

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                            |                                             |                                                 |                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Prüfbericht-Nr.:</b><br><i>Test report no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>CN243MN4 001</b>                                                                                                                        | <b>Auftrags-Nr.:</b><br><i>Order no.:</i>   | 180274440                                       | Seite 1 von 23<br>Page 1 of 23                                                        |
| <b>Kunden-Referenz-Nr.:</b><br><i>Client reference no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                          | N/A                                                                                                                                        | <b>Auftragsdatum:</b><br><i>Order date:</i> | 2023.10.27                                      |                                                                                       |
| <b>Auftraggeber:</b><br><i>Client:</i>                                                                                                                                                                                                                                                                                                                                                                                                                               | Changyou Technology (Zhejiang) Co.,Ltd.<br>1005 Xianggang Rd, Paidong Industrial, Liushi Town, Wenzhou City, 325604<br>Zhejiang P.R. China |                                             |                                                 |                                                                                       |
| <b>Prüfgegenstand:</b><br><i>Test item:</i>                                                                                                                                                                                                                                                                                                                                                                                                                          | DIN Rail Smart Switch                                                                                                                      |                                             |                                                 |                                                                                       |
| <b>Bezeichnung / Typ-Nr.:</b><br><i>Identification / Type no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                   | TO-Q-SY1-JZT, TO-Q-SY2-JZT                                                                                                                 |                                             |                                                 |                                                                                       |
| <b>Auftrags-Inhalt:</b><br><i>Order content:</i>                                                                                                                                                                                                                                                                                                                                                                                                                     | TÜV Rheinland – EMC Service                                                                                                                |                                             |                                                 |                                                                                       |
| <b>Prüfgrundlage:</b><br><i>Test specification:</i>                                                                                                                                                                                                                                                                                                                                                                                                                  | FCC Part 15, Subpart B:2023                                                                                                                |                                             |                                                 |                                                                                       |
| <b>Wareneingangsdatum:</b><br><i>Date of sample receipt:</i>                                                                                                                                                                                                                                                                                                                                                                                                         | 2023.11.17                                                                                                                                 | Refer to Photo Documentation                |                                                 |                                                                                       |
| <b>Prüfmuster-Nr.:</b><br><i>Test sample no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                    | A003604340-004                                                                                                                             |                                             |                                                 |                                                                                       |
| <b>Prüfzeitraum:</b><br><i>Testing period:</i>                                                                                                                                                                                                                                                                                                                                                                                                                       | 2023.11.20-2024.01.04                                                                                                                      |                                             |                                                 |                                                                                       |
| <b>Ort der Prüfung:</b><br><i>Place of testing:</i>                                                                                                                                                                                                                                                                                                                                                                                                                  | TÜV Rheinland / CCIC<br>(Ningbo) Co., Ltd.                                                                                                 |                                             |                                                 |                                                                                       |
| <b>Prüflaboratorium:</b><br><i>Testing laboratory:</i>                                                                                                                                                                                                                                                                                                                                                                                                               | TÜV Rheinland / CCIC<br>(Ningbo) Co., Ltd.                                                                                                 |                                             |                                                 |                                                                                       |
| <b>Prüfergebnis*:</b><br><i>Test result*:</i>                                                                                                                                                                                                                                                                                                                                                                                                                        | Pass                                                                                                                                       |                                             |                                                 |                                                                                       |
| <b>geprüft von:</b><br><i>tested by:</i>                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                             | <b>genehmigt von:</b><br><i>authorized by:</i>  |  |
| <b>Datum:</b><br><i>Date:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2024.05.22                                                                                                                                 |                                             | <b>Ausstellungsdatum:</b><br><i>Issue date:</i> | 2024.05.22                                                                            |
| <b>Stellung / Position:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                          | Chonghai Liang/PE                                                                                                                          |                                             | <b>Stellung / Position:</b>                     | Season Yang/Authorizer                                                                |
| <b>Sonstiges /</b><br><i>Other:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                  | FCC ID: 2BEKX-SYZ<br>Contains FCC ID: 2ANDL-ZSU                                                                                            |                                             |                                                 |                                                                                       |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br><i>Condition of the test item at delivery:</i>                                                                                                                                                                                                                                                                                                                                                               | Prüfmuster vollständig und unbeschädigt<br><i>Test item complete and undamaged</i>                                                         |                                             |                                                 |                                                                                       |
| <small>* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet<br/>* Legend: P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested</small>                                                                                                                                                             |                                                                                                                                            |                                             |                                                 |                                                                                       |
| <b>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.</b><br><i>This test report only relates to the above mentioned 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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### Anmerkungen Remarks

- |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b> | <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.<br/>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.</i></p> <p><i>Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>2</b> | <p>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. Informationen zur Verifizierung der Authentizität unserer Dokumente erhalten Sie auf folgender Webseite: <a href="http://go.tuv.com/digital-signature">go.tuv.com/digital-signature</a></p> <p><i>As contractually agreed, this document has been signed digitally only. TÜV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TÜV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. For information on verifying the authenticity of our documents, please visit the following website: <a href="http://go.tuv.com/digital-signature">go.tuv.com/digital-signature</a></i></p> |
| <b>3</b> | <p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. 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. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>4</b> | <p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen 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. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, 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. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p>                                                                                                                                                                                                                                                                                       |

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## Test Summary

5.1 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

*Result:*

*Pass*

5.2 RADIATED DISTURBANCE

*Result:*

*Pass*

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## 1 Test Sites

### 1.1 Test Facilities

Laboratory: TÜV Rheinland / CCIC(Ningbo) Co., Ltd.

**1st Floor, Building 11, Scholar Innovation Park, No.1188 Zhongguan Road,  
Zhenhai District, Ningbo 315200 P.R. China.**

The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

### 1.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**

| No. | Equipment         | Model    | Serial no. | Last cal. date | Cal. due date |
|-----|-------------------|----------|------------|----------------|---------------|
| 1.  | EMI test receiver | ESR7     | 101929     | 2023.10.30     | 2024.10.29    |
| 2.  | Bilog Antenna     | CBL6112D | 49033      | 2024.03.17     | 2027.03.16    |
| 3.  | Horn antenna      | HF907    | 102653     | 2023.07.20     | 2026.07.19    |
| 4.  | Pre-amplifier     | SCU-18F  | 180051     | 2023.10.30     | 2024.10.29    |
| 5.  | EMI test receiver | ESR3     | 102331     | 2023.10.30     | 2024.10.29    |
| 6.  | LISN              | ENV216   | 102250     | 2023.10.30     | 2024.10.29    |

### 1.3 Measurement Uncertainty

**Table 2: Measurement Uncertainty**

| Test Item                       | Expanded Measurement Uncertainty (k=2) |
|---------------------------------|----------------------------------------|
| Conducted Emission (9-150kHz)   | 3.70dB                                 |
| Conducted Emission (150k-30MHz) | 3.30dB                                 |
| Disturbance Power               | 4.27dB                                 |
| Radiated Emission (30-1000MHz)  | 4.39dB                                 |
| Radiated Emission (1-18GHz)     | 4.67dB                                 |
| Radiated Emission (CDNE method) | 4.05dB                                 |

## 2 General Product Information

### 2.1 Product Function and Intended Use

The EUT (equipment under test) is a DIN Rail Smart Switch which contains a 2.4GHz Zigbee module. It belongs to Class B category according to FCC Part 15. For the further information, refer to the user's manual.

### 2.2 Ratings and System Details

|                     |                       |                 |
|---------------------|-----------------------|-----------------|
| Rated Voltage Range | : AC 90-240V, 50/60Hz | For both models |
| Rated Current       | : Max. 63A            | For both models |
| Protection Class    | : Class II            | For both models |

Other aspects:

1. The rated current printed on the model TO-Q-SY1-JZT can be 6A, 10A, 16A, 25A, 32A, 40A, 50A or 63A, just for marketing purpose, no technical differences.
2. In electrical characteristics, the models TO-Q-SY1-JZT and TO-Q-SY2-JZT are based on the same circuit diagram and PCB Layout. TO-Q-SY1-JZT is based on TO-Q-SY2-JZT but with the removal of the temperature sensing resistor.
3. Therefore, all tests in this report were performed on the model TO-Q-SY2-JZT.

Refer to the user's manual for further information.

### 2.3 Independent Operation Modes

The basic operation modes are: "On (with Wireless connected)" or "Off".

Refer to the user's manual for further information.

### 2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram for more information.

### 2.5 Submitted Documents

Circuit diagram, PCB layout, user's manual etc.

## **3 Test Set-up and Operation Modes**

### **3.1 Principle of Configuration Selection**

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

### **3.2 Physical Configuration for Testing**

Refer to the related paragraph of this report.

### **3.3 Test Operation and Test Software**

Refer to related paragraph of this report. Software EMC32 V10.30 was used.

### **3.4 Special Accessories and Auxiliary Equipment**

None.

### **3.5 Countermeasures to achieve EMC Compliance**

The tested sample contained noise suppression components to achieve EMC compliance. No other special measure is employed to achieve the requirement.

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## 4 Conformity Decision Rule

For all EMI tests (when included in this report), as measurement uncertainties are less than the values  $U_{\text{CISPR}}$  given in CISPR 16-4-2, compliance with the limits is determined by comparing measurement results directly with corresponding limits without taking into consideration of measurement uncertainties.

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## 5 Test Results EMISSION

### 5.1 Mains Terminal Continuous Disturbance Voltage

Result:

Pass

Date of testing : 2023.12.06  
Kind of test site : Shielding Room  
Port : Mains  
Basic Standard : ANSI C63.4:2014+A1:2017 and CISPR 16-1 series standards  
Frequency Range : 0.15 – 30MHz  
Limit : FCC Part 15, Subpart B:2023, Class B  
Ambient Condition : Temperature: 20 °C ; Relative Humidity: 50 %

#### Test Setup

Input Voltage : AC 120, 60Hz / 230V, 50Hz  
Operational mode : Normal working  
Test Setup : ANSI C63.4:2014+A1:2017 and CISPR 16-1 series standards

The measurement setup was made according to ANSI C63.4:2014+A1:2017 in a shielded room.

The measurement equipment like test receivers, quasi-peak detector and artificial mains network (AMN) are in compliance with ANSI C63.4:2014+A1:2017 and CISPR 16-1 series standards.

The tested object was set-up on a wooden table. The EUT was set 0.8m away from the AMN. The length of the power cord of the tested object was about 0.8m.

The disturbance voltage test was performed on the neutral line and phase line of the power supply of the EUT respectively.

Before measurement, a survey was made to determine in which state the maximum disturbance was obtained. And the measurement was made in the state the maximum disturbance was obtained.

The following figures and tables were those measured by an automatic measuring system. Both Quasi Peak and Average Value were measured. Quasi-Peak and Average Value were measured and listed respectively where they had a maximum in previous scanning survey. In the Figures, “♦” means Quasi-Peak Value and Average Value which were measured in final measurement.

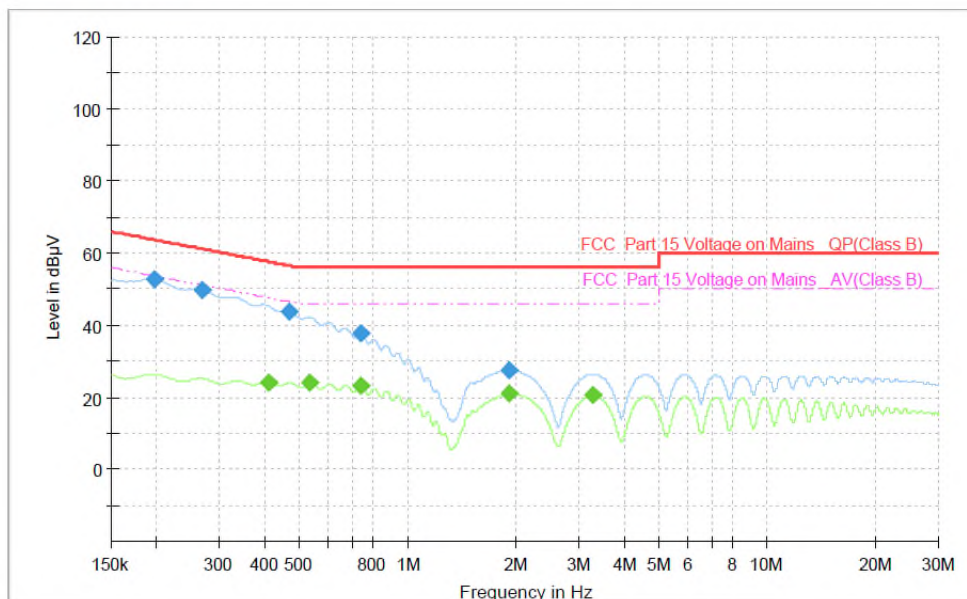
The measurement result is calculated based on the following formula by the test software:  
Emission Level = Reading level + Correction (LISN factor + cable loss)

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**Figure 1: Spectral Diagrams, Conducted Emission, 150kHz - 30MHz, L, AC 120V**

### Full Spectrum



### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.197250        | 52.70            | ---             | 63.73        | 11.03       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.267000        | 49.90            | ---             | 61.21        | 11.31       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.408750        | ---              | 24.30           | 47.67        | 23.37       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.469500        | 43.80            | ---             | 56.52        | 12.73       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.534750        | ---              | 24.10           | 46.00        | 21.90       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.737250        | 37.66            | ---             | 56.00        | 18.34       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.739500        | ---              | 23.19           | 46.00        | 22.81       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 1.914000        | ---              | 20.92           | 46.00        | 25.08       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 1.916250        | 27.40            | ---             | 56.00        | 28.60       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 3.277500        | ---              | 20.52           | 46.00        | 25.48       | 1000.0          | 9.000           | L1   | ON     | 9.8        |

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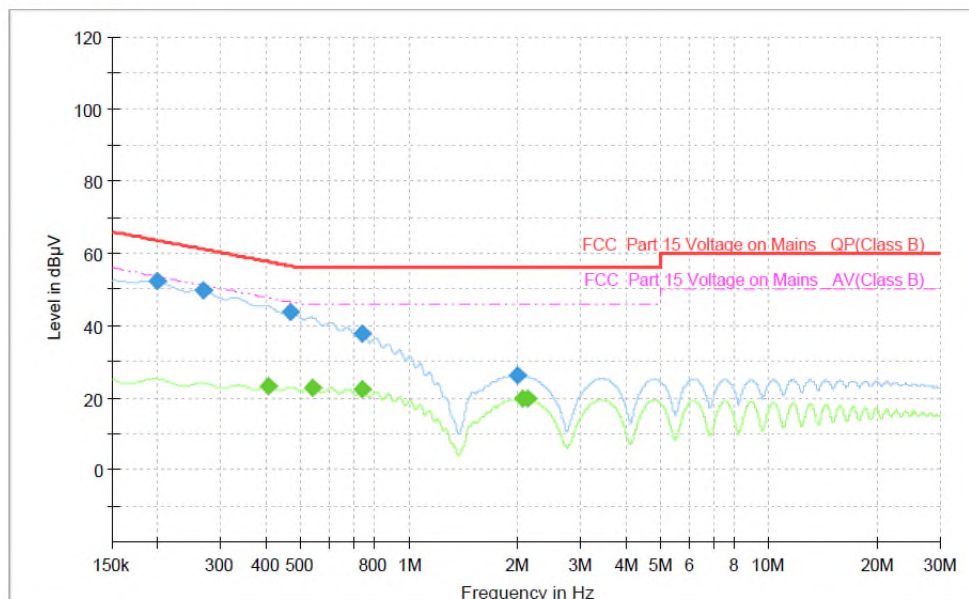
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Figure 2: Spectral Diagrams, Conducted Emission, 150kHz - 30MHz, N, AC 120V

### Full Spectrum



### Final Result

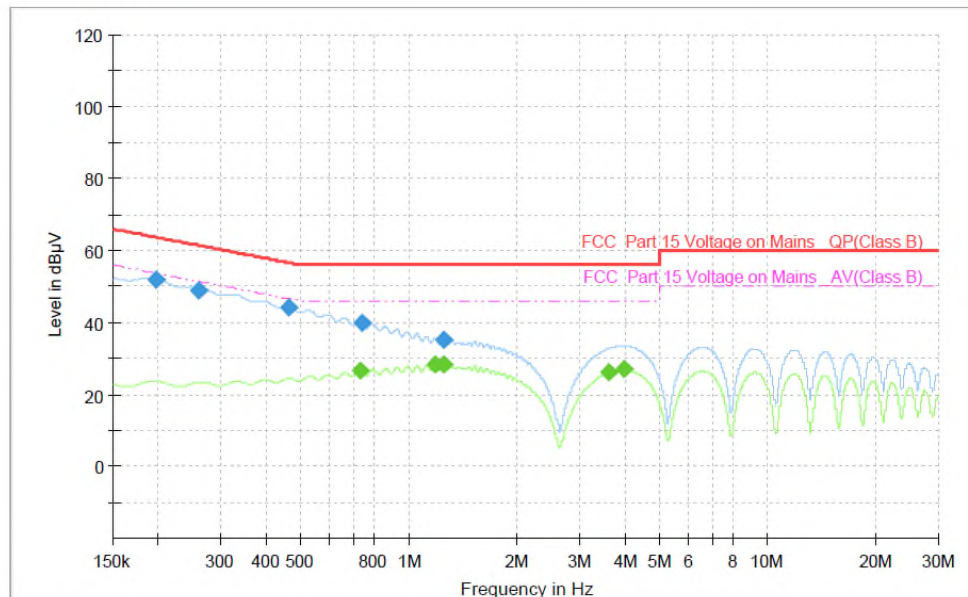
| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.199500        | 52.41            | ---             | 63.63        | 11.22       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.267000        | 49.79            | ---             | 61.21        | 11.42       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.406500        | ---              | 23.39           | 47.72        | 24.33       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.469500        | 43.92            | ---             | 56.52        | 12.60       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.537000        | ---              | 23.01           | 46.00        | 22.99       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.739500        | 37.97            | ---             | 56.00        | 18.03       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.741750        | ---              | 22.31           | 46.00        | 23.69       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 1.999500        | 26.15            | ---             | 56.00        | 29.85       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 2.062500        | ---              | 19.84           | 46.00        | 26.16       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 2.130000        | ---              | 19.66           | 46.00        | 26.34       | 1000.0          | 9.000           | N    | ON     | 9.7        |

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**Figure 3: Spectral Diagrams, Conducted Emission, 150kHz - 30MHz, L, AC 230V**

### Full Spectrum



### Final Result

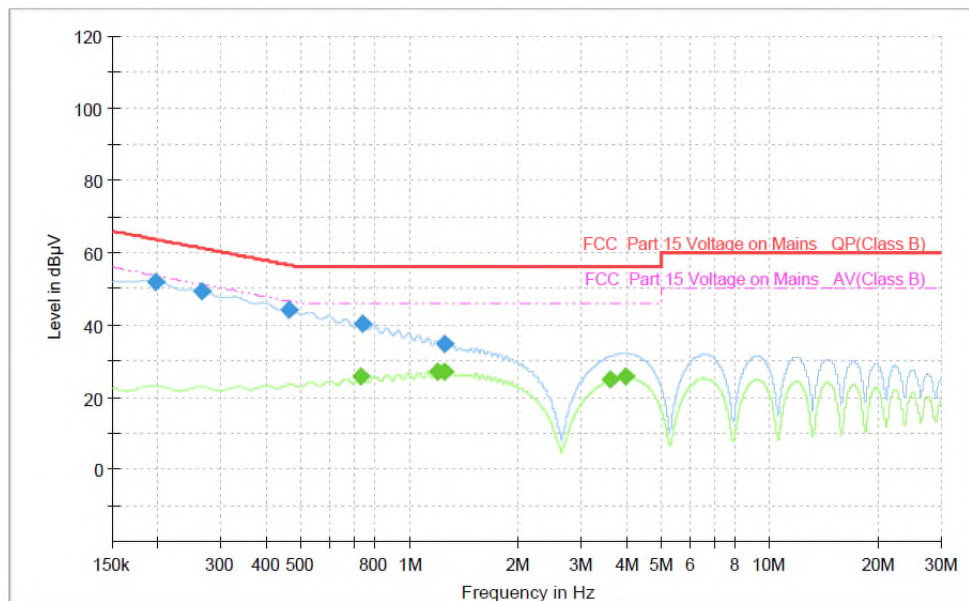
| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.197250        | 51.72            | ---             | 63.73        | 12.01       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.260250        | 48.99            | ---             | 61.42        | 12.44       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.462750        | 44.09            | ---             | 56.64        | 12.56       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.730500        | ---              | 26.69           | 46.00        | 19.31       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.737250        | 39.78            | ---             | 56.00        | 16.23       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 1.182750        | ---              | 28.31           | 46.00        | 17.69       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 1.250250        | ---              | 28.20           | 46.00        | 17.80       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 1.250250        | 35.24            | ---             | 56.00        | 20.76       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 3.601500        | ---              | 26.19           | 46.00        | 19.81       | 1000.0          | 9.000           | L1   | ON     | 9.8        |
| 3.970500        | ---              | 27.03           | 46.00        | 18.97       | 1000.0          | 9.000           | L1   | ON     | 9.8        |

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**Figure 4: Spectral Diagrams, Conducted Emission, 150kHz - 30MHz, N, AC 230V**

### Full Spectrum



### Final Result

| Frequency (MHz) | QuasiPeak (dBμV) | CAverage (dBμV) | Limit (dBμV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.197250        | 51.94            | ---             | 63.73        | 11.78       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.264750        | 49.54            | ---             | 61.28        | 11.74       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.462750        | 44.39            | ---             | 56.64        | 12.25       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.732750        | ---              | 25.64           | 46.00        | 20.36       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.737250        | 40.31            | ---             | 56.00        | 15.69       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 1.189500        | ---              | 27.03           | 46.00        | 18.97       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 1.250250        | 34.98            | ---             | 56.00        | 21.02       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 1.252500        | ---              | 26.96           | 46.00        | 19.04       | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 3.601500        | ---              | 24.86           | 46.00        | 21.14       | 1000.0          | 9.000           | N    | ON     | 9.8        |
| 3.988500        | ---              | 25.68           | 46.00        | 20.32       | 1000.0          | 9.000           | N    | ON     | 9.8        |

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## 5.2 Radiated disturbance

Result:

Pass

Date of testing : 2024.01.02-2024.01.04  
Test procedure : ANSI C63.4:2014+A1:2017 and CISPR 16-1 series standards  
Frequency range : 30MHz – 5th harmonic of the highest frequency  
Limits : FCC Part 15, Subpart B:2023, Class B  
Kind of test site : Semi-anechoic chamber  
Input Voltage : AC 120, 60Hz / 230V, 50Hz  
Operation modes : Normal working  
Ambient Condition : Temperature: 21 °C ; Relative Humidity: 53 %

The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3m. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a wooden table, which is 0.8m high. The wooden table was rotated 360° around and the antenna was varied from 1m to 4m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

According to the clause 15.33 “Frequency range of radiated measurements” of FCC Part 15, Subpart B:2023 Class B, The highest frequency in the EUT is 2480 MHz, therefore the EUT’s upper frequency of measurement range is about 12.5GHz.

The following figures and tables were those measured by an automatic measurement system. A preview test was firstly performed with peak detector. The final test was performed with quasi-peak at those critical frequencies during the preview test. In the following figures, “♦” mean final measurement results with quasi-peak detector.

The test was performed on the input voltage AC 120V, 60Hz / 230V, 50Hz.

Before measurement, a survey was made to determine in which state the maximum disturbance was obtained. And the measurement was made in the state the maximum disturbance was obtained.

The following figures were those measured and recorded by a test receiver. Peak Value were measured and listed respectively where they had a maximum in previous scanning survey. In the Figures, “♦” means Quasi-Peak Value which were measured in final measurement.

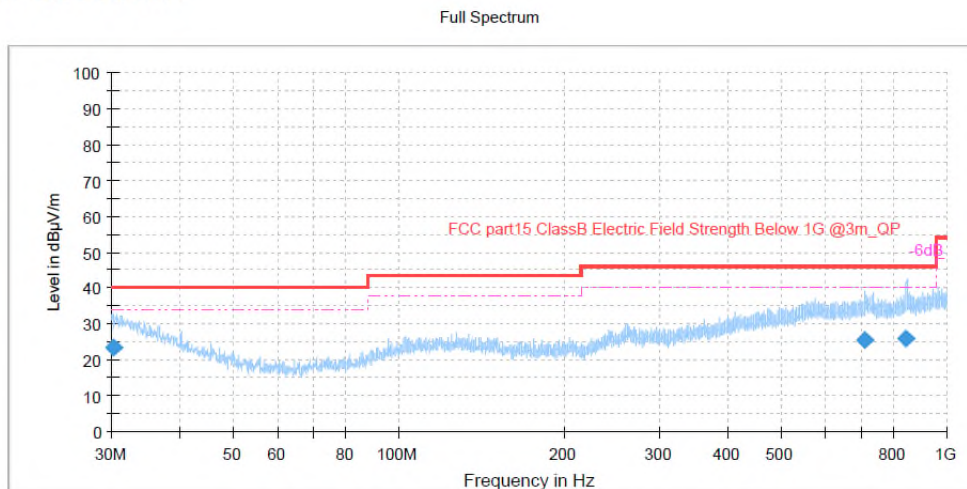
The measurement result is calculated based on the following formula by the test software:  
Emission Level = Reading level + Correction (Antenna factor + Cable loss - preamplifier factor(if used))

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**Figure 5: Spectral Diagrams, Radiated Emission, Below 1GHz, Horizontal, AC 120V**

### Full Spectrum



### Final Result

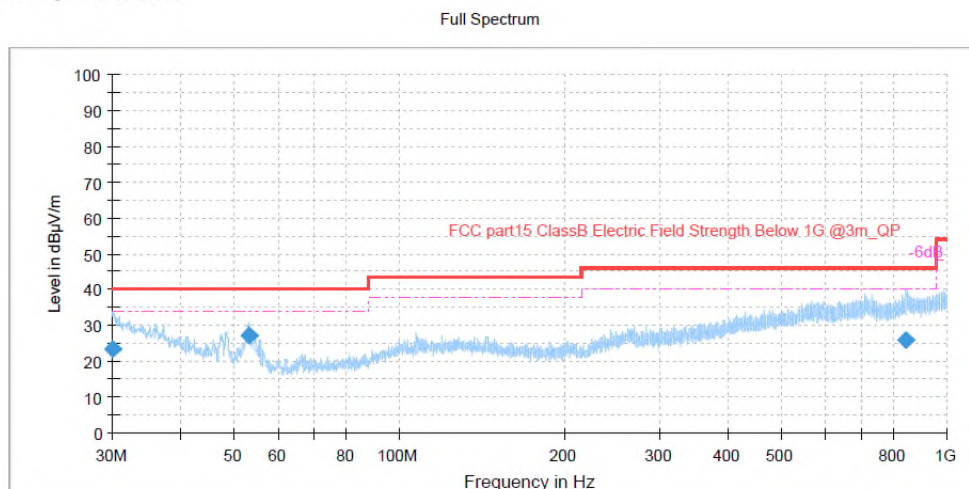
| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 30.160000       | 23.29              | 40.00          | 16.71       | 1000.0          | 120.000         | 237.0       | H   | 337.0         | 25.9       |
| 710.570556      | 25.48              | 46.00          | 20.52       | 1000.0          | 120.000         | 150.0       | H   | 129.0         | 27.8       |
| 844.701667      | 25.84              | 46.00          | 20.16       | 1000.0          | 120.000         | 136.0       | H   | 57.0          | 29.4       |

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**Figure 6: Spectral Diagrams, Radiated Emission, Below 1GHz, Vertical, AC 120V**

### Full Spectrum



### Final Result

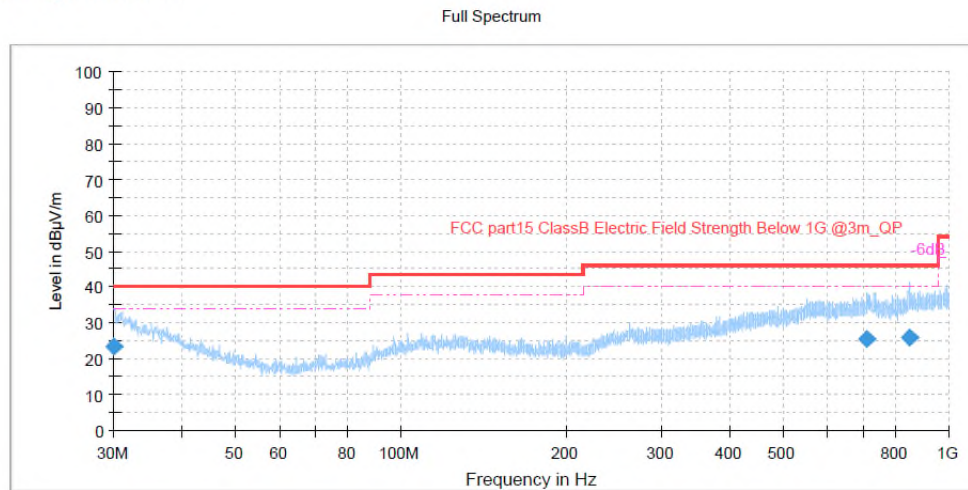
| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 30.040000       | 23.44              | 40.00          | 16.56       | 1000.0          | 120.000         | 150.0       | V   | -3.0          | 25.9       |
| 53.058333       | 27.39              | 40.00          | 12.61       | 1000.0          | 120.000         | 100.0       | V   | 185.0         | 14.5       |
| 844.540000      | 25.84              | 46.00          | 20.16       | 1000.0          | 120.000         | 225.0       | V   | 114.0         | 29.4       |

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**Figure 7: Spectral Diagrams, Radiated Emission, Below 1GHz, Horizontal, AC 230V**

### Full Spectrum



### Final Result

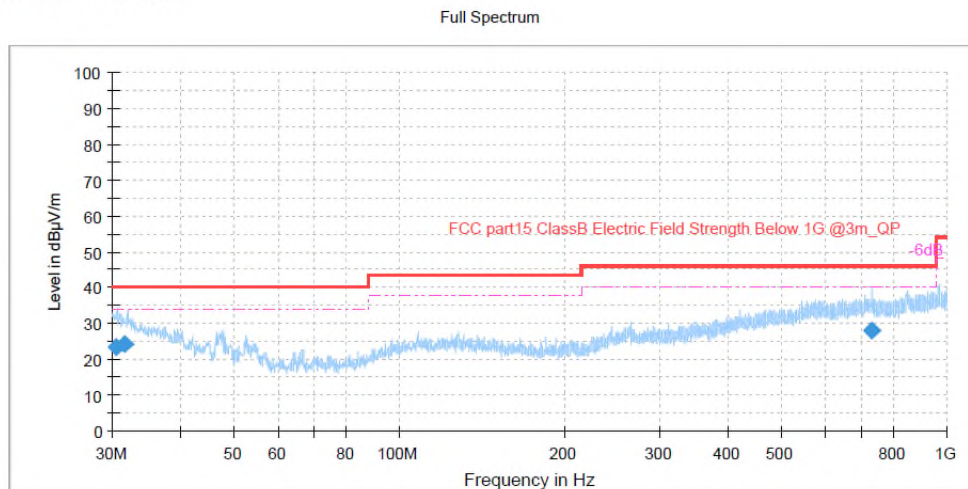
| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 30.080000       | 23.34              | 40.00          | 16.66       | 1000.0          | 120.000         | 111.0       | H   | 5.0           | 25.9       |
| 709.838889      | 25.35              | 46.00          | 20.65       | 1000.0          | 120.000         | 150.0       | H   | 24.0          | 27.8       |
| 846.123889      | 25.79              | 46.00          | 20.21       | 1000.0          | 120.000         | 150.0       | H   | 200.0         | 29.3       |

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**Figure 8: Spectral Diagrams, Radiated Emission, Below 1GHz, Vertical, AC 230V**

### Full Spectrum



### Final Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 30.332778       | 23.27              | 40.00          | 16.73       | 1000.0          | 120.000         | 139.0       | V   | 328.0         | 25.8       |
| 31.626111       | 24.26              | 40.00          | 15.74       | 1000.0          | 120.000         | 158.0       | V   | 18.0          | 24.8       |
| 729.550000      | 28.08              | 46.00          | 17.92       | 1000.0          | 120.000         | 134.0       | V   | 103.0         | 28.0       |

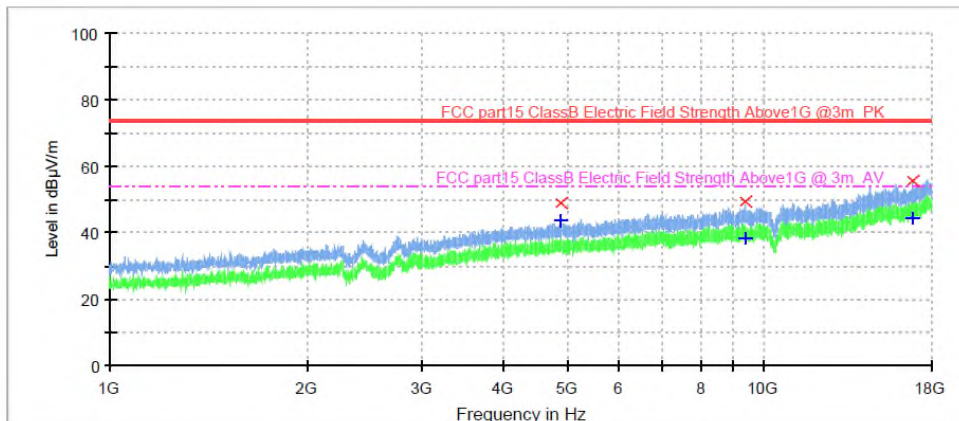
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Figure 9: Spectral Diagrams, Radiated Emission, Above 1GHz, Horizontal, AC 120V



#### Limit and Margin-PK

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - PK+ (dB) | Limit - PK+ (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 4902.560000     | 48.9             | 1000.0          | 1000.000        | 100.0       | H   | 0.0           | 3.3        | 25.1              | 74.0                 |
| 9363.470000     | 49.3             | 1000.0          | 1000.000        | 100.0       | H   | 0.0           | 9.6        | 24.7              | 74.0                 |
| 16893.935000    | 55.5             | 1000.0          | 1000.000        | 100.0       | H   | 0.0           | 18.4       | 18.5              | 74.0                 |

#### Limit and Margin-AV

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - AVG (dB) | Limit - AVG (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 4902.560000     | 43.5             | 1000.0          | 1000.000        | 100.0       | H   | 0.0           | 3.3        | 10.5              | 54.0                 |
| 9363.470000     | 38.4             | 1000.0          | 1000.000        | 100.0       | H   | 0.0           | 9.6        | 15.6              | 54.0                 |
| 16893.935000    | 44.3             | 1000.0          | 1000.000        | 100.0       | H   | 0.0           | 18.4       | 9.7               | 54.0                 |

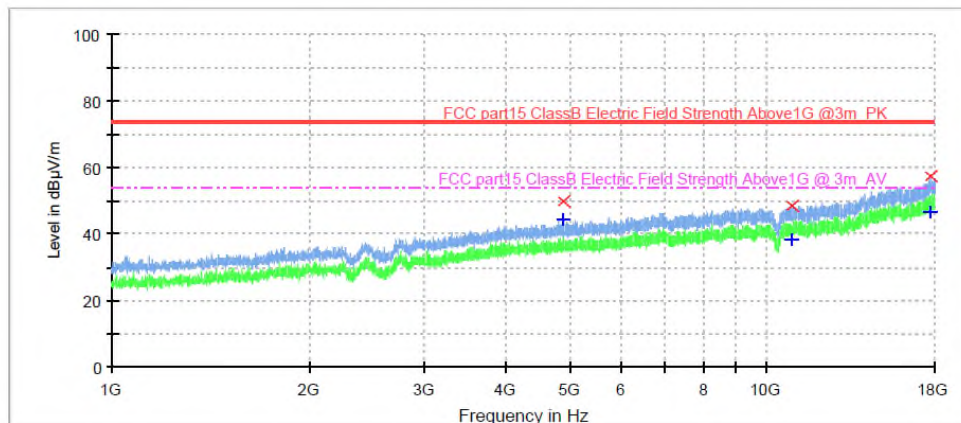
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Figure 10: Spectral Diagrams, Radiated Emission, Above 1GHz, Vertical, AC 120V



#### Limit and Margin-PK

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - PK+ (dB) | Limit - PK+ (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 4902.560000     | 49.6             | 1000.0          | 1000.000        | 200.0       | V   | 162.0         | 3.3        | 24.4              | 74.0                 |
| 10911.530000    | 48.6             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 11.4       | 25.4              | 74.0                 |
| 17797.060000    | 57.5             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 21.3       | 16.5              | 74.0                 |

#### Limit and Margin-AV

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - AVG (dB) | Limit - AVG (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 4902.560000     | 44.6             | 1000.0          | 1000.000        | 200.0       | V   | 162.0         | 3.3        | 9.4               | 54.0                 |
| 10911.530000    | 38.4             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 11.4       | 15.6              | 54.0                 |
| 17797.060000    | 46.8             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 21.3       | 7.2               | 54.0                 |

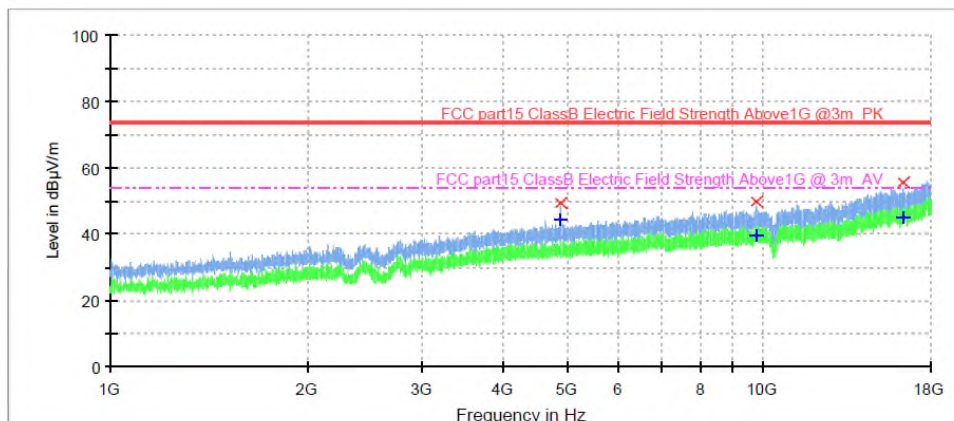
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Figure 11: Spectral Diagrams, Radiated Emission, Above 1GHz, Horizontal, AC 230V



### Limit and Margin-PK

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - PK+ (dB) | Limit - PK+ (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 4903.095000     | 49.4             | 1000.0          | 1000.000        | 100.0       | H   | 0.0           | 3.3        | 24.7              | 74.0                 |
| 9747.560000     | 49.8             | 1000.0          | 1000.000        | 100.0       | H   | 108.0         | 9.9        | 24.2              | 74.0                 |
| 16398.810000    | 55.4             | 1000.0          | 1000.000        | 100.0       | H   | 120.0         | 17.3       | 18.6              | 74.0                 |

### Limit and Margin-AV

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - AVG (dB) | Limit - AVG (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 4903.095000     | 44.3             | 1000.0          | 1000.000        | 100.0       | H   | 0.0           | 3.3        | 9.7               | 54.0                 |
| 9747.560000     | 39.5             | 1000.0          | 1000.000        | 100.0       | H   | 108.0         | 9.9        | 14.5              | 54.0                 |
| 16398.810000    | 44.7             | 1000.0          | 1000.000        | 100.0       | H   | 120.0         | 17.3       | 9.3               | 54.0                 |

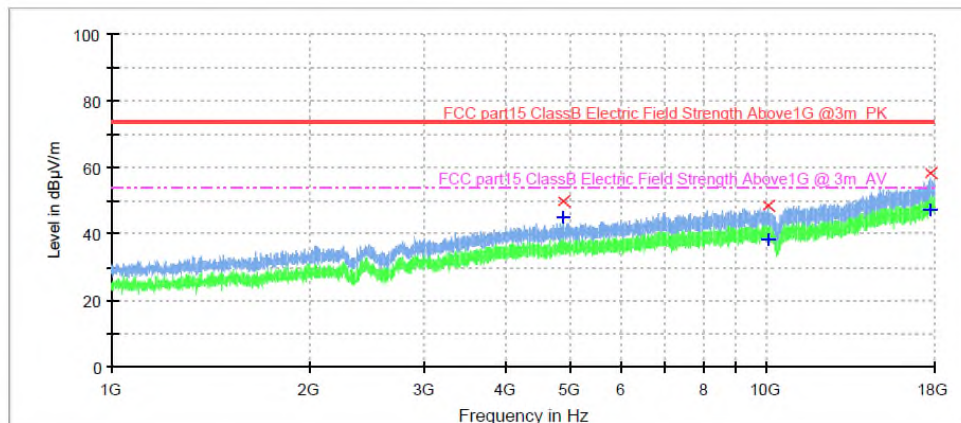
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Figure 12: Spectral Diagrams, Radiated Emission, Above 1GHz, Vertical, AC 230V



### Limit and Margin-PK

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - PK+ (dB) | Limit - PK+ (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 4902.560000     | 49.8             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 3.3        | 24.2              | 74.0                 |
| 10073.220000    | 48.6             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 10.4       | 25.4              | 74.0                 |
| 17783.780000    | 58.3             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 21.2       | 15.7              | 74.0                 |

### Limit and Margin-AV

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - AVG (dB) | Limit - AVG (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------|
| 4902.560000     | 44.8             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 3.3        | 9.2               | 54.0                 |
| 10073.220000    | 38.1             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 10.4       | 15.9              | 54.0                 |
| 17783.780000    | 47.0             | 1000.0          | 1000.000        | 200.0       | V   | 0.0           | 21.2       | 7.0               | 54.0                 |

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