



# Endicott Research Group, Inc.

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## Specifications and Applications Information

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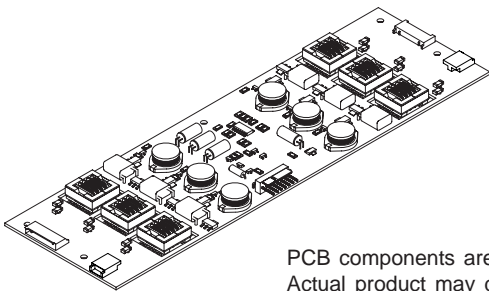
Preliminary

The ERG DmF63234 (DmF Series) DC to AC inverter features onboard connectors and can be easily dimmed using an external pulse-width modulated control signal or using the onboard PWM with an external analog voltage. This unit is less than 9mm in height and the six mounting holes makes installation very straight forward.

Powered by a regulated 12 Volt DC source, the DmF63234 is designed to power the LG LM201U04-A3 6 tube backlight, with onboard PWM.

### Product Features

- ✓ Small Package Size, less than 9mm in height.
- ✓ High Dimming Ratio (Greater than 1000:1)
- ✓ High Efficiency
- ✓ Made in U.S.A.



DmF Package

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

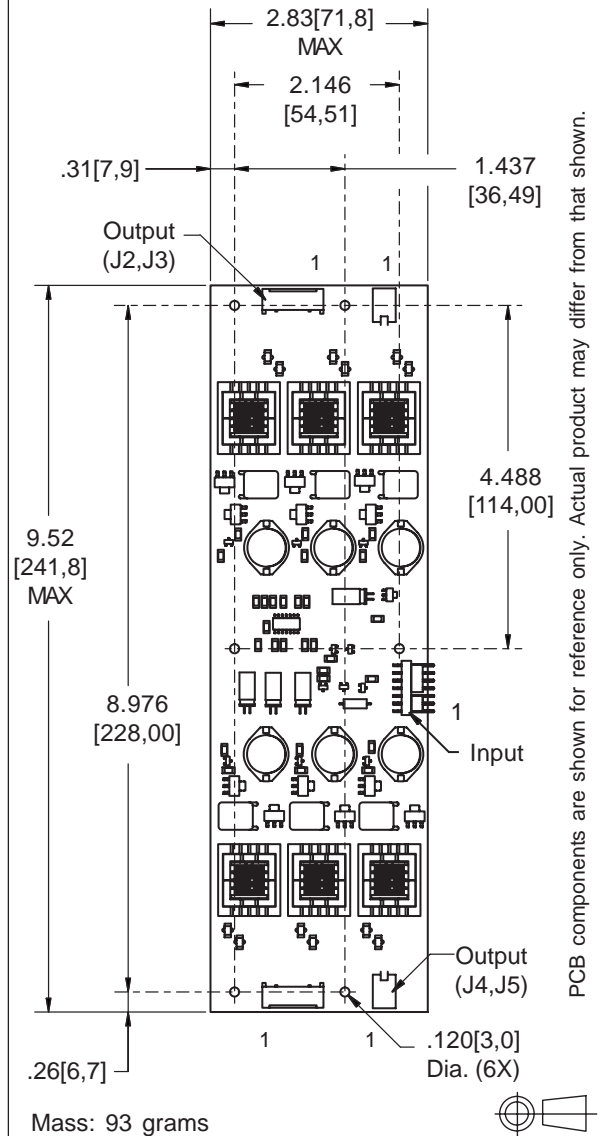
### Connectors

Input Molex 22-05-3071	Output (J2,J3) JST SM04(9-E2)B-BHS
	Output (J4,J5) JST SM02B-BHSS-1-TB

# DmF63234

## Six Tube DC to AC Inverter

### Package Configuration



### Pin Descriptions

J1-1 Vin	J2,J3-1 ACout
J1-2 Vin	J2,J3-2 ACout
J1-3 GND	J2,J3-3 ACreturn
J1-4 GND	J2,J3-4 ACreturn
J1-5 Enable/PWM	
J1-6 Control	
J1-7 N/C	
	J4,J5-1 ACout
	J4,J5-2 ACreturn



**Absolute Maximum Ratings** (Note 1)

Rating	Symbol	Value	Units
Input Voltage	$V_{in}$	-0.3 to +13.2	$V_{DC}$
Disable	$V_{Disable}$	-0.3 to +0.3	$V_{DC}$
Operating Temperature	$T_a$	-0 to +70	°C
Storage Temperature	$T_s$	-40 to +85	°C

**Recommended Operating Conditions**

Rating	Symbol	Value	Units
Input Voltage	$V_{in}$	+10.8 to 12.6	Vdc
Operating Temperature (Note 2)	$T_a$	0 to +70	°C

**Electrical Characteristics**

Unless otherwise noted  $V_{in} = 12.00$  Volts dc and  $T_a = 25^\circ\text{C}$  and unit has been running for 20 minutes.

Characteristic	Symbol	Min	Typ	Max	Units
Input Current	$I_{in}$	-	2.7	3.1	$A_{DC}$
Input Ripple Current	$I_{rip}$	-	60	-	$mA_{pk-pk}$
Operating Frequency	$F_o$	30	35	40	KHz
Efficiency	<b>h</b>	-	94	-	%
Output Voltage (no load)	$V_{start}$	1800	-	-	V
Output Voltage (with lamp)	$V_{out}$	-	680	-	V
Output Current (per lamp)	$I_{out}$	-	7.5	-	mArms
<b>Enable (pin J1-5)</b>					
Turn-off Threshold	$V_{thoff}$	GND	-	0.5	V
Turn-On Threshold	$V_{thon}$	2.5	-	$V_{in}$	V
Impedance to $V_{in}$	$R_{Disable}$	45	47	50	V

**(Note 1)** Reliable and predictable operation of the device is not guaranteed with applied stresses at or beyond those listed in "Absolute Maximum Ratings". Operation at these limits may reduce device reliability and is therefore not recommended. Please refer to "Recommended Operating Conditions" for reliable operation of the device.

**(Note 2)** Reliable operation above 70°C is possible if airflow is provided.

**(Note 3)** Data obtained using a simulated load.

**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 should be non-conductive.
- 3) Open framed inverters should not be used in applications at altitudes over 10,000 feet.
- 4) Contact ERG for possible exceptions.
- 5) Efficiency calculation made with lamp run voltage of 600 Vrms.



### Onboard PWM

Unless otherwise noted  $V_{in} = 12.00$  Volts DC ,  $T_a = 25$  °C and unit has been running for 20 minutes.

Characteristic	Symbol	Min	Typ	Max	Units
Frequency	$f_{pwm}$	-	160	-	Hz
Control Full On	$V_{ctrl}$	-	<.5	-	V
Control Full Off	$V_{ctrlh}$	-	>4.5	-	V
Control Input Bias Current	$I_{cbias}$	-	-	10	uA

### Pin Descriptions

- Vin** Input voltage to the inverter. Both pins should be connected for optimum reliability and efficiency .
- GND** Inverter ground. Both pins should be connected for optimum reliability and efficiency.
- Control** Analog voltage input to the onboard pulse width modulator. Increasing this voltage increases the off time of the onboard PWM resulting in decreased brightness.
- Enable/Disable** Inverter Enable/Disable. If this pin is driven high, the inverter is enabled. Pull this pin low to disable inverter operation.

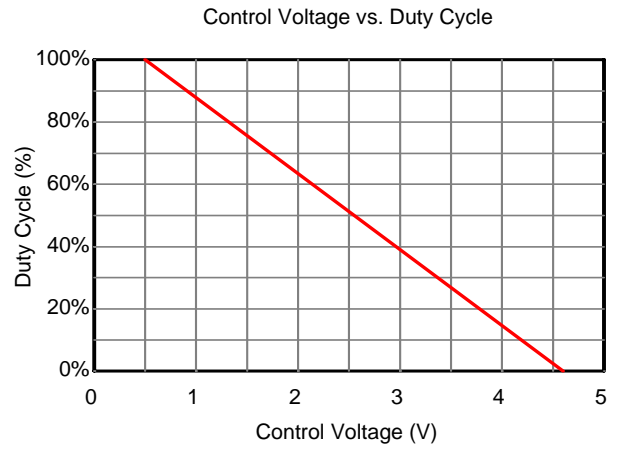
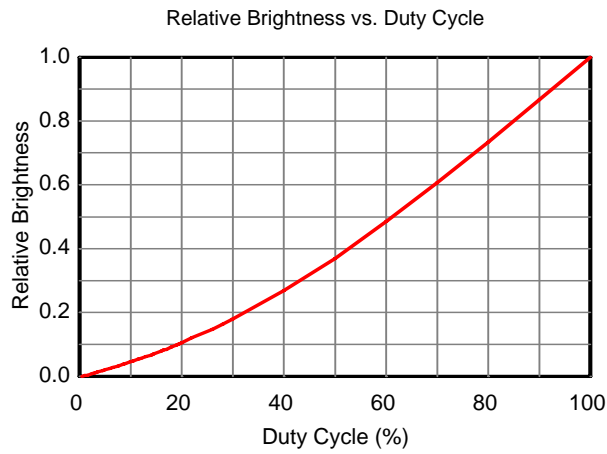
### Application information

The DmF series of inverters is designed to power up to six cold cathode fluorescent lamps with combined power of up to sixty watts. An external enable/disable control and an onboard analog controlled pulse width modulator provide flexibility in allowing either PWM or analog methods for dimming. The DmF inverter can reliably dim to less than 0.5% duty cycle, which results in an electrical dimming ratio of greater than 200:1. Depending upon the attached backlight assembly, optical dimming ratios of greater than 1000:1 can be accomplished. Graph 1 shows the relationship of relative brightness to duty cycle for a typical backlight assembly.

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

If analog voltage dimming is required, the onboard PWM can be enabled. The analog voltage is applied to the Control pin. Figure 1 shows how to connect the inverter for onboard PWM operation. Graph 2 shows the relationship of PWM duty cycle to input control voltage.

If more than one inverter is used in a backlight assembly, the PWM signal for each inverter should be synchronized to prevent flickering. Connect the Enable/Disable pin of each inverter to the external PWM source. Connect the control pin to GND.



Graph 1

Graph 2

Typical Application

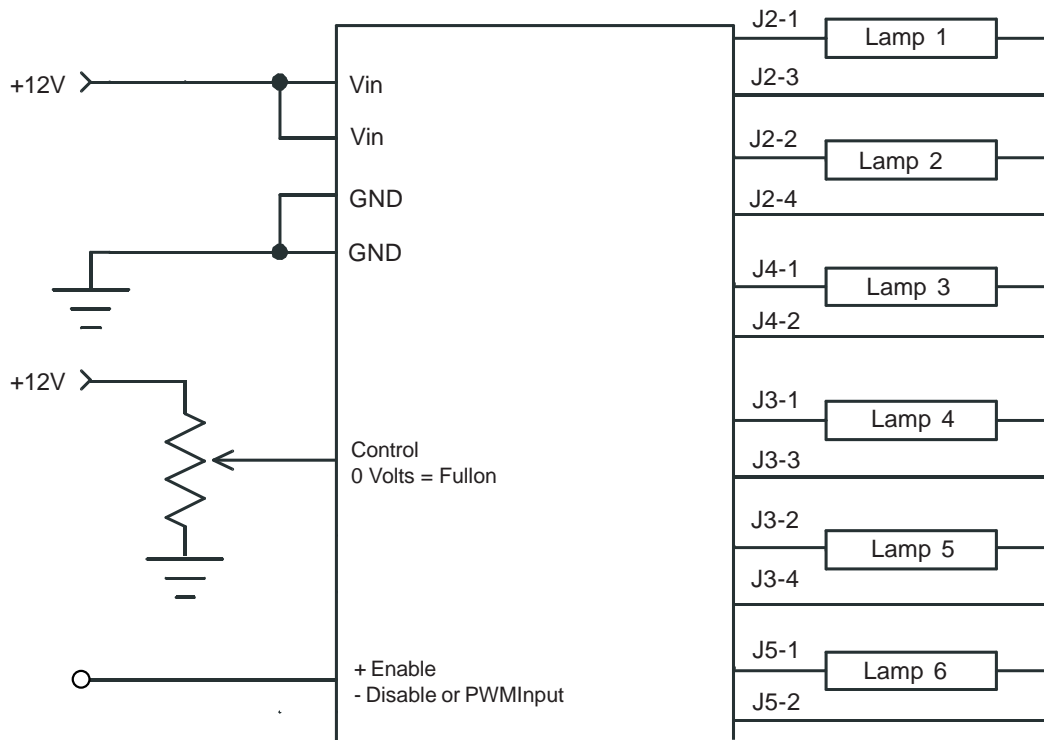


Figure 1



Endicott Research Group, Inc. (ERG) reserves the right to make changes in circuit design and/or specifications at any time without notice. Accordingly, the reader is cautioned to verify that data sheets are current before placing orders. Information furnished by ERG is believed to be accurate and reliable. However, no responsibility is assumed by ERG for its use.