



TEST REPORT



Report Reference No.	91800100060001
Sample ID	BLC-01-0883954-087
Date of issue	03/09/2025
Total number of pages	23
Testing Laboratory.....	TUV SUD South Asia Pvt Ltd
Address	Plot No. 3-P1-B, Hitech Defence & Aerospace Park, KIADB Industrial Area, BK Palya, Bengaluru, Bengaluru North Taluk Pin code – 562149 India
Applicant's name	Sudhir Srivastava Innovations Pvt. Ltd.
Address	404-405, 3 rd Floor, iLabs Center. Udyog Vihar, Phase III, Gurugram – 122016, Haryana, India
Client Representative.....	Srinivasa Pilli, Senior Vice President Govt. Affairs
Test specification Standard.....	FCC Part 15 Subpart C
Test Method.....	ANSI C63.10-2020
Non-standard test method.....	NA
Test Report Form Number.....	LAB_F(EE)_138-51
Product Name.....	Instrument Actuator
Test Item Description.....	Instrument Identifier
Manufacturer	Sudhir Srivastava Innovations Pvt. Ltd.
Model Number.....	MACT
Serial Number.....	MACT- 448
Ratings.....	24 VDC
FCC ID.....	2BOLQ-MACT
Tested by (Name + Signature)	Nikhil G 
Reviewed & Approved by (Name + Signature)	Raghunath M N 



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Possible test case verdicts:

- test case does not apply to the test object....: N/A
- test object does meet the requirement.....: Pass
- test object does not meet the requirement ...: Fail

Testing:

Condition of the EUT on Receipt.....: Good

Date of receipt of test item: 22/05/2025

Date (s) of performance of tests.....: 15/07/2025 to 22/07/2025

General remarks:

1. The submitted sample(s) were not drawn by laboratory.
2. The test results presented in this report relate only to the object tested.
3. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.
4. The correctness of the information related to sample(s) in the Test Request Form/Customer letterhead/E-mail is the customer's responsibility. The laboratory reports the said information in the test report and is not liable for the same.
5. The laboratory will retain the sample(s) for 45 days except for the mandatory retention period specified by the Regulatory Bodies and unless otherwise specified by the client.
6. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report.
7. Throughout this report a point is used as the decimal separator.

Use of uncertainty of measurement for decisions on conformity (decision rule): Yes/No

No decision rule is specified by the IEC/EN standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

Other: (to be specified)

Decisions on conformity: Decision on conformity of results is based on as per standard limits or criteria.

Summary of compliance: The Product comply with the requirements of FCC Part 15 Subpart C 15.225, 15.209, 15.205, 15.207 & 15.203.



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Revision History of Records

Test Report Number	Reason for Change	Date Issued
91800100060001	Initial Report	03/09/2025



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1 GENERAL INFORMATION

1.1 Appendices

The following documents are appended to this report as separate attachments:

Test Setup Photographs, External and Internal Photographs of the EUT, Label and its Location, Block Diagram, EUT Specifications, Schematic Diagrams, Bill of Materials, User Manual, and Maximum Permissible Exposure (MPE) information.



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2 TEST SUMMARY

Sl.no	Requirement – Test	Basic Standard	Result
1.	Occupied Channel bandwidth	FCC Part 15 Subpart C Section 15.215 (c)	N/T*
2.	Frequency tolerance	FCC part 15 Subpart C Section 15.225 (e)	N/T*
3.	Field Strength Measurement within the band 13.110-14.010 MHz	FCC part 15 Subpart C Section 15.225 (a,b,c,d) / (15.209)	Pass
4.	Radiated spurious emissions	FCC 15.209/15.205	Pass
5.	Conducted Spurious emission Test on AC Power lines	FCC 15.207	Pass
6.	Antenna Requirement	FCC 15.203	Pass

Note:

N/A* → Not Applicable

N/T* → Not Tested - These test cases are not tested, the product uses certified RFID Module from Sudhir Srivastava Innovations Pvt. Ltd, with **FCC ID: 2BOLQ-106MSF0063** Issued by the TUV SUD South Asia Pvt. Ltd.



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3 MEASUREMENT UNCERTAINTY

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k = 2$

Table 1: Measurement Uncertainty

No.	Item	Uncertainty
1	Conducted Emission Test	2.25dB
2	Radiated Emission Test	4.71 dB

4 TEST EQUIPMENT USED

Table 2: Test Equipment Used

S. No	Test Equipment	Manufacturer	Model No	Serial No	Calibration Due Date
1.	Active Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519C	43	07/04/2026
2.	Biconical Antenna	Schwarzbeck Mess-Elektronik	VHBB 9124	1941	22/02/2026
3.	Log-Periodic Antenna	Schwarzbeck Mess-Elektronik	VUSLP 9111 B	735	18/02/2026
4.	EMI Test Receiver	ROHDE & SCHWARZ	ESR3	103112	25/02/2026
5.	EMI Test Receiver	ROHDE & SCHWARZ	ESW44	103295	25/02/2026
6.	Signal controlling unit	ROHDE & SCHWARZ	SCU01F	100507	----
7.	LISN	Scientific Mes - Technik Pvt. Ltd.	SMLIN32-2	2303007	28/01/2026
8.	Pulse Limiter	ROHDE & SCHWARZ	ESH3-Z2	103167	16/01/2026

Table 3: Instrument application Software versions

Sl. No	Test Type	Application software and version
1	Radiated spurious emission measurement- 10-meter Semi Anechoic Chamber	Elektra V5.03.0



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5 EQUIPMENT INFORMATION

5.1 Product Function

The Instrument Identifier is installed in the Patient Side Arm Cart of the SSI Mantra Surgical Robotic System. It is utilized for Robotic Surgical Instruments identification, its usage, and regulation. It also contains the RFID Module

5.2 General Information of EUT

Table 4: EUT details as declared by client*

EUT Name	Instrument Actuator	
Protocol	RFID 13.56MHz	
Operating Frequency Range	13.110-14.010 MHz	
Environmental conditions	Storage	Temperature: 0°C to +55°C Humidity: 20% to 80% RH, non-condensing Atmospheric Pressure: 70.0 kPa to 106.0 kPa
	Operating	Temperature: +18°C to +24°C Humidity: 55% RH, non-condensing Atmospheric Pressure: 70.0 kPa to 106.0 kPa
Supply Voltage	24 VDC	
Max Measured field strength (Radiated)	41.30 dB μ V/m	
Modulation	Amplitude modulation	
Number of antennas	1	
Antenna Type	PCB Loop antenna	
Antenna Gain	N/A	
EUT Dimension (LxWxH)	114mm x 70mm x 88mm	

*Disclaimer: The TÜV SÜD is not responsible for the accuracy of the customer declared specification.



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6 TEST DESCRIPTION

6.1 Test Operation and software mode

Hardware Version: 1.0

Software Version: 1.3

6.2 Test modes – data rates and modulations

Transmission was enabled with highest possible duty cycle on 13.56 MHz channel.

6.3 Accessories and Auxiliary Equipment

Auxiliary Equipment: None.

7 OPERATIONAL DESCRIPTION

The Sudhir Srivastava Innovations Pvt. Ltd. Model-MACT is a Instrument Actuator for use in Mantra Surgical Robotic System. It identifies the instrument mounted on it. The EUT was treated as tabletop equipment during testing the electrical rating of the EUT is 0.56-0.63 mA @24V DC, 13-15W. It is powered by Tool Interface.



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8 TEST METHODOLOGY

8.1 Conducted Spurious Emission Test on AC Power Lines

AC powerline conducted emissions were measured across the 50Ω LISN port connected to the Equipment Under Test (EUT). Emission voltage and current measurements were performed on each current-carrying conductor at the EUT power cord plug using mating plugs and receptacles on the LISN. The EUT was tested using manufacturer-supplied or recommended power cords, ensuring equivalent electrical and shielding characteristics. The device will be positioned on a test table 80cm above the reference ground plane, with a vertical conducting plane located 40cm to its rear. AC conducted emission measurements were conducted over a frequency range of 150kHz to 30MHz, utilizing an AC adapter with a 110V AC 60Hz supply.

8.1.1 Test Setup Configuration

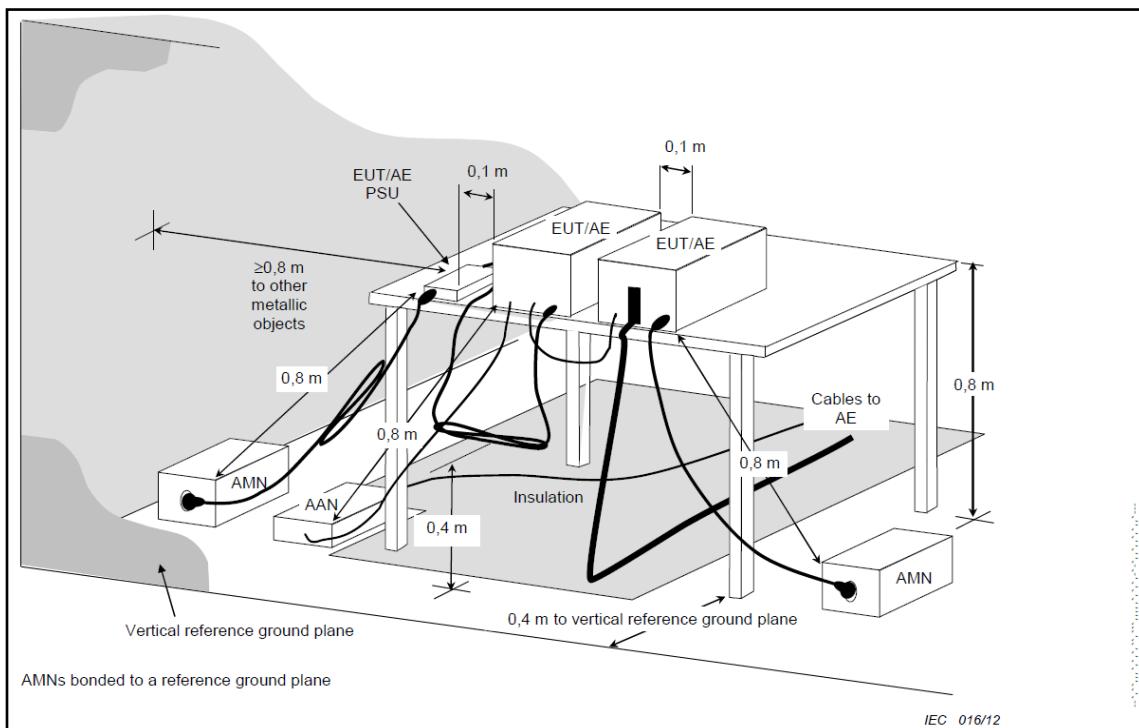


Figure 1: Conducted Spurious Emission Test on AC Power Lines Setup

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8.2 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 1mtr high turntable for below 1 GHz and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360 ° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1GHz was performed by Horn Antenna, the measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 1000 MHz was performed by Broadband Trilog Antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded

8.2.1 Test Setup Configuration

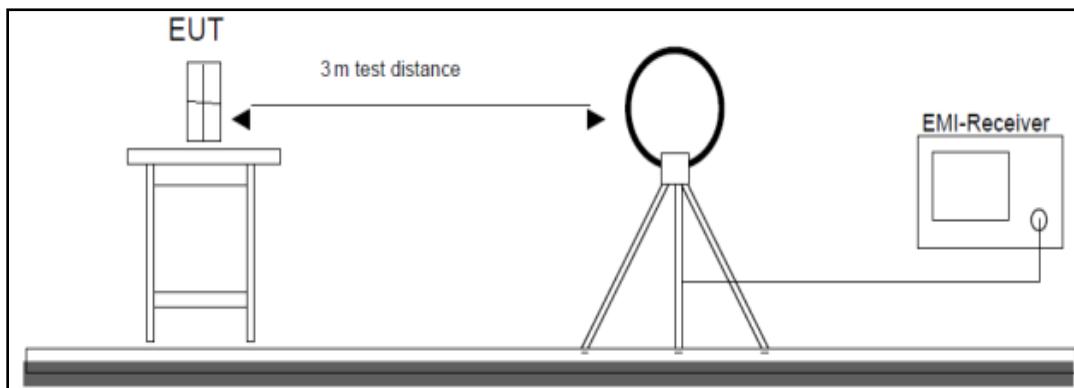


Figure 2: Frequency Range 9 kHz- 30 MHz

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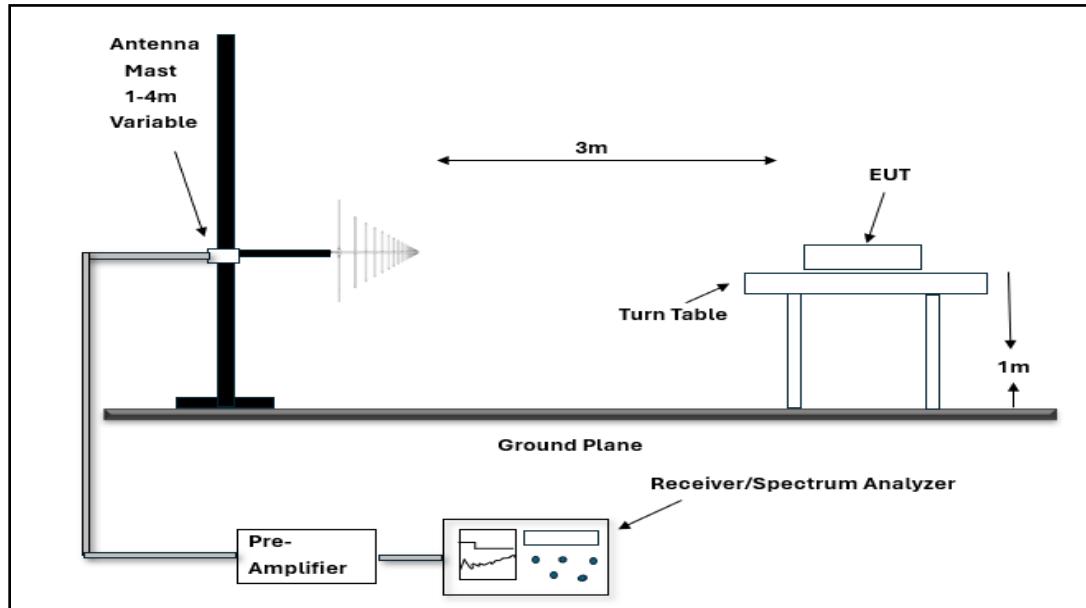


Figure 3: Frequency Range 30 MHz - 1GHz

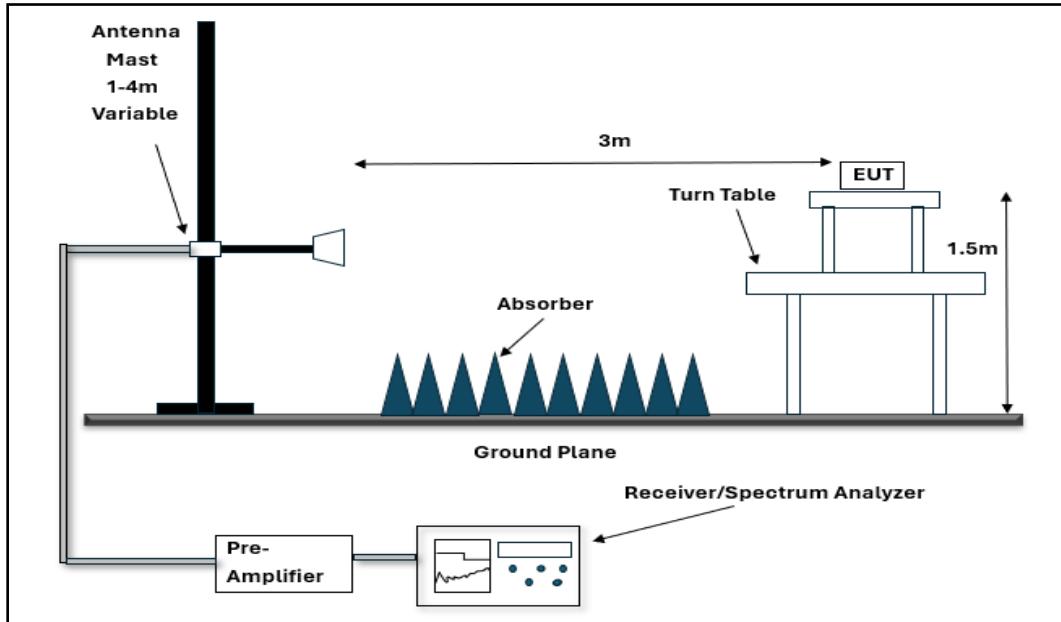


Figure 4: Frequency Range above 1 GHz



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9 TEST CONDITIONS AND RESULTS – FIELD STRENGTH MEASUREMENT WITHIN THE BAND 13.110-14.010 MHz

Test Specification	FCC part 15 Subpart C 15.225
Test Method	ANSI C63.10-2020
Measuring Distance	3 m
Detector	Peak detector/Quasi Peak
Requirement	As mentioned in the below
Test Setup	Refer <u>TEST METHODOLOGY</u>

Table 5: Field strength limits in 13.110-14.010 MHz Operation

Frequency (MHz)	Field strength (μ V/m)	Field strength limit for 30-meter distance ($\text{dB}\mu$ V/m)	Field strength limit for 3-meter distance ($\text{dB}\mu$ V/m)
13.553 -13.567	15848	83.99	123.99
13.410-13.553 and 13.567 -13.710	334	50.47	90.47
13.110 -13.410 and 13.710-14.010	106	40.5	80.5

Note: As per the 15.31 Section f(2), distance correction factor of 40dB/decade is used to convert Field strength limit from 30 meter to 3 meter measurement antenna distance.

9.1 Laboratory Environmental Conditions

Ambient Temperature	: +15°C to +35°C
Relative humidity	: 20% to 75%
Power supply	: 110V AC, 60Hz

9.2 EUT Conditions

Temperature	: +18°C to +24°C
Power supply	: 24V DC

9.3 Test results

Table 6: Field strength measurement within the band 13.110MHz to 14.010MHz Results

Antenna Polarization	Measured frequency (MHz)	Field Strength ($\text{dB}\mu$ V//m)	Limit ($\text{dB}\mu$ V//m)	Margin (dB)
Parallel	13.287	34.95	80.50	-45.55
	13.556	39.48	123.99	-84.51
	13.725	34.95	80.50	-45.55
Perpendicular	13.313	34.57	80.50	-45.93
	13.561	41.30	123.99	-82.69
	13.859	35.69	80.50	-44.81

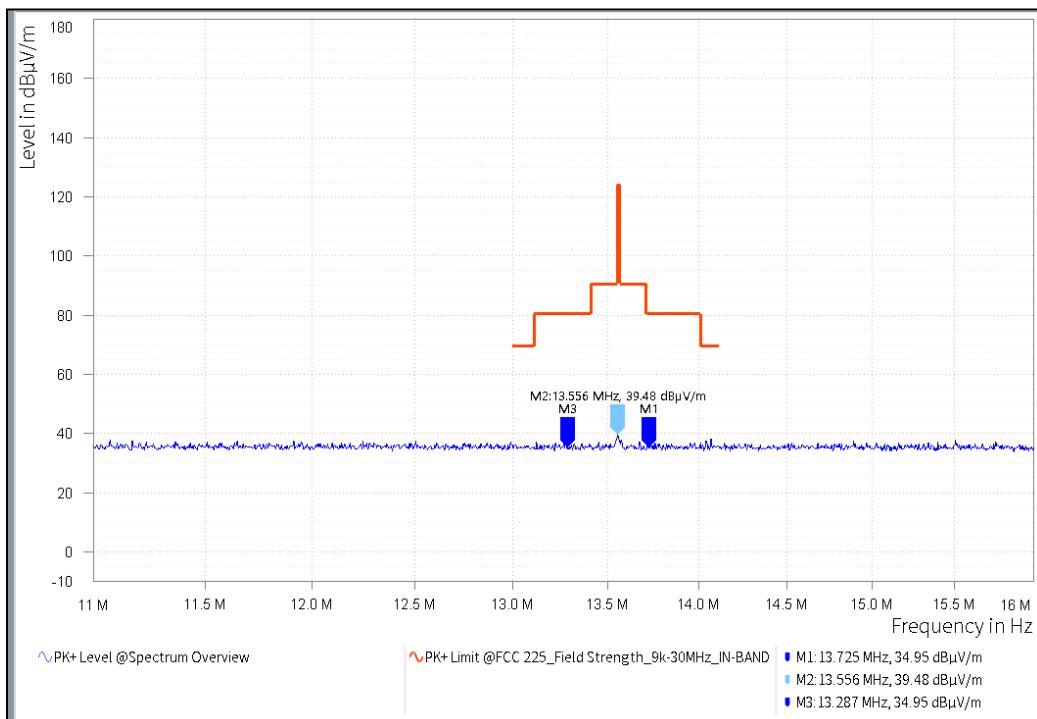


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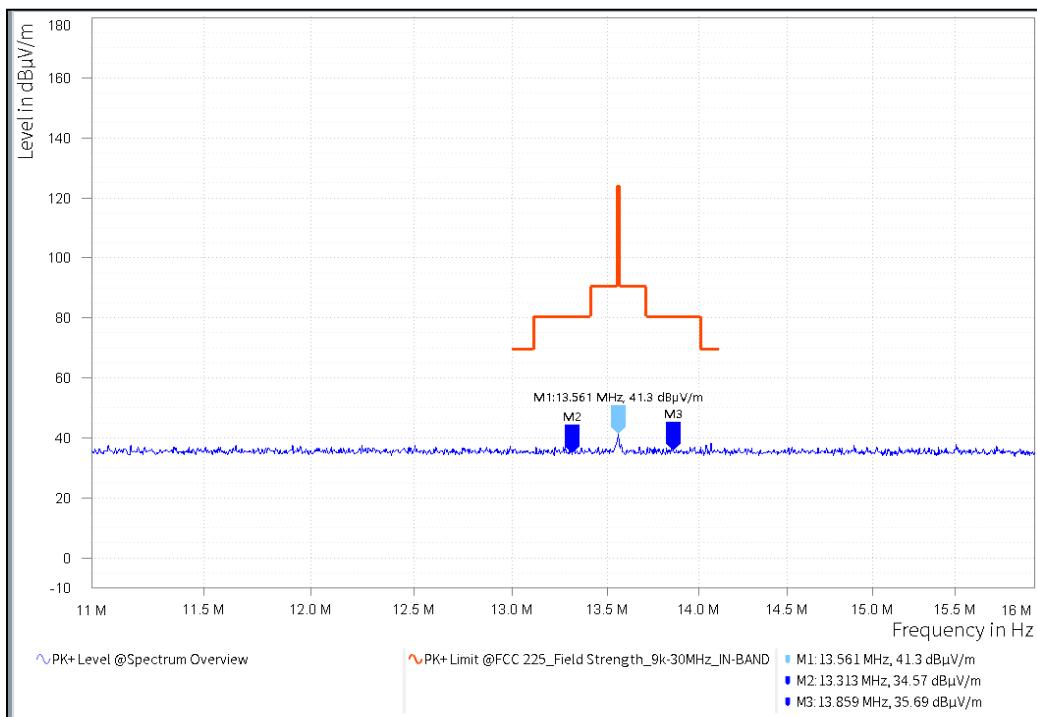
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Test Plots:



Channel Frequency: 13.56MHz

Polarization: Parallel



Channel Frequency: 13.56MHz

Polarization: Perpendicular



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10 TEST CONDITIONS AND RESULTS – SPURIOUS RADIATED EMISSIONS

Test Specification	FCC part 15 Subpart C 15.247 (d) / (15.209 & 15.205)
Test Method	ANSI C63.10-2020
Measuring Distance	3 m
Measurement Bandwidth	120kHz for frequency range < 1GHz
Detector	Refer remarks below
Requirement	As per the mentioned below Limits
Test Setup	Refer <u>TEST METHODOLOGY</u>

Table 7: Transmitter limits for Radiated Emission

Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Remark: * The limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300-meter, 30 meter and 30-meter range respectively, which corresponds to 128.51 – 93.80, 73.80 – 62.96 and 69.54 dB μ V/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

10.1 Laboratory Environmental Conditions

Ambient Temperature	: +15°C to +35°C
Relative humidity	: 20% to 75%
Power supply	: 110V AC, 60Hz

10.2 EUT Conditions

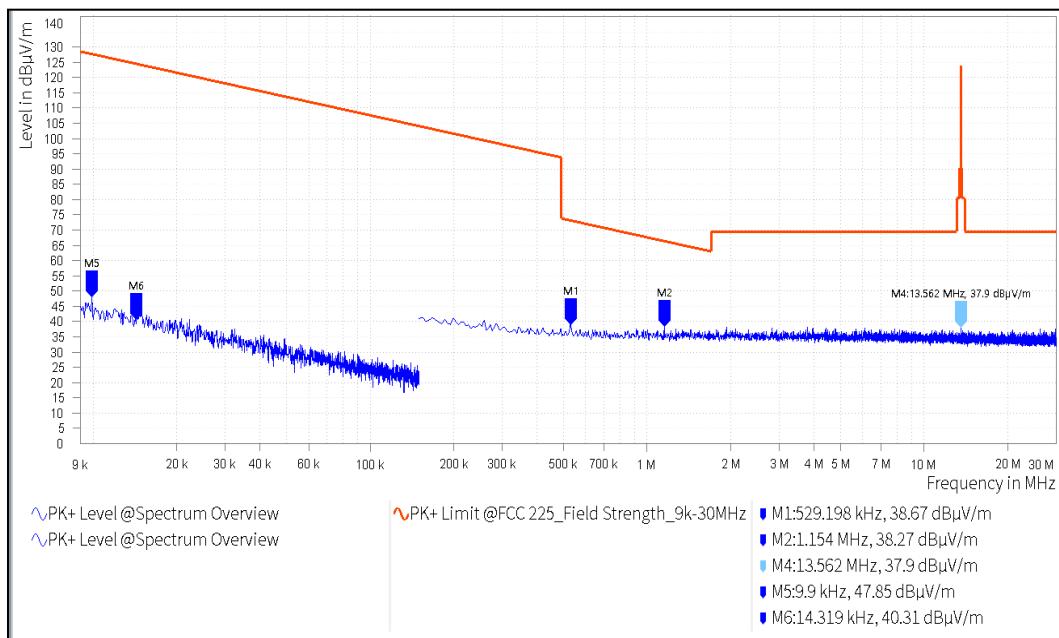
Temperature	: +18°C to +24°C
Power supply	: 24V DC

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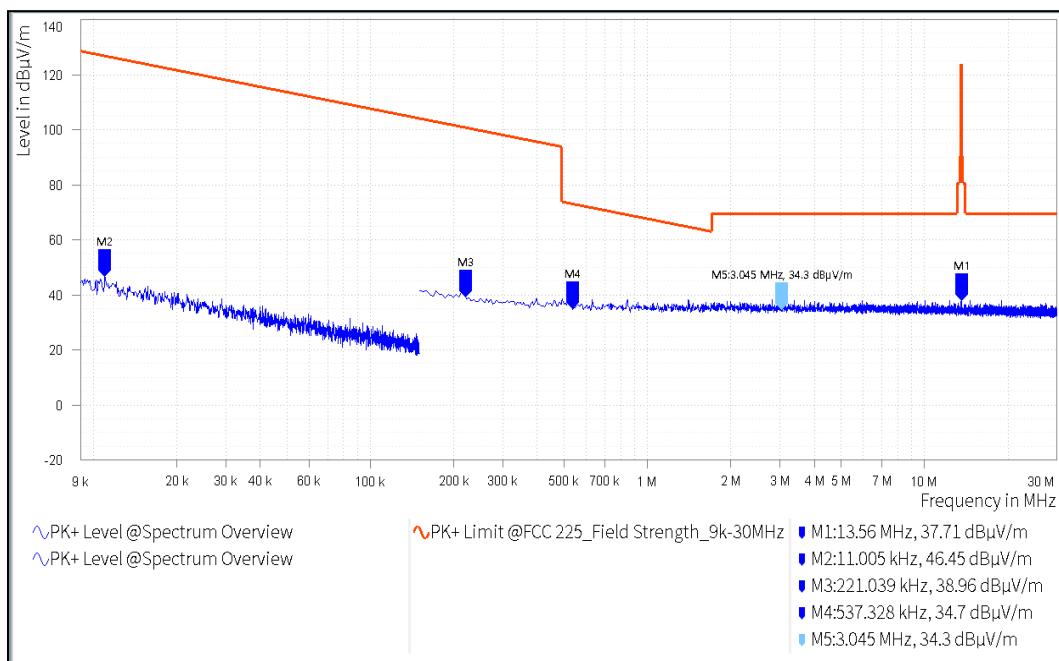
10.3 Test results

Test results for frequency range 9kHz – 30MHz

In the frequency range of 9 kHz to 30 MHz, the EUT's operational frequency of 13.56 MHz was the sole detected emission. All measured spurious emissions were found to satisfy the compliance criterion of a minimum 20 dB margin below the regulatory limit.



Polarization: Parallel



Polarization: Perpendicular



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Test results for frequency range 30MHz – 1GHz

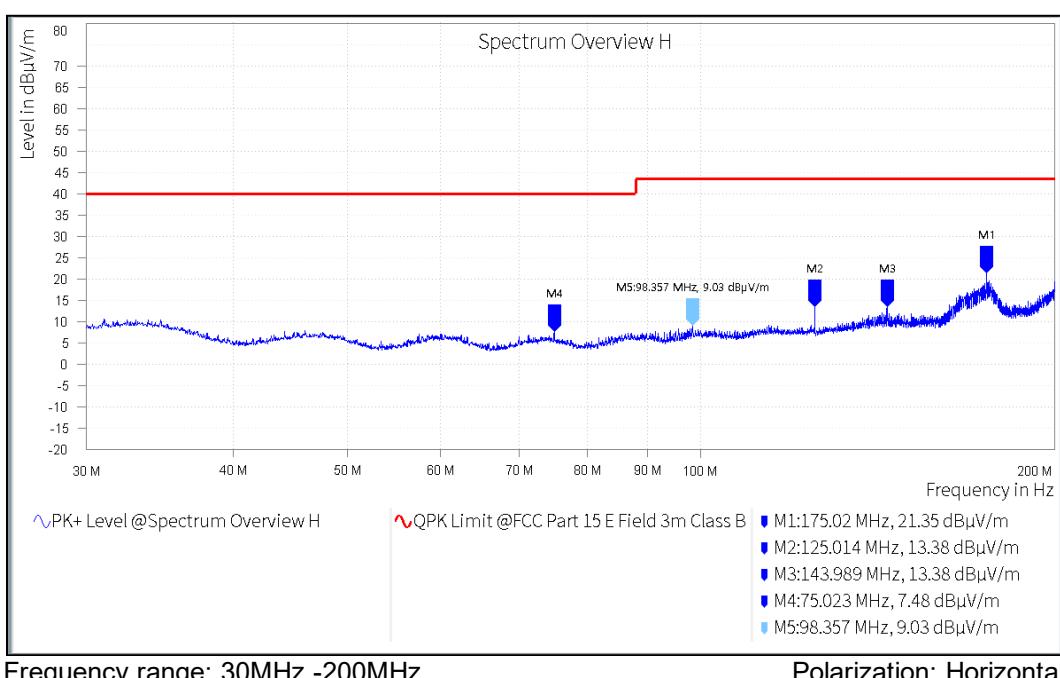
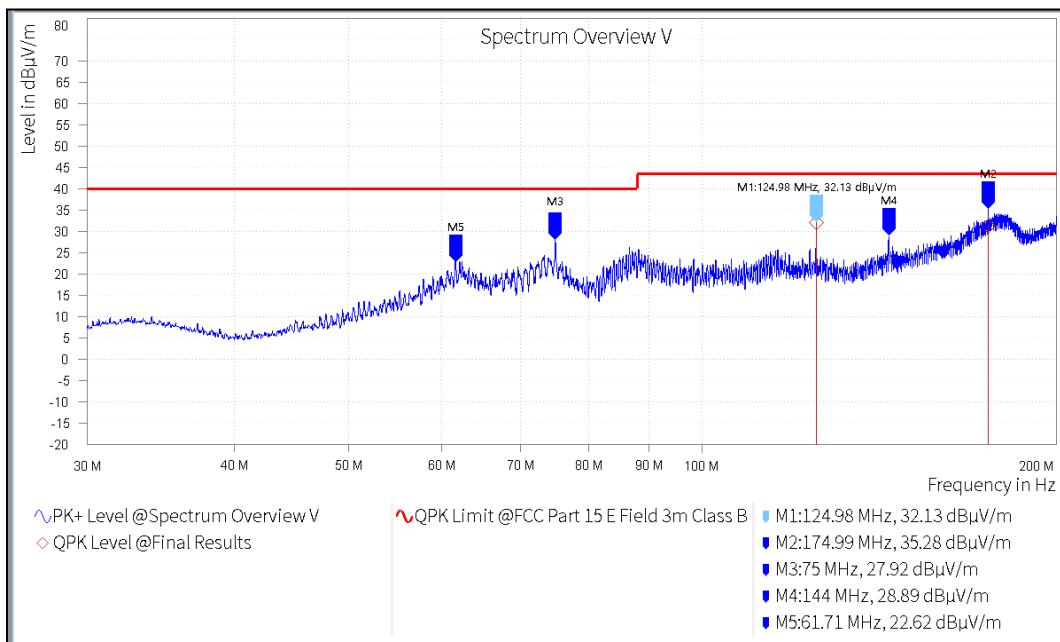
Table 8: Test results for frequency range 30MHz – 1GHz

Antenna Polarization	Measured Frequency (MHz)	Measured Spurious emission (dB μ V//m)	Limit (dB μ V//m)	Margin (dB)
Vertical	75.00	27.92	40.00	-12.08
	124.98	32.13	43.50	-11.37
	174.99	35.28	43.50	-8.22
	250.01	43.46(QP)	46.00	-2.54
	374.99	38.94(QP)	46.00	-7.06
	500.00	39.22(QP)	46.00	-6.78
Horizontal	125.01	13.38	43.50	-30.12
	143.99	13.38	43.50	-30.12
	175.02	21.35	43.50	-22.15
	250.01	34.78	46.00	-11.22
	500.00	37.98	46.00	-8.02
	749.99	32.96	46.00	-13.04

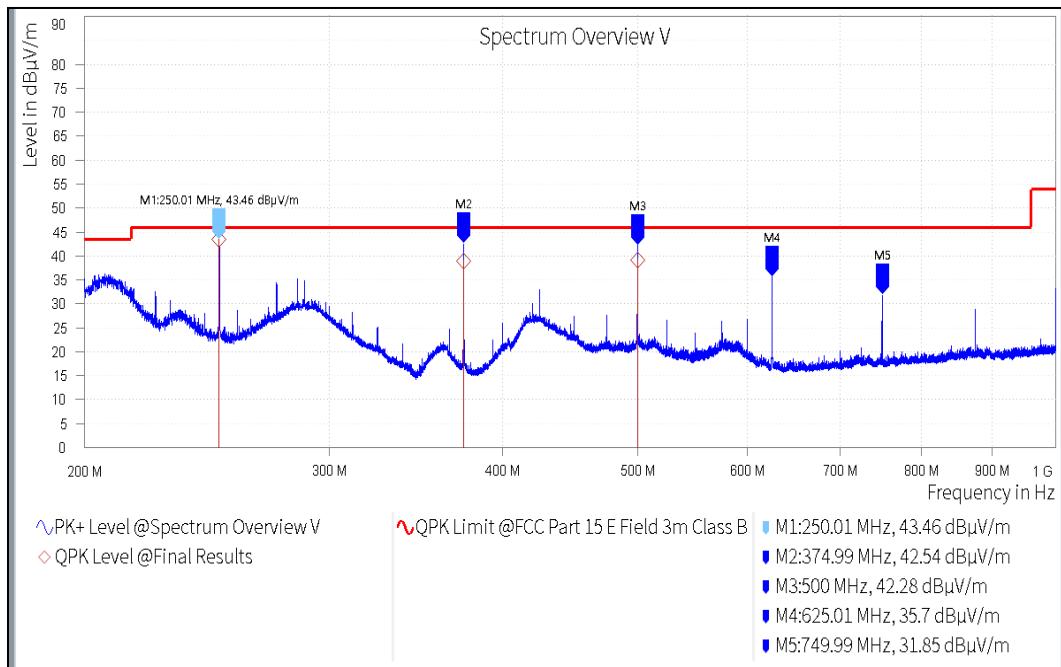
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Test plots:

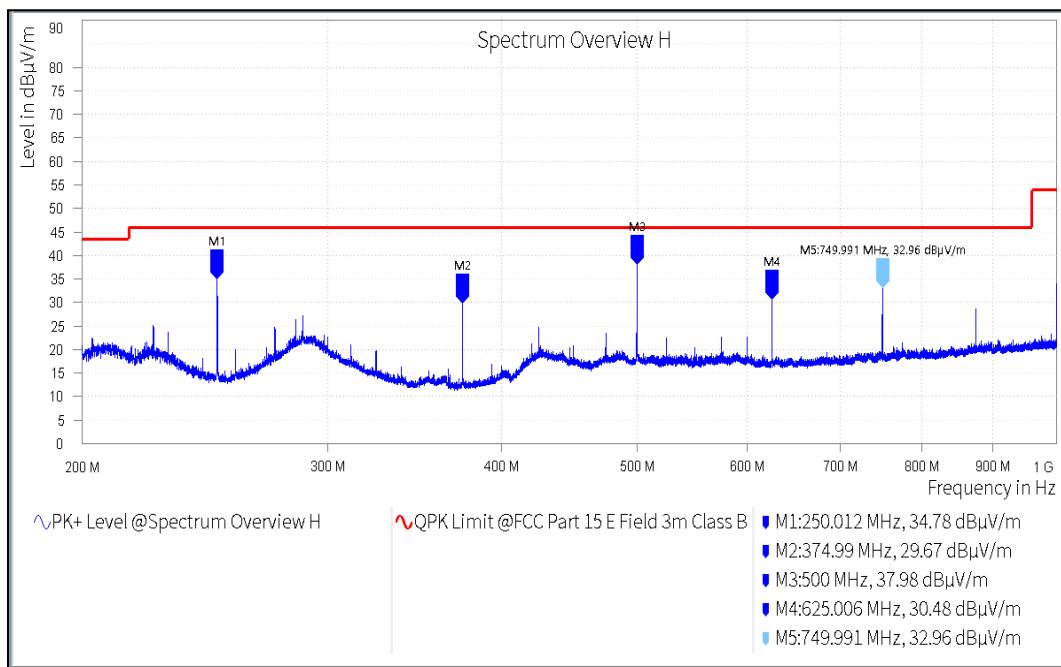


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Frequency range: 200MHz-1GHz

Polarization: Vertical



Frequency range: 200MHz-1GHz

Polarization: Horizontal



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11 TEST CONDITIONS AND RESULTS – CONDUCTED SPURIOUS EMISSION TEST ON AC POWER LINE

Test Specification	FCC Part 15 Section 15.207
Test Method	ANSI C63.10-2020
Testing Location	Shielded Room
Measurement Bandwidth	9kHz
Frequency Range	150kHz – 30MHz
Test Setup	Refer <u>TEST METHODOLOGY</u>

Table 9: Limits of section 15.207

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak (dB μ V)	Average (dB μ V)
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

11.1 Laboratory Environmental Conditions

Ambient Temperature : +15°C to +35°C
Relative humidity : 20% to 75%
Power supply : 110V AC, 60Hz

11.2 EUT Conditions

Temperature : +18°C to +24°C
Power supply : 24V DC



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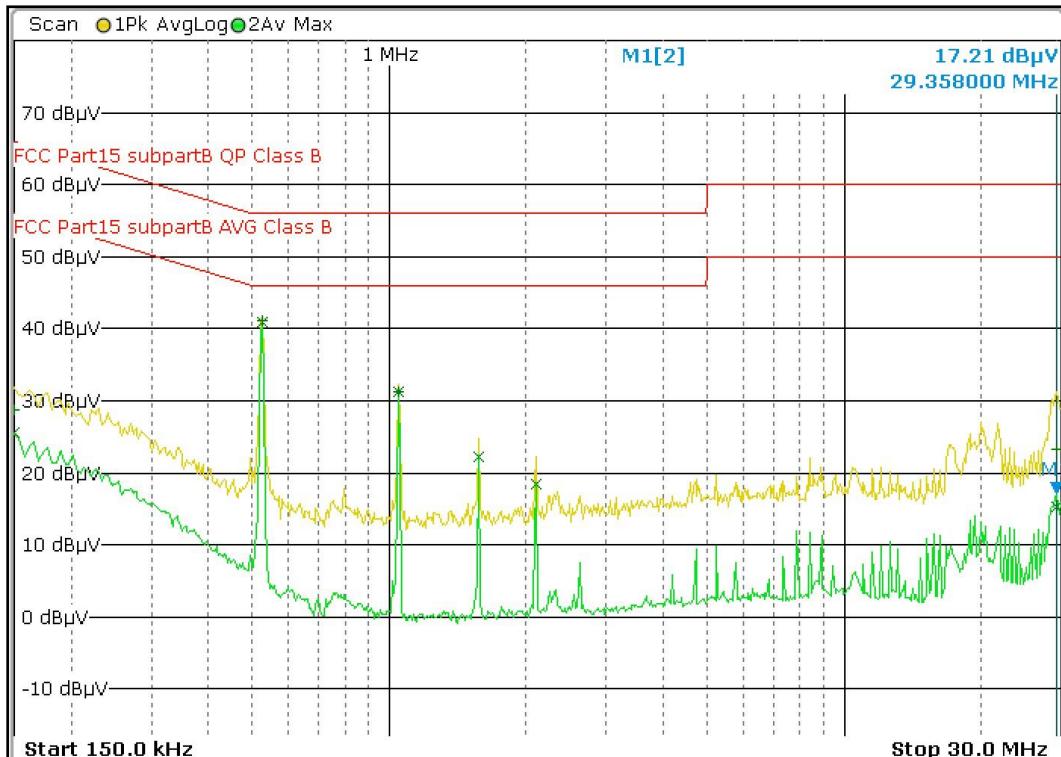
11.3 Test result:

Power: 110VAC_60Hz_LINE

Table 10: Power - 110VAC_60Hz_LINE Results

Trace	Frequency	Level (dB μ V)	Phase	Detector	Delta Limit/dB
1	150.000000000 kHz	28.69		Quasi Peak	-37.31
2	150.000000000 kHz	25.65		Average	-30.35
1	526.000000000 kHz	41.04		Quasi Peak	-14.96
2	526.000000000 kHz	40.84		Average	-5.16
1	1.050000000 MHz	31.35		Quasi Peak	-24.65
2	1.050000000 MHz	31.19		Average	-14.81
2	1.574000000 MHz	22.30		Average	-23.70
2	2.098000000 MHz	18.43		Average	-27.57

Test Plot:





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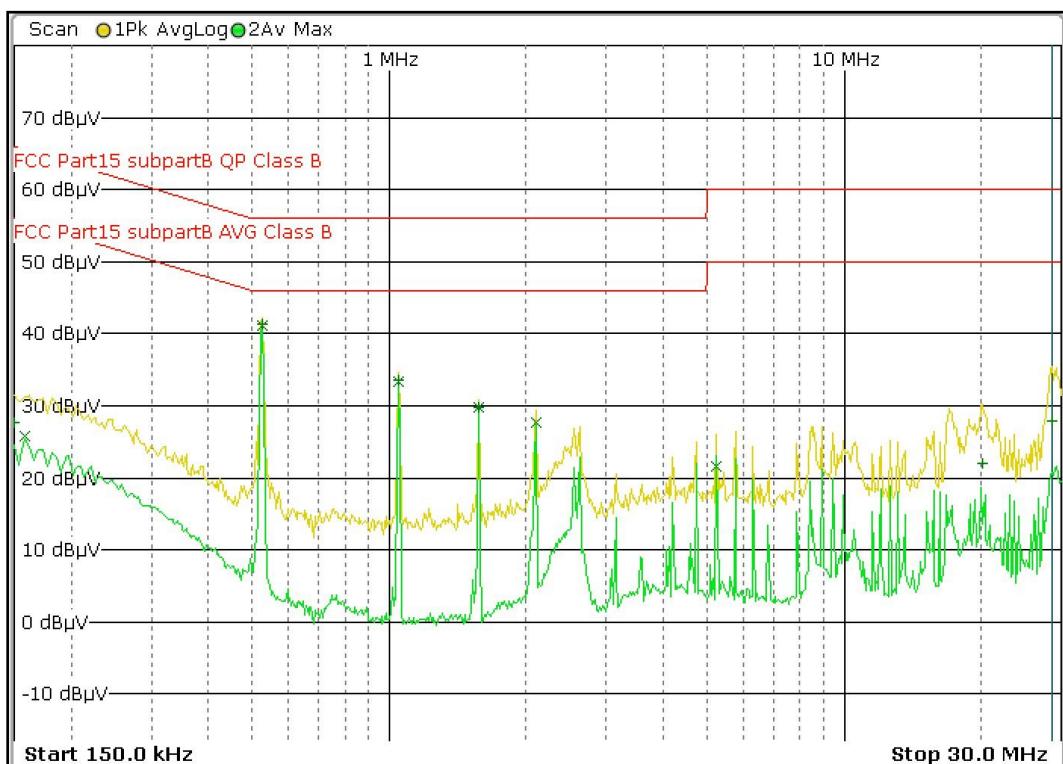
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Power: 110VAC_ 60Hz_Neutral

Table 11: Power - 110VAC_ 60Hz_Neutral Results

Trace	Frequency	Level (dB μ V)	Phase	Detector	Delta Limit/dB
1	150.000000000 kHz	27.71		Quasi Peak	-38.29
2	158.000000000 kHz	25.74		Average	-29.83
1	526.000000000 kHz	41.29		Quasi Peak	-14.71
2	526.000000000 kHz	41.17		Average	-4.83
1	1.050000000 MHz	33.48		Quasi Peak	-22.52
2	1.050000000 MHz	33.37		Average	-12.63
1	1.574000000 MHz	29.82		Quasi Peak	-26.18
2	1.574000000 MHz	29.74		Average	-16.26
2	2.098000000 MHz	27.77		Average	-18.23
2	5.246000000 MHz	21.61		Average	-28.39
1	20.178000000 MHz	22.02		Quasi Peak	-37.98

Test Plot:





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-----End of Report-----