak Trace = max hold Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission.
Limit:	21dBm
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

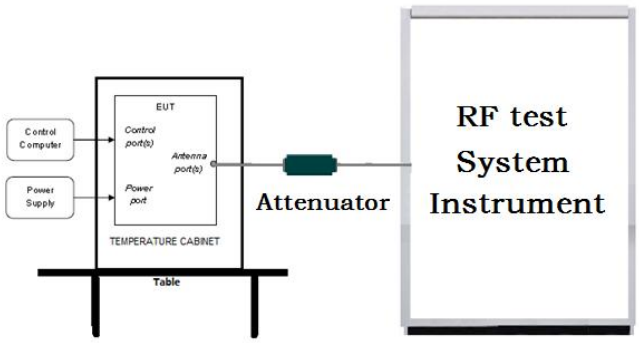
5.4 20dB Emission Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Test Procedure:	1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel; 1%≤RBW ≤5% of the 20 dB bandwidth; VBW≥3RBW; Sweep = auto; Detector function = peak; Trace = max hold. 4. Measure and record the results in the test report.
Limit:	NA
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

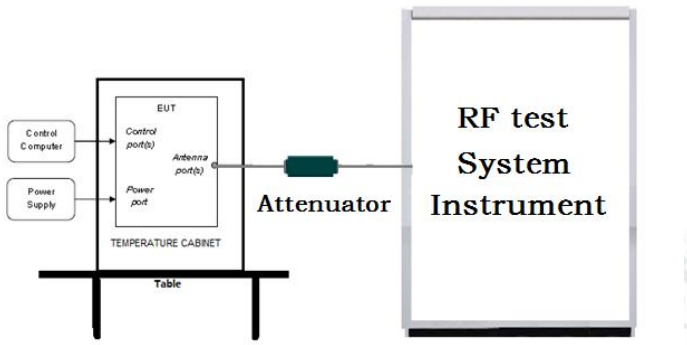
5.5 Carrier Frequency Separation

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Test Procedure:	1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels; RBW is set to approximately 30% of the channel spacing, adjust as necessary to best identify the center of each individual channel; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. 5. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Record the value in report.
Limit:	Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.
Exploratory Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

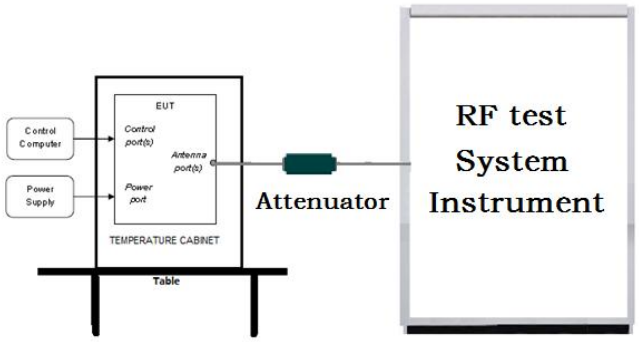
5.6 Number of Hopping Channel

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Test Procedure:	1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Span = the frequency band of operation; set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW≥RBW; Sweep= auto; Detector function = peak; Trace = max hold. 5. The number of hopping frequency used is defined as the number of total channel. 6. Record the measurement data in report.
Limit:	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
Test Mode:	Hopping transmitting with all kind of modulation
Test Results:	Refer to Appendix A

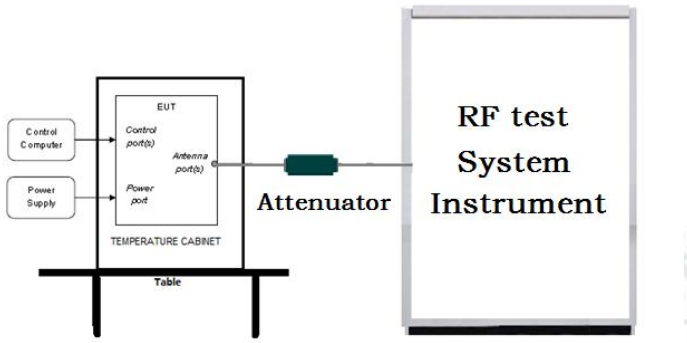
5.7 Time of Occupancy

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Test Procedure:	1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel; VBW≥RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold. 5. Measure and record the results in the test report.
Limit:	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type.
Test Results:	Refer to Appendix A

5.8 Band edge Measurements

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Test Procedure:	1. Set to the maximum power setting and enable the EUT transmit continuously. 2. Set RBW = 100 kHz, VBW = 300 kHz (≥RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used. 3. Enable hopping function of the EUT and then repeat step 2 and 3. 4. Measure and record the results in the test report.
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.
Exploratory Test Mode:	Hopping and Non-hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

5.9 Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Test Setup:	 Remark: Offset=Cable loss+ attenuation factor.
Test Procedure:	1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. 4. Measure and record the results in the test report. 5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
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.
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type
Test Results:	Refer to Appendix A

5.10 Radiated Spurious Emission & Restricted bands

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Peak	100 kHz	300kHz	Peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10kHz	Average

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Test Setup:	

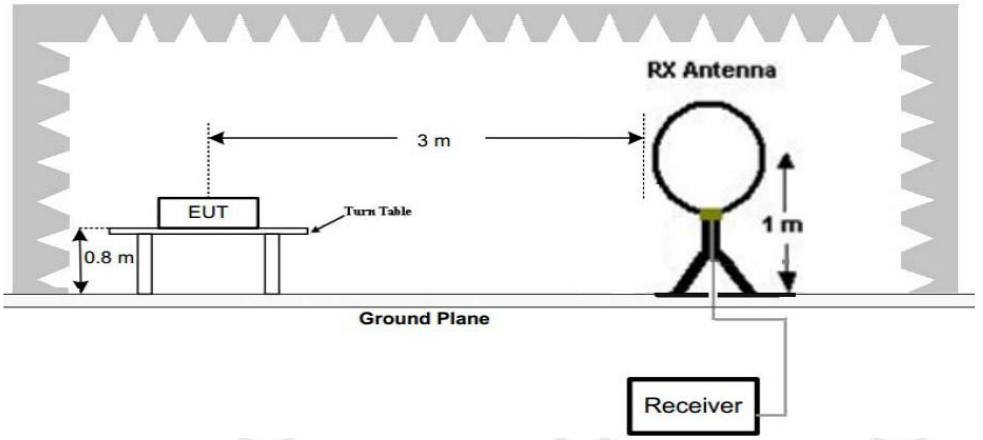


Figure 1. Below 30MHz

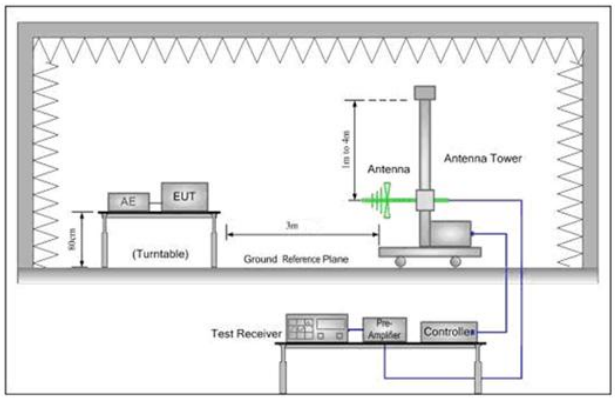


Figure 2. 30MHz to 1GHz

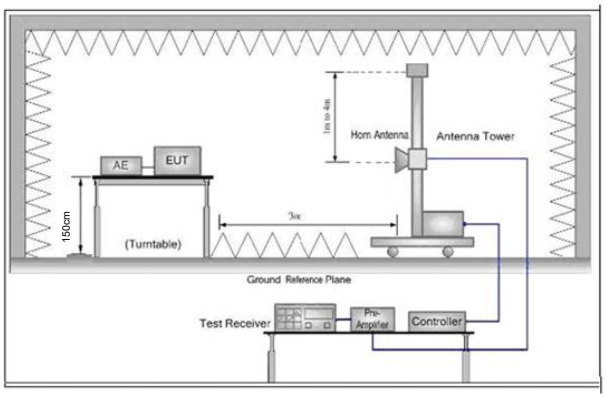


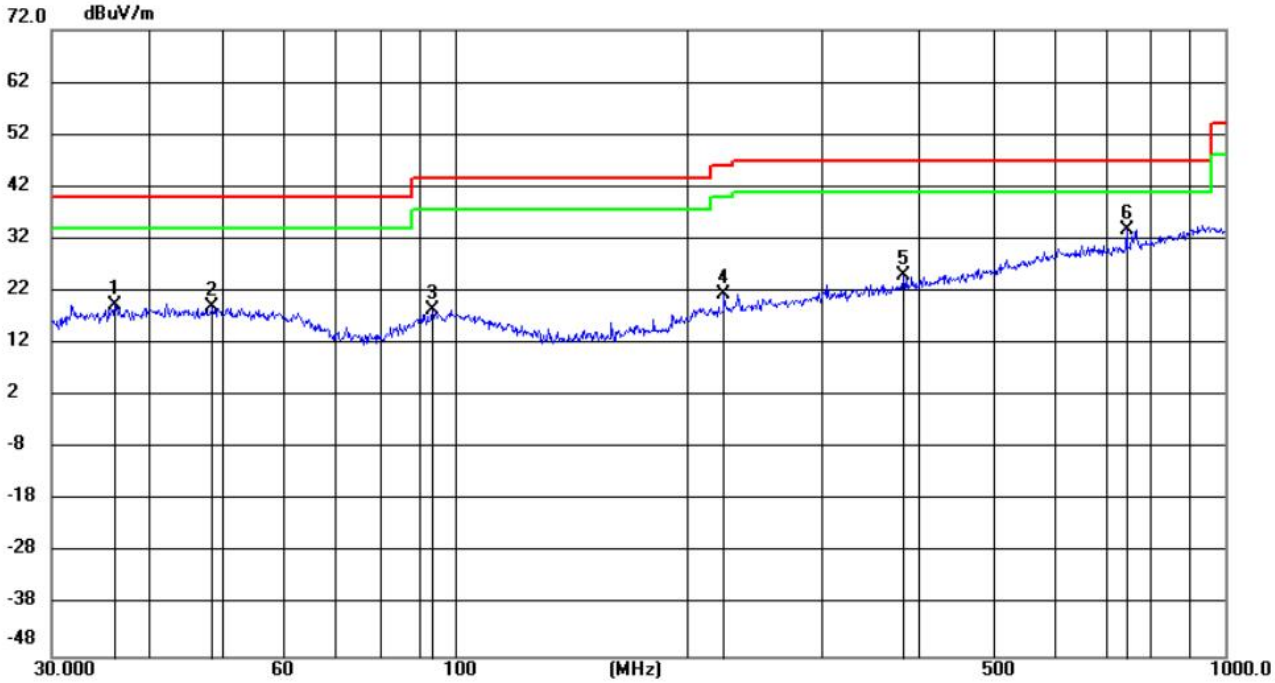
Figure 3. Above 1 GHz

Test Procedure:	a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. 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. d. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB 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 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel (2402MHz),the middle channel (2441MHz),the Highest channel (2480MHz) h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type
Test Results:	Pass

Radiated Spurious Emission below 1GHz:

Test Graph

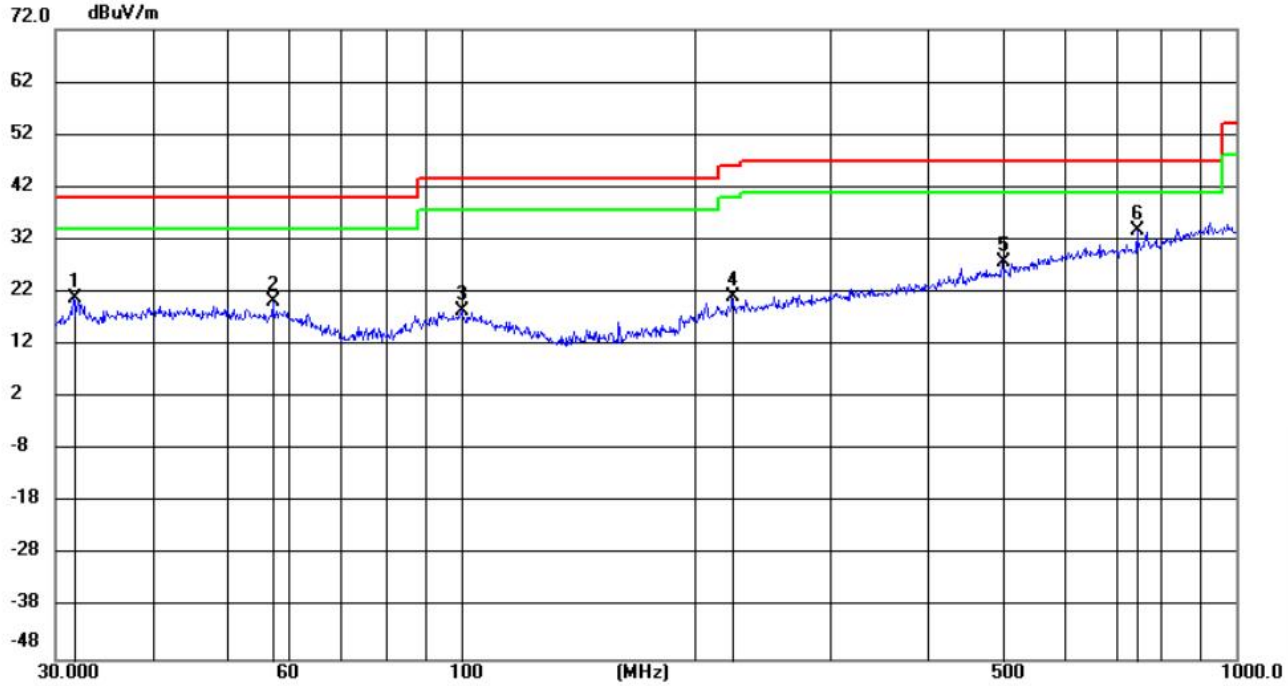
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		36.2540	5.63	13.87	19.50	40.00	-20.50	QP	100	177	
2		48.5015	4.67	14.31	18.98	40.00	-21.02	QP	200	20	
3		93.4402	5.39	13.15	18.54	43.50	-24.96	QP	200	100	
4		223.7333	6.94	14.60	21.54	46.00	-24.46	QP	100	26	
5		382.5878	5.97	19.02	24.99	47.00	-22.01	QP	200	80	
6	*	744.8660	8.27	25.48	33.75	47.00	-13.25	QP	200	4	

Note:
1. Margin=Measurement-Limit.
2. Measurement=Reading_Level+Correct Factor.
3. Correct Factor=Ant Factor+Cable loss.

Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		31.6202	7.74	13.05	20.79	40.00	-19.21	QP	100	261	
2		57.1914	6.39	13.76	20.15	40.00	-19.85	QP	100	4	
3		100.2286	4.42	14.01	18.43	43.50	-25.07	QP	100	250	
4		223.7334	6.61	14.60	21.21	46.00	-24.79	QP	100	4	
5		499.4247	6.28	21.53	27.81	47.00	-19.19	QP	100	4	
6	*	744.8661	8.29	25.48	33.77	47.00	-13.23	QP	200	356	

Note:
1. Margin=Measurement-Limit.
2. Measurement=Reading_Level+Correct Factor.
3. Correct Factor=Ant Factor+Cable loss.

Radiated Spurious Emission above 1GHz:

Mode:		Transmitting				Channel:		915.25MHz	
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1830.722	-24.54	69.89	45.35	74.00	28.65	Pass	H	PK
2	2745.4497	-22.09	66.75	44.66	74.00	29.34	Pass	H	PK
3	3661.1107	-20.33	66.93	46.60	74.00	27.40	Pass	H	PK
4	5491.4994	-14.37	67.34	52.97	74.00	21.03	Pass	H	PK
5	8237.5492	-11.05	57.19	46.14	74.00	27.86	Pass	H	PK
6	9153.2102	-8.12	59.38	51.26	74.00	22.74	Pass	H	PK
7	1830.722	-24.54	67.19	42.65	74.00	31.35	Pass	V	PK
8	2746.3831	-22.08	66.12	44.04	74.00	29.96	Pass	V	PK
9	3661.1107	-20.33	67.29	46.96	74.00	27.04	Pass	V	PK
10	5491.4994	-14.37	68.29	53.92	74.00	20.08	Pass	V	PK
11	8237.5492	-11.05	61.80	50.75	74.00	23.25	Pass	V	PK
12	9152.2768	-8.13	57.19	49.06	74.00	24.94	Pass	V	PK

Mode:		Transmitting				Channel:		921.25MHz	
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1841.9228	-24.48	71.24	46.76	74.00	27.24	Pass	H	PK
2	2763.1842	-22.01	66.67	44.66	74.00	29.34	Pass	H	PK
3	3684.4456	-20.23	66.72	46.49	74.00	27.51	Pass	H	PK
4	4604.7737	-16.75	56.16	39.41	74.00	34.59	Pass	H	PK
5	5526.0351	-14.29	66.80	52.51	74.00	21.49	Pass	H	PK
6	9210.1473	-7.68	56.30	48.62	74.00	25.38	Pass	H	PK
7	1202.5468	-26.59	60.02	33.43	74.00	40.57	Pass	V	PK
8	1841.9228	-24.48	70.68	46.20	74.00	27.80	Pass	V	PK
9	2763.1842	-22.01	66.83	44.82	74.00	29.18	Pass	V	PK
10	3684.4456	-20.23	67.06	46.83	74.00	27.17	Pass	V	PK
11	5526.0351	-14.29	68.97	54.68	74.00	19.32	Pass	V	PK
12	9209.2139	-7.68	56.51	48.83	74.00	25.17	Pass	V	PK
13	5526.9685	-14.29	63.35	49.06	54.00	4.94	Pass	V	AK

Mode:		Transmitting				Channel:		927.5MHz	
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1854.9903	-24.42	74.10	49.68	74.00	24.32	Pass	H	PK
2	2782.7855	-21.93	67.08	45.15	74.00	28.85	Pass	H	PK
3	3709.6473	-20.09	66.67	46.58	74.00	27.42	Pass	H	PK
4	4637.4425	-16.76	61.53	44.77	74.00	29.23	Pass	H	PK
5	5565.2377	-14.17	68.68	54.51	74.00	19.49	Pass	H	PK
6	8346.7565	-11.09	55.70	44.61	74.00	29.39	Pass	H	PK
7	5566.1711	-14.16	63.94	49.78	54.00	4.22	Pass	V	AK
8	1854.9903	-24.42	73.59	49.17	74.00	24.83	Pass	V	PK
9	2782.7855	-21.93	66.50	44.57	74.00	29.43	Pass	V	PK
10	3709.6473	-20.09	68.85	48.76	74.00	25.24	Pass	V	PK
11	4637.4425	-16.76	59.74	42.98	74.00	31.02	Pass	V	PK
12	5565.2377	-14.17	70.14	55.97	74.00	18.03	Pass	V	PK
13	8347.6898	-11.09	59.36	48.27	74.00	25.73	Pass	V	PK
14	5566.1711	-14.16	64.17	50.01	54.00	3.99	Pass	V	AK

Remark:

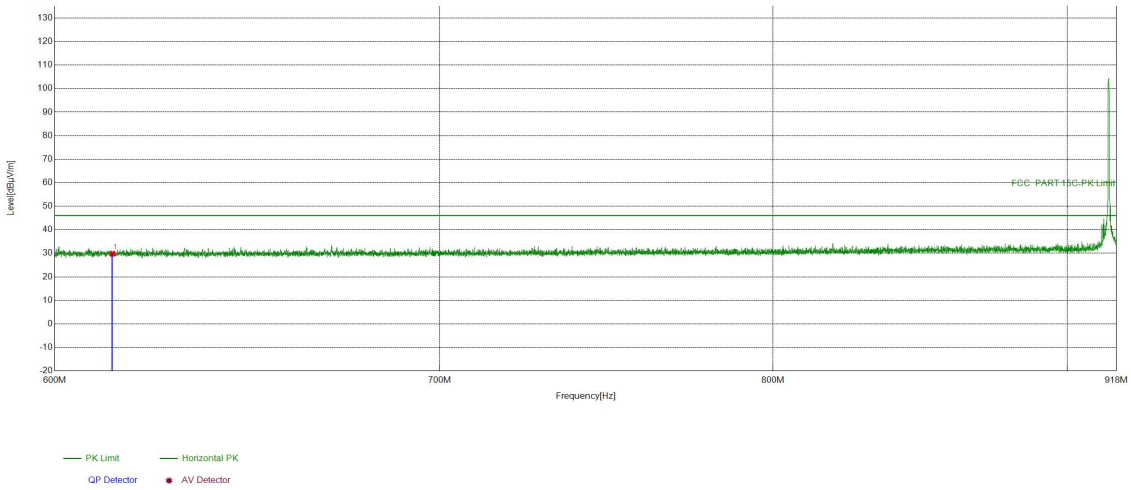
1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
2) Scan from 9kHz to 25GHz, the disturbance above 10GHz and below 30MHz was very low. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

Restricted bands:

Test plot as follows:

Mode:	Transmitting	Channel:	915.25 MHz
Remark:			

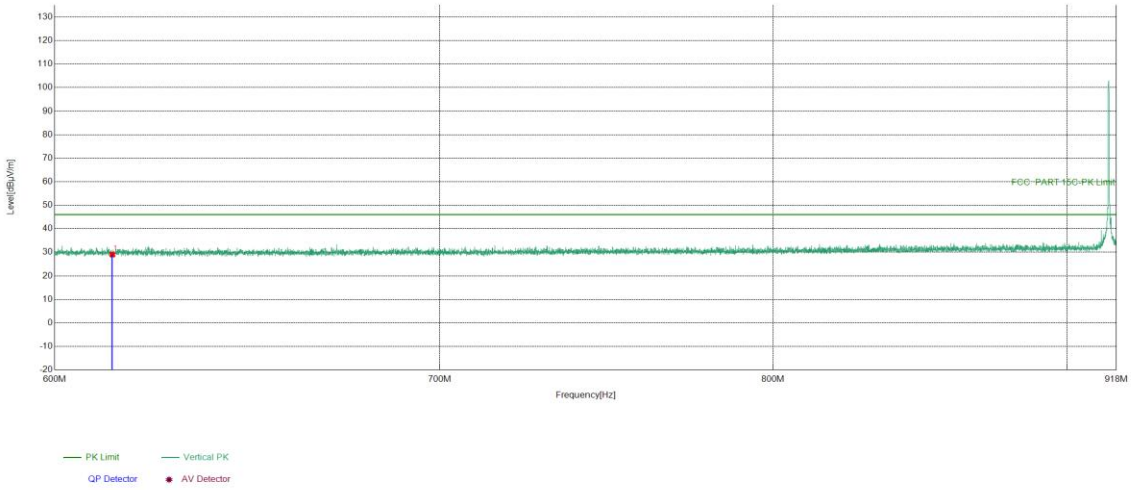
Test Graph



NO	Freq. [MHz]	Factor [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity	Remark
1	614	-8.49	38.27	29.78	46.00	16.22	PASS	Horizontal	PK

Mode:	Transmitting	Channel:	915.25 MHz
Remark:			

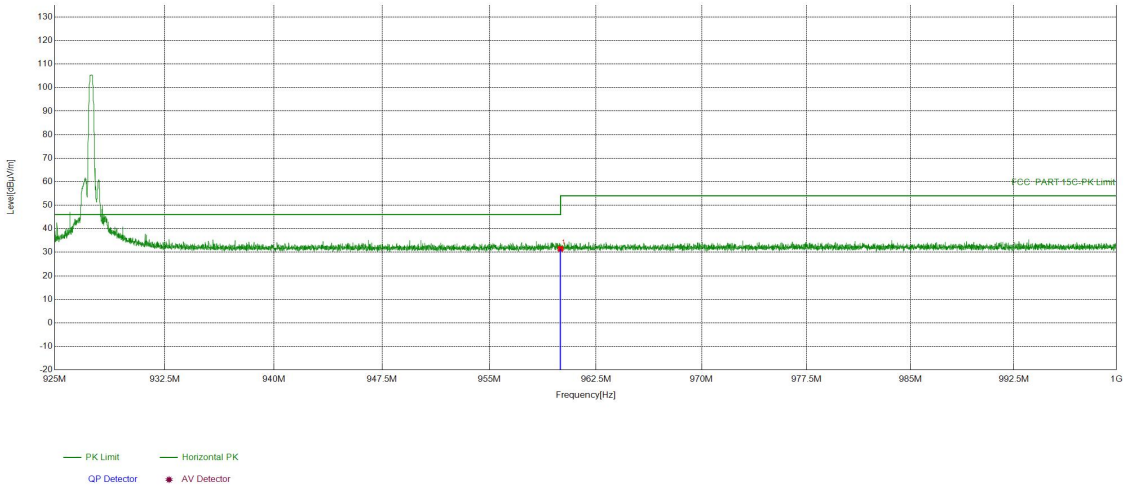
Test Graph



NO	Freq. [MHz]	Factor [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity	Remark
1	614	-8.49	37.52	29.03	46.00	16.97	PASS	Vertical	PK

Mode:	Transmitting	Channel:	927.5MHz
Remark:			

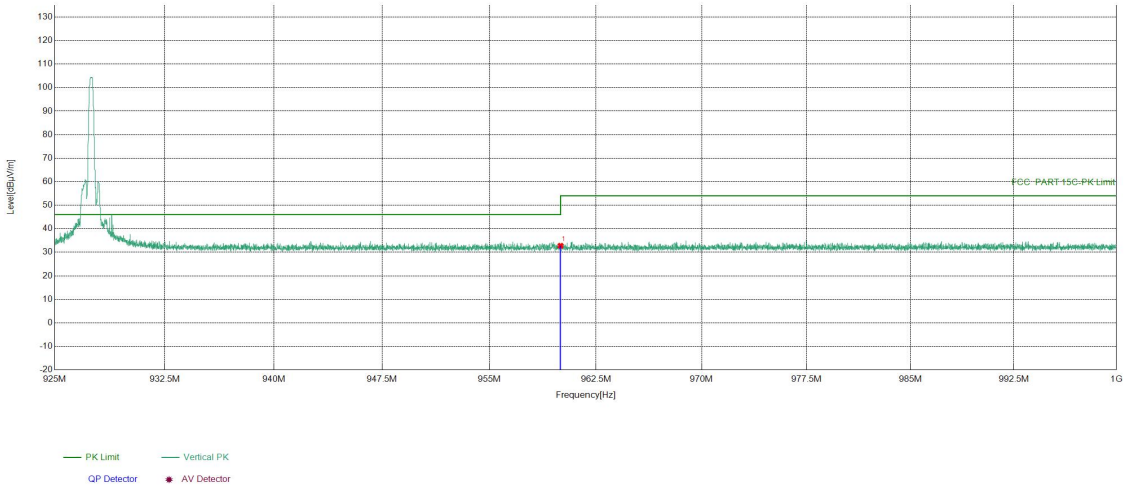
Test Graph



NO	Freq. [MHz]	Factor [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity	Remark
1	960	-4.37	35.85	31.48	54.00	22.52	PASS	Horizontal	PK

Mode:	Transmitting	Channel:	927.5 MHz
Remark:			

Test Graph



NO	Freq. [MHz]	Factor [dB]	Reading [dBµV]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Result	Polarity	Remark
1	960	-4.37	37.13	32.76	54.00	21.24	PASS	Vertical	PK

Note:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading - Correct Factor
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

6 Appendix A

Refer to Appendix: Lora FHSS of EED32Q80900001.