FCC RF Test Report
(DTS)

Report No.:	JYTSZ-R12-2400499
Applicant:	Ham-Let Singapore Valves & Fittings Pte Ltd
Address of Applicant:	8 Admiralty Street, #06-11, Admirax, Singapore 757438

Equipment Under Test (EUT)

Product Name:	IOTH6000 WLS(DC Smart Valve)
Model No.:	IOTH6000
Trade Mark:	N/A
FCC ID:	2A3I5-H6000
Applicable Standards:	FCC CFR Title 47 Part 15C (§15.247)
Date of Sample Receipt:	07 May, 2024
Date of Test:	08 May, to 17 Jun., 2024
Date of Report Issued:	28 Jun., 2024
Test Result:	PASS

Tested by:	Project Engineer	***Date:***	*28 Jun., 2024*
Reviewed by:	Senior Engineer	***Date:***	*28 Jun., 2024*
Approved by:	Manager	***Date:***	*28 Jun., 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	*18 Jun., 2024*	*Original*
01	*28 Jun., 2024*	*Update Page 11,35*

2 Contents

3 General Information

3.1 Client Information

Applicant:	Ham-Let Singapore Valves & Fittings Pte Ltd
Address:	8 Admiralty Street, #06-11, Admirax, Singapore 757438
Manufacturer/Factory:	Hamlet (Israel - Canada) Ltd
Address:	P.O. Box 824, Nazareth Illit, 1710801

3.2 General Description of E.U.T.

Product Name:	IOTH6000 WLS(DC Smart Valve)
Model No.:	IOTH6000
Operation Frequency:	125KHz Channel: 902.3-914.9MHz 500kHz Channel: 903-914.2MHz
Channel Numbers:	125KHz Channel: 64 channels 500KHz Channel: 8 channels
Channel Separation:	125KHz Channel: 200KHz 500KHz Channel: 1.6MHz
Modulation Technology:	LoRa
Antenna Type:	Monopole Antenna
Antenna Gain:	2.0dBi (declare by applicant)
Power Supply:	DC 24V
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

3.3 Test Mode and Test Environment

Test Mode:	
Transmitting mode	Keep the EUT in continuous transmitting with modulation
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: 24.0 Vdc
Test Engineer:	Logan (Conducted measurement) Alan (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	04-24-2024	04-23-2025
Pre-amplifier (1GHz ~ 18GHz)	YUNYI	PAM-118N	WXJ097-6	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
				06-11-2024	06-10-2025
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	11-01-2023	10-31-2024
DC Power Supply	Keysight	E3642A	WXJ025-2	N/A	

4 Measurement Setup and Procedure

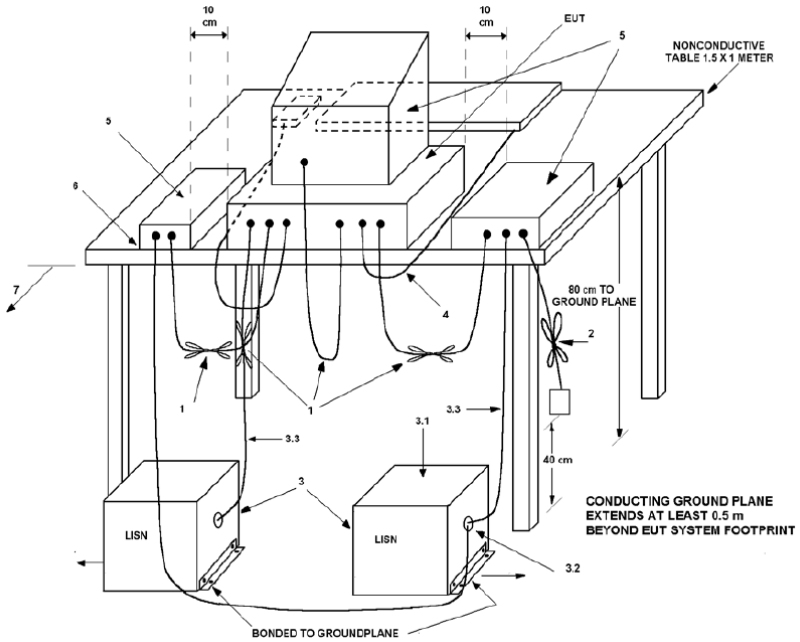
4.1 Test Channel

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:

125KHz:					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
CH01	902.3MHz	CH32	908.5MHz	CH64	914.9MHz
500KHz:					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
CH65	903MHz	CH68	907.8MHz	CH72	914.2MHz

4.2 Test Setup

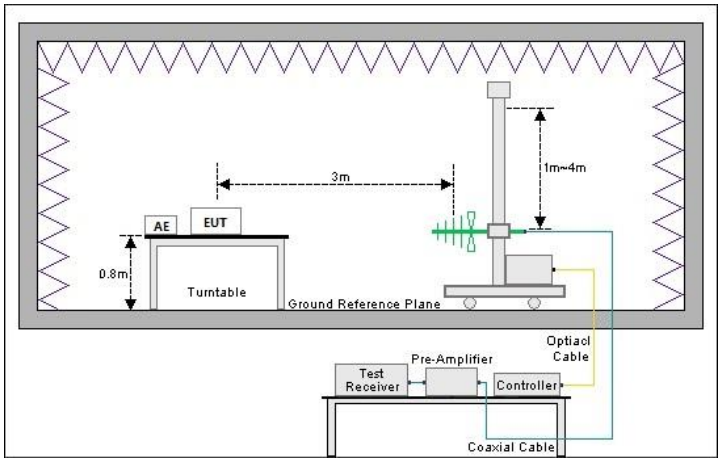
1) Conducted emission measurement:



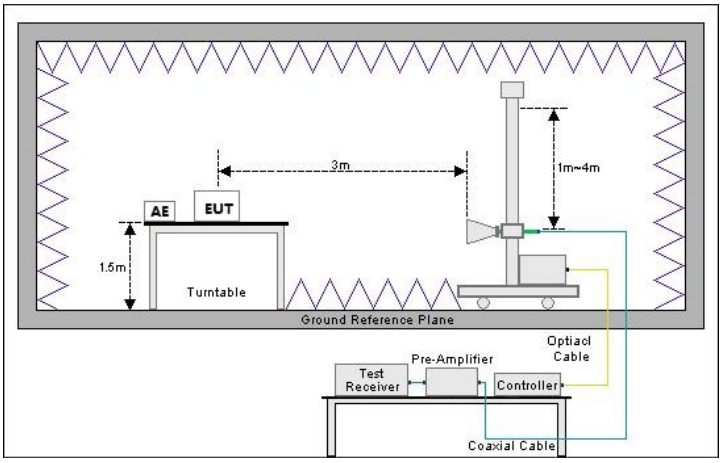
Note: The detailed descriptions please refer to Figure 8 of ANSI C63.4:2014.

2) Radiated emission measurement:

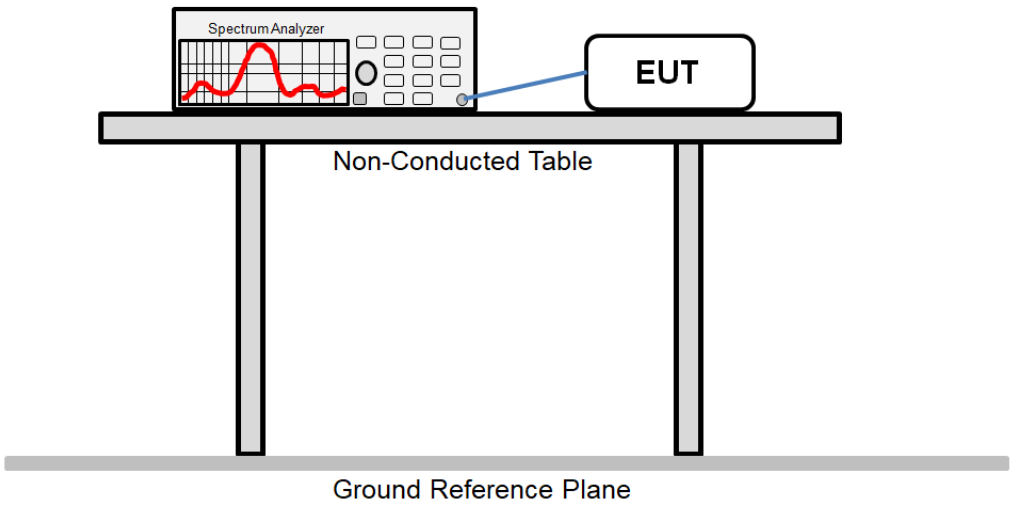
Below 1GHz (3m SAC)



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 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)(3)	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801.	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801
6dB Emission Bandwidth 99% Occupied Bandwidth	15.247 (a)(2)	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801.	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801
20dB Occupied Bandwidth	15.247 (a)(1)(i)	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801.	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801
Carrier Frequencies Separation	15.247 (a)(1)	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801.	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801
Hopping Channel Number	5.247 (a)(1)(i)	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801.	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801
Dwell Time	15.247 (a)(1)(i)	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801.	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801
Power Spectral Density	15.247 (e)	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801.	Please refer to FCC ID:VPYCMABZ Report SHEM160900621801
Spurious Emission	15.205 15.209 15.247 (d)	1.See Section 5.11 2. Please refer to FCC ID:VPYCMABZ Report SHEM160900621801.	1.Pass 2. Please refer to FCC ID:VPYCMABZ Report SHEM160900621801.

Remark:

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (provided by the customer).*
3. *Please refer to FCC ID:VPYCMABZ, report No.: SHEM160900621801, issued by SGS-CSTC (Shanghai) Co., Ltd.*

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 systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.
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>6dB Emission Bandwidth</td><td>For digitally modulated systems, The minimum 6 dB bandwidth shall be at least 500 kHz.</td></tr>
<tr><td>99% Occupied Bandwidth</td><td>N/A</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>Power Spectral Density</td><td>For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.</td></tr>
</table>

<table>
<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>

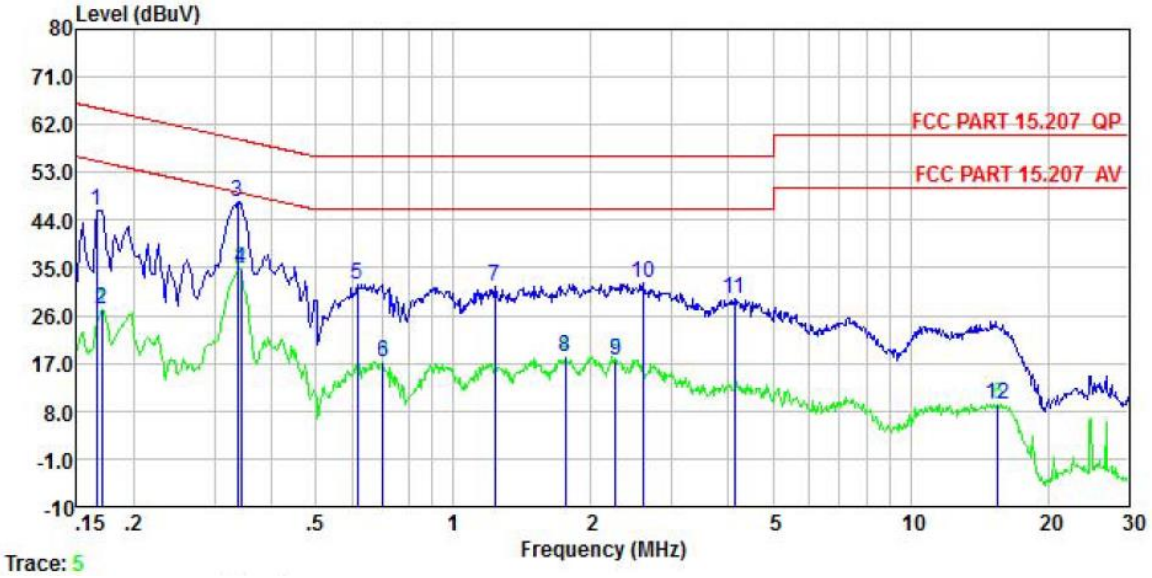
5.2 Antenna requirement

Standard requirement:	FCC Part 15 C Section 15.203 /247(b)(4)
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 cannot replace by end-user, the best case gain of the antenna is 2.0 dBi. See product internal photos for details.	

5.3 AC Power Line Conducted Emission

125KHz:

Product name:	IOTH6000 WLS(DC Smart Valve)	**Product model:**	IOTH6000
Test by:	Asher	**Test mode:**	Tx mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Line
Test voltage:	AC 120 V/60 Hz		

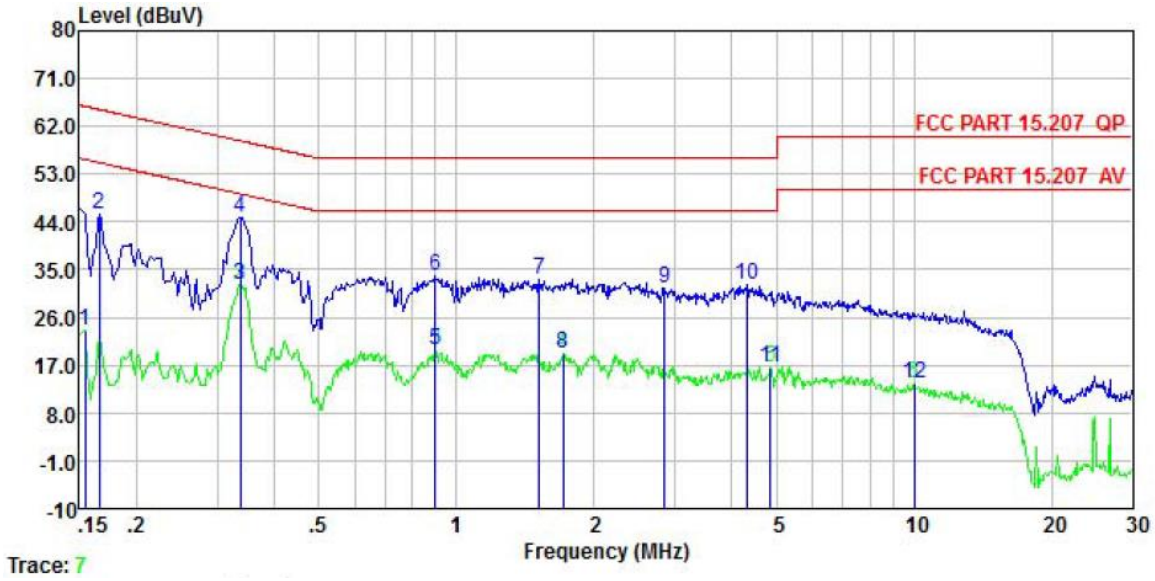


	Freq	Read Level	LISN Factor	Aux Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB	
1	0.166	35.74	0.20	0.00	9.88	0.01	45.83	65.16	-19.33	QP
2	0.170	17.11	0.20	0.00	9.88	0.01	27.20	54.94	-27.74	Average
3	0.337	37.40	0.20	0.00	9.88	0.02	47.50	59.27	-11.77	QP
4	0.343	24.73	0.20	0.00	9.88	0.02	34.83	49.13	-14.30	Average
5	0.617	21.89	0.20	0.00	9.88	0.02	31.99	56.00	-24.01	QP
6	0.701	7.23	0.20	0.00	9.88	0.03	17.34	46.00	-28.66	Average
7	1.229	21.32	0.20	0.00	9.88	0.10	31.50	56.00	-24.50	QP
8	1.753	8.12	0.20	0.00	9.88	0.18	18.38	46.00	-27.62	Average
9	2.261	7.48	0.20	0.00	9.88	0.17	17.73	46.00	-28.27	Average
10	2.608	21.95	0.20	0.00	9.88	0.12	32.15	56.00	-23.85	QP
11	4.114	19.15	0.20	0.00	9.89	0.08	29.32	56.00	-26.68	QP
12	15.552	-0.99	0.31	0.00	9.93	0.15	9.40	50.00	-40.60	Average

Remark:

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

Product name:	IOTH6000 WLS(DC Smart Valve)	Product model:	IOTH6000
Test by:	Asher	Test mode:	Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz		



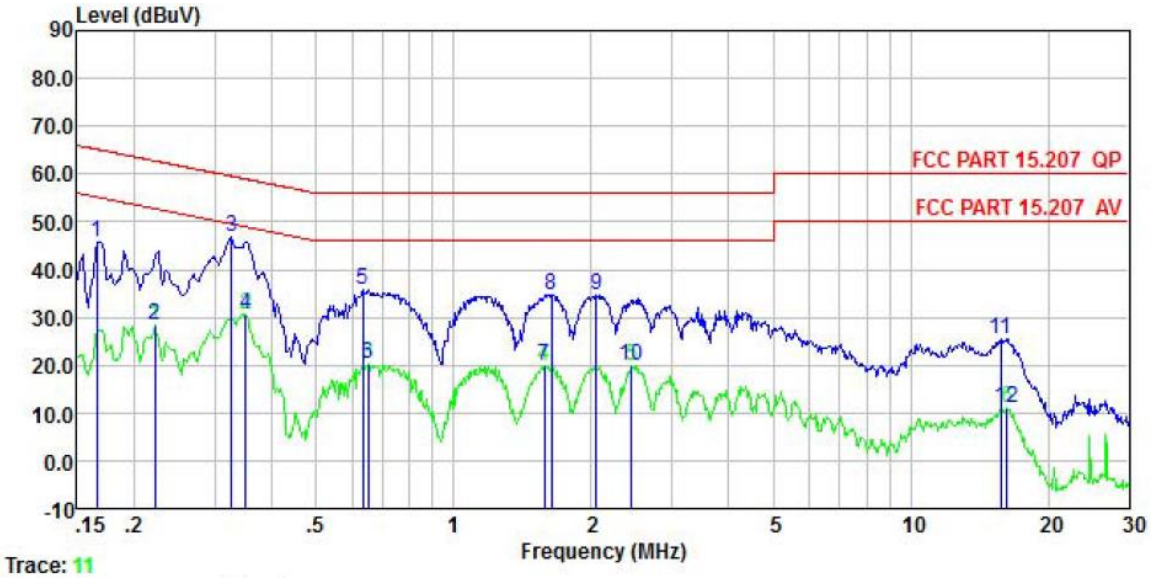
	Freq	Read Level	LISN Factor	Aux Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB	
1	0.154	13.61	0.20	0.00	9.88	0.01	23.70	55.78	-32.08	Average
2	0.166	35.53	0.20	0.00	9.88	0.01	45.62	65.16	-19.54	QP
3	0.337	22.05	0.20	0.00	9.88	0.02	32.15	49.27	-17.12	Average
4	0.337	34.80	0.20	0.00	9.88	0.02	44.90	59.27	-14.37	QP
5	0.899	9.63	0.20	0.00	9.88	0.04	19.75	46.00	-26.25	Average
6	0.899	23.73	0.20	0.00	9.88	0.04	33.85	56.00	-22.15	QP
7	1.519	22.96	0.26	0.00	9.88	0.15	33.25	56.00	-22.75	QP
8	1.707	8.74	0.28	0.00	9.88	0.17	19.07	46.00	-26.93	Average
9	2.854	21.37	0.30	0.00	9.89	0.09	31.65	56.00	-24.35	QP
10	4.315	21.95	0.30	0.00	9.89	0.08	32.22	56.00	-23.78	QP
11	4.848	6.39	0.30	0.00	9.89	0.09	16.67	46.00	-29.33	Average
12	10.019	3.03	0.40	0.00	9.91	0.13	13.47	50.00	-36.53	Average

Remark:

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

500 KHz:

Product name:	IOTH6000 WLS(DC Smart Valve)	Product model:	IOTH6000
Test by:	Kiran	Test mode:	Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz		

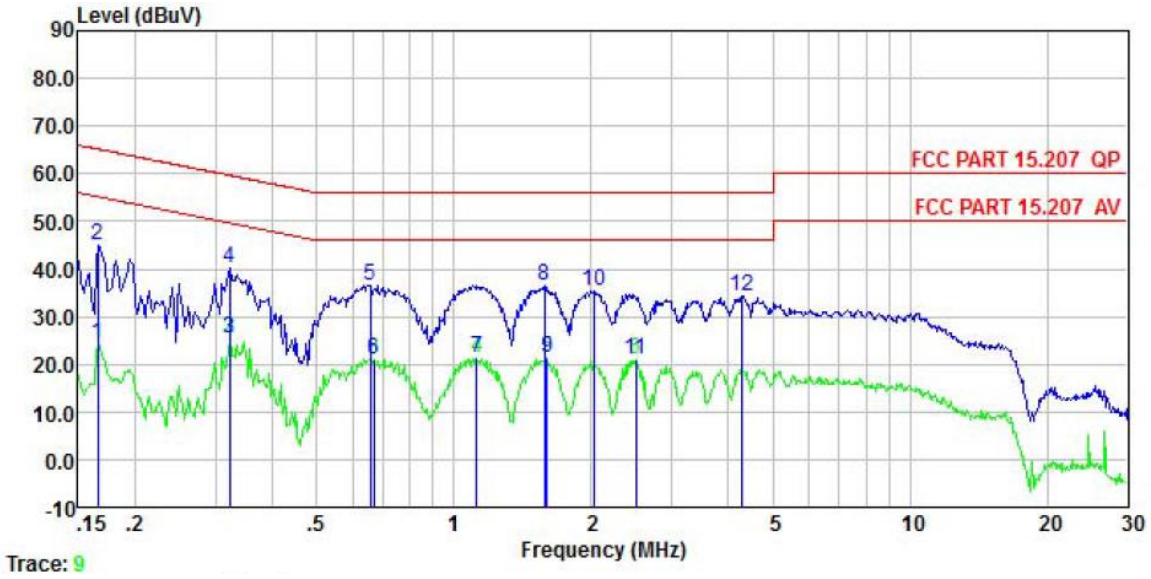


	Freq	Read Level	LISN Factor	Aux Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB	
1	0.166	35.53	0.20	0.00	9.88	0.01	45.62	65.16	-19.54	QP
2	0.222	18.18	0.20	0.00	9.88	0.03	28.29	52.74	-24.45	Average
3	0.327	36.75	0.20	0.00	9.88	0.02	46.85	59.53	-12.68	QP
4	0.350	20.42	0.20	0.00	9.88	0.02	30.52	48.96	-18.44	Average
5	0.634	25.56	0.20	0.00	9.88	0.02	35.66	56.00	-20.34	QP
6	0.651	10.14	0.20	0.00	9.88	0.03	20.25	46.00	-25.75	Average
7	1.577	9.79	0.20	0.00	9.88	0.16	20.03	46.00	-25.97	Average
8	1.636	24.52	0.20	0.00	9.88	0.16	34.76	56.00	-21.24	QP
9	2.055	24.26	0.20	0.00	9.88	0.20	34.54	56.00	-21.46	QP
10	2.448	9.83	0.20	0.00	9.88	0.14	20.05	46.00	-25.95	Average
11	15.718	15.19	0.31	0.00	9.93	0.15	25.58	60.00	-34.42	QP
12	16.226	0.53	0.33	0.00	9.94	0.16	10.96	50.00	-39.04	Average

Remark:

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

Product name:	IOTH6000 WLS(DC Smart Valve)	Product model:	IOTH6000
Test by:	Kiran	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	0.166	14.33	0.20	0.00	9.88	0.01	24.42	55.16	-30.74	Average
2	0.166	34.84	0.20	0.00	9.88	0.01	44.93	65.16	-20.23	QP
3	0.322	15.45	0.20	0.00	9.88	0.03	25.56	49.66	-24.10	Average
4	0.322	30.22	0.20	0.00	9.88	0.03	40.33	59.66	-19.33	QP
5	0.654	26.52	0.20	0.00	9.88	0.03	36.63	56.00	-19.37	QP
6	0.668	10.91	0.20	0.00	9.88	0.03	21.02	46.00	-24.98	Average
7	1.123	11.27	0.22	0.00	9.88	0.08	21.45	46.00	-24.55	Average
8	1.577	26.14	0.27	0.00	9.88	0.16	36.45	56.00	-19.55	QP
9	1.602	11.02	0.27	0.00	9.88	0.16	21.33	46.00	-24.67	Average
10	2.023	25.06	0.30	0.00	9.88	0.20	35.44	56.00	-20.56	QP
11	2.500	10.77	0.30	0.00	9.88	0.13	21.08	46.00	-24.92	Average
12	4.292	24.09	0.30	0.00	9.89	0.08	34.36	56.00	-21.64	QP

Remark:

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

5.4 Conducted Output Power

Please refer to report SHEM160900621801.

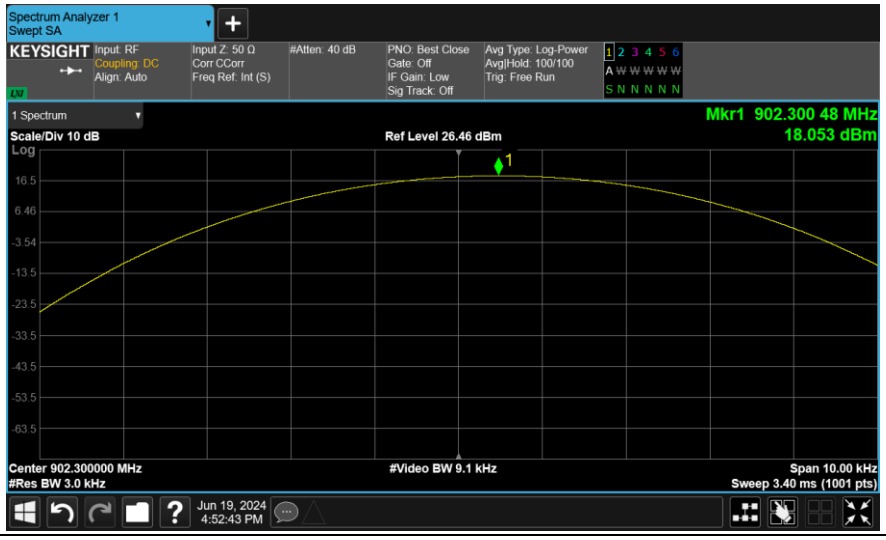
Spot Cheek Power

125 KHz

Test Channel	Maximum Output Power (dBm)	Limit(dBm)	Result
Lowest channel	18.05	30.00	Pass

Test plot as follows:

Lowest channel



500 KHz

Test Channel	Maximum Output Power (dBm)	Limit(dBm)	Result
Lowest channel	16.94	30.00	Pass

Test plot as follows:

Lowest channel

5.5 6dB & 99% Occupied Bandwidth

Please refer to report SHEM160900621801.

5.6 20dB Occupied Bandwidth

Please refer to report SHEM160900621801.

5.7 Carrier Frequencies Separation

Please refer to report SHEM160900621801.

5.8 Hopping Channel Number

Please refer to report SHEM160900621801.

5.9 Dwell Time

Please refer to report SHEM160900621801.

5.10 Power Spectral Density

Please refer to report SHEM160900621801.

5.11 Spurious Emission

5.11.1 Band-edge Emission

Please refer to report SHEM160900621801.

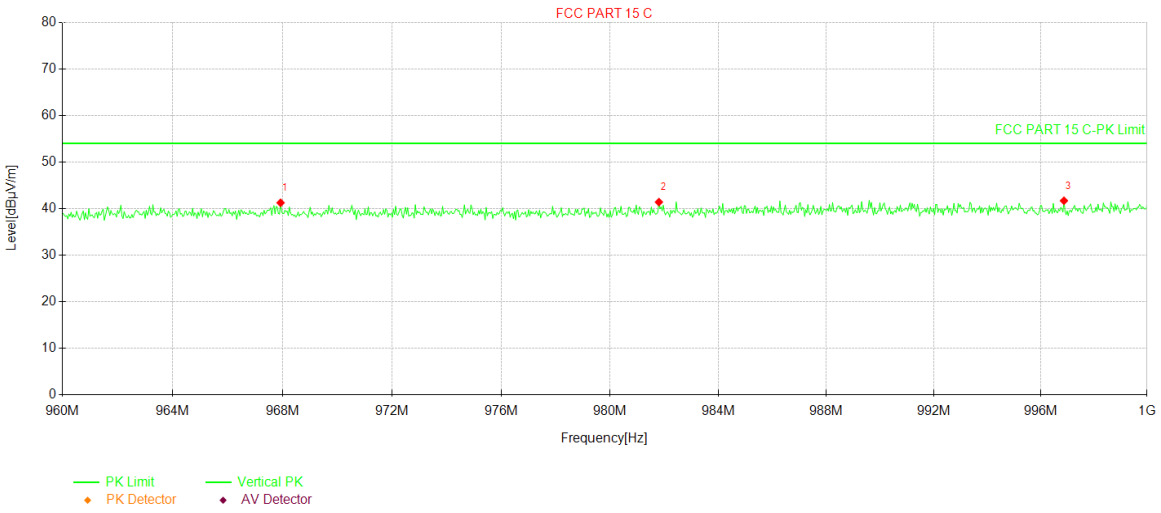
5.11.2 Conducted Spurious Emission

Please refer to report SHEM160900621801.

5.11.3 Emissions in Restricted Frequency Bands

125KHz:

Product Name:	IOTH6000 WLS(DC Smart Valve)	**Product Model:**	IOTH6000
Test By:	Alan	**Test mode:**	Tx mode
Test Channel:	Lowest channel	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz		

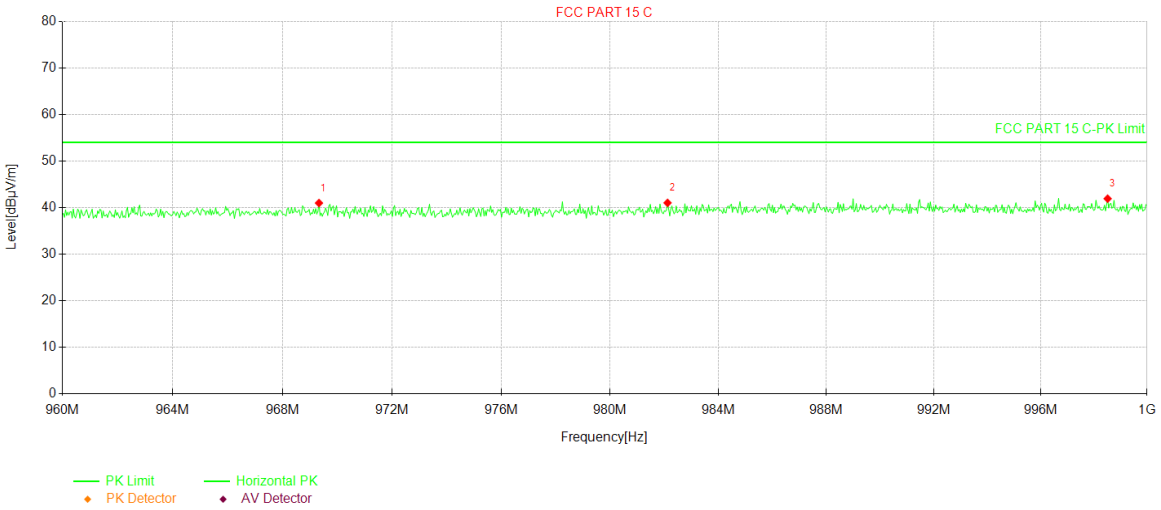


Suspected Data List										
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	967.92	50.40	-9.16	41.24	54.00	12.76	230	PK	PASS	Vertical
2	981.80	49.82	-8.43	41.39	54.00	12.61	50	PK	PASS	Vertical
3	996.88	49.50	-7.82	41.68	54.00	12.32	340	PK	PASS	Vertical

Remark:

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

Product Name:	IOTH6000 WLS(DC Smart Valve)	Product Model:	IOTH6000
Test By:	Alan	Test mode:	Tx mode
Test Channel:	Lowest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



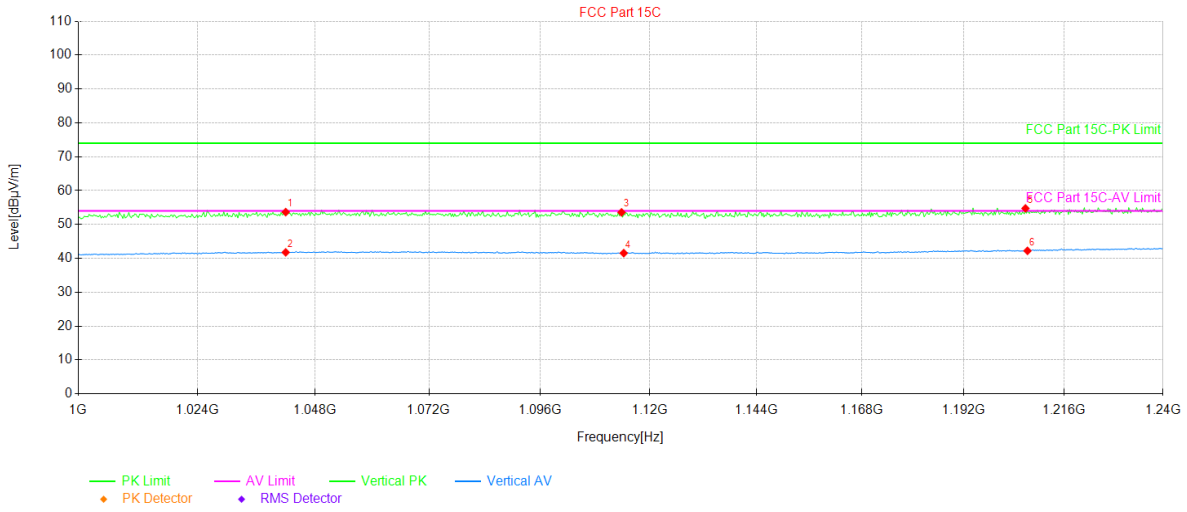
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	969.32	50.13	-9.16	40.97	54.00	13.03	180	PK	PASS	Horizon
2	982.12	49.41	-8.41	41.00	54.00	13.00	270	PK	PASS	Horizon
3	998.52	49.67	-7.77	41.90	54.00	12.10	140	PK	PASS	Horizon

Remark:

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

Product Name:	IOTH6000 WLS(DC Smart Valve)	Product Model:	IOTH6000
Test By:	Alan	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		



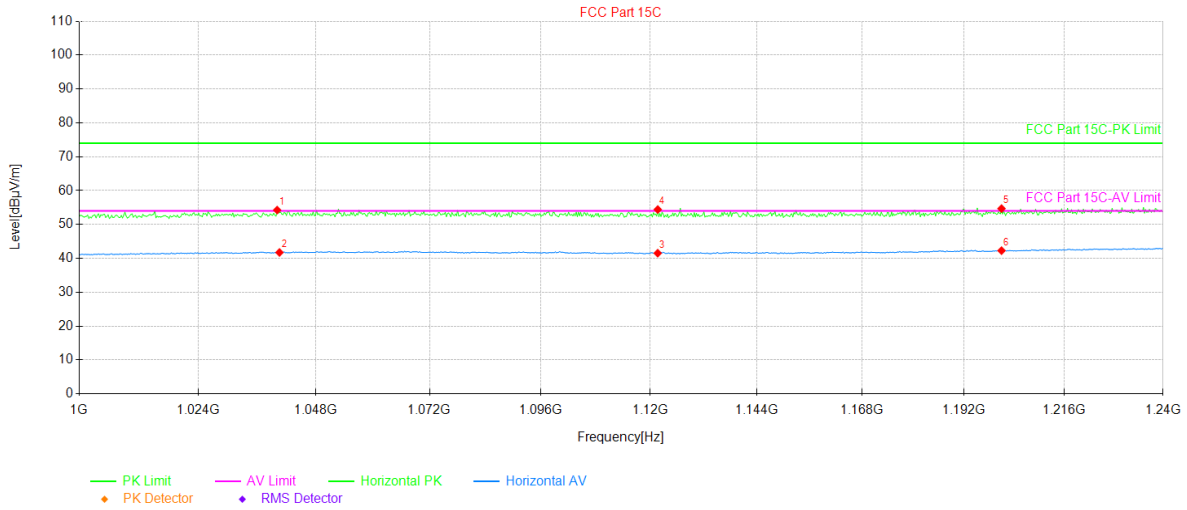
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	1042.00	22.96	30.69	53.65	74.00	20.35	31	PK	PASS	Vertical
2	1042.00	11.09	30.69	41.78	54.00	12.22	360	AV	PASS	Vertical
3	1113.76	22.80	30.78	53.58	74.00	20.42	349	PK	PASS	Vertical
4	1114.24	10.76	30.78	41.54	54.00	12.46	259	AV	PASS	Vertical
5	1206.64	23.53	31.23	54.76	74.00	19.24	268	PK	PASS	Vertical
6	1207.12	11.00	31.23	42.23	54.00	11.77	305	AV	PASS	Vertical

Remark:

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

Product Name:	IOTH6000 WLS(DC Smart Valve)	Product Model:	IOTH6000
Test By:	Alan	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



Suspected Data List

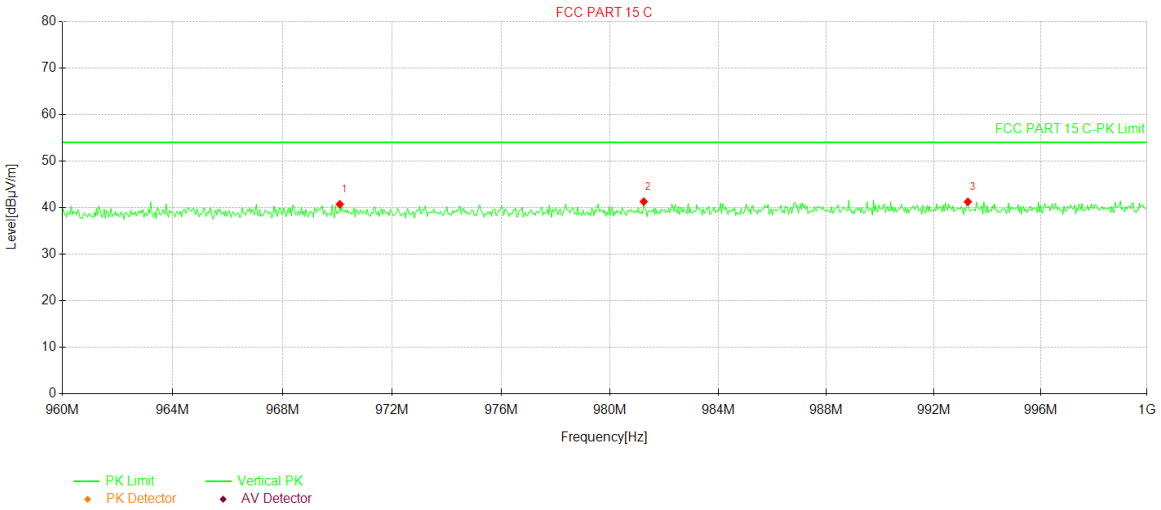
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	1040.08	23.58	30.68	54.26	74.00	19.74	32	PK	PASS	Horizontal
2	1040.56	11.05	30.69	41.74	54.00	12.26	59	AV	PASS	Horizontal
3	1121.68	10.72	30.81	41.53	54.00	12.47	36	AV	PASS	Horizontal
4	1121.68	23.60	30.81	54.41	74.00	19.59	2	PK	PASS	Horizontal
5	1200.88	23.47	31.22	54.69	74.00	19.31	297	PK	PASS	Horizontal
6	1200.88	11.06	31.22	42.28	54.00	11.72	166	AV	PASS	Horizontal

Remark:

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

500K:

Product Name:	IOTH6000 WLS(DC Smart Valve)	**Product Model:**	IOTH6000
Test By:	Alan	**Test mode:**	Tx mode
Test Channel:	Lowest channel	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz		

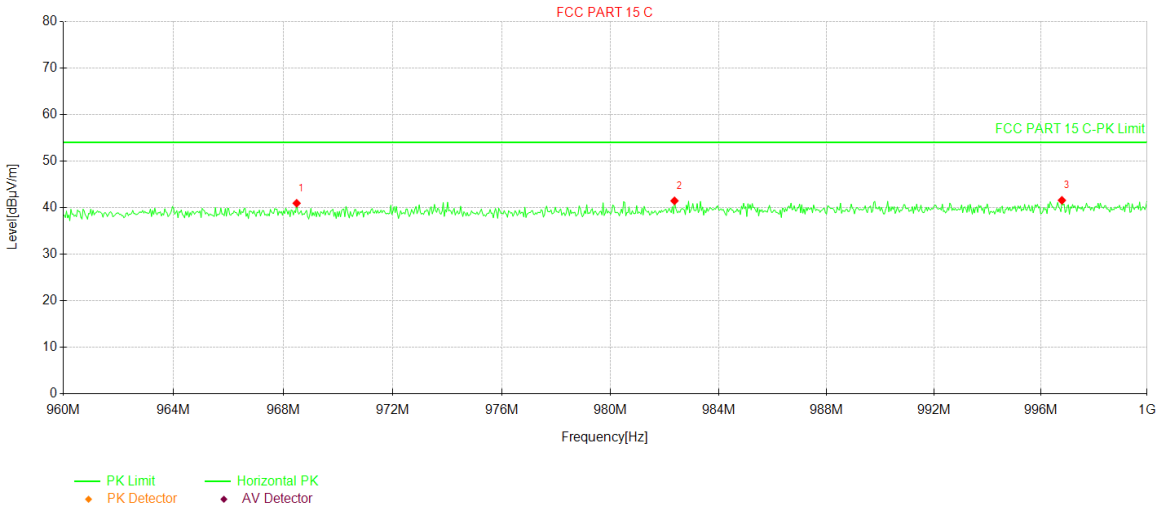


Suspected Data List										
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	970.08	49.87	-9.16	40.71	54.00	13.29	10	PK	PASS	Vertical
2	981.24	49.76	-8.48	41.28	54.00	12.72	50	PK	PASS	Vertical
3	993.28	49.11	-7.88	41.23	54.00	12.77	10	PK	PASS	Vertical

Remark:

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

Product Name:	IOTH6000 WLS(DC Smart Valve)	Product Model:	IOTH6000
Test By:	Alan	Test mode:	Tx mode
Test Channel:	Lowest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		

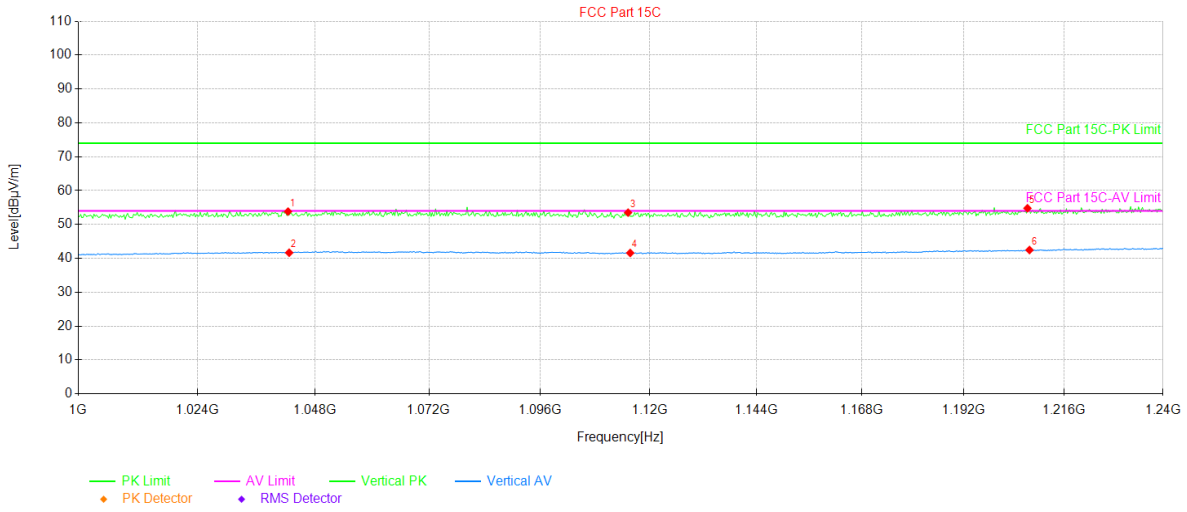


Suspected Data List										
NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	968.48	50.08	-9.16	40.92	54.00	13.08	300	PK	PASS	Horizontal
2	982.36	49.83	-8.39	41.44	54.00	12.56	290	PK	PASS	Horizontal
3	996.80	49.37	-7.82	41.55	54.00	12.45	260	PK	PASS	Horizontal

Remark:

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

Product Name:	IOTH6000 WLS(DC Smart Valve)	Product Model:	IOTH6000
Test By:	Alan	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		



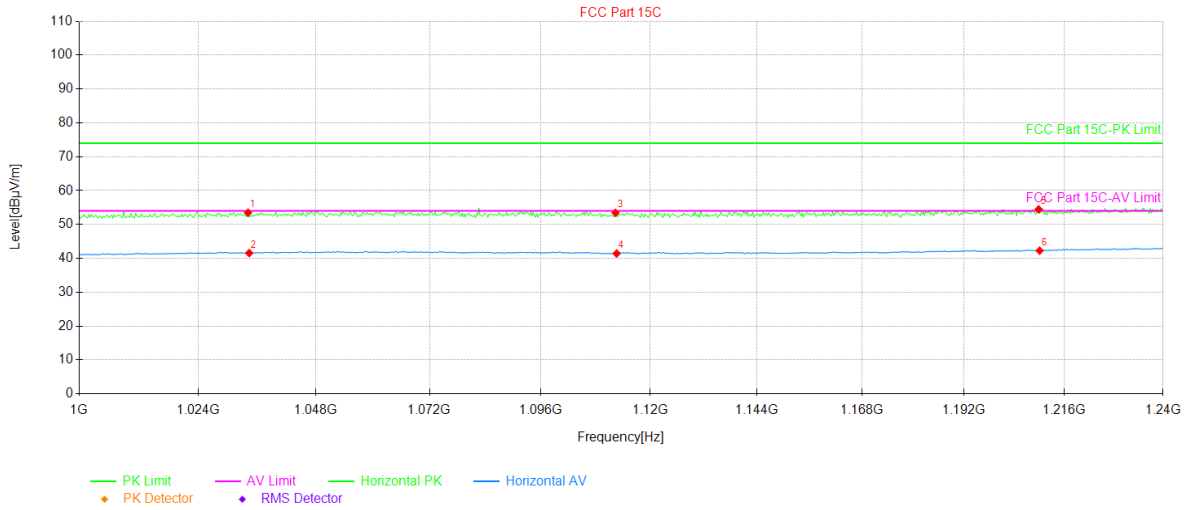
Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV]	Factor [dB/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Angle [°]	Detector	Verdict	Polarity
1	1042.48	23.12	30.69	53.81	74.00	20.19	247	PK	PASS	Vertical
2	1042.72	10.97	30.70	41.67	54.00	12.33	229	AV	PASS	Vertical
3	1115.20	22.72	30.78	53.50	74.00	20.50	220	PK	PASS	Vertical
4	1115.68	10.81	30.78	41.59	54.00	12.41	334	AV	PASS	Vertical
5	1207.12	23.56	31.23	54.79	74.00	19.21	339	PK	PASS	Vertical
6	1207.60	11.22	31.24	42.46	54.00	11.54	73	AV	PASS	Vertical

Remark:

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

Product Name:	IOTH6000 WLS(DC Smart Valve)	Product Model:	IOTH6000
Test By:	Alan	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	1034.08	22.82	30.65	53.47	74.00	20.53	225	PK	PASS	Horizontal
2	1034.32	10.91	30.65	41.56	54.00	12.44	283	AV	PASS	Horizontal
3	1112.32	22.68	30.76	53.44	74.00	20.56	297	PK	PASS	Horizontal
4	1112.56	10.67	30.77	41.44	54.00	12.56	96	AV	PASS	Horizontal
5	1209.76	23.23	31.24	54.47	74.00	19.53	325	PK	PASS	Horizontal
6	1210.00	11.03	31.24	42.27	54.00	11.73	109	AV	PASS	Horizontal

Remark:

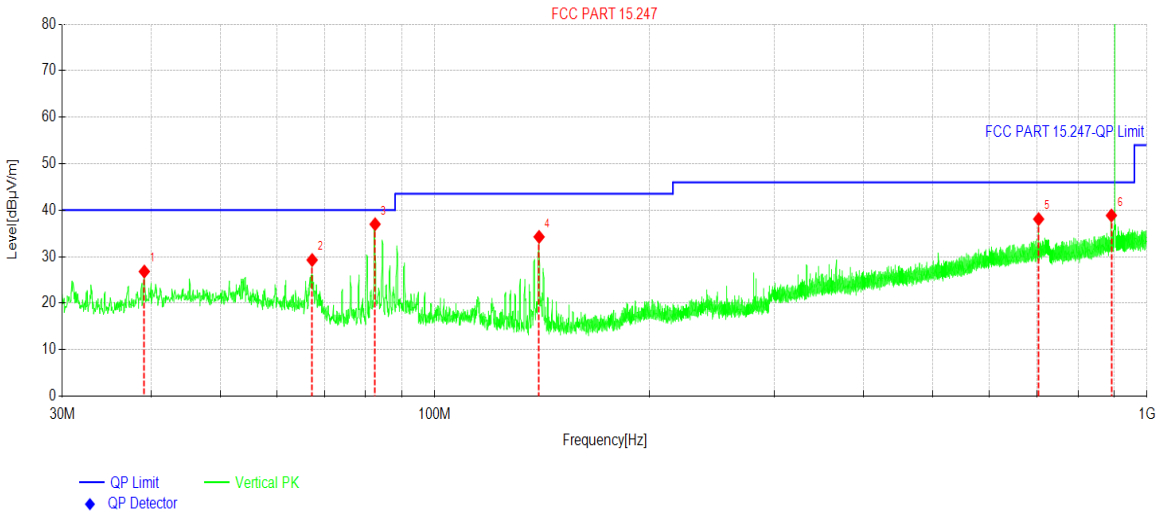
1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

5.11.4 Emissions in Non-restricted Frequency Bands

Below 1GHz:

125KHz

Product Name:	IOTH6000 WLS(DC Smart Valve)	**Product Model:**	IOTH6000
Test By:	Kiran	**Test mode:**	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz		

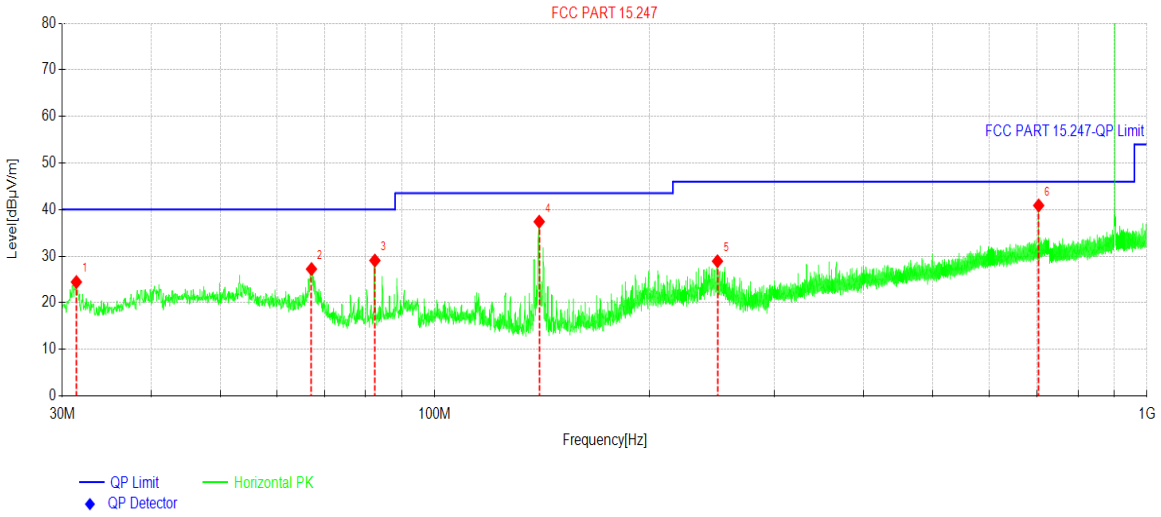


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	39.1185	40.73	-13.93	26.80	40.00	13.20	PK	Vertical
2	67.2984	45.03	-15.75	29.28	40.00	10.72	PK	Vertical
3	82.4796	55.29	-18.32	36.97	40.00	3.03	PK	Vertical
4	140.1490	52.55	-18.30	34.25	43.50	9.25	PK	Vertical
5	704.5232	43.55	-5.47	38.08	46.00	7.92	PK	Vertical
6	891.4031	41.63	-2.78	38.85	46.00	7.15	PK	Vertical

Remark:

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

Product Name:	IOTH6000 WLS(DC Smart Valve)	Product Model:	IOTH6000
Test By:	Kiran	Test mode:	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



Suspected Data List

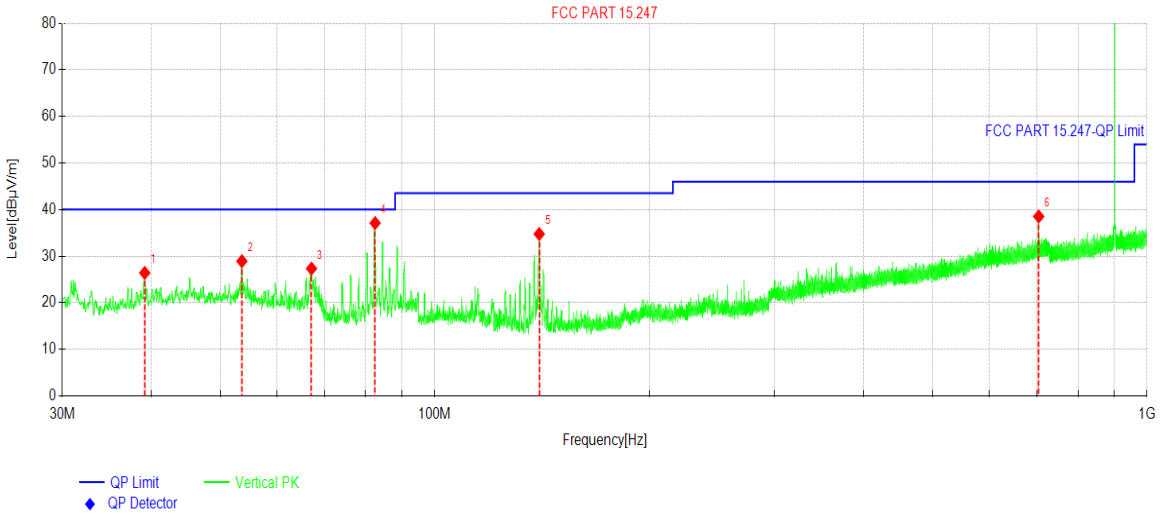
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	31.4066	40.33	-15.89	24.44	40.00	15.56	PK	Horizontal
2	67.1529	42.93	-15.70	27.23	40.00	12.77	PK	Horizontal
3	82.4311	47.39	-18.33	29.06	40.00	10.94	PK	Horizontal
4	140.1975	55.70	-18.30	37.40	43.50	6.10	PK	Horizontal
5	249.4735	42.81	-13.90	28.91	46.00	17.09	PK	Horizontal
6	704.6202	46.34	-5.47	40.87	46.00	5.13	PK	Horizontal

Remark:

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

500 KHz

Product Name:	IOTH6000 WLS(DC Smart Valve)	**Product Model:**	IOTH6000
Test By:	Kiran	**Test mode:**	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz		

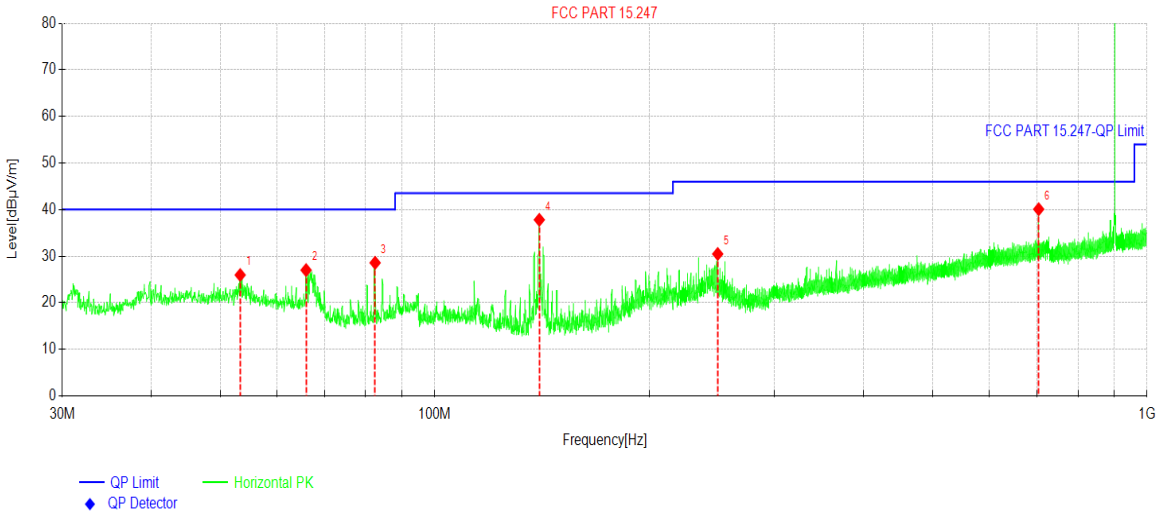


Suspected Data List								
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Trace	Polarity
1	39.1670	40.32	-13.92	26.40	40.00	13.60	PK	Vertical
2	53.6207	41.86	-12.94	28.92	40.00	11.08	PK	Vertical
3	67.1529	43.03	-15.70	27.33	40.00	12.67	PK	Vertical
4	82.4796	55.42	-18.32	37.10	40.00	2.90	PK	Vertical
5	140.1975	53.06	-18.30	34.76	43.50	8.74	PK	Vertical
6	704.6202	43.99	-5.47	38.52	46.00	7.48	PK	Vertical

Remark:

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

Product Name:	IOTH6000 WLS(DC Smart Valve)	Product Model:	IOTH6000
Test By:	Kiran	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	53.3297	38.84	-12.88	25.96	40.00	14.04	PK	Horizontal
2	65.9888	42.23	-15.23	27.00	40.00	13.00	PK	Horizontal
3	82.4796	46.89	-18.32	28.57	40.00	11.43	PK	Horizontal
4	140.2460	56.10	-18.30	37.80	43.50	5.70	PK	Horizontal
5	249.6675	44.37	-13.90	30.47	46.00	15.53	PK	Horizontal
6	704.6202	45.55	-5.47	40.08	46.00	5.92	PK	Horizontal

Remark:

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

Above 1GHz:

125KHz:

Lowest channel						
Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1804.60	59.40	-9.60	49.80	74.00	24.20	Vertical
1804.60	59.44	-9.60	49.84	74.00	24.16	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1804.60	48.83	-9.60	39.23	54.00	14.77	Vertical
1804.60	46.20	-9.60	36.60	54.00	17.40	Horizontal
Middle channel						
Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1817.00	59.42	-9.04	50.38	74.00	23.62	Vertical
1817.00	59.01	-9.04	49.97	74.00	24.03	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1817.00	49.05	-9.04	40.01	54.00	13.99	Vertical
1817.00	45.99	-9.04	36.95	54.00	17.05	Horizontal
Highest channel						
Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1829.80	59.02	-8.45	50.57	74.00	23.43	Vertical
1829.80	59.68	-8.45	51.23	74.00	22.77	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1829.80	49.23	-8.45	40.78	54.00	13.22	Vertical
1829.80	46.10	-8.45	37.65	54.00	16.35	Horizontal
Remark: *1. Level = Reading + Factor.*						

500KHz:

Lowest channel						
Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1846.60	59.20	-9.60	49.60	74.00	24.40	Vertical
1846.60	59.83	-9.60	50.23	74.00	23.77	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1846.60	48.64	-9.60	39.04	54.00	14.96	Vertical
1846.60	46.22	-9.60	36.62	54.00	17.38	Horizontal
Middle channel						
Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1851.40	58.93	-9.04	49.89	74.00	24.11	Vertical
1851.40	59.34	-9.04	50.30	74.00	23.70	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1851.40	66.97	-9.04	39.93	54.00	14.07	Vertical
1851.40	46.30	-9.04	37.26	54.00	16.74	Horizontal
Highest channel						
Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1855.00	59.49	-8.45	51.04	74.00	22.96	Vertical
1855.00	59.93	-8.45	51.48	74.00	22.52	Horizontal
Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
1855.00	48.86	-8.45	40.41	54.00	13.59	Vertical
1855.00	46.43	-8.45	37.98	54.00	16.02	Horizontal
Remark: *1. Level = Reading + Factor.*						

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