

Prüfbericht-Nr.: <i>Test report no.:</i>	IN235LQF 001	Auftrags-Nr.: <i>Order no.:</i>	146814428 0010	Seite 1 von 34 Page 1 of 34
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	2273364	Auftragsdatum: <i>Order date:</i>	26-07-2023	
Auftraggeber: <i>Client:</i>	Matica Technologies group SA Chamerstrasse 79, 6300 Zug, Switzerland			
Prüfgegenstand: <i>Test item:</i>	Re-transfer Card Printer			
Bezeichnung <i>Identification</i>	XID-M300, XFI-M300, XID-M100, XID-M600, XFI-M600, XID-600P, XID-M300K, XID-M600K.			
Auftrags-Inhalt: <i>Order content:</i>	Testing and Issue of Test Report with FCC & ISED Grant			
Prüfgrundlage: <i>Test specification:</i>	FCC Part15 subpart C -15.225 RSS 210 Issue 10 & RSS Gen Issue 5			
Wareneingangsdatum: <i>Date of sample receipt:</i>	26-07-2023			
Prüfmuster-Nr.: Serien -Nr.: <i>Test sample no:</i> <i>Serial no.:</i>	A003526149-001 009			
Prüfzeitraum: <i>Testing period:</i>	09-08-2023 - 21-08-2023			
Ort der Prüfung: <i>Place of testing:</i>	Wireless laboratory, Bangalore			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (India) Pvt. Ltd. 27/B, 2nd Cross, Electronic City , Phase 1 Bangalore – 560 100,Karnataka FCC Test Site Reg No: 496599 ISED Test Site Reg No: 277661 HVIN: XIDM			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: <i>Date:</i> 24-08-2023	Ausstellatum: <i>Issue date:</i> 25-09-2023			
Stellung / Position:	M.V.Naveen Kumar Senior Engineer	Stellung / Position:	Madhu K.N Assistant Manager	
Sonstiges / Other:	FCC ID: 2AT78-XIDM IC : 25413-XIDM			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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- | | |
|---|---|
| 1 | <p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</p> <p>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p> |
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| 3 | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</p> <p>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i></p> <p><i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p> |
| 4 | <p>Die Entscheidungsregel für Konformitätserklärungen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird.</p> <p><i>The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report.</i></p> |

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TEST SUMMARY

Test Item	FCC Clause	ISED Clause	Test Results
Occupied Channel bandwidth	FCC 215 Section C	RSS Gen Issue 5 Section 6.5	Pass
Frequency tolerance	FCC part 15 Subpart C Section 15.225 (e)	RSS 210 Issue 10 Annex B.6	Pass
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)	RSS 210 Issue 10 Annex B.6	Pass
Radiated spurious emissions	FCC 15.209/15.205	RSS-Gen Issue 5, Section 8.9 /8.10	Pass
AC Power lines on Conducted emission	FCC 15.207	RSS-Gen Issue 5, Section 8.8	Pass
Antenna requirement	FCC 15.203	NA	Pass

Discipline: Electronics Testing

Group: EMC Test Facility

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REVISION HISTORY OF THIS REPORT

Report Number	Version	Description	Issue date
IN235LQF 001	01	Initial Issue of test report	25-09-2023

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1 GENERAL REMARKS

1.1 Complimentary Materials

All attachments are integral part of this test report. This applies especially to the following items.

1. TEST SETUP PHOTOS
- 2: EUT EXTERNAL PHOTOS
- 3: EUT INTERNAL PHOTOS
- 4: FCC LABEL AND LABEL LOCATION
- 5: BLOCK DIAGRAM
- 6: SPECIFICATION OF EUT
- 7: SCHEMATIC DIAGRAM
- 8: BILL OF MATERIAL
- 9: USER MANUAL

2 TEST SITES

2.1 Testing Facilities

TUV Rheinland (India) Private Limited
27/B, 2nd Cross Road,
Electronic City Phase 1,
Bangalore – 560 100.
India

TUV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I,
Bangalore - 560 100.

2.2 List of Test and Measurement Instruments

Table 1: List of test and measurement instruments

Equipment	Manufacturer	Model Name	Serial Number	Firmware Versions	Calibration Due Date	Periodicity	Test Items Used
EMI Receiver	Rohde & Schwarz	ESW 44	101732	4.73 SP5	30.07.2024	Yearly	Radiated Spurious Emission
Active loop antenna	Frankonia	LAX-10	LAX-10-800	-	02.03.2024	Yearly	
Balun & Biconical Antenna	Schwarzbeck mess-elektronik	BBA 9106+VHB B 9124	9124-1117	-	05.05.2024	Yearly	
Log-Periodic Antenna	Schwarzbeck mess-elektronik	VUSLP 9111B	9111B-111	-	06.05.2024	Yearly	
10m Semi Anechoic Chamber	Frankonia	-	-	-	-	-	
Signal Analyser	Rohde & Schwarz	FSV7	1321.300 8K07/101 644	3.60	03.02.2024	Yearly	Antenna Port-Measurments
EMI Receiver	Rohde & Schwarz	ESR7	101133	3.48 SP3	29.07.2024	Yearly	Conducted AC Power line Test
Two Line V-Network (LISN)	Rohde & Schwarz	ENV 216	100022	-	10.10.2023	Yearly	
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100811	-	12.07.2024	Yearly	

Table 2: Instrument application Software versions

Sl. No	Test Type	Application software	Version
1	Radiated spurious emission measurement- 10 meter Semi Anechoic Chamber	BAT EMC	v2022.0.19.0
2	AC Power lines on Conducted emission	BAT EMC	v19

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

The XIDM is a Re-transfer technology direct-to-card printer for high quality card delivery. It is card printer classified under Information Technology device category. It is Designed for rigorous use. XIDM is extremely robust and provides high security card issuance.

Its main features are:

1. Printing using colour dye sublimation and resin monochrome ribbon & retransfer film.
2. For 600 DPI print resolution 600 DPI (23.6 dots/mm) thermal print head used .
3. For 300 dpi print resolution, 300 dpi thermal print head (11.8 dots/mm) used.
4. A flip-over module which allows dual-sided printing.
5. Magnetic stripe encoder ISO 7811 which enables ISO 1, 2 and 3 magnetic encoding.
6. Dual interface (contact and contactless) smart card encoder
7. Automatic ribbon recognition by means of 13,56 MHz RFID unit.
8. Connectivity interface via an USB and Ethernet.
9. The Printer has assembled with power supply that is 24VDC and 5VDC. The printer has been tested with power supply units manufactured by two different manufacturers i.e., TDK Lambda Corp and Mean Well.

3.2 Ratings and System Details of Equipment Under Test

Table 3: Ratings and System Details as declared by the client*

Radio Protocol		RFID
Operating Frequency Range		13.553MHz to 13.567MHz
No. of Channels		1
Supporting Data Rates		424 Kbit/s (supports up to 848 kbit/s)
Maximum Measured field strength (Radiated)		60.46dBμV/m
Modulation		ASK
Number of antennas		3 (Matica RFID PCB – 2Nos. and Dual interface smart Encoder (HID OK5122): 1)
Antenna Gain		NA
Antenna Type		Integrated PCB trace loop antenna
Supply Voltage to Product		100 to 240VAC through Power supply
Environmental conditions	Storage	Min/max storage temperature: -5° / +70 °C (23° / 158 °F)
	Operating	Min/max operating temperature: 15° / 40
EUT Dimension (L x W x H) mm		351 x 428 x 280 mm

***Disclaimer:**

The information/data is supplied by the client and the same is considered to arrive at the final value. Any changes made apart from the specified specification, can directly impact on the tests results. Refer the products user manual for more details.

3.3 Measurement Uncertainty:

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

Table 4: Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±3 °C
Supply Voltages	±3 %
Time	±5 %

3.4 TUV Test sample identification details.

Sample ID	Test sample type
A003526149-001	Conducted & Radiated

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

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

4.2 Operation and Software of the EUT

Hardware Version (HVIN): XIDM

Software name: NA

Test Firmware name: NA

Test Firmware version: NA

4.3 Test modes – data rates and modulations

EUT has two RFID transmitters (Matica RFID & HID RFID transmitter), following table mention the test mode details used for EUT testing.

Test mode	Test cases	Port of measurement
a	1. Frequency tolerance 2. Occupied channel bandwidth & 20 dB bandwidth	Antenna port of Matica RFID is accessed used coupled to spectrum analyser using near field probe.
b	1. Frequency tolerance 2. Occupied channel bandwidth & 20 dB bandwidth	HID RFID has a permanently attached trace loop antenna, intended emissions from the HID RFID are coupled to spectrum analyser using near field probe.
c	1. Field Strength Measurement within the band 13.110-14.010 MHz 2. Radiated spurious emissions	Measurements were made by simultaneously operating both transmitter from the antenna as required for EUT end application

4.4 Special Accessories and Auxiliary Equipment

- None

4.5 Countermeasures to achieve EMC Compliance

- None

5 Operational Description

- Blank cards are placed into the card feeder cartridge.
- Printing commands are issued from a PC through USB or LAN port.
- The print data will be saved on RAM memory of the printer (up to 5 panel data : Y, M, C, K, Uv)
- A new yellow panel of the ink ribbon will be detected and moved to its starting point.
- A new panel of retransfer film will be detected and moved to the printable location and the thermal head will be positioned to print location.
- Yellow data of memory will be printed to the retransfer film using thermal head.
- After printing yellow panel, the thermal head will be moved.
- Magenta panel will be moved to the starting point.
- The printed film will be repositioned to the printable location and the thermal head will be moved down.
- Magenta data of RAM memory will be printed to the card using thermal head.
- After printing magenta panel, the thermal head will be moved up.
- Cyan panel will be adjusted to the starting point.
- The film will be repositioned to the printable location and the thermal head will be down.
- Cyan data of RAM memory will be printed to the card using thermal head.
- After printing cyan panel, the thermal head will be moved up.
- Black panel will be moved to the starting point.
- The film will be repositioned to the printable location and the thermal head will be moved down.
- Black data of RAM memory will be printed to the card using thermal head.
- After printing black panel, the thermal head will be moved up.
- The card will be taken from feeder (via the flip-over or encoding station) and then laminated together with the printed retransfer film by means of heating rollers.
- At the end the card will be then exited

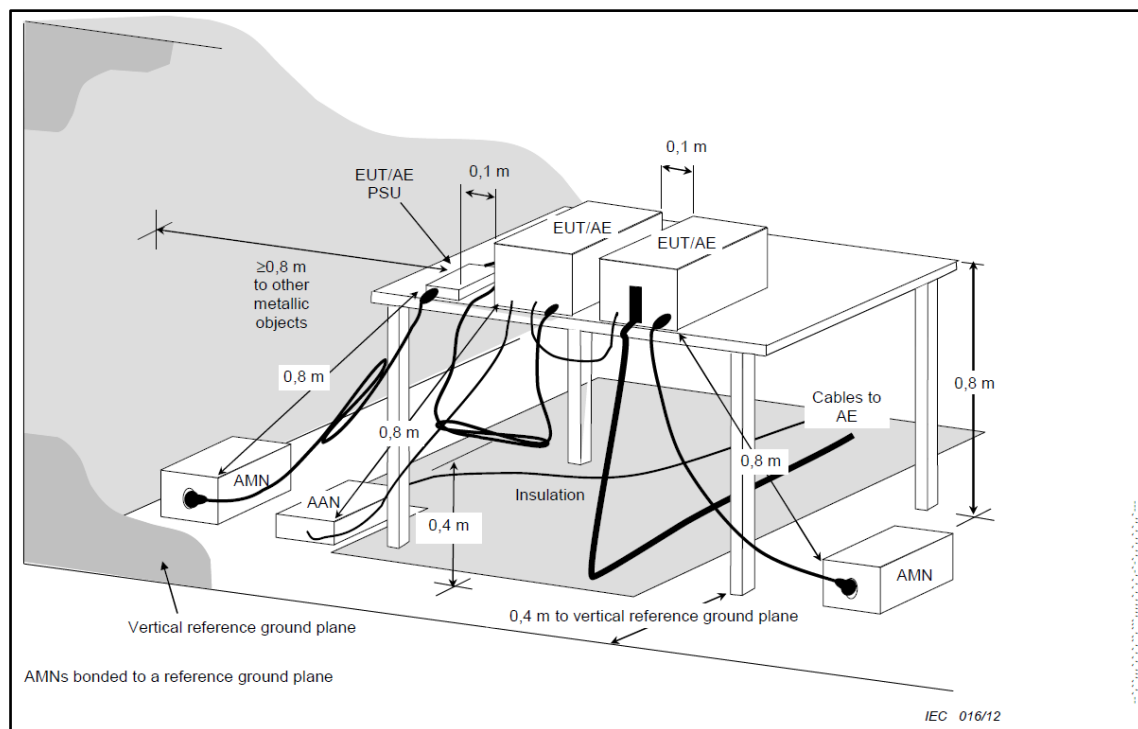
6 TEST METHODOLOGY

6.1 AC Power lines on Conducted emission

Measured levels of ac power-line conducted emission across the 50Ω LISN port (to which the EUT is connected). All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer.

The device is placed on the test table, raised 80cm above the reference ground plane. The vertical conducting plane is located 40cm to the rear of the device. AC Conducted emission measurement is made over frequency range from 150kHz to 30MHz, this measurement was performed with EUT powered with 110V AC 60Hz supply.

6.1.1 Test Setup Configuration



6.2 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 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, 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 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Baloon and Biconical Antenna, and measurement from 200 MHz to 1 GHz was performed by Log-Periodic Antenna.

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

Note: Measured Emissions (dBμV/m) = Received Emissions(dBμV) + Antenna Factor(dB)+ Cable Loss(dB) – Pre-amplifier Gain(dBi)

6.2.1 Test Setup Configuration

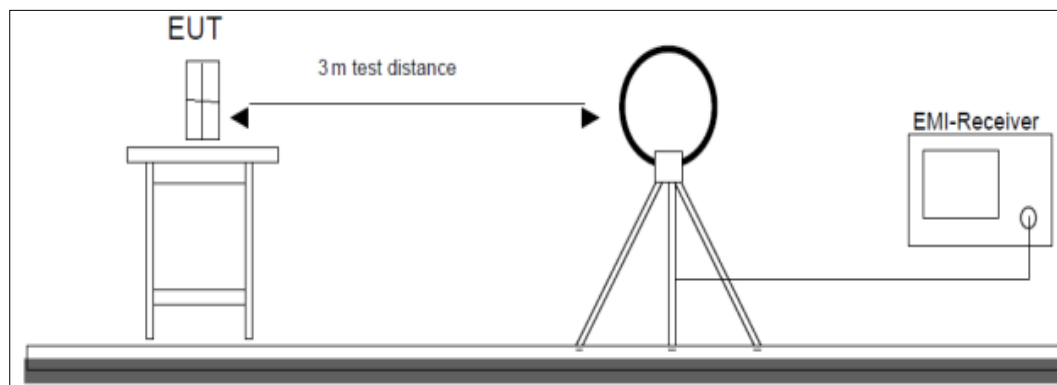


Figure 1: Frequency Range 9 kHz- 30 MHz

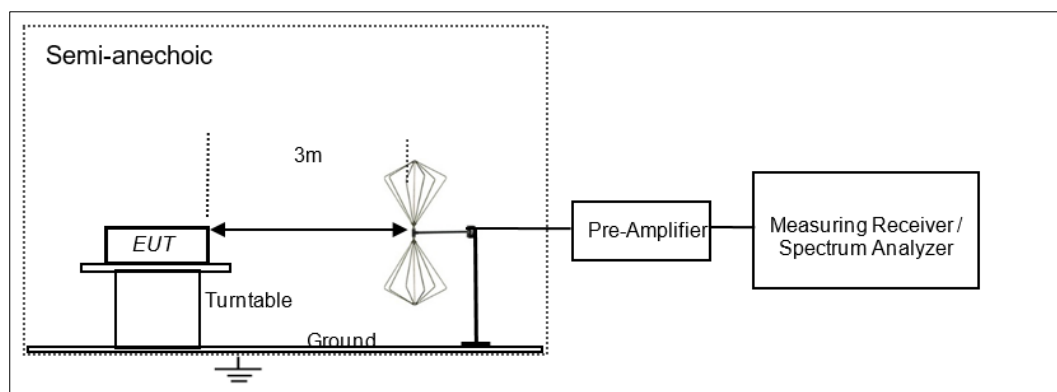


Figure 2: Frequency Range 30 MHz – 200 MHz

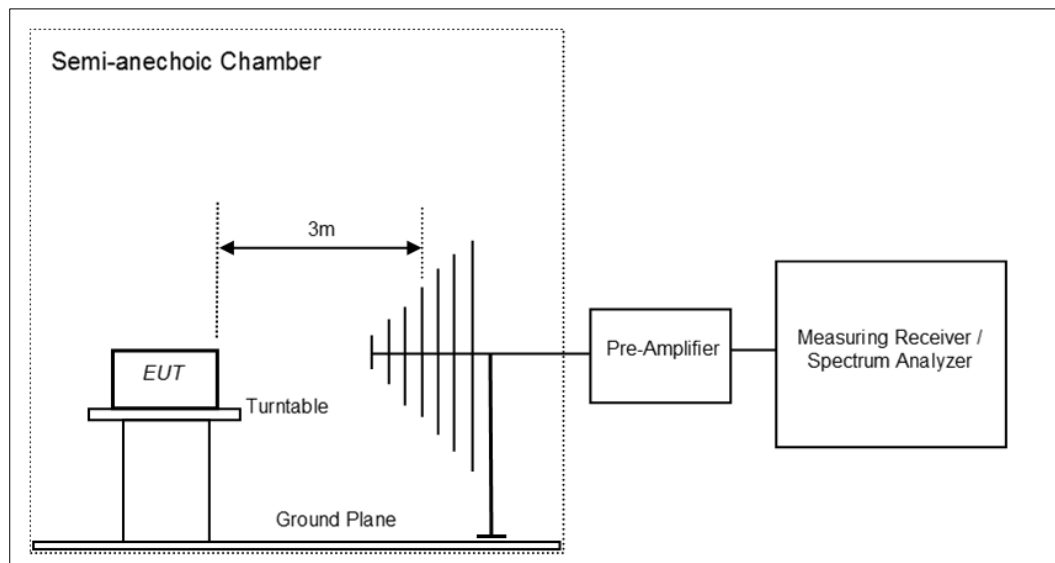


Figure 3: Frequency Range 200 MHz - 1GHz

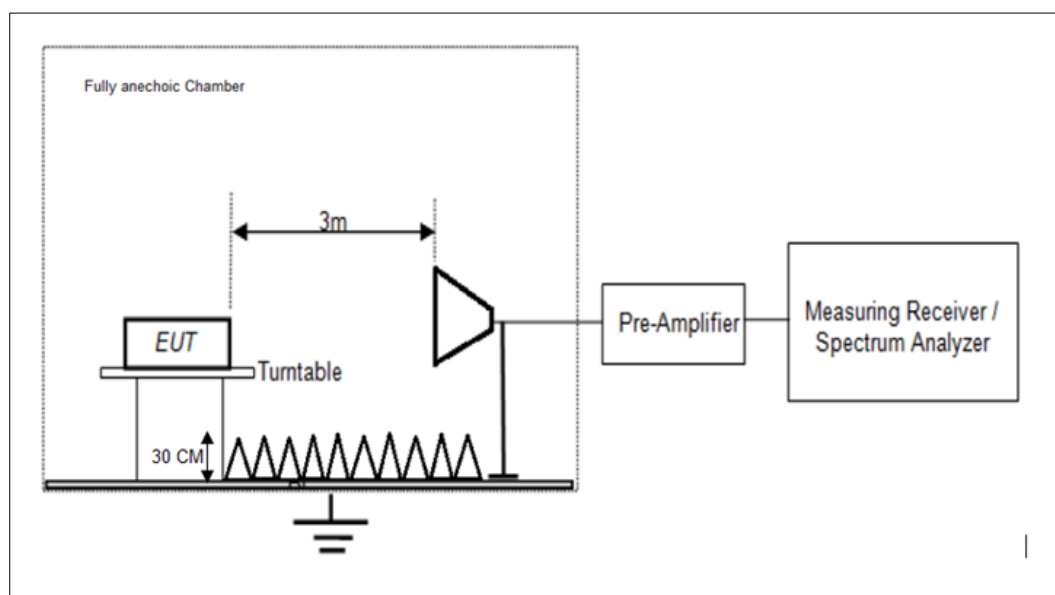


Figure 4: Frequency Range above 1 GHz

7 TEST RESULTS

7.1 Occupied channel bandwidth & 20 dB bandwidth

Result

Pass

Test Specification

FCC 15.215 Section C /RSS Gen Issue 5 section 6.7

Test Method

Subclause 6.9.3 of ANSI C63.10

Measurement Bandwidth

300 Hz

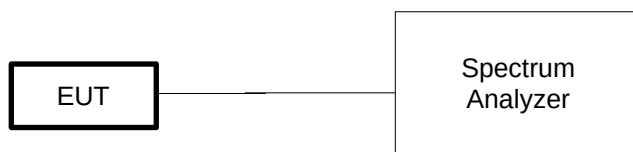
Detector

Peak

Requirements

Operation of the EUT must be within the assigned frequency band i.e. 13.553MHz to 13.567MHz

Test Setup



Test Condition

Normal Test Condition:

Temperature (Norm) = + 22.1 °C

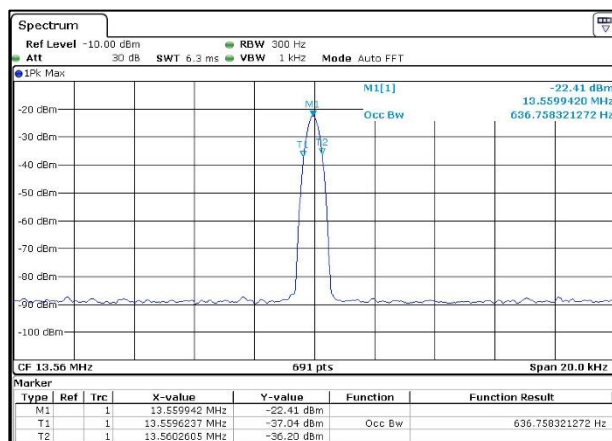
Voltage = 110VAC, 60 Hz through Power supply

Relative humidity: 62%

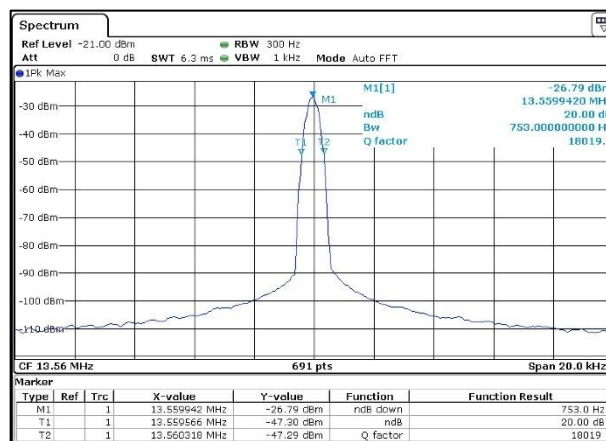
Test plots 1: Occupied & 20 dB bandwidth measurement plots

Test Mode a: EUT is configured to **Test Mode a** as defined in the clause 4.3 Test modes – data rates and modulations

Channel Frequency (MHz)	Measured 99% occupied channel bandwidth (Hz)	Measured 20dB Bandwidth (Hz)	Limit (MHz)
13.56	636.75	753	Operation of the EUT must be within the assigned frequency band i.e., 13.553MHz to 13.567MHz



99% Bandwidth



20dB Bandwidth

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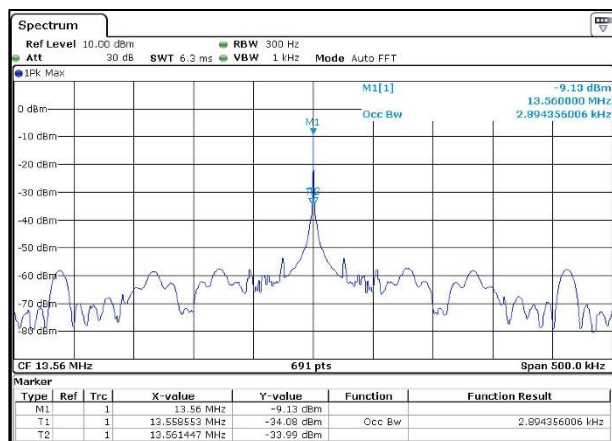
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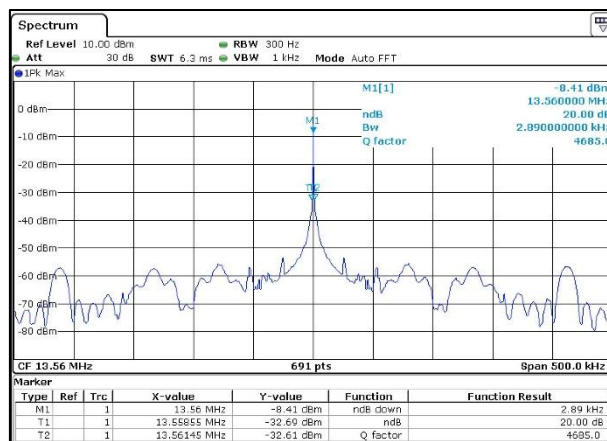
Test Mode b: EUT is configured to **Test Mode b** as defined in the clause 4.3 Test modes – data rates and modulations.

Channel Frequency (MHz)	Measured 99% occupied channel bandwidth (Hz)	Measured 20dB Bandwidth (Hz)	Limit (MHz)
13.56	2894	2890	Operation of the EUT must be within the assigned frequency band i.e., 13.553MHz to 13.567MHz

Remark: Remark: Use of 1% to 5 % RBW is not practical for this modulation, hence RBW of 300 Hz is used



99%Bandwidth



20dB Bandwidth

7.2 Frequency tolerance

Result

Pass

Test Specification

FCC part 15 Subpart C 15.225 (e) / RSS 210 Issue 10
Annex B section B.6 (b)

Test Method

Subclause 6.8 of ANSI C63.10

Measurement Bandwidth

300 Hz

Detector

Peak detector

Requirement

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ as per FCC and as per ISED the carrier frequency stability shall not exceed ± 100 ppm.

Test Setup:



Test Condition

Normal Test Condition:

Temperature (Norm) = + 22.1°C Voltage = 120 VAC, 60 Hz through Power Supply Relative humidity: 62 %

Extreme Temperature:

Nominal temperature: 15 °C to 30 °C

Extreme temperatures : -20 °C to + 50 °C with temperature variation step of 10°C

Extreme supply voltage:

Lower extreme: 102 VAC

Higher extreme: 138 VAC

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Test results:

Table 5: Frequency tolerance results

Test Mode a: EUT is configured to **Test Mode a** as defined in the clause 4.3 Test modes – data rates and modulations.

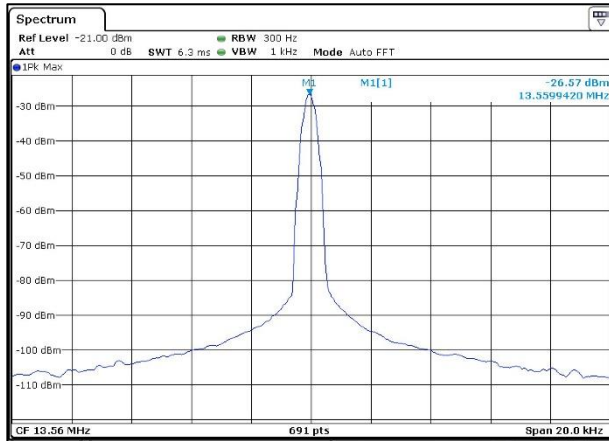
Channel frequency (Hz)	Temperature (°C)	Voltage (VAC)	Measured Frequency (Hz)	Frequency deviation (Hz)	Frequency deviation limit (Hz)
13560000	15	110	13559900	100	±1356
13560000	20		13559900	100	±1356
13560000	25		13559900	100	±1356
13560000	30		13559900	100	±1356
13560000	35		13559900	100	±1356
13560000	40		13559900	100	±1356
13560000	Normal	+15%	13559942	58	±1356
13560000		-15%	13559942	58	±1356

Test Mode b: EUT is configured to **Test Mode b** as defined in the clause 4.3 Test modes – data rates and modulations.

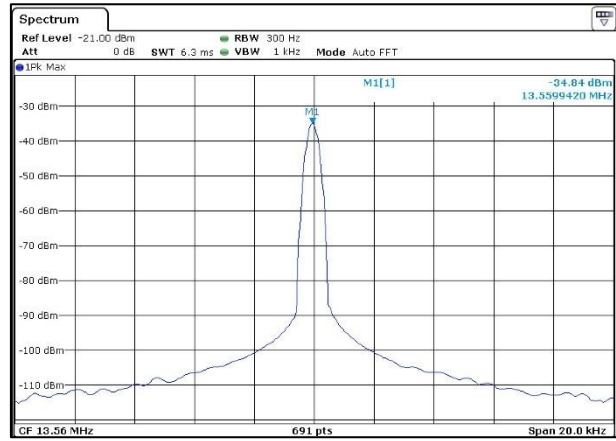
Channel frequency (Hz)	Temperature (°C)	Voltage (VAC)	Measured Frequency (Hz)	Frequency deviation (Hz)	Frequency deviation limit (Hz)
13560000	15	110	13559960	40	±1356
13560000	20		13559971	29	±1356
13560000	25		13560000	0	±1356
13560000	30		13559996	4	±1356
13560000	35		13559958	42	±1356
13560000	40		13559962	38	±1356
13560000	Normal	15%	13559978	22	±1356
13560000		-15%	13559968	32	±1356

Test plots 2: Frequency tolerance measurement plots

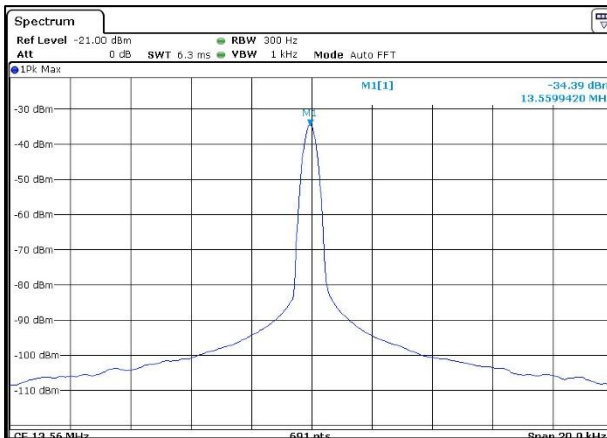
Test Mode a: EUT is configured to **Test Mode a** as defined in the clause 4.3 Test modes – data rates and modulations



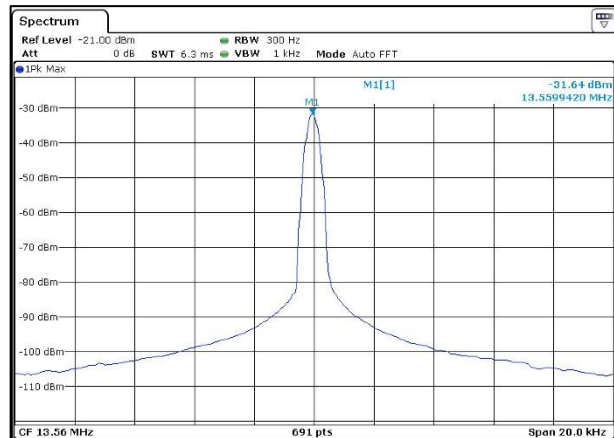
Nominal Voltage: 110VAC Temperature: +15°C



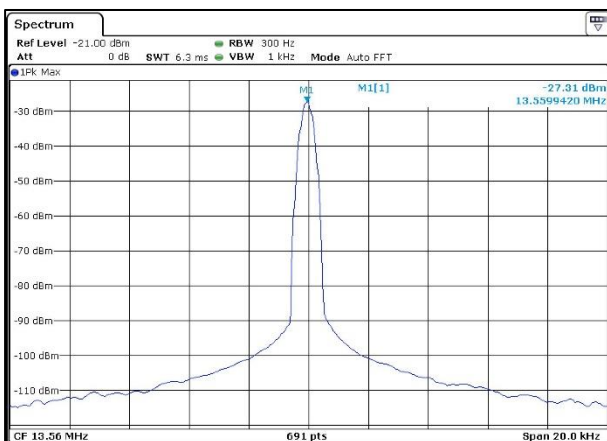
Nominal Voltage: 110VAC Temperature: +20°C



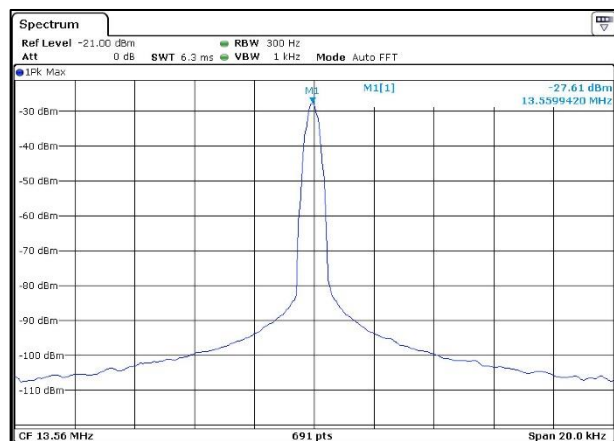
Nominal Voltage: 110VAC Temperature: +25°C



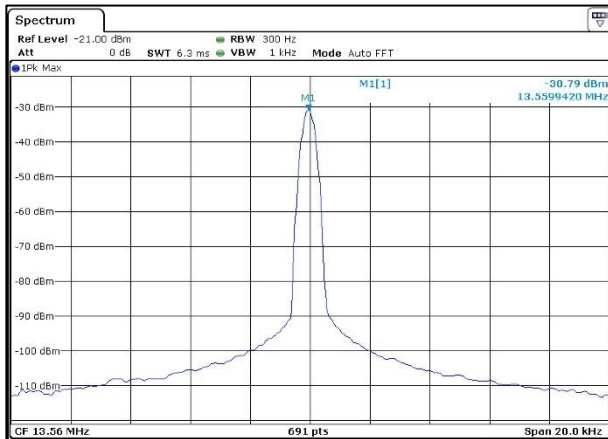
Nominal Voltage: 110VAC Temperature: +30°C



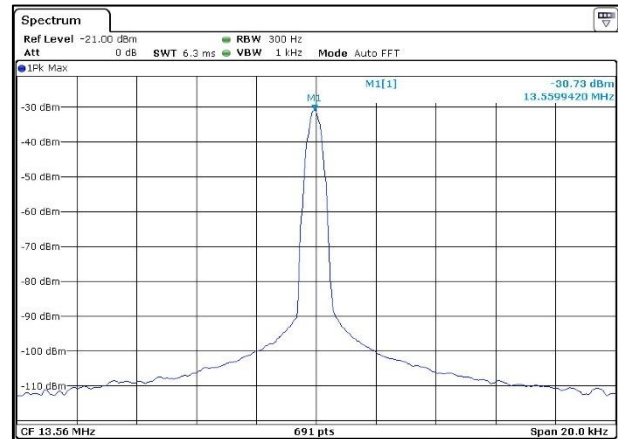
Nominal Voltage: 110VAC Temperature: +35°C



Nominal Voltage: 110VAC Temperature: +40°C



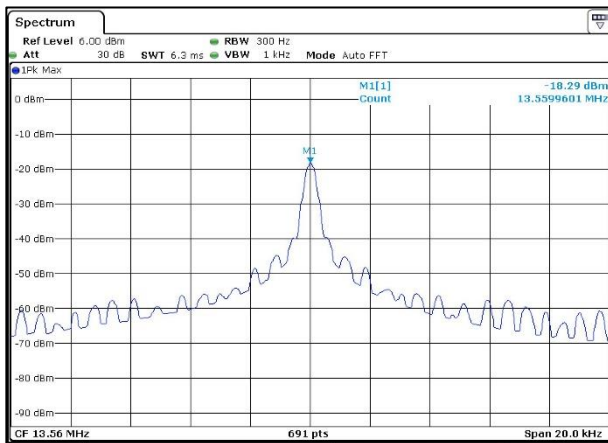
Nominal Temperature: +22.3 Volatge: 93.5VAC



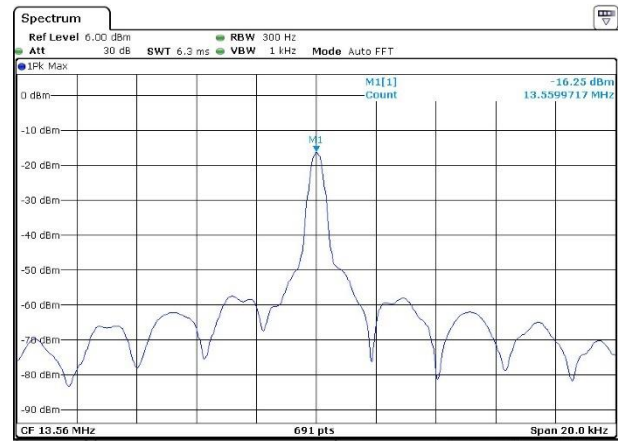
Nominal Temperature: +22.3 Volatge: 126VAC

Test Mode b: EUT is configured to **Test Mode b** as defined in the clause 4.3 Test modes – data rates and modulations

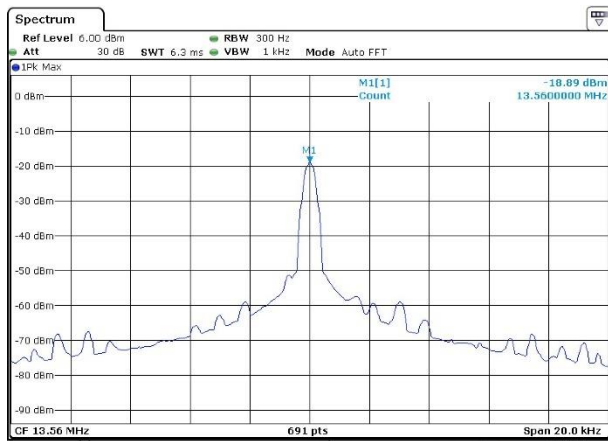
Temperature variation condition



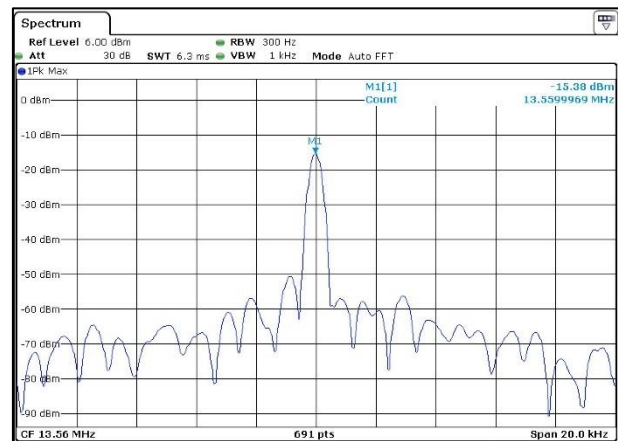
Nominal Voltage: 110VAC Temperature: +15°C



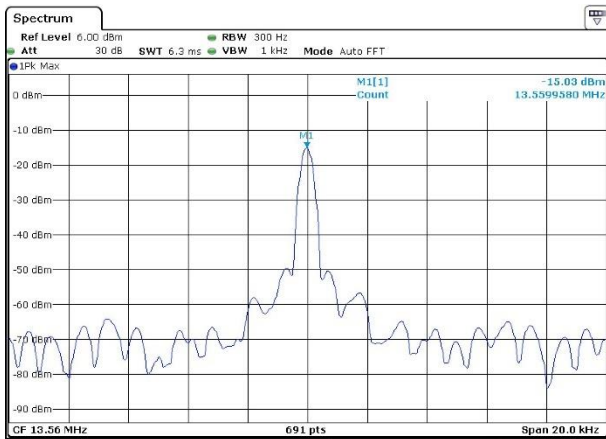
Nominal Voltage: 110VAC Temperature: +20°C



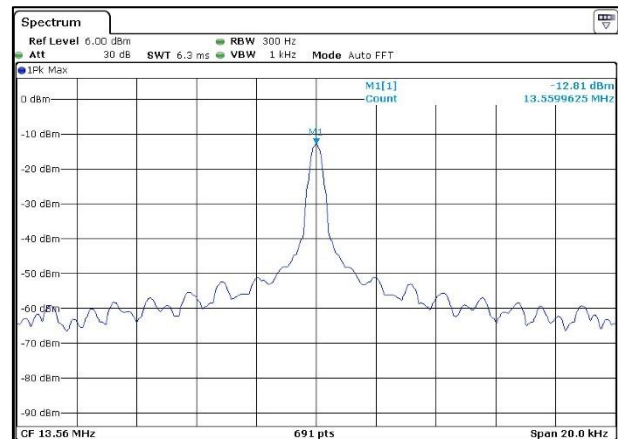
Nominal Voltage: 110VAC Temperature: +25°C



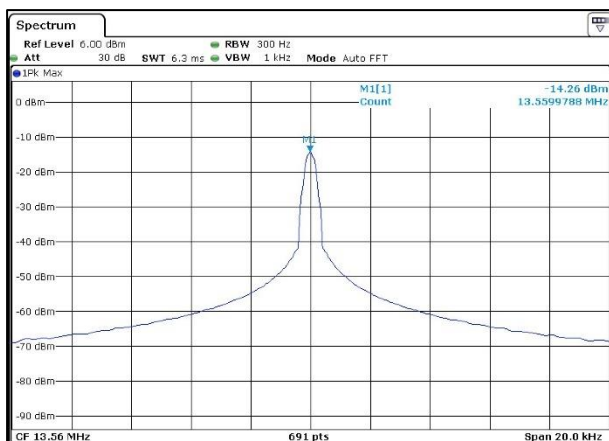
Nominal Voltage: 110VAC Temperature: +30°C



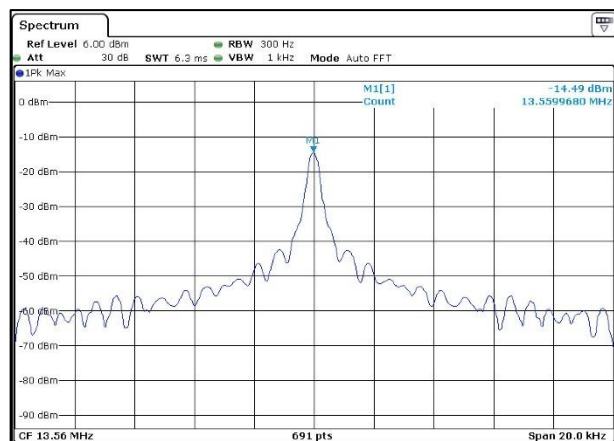
Nominal Voltage: 110VAC Temperature: +35°C



Nominal Voltage: 110VAC Temperature: +40°C



Nominal Temp: +22.3°deg Voltage: 93.5VAC



Nominal Temp: +22.3°deg Voltage: 126.5VAC

7.3 Field Strength Measurement within the band 13.110-14.010 MHz

Result

Pass

Test Specification	FCC part 15 Subpart C Section 15.225 (a,b,c,d) / RSS 210 Issue 10 Section B.6
Test Method	ANSI C 63.10 – 2013
Measurement Location	Semi Anechoic Chamber
Measuring Distance	3 m
Detector	Peak detector
Requirement	As mentioned in the below Table 6: Field strength limits in 13.110-14.010 MHz operation
Test setup	Refer Radiated Emission Test

Table 6: Field strength limits in 13.110-14.010 MHz operation

Frequency	Field strength ($\mu\text{V/m}$)	Field strength limit for 30 meter distance	Field strength limit for 3 meter distance
(MHz)		(dB $\mu\text{V/m}$)	(dB $\mu\text{V/m}$)
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.

Test Condition

Normal Test Condition:

Temperature (Norm) = + 24.8°C Voltage = 110 VAC, 60 Hz through power Supply Relative humidity: 61.76 %

Extreme Temperature:

Nominal temperature: 15 °C to 30 °C

Extreme temperatures : +15 °C to + 40 °C with temperature variation step of 10°C

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Test results:

Table 7: Field Strength Measurement within the band 13.110-14.010 MHz

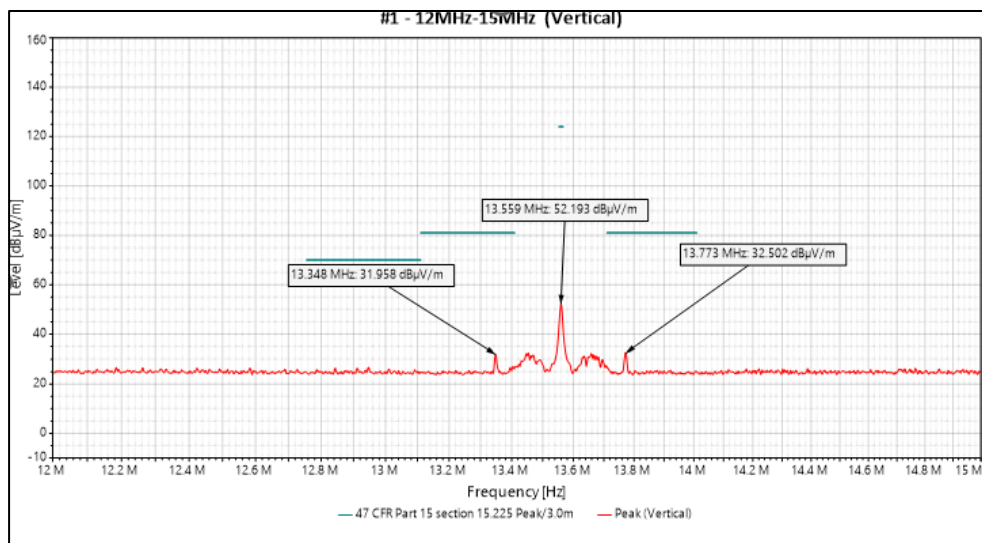
Note: EUT Is Configured to Test modes – data rates and modulations

Antenna Polarization	Frequency range (MHz)	Measured frequency (MHz)	Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Parallel	13.11-13.41	13.34	31.95	80.50	-48.55
	13.553-13.567	13.55	52.19	123.99	-71.80
	13.71-14.01	13.77	32.50	80.50	-48.00
Perpendicular	13.11-13.41	13.34	39.52	80.50	-40.98
	13.553-13.567	13.55	60.46	123.99	-63.53
	13.71-14.01	13.77	40.43	80.50	-40.07

Note:

- Field strength limits are converted to 3mts measurement distance.

Test plots 3: Spectrum Emission mask in the frequency range 12MHz to 15MHz



Frequency range: 12MHz to 15MHz

Antenna polarization: Parallel

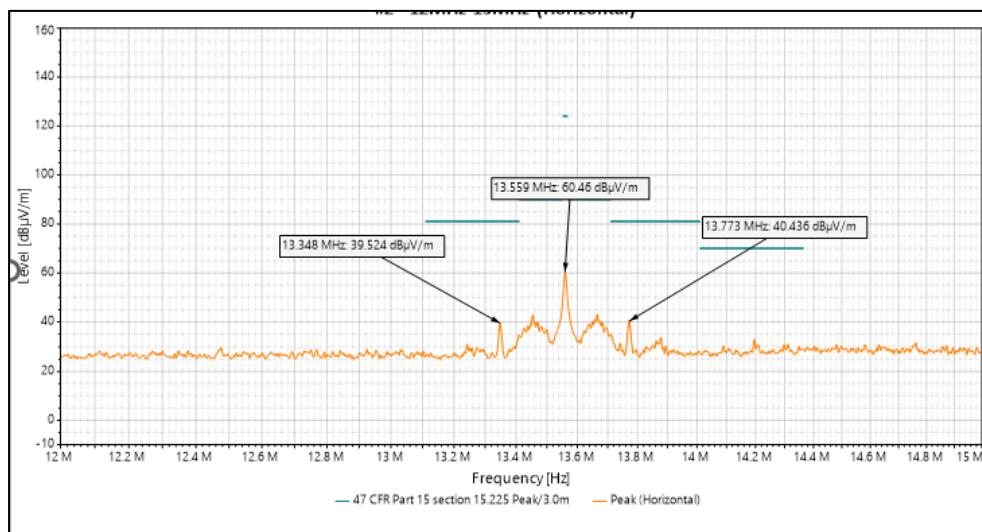
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Frequency range: 12MHz to 15MHz

Antenna polarization: Perpendicular

7.4 Spurious Radiated Emissions

Result

Pass

Test Specification	FCC part 15 Subpart C 15.247 (d) / (15.209 & 15.205) / IC RSS-GEN, Section 8.9 and 8.10
Test Method	ANSI C63.10
Measurement Location	Semi anechoic chamber
Measurement Bandwidth	100 kHz for frequency range < 1GHz
Detector	Refer remarks below
Measuring Distance	3 m
Requirement	As per the limits mentioned in the below table
Test setup	Refer TEST METHODOLOGY

Table 8: Transmitter limits for Radiated emission

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/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	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	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 dBμV/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.

Test Conditions:

Normal Test Condition:

Temperature (Norm) = + 24.8°C Voltage = 110 VAC, 60 Hz through power adaptor Relative humidity: 61.76 %

Extreme Temperature:

Nominal temperature: 15 °C to 30 °C

Extreme temperatures : -20 °C to + 50 °C with temperature variation step of 10°C

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Test results:

Note: All the losses are included during measurement and final values are mentioned in the test report. Refer TEST METHODOLOGY for more details.

Test results for frequency range 9kHz – 30MHz

No emissions found in frequency range 9 kHz to 30 MHz other than EUT intended power at 13.56MHz, and other measured spurious emission levels are below 20dB from the limit line, hence not reported

Test results for frequency range 30MHz to 200MHz

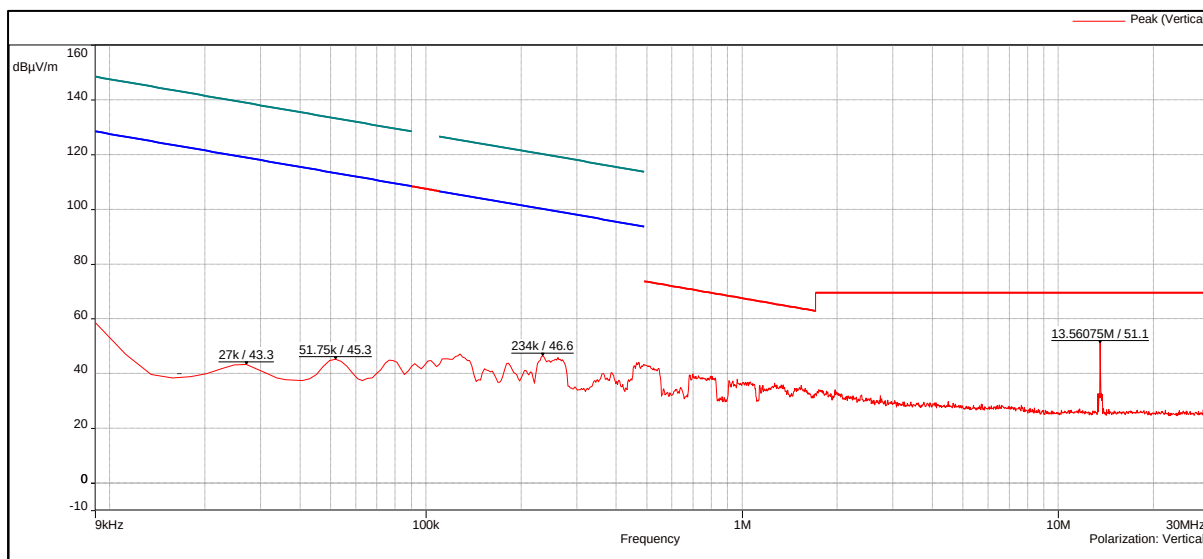
Table 9: Spurious emissions in the frequency range 30MHz to 200MHz

Antenna Polarization	Measured Frequency (MHz)	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	30.65(QP)	25.14	40.00	-14.86
	33.30(QP)	16.1	40.00	-23.9
	37.01(QP)	24.75	40.00	-15.25
	38.94(QP)	33.53	40.00	-6.47
	41.99(QP)	30.24	40.00	-9.76
	48.01(QP)	32.37	40.00	-7.63
	95.40(QP)	8.42	43.50	-35.08
	131.99(QP)	39.21	43.50	-4.29
Horizontal	36.32(QP)	17.87	40.00	-22.13
	48.00(QP)	37.67	40.00	-2.33
	96.00(QP)	32.29	43.50	-11.21
	120.01(QP)	37.07	43.50	-6.43
	132.09(QP)	30.28	43.50	-13.22
	143.78(QP)	22.62	43.50	-20.88

Table 10: Spurious emissions in the frequency range 200MHz to 1GHz

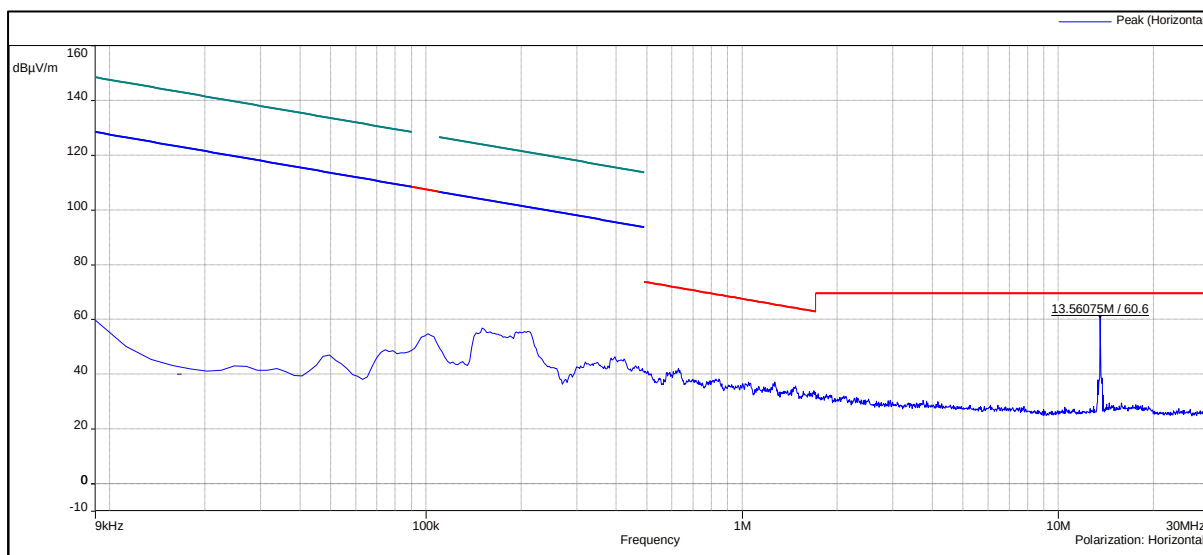
Antenna Polarization	Measured Frequency (MHz)	Measured emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	224.00(PK)	37.00	43.50	-6.50
	359.99(PK)	39.70	43.50	-3.80
	480.02(PK)	37.60	43.50	-5.90
	650.03(PK)	30.60	43.50	-12.90
	840.02(PK)	31.00	43.50	-12.50
Horizontal	235.73(PK)	38.90	43.50	-4.60
	287.99(PK)	35.20	43.50	-8.30
	359.99(PK)	38.70	43.50	-4.80
	480.02(PK)	36.90	43.50	-6.60
	599.99(PK)	30.20	43.50	-13.30
	867.95(PK)	29.20	43.50	-14.30

Test plots 4: Spurious emissions in 9KHz to 1GHz measurement range.



Frequency range: 9 kHz to 30MHz

Antenna polarization: Parallel



Frequency range: 9 kHz to 30MHz

Antenna polarization: Perpendicular

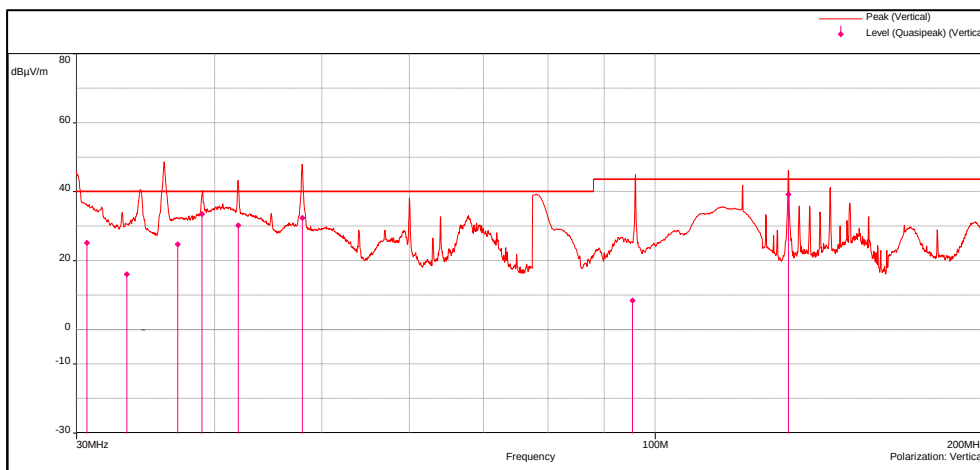
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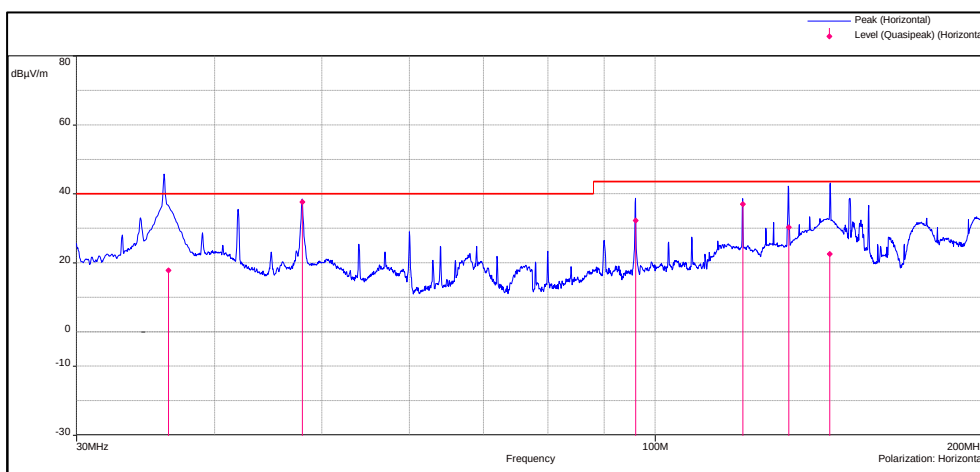
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Frequency range: 30MHz to 200MHz

Antenna polarization: Vertical



Frequency range: 30MHz to 200MHz

Antenna polarization: Horizontal

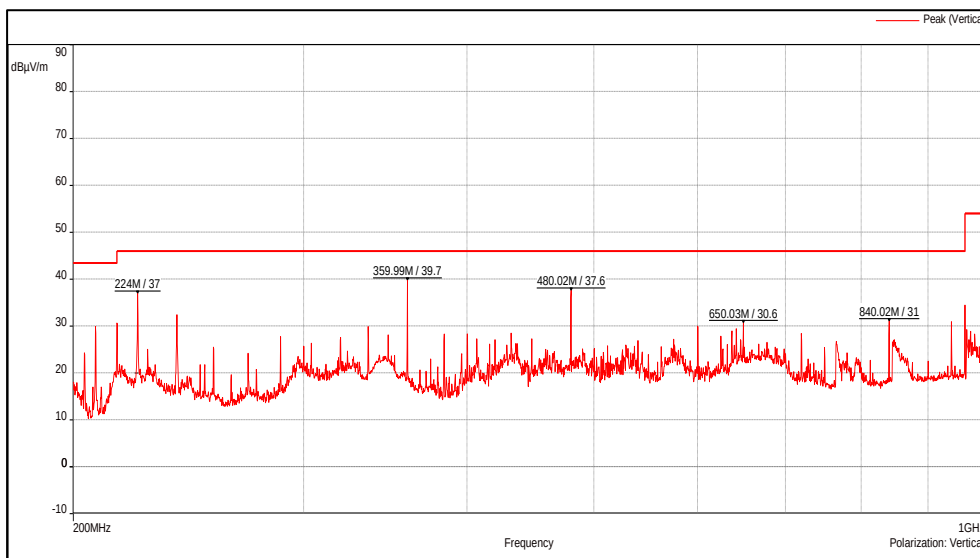
Prüfbericht - Nr.:

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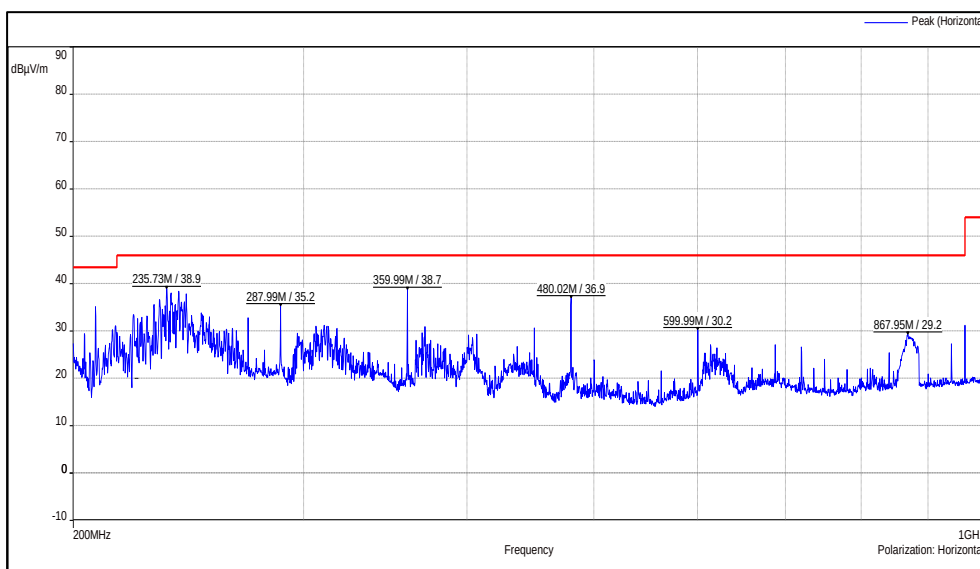
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Frequency range: 200MHz to 1GHz

Antenna polarization: Vertical



Frequency range: 200MHz to 1GHz

Antenna polarization: Horizontal

7.5 AC Power lines on Conducted emission

Result

Pass

Test Specification : FCC Part 15 Section 15.207 / RSS Gen Issue 5 Section 8.8

Test Method : ANSI C 63.10-2013

Testing Location : Screened room

Measurement Bandwidth : 9kHz

Frequency Range : 150kHz – 30MHz

Supply Voltage : 110VAC,60Hz

Test Method : Refer TEST METHODOLOGY

Limits of section 15.207

Frequency of emission (MHz)	QP Limit (dBμV)	AV Limit (dBμV)
0.15 – 0.5	66 – 56*	56 – 46*
0.5 – 5	56	46
5 – 30	60	50

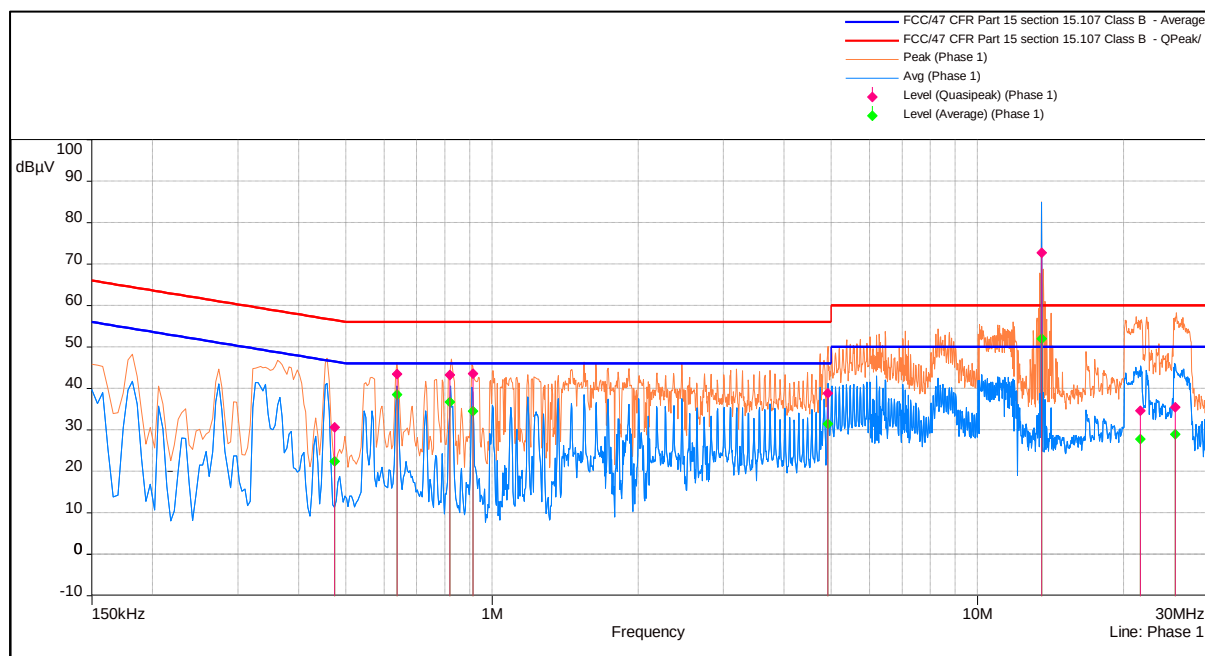
* Decreases with the logarithm of the frequency

Test Conditions:

Normal Temperature = +22.3°C Voltage (V norm) = 110V AC, 60Hz through Power supply RH = 64 %

Test result:

Power: 110VAC_ 60Hz_LINE



Graph: Line

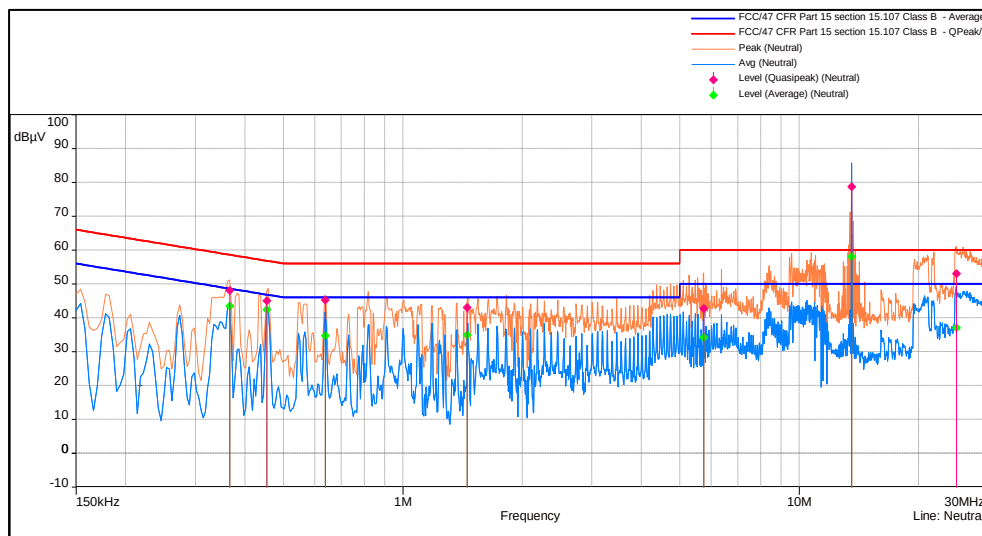
Detector: Quasi Peak

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Comments
13.56	72.76	60.00	-	-
0.91	43.56	56.00	-12.44	Pass
0.64	43.43	56.00	-12.57	Pass
0.82	43.29	56.00	-12.71	Pass
4.92	38.89	56.00	-17.11	Pass
25.51	35.47	60.00	-24.53	Pass
21.64	34.67	60.00	-25.33	Pass
0.48	30.65	56.44	-25.79	Pass

Detector: Average

Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Comments
13.56	52.03	50.00	-	-
0.64	38.58	46.00	-7.42	Pass
0.82	36.77	46.00	-9.23	Pass
0.91	34.54	46.00	-11.46	Pass
4.92	31.53	46.00	-14.47	Pass
25.51	28.95	50.00	-21.05	Pass
21.64	27.79	50.00	-22.21	Pass
0.48	22.40	46.44	-24.05	Pass

Power: 110VAC_60Hz_NEUTRAL



Graph: Neutral

Detector: Quasi Peak

Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
13.5589	78.74	60	-	-
24.8982	53.06	60	-6.94	Pass
0.36425	48.15	58.59	-10.44	Pass
0.6389	45.31	56	-10.69	Pass
0.4544	45.07	56.8	-11.73	Pass
1.45575	43.04	56	-12.96	Pass
5.7425	42.69	60	-17.31	Pass

Detector: Average

Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Comments
0.19	47.47	54.04	-6.56	Pass
0.38	31.05	48.24	-17.19	Pass
0.25	33.96	51.63	-17.67	Pass
13.57	31.46	50.00	-18.54	Pass
2.70	27.07	46.00	-18.93	Pass
6.66	31.00	50.00	-19.00	Pass
1.30	26.59	46.00	-19.41	Pass

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