FCC RF Test Report

(FHSS)

Applicant:	Shenzhen Friendcom Technology Development Co., Ltd.
Address of Applicant:	6/F,17 Building, Guangqian Industrial Park, Longzhu Road, Xili Town, Nanshan
Equipment Under Test (EUT)	
Product Name:	WSN27-915
Model No.:	WSN27-915BR, WSN27-915R
Trade Mark:	Friendcom
FCC ID:	UU3FC-3902-915
Applicable Standards:	FCC CFR Title 47 Part 15C (§15.247)
Date of Sample Receipt:	07 Nov., 2022
Date of Test:	08 Nov., to 23 Nov., 2022
Date of Report Issued:	05 Dec., 2022
Test Result:	PASS

Tested by:	Mike.ou ***Test Engineer***	***Date:***	*05 Dec., 2022*
Reviewed by:	Vivner Zhou ***Project Engineer***	***Date:***	*05 Dec., 2022*
Approved by:	***Manager***	***Date:***	*05 Dec., 2022*

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

1 Version

Version No.	Date	Description
00	*24 Nov., 2022*	*Original*
01	*05 Dec., 2022*	*Update page 20，page 37.*

2 Contents

Page

3 General Information

3.1 Client Information

Applicant:	Shenzhen Friendcom Technology Development Co., Ltd.
Address:	6/F,17 Building, Guangqian Industrial Park, Longzhu Road, Xili Town, Nanshan
Manufacturer:	Shenzhen Friendcom Technology Development Co., Ltd.
Address:	6/F,17 Building, Guangqian Industrial Park, Longzhu Road, Xili Town, Nanshan
Factory:	Shenzhen Friendcom Technology Development Co., Ltd.
Address:	6/F,17 Building, Guangqian Industrial Park, Longzhu Road, Xili Town, Nanshan

3.2 General Description of E.U.T.

Product Name:	WSN27-915
Model No.:	WSN27-915BR, WSN27-915R
Operation Frequency:	902 MHz - 928 MHz
Number of Channel:	129
Modulation Technology:	GFSK
Antenna Type:	External Antenna
Antenna Gain:	2 dBi (declare by applicant)
Power Supply:	DC 3.3V&DC 5V
Test Sample Condition:	The test samples were provided in good working order with no visible defects.
Remark:	Model No.: WSN27-915BR,WSN27-915R were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being model name. WSN27-915BR and WSN27-915R are Wi-SUN border router and router module used at two network locations.

3.3 Test Mode and Test Environment

Test Modes:	
Non-hopping mode:	Keep the EUT in continuous transmitting mode.
Hopping mode:	Keep the EUT in hopping mode.
Remark: *For spurious emission of below 1GHz, pre-scan lowest, middle and highest channel, found lowest channel was worse case mode. The report only reflects the test data of worst mode.*	
Operating Environment:	
Temperature:	15℃ ~ 35℃
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1008 mbar

3.4 Description of Test Auxiliary Equipment

Manufacturer	Description	Model	S/N	FCC ID/DoC
Lenovo	Laptop	ThinkPad T14 Gen 1	SL10Z47277	DoC
Shenzhen Friendcom Technology Co.,Ltd.	power supply PCB	FC-623-demo	/	/
/	Adapter	1210	/	DoC

3.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Conducted Emission for LISN (9kHz ~ 150kHz)	±3.11 dB
Conducted Emission for LISN (150kHz ~ 30MHz)	±2.62 dB
Radiated Emission (30MHz ~ 1GHz) (3m SAC)	±4.45 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	±5.34 dB
Radiated Emission (18GHz ~ 40GHz) (3m SAC)	±5.34 dB
Note: *All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.*	

3.6 Additions to, Deviations, or Exclusions From the Method

No

3.7 Laboratory Facility

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

- **FCC - Designation No.: CN1211**

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

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen 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 L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

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

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 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

3.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.
Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info-JYTee@lets.com, Website: http://jyt.lets.com

3.9 Test Instruments List

Radiated Emission(3m SAC):					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m SAC	ETS	9m*6m*6m	WXJ001-1	04-14-2021	04-13-2024
Loop Antenna	Schwarzbeck	FMZB 1519 B	WXJ002-4	03-07-2022	03-06-2023
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	03-08-2022	03-07-2023
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	03-08-2022	03-07-2023
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-5	04-07-2022	04-06-2023
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	01-20-2022	01-19-2023
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXJ001-3	01-20-2022	01-19-2023
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXJ002-7	03-30-2022	03-29-2023
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	03-05-2022	03-04-2023
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	01-20-2022	01-19-2023
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ004-2	10-27-2021	10-26-2022
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-20-2022	01-19-2023
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	01-20-2022	01-19-2023
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG001-7	01-20-2022	01-19-2023
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		
EMI Test Software	AUDIX	E3	Version: 6.110919b		

Conducted Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
EMI Test Receiver	Rohde & Schwarz	ESR3	WXJ003-2	07-12-2022	07-11-2023
LISN	Schwarzbeck	NSLK 8127	QCJ001-13	02-24-2022	02-23-2023
LISN	Rohde & Schwarz	ESH3-Z5	WXJ005-1	03-30-2022	03-29-2023
LISN Coaxial Cable (9kHz ~ 30MHz)	JYTSZ	JYTCE-1G-NN-2M	WXG003-1	02-24-2022	02-23-2023
RF Switch	TOP PRECISION	RSU0301	WXG003	N/A	
Test Software	AUDIX	E3	Version: 6.110919b		

Conducted Method:					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
Spectrum Analyzer	Agilent	N9020A	WXJ004-1	10-17-2022	10-16-2023
EMI Test Receiver	Rohde & Schwarz	ESCI3	WXJ003	01-19-2022	01-18-2023
DC Power Supply	Keysight	E3642A	WXJ025-2	N/A	

4 Measurement Setup and Procedure

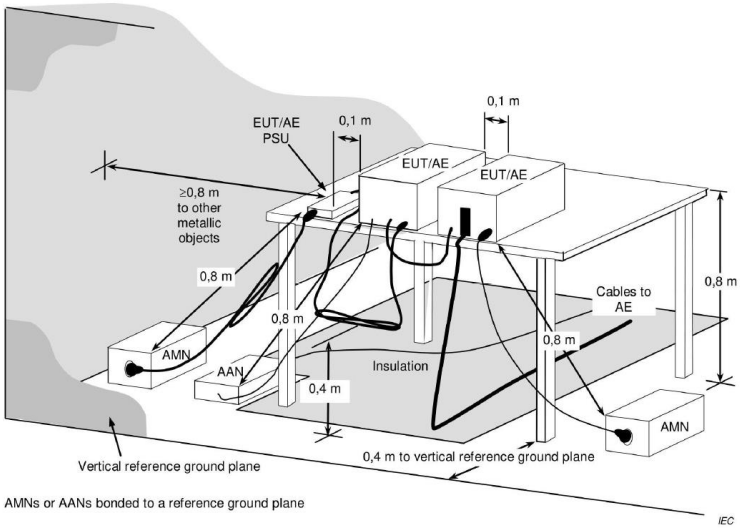
4.1 Test Channel

According to ANSI C63.10-2013 chapter 5.6.1 Table 4 requirement, select lowest channel, middle channel, and highest channel in the frequency range in which device operates for testing. The detailed frequency points are as follows:

Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	902.2	64	915.0	128	927.8

4.2 Test Setup

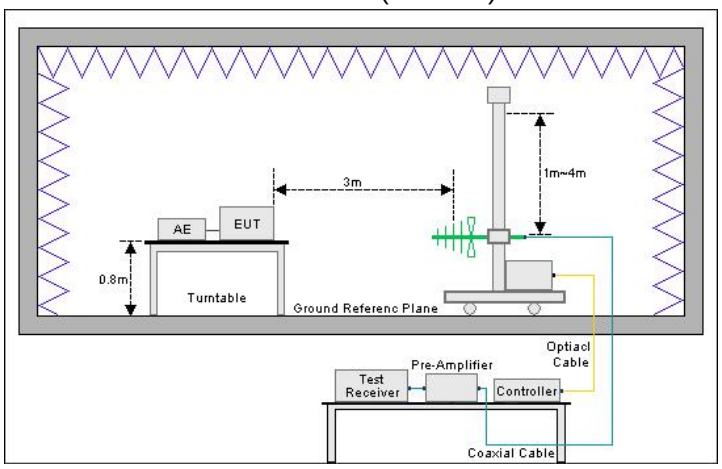
1) Conducted emission measurement:



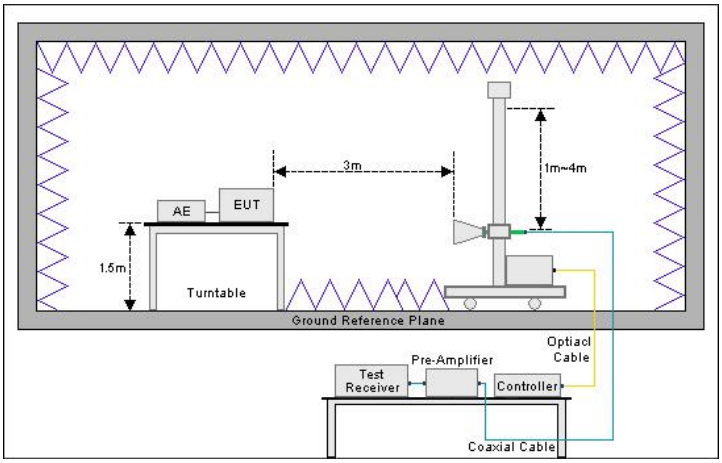
Note: The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

2) Radiated emission measurement:

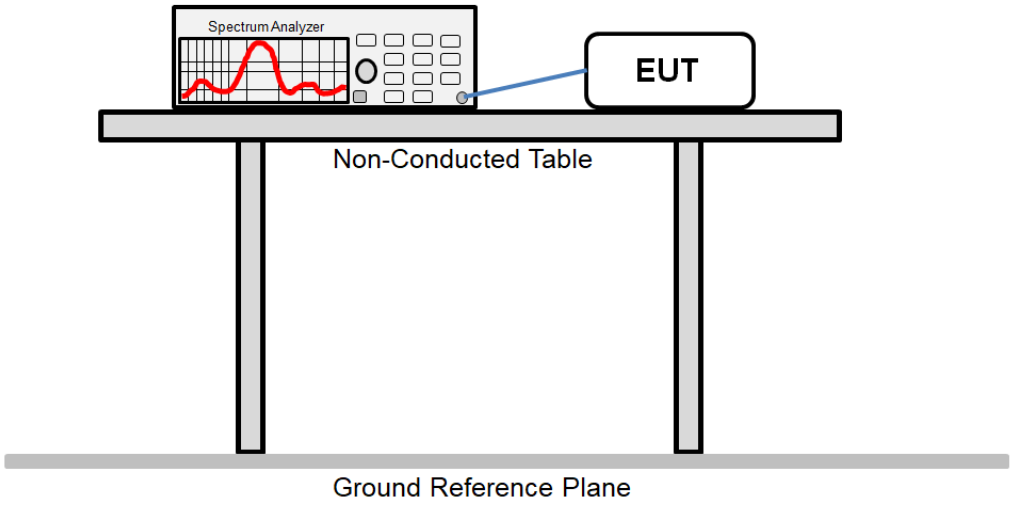
Below 1GHz (3m SAC)



Above 1GHz (3m SAC)



3) Conducted test method



4.3 Test Procedure

Test method	Test step
Conducted emission	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This 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 C63.10 on conducted measurement.
Radiated emission	**For below 1GHz:** 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested，and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data. **For above 1GHz:** 1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested，and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.
Conducted test method	1. The antenna port of EUT was connected to the test port of the test system through an RF cable. 2. The EUT is keeping in continuous transmission mode and tested in all modulation modes. 3. Open the test software, prepare a test plan, and control the system through the software. After the test is completed, the test report is exported through the test software.

5 Test Results

5.1 Summary

5.1.1 Clause and data summary

Test items	Standard clause	Test data	Result
Antenna Requirement	15.203 15.247 (b)(4)	See Section 5.2	Pass
AC Power Line Conducted Emission	15.207	See Section 5.3	Pass
Conducted Output Power	15.247 (b)(2)	See Section 5.4	Pass
20dB Occupied Bandwidth	15.247 (a)(1)(i)	See Section 5.5	Pass
Carrier Frequencies Separation	15.247 (a)(1)	See Section 5.6	Pass
Hopping Channel Number	5.247 (a)(1)(i)	See Section 5.7	Pass
Dwell Time	15.247 (a)(1)(i)	See Section 5.8	Pass
Spurious Emission	15.205 15.209 15.247 (d)	See Section 5.9	Pass

Remark:

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *N/A: Not Applicable.*
3. *The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (provided by the customer).*

Test Method:	*ANSI C63.10-2013* *KDB 558074 D01 15.247 Meas Guidance v05r02*

5.1.2 Test Limit

<table>
<tr><th>Test items</th><th>Limit</th></tr>
<tr><td>AC Power Line Conducted Emission</td><td>
<table>
<tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Limit (dBµV)</th></tr>
<tr><th>Quasi-Peak</th><th>Average</th></tr>
<tr><td>0.15 – 0.5</td><td>66 to 56 Note 1</td><td>56 to 46 Note 1</td></tr>
<tr><td>0.5 – 5</td><td>56</td><td>46</td></tr>
<tr><td>5 – 30</td><td>60</td><td>50</td></tr>
<tr><td colspan="3">Note 1: The limit level in dBµV decreases linearly with the logarithm of frequency.
Note 2: The more stringent limit applies at transition frequencies.</td></tr>
</table>
</td></tr>
<tr><td>Conducted Output Power</td><td>For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.</td></tr>
<tr><td>20dB Occupied Bandwidth

Hopping Channel Number

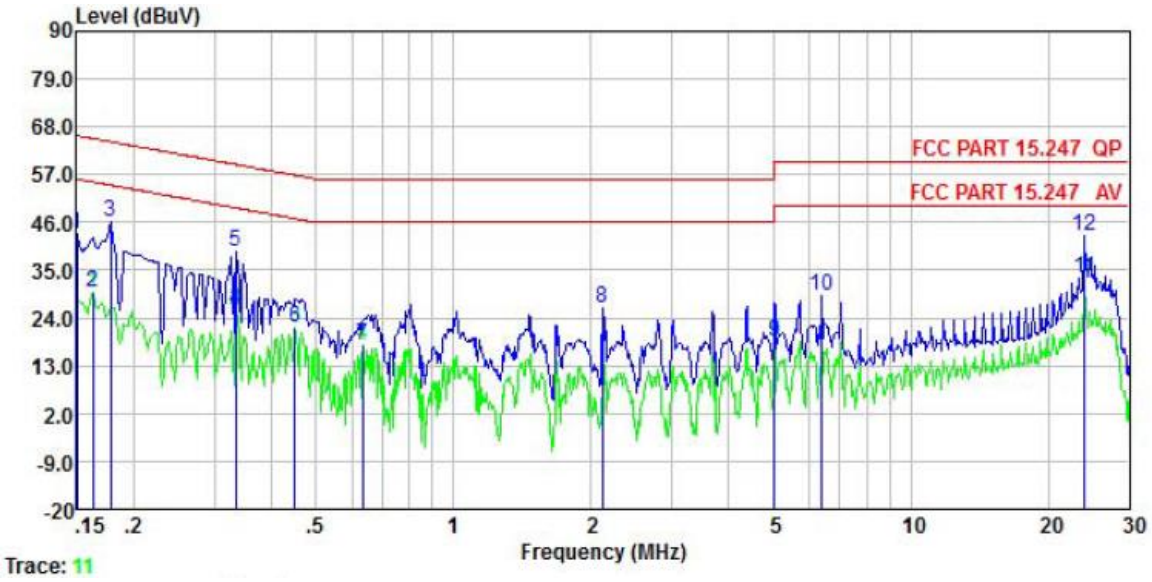
Dwell Time</td><td>For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.</td></tr>
<tr><td>Carrier Frequencies Separation</td><td>Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater</td></tr>
<tr><td>Spurious Emission</td><td>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)):
<table>
<tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Limit (dBµV/m)</th><th rowspan="2">Detector</th></tr>
<tr><th>@ 3m</th><th>@ 10m</th></tr>
<tr><td>30 – 88</td><td>40.0</td><td>30.0</td><td>Quasi-peak</td></tr>
<tr><td>88 – 216</td><td>43.5</td><td>33.5</td><td>Quasi-peak</td></tr>
<tr><td>216 – 960</td><td>46.0</td><td>36.0</td><td>Quasi-peak</td></tr>
<tr><td>960 – 1000</td><td>54.0</td><td>44.0</td><td>Quasi-peak</td></tr>
<tr><td colspan="4">Note: The more stringent limit applies at transition frequencies.</td></tr>
<tr><th rowspan="2">Frequency</th><th colspan="3">Limit (dBµV/m) @ 3m</th></tr>
<tr><th colspan="2">Average</th><th>Peake</th></tr>
<tr><td>Above 1 GHz</td><td colspan="2">54.0</td><td>74.0</td></tr>
<tr><td colspan="4">Note: The measurement bandwidth shall be 1 MHz or greater.</td></tr>
</table>
</td></tr>
</table>

5.2 Antenna Requirement

Standard requirement:	FCC Part 15 C Section 15.203 & 247(b)
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: (4) 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.	
E.U.T Antenna:	
The EUT antenna is an External Antenna which permanently attached, and the best case gain of the antenna is 2 dBi. See product internal photos for details.	

5.3 AC Power Line Conducted Emission

Product name:	WSN27-915	**Product model:**	WSN27-915BR
Test by:	Mike	**Test mode:**	Tx mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Line
Test voltage:	AC 120 V/60 Hz		

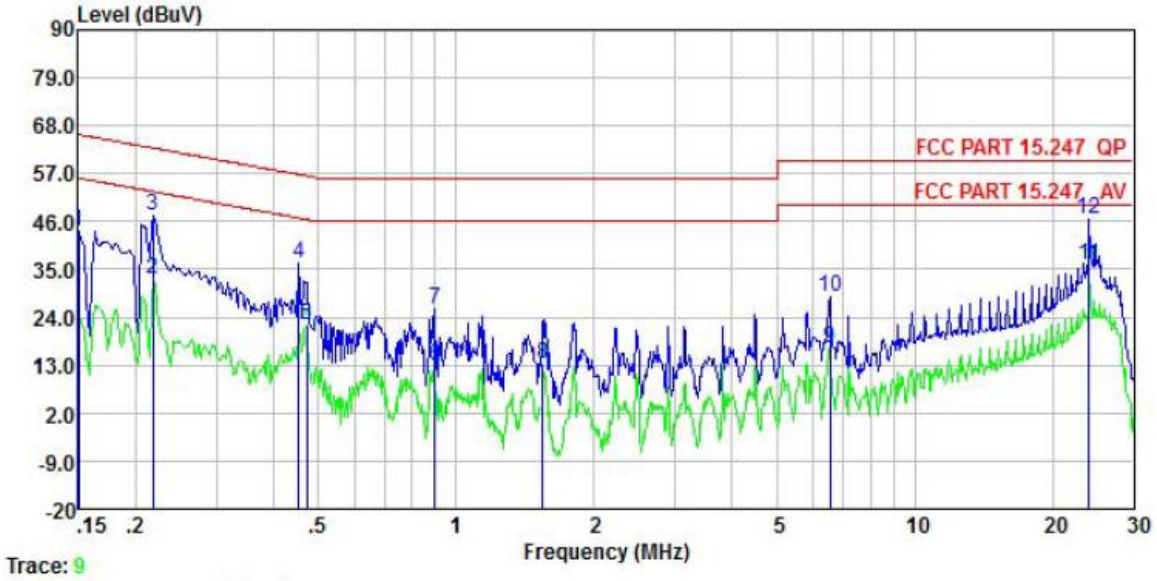


	Freq	Read Level	LISN Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.150	32.62	0.04	10.50	0.01	43.17	66.00	-22.83	QP
2	0.162	19.39	0.04	10.50	0.01	29.94	55.34	-25.40	Average
3	0.178	35.47	0.05	10.50	0.01	46.03	64.59	-18.56	QP
4	0.334	15.42	0.06	10.50	0.02	26.00	49.35	-23.35	Average
5	0.334	28.52	0.06	10.50	0.02	39.10	59.35	-20.25	QP
6	0.449	11.12	0.05	10.50	0.03	21.70	46.89	-25.19	Average
7	0.634	7.06	0.06	10.50	0.02	17.64	46.00	-28.36	Average
8	2.121	15.34	0.08	10.50	0.19	26.11	56.00	-29.89	QP
9	5.031	7.74	0.12	10.50	0.09	18.45	50.00	-31.55	Average
10	6.386	18.43	0.16	10.50	0.09	29.18	60.00	-30.82	QP
11	24.015	22.10	0.37	10.50	0.17	33.14	50.00	-16.86	Average
12	24.015	31.77	0.37	10.50	0.17	42.81	60.00	-17.19	QP

Remark:

1. Level = Read level + LISN Factor + Cable Loss+AUX2 Factor.

Product name:	WSN27-915	Product model:	WSN27-915BR
Test by:	Mike	Test mode:	Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz		



	Freq	Read Level	LISN Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.150	33.09	0.06	10.50	0.01	43.66	66.00	-22.34	QP
2	0.219	22.25	0.05	10.50	0.03	32.83	52.88	-20.05	Average
3	0.219	36.70	0.05	10.50	0.03	47.28	62.88	-15.60	QP
4	0.454	25.70	0.04	10.50	0.03	36.27	56.80	-20.53	QP
5	0.471	11.84	0.04	10.50	0.03	22.41	46.49	-24.08	Average
6	0.899	2.09	0.06	10.50	0.04	12.69	46.00	-33.31	Average
7	0.899	15.20	0.06	10.50	0.04	25.80	56.00	-30.20	QP
8	1.544	2.48	0.07	10.50	0.15	13.20	46.00	-32.80	Average
9	6.523	6.11	0.15	10.50	0.10	16.86	50.00	-33.14	Average
10	6.523	17.84	0.15	10.50	0.10	28.59	60.00	-31.41	QP
11	24.015	24.96	0.39	10.50	0.17	36.02	50.00	-13.98	Average
12	24.015	35.49	0.39	10.50	0.17	46.55	60.00	-13.45	QP

Remark:

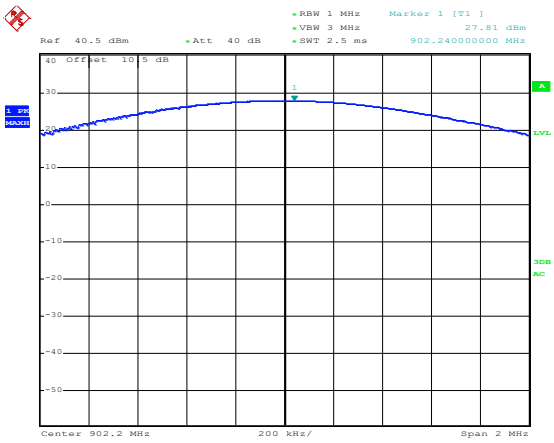
1. Level = Read level + LISN Factor + Cable Loss+AUX2 Factor.

5.4 Conducted Output Power

Test channel	Maximum Output Power (dBm)	Limit (dBm)	Result
Lowest channel	27.81	30.00	Pass
Middle channel	27.79	30.00	Pass
Highest channel	27.69	30.00	Pass

Test plot as follows:

Lowest channel



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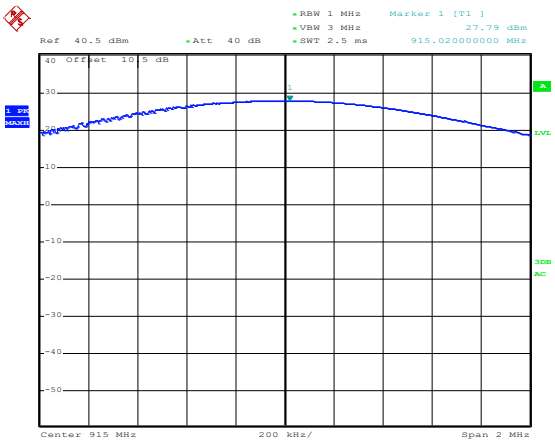
Middle channel



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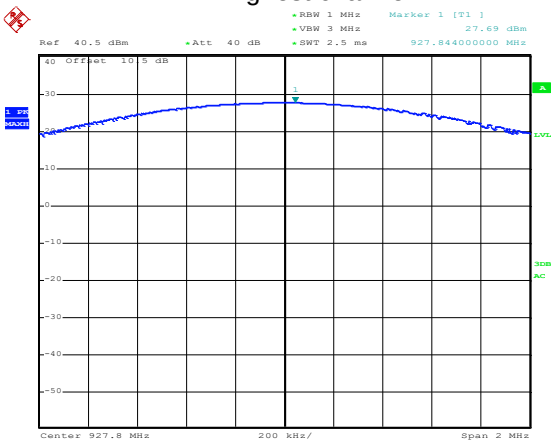
Highest channel



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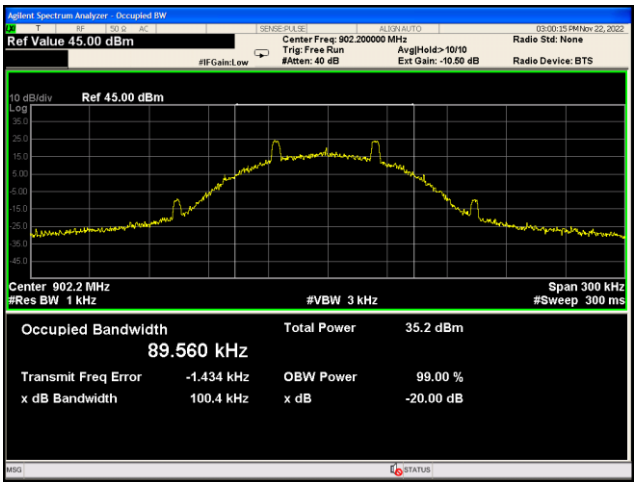
5.5 20dB Occupied Bandwidth

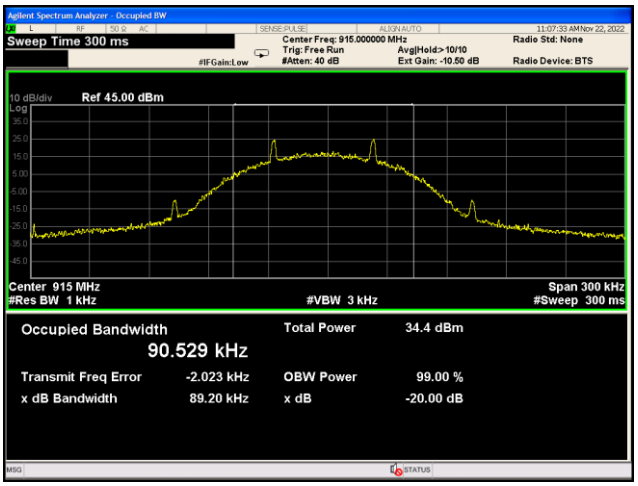
Test channel	20dB Occupy Bandwidth (kHz)	Limit (kHz)	Result
Lowest channel	100.4	$BW_{20dB} \leq 250$	Pass
Middle channel	89.20	$BW_{20dB} \leq 250$	Pass
Highest channel	95.26	$BW_{20dB} \leq 250$	Pass

Test plot as follows:

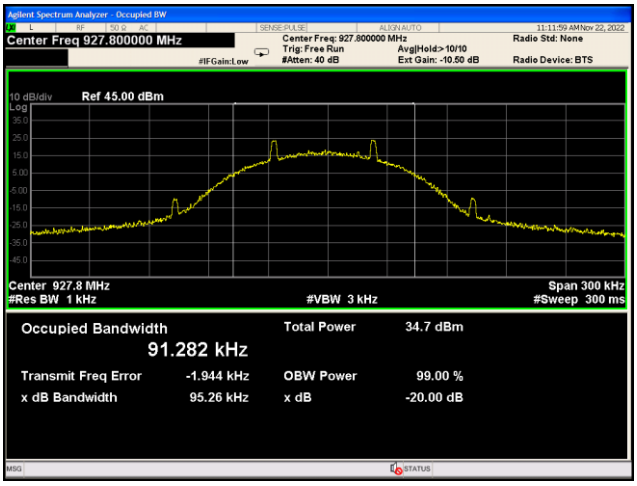
Lowest channel



Middle channel



Highest channel

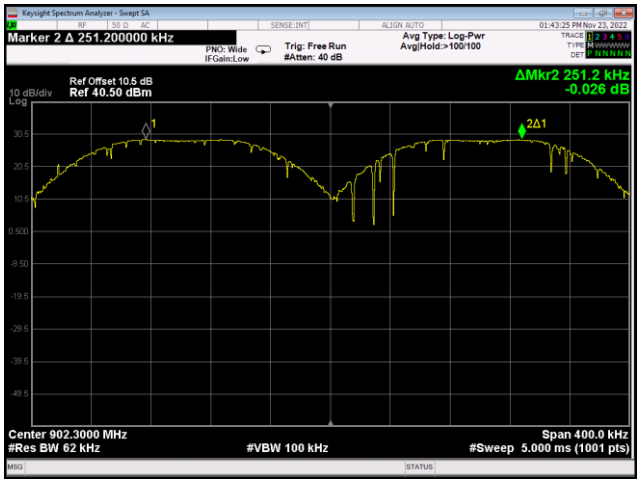


5.6 Carrier Frequencies Separation

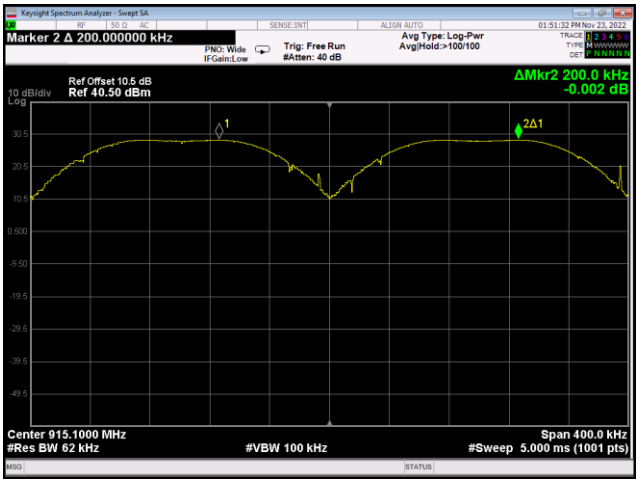
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest channel	251.2	100.4	Pass
Middle channel	200	100.4	Pass
Highest channel	200	100.4	Pass

Test plot as follows:

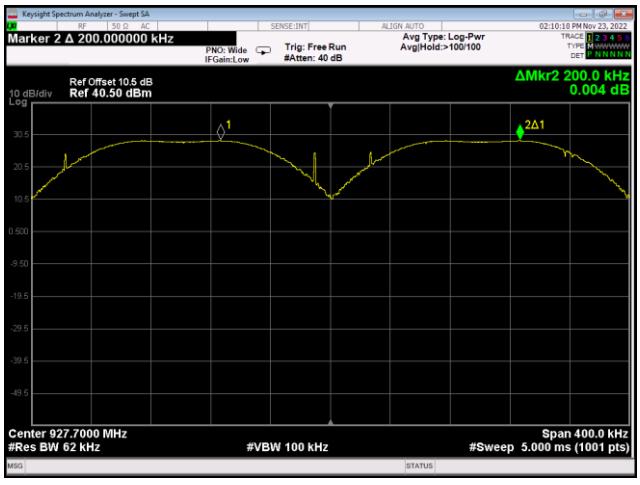
Lowest channel



Middle channel



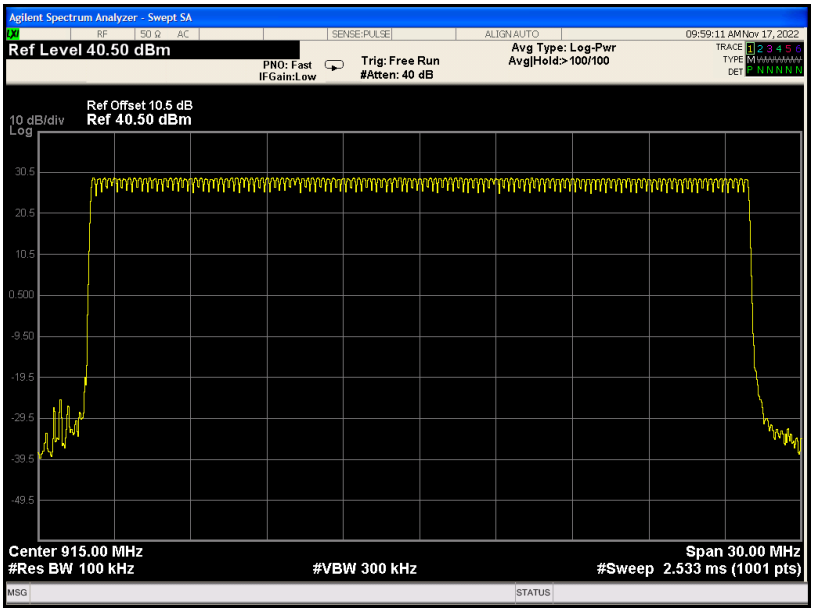
Highest channel



5.7 Hopping Channel Number

Hopping channel numbers	Limit	Result
129	$N_{ch} \geq 50$	Pass

Test plot as follows:



5.8 Dwell Time

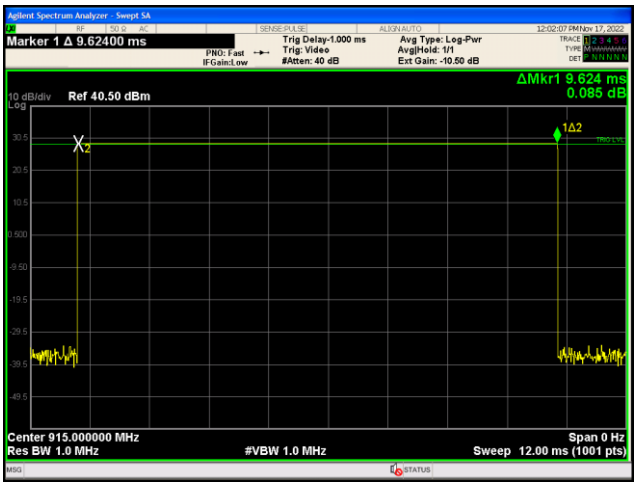
T_{on} (s)	Hopping numbers (20 s period)	Dwell time (s)	Limit (s)	Result
0.009624	4	0.038496	0.4	Pass

Note:

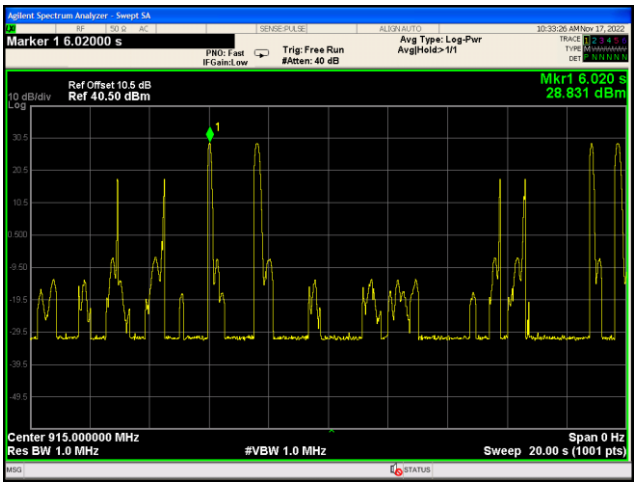
1. T_{on} is time per hop.

*2. Dwell time = T_{on} * Hopping numbers.*

Test plot as follows:



T_{on}

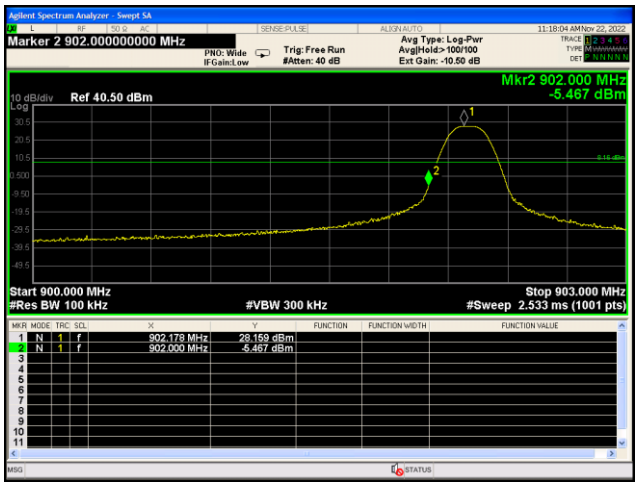


20s

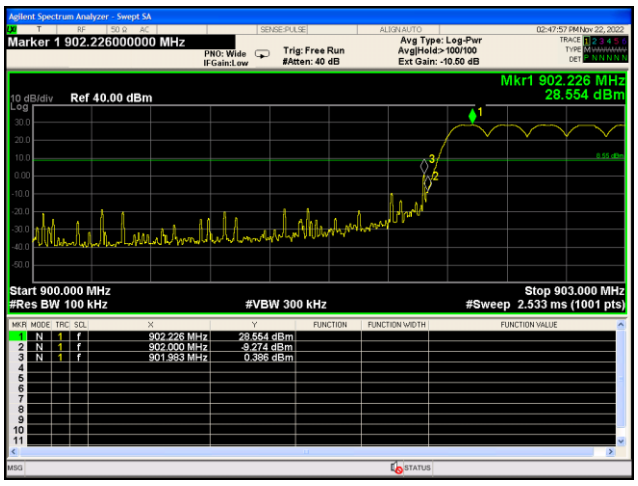
5.9 Spurious Emission

5.9.1 Band-edge Emission

Lowest Channel

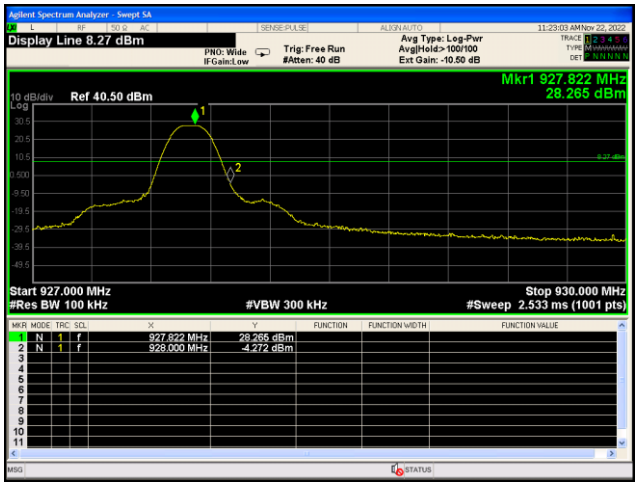


No-hopping mode

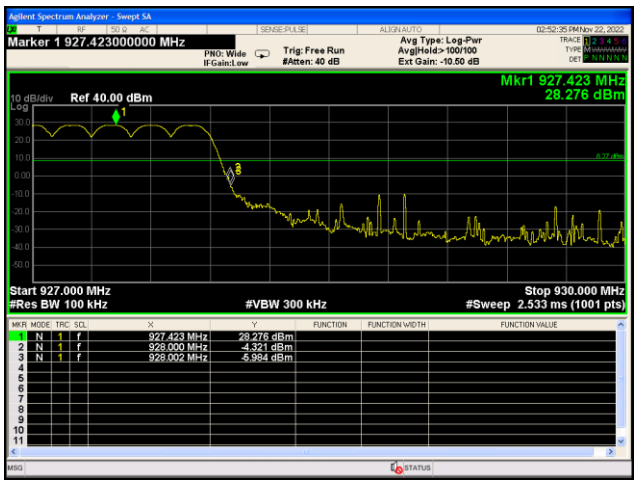


Hopping mode

Highest Channel



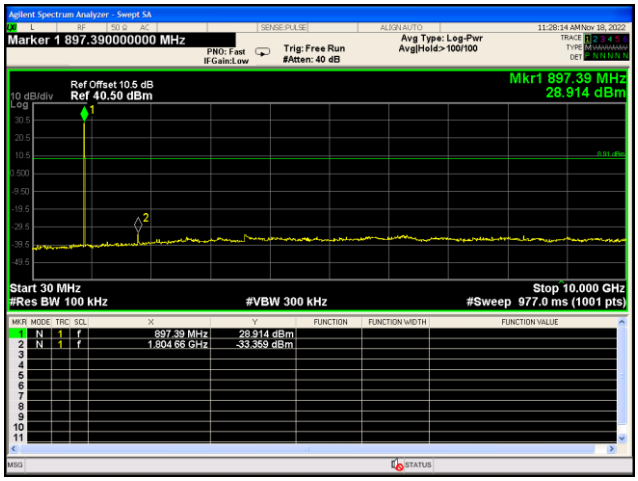
No-hopping mode



Hopping mode

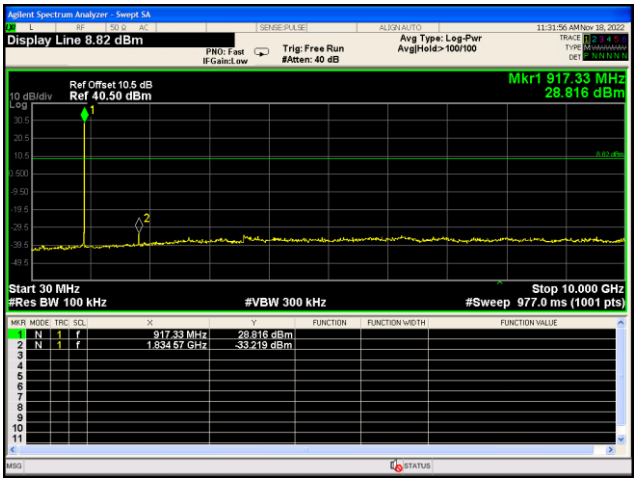
5.9.2 Conducted Spurious Emission

Lowest channel



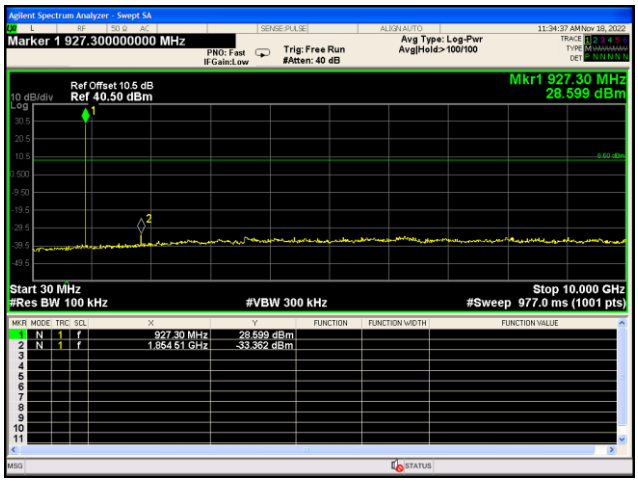
30MHz~10GHz

Middle channel



30MHz~10GHz

Highest channel

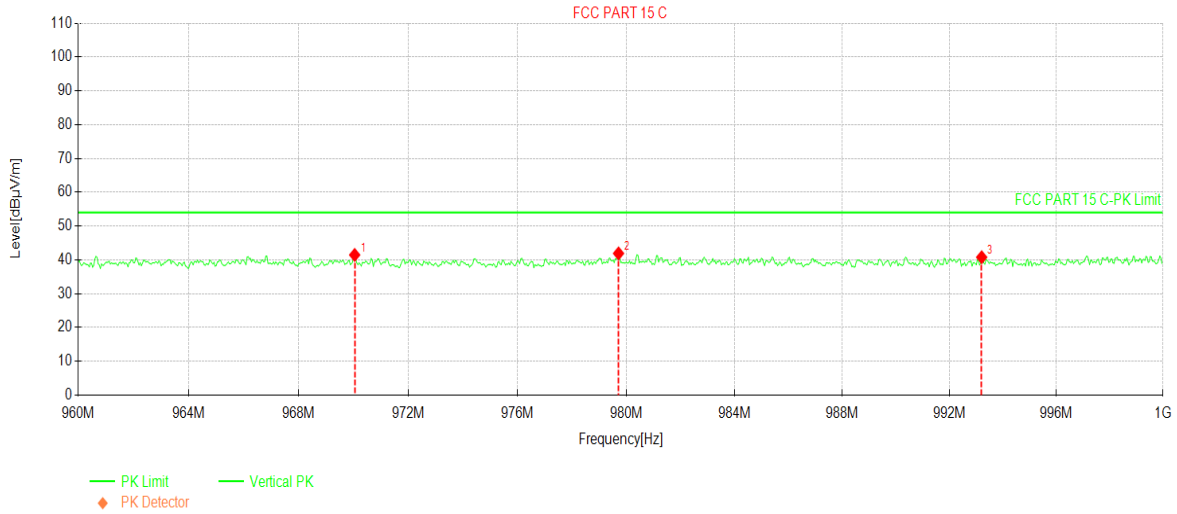


30MHz~10GHz

5.9.3 Emissions in Restricted Frequency Bands

902.2MHz:

Product Name:	WSN27-915	**Product Model:**	WSN27-915BR
Test By:	Mike	**Test mode:**	Tx mode
Test Channel:	960MHz-1GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz		

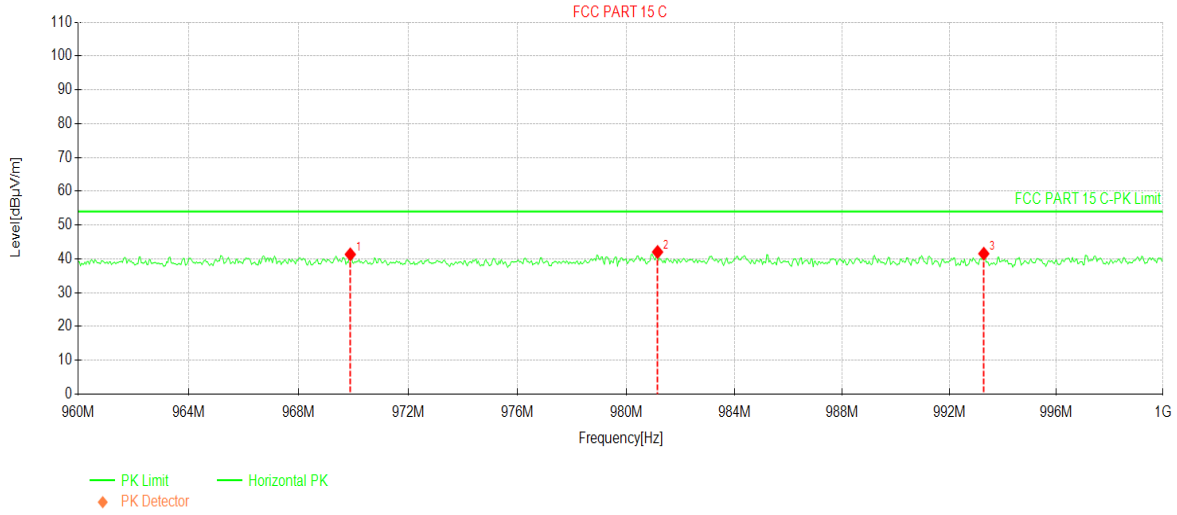


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	970.040	16.03	41.46	25.43	54.00	12.54	PK	Vertical
2	979.720	16.37	41.91	25.54	54.00	12.09	PK	Vertical
3	993.200	15.04	40.78	25.74	54.00	13.22	PK	Vertical

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	960MHz-1GHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



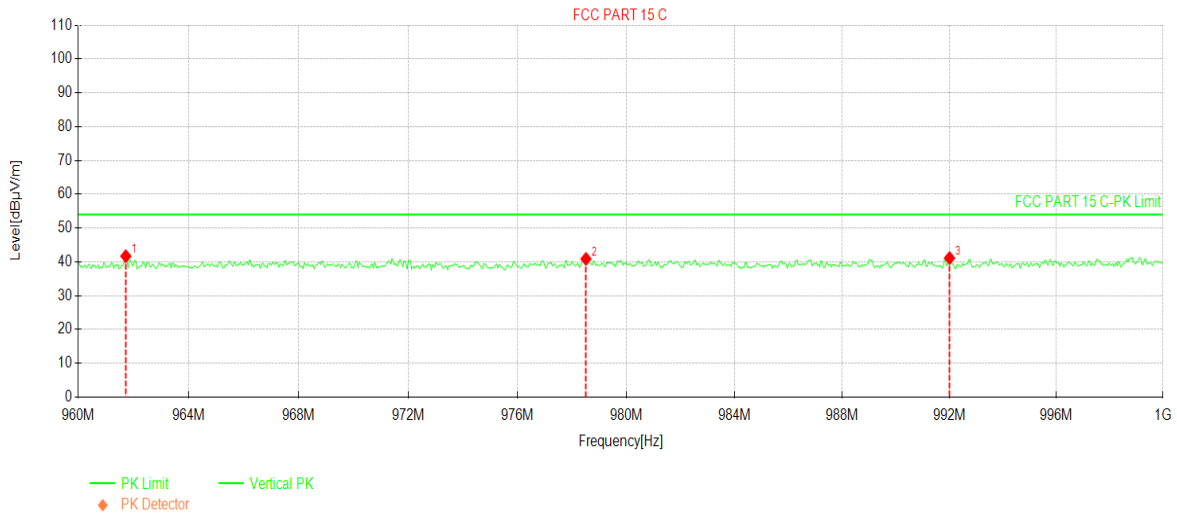
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	969.880	15.90	41.33	25.43	54.00	12.67	PK	Horizontal
2	981.160	16.47	42.04	25.57	54.00	11.96	PK	Horizontal
3	993.280	15.80	41.54	25.74	54.00	12.46	PK	Horizontal

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

915MHz:

Product Name:	WSN27-915	**Product Model:**	WSN27-915BR
Test By:	Mike	**Test mode:**	Tx mode
Test Channel:	960MHz-1GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz		

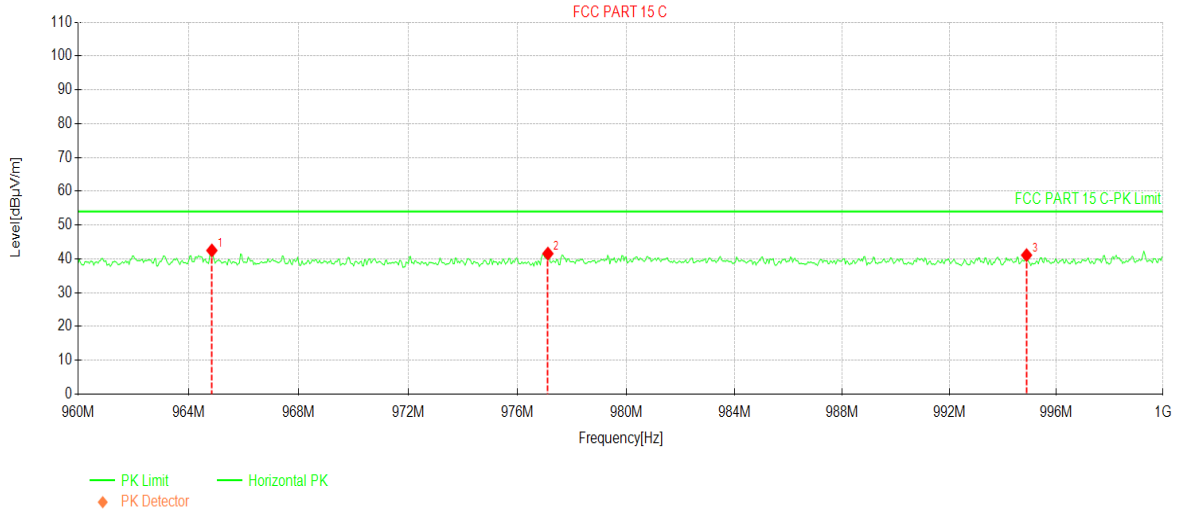


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	961.720	16.40	41.69	25.29	54.00	12.31	PK	Vertical
2	978.520	15.36	40.88	25.52	54.00	13.12	PK	Vertical
3	992.000	15.39	41.14	25.75	54.00	12.86	PK	Vertical

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	960MHz-1GHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



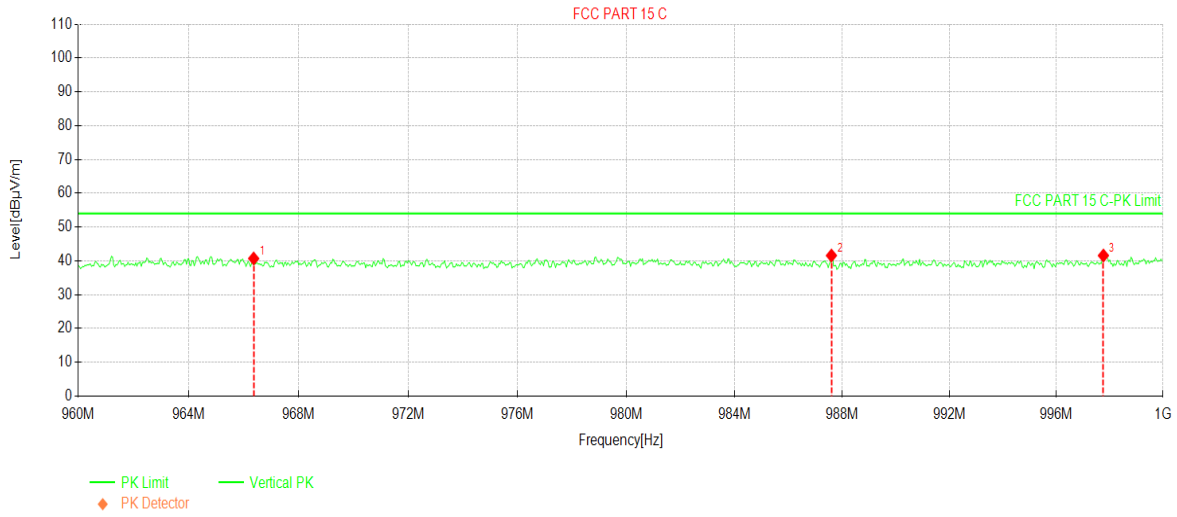
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	964.840	17.14	42.48	25.34	54.00	11.52	PK	Horizontal
2	977.120	16.04	41.55	25.51	54.00	12.45	PK	Horizontal
3	994.880	15.37	41.10	25.73	54.00	12.90	PK	Horizontal

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

927.8MHz:

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	960MHz-1GHz	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		

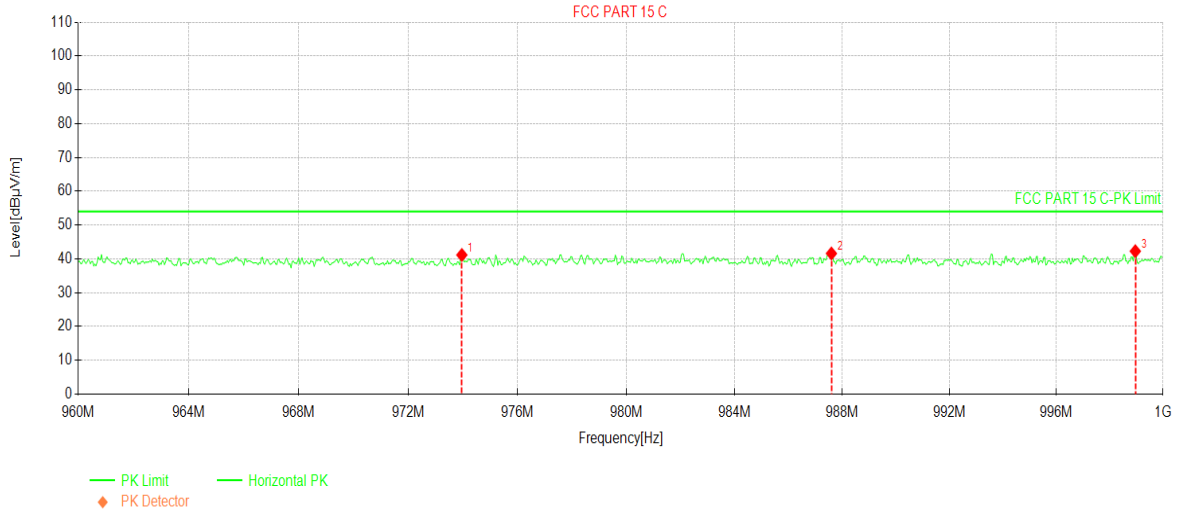


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	966.360	15.32	40.69	25.37	54.00	13.31	PK	Vertical
2	987.600	15.86	41.57	25.71	54.00	12.43	PK	Vertical
3	997.760	15.87	41.58	25.71	54.00	12.42	PK	Vertical

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	960MHz-1GHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



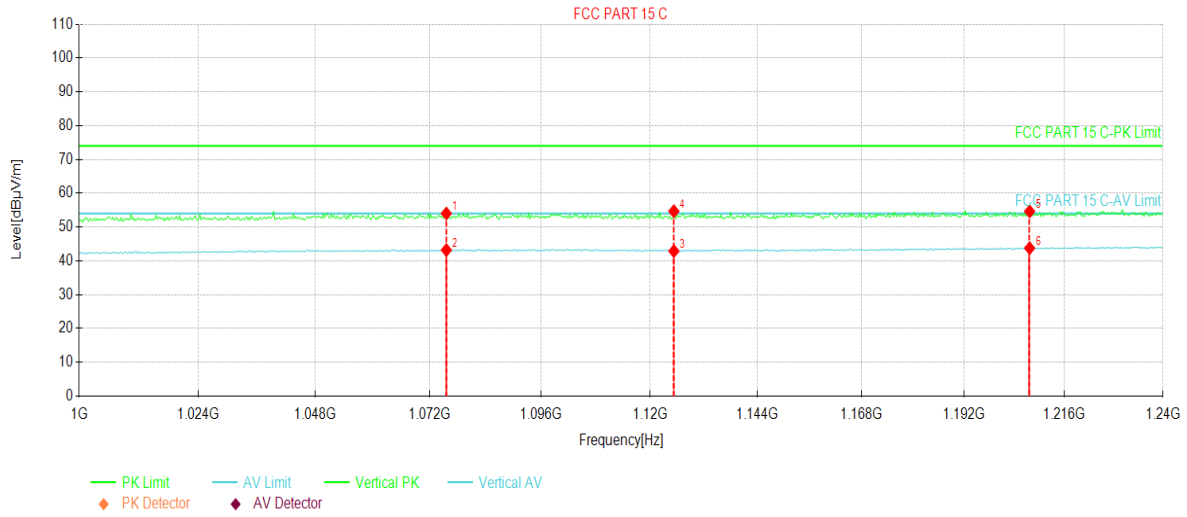
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	973.960	15.68	41.15	25.47	54.00	12.85	PK	Horizontal
2	987.600	15.88	41.59	25.71	54.00	12.41	PK	Horizontal
3	998.960	16.56	42.27	25.71	54.00	11.73	PK	Horizontal

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

902.2MHz:

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	1GHz-1240MHz	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		

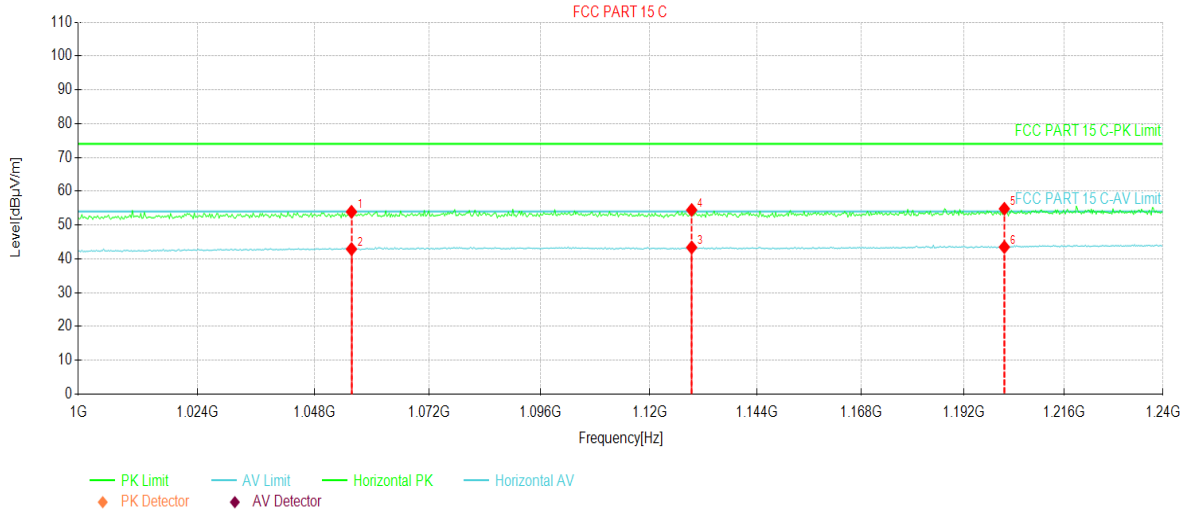


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	1075.60	23.66	30.35	54.01	74.00	19.99	PK	Vertical
2	1075.60	12.86	30.35	43.21	54.00	10.79	AV	Vertical
3	1125.28	12.29	30.59	42.88	54.00	11.12	AV	Vertical
4	1125.28	24.09	30.59	54.68	74.00	19.32	PK	Vertical
5	1207.60	23.81	30.81	54.62	74.00	19.38	PK	Vertical
6	1207.60	12.95	30.81	43.76	54.00	10.24	AV	Vertical

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	1GHz-1240MHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



Suspected Data List

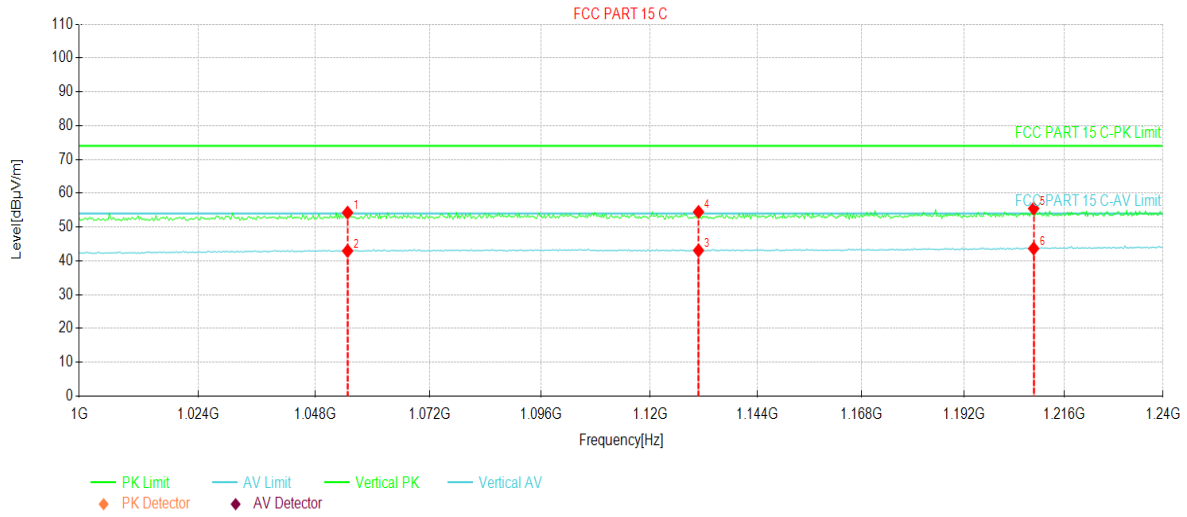
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	1055.68	23.69	30.22	53.91	74.00	20.09	PK	Horizontal
2	1055.68	12.67	30.22	42.89	54.00	11.11	AV	Horizontal
3	1129.36	12.78	30.60	43.38	54.00	10.62	AV	Horizontal
4	1129.36	23.85	30.60	54.45	74.00	19.55	PK	Horizontal
5	1201.60	24.03	30.79	54.82	74.00	19.18	PK	Horizontal
6	1201.60	12.70	30.79	43.49	54.00	10.51	AV	Horizontal

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

915MHz:

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	1GHz-1240MHz	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		

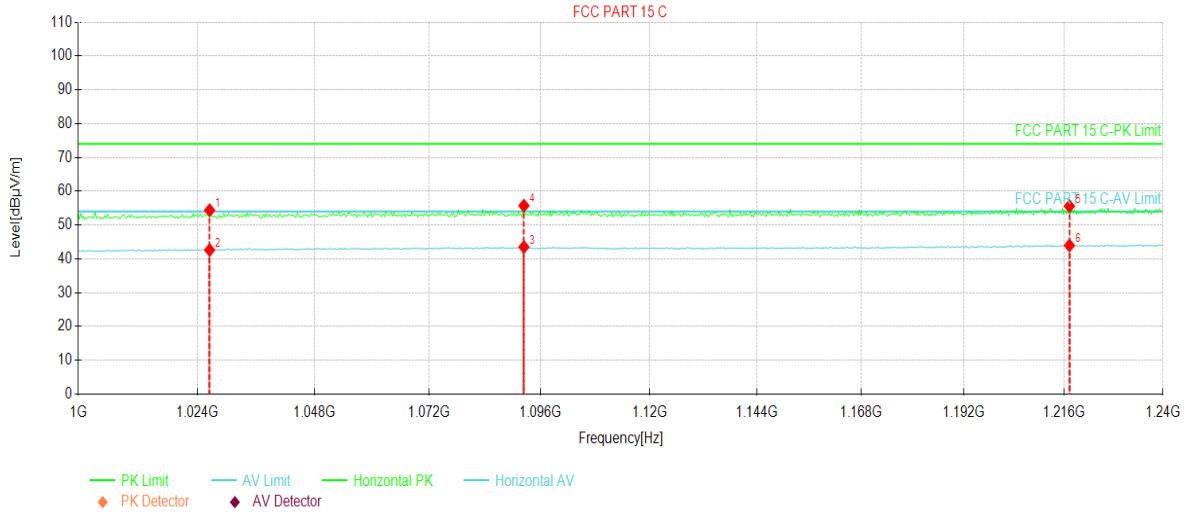


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	1054.72	24.05	30.21	54.26	74.00	19.74	PK	Vertical
2	1054.72	12.73	30.21	42.94	54.00	11.06	AV	Vertical
3	1130.80	12.48	30.60	43.08	54.00	10.92	AV	Vertical
4	1130.80	23.87	30.60	54.47	74.00	19.53	PK	Vertical
5	1208.56	24.67	30.81	55.48	74.00	18.52	PK	Vertical
6	1208.56	12.84	30.81	43.65	54.00	10.35	AV	Vertical

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	1GHz-1240MHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



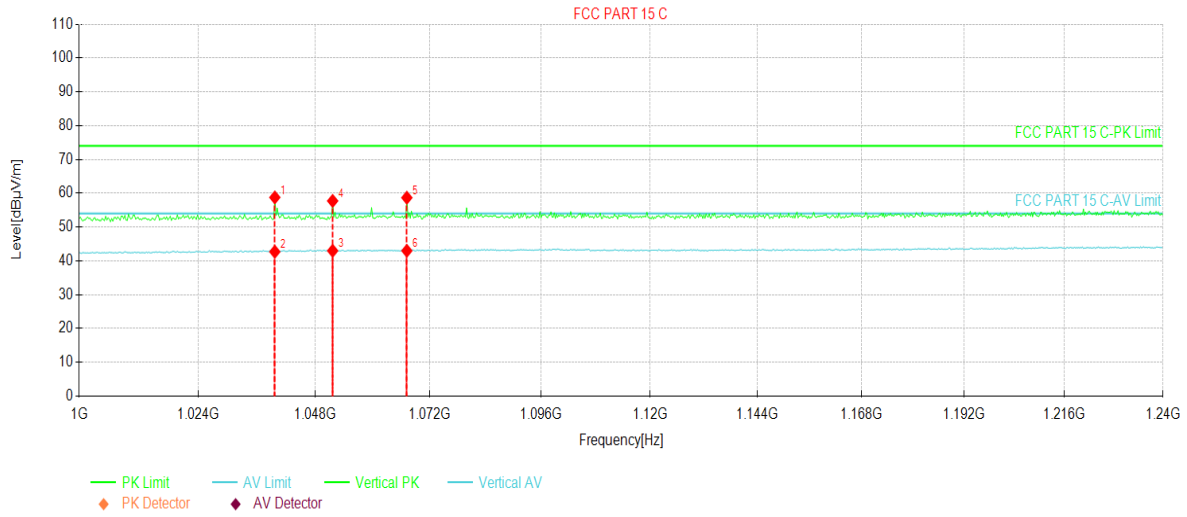
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	1026.40	24.35	30.02	54.37	74.00	19.63	PK	Horizontal
2	1026.40	12.61	30.02	42.63	54.00	11.37	AV	Horizontal
3	1092.40	13.03	30.47	43.50	54.00	10.50	AV	Horizontal
4	1092.40	25.26	30.47	55.73	74.00	18.27	PK	Horizontal
5	1217.20	24.75	30.85	55.60	74.00	18.40	PK	Horizontal
6	1217.20	13.10	30.85	43.95	54.00	10.05	AV	Horizontal

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

927.8MHz:

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	1GHz-1240MHz	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		

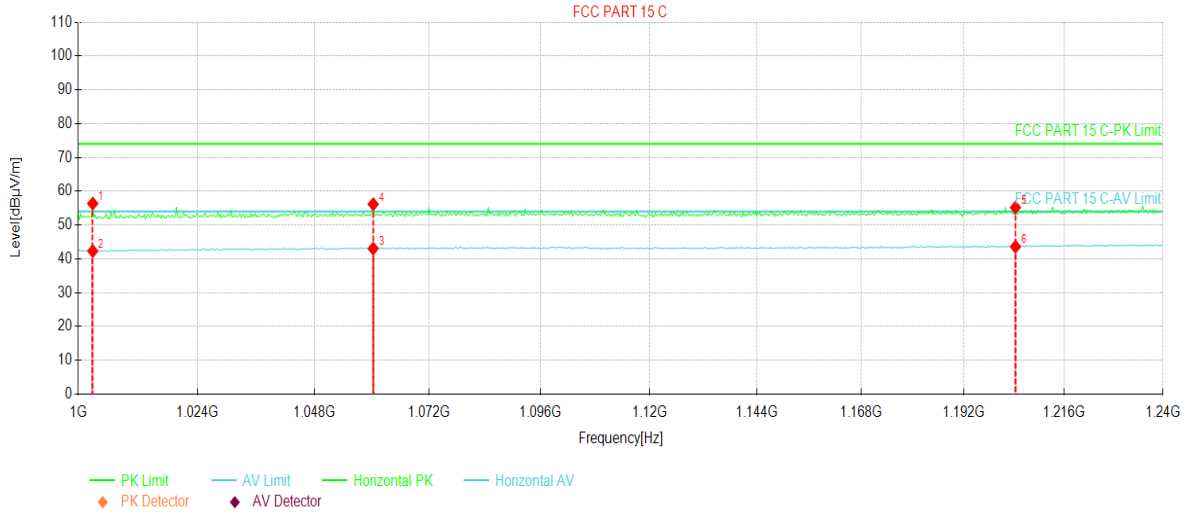


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	1039.60	28.66	30.11	58.77	74.00	15.23	PK	Vertical
2	1039.60	12.59	30.11	42.70	54.00	11.30	AV	Vertical
3	1051.60	12.80	30.19	42.99	54.00	11.01	AV	Vertical
4	1051.60	27.54	30.19	57.73	74.00	16.27	PK	Vertical
5	1067.20	28.39	30.30	58.69	74.00	15.31	PK	Vertical
6	1067.20	12.69	30.30	42.99	54.00	11.01	AV	Vertical

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Channel:	1GHz-1240MHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	1002.88	26.49	29.86	56.35	74.00	17.65	PK	Horizontal
2	1002.88	12.46	29.86	42.32	54.00	11.68	AV	Horizontal
3	1060.24	12.79	30.25	43.04	54.00	10.96	AV	Horizontal
4	1060.24	25.92	30.25	56.17	74.00	17.83	PK	Horizontal
5	1204.24	24.39	30.80	55.19	74.00	18.81	PK	Horizontal
6	1204.24	12.80	30.80	43.60	54.00	10.40	AV	Horizontal

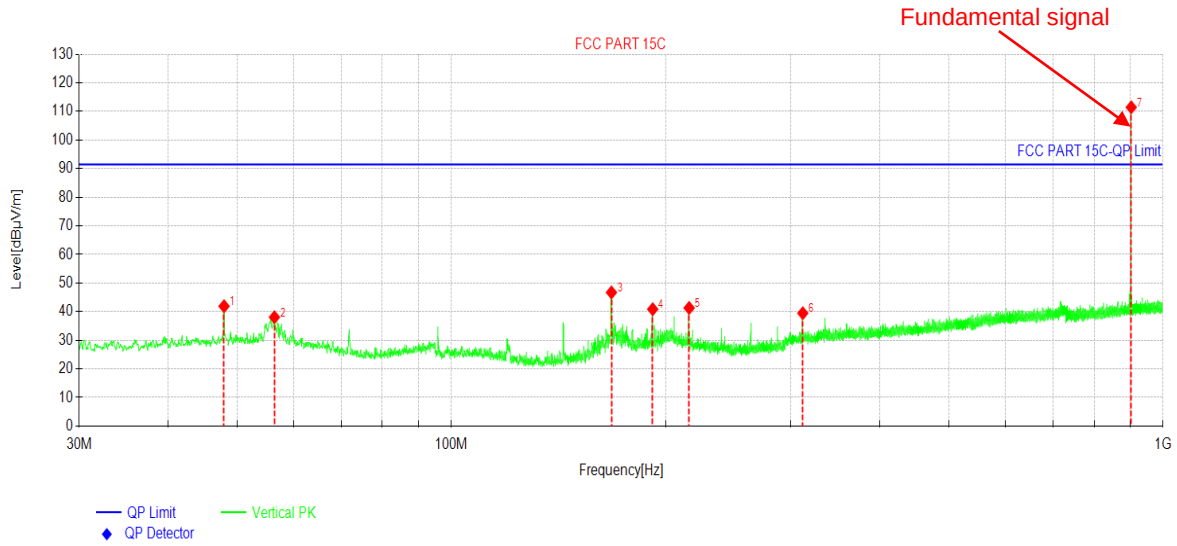
Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

5.9.4 Emissions in Non-restricted Frequency Bands

Below 1GHz:

Product Name:	WSN27-915	**Product Model:**	WSN27-915BR
Test By:	Mike	**Test mode:**	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz		

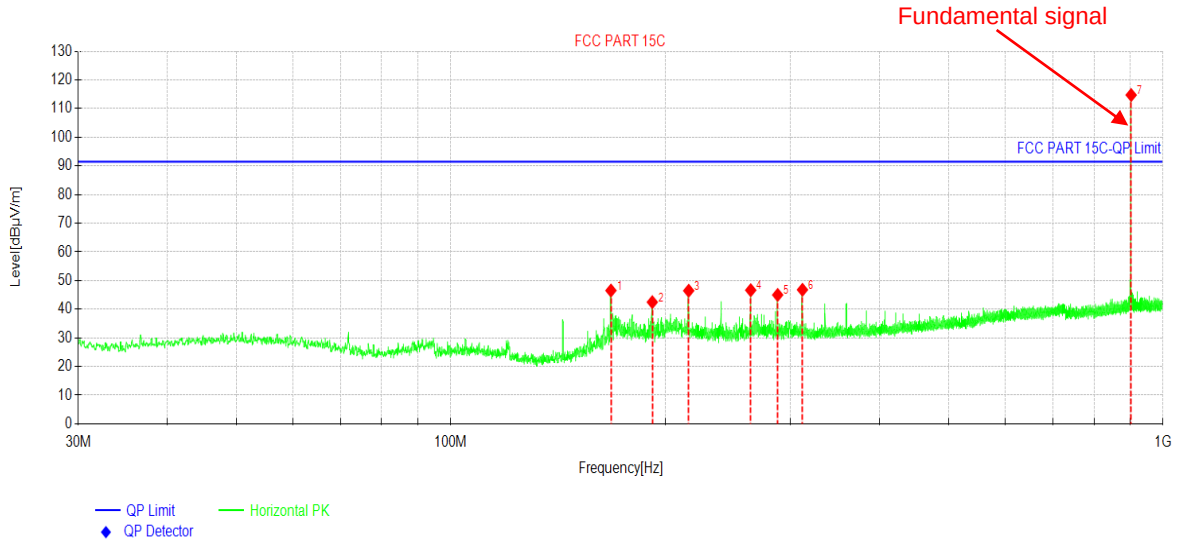


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	47.9450	26.75	41.90	15.15	91.44	49.54	PK	Vertical
2	56.4325	23.58	38.06	14.48	91.44	53.38	PK	Vertical
3	167.885	36.08	46.72	10.64	91.44	44.72	PK	Vertical
4	191.844	28.57	40.86	12.29	91.44	50.58	PK	Vertical
5	215.852	27.91	41.31	13.40	91.44	50.13	PK	Vertical
6	311.785	23.97	39.48	15.51	91.44	51.96	PK	Vertical
7	902.272	86.55	111.44	24.89	91.44	-20.00	PK	Vertical

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	WSN27-915	Product Model:	WSN27-915BR
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	167.885	35.89	46.53	10.64	91.44	44.91	PK	Horizontal
2	191.893	30.18	42.47	12.29	91.44	48.97	PK	Horizontal
3	215.852	33.06	46.46	13.40	91.44	44.98	PK	Horizontal
4	263.770	32.29	46.63	14.34	91.44	44.81	PK	Horizontal
5	287.777	30.18	45.00	14.82	91.44	46.44	PK	Horizontal
6	311.785	31.27	46.78	15.51	91.44	44.66	PK	Horizontal
7	902.224	89.84	114.73	24.89	91.44	-23.29	PK	Horizontal

Remark:

1. Level = Reading + FactorAntenna Factor + Cable Loss – Preamplifier Factor).

Above 1GHz:

Lowest channel						
Peak Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
1804.4	84.25	-21.88	62.37	74	-95.88	Vertical
2706.6	65.17	-17.63	47.54	74	-26.46	Vertical
3608.8	57.19	-14.63	42.56	74	-31.44	Vertical
1804.4	81.45	-21.88	59.57	74	-14.43	Horizontal
2706.6	68.62	-17.63	50.99	74	-23.01	Horizontal
3608.8	55.89	-14.63	41.26	74	-32.74	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
2706.6	61.42	-17.63	43.79	54	-10.21	Vertical
3608.8	49.06	-14.63	34.43	54	-19.57	Vertical
2706.6	65.11	-17.63	47.48	54	-6.52	Horizontal
3608.8	48.21	-14.63	33.58	54	-20.42	Horizontal
Middle channel						
Peak Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
1830	85.56	-21.74	63.82	74	-10.18	Vertical
2745	70.61	-17.58	53.03	74	-20.97	Vertical
3660	56.14	-14.39	41.75	74	-32.25	Vertical
1830	90.41	-21.74	68.67	74	-5.33	Horizontal
2745	70.22	-17.58	52.64	74	-21.36	Horizontal
3660	55.59	-14.39	41.2	74	-32.8	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
2745	67.42	-17.58	49.84	54	-4.16	Vertical
3660	48.4	-14.39	34.01	54	-19.99	Vertical
2745	68.88	-17.58	51.3	54	-2.7	Horizontal
3660	49.05	-14.39	34.66	54	-19.34	Horizontal
Highest channel						
Peak Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
1855.6	87.76	-21.59	66.17	74	-7.83	Vertical
2783.4	72.01	-17.52	54.49	74	-19.51	Vertical
3711.2	55.11	-14.13	40.98	74	-33.02	Vertical
1855.6	89.56	-21.59	67.97	74	-6.03	Horizontal
2783.4	73.82	-17.52	56.3	74	-17.7	Horizontal
3711.2	56.8	-14.13	42.67	74	-31.33	Horizontal

Average Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Polarization
2783.4	69.27	-17.52	51.75	54	-2.25	Vertical
3711.2	48.68	-14.13	34.55	54	-19.45	Vertical
2783.4	69.58	-17.52	52.06	54	-1.94	Horizontal
3711.2	48.5	-14.13	34.37	54	-19.63	Horizontal
Remark: *1. Level = Read level + Factor.*						

------End of report------