

14.5KV BURN-IN TEST SYSTEM



The CPE Burn-In Test System (BTS) is a TWT power supply used for production aging, predictive failure analysis, and RF experimentation. The BTS offers high voltage, patented series-stackable resonant converter modules that provide 3 to 5 collector outputs plus a cathode output ranging from 1000V to 14.5kV at a maximum of 500mA Ik and 1000W. Each converter can supply 250V to 4500VDC differential voltage up to a wide load range of 400W per module with 1% voltage and current regulation.

In each unit, a 4-wire Kelvin connected, Cathode-referenced heater supply provides anywhere from 1V to 12VDC @ 3A. The heater includes a current limit setpoint to decrease thermal shock to the TWT filament, and a configurable ON timer will shut down the heater after a specified period of time when a Vac-Ion voltage is not present.

Input Power Ratings

Input Min. Voltage	Input Max. Voltage	Maximum Input Current	Input Frequency Range	Power Factor
100VAC	240VAC	20A	50-60Hz	>0.95

Output Power Ratings

	Min. Voltage	Max. Voltage	Current Range
Cathode ^[1]	1kV	14.5kV	0-500mA
Collector Differential Voltage ^[1]	250V	4500V	
Heater ^{[2] [6]}	1V	12V	0-3.5A
IFE ^{[2] [3] [6]}	0V	100V	0-10mA
Grid Bias ^{[3] [6]}	-2000V	-100V	
Grid Pulse Top ^{[3] [6]}	-1.7kV	+400V	
Grid Current ^[3]			0-50mA
Positive Anode	0V	1kV	0-2mA
Negative Anode ^[4]	5kV/-9kV	0V	0-2mA
Vac-Ion	0V	5kV	0 - 1mA

Grid Pulser Ratings

Grid Frequency ^[3]	CW	1MHz	
Grid Pulse Width ^[3]	0.4us	1 second, CW	
Grid Duty ^[3]	0.01%	99% ^[5]	

[1] Cathode and collector measurements are expressed in absolute value for readability, but are negative with respect to ground.

[2] Heater and IFE measurements, while expressed in absolute value, are negative with respect to cathode.

[3] Grid option replaces IFE.

[4] -9kV option replaces the -5kV Anode.

[5] Grid Pulse Width, Duty and Period limits are user-configurable.

[6] wrt Cathode

Each unit is configured with positive and negative anode supplies plus a voltage-regulated Vac-Ion pump supply:

- Positive Anode - 0 to 1kV @ 2mA
- Negative Anode - 0 to -5kV @ 2mA (-9kV modules available)
- Vac-Ion - 0 to 5kV @ 1mA

The BTS offers two options for grid control:

- IFE - 0 to 100VDC cathode-referenced voltage output
- Grid Pulser with programmable PRF from CW to 1MHz, bias voltage from -100V to -2000V, and pulse top voltage from -1.7kV to +400V. Sample and hold telemetry provides peak cathode current measurements during pulsing operation.
- Grid pulser add-on options include:
 - External Synchronization Input
 - Sync Out for external triggering
 - Burst mode

The BTS offers a range of fast protection circuitry and programming including a cathode crowbar switch, arc detection of each high voltage output, ground fault protection, helix over-current protection and firmware-based setpoint regulation faults.

The BTS is controlled digitally. Control features include:

- Optically isolated ADCs to provide accurate, 16 bit high voltage measurement
- 16-bit setpoints
- User interlocks and high voltage warning lamp driver
- Auto-reset feature which automatically attempts to clear faults and reapply power to TWT for unattended burn-in
- Fault history logs and telemetry on an internal SD flash memory card
- Ethernet TCP/IP communication API with Windows PC-based software
- Includes standard CPE Burn-In GUI for Windows XP/7/8



COLORADO POWER ELECTRONICS

120 Commerce Dr., Ste 1 • Fort Collins, CO 80524
phone // 970-482-0191 • fax // 970-482-1992
email // sales@c-pwr.com

www.c-pwr.com

24KV TWT TEST STATION

The TWT Test Station (TTS) is CPE's 24kV, high voltage modulator for manufacturing, powering and operating TWT amplifiers. These units can be used for specific application needs including production aging, predictive failure analysis, and RF experimentation.

This system is computer controlled with high-voltage supplies, cathode switch and fully integrated data acquisition instrumentation. The Cathode supply is capable of outputting up to 24kV with 0.33uF output capacitance for superior power initiation and pulse stability.

The collector supplies are designed as series-stackable with 3-5 modules per unit to support customer budget and expandability. Each collector supply is floatable to 25kV with an operating voltage of up to 4kV differential with a wide load capability and 0.1% voltage and current regulation.

The heater supply features a 4-wire Kelvin connection for accurate load point measurement, a current limit for thermal shock reduction, and a timer to remove heater power when no high voltage is present. Available is the capability of modulating the Grid/IFE between bias and pulse top voltages, adding pulsing capability from the same rack to allow the cathode to be pulsed to full operating voltage with varying duty cycle and period.

The TTS features fast protection circuitry which allows 15kV rise and fall times of 400ns, 1mJ tube fault energy and high speed hardware fault protection - no firmware intervention is required to detect fault conditions.

The TTS unit also features hardware interlocks including a wired interlock, smoke detector and external HV warning lamp.



COLLECTOR SUPPLIES



The TTS is controlled via TCP/IP communications over optical Ethernet, and has the following features:

- Integrated data acquisition instrumentation with 10us resolution
- Isolated sync output
- A selectable automatic reset function to automatically clear faults and re-apply TWT power
- Fault history log
- Selectable cathode tracking that automatically adjusts collector voltage to track cathode voltage changes
- Preset tube families providing quick configuration and recall for TWT types.

COLORADO POWER ELECTRONICS

120 Commerce Dr., Ste 1 • Fort Collins, CO 80524
phone // 970-482-0191 • fax // 970-482-1992
email // sales@c-pwr.com

www.c-pwr.com

