Test Report
of the
Functional HV Prototype VDM (CAEN)

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The VDM prototype is contained in one crate and is made of:

- One primary HV module generating +4kV and –2kV to distribute via SHV cables to
- Four peripheral modules that generate the +2kV and regulate all three voltages in their full range
- One peripheral interface for communication embedded in the primary module, connecting the VDM to a PC.

Definitions :

Load ⇒	**1 GΩ output A0÷A3**
	500 MΩ output S
	200 MΩ output C
"Z" ⇒	**set to 0**
"V" ⇒	**set to reported voltage**
A0÷A3	**Anode-wire channels in a Module**
S	**Strip channel in a Module**
C	**Cathode channel in a Module**
A,B,C,D	**The four Modules of the prototype.**

Tables 5÷11 allow for an estimation of the medium-term Drift of output voltages and currents: in some cases Drifts are important, and must be eliminated in a final prototype.Initial Offsets both of voltages and currents are in general acceptable.

The short term variability of voltage readings is good, while that of currents is acceptable only in the range +/-1 l.s.d. ≈10nA (Tab 4÷6).

The Short Circuit measurements give a direct size of the OFF output impedence (Tab5÷6).

In general the S channel of each Module shows systematically higher OFFSETS and Drifts than others and this must be corrected.

The harware protection that binds the Anod-wire channels to the Strip channel in each module so that ΔV≤ given limit is working, but the present limit of 2300 V is too big ans must be reduced to a smaller value ≈ 1900÷2000 V, that will be defined.

The present prototype has been useful to verify the principles of the circuts' structures, and to get informations for the engineering of a final prototype that must correct the defects of the present one.

Tab1: Reading OFFSETs HVin=**OFF**; HVout=**Z** ; **Load**.
19/01/99 14:00

Ch	Mod	V volts	I μA	Mod	V volts	I μA
A0		1	0.00		2	0.00
A1		0	0.00		1	0.00
A2	**A**	3	0.00	**C**	2	0.00
A3		3	0.00		2	0.02
S		5	0.02		1	0.03
C		0	0.00		0	0.00
A0		0	0.00		0	0.00
A1		2	0.00		1	0.00
A2	**B**	2	0.00	**D**	1	0.00
A3		2	0.00		1	0.00
S		3	0.02		1	0.01
C		0	0.00		0	0.00

Tab2: Readings stability HVin=**ON**; HVout=**V** ; **no Load** (MB96).
15/01/99 14:00

Ch	Mod	V volts	I μA	Mod	V volts	I μA
A0		3601	**0.05**		3603	0.00
A1		3602	0.00		3603	0.00
A2	**A**	3602	0.00	**C**	3603	0.00
A3		3601	0.00		3603	0.00
S		1802	**0.02**		1801	**0.05**
C		1801	0.00		1800	0.00
A0		3602	0.00		3603	0.00
A1		3602	0.00		3603	0.00
A2	**B**	3602	**0.01**	**D**	3602	0.00
A3		3602	0.00		3604	0.00
S		1800	**0.03**		1801	**0.04**
C		1801	0.00		1800	0.00

Tab3: Readings stability HVin=**ON**; HVout=**V** ; **no Load** (MB96).
18/01/99 10:00

Ch	Mod	V volts	I μA	Mod	V volts	I μA
A0		3600	**0.04**		3601	0.00
A1		3600	0.00		3601	**0.01**
A2	**A**	3601	0.00	**C**	3602	0.00
A3		3601	0.00		3601	0.00
S		1801	**0.04**		1799	**0.05**
C		1800	0.00		1800	0.00
A0		3602	0.00		3602	0.00
A1		3600	0.00		3602	0.00
A2	**B**	3600	**0.01**	**D**	3601	0.00
A3		3600	0.00		3602	0.00
S		1799	**0.03**		1801	**0.04**
C		1800	**0.02**		1799	0.00

Tab4: Reading short tert varibility HVin=**ON**; HVout=**V** ; **Load**
18/01/99

Ch	Mod	V (ΔV) volts	I (ΔI) μA	Mod	V (ΔV) volts	I (ΔI) μA
A0		3599 +/-1	3.57 +/- .03		3602 +/-1	3.29 +/- .01
A1		3601 +/-1	3.25 +/- .02		3601 +/-1	3.70 +/- .01
A2	**A**	3601 +/-1	3.45 +/- .02	**C**	3601 +/-2	3.63 +/- .01
A3		3600 +/-1	3.44 +/- .02		3601 +/-1	3.57 +/- .01
S		1801 +/-1	3.51 +/- .01		1800 +/-1	3.49 +/- .01
C		1801 +/-1	9.12 +/- .03		1802 +/-1	8.95 +/- .02
A0		3601 +/-1	3.43 +/- .03		3603 +/-1	3.33 +/- .03
A1		3600 +/-1	3.53 +/- .01		3603 +/-1	3.27 +/- .01
A2	**B**	3599 +/-1	3.47 +/- .01	**D**	3602 +/-2	3.61 +/- .01
A3		3600 +/-1	3.43 +/- .01		3603 +/-1	3.23 +/- .01
S		1800 0	3.45 +/- .01		1801 +/-1	3.44 +/- .01
C		1801 +/-1	8.90 +/- .02		1800 +/-1	9.55 +/- .02

Tab5: OFFSETS drift HVin=**ON**; HVout=**Z**; outputs Short Circuit to GND
19/01/99 12:00 with shot term variability ΔI and ΔV

Ch	Mod	V (ΔV) volts	I (ΔI) μA	Mod	V (ΔV) volts	I (ΔI) μA
A0		1	0.11 +/- .03		3	0.03 +/- .03
A1		1	0.24 +/- .02		2	0.08 +/- .02
A2	**A**	3	0.06 +/- .01	**C**	3	0.34 +/- .03
A3		3	0.00 +/- .00		2	0.11 +/- .03
S		5	0.30 +/- .02		1	1.21 +/- .03
C		0	0.00 +/- .00		0	0.00 +/- .00
A0		1	0.09 +/- .07		0	0.02 +/- .02
A1		1	0.01 +/- .01		2	0.00 +/- .00
A2	**B**	2	0.04 +/- .01	**D**	0	0.33 +/- .05
A3		2	0.01 +/- .01		2	1.30 +/- .05
S		3	0.69 +/- .01		3	4.92 +/- .10
C		0	0.00 +/- .00		0	0.00 +/- .00

Tab6: OFFSETS drift HVin=**ON**; HVout=**Z**; outputs Short Circuit to GND
20/01/99 10:00 with shot term variability ΔI and ΔV

Ch	Mod	V (ΔV) volts	I (ΔI) μA	Mod	V (ΔV) volts	I (ΔI) μA
A0		2	0.54 +/- .02		3	0.33 +/- .03
A1		1	1.23 +/- .02		2	0.49 +/- .02
A2	**A**	3	0.11 +/- .02	**C**	3	1.98 +/- .02
A3		3	0.24 +/- .01		3	0.78 +/- .02
S		6	1.62 +/- .01		2	2.33 +/- .03
C		0	0.30 +/- .02		1	0.17 +/- .02
A0		1	0.66 +/- .03		0	0.38 +/- .05
A1		1	0.10 +/- .02		1	0.85 +/- .07
A2	**B**	2	0.04 +/- .02	**D**	2	1.18 +/- .06
A3		2	0.05 +/- .01		3	3.36 +/- .05
S		3	1.52 +/- .02		3	3.52 +/- .08
C		0	0.08 +/- .02		0	0.03 +/- .03

Tab7: OFFSETS drift HVin=**ON**; HVout=**Z**; **Load**
18/01/99 **14:00** 1 hour after switch-on

Ch	Mod	V volts	I µA	Mod	V volts	I µA
A0		6	**0.06**		6	**0.02**
A1		15	0.00		7	0.01
A2	**A**	10	0.00	**C**	25	0.00
A3		7	0.00		10	0.00
S		11	**0.05**		46	**0.14**
C		0	0.00		2	0.00
A0		13	0.00		3	0.00
A1		5	0.00		7	0.00
A2	**B**	7	0.00	**D**	18	0.00
A3		5	0.00		75	0.00
S		41	**0.01**		111	**0.26**
C		0	0.00		2	0.00

Tab8: OFFSETS drift HVin=**ON**; HVout=**Z**; **Load**
19/01/99 **11:00**

Ch	Mod	V volts	I µA	Mod	V volts	I µA
A0		6	**0.06**		6	0.00
A1		19	0.00		7	0.01
A2	**A**	12	0.00	**C**	25	0.00
A3		7	0.00		11	0.00
S		27	**0.08**		84	**0.18**
C		1	0.00		2	0.00
A0		14	0.00		3	0.00
A1		5	0.00		8	0.00
A2	**B**	7	0.00	**D**	30	0.00
A3		5	0.00		90	0.00
S		52	**0.12**		210	**0.50**
C		0	0.00		3	0.00

Tab9: OFFSETS drift HVin=**ON**; HVout=**Z**; **Load**
22/01/99 **11:00** 10 hours after switch-on

Ch	Mod	V volts	I μA	Mod	V volts	I μA
A0		52	**0.07**		35	**0.03**
A1		94	**0.06**		46	**0.03**
A2	**A**	16	0.00	**C**	147	**0.11**
A3		30	0.00		64	**0.05**
S		129	**0.28**		163	**0.33**
C		26	**0.01**		15	**0.06**
A0		53	0.00		43	0.00
A1		17	0.00		91	0.00
A2	**B**	7	0.00	**D**	163	**0.03**
A3		10	0.00		222	**0.08**
S		118	**0.24**		235	**0.45**
C		7	0.00		8	0.00

Tab10: OFFSETS drift HVin=**ON**; HVout=**Z**; **Load**
23/01/99 **17:30**

Ch	Mod	V volts	I μA	Mod	V volts	I μA
A0		64	**0.10**		48	**0.05**
A1		110	**0.06**		56	**0.04**
A2	**A**	18	0.00	**C**	166	**0.15**
A3		36	0.00		74	**0.07**
S		148	**0.32**		173	**0.35**
C		31	**0.03**		19	**0.02**
A0		58	0.00		59	0.00
A1		25	0.00		121	0.00
A2	**B**	8	0.00	**D**	215	**0.15**
A3		14	0.00		232	**0.08**
S		128	**0.25**		267	**0.57**
C		10	**0.02**		12	0.00

Tab11: OFFSETS drift HVin=**ON**; HVout=**Z**; **Load**
25/01/99 14:00

Ch	Mod	V volts	I μA	Mod	V volts	I μA
A0		73	**0.08**		58	**0.02**
A1		118	**0.08**		62	**0.07**
A2	**A**	19	0.00	**C**	177	**0.18**
A3		41	0.00		83	**0.05**
S		161	**0.35**		180	**0.38**
C		36	**0.06**		21	**0.06**
A0		61	0.00		70	0.00
A1		32	0.00		143	0.00
A2	**B**	8	**0.01**	**D**	239	**0.17**
A3		17	0.00		242	**0.17**
S		138	**0.27**		292	**0.52**
C		13	**0.03**		15	0.00