資訊產品電磁干擾各國相關規格及 LIMIT

美國 FCC (old rule)								
輻射 Radiation			傳導 Conduction					
Category (Test distance)	Class A (10m)	Class B (3m)	Category	Class A	Class B			
Frequency(MHz)	Limit(dBuV/m)	Limit(dBuV/m)	Frequency(MHz)	Limit(dBuV)	Limit(dBuV)			
---	Q.P.	Q.P.	---	Q.P.	Q.P.			
30-88	39	40	0.45-1.705	60	48			
88-216	43.5	43.5	1.705-30	69	48			
216-960	46.4	46	Standard: CFR 47 Part 15, Subpart B· Power: 120Vac, 60Hz					
960 以上	49.5	54	Class A 用於商業及工業場所之產品, Class B 用於住宅區之產品					

歐聯 CE, 澳洲 AS, 紐西蘭 NZS, 日本 VCCI, 中華民國 BCIQ, 美國 FCC(New rule)															
輻射 Radiation			傳導 Conduction					傳導 Conduction(common mode)							
Category (Test distance)	Class A (10m)	Class B (3m)	Category	Class A		Class B		Class A		Class B		Class A		Class B	
Frequency (MHz)	Limit (dBuV/m)	Limit (dBuV/m)	Frequency (MHz)	Limit (dBuV)		Limit (dBuV)		Limit (dBuV)		Limit (dBuV)		Limit (dBuA)		Limit (dBuA)	
---	Q.P.	Q.P.	---	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG
30-230	40	30	0.15-0.5	79	66	66-56	56-46	97-87	84-74	84-74	74-64	53-43	40-30	40-30	30-20
23-1000	47	37	0.5-5	73	60	56	46	87	74	74	64	43	30	30	20
			5-30	73	60	60	50	87	74	74	64	43	30	30	20
Standard: EN55022(歐聯, pwr:230Vac/50Hz), AS/NZS3548(紐澳 pwr:230Vac/50Hz), V-3(日本 pwr:100Vac/50Hz), CNS13438(中華民國 pwr:120Vac/60Hz)															
Q.P.: Quasi-peak; AVG: Average															

** Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports

** Define: telecommunication ports

Ports which are intended to be connected to telecommunication networks (e.g. public switched telecommunication networks, integrated services digital networks), local area networks (e.g. Ethernet, Token Ring) and similar networks.

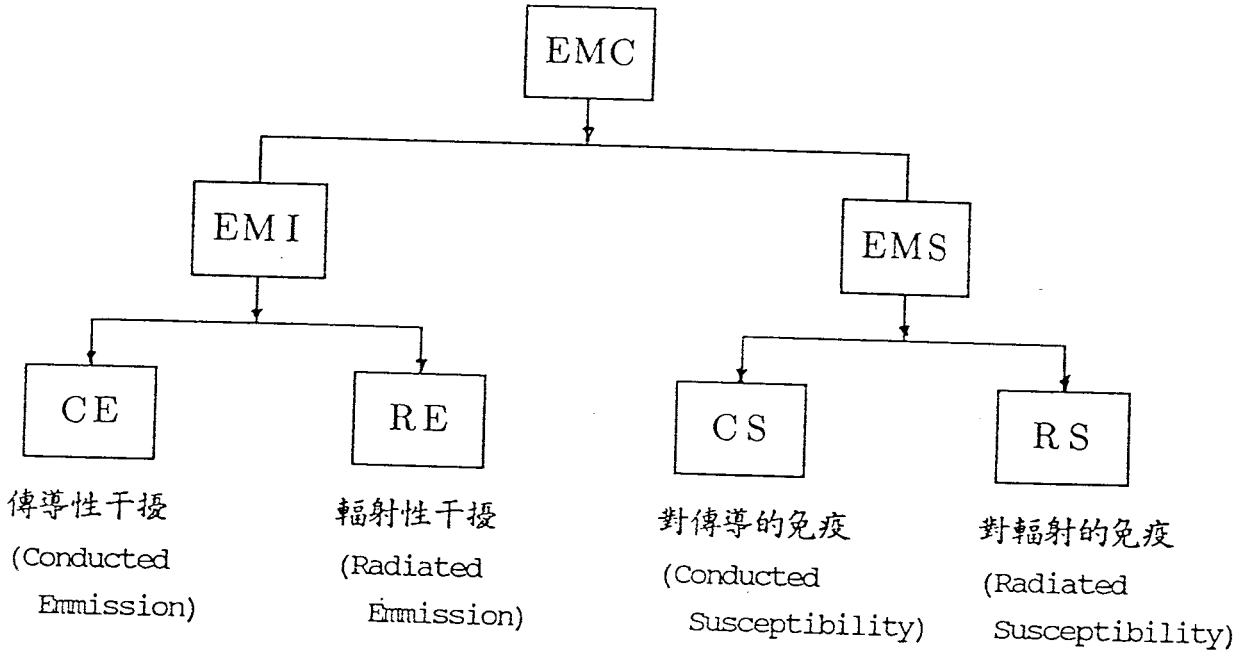


圖 1-9 EMI／EMS與EMC 的分類

1 - 1 - 7. EMS(susceptibility) 與『電磁感受性(imunity) 』的關係

EMS 是指電磁免疫性，而imunity 是指『感受性』，當然感受性是愈低愈好。兩者間的關係如(1-1) 式。

$$『電磁感受性(imunity)』 = \frac{1}{『電磁免疫性(susceptibility),EMS』} \quad (1-1)$$

世界主要國家有如圖 1-10 的各種單位制訂相關規格。

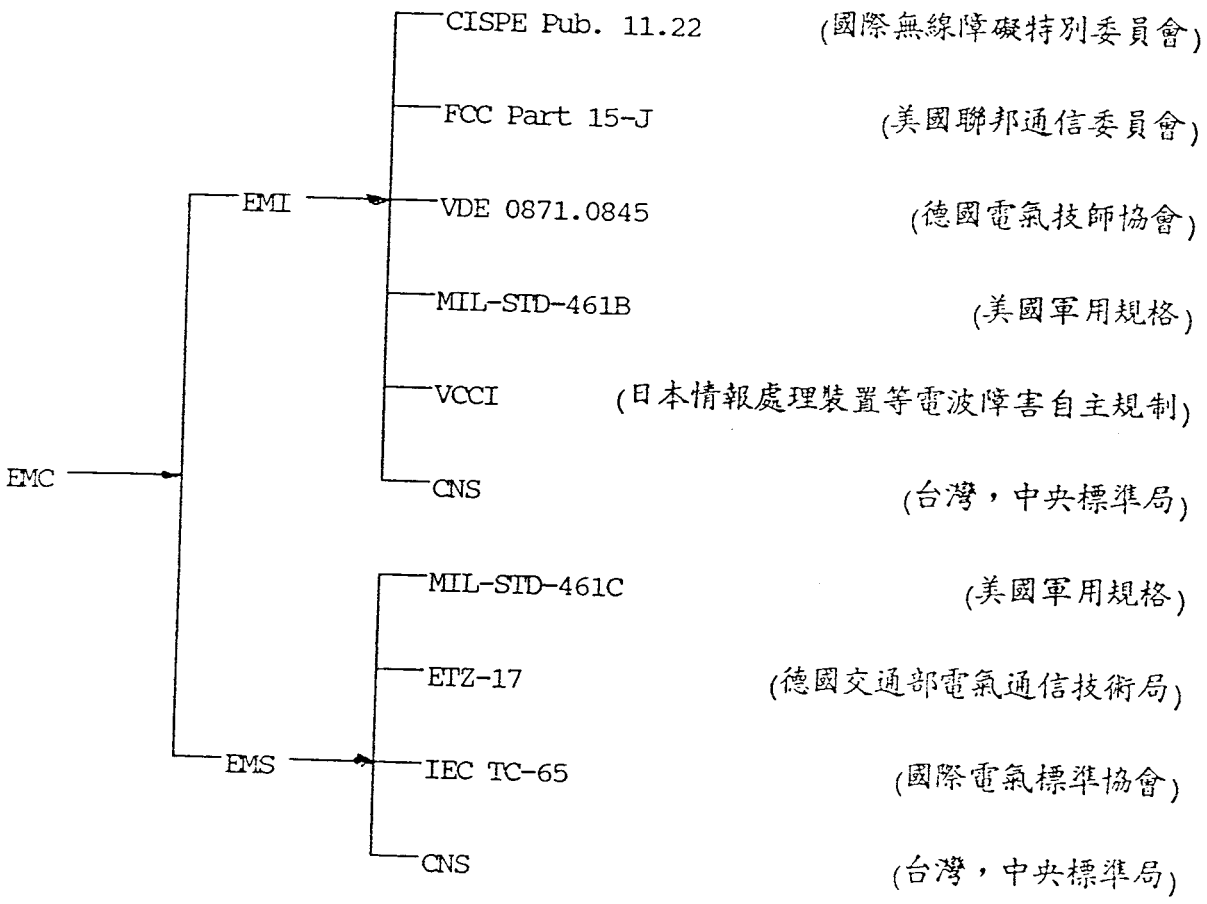


圖 1-10 世界各國有關電磁障礙的規格

1 - 2. EMS 試驗

1 - 2 - 1. EMS 標準適用順序分類

EMC 標準分為三級，即基本標準(basic standard)、一般標準(generic standard)、及產品標準(product standard)，三者中的適用順序(priority)如圖 1-11 。目前標準並不全，但由該圖可知，如果產品標準或產品群(family)標準頒佈，則屬於第一優先(highest priority)適用。其次是次高優先(second priority) 適用一般標準。

圖 2-1 人體帶電

表 2-2[1]

動作	相對濕度		
	10 %	40 %	55 %
1) 在地毯上走動	35,000 V	15,000 V	7,500 V
2) 在塑膠地磚上走動	12,000	5,000	3,000
3) 工作台操作員	6,000	800	400
4) 由塑膠管移開雙排裝IC	2,000	700	400
5) 由塑膠袋移開雙排裝IC	11,500	4,000	2,000
6) 由海綿體移開雙排裝IC	14,500	5,000	3,500
7) 移開印刷電路板 (PWB) 上的海綿包封	26,000	20,000	7,000
8) 將PWB 包裝內襯海綿箱	21,000	11,000	5,500

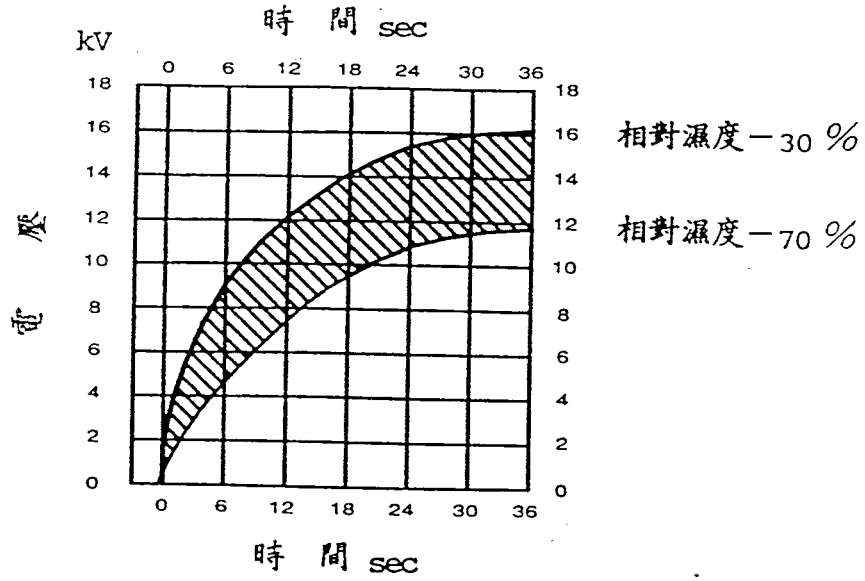


圖 2-2 相對濕度對帶電荷的影響

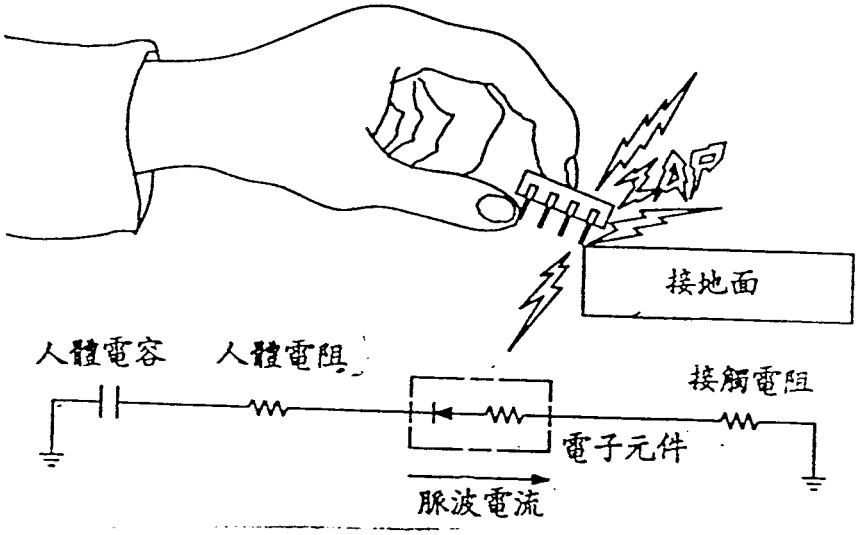


圖 2-3 電子零件靜電荷放電時的等效電路 (人體帶靜電電荷)

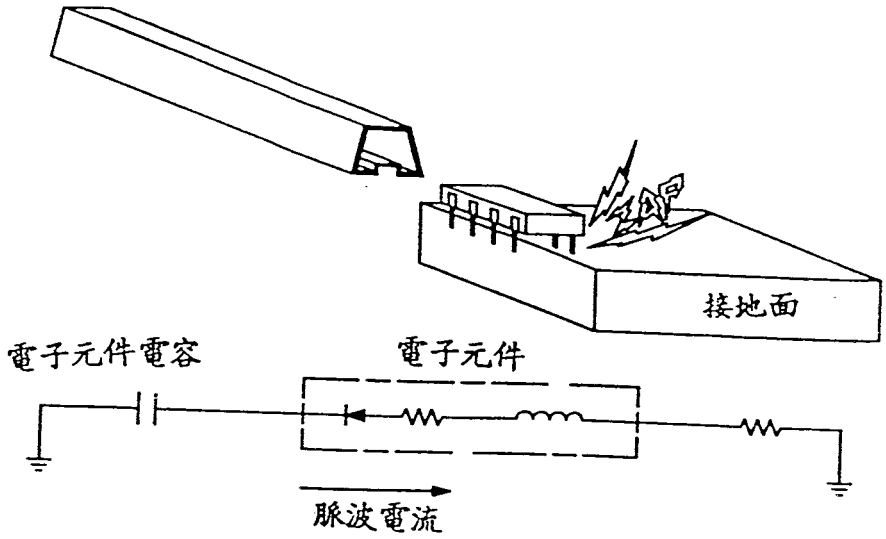


圖 2-4 電子零件靜電荷放電時的等效電路 (物體帶靜電電荷)

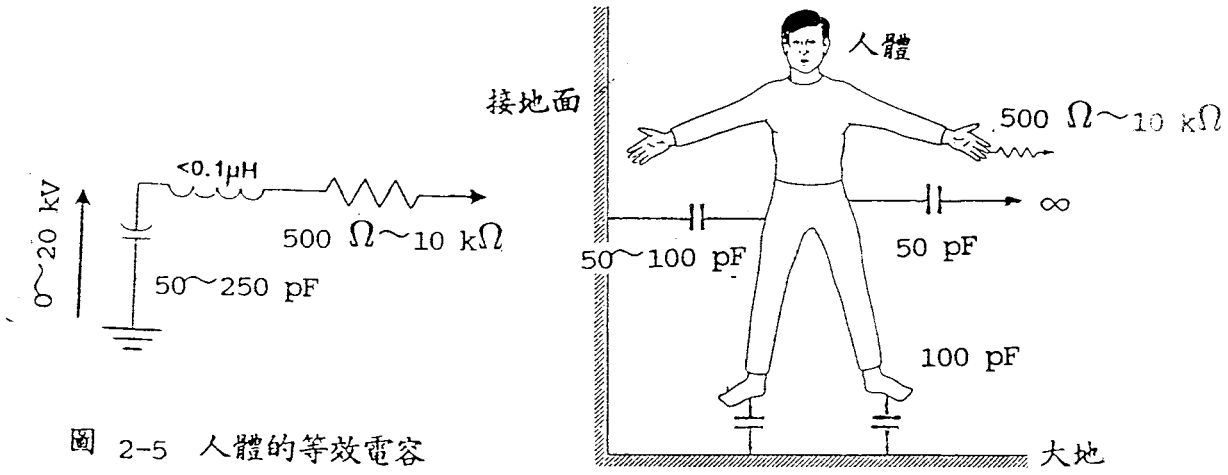


圖 2-5 人體的等效電容

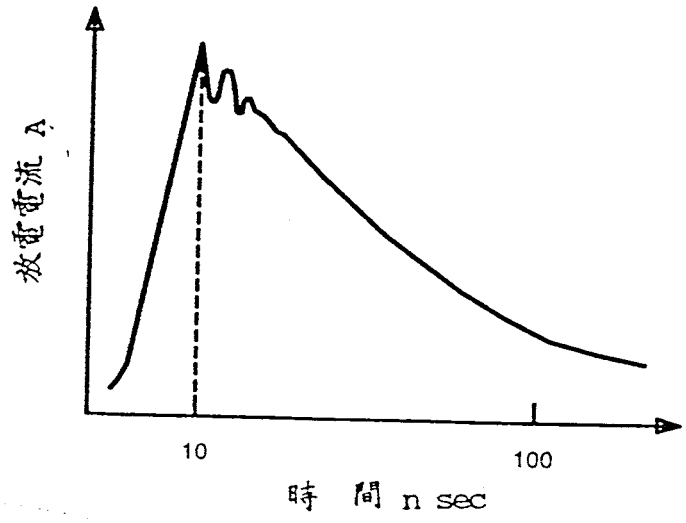
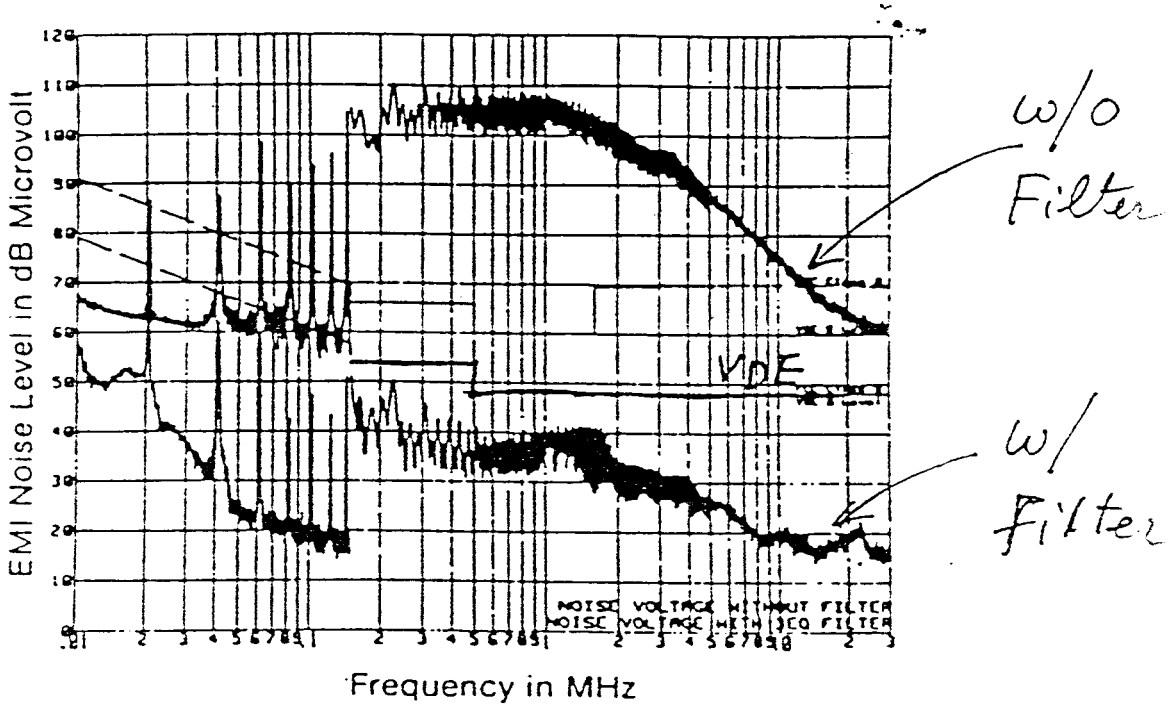


圖 2-6 由模擬人體的放電脈波電流波形例 (參考圖 2-3)

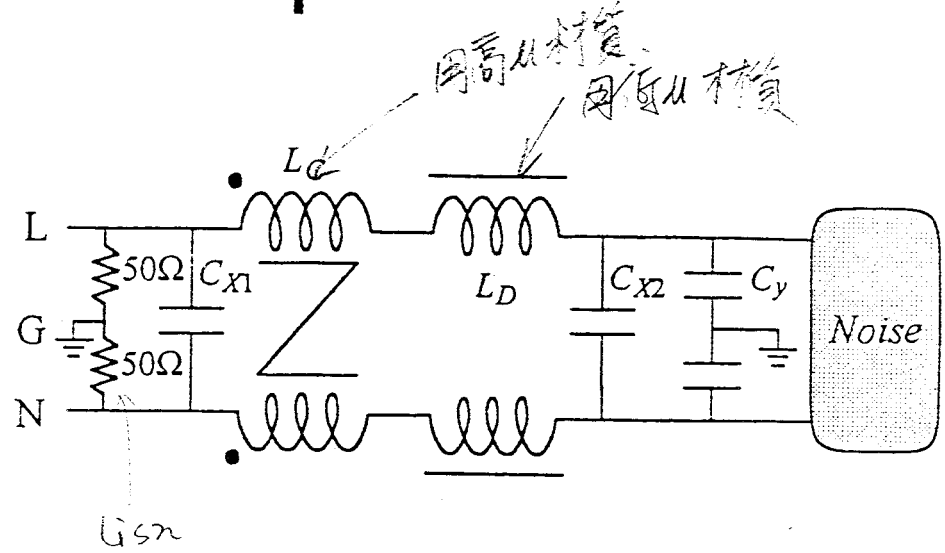
Conducted EMI Test

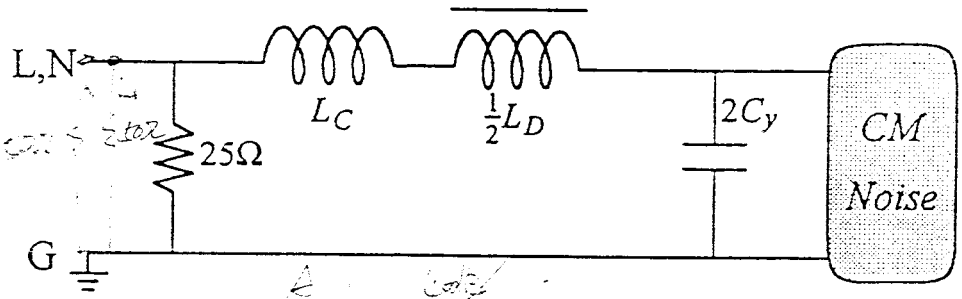


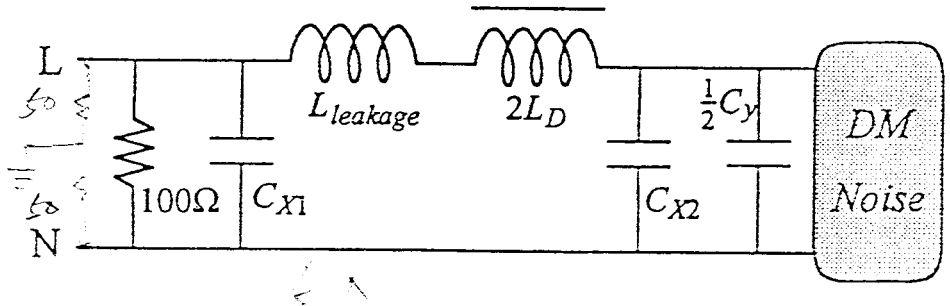
- Measurement bandwidth changes (RBW) at 150 KHz

  10K Hz - 150 KHz, RBW = 200 Hz
  150 KHz - 30 MHz, RBW = 9 KHz

Filter Equivalent Circiuts







Tests Using a Noise Separator

Test # 1: No filter is inserted.

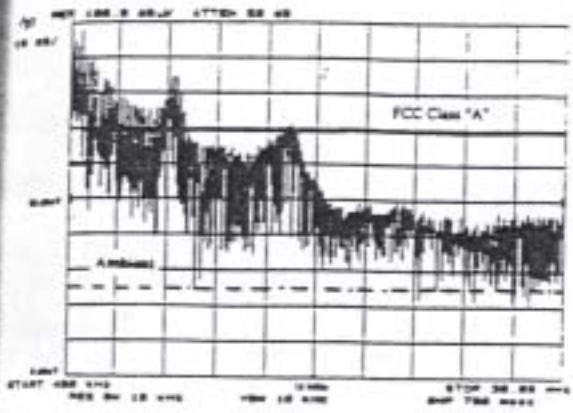


Figure 5(a) Total Noise

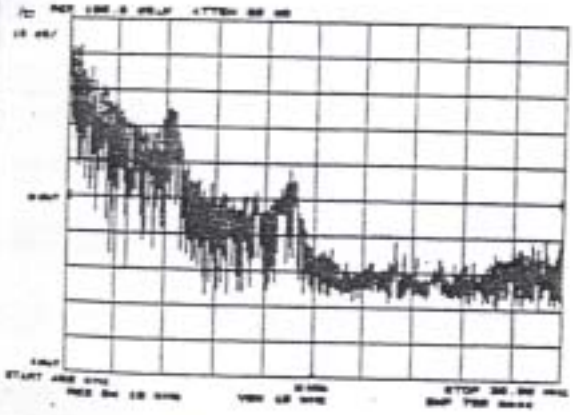


Figure 5(b) DM Noise

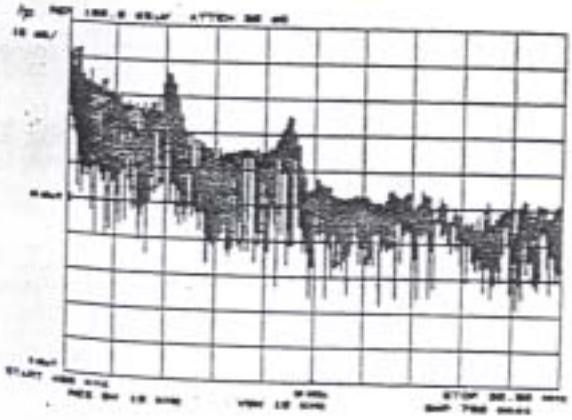


Figure 5(c) CM Noise

Test # 2: "Tests Using Noise Separator"

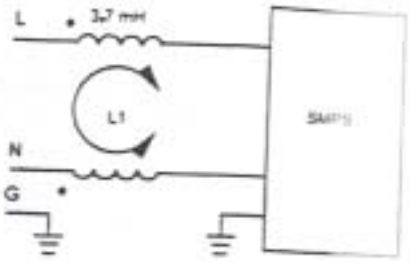


Figure 6(a) Test 2 Diagram

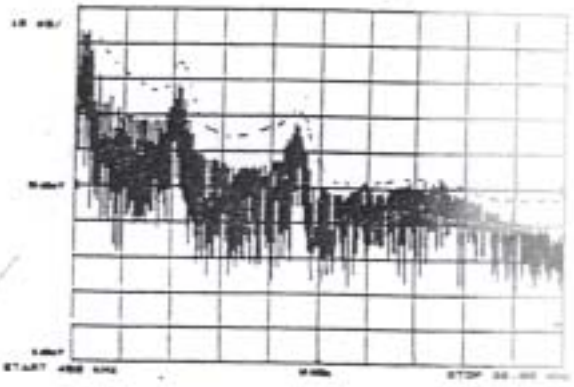


Figure 6(b) Total Noise

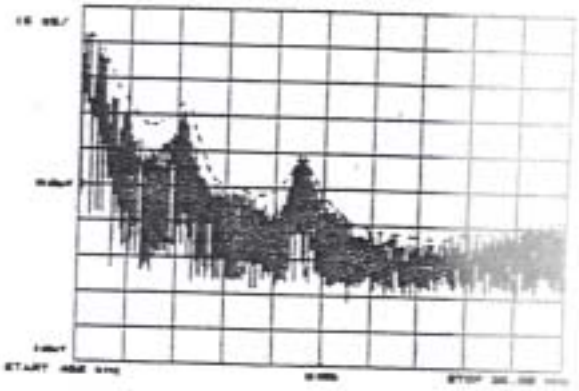


Figure 6(c) DM Noise

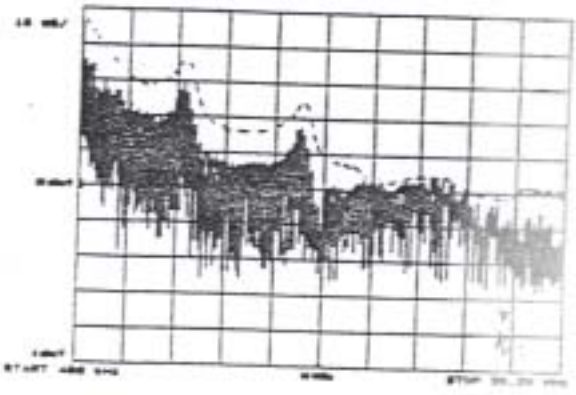


Figure 6(d) CM Noise

Test # 3:

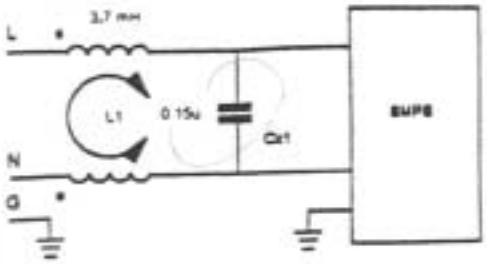


Figure 7(a) Test 3 Diagram

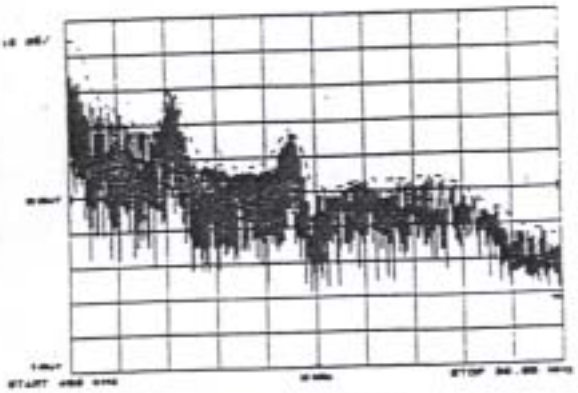


Figure 7(b) Total Noise

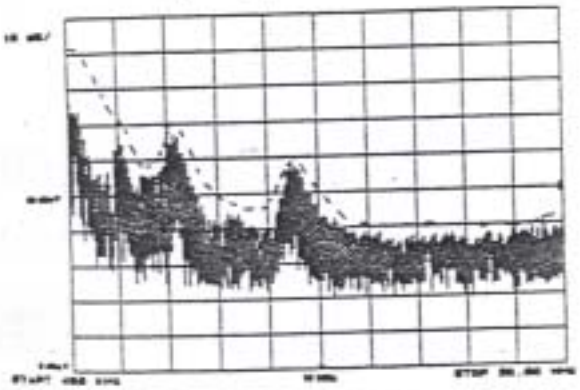


Figure 7(c) DM Noise

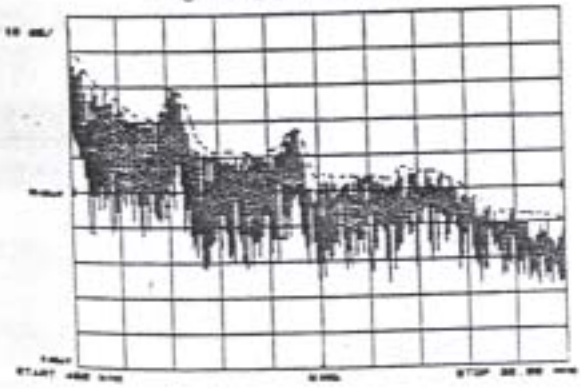


Figure 7(d) CM Noise

Test # 4:

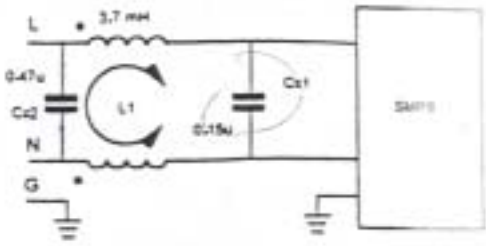


Figure 8(a) Test 4 Diagram

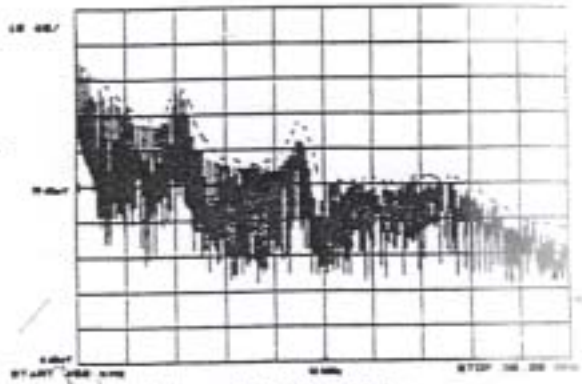


Figure 8(b) Total Noise

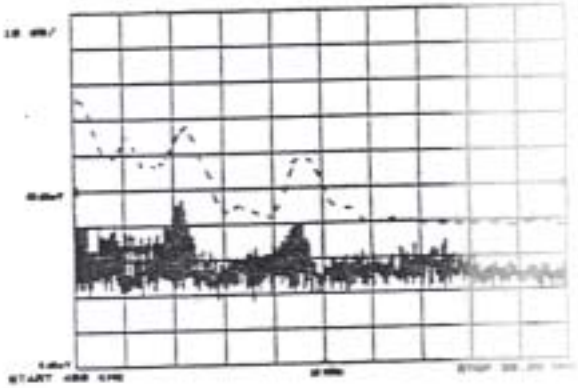


Figure 8(c) DM Noise

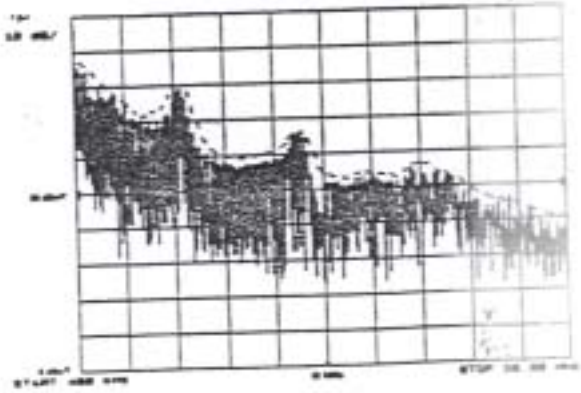


Figure 8(d) CM Noise

Test # 3:

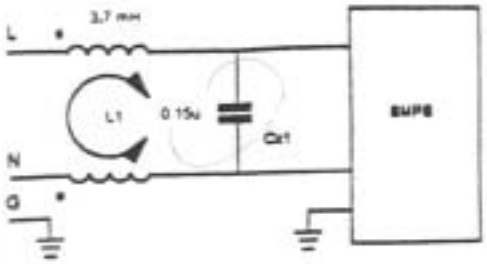


Figure 7(a) Test 3 Diagram

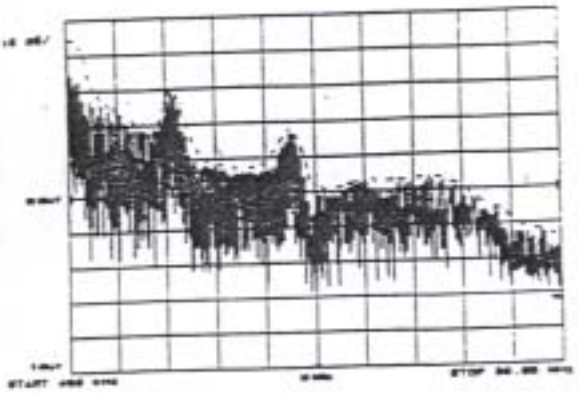


Figure 7(b) Total Noise

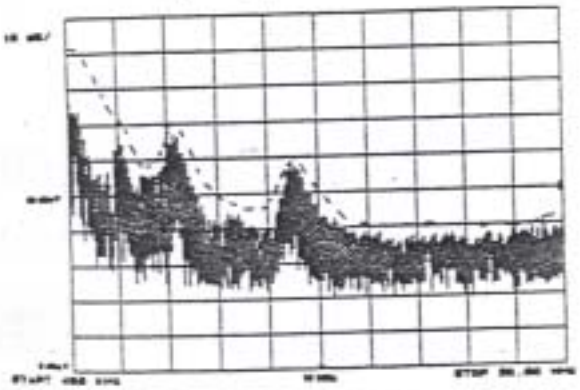


Figure 7(c) DM Noise

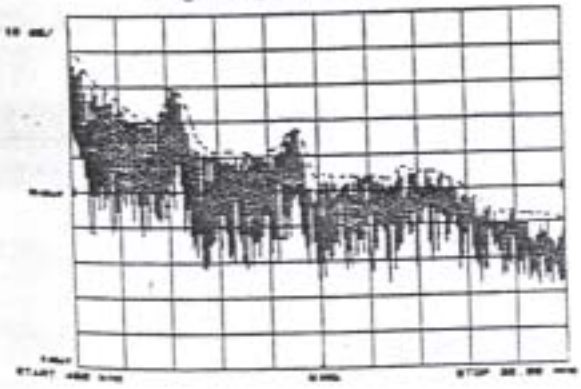


Figure 7(d) CM Noise

Test # 4:

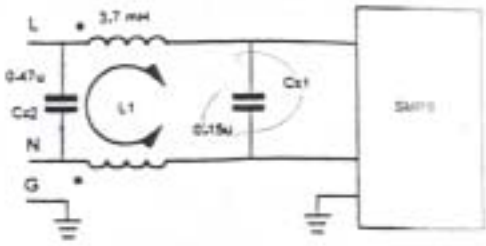


Figure 8(a) Test 4 Diagram

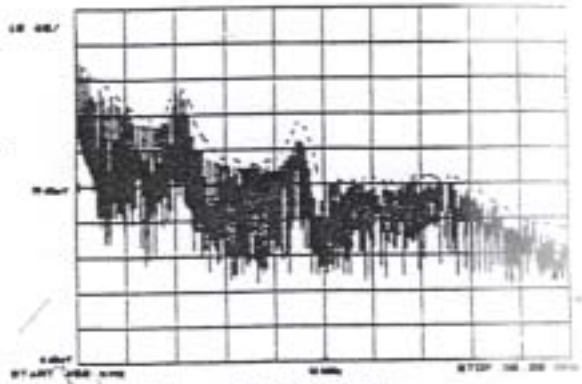


Figure 8(b) Total Noise

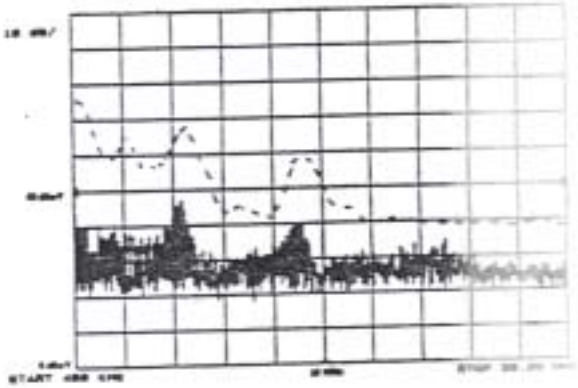


Figure 8(c) DM Noise

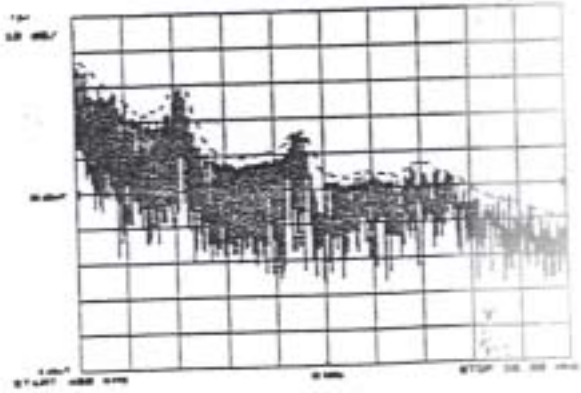


Figure 8(d) CM Noise

Test # 5:

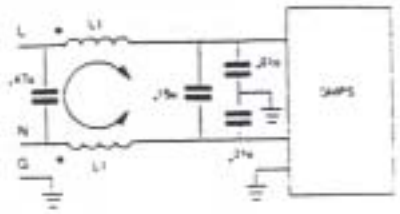


Figure 9(a) Test 5 Diagram

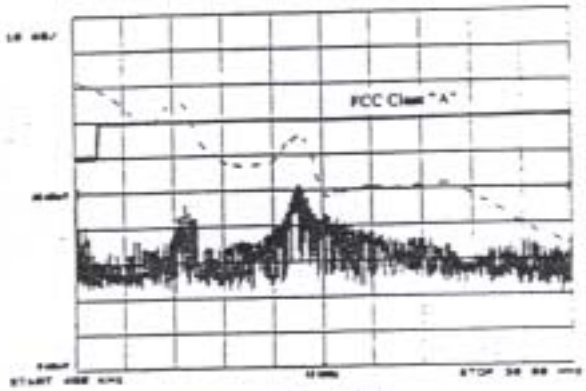


Figure 9(b) Total Noise

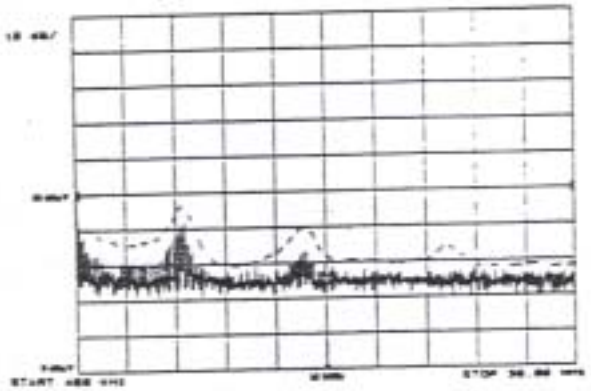


Figure 9(c) DM Noise

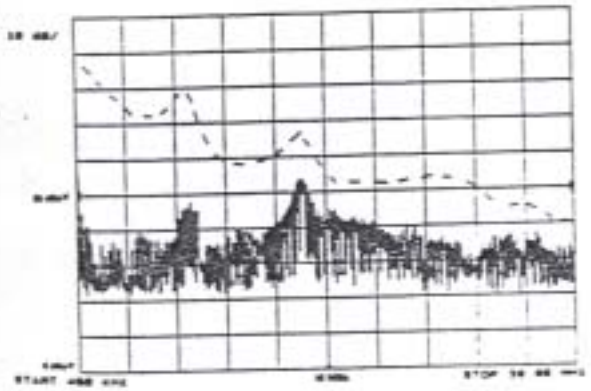


Figure 9(d) CM Noise

Test # 6:

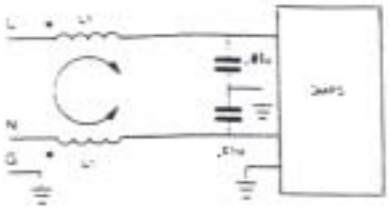


Figure 10(a) Test 6 Diagram

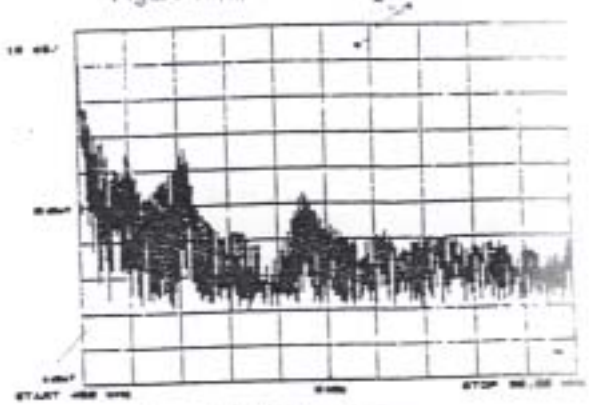


Figure 10(b) Total Noise

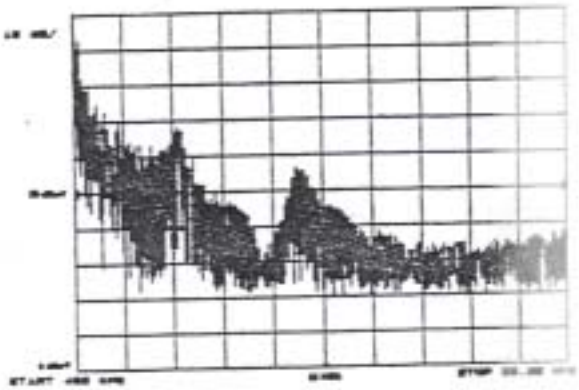


Figure 10(c) DM Noise

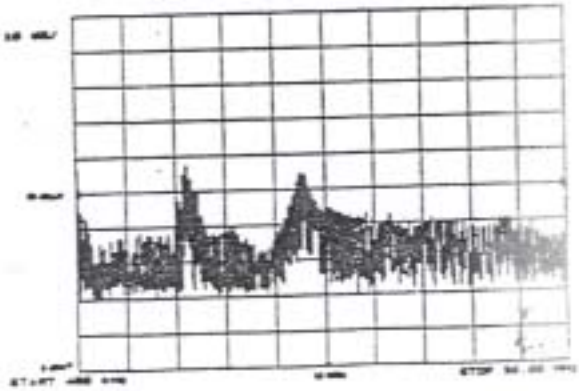


Figure 10(d) CM Noise

Test # 7:

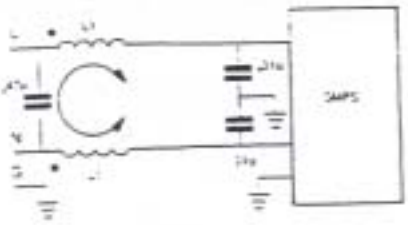


Figure 11(a) Test 7 Diagram

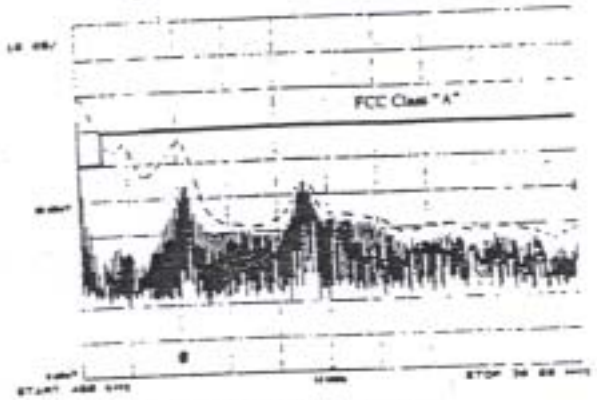


Figure 11(b) Total Noise

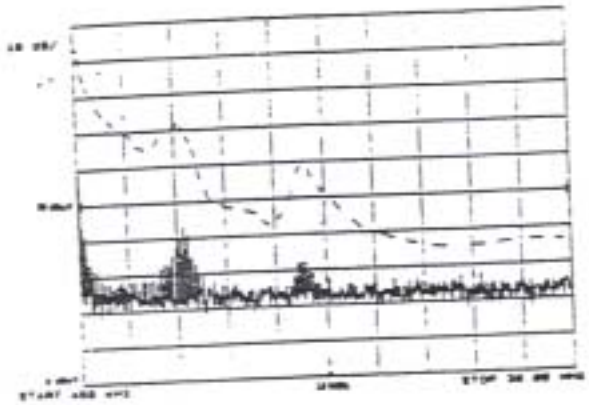


Figure 11(c) DM Noise

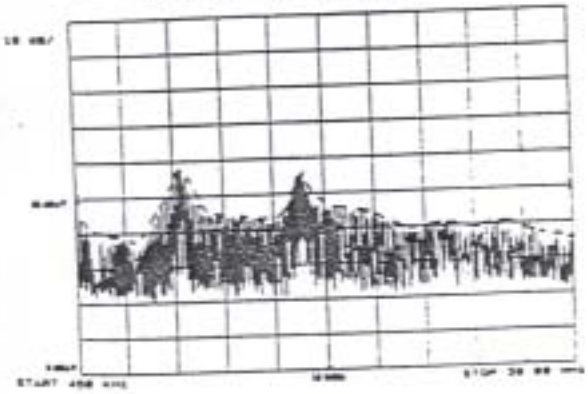


Figure11(d) CM Noise

Test # 8:

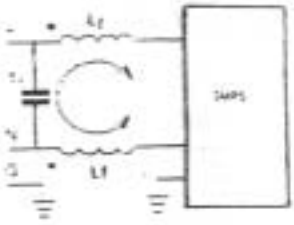


Figure 12(a) Test 8 Diagram

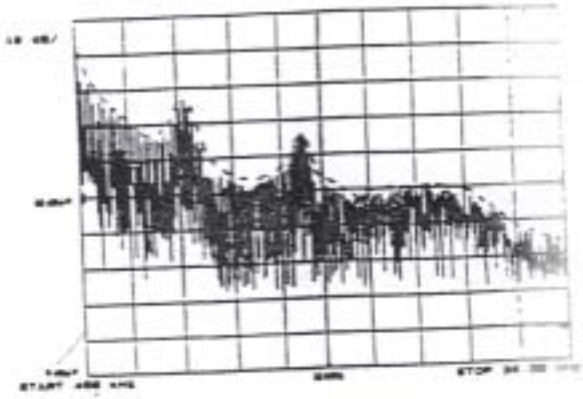


Figure 12(b) Total Noise

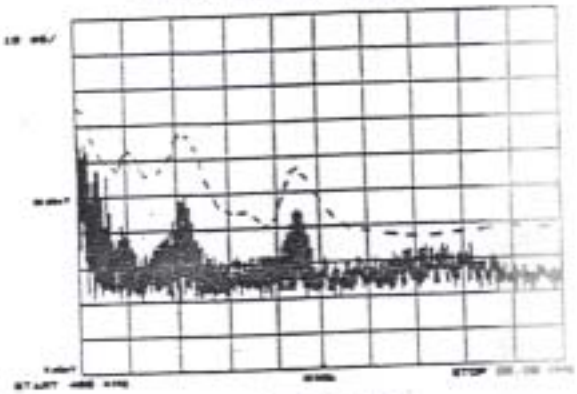


Figure 12(c) DM Noise

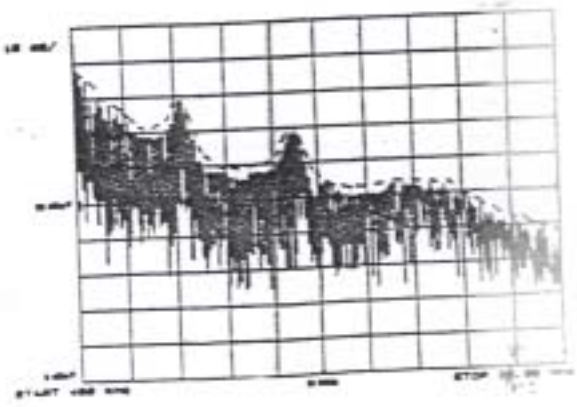
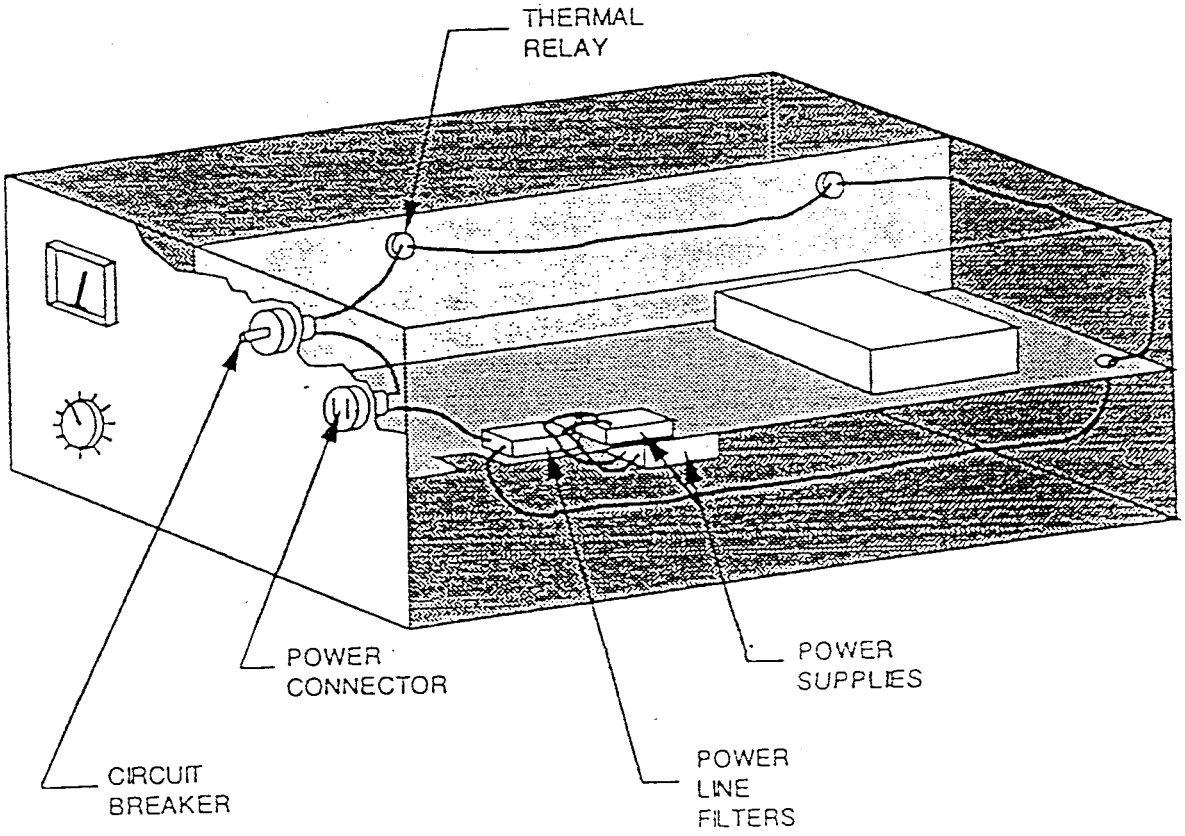
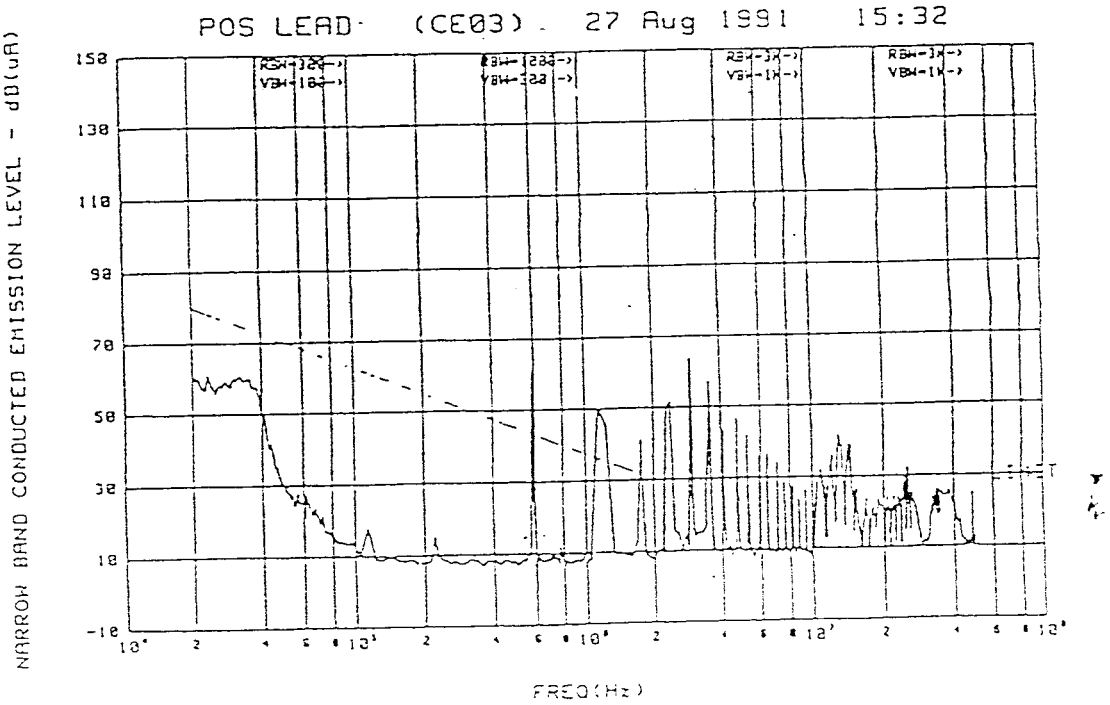
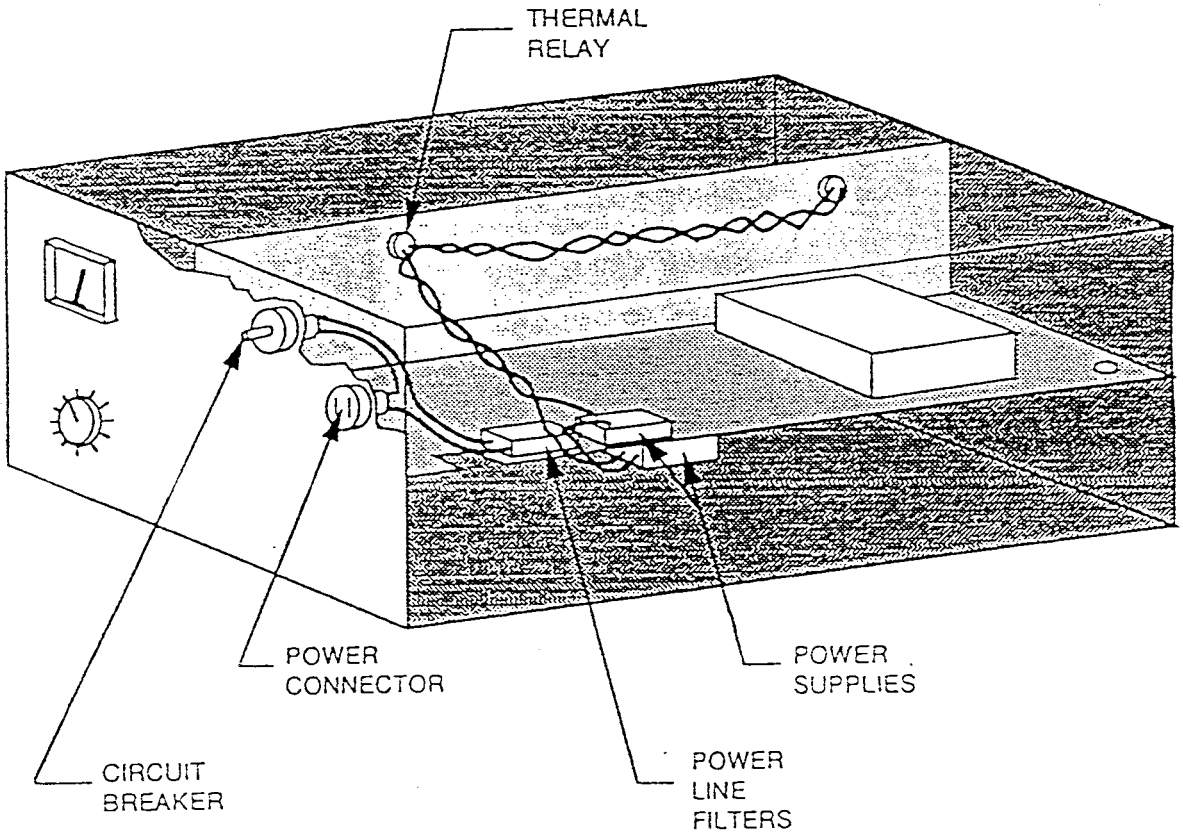


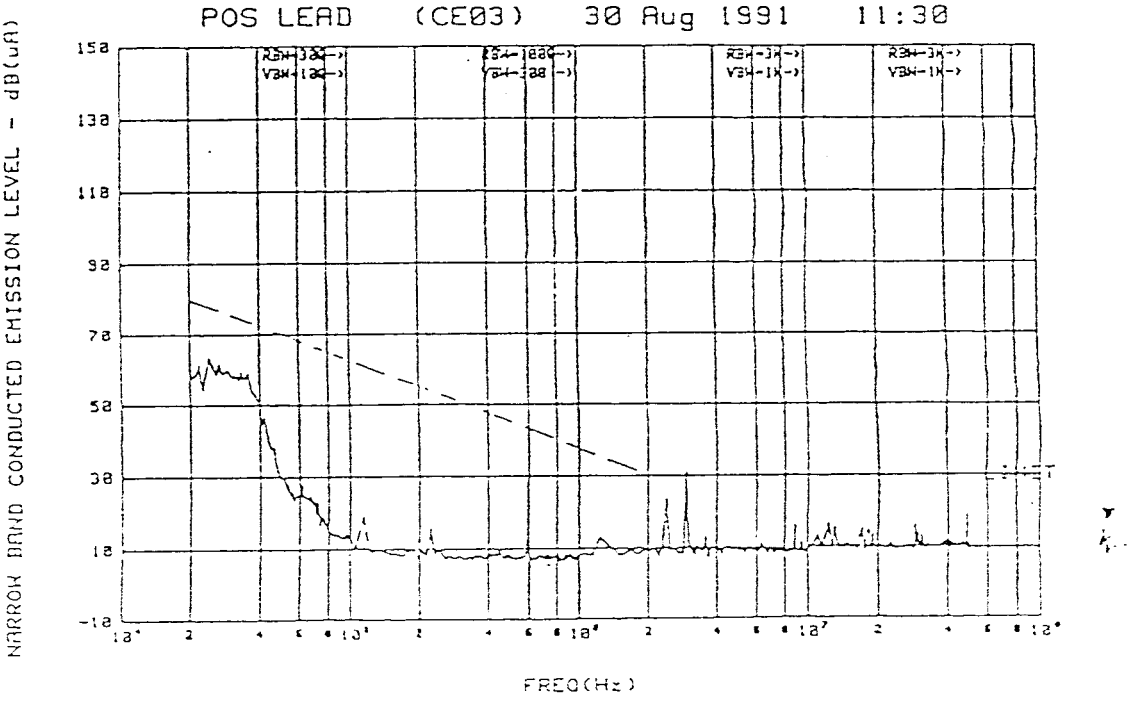
Figure 12(d) CM Noise

Radiation Coupling to Conducted EMI






THERMAL
RELAY
POWER
CONNECTOR
POWER
SUPPLIES
CIRCUIT
BREAKER
POWER
LINE
FILTERS


POS LEAD (CE03) 30 Aug 1991 11:30
NARROW BAND CONDUCTED EMISSION LEVEL - dB(uA)
FREQ(Hz)