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|---|---|---|-----------------------------|--|
| Prüfbericht-Nr.: <i>Test Report No.:</i> | 50159404 001 | Auftrags-Nr.: <i>Order No.:</i> | 1150028279 | Seite 1 von 44 <i>Page 1 of 44</i> |
| Kunden-Referenz-Nr.: <i>Client Reference No.:</i> | 673903 | Auftragsdatum: <i>Order date.:</i> | 21.06.2018 | |
| Auftraggeber: <i>Client:</i> | Qingdao Kaichuang Electrical Appliance CO., Ltd No.70, Jinsheng 1st road, Chengyan district, Qingdao City, P. R. China | | | |
| Prüfgegenstand: <i>Test item:</i> | Chest Display Freezer | | | |
| Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i> | Refer to page 2-3 | | | |
| Auftrags-Inhalt: <i>Order content:</i> | CE-EMC | | | |
| Prüfgrundlage: <i>Test specification:</i> | EN 55014-1:2017 EN 61000-3-2:2014 EN 61000-3-3:2013 EN 55014-2:2015 | | | |
| Wareneingangsdatum: <i>Date of receipt:</i> | 08.11.2018 | Dokumenten-Check (keine Fotodokumentation erforderlich) Document Check (no photo documentation required) | | |
| Prüfmuster-Nr.: <i>Test sample No.:</i> | A000801411-001 to 005 | | | |
| Prüfzeitraum: <i>Testing period:</i> | 09.11.2018 – 15.11.2018 | | | |
| Ort der Prüfung: <i>Place of testing:</i> | Refer to section 1.1 | | | |
| Prüflaboratorium: <i>Testing laboratory:</i> | TÜV Rheinland /CCIC (Qingdao) Co., Ltd. | | | |
| Prüfergebnis*: <i>Test result*:</i> | Pass | | | |
| geprüft von / tested by: | | kontrolliert von / reviewed by: | | |
|  | |  | | |
| 05.12.2018 | Hunter Yu / Project Engineer | 05.12.2018 | Ying Xie / TC | |
| Datum <i>Date</i> | Name/Stellung <i>Name/Position</i> | Unterschrift <i>Signature</i> | Datum <i>Date</i> | Name/Stellung <i>Name/Position</i> |
| | | | | Unterschrift <i>Signature</i> |
| Sonstiges / Other: Refer to page 2-3. | | | | |
| Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i> | | Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i> | | |
| * Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested | | | | |
| Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugswise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i> | | | | |

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| | Model | Rated voltage/frequency | Rated Current (A) | Compressor |
|------------|------------|-------------------------|-------------------|------------------|
| Series A | SDQ-300DR | 220-240V/50Hz | 1.8 | NLT80AA/NUM80LA1 |
| | SDQ-300SR | | 1.8 | |
| | SDQ-300R | | 1.8 | |
| | SD-320QLR | | 1.8 | |
| | SD-320QR | | 1.8 | |
| | SD-310R | | 1.8 | |
| | SD-310LR | | 1.8 | |
| | SD-305R | | 1.8 | |
| | SD-305LR | | 1.8 | |
| | SDQ-400DR | | 1.8 | |
| | SDQ-400SR | | 1.8 | |
| | SDQ-400R | | 1.8 | |
| | SD-420QLR | | 1.8 | |
| | SD-420QR | | 1.8 | |
| | SD-410R | | 1.8 | |
| | SD-410LR | | 1.8 | |
| | SD-405R | | 1.8 | |
| | SD-405LR | | 1.8 | |
| | ZDS120PWR | | 1.8 | |
| ZDS120PWHR | 1.8 | | | |
| Series B | SDQ-500DR | 220-240V/50Hz | 1.7 | NUM90LA1 |
| | SDQ-500SR | | 1.7 | |
| | SDQ-500R | | 1.7 | |
| | SD-520QLR | | 1.7 | |
| | SD-520QR | | 1.7 | |
| | SD-510R | | 1.7 | |
| | SD-510LR | | 1.7 | |
| | SD-505R | | 1.7 | |
| | SD-505LR | | 1.7 | |
| | ZDS147PWR | | 1.7 | |
| | ZDS147PWHR | | 1.7 | |
| Series C | SDQ-600DR | 220-240V/50Hz | 2.0 | NPY12LA/NPY14LA |
| | SDQ-600SR | | 2.0 | |
| | SDQ-600R | | 2.0 | |
| | SD-620QLR | | 2.0 | |
| | SD-620QR | | 2.0 | |
| | SD-610R | | 2.0 | |
| | SD-610LR | | 2.0 | |
| | SD-605R | | 2.0 | |
| | SD-605LR | | 2.0 | |
| | ZDS160DTR | | 2.0 | |

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| | |
|------------|-----|
| ZDS160DTHR | 2.0 |
| SDQ-700DR | 2.0 |
| SDQ-700SR | 2.0 |
| SDQ-700R | 2.0 |
| SD-720QLR | 2.0 |
| SD-720QR | 2.0 |
| SD-710R | 2.0 |
| SD-710LR | 2.0 |
| SD-705R | 2.0 |
| SD-705LR | 2.0 |
| ZDS200PWR | 2.0 |
| ZDS200PWHR | 2.0 |

Other aspects:

In electrical characteristics, all above models in each series are similar, the only difference among them is appearance. Therefore, all EMC tests were performed on models ZDS120PWR (compressor: NLT80AA) and ZDS120PWHR (compressor: NUM80LA1) in series A, SDQ-500SR in series B, SDQ-700SR (NPY12LA) and ZDS200PWHR (NPY14LA) in series C which have LED lamps.

TEST SUMMARY

4.1.1 HARMONICS ON AC MAINS

Result:

Passed

4.1.2 VOLTAGE FLUCTUATIONS AND FLICKER ON AC MAINS

Result:

Passed

4.1.3 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

Passed

4.1.4 DISCONTINUOUS INTERFERENCE ON AC MAINS

Result:

Pass

4.2.1 DISTURBANCE POWER IN THE FREQUENCY RANGE FROM 30MHZ TO 300MHZ

Result:

Passed

4.2.2 RADIATED DISTURBANCE IN THE FREQUENCY RANGE FROM 30MHZ TO 1000MHZ

Result:

Passed

5.1.1 ELECTROSTATIC DISCHARGE

Result:

Passed

5.2.1 FAST TRANSIENTS ON AC POWER LINES

Result:

Passed

5.2.2 INJECTED CURRENT INTO AC POWER PORT

Result:

Passed

5.2.3 SURGES TO AC POWER PORT

Result:

Passed

5.2.4 VOLTAGE DIPS AND INTERRUPTIONS TO AC POWER PORT

Result:

Passed

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1 Test Sites

1.1 Test Facilities

Laboratory: Qingdao Supervision & Testing Center of Product Quality

Address: No. 173 Shenzhen Road, Laoshan District, Qingdao 266061, Shandong

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

The performed tests have been conducted by “Qingdao Supervision & Testing Center of Product Quality”, under supervision of TÜV Rheinland’s engineer.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

| Kind of Equipment | Manufacturer | Type | Serial No. | Calibrated until |
|-----------------------------|---------------------|-------------|-------------------|-------------------------|
| EMI Test Receiver | Rohde & Schwarz | ESCS30 | 100069 | 21.03.2019 |
| V-Network | Rohde & Schwarz | ESH3-Z5 | 100059 | 04.06.2019 |
| Absorbing Clamp | Rohde & Schwarz | MDS-21 | 100015 | 04.06.2019 |
| Ultra Compact Generator | EM TEST | UCS500M | 0101-46 | 21.03.2019 |
| ESD Simulator | EM TEST | HF500 | 100023 | 30.05.2019 |
| Continuous Wave Simulator | EM TEST | CWS500 | 0900-13 | 30.05.2019 |
| CDN | EM TEST | M3 | 0900-17 | 04.06.2019 |
| AC Source | EM TEST | HF500 | 54663 | 21.03.2019 |
| Harmonics& Flicker Analyzer | EM TEST | DPA500 | 0501-04 | 21.03.2019 |
| Click Meter | A.F.J | CL55C | 55040019049 | 21.03.2019 |

2 General Product Information

2.1 Product Function and Intended Use

The EUTs (equipment under test) are chest display freezers. For the further information, refer to the user's manual.

2.2 Ratings and System Detail

System input voltage : Refer to page 2-3
Frequency : Refer to page 2-3
Rated current : Refer to page 2-3
Protection class : I

2.3 Independent Operation Modes

The basic operation modes are: "ON with adjustable temperature" and "OFF".
Refer to the user's manual for further information.

2.4 Noise Generating and Noise Suppressing Parts

Refer to the circuit diagram for further information.

2.5 Submitted Documents

Diagrams and rating labels, etc.

Photo documentation, construction drawing etc. (Refer to relevant safety report 50159406 001)

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.

Immunity: The equipment under test (EUT) was configured to have its highest possible susceptibility against the tested phenomena. 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 the related paragraph of this report. No software was used.

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to achieve EMC Compliance

No special measure is employed to achieve the requirement.

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4 Test Results EMISSION

4.1 Emission in the Frequency Range up to 30 MHz

4.1.1 Harmonics on AC Mains

| | |
|----------------|---------------|
| Result: | Passed |
|----------------|---------------|

Date of testing : 14.11.2018
Test procedure : EN 61000-3-2:2014
Test duration : 2.5min
Harmonic order : 2 – 40th
Frequency range : 0 – 2kHz
Ambient conditions : Temperature: 20°C, relative humidity: 50%

Following is the measurement result, which were obtained via an automatic measurement system.

Table 2: Harmonic currents measurement result for ZDS120PWR

Equipment category: Class A

Test voltage: AC 230V 50Hz

Fundamental current I1: 0.670A; Power factor: 0.790; Active input power: 131.4W.

| Harmonic order | Result (avg.) (A) | 100% limits (A) | Result (max.) (A) | 150% limits (A) | Result |
|-----------------------|--------------------------|------------------------|--------------------------|------------------------|---------------|
| 2 | 32.696E-3 | 1.08 | 42.168E-3 | 1.62 | Passed |
| 3 | 65.234E-3 | 2.30 | 81.273E-3 | 3.45 | Passed |
| 4 | 14.506E-3 | 430.00E-3 | 16.939E-3 | 645.00E-3 | Passed |
| 5 | 41.545E-3 | 1.14 | 49.307E-3 | 1.71 | Passed |
| 6 | 6.236E-3 | 300.00E-3 | 6.843E-3 | 450.00E-3 | Passed |
| 7 | 17.308E-3 | 770.00E-3 | 19.298E-3 | 1194.00E-3 | Passed |
| 8 | 2.396E-3 | 230.00E-3 | 3.678E-3 | 345.00E-3 | Passed |
| 9 | 5.778E-3 | 400.00E-3 | 6.696E-3 | 500.00E-3 | Passed |
| 10 | 1.492E-3 | 184.00E-3 | 2.293E-3 | 276.00E-3 | Passed |
| 11 | 4.191E-3 | 330.00E-3 | 5.035E-3 | 495.00E-3 | Passed |
| 12 | 1.188E-3 | 153.00E-3 | 1.383E-3 | 230.00E-3 | Passed |
| 13 | 1.690E-3 | 210.00E-3 | 2.136E-3 | 315.00E-3 | Passed |
| 14 | 1.158E-3 | 131.00E-3 | 1.300E-3 | 197.00E-3 | Passed |
| 15 | 1.780E-3 | 150.00E-3 | 2.046E-3 | 225.00E-3 | Passed |
| 16 | 1.090E-3 | 115.00E-3 | 1.289E-3 | 173.00E-3 | Passed |
| 17 | 1.310E-3 | 132.00E-3 | 1.493E-3 | 198.00E-3 | Passed |
| 18 | 1.031E-3 | 102.00E-3 | 1.184E-3 | 153.00E-3 | Passed |
| 19 | 1.040E-3 | 118.00E-3 | 1.208E-3 | 177.00E-3 | Passed |
| 20 | 993.145E-6 | 92.00E-3 | 1.124E-3 | 138.00E-3 | Passed |
| 21 | 1.092E-3 | 107.00E-3 | 1.234E-3 | 160.00E-3 | Passed |
| 22 | 1.019E-3 | 84.00E-3 | 1.184E-3 | 126.00E-3 | Passed |
| 23 | 1.041E-3 | 98.00E-3 | 1.202E-3 | 147.00E-3 | Passed |
| 24 | 1.060E-3 | 77.00E-3 | 1.186E-3 | 116.00E-3 | Passed |
| 25 | 1.193E-3 | 90.00E-3 | 1.332E-3 | 135.00E-3 | Passed |
| 26 | 1.030E-3 | 71.00E-3 | 1.229E-3 | 106.00E-3 | Passed |
| 27 | 1.139E-3 | 83.00E-3 | 1.326E-3 | 125.00E-3 | Passed |
| 28 | 1.047E-3 | 66.00E-3 | 1.259E-3 | 99.00E-3 | Passed |
| 29 | 1.140E-3 | 78.00E-3 | 1.306E-3 | 117.00E-3 | Passed |
| 30 | 1.048E-3 | 61.00E-3 | 1.179E-3 | 92.00E-3 | Passed |
| 31 | 1.217E-3 | 73.00E-3 | 1.390E-3 | 110.00E-3 | Passed |
| 32 | 982.971E-6 | 58.00E-3 | 1.101E-3 | 87.00E-3 | Passed |
| 33 | 995.471E-6 | 68.00E-3 | 1.145E-3 | 102.00E-3 | Passed |
| 34 | 976.928E-6 | 54.00E-3 | 1.103E-3 | 81.00E-3 | Passed |
| 35 | 992.869E-6 | 64.00E-3 | 1.136E-3 | 96.00E-3 | Passed |
| 36 | 979.626E-6 | 51.00E-3 | 1.106E-3 | 77.00E-3 | Passed |
| 37 | 1.006E-3 | 61.00E-3 | 1.100E-3 | 92.00E-3 | Passed |
| 38 | 1.046E-3 | 48.00E-3 | 1.164E-3 | 72.00E-3 | Passed |
| 39 | 989.066E-6 | 58.00E-3 | 1.117E-3 | 87.00E-3 | Passed |
| 40 | 965.794E-6 | 46.00E-3 | 1.049E-3 | 69.00E-3 | Passed |

Table 3: Harmonic currents measurement result for ZDS120PWHR

Equipment category: Class A

Test voltage: AC 230V 50Hz

Fundamental current I1: 0.781A; Power factor: 0.709; Active input power: 130W.

| Harmonic order | Result (avg.) (A) | 100% limits (A) | Result (max.) (A) | 150% limits (A) | Result |
|-----------------------|--------------------------|------------------------|--------------------------|------------------------|---------------|
| 2 | 82.158E-3 | 1.08 | 85.219E-3 | 1.62 | Passed |
| 3 | 45.435E-3 | 2.30 | 47.579E-3 | 3.45 | Passed |
| 4 | 16.533E-3 | 430.00E-3 | 17.125E-3 | 645.00E-3 | Passed |
| 5 | 6.910E-3 | 1.14 | 7.311E-3 | 1.71 | Passed |
| 6 | 3.928E-3 | 300.00E-3 | 4.119E-3 | 450.00E-3 | Passed |
| 7 | 5.916E-3 | 770.00E-3 | 6.218E-3 | 1194.00E-3 | Passed |
| 8 | 3.787E-3 | 230.00E-3 | 4.118E-3 | 345.00E-3 | Passed |
| 9 | 2.296E-3 | 400.00E-3 | 2.447E-3 | 500.00E-3 | Passed |
| 10 | 1.865E-3 | 184.00E-3 | 2.002E-3 | 276.00E-3 | Passed |
| 11 | 2.266E-3 | 330.00E-3 | 2.450E-3 | 495.00E-3 | Passed |
| 12 | 1.590E-3 | 153.00E-3 | 1.710E-3 | 230.00E-3 | Passed |
| 13 | 1.429E-3 | 210.00E-3 | 1.551E-3 | 315.00E-3 | Passed |
| 14 | 1.358E-3 | 131.00E-3 | 1.472E-3 | 197.00E-3 | Passed |
| 15 | 1.290E-3 | 150.00E-3 | 1.416E-3 | 225.00E-3 | Passed |
| 16 | 1.275E-3 | 115.00E-3 | 1.399E-3 | 173.00E-3 | Passed |
| 17 | 1.269E-3 | 132.00E-3 | 1.367E-3 | 198.00E-3 | Passed |
| 18 | 1.130E-3 | 102.00E-3 | 1.263E-3 | 153.00E-3 | Passed |
| 19 | 1.173E-3 | 118.00E-3 | 1.265E-3 | 177.00E-3 | Passed |
| 20 | 1.110E-3 | 92.00E-3 | 1.204E-3 | 138.00E-3 | Passed |
| 21 | 1.168E-3 | 107.00E-3 | 1.278E-3 | 160.00E-3 | Passed |
| 22 | 1.078E-3 | 84.00E-3 | 1.176E-3 | 126.00E-3 | Passed |
| 23 | 1.110E-3 | 98.00E-3 | 1.219E-3 | 147.00E-3 | Passed |
| 24 | 1.108E-3 | 77.00E-3 | 1.224E-3 | 116.00E-3 | Passed |
| 25 | 1.176E-3 | 90.00E-3 | 1.286E-3 | 135.00E-3 | Passed |
| 26 | 1.159E-3 | 71.00E-3 | 1.290E-3 | 106.00E-3 | Passed |
| 27 | 1.093E-3 | 83.00E-3 | 1.200E-3 | 125.00E-3 | Passed |
| 28 | 1.040E-3 | 66.00E-3 | 1.146E-3 | 99.00E-3 | Passed |
| 29 | 1.045E-3 | 78.00E-3 | 1.168E-3 | 117.00E-3 | Passed |
| 30 | 1.090E-3 | 61.00E-3 | 1.206E-3 | 92.00E-3 | Passed |
| 31 | 1.045E-3 | 73.00E-3 | 1.169E-3 | 110.00E-3 | Passed |
| 32 | 1.094E-3 | 58.00E-3 | 1.223E-3 | 87.00E-3 | Passed |
| 33 | 1.058E-3 | 68.00E-3 | 1.152E-3 | 102.00E-3 | Passed |
| 34 | 1.050E-3 | 54.00E-3 | 1.155E-3 | 81.00E-3 | Passed |
| 35 | 1.153E-3 | 64.00E-3 | 1.288E-3 | 96.00E-3 | Passed |
| 36 | 1.030E-3 | 51.00E-3 | 1.112E-3 | 77.00E-3 | Passed |
| 37 | 1.047E-3 | 61.00E-3 | 1.165E-3 | 92.00E-3 | Passed |
| 38 | 1.012E-3 | 48.00E-3 | 1.123E-3 | 72.00E-3 | Passed |
| 39 | 1.037E-3 | 58.00E-3 | 1.189E-3 | 87.00E-3 | Passed |
| 40 | 0.999E-3 | 46.00E-3 | 1.100E-3 | 69.00E-3 | Passed |

Table 4: Harmonic currents measurement result for SDQ-500SR

Equipment category: Class A

Test voltage: AC 230V 50Hz

Fundamental current I1: 0.769A; Power factor: 0.833; Active input power: 151.3W.

| Harmonic order | Result (avg.) (A) | 100% limits (A) | Result (max.) (A) | 150% limits (A) | Result |
|-----------------------|--------------------------|------------------------|--------------------------|------------------------|---------------|
| 2 | 90.128E-3 | 1.08 | 93.347E-3 | 1.62 | Passed |
| 3 | 60.925E-3 | 2.30 | 63.101E-3 | 3.45 | Passed |
| 4 | 18.539E-3 | 430.00E-3 | 19.073E-3 | 645.00E-3 | Passed |
| 5 | 10.734E-3 | 1.14 | 11.448E-3 | 1.71 | Passed |
| 6 | 10.449E-3 | 300.00E-3 | 11.042E-3 | 450.00E-3 | Passed |
| 7 | 5.581E-3 | 770.00E-3 | 6.124E-3 | 1194.00E-3 | Passed |
| 8 | 3.135E-3 | 230.00E-3 | 3.421E-3 | 345.00E-3 | Passed |
| 9 | 3.608E-3 | 400.00E-3 | 3.786E-3 | 500.00E-3 | Passed |
| 10 | 2.706E-3 | 184.00E-3 | 2.980E-3 | 276.00E-3 | Passed |
| 11 | 1.959E-3 | 330.00E-3 | 2.139E-3 | 495.00E-3 | Passed |
| 12 | 1.723E-3 | 153.00E-3 | 1.873E-3 | 230.00E-3 | Passed |
| 13 | 1.544E-3 | 210.00E-3 | 1.729E-3 | 315.00E-3 | Passed |
| 14 | 1.468E-3 | 131.00E-3 | 1.623E-3 | 197.00E-3 | Passed |
| 15 | 1.512E-3 | 150.00E-3 | 1.663E-3 | 225.00E-3 | Passed |
| 16 | 1.278E-3 | 115.00E-3 | 1.410E-3 | 173.00E-3 | Passed |
| 17 | 1.292E-3 | 132.00E-3 | 1.432E-3 | 198.00E-3 | Passed |
| 18 | 1.250E-3 | 102.00E-3 | 1.430E-3 | 153.00E-3 | Passed |
| 19 | 1.253E-3 | 118.00E-3 | 1.388E-3 | 177.00E-3 | Passed |
| 20 | 1.197E-3 | 92.00E-3 | 1.304E-3 | 138.00E-3 | Passed |
| 21 | 1.207E-3 | 107.00E-3 | 1.325E-3 | 160.00E-3 | Passed |
| 22 | 1.201E-3 | 84.00E-3 | 1.346E-3 | 126.00E-3 | Passed |
| 23 | 1.205E-3 | 98.00E-3 | 1.366E-3 | 147.00E-3 | Passed |
| 24 | 1.209E-3 | 77.00E-3 | 1.428E-3 | 116.00E-3 | Passed |
| 25 | 1.191E-3 | 90.00E-3 | 1.333E-3 | 135.00E-3 | Passed |
| 26 | 1.183E-3 | 71.00E-3 | 1.299E-3 | 106.00E-3 | Passed |
| 27 | 1.185E-3 | 83.00E-3 | 1.295E-3 | 125.00E-3 | Passed |
| 28 | 1.140E-3 | 66.00E-3 | 1.254E-3 | 99.00E-3 | Passed |
| 29 | 1.239E-3 | 78.00E-3 | 1.404E-3 | 117.00E-3 | Passed |
| 30 | 1.265E-3 | 61.00E-3 | 1.373E-3 | 92.00E-3 | Passed |
| 31 | 1.197E-3 | 73.00E-3 | 1.310E-3 | 110.00E-3 | Passed |
| 32 | 1.118E-3 | 58.00E-3 | 1.218E-3 | 87.00E-3 | Passed |
| 33 | 1.117E-3 | 68.00E-3 | 1.228E-3 | 102.00E-3 | Passed |
| 34 | 1.121E-3 | 54.00E-3 | 1.301E-3 | 81.00E-3 | Passed |
| 35 | 1.143E-3 | 64.00E-3 | 1.315E-3 | 96.00E-3 | Passed |
| 36 | 1.062E-3 | 51.00E-3 | 1.168E-3 | 77.00E-3 | Passed |
| 37 | 1.081E-3 | 61.00E-3 | 1.190E-3 | 92.00E-3 | Passed |
| 38 | 1.051E-3 | 48.00E-3 | 1.159E-3 | 72.00E-3 | Passed |
| 39 | 1.075E-3 | 58.00E-3 | 1.220E-3 | 87.00E-3 | Passed |
| 40 | 1.046E-3 | 46.00E-3 | 1.175E-3 | 69.00E-3 | Passed |

Table 5: Harmonic currents measurement result for SDQ-700SR

Equipment category: Class A

Test voltage: AC 230V 50Hz

Fundamental current I1: 0.961A; Power factor: 0.849; Active input power: 207.6W.

| Harmonic order | Result (avg.) (A) | 100% limits (A) | Result (max.) (A) | 150% limits (A) | Result |
|-----------------------|--------------------------|------------------------|--------------------------|------------------------|---------------|
| 2 | 81.618E-3 | 1.08 | 98.038E-3 | 1.62 | Passed |
| 3 | 86.207E-3 | 2.30 | 100.637E-3 | 3.45 | Passed |
| 4 | 22.695E-3 | 430.00E-3 | 24.769E-3 | 645.00E-3 | Passed |
| 5 | 34.246E-3 | 1.14 | 35.601E-3 | 1.71 | Passed |
| 6 | 9.679E-3 | 300.00E-3 | 13.845E-3 | 450.00E-3 | Passed |
| 7 | 17.188E-3 | 770.00E-3 | 23.588E-3 | 1194.00E-3 | Passed |
| 8 | 7.648E-3 | 230.00E-3 | 8.068E-3 | 345.00E-3 | Passed |
| 9 | 7.990E-3 | 400.00E-3 | 9.843E-3 | 500.00E-3 | Passed |
| 10 | 2.585E-3 | 184.00E-3 | 3.082E-3 | 276.00E-3 | Passed |
| 11 | 2.160E-3 | 330.00E-3 | 2.530E-3 | 495.00E-3 | Passed |
| 12 | 2.141E-3 | 153.00E-3 | 2.541E-3 | 230.00E-3 | Passed |
| 13 | 2.142E-3 | 210.00E-3 | 2.438E-3 | 315.00E-3 | Passed |
| 14 | 1.452E-3 | 131.00E-3 | 1.734E-3 | 197.00E-3 | Passed |
| 15 | 1.364E-3 | 150.00E-3 | 1.489E-3 | 225.00E-3 | Passed |
| 16 | 1.299E-3 | 115.00E-3 | 1.446E-3 | 173.00E-3 | Passed |
| 17 | 1.321E-3 | 132.00E-3 | 1.485E-3 | 198.00E-3 | Passed |
| 18 | 1.199E-3 | 102.00E-3 | 1.355E-3 | 153.00E-3 | Passed |
| 19 | 1.181E-3 | 118.00E-3 | 1.359E-3 | 177.00E-3 | Passed |
| 20 | 1.182E-3 | 92.00E-3 | 1.422E-3 | 138.00E-3 | Passed |
| 21 | 1.205E-3 | 107.00E-3 | 1.345E-3 | 160.00E-3 | Passed |
| 22 | 1.191E-3 | 84.00E-3 | 1.355E-3 | 126.00E-3 | Passed |
| 23 | 1.221E-3 | 98.00E-3 | 1.359E-3 | 147.00E-3 | Passed |
| 24 | 1.605E-3 | 77.00E-3 | 1.842E-3 | 116.00E-3 | Passed |
| 25 | 1.418E-3 | 90.00E-3 | 1.628E-3 | 135.00E-3 | Passed |
| 26 | 1.210E-3 | 71.00E-3 | 1.372E-3 | 106.00E-3 | Passed |
| 27 | 1.197E-3 | 83.00E-3 | 1.299E-3 | 125.00E-3 | Passed |
| 28 | 1.271E-3 | 66.00E-3 | 1.485E-3 | 99.00E-3 | Passed |
| 29 | 1.298E-3 | 78.00E-3 | 1.478E-3 | 117.00E-3 | Passed |
| 30 | 1.245E-3 | 61.00E-3 | 1.429E-3 | 92.00E-3 | Passed |
| 31 | 1.221E-3 | 73.00E-3 | 1.379E-3 | 110.00E-3 | Passed |
| 32 | 1.174E-3 | 58.00E-3 | 1.320E-3 | 87.00E-3 | Passed |
| 33 | 1.132E-3 | 68.00E-3 | 1.250E-3 | 102.00E-3 | Passed |
| 34 | 1.108E-3 | 54.00E-3 | 1.289E-3 | 81.00E-3 | Passed |
| 35 | 1.158E-3 | 64.00E-3 | 1.274E-3 | 96.00E-3 | Passed |
| 36 | 1.038E-3 | 51.00E-3 | 1.153E-3 | 77.00E-3 | Passed |
| 37 | 1.050E-3 | 61.00E-3 | 1.227E-3 | 92.00E-3 | Passed |
| 38 | 1.032E-3 | 48.00E-3 | 1.145E-3 | 72.00E-3 | Passed |
| 39 | 1.049E-3 | 58.00E-3 | 1.173E-3 | 87.00E-3 | Passed |
| 40 | 1.022E-3 | 46.00E-3 | 1.135E-3 | 69.00E-3 | Passed |

Table 6: Harmonic currents measurement result for ZDS200PWHR

Equipment category: Class A

Test voltage: AC 230V 50Hz

Fundamental current I1: 0.814A; Power factor: 0.899; Active input power: 181.7W.

| Harmonic order | Result (avg.) (A) | 100% limits (A) | Result (max.) (A) | 150% limits (A) | Result |
|-----------------------|--------------------------|------------------------|--------------------------|------------------------|---------------|
| 2 | 65.746E-3 | 1.08 | 78.555E-3 | 1.62 | Passed |
| 3 | 83.283E-3 | 2.30 | 93.107E-3 | 3.45 | Passed |
| 4 | 16.867E-3 | 430.00E-3 | 18.815E-3 | 645.00E-3 | Passed |
| 5 | 36.292E-3 | 1.14 | 40.078E-3 | 1.71 | Passed |
| 6 | 9.912E-3 | 300.00E-3 | 13.750E-3 | 450.00E-3 | Passed |
| 7 | 19.791E-3 | 770.00E-3 | 25.099E-3 | 1194.00E-3 | Passed |
| 8 | 5.048E-3 | 230.00E-3 | 6.022E-3 | 345.00E-3 | Passed |
| 9 | 4.052E-3 | 400.00E-3 | 5.720E-3 | 500.00E-3 | Passed |
| 10 | 2.921E-3 | 184.00E-3 | 3.403E-3 | 276.00E-3 | Passed |
| 11 | 3.470E-3 | 330.00E-3 | 3.874E-3 | 495.00E-3 | Passed |
| 12 | 1.396E-3 | 153.00E-3 | 1.620E-3 | 230.00E-3 | Passed |
| 13 | 1.510E-3 | 210.00E-3 | 1.822E-3 | 315.00E-3 | Passed |
| 14 | 1.431E-3 | 131.00E-3 | 1.629E-3 | 197.00E-3 | Passed |
| 15 | 1.478E-3 | 150.00E-3 | 1.660E-3 | 225.00E-3 | Passed |
| 16 | 1.189E-3 | 115.00E-3 | 1.321E-3 | 173.00E-3 | Passed |
| 17 | 1.148E-3 | 132.00E-3 | 1.320E-3 | 198.00E-3 | Passed |
| 18 | 1.127E-3 | 102.00E-3 | 1.258E-3 | 153.00E-3 | Passed |
| 19 | 1.145E-3 | 118.00E-3 | 1.306E-3 | 177.00E-3 | Passed |
| 20 | 1.131E-3 | 92.00E-3 | 1.278E-3 | 138.00E-3 | Passed |
| 21 | 1.235E-3 | 107.00E-3 | 1.385E-3 | 160.00E-3 | Passed |
| 22 | 1.111E-3 | 84.00E-3 | 1.234E-3 | 126.00E-3 | Passed |
| 23 | 1.138E-3 | 98.00E-3 | 1.279E-3 | 147.00E-3 | Passed |
| 24 | 1.232E-3 | 77.00E-3 | 1.451E-3 | 116.00E-3 | Passed |
| 25 | 1.213E-3 | 90.00E-3 | 1.386E-3 | 135.00E-3 | Passed |
| 26 | 1.096E-3 | 71.00E-3 | 1.271E-3 | 106.00E-3 | Passed |
| 27 | 1.106E-3 | 83.00E-3 | 1.226E-3 | 125.00E-3 | Passed |
| 28 | 1.157E-3 | 66.00E-3 | 1.403E-3 | 99.00E-3 | Passed |
| 29 | 1.177E-3 | 78.00E-3 | 1.317E-3 | 117.00E-3 | Passed |
| 30 | 1.048E-3 | 61.00E-3 | 1.219E-3 | 92.00E-3 | Passed |
| 31 | 1.048E-3 | 73.00E-3 | 1.156E-3 | 110.00E-3 | Passed |
| 32 | 1.042E-3 | 58.00E-3 | 1.138E-3 | 87.00E-3 | Passed |
| 33 | 1.062E-3 | 68.00E-3 | 1.213E-3 | 102.00E-3 | Passed |
| 34 | 1.049E-3 | 54.00E-3 | 1.198E-3 | 81.00E-3 | Passed |
| 35 | 1.162E-3 | 64.00E-3 | 1.263E-3 | 96.00E-3 | Passed |
| 36 | 1.021E-3 | 51.00E-3 | 1.152E-3 | 77.00E-3 | Passed |
| 37 | 1.038E-3 | 61.00E-3 | 1.130E-3 | 92.00E-3 | Passed |
| 38 | 1.017E-3 | 48.00E-3 | 1.120E-3 | 72.00E-3 | Passed |
| 39 | 1.032E-3 | 58.00E-3 | 1.141E-3 | 87.00E-3 | Passed |
| 40 | 1.006E-3 | 46.00E-3 | 1.137E-3 | 69.00E-3 | Passed |

4.1.2 Voltage Fluctuations and Flicker on AC Mains

| | |
|----------------|---------------|
| Result: | Passed |
|----------------|---------------|

Date of testing : 14.11.2018
 Test procedure : EN 61000-3-3:2013
 Ambient conditions : Temperature: 20°C, relative humidity: 50%

According to the characteristics of the sample, as specified by clause 5 of the basic standard, following limits apply:

- the value of $d(t)$ during a voltage change shall not exceed 3.3% for more than 500ms;
- the relative steady-state voltage change d_c , shall not exceed 3.3%;
- the maximum relative voltage change d_{max} , shall not exceed 4%.

Following is the measurement result obtained via an automatic testing system.

Table 7: Voltage fluctuations and Flicker measurement results for ZDS120PWR

| | d_c | d_{max} | $d(t)$ | P_{st} | P_{lt} |
|--------|--------|-----------|------------|----------|----------|
| Limits | 3.3% | 4% | 3.3%/500ms | 1.0 | 0.65 |
| Result | 0.931% | 1.148% | 0ms | - | - |

Table 8: Voltage fluctuations and Flicker measurement results for ZDS120PWHR

| | d_c | d_{max} | $d(t)$ | P_{st} | P_{lt} |
|--------|--------|-----------|------------|----------|----------|
| Limits | 3.3% | 4% | 3.3%/500ms | 1.0 | 0.65 |
| Result | 0.134% | 1.305% | 0ms | - | - |

Table 9: Voltage fluctuations and Flicker measurement results for SDQ-500SR

| | d_c | d_{max} | $d(t)$ | P_{st} | P_{lt} |
|--------|--------|-----------|------------|----------|----------|
| Limits | 3.3% | 4% | 3.3%/500ms | 1.0 | 0.65 |
| Result | 0.136% | 1.252% | 0ms | - | - |

Table 10: Voltage fluctuations and Flicker measurement results for SDQ-700SR

| | d_c | d_{max} | $d(t)$ | P_{st} | P_{lt} |
|--------|--------|-----------|------------|----------|----------|
| Limits | 3.3% | 4% | 3.3%/500ms | 1.0 | 0.65 |
| Result | 0.165% | 1.724% | 0ms | - | - |

Table 11: Voltage fluctuations and Flicker measurement results for ZDS200PWHR

| | d_c | d_{max} | $d(t)$ | P_{st} | P_{lt} |
|--------|--------|-----------|------------|----------|----------|
| Limits | 3.3% | 4% | 3.3%/500ms | 1.0 | 0.65 |
| Result | 0.138% | 1.605% | 0ms | - | - |

4.1.3 Mains Terminal Continuous Disturbance Voltage

| | |
|----------------|---------------|
| Result: | Passed |
|----------------|---------------|

| | |
|---|---|
| Date of testing | : 09.11.2018 |
| Test procedure | : EN 55014-1:2017 and CISPR 16-1 series standards |
| Frequency range | : 0.15 – 30MHz |
| Kind of test site | : Shielded room |
| Ambient conditions | : Temperature: 20°C, relative humidity: 50% |
| Expanded measurement uncertainty($k=2$) | : 3.2 dB |

Test Setup

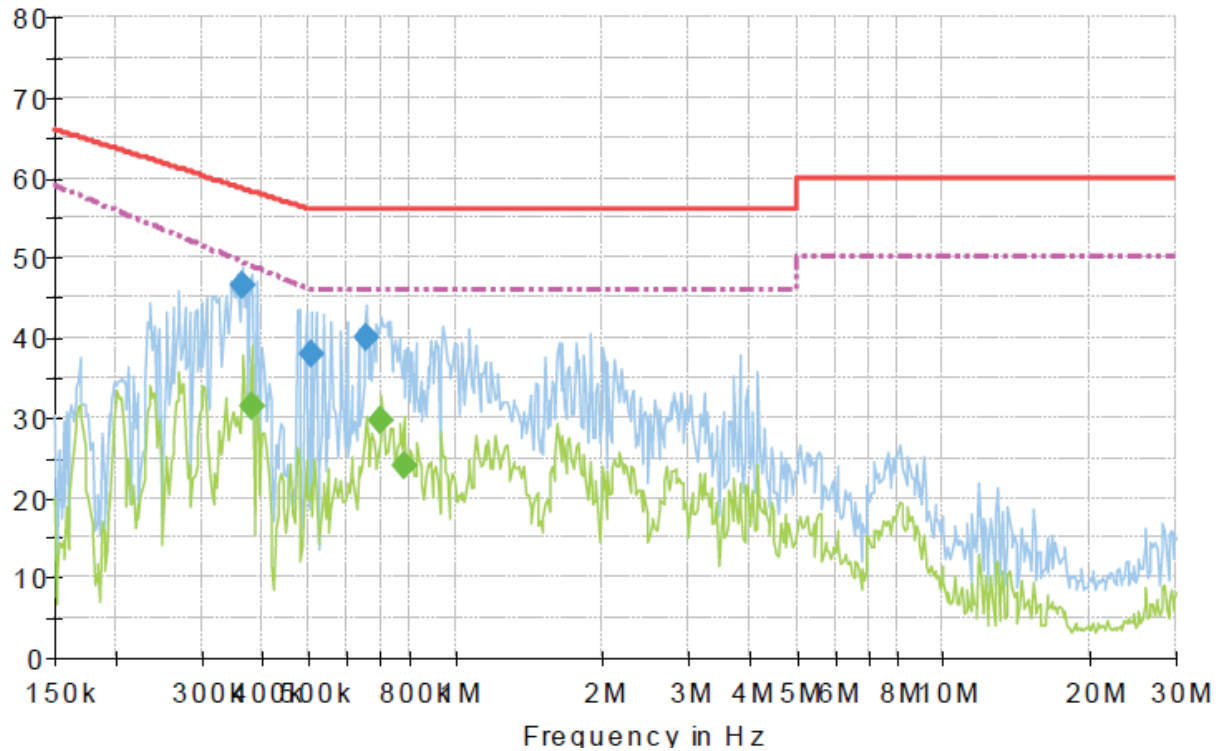
| | |
|---------------------|--------------------------------------|
| Input Voltage | : AC 230V, 50Hz |
| Artificial hand | : N/A |
| Earthing | : Earthed through power cord |
| Operating condition | : ON with medial temperature setting |

The measurement setup was made according to EN 55014-1:2017 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. Prior to the measurements the test object operated about 15 minutes (warm-up) in order to stabilize its operating conditions and to ensure reliable measurement values.

The tested object was set-up on a 0.1m wooden table. The EUT was set 0.8m 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 0.3m and 0.4m.

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.

Figure 1: Spectral Diagrams, Disturbance voltage, 150kHz - 30MHz, L&N for ZDS120PWR


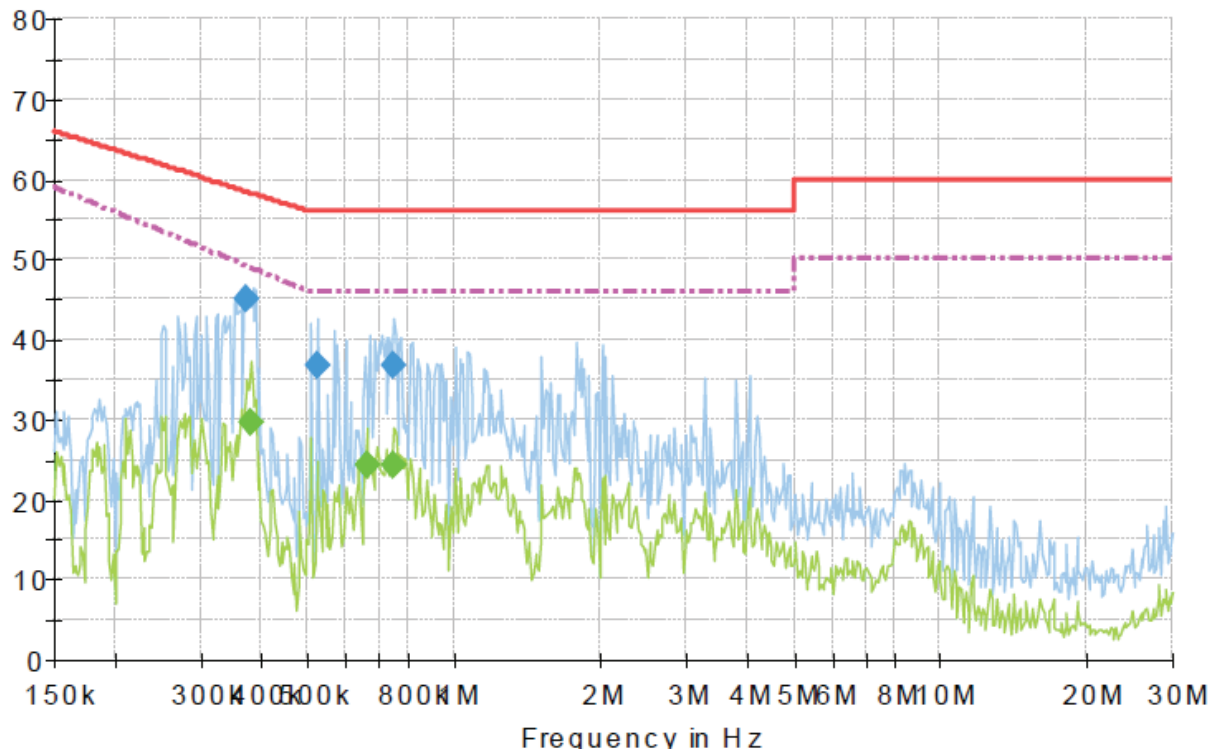
Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dB µV) | Limit (dB µV) | Margin (dB) |
|-----------------|-------------------|---------------|-------------|
| 0.363254 | 46.5 | 58.7 | 12.2 |
| 0.503607 | 37.8 | 56.0 | 18.2 |
| 0.655073 | 39.9 | 56.0 | 16.1 |

Final average measurement results:

| Frequency (MHz) | Average (dB µV) | Limit (dB µV) | Margin (dB) |
|-----------------|-----------------|---------------|-------------|
| 0.381043 | 31.3 | 48.9 | 17.6 |
| 0.703776 | 29.7 | 46.0 | 16.3 |
| 0.780587 | 23.9 | 46.0 | 22.1 |

Figure 2: Spectral Diagrams, Disturbance voltage, 150kHz - 30MHz, L&N for ZDS120PWHR



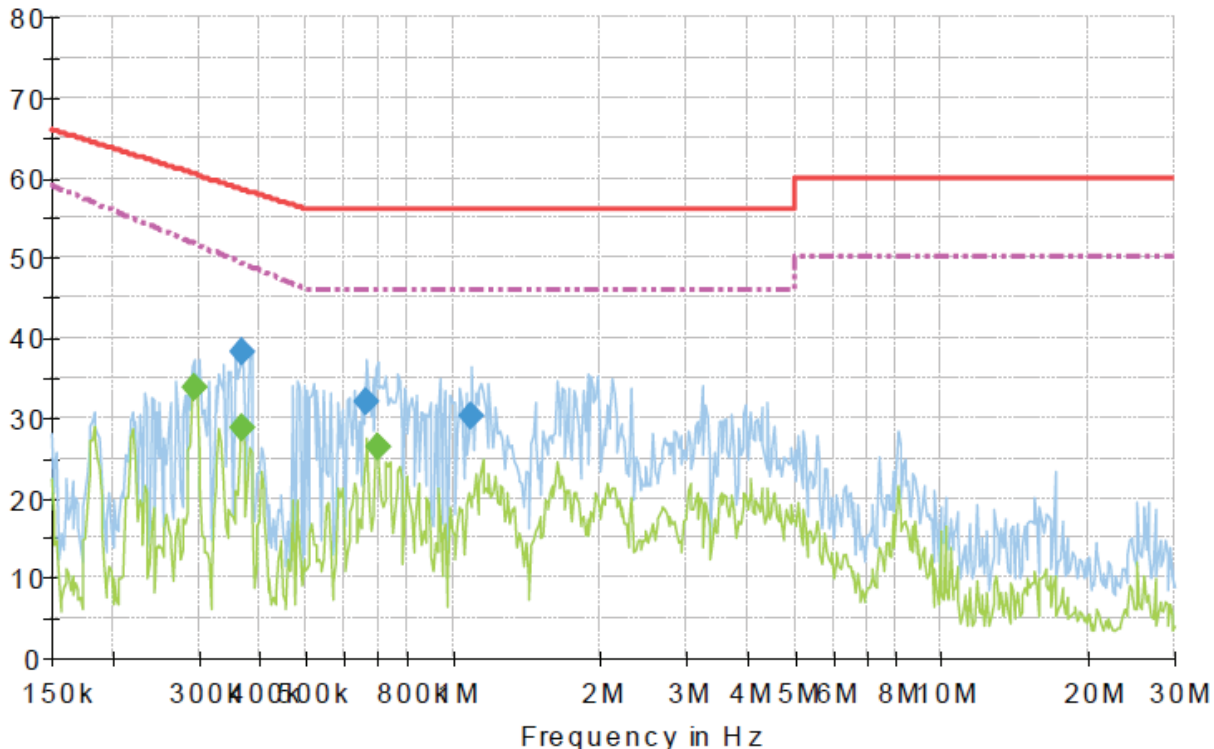
Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dB µV) | Limit (dB µV) | Margin (dB) |
|-----------------|-------------------|---------------|-------------|
| 0.372042 | 45.0 | 58.5 | 13.5 |
| 0.524077 | 36.8 | 56.0 | 19.2 |
| 0.750099 | 36.7 | 56.0 | 19.3 |

Final average measurement results:

| Frequency (MHz) | Average (dB µV) | Limit (dB µV) | Margin (dB) |
|-----------------|-----------------|---------------|-------------|
| 0.381043 | 29.7 | 48.9 | 19.2 |
| 0.660314 | 24.2 | 46.0 | 21.8 |
| 0.750099 | 24.4 | 46.0 | 21.6 |

Figure 3: Spectral Diagrams, Disturbance voltage, 150kHz - 30MHz, L&N for SDQ-500SR

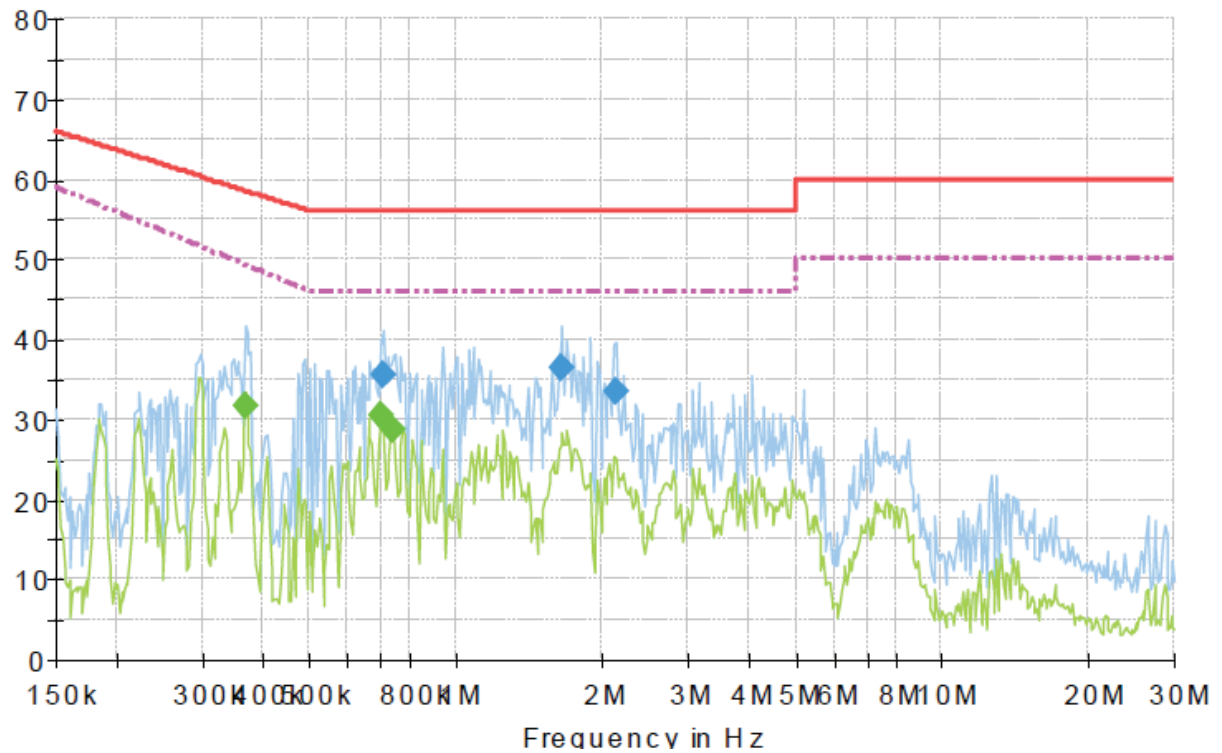


Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dB µV) | Limit (dB µV) | Margin (dB) |
|-----------------|-------------------|---------------|-------------|
| 0.369089 | 38.1 | 58.5 | 20.4 |
| 0.665596 | 32.1 | 56.0 | 23.9 |
| 1.090847 | 30.1 | 56.0 | 25.9 |

Final average measurement results:

| Frequency (MHz) | Average (dB µV) | Limit (dB µV) | Margin (dB) |
|-----------------|-----------------|---------------|-------------|
| 0.292938 | 33.7 | 51.8 | 18.1 |
| 0.369089 | 28.7 | 49.3 | 20.6 |
| 0.698191 | 26.3 | 46.0 | 19.7 |

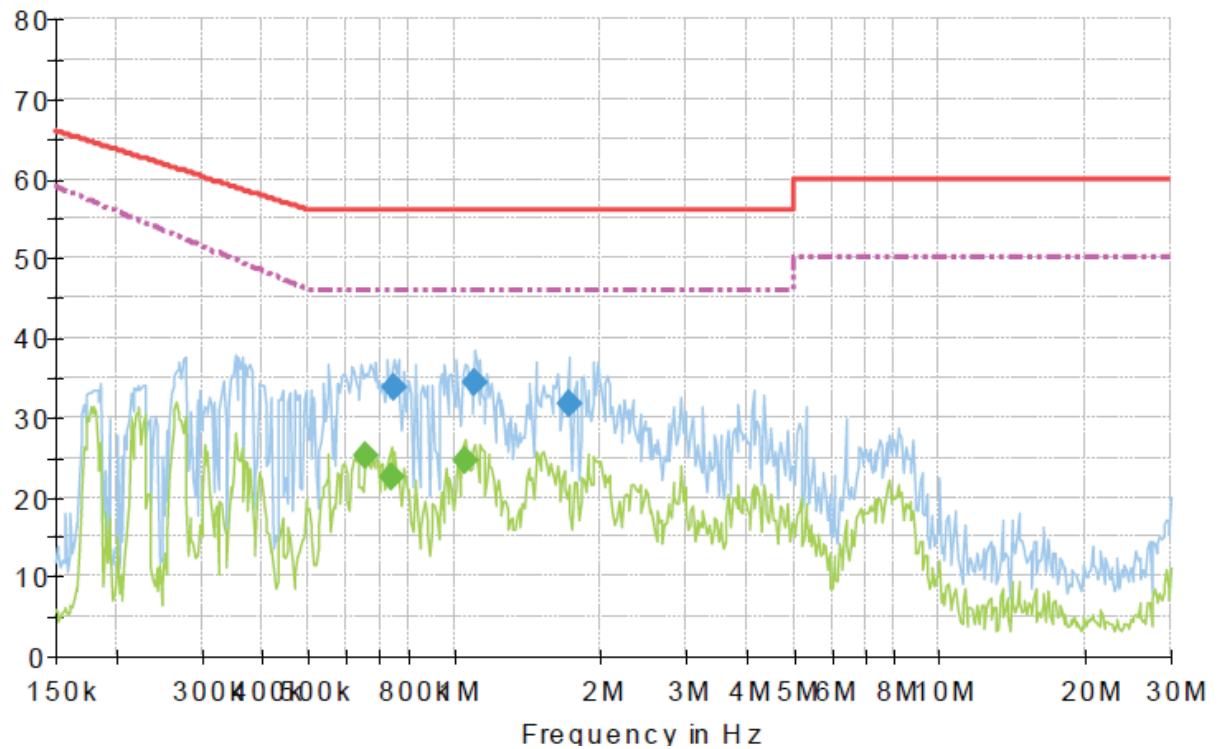
Figure 4: Spectral Diagrams, Disturbance voltage, 150kHz - 30MHz, L&N for SDQ-700SR


Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dB µ V) | Limit (dB µ V) | Margin (dB) |
|-----------------|--------------------|----------------|-------------|
| 0.709406 | 35.5 | 56.0 | 20.5 |
| 1.650864 | 36.3 | 56.0 | 19.7 |
| 2.130338 | 33.4 | 56.0 | 22.6 |

Final average measurement results:

| Frequency (MHz) | Average (dB µ V) | Limit (dB µ V) | Margin (dB) |
|-----------------|------------------|----------------|-------------|
| 0.369089 | 31.7 | 49.3 | 17.6 |
| 0.703776 | 30.5 | 46.0 | 15.5 |
| 0.744146 | 28.8 | 46.0 | 17.2 |

Figure 5: Spectral Diagrams, Disturbance voltage, 150kHz - 30MHz, L&N for ZDS200PWHR


Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dB μ V) | Limit (dB μ V) | Margin (dB) |
|-----------------|------------------------|--------------------|-------------|
| 0.750099 | 33.9 | 56.0 | 22.1 |
| 1.099574 | 34.3 | 56.0 | 21.7 |
| 1.717964 | 31.6 | 56.0 | 24.4 |

Final average measurement results:

| Frequency (MHz) | Average (dB μ V) | Limit (dB μ V) | Margin (dB) |
|-----------------|----------------------|--------------------|-------------|
| 0.655073 | 25.0 | 46.0 | 21.0 |
| 0.738240 | 22.5 | 46.0 | 23.5 |
| 1.048241 | 24.7 | 46.0 | 21.3 |

4.1.4 Discontinuous Interference on AC Mains

| | |
|----------------|-------------|
| Result: | Pass |
|----------------|-------------|

| | |
|---------------------|---|
| Date of testing | : 09.11.2018 |
| Test procedure | : EN 55014-1:2017 and CISPR 16-1 series standards |
| Kind of test site | : Shielded room |
| Port | : Mains |
| Basic standard | : EN 55014-1:2017 |
| Frequency range | : 0.15-30MHz |
| Limit | : Refer to EN 55014-1:2017 |
| Operating condition | : ON with medial temperature setting |

The discontinuous interference on AC mains in the frequency range from 0.15 to 30MHz was measured in accordance to EN 55014-1:2017.

The measurement setup was made according to EN 55014-1:2017. The used measurement equipment was in accordance to CISPR 16-1 series standards.

The clicks were measured at the frequency of 0.15MHz, 0.5MHz, 1.4MHz and 30MHz.

Table 12: Result of Discontinuous Interference for ZDS120PWR

| | | | | |
|---|-------|-------|-------|-------|
| Measured Frequency (MHz) | 0.15 | 0.5 | 1.4 | 30 |
| Continuous disturbance limit (dB μ V) | 66.0 | 56.0 | 56.0 | 60.0 |
| Last Time T (min.) | 120 | 120 | 120 | 120 |
| Click Number n1 of <10ms | 19 | 25 | 22 | 5 |
| Click Number n2 of \geq 10ms | 0 | 0 | 0 | 0 |
| Total Click Number n=n1+n2 | 19 | 25 | 22 | 5 |
| Switching Operation | 32 | | | |
| Factor f | 0.5 | | | |
| Click Rate = $f \times n/T$ | 0.133 | 0.133 | 0.133 | 0.133 |

According to the standard EN 55014-1:2017, due to that the click rate is less than 5, none of the clicks has a duration of longer than 20ms, and all the caused clicks have a duration less than 10ms, the sample is deemed to comply with the discontinuous disturbance limits without further testing.

Table 13: Result of Discontinuous Interference for ZDS120PWHR

| | | | | |
|---|-------|-------|-------|-------|
| Measured Frequency (MHz) | 0.15 | 0.5 | 1.4 | 30 |
| Continuous disturbance limit (dB μ V) | 66.0 | 56.0 | 56.0 | 60.0 |
| Last Time T (min.) | 120 | 120 | 120 | 120 |
| Click Number n1 of <10ms | 11 | 23 | 8 | 1 |
| Click Number n2 of \geq 10ms | 0 | 0 | 0 | 0 |
| Total Click Number n=n1+n2 | 11 | 23 | 8 | 1 |
| Switching Operation | 26 | | | |
| Factor f | 0.5 | | | |
| Click Rate = $f \times n/T$ | 0.108 | 0.108 | 0.108 | 0.108 |

According to the standard EN 55014-1:2017, due to that the click rate is less than 5, none of the clicks has a duration of longer than 20ms, and all the caused clicks have a duration less than 10ms, the sample is deemed to comply with the discontinuous disturbance limits without further testing.

Table 14: Result of Discontinuous Interference for SDQ-500SR

| | | | | |
|---|-------|-------|-------|-------|
| Measured Frequency (MHz) | 0.15 | 0.5 | 1.4 | 30 |
| Continuous disturbance limit (dB μ V) | 66.0 | 56.0 | 56.0 | 60.0 |
| Last Time T (min.) | 120 | 120 | 120 | 120 |
| Click Number n1 of <10ms | 5 | 1 | 0 | 0 |
| Click Number n2 of \geq 10ms | 0 | 0 | 0 | 0 |
| Total Click Number n=n1+n2 | 5 | 1 | 0 | 0 |
| Switching Operation | 19 | | | |
| Factor f | 0.5 | | | |
| Click Rate = $f \times n/T$ | 0.079 | 0.079 | 0.079 | 0.079 |

According to the standard EN 55014-1:2017, due to that the click rate is less than 5, none of the clicks has a duration of longer than 20ms, and all the caused clicks have a duration less than 10ms, the sample is deemed to comply with the discontinuous disturbance limits without further testing.

Table 15: Result of Discontinuous Interference for SDQ-700SR

| | | | | |
|---|-------|-------|-------|-------|
| Measured Frequency (MHz) | 0.15 | 0.5 | 1.4 | 30 |
| Continuous disturbance limit (dB μ V) | 66.0 | 56.0 | 56.0 | 60.0 |
| Last Time T (min.) | 120 | 120 | 120 | 120 |
| Click Number n1 of <10ms | 11 | 6 | 1 | 0 |
| Click Number n2 of \geq 10ms | 0 | 0 | 0 | 0 |
| Total Click Number n=n1+n2 | 11 | 6 | 1 | 0 |
| Switching Operation | 0 | | | |
| Factor f | 0.5 | | | |
| Click Rate = $f \times n/T$ | 0.000 | 0.000 | 0.000 | 0.000 |

According to the standard EN 55014-1:2017, due to that the click rate is less than 5, none of the clicks has a duration of longer than 20ms, and all the caused clicks have a duration less than 10ms, the sample is deemed to comply with the discontinuous disturbance limits without further testing.

Table 16: Result of Discontinuous Interference for ZDS200PWHR

| | | | | |
|---|-------|-------|-------|-------|
| Measured Frequency (MHz) | 0.15 | 0.5 | 1.4 | 30 |
| Continuous disturbance limit (dB μ V) | 66.0 | 56.0 | 56.0 | 60.0 |
| Last Time T (min.) | 120 | 120 | 120 | 120 |
| Click Number n1 of <10ms | 2 | 2 | 1 | 1 |
| Click Number n2 of \geq 10ms | 0 | 0 | 0 | 0 |
| Total Click Number n=n1+n2 | 2 | 2 | 1 | 1 |
| Switching Operation | 2 | | | |
| Factor f | 0.5 | | | |
| Click Rate = $f \times n/T$ | 0.008 | 0.008 | 0.008 | 0.008 |

According to the standard EN 55014-1:2017, due to that the click rate is less than 5, none of the clicks has a duration of longer than 20ms, and all the caused clicks have a duration less than 10ms, the sample is deemed to comply with the discontinuous disturbance limits without further testing.

4.2 Emission in the Frequency Range from 30 MHz to 1000MHz

4.2.1 Disturbance Power in the Frequency Range from 30MHz to 300MHz

| | |
|----------------|---------------|
| Result: | Passed |
|----------------|---------------|

| | |
|--|---|
| Date of testing | : 09.12.2018 |
| Port | : Mains |
| Basic Standard | : EN 55014-1:2017 |
| Frequency Range | : 30 – 300MHz |
| Limit | : Refer to EN 55014-1:2017 |
| Ambient conditions | : Temperature: 20°C, relative humidity: 50% |
| Expanded measurement uncertainty ($k=2$) | : 3.0 dB |

Test Setup

| | |
|------------------|--------------------------------------|
| Input Voltage | : AC 230V, 50Hz |
| Operational mode | : ON with medial temperature setting |
| Earthing | : Earthed through power cord |

Measuring configuration and description

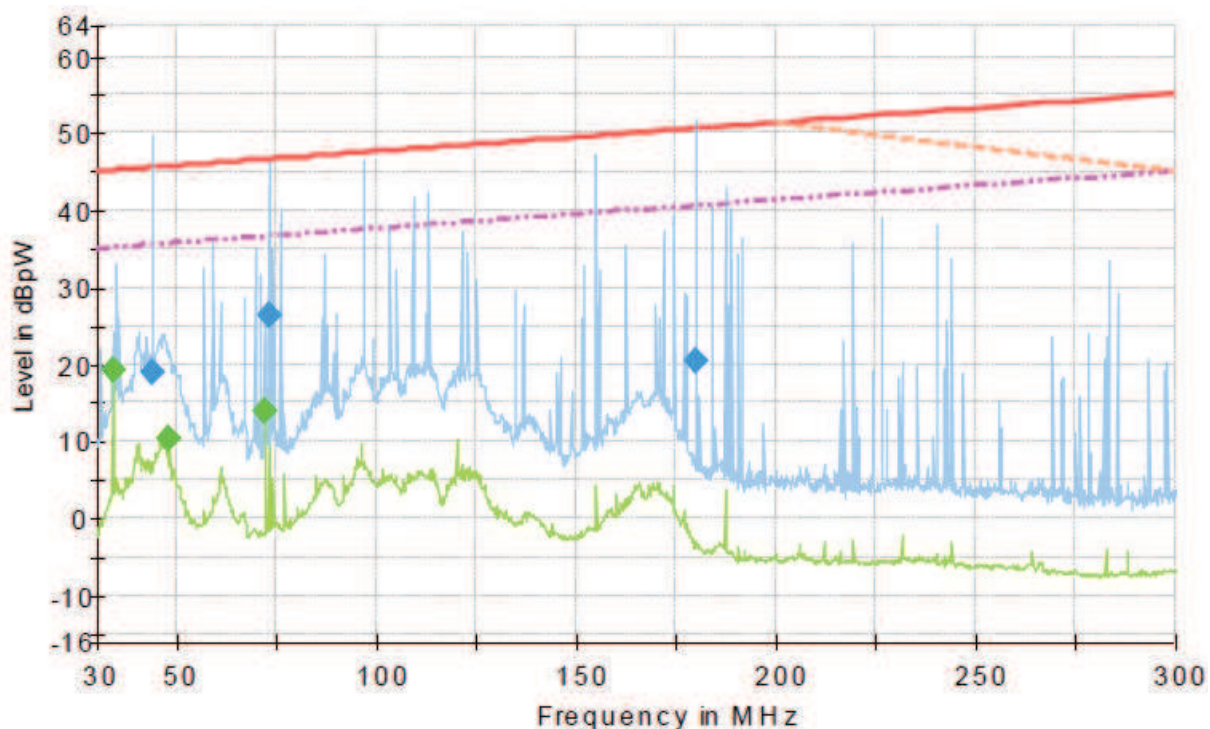
The measurement setup was made according to EN 55014-1:2017.

The measurement equipment like test receivers and absorption clamp are in compliance with CISPR 16-1 series standards. Prior to the measurements the test objects operated about 10 minutes (warm-up) in order to stabilize their operating conditions and to ensure reliable measurement values.

The Disturbance Power was determined according to EN 55014-1:2017. The length of power cord of EUT plus that of the extension cord was 6.0m.

The measurement was performed by operating the EUT in normal operation mode. The figures and tables below were those measured in the operation mode. Both Quasi Peak and Average Value were measured. In final measurement, by moving the absorption clamp along the power supply cord from the test object. Both Quasi Peak and Average Value were measured and listed respectively where they had a maximum in previous scanning survey.

Figure 6: Spectral Diagrams, Disturbance Power, Power Line, 30–300MHz for ZDS120PWR

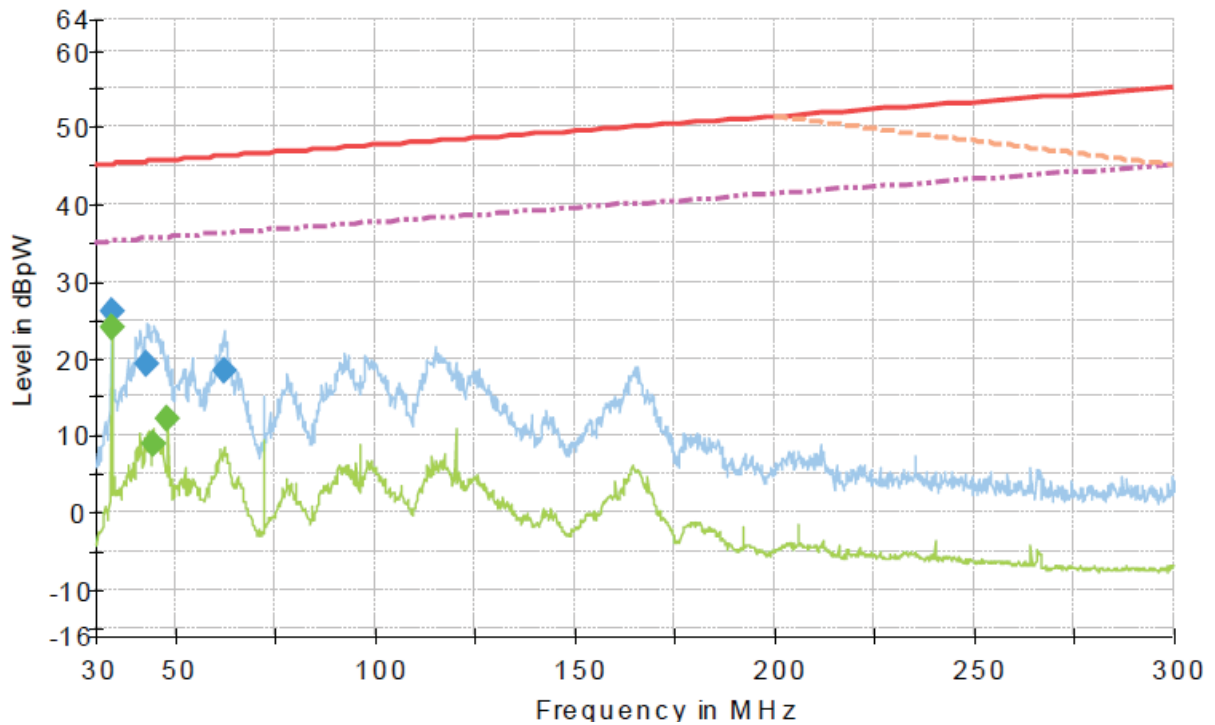


Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|------------------|--------------|-------------|
| 43.800000 | 18.8 | 45.5 | 26.7 |
| 72.800000 | 26.3 | 46.6 | 20.3 |
| 180.000000 | 20.5 | 50.6 | 30.1 |

Final average measurement results:

| Frequency (MHz) | Average (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|----------------|--------------|-------------|
| 33.800000 | 19.2 | 35.1 | 15.9 |
| 48.000000 | 10.4 | 35.7 | 25.3 |
| 72.000000 | 14.0 | 36.6 | 22.6 |

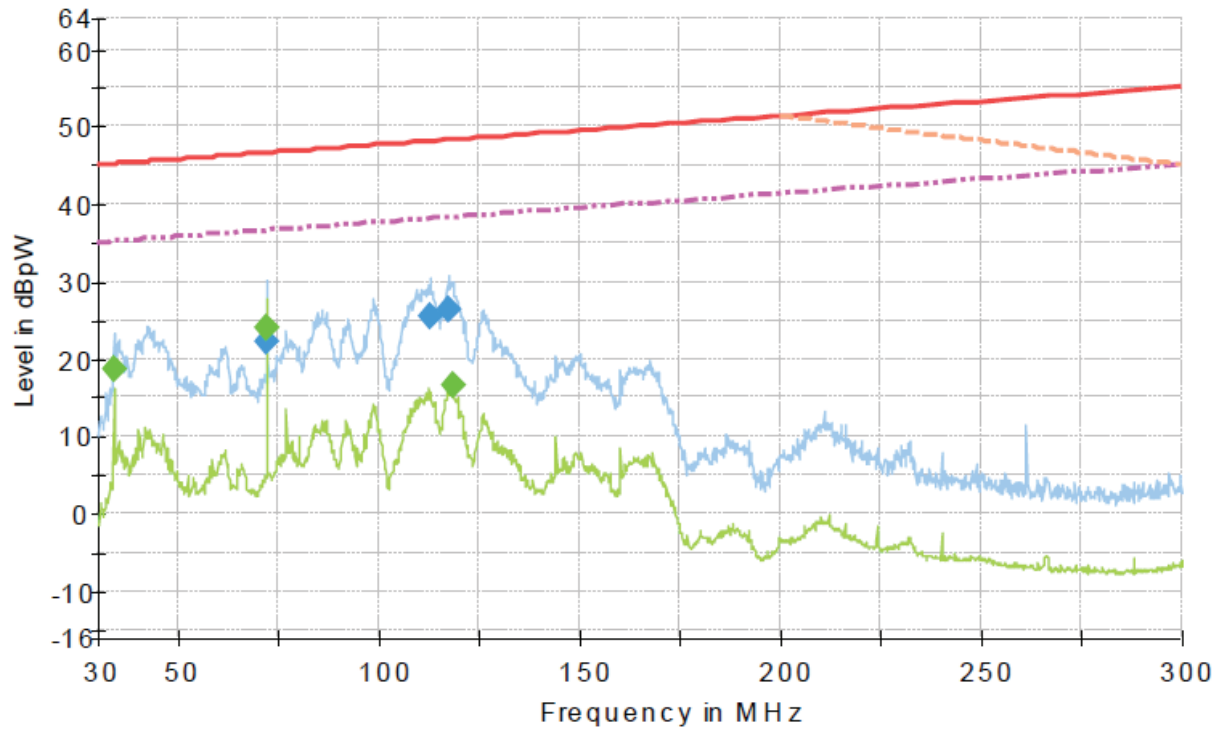
Figure 7: Spectral Diagrams, Disturbance Power, Power Line, 30–300MHz for ZDS120PWHR


Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|------------------|--------------|-------------|
| 33.800000 | 26.0 | 45.1 | 19.1 |
| 42.800000 | 19.3 | 45.5 | 26.2 |
| 62.000000 | 18.3 | 46.2 | 27.9 |

Final average measurement results:

| Frequency (MHz) | Average (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|----------------|--------------|-------------|
| 33.800000 | 24.1 | 35.1 | 11.0 |
| 44.200000 | 9.0 | 35.5 | 26.5 |
| 48.000000 | 12.1 | 35.7 | 23.6 |

Figure 8: Spectral Diagrams, Disturbance Power, Power Line, 30–300MHz for SDQ-500SR


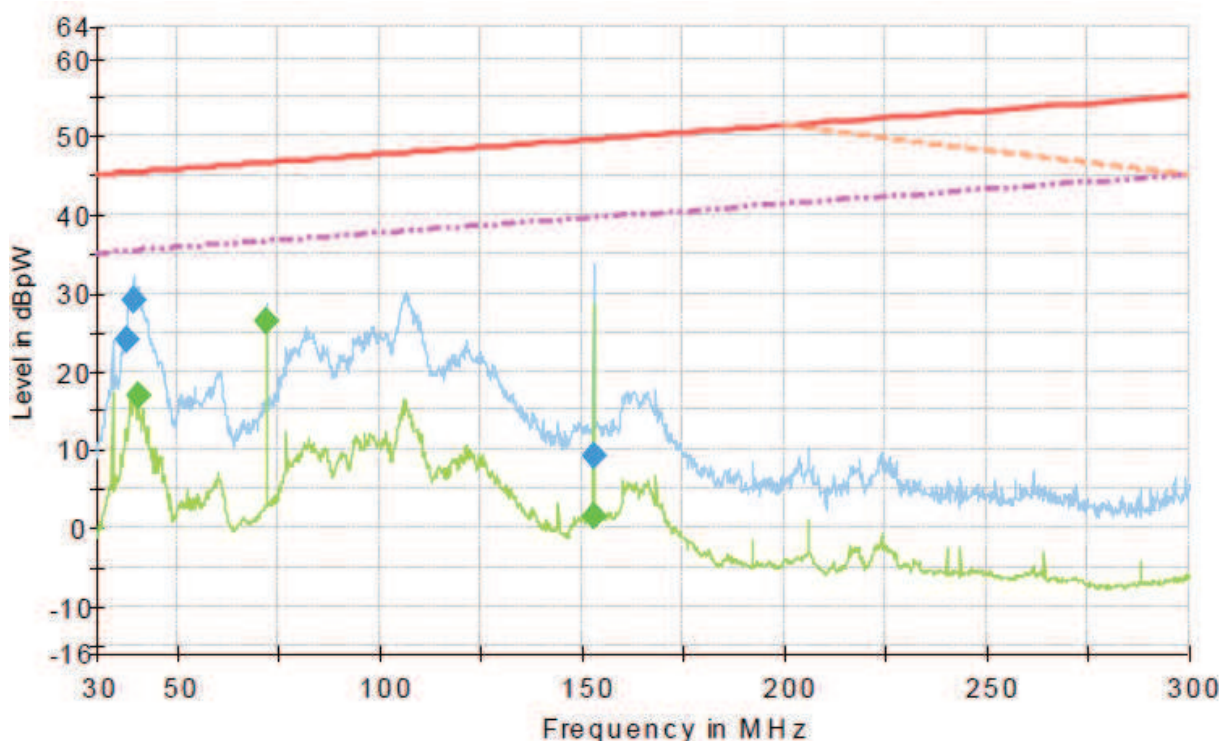
Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|------------------|--------------|-------------|
| 72.000000 | 22.3 | 46.6 | 24.3 |
| 112.800000 | 25.6 | 48.1 | 22.5 |
| 117.400000 | 26.5 | 48.2 | 21.7 |

Final average measurement results:

| Frequency (MHz) | Average (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|----------------|--------------|-------------|
| 33.800000 | 18.6 | 35.1 | 16.5 |
| 72.000000 | 23.9 | 36.6 | 12.7 |
| 118.200000 | 16.6 | 38.3 | 21.7 |

Figure 9: Spectral Diagrams, Disturbance Power, Power Line, 30–300MHz for SDQ-700SR

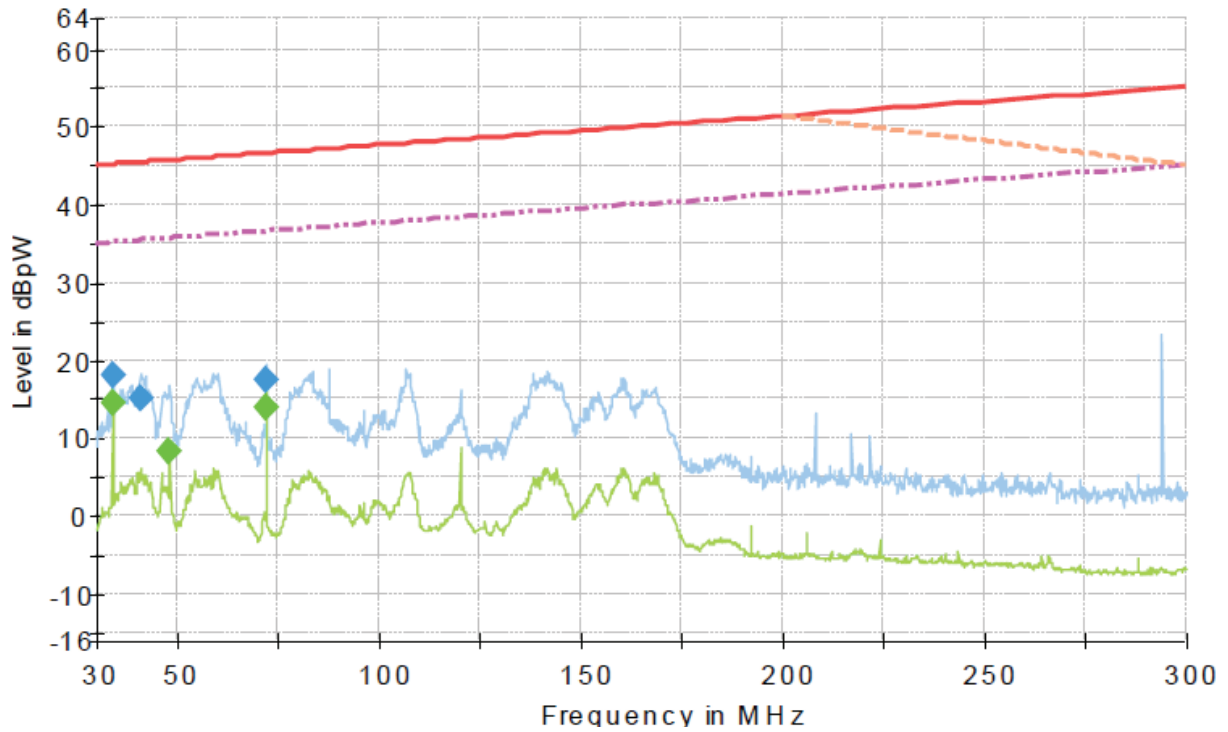


Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|------------------|--------------|-------------|
| 37.600000 | 24.0 | 45.3 | 21.3 |
| 39.000000 | 29.0 | 45.3 | 16.3 |
| 152.800000 | 9.1 | 49.5 | 40.4 |

Final average measurement results:

| Frequency (MHz) | Average (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|----------------|--------------|-------------|
| 40.200000 | 16.9 | 35.4 | 18.5 |
| 72.000000 | 26.5 | 36.6 | 10.1 |
| 152.800000 | 1.5 | 39.5 | 38.0 |

Figure 10: Spectral Diagrams, Disturbance Power, Power Line, 30–300MHz for ZDS200PWHR


Final quasi-peak measurement results:

| Frequency (MHz) | QuasiPeak (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|------------------|--------------|-------------|
| 33.800000 | 18.0 | 45.1 | 27.1 |
| 40.800000 | 15.0 | 45.4 | 30.4 |
| 72.000000 | 17.6 | 46.6 | 29.0 |

Final average measurement results:

| Frequency (MHz) | Average (dBpW) | Limit (dBpW) | Margin (dB) |
|-----------------|----------------|--------------|-------------|
| 33.800000 | 14.4 | 35.1 | 20.7 |
| 48.000000 | 8.3 | 35.7 | 27.4 |
| 72.000000 | 13.9 | 36.6 | 22.7 |

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4.2.2 Radiated Disturbance in the Frequency Range from 30MHz to 1000MHz**Result:****Passed**

Port : Enclosure
Basic Standard : EN 55014-1:2017
Frequency Range : 30 –1000MHz
Limit : Refer to EN 55014-1:2017

The measured result in 200MHz to 300MHz fulfill margin requirement of EN 55014-1:2017 (see Figure 6-10 of this report). Meanwhile, the maximum internal clock frequency of EUT is less than 30MHz. Therefore, the EUTs are deemed to meet the radiated requirements without actual testing according to EN 55014-1:2017.

5 Test Results IMMUNITY

Result:**Passed**

During the immunity tests, the EUT was operated under conditions specified by clause 3.1 of this report.

Performance criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Date of testing: 15.11.2018

Room temperature: 20°C

Relative Humidity: 50%

According to the electrical characteristics and EN 55014-2:2015, the EUT belongs to category II equipment.

5.1 Enclosure

5.1.1 Electrostatic Discharge

| | |
|----------------|---------------|
| Result: | Passed |
|----------------|---------------|

The immunity against electrostatic discharge was tested in accordance with EN 55014-2:2015.

Test setup and ESD-Generator are according to IEC 61000-4-2, which is specified by EN 55014-2:2015.

Charge voltage : $\pm 4.0\text{kV}$ (Contact Discharge), $\pm 8.0\text{kV}$ (Air Discharge)
 Polarity : Positive / negative
 Number of discharges : ≥ 10
 Performance criteria : B

Table 17: ESD, Positive / Negative Polarity

| Position | Kind of Discharge | Result | Remarks |
|---|------------------------------------|--------|----------------------------|
| Display | Air discharge $\pm 8\text{kV}$ | Passed | No disturbance of function |
| Buttons | Air discharge $\pm 8\text{kV}$ | Passed | Ditto |
| Metallic part of the enclosure and screws | Contact discharge $\pm 4\text{kV}$ | Passed | Ditto |
| Coupling plane (VCP) | Contact discharge $\pm 4\text{kV}$ | Passed | Ditto |

5.2 Input and Output AC Power Ports

5.2.1 Fast Transients on AC Power Lines

| | |
|----------------|---------------|
| Result: | Passed |
|----------------|---------------|

The immunity against fast transients on AC power lines was tested in accordance with EN 55014-2:2015.

Test setup and the fast transient noise generator were in accordance with IEC 61000-4-4 which is specified by EN 55014-2:2015.

| | | |
|----------------------|---|-------------------|
| Test Voltage | : | 1kV |
| Polarity | : | Negative/positive |
| Repetition frequency | : | 5kHz |
| Test duration | : | ≥120sec |
| Tr/Tn | : | 5ns/50ns |
| Performance criteria | : | B |

Table 18: Burst, AC Power lines, Positive and Negative Polarity

| Line | Result | Remarks |
|------------|-------------|----------------------------|
| L+N+PE-GRD | ±1kV Passed | No disturbance of function |

5.2.2 Injected Current into AC Power Port**Result:****Passed**

The immunity against injected current into AC power port was tested according to EN 55014-2:2015 in a shielded room. The Test setup and the test generator was according to IEC 61000-4-6 which is specified by EN 55014-2:2015.

| | |
|-------------------------|--|
| Voltage Level | : 3V(rms)(unmodulated) |
| Environmental phenomena | : r.f. current, common mode, 1kHz, 80%AM |
| Source impedance | : 150 Ω |
| Frequency range | : 0.15 – 230 MHz |
| Step size/dwell time | : 1%/2s |
| Performance criteria | : A |

Table 19: Injected current, AC Power Port

| Line | Result | Remarks |
|---------------|--------|----------------------------|
| AC Input port | Passed | No disturbance of function |

5.2.4 Voltage dips and interruptions to AC Power Port

Result:
Passed

The immunity against voltage dips and interruptions to AC power port was tested in accordance to EN 55014-2:2015. Test setup and the test generator were according to IEC 61000-4-11 which is specified by EN 55014-2:2015. The EUT was placed directly on the table.

Performance criteria : C
 Test level (in % U_T) and duration (in periods of the rated frequency) : 0 0.5 periods
 40 10 periods
 70 25 periods

Table 21: Test condition and Test Result for Voltage dips

| Test level (in % U_T) | Duration | Performance criteria | Result | Remarks |
|--------------------------|------------|----------------------|--------|----------------------------|
| 0 | 0.5 (10ms) | C | Passed | No disturbance of function |
| 40 | 10 (200ms) | C | Passed | Ditto |
| 70 | 25 (500ms) | C | Passed | Ditto |

6 Photographs of the Test Set-Up

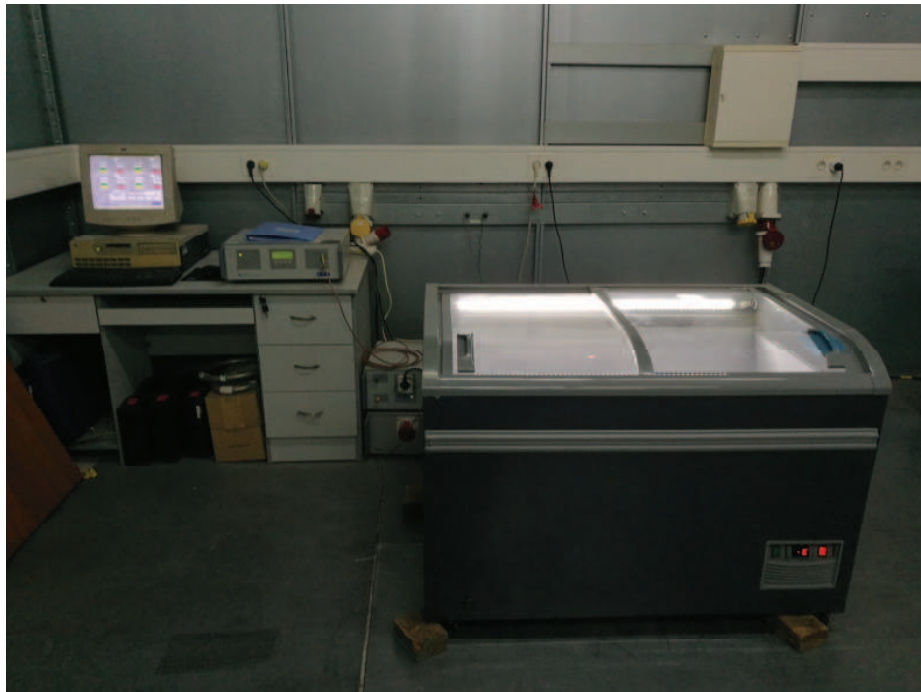
Photograph 1: Set-up for Harmonics, Voltage Fluctuations and Flicker



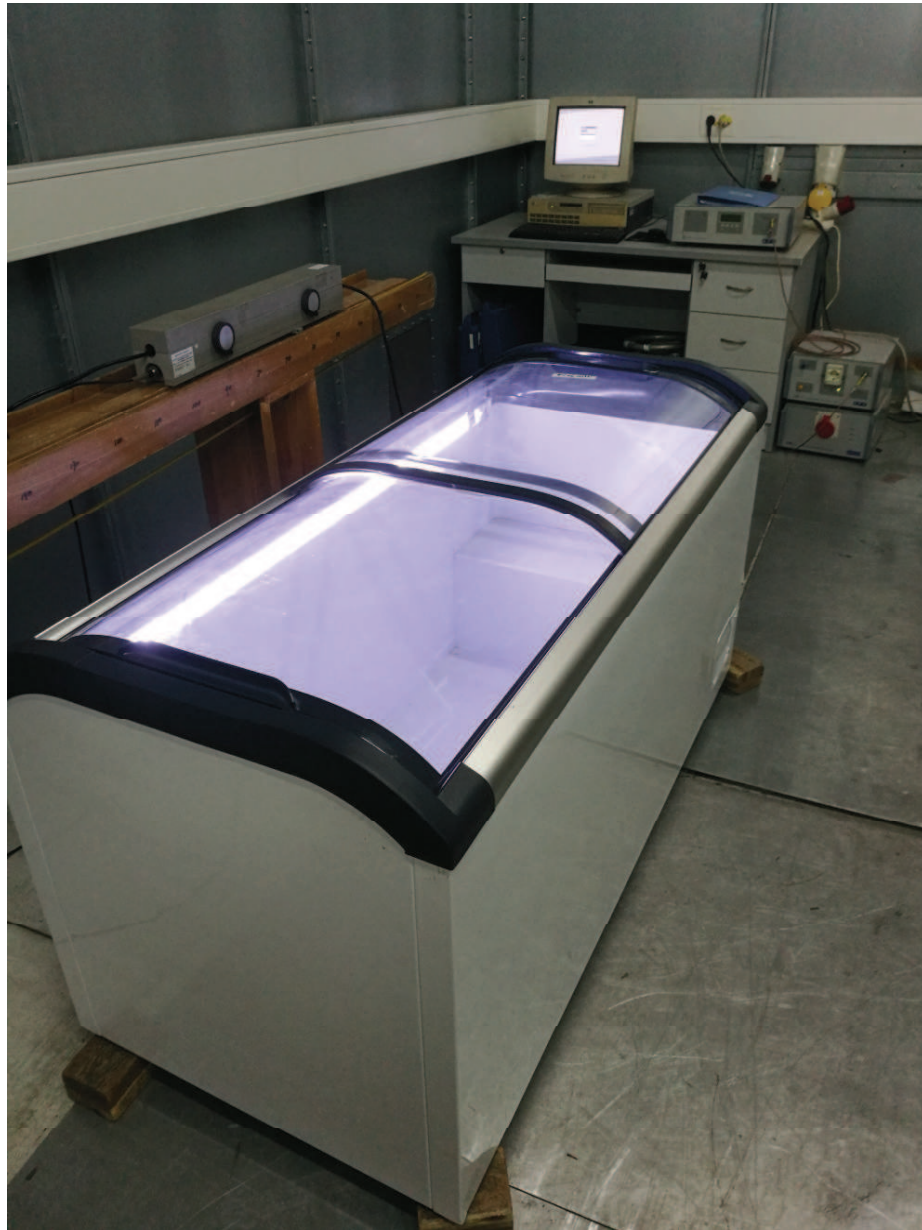
Photograph 2: Set-up for Disturbance Voltage



Photograph 3: Set-up for Discontinuous Interference on AC Mains



Photograph 4: Set-up for Disturbance Power



Photograph 5: Set-up for EFT and Surge



Photograph 6: Set-up for Voltage Dips



Photograph 7: Set-up for ESD



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