CE EMC

TEST REPORT

For

LED FLOOD LIGHTS

Model No.:	**VT-4911, VT-4922, VT-4933, VT-4955, VT-49100, VT-49150, VT-4611, VT-4621, VT-4631, VT-4651, VT-46100, VT-46150, VT-46200, VT-10, VT-20, VT-30, VT-50, VT-100, VT-150, VT-200, VT-300**
Applicant :	**V-TAC EXPORTS LIMITED** **ROOM NO.301, KAM ON BUILDING 176A QUEENS ROAD CENTRAL, CENTRAL, HONGKONG**
Manufacturer :	**V-TAC EXPORTS LIMITED** **ROOM NO.301, KAM ON BUILDING 176A QUEENS ROAD CENTRAL, CENTRAL, HONGKONG**
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Note:

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1 TEST CERTIFICATION

Product:	**LED FLOOD LIGHTS**
Model:	VT-4911, VT-4922, VT-4933, VT-4955, VT-49100, VT-49150, VT-4611, VT-4621, VT-4631, VT-4651, VT-46100, VT-46150, VT-46200, VT-10, VT-20, VT-30, VT-50, VT-100, VT-150, VT-200, VT-300
Applicant:	**V-TAC EXPORTS LIMITED** ROOM NO.301, KAM ON BUILDING 176A QUEENS ROAD CENTRAL, CENTRAL, HONGKONG
Factory:	**V-TAC EXPORTS LIMITED** ROOM NO.301, KAM ON BUILDING 176A QUEENS ROAD CENTRAL, CENTRAL, HONGKONG
Test Voltage:	AC230V 50Hz
Applicable Standards:	**EN 55015:2013+A1:2015** **EN 61547:2009** **EN 61000-3-2:2014** **EN 61000-3-3:2013**

Deviation from Applicable Standard
None

The above equipment has been tested by Global-Standard Testing Service Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By: Sean Xiao **Date:** **May 07, 2018**

Sean Xiao

Approved By: **Date:** **May 07, 2018**

Tim Sun

Global-Standard Testing Service Co., Ltd. APPROVED

2 TEST RESULT SUMMARY

EMISSION			
Standard	**Item**	**Result**	**Remarks**
EN 55015:2013+A1:2015	Conducted (Main Port)	PASS	Meet limit
	Radiated Electromagnetic Disturbance	PASS	Meet limit
	Radiated	PASS	Meet limit
EN 61000-3-2:2014	Harmonic current emissions	PASS	Meet limit
EN 61000-3-3:2013	Voltage fluctuations & flicker	PASS	Meet limit

IMMUNITY【EN 61547:2009】			
Standard	**Item**	**Result**	**Remarks**
EN 61000-4-2:2009	ESD	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-3:2006+A1:2008 +A2:2010	RS	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-4:2012	EFT	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-5:2014	Surge	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-6:2014	CS	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-8:2010	PFMF	PASS	Meets the requirements
EN 61000-4-11:2004	Voltage dips & voltage variations	PASS	Meets the requirements of **Voltage dips and variations** 1) 30% reduction performance Criterion C 2)100% reduction performance Criterion B

Note: 1. The test result judgment is decided by the limit of test standard
2. The information of measurement uncertainty is available upon the customer's request.

3 EUT DESCRIPTION

Product	LED FLOOD LIGHTS
Model	VT-4911, VT-4922, VT-4933, VT-4955, VT-49100, VT-49150, VT-4611, VT-4621, VT-4631, VT-4651, VT-46100, VT-46150, VT-46200, VT-10, VT-20, VT-30, VT-50, VT-100, VT-150, VT-200, VT-300
Applicant	V-TAC EXPORTS LIMITED
Housing material	Plastic & Metal
EUT Type	☒ Engineering Sample. ☐ Product Sample, ☐ Mass Product Sample.
Serial Number	N/A
EUT Power Rating	AC220-240V, 50/60Hz, 100W.
AC Line	P

All test are carried out on VT-49100

4. TEST INSTRUMENTS

Immunity shielded room				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMC PARTNER TRANSIENT 2000	EMC PARTNER	TRA2000	881	09/27/2018
Power-frequency Magnetic field	SCHAFFNER	CCN 1000-1	72046	09/27/2018
Induction Coil Interface	SCHAFFNER	INA2141	6003	09/27/2018
Signal Generator	Maconi	2022D	119246/003	09/27/2018
Power Amplifier	M2S	A00181-1000	9801-112	09/27/2018
CDN	MEB	M3-8016	003683	09/27/2018
Power Amplifier	M2S	AC8113/ 800-250A	9801-179	09/27/2018
Power Antenna	SCHAFFNER	CBL6140A	1204	09/27/2018
ESD 2000	EMC PARTNER	ESD2000	182	09/27/2018
Harmonic & Flicker Tester	California instruments	PACS-3	SB2588/01	09/27/2018
AC Power Source	California instruments	5001iX-CTS-40	SB2588	09/27/2018
EMI Test Receiver	R&S	ESCI	100005	09/27/2018
Spectrum Analyzer	R&S	FSU	100114	09/27/2018
Pre Amplifier	H.P.	HP8447E	2945A02715	09/27/2018
Bilog Antenna	SUNOL Sciences	JB3	A021907	09/27/2018
Cable	TIME MICROWAVE	LMR-400	N-TYPE04	09/27/2018
System-Controller	CCS	N/A	N/A	09/27/2018
Turn Table	CCS	N/A	N/A	09/27/2018
Antenna Tower	CCS	N/A	N/A	09/27/2018
Triple-Loop Antenna	EVERFINE	LLA-2	N/A	09/27/2018
LISN	AFJ	LS16	16010222119	09/27/2018
LISN(EUT)	Mestec	AN3016	04/10040	09/27/2018

NOTE:

(1) The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

(2). N.C.R = No Calibration Request.

5. TEST METHODOLOGY

5.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the thereinafter additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The following test mode(s) were scanned during the preliminary test:

Pre-Test Mode		
Emission	Conducted Emission	Mode: Lighting(Full load)
	Radiated Electromagnetic Disturbance	Mode: Lighting(Full load)
	Radiated Emission	Mode: Lighting(Full load)
Immunity		Mode: Lighting(Full load)

After the preliminary scan, the following test mode was found to produce the highest emission level.

The Worst Mode		
Emission	Conducted Emission	Mode: Lighting(Full load)
	Radiated Electromagnetic Disturbance	Mode: Lighting(Full load)
	Radiated Emission	Mode: Lighting(Full load)
Immunity		Mode: Lighting(Full load)

5.2. EUT SYSTEM OPERATION

1. Set up EUT with the support equipments.
2. Make sure the EUT work normally during the test.

6. SETUP OF EQUIPMENT UNDER TEST

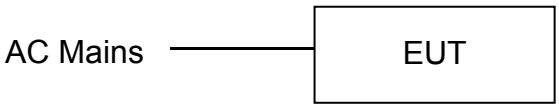
6.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1.	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note:
1)All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2)Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6.2. CONFIGURATION OF SYSTEM UNDER TEST



(EUT: LED FLOOD LIGHTS)

7. FACILITIES AND ACCREDITATIONS

7.1. FACILITIES

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 15. All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”
All measurement required was performed at laboratory of NTEK Testing Technology Co., Ltd. Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen, China

7.2. ACCREDITATIONS

7.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency		Uncertainty
Conducted emissions	9kHz~30MHz		+/- 3.59dB
Radiated electromagnetic	9kHz~30MHz		+/- 4.77dB
Radiated emissions	Horizontal	30MHz ~ 200MHz	+/- 4.77dB
		200MHz ~1000MHz	+/- 4.93dB
	Vertical	30MHz ~ 200MHz	+/- 5.04dB
		200MHz ~1000MHz	+/- 4.93dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

8 EMISSION TEST

8.1. CONDUCTED EMISSION MEASUREMENT

8.1.1. LIMITS

FREQUENCY (MHz)	LIMITS(dBuV)	
	Quasi-peak	Average
0.009-0.05	110	N/A
0.05-0.15	90 – 80	N/A
0.15 – 0.5	66 – 56	56 – 46
0.50 – 5.0	56	46
5.0 – 30.0	60	50

NOTE:
(1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
(3) All emanations from EUT or system, shall not exceed the level of field strengths specified above.

8.1.2. TEST PROCEDURES

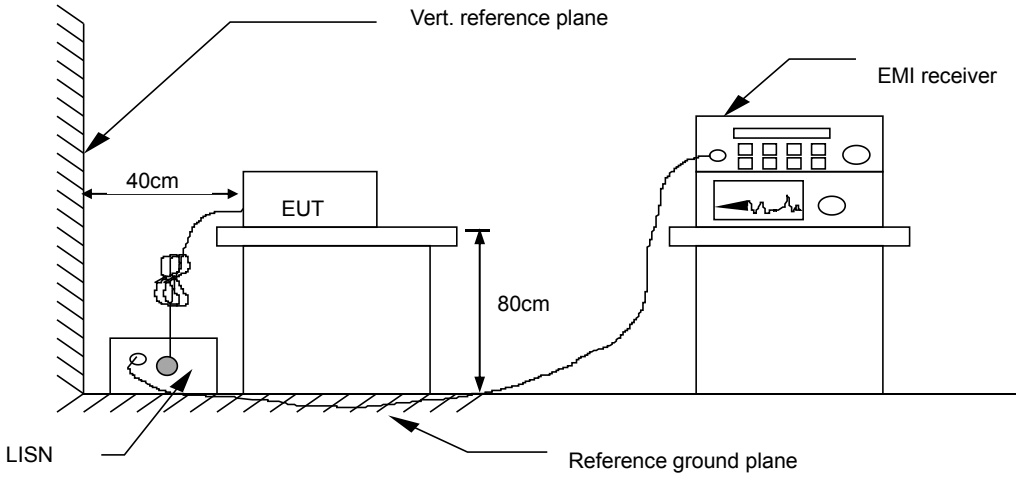
Procedure of Preliminary Test

The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
The Receiver scanned from 9 kHz to 30MHz for emissions in each of the test modes.
During the above scans, the emissions were maximized by cable manipulation.
The test mode(s) described in Item 3.1 were scanned during the preliminary test.
After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
The test data of the worst-case condition(s) was recorded.

8.1.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.1.4. TEST RESULTS

Temperature (℃)	22~28
Humidity (%RH)	50~58
Barometric Pressure (mbar)	950~1000
EUT	LED FLOOD LIGHTS
M/N	VT-49100
Operating Mode	Lighting(Full load)
Test Results	PASS

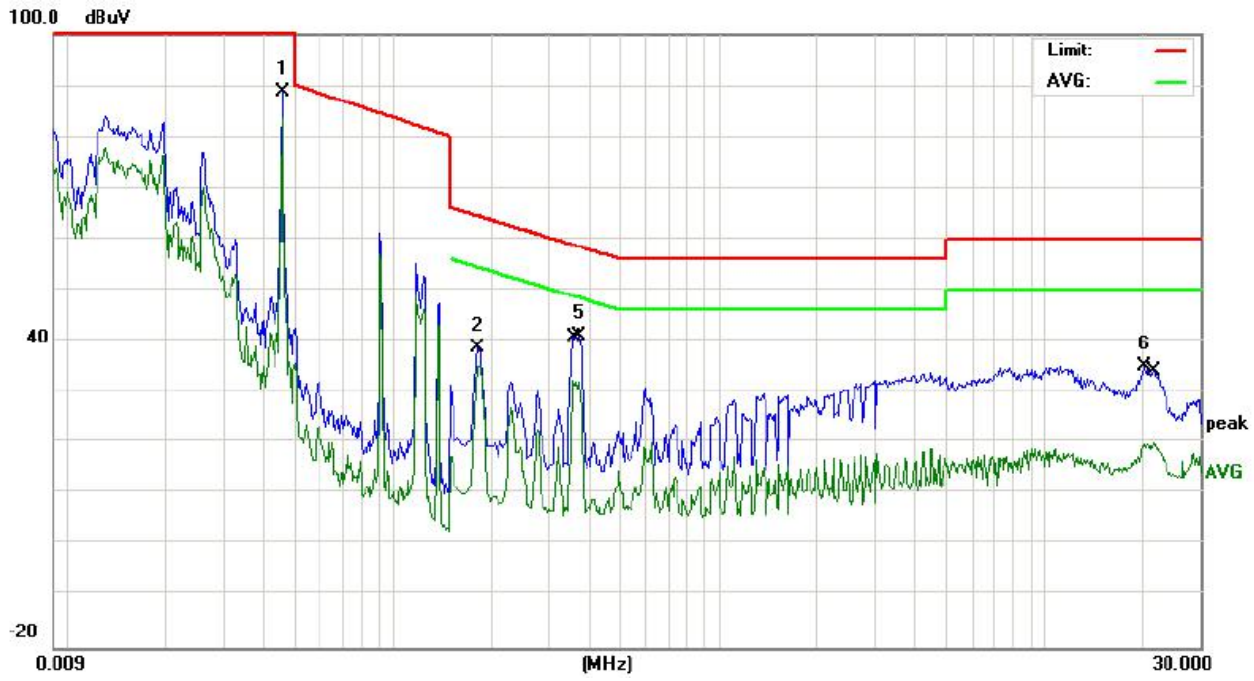
Please refer to following diagram for individual

EUT：	LED FLOOD LIGHTS	Model Name ：	VT-49100
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	May 03, 2018
Test Mode ：	Lighting(Full load)	Polarization：	L
Test Power ：	AC230V 50Hz		

	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
1	0.0458	77.00	11.84	88.84	110.00	-21.16	QP
2	0.1819	27.75	10.96	38.71	64.39	-25.68	QP
3	0.1819	24.21	10.96	34.17	54.39	-19.22	AV
4	0.3540	21.66	10.82	32.48	48.78	-16.39	AV
5	0.3700	30.20	10.78	40.98	58.50	-17.52	QP
6	20.2580	23.92	11.07	34.99	60.00	-35.01	QP
7	21.6100	8.87	11.09	19.96	50.00	-30.04	AV

Remark:

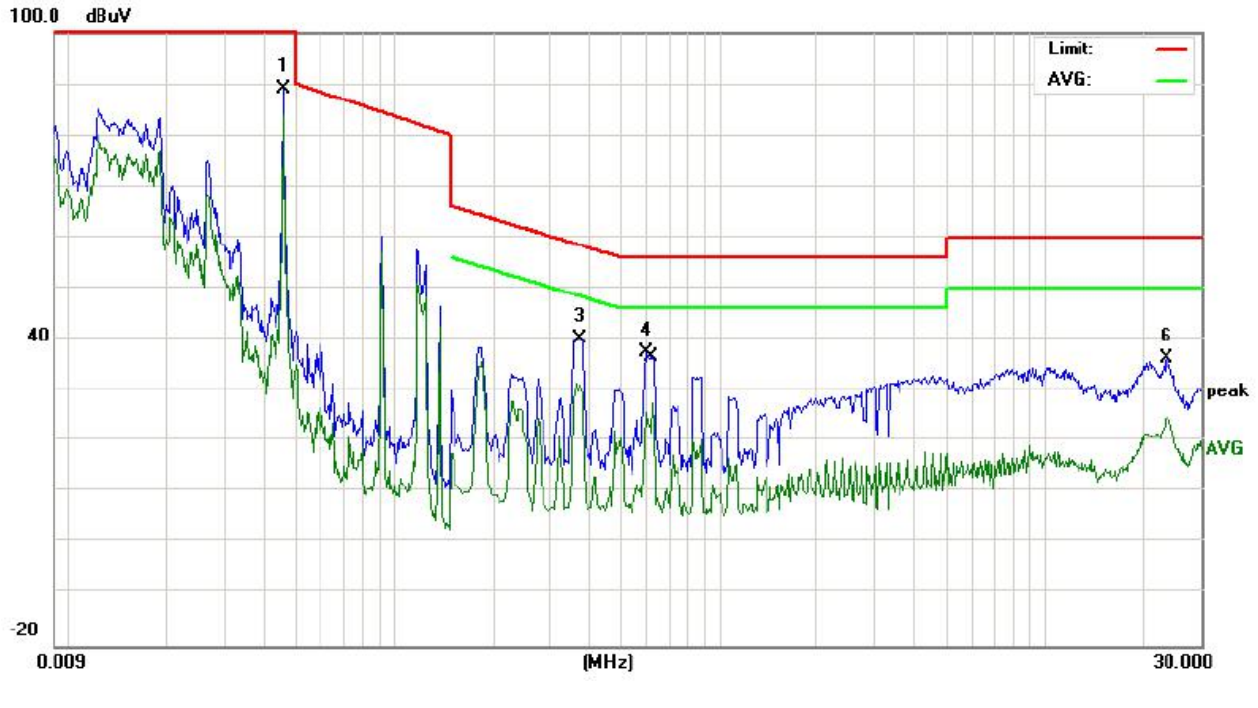
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit



EUT：	LED FLOOD LIGHTS	Model Name ：	VT-49100
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	May 03, 2018
Test Mode ：	Lighting(Full load)	Polarization：	N
Test Power ：	AC230V 50Hz		

	Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
1	0.0459	77.17	11.87	89.04	110.00	-20.96	QP
2	0.3620	20.79	10.76	31.55	48.68	-17.13	AV
3	0.3700	29.44	10.74	40.18	58.50	-18.32	QP
4	0.5980	26.86	10.55	37.41	56.00	-18.59	QP
5	0.6220	17.12	10.55	27.67	46.00	-18.33	AV
6	23.6700	25.06	11.14	36.20	60.00	-23.80	QP
7	23.6700	13.85	11.14	24.99	50.00	-25.01	QP

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit



8.2. RADIATED ELECTROMAGNETIC DISTURBANCE

8.2.1. LIMITS

Frequency	Limits for loop diameter dB(uA)*		
	2m	3m	4m
9KHz-70KHz	88	81	75
70KHz-150KHz	88-58**	81-51**	75-45**
150KHz-3.0MHz	58-22**	51-22**	45-16**
3.0MHz-30MHz	22	15-16***	9-12***
* At the transition frequency, the lower limit applies. ** Decreasing linearly with the logarithm of the frequency. *** Increasing linearly with the logarithm of the frequency.			
Note: In Japan, the limits for frequencies 9KHz to 150KHz do not apply.			

8.2.2. TEST PROCEDURE

In the frequency range 9KHz to 30MHz the interference capability of the magnetic field component of the radiation of Equipment Under Test (EUT) can be determined by using a special Loop Antenna System (LAS). In the LAS, this capability is measured in terms of the currents induced by the magnetic field in the loop antennas of the LAS. The LAS allows indoor measurement.

The LAS consists of three circular, mutually perpendicular Large-Loop Antennas (LLAs), having a diameter of 2 m, supported by a non-metallic base. A 50Ω coaxial cable between the current probe of an LLA and the coaxial switch, and between this switch and the measuring equipment, shall have a surface transfer impedance smaller than 10mΩ/m at 100KHz and 1mΩ/m at 10MHz.

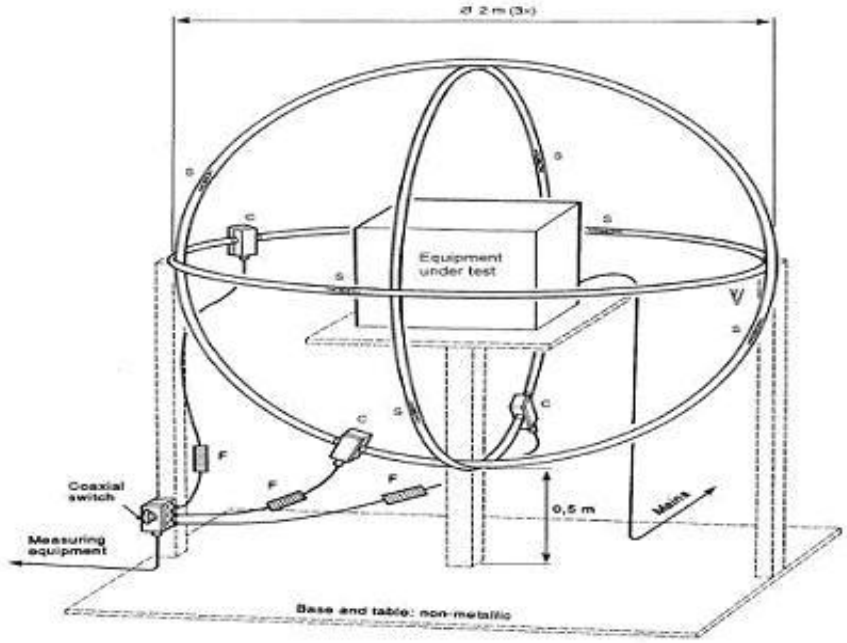
The distance between the outer diameter of the loop antenna system and nearby objects, such as floor and walls, shall be at least 0.5m as per CISPR 15/ EN55015.

The EUT is positioned in the center of the LAS (To avoid unwanted capacitive coupling between the EUT and the LAS, the maximum dimensions of the EUT are limited so that the distance between the EUT and an LLA is at least 0.2m). Cables should be routed together and leave the loop volume in the same octant of the cell, no closer than 0.4m to the LAS loops.

The induced current in the loop antenna is measured by means of a current probe(1V/A) and the CISPR measuring receiver(or equivalent). By means of a coaxial switch, the three field direction(X, Y, Z) can be measured in sequence, and recorded at least the six highest emission. Each value shall fulfill the requirement given.

The test data of the worst-case condition(s) was recorded.

8.2.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

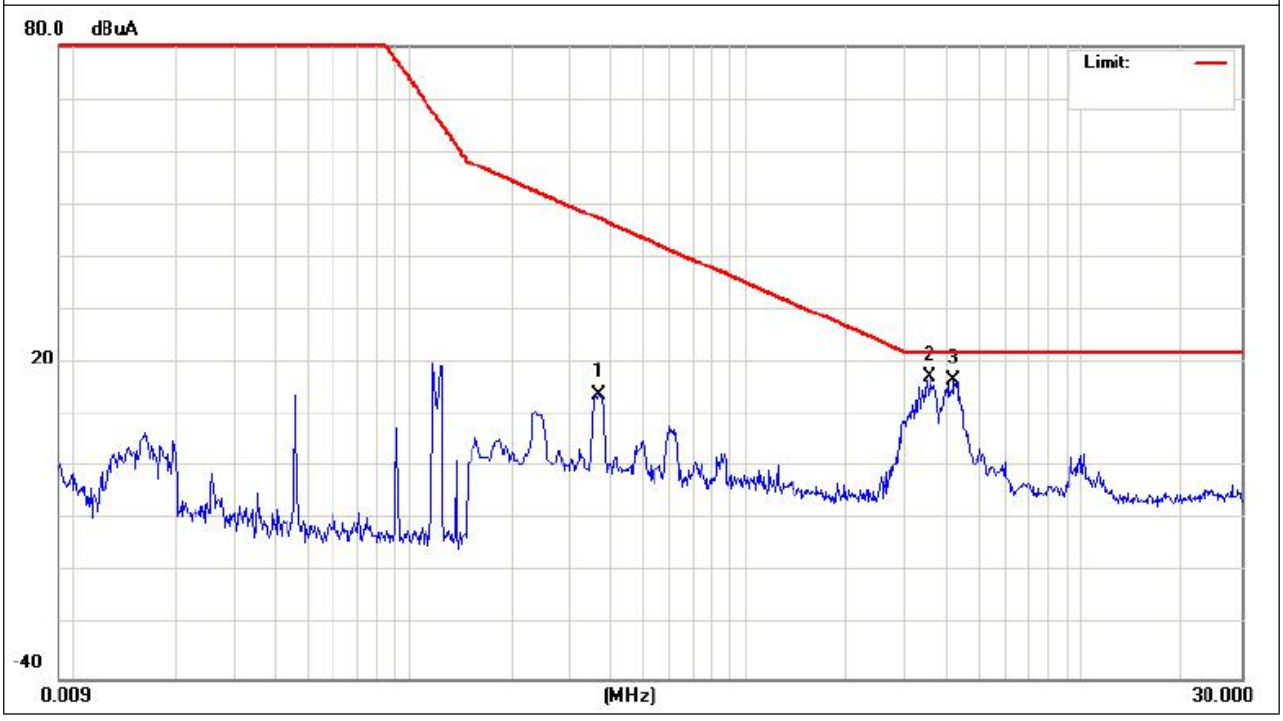
8.2.4.TEST RESULTS

Temperature (℃)	22~28
Humidity (%RH)	50~58
Barometric Pressure (mbar)	950~1000
EUT	LED FLOOD LIGHTS
M/N	VT-49100
Operating Mode	Lighting(Full load)
Test Results	PASS

EUT：	LED FLOOD LIGHTS	Model Name ：	VT-49100
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	May 03, 2018
Test Mode ：	Lighting(Full load)	Polarization：	X
Test Power ：	AC230V 50Hz		

	Freq.	Reading	Factor	Measurement	Limit	Over	Detector
	(MHz)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	
1	0.3660	3.07	10.79	13.86	47.28	-33.42	QP
2	3.5580	6.71	10.59	17.30	22.00	-4.70	QP
3	4.2020	5.80	10.61	16.41	22.00	-5.59	QP

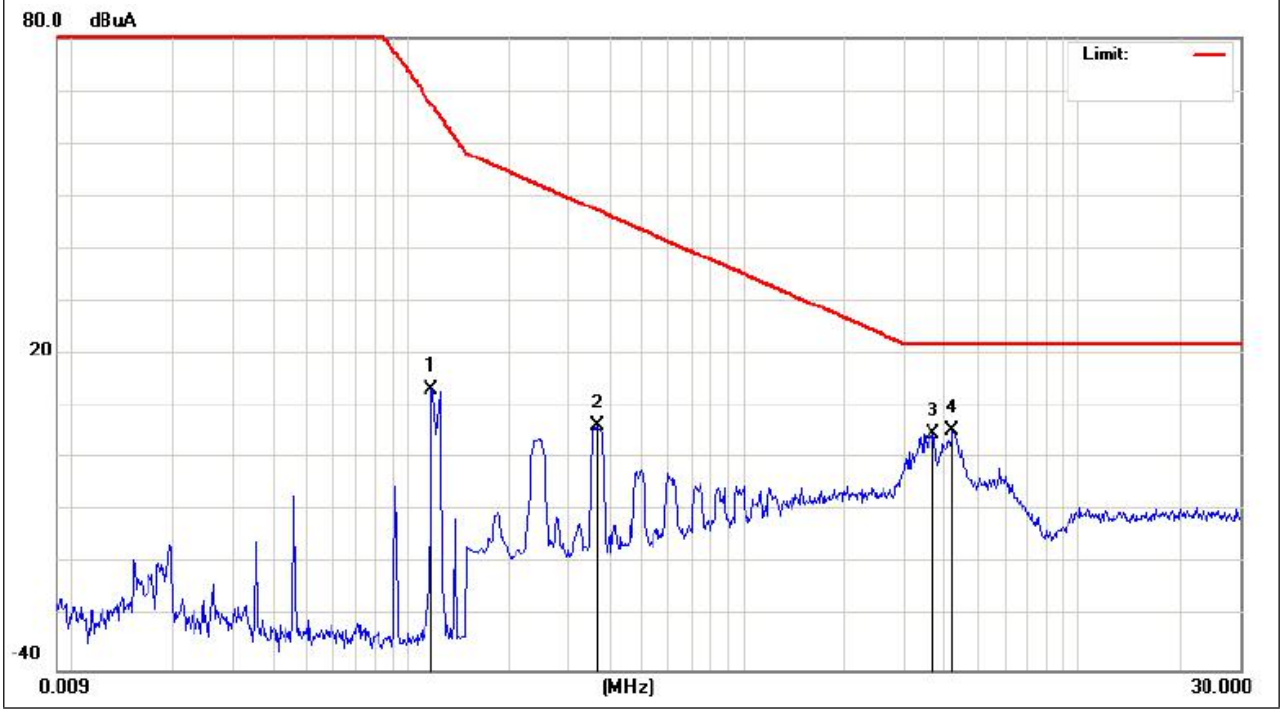
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Antenna Factor + Cable Loss - Amplifier.
3. N/A means All Data have pass Limit



EUT：	LED FLOOD LIGHTS	Model Name ：	VT-49100
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	May 03, 2018
Test Mode ：	Lighting(Full load)	Polarization：	Y
Test Power ：	AC230V 50Hz		

	Freq.	Reading	Factor	Measurement	Limit	Over	Detector
	(MHz)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	
1	0.1186	-8.57	21.97	13.40	67.23	-53.83	QP
2	0.3660	-16.16	22.37	6.21	47.28	-41.07	QP
3	3.6660	-18.44	23.27	4.83	22.00	-17.17	QP
4	4.2060	-17.82	23.38	5.56	22.00	-16.44	QP

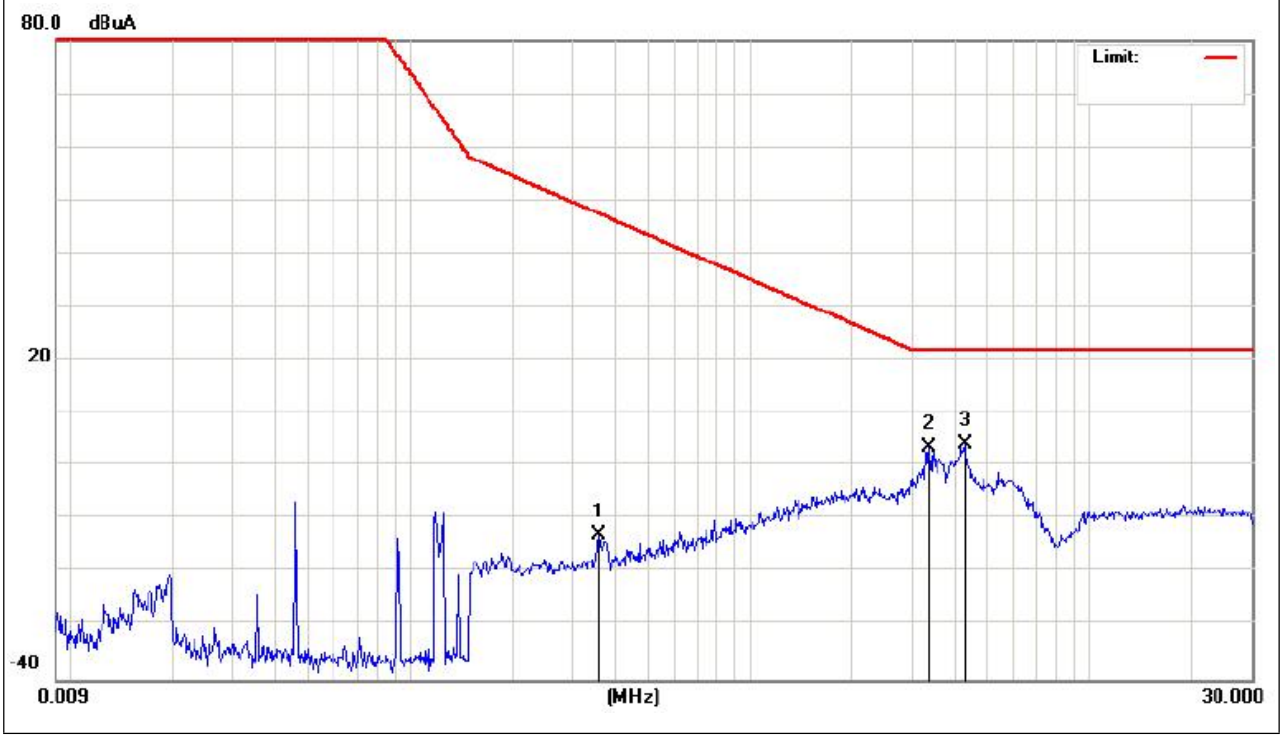
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Antenna Factor + Cable Loss - Amplifier.
3. N/A means All Data have pass Limit



EUT：	LED FLOOD LIGHTS	Model Name ：	VT-49100
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	May 03, 2018
Test Mode ：	Lighting(Full load)	Polarization：	Z
Test Power ：	AC230V 50Hz		

	Freq.	Reading	Factor	Measurement	Limit	Over	Detector
	(MHz)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	
1	0.3580	-36.93	23.94	-12.99	47.54	-60.53	QP
2	3.3660	-20.87	24.58	3.71	22.00	-18.29	QP
3	4.2819	-20.56	24.80	4.24	22.00	-17.76	QP

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Antenna Factor + Cable Loss - Amplifier.
3. N/A means All Data have pass Limit



8.3. RADIATED EMISSION MEASUREMENT

8.3.1. LIMITS

FREQUENCY (MHz)	dBuV/m (At 3m)
30 ~ 230	40
230 ~ 300	47

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

8.3.2. TEST PROCEDURE

Procedure of Preliminary Test

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

Support equipment, if needed, was placed as per EN 55015.

All I/O cables were positioned to simulate typical usage as per EN 55015.

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.

The antenna was placed at 3 meter away from the EUT as stated in EN 55015. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

The Analyzer / Receiver quickly scanned from 30MHz to 300MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

The test mode(s) described in Item 3.1 were scanned during the preliminary test:

After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

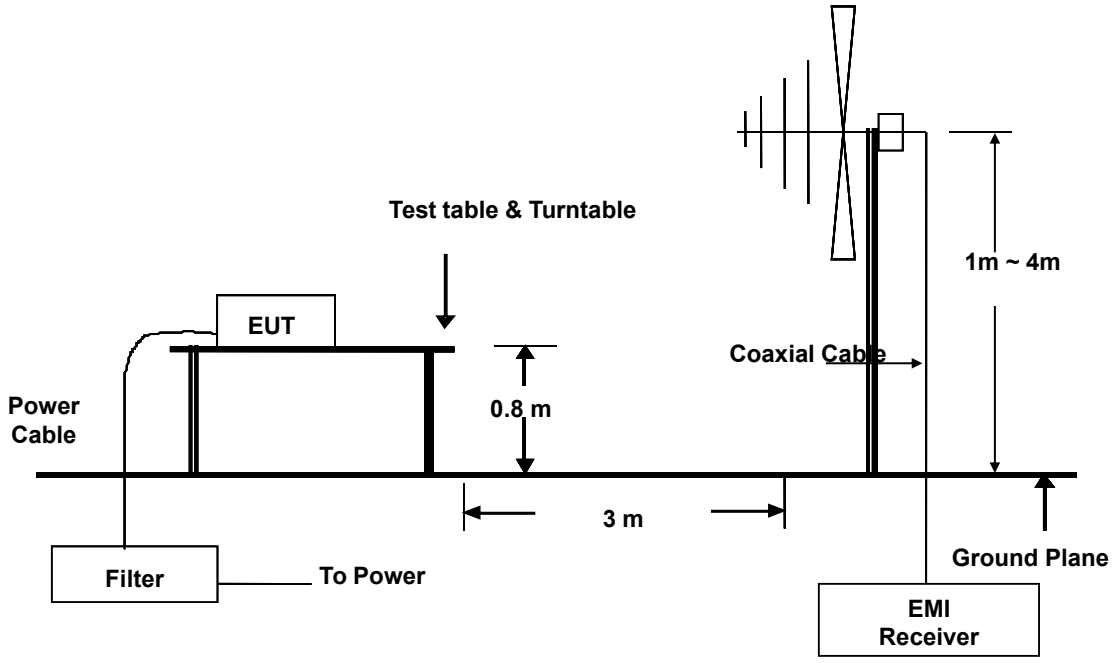
EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.

The Analyzer / Receiver scanned from 30MHz to 300MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

The test data of the worst-case condition(s) was recorded.

8.3.3. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.3.4 TEST RESULTS

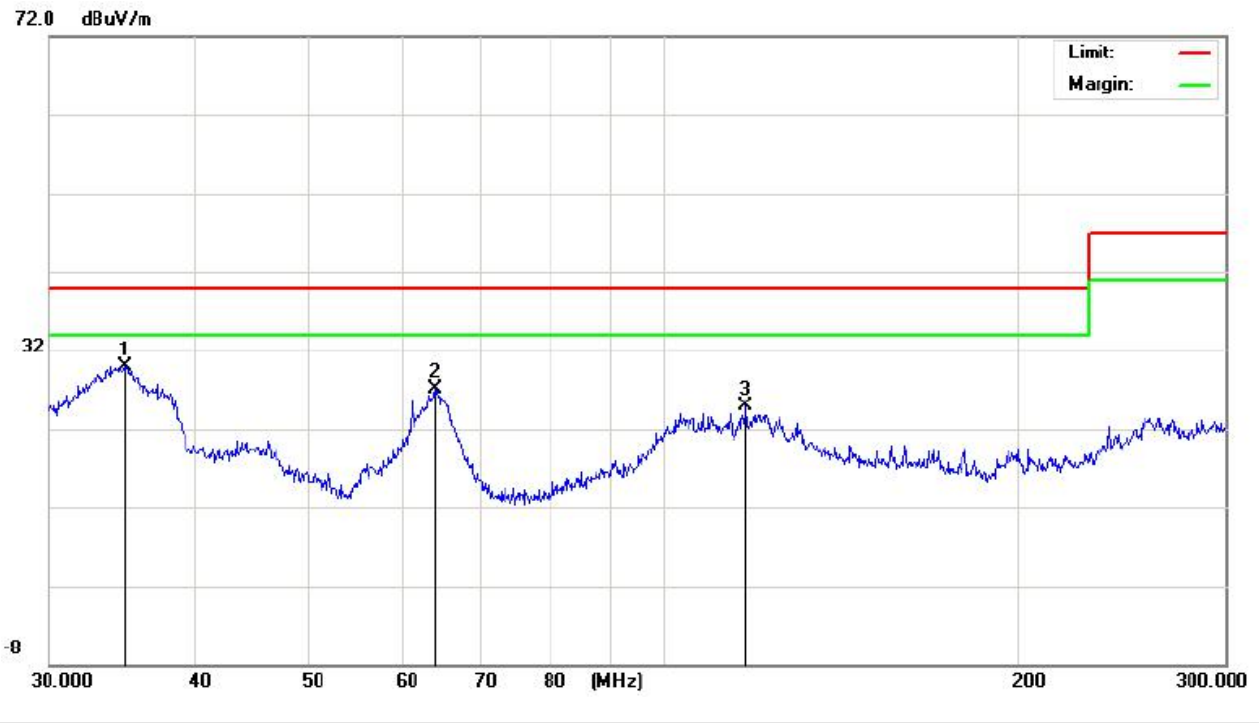
Temperature (℃)	22~28
Humidity (%RH)	50~58
Barometric Pressure (mbar)	950~1000
EUT	LED FLOOD LIGHTS
M/N	VT-49100
Operating Mode	Lighting(Full load)
Test Results	PASS

EUT：	LED FLOOD LIGHTS	Model Name ：	VT-49100
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date :	May 03, 2018
Test Mode ：	Lighting(Full load)	Polarization :	Vertical
Test Power ：	AC230V 50Hz		

	Freq.	Reading	Factor	Measurement	Limit	Over	Detector
	(MHz)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	
1	34.7633	14.01	15.99	30.00	40.00	-10.00	QP
2	63.8442	21.79	5.41	27.20	40.00	-12.80	QP
3	117.5226	12.80	12.03	24.83	40.00	-15.17	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit

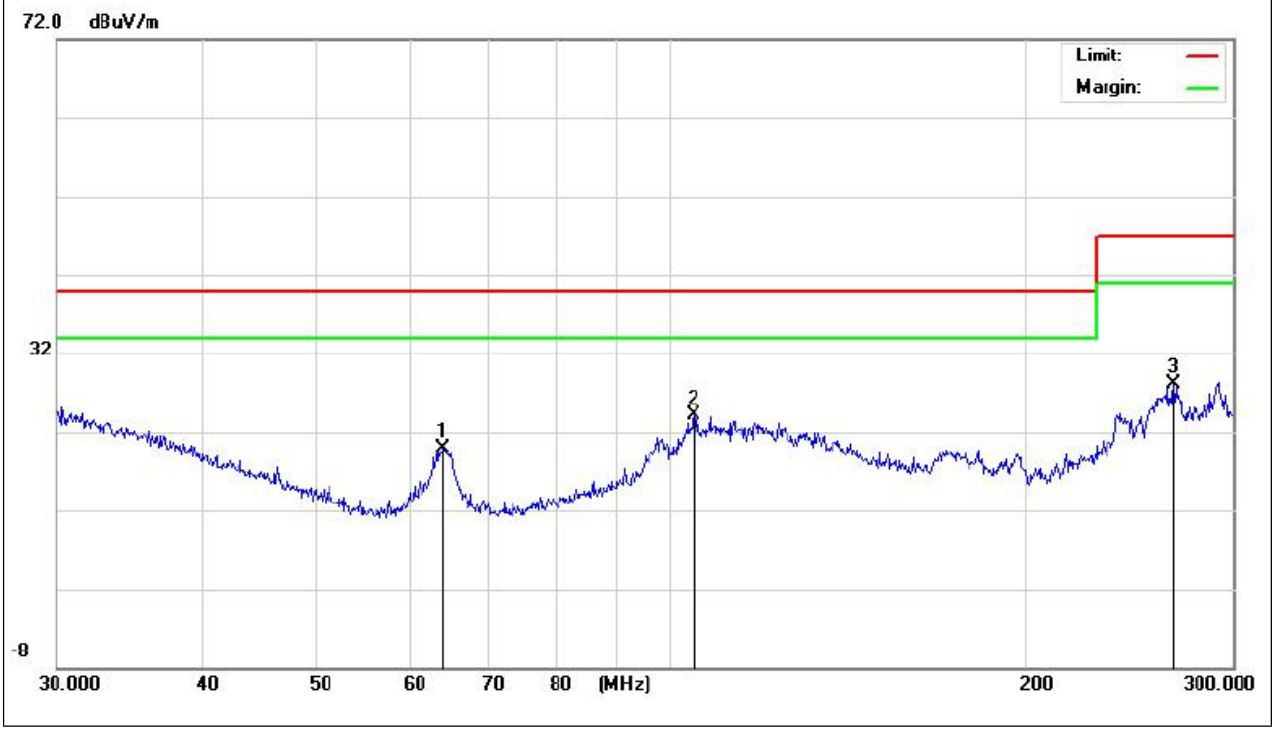


EUT：	LED FLOOD LIGHTS	Model Name ：	VT-49100
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	May 03, 2018
Test Mode ：	Lighting(Full load)	Polarization：	Horizontal
Test Power ：	AC230V 50Hz		

	Freq.	Reading	Factor	Measurement	Limit	Over	Detector
	(MHz)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	
1	63.8442	14.53	5.41	19.94	40.00	-20.03	QP
2	104.5012	13.04	11.03	24.07	40.00	-15.93	QP
3	267.3753	13.70	14.32	28.02	47.00	-18.98	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit



8.4. HARMONICS CURRENT MEASUREMENT

8.4.1. LIMITS OF HARMONICS CURRENT MEASUREMENT

Limits for Class A equipment	
Harmonics Order n	Max. permissible harmonics current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15<=n<=39	0.15x15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8<=n<=40	0.23x8/n

Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd Harmonics only		
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13	0.30	0.21
15<=n<=39	3.85/n	0.15x15/n

NOTE: 1. Class A and Class D are classified according to item 4.4.3.

2. According to section 7 of EN 61000-3-2, the above limits apply for all equipments with a rated power more than 75W, except for lighting equipment.

8.4.2. TEST PROCEDURE

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under LIGHTING operating conditions for each successive harmonic component in turn.
The classification of EUT is according to section 5 of EN 61000-3-2.
The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

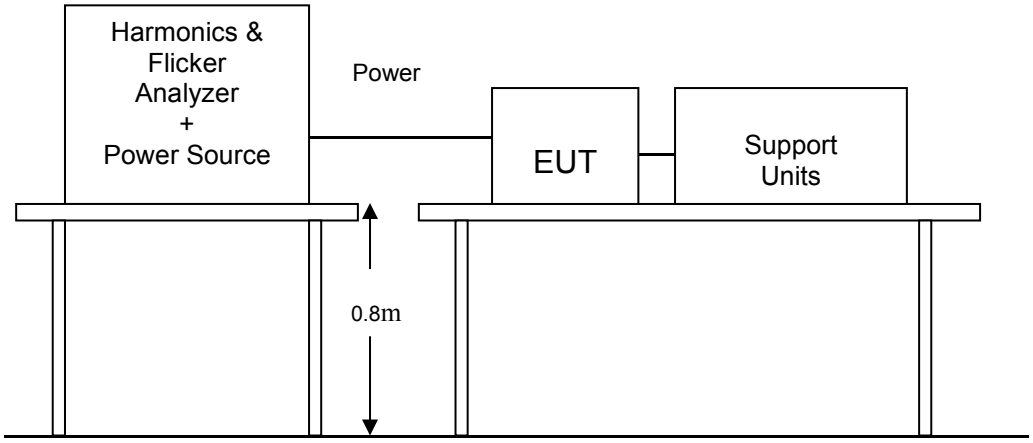
Class B: Portable tools; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

8.4.3. TEST SETUP



For the actual test configuration, please refer to the related item.

8.4.4. TEST RESULTS

Temperature (℃)	22~28
Humidity (%RH)	50~58
Barometric Pressure (mbar)	950~1000
EUT	LED FLOOD LIGHTS
M/N	VT-49100
Operating Mode	Lighting(Full load)
Test Results	PASS

E. U. T. Result

Harmonic(s) > 200%:	
Order (n):	None
Harmonic(s) with average > 90%:	
Order (n):	None
Harmonic(s) between 150% and 200% during more than 10% of the test time or max. 10min:	
Order (n):	None

Power Source Result

First dataset out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [%]	Result
1	1.031	99.721		
2	1.024E-3	0.099	2.00	PASS
3	73.028E-3	7.063	29.30	PASS
4	1.983E-3	0.192		PASS
5	9.291E-3	0.899	10.00	PASS
6	758.849E-6	0.073		PASS
7	16.466E-3	1.592	7.00	PASS
8	802.388E-6	0.078		PASS
9	16.968E-3	1.641	5.00	PASS
10	800.167E-6	0.077		PASS
11	15.012E-3	1.452	3.00	PASS
12	751.233E-6	0.073		PASS
13	12.607E-3	1.219	3.00	PASS
14	737.000E-6	0.071		PASS
15	11.396E-3	1.102	3.00	PASS
16	816.959E-6	0.079		PASS
17	11.254E-3	1.088	3.00	PASS
18	845.290E-6	0.082		PASS
19	6.745E-3	0.652	3.00	PASS
20	776.966E-6	0.075		PASS
21	4.345E-3	0.420	4.50	PASS
22	1.123E-3	0.109		PASS
23	6.320E-3	0.611	4.50	PASS
24	756.421E-6	0.073		PASS
25	8.903E-3	0.861	4.50	PASS
26	1.078E-3	0.104		PASS
27	2.884E-3	0.279	4.50	PASS
28	752.391E-6	0.073		PASS
29	7.894E-3	0.763	4.50	PASS
30	869.412E-6	0.084		PASS
31	3.701E-3	0.358	4.50	PASS
32	756.163E-6	0.073		PASS
33	5.402E-3	0.522	4.50	PASS
34	845.459E-6	0.082		PASS
35	5.291E-3	0.512	4.50	PASS
36	707.673E-6	0.068		PASS
37	3.193E-3	0.309	4.50	PASS
38	751.219E-6	0.073		PASS
39	2.480E-3	0.240	4.50	PASS
40	771.953E-6	0.075		PASS

Maximum harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [%]	Result
1	1.034	100.000		
2	1.171E-3	0.113	3.00	PASS
3	73.551E-3	7.113	43.95	PASS
4	2.107E-3	0.204		PASS
5	9.460E-3	0.915	15.00	PASS
6	844.791E-6	0.082		PASS
7	16.628E-3	1.608	10.50	PASS
8	904.841E-6	0.088		PASS
9	17.126E-3	1.656	7.50	PASS
10	948.061E-6	0.092		PASS
11	15.495E-3	1.499	4.50	PASS
12	855.755E-6	0.083		PASS
13	12.871E-3	1.245	4.50	PASS
14	830.110E-6	0.080		PASS
15	12.017E-3	1.162	4.50	PASS
16	917.216E-6	0.089		PASS
17	11.566E-3	1.119	4.50	PASS
18	951.248E-6	0.092		PASS
19	6.905E-3	0.668	4.50	PASS
20	928.060E-6	0.090		PASS
21	4.582E-3	0.443	4.50	PASS
22	1.256E-3	0.121		PASS
23	6.561E-3	0.635	4.50	PASS
24	895.188E-6	0.087		PASS
25	9.208E-3	0.891	4.50	PASS
26	1.163E-3	0.112		PASS
27	3.247E-3	0.314	4.50	PASS
28	884.596E-6	0.086		PASS
29	8.093E-3	0.783	4.50	PASS
30	1.044E-3	0.101		PASS
31	3.952E-3	0.382	4.50	PASS
32	877.848E-6	0.085		PASS
33	5.655E-3	0.547	4.50	PASS
34	960.379E-6	0.093		PASS
35	5.476E-3	0.530	4.50	PASS
36	852.486E-6	0.082		PASS
37	3.385E-3	0.327	4.50	PASS
38	856.163E-6	0.083		PASS
39	2.668E-3	0.258	4.50	PASS
40	928.254E-6	0.090		PASS

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	231.53	100.663		
2	72.90E-3	0.032	0.2	PASS
3	116.74E-3	0.051	0.9	PASS
4	16.23E-3	0.007	0.2	PASS
5	59.21E-3	0.026	0.4	PASS
6	16.37E-3	0.007	0.2	PASS
7	36.06E-3	0.016	0.3	PASS
8	10.71E-3	0.005	0.2	PASS
9	59.16E-3	0.026	0.2	PASS
10	13.23E-3	0.006	0.2	PASS
11	22.47E-3	0.010	0.1	PASS
12	11.07E-3	0.005	0.1	PASS
13	59.13E-3	0.026	0.1	PASS
14	9.68E-3	0.004	0.1	PASS
15	10.45E-3	0.005	0.1	PASS
16	10.05E-3	0.004	0.1	PASS
17	42.37E-3	0.018	0.1	PASS
18	11.82E-3	0.005	0.1	PASS
19	23.63E-3	0.010	0.1	PASS
20	9.53E-3	0.004	0.1	PASS
21	36.60E-3	0.016	0.1	PASS
22	10.37E-3	0.005	0.1	PASS
23	35.35E-3	0.015	0.1	PASS
24	11.79E-3	0.005	0.1	PASS
25	23.99E-3	0.010	0.1	PASS
26	9.99E-3	0.004	0.1	PASS
27	40.40E-3	0.018	0.1	PASS
28	11.32E-3	0.005	0.1	PASS
29	30.90E-3	0.013	0.1	PASS
30	13.65E-3	0.006	0.1	PASS
31	40.56E-3	0.018	0.1	PASS
32	10.79E-3	0.005	0.1	PASS
33	21.31E-3	0.009	0.1	PASS
34	9.61E-3	0.004	0.1	PASS
35	32.11E-3	0.014	0.1	PASS
36	9.95E-3	0.004	0.1	PASS
37	17.64E-3	0.008	0.1	PASS
38	11.27E-3	0.005	0.1	PASS
39	29.65E-3	0.013	0.1	PASS
40	12.65E-3	0.006	0.1	PASS

Harmonic current results - DS: 12

Hn	Ieff [A]	Ieff [%]	Limit [%]	Result
1	1.034	99.989		
2	1.078E-3	0.104	2.00	PASS
3	73.484E-3	7.107	29.30	PASS
4	2.070E-3	0.200		PASS
5	9.399E-3	0.909	10.00	PASS
6	619.274E-6	0.060		PASS
7	16.615E-3	1.607	7.00	PASS
8	739.841E-6	0.072		PASS
9	16.900E-3	1.634	5.00	PASS
10	785.835E-6	0.076		PASS
11	14.715E-3	1.423	3.00	PASS
12	718.024E-6	0.069		PASS
13	12.654E-3	1.224	3.00	PASS
14	734.298E-6	0.071		PASS
15	11.973E-3	1.158	3.00	PASS
16	730.672E-6	0.071		PASS
17	11.405E-3	1.103	3.00	PASS
18	795.142E-6	0.077		PASS
19	6.548E-3	0.633	3.00	PASS
20	702.602E-6	0.068		PASS
21	4.320E-3	0.418	3.00	PASS
22	1.074E-3	0.104		PASS
23	6.521E-3	0.631	3.00	PASS
24	628.868E-6	0.061		PASS
25	9.001E-3	0.871	3.00	PASS
26	1.063E-3	0.103		PASS
27	2.418E-3	0.234	3.00	PASS
28	651.234E-6	0.063		PASS
29	7.900E-3	0.764	3.00	PASS
30	967.014E-6	0.094		PASS
31	3.442E-3	0.333	3.00	PASS
32	684.957E-6	0.066		PASS
33	5.266E-3	0.509	3.00	PASS
34	780.353E-6	0.075		PASS
35	5.289E-3	0.512	3.00	PASS
36	697.823E-6	0.067		PASS
37	3.053E-3	0.295	3.00	PASS
38	726.964E-6	0.070		PASS
39	2.413E-3	0.233	3.00	PASS
40	738.960E-6	0.071		PASS

Caution: Results related to the 100% limit values

Harmonic voltage results - DS: 12

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	231.52	100.661		
2	53.56E-3	0.023	0.2	PASS
3	95.70E-3	0.042	0.9	PASS
4	11.99E-3	0.005	0.2	PASS
5	37.58E-3	0.016	0.4	PASS
6	11.34E-3	0.005	0.2	PASS
7	9.73E-3	0.004	0.3	PASS
8	5.88E-3	0.003	0.2	PASS
9	42.24E-3	0.018	0.2	PASS
10	4.34E-3	0.002	0.2	PASS
11	13.01E-3	0.006	0.1	PASS
12	3.11E-3	0.001	0.1	PASS
13	50.18E-3	0.022	0.1	PASS
14	2.06E-3	0.001	0.1	PASS
15	5.30E-3	0.002	0.1	PASS
16	7.28E-3	0.003	0.1	PASS
17	35.05E-3	0.015	0.1	PASS
18	1.56E-3	0.001	0.1	PASS
19	19.77E-3	0.009	0.1	PASS
20	6.28E-3	0.003	0.1	PASS
21	27.53E-3	0.012	0.1	PASS
22	3.65E-3	0.002	0.1	PASS
23	27.48E-3	0.012	0.1	PASS
24	3.17E-3	0.001	0.1	PASS
25	10.89E-3	0.005	0.1	PASS
26	4.17E-3	0.002	0.1	PASS
27	33.70E-3	0.015	0.1	PASS
28	3.36E-3	0.001	0.1	PASS
29	22.29E-3	0.010	0.1	PASS
30	3.64E-3	0.002	0.1	PASS
31	34.15E-3	0.015	0.1	PASS
32	5.06E-3	0.002	0.1	PASS
33	14.87E-3	0.006	0.1	PASS
34	3.48E-3	0.002	0.1	PASS
35	19.70E-3	0.009	0.1	PASS
36	8.88E-3	0.004	0.1	PASS
37	10.30E-3	0.004	0.1	PASS
38	5.37E-3	0.002	0.1	PASS
39	22.47E-3	0.010	0.1	PASS
40	4.88E-3	0.002	0.1	PASS

8.5. VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

8.5.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

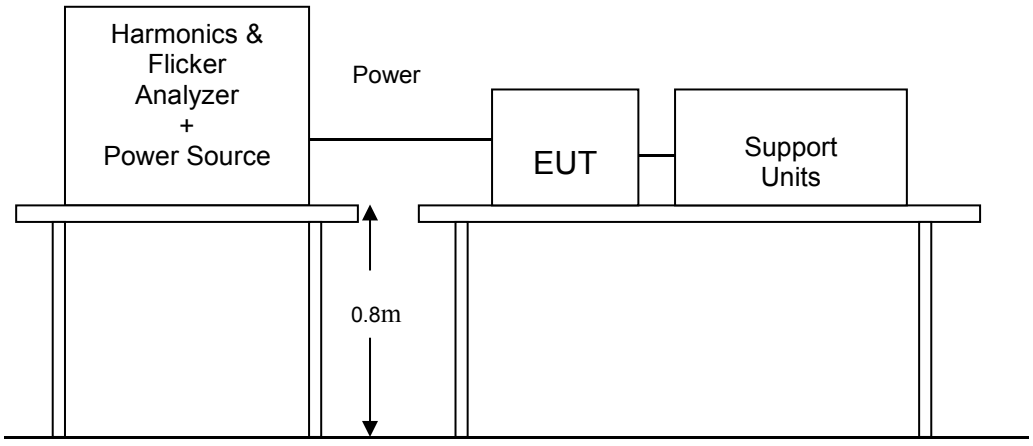
TEST ITEM	LIMIT	REMARK
P_{st}	1.0	P_{st} means short-term flicker indicator.
P_{lt}	0.65	P_{lt} means long-term flicker indicator.
T_{dt} (ms)	500	T_{dt} means maximum time that dt exceeds 3 %.
d_{max} (%)	4%	d_{max} means maximum relative voltage change.
dc (%)	3.3%	dc means relative steady-state voltage change

8.5.2. TEST PROCEDURE

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under LIGHTING operating conditions.

During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

8.5.3. TEST SETUP



For the actual test configuration, please refer to the related item.

8.5.4. TEST RESULTS

Temperature (℃)	22~28
Humidity (%RH)	50~58
Barometric Pressure (mbar)	950~1000
EUT	LED FLOOD LIGHTS
M/N	VT-49100
Operating Mode	Lighting(Full load)
Test Results	PASS

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.005	3.30	PASS
dmax [%]	0.269	4.00	PASS
dt [s]	0.000	0.50	PASS

9. IMMUNITY TEST

9.1. GENERAL DESCRIPTION

Product Standard	EN 61547: 2009	
	Test Type	Minimum Requirement
Basic Standard, Specification, and Performance Criterion required	EN61000-4-2:2009	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	EN61000-4-3:2006+A1:2008 +A2:2010	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~1000 MHz, 3V/m, 80% AM(1kHz), Performance Criterion A
	EN61000-4-4:2012	Electrical Fast Transient/Burst - EFT, Power line: 1kV, Signal line: 0.5kV, Performance Criterion B
	EN61000-4-5:2014	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, Power Port ~ Line to line: 0.5kV, Line to ground: 1kV (to self-ballasted lamps and semi-luminaries; luminaires and independent auxiliaries which are less than 25W) Power Port ~ Line to line: 1kV, Line to ground: 2kV (to luminaires and independent auxiliaries which are more than 25W) Signal Port : 0.5kV Performance Criterion B
	EN61000-4-6:2014	Conducted Radio Frequency Disturbances Test –CS: 0.15 ~ 80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
	EN61000-4-8: 2010	Power frequency magnetic field immunity test 50 Hz, 3A/m Performance Criterion A
	EN61000-4-11:2004	Voltage Dips and Interruptions: ii) 30% reduction for 10 period, Performance Criterion C 100% reduction for 0.5 period Performance Criterion B

9.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

Criteria A:	During the test no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.
Criteria B:	During the test the luminous intensity may change to any value. After the test the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.
Criteria C:	During and after the test any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to T5 LED Flood Lightif necessary by temporary interruption of the mains supply and/or operating the regulating control. Additional requirement for lighting equipment incorporating a starting device: After the test the lighting equipment is switched off. After half an hour it is switched on again. The lighting equipment shall start and operate as intended.

9.3. ELECTROSTATIC DISCHARGE (ESD)

9.3.1. TEST SPECIFICATION

Basic Standard:	EN 61000-4-2
Discharge Impedance:	330ohm
Charging Capacity:	150pF
Discharge Voltage:	Air Discharge: 8 kV (Direct) Contact Discharge: 4 kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	1 time/s
Performance Criterion:	B

9.3.2. TEST PROCEDURE

The discharges shall be applied in two ways:

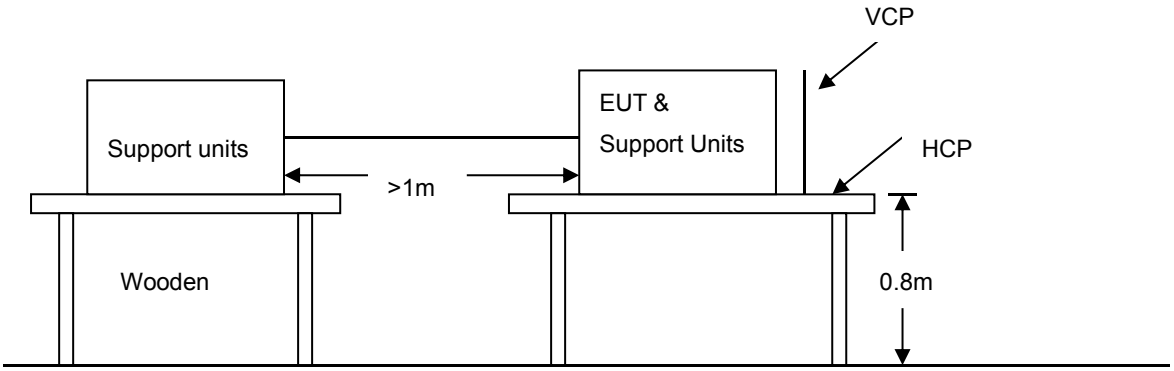
a) Contact discharges to the conductive surfaces and coupling planes:
   Twenty dischargers (10 with positive and 10 with negative polarity) shall be applied on each accessible metallic part of the enclosure, terminals are excluded. In case of a non-conductive enclosure, dischargers shall be applied on the horizontal or vertical coupling planes. Test shall be performed at a maximum repetition rate of one discharge per second.

b) Air discharges at slots and apertures and insulating surfaces:
   On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with IEC 61000-4-2:

a) The EUT was located 0.1 m minimum from all side of the **HCP** (dimensions 1.6m x 0.8m).
b) The support units were located another table 30 cm away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
c) The time interval between two successive single discharges was at least 1 second.
d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
e) Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
f) At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each **HCP** opposite the center point of each unit of the EUT and 0.1 meters from the front of the EUT. The long axis of the discharge electrode was in the plane of the **HCP** and perpendicular to its front edge during the discharge.
g) At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **V**ertical **C**oupling **P**lane (**VCP**) in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

9.3.3. TEST SETUP



Ground Reference

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **G**round **R**eference **P**lane. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **H**orizontal **C**oupling **P**lane (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.