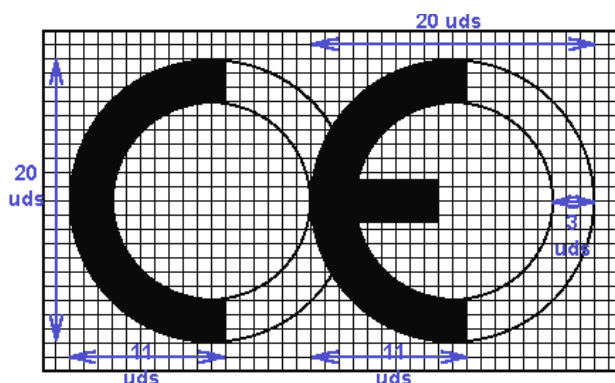


# REPORT

## ELECTROMAGNETIC COMPATIBILITY

### Test Laboratory, CE mark



### TESTS AND MEASURES REQUESTED:

#### DIRECTIVE:

2004/108/CE Electromagnetic Compatibility. (E. M. C.)

#### STANDARD:

UNE-EN 61000-6-1:2007 (IEC 61 000-6-1:2005) EMC, Generic immunity standard. Residential and light industry

UNE-EN 61000-6-3:2007 (IEC 61 000-6-3:2005) EMC, Generic EMI standard. Residential and light industry

UNE-EN 61000-6-2:2006+E:2009 (IEC 61 000-6-2:2005) EMC, Generic immunity standard. Industry

UNE-EN 61000-6-4:2007+E:2008 (IEC 61 000-6-4:2005) EMC, Generic EMI standard. Industry

EN 301489-1 v1.8.1 (2008-02) Radio Electric Spectrum Protection (1 – 6 GHz Band)

UNE-EN 55011:2008+A2:2008 ISM Equipments.

UNE-EN 55 022:2011 + Err UNE-EN55022:2011/AC) Emissions information technology

UNE-EN 55 024:1999+A1:2002+A2:2004 (EN55022:1998) Immunity information technology

UNE-EN61326-1:2006 Electrical equipment for measurement, control and laboratory use



F. J. García. T. Telecom. Eng.

# SUMMARY

## Part 1: GENERAL INFORMATION SECTION

- Test laboratory general conditions
- Particular conditions
- Description test sample
- Test notes
- Additional documentation
- Classification
- Summary and test results
- Modifications to obtain standard type approval
- Reference standards used in the report

## Part 2: TEST AND MEASURES REQUESTED

Standard Clauses

## ANNEX:

- RELATION LABORATORY INSTRUMENTS
- CALIBRATION ACCURACY AND TOLERANCE OF MEASURES
- PHOTOGRAPHS

## Part 1: GENERAL INFORMATION SECTION

### Test laboratory general conditions

In order to ensure the measurement traceability in reference to the national and international standards, the laboratory has established a program for all the instruments, probes and measurement accessories of calibration being verified and maintained with periodical verifications of all their technical characteristics.

Professional privacy is guaranteed.

All tests are performed according to these standards and type test.

The test results presented in this report relate only to the item(s) tested.

#### TEST LABORATORY CLIMATIC CONDITIONS

Ambient temperature: 21 °C to 23 °C

Relative humidity: 45 % to 65 %

Atmospheric pressure: 90 kPa (900 mbar) to 104 kPa (1040 mbar)

### Particular conditions

The equipment under test have been chosen:	a) Under supplier by free delivery
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a) Under supplier by free delivery

b) Under supplier by sampling procedure

### Description test sample

Deionizer lightning rod (PDE) 3 Models: BABY , JUNIOR , SENIOR
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### Test notes

---NO COMMENTS---
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### Additional documentation

Description	Remark
Utilization	User manual
Safety instructions	User manual
Installation	Installation manual
Maintenance	Maintenance manual
Service	Service manual
Construction manual. Description Schematics and diagrams Printer circuits. Layout Spare parts, and critical components list	Constructive technical File

### Classification

CLASSIFICATION IMMUNITY	Class (Environment) A and B
-------------------------	-----------------------------

Class (Environment) B (IEC) EN 61000-6-1 , Generic immunity standard. Residential and light industry environment.

Class (Environment) A (IEC) EN 61000-6-2 , Generic immunity standard. Industrial environment.

CLASSIFICATION EMISSIONS	Class (Environment) A and B
--------------------------	-----------------------------

Class (Environment) B (IEC) EN 61000-6-3 , Generic EMI standard. Residential and light industry environment

Class (Environment) A (IEC) EN 61000-6-4 , Generic EMI standard. Industrial environment (restricted use)

### Summary and conclusions of the tests requested

DESCRIPCIÓN	RESULT		
	P	F	N
TEST OF CONDUCTED EMISSIONS	X		
TEST OF RADIATED EMISSIONS	X		
RADIO ELECTRIC SPECTRUM PROTECTION	X		
IMMUNITY CONDUCTED ELECTROMAGNETIC FIELD	X		
IMMUNITY RADIATED ELECTROMAGNETIC FIELD	X		
IMMUNITY ELECTROSTATIC DISCHARGE (ESD)	X		
IMMUNITY FAST TRANSIENTS (BURST)	X		
IMMUNITY HIGH ENERGY PULSES (SURGES)	X		
IMMUNITY VOLTAGE DIPS AND INTERRUPTIONS	X		
IMMUNITY MAGNETIC FIELD, INDUSTRIAL FREQUENCY	X		

### Modifications to obtain standard type approval

---- NO COMMENT---

#### NOTES:

Abbreviations used in this report:

P: Pass

F: Fail

N: Not applied, or not requested.

D.U.T. = E.U.T. = Device under test

#### PERFORMANCE CRITERIA FOR IMMUNITY TEST

- A: No fail: Normal performance within the specification limits.
- B: Temporary degradation or loss of function or performance which is self - recoverable.
- C: Temporary degradation or loss of function or performance which requires operator intervention or system reset.
- D: Degradation or loss of function which is not recoverable, due to damage to equipment (components) or software, or loss of data.

## Reference standards used in the report

This standards do not take in consideration safety regulations.

### ELECTROMAGNETIC INTERFERENCE ( EMI )

#### BASICS STANDARDS

EN 55011	CISPR 11	Industrial scientific medic equipment.
EN 55013	CISPR 13	Broadcasting receivers and ancillary.
EN 55014	CISPR 14	Electrical domestic apparatus, portable electrical tools, and similar equipment.
EN 55015	CISPR 15	Lighting equipment, and similar.
EN 55022	CISPR 22	Computers.
EN 61000-3-2	IEC 61000-3-2	Harmonic current emissions a. c. Mains.
EN 61000-3-3	IEC 61000-3-3	Voltage fluctuations and Flicker a. c. Mains.

#### GENERIC STANDARDS

EN 61000-6-3	IEC 61000-6-3	EMC, Generic EMI standard. Residential and light industry
EN 61000-6-4	IEC 61000-6-4	EMC, Generic EMI standard. Industry
IEC 60050-161		International Electro technical Vocabulary. EMC

### IMMUNITY OR SUSCEPTIBILITY

#### BASICS STANDARDS

EN 55024	CISPR 24	Computers.
EN 61000-4-1	IEC 61000-4-1	Testing and measurement techniques.
EN 61000-4-2	IEC 61000-4-2	Electrostatic discharge (ESD)
EN 61000-4-3	IEC 61000-4-3	Radiated electromagnetic field
EN 61000-4-4	IEC 61000-4-4	Fast transients (Burst ) (EFT)
EN 61000-4-5	IEC 61000-4-5	High energy pulses (Surges)
EN 61000-4-6	IEC 61000-4-6	Conducted electromagnetic field
EN 61000-4-8	IEC 61000-4-8	Magnetic field
EN 61000-4-9	IEC 61000-4-9	Pulsed magnetic field
EN 61000-4-10	IEC 61000-4-10	Oscillatory magnetic field
EN 61000-4-11	IEC 61000-4-11	Voltage dips and interruptions
EN 61000-4-12	IEC 61000-4-12	Oscillatory waves
EN 61 000-4-13	IEC 61 000-4-13	Harmonics and inter harmonics

#### GENERIC STANDARDS

EN 61000-6-1	IEC 61000-6-1	EMC, Generic immunity standard. Residential and light industry
EN 61000-6-2	IEC 61000-6-2	EMC, Generic immunity standard. Industry
ISO 7637		Immunity vehicular environment

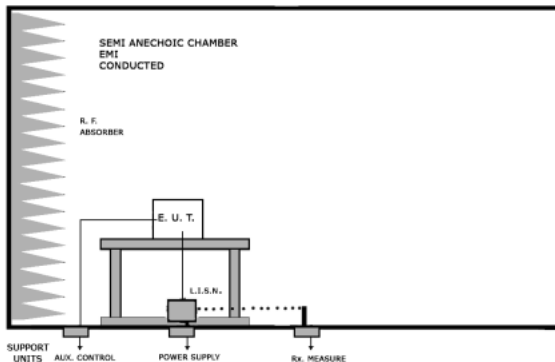
## Part 2: TEST AND MEASURES REQUESTED

### TEST OF CONDUCTED EMISSIONS

Measure the voltage disturbing conducted in the supply terminals.  
Interviews are conducted with graphic detectors quasi peak and average value.

Tested in semi - anechoic room

Test Set-up:

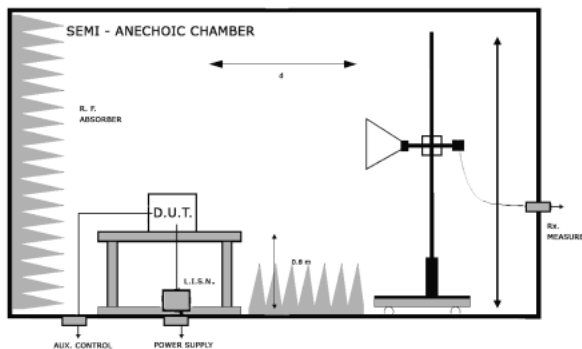
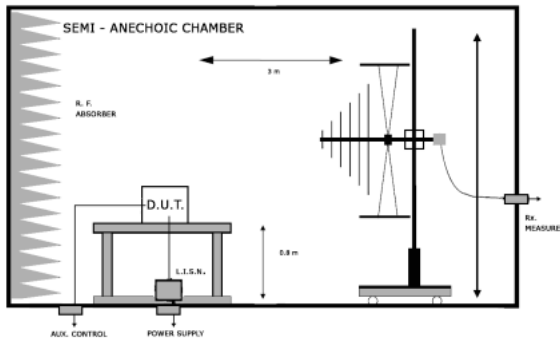


A measure of the radiated disturbance.

Graphics are made with vertical and horizontal polarization.  
Used detector peak in the previous sweep, and quasi-peak at the end.

Tested en semi - anechoic room

Test Set-up:



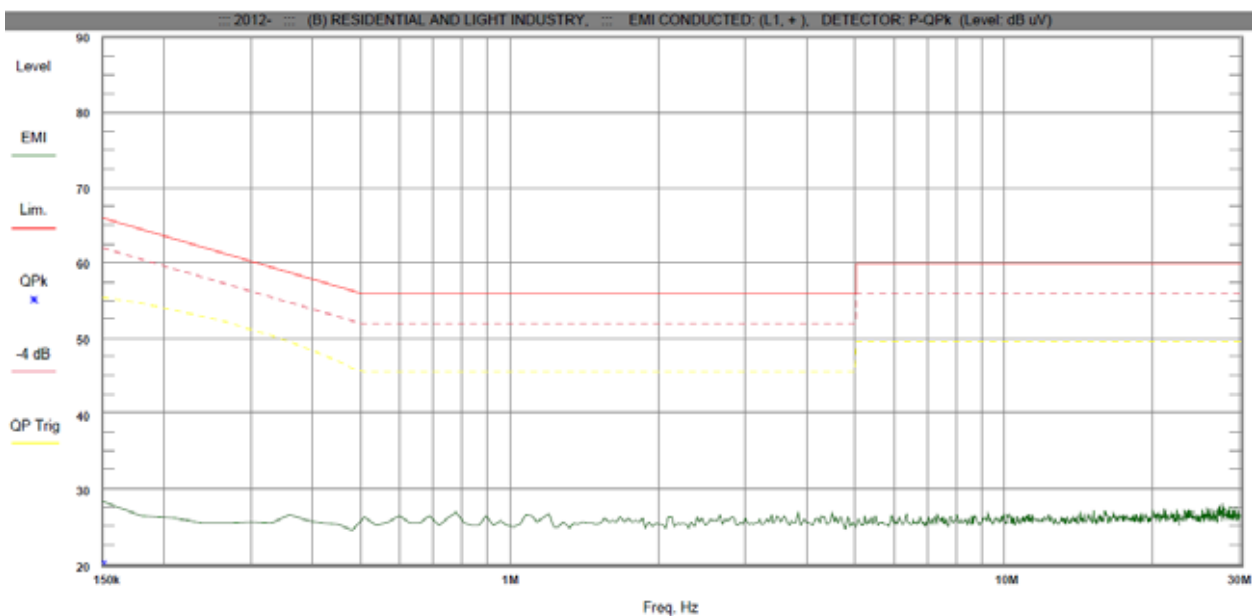
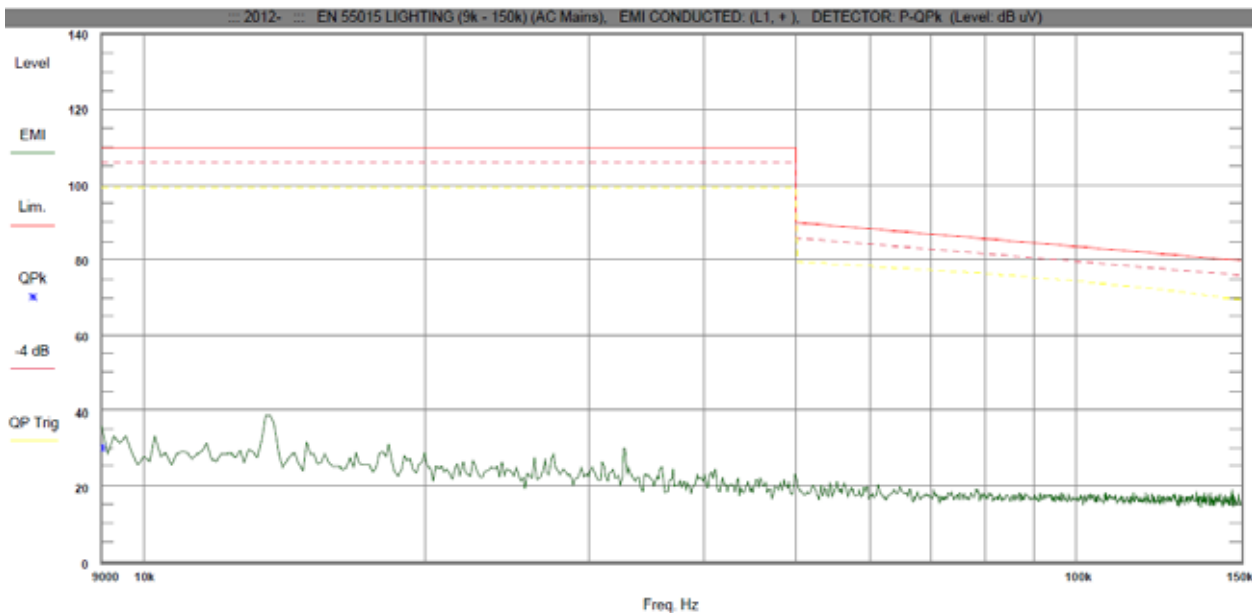
## TEST OF CONDUCTED EMISSIONS

AC OR DC MAINS

Band: 150 kHz - 30 MHz

QUASI - PEAK DETECTOR

Tested in semi - anechoic room





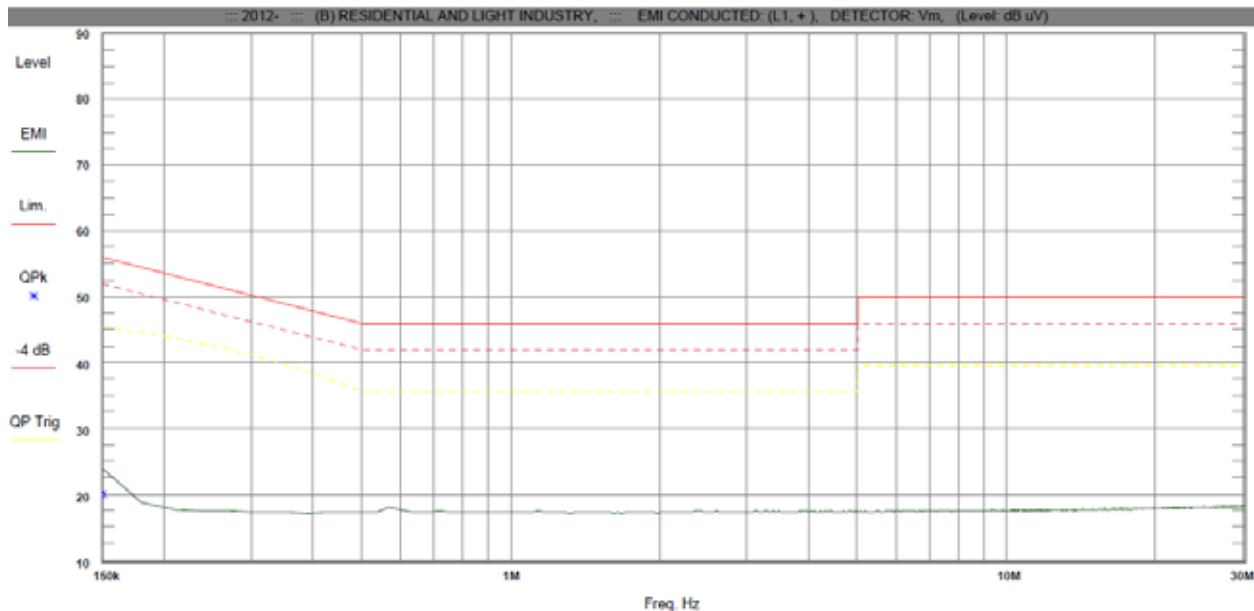
## TEST OF CONDUCTED EMISSIONS

AC OR DC MAINS

Band: 150 kHz - 30 MHz

AVERAGE DETECTOR

Tested in semi - anechoic room



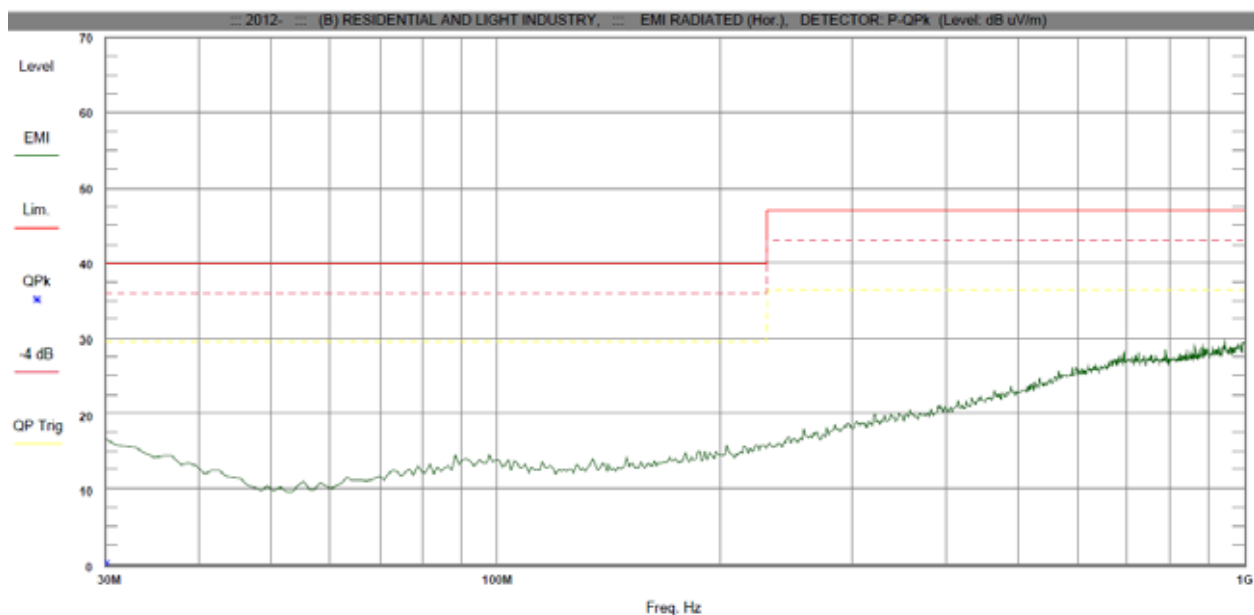
## TEST OF RADIATED EMISSIONS

Band: 30 MHz to 1 GHz

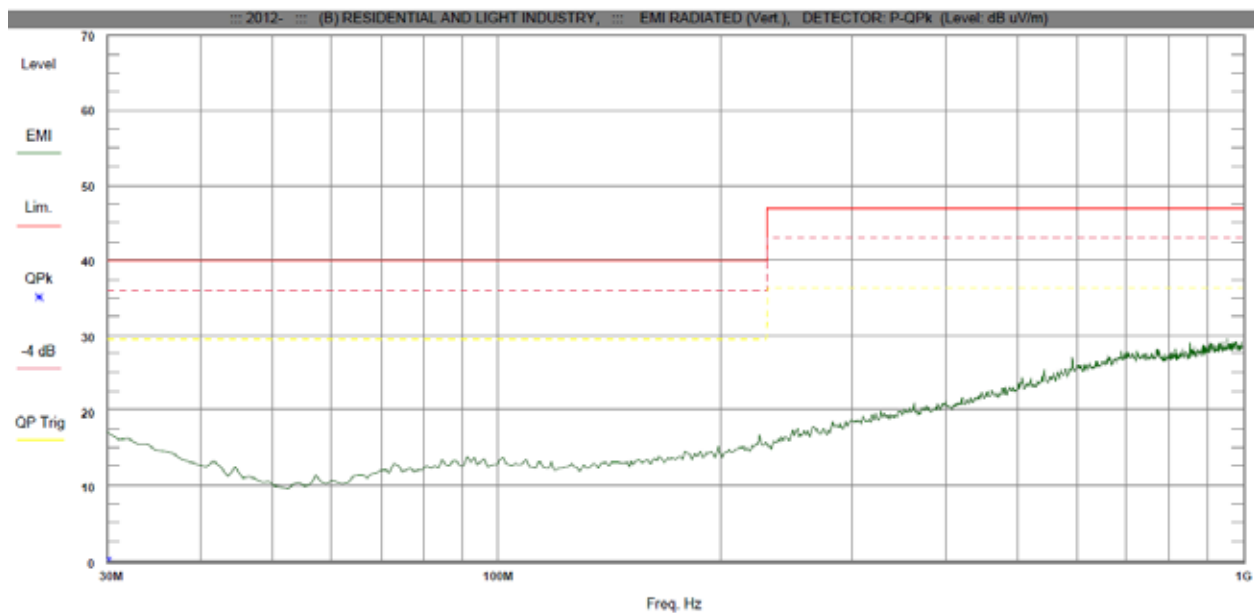
QUASI – PEAK DETECTOR

Tested in semi - anechoic room

### Horizontal Polarity



### Vertical Polarity



## TEST OF RADIATED EMISSIONS

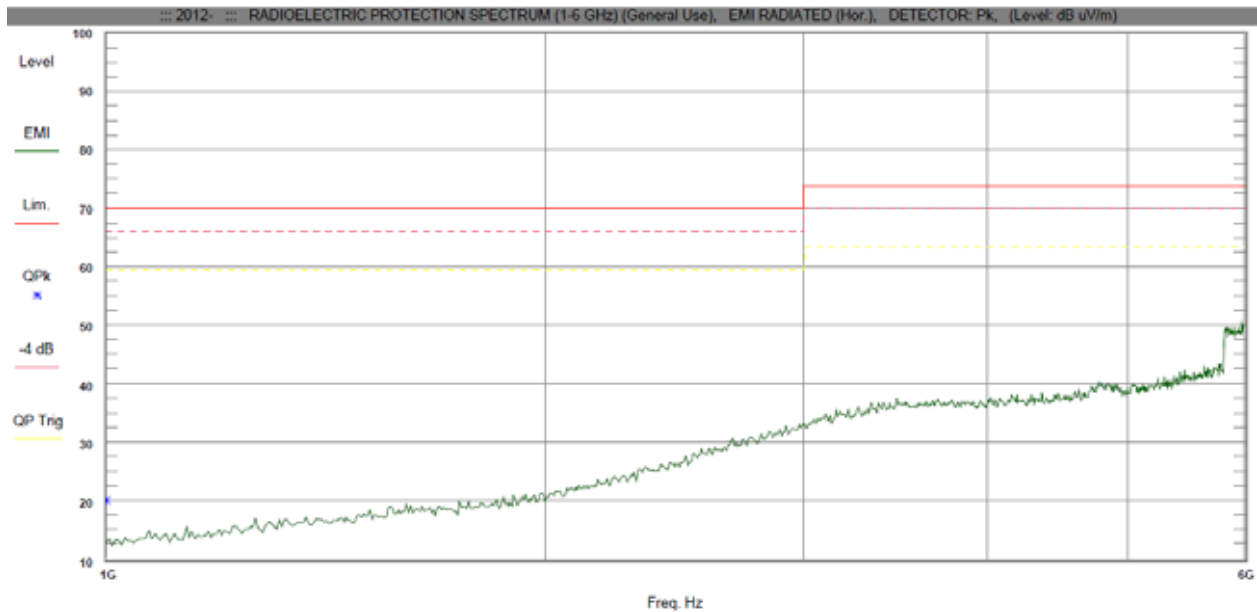
### RADIO ELECTRIC PROTECTION SPECTRUM

Band: 1 to 6 GHz

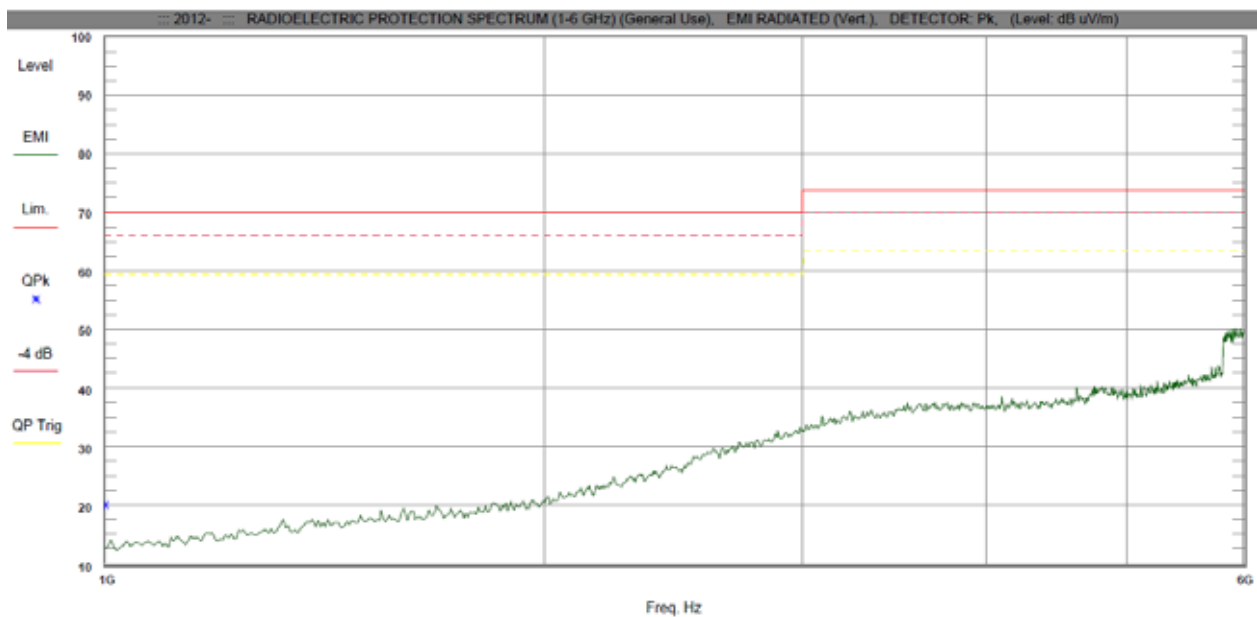
Distance: 3 m. PEAK DETECTOR

Tested in semi - anechoic room.

#### Horizontal Polarity



#### Vertical Polarity



## TEST OF RADIATED EMISSIONS

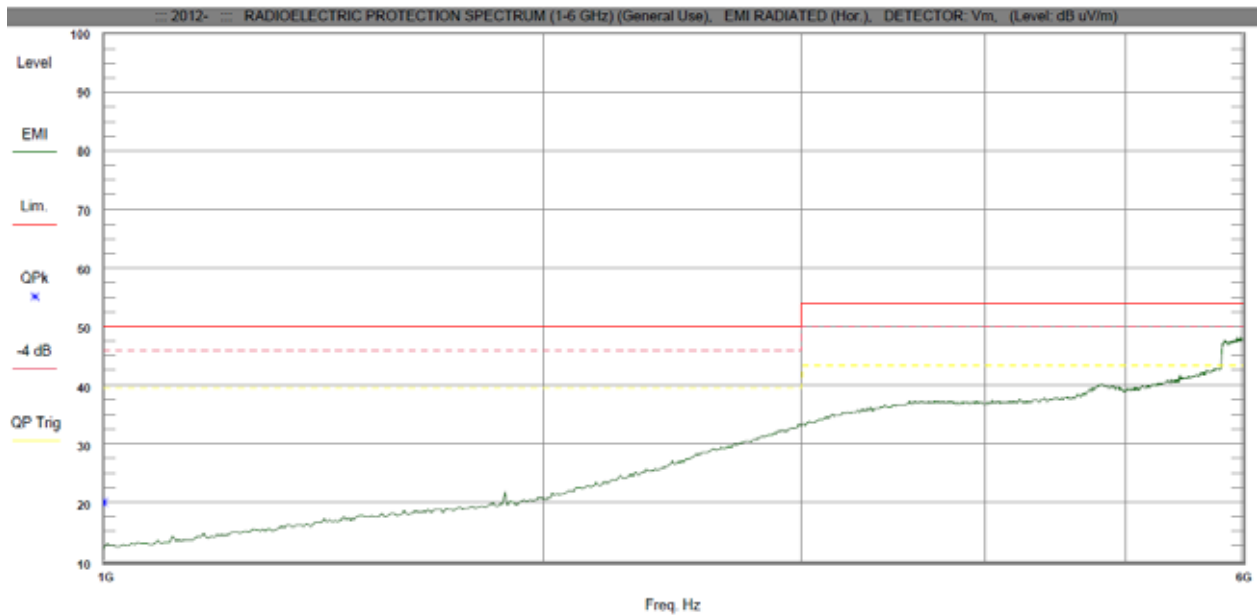
### RADIO ELECTRIC PROTECTION SPECTRUM

1 to 6 GHz Band

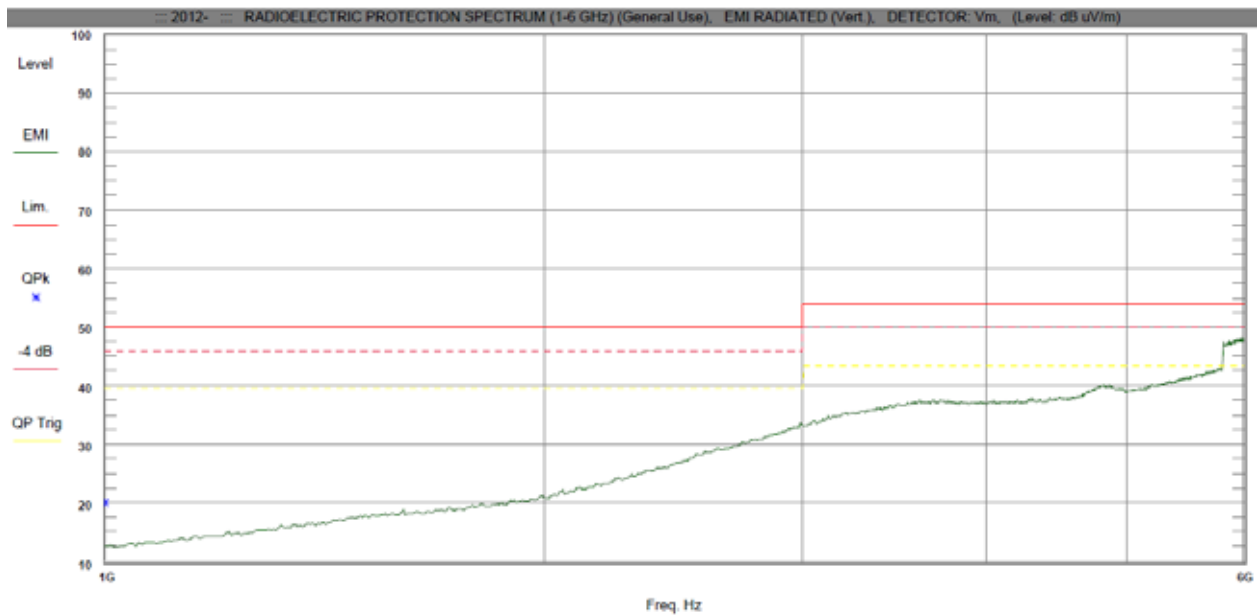
Tested in semi - anechoic room.

Distance: 3 m. AVERAGE DETECTOR

#### Horizontal Polarity



#### Vertical Polarity



## RADIO ELECTRIC PROTECTION SPECTRUM

UTILISATION	<ul style="list-style-type: none"> <li>General use</li> </ul>
-------------	---

- General use
- For use in telecommunications centers only

### LIMITS:

Radiated disturbance above 1 GHz at a measurement distance of 3 m.

EN 55022:2008 +A1:2008

EN 301 489-1 v1.8.1

- General use

Frequency range	Average (dBµV/m)	Peak (dBµV/m)
1 000 MHz a 3 000 MHz	50	70
3 000 MHz a 6 000 MHz	54	74
NOTE: The lower limit applies at the transition frequency		

- For use in telecommunications centers only

Frequency range	Average Limit (dBµV/m)	Peak limit (dBµV/m)
1 000 MHz to 3 000 MHz	56	76
3 000 MHz to 6 000 MHz	60	80
NOTE: The lower limit applies at the transition frequency		

DESCRIPTION	P	F	N
TEST RESULTS	X		

**LIMITS:**

LIMITS IN POWER SUPPLY AND / OR AC MAINS ( dB $\mu$ V)											
FREQUENCY		Residential and light industry EN 61000-6-3 EN 55011 Class B Type 1 y 2		Industrial environment EN 61000-6-4 EN 55011 Class to Group 1		EN 55022 Class A (1)		EN 55022 Class B		EN 55015	
Low	High	Quasi Peak	Avg.	Quasi Peak	Avg.	Quasi Peak	Avg.	Quasi Peak	Avg.	Quasi Peak	Avg.
9 kHz	50 kHz	---	---	---	---	Under consideration		---	---	110	---
50 kHz	150 kHz	---	---	---	---			---	90 to 80	---	
150 kHz 148.5 kHz	500 kHz	66 to 56	56 to 46	79	66	79	66	66 to 56	56 to 46	66 to 56	56 to 46
500 kHz	5 MHz	56	46	73	60	73	60	56	46	56	46
5 MHz	30 MHz	60	50	73	60	73	60	60	50	60	50
30 MHz	300 MHz	---	---	---	---	---	---	---	---	---	---

LIMITS IN LINES INPUT OUTPUT, SIGNALING AND CONTROL ( dB $\mu$ V)									
FREQUENCIES		Residential and light industry EN 61000-6-3		Industrial environment EN 61000-6-4		EN 55022 Class A (1)		EN 55022 Class B	
Low	High	Quasi Peak	Average	Quasi Peak	Average	Quasi Peak	Average	Quasi Peak	Average
9 kHz	50 kHz	---	---	Look basic standard		Under consideration		---	---
50 kHz	150 kHz	---	---					---	---
150 kHz 148.5 kHz	500 kHz	40 to 30	30 to 20			79	66	66 to 56	56 to 46
500 kHz	5 MHz	30	20			73	60	56	46
5 MHz	30 MHz	30	20			73	60	60	50

LIMITS RADIATED RADIO ELECTRIC EMISSIONS ( dB $\mu$ V/m)							
FREQUENCIES		EN 61000-6-3	EN 61000-6-4	EN 55011		EN 55022	
Low	High	Limits 10 m	Limits 30 m	Group 1 Class A 30 m	Group 1 Class B 10 m	Group 1 Class A 30 m	Group 1 Class B 10 m
0.15 MHz	30 MHz	In study	In study	Under consideration		Under consideration	
30 MHz	230 MHz	30	30	30	30	30	30
230 MHz	1 GHz	37	37	37	37	37	37

STANDARD APPLIED See Classification Pag.: 4	Environment B $\rightarrow$ EN 61000-6-3 Environment A $\rightarrow$ EN 61000-6-4
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DESCRIPTION	P	F	N
TEST RESULTS	X		

**LIMITS:**
**EN 55011**
**EN 61800-3**

LIMITS IN POWER SUPPLY AND / OR AC MAINS					
CLASSE A ( dB $\mu$ V)					
FRECUENCIAS		Group 1 Category C1		Group 2 Category C2	
Inferior	Superior	Quasi Peak	AVG	Quasi Peak	AVG
9 kHz	50 kHz	---	---	---	---
50 kHz	150 kHz	---	---	---	---
150 kHz	500 kHz	79	66	100	90
500 kHz	5 MHz	73	60	86	76
5 MHz	30 MHz	73	60	90 a 70	80 a 60
30 MHz	300 MHz	---	---	---	---

LIMITS IN POWER SUPPLY AND / OR AC MAINS			
CLASSE B (dB $\mu$ V)			
FRECUENCIAS		Group: 1 - 2 Category: C1 - C2	
Inferior	Superior	Quasi - Peak	AVG
9 kHz	50 kHz	---	---
50 kHz	150 kHz	---	---
150 kHz	500 kHz	66 a 56	56 a 46
500 kHz	5 MHz	56	46
5 MHz	30 MHz	60	50
30 MHz	300 MHz	---	---

LIMITS RADIATED RADIO ELECTRIC EMISSIONS ( dB $\mu$ V)			
FRECUENCIAS		Group - Category	
Inferior	Superior	1 , C1 Class A 30 m	2 , C2 Class. B 10 m
0.15 MHz	30 MHz	----	----
30 MHz	230 MHz	30	30
230 MHz	1 GHz	37	37

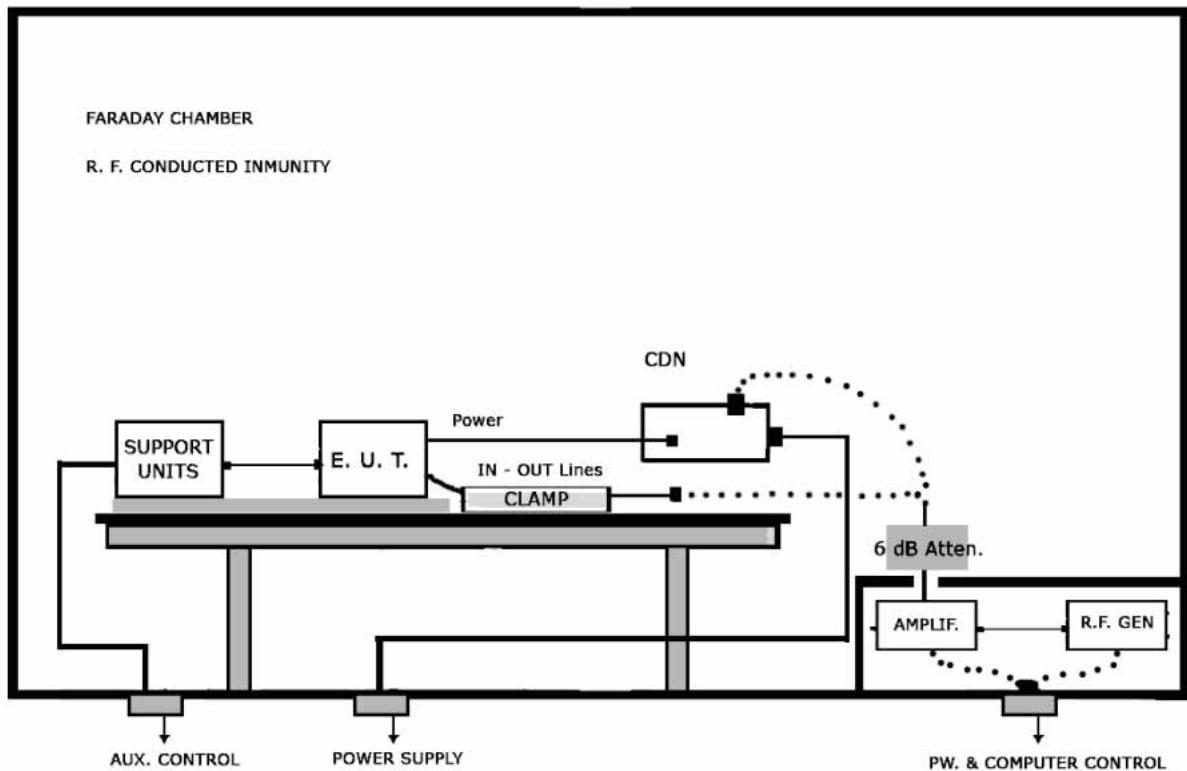
DESCRIPTION	P	F	N
TEST RESULTS	X		

## IMMUNITY CONDUCTED ELECTROMAGNETIC FIELD

(IEC) EN 61000 - 4 - 6

RADIO FREQUENCY COMMON MODE

Test Set-Up:





## IMMUNITY CONDUCTED ELECTROMAGNETIC FIELD

(IEC) EN 61000 - 4 - 6

RADIO FREQUENCY COMMON MODE

Steps 1%. Sweep time 4 s. min.

Test Frequencies:

0,150	0,152	0,153	0,155	0,156	0,158	0,159	0,161	0,162	0,164
0,166	0,167	0,169	0,171	0,172	0,174	0,176	0,178	0,179	0,181
0,183	0,185	0,187	0,189	0,190	0,192	0,194	0,196	0,198	0,200
0,202	0,204	0,206	0,208	0,210	0,212	0,215	0,217	0,219	0,221
0,223	0,226	0,228	0,230	0,232	0,235	0,237	0,239	0,242	0,244
0,247	0,249	0,252	0,254	0,257	0,259	0,262	0,264	0,267	0,270
0,273	0,275	0,278	0,281	0,284	0,286	0,289	0,292	0,295	0,298
0,301	0,304	0,307	0,310	0,313	0,316	0,320	0,323	0,326	0,329
0,333	0,336	0,339	0,343	0,346	0,349	0,353	0,356	0,360	0,364
0,367	0,371	0,375	0,378	0,382	0,386	0,390	0,394	0,398	0,402
0,406	0,410	0,414	0,418	0,422	0,426	0,431	0,435	0,439	0,444
0,448	0,453	0,457	0,462	0,466	0,471	0,476	0,480	0,485	0,490
0,495	0,500	0,505	0,510	0,515	0,520	0,526	0,531	0,536	0,541
0,547	0,552	0,558	0,563	0,569	0,575	0,580	0,586	0,592	0,598
0,604	0,610	0,616	0,622	0,629	0,635	0,641	0,648	0,654	0,661
0,667	0,674	0,681	0,687	0,694	0,701	0,708	0,715	0,723	0,730
0,737	0,744	0,752	0,759	0,767	0,775	0,782	0,790	0,798	0,806
0,814	0,822	0,831	0,839	0,847	0,856	0,864	0,873	0,882	0,890
0,899	0,908	0,917	0,927	0,936	0,945	0,955	0,964	0,974	0,984
0,993	1,003	1,013	1,024	1,034	1,044	1,055	1,065	1,076	1,087
1,097	1,108	1,119	1,131	1,142	1,153	1,165	1,177	1,188	1,200
1,212	1,224	1,237	1,249	1,261	1,274	1,287	1,300	1,313	1,326
1,339	1,352	1,366	1,380	1,393	1,407	1,421	1,436	1,450	1,464
1,479	1,494	1,509	1,524	1,539	1,555	1,570	1,586	1,602	1,618
1,634	1,650	1,667	1,683	1,700	1,717	1,734	1,752	1,769	1,787
1,805	1,823	1,841	1,860	1,878	1,897	1,916	1,935	1,954	1,974
1,994	2,014	2,034	2,054	2,075	2,095	2,116	2,137	2,159	2,180
2,202	2,224	2,246	2,269	2,292	2,315	2,338	2,361	2,385	2,409
2,433	2,457	2,482	2,506	2,531	2,557	2,582	2,608	2,634	2,661
2,687	2,714	2,741	2,769	2,796	2,824	2,852	2,881	2,910	2,939
2,968	2,998	3,028	3,058	3,089	3,120	3,151	3,182	3,214	3,246

Continue next page... / →

## IMMUNITY CONDUCTED ELECTROMAGNETIC FIELD

(IEC) EN 61000 - 4 - 6

RADIO FREQUENCY COMMON MODE

Steps 1%. Sweep time 4 s. min.

Test Frequencies: Continue:

3,279	3,312	3,345	3,378	3,412	3,446	3,481	3,515	3,550	3,586
3,622	3,658	3,695	3,732	3,769	3,807	3,845	3,883	3,922	3,961
4,001	4,041	4,081	4,122	4,163	4,205	4,247	4,289	4,332	4,376
4,419	4,464	4,508	4,553	4,599	4,645	4,691	4,738	4,786	4,833
4,882	4,931	4,980	5,030	5,080	5,131	5,182	5,234	5,286	5,339
5,957	6,016	6,076	6,137	6,198	6,260	6,323	6,386	6,450	6,515
6,580	6,646	6,712	6,779	6,847	6,915	6,985	7,054	7,125	7,196
7,268	7,341	7,414	7,488	7,563	7,639	7,715	7,792	7,870	7,949
8,029	8,109	8,190	8,272	8,355	8,438	8,523	8,608	8,694	8,781
8,869	8,957	9,047	9,137	9,229	9,321	9,414	9,508	9,603	9,699
9,796	9,894	9,993	10,093	10,194	10,296	10,399	10,503	10,608	10,714
10,821	10,930	11,039	11,149	11,261	11,373	11,487	11,602	11,718	11,835
11,954	12,073	12,194	12,316	12,439	12,563	12,689	12,816	12,944	13,073
13,204	13,336	13,470	13,604	13,740	13,878	14,016	14,157	14,298	14,441
14,586	14,731	14,879	15,028	15,178	15,330	15,483	15,638	15,794	15,952
16,112	16,273	16,435	16,600	16,766	16,933	17,103	17,274	17,446	17,621
17,797	17,975	18,155	18,336	18,520	18,705	18,892	19,081	19,272	19,464
19,659	19,856	20,054	20,255	20,457	20,662	20,869	21,077	21,288	21,501
21,716	21,933	22,152	22,374	22,598	22,824	23,052	23,282	23,515	23,750
23,988	24,228	24,470	24,715	24,962	25,212	25,464	25,718	25,975	26,235
26,498	26,763	27,030	27,300	27,573	27,849	28,128	28,409	28,693	28,980
29,270	29,562	29,858	30,157	30,458	30,763	31,070	31,381	31,695	32,012
32,332	32,655	32,982	33,312	33,645	33,981	34,321	34,664	35,011	35,361
35,715	36,072	36,433	36,797	37,165	37,536	37,912	38,291	38,674	39,061
39,451	39,846	40,244	40,647	41,053	41,464	41,878	42,297	42,720	43,147
43,579	44,014	44,455	44,899	45,348	45,802	46,260	46,722	47,189	47,661
48,138	48,619	49,106	49,597	50,093	50,594	51,099	51,610	52,127	52,648
53,174	53,706	54,243	54,786	55,333	55,887	56,446	57,010	57,580	58,156
58,738	59,325	59,918	60,517	61,122	61,734	62,351	62,975	63,604	64,240
64,883	65,532	66,187	66,849	67,517	68,192	68,874	69,563	70,259	70,961
71,671	72,388	73,112	73,843	74,581	75,327	76,080	76,841	77,609	78,385
79,169	79,961	80,761	81,568	82,384	83,208	84,040	84,880	85,729	86,586
87,452	88,327	89,210	90,102	91,003	91,913	92,832	93,761	94,698	95,645
96,602	97,568	98,543	99,529	100,000	---	---	---	---	---

## IMMUNITY CONDUCTED ELECTROMAGNETIC FIELD

(IEC) EN 61000 – 4 – 6

RADIO FREQUENCY COMMON MODE

Modulated RF signal 80% AM with 1 kHz tone. Steps 1%. Sweep time, 4 s. min.

INTERFERENCE SIGNAL LEVEL V (Ef. Un modulated ) See Classification Page.: 4	3 V. CLASS B 10V. CLASS A
--	------------------------------

TEST IN EARTH TERMINAL	
Result	PERFORMANCE CRITERIA
	A

INCIDENCES	-----
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PERFORMANCE CRITERIA (LIMIT)	A
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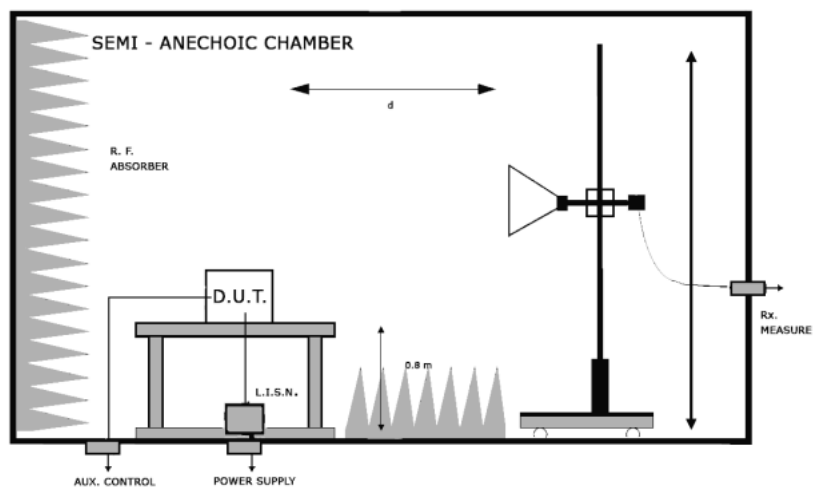
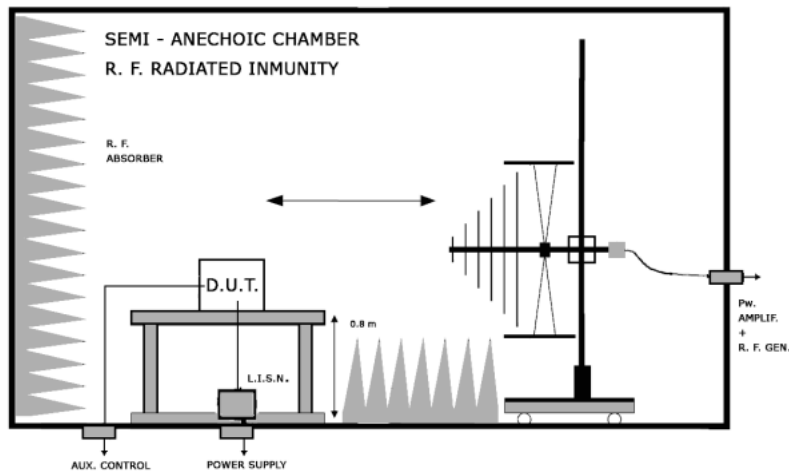
DESCRIPTION	P	F	N
TEST RESULTS	X		

## IMMUNITY RADIATED ELECTROMAGNETIC FIELD

(IEC) EN 61000 – 4 -3

ENVELOPING ANTENNA ACCESS

Test Set-Up:



## IMMUNITY RADIATED ELECTROMAGNETIC FIELD

(IEC) EN 61000 – 4 -3

ENVELOPING ANTENNA ACCESS

80 – 1000 MHz

Steps 1%. Sweep time 4 s. min.

Test Frequencies:

80	80,800	81,608	82,424	83,248	84,081	84,922	85,771	86,629	87,495
88,370	89,253	90,146	91,047	91,958	92,878	93,806	94,744	95,692	96,649
97,615	98,591	99,577	100,573	101,579	102,595	103,621	104,657	105,703	106,760
107,828	108,906	109,995	111,095	112,206	113,328	114,462	115,606	116,762	117,930
119,109	120,300	121,503	122,718	123,945	125,185	126,437	127,701	128,978	130,268
131,571	132,886	134,215	135,557	136,913	138,282	139,665	141,061	142,472	143,897
145,336	146,789	148,257	149,740	151,237	152,749	154,277	155,820	157,378	158,952
160,541	162,146	163,768	165,406	167,060	168,730	170,418	172,122	173,843	175,581
177,337	179,111	180,902	182,711	184,538	186,383	188,247	190,129	192,031	193,951
195,891	197,850	199,828	201,826	203,845	205,883	207,942	210,021	212,121	214,243
216,385	218,549	220,734	222,942	225,171	227,423	229,697	231,994	234,314	236,657
239,024	241,414	243,828	246,266	248,729	251,216	253,729	256,266	258,828	261,417
264,031	266,671	269,338	272,031	274,752	277,499	280,274	283,077	285,908	288,767
291,654	294,571	297,517	300,492	303,497	306,532	309,597	312,693	315,820	318,978
322,168	325,390	328,644	331,930	335,249	338,602	341,988	345,408	348,862	352,350
355,874	359,433	363,027	366,657	370,324	374,027	377,767	381,545	385,360	389,214
393,106	397,037	401,008	405,018	409,068	413,158	417,290	421,463	425,678	429,934
434,234	438,576	442,962	447,391	451,865	456,384	460,948	465,557	470,213	474,915
479,664	484,461	489,305	494,198	499,140	504,132	509,173	514,265	519,408	524,602
529,848	535,146	540,498	545,903	551,362	556,875	562,444	568,068	573,749	579,487
585,281	591,134	597,046	603,016	609,046	615,137	621,288	627,501	633,776	640,114
646,515	652,980	659,510	666,105	672,766	679,494	686,289	693,151	700,083	707,084
714,155	721,296	728,509	735,794	743,152	750,584	758,089	765,670	773,327	781,060
788,871	796,760	804,727	812,775	820,902	829,111	837,402	845,776	854,234	862,777
871,404	880,118	888,920	897,809	906,787	915,855	925,013	934,263	943,606	953,042
962,572	972,198	981,920	991,739	1000	---	---	---	---	---

## IMMUNITY RADIATED ELECTROMAGNETIC FIELD

(IEC) EN 61000 – 4 -3

ENVELOPING ANTENNA ACCESS

1000 – 4200 MHz

Steps 1%. Sweep time 4 s. min.

Test Frequencies:

1000	1010,000	1020,100	1030,301	1040,604	1051,010	1061,520	1072,135	1082,857	1093,685
1104,622	1115,668	1126,825	1138,093	1149,474	1160,969	1172,579	1184,304	1196,147	1208,109
1220,190	1232,392	1244,716	1257,163	1269,735	1282,432	1295,256	1308,209	1321,291	1334,504
1347,849	1361,327	1374,941	1388,690	1402,577	1416,603	1430,769	1445,076	1459,527	1474,123
1488,864	1503,752	1518,790	1533,978	1549,318	1564,811	1580,459	1596,263	1612,226	1628,348
1644,632	1661,078	1677,689	1694,466	1711,410	1728,525	1745,810	1763,268	1780,901	1798,710
1816,697	1834,864	1853,212	1871,744	1890,462	1909,366	1928,460	1947,745	1967,222	1986,894
2006,763	2026,831	2047,099	2067,570	2088,246	2109,128	2130,220	2151,522	2173,037	2194,768
2216,715	2238,882	2261,271	2283,884	2306,723	2329,790	2353,088	2376,619	2400,385	2424,389
2448,633	2473,119	2497,850	2522,829	2548,057	2573,538	2599,273	2625,266	2651,518	2678,033
2704,814	2731,862	2759,181	2786,772	2814,640	2842,787	2871,214	2899,927	2928,926	2958,215
2987,797	3017,675	3047,852	3078,330	3109,114	3140,205	3171,607	3203,323	3235,356	3267,710
3300,387	3333,391	3366,725	3400,392	3434,396	3468,740	3503,427	3538,461	3573,846	3609,585
3645,680	3682,137	3718,959	3756,148	3793,710	3831,647	3869,963	3908,663	3947,749	3987,227
4027,099	4067,370	4108,044	4149,124	4200	---	---	---	---	---

## IMMUNITY RADIATED ELECTROMAGNETIC FIELD

(IEC) EN 61000 – 4 -3

ENVELOPING ANTENNA ACCESS

Modulated RF signal 80% AM with 1 kHz tone. Steps 1%. Sweep time, 4 s. min.

FIELD LEVEL V / m (Ef. Un modulated) See Classification Page.: 4	3 V. CLASS B 10V. CLASS A
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ENVELOPING VERTICAL ANTENNA ACCESS				
Result	FRONTAL	BACK	LATERAL RIGHT	LATERAL LEFT
Test Face				
Performance Criteria	A	A	A	A

INCIDENCES	-----
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ENVELOPING HORIZONTAL ANTENNA ACCESS				
Result	FRONTAL	BACK	LATERAL RIGHT	LATERAL LEFT
Test Face				
Performance Criteria	A	A	A	A

INCIDENCES	-----
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PERFORMANCE CRITERIA (LIMIT)	A
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NOTE: You can blink of an indicator.

DESCRIPTION	P	F	N
TEST RESULTS	X		

## IMMUNITY RADIATED ELECTROMAGNETIC FIELD

(IEC) EN 61000 – 4 -3

ENVELOPING ANTENNA ACCESS

Pulse modulated RF signal (PM) . Steps 1%. Sweep time 4 s. min.

Band: 850 MHz to 950 MHz

ENVELOPING VERTICAL ANTENNA ACCESS				
Result Test Face	FRONTAL	BACK	LATERAL RIGHT	LATERAL LEFT
Performance Criteria	A	A	A	A

INCIDENCES	-----
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ENVELOPING HORIZONTAL ANTENNA ACCESS				
Result Test Face	FRONTAL	BACK	LATERAL RIGHT	LATERAL LEFT
Performance Criteria	A	A	A	A

INCIDENCES	-----
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PERFORMANCE CRITERIA (LIMIT)	A
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NOTE: You can blink of an indicator.

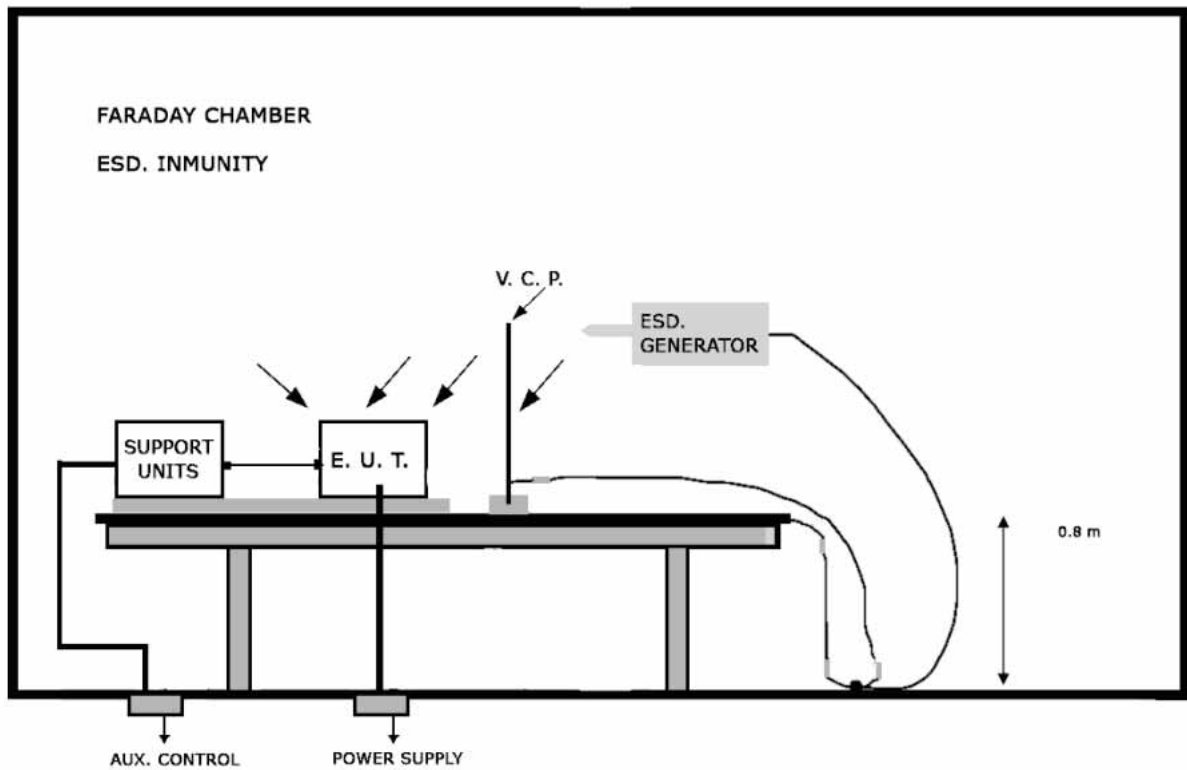
DESCRIPTION	P	F	N
TEST RESULTS	X		



## IMMUNITY ELECTROSTATIC DISCHARGE (ESD)

(IEC) EN 61000-4-2

Test Set-Up:



## IMMUNITY ELECTROSTATIC DISCHARGE (ESD)

(IEC) EN 61000-4-2

SEVERITY LEVEL See Classification Pag.: 4	TEST VOLTAGE "CONTACT MODE"	TEST VOLTAGE "AIR DISCHARGE MODE"
Class B	± 4 kV	± 8 kV
Class A		
Alarm Systems	± 2 kV± 4 kV± 6 kV	± 2 kV± 4 kV± 8 kV

DISCHARGE: Direct application . Test "Contact discharge"

DESCRIPTION	PERFORMANCE CRITERIA
Frontal discharge	A
Back discharge	A
Right discharge	A
Left discharge	A

INCIDENCES	-----
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DISCHARGE: Direct application . Test "Air discharge"

DESCRIPTION	PERFORMANCE CRITERIA
Frontal discharge	A
Back discharge	A
Right discharge	A
Left discharge	A

INCIDENCES	-----
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## IMMUNITY ELECTROSTATIC DISCHARGE (ESD)

(IEC) EN 61000-4-2

DISCHARGE: Indirect application. Test "Coupling plane"

DESCRIPTION	PERFORMANCE CRITERIA
Horizontal plane discharge	A
Vertical plane discharge	A

INCIDENCES	-----
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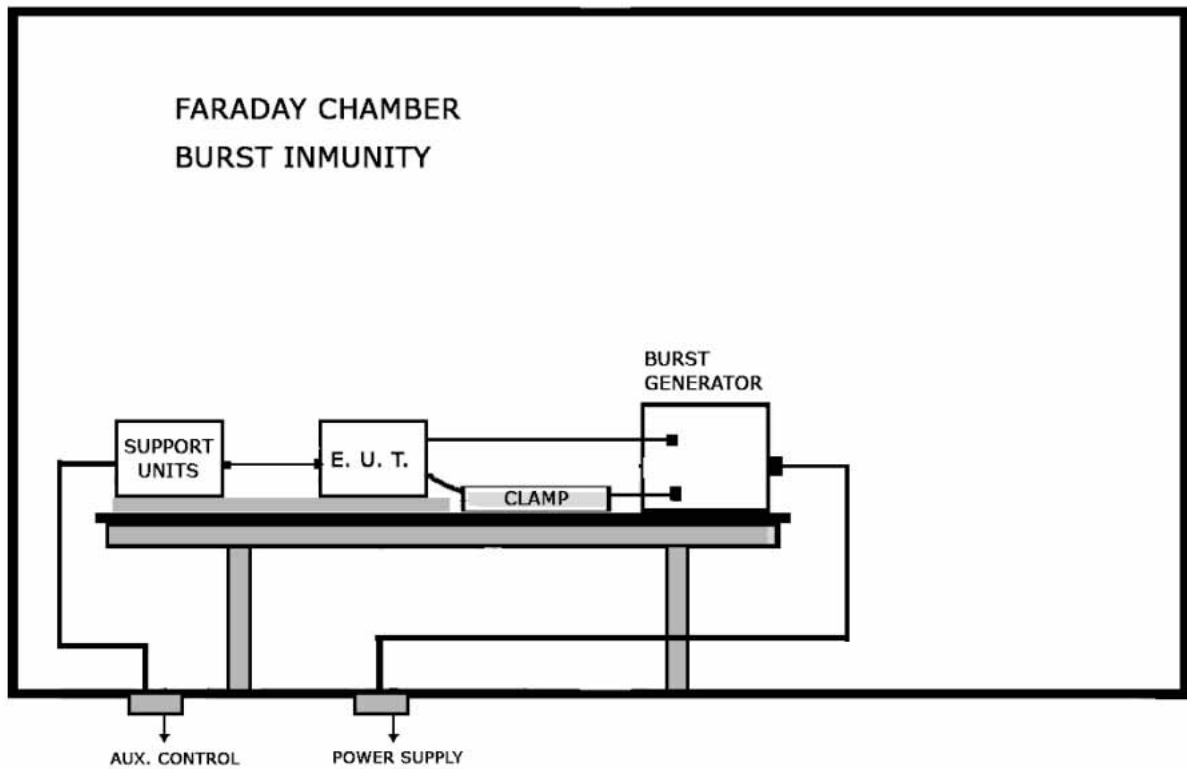
PERFORMANCE CRITERIA (LIMIT)	B
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DESCRIPTION	P	F	N
TEST RESULTS	X		

## IMMUNITY FAST TRANSIENTS (BURST)

(IEC) EN 61000 – 4 -4

Test Set-Up:



## IMMUNITY FAST TRANSIENTS (BURST)

(IEC) EN 61000 – 4 -4

SEVERITY LEVEL See Classification Pag.: 4	TEST VOLTAGE Input - Output Power A C Mains	TEST VOLTAGE Input - Output Power C. C Mains	TEST VOLTAGE Lines cc, e/s, signal, dates and control	TEST VOLTAGE Gnd
Class B	± 1 kV	± 0.5 kV	± 0.5 kV	± 0.5 kV
Class A	± 2 kV	± 2 kV	± 1 kV	± 1 kV
Alarm Systems	± (0.5, 1y 2) kV	± (0.25, 0.5y 1) kV	± (0.25, 0.5y 1) kV	± (0.5, 1y 2) kV

	Test Specification	Performance Criteria	Remarks
(HBES)	± 0.5 kV	A	Capacitive Coupling Clamp
	± 1 kV	B	

TEST SIGNAL LINES, INPUT - OUTPUT DATA AND CONTROL PERFORMANCE CRITERIA					
BURST	POLARITY	0.25 KV	0.5 KV	1 KV	4 KV
Coupling clamp	+	A	A	A	A
	-	A	A	A	A

INCIDENCES	-----
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PERFORMANCE CRITERIA (LIMIT)	B
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DESCRIPTION	P	F	N
TEST RESULTS	X		

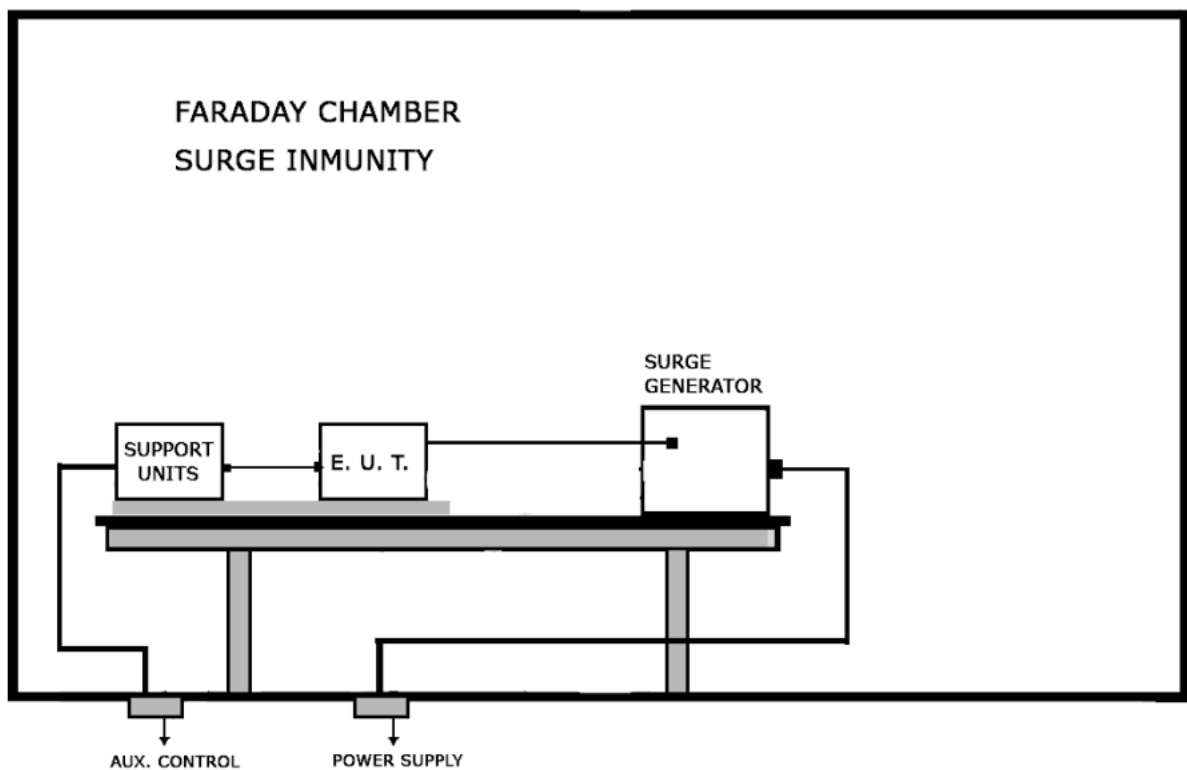
## IMMUNITY HIGH ENERGY PULSES (SURGES)

(IEC) EN 61000 – 4 – 5

IMMUNITY VOLTAGE PULSES

(Combined, 1,2 / 50  $\mu$ s – 8 / 20  $\mu$ s)

Test Set-Up:



## IMMUNITY HIGH ENERGY PULSES (SURGES)

(IEC) EN 61000 – 4 – 5

IMMUNITY VOLTAGE PULSES

 (Combined, 1,2 / 50  $\mu$ s – 8 / 20  $\mu$ s)

SEVERITY LEVEL See Classification Pag.: 4	TEST VOLTAGE				
	Input - Output Power A. C. Mains		Input - Output Power C. C. Mains		Signal dates, control and gnd.
	Between lines and gnd	Between lines	Between lines and gnd	Between lines	
Class B	± 2 kV	± 1 kV	± 0.5 kV	± 0.5 kV	-----
Class A					± 1 kV

TEST SIGNAL LINES, INPUT - OUTPUT DATA AND CONTROL PERFORMANCE CRITERIA					
BURST	POLARITY	0.25 KV	0.5 KV	1 KV	4 KV
Coupling clamp	+	A	A	A	A
	-	A	A	A	A

INCIDENCES	-----
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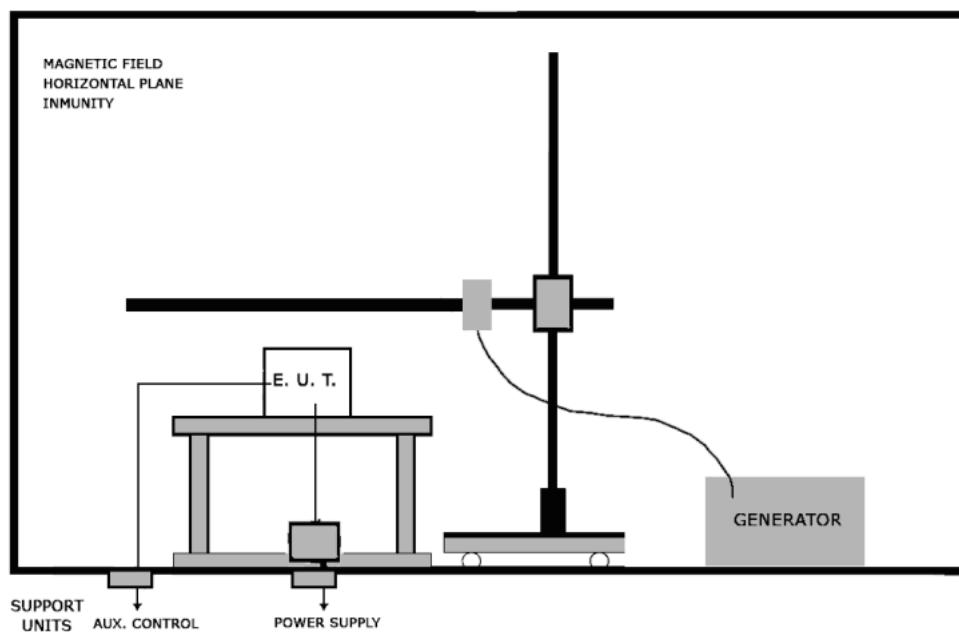
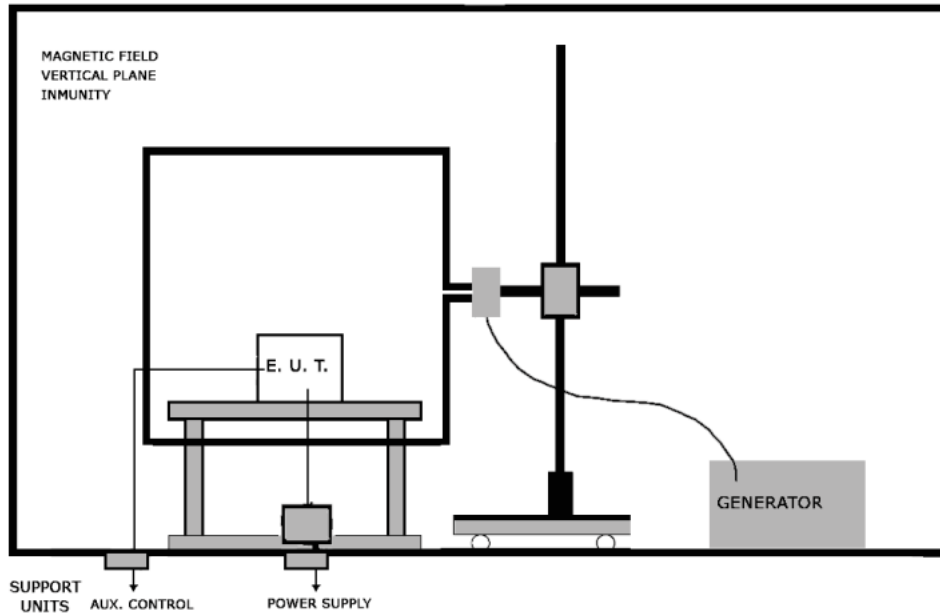
PERFORMANCE CRITERIA (LIMIT)	B
------------------------------	---

DESCRIPTION	P	F	N
TEST RESULTS	X		

## IMMUNITY MAGNETIC FIELD, INDUSTRIAL FREQUENCY

(IEC) EN 61000 - 4 - 8

Test Set-Up:

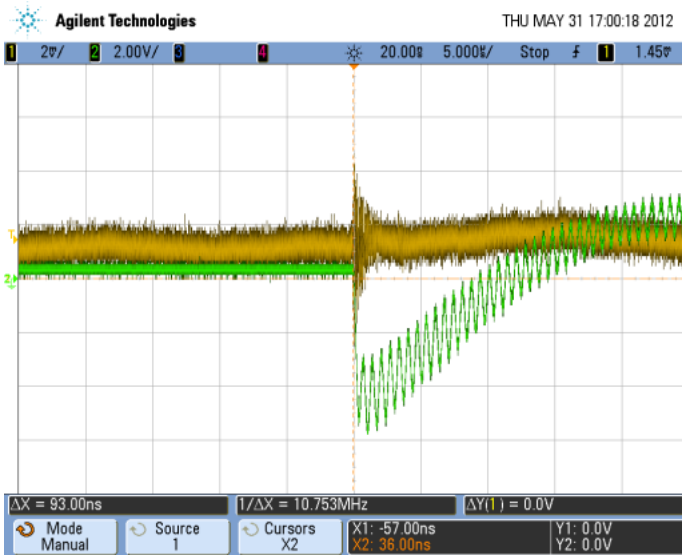




## IMMUNITY MAGNETIC FIELD, INDUSTRIAL FREQUENCY

(IEC) EN 61000 - 4 - 8

FIELD LEVEL: 1000 A / m (Green)	Current through the ground wire (Yellow)
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DESCRIPTION	PERFORMANCE CRITERIA
Test Edge: X	A
Test Edge: Y	A
Test Edge: Z	A

INCIDENCES	-----
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PERFORMANCE CRITERIA (LIMIT)	A
------------------------------	---

DESCRIPTION	P	F	N
TEST RESULTS	X		

## ANNEX

### LABORATORY INSTRUMENTS

#### LOGIC ANALYSIS SYSTEM HP-16500 A

Modular system.

State analyser dos 80 channels, enlarged to 400. Timer analyser 80 channels, enlarged to 400

Pattern generator 16 channels,

Oscilloscope digital 2 channels 400 MS/s, enlarged to 8. Sweep time. IEE488

#### POWER SUPPLY HP-6654A

Power 600W. Regulated 0-60V., 0-9A., IEE488

#### POWER SUPPLY HP-6032B

Power 1200W Regulated 0-60V., 0-50A., IEE488

#### RF. GENERATOR HP-8656B

Range: 100KHz to 990MHz Resolution 10Hz., IEE488

#### RF. GENERATOR HP-8662A

Range: 10KHz to 1280 MHz Resolution 0.1 Hz. Pattern frequency, stability  $5 \times 10^{-10}$ , IEE488.

#### FREQUENCY DOUBLER HP11721A

Range: 100 to 2600 MHz

#### AUDIO ANALYZER SCOTT 830Z

Ranges: 32Hz. to 16KHz. 30 to 130 dB SPL (-), (A), (C). De -60 to +40dBm.

#### AUDIO ANALYZER HP-8903A

Range: 20Hz. to 100KHz. IEE488

#### MODULATION ANALYZER HP-8901B

Range: 150 kHz. to 1300 MHz. With external mixer to 22 GHz. Resolution Hz.

Precision Wattmeter 18 GHz. IEE488

#### MODULATION ANALYZER HP 8901A

Range: 150 kHz to 1300 MHz. Resolution: 10 Hz for  $F < 1\text{GHz}$ , 100 Hz for  $F > 1\text{GHz}$ , IEE488

#### SYSTEM INTERFACE HP-8956A

Range: 0 to 18 GHz. IEE488

#### SYSTEM INTERFACE HP-8954A

Range: 0 to 18 GHz IEE488

#### ATTENUATOR HP-8498A

Range: 0 to 18 GHz. ,30 dB. ,30W. ,50 Ohm..

#### SET MARCONI COMMUNICATIONS TEST 2955

Range: 0.4 MHz to 1000 MHz. (Alta stability, IEE488,)

#### ATTENUATOR BIRD A 8322

Range: 0 to 1200 MHz., 30 dB. ,200W. ,50 Ohm..

#### LOAD BIRD A 8164

Range de 0 to 2400 MHz.. 100W. ,50 Ohm.

#### WATTMETER BIRD 43

#### REGULABLE COUPLING BIRD 4275

#### HP CALIBRATION SET AUTOMATIC MEASURES KIT

Adapters , probes, calibrated attenuator and loads. Range: 0 to 12.4 GHz.

## RECEIVER EMI FORMED FOR:

SPECTRUM ANALYZER HP-8566B, QUASI PEAK DETECTOR HP85650A, PRESELECTOR HP-85685A  
Range: 100 Hz. to 22 GHz. Resolution 0,1 Hz. Dynamic Range: -134 to +30.1 dBm. IEE488

## RECEIVER EMI FORMED FOR:

SPECTRUM ANALYZER HP-8566B, and QUASI PEAK DETECTOR HP85650A  
Range: 100 Hz. to 22 GHz. Resolution 0,1 Hz. Dynamic Range: -134 to +30.1 dBm. IEE488  
TRANSIENT LIMITER HP11947A  
Range: 9 kHz to 200 MHz

## ISOTROPIC FIELD METER EMCO 7110

Range: 10 kHz to 22 GHz, Level 1 to 400 V / m. 8 Inputs . IEE488  
OPTIC FIBRE INTERFACE FOR ISOTROPIC PROBE EMCO 7120. 2 units.  
ISOTROPIC PROBE EMCO 7122. Range 10 kHz to 1000 MHz, dynamic 1 to 250 V / m.  
ISOTROPIC PROBE EMCO 7121. Range 100 MHz to 18 GHz, dynamic 2 to 500 V / m.

LISN TELPRO 3 units.

## COUPLING NETWORK

Range: 100 kHz to 30 MHz

## LOG-PERIODIC ANTENNA CREATE

Range: 100 to 1300 MHz

## HORN ANTENNA

Range: 1 to 12 GHz

## NEAR FIELD PROBE HP 11940A

Range: 30 MHz to 1 GHz

## CURRENT PROBE SINGER 91550

## HIGH FREQUENCY PROBE HP85024A

Range: 300 kHz to 3 GHz

## DETECTOR PROBE HP11096A

Range: 100 kHz to 500 MHz

## POWER SENSOR HP8484A ( Automatic system calibration)

Range: 10 MHz to 18 GHz , y 100 pW to 10 $\mu$ W ( -70 dBm to - 20 dBm )

## POWER SENSOR HP8482A

Range: 10 MHz to 4200 MHz

## COAXIAL CABLES CALIBRATION AND MEASURE

HP11500A,  
HP11500A, 2 units.

## CLIMATIC CHAMBER HERAEUS VLK 04/150

Temperature range: -55 °C to + 200 °C , Resolution 0.1 °C  
Humidity range: 0 to 100% , Resolution 1%.  
Capacity : 53 x 53 x 53 cm. 150 litres.

## ELECTROSTATIC DISCHARGES GENERATOR KEYTEK MZ-15 / EC

Voltage range:  $\pm 0.5$  kV to  $\pm 15$  kV.  
Resolution: 10 V.  
Precision:  $\pm 3$  % .

## INSULATION METER TES 1600

Resistance range: 200 to 20000 M $\Omega$

## DIELECTRIC STRENGTH , EARTH CONTINUITY AND INSULATION RESISTANCE METER SEFELEC SMG 500

Range: 0 to

Delta detector, I , I max., I max. + delta; regulated: 0.1 to 100 mA  
Insulation resistance range: 50K $\Omega$  to 200 G $\Omega$ , With voltage test of 100 to 1000 V DC.

Earth continuity meter range: 1m $\Omega$  to 1.5  $\Omega$ , Current range: 5 to 30 A,, Application time: 0 to 999 s,, Test voltage: 6V or 12 V rms. IEE 488

LINEAR POWER AMPLIFIER KALMUS 747LC - CE  
Class A. Range: 10 kHz to 1 GHz. Power 50 W.

LINEAR POWER AMPLIFIER TELPRO  
Frequency range: 700 MHz to 2500 MHz Power 1 W.

LINEAR POWER AMPLIFIER TELPRO  
Frequency range: 2 Hz to 200 kHz Power 2x75 W.

BICONILOG ANTENNA EMCO 3141  
Range: 26 to 2000 MHz,, Power in continuous wave 1 kW.

TRIPOD EMCO 6-TR  
Telescopic, and polarity changer.

AMPLIFIER EMCO 7405  
Range: 100 kHz to 3 GHz.

IMMUNITY COMPACT GENERATOR EMTEST UCS 500/M4  
Fast transients (Burst). High energy pulses (surges). Voltage dips and interruptions AC/DC. Magnetic field immunity generator. IEE 488.

CAPTIVE COUPLING PROBE HFK

TEM CELL.  
Range: 10 kHz to 2 GHz.

FARADAY CHAMBER - SEMI ANECHOIC  
Dimensions 5.80 m. x 3.30m. x 2.70m. Access door: 1.20m. x 2.20m.

MULTIMETER AGILENT 34410A 6.5 Digit

LINEAR POWER AMPLIFIER. AMPLIFIER RESEARCH 5S1G4 + DC7144A + DC3010A  
Range: 0.8 – 4.2 GHz.

HORN ANTENNA SCHWARZBECK MESS – ELEKTRONIK BBHA 9120 E  
Range: 0.5 – 6 GHz

WOOD TRIPOD EMC 2202 HL

CLAMP CISPR-16-2 LUTHI MDS 21 B

CURRENT INJECTION CLAMP LUTHI EM101 RF

RF GENERATOR AGILENT E 8257 D - PSG  
Range: 250 KHz a 20 GHz

SPECTRUM ANALYZER HP-8566B,  
Range: 100 Hz. to 22 GHz. Resolution 0,1 Hz. Dynamic Range: -134 to +30.1 dBm. IEE488

OSCILSCOPE AGILENT – DSO7104B  
Range DC – 1 GHz.

CURRENT CLAMP FLUKE i30S

## CALIBRATION, PRECISION AND MEASUREMENT TOLERANCE

PARAMETERS (MEASURED IN CALIBRATION LABORATORY)			
FUNCTION	NOMINAL	MEASURED	TOLERANCE
FREQUENCY PRECISION	$5 \times 10^{-10}$	$3.2 \times 10^{-10}$	$5 \times 10^{-10}$
FREQUENCY RESOLUTION	0.1 Hz	---	---
RF POWER PRECISION (normal)	1.3 to 2.2 %		5 %
RF POWER PRECISION (maxim sens. calibr.)			1%
ATTENUATOR DEVIATION		0.1 to 0.33 dB	1 dB
POWER LEVEL (STEEP 0.1 dB)		0.01 to 0.03 dB	
POWER LEVEL (STEEP 2 dB)		0.01 to 0.04 dB	
POWER LEVEL (STEEP 10 dB)		0.00 to 0.33 dB	
BROADBAND		0.0 to 0.3 dB	
UNCERTAINLY LOGARITHMIC TEST		0.04 to 0.06 dB	
ERROR RESOLUTION BROADBAND		0.1 to 0.37 %	
ERROR FREQUENCY SPAN		0.00 to 0.75 %	
PRECISION MODULATION ANALYZER AM	100 %	99.950 to 100.020 %	1 %
PRECISION MODULATION ANALYZER FM		0.06 %	0.1 %
PRECISION MODULATION ANALYZER PHASE	0.2 to 250 rad.	0.205 to 249.7 rad.	0.007 to 7.6 rad
PRECISION MODULATION ANALYZER DISTORTION		0.01 to 0.03 %	0.1%
PRECISION MEASURES ISOTROPIC FIELD	$\pm 0.5$ dB max.	$\pm 0.44$ dB max.	
TEMPERATURE		$\pm 1$ °C	

## PHOTOGRAPHS

