

CAEN High Voltage Module 7030TN Stability Testing

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Hall C purchased CAEN system 4527 high voltage mainframes and 7030TN high voltage modules for the Neutral Particle Spectrometer. During the initial setup and use of the equipment, errors in settings, readback, and high voltage controls were identified [1,2,3,4, and 5]. A series of tests are being performed to identify which operation and/or control method caused the errors. The high voltage stability test is discussed.

The high voltage stability test uses the CAEN General Control (GECO)2020 software to control the mainframe from a Windows PC. GECO permits logging of controls settings and monitors voltage and current readbacks.

High voltage stability testing is performed at 1500 V. The stability of the high voltage module and the high voltage parameters of each of the 36 channels of the module are monitored and recorded for a period of at least 12 hours. These tests are performed without load and with load (2 M Ω). To date, stability testing without load has been performed on 33 high voltage cards and 17 of the 33 with load.

The load test setup, Fig. 1, comprises a CAEN crate and modules, high voltage distribution box (black box), and load chassis. The module's output is via Radiall connector and the black output cable. The output of the high voltage distribution box uses SHV connectors to connect to the load chassis.



FIG. 1. A photograph of the test setup, showing the CAEN crate loaded with modules, black high voltage distribution load box, and load chassis.

With this setup, only one module can be tested under load at a time, even though the crate is fully populated with 16 modules. The remaining 15 modules that are not connected to the load are monitored to establish baseline module behavior. Therefore, the load and no-load tests are conducted simultaneously.

The results of the load and no-load tests for each module are compared to verify that the module's performance isn't degraded when operating connected to a load.

During the test, the high voltage parameters [5] are monitored and any changes are recorded in a log file. The only issue encountered during testing is related to the connector pins' failure to make proper contact with the module pins. The pins on both the connector and modules easily push out. If the pins did not make proper contact they have to be reseated.

At the end of the test, the log files are analyzed to determine if any of the monitored setpoints or parameters changed during the test.

The average readback voltages during the test for each channel of module #304 are shown in Fig. 2, without load, and Fig. 3, with load. In Fig. 2, channels 11 and 24 are not within the manufacturer's specification of ± 0.2 V. Channel 11 is ~ 120 mV below specification and channel 24 is ~ 50 mV below specification. The average voltage for all of the channels on module #304 is 1499.92 V, which is ~ 80 mV lower than the set value of 1500 V. Figure 2 and Fig. 3 indicate that the differences between the unloaded and loaded averages of the channel voltages are negligible.

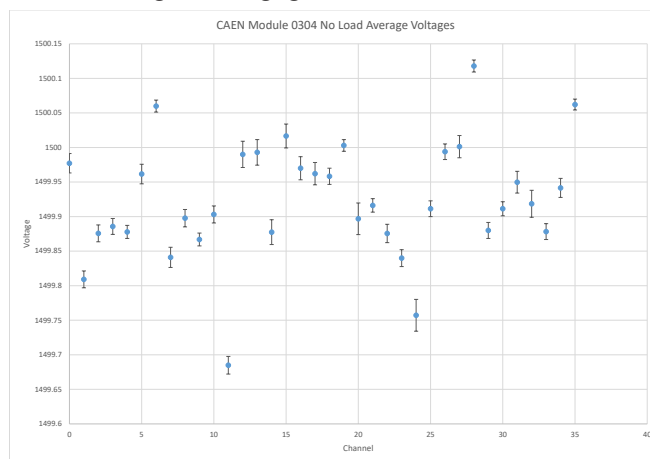


FIG 2. Plot of average voltages without load.

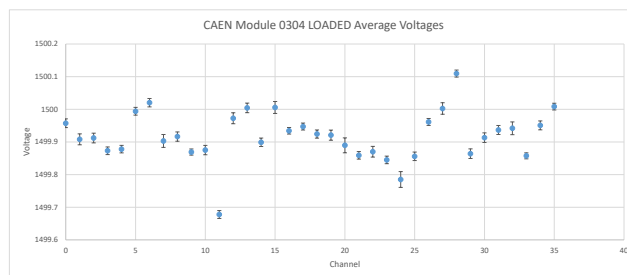


FIG 3. Plot of average voltages with load.

In summary, tests and analysis are proceeding smoothly. Results of the test on module #304 indicate that despite two channels being slightly out of specification, the stability of the module is satisfactory.

- [1] M. McMullen, et al., *Testing of CAEN SY4527 and A7435SN High Voltage Modules*, DSG Note 2019-19, 2019.
- [2] P. Campero, et al., *Test Results of CAEN SY4527 System Installed with A1535 High Voltage Boards for Hall C*, DSG Note 2019-30, 2019.
- [3] M. McMullen, et al., *CAEN A7030TN Module Testing*, DSG Note 2019-38, 2019.
- [4] P. Campero, et al., *Debugging SY4527 Mainframe and A7030TN High Voltage Boards with EPICS CSS-BOY*, DSG Note 2019-39, 2019:
- [5] P. Campero, et al., *Using GECON2020 to Debug SY4527 Mainframe and A7030TN High Voltage Boards*, DSG Note 2019-42, 2019.