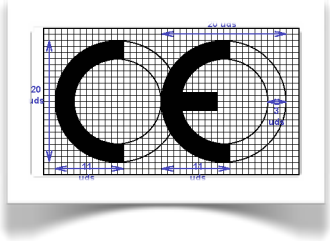
Laboratorio de Ensayos, marcado CE

Test Laboratory, CE mark

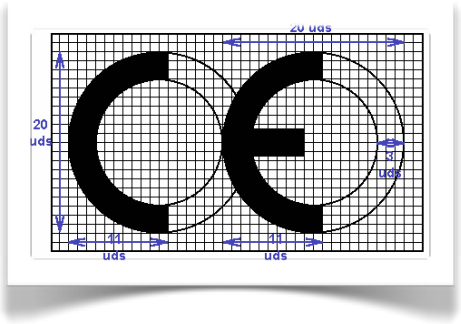


Marca: Brand:	OSA ELECTRONICS
2 Modelos: 2 Models:	DACBERRY 400M DACBERRY 400S
Descripción: Description:	Low power stereo audio codec
Directivas: Directives:	2014/30/EU (E. M. C.)
Ensayos y medidas. Norma: Tests and measurements. Standard:	UNE-EN 55032:2016 +/AC:2016-07 Class B UNE-EN 55035:2017
Resultado en el informe de los ensayos Nº.: Show in summary in test report Nº.:	2021-07-014
Verificado: Verified:	V
Fecha (DD-MM-AAAA): Date(DD-MM-YYYY):	29-07-2021
Sello de la compañía y firma: Company seal and signature: F. J. García. Ing. T. Telecom. General manager.	laboratorio de ensayos telpro CE www.elmarcadoCE.com F. J. García. T. Telecom. Eng.

REPORT

ELECTROMAGNETIC COMPATIBILITY

Test Laboratory, CE mark



TESTS AND MEASURES REQUESTED:
Electromagnetic Compatibility. Emissions
Electromagnetic Compatibility. Immunity
DIRECTIVES:
2014/30/EU Electromagnetic Compatibility. (E. M. C.)

STANDARD:

UNE-EN 55032:2016 +AC:2016-07 Class B UNE-EN 55035:2017+A11:2020	EMI: Multimedia Equipment. Immunity: Multimedia equipment

Sello de la compañía y firma: Company seal and signature: F. J. García. Ing. T. Telecom. General manager.	laboratorio de ensayos telpro CE www.elmarcadoCE.com F. J. García. Ing. T. Telecom. Eng.

SUMMARY

Part 1: GENERAL INFORMATION SECTION

Test laboratory general conditions

In order to ensure the measurement traceability in reference to the nationals and internationals 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 this 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 ºC to 23 ºC
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

a) Under supplier by free delivery

b) Under supplier by sampling procedure

Abbreviations used in this report:

P: Pass

F: Fail

N: Not applied, or not requested.

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

AVG: Average

Pk. Peak

Q-Pk: Quasi Peak

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.

Description test sample, data declared by the applicant.

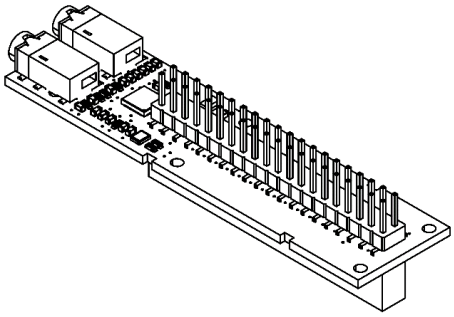
Low power stereo audio codec.

DACBerry 400 M Datasheet
JUL 2021

OSA ELECTRONICS DACBERRY 400 M

Features

- Up to 96kHz/32bits
- 102dB SNR DAC, 92dB SNR ADC
- THD+N @1kHz – 0.006 %
- Integrated DSP
- 3D Effects and De-Emphasis
- Low-Noise design with isolated Digital and Analog parts
- Board leaves all the USB ports free
- GPIO accessible w/ or w/o case
- Compatible with Raspberry Pi and others with the same GPIO



Specifications		
Model		DBR400M
DAC	-	102dB SNR @96kHz / 32 bits
ADC	-	92dB SNR @96kHz / 32 bits
THD+N		0.006 % @1kHz
Features	-	- Integrated DSP - 3D, Bass, Treble, EQ, or De-Emphasis Effects - Ultra-Low-Power Mode With Passive Analog Bypass - Programmable I/O Analog Gains - Automatic Gain Control (AGC) for Record - Programmable Microphone Bias Level - Headset auto-detect - High Power Outputs
Inputs	-	1x mic in on headset connector, 1x stereo line in
Outputs	-	1x stereo on headset connector
Top header connector	-	Included / Soldered
Case	-	Included
Weight	-	28g
Size WxHxD	-	77 x 20 x 20 mm

For more information: www.osaelectronics.com

Low power stereo audio codec.

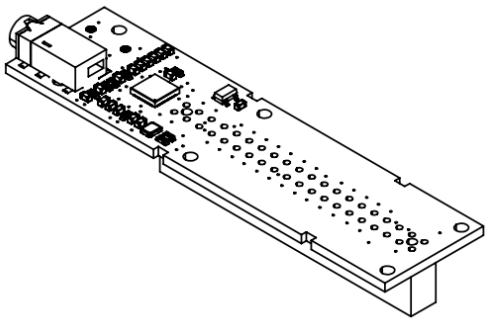
OSA ELECTRONICS

DACBerry 400 S Datasheet
JUL 2021

OSA ELECTRONICS DACBERRY 400 S

Features

- Up to 96kHz/32bits
- 102dB SNR DAC, 92dB SNR ADC
- THD+N @1kHz – 0.006 %
- Integrated DSP
- 3D Effects and De-Emphasis
- Low-Noise design with isolated Digital and Analog parts
- Board leaves all the USB ports free
- Compatible with Raspberry Pi and others with the same GPIO



Specifications		
Model		DBR400S
DAC	-	102dB SNR @96kHz / 32 bits
ADC	-	92dB SNR @96kHz / 32 bits
THD+N		0.006 % @1kHz
Features	-	- Integrated DSP - 3D, Bass, Treble, EQ, or De-Emphasis Effects - Ultra-Low-Power Mode With Passive Analog - Bypass - Programmable I/O Analog Gains - Automatic Gain Control (AGC) for Record - Programmable Microphone Bias Level - Headset auto-detect - High Power Outputs
Inputs	-	1x mic in on headset connector
Outputs	-	1x stereo on headset connector
Top header connector	-	NOT Included / NOT soldered
Case	-	NOT Included
Weight	-	25g
Size WxHxD	-	77 x 20x 20 mm

For more information: www.osaelectronics.com

Test notes

NO COMMENTS

Additional documentation

Description	Remark

Utilisation	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

Test, Classification

Classification (General Safety)	Class III (Very low voltage safety protection)
CLASSIFICATION IMMUNITY	Class B (Residential and light Industry environment)
CLASSIFICATION EMISSIONS	Class B (Residential and light Industry environment)

Summary and conclusions of the tests requested

Description	Result
TEST OF CONDUCTED EMISSIONS	P
TEST OF RADIATED EMISSIONS	P
(IEC) EN 61000-3-2 OF HARMONIC CURRENT EMISSIONS (AC MAINS)	N
(IEC) EN 61000-3-3 OF VOLTAGE FLUCTUATIONS AND FLICKER (AC MAINS)	N
(IEC) EN 61000-4-2 IMMUNITY ELECTROSTATIC DISCHARGE (ESD)	P
(IEC) EN 61000-4-3 IMMUNITY RADIATED ELECTROMAGNETIC FIELD	P
(IEC) EN 61000-4-4 IMMUNITY FAST TRANSIENTS (BURST)	P
(IEC) EN 61000-4-5 IMMUNITY HIGH ENERGY PULSES (SURGES)	N
(IEC) EN 61000-4-6 IMMUNITY CONDUCTED ELECTROMAGNETIC FIELD	P
(IEC) EN 61000-4-8 IMMUNITY MAGNETIC FIELD, INDUSTRIAL FREQUENCY	P
(IEC) EN 61000-4-11 IMMUNITY VOLTAGE DIPS AND INTERRUPTIONS (VAC)	N
(IEC) EN 61000-4-29 IMMUNITY VOLTAGE DIPS AND INTERRUPTIONS (VDC)	P

Modifications to obtain standard type approval

---- NO COMMENT----

Reference standards used in the report

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.

GENERICS 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	IEC6 1000-4-5	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
EN 61 000-4-17	IEC 61 000-4-17	Immunity to ripple DC

GENERICS STANDARDS

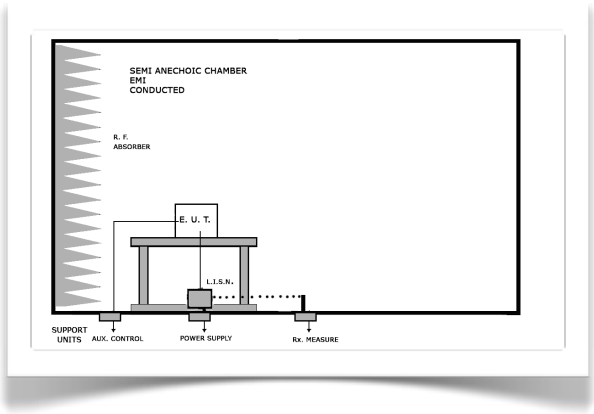
EN 61000-6-1	IEC 61000-6-1	EMC, Generic immunity standard. Residential and light industry
EN 61000-6-2	IEC 61000-6-2	EMC, Generic immunity standard. Industry
ISO 7637	Immunity vehicular environment	

Part 2: TEST AND MEASURES REQUESTED

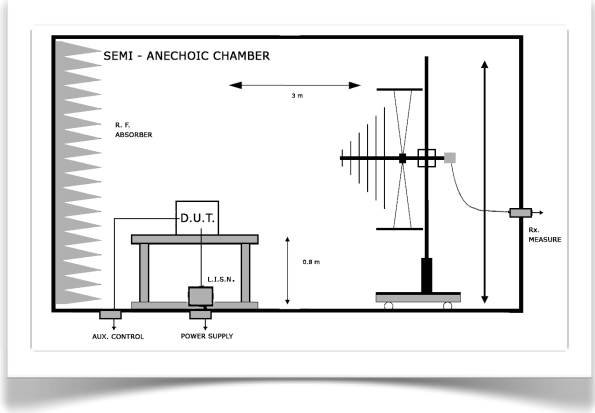
ELECTROMAGNETIC COMPATIBILITY

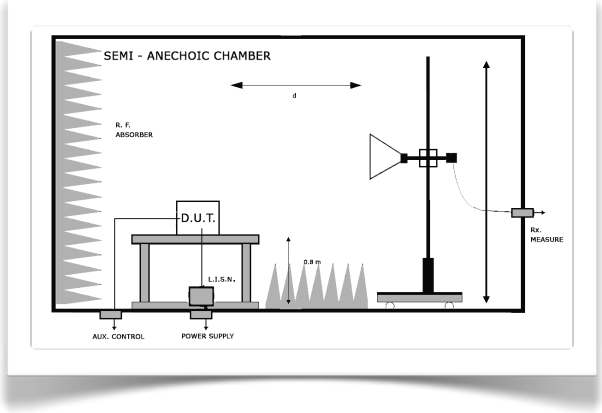
TEST OF EMISSIONS

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 polarisation.
Used detector peak in the previous sweep, and quasi-peak at the end.
Tested en semi - anechoic room
Test Set-up:

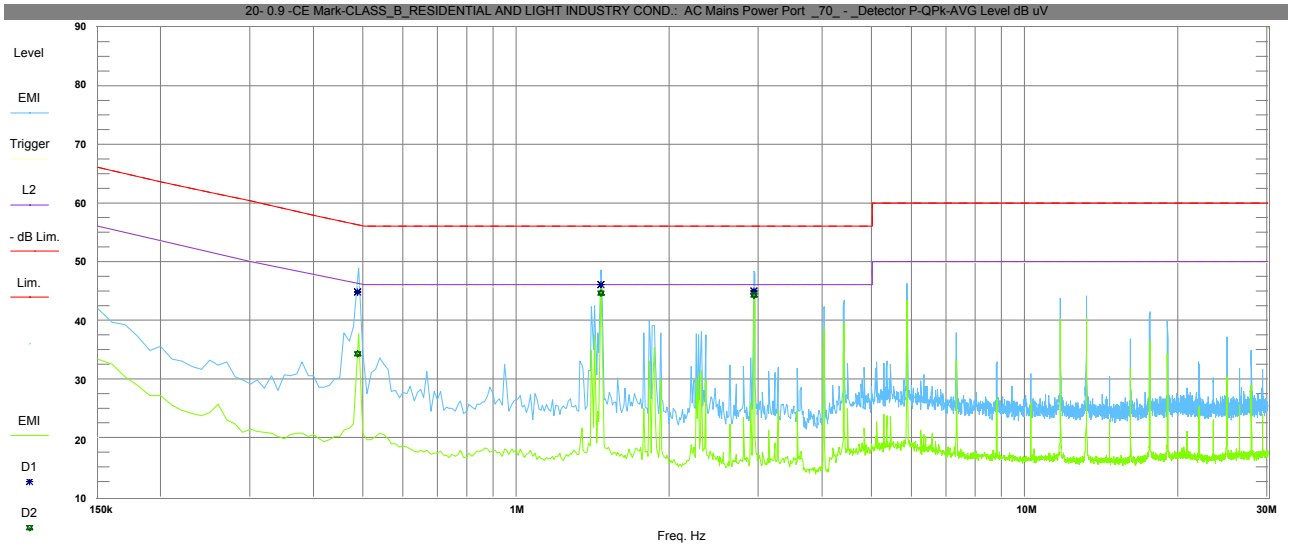




TEST OF CONDUCTED EMISSIONS

Tested in semi - anechoic room
Band: 150 kHz - 30 MHz
Pk and Q-Pk DETECTOR: / AVG DETECTOR:

VDC, POWER SUPPLY, (-)



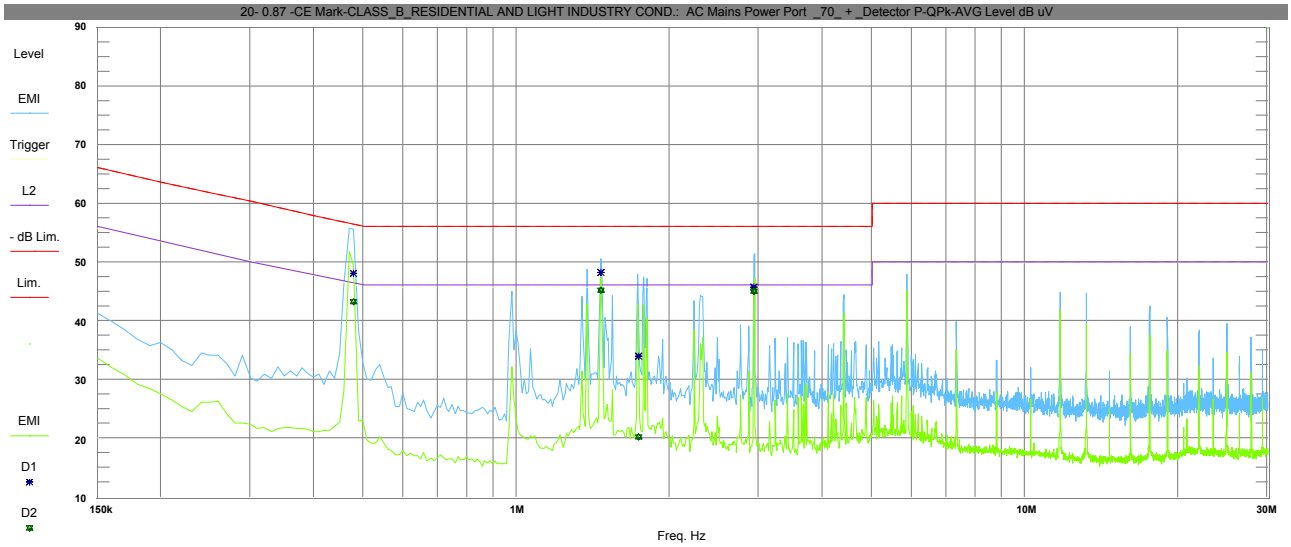
Freq MHz:	Measure:	Limit	Margin (dB)	Corr. Fact.	Marker	Detector	Verdict
0,49	44,75	56,21	-11,46	13,34	31,41	QPk	PASS
1,47	46,01	56	-9,99	13,36	32,65	QPk	PASS
2,93	44,93	56	-11,07	13,35	31,57	QPk	PASS
0,49	34,31	46,23	-11,92	13,34	20,98	AVG	PASS
1,47	44,71	46	-1,29	13,36	31,34	AVG	PASS
2,93	44,36	46	-1,64	13,35	31	AVG	PASS

TEST RESULT	PASS

TEST OF CONDUCTED EMISSIONS

Tested in semi - anechoic room
Band: 150 kHz - 30 MHz
Pk and Q-Pk DETECTOR: / AVG DETECTOR:

VDC, POWER SUPPLY, (+)



Freq MHz:	Measure:	Limit	Margin (dB)	Corr. Fact.	Marker	Detector	Verdict
0,48	48,03	56,39	-8,35	13,33	34,71	QPk	PASS
1,47	48,21	56	-7,79	13,36	34,84	QPk	PASS
1,74	33,94	56	-22,06	13,37	20,57	QPk	PASS
2,93	45,66	56	-10,34	13,35	32,31	QPk	PASS
0,48	43,16	46,43	-3,27	13,33	29,83	AVG	PASS
1,47	45,12	46	-0,88	13,36	31,76	AVG	PASS
1,74	20,14	46	-25,86	13,37	6,77	AVG	PASS
2,93	44,92	46	-1,08	13,35	31,57	AVG	PASS

TEST RESULT	PASS

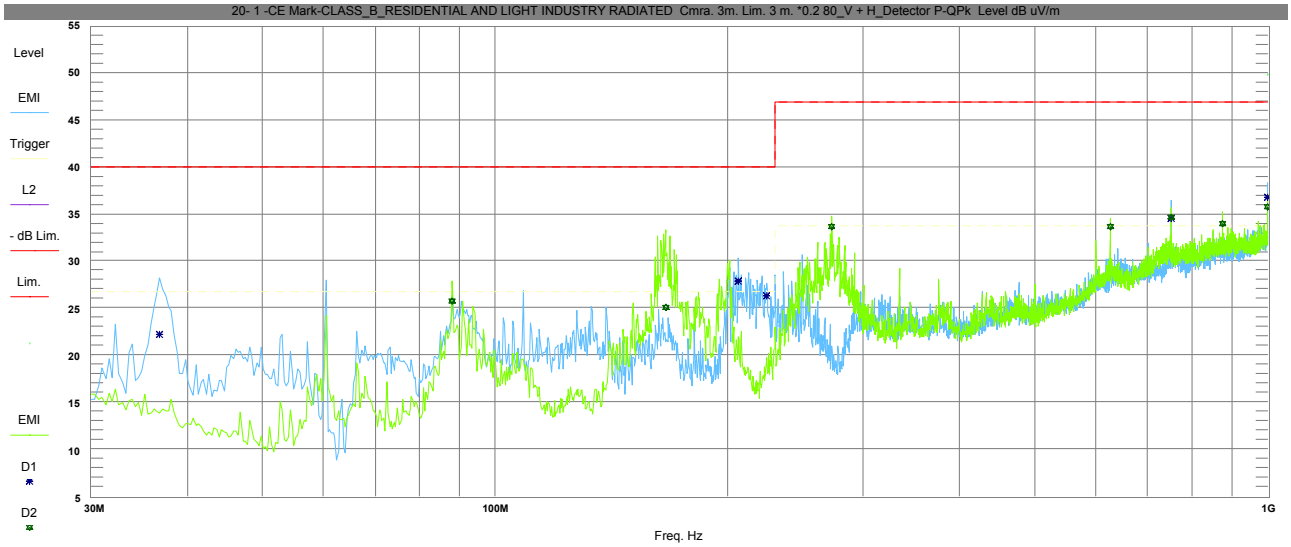
TEST OF RADIATED EMISSIONS

Tested in semi - anechoic room. Distance. 3 m.

30 MHz to 1 GHz Band

Vertical Polarity / Horizontal Polarity

Pk and Q-Pk DETECTOR:



Freq MHz:	Measure:	Limit	Margin (dB)	Corr. Fact.	Marker	Angle °	High cm	Polarization	Detector	Verdict
36,79	22,17	40	-17,83	-22,06	44,23	0	130	Vert. (Blue)	QPk	PASS
206,6	27,9	40	-12,1	-17,03	44,93	0	130	Vert. (Blue)	QPk	PASS
224,71	26,34	40	-13,66	-16,51	42,85	0	130	Vert. (Blue)	QPk	PASS
749,98	34,55	47	-12,45	-6	40,55	0	130	Vert. (Blue)	QPk	PASS
1000	36,81	47	-10,19	-2,87	39,68	0	130	Vert. (Blue)	QPk	PASS
87,9	25,79	40	-14,21	-21,65	47,44	0	130	Horiz.(Green)	QPk	PASS
166,17	25,06	40	-14,94	-17,16	42,22	0	130	Horiz.(Green)	QPk	PASS
272,9	33,7	47	-13,3	-15,69	49,4	0	130	Horiz.(Green)	QPk	PASS
625,13	33,67	47	-13,33	-5,98	39,65	0	130	Horiz.(Green)	QPk	PASS
749,98	34,63	47	-12,37	-4,97	39,6	0	130	Horiz.(Green)	QPk	PASS
875,15	34,02	47	-12,98	-4,26	38,28	0	130	Horiz.(Green)	QPk	PASS
1000	35,85	47	-11,15	-2,52	38,37	0	130	Horiz.(Green)	QPk	PASS

TEST RESULT	PASS

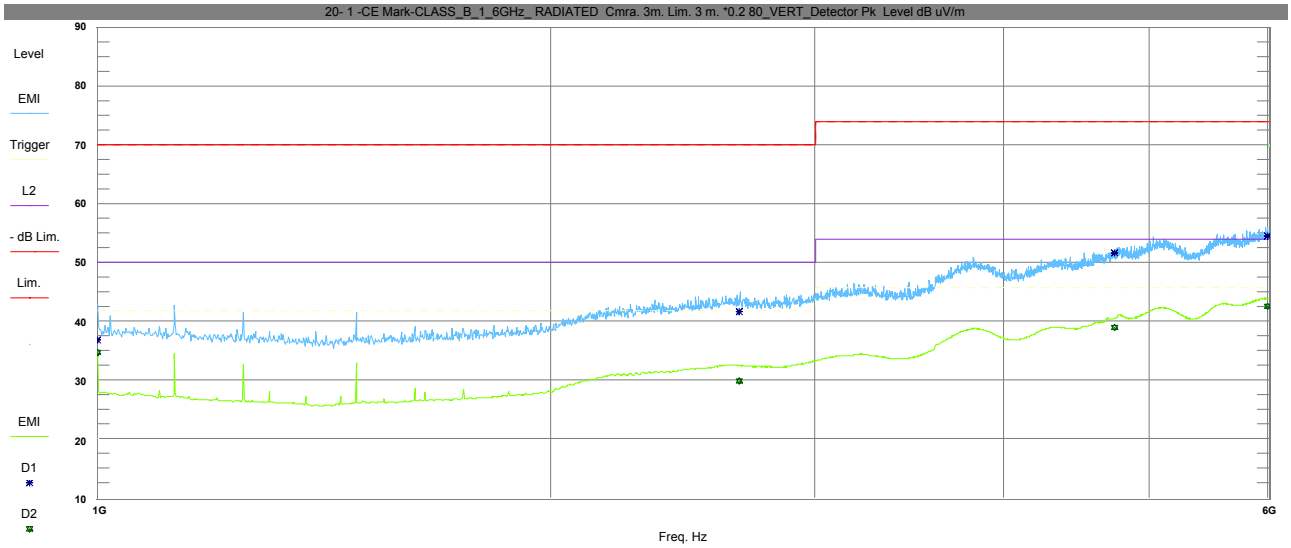
TEST OF RADIATED EMISSIONS

Tested in semi - anechoic room. Distance. 3 m.

1 to 6 GHz Band

Vertical Polarity

Pk DETECTOR: / AVG DETECTOR:



Freq MHz:	Measure:	Limit	Margin (dB)	Corr. Fact.	Marker	Angle º	High cm	Polarization	Detector	Verdict
1000,04	36,83	70	-33,17	-0,46	37,29	0	130	Vertical	Pk	PASS
2668,36	41,67	70	-28,33	5,3	36,37	0	130	Vertical	Pk	PASS
4741,01	51,65	74	-22,35	12,63	39,02	0	130	Vertical	Pk	PASS
5988,67	54,54	74	-19,46	16,77	37,78	0	130	Vertical	Pk	PASS
1000,04	34,71	50	-15,29	-0,46	35,17	0	130	Vertical	AVG	PASS
2668,36	29,88	50	-20,12	5,3	24,58	0	130	Vertical	AVG	PASS
4741,01	38,97	54	-15,03	12,63	26,34	0	130	Vertical	AVG	PASS
5988,67	42,49	54	-11,51	16,77	25,72	0	130	Vertical	AVG	PASS

TEST RESULT	PASS

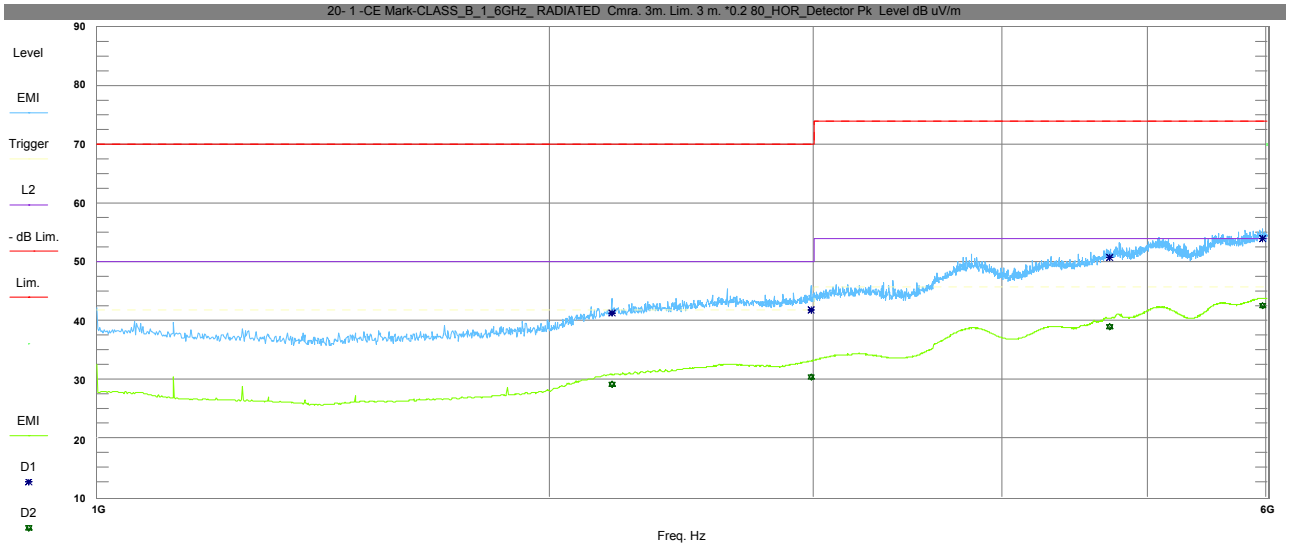
TEST OF RADIATED EMISSIONS

Tested in semi - anechoic room. Distance. 3 m.

1 to 6 GHz Band

Horizontal Polarity

Pk DETECTOR: / AVG DETECTOR:



Freq MHz:	Measure:	Limit	Margin (dB)	Corr. Fact.	Marker	Angle °	High cm	Polarization	Detector	Verdict
2200,01	41,3	70	-28,7	4,29	37	0	130	Horizontal	Pk	PASS
2986,55	41,83	70	-28,17	6,26	35,57	0	130	Horizontal	Pk	PASS
4718,47	50,74	74	-23,26	12,54	38,2	0	130	Horizontal	Pk	PASS
5962,42	53,93	74	-20,07	16,67	37,26	0	130	Horizontal	Pk	PASS
2200,01	29,04	50	-20,96	4,29	24,75	0	130	Horizontal	AVG	PASS
2986,55	30,45	50	-19,55	6,26	24,18	0	130	Horizontal	AVG	PASS
4718,47	38,88	54	-15,12	12,54	26,35	0	130	Horizontal	AVG	PASS
5962,42	42,57	54	-11,43	16,67	25,91	0	130	Horizontal	AVG	PASS

TEST RESULT	PASS

LIMITS:

LIMITS FOR CONDUCTED DISTURBANCES

POWER SUPPLY AC MAINS (dB µV)											
FREQUENCIES		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 55032 Class A		EN 55032 Class B		EN 55015	
Low	High	Q-Pk	AVG	Q-Pk	AVG	Q-Pk	AVG	Q-Pk	AVG	Q-Pk	AVG
9 kHz	50 kHz	---	---	---	---	Under consideration		---	---	110	---
50 kHz	150 kHz	---	---	---	---			---	---	90 to 80	---
150 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	---	---	---	---	---	---	---	---	---	---

EN 55015 Class A Group 1: POWER SUPPLY AC MAINS (dB µV) (dB µV)				
FREQUENCIES MHz	> 20 kVA < 75 kVA		> 75 kVA	
	Q-Pk	AVG	Q-Pk	AVG
0,15 - 0,5	100	90	130	120
0,5 - 5	86	76	125	115
5 - 30	90 73	80 60	115	105

LIMITS IN LINES INPUT OUTPUT, SIGNALING AND CONTROL (Asymmetric mode) (dB µV)									
FREQUENCIES		Residential and light industry EN 61000-6-3		Industrial environment EN 61000-6-4		EN 55032 Class A (1)		EN 55032 Class B	
Low	High	Q-Pk	AVG	Q-Pk	AVG	Q-Pk	AVG	Q-Pk	AVG
9 kHz	50 kHz	---	---	Look basic standard		Under consideration		---	---
50 kHz	150 kHz	---	---					---	---
150 kHz	500 kHz	40 to 30	30 to 20			97 - 87	84 - 74	84 - 74	74 - 64
500 kHz	5 MHz	30	20			87	74	74	64
5 MHz	30 MHz	30	20			87	74	74	64

EN 55011 DC POWER PORT (< 20 kVA)				
Frequency Band MHz	Class A dB(uV)		Class B dB(uV)	
	Quasi Peak	Average	Quasi Peak	Average
0,15 - 0,5	97 - 89	84 - 76	84 - 74	74 - 64
0,5 - 30	89	76	74	64

TEST RESULT	PASS

LIMITS FOR RADIATED DISTURBANCES

LIMITS RADIATED RADIO ELECTRIC EMISSIONS Q-Pk (dB µV/m)					
FREQUENCIES		EN 61000-6-4 Industry EN 55032 Classe A EN 55011 Group 1 Classe A EN 55011 Group 2 Classe A		EN 61000-6-3 Residential and light industry EN 55032 Class B EN 55011 Group 1 Class B EN 55011 Group 2 Class B	
Low	High	Measurement distance 10 m	Measurement distance 3 m	Measurement distance 10 m	Measurement distance 3 m
30 MHz	230 MHz	40	50	30	40
230 MHz	1 GHz	47	57	37	47

All other environments (Class A) (Measurement distance of 3 m)		
Frequency range	AVG Limit (dBµV/m)	Pk 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		

Residential environment (Class B) (measurement distance of 3 m)		
Frequency range	AVG Limit (dBµV/m)	Pk limit (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		

TEST RESULT	PASS

TEST OF HARMONIC CURRENT EMISSIONS (AC MAINS)

(IEC) EN 61000 - 3 - 3
Tested en semi - anechoic room.

TEST RESULT	N

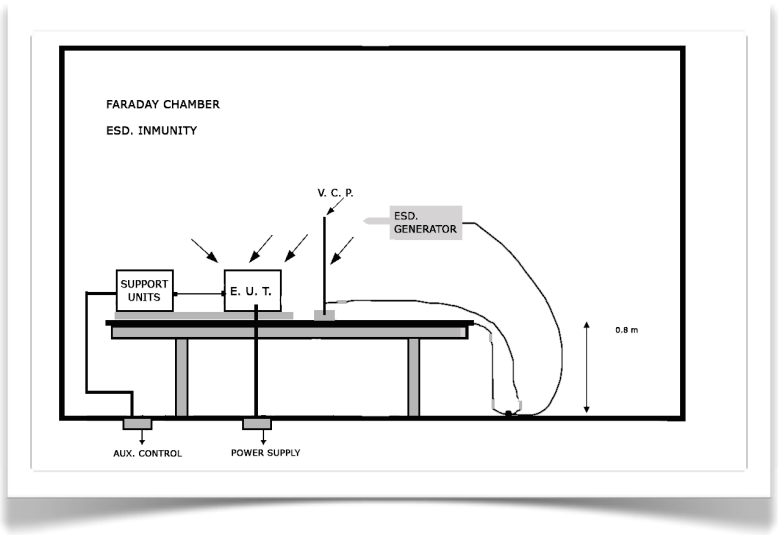
TEST OF VOLTAGE FLUCTUATIONS AND FLICKER (AC MAINS)

(IEC) EN 61000 - 3 - 3
Tested en semi - anechoic room.

TEST RESULT	N

IMMUNITY ELECTROSTATIC DISCHARGE (ESD)

(IEC) EN 61000-4-2
Test Set-Up:



SEVERITY LEVEL See Classification	TEST VOLTAGE “CONTACT MODE”	TEST VOLTAGE “AIR DISCHARGE MODE”
Class B Class A	± 4 kV	± 8 kV

IMMUNITY ELECTROSTATIC DISCHARGE (ESD)

25 DISCHARGES: Direct application. “Air discharge”		
APPLICATION POINT	PERFORMANCE CRITERIA	RESULTS
Frontal discharge	B	P
Back discharge	B	P
Right discharge	B	P
Left discharge	B	P
Upper discharge	B	P
Bottom discharge	B	P
INCIDENCES	- - - - - - -	

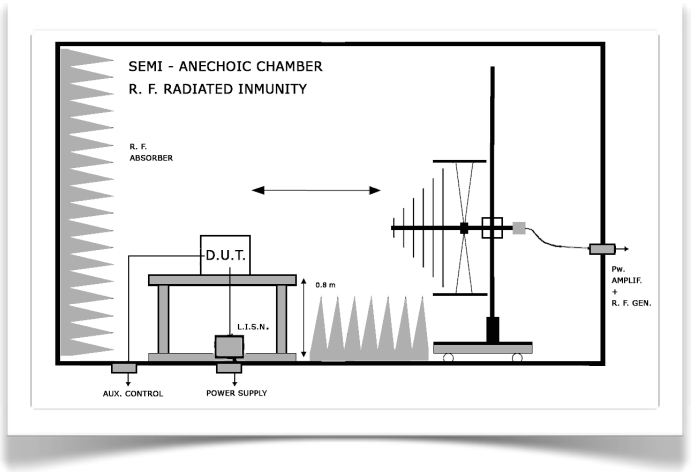
25 DISCHARGES: Direct application. “Contact discharge”		
APPLICATION POINT	PERFORMANCE CRITERIA	RESULTS
Frontal discharge	B	P
Back discharge	B	P
Right discharge	B	P
Left discharge	B	P
Upper discharge	B	P
Bottom discharge	B	P
INCIDENCES	- - - - - - -	

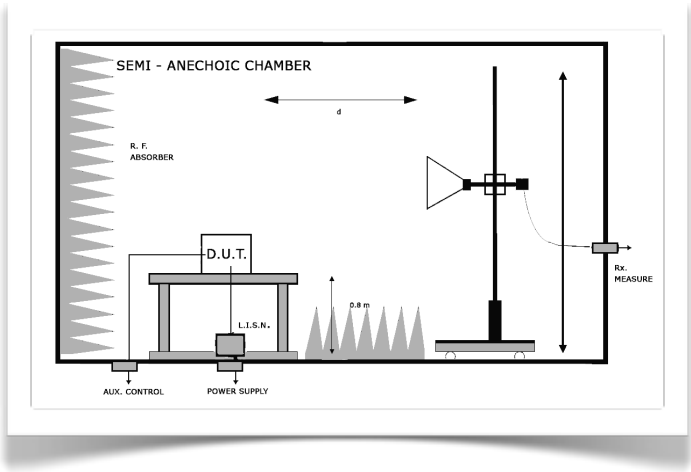
25 DISCHARGES: Indirect application. “Coupling plane discharge”		
APPLICATION POINT	PERFORMANCE CRITERIA	RESULTS
Horizontal plane discharge	B	P
Vertical plane discharge	B	P
INCIDENCES	- - - - - - -	

NOTE	After the test there are no signs of degradation or deterioration of performance.
PERFORMANCE CRITERIA (LIMIT)	B
TEST RESULT	PASS

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
Steps 1%. Sweep time 4 s. min.
TEST FREQUENCY TABLE:

BAND: 80 - 1000 MHz									
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	---	---	---	---	---

BAND: 1000 - 6000 MHz									
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	4190,616	4232,522	4274,847	4317,595	4360,771	4404,379
4448,423	4492,907	4537,836	4583,215	4629,047	4675,337	4722,091	4769,311	4817,005	4865,175
4913,826	4962,965	5012,594	5062,720	5113,347	5164,481	5216,126	5268,287	5320,970	5374,180
5427,921	5482,201	5537,023	5592,393	5648,317	5704,800	5761,848	5819,466	5877,661	5936,438
5995,802	6000,000	---	---	---	---	---	---	---	---

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.

Band: Up to 1 GHz:	
FIELD LEVEL V / m (Ef. Un modulated) See Classification	3 V.

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

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

NOTE	During and after the test there are no signs of degradation or deterioration of performance.
PERFORMANCE CRITERIA (LIMIT)	A
TEST RESULT	PASS

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	
FIELD LEVEL V / m	3 V

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

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

NOTE	During and after the test there are no signs of degradation or deterioration of performance.
PERFORMANCE CRITERIA (LIMIT)	A
TEST RESULT	PASS

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.

Band: 1 - 6 GHz.	
FIELD LEVEL V / m (Ef. Un modulated)	3 V

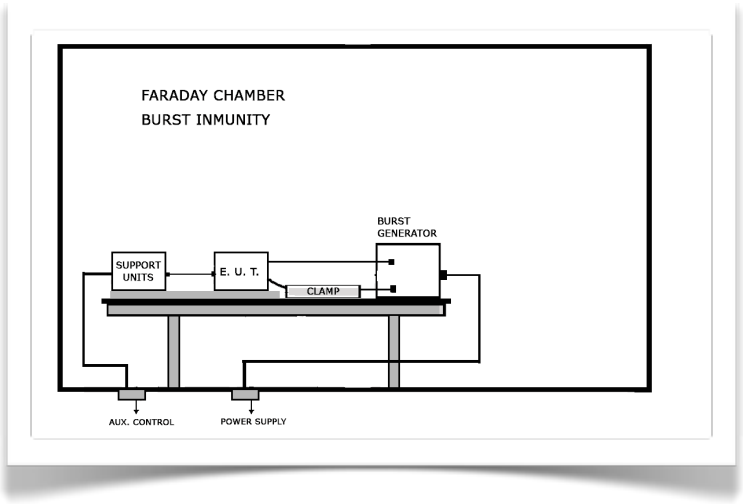
ENVELOPING VERTICAL ANTENNA ACCESS				
Test Face	FRONTAL	BACK	LATERAL RIGHT	LATERAL LEFT
Performance Criteria	A	A	A	A
Result	P	P	P	P
INCIDENCES	- - - - - - -			

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

NOTE	During and after the test there are no signs of degradation or deterioration of performance.
PERFORMANCE CRITERIA (LIMIT)	A
TEST RESULT	PASS

IMMUNITY FAST TRANSIENTS (BURST)

(IEC) EN 61000 – 4 -4
Test Set-Up:



SEVERITY LEVEL See Classification	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

IMMUNITY FAST TRANSIENTS (BURST)

POWER SUPPLY CONTINUOUS CURRENT

CONDUCTORS	POLARITY	PERFORMANCE CRITERIA	RESULT
+ (Positive)	+	B	P
	-	B	P
- (Negative)	+	B	P
	-	B	P
+ , - (Positive , Negative)	+	B	P
	-	B	P
PE (Earth)	+	B	P
	-	B	P
+ , PE (Positive , Earth)	+	B	P
	-	B	P
- , PE (Negative , Earth)	+	B	P
	-	B	P
+ , - , PE (Positive, Negative, Earth)	+	B	P
	-	B	P

INCIDENCES	- - - - - - -

NOTE	After the test there are no signs of degradation or deterioration of performance.

PERFORMANCE CRITERIA (LIMIT)	B

TEST RESULT	P

TEST SIGNAL LINES, INPUT - OUTPUT DATA AND CONTROL

PERFORMANCE CRITERIA (Class B)						RESULT
CONDUCTORS	POLARITY	0.25 KV	0.5 KV	1 KV	2 KV	
Coupling clamp	+	B	B	-----	-----	P
	-	B	B	-----	-----	P

INCIDENCES	- - - - - - -

NOTE	After the test there are no signs of degradation or deterioration of performance.

PERFORMANCE CRITERIA (LIMIT)	B

TEST RESULT	PASS

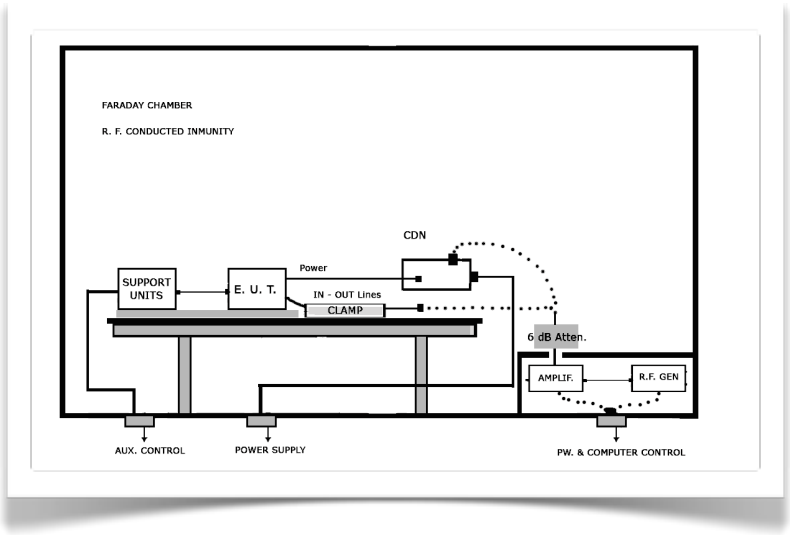
IMMUNITY HIGH ENERGY PULSES (SURGES)

(IEC) EN 61000 – 4 – 5
IMMUNITY VOLTAGE PULSES
(Combined, 1,2 / 50 µs – 8 / 20 µs)

TEST RESULT	N

IMMUNITY CONDUCTED ELECTROMAGNETIC FIELD

(IEC) EN 61000 - 4 - 6
RADIO FREQUENCY COMMON MODE
Test Set-Up:



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	3 V.

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

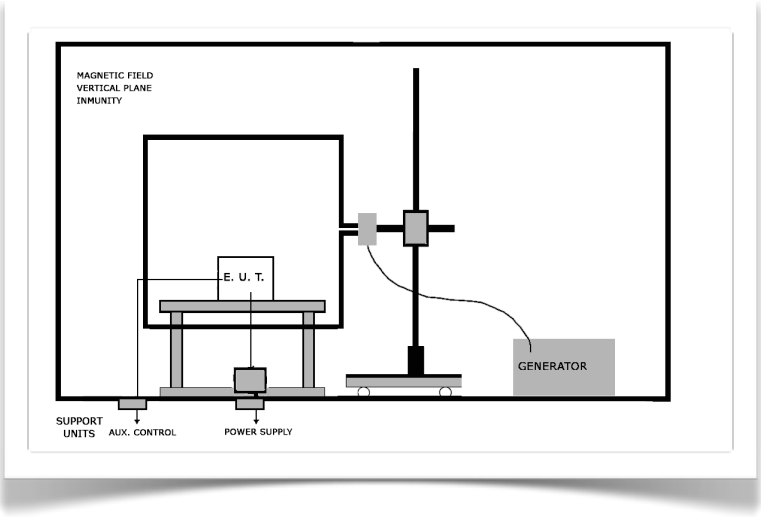
TEST POWER SUPPLY LINES		
Result	PERFORMANCE CRITERIA	RESULT
	A	P
INCIDENCES	- - - - - - -	

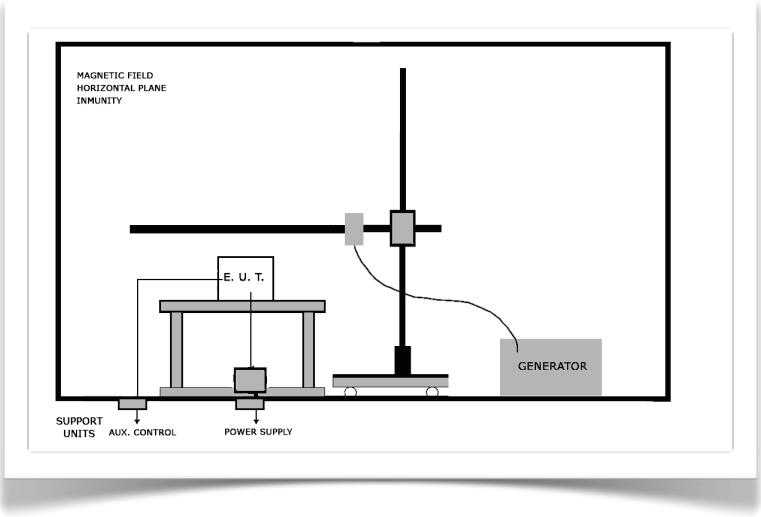
NOTE	During and after the test there are no signs of degradation or deterioration of performance.
PERFORMANCE CRITERIA (LIMIT)	A
TEST RESULT	PASS

IMMUNITY MAGNETIC FIELD, INDUSTRIAL FREQUENCY

(IEC) EN 61000 - 4 -8

Test Set-Up:





IMMUNITY MAGNETIC FIELD, INDUSTRIAL FREQUENCY

FIELD LEVEL A / m See Classification	3 A / m

DESCRIPTION	PERFORMANCE CRITERIA	RESULT
Test Edge: X	A	P
Test Edge: Y	A	P
Test Edge: Z	A	P

INCIDENCES	- - - - - - -

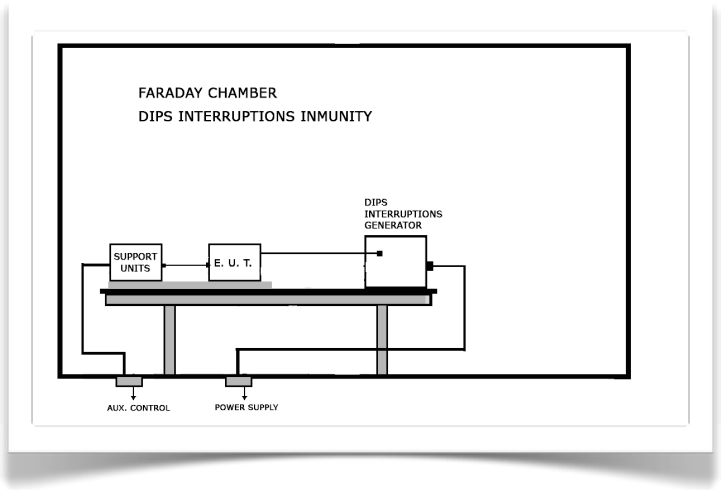
NOTE	During and after the test there are no signs of degradation or deterioration of performance.

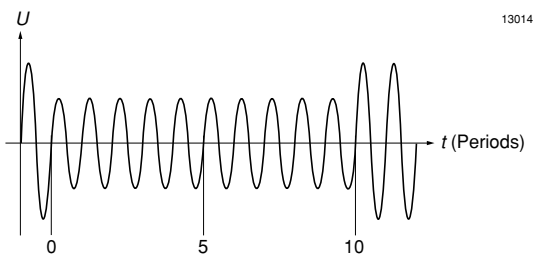
PERFORMANCE CRITERIA (LIMIT) (Blinking of an indicator is allowed)	A

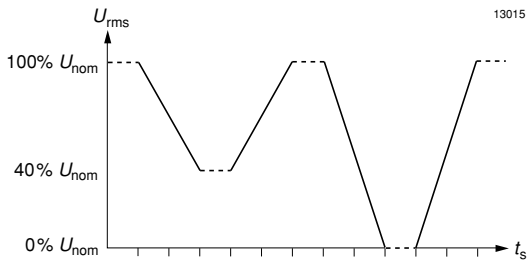
TEST RESULT	PASS

IMMUNITY VOLTAGE DIPS AND INTERRUPTION

Test Set-Up:







IMMUNITY VOLTAGE VARIATIONS

(IEC) EN 61000-4-29 VOLTAGE VARIATIONS (VDC)		
DESCRIPTION	PERFORMANCE CRITERIA	RESULT
V = U_T +10 %	A	P
V = U_T – 10%	A	P
V = U_T – 30%	A	P
INCIDENCES	- - - - - - -	

NOTE	During and after the test there are no signs of degradation or deterioration of performance.

PERFORMANCE CRITERIA (LIMIT) (Blinking of an indicator is allowed)	A

TEST RESULT	PASS

IMMUNITY VOLTAGE DIPS AND INTERRUPTION

(IEC) EN 61000-4-29 VOLTAGE DIPS AND INTERRUPTION (VDC)				
DURATION (Time)	V = 30% U_T	V = 60% U_T	V = 100% U_T	RESULT
	PERFORMANCE CRITERIA	PERFORMANCE CRITERIA	PERFORMANCE CRITERIA	
10 ms	B	B	B	P
10 ms	B	B	B	P
20 ms	C	C	C	P
100 ms	C	C	C	P
200 ms	C	C	C	P
500 ms	----	----	C	P
1 s	----	----	C	P
3 s	----	----	C	P
10 s	----	----	C	P

INCIDENCES	- - - - - - -

PERFORMANCE CRITERIA	B for 10 ms C for 100 ms C for 5000 ms

NOTE	After the test there are no signs of degradation or deterioration of performance.

TEST RESULT	PASS

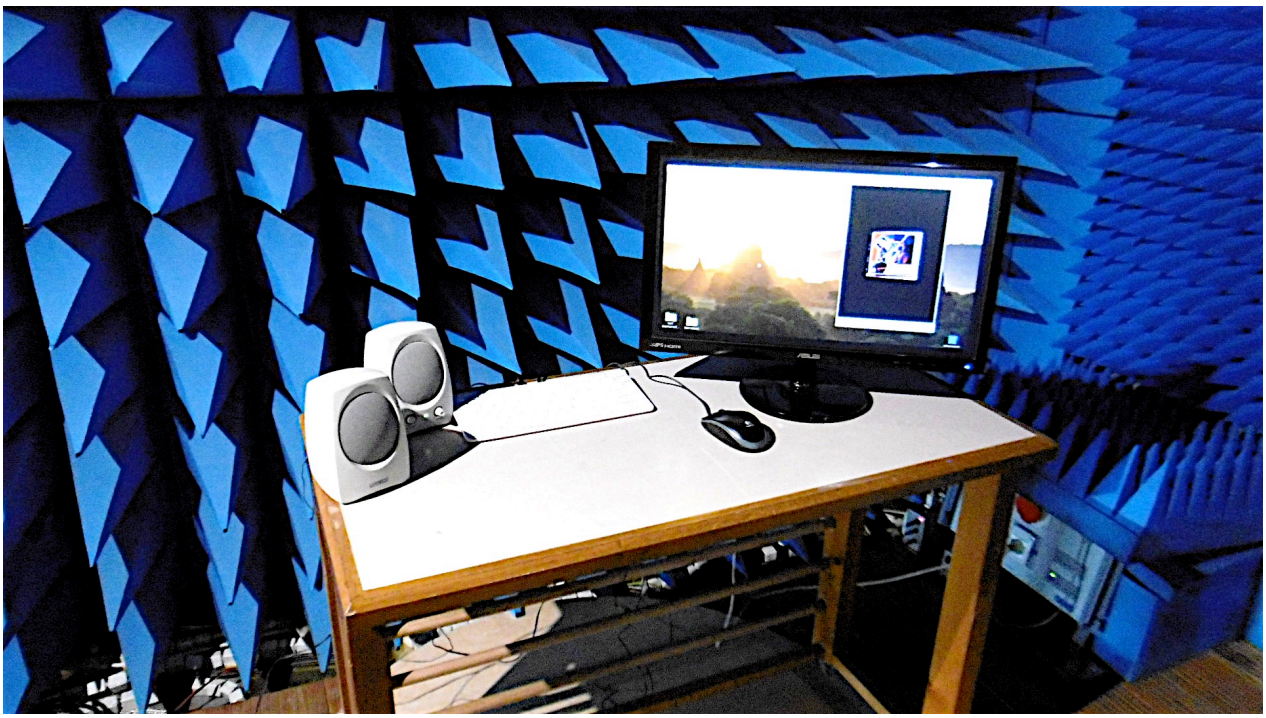
ANNEX

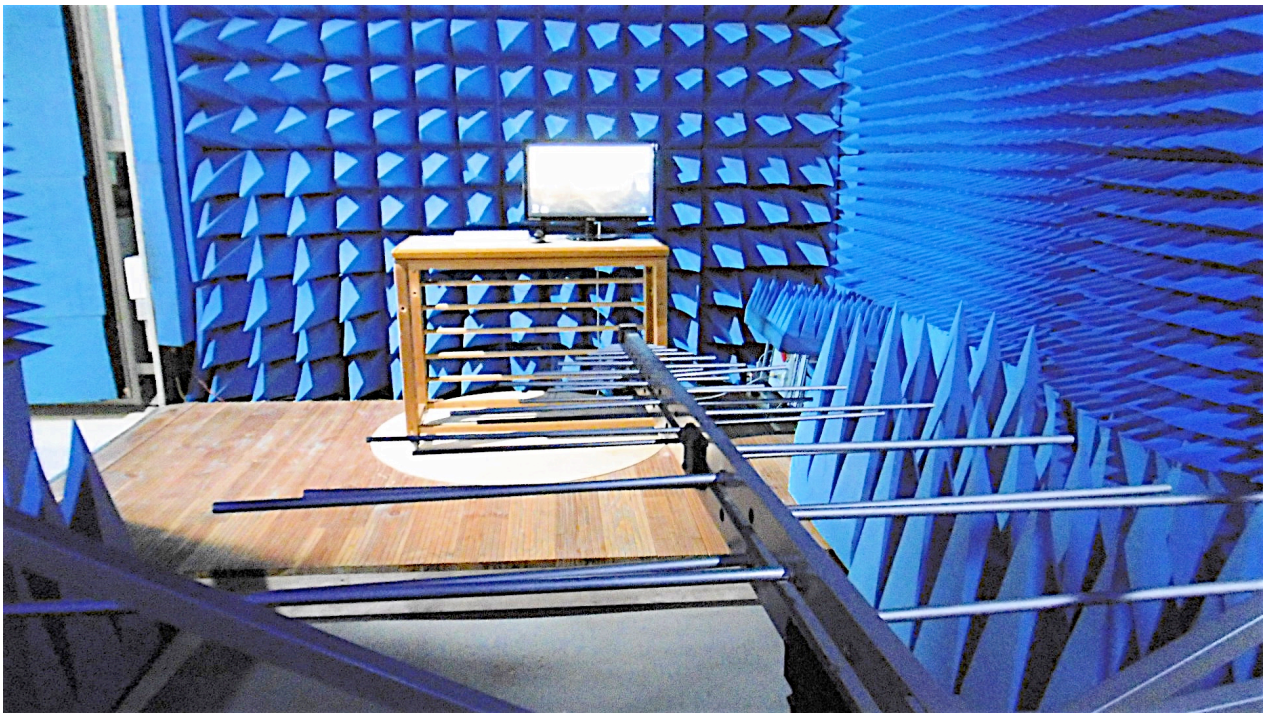
CALIBRATION: INSTRUMENTS AND ACCESSORIES

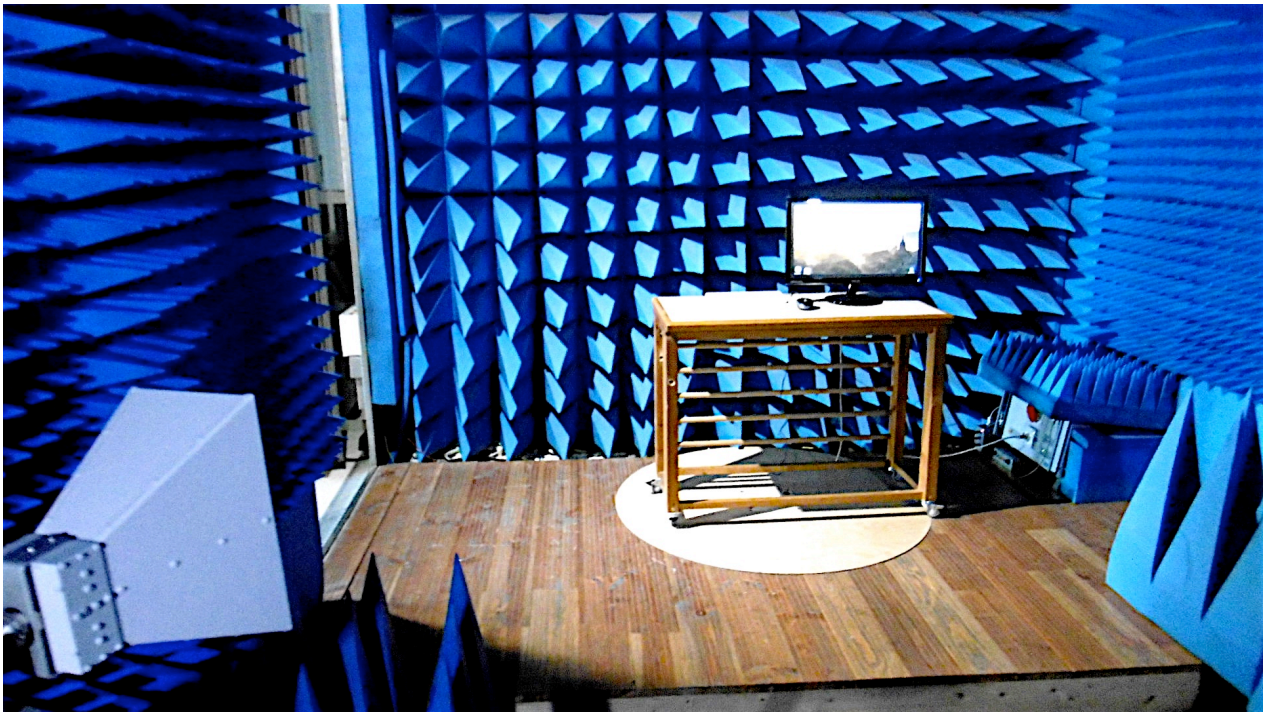
Description	Manufacturer	Model	Serial Nº	Last Calibration Date	Next Calibration Date
Semi anechoic chamber	Siepel	65033025	----	02/01/2021	02/01/2022
EMI receiver	Agilent	N9010A	SG52220047	02/01/2021	02/01/2022
Oscilloscope	Agilent	DSO 7104 B	MY50340350	02/01/2021	02/01/2022
Multimeter	Agilent	34410A	MY47000553	02/01/2021	02/01/2022
Field Meter	Narda	NBM-550	H-0596	09/01/2021	09/01/2022
E&H Field Analyzer	Narda	EPH-50F	310WY80298	09/01/2021	09/01/2022
E-Field	Narda	EF 0691	H0640	09/01/2021	09/01/2022
Feld Probe	Dhare!!	13I00444	24	10/01/2021	10/01/2022
Feld Probe	Dhare!!	10I00195	33	10/01/2021	10/01/2022
EFT , Surge, Magnetic Pulse, Dips an Interruptions	EMTEST	UCS500/M4	0499-08	09/01/2021	09/01/2022
ESD Simulator	Keytek	MZ-15/EC	9712269	10/01/2021	10/01/2022
Power supply	Hewlett Packard	6032A	281.8A-031.52	08/01/2021	08/01/2022
Power supply	Hewlett Packard	6654A	3032A-00231	08/01/2021	08/01/2022
Power supply	Keysight	AC6804A	JPWL002625	08/01/2021	08/01/2022
Generator	Agilent	E8257D	MY46521262	08/01/2021	08/01/2022
Generator	Keysight	N5173B	MY57280368	08/01/2021	08/01/2022
Generator	Keysight	33600A	MY5380243233 622A	08/01/2021	08/01/2022
Generator	AETechron	3110	3110-0518-0056	10/01/2021	10/01/2022
Spherical Reference Radiation Source	Teseq	KSQ1001A + SAC-DAkkS	76013	10/01/2021	10/01/2022
Pre-Amplifier	EMCO	7405	-----	02/01/2021	02/01/2022
Pre-Amplifier	Minicircuits	ZVA-213-S	193610842	02/01/2021	02/01/2022
Amplifier	BONN	BSA 0101-150/120D	1711247A	02/01/2021	02/01/2022
Amplifier	BONN	BLMA 1018-25/12D	1711247B	02/01/2021	02/01/2022
Amplifier	AETechron	7794	7794-0618-0011	02/01/2021	02/01/2022
Biconilog Antenna	EMCO	3141	9902-1138	10/01/2021	10/01/2022
Horn Antenna	Schwarzbeck	BBHA 9120 E	899	10/01/2021	10/01/2022
Horn Antenna	Schwarzbeck	BBHA 9120 D	1201	10/01/2021	10/01/2022
Horn Antenna	M.V.G.	EH1840	EH1840-07	04/01/2021	04/01/2022
Mag. Field Antenna	Schwarzbeck	FMZB 1513	289	10/01/2021	10/01/2022
Rod Antenna	Schwarzbeck	VAMP 9243 B	1034	10/01/2021	10/01/2022
Mag. Field Antenna	Telpro	MFA 8	-----	02/01/2021	02/01/2022

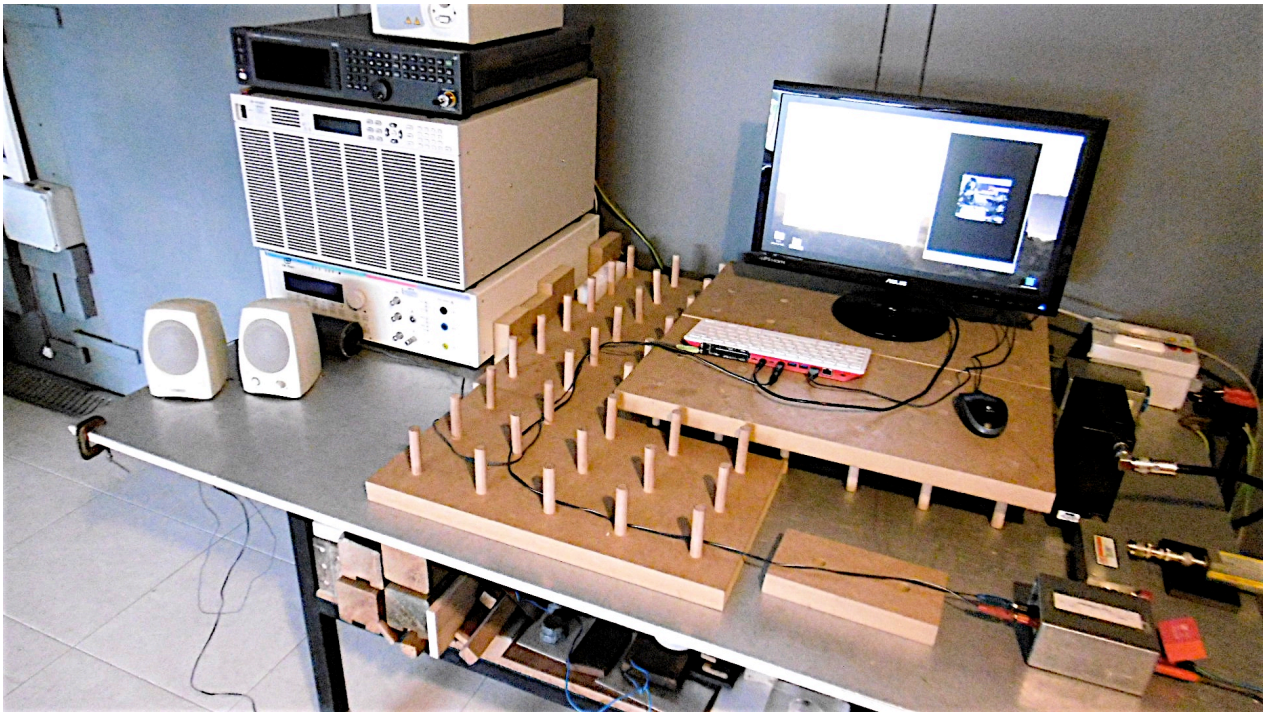
Loop Sensor	Solar Electronics	Type 7334-1	218989-1	02/01/2021	02/01/2022
LISN	AFJ	LT32C	2031312167	02/01/2021	02/01/2022
Artificial network	Teseq	HV-AN 150	48104	04/01/2021	04/01/2022
Artificial network	Teseq	HV-AN 150	48105	04/01/2021	04/01/2022
Coupling decoupling network	Teseq	CDN HSS2	51254	04/01/2021	04/01/2022
Coupling decoupling network	Teseq	ISN ST08	51320	04/01/2021	04/01/2022
Impedance stabilization network	Teseq	ISN ST200A	56295	04/01/2021	04/01/2022
Monitoring probe	Teseq	MD 4070	46615	04/01/2021	04/01/2022
Current injection probe	Teseq	CIP 9136A	46742	04/01/2021	04/01/2022
Probe calibration jig	Teseq	PCJ 9201B	46763	04/01/2021	04/01/2022
Differential probe	Keysight	N2790A	JP49123878	04/01/2021	04/01/2022
AC/DC Current clamp	Fluke	i30s	16980048	04/01/2021	04/01/2022
Capacitive Coupling Clamp	EMTEST	-----	-----	02/01/2021	02/01/2022
Injection Clamp	Luthi	EM101	35817	02/01/2021	02/01/2022
Absorbing Clamp	Luthi	MDS 21	3731	02/01/2021	02/01/2022
Power Attenuator 6 dB	Bird	100-A-MFN-06	9914	02/01/2021	02/01/2022
Power Attenuator 30 dB	Bird	8322	803	02/01/2021	02/01/2022
Power Attenuator 30 dB	Hewlett Packard	8498A	1801A01796	02/01/2021	02/01/2022
Load 100 W	Bird	8164	3910	02/01/2021	02/01/2022
Coaxial 3,5 m	Huber+Suhner	SF103EA	500136/3EA	02/01/2021	02/01/2022
Coaxial 4 m	Huber+Suhner	SF103E	5001285/3E	02/01/2021	02/01/2022
Coaxial 10 m	Huber+Suhner	04272 B	1609983	03/01/2021	03/01/2022
ESD Simulator	Teseq	NSG 437	1610	02/01/2021	02/01/2022

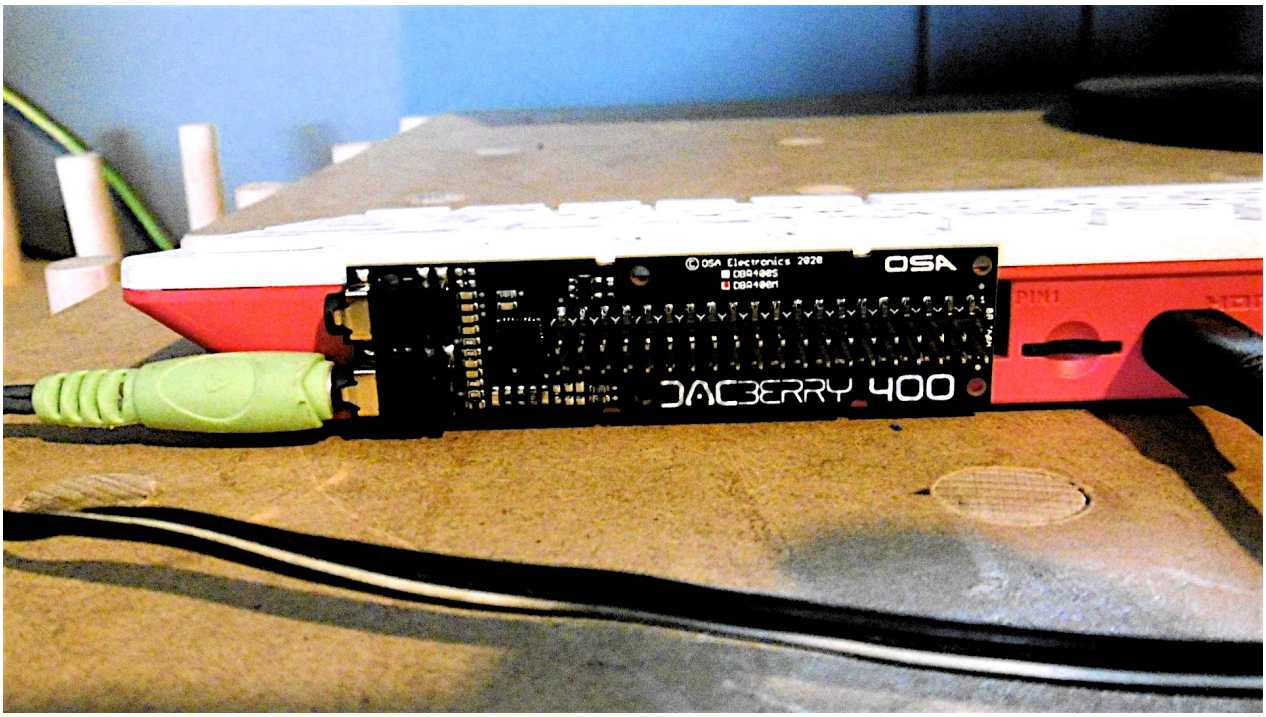
PHOTOGRAPHS

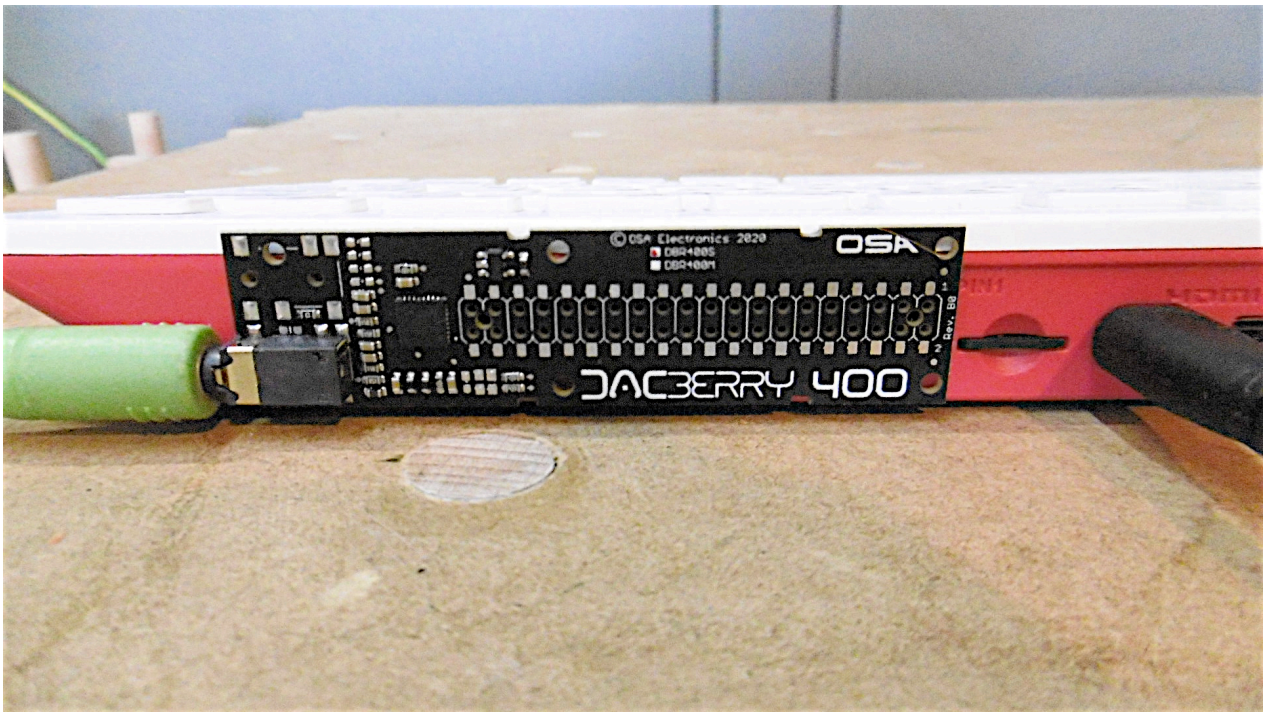









OSA
DACBERRY 400


OSA Electronics 2020
DB400S
DB400M
OSA
DACBERRY 400