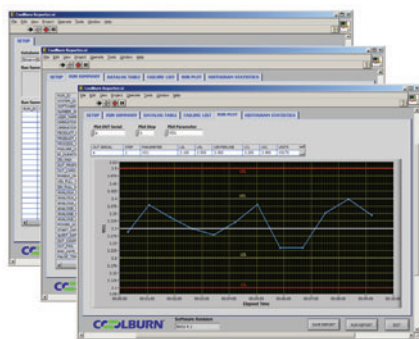


Regenerative Burn-in Systems

Key Features:

- Saves up to 80% of energy costs
- Good for both isolated & non-isolated converters burn-in.
Up to 128 converters per system.
- Programmable line, load and temperature.
- Burn-in monitoring of;
 - DUT output V&I
 - DUT input V&I
 - Individual DUT and chamber temperature
- Statistical data to determine optimal burn-in duration



Regenerative Burn-in Systems for DC/DC Converters

Burn-in has been used for many years within the electronics industry to eliminate infant mortalities. Conventional burn-in systems consume a great deal of energy and dissipate excessive heat due to the use of passive loads. Additionally passive load systems require complex and costly data acquisition systems to monitor DUT parameters and a time consuming and awkward reconfiguring for new models. These are some of the reasons that Burn-in is generally the highest cost process in the manufacturing of dc-dc converters.

Chroma's new patent-pending* COOLBURN® recyclable burn-in systems use state-of-the-art techniques to recycle the converter's output power, thereby reducing utility costs and wasted heat by typically %. Other benefits include smaller and less costly input sources and lower air conditioning costs. In addition to the recycling benefits, the COOLBURN® systems include programmable loads designed to cover a wide range of converters, plus the loads can be paralleled for higher power applications, so change over time is reduced. The COOLBURN® systems are packaged in standard cabinets replacing large and expensive burn-in rooms. Full programmable control over line/load/temperature profiles mean prewritten profiles and reports are some of the other industry-first features.



Software calculates energy and cost savings.

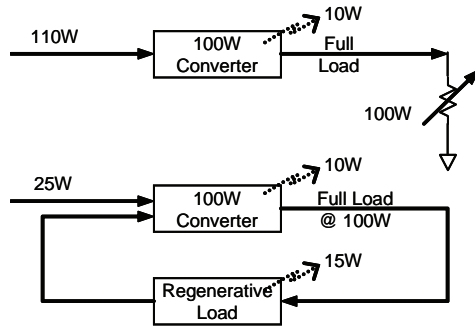
*U.S. & International Patent Pending #11/287580, System and Method for Regenerative Burn-in of DC-DC converters.



WHY REGENERATIVE?



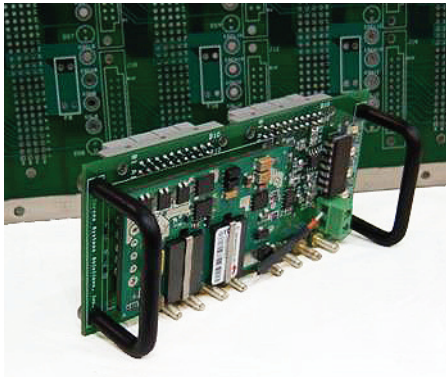
During burn-in of a typical 100W converter, COOLBURN's recyclable loads reduce input power and wasted heat by 85W, or 77%. The figure below illustrates the fundamental advantages of the COOLBURN® system.



Conventional Burn-in
 Input Power = 110W
 Heat Dissipated = 110W

COOLBURN
 Input Power = 25W
 Heat Dissipated = 25W

DUT ADAPTER BOARDS



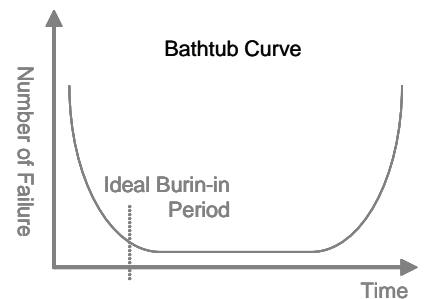
Chroma's COOLBURN® systems employ a unique approach to allow DUTs to be quickly and inexpensively mated to the test system using low cost adapter boards. Each adapter board connects (via low DIN connectors) to an intermediate main board. Two regenerative loads connect to the reverse side of the main board allowing a quick and low cost means of connecting DUTs to the system. Each adapter board can carry one, two or in some cases more, DUTs depending on DUT form factor and current demands.

The COOLBURN® mainboards provide interface pins to allow DUT adapters to be customized to accomplish many types of specialized testing. The following are features available at the DUT adapter board interface: VID Control (3 bits); Power good; DUT enable/disable; Visual LED pass/fail indicator; DUT present; Case or local ambient temperature measurements.

DUT boards allow for a wide range of test strategies including one, two or more independent DUTs per card, paralleled DUT or dual output DUTs. To assist in the development of n DUT cards Chroma provides a designer guide as well as artwork on design information on reference designs.

BURN-IN PROFILE AND MONITORING

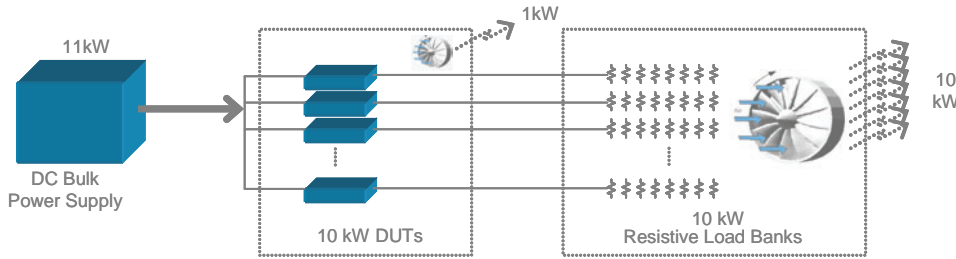
The graph to the right shows a typical burn-in profile of failures rates vs. burn-in length. Finding the "knee" of this "bathtub" curve for each model type optimizes quality and factory throughput. Conventional burn-in systems often lack the statistical data collections capability needed to provide real-time information to optimum burn-in length for a given product, nor do they provide data to indicate when burn-in times can be reduced as products mature. Since each load within the COOLBURN® system provides readback of input and output V&I of each converter, this data is provided as a standard feature of the COOLBURN® system.



RETURN ON INVESTMENT

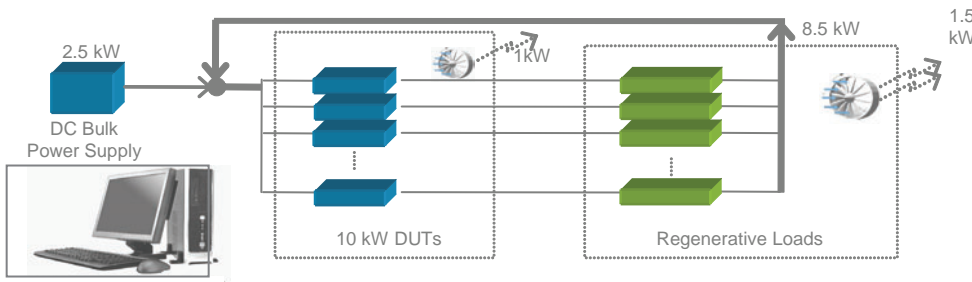
The figures below show the multiple effects that recycling systems have over conventional burn-in for a typical 10KW system. As shown recycling loads save \$1,255/wk or over \$93,340 per year! Additional cost benefits result from lower air conditioning/heat remove costs. ROI for a typical system is less then one year!

Conventional Converter Burn-in



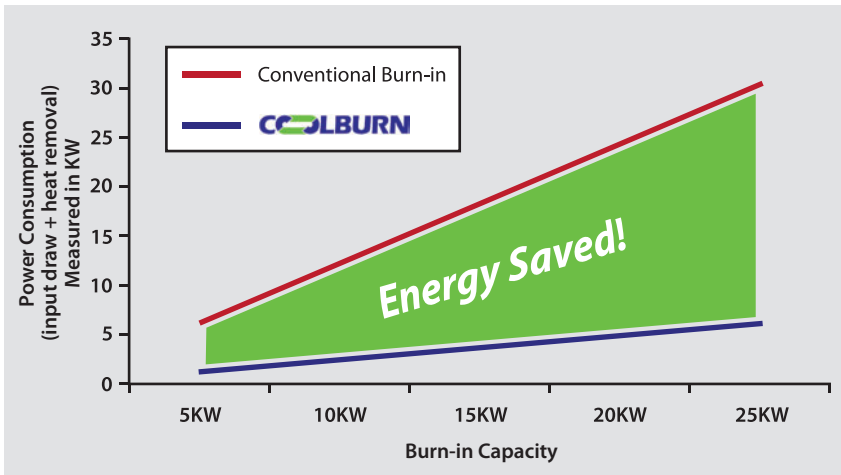
Conventional Burn-in (10kW)	
Input Power	=11kW
Heat Dissipated	=11kW
Operating Cost	= \$392/wk
Change-over Cost	= \$600/wk

COOLBURN Regenerative Burn-in system



COOLBURN (10kW)	
Input Power	=2.5kW
Heat Dissipated	=2.5kW
Operating Cost	= \$97/wk
Change-over Cost	= \$100/wk

Power Consumption Comparison



can save your company

\$93,340

per year*
in operation and change over costs.

Financial Comparison – Recurring Costs

	Conventional	COOLBURN
Operating Costs*:	\$392/wk	\$97/wk
Change Over Costs:	\$600/wk	\$100/wk
Total:	\$2,192/wk	\$397/wk
Savings per week using COOLBURN®:		\$1,795
Savings per year using COOLBURN®:		\$93,340



Software calculates energy and cost savings.

*Note: Assumes efficiency or DUT =90%, Utility costs of \$0.193/kWh, 3 times/wk model changeover. Does not include production savings of shorter burn-in times resulting from monitored burn-in.

SYSTEM SPECS

COOLBURN® 100-6-75-20

Power: 100W

Input section

Input Voltage: 1-6V

Input Current

Range: 0.1-20A
Resolution: 12 bits
Accuracy: 0.1% FS

Output Section

Output Voltage Ranges: 1.2-18V / 18-75V
Efficiency: 80% Typical

Measurement Section

Input Voltage

Range: 0-6V
Resolution: 12 bits
Accuracy: 0.2% FS

Input Current

Range: 0-6V
Resolution: 12 bits
Accuracy: 0.29% FS

Output Voltage

Range: 0-75V
Resolution: 12 bits
Accuracy: 0.1% FS

Output Current (requires shunt on DUT carrier card)

Range: 0-2.5V
Resolution: 12 bits
Accuracy: 0.1% FS

Thermal Sense (requires thermocouple on DUT carrier card)

Range: 0-2.5V
Resolution: 12 bits
Accuracy: 0.1% FS

Other

Operating Temp: 10-40° C / 50-104° F
Control Interface: RS-485

SYSTEM

Max no. of regenerative loads per rack¹

128 Channels

Temp range of DUT chamber

50° C / 122° F

Temp uniformity of DUT chamber

Better than 5° C / 9° F

Software database

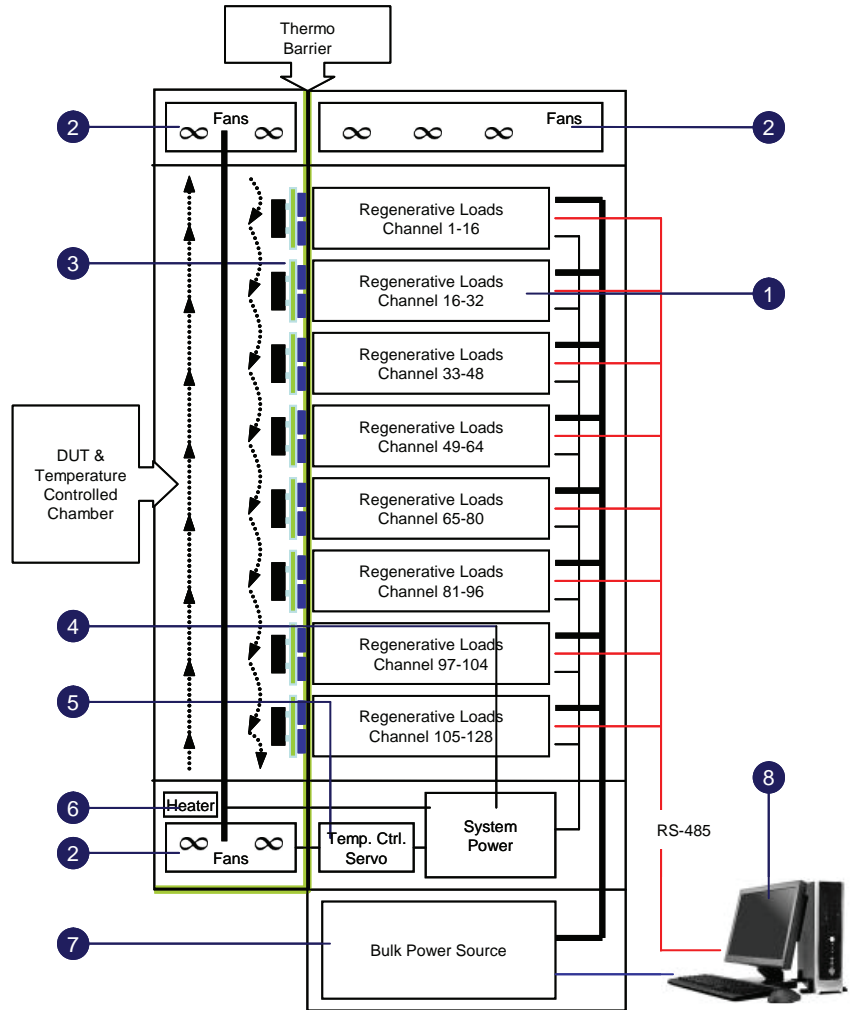
M/S SQL compatible

¹When the loads are paralleled for higher power application, less logical load channels can be used per rack. ²All Specifications are subject to change with notice.

SYSTEM STRUCTURE

COOLBURN® system structure; Configured for 128 load channels.

Diagram depicts COOLBURN® system with optional temperature chamber.



1. Regenerative Loads:
Recyclable electronic loads with precision voltage and current measurements. Up to 128 isolated load channels may be installed per rack.

2. Ventilation system:
Exhaust hot air and control DUT and Load chamber temperature.

3. DUT chamber and Interface:
Provides controllable temperature and DUT interfacing connection.

4. System Power:
Provide power rails for system modules.

5. Temperature Control:
Control temperature of the DUT chamber to user set point.

6. Heating System:
Provide preheating when burn-in starts.

7. Bulk power supply:
Provides input power for DUTs and input voltage control.

8. Host PC & System:
Software Provides control and monitoring GUI.