FCC RF Test Report
(FHSS)

Report No.:	JYTSZ-R12-2400170
Applicant:	Hangzhou Roombanker Technology Co., Ltd.
Address of Applicant:	A#801 Wantong center, Hangzhou, China

Equipment Under Test (EUT)

Product Name:	Industrial AI Edge Computing Gateway
Model No.:	DSGW-380, DSGW-380-1, DSGW-380-2, DSGW-380-3, DSGW-380-4, DSGW-380-X(X:1~29)
Trade Mark:	Roombanker
FCC ID:	2AUXBDSGW-380
Applicable Standards:	FCC CFR Title 47 Part 15C (§15.247)
Date of Sample Receipt:	26 Feb., 2024
Date of Test:	27 Feb., to 29 May, 2024
Date of Report Issued:	09 Aug., 2024
Test Result:	PASS

Tested by:	***Project Engineer***	***Date:***	*09 Aug., 2024*
Reviewed by:	***Senior Engineer***	***Date:***	*09 Aug., 2024*
Approved by:	***Manager***	***Date:***	*09 Aug., 2024*

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	*29 May, 2024*	*Original*
01	*09 Aug., 2024*	*Update Page 32*

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3 General Information

3.1 Client Information

Applicant:	Hangzhou Roombanker Technology Co., Ltd.
Address:	A#801 Wantong center, Hangzhou, China
Manufacturer/ Factory:	Zhejiang Dusun Electron Co., Ltd.
Address:	No.640 Feng Qing St, DeQing Zhejiang China

3.2 General Description of E.U.T.

Product Name:	Industrial AI Edge Computing Gateway
Model No.:	DSGW-380, DSGW-380-1, DSGW-380-2, DSGW-380-3, DSGW-380-4, DSGW-380-X(X:1~29)
Operation Frequency:	902 MHz - 915 MHz
Number of Channel:	64
Channel Separation:	200KHz
Modulation Technology:	Lora
Antenna Type:	External Antenna
Antenna Gain:	1.39 dBi (declare by applicant)
Power Supply:	DC 12V
Remark:	Model No.: DSGW-380, DSGW-380-1, DSGW-380-2, DSGW-380-3, DSGW-380-4, DSGW-380-X(X:1~29) were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being model name.
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

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
Voltage:	Nominal: 12.0 Vdc
Test Engineer:	Vieta Zhang (Conducted measurement) Kiran Zeng , Robin Gu, Asher Zhang(Radiated measurement)

3.4 Description of Test Auxiliary Equipment

The EUT has been tested as an independent unit.

3.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Conducted Emission for LISN (9kHz ~ 150kHz)	3.57 dB
Conducted Emission for LISN (150kHz ~ 30MHz)	3.14 dB
Radiated Emission (30MHz ~ 200MHz) (3m SAC)	4.6 dB
Radiated Emission (200MHz ~ 1000MHz) (3m SAC)	5.8 dB
Radiated Emission (30MHz ~ 1GHz) (3m FAR)	3.43 dB
Radiated Emission (1GHz ~ 6GHz) (3m FAR)	4.95 dB
Radiated Emission (6GHz ~ 18GHz) (3m FAR)	5.23 dB
Radiated Emission (18GHz ~ 40GHz) (3m FAR)	5.32 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	04-13-2026
Loop Antenna	Schwarzbeck	FMZB 1519 B	WXJ002-4	01-05-2024	01-04-2025
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	01-09-2024	01-08-2025
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	01-05-2024	01-04-2025
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-5	12-28-2023	12-27-2024
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	12-27-2023	12-26-2024
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXJ001-3	12-27-2023	12-26-2024
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXJ002-7	12-28-2023	12-27-2024
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	12-27-2023	12-26-2024
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	12-27-2023	12-26-2024
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ004-2	09-25-2023	09-24-2024
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-17-2024	01-16-2025
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	01-17-2024	01-16-2025
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG001-7	01-17-2024	01-16-2025
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		

Radiated Emission(3m FAR):					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m FAR	YUNYI	9m*6m*6m	WXJ097	06-15-2023	06-14-2028
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ097-2	07-13-2023	07-12-2024
Biconical Antenna	Schwarzbeck	VUBA9117	WXJ002-1	07-02-2021	07-01-2024
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ097-3	07-14-2023	07-13-2024
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-3	12-28-2023	12-27-2024
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-5	12-28-2023	12-27-2024
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-6	12-28-2023	12-27-2024
Pre-amplifier (30MHz ~ 1GHz)	YUNYI	PAM-310N	WXJ097-5	05-14-2023	05-13-2024
				04-24-2024	04-23-2025
Pre-amplifier (1GHz ~ 18GHz)	YUNYI	PAM-118N	WXJ097-6	05-14-2023	05-13-2024
				04-24-2024	04-23-2025
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXJ002-7	12-28-2023	12-27-2024
EMI Test Receiver	Rohde & Schwarz	ESCI3	WXJ003	12-27-2023	12-26-2024
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	12-27-2023	12-26-2024
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ081-1	06-13-2023	06-12-2024
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-13M	WXG097-1	08-01-2023	07-31-2024
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG097-2	08-01-2023	07-31-2024
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG097-3	08-01-2023	07-31-2024
High Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Low Band Reject Filter Group	Tonscend	JS0806-F	WXJ097-4	N/A	
Test Software	Tonscend	TS+	Version: 5.0.0		

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	07-05-2023	07-04-2024
LISN	Schwarzbeck	NSLK 8127	QCJ001-13	12-27-2023	12-26-2024
LISN	Rohde & Schwarz	ESH3-Z5	WXJ005-1	12-27-2023	12-26-2024
LISN Coaxial Cable (9kHz ~ 30MHz)	JYTSZ	JYTCE-1G-NN-2M	WXG003-1	01-17-2024	01-16-2025
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	Rohde & Schwarz	FSP 30	WXJ004	12-27-2023	12-26-2024
EMI Test Receiver	Rohde & Schwarz	ESCI3	WXJ003	12-27-2023	12-26-2024
Spectrum Analyzer	Keysight	N9010B	WXJ004-3	09-25-2023	09-24-2024
DC Power Supply	Keysight	E3642A	WXJ025-2	N/A	

4 Measurement Setup and Procedure

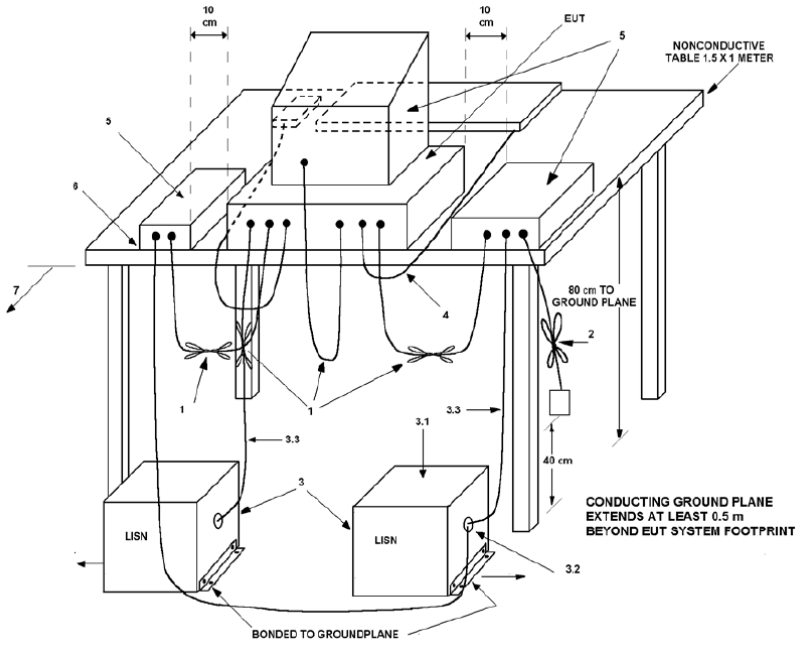
4.1 Test Channel

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)
1	902.3	32	908.5	64	914.9

4.2 Test Setup

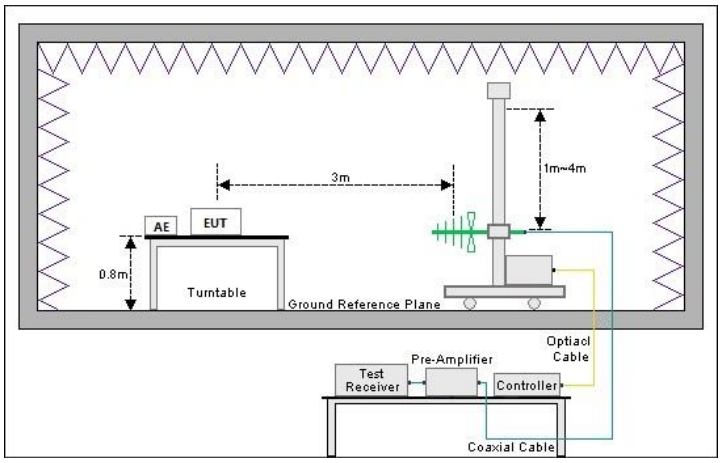
1) Conducted emission measurement:



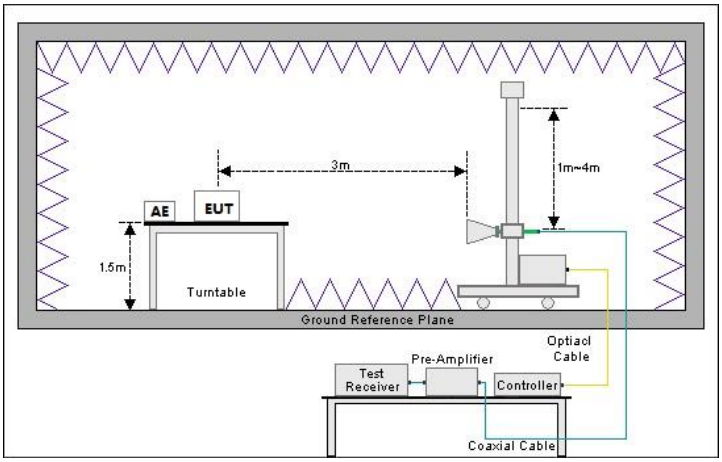
Note: The detailed descriptions please refer to Figure 8 of ANSI C63.4:2014.

2) Radiated emission measurement:

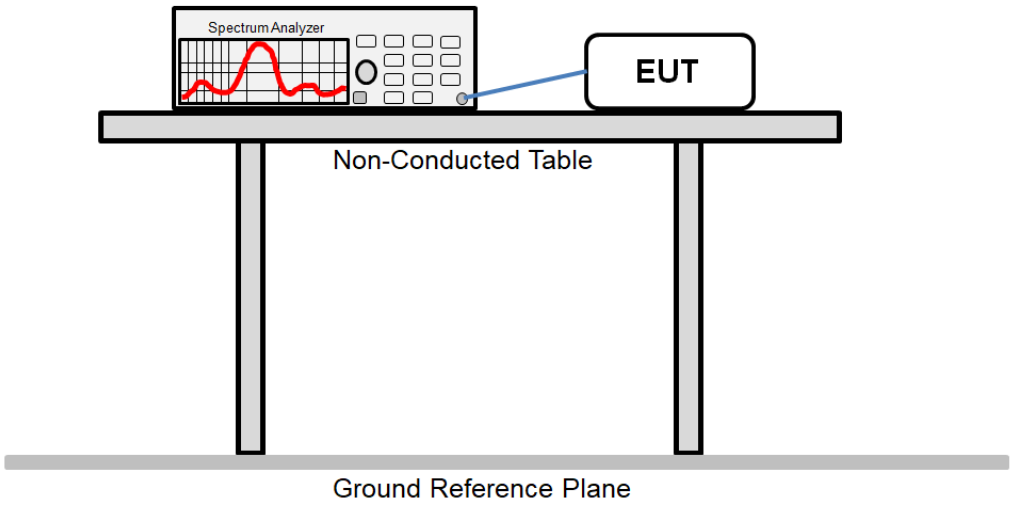
Below 1GHz (3m SAC)



Above 1GHz (3m FAR)



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 table top of a rotating table 0.8 m the ground at a 10 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 table top 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

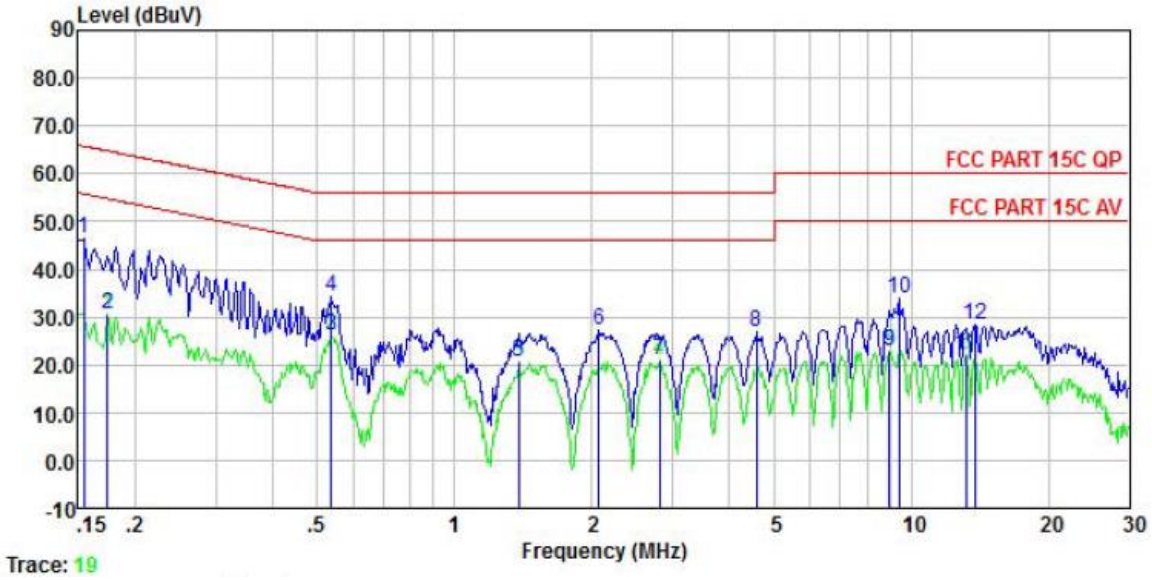
Dwell Time</td><td>For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within 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 1.39 dBi. See product internal photos for details.	

5.3 AC Power Line Conducted Emission

Product name:	Industrial AI Edge Computing Gateway	**Product model:**	DSGW-380
Test by:	Asher Zhang	**Test mode:**	Tx mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Line
Test voltage:	AC 120 V/60 Hz		

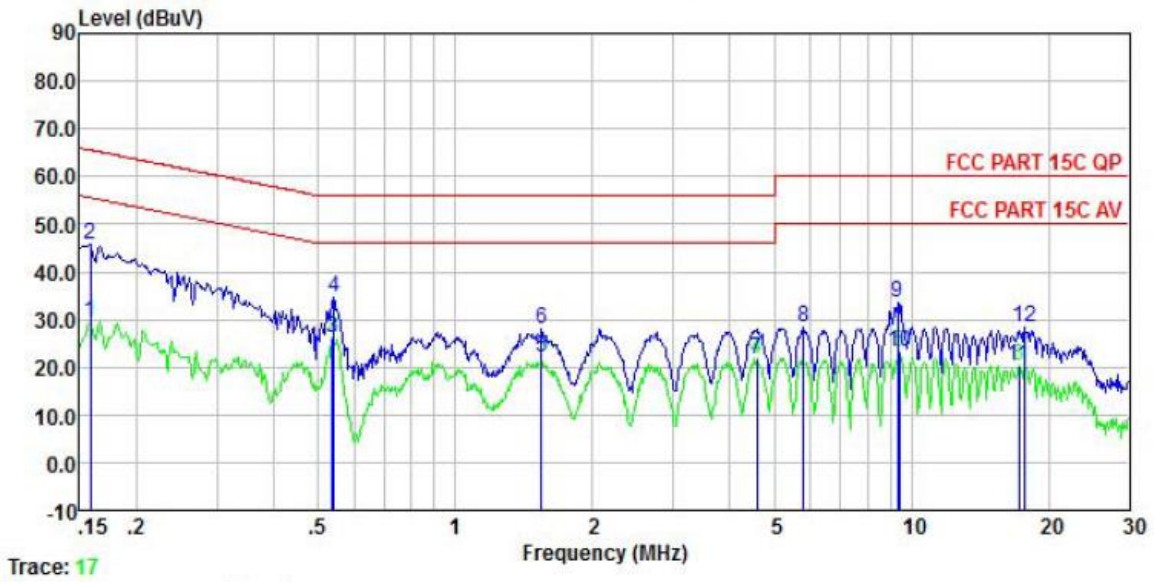


	Freq	Read Level	LISN Factor	Aux Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB	
1	0.154	35.59	0.20	0.00	10.50	0.01	46.30	65.78	-19.48	QP
2	0.174	19.86	0.20	0.00	10.50	0.01	30.57	54.77	-24.20	Average
3	0.538	15.43	0.20	0.00	10.50	0.03	26.16	46.00	-19.84	Average
4	0.538	23.66	0.20	0.00	10.50	0.03	34.39	56.00	-21.61	QP
5	1.381	9.68	0.20	0.00	10.50	0.13	20.51	46.00	-25.49	Average
6	2.066	16.34	0.20	0.00	10.50	0.20	27.24	56.00	-28.76	QP
7	2.809	10.36	0.20	0.00	10.50	0.09	21.15	46.00	-24.85	Average
8	4.574	15.93	0.20	0.00	10.50	0.09	26.72	56.00	-29.28	QP
9	8.964	12.15	0.20	0.00	10.50	0.11	22.96	50.00	-27.04	Average
10	9.401	23.17	0.20	0.00	10.50	0.12	33.99	60.00	-26.01	QP
11	13.197	11.08	0.27	0.00	10.50	0.11	21.96	50.00	-28.04	Average
12	13.768	17.65	0.28	0.00	10.50	0.12	28.55	60.00	-31.45	QP

Remark:

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

Product name:	Industrial AI Edge Computing Gateway	Product model:	DSGW-380
Test by:	Asher Zhang	Test mode:	Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz		



	Freq	Read Level	LISN Factor	Aux Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB	
1	0.158	18.84	0.20	0.00	10.50	0.01	29.55	55.56	-26.01	Average
2	0.158	34.91	0.20	0.00	10.50	0.01	45.62	65.56	-19.94	QP
3	0.538	15.46	0.20	0.00	10.50	0.03	26.19	46.00	-19.81	Average
4	0.541	23.90	0.20	0.00	10.50	0.03	34.63	56.00	-21.37	QP
5	1.544	11.12	0.26	0.00	10.50	0.15	22.03	46.00	-23.97	Average
6	1.544	16.94	0.26	0.00	10.50	0.15	27.85	56.00	-28.15	QP
7	4.574	10.88	0.30	0.00	10.50	0.09	21.77	46.00	-24.23	Average
8	5.805	17.46	0.30	0.00	10.50	0.09	28.35	60.00	-31.65	QP
9	9.302	22.69	0.38	0.00	10.50	0.12	33.69	60.00	-26.31	QP
10	9.401	12.16	0.38	0.00	10.50	0.12	23.16	50.00	-26.84	Average
11	17.199	9.25	0.40	0.00	10.50	0.15	20.30	50.00	-29.70	Average
12	17.661	17.21	0.40	0.00	10.50	0.15	28.26	60.00	-31.74	QP

Remark:

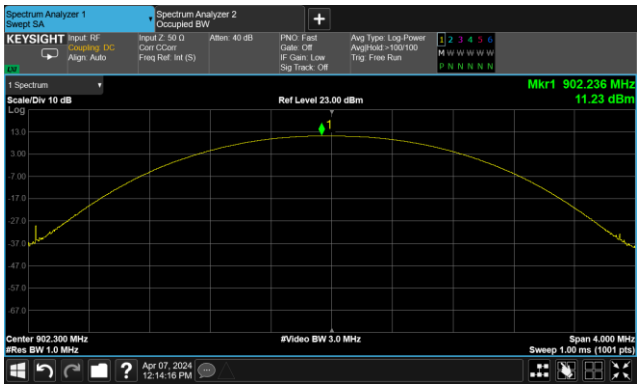
1. Level = Read level + LISN Factor + Cable Loss.

5.4 Conducted Output Power

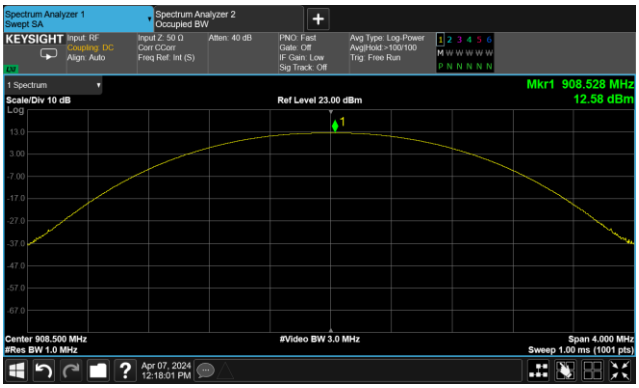
Test channel	Maximum Output Power (dBm)	Limit (dBm)	Result
Lowest channel	11.23	30.00	Pass
Middle channel	12.58	30.00	Pass
Highest channel	11.70	30.00	Pass

Test plot as follows:

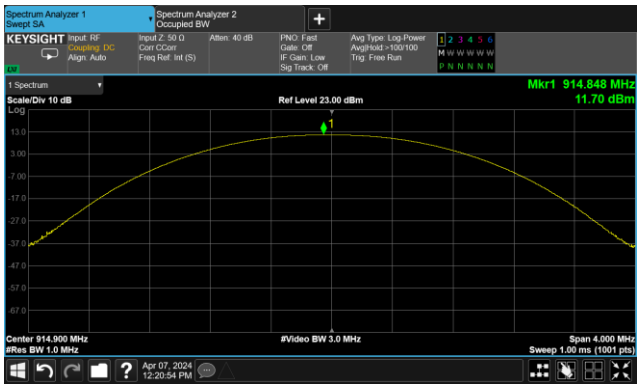
Lowest channel



Middle channel



Highest channel

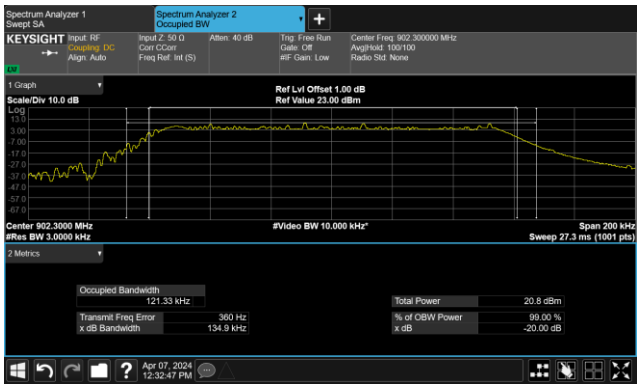


5.5 20dB Occupied Bandwidth

Test channel	20dB Occupy Bandwidth (kHz)	Limit (kHz)	Result
Lowest channel	134.9	$BW_{20dB} \leq 250$	Pass
Middle channel	137.1	$BW_{20dB} \leq 250$	Pass
Highest channel	137.1	$BW_{20dB} \leq 250$	Pass

Test plot as follows:

Lowest channel



Middle channel

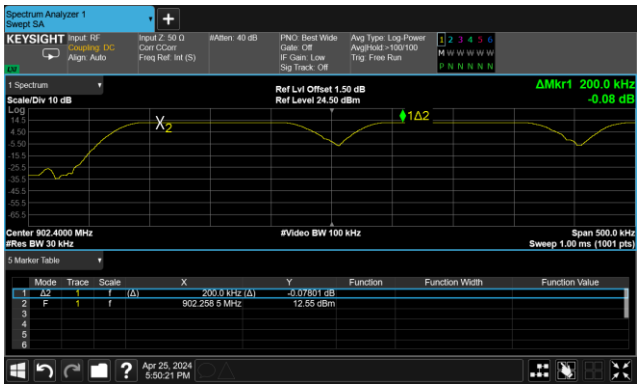
Highest channel

5.6 Carrier Frequencies Separation

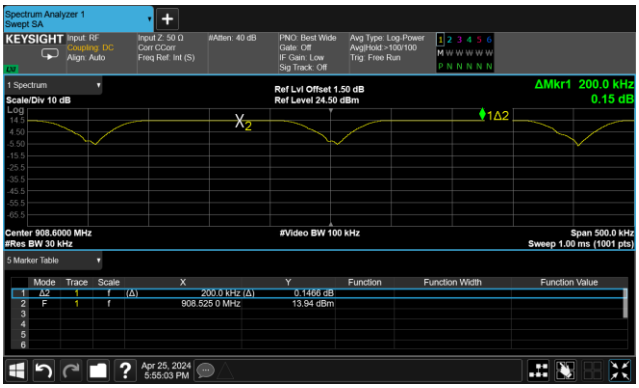
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest channel	200.0	137.1	Pass
Middle channel	200.0	137.1	Pass
Highest channel	200.0	137.1	Pass

Test plot as follows:

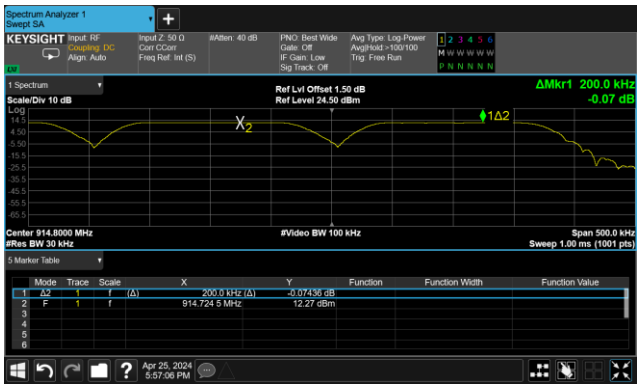
Lowest channel



Middle channel



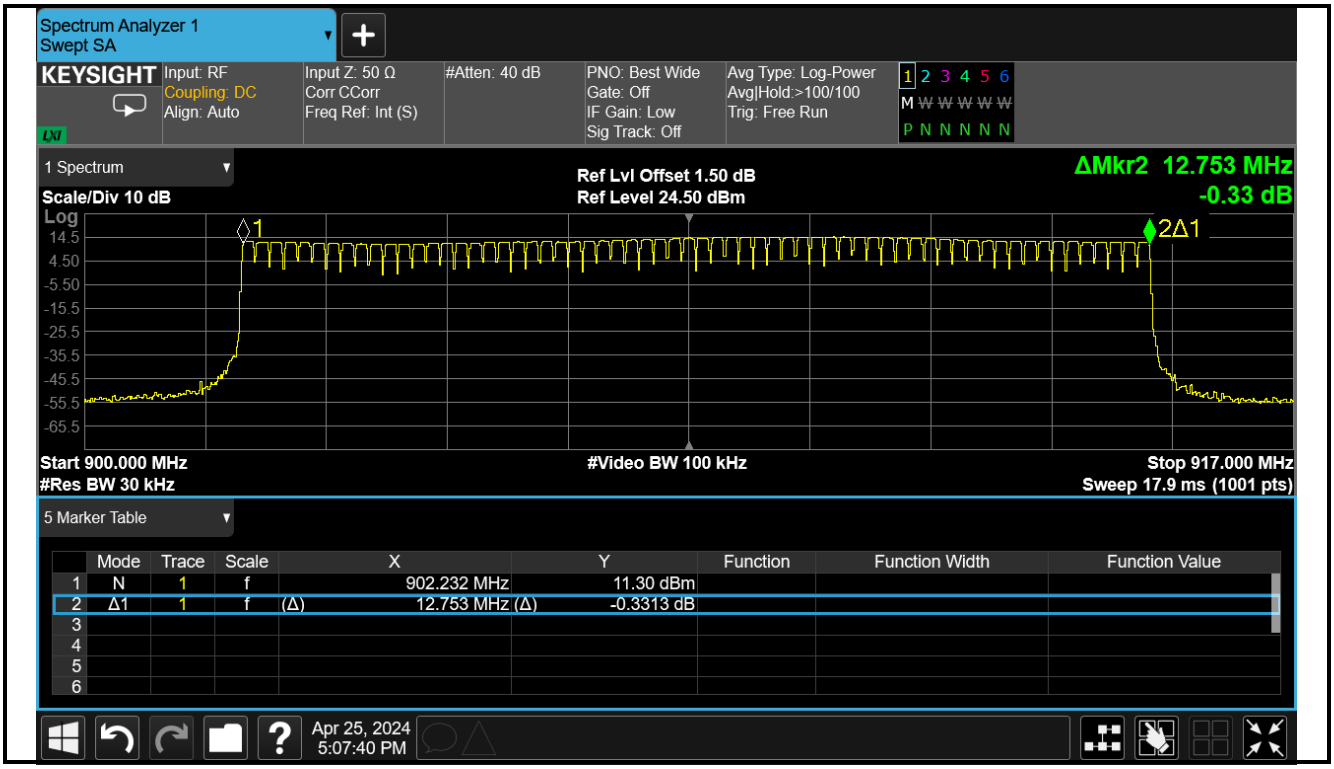
Highest channel



5.7 Hopping Channel Number

Hopping channel numbers	Limit	Result
64	$N_{ch} \geq 50$	Pass

Test plot as follows:



5.8 Dwell Time

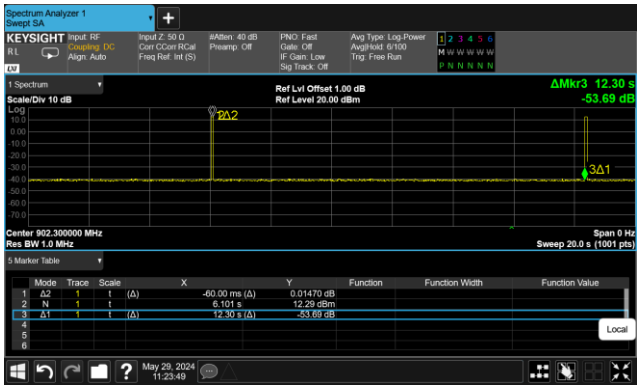
T_{on} (s)	Hopping numbers (20 s period)	Dwell time (s)	Limit (s)	Result
0.062	2	0.124	0.4	Pass

Note:

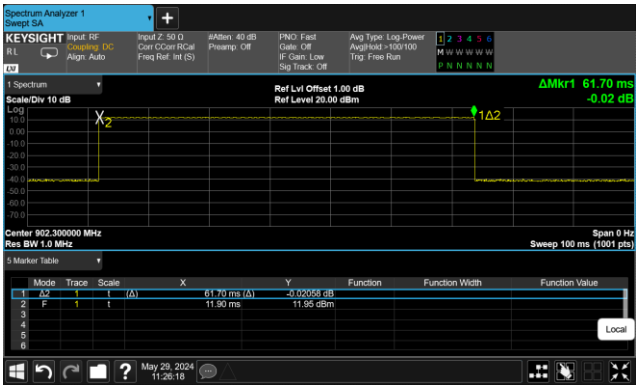
1. T_{on} is time per hop.

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

Test plot as follows:



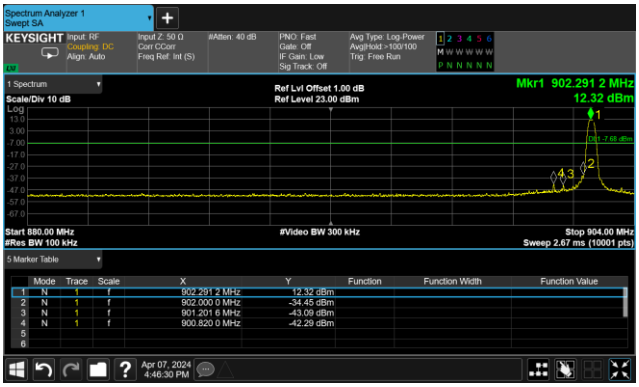
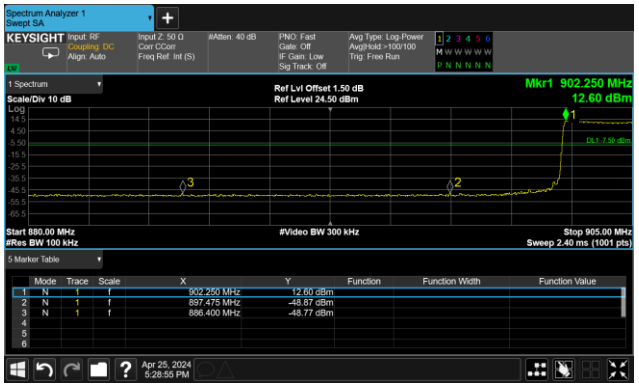
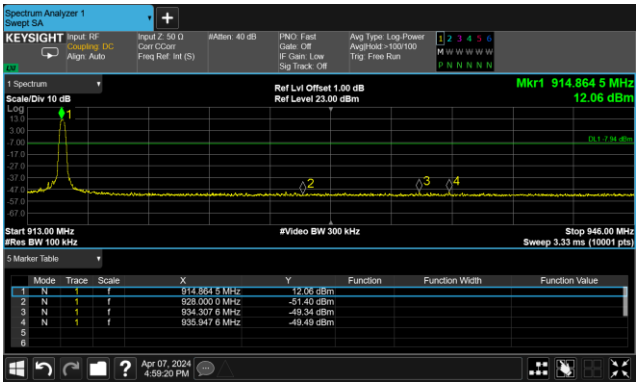
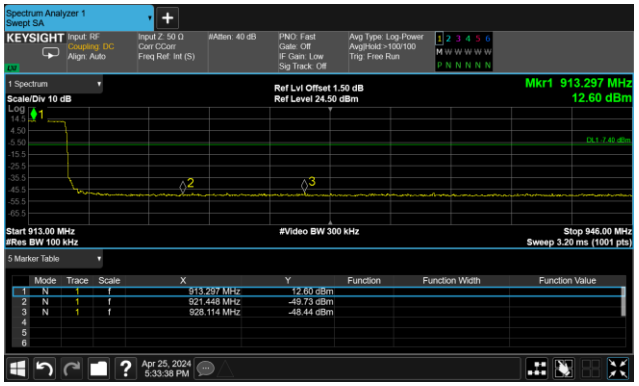
20 s



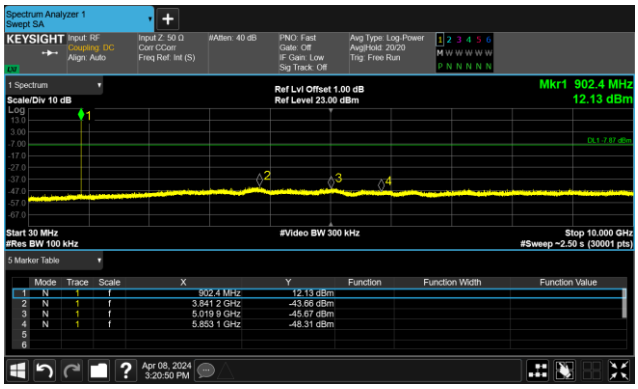
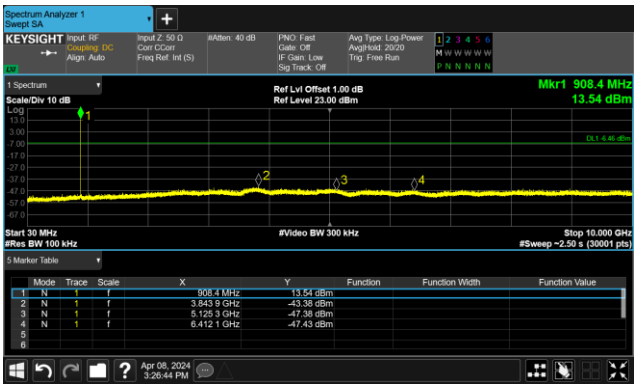
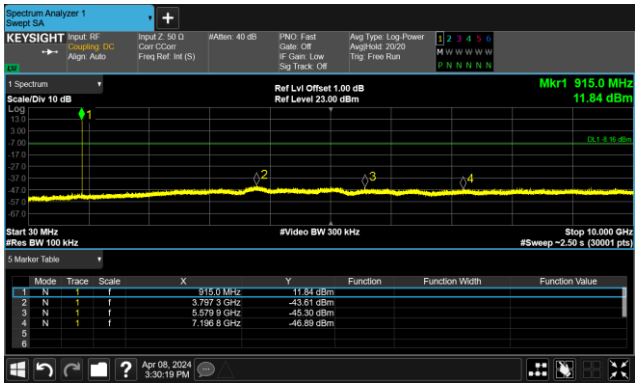
T_{on}

5.9 Spurious Emission

5.9.1 Band-edge Emission

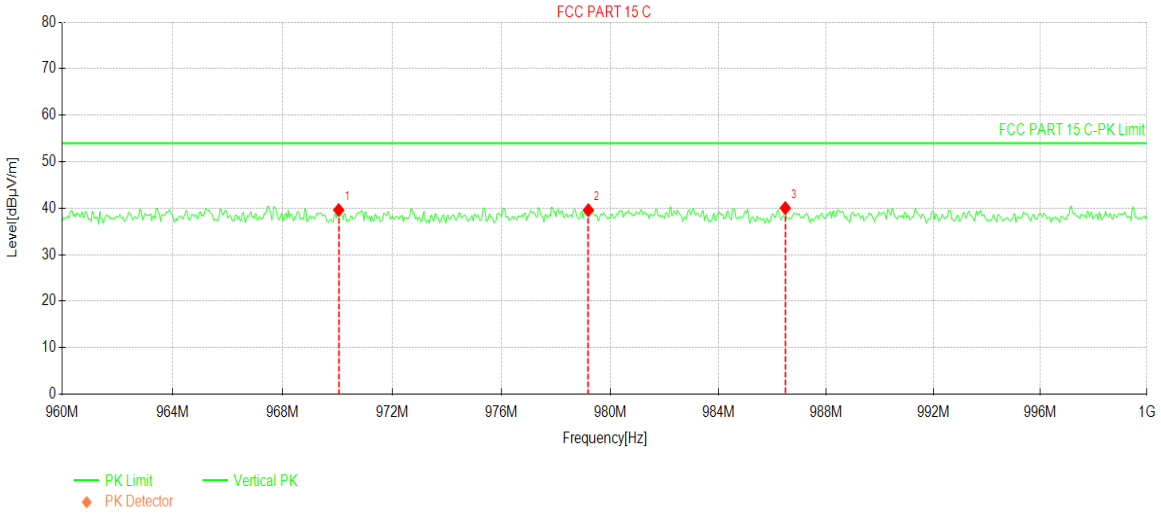
<table>
<tr><td colspan="2">Lowest Channel</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>No-hopping mode</td><td>Hopping mode</td></tr>
<tr><td colspan="2">Highest Channel</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>No-hopping mode</td><td>Hopping mode</td></tr>
</table>

5.9.2 Conducted Spurious Emission

Lowest channel	Middle channel
	
30MHz~10GHz	30MHz~10GHz
Highest channel	
	
30MHz~10GHz	

5.9.3 Emissions in Restricted Frequency Bands

Product Name:	Industrial AI Edge Computing Gateway	**Product Model:**	DSGW-380
Test By:	Robin Gu	**Test mode:**	Tx mode
Test Channel:	Lowest channel	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz		

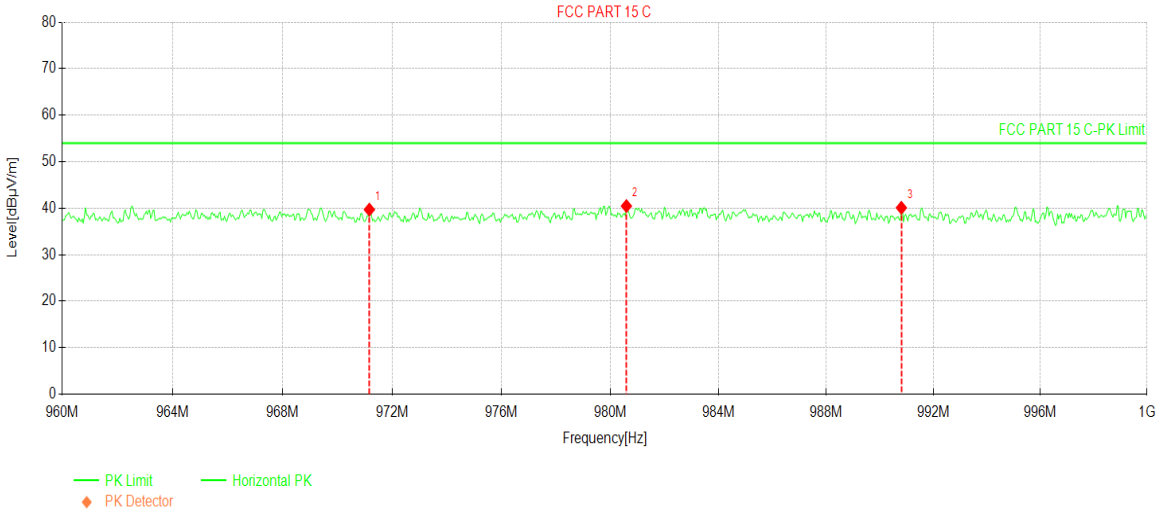


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	970.0400	12.88	39.60	26.72	54.00	14.40	PK	Vertical
2	979.2000	12.78	39.58	26.80	54.00	14.42	PK	Vertical
3	986.4800	13.18	40.02	26.84	54.00	13.98	PK	Vertical

Remark:

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

Product Name:	Industrial AI Edge Computing Gateway	Product Model:	DSGW-380
Test By:	Robin Gu	Test mode:	Tx mode
Test Channel:	Lowest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		

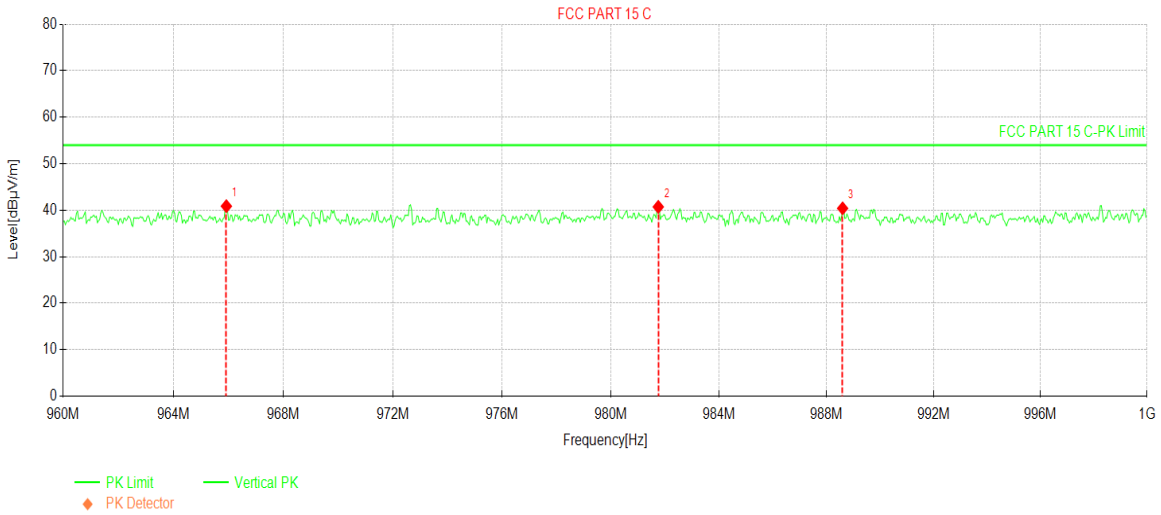


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	971.1600	12.97	39.69	26.72	54.00	14.31	PK	Horizontal
2	980.6000	13.64	40.45	26.81	54.00	13.55	PK	Horizontal
3	990.8000	13.19	40.08	26.89	54.00	13.92	PK	Horizontal

Remark:

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

Product Name:	Industrial AI Edge Computing Gateway	Product Model:	DSGW-380
Test By:	Robin Gu	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		

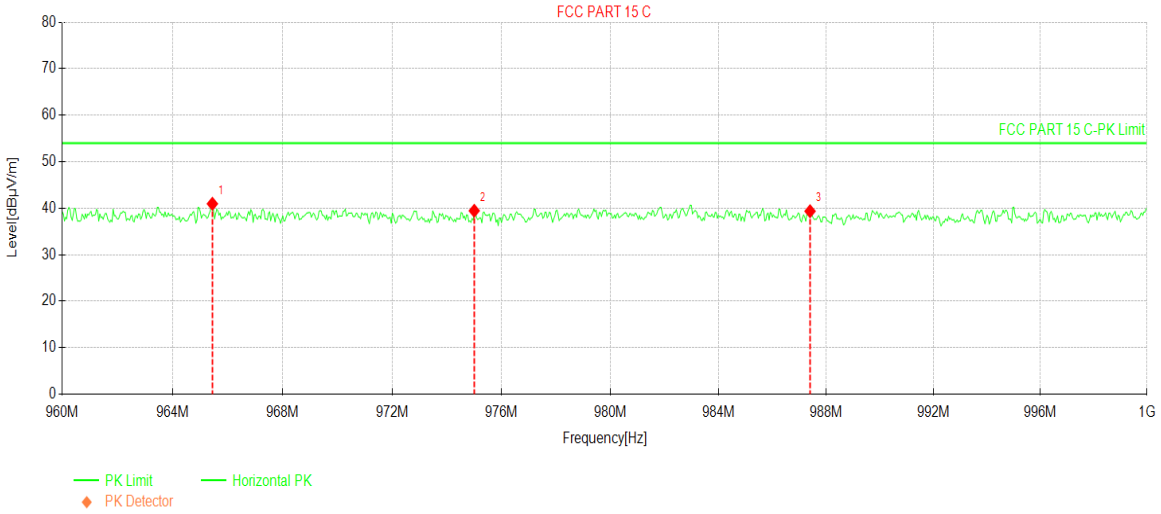


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	965.9200	14.24	40.86	26.62	54.00	13.14	PK	Vertical
2	981.7600	13.90	40.71	26.81	54.00	13.29	PK	Vertical
3	988.6000	13.51	40.39	26.88	54.00	13.61	PK	Vertical

Remark:

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

Product Name:	Industrial AI Edge Computing Gateway	Product Model:	DSGW-380
Test By:	Robin Gu	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		

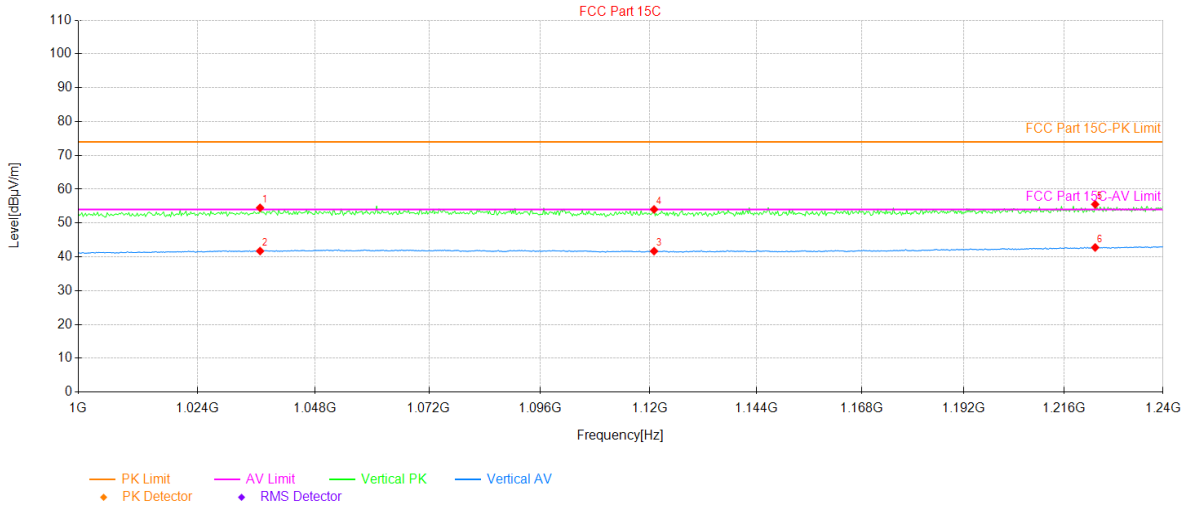


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	965.4400	14.33	40.94	26.61	54.00	13.06	PK	Horizontal
2	975.0000	12.72	39.44	26.72	54.00	14.56	PK	Horizontal
3	987.4000	12.49	39.35	26.86	54.00	14.65	PK	Horizontal

Remark:

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

Product Name:	Industrial AI Edge Computing Gateway	Product Model:	DSGW-380
Test By:	Kiran Zeng	Test mode:	Tx mode
Test Channel:	Lowest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		



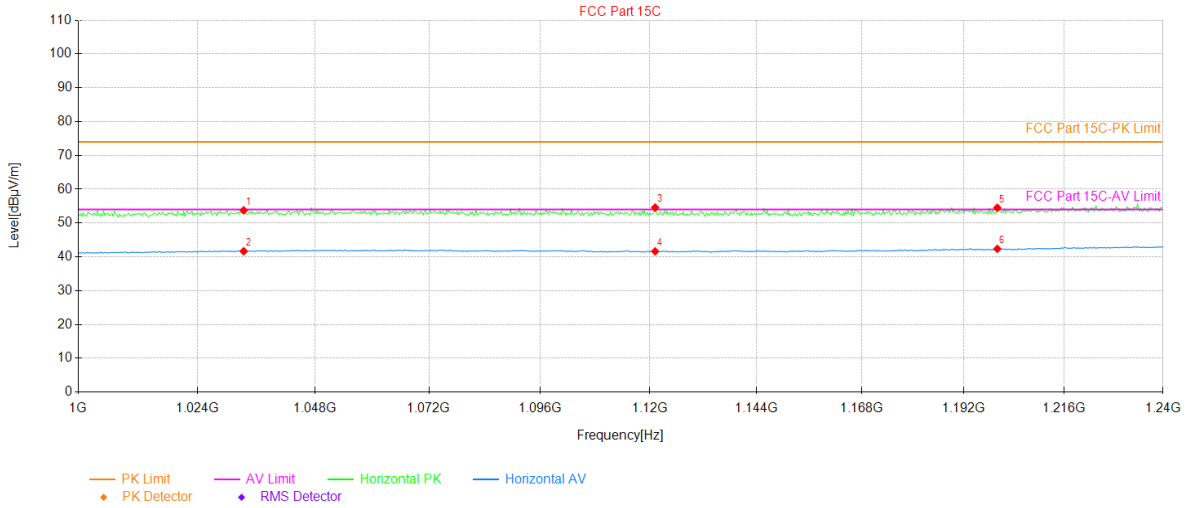
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	1036.72	23.84	30.66	54.50	74.00	19.50	257	PK	PASS	Vertical
2	1036.72	11.06	30.66	41.72	54.00	12.28	186	AV	PASS	Vertical
3	1120.96	10.88	30.81	41.69	54.00	12.31	306	AV	PASS	Vertical
4	1120.96	23.22	30.81	54.03	74.00	19.97	360	PK	PASS	Vertical
5	1223.44	24.19	31.34	55.53	74.00	18.47	173	PK	PASS	Vertical
6	1223.44	11.43	31.34	42.77	54.00	11.23	231	AV	PASS	Vertical

Remark:

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

Product Name:	Industrial AI Edge Computing Gateway	Product Model:	DSGW-380
Test By:	Kiran Zeng	Test mode:	Tx mode
Test Channel:	Lowest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		

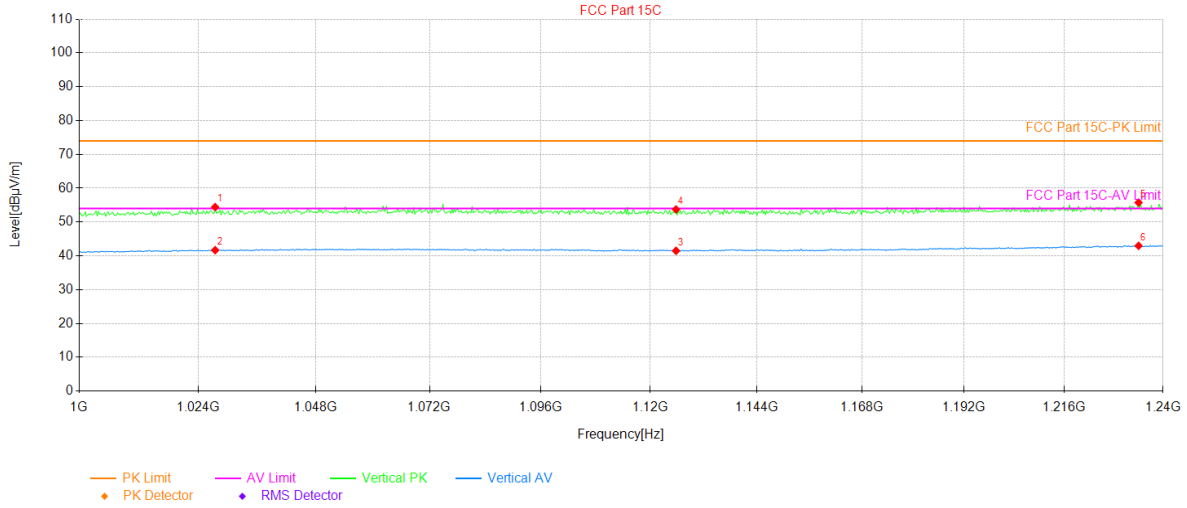


Suspected Data List										
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	1033.36	23.10	30.65	53.75	74.00	20.25	236	PK	PASS	Horizontal
2	1033.36	11.02	30.65	41.67	54.00	12.33	79	AV	PASS	Horizontal
3	1121.20	23.76	30.81	54.57	74.00	19.43	271	PK	PASS	Horizontal
4	1121.20	10.82	30.81	41.63	54.00	12.37	254	AV	PASS	Horizontal
5	1199.92	23.30	31.22	54.52	74.00	19.48	227	PK	PASS	Horizontal
6	1199.92	11.15	31.22	42.37	54.00	11.63	74	AV	PASS	Horizontal

Remark:

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

Product Name:	Industrial AI Edge Computing Gateway	Product Model:	DSGW-380
Test By:	Kiran Zeng	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		

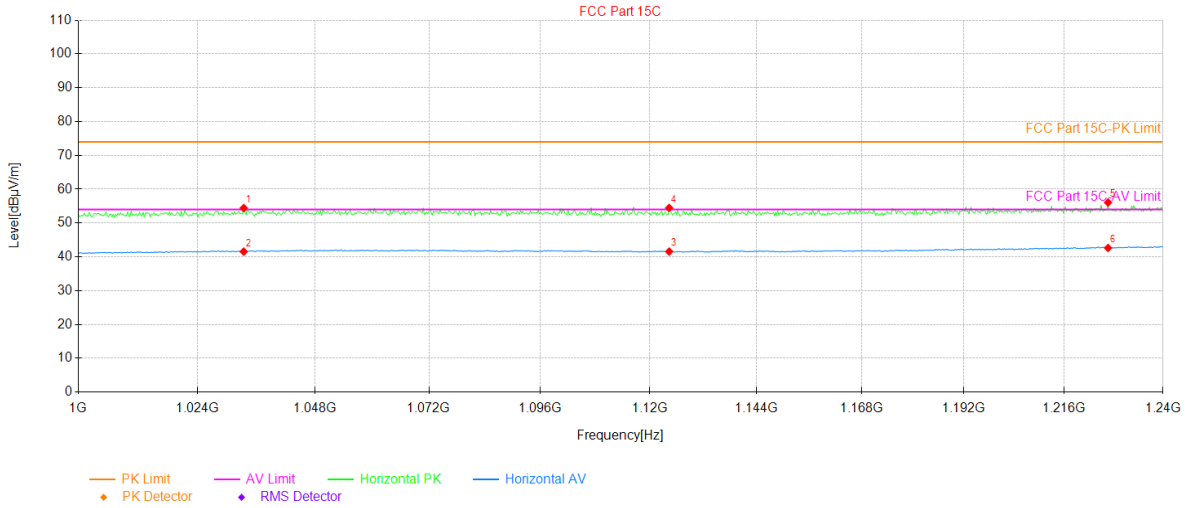


Suspected Data List										
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	1027.36	23.81	30.61	54.42	74.00	19.58	341	PK	PASS	Vertical
2	1027.36	11.07	30.61	41.68	54.00	12.32	193	AV	PASS	Vertical
3	1125.76	10.67	30.83	41.50	54.00	12.50	167	AV	PASS	Vertical
4	1125.76	22.89	30.83	53.72	74.00	20.28	328	PK	PASS	Vertical
5	1234.00	24.34	31.42	55.76	74.00	18.24	167	PK	PASS	Vertical
6	1234.00	11.55	31.42	42.97	54.00	11.03	26	AV	PASS	Vertical

Remark:

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

Product Name:	Industrial AI Edge Computing Gateway	Product Model:	DSGW-380
Test By:	Kiran Zeng	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



Suspected Data List										
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	1033.36	23.78	30.65	54.43	74.00	19.57	61	PK	PASS	Horizontal
2	1033.36	10.90	30.65	41.55	54.00	12.45	235	AV	PASS	Horizontal
3	1124.32	10.74	30.83	41.57	54.00	12.43	159	AV	PASS	Horizontal
4	1124.32	23.64	30.83	54.47	74.00	19.53	325	PK	PASS	Horizontal
5	1226.56	24.71	31.36	56.07	74.00	17.93	311	PK	PASS	Horizontal
6	1226.56	11.28	31.36	42.64	54.00	11.36	146	AV	PASS	Horizontal

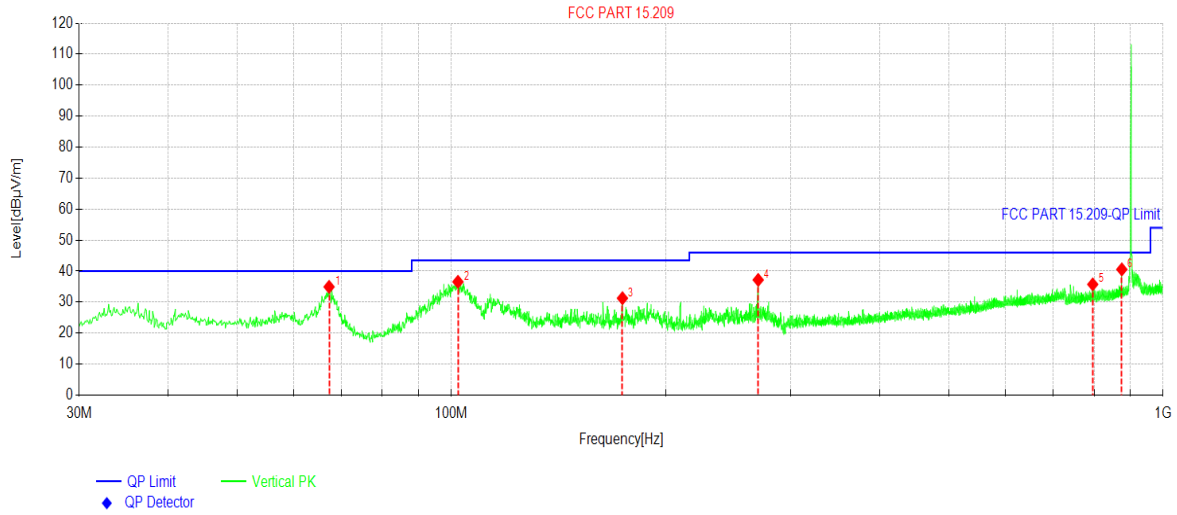
Remark:

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

5.9.4 Emissions in Non-restricted Frequency Bands

Below 1GHz:

Product Name:	Industrial AI Edge Computing Gateway	**Product Model:**	DSGW-380
Test By:	Robin Gu	**Test mode:**	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz		

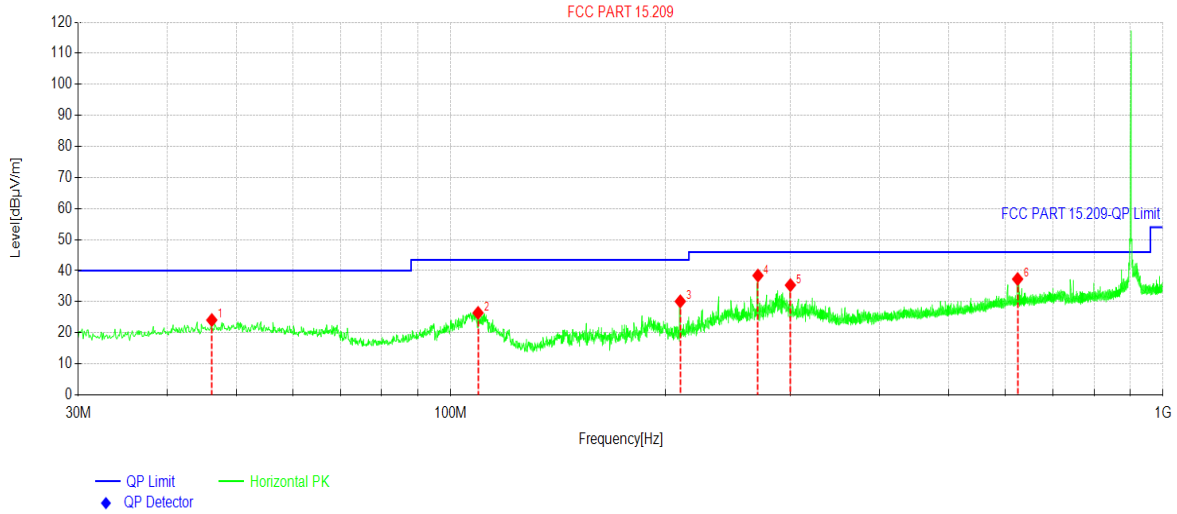


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	67.3487	50.70	-15.77	34.93	40.00	5.07	PK	Vertical
2	102.1752	51.13	-14.58	36.55	43.50	6.95	PK	Vertical
3	173.9624	48.56	-17.29	31.27	43.50	12.23	PK	Vertical
4	269.9050	50.91	-13.74	37.17	46.00	8.83	PK	Vertical
5	796.5707	39.80	-4.06	35.74	46.00	10.26	PK	Vertical
6	875.0515	43.58	-3.02	40.56	46.00	5.44	PK	Vertical

Remark:

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

Product Name:	Industrial AI Edge Computing Gateway	Product Model:	DSGW-380
Test By:	Robin Gu	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]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	46.2006	36.83	-12.73	24.10	40.00	15.90	PK	Horizontal
2	109.2569	41.14	-14.75	26.39	43.50	17.11	PK	Horizontal
3	210.0500	45.55	-15.43	30.12	43.50	13.38	PK	Horizontal
4	270.0020	52.17	-13.74	38.43	46.00	7.57	PK	Horizontal
5	299.8810	48.34	-13.00	35.34	46.00	10.66	PK	Horizontal
6	625.0575	43.66	-6.36	37.30	46.00	8.70	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)	Margin (dB)	Polarization
1804.60	76.19	-22.41	53.78	74.00	20.22	Vertical
1804.60	70.86	-22.41	48.45	74.00	25.55	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
1804.60	73.02	-22.41	50.61	54.00	3.39	Vertical
1804.60	67.51	-22.41	45.10	54.00	8.90	Horizontal
Middle channel						
Peak Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
1817.00	59.94	-22.33	37.61	74.00	36.39	Vertical
1817.00	57.44	-22.33	35.11	74.00	38.89	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
1817.00	53.12	-22.33	30.79	54.00	23.21	Vertical
1817.00	50.80	-22.33	28.47	54.00	25.53	Horizontal
Highest channel						
Peak Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
1829.80	57.75	-22.27	35.48	74.00	38.52	Vertical
1829.80	56.25	-22.27	33.98	74.00	40.02	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBuV)	Factor(dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
1829.80	49.33	-22.27	27.06	54.00	26.94	Vertical
1829.80	47.98	-22.27	25.71	54.00	28.29	Horizontal
Remark:						
1. Level = Read level + Factor.						

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