

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                           |                                                                                           |                                       |                                              |                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------|----------------------------------------------|-----------------------------------------|
| <b>Prüfbericht-Nr.:</b><br><i>Test Report No.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>50307090 001</b>                                                       | <b>Auftrags-Nr.:</b><br><i>Order No.:</i>                                                 | <b>244177215</b>                      | <b>Seite 1 von 26</b><br><i>Page 1 of 26</i> |                                         |
| <b>Kunden-Referenz-Nr.:</b><br><i>Client Reference No.:</i>                                                                                                                                                                                                                                                                                                                                                                                                           | <b>60051577</b>                                                           | <b>Auftragsdatum:</b><br><i>Order date.:</i>                                              | <b>10.10.2019</b>                     |                                              |                                         |
| <b>Auftraggeber:</b><br><i>Client:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>IKEA of Sweden AB</b><br>Box 702, SE-343 81 Älmhult, Sweden            |                                                                                           |                                       |                                              |                                         |
| <b>Prüfgegenstand:</b><br><i>Test item:</i>                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Power Supply</b>                                                       |                                                                                           |                                       |                                              |                                         |
| <b>Bezeichnung / Typ-Nr.:</b><br><i>Identification / Type No.:</i>                                                                                                                                                                                                                                                                                                                                                                                                    | <b>ICPSW5-18-BI-1</b>                                                     |                                                                                           |                                       |                                              |                                         |
| <b>Auftrags-Inhalt:</b><br><i>Order content:</i>                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>EMC test</b>                                                           |                                                                                           |                                       |                                              |                                         |
| <b>Prüfgrundlage:</b><br><i>Test specification:</i>                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>FCC 47 CFR Part 15, Subpart B:2018 Class B</b><br><b>ICES-003:2016</b> |                                                                                           |                                       |                                              |                                         |
| <b>Wareneingangsdatum:</b><br><i>Date of receipt:</i>                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>25.10.2019</b>                                                         | Refer to the EUT photos file                                                              |                                       |                                              |                                         |
| <b>Prüfmuster-Nr.:</b><br><i>Test sample No.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>A001050649-001</b>                                                     |                                                                                           |                                       |                                              |                                         |
| <b>Prüfzeitraum:</b><br><i>Testing period:</i>                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Refer to test report</b>                                               |                                                                                           |                                       |                                              |                                         |
| <b>Ort der Prüfung:</b><br><i>Place of testing:</i>                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>EMC laboratory</b>                                                     |                                                                                           |                                       |                                              |                                         |
| <b>Prüflaboratorium:</b><br><i>Testing laboratory:</i>                                                                                                                                                                                                                                                                                                                                                                                                                | <b>TÜV Rheinland (Shanghai) Co., Ltd.</b>                                 |                                                                                           |                                       |                                              |                                         |
| <b>Prüfergebnis*:</b><br><i>Test result*:</i>                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Pass</b>                                                               |                                                                                           |                                       |                                              |                                         |
| <b>geprüft von / tested by:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                           | <b>kontrolliert von / reviewed by:</b>                                                    |                                       |                                              |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                    |                                                                           |      |                                       |                                              |                                         |
| <b>08.01.2020</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Jessie Xu/Senior project engineer</b>                                  | <b>08.01.2020</b>                                                                         | <b>Hexiong Liu/Department manager</b> |                                              |                                         |
| <b>Datum</b><br><i>Date</i>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Name/Stellung</b><br><i>Name/Position</i>                              | <b>Unterschrift</b><br><i>Signature</i>                                                   | <b>Datum</b><br><i>Date</i>           | <b>Name/Stellung</b><br><i>Name/Position</i> | <b>Unterschrift</b><br><i>Signature</i> |
| <b>Sonstiges / Other:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                           |                                                                                           |                                       |                                              |                                         |
| FCC ID: FHO-ICPSW5-18BI-1<br>Test Firm Registration Number: 958801                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                           |                                                                                           |                                       |                                              |                                         |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br><i>Condition of the test item at delivery:</i>                                                                                                                                                                                                                                                                                                                                                                |                                                                           | <b>Prüfmuster vollständig und unbeschädigt</b><br><i>Test item complete and undamaged</i> |                                       |                                              |                                         |
| <p>* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft<br/>P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet</p> <p>Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor<br/>P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested</p>                      |                                                                           |                                                                                           |                                       |                                              |                                         |
| <p><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></p> <p><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></p> |                                                                           |                                                                                           |                                       |                                              |                                         |

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## TEST SUMMARY

4.1.1 CONDUCTED EMISSION

*Result:*

*Passed*

4.2.1 RADIATED EMISSION

*Result:*

*Passed*

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# 1 Test Sites

## 1.1 Test Facilities

**Laboratory: TÜV Rheinland (Shanghai) Co., Ltd.**

**Address: No.177, 178, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, China**

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

Refer to Clause 6 for test and measurement instruments.

## 2 General Product Information

### 2.1 Product Function and Intended Use

The EUT (equipment under test) is an ordinary power supply for household and similar use.  
For the further information, refer to the user's manual.

### 2.2 Ratings and System Details

System input : AC 100 – 240 V, 50/60 Hz, Max. 0.5 A  
Output : DC 5 V 3 A, DC 9 V 2 A,  
DC 12 V 1.5 A, DC 15 V 1.2 A  
Protection class : II

### 2.3 Independent Operation Modess

The basic operation modes are: "ON" and "OFF" etc.

The test modes are following:

|        |                                   |
|--------|-----------------------------------|
| Mode 1 | Power On with USB-C: 5 VDC 3 A    |
| Mode 2 | Power On with USB-C: 12 VDC 1.5 A |
| Mode 3 | Power On with USB-C: 15 VDC 1.2 A |

### 2.4 Description of interconnecting cables

None.

### 2.5 Noise Generating and Noise Suppressing Parts

Refer to the circuit diagram for further information.

### 2.6 Highest frequency generated or used in the device or on which the device operates or tunes

The highest frequency used in the EUT is less than 108 MHz.

### 2.7 Submitted Documents

Circuit diagram, user's manual and rating label.

### 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 emission level. The test conditions were adapted accordingly in reference to the instructions for use.

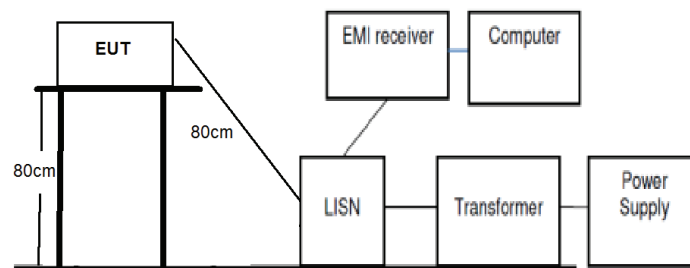
Refer to the related paragraph of this report.

The sequence of testing:

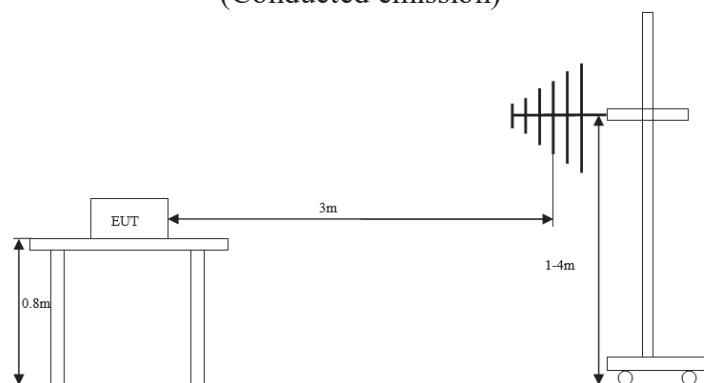
1. Radiated emission tests were performed on 24.12.2019;
2. Conducted emission tests were performed on 23.12.2019.

#### 3.2 Equipment and cable arrangement

Block diagram for both conducted emission and radiated emission tests is as follows:



(Conducted emission)



(Radiated emission)

Also refer to photographs on clause 5 for test setups for both conducted emission test and radiated emission test.

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### **3.3 Test Software**

No special test software was used during the tests.

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

During the tests, the matched resistor was used as load.

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

No other special measure is employed to achieve the requirement.

## 4 Test Results EMISSION

### 4.1 Emission in the Frequency Range up to 30 MHz

#### 4.1.1 Conducted emission

| Result:                                         |                                                                                                                                                                                                                                                                                                                         | Passed |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Date of testing                                 | : 23.12.2019                                                                                                                                                                                                                                                                                                            |        |
| Test procedure                                  | : FCC 47 CFR Part 15, Subpart B:2018, ICES-003:2016, ANSI C63.4-2014 and CISPR 16-1 series standards                                                                                                                                                                                                                    |        |
| Frequency range                                 | : 0.15 – 30 MHz                                                                                                                                                                                                                                                                                                         |        |
| Limits                                          | : Quasi-peak limit:<br>0.15 - 0.5 MHz, 66 to 56 dB $\mu$ V (decrease with the logarithm of frequency); 0.5 - 5 MHz, 56 dB $\mu$ V; 5 - 30 MHz, 60 dB $\mu$ V<br>Average limit:<br>0.15 - 0.5 MHz, 56 to 46 dB $\mu$ V (decrease with the logarithm of frequency); 0.5 – 5 MHz, 46 dB $\mu$ V; 5 – 30 MHz, 50 dB $\mu$ V |        |
| Bandwidth of EMI receiver for final measurement | : 9 kHz                                                                                                                                                                                                                                                                                                                 |        |
| Measurement time for final measurement          | : 1 s                                                                                                                                                                                                                                                                                                                   |        |
| Kind of test site                               | : Shielded room                                                                                                                                                                                                                                                                                                         |        |
| Input voltage                                   | : AC 120 V, 60 Hz                                                                                                                                                                                                                                                                                                       |        |
| Operational mode                                | : Mode 1, Mode 2 & Mode 3 as defined in clause 2.3                                                                                                                                                                                                                                                                      |        |
| Ambient condition                               | : Temperature: 20.0 °C; Relative humidity: 47.5 %                                                                                                                                                                                                                                                                       |        |
| Expanded measurement uncertainty ( $k=2$ )      | : 3.39 dB                                                                                                                                                                                                                                                                                                               |        |

The measurement setup was made according to ANSI C63.4-2014 in a shielded room.

The measurement equipment like test receivers, quasi-peak detector and artificial mains network (AMN) are in compliance with CISPR 16-1 series standards.

The tested object was set-up on a wooden support. The EUT was set 0.8 m away from the AMN. The cord longer than necessary to be connected to the AMN was folded forth and back parallel so as to form a bundle with a length between 0.3 m and 0.4 m.

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

The following figures and tables were those measured by an automatic measuring system. Both quasi-peak and average measurements were performed. In the following spectral diagram, Blue “◆” means Quasi-Peak Value and green “◆” means Average Value results.

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Notes on following tables of conducted emission results and conversions:

Level (dB $\mu$ V): final measurement results by using quasi-peak detector and average detector

Transd (dB): transducer factor including cable loss, insertion loss of artificial mains network and gain of pre-amplifier (if used)

Margin: Limit (dB $\mu$ V) - Level (dB $\mu$ V)

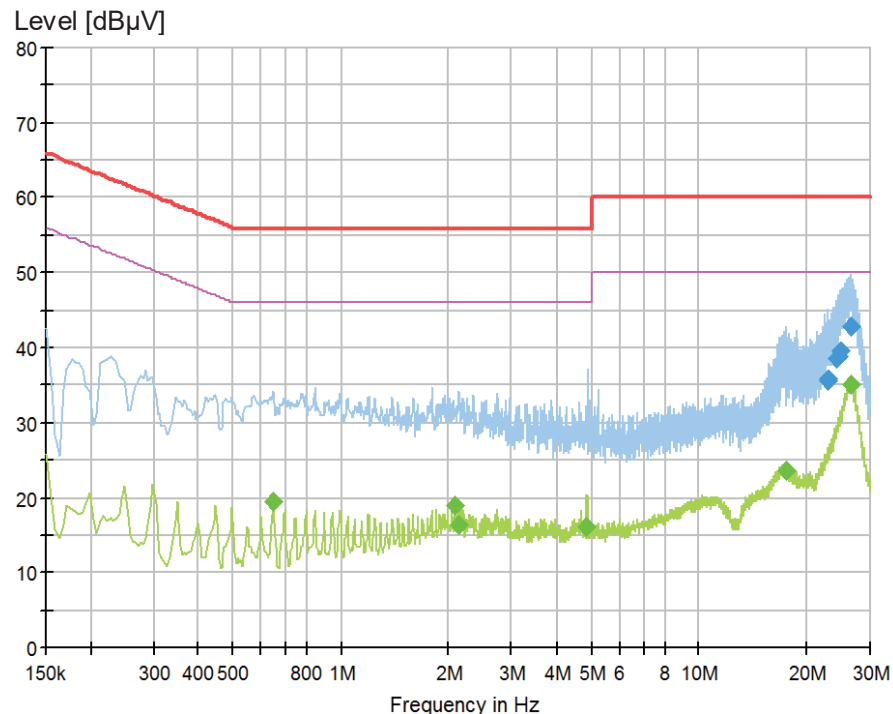
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**Figure 1: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L for Mode 1**



Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB μ V) | Limit (dB μ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|------|--------|------------|
| 22.915500       | 35.60              | 60.00          | 24.40       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 23.010000       | 35.86              | 60.00          | 24.14       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 24.243000       | 38.50              | 60.00          | 21.50       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 24.427500       | 38.80              | 60.00          | 21.20       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 24.747000       | 39.63              | 60.00          | 20.37       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 26.592000       | 42.92              | 60.00          | 17.08       | 1000.0          | 9.000           | L1   | ON     | 10.1       |

Final Average measurement result:

| Frequency (MHz) | CAverage (dB μ V) | Limit (dB μ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-------------------|----------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.645000        | 19.42             | 46.00          | 26.58       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 2.094000        | 19.05             | 46.00          | 26.95       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 2.143500        | 16.34             | 46.00          | 29.66       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 4.875000        | 16.18             | 46.00          | 29.82       | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 17.398500       | 23.70             | 50.00          | 26.30       | 1000.0          | 9.000           | L1   | ON     | 10.2       |
| 26.493000       | 35.12             | 50.00          | 14.88       | 1000.0          | 9.000           | L1   | ON     | 10.1       |

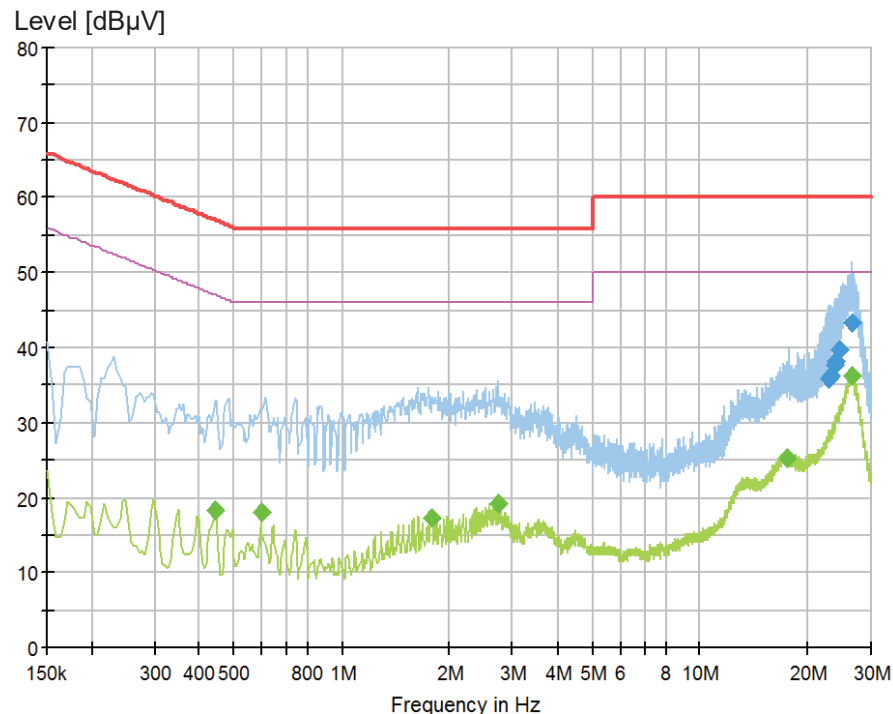
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Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N for Mode 1



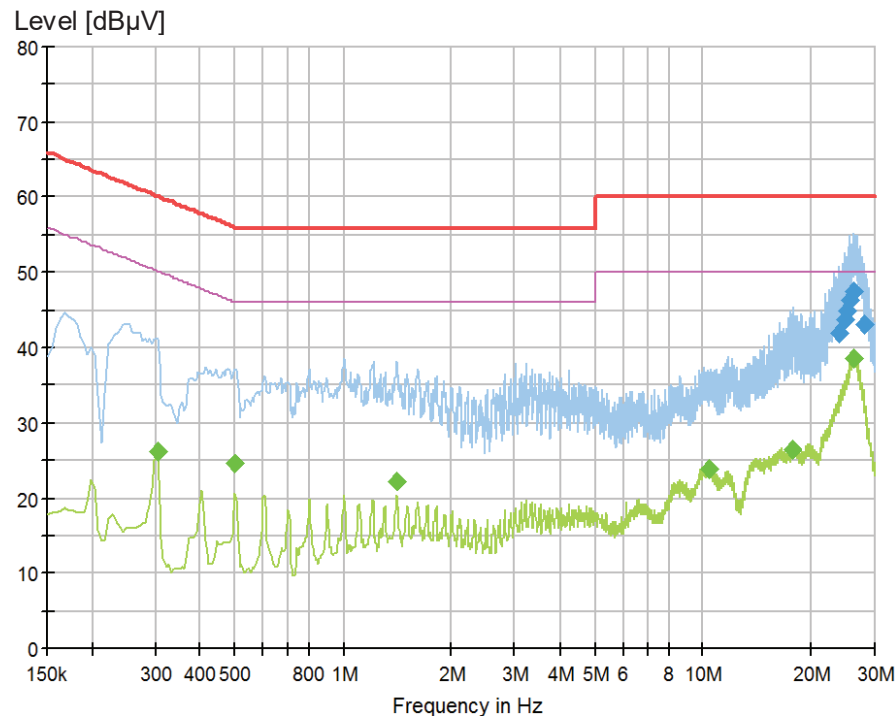
Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB $\mu$ V) | Limit (dB $\mu$ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------------|--------------------|-------------|-----------------|-----------------|------|--------|------------|
| 23.028000       | 35.87                  | 60.00              | 24.13       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 23.145000       | 36.28                  | 60.00              | 23.72       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 23.622000       | 37.58                  | 60.00              | 22.42       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 23.824500       | 38.09                  | 60.00              | 21.91       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 24.553500       | 39.83                  | 60.00              | 20.17       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 26.556000       | 43.32                  | 60.00              | 16.68       | 1000.0          | 9.000           | N    | ON     | 10.2       |

Final Average measurement result:

| Frequency (MHz) | CAverage (dB $\mu$ V) | Limit (dB $\mu$ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-----------------------|--------------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.442500        | 18.31                 | 47.02              | 28.70       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.595500        | 17.98                 | 46.00              | 28.02       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 1.783500        | 17.26                 | 46.00              | 28.74       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 2.724000        | 19.15                 | 46.00              | 26.85       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 17.520000       | 25.32                 | 50.00              | 24.68       | 1000.0          | 9.000           | N    | ON     | 10.1       |
| 26.646000       | 36.18                 | 50.00              | 13.82       | 1000.0          | 9.000           | N    | ON     | 10.2       |

Figure 3: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L for Mode 2



Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB $\mu$ V) | Limit (dB $\mu$ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------------|--------------------|-------------|-----------------|-----------------|------|--------|------------|
| 24.018000       | 41.84                  | 60.00              | 18.16       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 24.693000       | 43.71                  | 60.00              | 16.29       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 25.089000       | 45.00                  | 60.00              | 15.00       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 25.750500       | 46.27                  | 60.00              | 13.73       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 26.232000       | 47.42                  | 60.00              | 12.58       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 28.153500       | 43.05                  | 60.00              | 16.95       | 1000.0          | 9.000           | L1   | ON     | 10.1       |

Final Average measurement result:

| Frequency (MHz) | CAverage (dB $\mu$ V) | Limit (dB $\mu$ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-----------------------|--------------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.303000        | 26.20                 | 50.16              | 23.96       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.501000        | 24.67                 | 46.00              | 21.33       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 1.414500        | 22.33                 | 46.00              | 23.67       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 10.378500       | 23.90                 | 50.00              | 26.10       | 1000.0          | 9.000           | L1   | ON     | 9.9        |
| 17.632500       | 26.48                 | 50.00              | 23.52       | 1000.0          | 9.000           | L1   | ON     | 10.2       |
| 26.268000       | 38.54                 | 50.00              | 11.46       | 1000.0          | 9.000           | L1   | ON     | 10.1       |

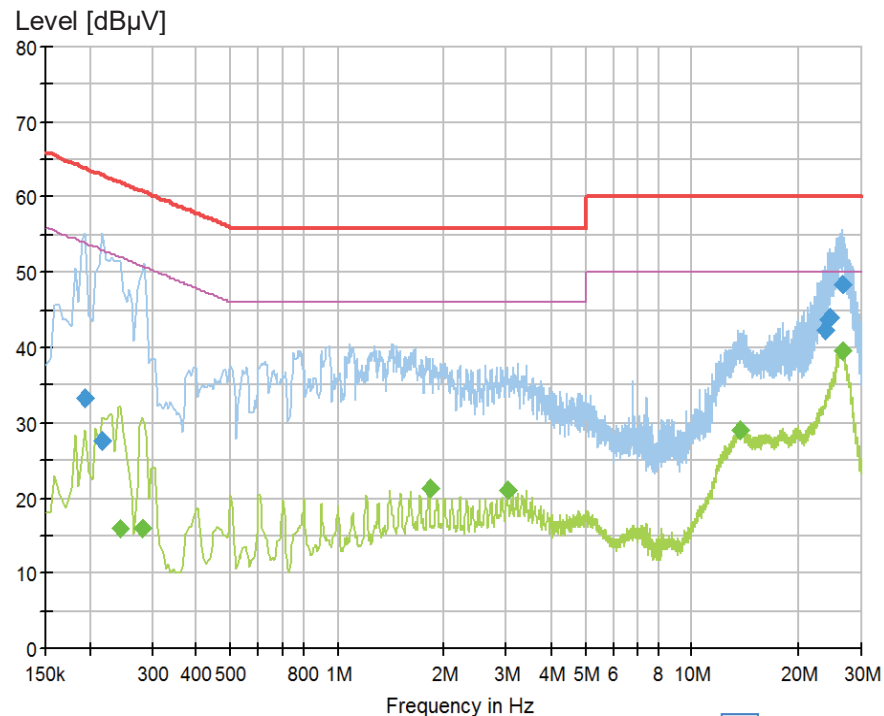
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**Figure 4: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N for Mode 2**



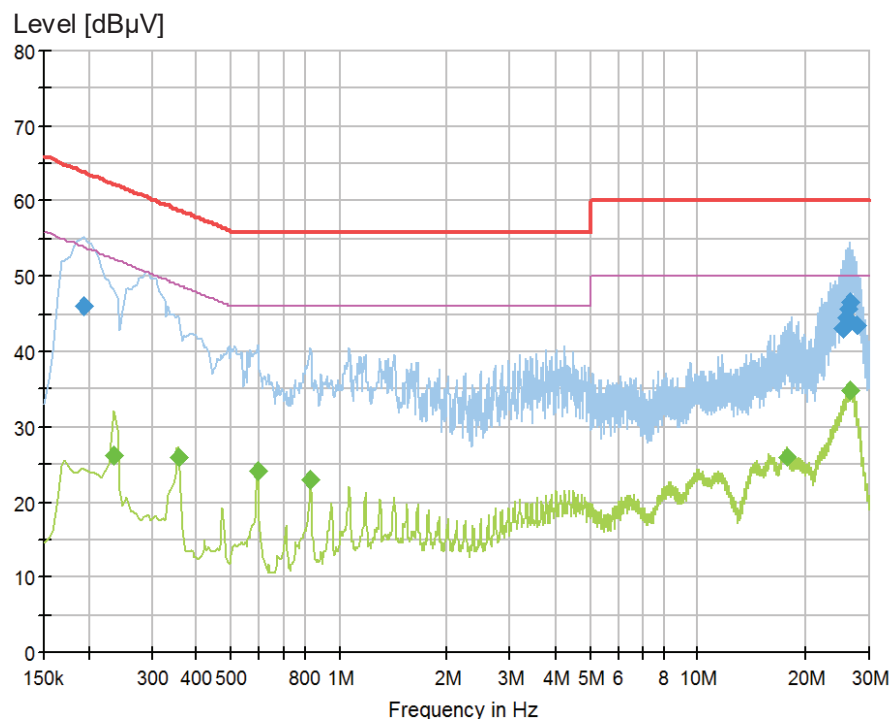
Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB $\mu$ V) | Limit (dB $\mu$ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|------------------------|--------------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.195000        | 33.22                  | 63.82              | 30.60       | 1000.0          | 9.000           | N    | ON     | 9.5        |
| 0.217500        | 27.50                  | 62.91              | 35.42       | 1000.0          | 9.000           | N    | ON     | 9.5        |
| 23.766000       | 42.36                  | 60.00              | 17.65       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 24.333000       | 43.72                  | 60.00              | 16.28       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 24.535500       | 43.98                  | 60.00              | 16.02       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 26.421000       | 48.50                  | 60.00              | 11.50       | 1000.0          | 9.000           | N    | ON     | 10.2       |

Final Average measurement result:

| Frequency (MHz) | CAverage (dB $\mu$ V) | Limit (dB $\mu$ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-----------------------|--------------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.244500        | 16.02                 | 51.94              | 35.92       | 1000.0          | 9.000           | N    | ON     | 9.5        |
| 0.280500        | 16.02                 | 50.80              | 34.78       | 1000.0          | 9.000           | N    | ON     | 9.5        |
| 1.815000        | 21.27                 | 46.00              | 24.73       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 3.021000        | 21.07                 | 46.00              | 24.93       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 13.713000       | 28.94                 | 50.00              | 21.06       | 1000.0          | 9.000           | N    | ON     | 9.9        |
| 26.362500       | 39.55                 | 50.00              | 10.45       | 1000.0          | 9.000           | N    | ON     | 10.2       |

Figure 5: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L for Mode 3



Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB µ V) | Limit (dB µ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.195000        | 46.18              | 63.82          | 17.64       | 1000.0          | 9.000           | L1   | ON     | 9.5        |
| 25.305000       | 43.16              | 60.00          | 16.84       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 25.836000       | 44.42              | 60.00          | 15.58       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 26.299500       | 45.70              | 60.00          | 14.30       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 26.623500       | 46.47              | 60.00          | 13.53       | 1000.0          | 9.000           | L1   | ON     | 10.1       |
| 27.712500       | 43.50              | 60.00          | 16.50       | 1000.0          | 9.000           | L1   | ON     | 10.1       |

Final Average measurement result:

| Frequency (MHz) | CAverage (dB µ V) | Limit (dB µ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-------------------|----------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.235500        | 26.19             | 52.25          | 26.06       | 1000.0          | 9.000           | L1   | ON     | 9.5        |
| 0.357000        | 26.00             | 48.80          | 22.80       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.591000        | 24.18             | 46.00          | 21.82       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 0.829500        | 22.90             | 46.00          | 23.10       | 1000.0          | 9.000           | L1   | ON     | 9.6        |
| 17.592000       | 26.05             | 50.00          | 23.95       | 1000.0          | 9.000           | L1   | ON     | 10.2       |
| 26.403000       | 34.88             | 50.00          | 15.12       | 1000.0          | 9.000           | L1   | ON     | 10.1       |

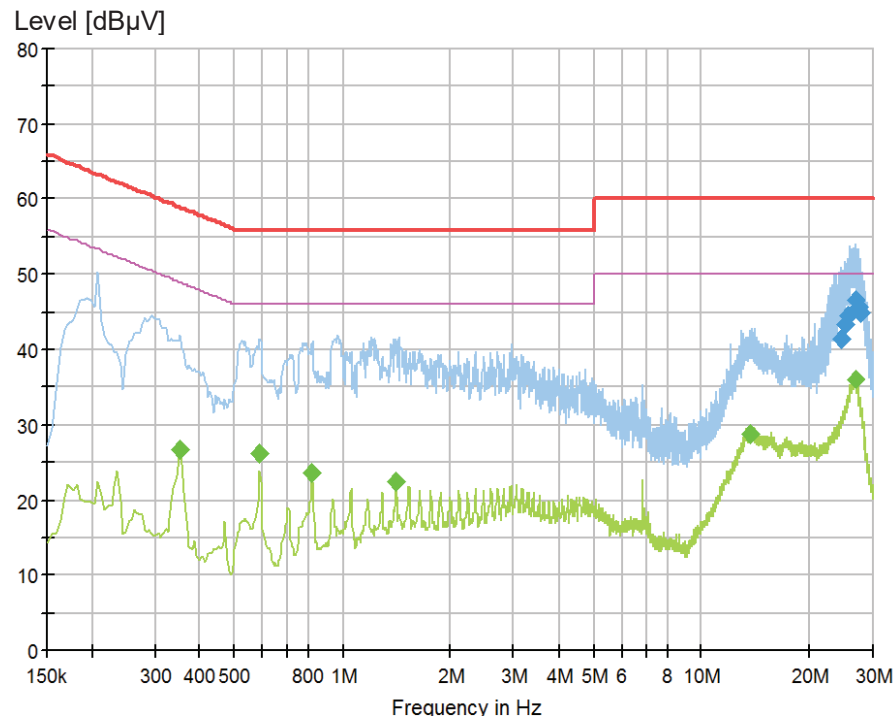
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**Figure 6: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N for Mode 3**



Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB µ V) | Limit (dB µ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|------|--------|------------|
| 24.382500       | 41.33              | 60.00          | 18.67       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 25.165500       | 43.39              | 60.00          | 16.61       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 25.579500       | 44.51              | 60.00          | 15.49       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 26.920500       | 46.51              | 60.00          | 13.49       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 27.397500       | 45.55              | 60.00          | 14.45       | 1000.0          | 9.000           | N    | ON     | 10.2       |
| 27.672000       | 44.91              | 60.00          | 15.09       | 1000.0          | 9.000           | N    | ON     | 10.2       |

Final Average measurement result:

| Frequency (MHz) | CAverage (dB µ V) | Limit (dB µ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-------------------|----------------|-------------|-----------------|-----------------|------|--------|------------|
| 0.352500        | 26.72             | 48.90          | 22.18       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.586500        | 26.28             | 46.00          | 19.72       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 0.820500        | 23.65             | 46.00          | 22.35       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 1.410000        | 22.49             | 46.00          | 23.51       | 1000.0          | 9.000           | N    | ON     | 9.6        |
| 13.708500       | 28.89             | 50.00          | 21.11       | 1000.0          | 9.000           | N    | ON     | 9.9        |
| 26.659500       | 36.07             | 50.00          | 13.93       | 1000.0          | 9.000           | N    | ON     | 10.2       |

## 4.2 Emission in the Frequency Range above 30 MHz

### 4.2.1 Radiated emission

|                |               |
|----------------|---------------|
| <b>Result:</b> | <b>Passed</b> |
|----------------|---------------|

|                                                 |                                                                                                                                                                                             |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date of testing                                 | : 24.12.2019                                                                                                                                                                                |
| Test procedure                                  | : FCC 47 CFR Part 15, Subpart B:2018, ICES-003:2016, ANSI C63.4-2014 and CISPR 16-1 series standards                                                                                        |
| Frequency range                                 | : 30 – 1000 MHz<br>Note: The highest frequency in the EUT is 125 kHz. According to FCC Part 15 subpart B §15.33 (b) (1), the upper frequency for radiated emission measurement is 1000 MHz. |
| Limits                                          | : Quasi-peak limits (3 m distance):<br>30 – 88 MHz, 40 dB $\mu$ V/m; 88 – 216 MHz, 43.5 dB $\mu$ V/m;<br>216 – 960 MHz, 46 dB $\mu$ V/m; Above 960 MHz, 54 dB $\mu$ V/m.                    |
| Bandwidth of EMI receiver for final measurement | : 120 kHz                                                                                                                                                                                   |
| Measurement time for final measurement          | : 1 s                                                                                                                                                                                       |
| Kind of test site                               | : Semi-anechoic chamber                                                                                                                                                                     |
| Operational mode                                | : Mode 1, Mode 2 & Mode 3 as defined in clause 2.3                                                                                                                                          |
| Ambient condition                               | : Temperature: 20.2 °C; Relative humidity: 47.9 %                                                                                                                                           |
| Expanded measurement uncertainty ( $k=2$ )      | : 5.49 dB                                                                                                                                                                                   |

The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3 m. 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 0.8 m high wooden table above the reference ground plane. The wooden table was rotated 360° around and the height of the antenna was varied from 1 m to 4 m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

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 spectral diagram, “x” means quasi-peak test results.

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Notes on following tables of radiated emission results and conversions:

QuasiPeak (dB $\mu$ V/m): final measurement results by using quasi-peak detector

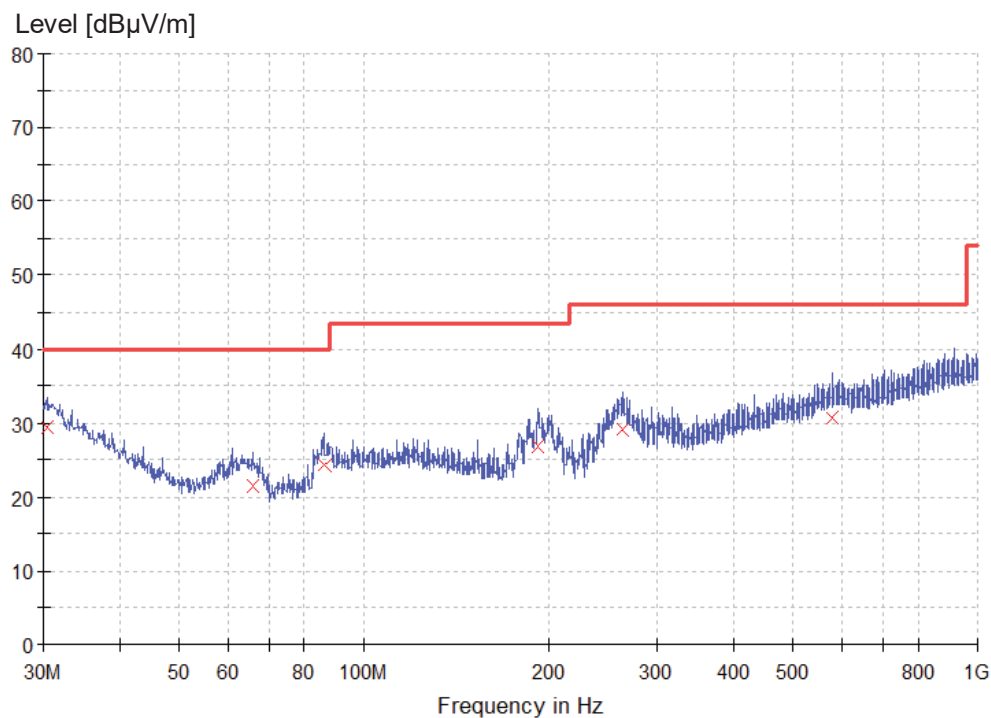
Corr. (dB): correction factor including: antenna factor, cable loss, and gain of pre-amplifier (if used)

Margin: Limit (dB $\mu$ V/m) - QuasiPeak (dB $\mu$ V/m)

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**Figure 7: Spectral Diagrams and measurement results, horizontal polarization (30 MHz to 1 GHz) for Mode 1**



Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dB μ V/m) |
|-----------------|----------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|------------------------|
| 30.360000       | 29.3                 | 1000.0          | 120.000         | 120.0       | H   | 90.0          | 25.2       | 10.7              | 40.0                   |
| 65.880000       | 21.6                 | 1000.0          | 120.000         | 100.0       | H   | -135.0        | 12.7       | 18.4              | 40.0                   |
| 86.120000       | 24.2                 | 1000.0          | 120.000         | 150.0       | H   | 180.0         | 15.1       | 15.8              | 40.0                   |
| 192.600000      | 26.8                 | 1000.0          | 120.000         | 100.0       | H   | 0.0           | 15.8       | 16.7              | 43.5                   |
| 263.160000      | 29.1                 | 1000.0          | 120.000         | 150.0       | H   | -45.0         | 21.5       | 16.9              | 46.0                   |
| 581.080000      | 30.6                 | 1000.0          | 120.000         | 100.0       | H   | 135.0         | 26.6       | 15.4              | 46.0                   |

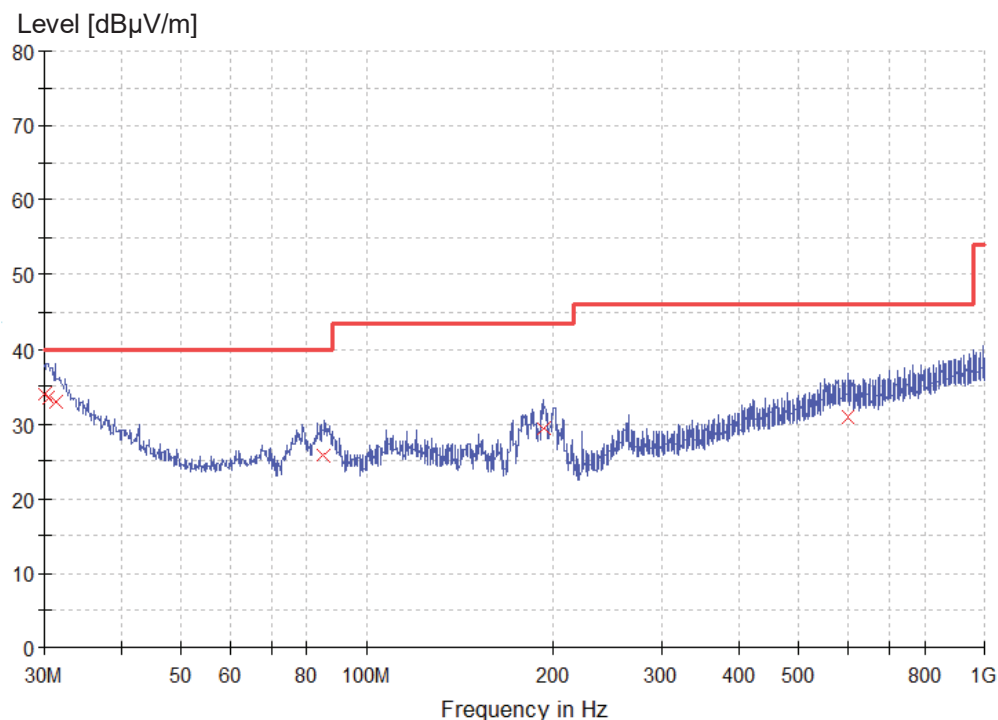
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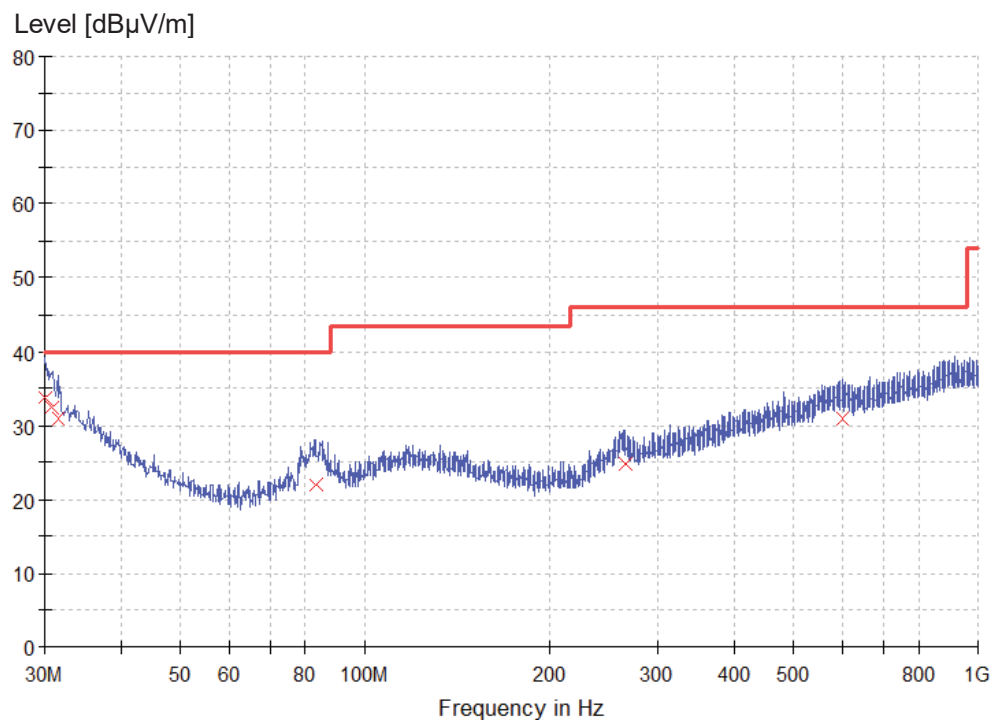
**Figure 8: Spectral Diagrams and measurement results, vertical polarization (30 MHz to 1 GHz) for Mode 1**



Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB $\mu$ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dB $\mu$ V/m) |
|-----------------|--------------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------------|
| 30.000000       | 33.9                     | 1000.0          | 120.000         | 115.0       | V   | 39.0          | 25.4       | 6.1               | 40.0                       |
| 30.480000       | 33.5                     | 1000.0          | 120.000         | 100.0       | V   | -168.0        | 25.1       | 6.5               | 40.0                       |
| 31.200000       | 32.9                     | 1000.0          | 120.000         | 120.0       | V   | 42.0          | 24.7       | 7.1               | 40.0                       |
| 84.920000       | 25.8                     | 1000.0          | 120.000         | 100.0       | V   | -90.0         | 14.7       | 14.2              | 40.0                       |
| 193.320000      | 29.4                     | 1000.0          | 120.000         | 200.0       | V   | 135.0         | 15.8       | 14.1              | 43.5                       |
| 599.400000      | 31.1                     | 1000.0          | 120.000         | 100.0       | V   | 0.0           | 26.8       | 15.0              | 46.0                       |

**Figure 9: Spectral Diagrams and measurement results, horizontal polarization (30 MHz to 1 GHz) for Mode 2**



Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dB μ V/m) |
|-----------------|----------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|------------------------|
| 30.363750       | 29.3                 | 1000.0          | 120.000         | 115.0       | H   | 45.0          | 25.2       | 10.7              | 40.0                   |
| 32.425000       | 28.2                 | 1000.0          | 120.000         | 120.0       | H   | -90.0         | 24.1       | 11.9              | 40.0                   |
| 86.138750       | 21.6                 | 1000.0          | 120.000         | 100.0       | H   | 135.0         | 15.1       | 18.4              | 40.0                   |
| 203.145000      | 24.8                 | 1000.0          | 120.000         | 150.0       | H   | -180.0        | 16.6       | 18.7              | 43.5                   |
| 317.120000      | 28.1                 | 1000.0          | 120.000         | 100.0       | H   | 0.0           | 20.7       | 17.9              | 46.0                   |
| 574.897500      | 31.0                 | 1000.0          | 120.000         | 200.0       | H   | 180.0         | 26.6       | 15.0              | 46.0                   |

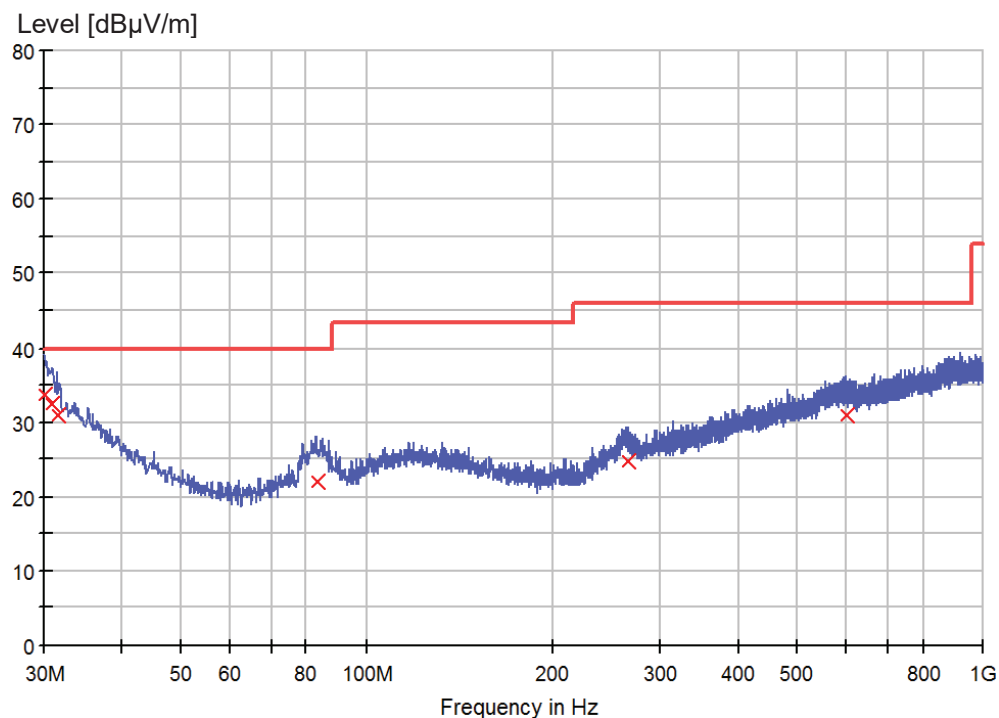
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**Figure 10: Spectral Diagrams and measurement results, vertical polarization (30 MHz to 1 GHz) for Mode 2**



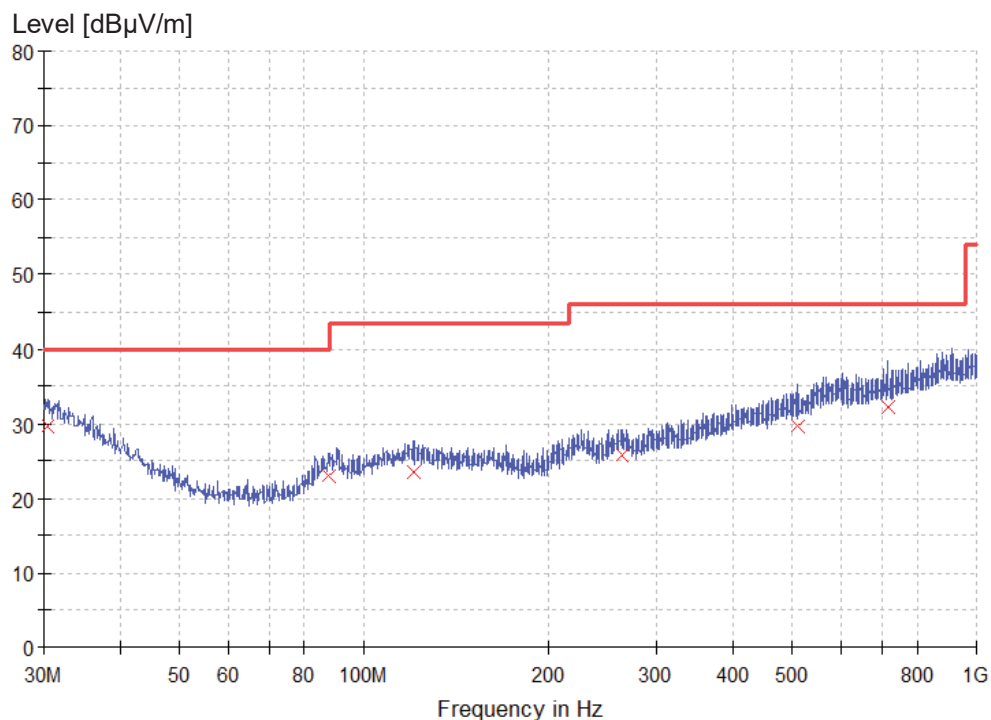
Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB $\mu$ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dB $\mu$ V/m) |
|-----------------|--------------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|----------------------------|
| 30.000000       | 33.8                     | 1000.0          | 120.000         | 120.0       | V   | -96.0         | 25.4       | 6.2               | 40.0                       |
| 30.840000       | 32.3                     | 1000.0          | 120.000         | 115.0       | V   | 117.0         | 24.9       | 7.7               | 40.0                       |
| 31.440000       | 30.9                     | 1000.0          | 120.000         | 100.0       | V   | -172.0        | 24.6       | 9.1               | 40.0                       |
| 83.000000       | 22.0                     | 1000.0          | 120.000         | 150.0       | V   | 45.0          | 14.3       | 18.1              | 40.0                       |
| 265.840000      | 24.9                     | 1000.0          | 120.000         | 200.0       | V   | -90.0         | 21.2       | 21.1              | 46.0                       |
| 599.280000      | 31.0                     | 1000.0          | 120.000         | 100.0       | V   | 180.0         | 26.8       | 15.0              | 46.0                       |

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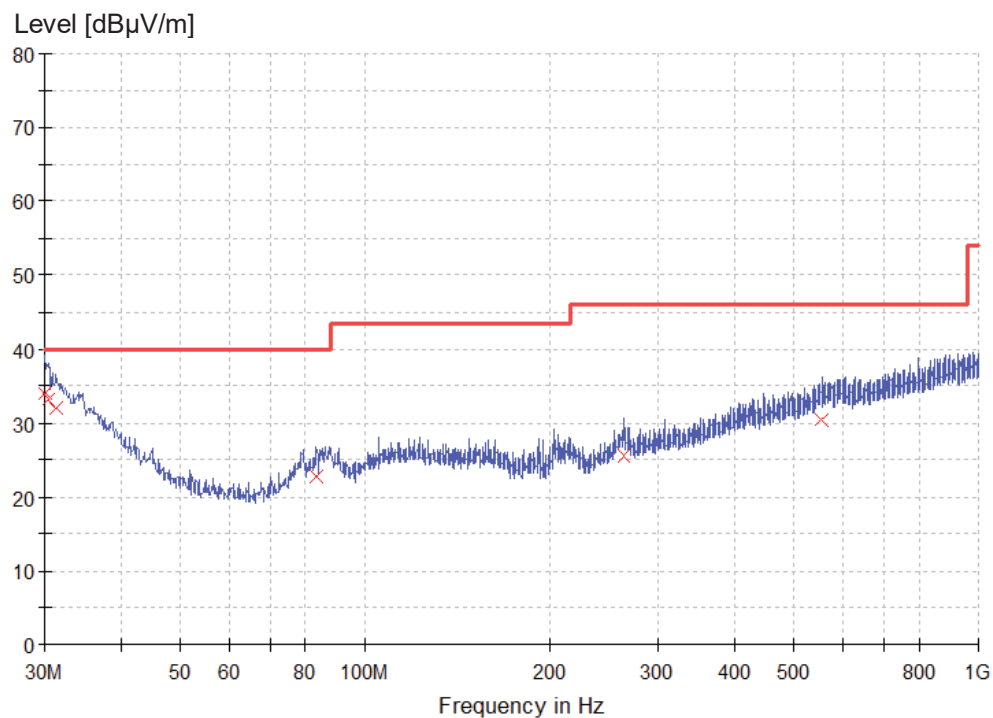
**Figure 11: Spectral Diagrams and measurement results, horizontal polarization (30 MHz to 1 GHz) for Mode 3**



Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dB μ V/m) |
|-----------------|----------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|------------------------|
| 30.363750       | 29.7                 | 1000.0          | 120.000         | 100.0       | H   | 45.0          | 25.2       | 10.3              | 40.0                   |
| 87.593750       | 22.9                 | 1000.0          | 120.000         | 120.0       | H   | -135.0        | 15.3       | 17.1              | 40.0                   |
| 120.331250      | 23.5                 | 1000.0          | 120.000         | 100.0       | H   | 0.0           | 19.3       | 20.0              | 43.5                   |
| 264.255000      | 25.8                 | 1000.0          | 120.000         | 115.0       | H   | 90.0          | 21.4       | 20.2              | 46.0                   |
| 510.513750      | 29.7                 | 1000.0          | 120.000         | 100.0       | H   | -180.0        | 25.2       | 16.3              | 46.0                   |
| 716.517500      | 32.2                 | 1000.0          | 120.000         | 150.0       | H   | 135.0         | 27.3       | 13.8              | 46.0                   |

**Figure 12: Spectral Diagrams and measurement results, vertical polarization (30 MHz to 1 GHz) for Mode 3**



Final Quasi-peak measurement result:

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dB μ V/m) |
|-----------------|----------------------|-----------------|-----------------|-------------|-----|---------------|------------|-------------------|------------------------|
| 30.000000       | 33.9                 | 1000.0          | 120.000         | 100.0       | V   | 79.0          | 25.4       | 6.1               | 40.0                   |
| 30.360000       | 33.2                 | 1000.0          | 120.000         | 115.0       | V   | -115.0        | 25.2       | 6.8               | 40.0                   |
| 31.320000       | 32.1                 | 1000.0          | 120.000         | 120.0       | V   | 135.0         | 24.7       | 7.9               | 40.0                   |
| 83.480000       | 22.7                 | 1000.0          | 120.000         | 100.0       | V   | 0.0           | 14.5       | 17.3              | 40.0                   |
| 264.880000      | 25.7                 | 1000.0          | 120.000         | 150.0       | V   | -90.0         | 21.3       | 20.3              | 46.0                   |
| 554.160000      | 30.4                 | 1000.0          | 120.000         | 200.0       | V   | 180.0         | 26.6       | 15.6              | 46.0                   |

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## **5 Photographs of the Test Set-Up**

Refer to the test setup file

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## 6 List of Test and Measurement Instruments

| Equip.  | Description                       | Model                | Manufacturer  | Due Date<br>DD.MM.YYYY | Cal. interval |
|---------|-----------------------------------|----------------------|---------------|------------------------|---------------|
| 1811380 | EMI test receiver                 | ESIB26               | Rohde&Schwarz | 19.04.2020             | 1 year        |
| 1811403 | Artificial mains network          | ENV216               | Rohde&Schwarz | 17.09.2020             | 1 year        |
| 1824845 | EMC measurement software          | EMC32 (Ver 10.20.01) | Rohde&Schwarz | N/A                    | N/A           |
| 1811378 | 3m modified semi-anechoic chamber | SAC3                 | Frankonia     | 14.05.2022             | 3 years       |
| 1811391 | EMI test receiver                 | ESCI                 | Rohde&Schwarz | 01.11.2020             | 1 year        |
| 1811425 | Bilog antenna                     | CBL 6112D            | Teseq         | 14.02.2020             | 3 years       |

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**End of test report**