Nixie Tube Power Supply Test Report

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1 Methodology

Each sold device has been tested individually before shipping using an automated process. The test setup is shown in figure 1.
The test results are written to a file and included inside the package for each sold device.
In case of failure the module is not to be sold and may be repaired prior to re-testing and sale.
Each module has to pass the tests specified below.

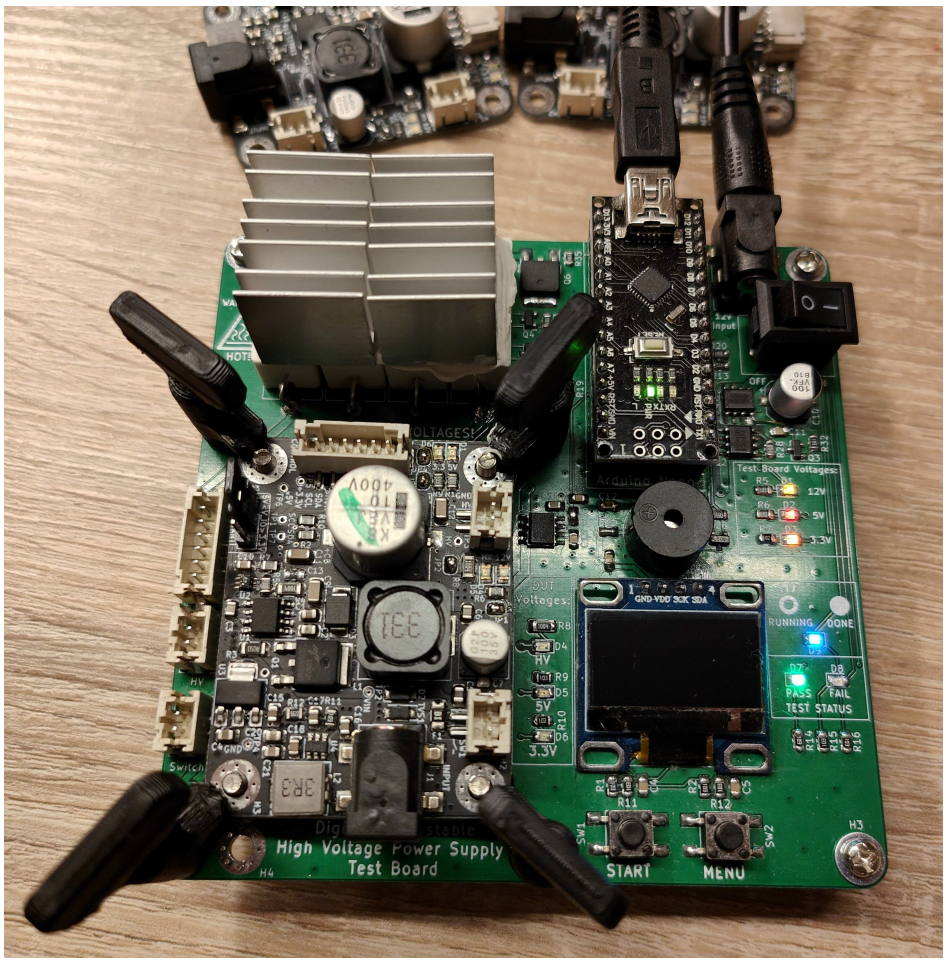

Figure 1: Automated test setup using test jig.

During the test the voltages of the different supply rails are measured. Since a fixed resistor is used as a load per rail, no current measurement is necessary.

Test procedure:

1. Verify that the 3.3 V and 5 V rail are within spec under no load.
2. Verify that the high voltage is within spec under no load.
3. Verify that the 5 V rail is within spec under 1.5 A load.
4. Verify that the 3.3 V and 5 V rail are within spec under 0.44 A / 1.5 A load (both rails are loaded simultaneously).
5. Verify that the high voltage rail is within spec under 12 mA load.
6. Verify that the 3.3 V, 5 V and high voltage rail are within spec under 0.44 A / 1.5 A / 10 mA load (all rails are loaded simultaneously).

Allowed deviation of measured values during test from calculated ideal values:

- 3.3 V: +/- 6%
- 5 V: +/- 6%
- High voltage: +/- 10%

Please note that the output voltage of the high voltage boost converter can be calibrated since it is adjustable. The test script is not able to do so and thus a relatively large margin of +/- 10% was set.
Thus, the margin of +/- 10% does not accurately reflect real-world accuracy which can be better with proper calibration.

```
-- Nixie HV PSU Module Tester --
Firmware Version: 1.10
Firmware Release Date: 02. Nov. 2021
Author: Wilhelm Zeuschner
https://wizeus.de/home/projects/adj-hv-psu/
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Compiled on: Oct  6 2023, 22:44:45
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Starting tests...
TEST STEP:                          1
MEASUREMENTS:
5V:                                 5.05
3.3V:                               3.39
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
STEP 1 DONE WITH NO ERRORS


##############################
TEST STEP:                          2
Starting tests for HV.
Verifying high voltage is actually present.
Verifying high voltage output accuracy.
SET VALUE:                          82.58
MEAS VALUE:                         81.83
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          87.21
MEAS VALUE:                         85.97
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          92.41
MEAS VALUE:                         91.71
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          98.27
MEAS VALUE:                         98.15
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          104.95
MEAS VALUE:                         104.58
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          112.61
MEAS VALUE:                         112.63
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          121.50
MEAS VALUE:                         122.05
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          131.93
MEAS VALUE:                         132.86
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          144.36
MEAS VALUE:                         145.73
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          159.39
MEAS VALUE:                         162.51
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          177.97
MEAS VALUE:                         171.01
PASS:                               HV output accuracy OK for this step!

STEP 2 DONE WITH NO ERRORS


##############################
TEST STEP:                          3
MEASUREMENTS before Load on:
5V:                                 5.27
Starting periodic measurements. Reporting current value every 5 seconds.
5V MEASUREMENTS after: 5s:          5.07V
5V MEASUREMENTS after: 10s:         5.07V
5V MEASUREMENTS after: 15s:         5.06V
5V MEASUREMENTS after: 20s:         5.08V
5V MEASUREMENTS after: 25s:         5.08V
5V MEASUREMENTS after: 30s:         5.07V
5V MEASUREMENTS after: 35s:         5.07V
5V MEASUREMENTS after: 40s:         5.07V
5V MEASUREMENTS after: 45s:         5.06V
5V MEASUREMENTS after: 50s:         5.06V
5V MEASUREMENTS after: 55s:         5.07V
5V MEASUREMENTS after: 60s:         5.07V
PASS:                               5V output voltage within spec.
STEP 3 DONE WITH NO ERRORS


##############################
TEST STEP:                          4
MEASUREMENTS:
5V:                                 5.28
3.3V:                               3.38
Starting periodic measurements. Reporting measured value every 5 seconds.
3.3V MEASUREMENTS after: 5s:        3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 10s:       3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 15s:       3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 20s:       3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 25s:       3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 30s:       3.38V
5V MEASUREMENT:                     5.03V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 35s:       3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 40s:       3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 45s:       3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 50s:       3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
3.3V MEASUREMENTS after: 55s:       3.38V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
PASS:                               3.3V and 5V output voltage within spec.
STEP 4 DONE WITH NO ERRORS


##############################
TEST STEP:                          5
Starting tests for HV.
Verifying high voltage is actually present.
Verifying high voltage output accuracy under load.
SET VALUE:                          82.58
MEAS VALUE:                         81.37
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          87.21
MEAS VALUE:                         86.66
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          92.41
MEAS VALUE:                         91.94
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          98.27
MEAS VALUE:                         98.15
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          104.95
MEAS VALUE:                         104.58
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          112.61
MEAS VALUE:                         112.86
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          121.50
MEAS VALUE:                         122.28
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          131.93
MEAS VALUE:                         132.40
PASS:                               HV output accuracy OK for this step!

SET VALUE:                          144.36
MEAS VALUE:                         145.96
PASS:                               HV output accuracy OK for this step!

STEP 5 DONE WITH NO ERRORS


##############################
TEST STEP:                          6
MEASUREMENTS:
5V:                                 5.28
3.3V:                               3.39
Verifying high voltage is actually present.
Starting periodic measurements. Reporting measured value every 5 seconds.
3.3V MEASUREMENTS after: 5s:        3.39V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.64
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 10s:       3.39V
5V MEASUREMENT:                     5.03V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.41
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 15s:       3.39V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.64
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 20s:       3.39V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.87
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 25s:       3.39V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.64
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 30s:       3.39V
5V MEASUREMENT:                     5.05V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         130.10
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 35s:       3.39V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.87
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 40s:       3.39V
5V MEASUREMENT:                     5.04V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.41
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 45s:       3.39V
5V MEASUREMENT:                     5.05V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.64
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 50s:       3.39V
5V MEASUREMENT:                     5.05V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.41
PASS:                               HV output accuracy OK for this step!

3.3V MEASUREMENTS after: 55s:       3.39V
5V MEASUREMENT:                     5.03V
PASS:                               5V output voltage within spec.
PASS:                               3.3V output voltage within spec.
SET VALUE:                          128.62
MEAS VALUE:                         129.41
PASS:                               HV output accuracy OK for this step!

PASS:                               3.3V, 5V and HV output voltage within
spec.
STEP 6 DONE WITH NO ERRORS


##############################
ALL PASSED!
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