



**EN 62493:2010
(IEC 62493:2010)**



**Assessment of lighting equipment related to human
Exposure to electromagnetic fields**
涉及人体暴露于电磁场的照明设备的评估

广州极端机械科技有限公司

2012-7-1

WHEN YOU NEED TO BE SURE

SGS

- **EN 62493:2010**
(IEC 62493:2010)

(dop) 2010-11-01

(dow) 2013-02-01

dop: date of publication

dow: date of withdrawn



1

为何出版EN 62493标准？

2

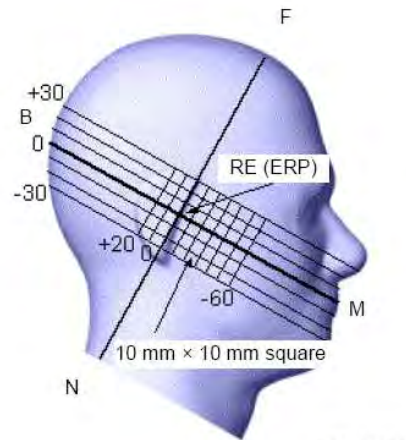
EMF对人体健康有何影响？

3

常见的EMF标准？

为何出版EN 62493标准?

- 建立一个评价在照明设备周围空间电磁场的合理方法
- 保护暴露其中的人体头部和躯干的中枢神经系统组织，减少其对人身造成的影响。



EMF对人体健康有何影响？

■ 电磁场（辐射）对人体的影响

头晕、呕吐

罹患儿童白血病

成人恶性脑瘤

肌萎缩侧索硬化症

丧失生育功能、流产

癌症等

■ 核辐射

导致人体甲状腺肿大、破坏人体造血系统、丧失生育能力



常见的EMF标准?



- 家用及类似用途电器EMF评估标准:

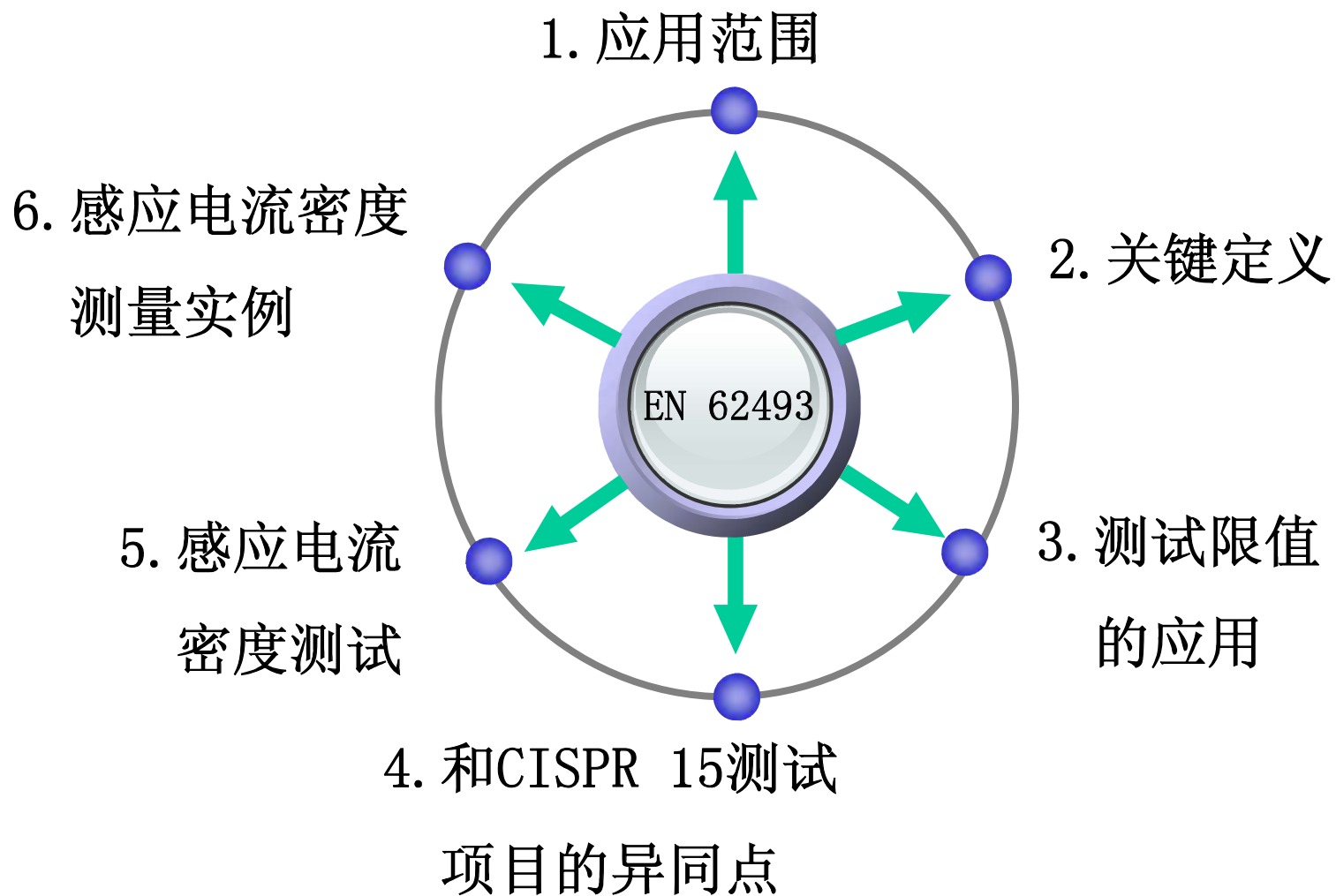
EN 50366:2003=> EN 50366:2003+A1:2006=>EN
62233:2008

- 低功率无线产品EMF评估标准:

EN 50371:2002=>EN 50392:2004=>EN 62311:2008

- 另外还有针对手机和贴近人耳的便携式设备的EMF评估标准等等，例如 IEC 62209-1和IEC 62209-2。





1.应用范围



- 本标准应用于照明设备涉及人体暴露于电磁场的评估。该评估由照明设备周边的20 kHz 到10 MHz感应电流密度和100 kHz 到300 MHz的特殊吸收比组成。
- 标准包括以下设备：
 - 用于照明为目的地,具有产生和分配光的基本功能,并打算连接到**低压电源**上或者用**电池工作**的所有室内和室外照明设备;一般照明设备指所有工业,住宅,公共场所和街道照明设备。
 - 主要功能之一是照明的**多功能设备**的照明部分。
 - 用于照明设备的独立附件

1.应用范围



■ 本标准不包含以下照明设备:

- 航空器和飞机场使用的照明设备
- 道路机动车辆的照明设备; (除公共交通工具乘客车间的照明设备)
- 农业照明设备
- 船上照明设备
- 复印机, 反映机照明设备
- 其他IEC或CISPR标准明确规定的无线电频率范围内的电磁兼容要求的器具; (例如: EN 60669-2-1:2004:Switches for household and similar fixed electrical installations。不过测试方法依然参考EN 55015)



1.应用范围

- 以下照明设备不需要进行测试评估即认为符合本标准的要求：
 - 不带电子控制装置的照明设备
 - 所有类型的点火器，启辉器，开关，调光器（包含相位控制单位，例如双向可控硅，GTO)和传感器都不属于电子控制装置。



- **Lamp control gear (灯具电子控制装置)**



one or more components between the supply and one or more lamps which may serve to transform the supply voltage, limit the current of the lamp(s) to the required value, provide starting voltage and preheating current, prevent cold starting, correct power factor or reduce

radio interference

- **Ballast (电子镇流器)**

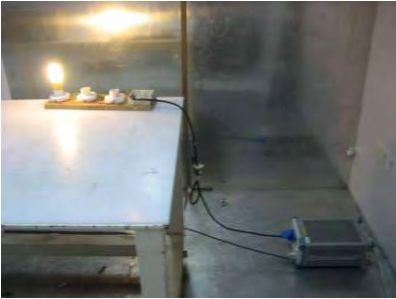
unit inserted between the supply and one or more discharge lamps which by means of inductance, capacitance, or a combination of inductance and capacitance, serves mainly to limit the current of the lamp (s) to the required value. It may also include means for transforming the supply voltage and arrangements that help provide starting voltage and preheating current



- **Independent electronic converter (独立电子变换器)**

lamp control gear consisting of one or more separate elements so designed that it can be mounted separately outside a lighting equipment, with protection according to the marking of the lamp control gear and without any additional enclosure. This may consist of a built-in lamp control gear housed in suitable enclosure that provides all the necessary protection according to its markings

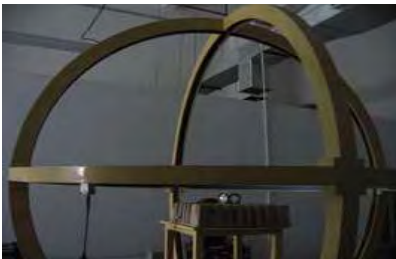
3.测试限值的应用



- CISPR 15:2005:

- § 4.3.1: Disturbance voltage mains terminals in the frequency range from 20 kHz to 30 MHz;

- § 4.4: Radiated electromagnetic disturbances in the frequency range from 100 kHz to 30 MHz;



- CISPR 15:2005, Amendment 1 (2006):

- § 4.4.2: Radiated electromagnetic disturbances in the frequency range from 30 MHz to 300 MHz;

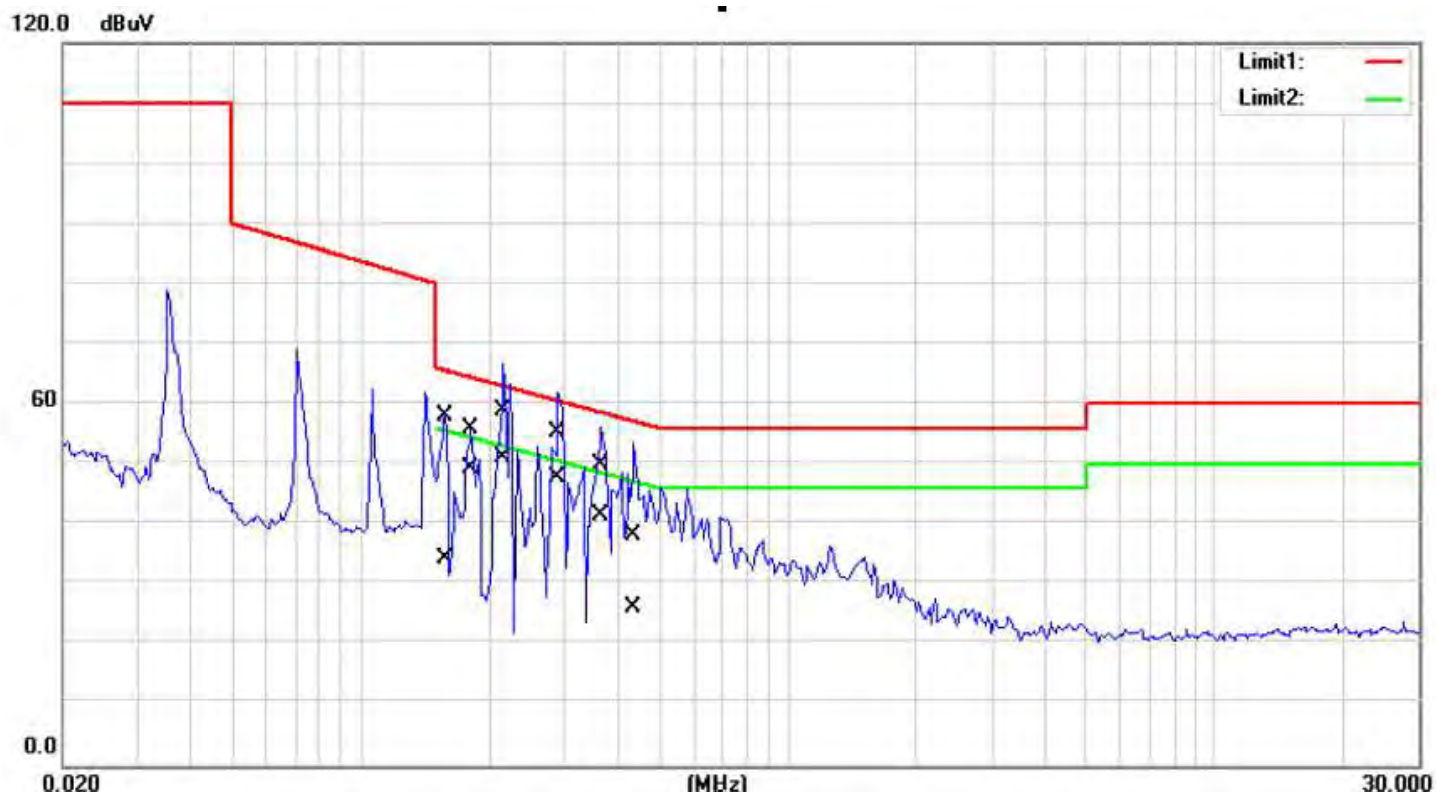


- The measured (weighted and summarized) induced current density due to the electric field in the frequency range 20 kHz to 10 MHz does not exceed the factor (F) 0,85 as defined in Annex D.

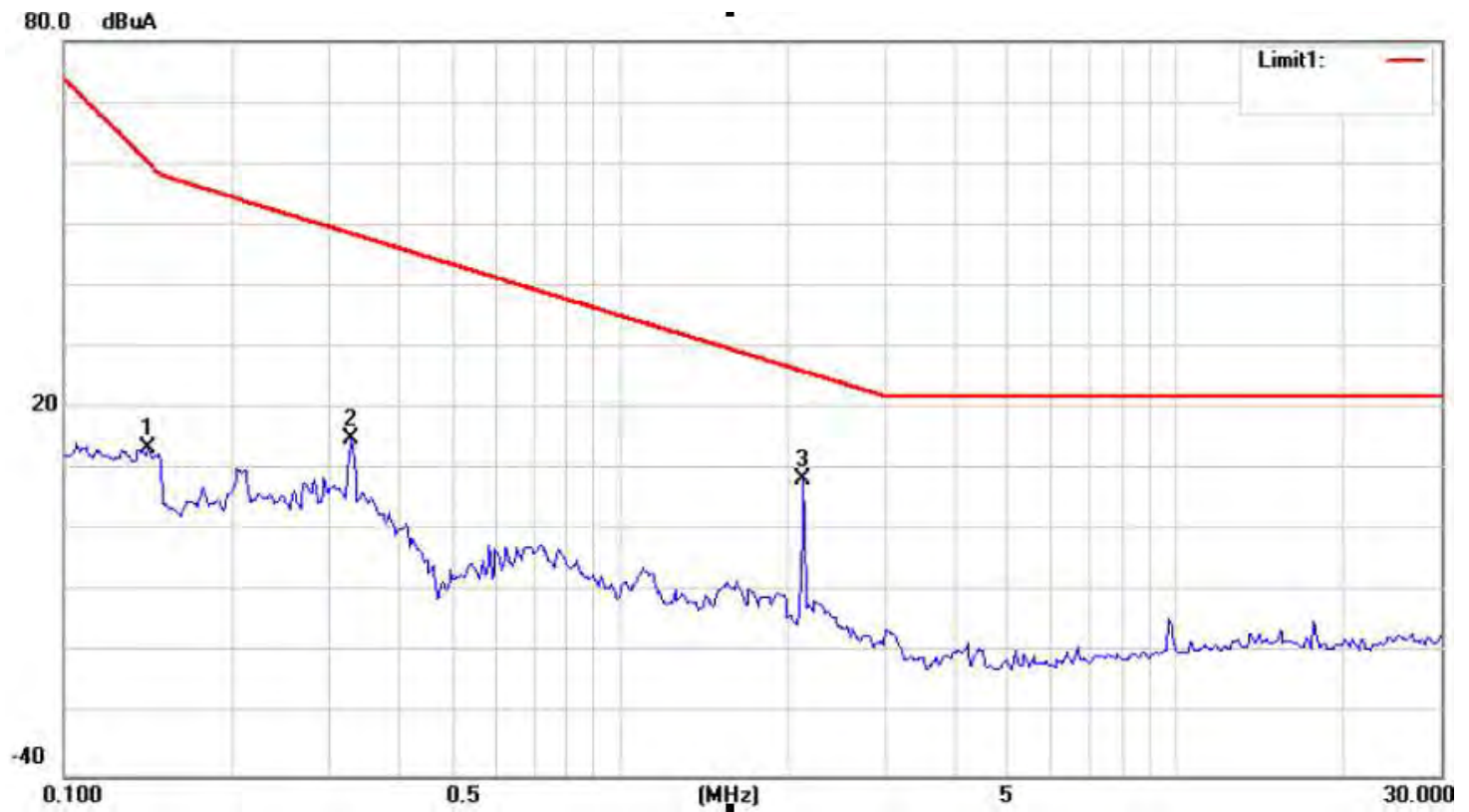
- 符合以上所有限值要求，则说明该灯具符合EN 62493 EMF要求。

3.测试限值的应用

EN 62493电源端骚扰20 kHz-30 MHz测试数据

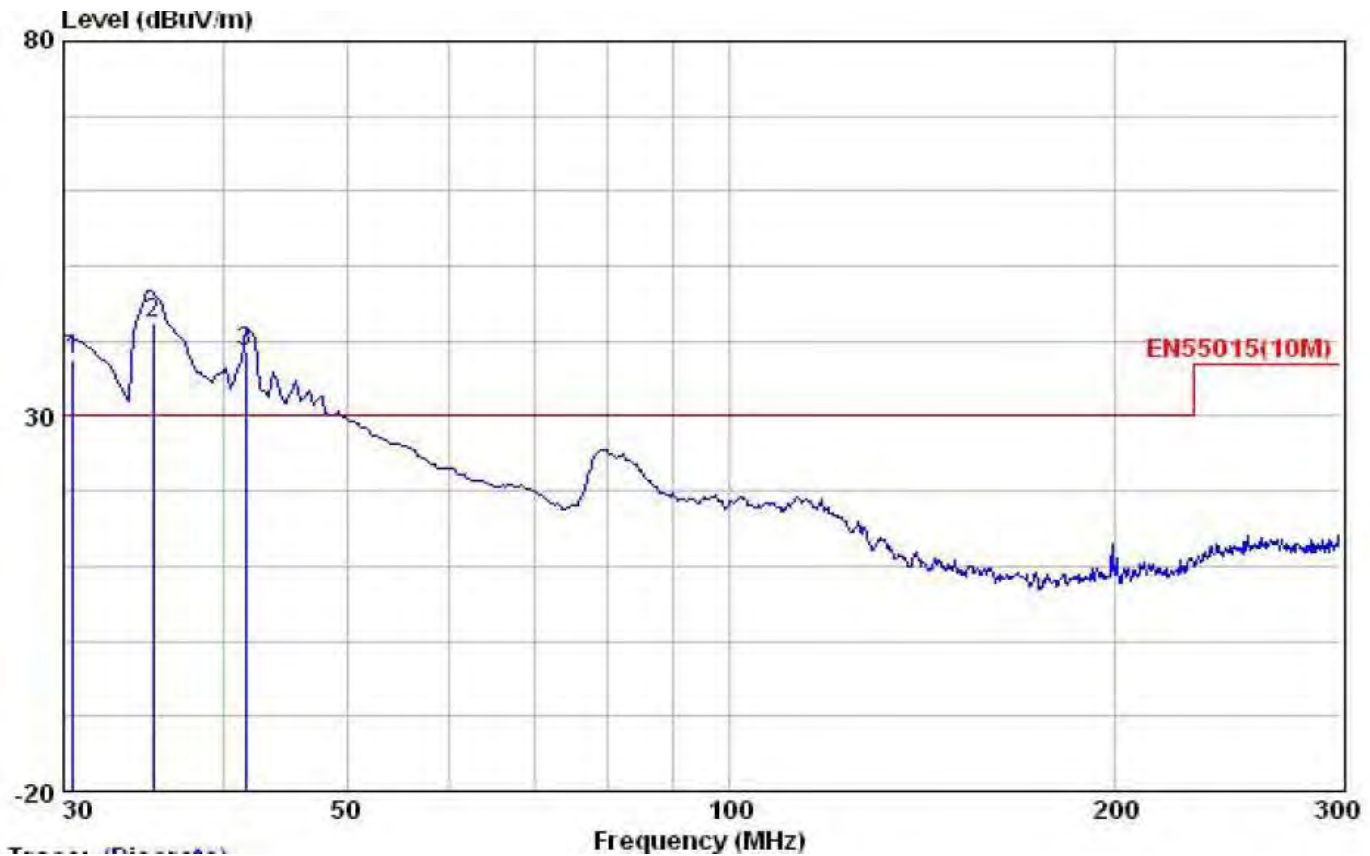


EN 62493电压辐射电磁场骚扰（低频段）100 kHz-30 MHz 测试数据



3.测试限值的应用

EN 62493电压辐射电磁场骚扰（高频段）30 MHz- 300 MHz测试数据



4.EN 62493和CISPR 15测试项目的异同点

测试项目	测试频率范围	
	CISPR15:2005+A1: 2006	EN 62493:2010
电源端骚扰电压	9 kHz -30 MHz	20 kHz -30 MHz
辐射电磁场骚扰 (低频段)	9 kHz -30 MHz	100 kHz -30 MHz
辐射电磁场骚扰 (高频段)	30 MHz - 300 MHz	30 MHz - 300 MHz
感应电流密度	N/A	20 kHz - 10 MHz

5. 感应电流密度测试

■ 一般要求

供电电压，测试频率范围，环境温度

测量设备要求

■ 测试程序

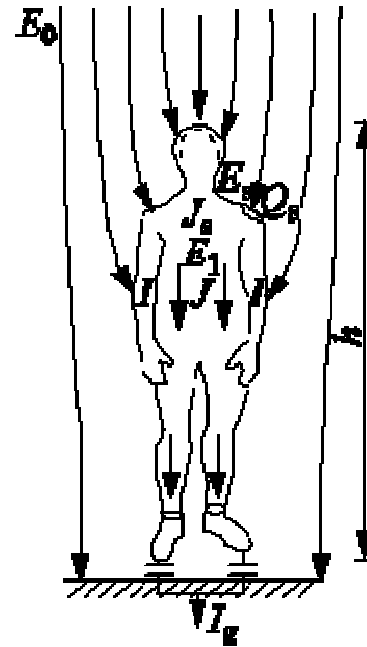
一般照明设备的工作条件

特殊照明设备的工作条件

测试距离

测试设置

测试探头的位置摆放



5. 感应电流密度测试

■ 一般要求

供电电压：最大额定工作电压的±2%范围内

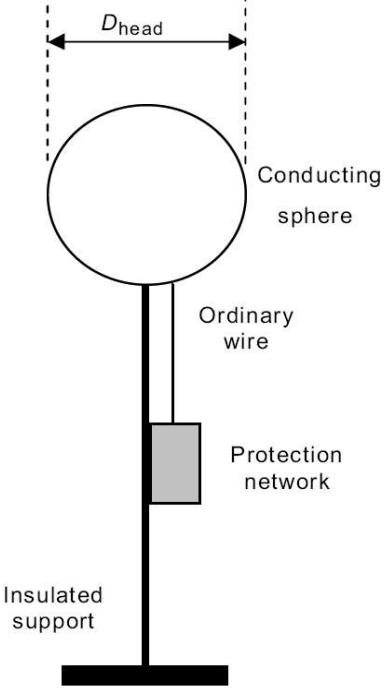

测试频率范围：20 kHz to 10 MHz

环境温度：15 °C to 25 °C .

测量设备要求：辐射CISPR 16-1-1的EMI测量接收机或频谱分析仪接手机或频谱分析仪的参数设置如下：

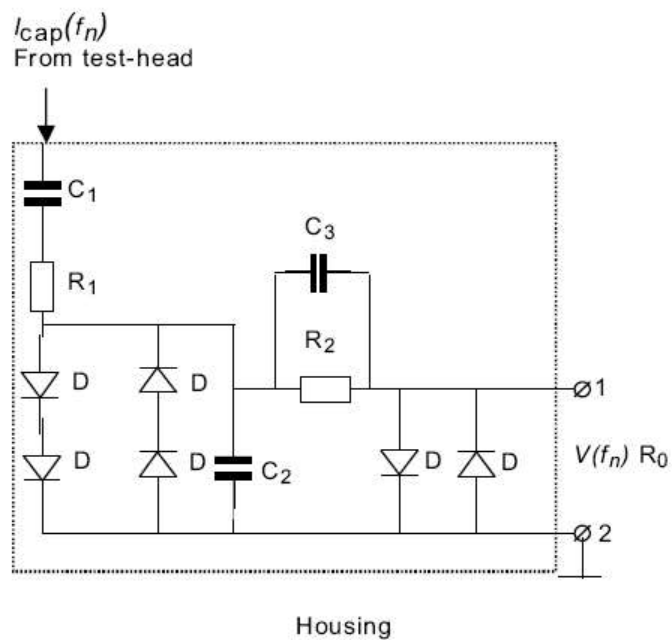
Frequency range	B_6 according to CISPR 16-1-1	Measurement time	f_{step}	Detector
20 kHz – 150 kHz	200 Hz	100 ms	220 Hz	Peak
150 kHz – 10 MHz	9 kHz	20 ms	10 kHz	Peak

5. 感应电流密度测试

“Van der Hoofden” test-head标准要求	“Van der Hoofden” test-head实物
 <p>Diagram illustrating the standard requirements for a “Van der Hoofden” test-head. The components are labeled as follows:</p> <ul style="list-style-type: none"> D_{head}: Diameter of the conducting sphere. Conducting sphere Ordinary wire Protection network Insulated support 	
<p>A “Van der Hoofden” test-head, as depicted in Figure 1, consists of a conducting sphere with an outside diameter of $D_{\text{head}} = 210 \text{ mm} \pm 5 \text{ mm}$ mounted on an insulated (e.g. wood, plastic) support and connected via an ordinary wire to a protection network.</p>	

5. 感应电流密度测试

保护网络实物

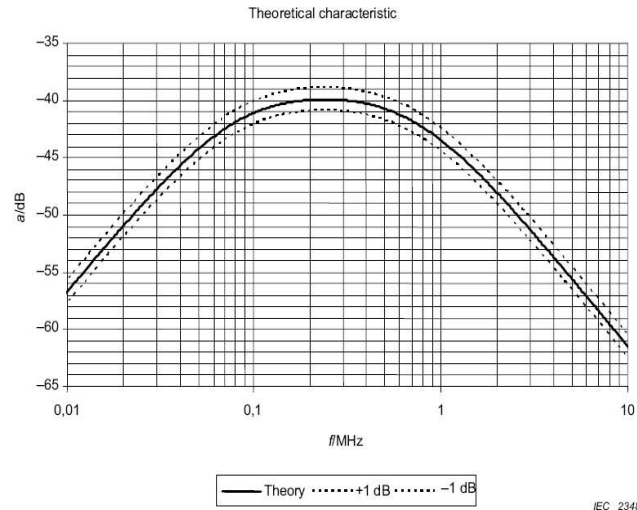


保护网络实物



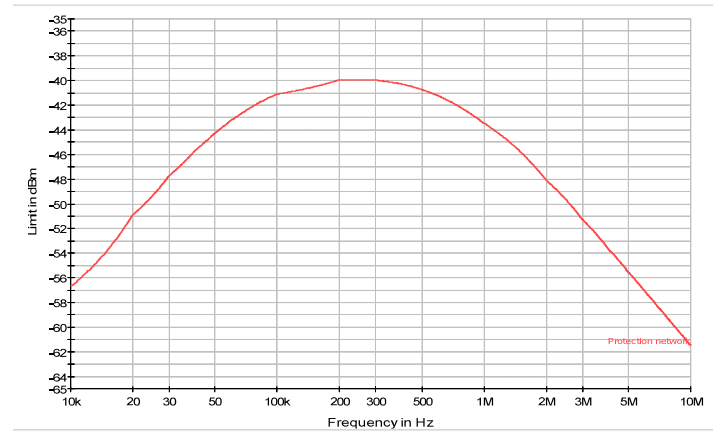
5. 感应电流密度测试

保护网络特性曲线标准要求



The maximum allowed deviation in the picture is set to ± 1 dB.

保护网络实际校准曲线



5. 感应电流密度测试

■ 测试程序

● 一般照明设备的工作条件

灯泡需要老化100个小时

测试前，不同灯具需要稳定的时间不同。

- 15 min. for fluorescent lamps;
- 30 min. for other discharge lamps.

● 特殊照明设备的工作条件

Multiple lamp lighting equipment: When the lighting equipment incorporates more than one lamp, **all lamps** shall be operated **simultaneously**.



5. 感应电流密度测试

■ 特殊照明设备的工作条件（接上）

- Self-contained emergency lighting equipments: If the appliance can be connected and be operated from the mains it shall be tested in this mode of operation. **No tests are required in the battery-operating mode.**
- Lighting equipment capable of light regulation shall be measured at both the **maximum and minimum** limit of light regulation.
- Measurements shall be carried out within **$\pm 2\%$** of the rated supply voltage.
- In the case of a voltage range, measurement shall be carried out within **$\pm 2\%$ of minimum and maximum** nominal supply voltage of that range.

5. 感应电流密度测试

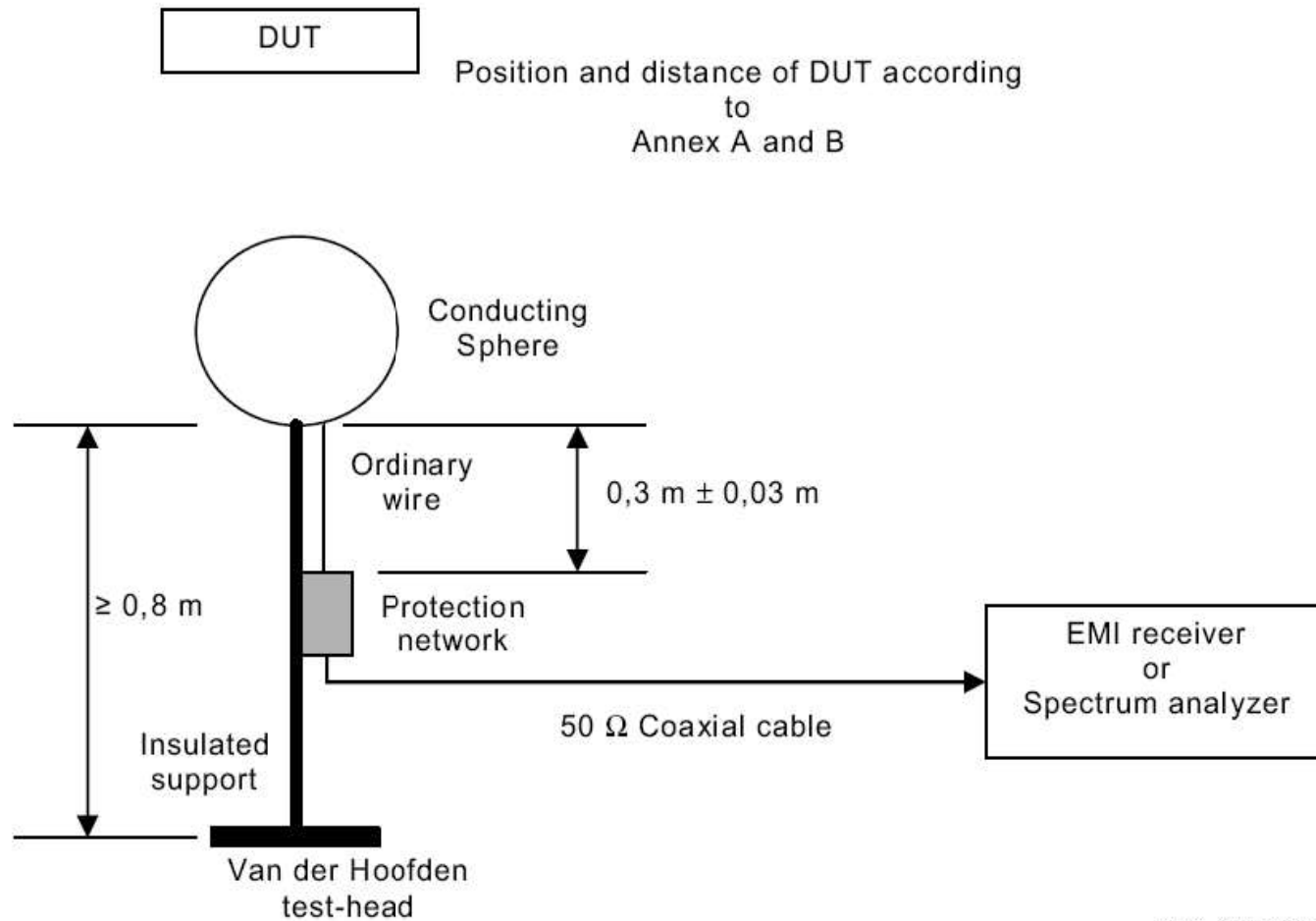
- 测试距离
- 不同照明设备类型，测试距离不同。例如：



照明设备类型	测量距离 (cm)
手持灯	5
桌面灯	30
壁灯	50
吊灯	50
输入功率 $\leq 180\text{W}$ 的天花和/或嵌入式荧光灯	50
输入功率 $> 180\text{W}$ 的天花和/或嵌入式荧光灯	70
输入功率 $\leq 180\text{W}$ 的天花和/或嵌入式放电灯	70
输入功率 $> 180\text{W}$ 的天花和/或嵌入式荧光灯	100

5. 感应电流密度测试

■ 测试设置



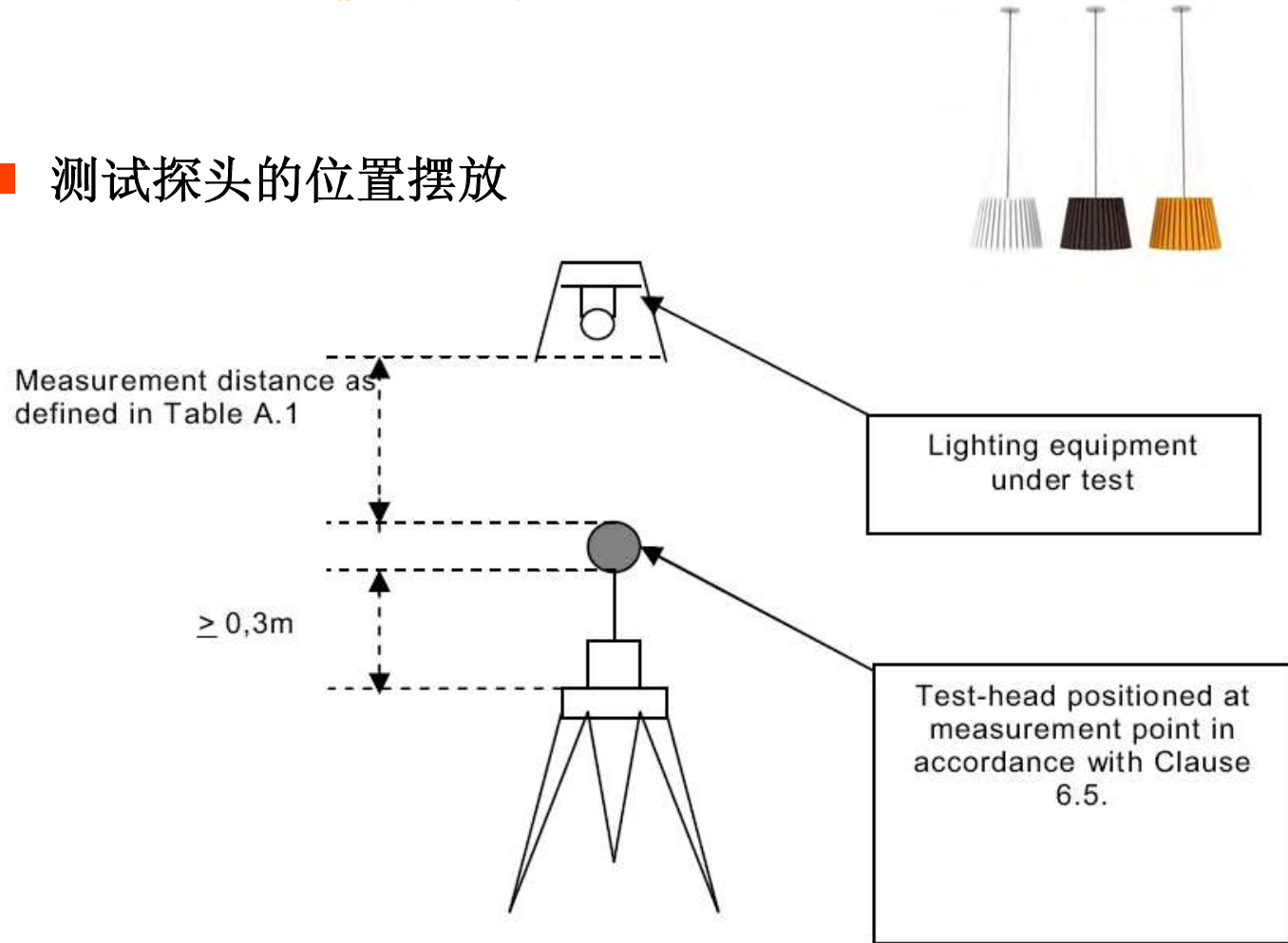
5. 感应电流密度测试

■ 测试设置

- DUT = device under test.
- NOTE The EMI receiver or spectrum analyzer must be powered by mains including protective earth.
- If the lighting equipment is provided with an **earthing terminal**, the lighting equipment shall be connected by means of an earth conductor contained in the power cable to the lighting equipment.
- During the tests **no conductive plane or object or human** being should be closer to the lighting equipment than **0,8 m**.
- The height of the insulated support is minimum **0,8 m**. The conducting sphere is connected to the protection network via an ordinary wire of length **30 cm ± 3 cm**. The protection network is then connected to the EMI receiver, or spectrum analyser, by a 50 Ω coaxial cable having a maximum cable loss of 0,2 dB and a d.c. resistance of $\leq 10 \Omega$.

5. 感应电流密度测试

■ 测试探头的位置摆放



IEC 2334/09

Figure B.1 – Typical measurement arrangement

5. 感应电流密度测试

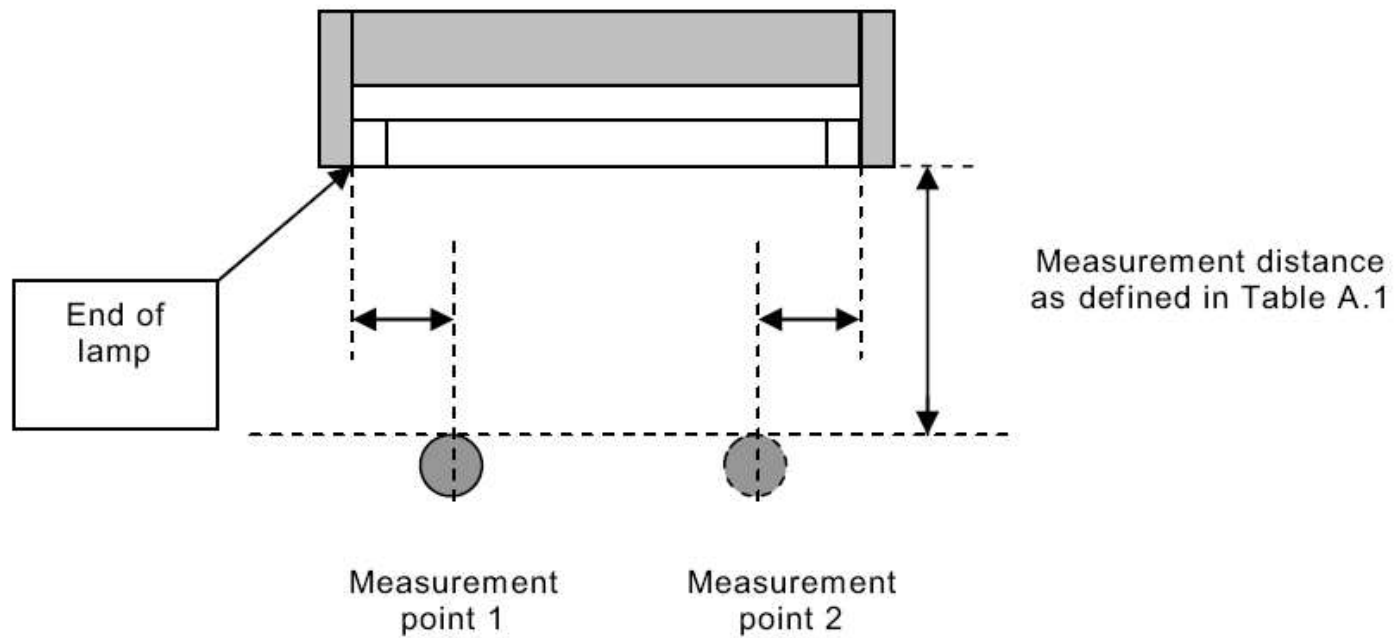


Figure B.2a –双灯帽荧光灯（嵌入式，墙面或管道安装）测量点的位置

5. 感应电流密度测试

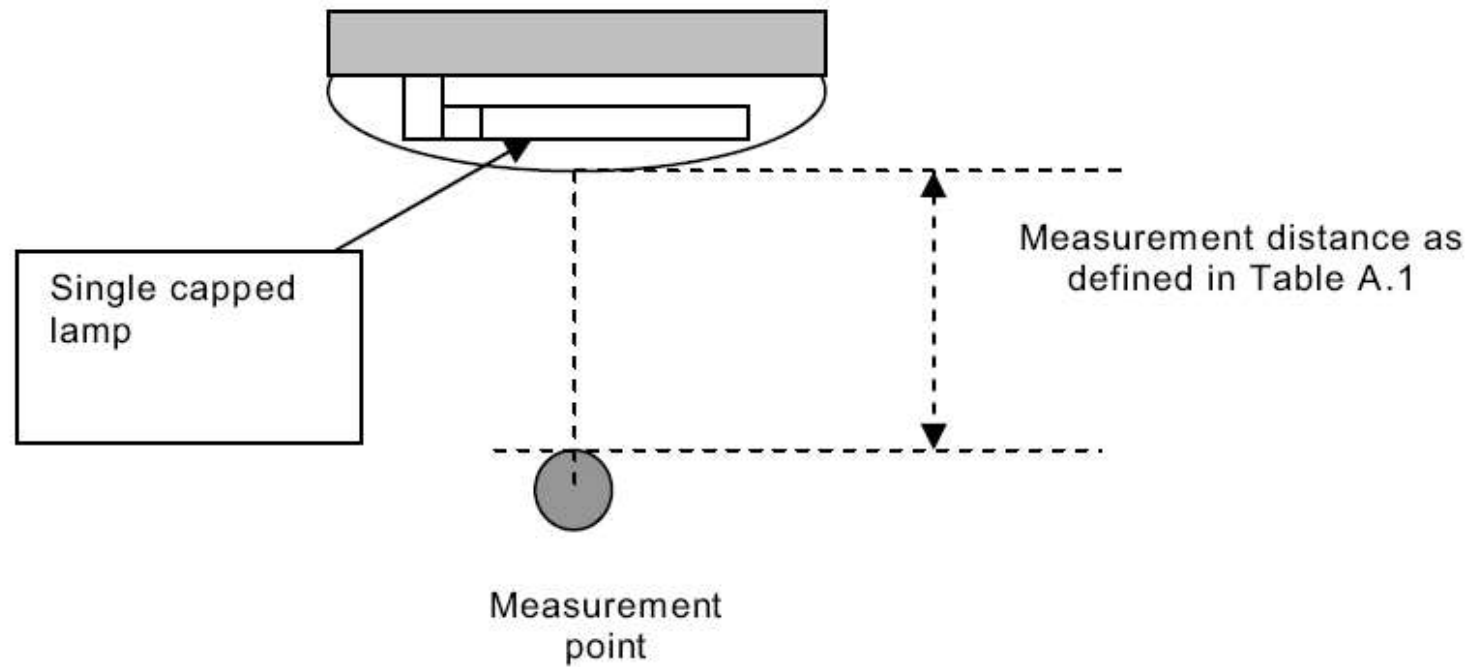


Figure B.2b –单灯帽荧光灯（嵌入式，墙面或管道安装）测量点的位置

5. 感应电流密度测试

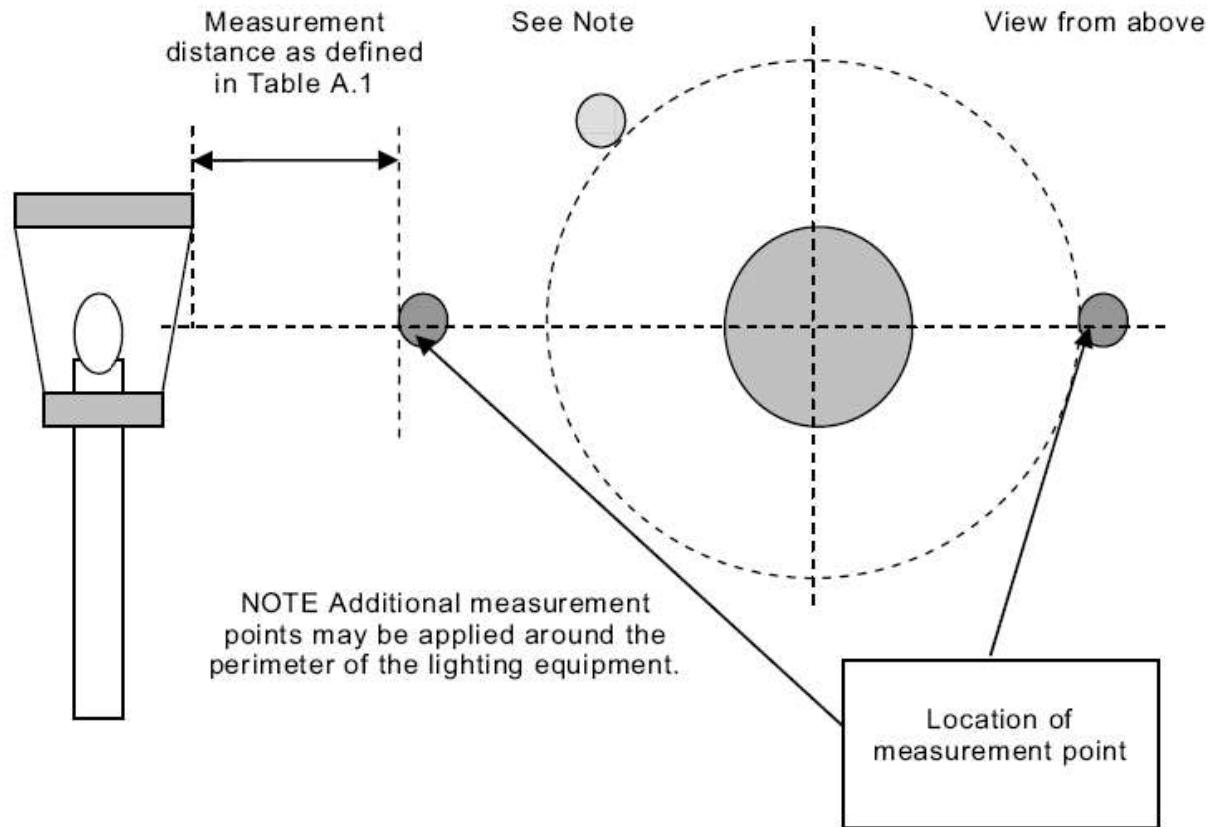


Figure B.2c –单灯帽照明设备测量点的位置（360°照明）

5. 感应电流密度测试

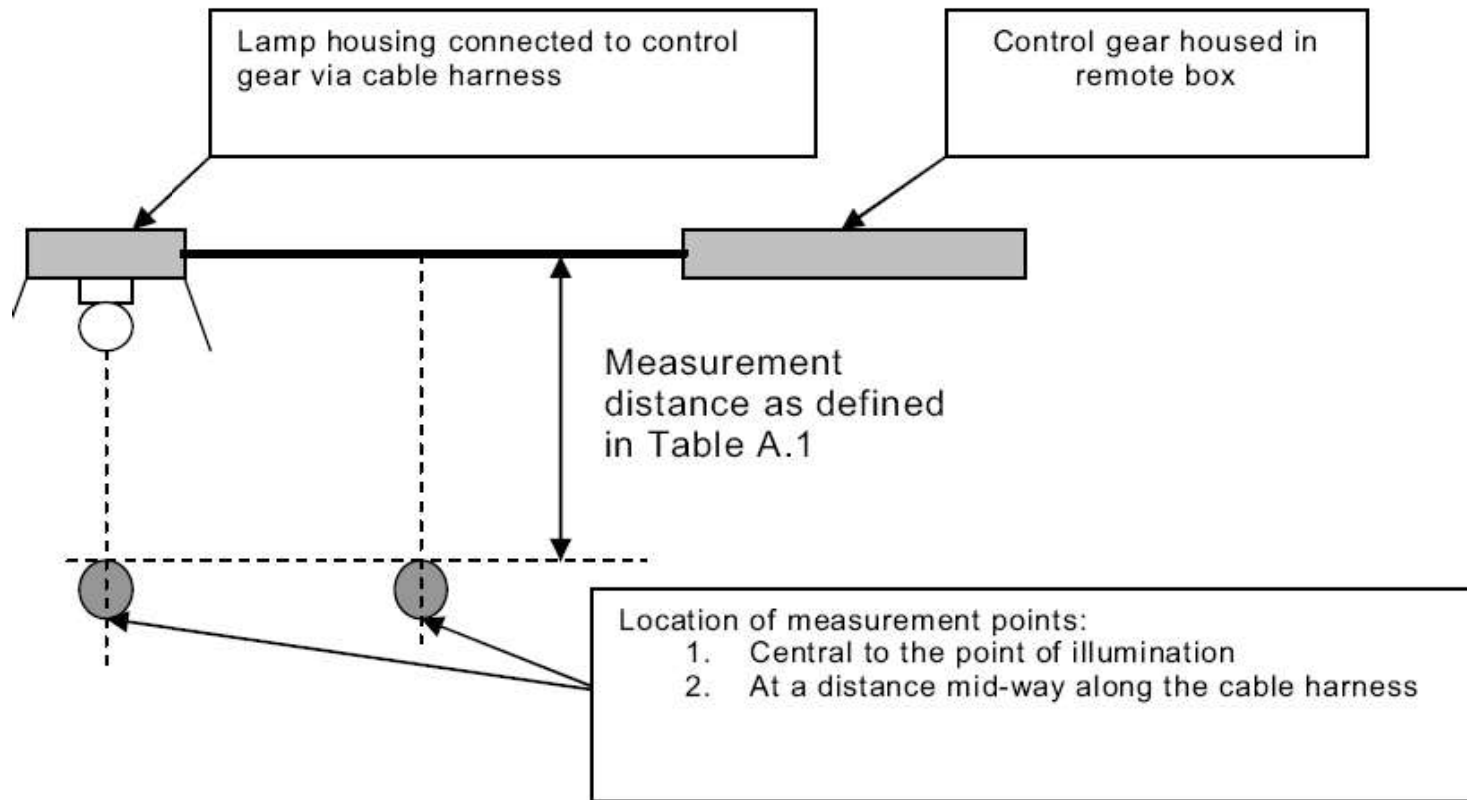


Figure B.2d –带远端电子控制装置照明设备测量点的位置

5. 感应电流密度测试

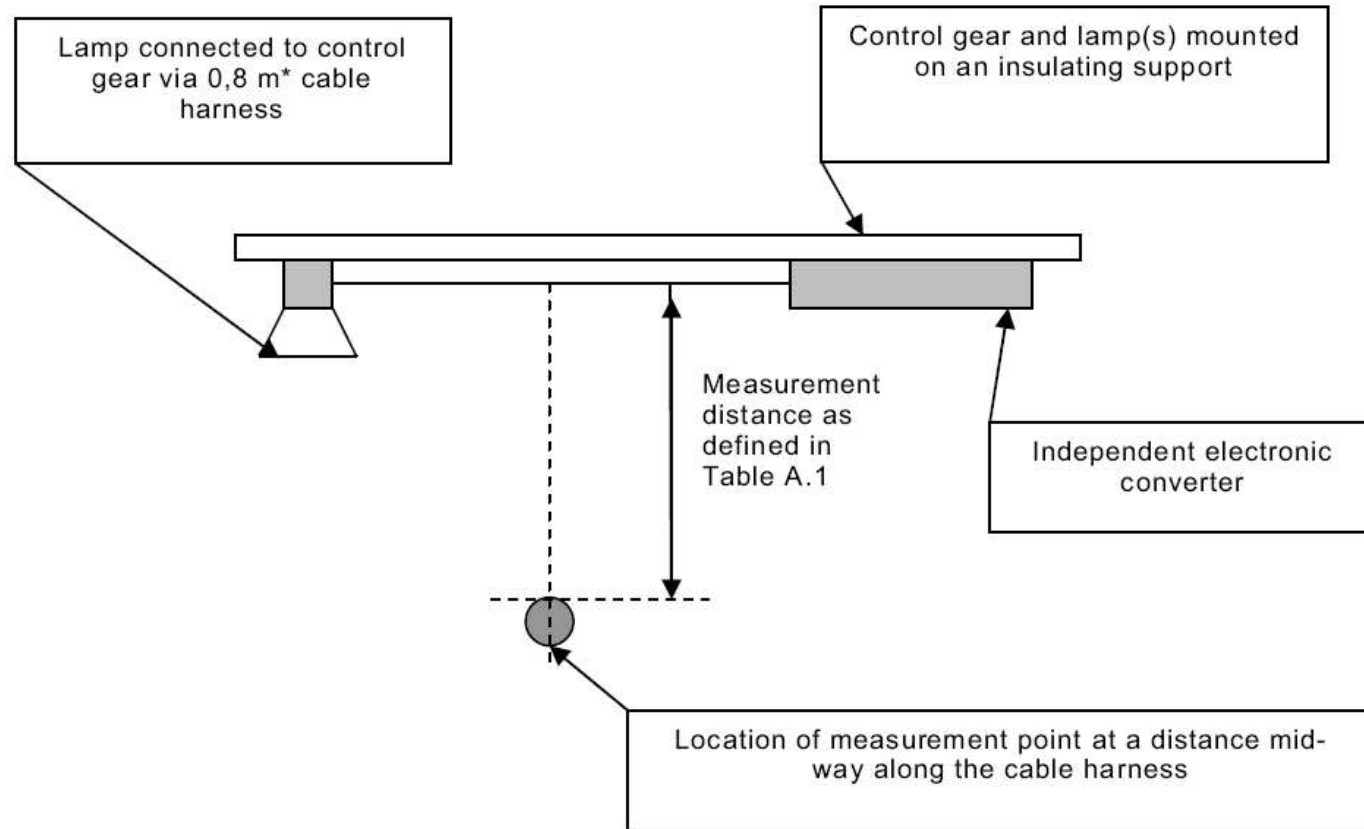


Figure B.2e –独立电子控变换器测量点的位置

5. 感应电流密度测试

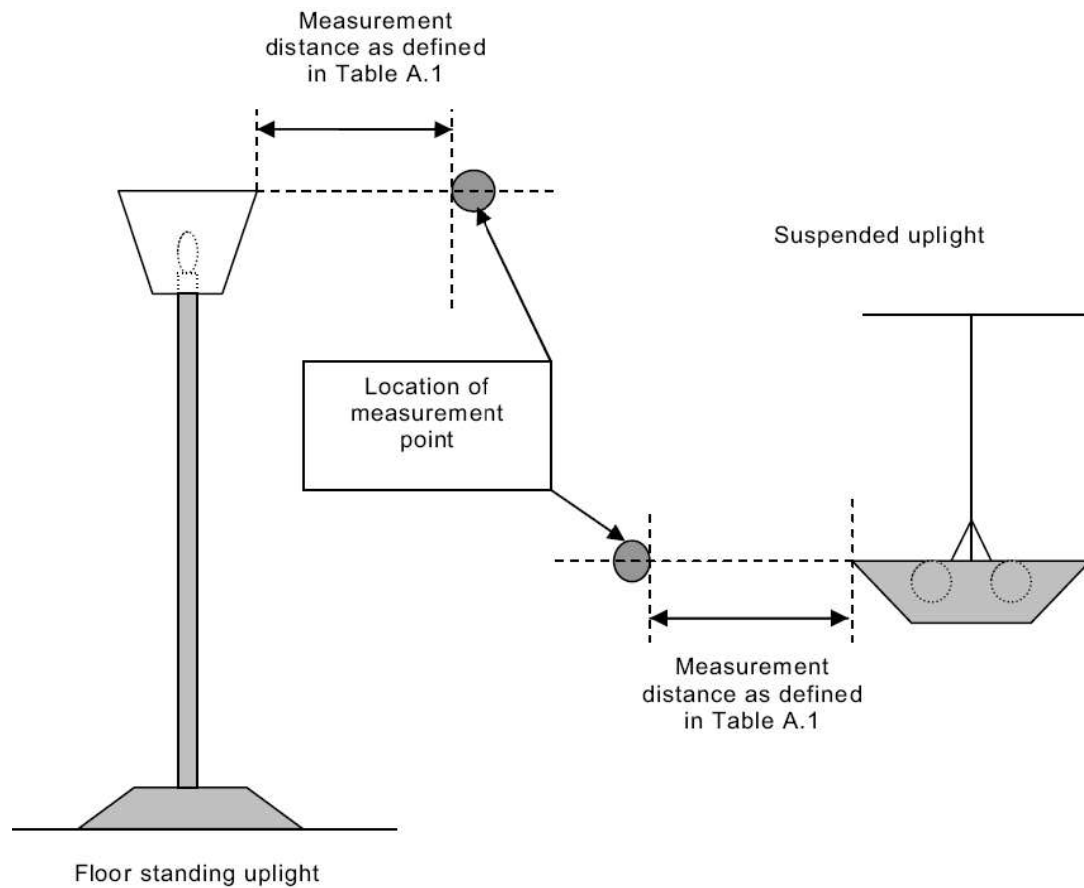


Figure B.2f –落地式照明设备测量点的位置

6. 感应电流密度测量实例

- 产品1，测试距离50 cm



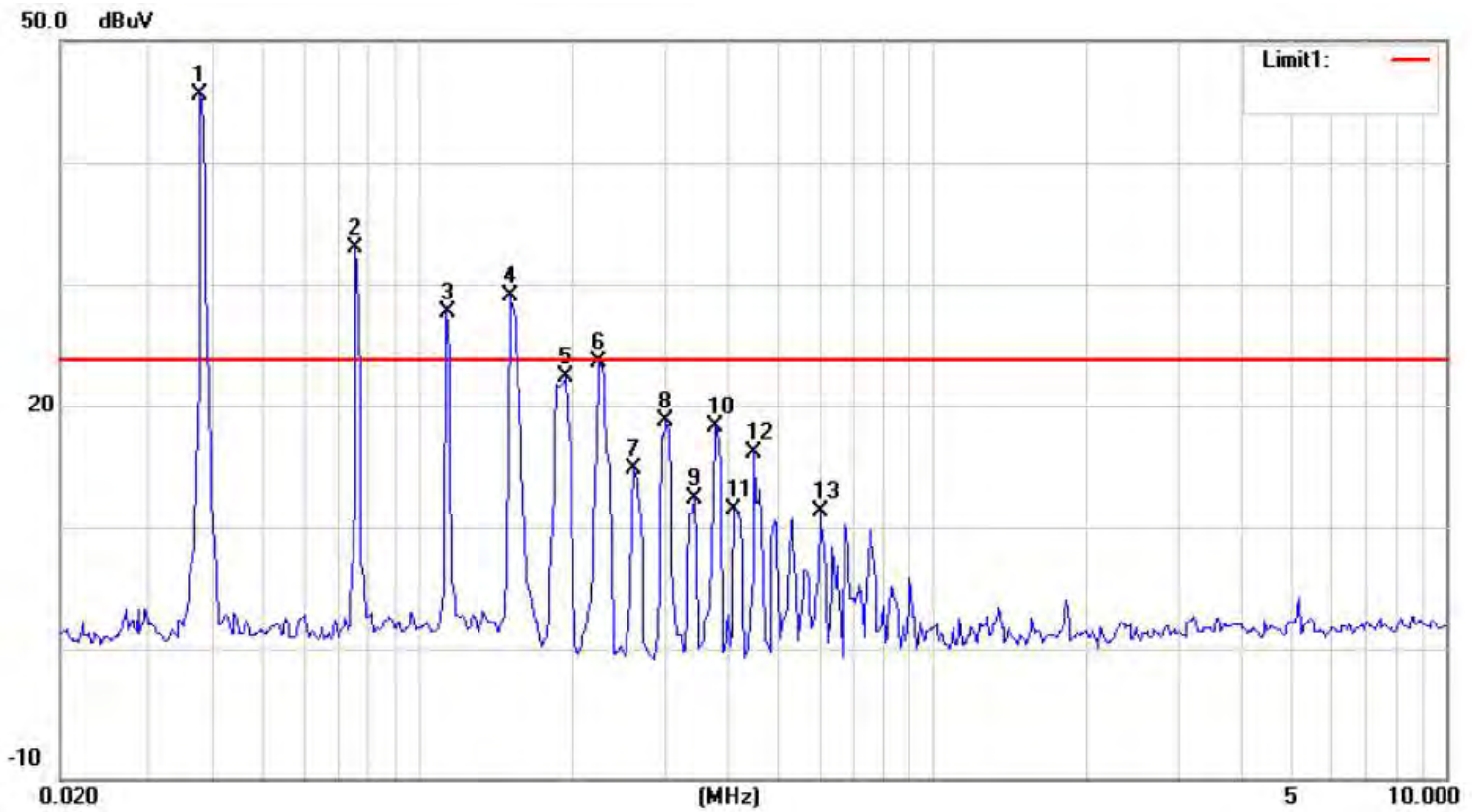
6. 感应电流密度测量实例

- 产品2，测试距离30 cm



6. 感应电流密度测量实例

■ Calculation of the results 结果计算



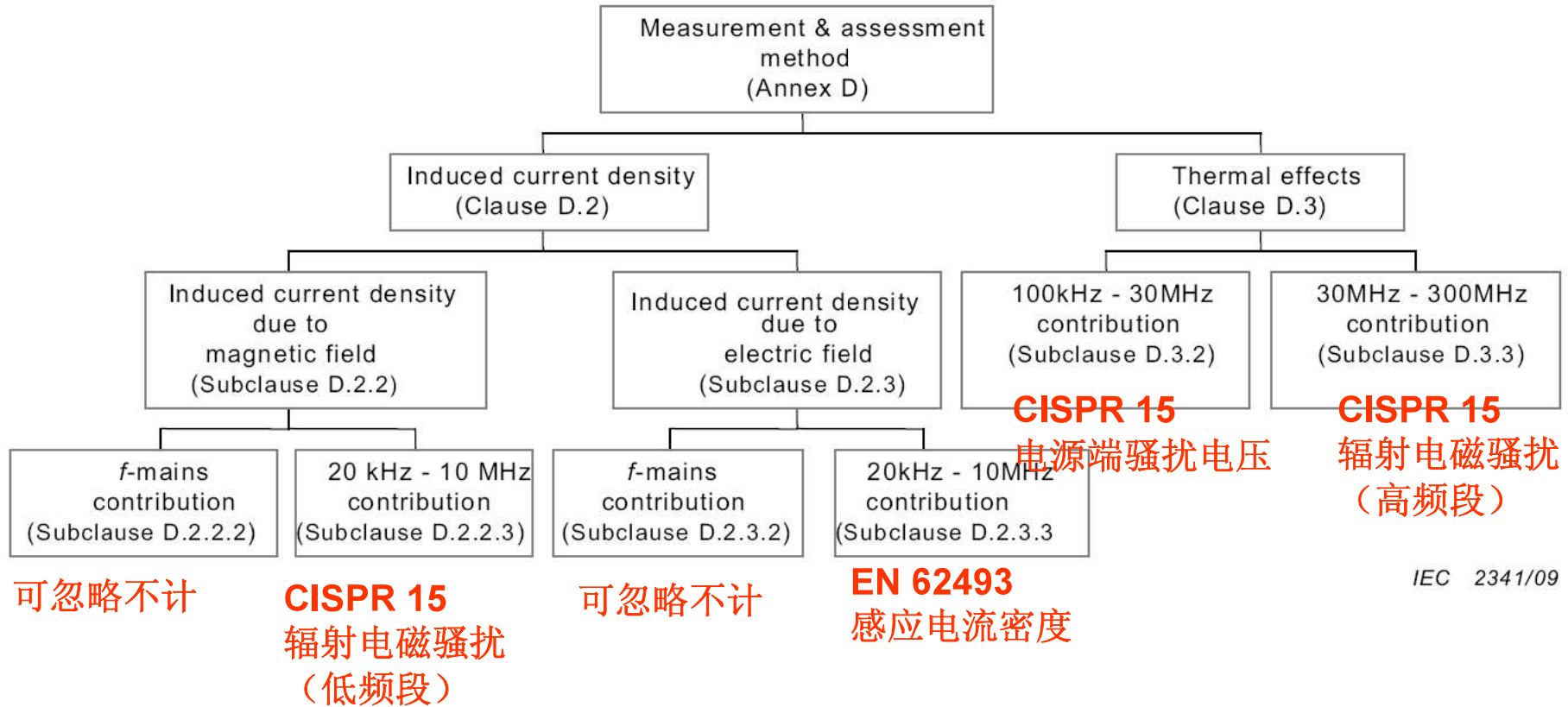
6. 感应电流密度测量实例



■ Calculation of the results 结果计算

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.0376	45.52	0.00	45.52	24.00	21.52	peak	
2	X	0.0754	33.14	0.00	33.14	24.00	9.14	peak	
3	X	0.1131	27.92	0.02	27.94	24.00	3.94	peak	
4	X	0.1500	29.20	0.06	29.26	24.00	5.26	peak	
5		0.1930	22.50	0.12	22.62	24.00	-1.38	peak	
6		0.2242	23.64	0.12	23.76	24.00	-0.24	peak	
7		0.2633	14.96	0.10	15.06	24.00	-8.94	peak	
8		0.3023	18.96	0.08	19.04	24.00	-4.96	peak	
9		0.3453	12.72	0.06	12.78	24.00	-11.22	peak	
10		0.3766	18.56	0.05	18.61	24.00	-5.39	peak	
11		0.4117	11.86	0.04	11.90	24.00	-12.10	peak	
12		0.4508	16.50	0.05	16.55	24.00	-7.45	peak	
13		0.6031	11.64	0.05	11.69	24.00	-12.31	peak	

■ 经测试软件计算： $F=0.53 < 0.85$



Thank You!

- 广州极端机械科技有限公司
- 广州市天河区中山大道中235号
- Tel/Fax: 020-34898196 / 020-34709296
- Email: ET5117@gmail.com
- Http: www.extreme-china.com