

# 5D Series

## Modular DC LED Loads

### 1800W and 3600 Models

#### Key Features

- High Power LED Loads
- 1800W and 3600W Models
- Supports up to 600Vdc for long
- Series String LED Configurations
- Current Ranges up to 24.0 Adc
- High-Speed 5 Digit Precision Metering Capability
- LED Operating Mode: Program LED forward bias voltage (Vd) and Resistance (Rd)
- Built-in PWM Dimming Controls
- Operating Modes: CC, CP, CR and CV
- Static and Dynamic CC Modes
- Fast Current Slew Rates
- Short Circuit Test Relay Option
- Built-in Power Supply Over Current Protection Test Mode
- Built-in Power Supply Over PowerProtection Test Mode
- Go/NoGo Test Support using 150 Set-ups
- Auto-Sequencing
- USB, RS232, GPIB and LAN Interface Options



#### OVERVIEW

The ADAPTIVE POWER 5D Series Programmable LED Electronic Loads are ideally suited for the development and test of high power LED drivers. With their ability to simulate LED load characteristics for large LED strings, the 5D Series LED loads can provide a wide range of LED load test conditions.

Target applications for these loads are research & development, production test, incoming inspection, quality control and service of LED lighting supplies and fixtures.

The high power density of 1800W in a 4U high, single 19" wide rack-mount mainframe represents industry leading power density for LED loads. The 5D Series consists of two models, providing either 1800 Watt or 3600 Watt load power at voltages up to 600Vdc. Both models offer dual voltage and current range capability for optimal accuracy and resolution.

#### LED DIMMING CONTROL BUILT-IN

With the push for the widespread use of dimmable LED bulbs, the 5D Loads are ready to support this using their built in PWM dimming output control signals.

#### 'REGULAR' DC LOAD OPERATING MODES INCLUDED

The 5D Series Loads also offers regular DC load operation modes for nonLED applications, further expanding their usefulness for any electric lab or test department.

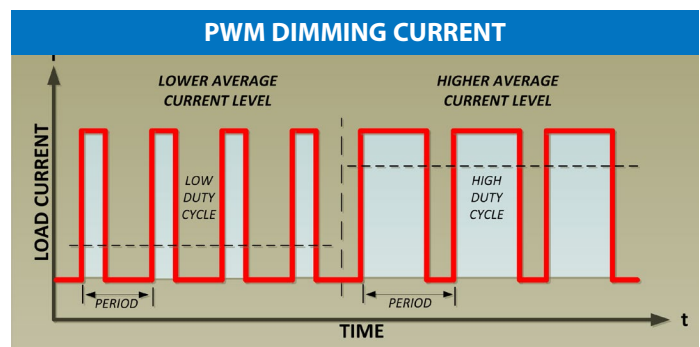
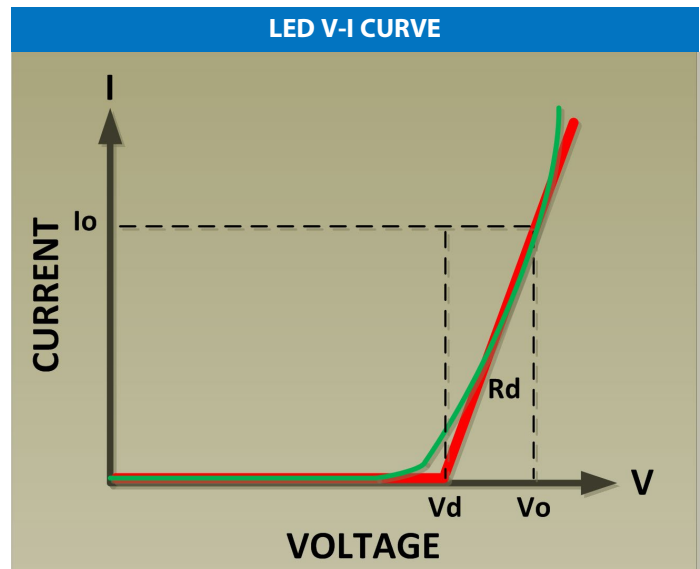
## LED SIMULATION

Significant advances are being made in solid state lighting technologies that promise greatly reduced worldwide power consumption as a result of using light emitting diodes instead of incandescent light bulbs. However, the electrical behavior of LEDs is considerably different from that of a light bulb, which can be viewed as a resistive load. Consequently, testing LED driver designs using CR or even CV mode is typically inadequate. While it is possible to use actual LEDs to test such products, given the variety of LEDs that exist, this is not very practical for either development or production test.

The 5D LED loads address this unique requirement in an effective way.

When LED mode of operation is selected, the load will simulate the forward bias V-I characteristic of an LED or a string of LEDs, which is very different from that of a resistor. Values for the LED driver's output Current ( $I_o$ ) and Voltage ( $V_o$ ) as well as the LEDs forward Voltage ( $V_d$ ) and Resistance ( $R_d$ ) can be programmed on the load.

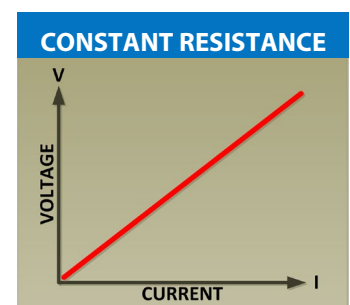
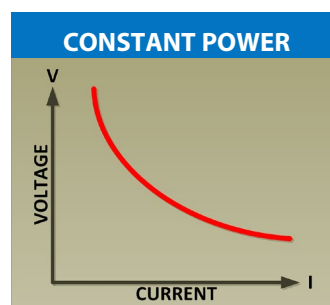
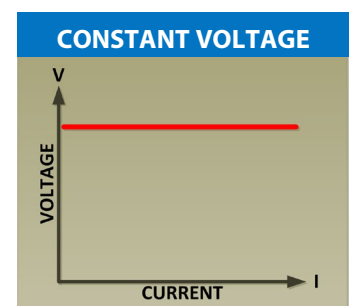
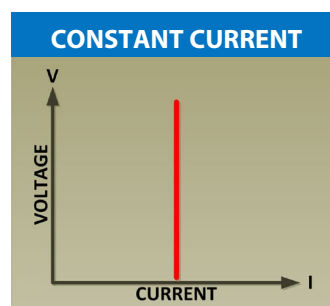
A built in **dimming control** circuit with a DC to 1KHz frequency range and 1% to 99% duty cycle is included with each LED Load module. Also available is an optional external shorting relay controlled by the shorting output of the LED load. This option allows zero ohm shorts to be applied.



## STANDARD DC LOAD MODES

The 5D Series loads also support regular programmable DC load modes of operation to accommodate a wide range of conventional test requirements as well. Voltage sources like AC/DC power supplies are best tested using Constant Current (CC) mode. Battery chargers on the other hand can be tested using an E-load in Constant Voltage (CV) mode.

The available operating modes are Constant Current, Constant Voltage, Constant Power and Constant Resistance. A graphical representation of these modes of operation is shown here.



# SPECIFICATIONS - 5D SERIES LED DC LOADS

MODEL		5D18-12		5D36-24	
OPERATING RANGES					
Power Ranges		0-1800 W		0-3600 W	
Current Ranges		0-12.0 A		0-24.0 A	
Voltage Range		0 - 600 V		0 - 600 V	
Minimum Voltage		6.0 V @ 12 A		6.0 V @ 24 A	
OPERATING MODES					
LED Mode	Vo Voltage Range	LEDL: 60V / LEDM: 300V / LEDH: 600V		LEDL: 60V / LEDM: 300V / LEDH: 600V	
	Rd Resistance Range	LEDL:0.5-100@Vo-Vd=0-6VLEDM:25-5K@Vo-Vd=30-300V LEDL: 5-1K @ Vo-Vd=6-60V LEDH: 5-1K @ Vo-Vd=0-60V LEDM:2.5-500@Vo-Vd=0-30VLEDH:50-10K@Vo-Vd=60-600V		LEDL:0.25-125@Vo-Vd=0-6VLEDM:12.5-6.25K@Vo-Vd=30-300V LEDL:2.5-1.25K@Vo-Vd=6-60VLEDH:2.5-1.25K@Vo-Vd=0-60V LEDM:1.25-625@Vo-Vd=0-30VLEDH:25-12.5K@Vo-Vd=60-600V	
	Resolution	16 bits		16 bits	
	Accuracy	Vd: ± (0.05% OF SETTING + 0.1% OF RANGE) / Rd: ± (0.05% OF SETTING + 0.1% OF RANGE)			
CC Mode	Range	0-3.0 A	0-12.0 A	0-6.0 A	0-24.0 A
	Resolution	0.05 mA	0.2 mA	0.1 mA	0.4 mA
	Accuracy	± 0.1% OF (SETTING + RANGE)			
CR Mode	Range	CRL: 0.5-1.5K (300V)	CRH: 0.1-3K (600V)	CRL: 0.25-3K (300V)	CRH: 0.5-6K (600V)
	Resolution	CRL: 3.333 uS	CRH: 1.666 uS	CRL: 6.666 uS	CRH: 3.333 uS
	Accuracy	± 0.2% OF (SETTING + RANGE)			
CV Mode	Range	0-60 V / 0-300 V / 0-600V		0-60 V / 0-300 V / 0-600V	
	Resolution	1 mV / 5 mV / 10 mV		1 mV / 5 mV / 10 mV	
	Accuracy	± 0.05% OF (SETTING + RANGE)			
CP Mode	Range	0-1800 W		0-3600 W	
	Resolution	30 mW		60 mW	
	Accuracy	± 0.5% OF (SETTING + RANGE)			
PROTECTION					
Over Power (OP)		1890 W		3780 W	
Over Current (OC)		12.6 A		25.2 A	
Over Voltage (OV)		630 V		630 V	
Over Temperature (OT)		+85° C / +185° F			
DYNAMIC OPERATION CC Mode					
T high & T low		0.050 - 9.999 / 99.99 / 999.9 / 9999ms (20 kHz)			
Resolution		0.001 / 0.01 / 0.1 / 1ms			
Accuracy		1µs / 10µs / 100µs / 1ms + 50ppm			
Slew Rate		2.4mA-150mA/µs	9.6mA-600mA/µs	4.8mA-300mA/µs	19.2mA-1200mA/µs
Resolution		0.8 mA/µs	2.4 mA/µs	1.2 mA/µs	4.8 mA/µs
Min. Rise Time		20µs Typical			
METERING					
Voltage Range		0 - 6.0 V / 60.0 V			
Resolution / Accuracy		0.1 mV / 1 mV / ± 0.025% OF (READING + RANGE)			
Current	Range	0-12 A / 120 A	0-12 A / 120 A	0-24 A / 240 A	0-12 A / 120 A
	Resolution	0.2 mA / 2 mA	0.2 mA / 2 mA	0.4 mA / 4 mA	0.2 mA / 2 mA
	Accuracy	± 0.1% OF (READING + RANGE)			
Power	Range	0 - 600.0 W	0 - 1200.0 W	0 - 1200.0 W	0 - 1800.0 W
Resolution / Accuracy		0.1 W / ± 0.125% OF (READING + RANGE)			
MISC. SPECIFICATIONS					
Max. Short Current		12 A		24 A	
Analog Monitor Out		1.2A / V		2.4A / V	
Power & Cooling		115/230Vac ± 10%, 50/60 Hz, Variable Speed Fan Cooled			
Power Consumption		100 W max.		200 W max.	
Dimensions (H x W x D)		177 x 440 x 445 mm / 7.0" x 17.3" x 17.5"		839 x 600 x 600 mm / 33.0" x 23.6" x 23.6"	
Weight (Net)		23.6 kg / 52.0 lbs		81.2 kg / 179 lbs	
Operating Range		0 - 40° C / 32 - 104° F			
EMC & Safety		CE Mark			

## ORDERING INFORMATION:

**Line 1:** Specify DC Load Model:

5D18-12 Chassis

or

5D36-24 Cabinet System

**Line 2:** Specify Remote Control Option:

None, Opt GPIB, Opt RS232, Opt USB or Opt LAN

**Line 3:** Specify Options. (See Table)

**Available Options:**

Option P/N	Description	
Opt R024	Shorting Relay Fixture	5D18-12, 5D36-24

### AC Input Voltage

Please specify AC Line input voltage at the ship-to location on the order as either 120Vac or 230Vac.

**Included in Mainframe Ship kit:**

- User Manuals in PDF Format on CD ROM.
- AC Line Cord.
- Rack Handles 5D18-12 (detached).
- LAN/USB Driver CD ROM (with Opt USB or Opt LAN).
- Certificate of Conformance.

Item	Accessories
Banana plug, 4 mm, Red	1
Banana plug, 4 mm, Black	1
Banana plug, 2 mm, Red	3
Banana plug, 2 mm, Black	3
Y-hook Terminal, Large	4
BNC Cable, 3 feet	1

## WORLDWIDE SERVICE AND SUPPORT

Adaptive Power Systems' customer support is second to none. Our Customer Support Program provides the training, repair, calibration, and technical support services that our customers value. Customers can rely on us for excellent support before, during and after the sale with support and service centers around the world.

Complete calibration and repair services are offered at our US, European and Chinese manufacturing facilities. Calibrations are to original factory specifications and are traceable to NIST (National Institute of Standards and Technology).

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