

TEST REPORT

Applicant Name & : NINGBO LINSHENG ELECTRIC CO.,LTD
Address : Xiao Dong Industrial Park, Yuyao City, Zhejiang China 315409

Sample Description

Product : LED STRING LIGHT
FCC ID : 2AL5O-LS
Model No. : LS-01RD
Electrical Rating : 100V-240V, 50/60Hz

Date Received : 01 April 2017

Date Test Conducted : 01 April 2017 – 15 May 2017

Test standards : **FCC Part 15: 2015 Subpart B**

Test Result : Pass

Conclusion : The submitted samples complied with the above rules/standards.

Remark : None.

*****End of Page*****

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18 May 2017 Date

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TEST RESULTS SUMMARY**Classification of EUT: Class B**

| Test Item | Standard | Result |
|--|------------------------------|--------|
| Conducted disturbance voltage at mains ports | FCC Part 15: 2015, Subpart B | Pass |
| Radiated emission (30 MHz–1 GHz) | FCC Part 15: 2015, Subpart B | Pass |
| Radiated emission (Above 1 GHz) | FCC Part 15: 2015, Subpart B | Pass |
| Remark: Reference publication is used for methods of measurement: ANSI C63.4:2014 | | |

Remark: 1. The symbol “N/A” in above table means Not Applicable.**2. When determining the test results, measurement uncertainty of tests has been considered.**

2

Test Results Conclusion

(with Justification)

RE: EMC Testing Pursuant to FCC Part 15, Subpart B Performed on the LED STRING LIGHT, Model: LS-01RD.

The controller model is LDK01; the controller is a part of the LED STRING LIGHT.
All tests were performed on the LED STRING LIGHT

We tested the LED STRING LIGHT, Model: LS-01RD to determine if it was in compliance with the relevant FCC rules as marked on the Test Results Summary. We found that the unit met the requirement of FCC Part 15, Subpart B when tested as received. The worst case's test data was presented in this test report.

An un-modulated CW signal at the operating frequency 433.92MHz of the EUT is supplied to the EUT for all measurements.

The receiver type of the EUT is super heterodyne.

Conclusion:

The sample as received complied with the FCC Part 15 requirement.

The production units are required to conform to the initial sample as received when the units are placed on the market.

3**LABORATORY MEASUREMENTS****Configuration Information****Equipment Under Test (EUT):** LED STRING LIGHT**Model:** LS-01RD**Serial No.** None**Support Equipment:** None**Rated Voltage:** 100V-240V, 50/60Hz**Condition of Environment:** Temperature : 22~28°C
Relative Humidity: 35~60%
Atmosphere Pressure 86~106kPa**Notes:**

1. The EMI measurements had been made in the operating mode producing the largest emission in the frequency band being investigated consistent with normal applications.
An attempt had been made to maximize the emission by varying the configuration of the EUT.

2. Test Facility

All of the tests are performed at:

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch. located at Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, 510663, China. This test facility and site measurement data have been fully placed on file with the FCC, test firm registration number is 549654.

4 TEST RESULTS

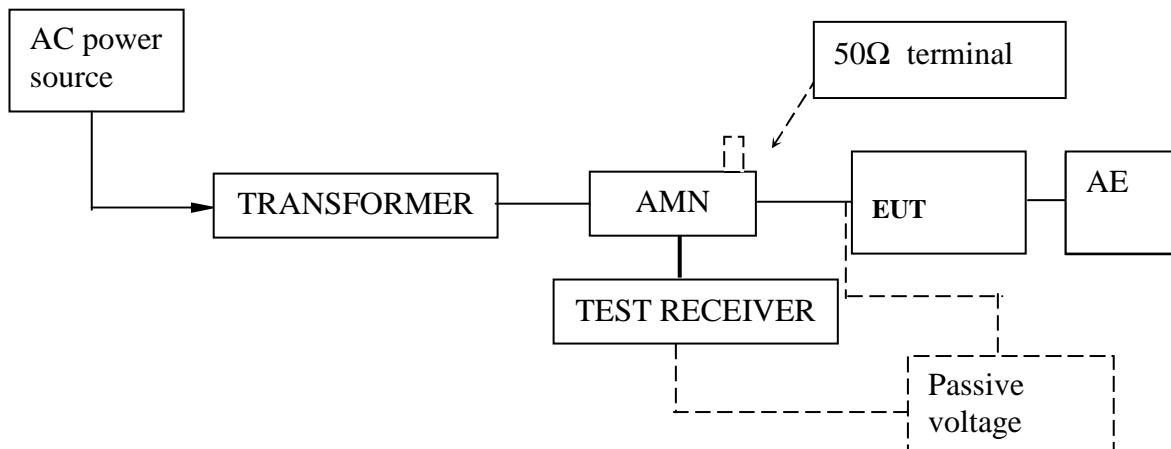
4.1 Conducted Disturbance Voltage at mains ports

Test Result: Pass

4.1.1 Used Test Equipment

| Equipment No. | Equipment | Model | Manufacturer | Cal.Date | Due Date |
|---------------|------------------|----------|--------------|-----------|-----------|
| EM004-04 | EMC shield Room | 8m×3m×3m | Zhongyu | 2017-1-25 | 2018-1-25 |
| EM080-05 | EMI receiver | ESCI | R&S | 2016-9-18 | 2017-9-18 |
| EM006-05 | LISN | ENV216 | R&S | 2016-9-18 | 2017-9-18 |
| EM084-02 | SIGNAL Generator | SML02 | R&S | 2016-6-9 | 2017-6-9 |

4.1.2 Block Diagram of Test Setup



4.1.3 Test Setup and Procedure

Test was performed according to ANSI C63.4: 2014. The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance. An Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane (Ground Reference Plane). And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.

4.1.4 Limit

Class B

| Frequency range MHz | AC mains terminals dB (uV) | |
|-------------------------------|--------------------------------------|----------|
| | Quasi-peak | Average |
| 0.15 to 0.5 | 66 to 56 | 56 to 46 |
| 0.5 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

Note 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Note 2: The lower limit is applicable at the transition frequency.

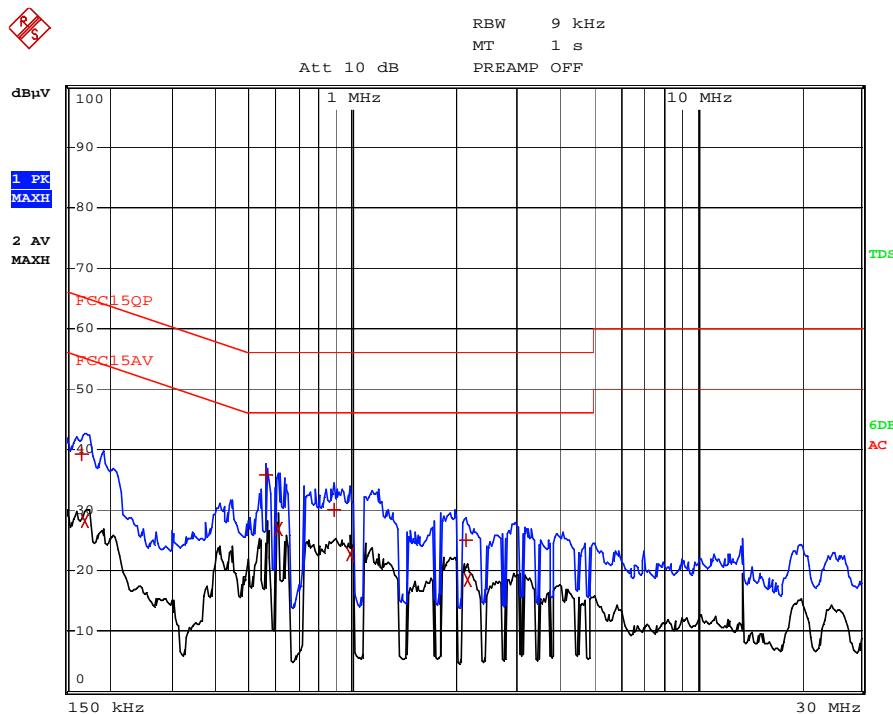
4.1.5 Test Data and curve

At main terminal: Pass

Tested Wire: Live

Test Voltage: AC120 V, 60 Hz

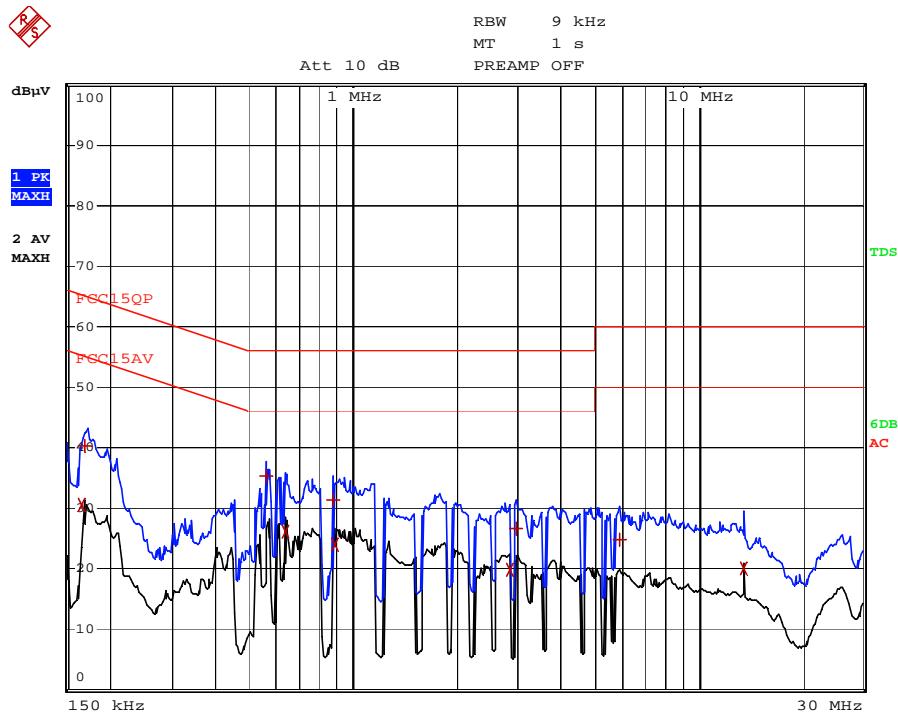
Operation Mode: Receiving mode + Lighting



| EDIT PEAK LIST (Final Measurement Results) | | | | |
|--|-----------|------------------|--------|----------|
| Trace1: | FCC15QP | | | |
| Trace2: | FCC15AV | | | |
| Trace3: | --- | | | |
| TRACE | FREQUENCY | LEVEL dB μ V | DELTA | LIMIT dB |
| 2 Average | 610 kHz | 26.90 L1 | -19.09 | |
| 1 Quasi Peak | 562 kHz | 35.78 L1 | -20.21 | |
| 2 Average | 986 kHz | 22.82 L1 | -23.17 | |
| 1 Quasi Peak | 166 kHz | 39.35 L1 | -25.80 | |
| 1 Quasi Peak | 882 kHz | 29.95 L1 | -26.04 | |
| 2 Average | 170 kHz | 28.27 L1 | -26.69 | |
| 2 Average | 2.174 MHz | 18.52 L1 | -27.47 | |
| 1 Quasi Peak | 2.138 MHz | 25.14 L1 | -30.85 | |

Tested Wire: Neutral

Operation Mode: Receiving mode + Lighting



| EDIT PEAK LIST (Final Measurement Results) | | | | | |
|--|------------|------------|----|--------|----------|
| Trace1: | FCC15QP | | | | |
| Trace2: | FCC15AV | | | | |
| Trace3: | --- | | | | |
| TRACE | FREQUENCY | LEVEL dBμV | L1 | DELTA | LIMIT dB |
| 2 Average | 638 kHz | 26.03 | L1 | -19.96 | |
| 1 Quasi Peak | 558 kHz | 35.27 | L1 | -20.72 | |
| 2 Average | 890 kHz | 24.06 | L1 | -21.93 | |
| 2 Average | 166 kHz | 30.57 | L1 | -24.58 | |
| 1 Quasi Peak | 878 kHz | 31.34 | L1 | -24.65 | |
| 1 Quasi Peak | 170 kHz | 40.26 | L1 | -24.69 | |
| 2 Average | 2.846 MHz | 19.89 | L1 | -26.10 | |
| 1 Quasi Peak | 2.958 MHz | 26.77 | L1 | -29.22 | |
| 2 Average | 13.522 MHz | 20.19 | L1 | -29.80 | |
| 1 Quasi Peak | 5.914 MHz | 24.89 | L1 | -35.10 | |

4.1.6 Measurement Uncertainty

Uncertainty: 2.58 dB at a level of confidence of 95%

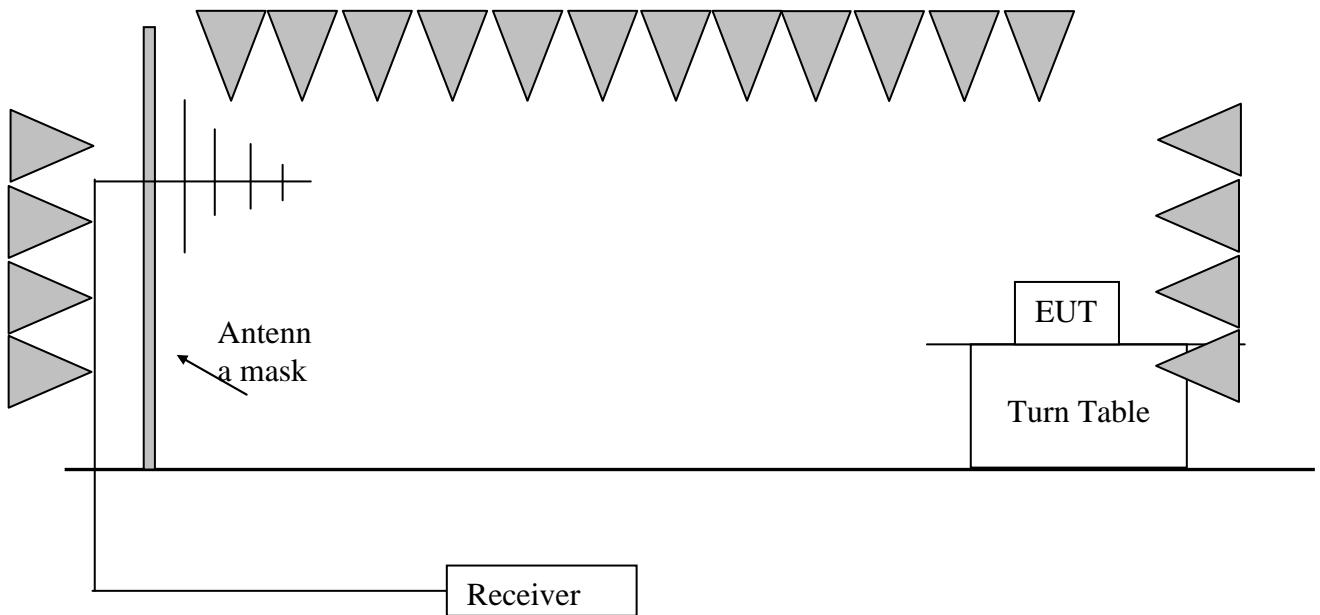
4.2 Radiated Emission (30 MHz -1000 MHz)

Test Result: Pass

4.2.1 Used Test Equipment

| Equipment No. | Equipment | Model | Manufacturer | Cal.Date | Due Date |
|---------------|--|-----------|---------------|----------|----------|
| EM030-01 | 3m Semi-Anechoic Chamber | 9×6×6 m3 | ETS•LINDGR EN | 2016-5-9 | 2017-5-9 |
| EM030-02 | Control room for 3m Semi-Anechoic Chamber | 4×4×3 m3 | ETS•LINDGR EN | 2016-5-9 | 2017-5-9 |
| EM031-02 | EMI Test Receiver (9 kHz~7 GHz) | R&S ESR7 | R&S | 2016-6-7 | 2017-6-7 |
| EM033-01 | TRILOG Super Broadband test Antenna (30 MHz-3 GHz) | VULB 9163 | SCHWARZB ECK | 2016-9-8 | 2017-9-8 |
| EM031-02-01 | Coaxial cable | / | R&S | 2016-6-9 | 2017-6-9 |
| EM084-02 | SIGNAL Generator | SML02 | R&S | 2016-6-9 | 2017-6-9 |

4.2.2 Block Diagram of Test Setup



4.2.3 Test Setup and Procedure

The measurement was applied in a 3 m semi-anechoic chamber. The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mask. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

Broadband antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2014 requirement during radiated test. The bandwidth setting on R&S Test Receiver was 120 kHz. The frequency range from 30MHz to 1000MHz was checked

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

| Highest frequency generated or used in the device or on which the device operates or tunes (MHz) | Upper Frequency of Radiated Measurement |
|---|--|
| Below 1.705 MHz | 30MHz |
| 1.705 MHz – 108 MHz | 1 GHz |
| 108 MHz – 500 MHz | 2 GHz |
| 500 MHz – 1 GHz | 5 GHz |
| Above 1 GHz | 5th harmonic of the highest frequency or 40 GHz, whichever is lower. |

At transitional frequencies the lower limit applies.

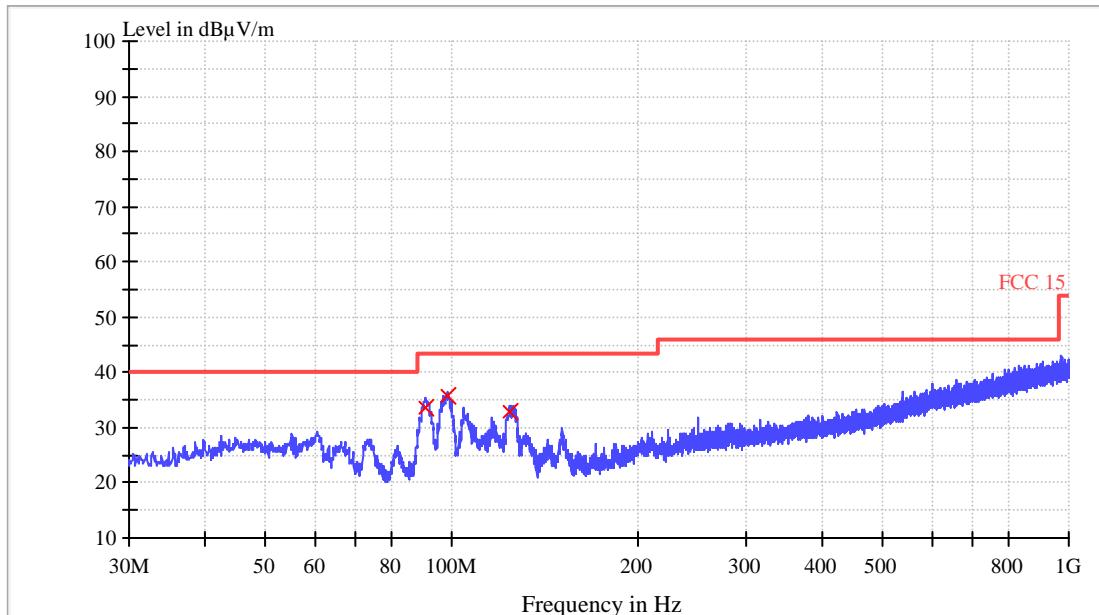
Remark: Radiated Emission was performed from 30 MHz to 1 GHz.

4.2.4 Limit

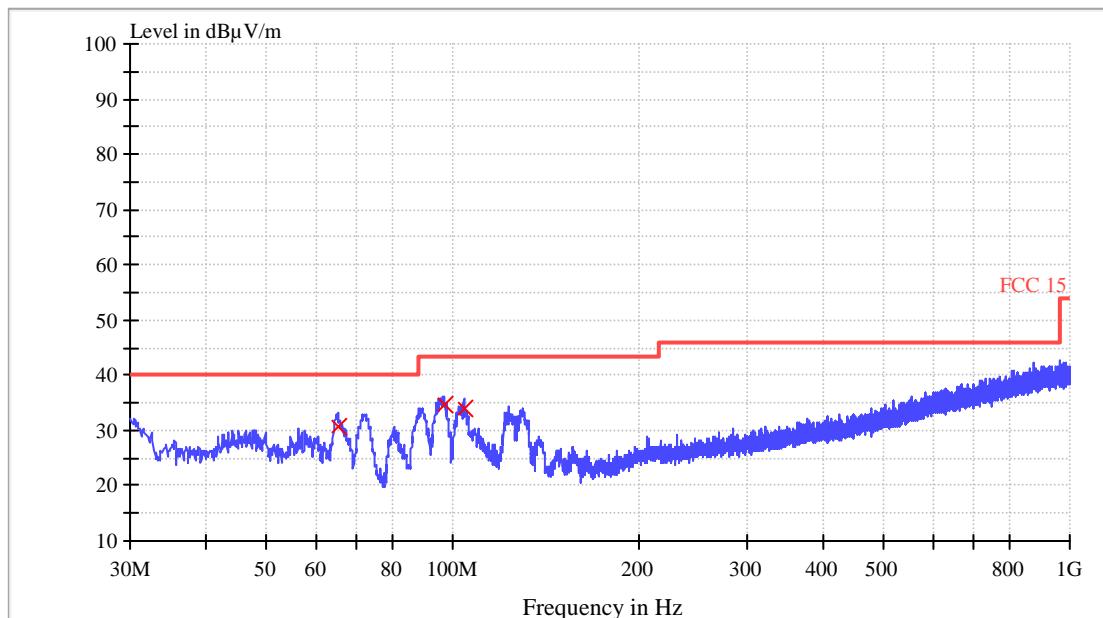
Class B limit at 3m test distance:

| Frequency range MHz | Quasi-peak limits dB (μ V/m) |
|-------------------------------|---|
| 30 to 88 | 40 |
| 88 to 216 | 43.5 |
| 216 to 960 | 46 |
| 960 to 1000 | 54 |

At transitional frequencies the lower limit applies.

4.2.5 Test Data and Curve**Test Voltage: AC120 V, 60 Hz**
Horizontal:**Test mode: Receiver function + Lighting on****QP**

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Bandwidth (kHz) | Pol | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dB μ V/m) |
|-----------------|--------------------------|-----------------|-----|------------|-------------------|----------------------------|
| 90.680000 | 33.6 | 120.000 | H | 10.7 | 9.9 | 43.5 |
| 98.800000 | 35.8 | 120.000 | H | 12.2 | 7.8 | 43.5 |
| 124.040000 | 32.8 | 120.000 | H | 10.0 | 10.8 | 43.5 |

Vertical**QP**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Bandwidth (kHz) | Pol | Corr. (dB) | Margin - QPK (dB) | Limit - QPK (dBµV/m) |
|-----------------|--------------------|-----------------|-----|------------|-------------------|----------------------|
| 65.120000 | 30.8 | 120.000 | V | 11.4 | 9.2 | 40.0 |
| 96.720000 | 34.6 | 120.000 | V | 11.8 | 8.9 | 43.5 |
| 104.240000 | 33.8 | 120.000 | V | 12.3 | 9.7 | 43.5 |

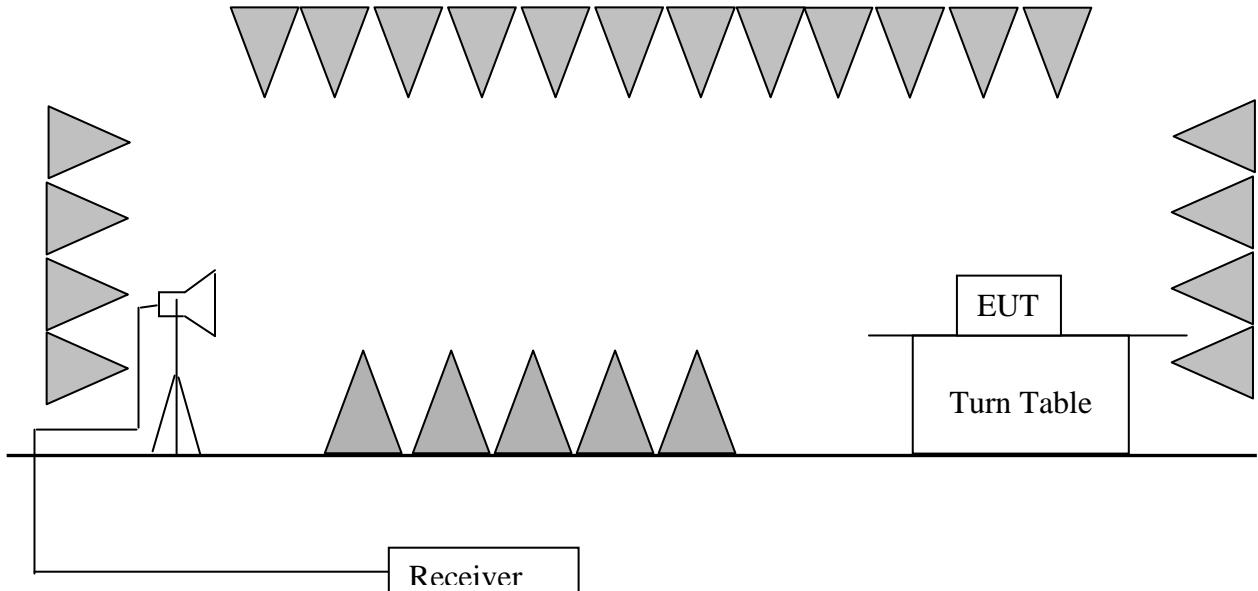
4.2.6 Measurement uncertainty

Uncertainty: 4.87 dB in the frequency range of 30-1000 MHz at a level of confidence of 95%

4.3 Radiated Emission above 1 GHz**Test Result: Pass****4.3.1 Used Test Equipment**

| Equipment No. | Equipment | Model | Manufacturer | Cal.Date | Due Date |
|---------------|---|-----------|---------------|-----------|-----------|
| EM030-01 | 3m Semi-Anechoic Chamber | 9×6×6 m3 | ETS•LINDGR EN | 2017-5-3 | 2018-5-3 |
| EM030-02 | Control room for 3m Semi-Anechoic Chamber | 4×4×3 m3 | ETS•LINDGR EN | 2017-5-3 | 2018-5-3 |
| EM031-02 | EMI Test Receiver (9 kHz~7 GHz) | R&S ESR7 | R&S | 2016-6-9 | 2017-6-9 |
| EM033-01 | TRILOG Super Broadband test Antenna (30 MHz-3 GHz) | VULB 9163 | SCHWARZB ECK | 2016-8-30 | 2017-8-30 |
| EM031-03 | Signal and Spectrum Analyzer (10 Hz~40 GHz) | R&S FSV40 | R&S | 2016-6-9 | 2017-6-9 |
| EM033-02 | Double-Ridged Waveguide Horn Antenna (800 MHz-18 GHz) | R&S HF907 | EM033-02 | 2016-5-30 | 2017-5-30 |
| EM031-02-01 | Coaxial cable | / | R&S | 2016-6-9 | 2017-6-9 |
| EM084-02 | SIGNAL Generator | SML02 | R&S | 2016-6-9 | 2017-6-9 |

4.3.2 Block Diagram of Test Setup



4.3.3 Test Setup and Procedure

The measurement was applied in a semi-anechoic chamber with absorbing material placed on the ground. The EUT were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turntable varied every 30 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna pole. The antenna was set as same as the height of the radiation centre of the EUT.

Horn antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated during radiated test.

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

| Highest Frequency Generated or Used in Device | Upper Frequency of Radiated Measurement |
|--|--|
| Below 1.705 MHz | 30MHz |
| 1.705 MHz – 108 MHz | 1 GHz |
| 108 MHz – 500 MHz | 2 GHz |
| 500 MHz – 1 GHz | 5 GHz |
| Above 1 GHz | 5th harmonic of the highest frequency or 40 GHz, whichever is lower. |
| At transitional frequencies the lower limit applies. | |

Remark: Radiated Emission was performed from 1 GHz to 2 GHz since the highest frequency generated from the EUT was 433.92MHz.

4.3.4 Limit

Class B limit at 3m test distance:

| Frequency range MHz | Linear Average Detector dB (μ V/m) | Peak Detector dB (μ V/m) |
|--|---|---|
| > 1000 | 54 | 74 |
| At transitional frequencies the lower limit applies. | | |

4.3.5 Test Data

Receiver mode + Lighting on
Horizontal

| Frequency (GHz) | Read Level (dBuV) | Correction Factor (dB) | Level (dBuV/m) | Limit Line (dB μ V/m) | Over Limit (dB) | Detector Function |
|-----------------|-------------------|------------------------|----------------|---------------------------|-----------------|-------------------|
| 1.11 | 47.50 | -14.00 | 33.50 | 54.00 | -20.50 | Peak |
| 1.51 | 45.60 | -12.40 | 33.20 | 54.00 | -20.80 | Peak |
| 1.85 | 46.10 | -9.40 | 36.70 | 54.00 | -17.30 | Peak |

Vertical

| Frequency (GHz) | Read Level (dBuV) | Correction Factor (dB) | Level (dBuV/m) | Limit Line (dB μ V/m) | Over Limit (dB) | Detector Function |
|-----------------|-------------------|------------------------|----------------|---------------------------|-----------------|-------------------|
| 1.34 | 46.70 | -13.10 | 33.60 | 54.00 | -20.40 | Peak |
| 1.54 | 46.17 | -12.10 | 34.07 | 54.00 | -19.93 | Peak |
| 1.73 | 49.30 | -10.40 | 38.90 | 54.00 | -15.10 | Peak |

Remark: The measured PK value is below AV limit so the result was passed.

4.3.6 Measurement uncertainty

Uncertainty: 4.8 dB in the frequency range of 1GHz-25 GHz at a level of confidence of 95%

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