



Report No.: 170401141GZU-002
Issued: 2017-5-18

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 : 2AL50-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**

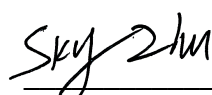
Test Result : Pass

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

Remark : None.

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Prepared and Checked By:



Sky Zhu
Project Engineer
Intertek Guangzhou

Approved By:

 **Signature**

Helen Ma
Team Leader
Intertek Guangzhou

18 May 2017 **Date**

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Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China
Tel / Fax: 86-20-8213 9688/86-20-3205 7538
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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

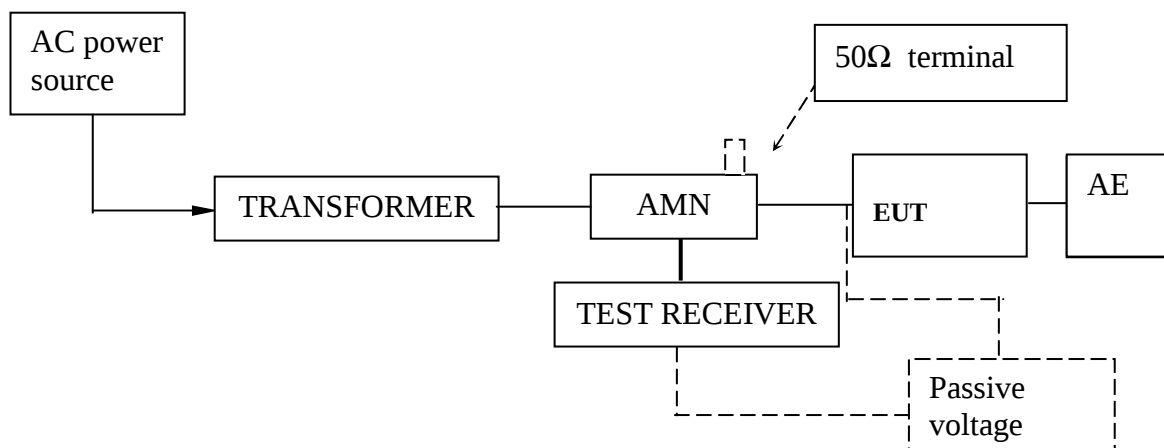
4.1 Conducted Disturbance Voltage at mains ports

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. 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.		

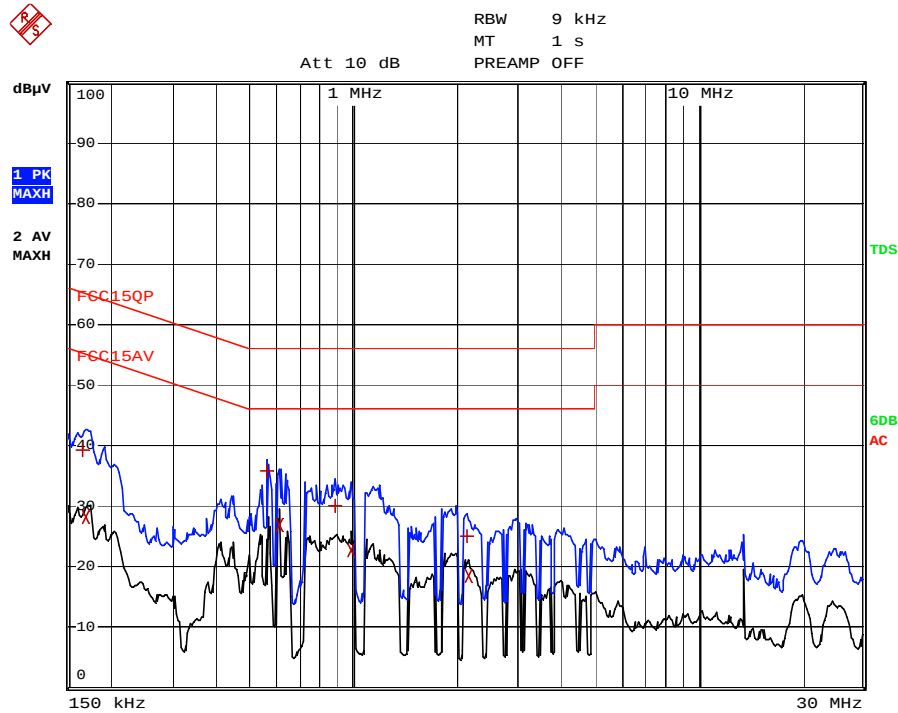
4.1.5 Test Data and curve

At main terminal: Pass

Test Voltage: AC120 V, 60 Hz

Tested Wire: Live

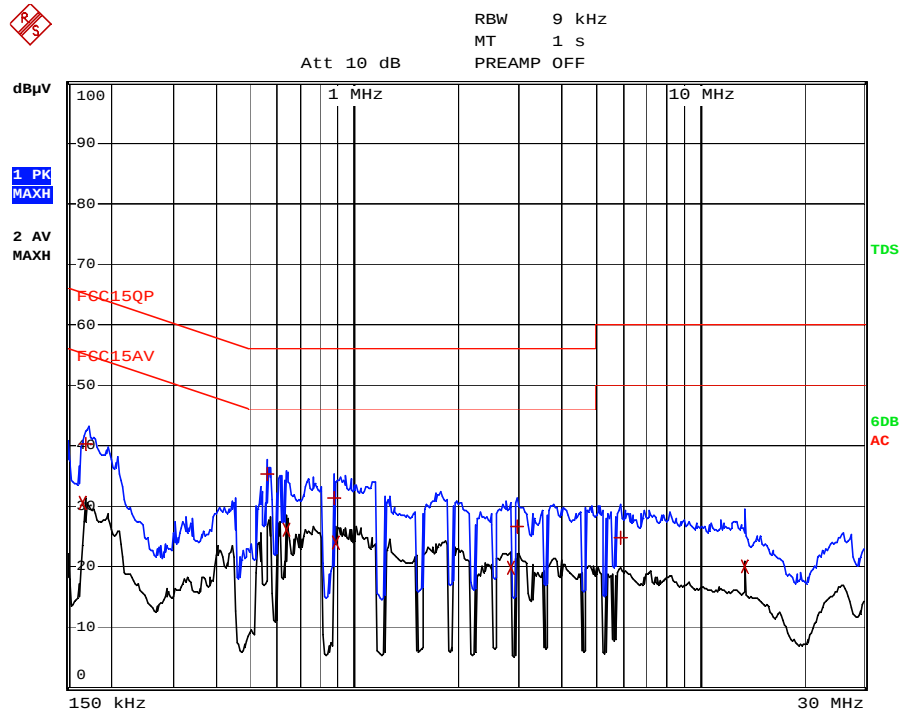
Operation Mode: Receiving mode + Lighting



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC15QP			
Trace2:	FCC15AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL	dBμV	DELTA LIMIT
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	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%

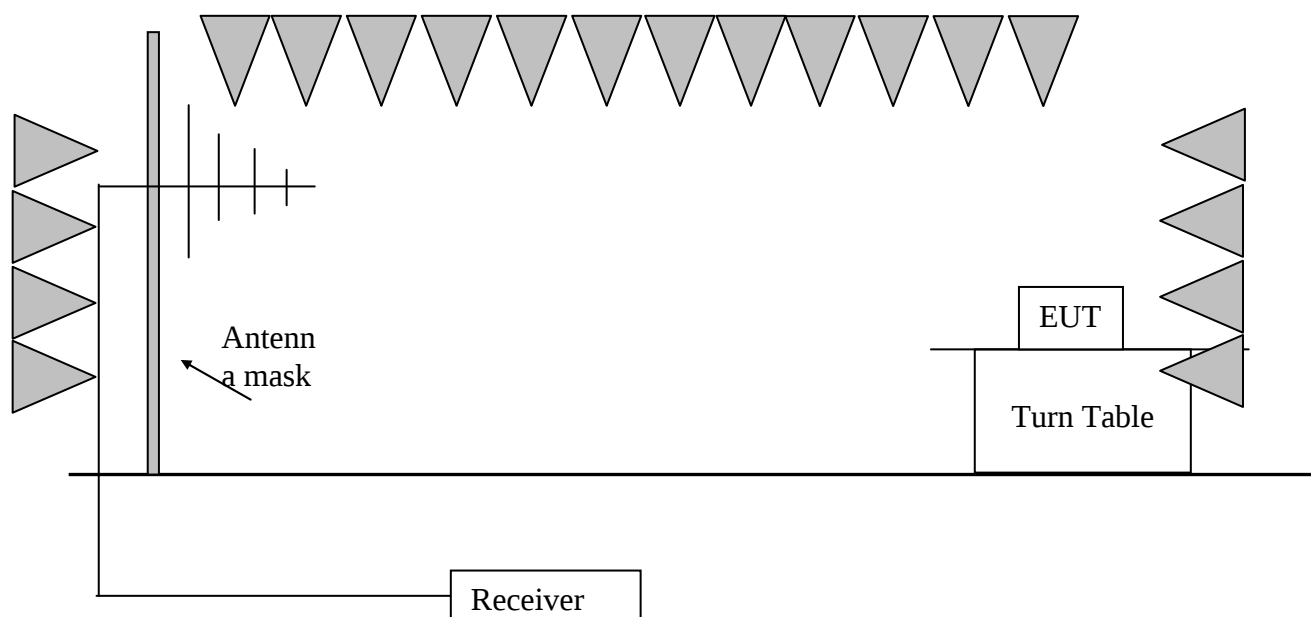
4.2 Radiated Emission (30 MHz -1000 MHz)

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

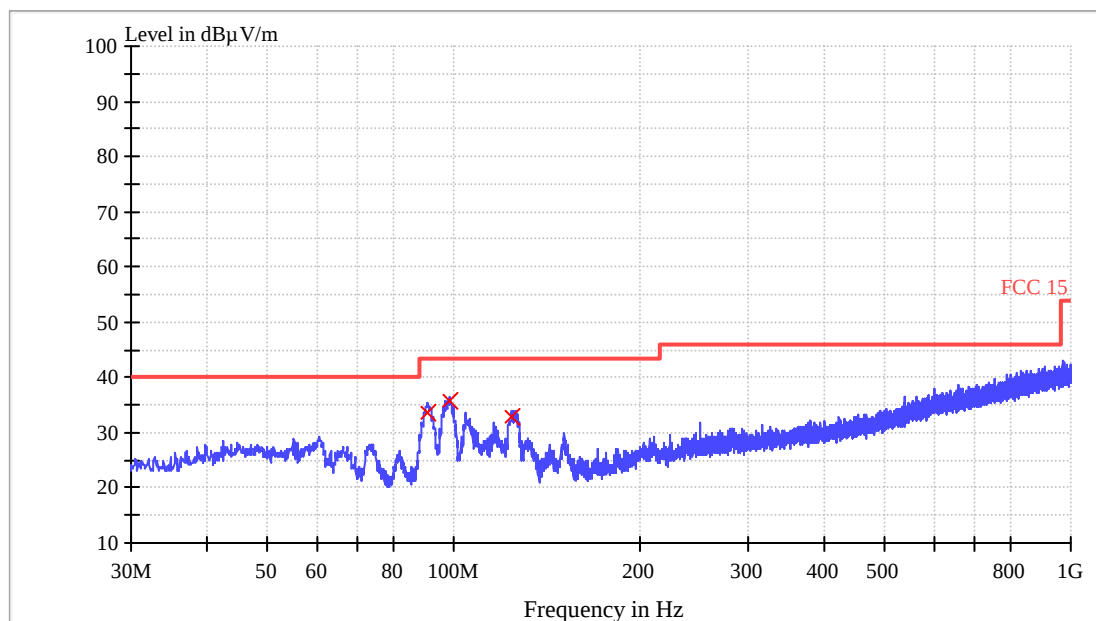
Class B limit at 3m test distance:

Frequency range MHz	Quasi-peak limits dB (μV/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:

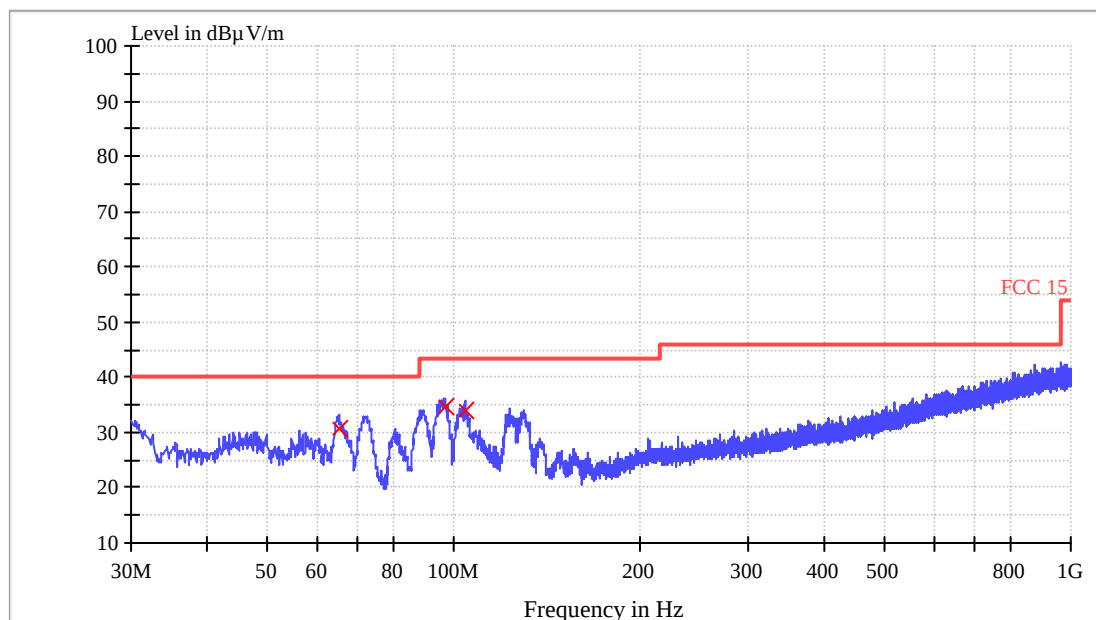
Test mode: Receiver function + Lighting on



QP

Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV/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%

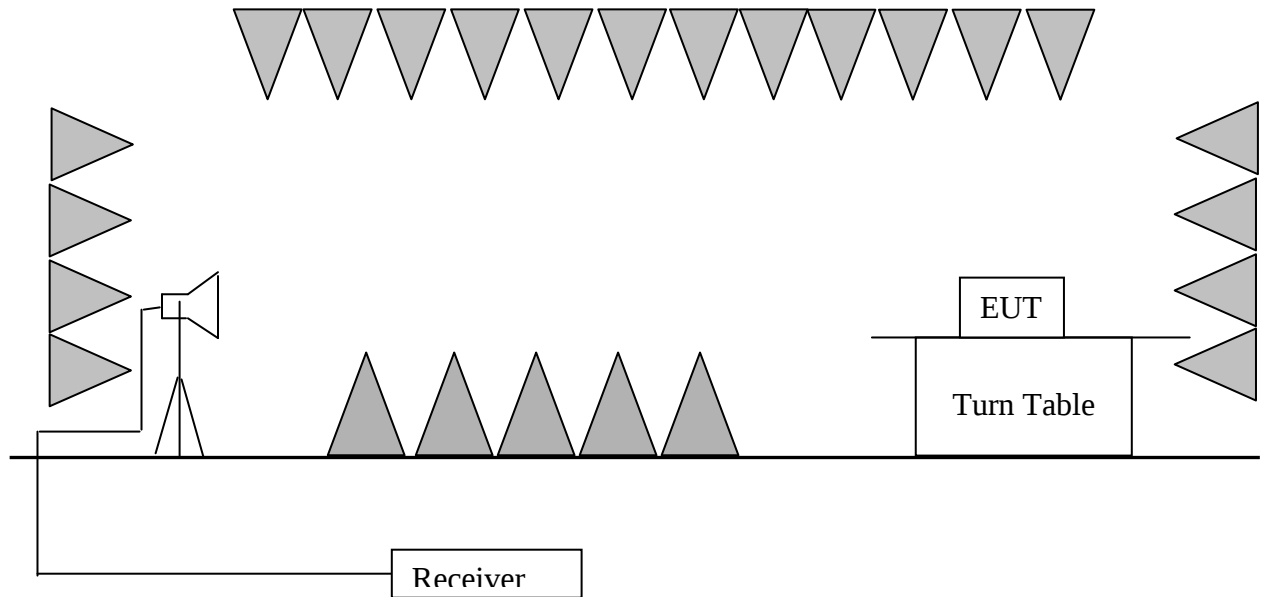
4.3 Radiated Emission above 1 GHz

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	Bouble-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 (μV/m)	Peak Detector dB (μV/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 (dBμV/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 (dBμV/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%