

FCC RF Test Report

(FHSS)

Applicant: Shenzhen VANCH Intelligent Technology Co., Ltd

Address of Applicant: Floor 4, Building B west side, QingHu FuAnNa industrial zone,
QingNing road 1, LongHua district, Shenzhen, Guangdong,
China 518109

Equipment Under Test (EUT)

Product Name: UHF RFID Industrial Reader

Model No.: VI-IR610P

FCC ID: 2A3H9VI-IR610P

Applicable Standards: FCC CFR Title 47 Part 15C (§15.247)

Date of Sample Receipt: 20 Jun., 2022

Date of Test: 21 Jun., 2022 to 02 Feb., 2023

Date of Report Issued: 16 May, 2023

Test Result: PASS

Tested by:
Test Engineer**Date:**

16 May, 2023

Reviewed by:
Project Engineer**Date:**

16 May, 2023

Approved by:
Manager**Date:**

16 May, 2023

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.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

1 Version

Version No.	Date	Description
00	03 Feb., 2023	Original
01	16 May, 2023	Update page 7

2 Contents

Page

Cover Page	1
1 Version	2
2 Contents.....	3
3 General Information.....	4
3.1 Client Information	4
3.2 General Description of E.U.T.	4
3.3 Test Mode and Test Environment.....	5
3.4 Description of Test Auxiliary Equipment	5
3.5 Measurement Uncertainty	5
3.6 Additions to, Deviations, or Exclusions From the Method.....	5
3.7 Laboratory Facility	5
3.8 Laboratory Location.....	5
3.9 Test Instruments List.....	6
4 Measurement Setup and Procedure	7
4.1 Test Channel	7
4.2 Test Setup	7
4.3 Test Procedure	9
5 Test Results.....	10
5.1 Summary	10
5.1.1 Clause and data summary	10
5.1.2 Test Limit.....	11
5.2 Antenna Requirement	12
5.3 AC Power Line Conducted Emission	13
5.4 Conducted Output Power	15
5.5 20dB Occupied Bandwidth	16
5.6 Carrier Frequencies Separation	17
5.7 Hopping Channel Number	18
5.8 Dwell Time.....	19
5.9 Spurious Emission.....	20
5.9.1 Band-edge Emission	20
5.9.2 Conducted Spurious Emission.....	21
5.9.3 Emissions in Restricted Frequency Bands	22
5.9.4 Emissions in Non-restricted Frequency Bands.....	26

3 General Information

3.1 Client Information

Applicant:	Shenzhen VANCH Intelligent Technology Co., Ltd
Address:	Floor 4, Building B west side, QingHu FuAnNa industrial zone, QingNing road 1, LongHua district, Shenzhen, Guangdong, China 518109
Manufacturer/Factory:	Shenzhen VANCH Intelligent Technology Co., Ltd
Address:	Floor 4, Building B west side, QingHu FuAnNa industrial zone, QingNing road 1, LongHua district, Shenzhen, Guangdong, China 518109

3.2 General Description of E.U.T.

Product Name:	UHF RFID Industrial Reader
Model No.:	VI-IR610P
Operation Frequency:	902.5 MHz – 927.5 MHz
Number of Channel:	51
Modulation Technology:	ASK
Antenna Type:	Internal Antenna
Antenna Gain:	2 dBi (declare by applicant)
Power Supply:	DC 12.0V
AC Adapter:	Model: TDX-1203000 Input: AC100-240V, 50/60Hz, 2.0A Output: DC12.0V, 3.0A
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°C ~ 35°C
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1008 mbar

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 ~ 10MHz)	1.9 dB
Conducted Emission for LISN (10MHz ~ 30MHz)	2.6 dB
Radiated Emission (30MHz ~ 1GHz) (3m SAC)	3.8 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	3.6 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
				01-10-2023	01-09-2024
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXJ001-3	01-20-2022	01-19-2023
				01-10-2023	01-09-2024
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
				01-10-2023	01-09-2024
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ004-2	10-27-2021	10-26-2022
				10-17-2022	10-16-2023
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-20-2022	01-19-2023
				01-10-2023	01-09-2024
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	01-20-2022	01-19-2023
				01-10-2023	01-09-2024
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG001-7	01-20-2022	01-19-2023
				01-10-2023	01-09-2024
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	Rohde & Schwarz	FSP 30	WXJ004	01-20-2022	01-20-2023
				01-10-2023	01-09-2024
EMI Test Receiver	Rohde & Schwarz	ESCI3	WXJ003	01-19-2022	01-18-2023
				01-10-2023	01-09-2024
Spectrum Analyzer	Keysight	N9010B	WXJ004-3	10-27-2021	10-26-2022
				10-17-2022	10-16-2023

4 Measurement Setup and Procedure

4.1 Test Channel

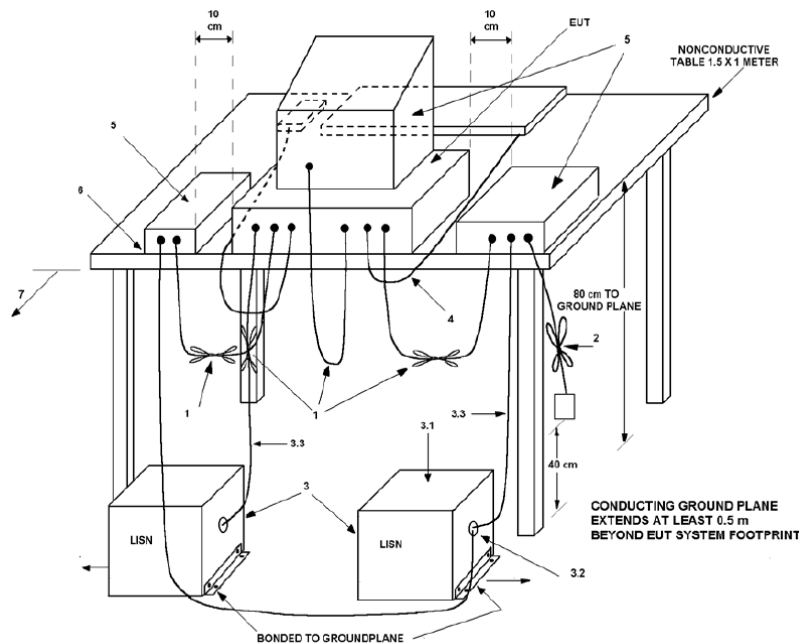
According to ANSI C63.10-2013 chapter 5.6.1 Table 4 requirement, select lowest channel, middle channel, and highest channel in the frequency range in which device operates for testing. The detailed frequency points are as follows:

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	902.5	17	911.0	34	919.5
1	903.0	18	911.5	35	920.0
2	903.5	19	912.0	36	920.5
3	904.0	20	912.5	37	921.0
4	904.5	21	913.0	38	921.5
5	905.0	22	913.5	39	922.0
6	905.5	23	914.0	40	922.5
7	906.0	24	914.5	41	923.0
8	906.5	25	915.0	42	923.5
9	907.0	26	915.5	43	924.0
10	907.5	27	916.0	44	924.5
11	908.0	28	916.5	45	925.0
12	908.5	29	917.0	46	925.5
13	909.0	30	917.5	47	926.0
14	909.5	31	918.0	48	926.5
15	910.0	32	918.5	49	927.0
16	910.5	33	919.0	50	927.5

Remark: Channel 0, 25 & 50 selected for tested.

4.2 Test Setup

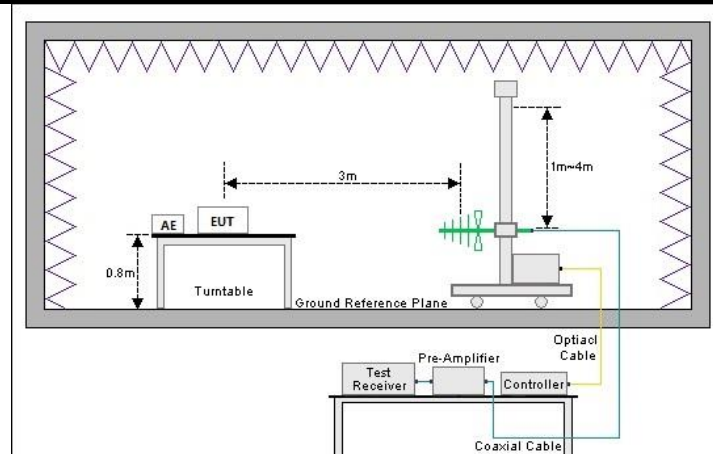
1) Conducted emission measurement:



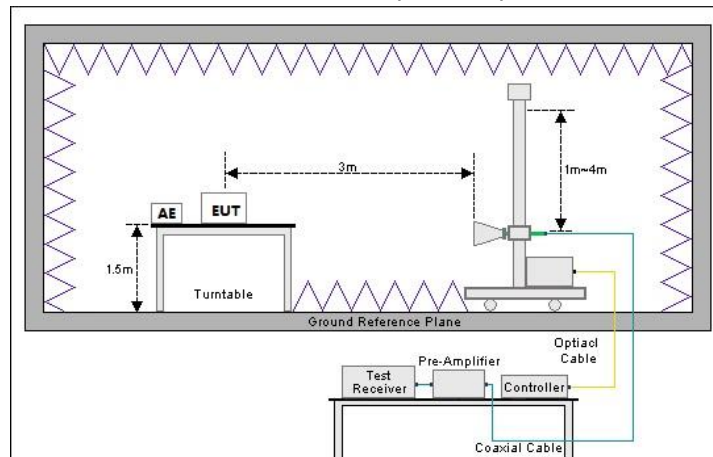
Note: The detailed descriptions please refer to Figure 8 of ANSI C63.4:2014.

2) Radiated emission measurement:

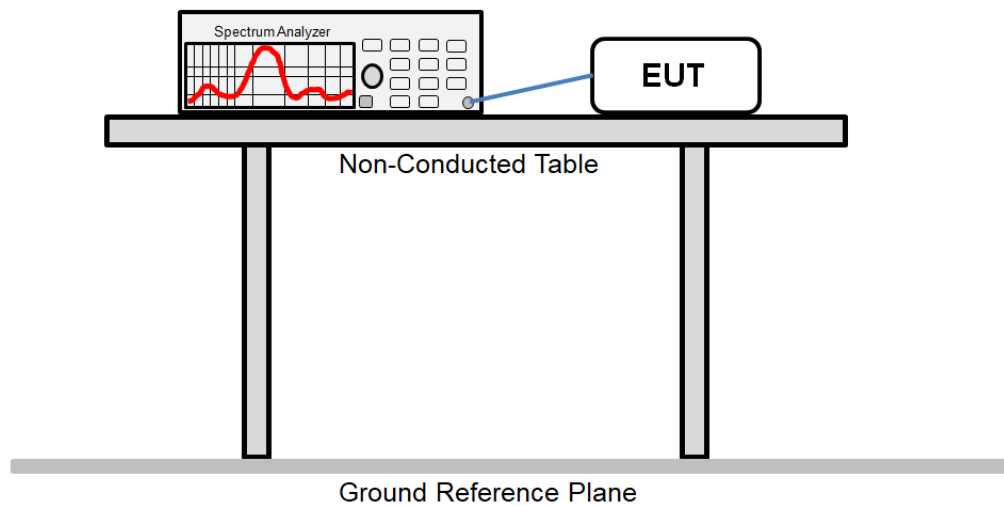
Below 1GHz (3m SAC)



Above 1GHz (3m 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

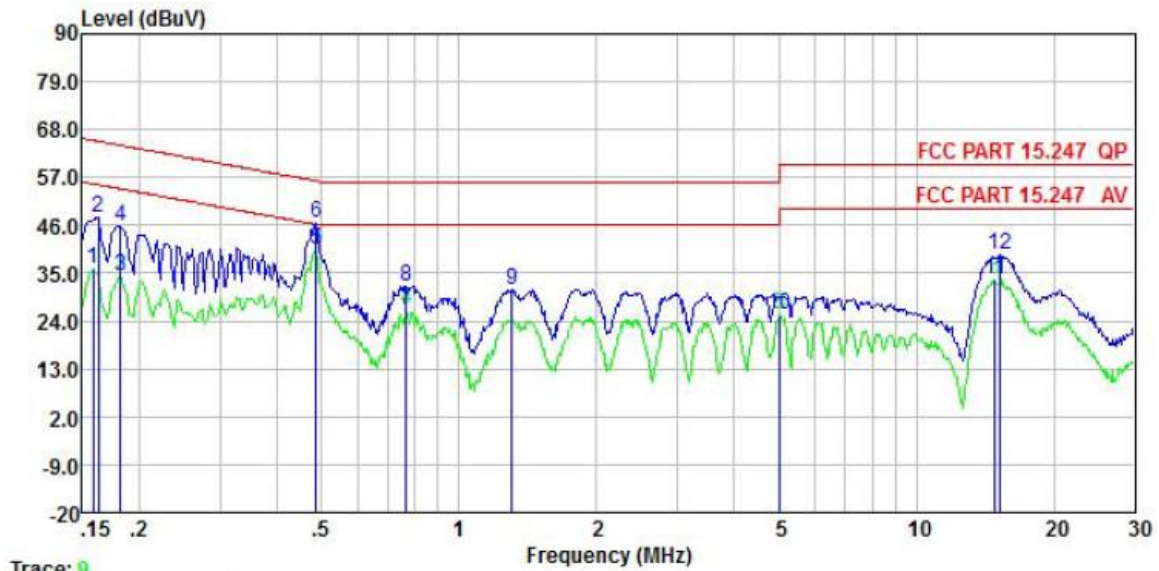
Test items	Limit																														
AC Power Line Conducted Emission	<table><tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-Peak</th><th>Average</th></tr><tr><td>0.15 – 0.5</td><td>66 to 56 Note 1</td><td>56 to 46 Note 1</td></tr><tr><td>0.5 – 5</td><td>56</td><td>46</td></tr><tr><td>5 – 30</td><td>60</td><td>50</td></tr></table> Note 1: The limit level in dBμV decreases linearly with the logarithm of frequency. Note 2: The more stringent limit applies at transition frequencies.	Frequency (MHz)	Limit (dBμV)		Quasi-Peak	Average	0.15 – 0.5	66 to 56 Note 1	56 to 46 Note 1	0.5 – 5	56	46	5 – 30	60	50																
Frequency (MHz)	Limit (dBμV)																														
	Quasi-Peak	Average																													
0.15 – 0.5	66 to 56 Note 1	56 to 46 Note 1																													
0.5 – 5	56	46																													
5 – 30	60	50																													
Conducted Output Power	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.																														
20dB Occupied Bandwidth Hopping Channel Number Dwell Time	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.																														
Carrier Frequencies Separation	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																														
Spurious Emission	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></table> Note: The more stringent limit applies at transition frequencies. <table><tr><th rowspan="2">Frequency</th><th colspan="2">Limit (dBμV/m) @ 3m</th></tr><tr><th>Average</th><th>Peake</th></tr><tr><td>Above 1 GHz</td><td>54.0</td><td>74.0</td></tr></table> Note: The measurement bandwidth shall be 1 MHz or greater.	Frequency (MHz)	Limit (dBμV/m)		Detector	@ 3m	@ 10m	30 – 88	40.0	30.0	Quasi-peak	88 – 216	43.5	33.5	Quasi-peak	216 – 960	46.0	36.0	Quasi-peak	960 – 1000	54.0	44.0	Quasi-peak	Frequency	Limit (dBμV/m) @ 3m		Average	Peake	Above 1 GHz	54.0	74.0
Frequency (MHz)	Limit (dBμV/m)		Detector																												
	@ 3m	@ 10m																													
30 – 88	40.0	30.0	Quasi-peak																												
88 – 216	43.5	33.5	Quasi-peak																												
216 – 960	46.0	36.0	Quasi-peak																												
960 – 1000	54.0	44.0	Quasi-peak																												
Frequency	Limit (dBμV/m) @ 3m																														
	Average	Peake																													
Above 1 GHz	54.0	74.0																													

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 Internal 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:	UHF RFID Industrial Reader	Product model:	VI-IR610P
Test by:	Mike	Test mode:	Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz		

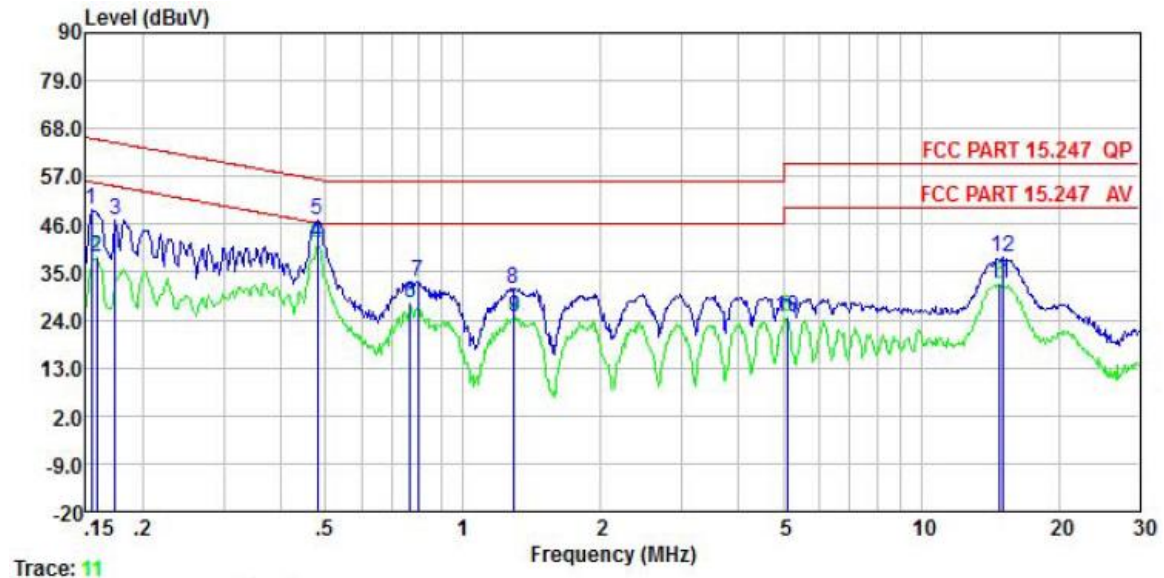


	Freq	Read Level	LISN Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.158	25.50	0.04	10.50	0.01	36.05	55.56	-19.51	Average
2	0.162	37.34	0.04	10.50	0.01	47.89	65.34	-17.45	QP
3	0.182	23.96	0.05	10.50	0.01	34.52	54.42	-19.90	Average
4	0.182	35.12	0.05	10.50	0.01	45.68	64.42	-18.74	QP
5	0.486	29.75	0.05	10.50	0.03	40.33	46.23	-5.90	Average
6	0.486	35.97	0.05	10.50	0.03	46.55	56.23	-9.68	QP
7	0.767	16.11	0.07	10.50	0.03	26.71	46.00	-19.29	Average
8	0.767	21.56	0.07	10.50	0.03	32.16	56.00	-23.84	QP
9	1.303	20.56	0.07	10.50	0.11	31.24	56.00	-24.76	QP
10	5.031	14.72	0.12	10.50	0.09	25.43	50.00	-24.57	Average
11	14.828	22.53	0.29	10.50	0.14	33.46	50.00	-16.54	Average
12	15.226	28.39	0.29	10.50	0.14	39.32	60.00	-20.68	QP

Remark:

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

Product name:	UHF RFID Industrial Reader	Product model:	VI-IR610P
Test by:	Mike	Test mode:	Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz		



	Freq	Read	LISN	Aux2	Cable	Level	Limit	Over	Remark
	MHz	Level	Factor	Factor	Loss	dBuV	Line	Limit	
		dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.154	38.73	0.06	10.50	0.01	49.30	65.78	-16.48	QP
2	0.158	27.92	0.06	10.50	0.01	38.49	55.56	-17.07	Average
3	0.174	36.52	0.05	10.50	0.01	47.08	64.77	-17.69	QP
4	0.481	31.06	0.04	10.50	0.03	41.63	46.32	-4.69	Average
5	0.481	36.42	0.04	10.50	0.03	46.99	56.32	-9.33	QP
6	0.767	17.20	0.06	10.50	0.03	27.79	46.00	-18.21	Average
7	0.796	22.36	0.06	10.50	0.03	32.95	56.00	-23.05	QP
8	1.289	20.53	0.06	10.50	0.11	31.20	56.00	-24.80	QP
9	1.296	14.14	0.06	10.50	0.11	24.81	46.00	-21.19	Average
10	5.112	13.97	0.11	10.50	0.09	24.67	50.00	-25.33	Average
11	14.828	21.32	0.27	10.50	0.14	32.23	50.00	-17.77	Average
12	15.066	27.40	0.27	10.50	0.14	38.31	60.00	-21.69	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	23.62	24.00	Pass
Middle channel	23.13	24.00	Pass
Highest channel	22.42	24.00	Pass

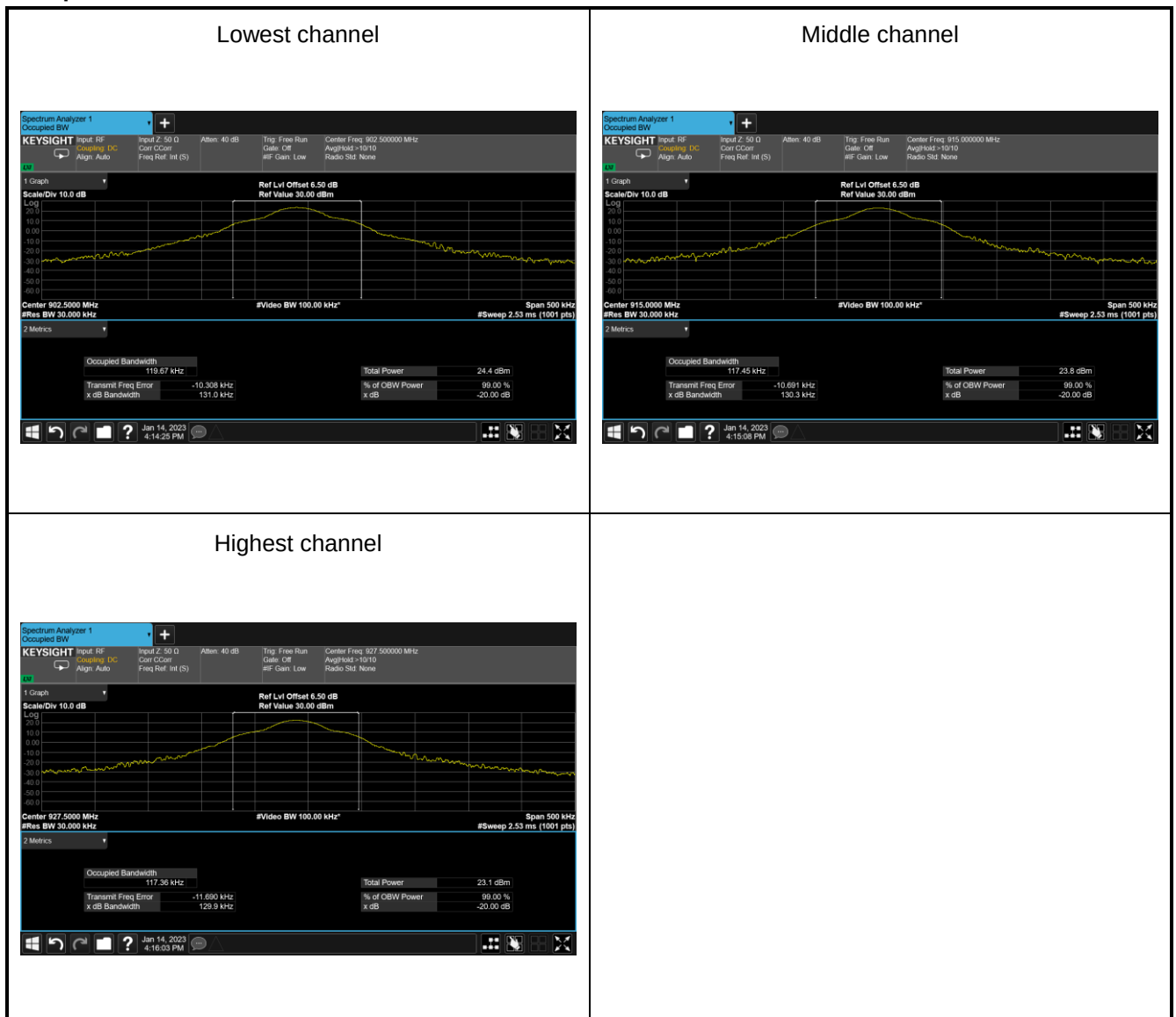
Test plot as follows:



5.5 20dB Occupied Bandwidth

Test channel	20dB Occupy Bandwidth (kHz)	Limit (kHz)	Result
Lowest channel	131.0	$BW_{20dB} \leq 250$	Pass
Middle channel	130.3	$BW_{20dB} \leq 250$	Pass
Highest channel	129.9	$BW_{20dB} \leq 250$	Pass

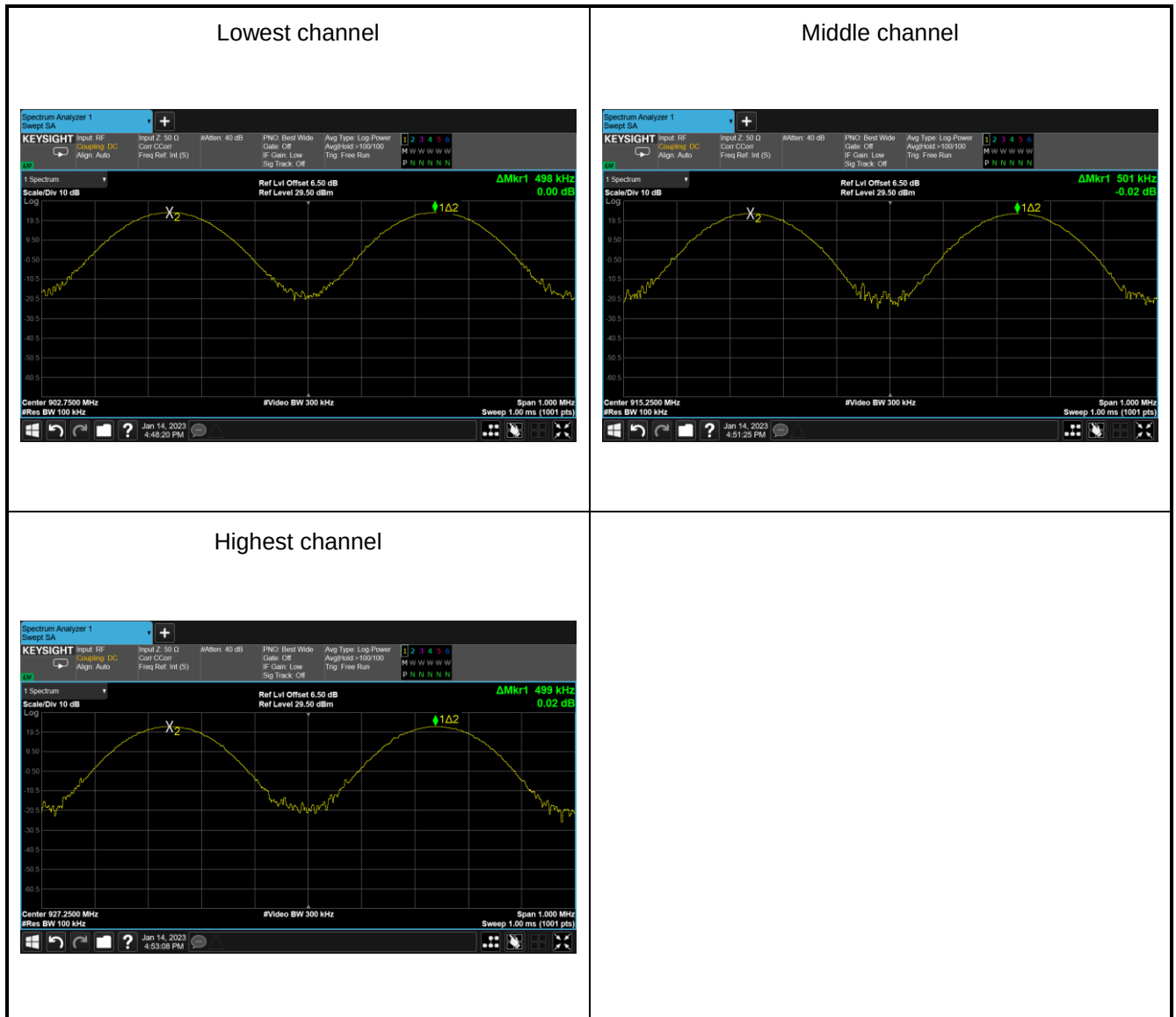
Test plot as follows:



5.6 Carrier Frequencies Separation

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest channel	498	131.0	Pass
Middle channel	501	131.0	Pass
Highest channel	499	131.0	Pass

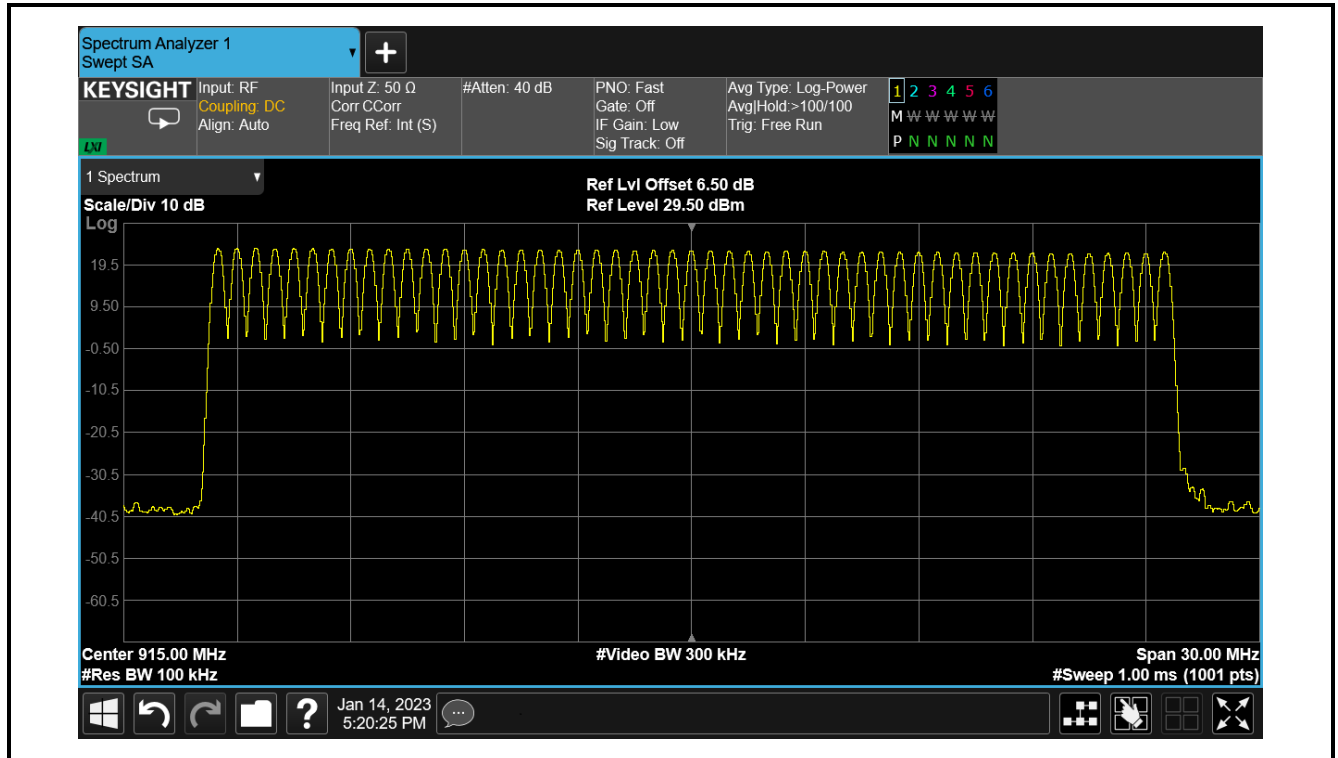
Test plot as follows:



5.7 Hopping Channel Number

Hopping channel numbers	Limit	Result
51	$N_{ch} \geq 50$	Pass

Test plot as follows:



5.8 Dwell Time

T_{on} (s)	Hopping numbers (20 s period)	Dwell time (s)	Limit (s)	Result
0.03141	7	0.21987	0.4	Pass

Note:

- T_{on} is time per hop.
- Dwell time = $T_{on} * \text{Hopping numbers}$.

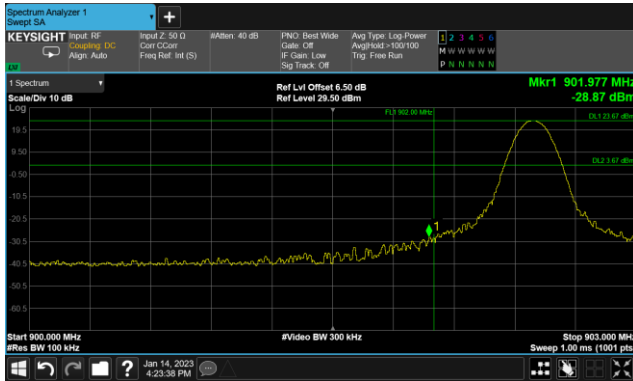
Test plot as follows:



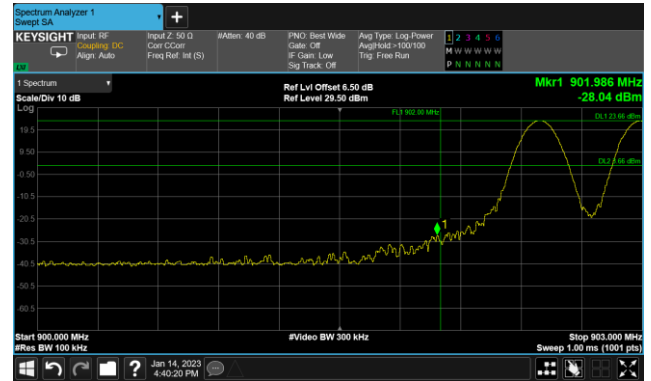
5.9 Spurious Emission

5.9.1 Band-edge Emission

Lowest Channel

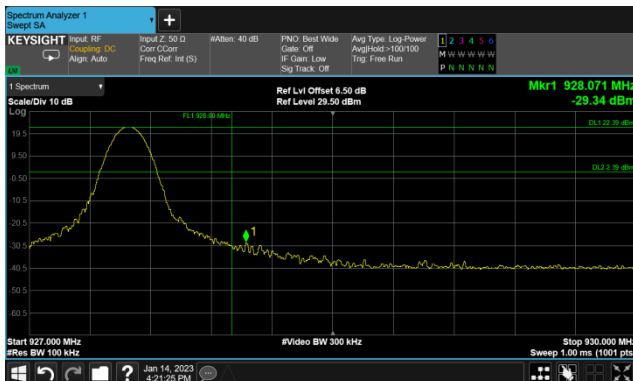


No-hopping mode

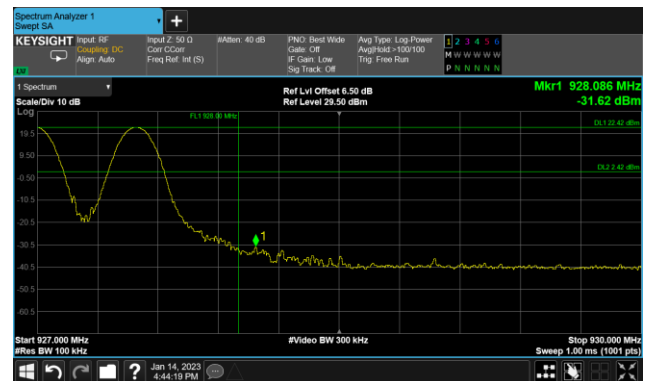


Hopping mode

Highest Channel



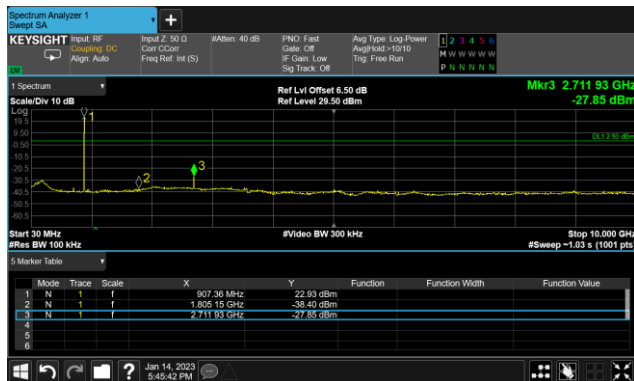
No-hopping mode



Hopping mode

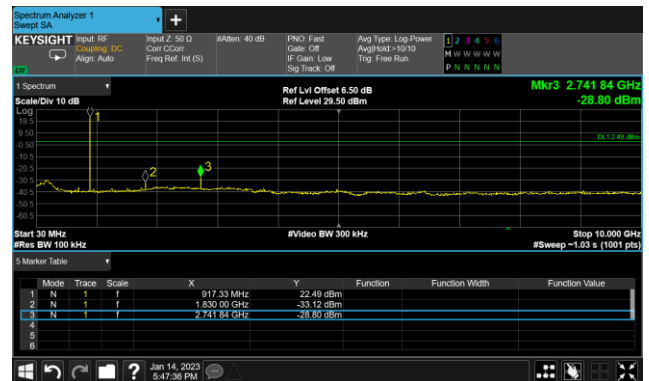
5.9.2 Conducted Spurious Emission

Lowest channel



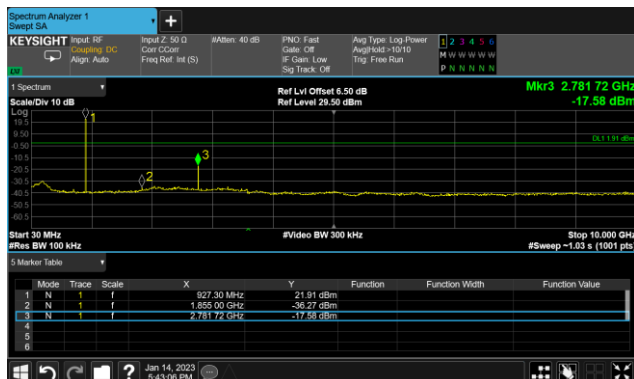
30MHz~10GHz

Middle channel



30MHz~10GHz

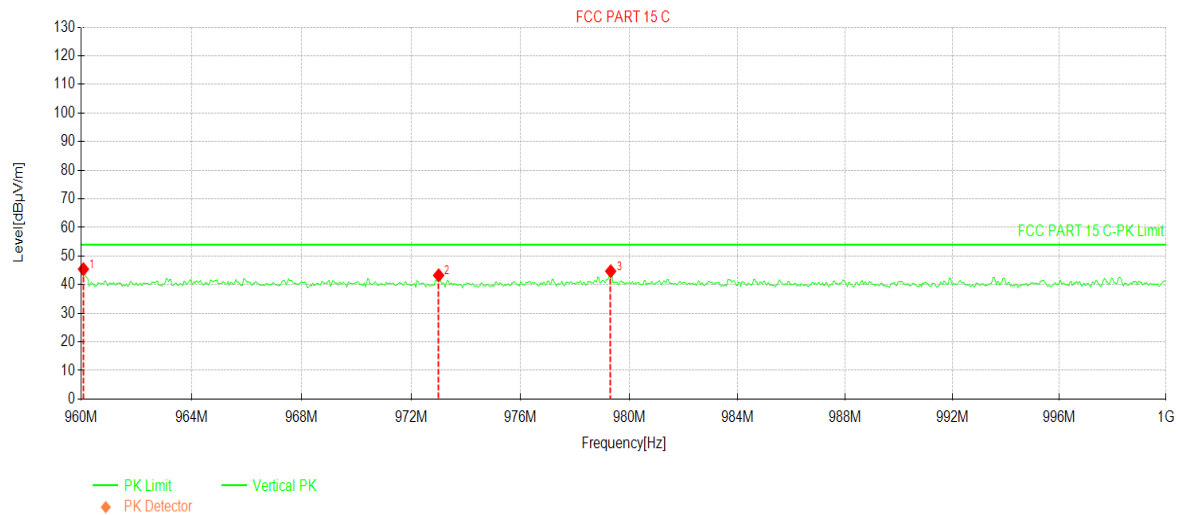
Highest channel



30MHz~10GHz

5.9.3 Emissions in Restricted Frequency Bands

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Channel:	Lowest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		



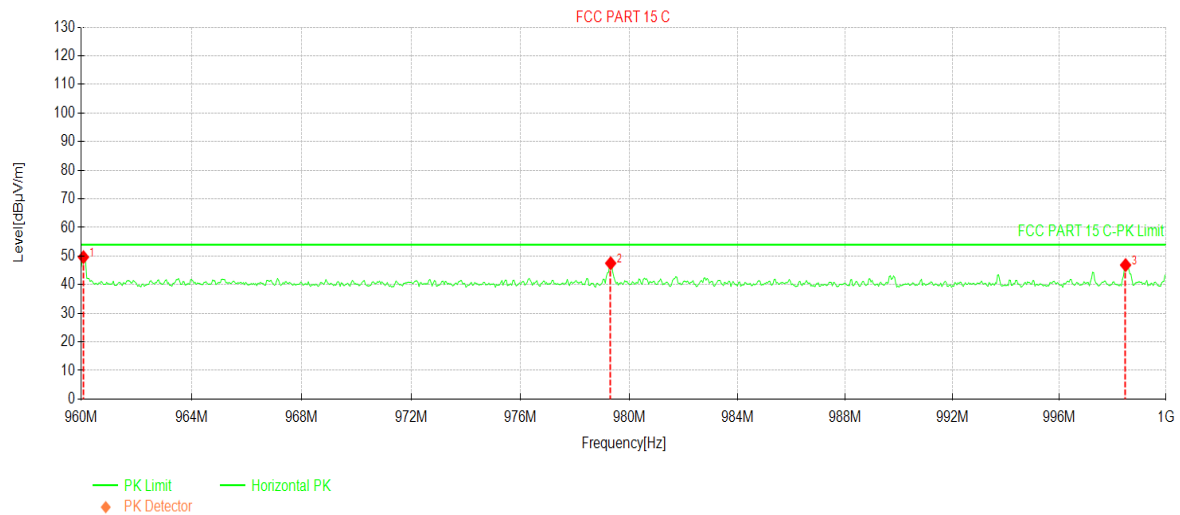
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	960.080	18.83	45.43	26.60	54.00	8.57	PK	Vertical
2	973.000	16.53	43.26	26.73	54.00	10.74	PK	Vertical
3	979.320	17.93	44.70	26.77	54.00	9.30	PK	Vertical

Remark:

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

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Channel:	Lowest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz		



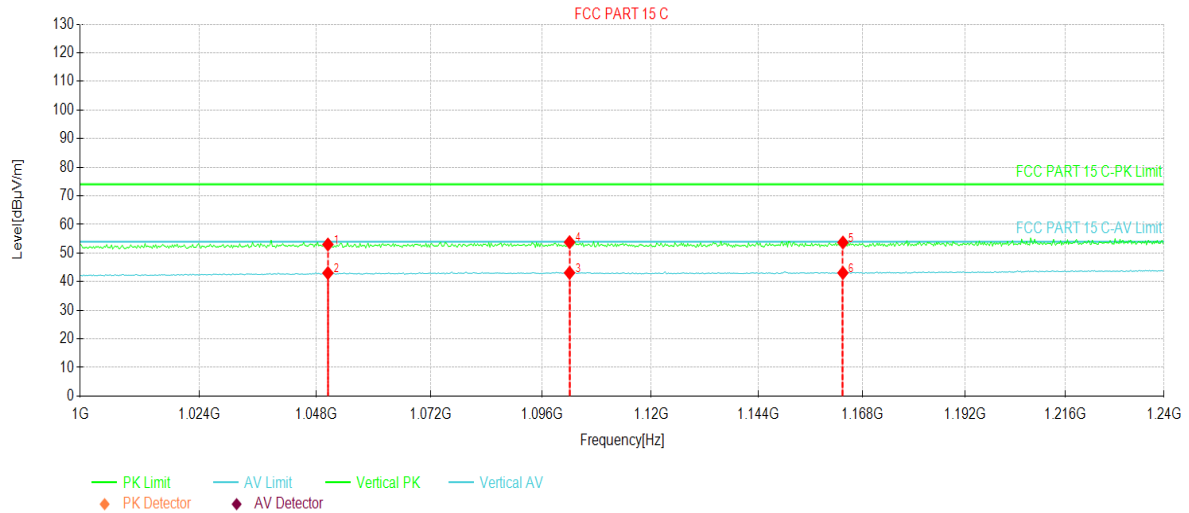
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	960.080	23.02	49.62	26.60	54.00	4.38	PK	Horizontal
2	979.320	20.72	47.49	26.77	54.00	6.51	PK	Horizontal
3	998.480	20.19	46.86	26.67	54.00	7.14	PK	Horizontal

Remark:

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

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		



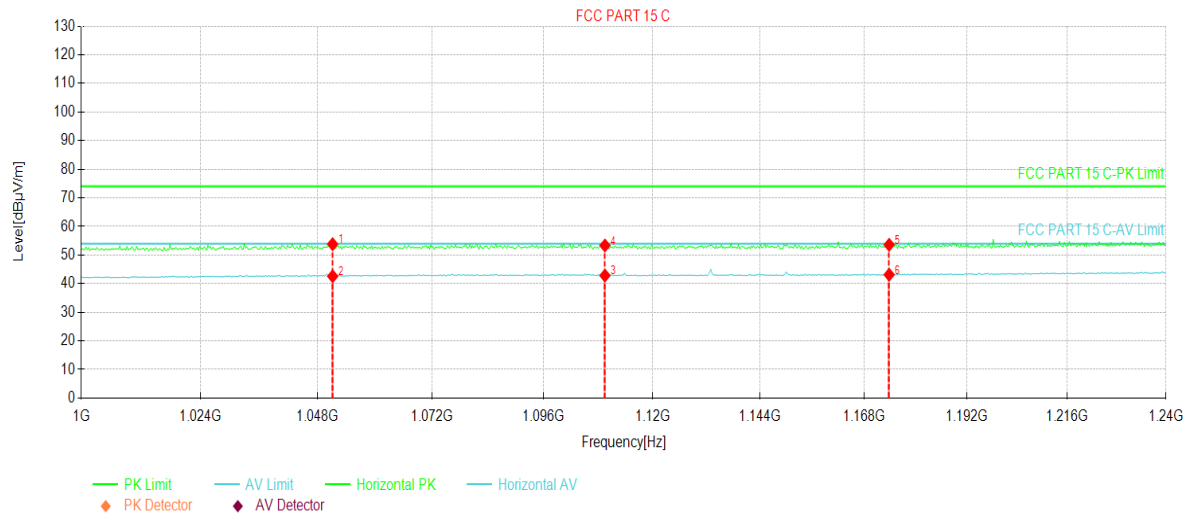
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	1050.40	22.83	53.01	30.18	74.00	20.99	PK	Vertical
2	1050.40	12.84	43.02	30.18	54.00	10.98	AV	Vertical
3	1102.00	12.57	43.10	30.53	54.00	10.90	AV	Vertical
4	1102.00	23.27	53.80	30.53	74.00	20.20	PK	Vertical
5	1163.44	23.02	53.70	30.68	74.00	20.30	PK	Vertical
6	1163.44	12.40	43.08	30.68	54.00	10.92	AV	Vertical

Remark:

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

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	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	1051.12	23.61	53.80	30.19	74.00	20.20	PK	Horizontal
2	1051.12	12.42	42.61	30.19	54.00	11.39	AV	Horizontal
3	1109.44	12.30	42.84	30.54	54.00	11.16	AV	Horizontal
4	1109.44	22.81	53.35	30.54	74.00	20.65	PK	Horizontal
5	1173.76	22.89	53.60	30.71	74.00	20.40	PK	Horizontal
6	1173.76	12.44	43.15	30.71	54.00	10.85	AV	Horizontal

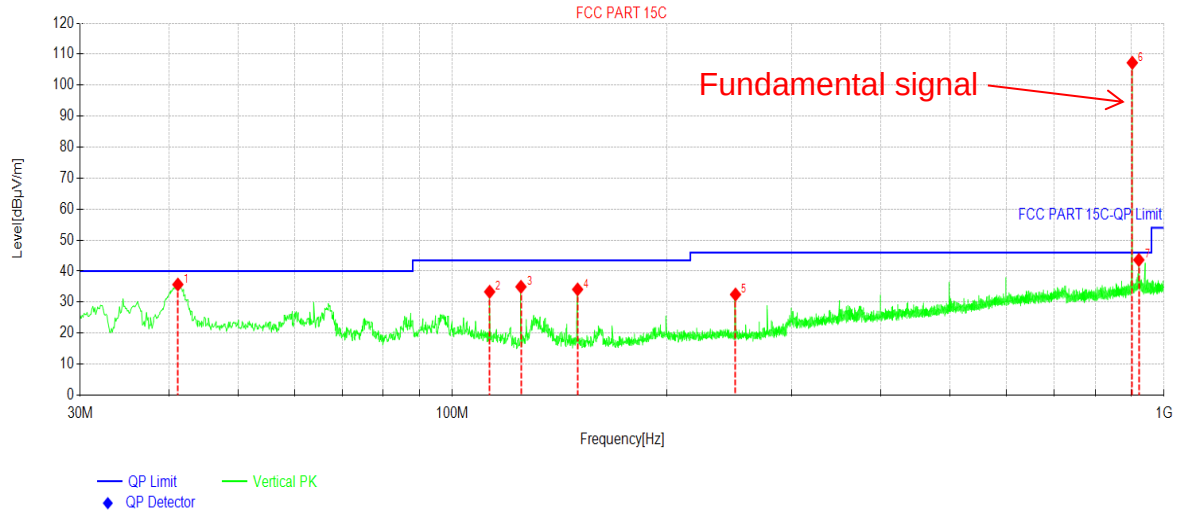
Remark:

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

5.9.4 Emissions in Non-restricted Frequency Bands

Below 1GHz:

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	AC 120/60Hz		



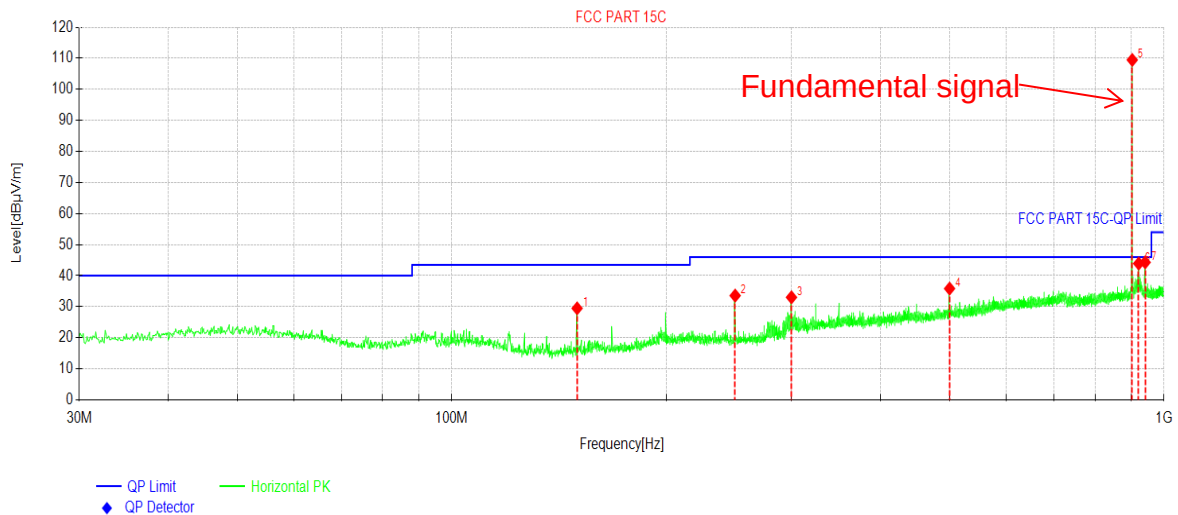
Suspected Data List

NO.	Freq. [MHz]	Reading[dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Angle [°]	Polarity
1	41.1561	49.23	35.69	-13.54	40.00	4.31	5	Vertical
2	112.846	48.65	33.34	-15.31	43.50	10.16	91	Vertical
3	124.875	52.47	34.96	-17.51	43.50	8.54	117	Vertical
4	150.001	52.39	34.10	-18.29	43.50	9.40	267	Vertical
5	250.018	46.46	32.46	-14.00	46.00	13.54	104	Vertical
6	902.505	109.87	107.23	-2.64	46.00	-61.23	121	Vertical
7	921.616	45.98	43.62	-2.36	46.00	2.38	130	Vertical

Remark:

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

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
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]	Angle [°]	Polarity
1	150.001	47.77	29.48	-18.29	43.50	14.02	279	Horizontal
2	250.018	47.58	33.58	-14.00	46.00	12.42	184	Horizontal
3	299.978	46.10	33.03	-13.07	46.00	12.97	214	Horizontal
4	500.012	44.83	35.84	-8.99	46.00	10.16	266	Horizontal
5	902.505	112.12	109.48	-2.64	46.00	-63.48	158	Horizontal
6	921.519	46.27	43.91	-2.36	46.00	2.09	149	Horizontal
7	940.921	46.75	44.29	-2.46	46.00	1.71	19	Horizontal

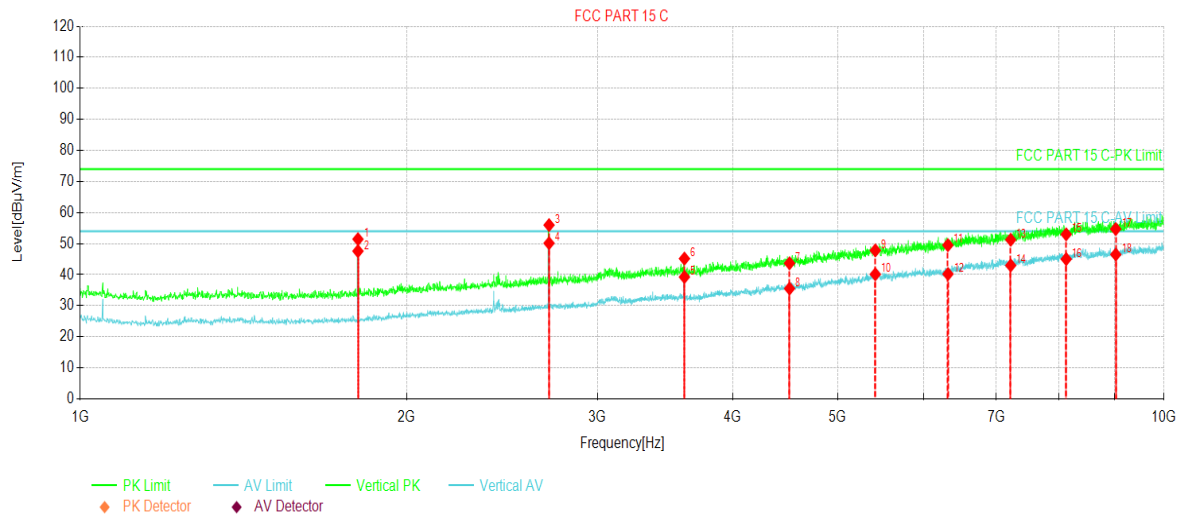
Remark:

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

Above 1GHz:

902.5MHz:

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	1 GHz ~ 10 GHz	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



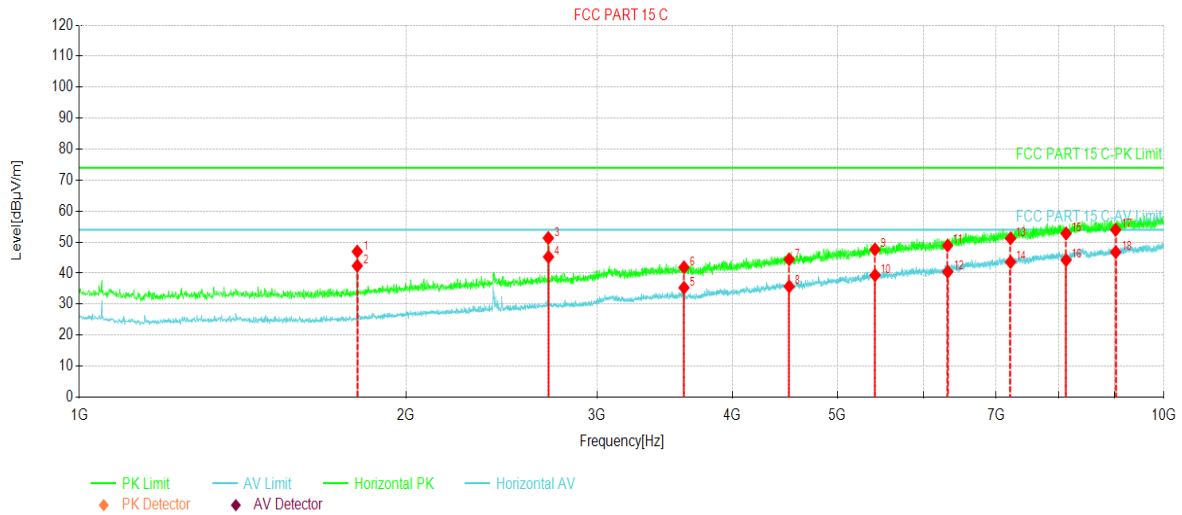
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	1804.37	73.31	-21.88	51.43	74.00	22.57	PK	Vertical
2	1804.37	69.46	-21.88	47.58	54.00	6.42	AV	Vertical
3	2707.75	73.60	-17.63	55.97	74.00	18.03	PK	Vertical
4	2707.75	67.77	-17.63	50.14	54.00	3.86	AV	Vertical
5	3610.00	53.87	-14.62	39.25	54.00	14.75	AV	Vertical
6	3610.00	59.79	-14.62	45.17	74.00	28.83	PK	Vertical
7	4513.00	53.73	-10.06	43.67	74.00	30.33	PK	Vertical
8	4513.37	45.59	-10.06	35.53	54.00	18.47	AV	Vertical
9	5415.00	53.79	-5.97	47.82	74.00	26.18	PK	Vertical
10	5415.62	46.10	-5.97	40.13	54.00	13.87	AV	Vertical
11	6318.00	53.04	-3.53	49.51	74.00	24.49	PK	Vertical
12	6319.00	43.73	-3.53	40.20	54.00	13.80	AV	Vertical
13	7220.00	51.52	-0.28	51.24	74.00	22.76	PK	Vertical
14	7220.12	43.26	-0.28	42.98	54.00	11.02	AV	Vertical
15	8123.00	51.76	1.22	52.98	74.00	21.02	PK	Vertical
16	8123.50	43.79	1.22	45.01	54.00	8.99	AV	Vertical
17	9025.00	52.22	2.48	54.70	74.00	19.30	PK	Vertical
18	9025.75	44.01	2.48	46.49	54.00	7.51	AV	Vertical

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	1 GHz ~ 10 GHz	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



Suspected Data List

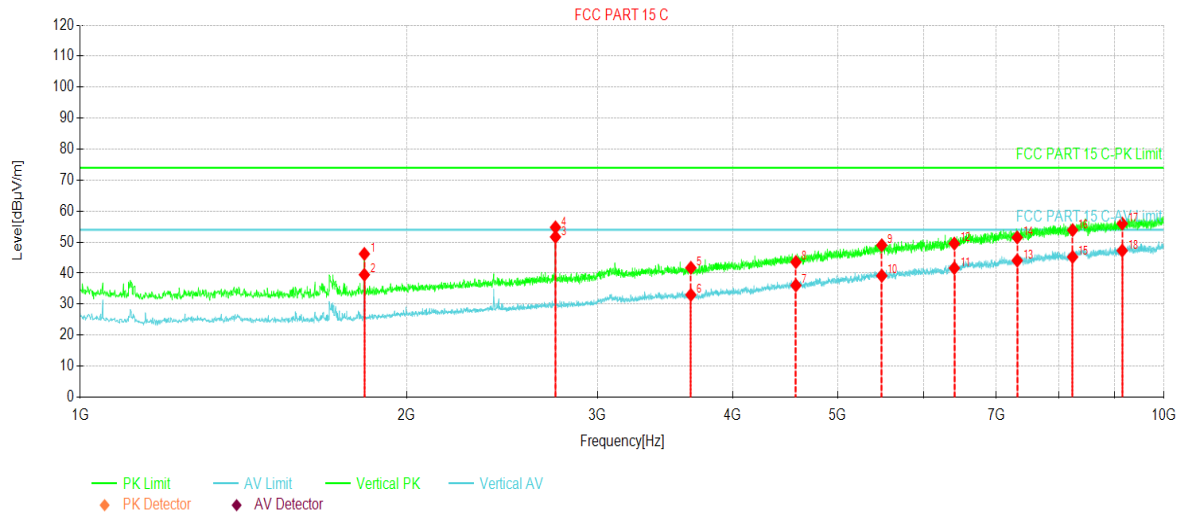
NO.	Freq. [MHz]	Reading [dBuV/m]	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Trace	Polarity
1	1804.37	68.84	-21.88	46.96	74.00	27.04	PK	Horizontal
2	1804.37	64.23	-21.88	42.35	54.00	11.65	AV	Horizontal
3	2706.62	68.96	-17.63	51.33	74.00	22.67	PK	Horizontal
4	2707.75	62.87	-17.63	45.24	54.00	8.76	AV	Horizontal
5	3610.00	49.92	-14.62	35.30	54.00	18.70	AV	Horizontal
6	3610.00	56.51	-14.62	41.89	74.00	32.11	PK	Horizontal
7	4513.00	54.52	-10.06	44.46	74.00	29.54	PK	Horizontal
8	4513.37	45.76	-10.06	35.70	54.00	18.30	AV	Horizontal
9	5415.00	53.61	-5.97	47.64	74.00	26.36	PK	Horizontal
10	5415.62	45.30	-5.97	39.33	54.00	14.67	AV	Horizontal
11	6318.00	52.43	-3.53	48.90	74.00	25.10	PK	Horizontal
12	6319.00	43.97	-3.53	40.44	54.00	13.56	AV	Horizontal
13	7220.00	51.50	-0.28	51.22	74.00	22.78	PK	Horizontal
14	7220.12	43.88	-0.28	43.60	54.00	10.40	AV	Horizontal
15	8123.00	51.56	1.22	52.78	74.00	21.22	PK	Horizontal
16	8123.50	42.98	1.22	44.20	54.00	9.80	AV	Horizontal
17	9025.00	51.48	2.48	53.96	74.00	20.04	PK	Horizontal
18	9025.75	44.31	2.48	46.79	54.00	7.21	AV	Horizontal

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

915 MHz:

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	1 GHz ~ 10 GHz	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



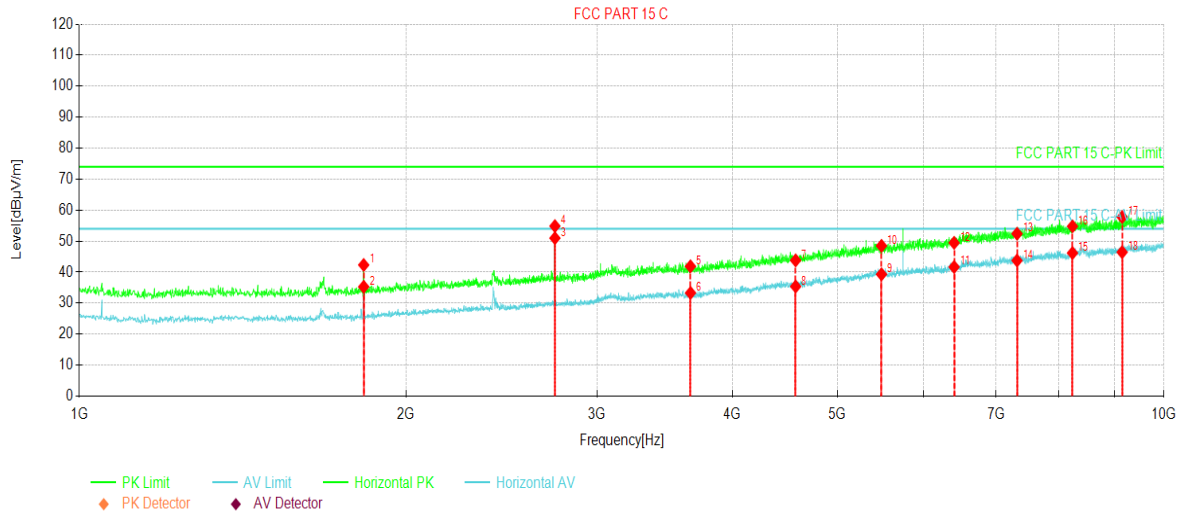
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	1829.12	67.94	-21.74	46.20	74.00	27.80	PK	Vertical
2	1829.12	61.23	-21.74	39.49	54.00	14.51	AV	Vertical
3	2744.87	69.27	-17.58	51.69	54.00	2.31	AV	Vertical
4	2744.87	72.36	-17.58	54.78	74.00	19.22	PK	Vertical
5	3660.00	56.11	-14.39	41.72	74.00	32.28	PK	Vertical
6	3660.00	47.38	-14.39	32.99	54.00	21.01	AV	Vertical
7	4575.00	45.87	-9.82	36.05	54.00	17.95	AV	Vertical
8	4575.00	53.40	-9.82	43.58	74.00	30.42	PK	Vertical
9	5490.00	55.17	-6.16	49.01	74.00	24.99	PK	Vertical
10	5490.00	45.31	-6.16	39.15	54.00	14.85	AV	Vertical
11	6405.00	44.16	-2.53	41.63	54.00	12.37	AV	Vertical
12	6405.00	52.06	-2.53	49.53	74.00	24.47	PK	Vertical
13	7320.00	44.32	-0.25	44.07	54.00	9.93	AV	Vertical
14	7320.00	51.77	-0.25	51.52	74.00	22.48	PK	Vertical
15	8235.00	43.67	1.55	45.22	54.00	8.78	AV	Vertical
16	8235.00	52.32	1.55	53.87	74.00	20.13	PK	Vertical
17	9150.00	53.17	2.80	55.97	74.00	18.03	PK	Vertical
18	9150.00	44.47	2.80	47.27	54.00	6.73	AV	Vertical

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	1 GHz ~ 10 GHz	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



Suspected Data List

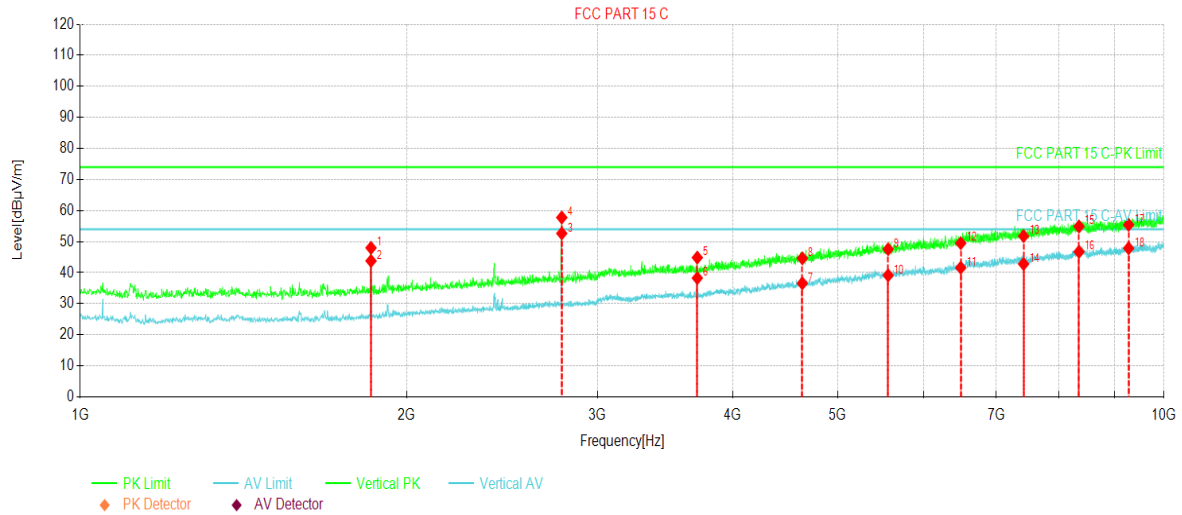
NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	1829.12	64.06	-21.74	42.32	74.00	31.68	PK	Horizontal
2	1829.12	57.02	-21.74	35.28	54.00	18.72	AV	Horizontal
3	2744.87	68.56	-17.58	50.98	54.00	3.02	AV	Horizontal
4	2744.87	72.43	-17.58	54.85	74.00	19.15	PK	Horizontal
5	3660.00	56.27	-14.39	41.88	74.00	32.12	PK	Horizontal
6	3660.62	47.69	-14.39	33.30	54.00	20.70	AV	Horizontal
7	4575.00	53.61	-9.82	43.79	74.00	30.21	PK	Horizontal
8	4575.25	45.20	-9.82	35.38	54.00	18.62	AV	Horizontal
9	5490.00	45.46	-6.16	39.30	54.00	14.70	AV	Horizontal
10	5490.00	54.65	-6.16	48.49	74.00	25.51	PK	Horizontal
11	6405.00	44.19	-2.53	41.66	54.00	12.34	AV	Horizontal
12	6405.00	51.98	-2.53	49.45	74.00	24.55	PK	Horizontal
13	7320.00	52.64	-0.25	52.39	74.00	21.61	PK	Horizontal
14	7320.00	44.00	-0.25	43.75	54.00	10.25	AV	Horizontal
15	8235.00	44.62	1.55	46.17	54.00	7.83	AV	Horizontal
16	8235.00	53.24	1.55	54.79	74.00	19.21	PK	Horizontal
17	9150.00	54.98	2.80	57.78	74.00	16.22	PK	Horizontal
18	9150.00	43.65	2.80	46.45	54.00	7.55	AV	Horizontal

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

927.5 MHz:

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	1 GHz ~ 10 GHz	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



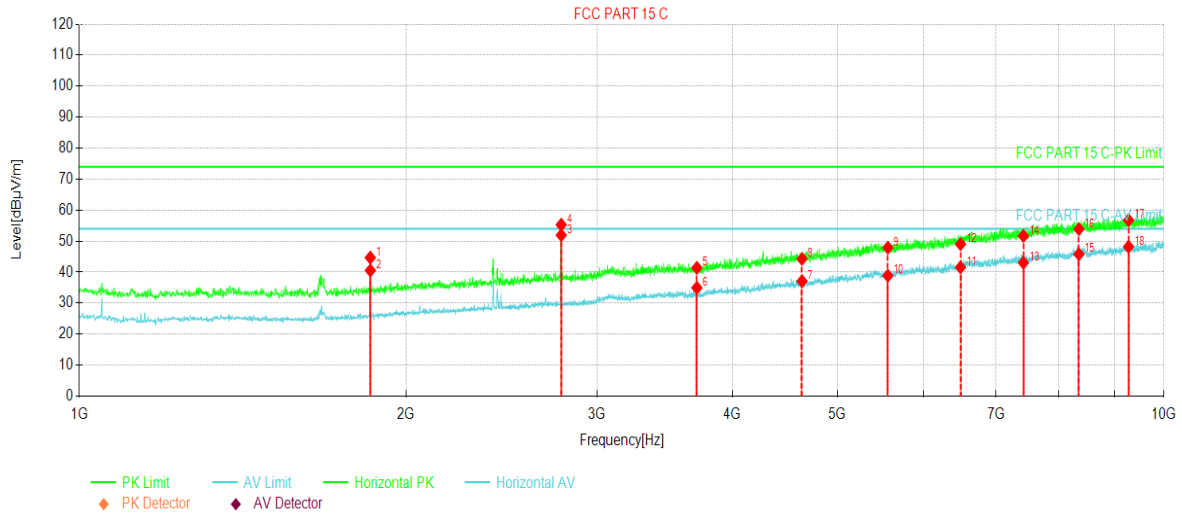
Suspected Data List

NO.	Freq. [MHz]	Reading [dBuV/m]	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Trace	Polarity
1	1855.00	69.58	-21.60	47.98	74.00	26.02	PK	Vertical
2	1855.00	65.39	-21.60	43.79	54.00	10.21	AV	Vertical
3	2782.00	70.17	-17.53	52.64	54.00	1.36	AV	Vertical
4	2782.00	75.30	-17.53	57.77	74.00	16.23	PK	Vertical
5	3710.12	58.99	-14.14	44.85	74.00	29.15	PK	Vertical
6	3710.12	52.40	-14.14	38.26	54.00	15.74	AV	Vertical
7	4637.50	46.08	-9.50	36.58	54.00	17.42	AV	Vertical
8	4637.50	54.13	-9.50	44.63	74.00	29.37	PK	Vertical
9	5565.00	53.63	-6.07	47.56	74.00	26.44	PK	Vertical
10	5565.00	45.21	-6.07	39.14	54.00	14.86	AV	Vertical
11	6492.50	44.05	-2.46	41.59	54.00	12.41	AV	Vertical
12	6492.50	51.97	-2.46	49.51	74.00	24.49	PK	Vertical
13	7420.00	51.66	0.12	51.78	74.00	22.22	PK	Vertical
14	7420.00	42.70	0.12	42.82	54.00	11.18	AV	Vertical
15	8347.50	52.64	2.24	54.88	74.00	19.12	PK	Vertical
16	8347.50	44.49	2.24	46.73	54.00	7.27	AV	Vertical
17	9275.00	52.07	3.35	55.42	74.00	18.58	PK	Vertical
18	9275.00	44.52	3.35	47.87	54.00	6.13	AV	Vertical

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

Product Name:	UHF RFID Industrial Reader	Product Model:	VI-IR610P
Test By:	Mike	Test mode:	Tx mode
Test Frequency:	1 GHz ~ 10 GHz	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	1855.00	66.28	-21.60	44.68	74.00	29.32	PK	Horizontal
2	1855.00	62.14	-21.60	40.54	54.00	13.46	AV	Horizontal
3	2782.00	69.47	-17.53	51.94	54.00	2.06	AV	Horizontal
4	2782.00	72.83	-17.53	55.30	74.00	18.70	PK	Horizontal
5	3710.00	55.54	-14.14	41.40	74.00	32.60	PK	Horizontal
6	3710.00	49.09	-14.14	34.95	54.00	19.05	AV	Horizontal
7	4637.50	46.58	-9.50	37.08	54.00	16.92	AV	Horizontal
8	4637.50	53.80	-9.50	44.30	74.00	29.70	PK	Horizontal
9	5565.00	53.96	-6.07	47.89	74.00	26.11	PK	Horizontal
10	5565.00	44.94	-6.07	38.87	54.00	15.13	AV	Horizontal
11	6492.50	44.03	-2.46	41.57	54.00	12.43	AV	Horizontal
12	6492.50	51.49	-2.46	49.03	74.00	24.97	PK	Horizontal
13	7420.00	42.93	0.12	43.05	54.00	10.95	AV	Horizontal
14	7420.00	51.57	0.12	51.69	74.00	22.31	PK	Horizontal
15	8347.50	43.56	2.24	45.80	54.00	8.20	AV	Horizontal
16	8347.50	51.65	2.24	53.89	74.00	20.11	PK	Horizontal
17	9275.00	53.41	3.35	56.76	74.00	17.24	PK	Horizontal
18	9275.00	44.84	3.35	48.19	54.00	5.81	AV	Horizontal

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

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