



LED Load Simulator

Model 63110A

Key Features

- ✓ Unique LED mode for LED driver test
- ✓ Programmable LED operating resistance (Rd)
- ✓ Programmable internal resistance (Rr) for simulating LED ripple current
- ✓ Fast response for PWM dimming test
- ✓ Up to eight channels in one mainframe
- ✓ 16-bit precision voltage and current measurement with dual-range
- ✓ Full Protection: OV, OC, OP and OT protection



As a constant current source, the LED driver has an output voltage range with a constant output current. LED power drivers are usually tested in one of the following ways;

1. With LEDs
 2. Using resistors for loading
 3. Using Electronic Loads in Constant Resistance (CR) mode, or Constant Voltage (CV) mode
- However all these testing methods each have their own disadvantages.

As shown on the V-I curve in Figure 1, the LED has a forward voltage V_f and a operating resistance (Rd). When using a resistor as loading, the V-I curve of the resistor is not able to simulate the V-I curve of the LED as shown in blue on Figure 1. This may cause the LED driver to not start up due to the difference in V-I characteristic between the resistors and the LEDs. When using Electronic Loads, the CR and CV mode settings are set for when the LED is under stable operation and therefore, is unable to simulate turn on or PWM brightness control characteristics. This may cause the LED driver to function improperly or trigger it's protection circuits. These testing requirements can be achieved when using a LEDs as a load; however, issues regarding the LED aging as well as different LED power drivers may require different types of LEDs or a number of LEDs. This makes it inconvenient for mass production testing.

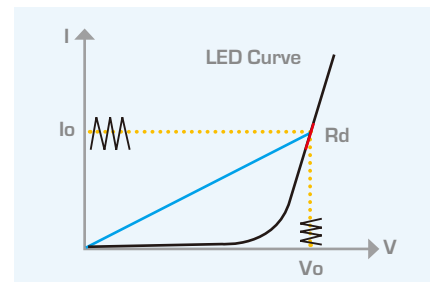
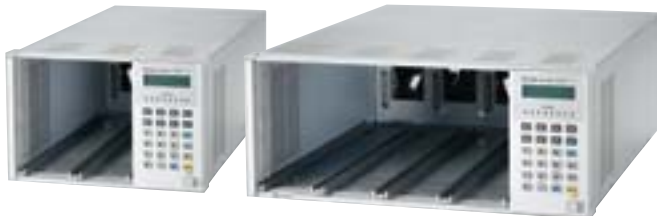


Figure 1 LED V-I Characteristics



Mainframe Model	6312A (2 slots)	6314A (4 slots)
Dimensions (HxWxD)	194x275x550 mm / 7.6x10.8x21.7 inch	194x439x550 mm / 7.6x17.3x21.7 inch
Weight	15 kg / 33.1 lbs	21.5 kg / 47.4 lbs

Chroma has created the industries first LED Load Simulator for simulating LED loading with our 63110A load model from our 6310A series Electronic Loads. By setting the LED driver's output voltage, and current, the Electronic Load can simulate the LED's loading characteristics. The LED's forward voltage and operating resistance can also be set to further adjust the loading current and ripple current to better simulate LED characteristics. The 63110A design also has increased bandwidth to allow for PWM dimming testing.

Figure 2 shows the current waveform from a LED load. Figure 3 shows the current waveform from 63110A's LED mode load function. From figures 2 and 3, the start up voltage and current of the LED driver is very similar. Figure 4 shows the dimming current waveform of the LED. Figure 5 shows the dimming current waveform when using 63110A as a load.

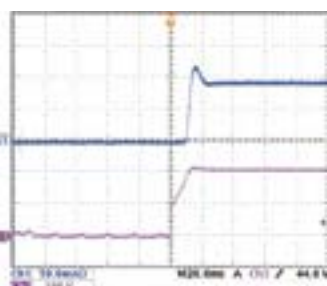


Figure 2 - LED loading

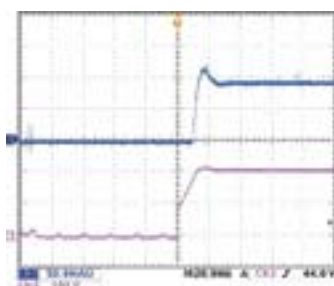


Figure 3 - 63110A LED mode loading

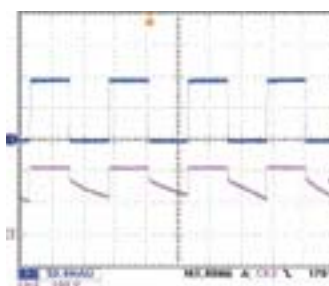


Figure 4 - LED dimming test

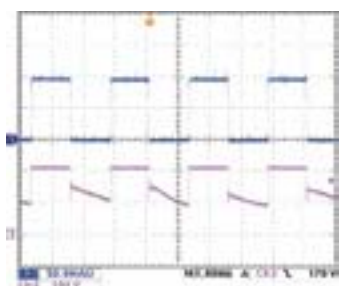


Figure 5 - 63110A dimming test

The internal resistance (R_r) can be adjusted to simulate the LED driver output ripple current. The traditional E-load can not simulate the ripple current of LED shown as Figure 6. Figure 7 shows the ripple current waveform from a LED load. Figure 8 shows the ripple current waveform from the 63110A LED mode load function.

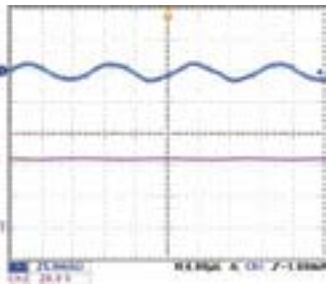


Figure 6 - Traditional E-load loading

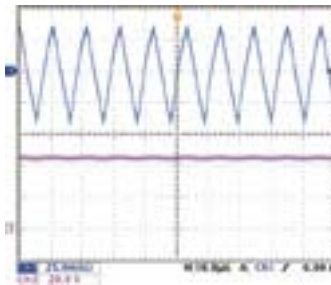


Figure 7 - LED loading

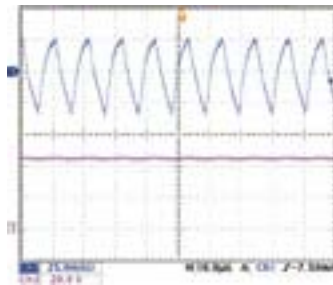


Figure 8 - 63110A loading

Figure 9 shows the current waveform from a resistive load. Figure 10 shows the current waveform from a CR mode of an Electronic Load loading. Figure 9 and 10 current waveform differs significantly from that of LED loading, especially the voltage and current overshoot, which may cause the LED driver to go into protection. Using resistive load or CR mode to test LED power drivers may cause the LED power drivers to fail to turn on as shown in Figure 11.

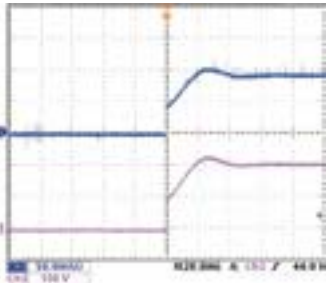


Figure 9 - Resistive loading

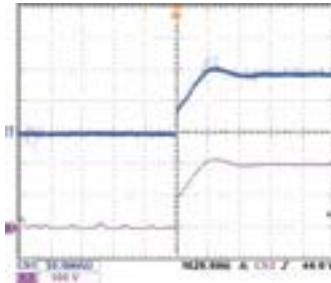


Figure 10 - CR mode loading

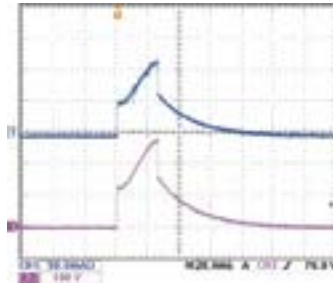


Figure 11 - Resistive loading (Fail)

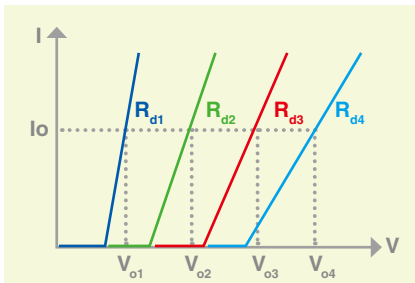


Figure 12 - Simulate different number of LEDs

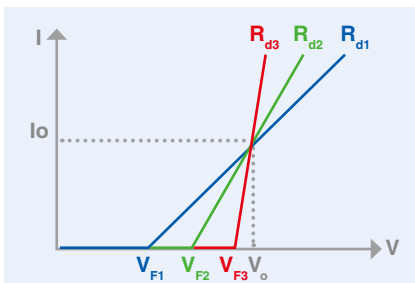


Figure 13 - Simulate different characteristic of LEDs

Model	63110A (100Wx2)	
Power	100W	
Current	0~0.6A	0~2A
Voltage	0~500V	
Min. Operating Voltage	6V@2A	
LED MODE		
Range	Operation Voltage: 0~100V/0~500V Rd Coefficient : 0.001~1	
Resolution	VL: 4mV VH: 20mV	
CONSTANT RESISTANCE MODE		
Range	CRL: 1Ω~1kΩ (100W/100V) CRH: 10Ω~10kΩ (100W/500V)	
Resolution	14 bits	
Accuracy	1kΩ : 0.001mho+0.2% 10kΩ : 0.0001mho+0.1%	
CONSTANT VOLTAGE MODE		
Range	0~500V	
Resolution	20mV	
Accuracy	0.05%±0.1%F.S.	
CONSTANT CURRENT MODE		
Range	0~0.6A	0~2A
Resolution	12μA	40μA
Accuracy	0.1%+0.2% F.S.	0.1%+0.2% F.S.
MEASUREMENT SECTION		
VOLTAGE READ BACK		
Range	0~100V	0~500V
Resolution	2mV	10mV
Accuracy	0.025%+0.025% F.S.	
CURRENT READ BACK		
Range	0~0.6A	0~2A
Resolution	12μA	40μA
Accuracy	0.05%+0.05% F.S.	

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