



# Endicott Research Group, Inc.

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# DMD43209F



## Specifications and Applications Information

02/24/10

Preliminary

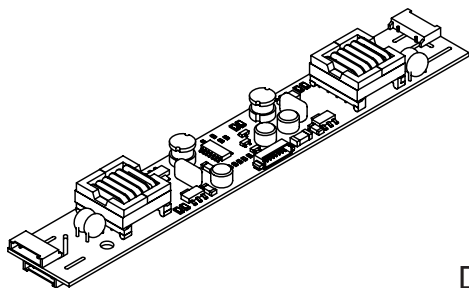
### Four Lamp DC to AC Inverter

The ERG DMD43209F (DMD *Series*) DC to AC inverter features onboard connectors and can be easily dimmed using the onboard PWM Dimming or an external PWM generator.

Powered by a regulated +12 Volt DC source, the DMD43209F is designed to power the backlight of the Sharp LQ190E1LW02 (Fujitsu FLC48SXC8V-02/10).

### Product Features

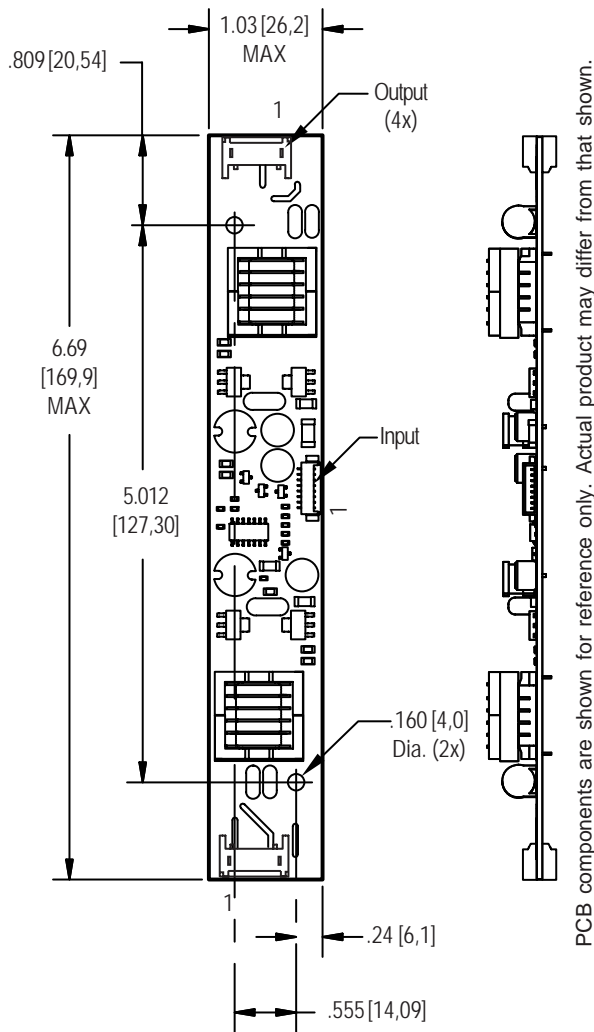
- ✓ Small Package Size, less than 13mm in height
- ✓ High Dimming Ratio
- ✓ High Efficiency
- ✓ Made in U.S.A.



DMD Package

PCB components are shown for reference only.  
 Actual product may differ from that shown.

### Package Configuration



PCB components are shown for reference only. Actual product may differ from that shown.

Mass: 45 grams

### Pin Descriptions

J2-1 ACout	J1-1 +Vin	J3-1 ACout
J2-2 ACreturn	J1-2 +Vin	J3-2 ACreturn
	J1-3 GND	
J8-1 ACout	J1-4 GND	J9-1 ACout
J8-2 ACreturn	J1-5 Enable	J9-2 ACreturn
	J1-6 Control	
	J1-7 GND	
	J1-8 GND	

### Connectors

Output (J2,J3,J8,J9)  
 JST SM02(8.0)B-BHS-1-TB

Input (J1)  
 Molex 53261-0871

**Absolute Maximum Ratings**

Rating	Symbol	Value	Units
Input Voltage Range	$V_{in}$	-0.3 to +13.2	Vdc
Storage Temperature	$T_{stg}$	-40 to +85	°C

**Operating Characteristics**

With the referenced display and lamp warm-up of 5 minutes.  
Unless otherwise noted  $V_{in} = 12.00$  Volts dc and  $T_a = 25^{\circ}\text{C}$ .

Characteristic	Symbol	Min	Typ	Max	Units
Input Voltage	$V_{in}$	+10.8	+12.0	+12.6	Vdc
Component Surface Temperature (Note 1)	$T_s$	-20	-	+80	°C
Input Current (Note 2)	$I_{in}$	-	1.71	2.00	Adc
Input Ripple Current	$I_{rip}$	-	20	-	$\text{mA}_{pk-pk}$
Operating Frequency	$F_o$	31	36	41	kHz
Minimum Output Voltage (Note 3)	$V_{out}(\text{min})$	1800	-	-	Vrms
Efficiency (Note 4)	$\eta$	-	96	-	%
Output Current (per lamp)	$I_{out}$	-	7.0	-	$\text{mA}_{rms}$
Output Voltage	$V_{out}$	-	750	-	Vrms
<b>Enable Pin</b>					
Turn-off Threshold	$V_{thoff}$	GND	-	0.5	Vdc
Turn-on Threshold	$V_{thon}$	2.5	-	$V_{in}$	Vdc
Impedance to $V_{in}$	$R_{Enable}$	-	10	-	kOhms

Specifications subject to change without notice.

(Note 1) Surface temperature must not exceed 80 degrees C; thermal management actions may be required.

(Note 2) Input current in excess of maximum may indicate a load/inverter mismatch condition, which can result in reduced reliability. Please contact ERG technical support.

(Note 3) Provided data is not tested but guaranteed by design.

(Note 4) 700 Vrms is used in the efficiency calculation.

**Application Notes:**

- 1) The minimum distance from high voltage areas of the inverter to any conductive material should be .12 inches per kilovolt of starting voltage.
- 2) Mounting hardware to be non-conductive.
- 3) Open framed inverters should not be used in applications at altitudes over 10,000 feet.
- 4) ACreturn should be left floating, not grounded.
- 5) Contact ERG for possible exceptions.



## Onboard PWM

Unless otherwise noted  $V_{in} = 12.00$  Volts DC,  $T_a = 25$  °C and unit has been running for 5 minutes.

Characteristic	Symbol	Min	Typ	Max	Units
Frequency	$f_{pwm}$	-	160	-	Hz
Control Input Bias Current	$I_{cbias}$	-	-	10	uA

## Pin Descriptions

- Vin** Input voltage to the inverter. The two pins should be connected for optimum reliability and efficiency.
- GND** Inverter ground. The four pins should be connected for optimum reliability and efficiency.
- Control** Analog voltage input to the onboard pulse width modulator. Decreasing this voltage increases the ON time of the onboard PWM resulting in increased brightness. The inverter is full ON when this voltage is near inverter ground.
- Enable** Inverter Enable. Pull this pin low to disable inverter operation. This pin must be high to enable the inverter. The onboard PWM is always utilized.

## Application information

The DMD series of inverters is designed to power up to four cold cathode fluorescent lamps. An external analog control interfaces with an onboard pulse width modulator to provide dimming control. The DMD inverter can reliably dim to less than 5% duty cycle.

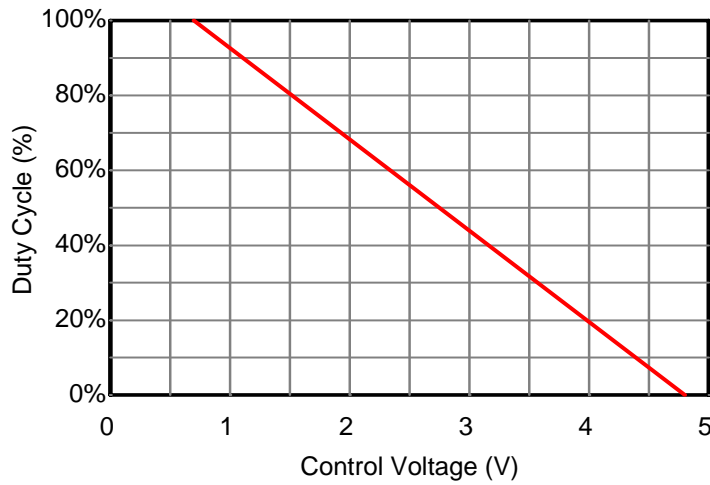
External shutdown of the inverter is accomplished using the Enable pin. Pulling this pin low (below  $V_{thoff}$ ) disables the inverter. Enabling the inverter is accomplished by pulling this pin high (above  $V_{thon}$ ).

If analog voltage dimming is required, the analog voltage is applied to the Control pin. Figure 1 shows how to connect the inverter for onboard PWM operation. Graph 1 shows the relationship of PWM duty cycle to input control voltage.

If an external PWM is used, simply connect the Enable pin to the PWM source and connect the Control pin to inverter Ground. If the onboard PWM is used, connect the analog voltage to the Control pin.



### Control Voltage vs. Duty Cycle



Graph 1

### Typical Application

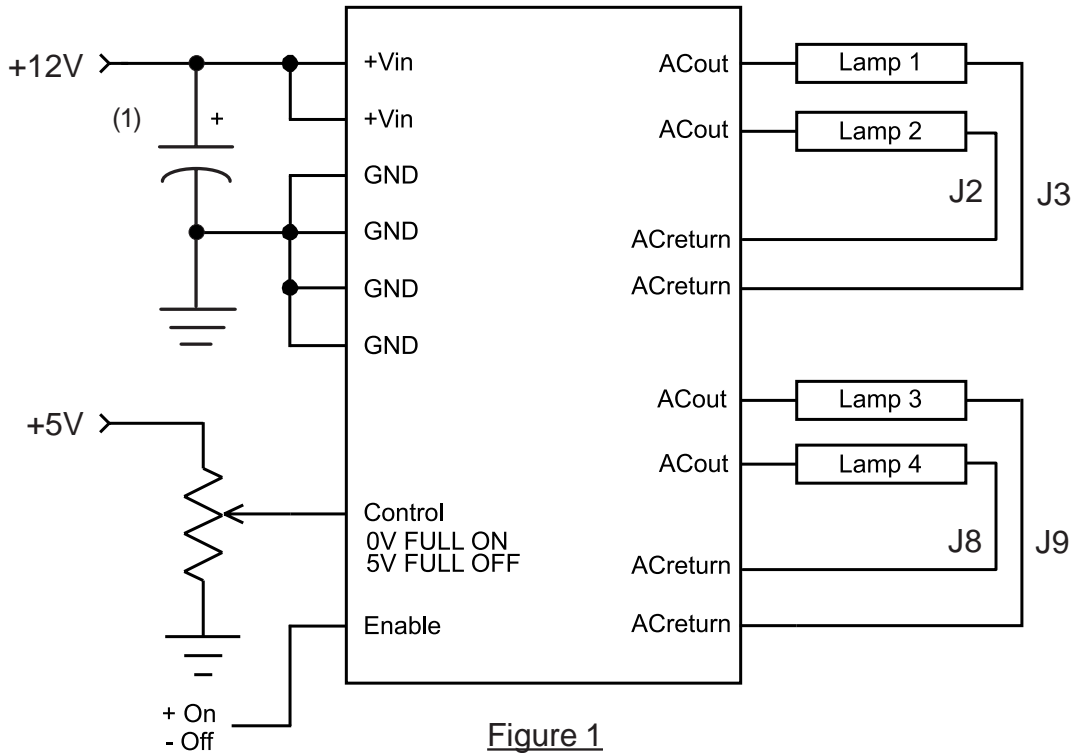


Figure 1

(1) Low ESR type input by-pass capacitor (22 uF - 220 uF) may be required to reduce reflected ripple, and to improve power supply transient response.



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