Testing Fermilab PoF system in LAr VIII

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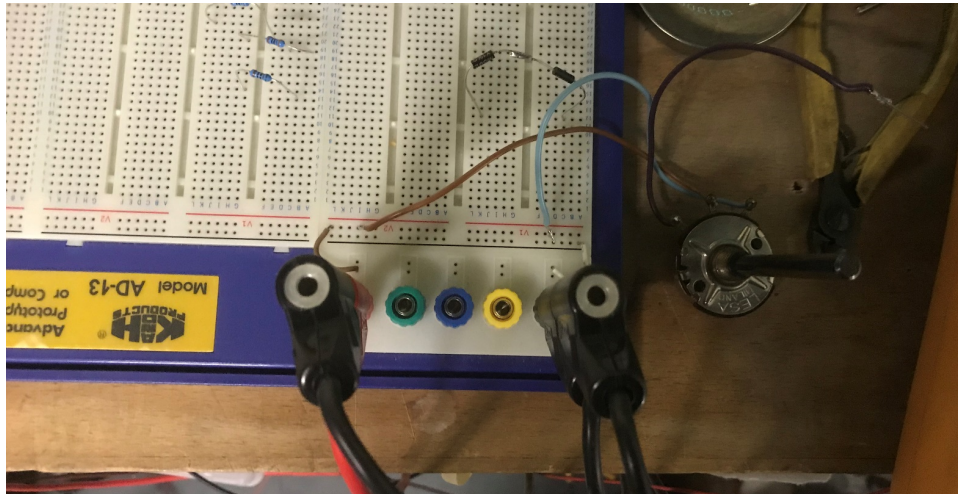
Test #1

- Setting Laser power to ~2W (R_{set} = 1.8 kΩ)
- testing single PPC with load of 100, 210, 360, 750 and 1000 Ohm.

Test #2

- Using potentiometer as a variable resistors to find maximum power we can reach.
- Potentiometer could be vary from 3 ohm to 83.7 kohm by fingers
- Laser power set to 1 and 2 Wats.
- We will repeat again with better controlled potentiometers



Test #1

Setting R (kΩ)	Loaded R (kΩ)	Voltage (V)	Current (mA)	Power (mW)
1.8	0.100	5.60	56.80	336
1.8	0.210	11.20	53.40	598
1.8	0.360	11.38	31.76	360
1.8	0.510	11.41	22.40	255
1.8	0.750	11.44	15.27	174
1.8	1.0	11.4	11.48	130
Single PPC used in this test (LAr boiling a lot)				

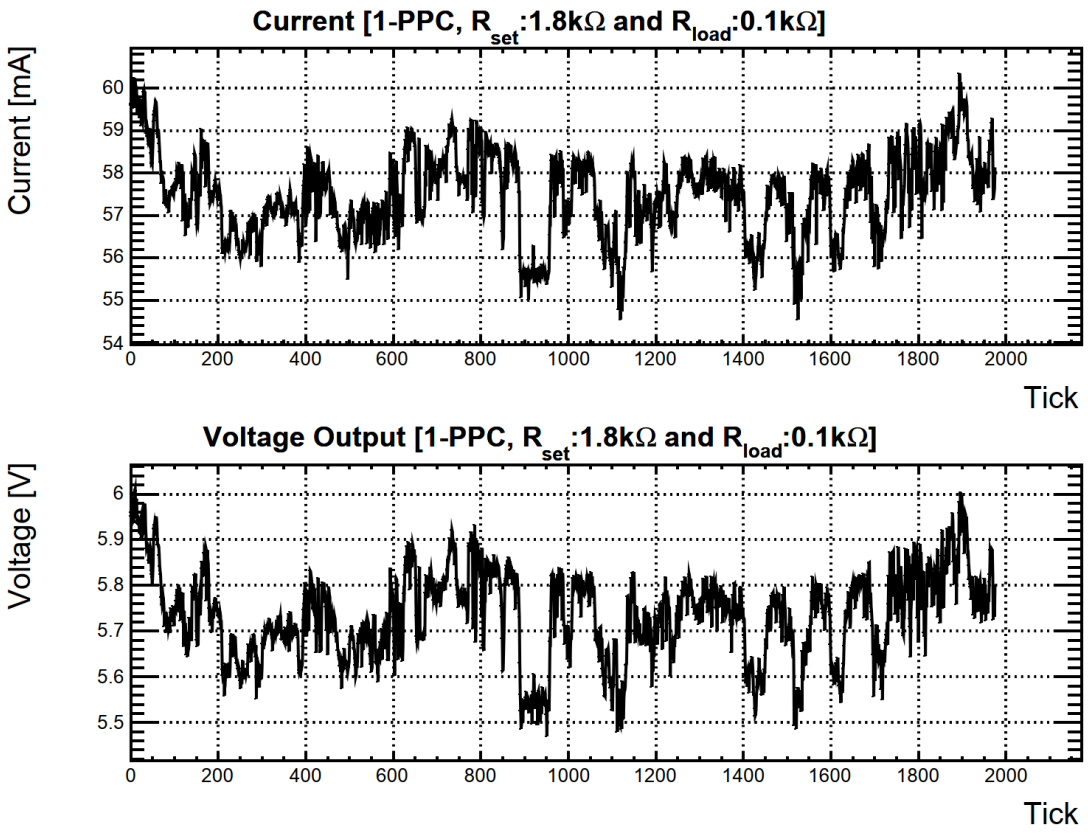
Laser power is about 2.1 W

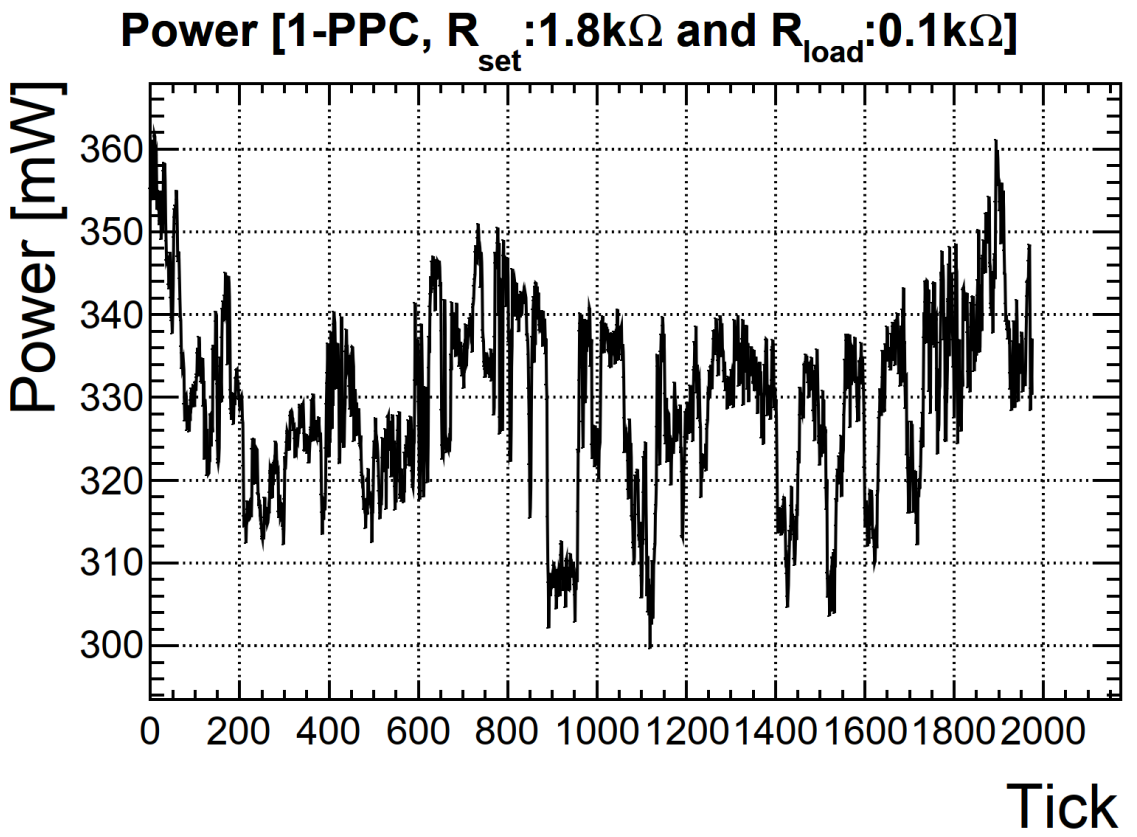
Laser Power Settings *

Laser Power (W)	0.25	0.50	1.00	1.50	2.00	2.50	3.00	3.50
Setting Voltage (V)	0.28	0.39	0.60	0.85	1.08	1.31	1.56	1.78
Resistance (KΩ)	0.30	0.43	0.74	1.16	1.73	2.47	3.69	5.60

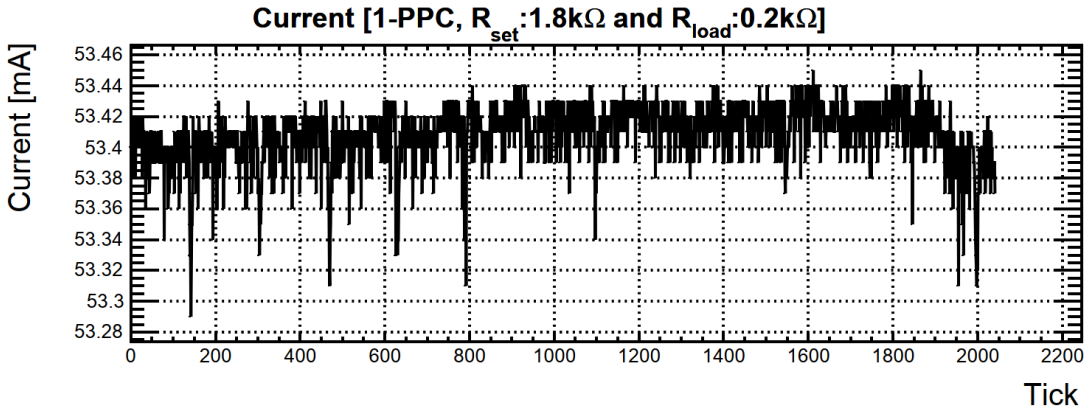
** Voltage setting between Pin 1(LIS) and Pin 4(GND) to adjust laser power*
** Tested with 3 meter 62.5um fiber at 25 ℃ ambient*

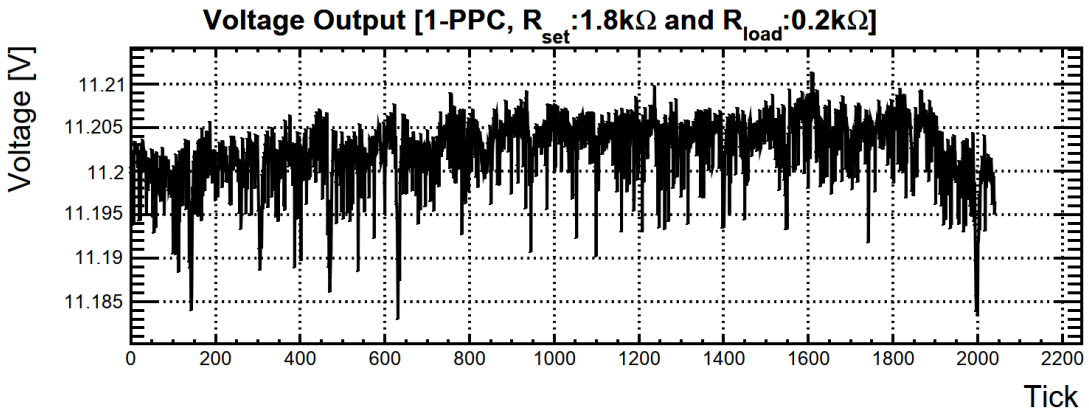
Test #1

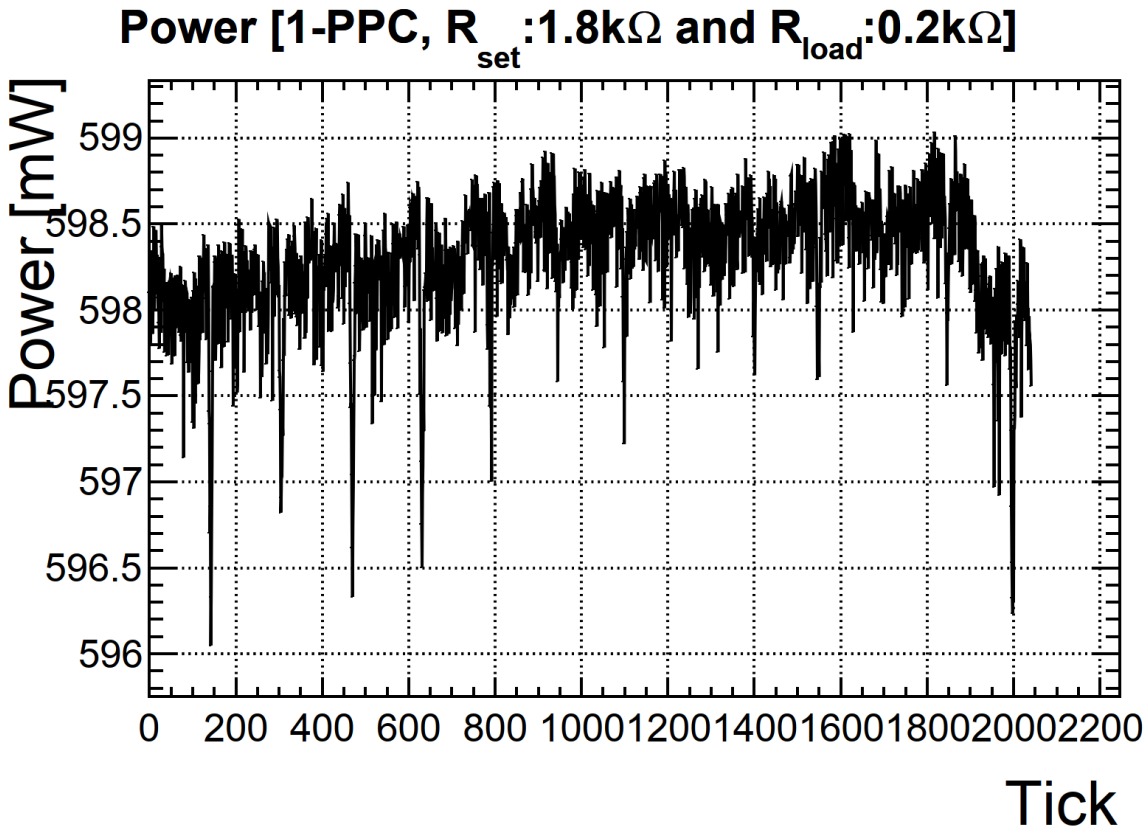

Current [1-PPC, R_set:1.8kΩ and R_load:0.1kΩ]
Current [mA]
60
59
58
57
56
55
54
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Tick
Voltage Output [1-PPC, R_set:1.8kΩ and R_load:0.1kΩ]
Voltage [V]
6
5.9
5.8
5.7
5.6
5.5
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Tick


Power [1-PPC, R_set:1.8kΩ and R_load:0.1kΩ]
Power [mW]
360
350
340
330
320
310
300
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Tick

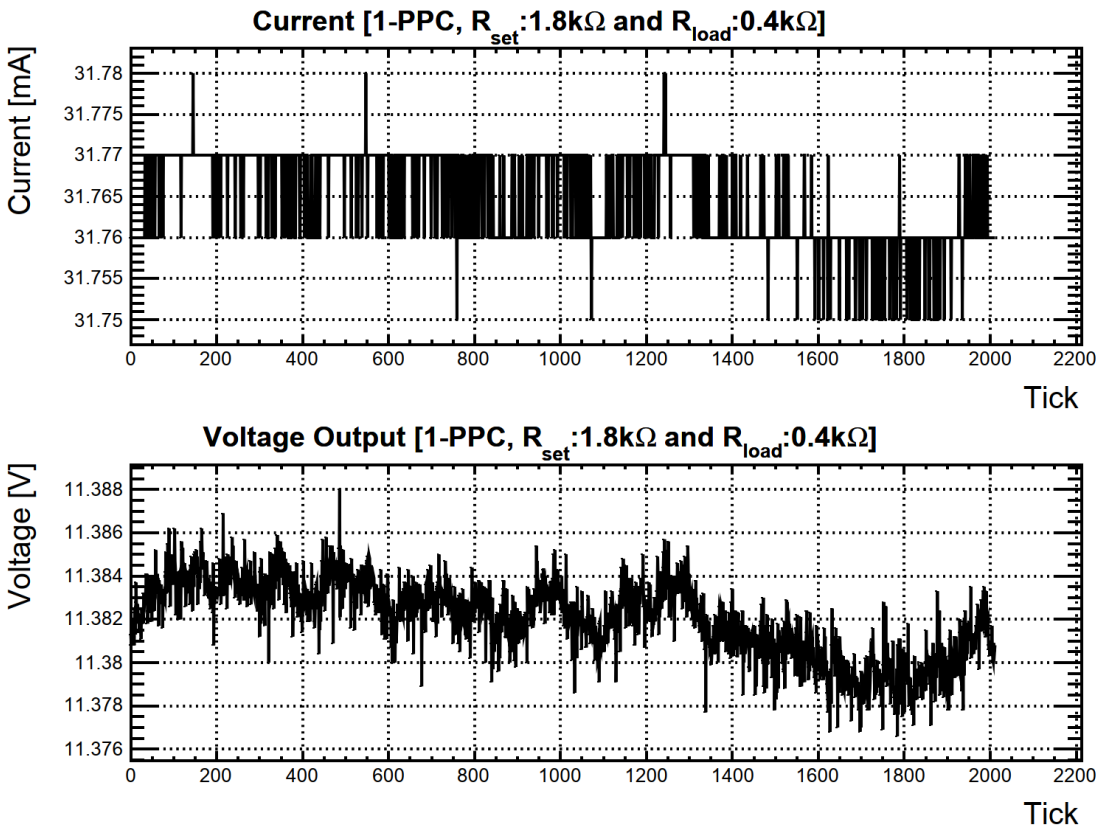
Test #1

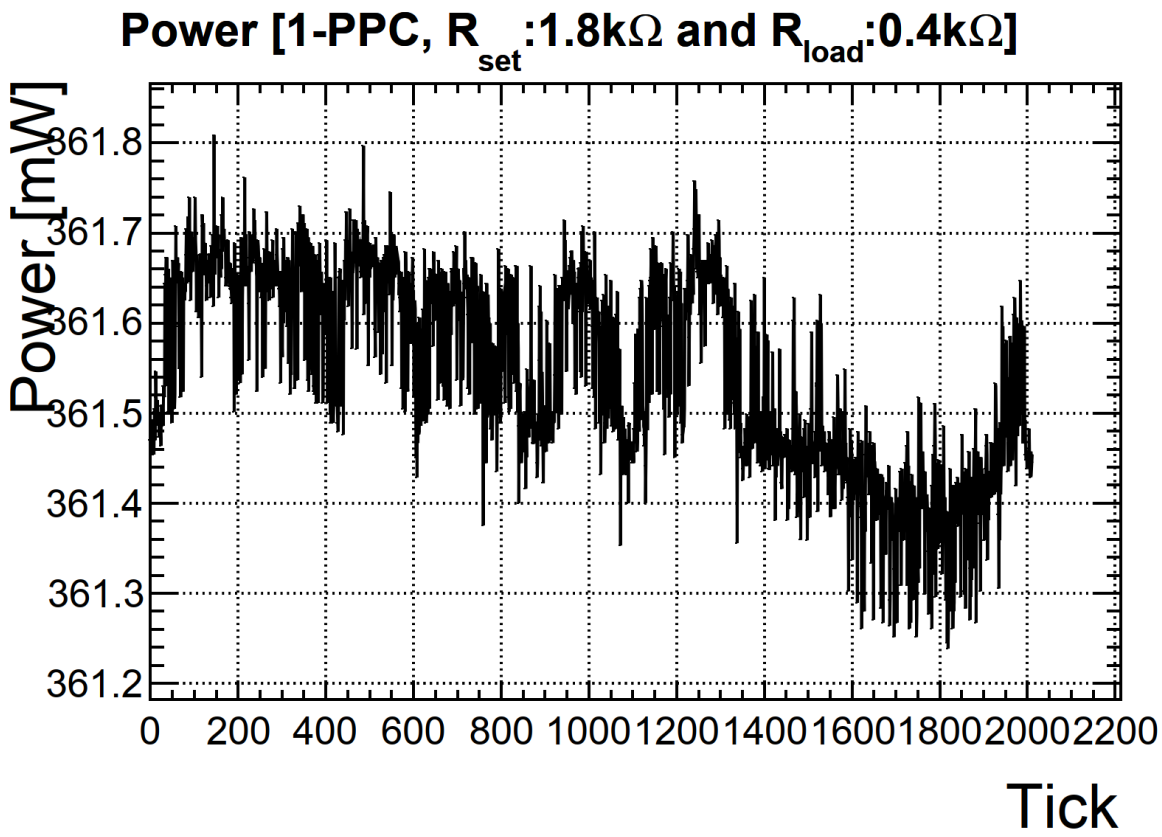

Current [1-PPC, R_set:1.8kΩ and R_load:0.2kΩ]
Current [mA]
53.46
53.44
53.42
53.4
53.38
53.36
53.34
53.32
53.3
53.28
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
Tick


Voltage Output [1-PPC, R_set:1.8kΩ and R_load:0.2kΩ]
Voltage [V]
11.21
11.205
11.2
11.195
11.19
11.185
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
Tick

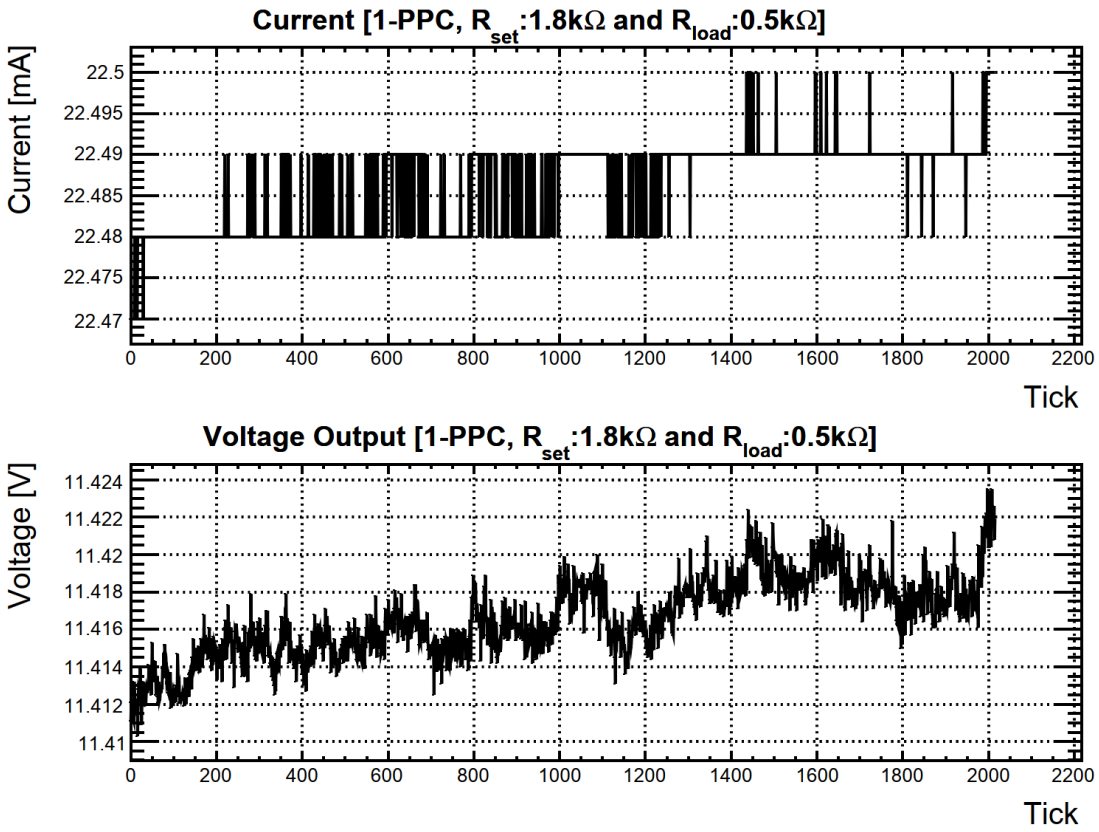

Power [1-PPC, R_set:1.8kΩ and R_load:0.2kΩ]
Power [mW]
599
598.5
598
597.5
597
596.5
596
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
Tick

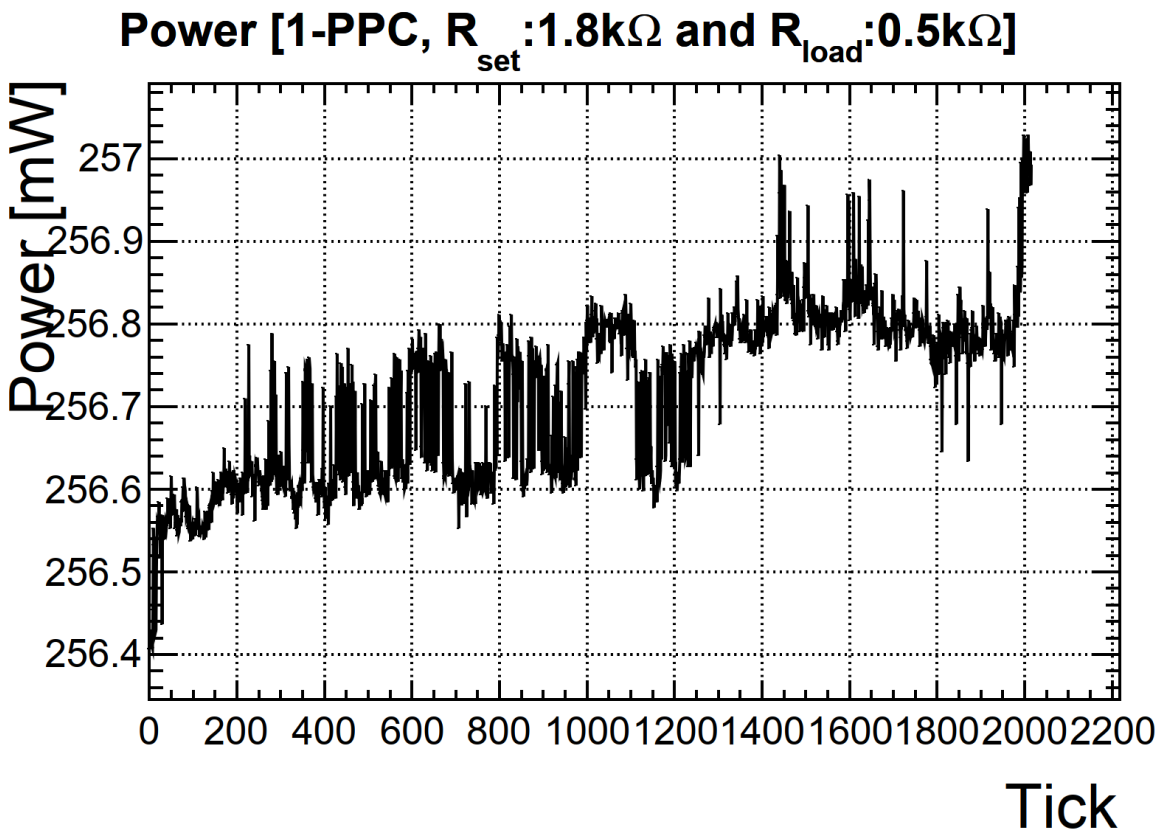
Test #1


Current [1-PPC, R_set:1.8kΩ and R_load:0.4kΩ]
Current [mA]
31.78
31.775
31.77
31.765
31.76
31.755
31.75
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
Tick
Voltage Output [1-PPC, R_set:1.8kΩ and R_load:0.4kΩ]
Voltage [V]
11.388
11.386
11.384
11.382
11.38
11.378
11.376
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
Tick

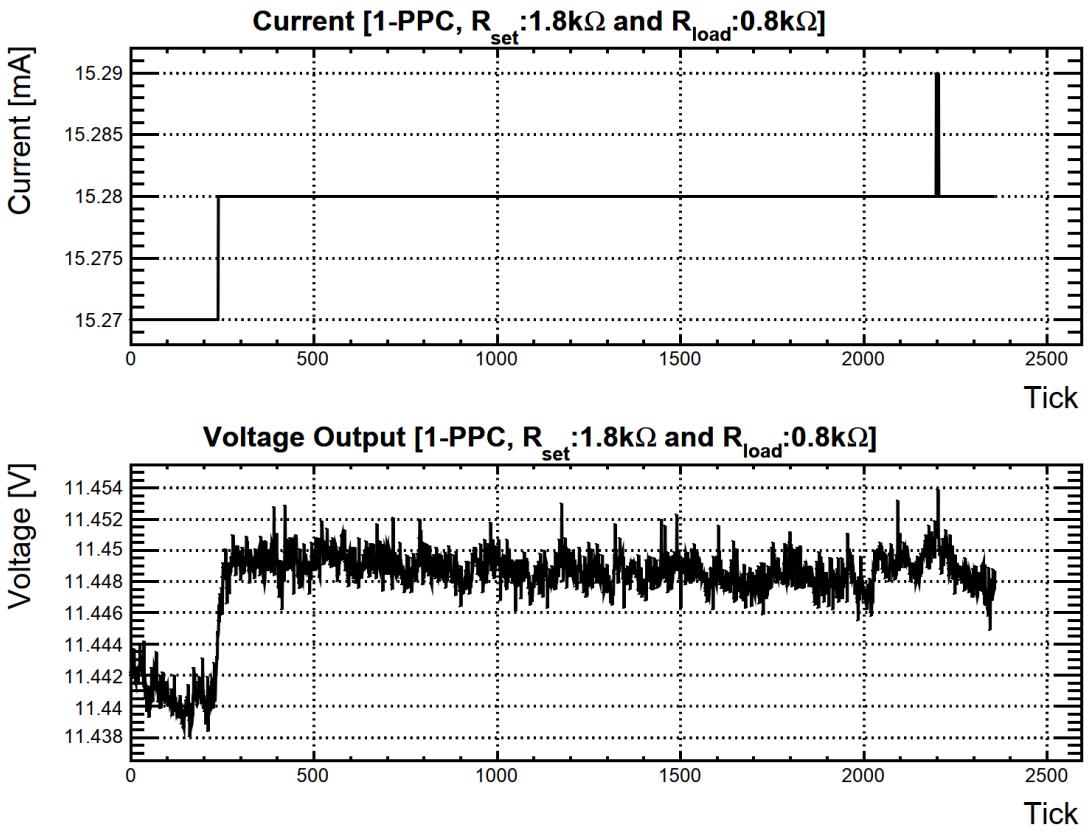

Power [1-PPC, R_set:1.8kΩ and R_load:0.4kΩ]
Power [mW]
361.8
361.7
361.6
361.5
361.4
361.3
361.2
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
Tick

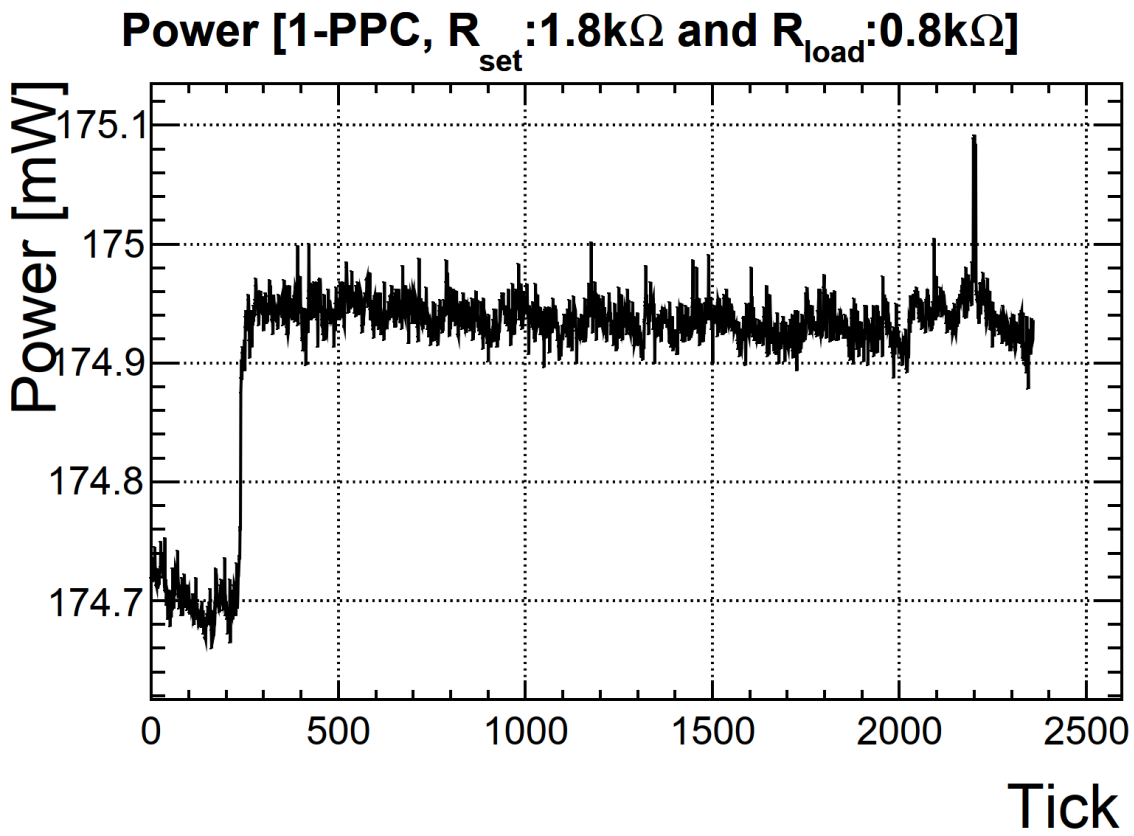
Test #1


Current [1-PPC, R_set:1.8kΩ and R_load:0.5kΩ]
Current [mA]
22.5
22.495
22.49
22.485
22.48
22.475
22.47
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
Tick
Voltage Output [1-PPC, R_set:1.8kΩ and R_load:0.5kΩ]
Voltage [V]
11.424
11.422
11.42
11.418
11.416
11.414
11.412
11.41
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
Tick

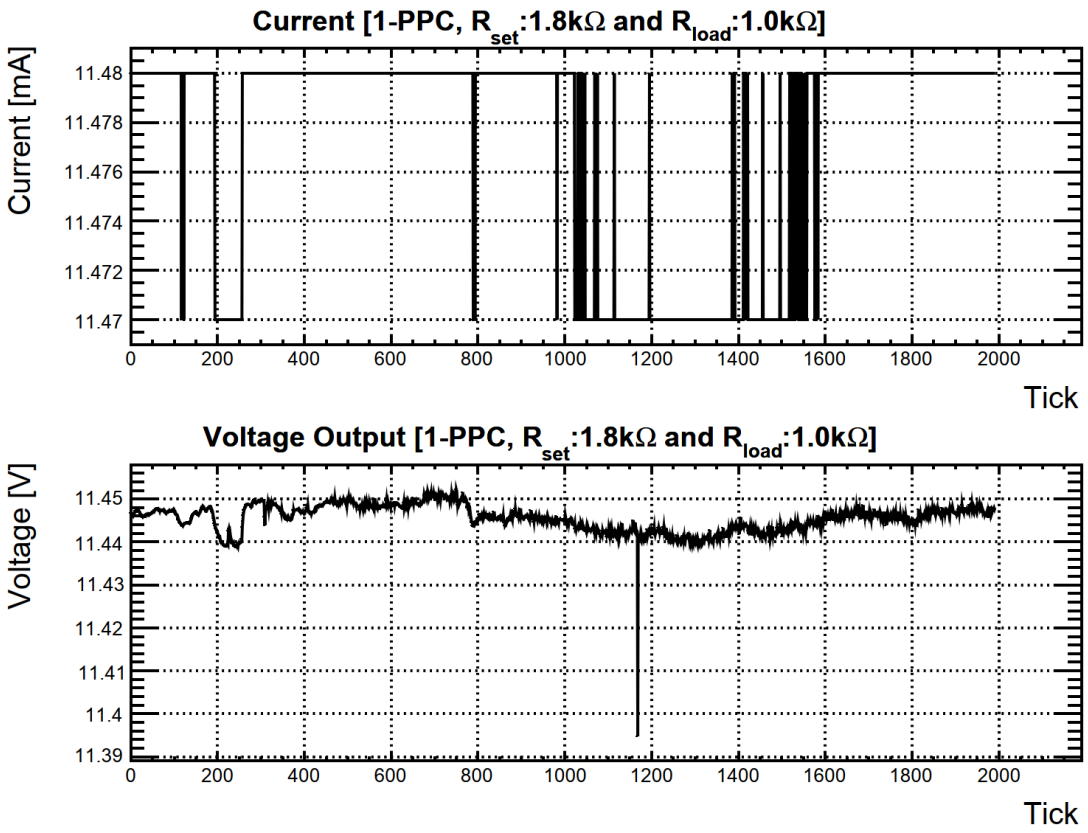

Power [1-PPC, R_set:1.8kΩ and R_load:0.5kΩ]
Power [mW]
257
256.9
256.8
256.7
256.6
256.5
256.4
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200
Tick

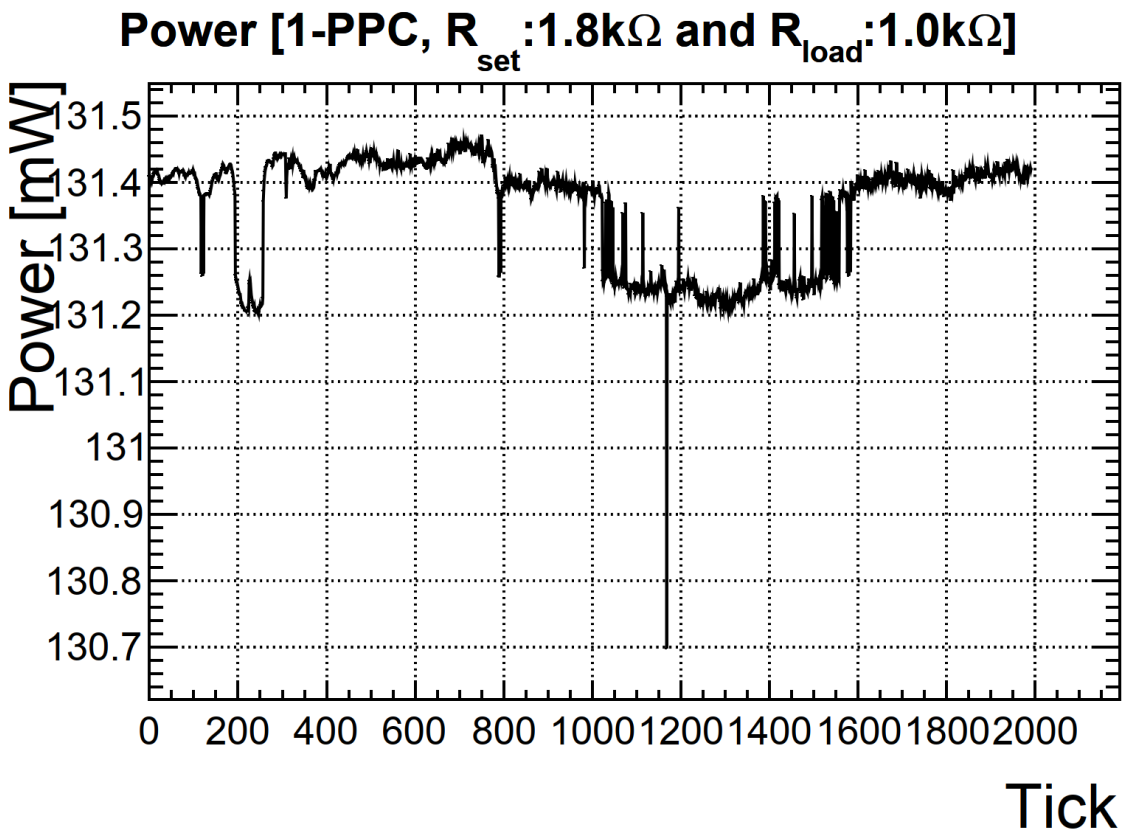
Test #1


Current [1-PPC, R_set:1.8kΩ and R_load:0.8kΩ]
Current [mA]
15.29
15.285
15.28
15.275
15.27
0
500
1000
1500
2000
2500
Tick
Voltage Output [1-PPC, R_set:1.8kΩ and R_load:0.8kΩ]
Voltage [V]
11.454
11.452
11.45
11.448
11.446
11.444
11.442
11.44
11.438
0
500
1000
1500
2000
2500
Tick


Power [1-PPC, R_set:1.8kΩ and R_load:0.8kΩ]
Power [mW]
175.1
175
174.9
174.8
174.7
0
500
1000
1500
2000
2500
Tick

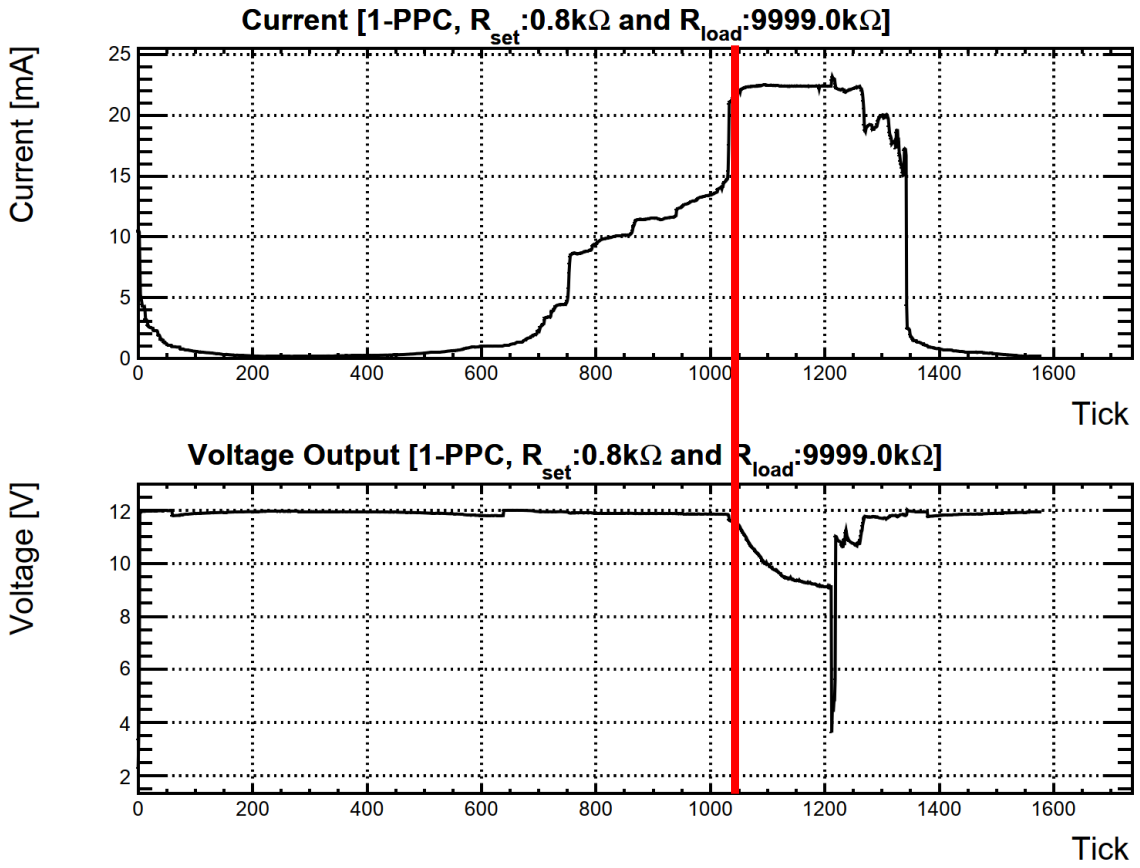
Test #1

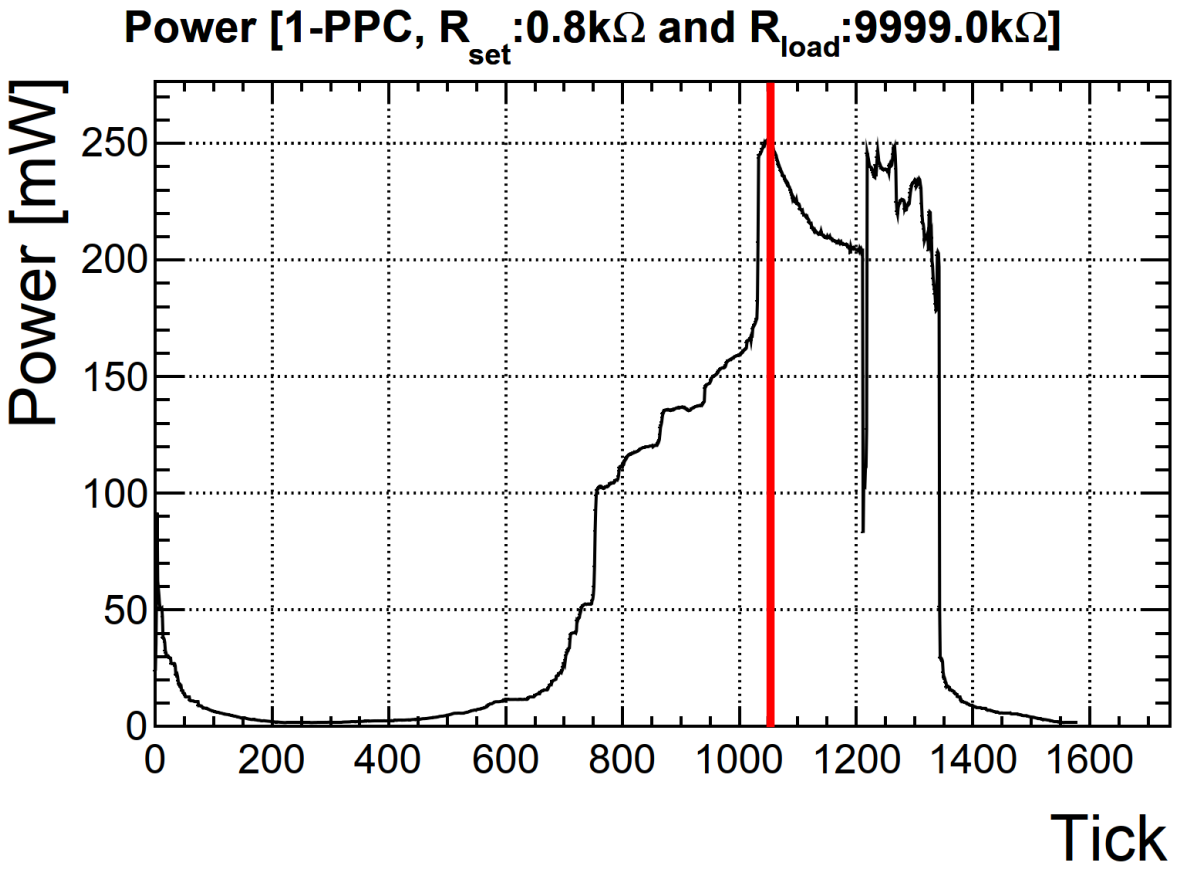

Current [1-PPC, R_set:1.8kΩ and R_load:1.0kΩ]
Current [mA]
11.48
11.478
11.476
11.474
11.472
11.47
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Tick
Voltage Output [1-PPC, R_set:1.8kΩ and R_load:1.0kΩ]
Voltage [V]
11.45
11.44
11.43
11.42
11.41
11.4
11.39
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Tick


Power [1-PPC, R_set:1.8kΩ and R_load:1.0kΩ]
Power [mW]
131.5
131.4
131.3
131.2
131.1
131
130.9
130.8
130.7
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Tick

Test #2

- Setting resistors on Laser power (750 ohm) corresponding to 1W of optical power
- Using potentiometers as variable resistors (tuning by finger not precise)

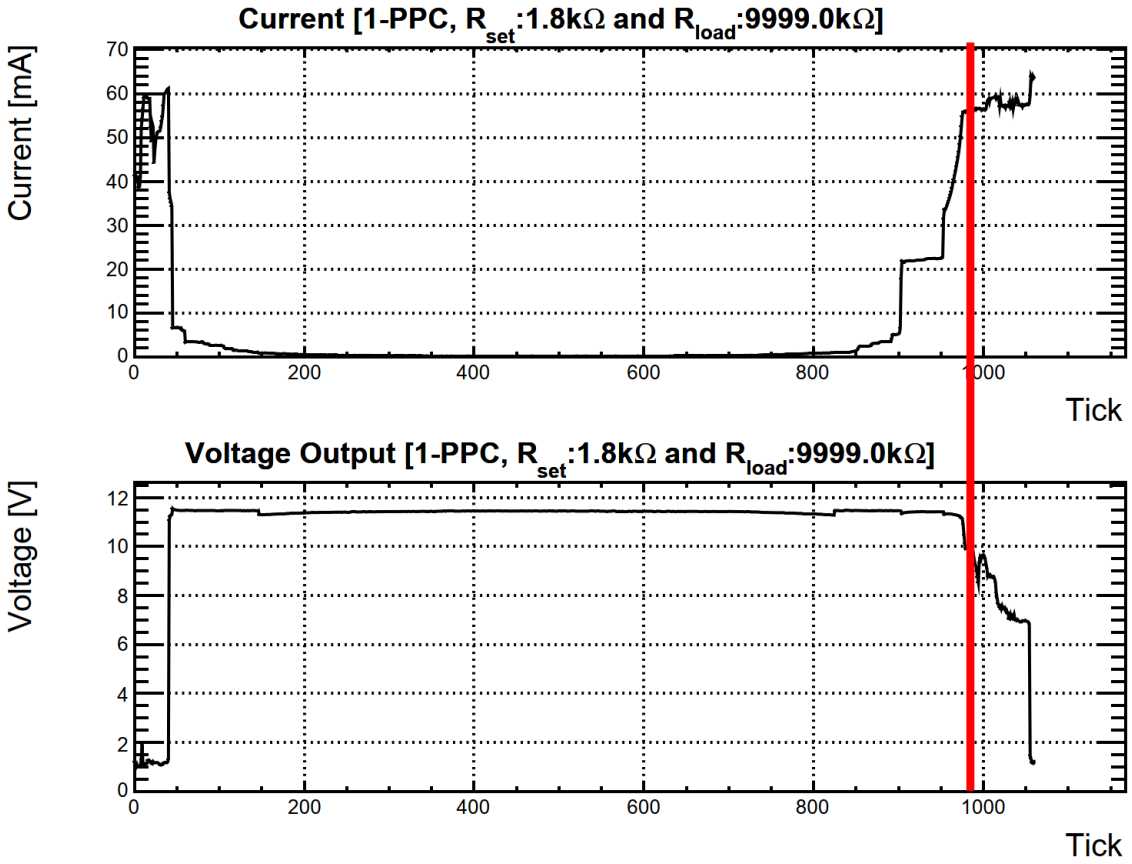


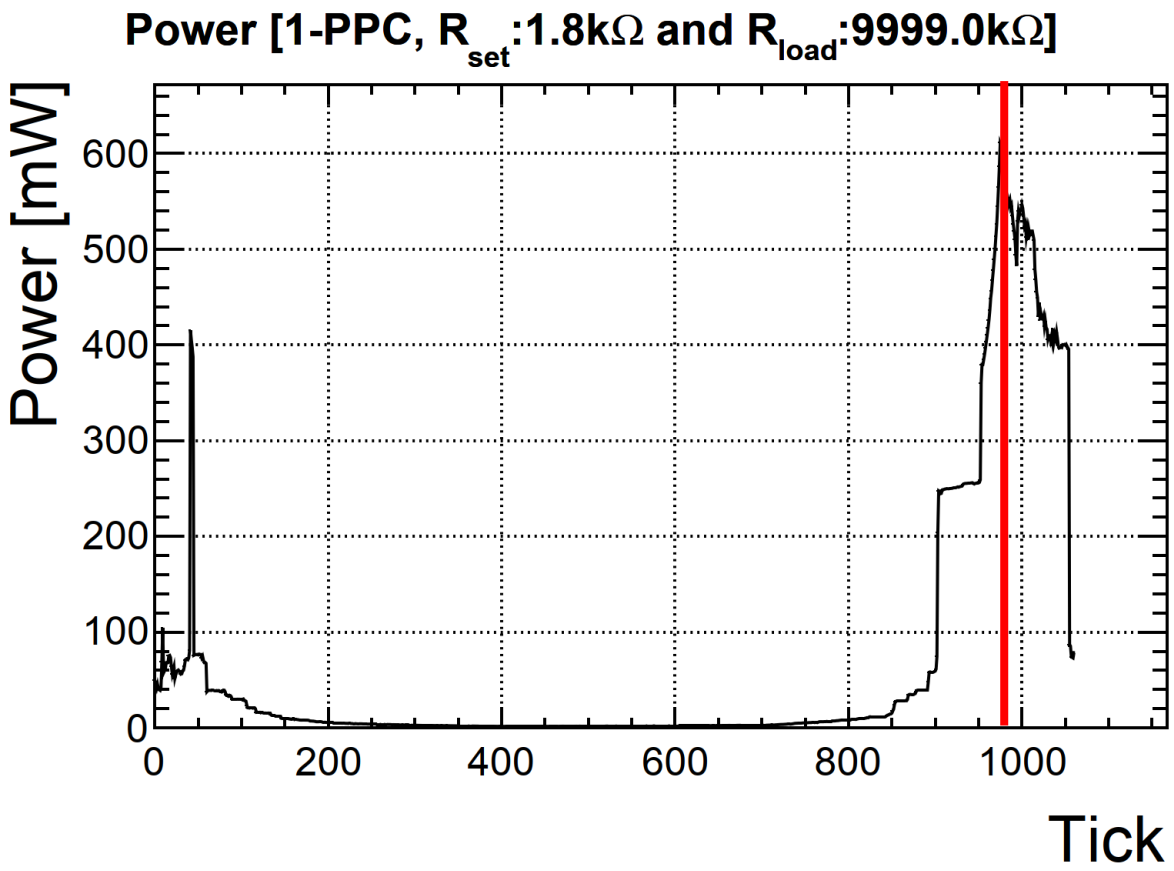


Maximum power 250 mW (11.4 V, 22 mA), load resistors is around 500 ohm

Test #2

- Setting resistors on Laser power at 1.8 kohm, corresponding to 2.1W of optical power
- Using potentiometers as variable resistors (tuning by finger not precise)





Maximum power 600 mW (11.1 V, 54.8 mA), load resistors is around 200 ohm

- Getting more experience with the system
- Performing maximum power study for single PPC units
- The more laser power set, the more heat load into argon released as a results bubbles increases (boiling a lot)
- We try to find power curve as a function of load resistor (need better controlled potentiometers/trimmer)