

# High Slew Rate DC Electronic Load

## MODEL 63472

### Key Features

- Designed for VRM, embedded VRD and Intel® Itanium™ Power Pod testing
- Static Loading:  
Power rating: 200W  
Voltage range: 0-2V  
Current range: 150A
- Dynamic Loading  
Current range: 150A  
Slew rate: Up to 1000A/  $\mu$ s  
Dynamic Freq: Up to 1MHz  
Duty control: 10-90%
- Built-in and user definable VID tables for flexibility
- Dynamic VID simulation
- Current monitor output
- Measurements  
Static mode: Vdc, Idc  
Dynamic mode: Vpk+, Vpk-  
Dynamic VID: Vpk check, Vdc for last VID
- Customized adapter boards for different types of VRMs, CPU sockets or Power Pod
- Optional Bias voltage source for CPU adapter for embedded testing scenarios
- Full protection: OP,OC and OV protection
- Versatile remote controller
- GPIB and drivers interface
- LabView Soft-panel



Modular VRM / PowerPod Testing

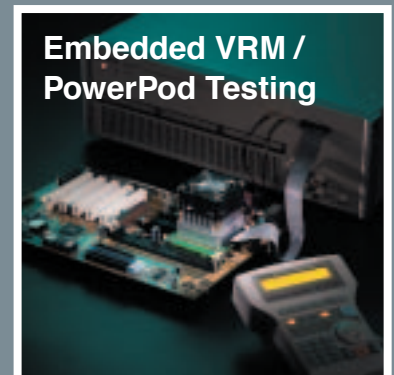
## HIGH SLEW RATE DC ELECTRONIC LOAD FOR VRM / POWER POD TESTING

As a result of the exploding increase in CPU complexity according to Moore's Law, all modern processors require a low voltage with high instantaneous current power source. Voltage Regulator Modules, along with embedded solutions, are the only way to correctly supply these currents. A need to simulate this low voltage, high current with fast di/dt loading has become more important than ever. Every main board design using a VRM, Intel® Itanium™ power pod or an embedded regulator (VRD) will need processor voltage supply performance qualification.

Integrating Intel®'s latest high di/dt test technology with years of experience in the design and manufacture of highly accurate, precision DC load and measurement instrumentation, the Chroma 63472 electronic load is your total solution for qualifying all main board Intel® processor power performance requirements!

The Chroma 63472 electronic load provides 150A of static, DC load with 150A of dynamic load - featuring up to 1000A/  $\mu$ s slew rate! This fully controllable capability, along with Dynamic VID control and sophisticated measurement functions, comprises a total solution - all in one unit. Gone is the need for the individual equipment stack of traditional test setups, saving precious bench space and expense. The Chroma 63472 can replace a function generator, oscilloscope, DVM, DC load bank, in addition to any customized dynamic load and VID control circuitry.

Similarly, the Chroma 63472 makes an economical choice for all your production line test requirements. From industry data, more than 5% of today's main boards fail due to on-board converter failures. The Chroma 63472 can quickly identify suspect units in production - well ahead of an expensive service call.



Embedded VRM /  
PowerPod Testing



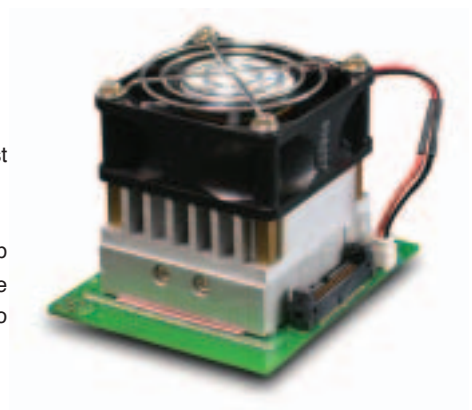
Chroma

# HIGH SLEW RATE DC ELECTRONIC LOAD FOR VRM / POWER POD TESTING

## 1. Incorporates Intel®'s latest Processor Power Test Tool (PTT)

Using new slew rate and loading control techniques, Intel® recently introduced the latest generation PTT to address ultra-fast processor di/dt requirements.

The PTT is controllable by external analog and clock signals. It will sink step currents up to 150A at slew rates over 1000A/ $\mu$ s, with repetition rates up to 1MHz. Users may drive this component with a traditional DAQ card and/or signal generator, or, simply choose to use the Chroma 63472 to obtain a complete test solution.

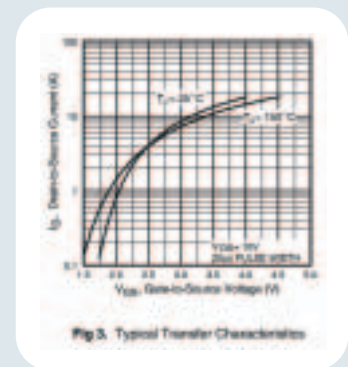
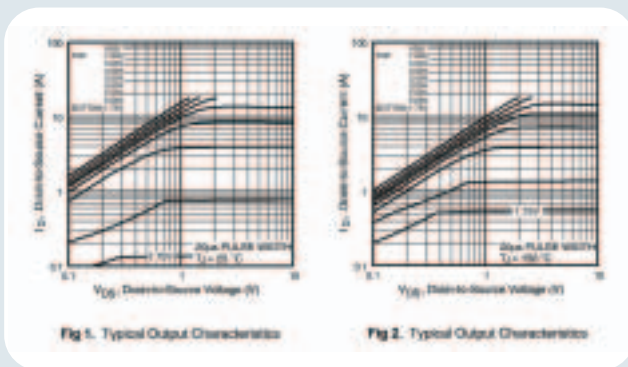


## 2. Auto Calibration

Because the PTT is an "open loop" design, a constant calibration scheme for assuring accurate loading levels and slew rates is necessary. The Chroma 63472 has built-in means for accomplishing real-time, on-the-fly calibrations. Using a high speed ADC and comparators, all necessary calibrations are automatically performed before any measurement reading is taken to ensure accuracy.

The following paragraph explains why the automatic calibration feature is required :

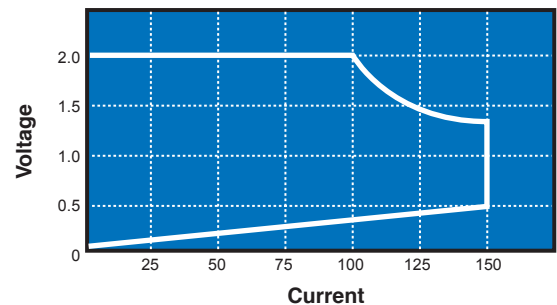
Any change in the PTT unit heatsink temperature will cause a dramatic Id drift in the loading transistors and make the load current inaccurate, if the drive voltage signal is not corrected for continuously. This, combined with the non-linearity of the Vgs/Id response, makes a very difficult control scenario. Without the automatic calibration feature of the Chroma 63472, the PTT load current accuracy may be compromised.



## 3. Static Loading Simulation

In order to physically fit into all current and future CPU sockets, the PTT heat sink volume is small and therefore cannot reliably dissipate the huge amount of heat generated when loading a processor power source continuously.

The Chroma 63472 has a built-in 200W DC electronic load for converter design / development, thermal studies, and reliability testing. It can sink its full rated current down to 0.5V, exceeding all existing processor voltage requirements.

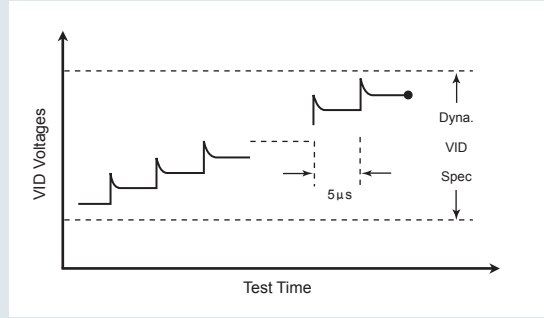


Model 63472(200W) input characteristics

## 4. VID Control / Dynamic Simulation

The Chroma 63472 provides two built-in VID tables for the VRM10.X and VRM9.X series. There are also three user definable VID tables that allow the user to expand for future VID coding schemes.

For the VRM10.X series regulator, a unique dynamic VID function needs to be tested. The Chroma 63472 allows a user to specify any number of VID steps within the programmed VID table. In addition, the step time may be reduced to as little as  $5 \mu s$ . Measurement of the output voltage behavior throughout the entire Dynamic VID sequence is supported.



## 5. Measurement System

The Chroma 63472's comprehensive measurement capability provides all the necessary voltage ( $V_{pk+}$  and  $V_{pk-}$ ) and current information for both static and dynamic CPU "load-line" measurements.

In the Dynamic VID simulation mode, the measurement system captures the peak voltage reading and compares it with the Dynamic VID specification limits. Any value found outside of the boundaries is flagged as a failure.



UUT output voltage and current readings are measured through two separate SMA connectors on the unit's front panel. This provides the user with the flexibility to locate the most desirable voltage measurement point on any particular main board. Doing so will maximize accuracy of the measurement values and minimize external noise interference.

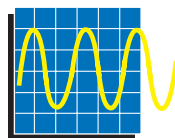
### Applications



VRM / Power Pod Testing



PC Mother Board Testing



R / D Validation And Characterization Test



System Integration And Production Line Test

# High Slew Rate DC Electronic Load

## SPECIFICATIONS:

Static Load Section	
<b>POWER</b>	200W
<b>CURRENT</b>	
Range	0-150A
Resolution	12 Bits
Accuracy	0.1%+0.2%F.S.(typical)
<b>VOLTAGE</b>	
Range	0-2V
Min. voltage	0.5V@ full load
<b>PROTECTION</b>	
OCP	165A
OVP	2.1V
Dynamic Load Section	
Current Range	0-150A
Dynamic-clock	1MHz(10 ~ 90%)
Resolution	1%
Accuracy	100 ppm
Slew Rate	100A/ $\mu$ s ~ 1000A/ $\mu$ s
Min. rise time	100ns
<b>TTL Output</b>	
Level	Low (<0.8V), High (>3.15V)
VID code	6 bits
OUTEN	Yes
<b>Aux. Power</b>	
Outputs	+12V /+5V
Current	0.5A/ 0.3A
Power	7.5W total
Load regulation	5%

\*All specifications are subject to change prior notice.

Measurement Section	
<b>Static Mode</b>	
Voltage read back	
Range	0-2V
Resolution	16 bits
Accuracy	0.05%+0.05% F.S.
Current read back	
Range	0-150A
Resolution	16 bits
Accuracy	0.1%+0.1% F.S.
<b>Dynamic Mode</b>	
I monitor read back	
Range	0-0.5V(refer to 150A)
Resolution	12 bits
Accuracy	0.5%+0.2% F.S.
Peak Voltage	
Range	0-2V
Resolution	12 bits
Accuracy	0.5%+0.2% F.S.
<b>Dynamic VID</b>	
Voltage read back	
Range	0-2V
Resolution	12 bits
Accuracy	0.5%+0.2% F.S.
<b>Dynamic VID Control</b>	
Dwell time	
Range	5 $\mu$ s ~ 10ms
Resolution	1 $\mu$ s
<b>Other</b>	
<b>Interface</b>	
RS-232	For A634701 Remote Controller or PC Control
GPIO	Optional

### ORDERING INFORMATION :

63472 : High Slew Rate Load Control & Measurement Unit

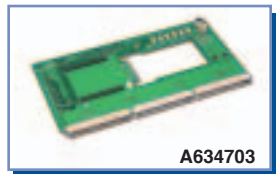
A634701 : Remote controller for 63472

A634702 : Transient Load

A634703 : Test fixture for Power Pod

A634704 : Test fixture for VRM10.0

A634001 : GPIO Option Board



Developed and Manufactured by :

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