Endicott Research Group, Inc.
2601 Wayne St., Endicott, NY 13760
607-754-9187 Fax 607-754-9255
http://www.ergpower.com

X450BF

RoHS Compliant

Specifications and Applications Information

12/22/15

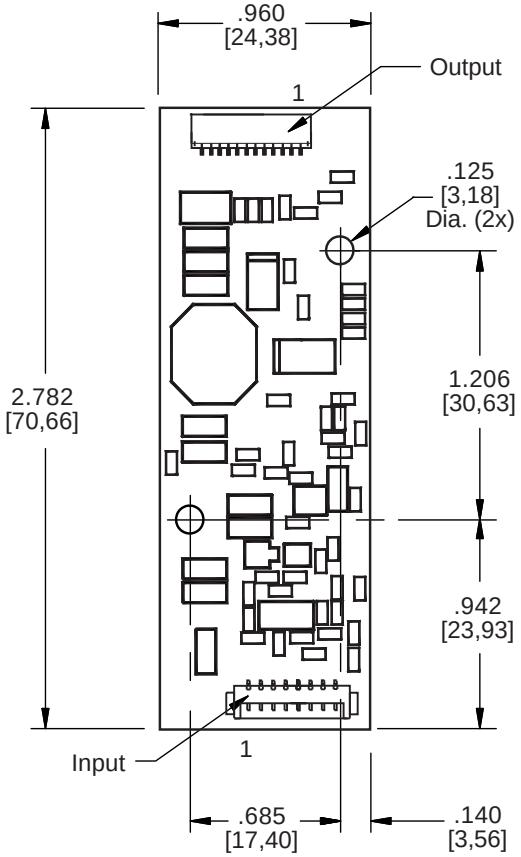
Smart Force LED Driver

The ERG **Smart Force Series** of LED Drivers are specifically designed for applications which require high efficiency, small footprint and LCD brightness stability from a 12 Volt dc source. The X450BF is designed to provide LED backlight power for NLT displays.

Designed, manufactured and supported within the USA, the X450BF features:

- ✓ Less than 5 mm in height
- ✓ Constant LED current
- ✓ Open and short circuit protection
- ✓ High efficiency
- ✓ Separate enable and dimming function
- ✓ Analog dimming function
- ✓ Soft start
- ✓ One year warranty

Package Configuration



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

Mass: 8 grams typ.

Connectors	
Input Connector Molex 53261-0871	**Output Connector *** JST SM12B-SRSS-TB
J1-1 Vin(+) J1-2 Vin(+) J1-3 GND J1-4 GND J1-5 Enable J1-6 N/C J1-7 Control J1-8 Fault Indicator (output)	J2-1 Anode 1 J2-7 Anode 4 J2-2 Cathode 1 J2-8 Cathode 4 J2-3 Anode 2 J2-9 (do not use) J2-4 Cathode 2 J2-10 (do not use) J2-5 Anode 3 J2-11 (do not use) J2-6 Cathode 3 J2-12 (do not use) * Requires harness: ERG part number HX150F recommended

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Absolute Maximum Ratings

Rating	Symbol	Value	Units
Input Voltage Range	V_{in}	-0.3 to +15	Vdc
Storage Temperature	T_{stg}	-40 to +85	°C
Enable Input Voltage	V_{Enable}	0 to +5.5	Vdc
Control Input Voltage	V_{PWM}	0 to +5.5	Vdc
Fault Indicator	V_{FL}	0 to +4.0	Vdc

Operating Characteristics

Unless otherwise noted Vin = 12.00 Volts dc and Ta = 25°C.

Characteristic	Symbol	Min	Typ	Max	Units
Input Voltage	V_{in}	+10.8	+12.0	+13.2	Vdc
Component Surface Temperature (Note 1)	T_s	-40	-	+80	°C
Input Current	I_{in}	-	0.51	-	Adc
LED String Voltage (Note 2)	V_{LED}	15	-	31	Vdc
Efficiency (Note 3)	η	-	85	-	%
Output Current (per string)	I_{out}	47.9	50.4	57.9	mAdc
Enable Pin (Note 4)					
Turn-on Threshold	V_{thon}	-	-	2.0	Vdc
Turn-off Threshold	V_{thoff}	0.8	-	-	Vdc
Enable Input Impedance (Note 5)	R_{Enable}	-	100	-	kOhms
Control Pin (Notes 6,7)					
Full-on Threshold	V_{thon}	-	1.0	-	Vdc
Minimum Pulse Width Threshold	V_{PWmin}	-	5.0	-	Vdc
Control Input Bias Current	I_{Cbias}	-	-	10	uA
Frequency	F_{PWM}	-	245	-	Hz

(Operating Characteristics and notes are continued on next page.)

Operating Characteristics (continued)

Characteristic	Symbol	Min	Typ	Max	Units
Fault Indicator					
No Fault Level (Note 8)	V_{NFL}	-	3.7	-	Vdc
Fault Level (Note 8)	V_{FL}	-	0.3	-	Vdc

Specifications subject to change without notice.

Note 1 Surface temperature must not exceed 80°C, except U1, which cannot exceed 105°C.
Note 2 If maximum string voltage is exceeded, driver will enter overvoltage self protection mode and shut down. Reducing the LED string voltage then toggling the Enable and/or power cycling the driver, will restart the driver.
Note 3 Efficiency is calculated using a 25.9V LED string.
Note 4 If the Enable pin is floated, the driver defaults to the OFF mode.
Note 5 Enable pin input impedance is 100kΩ to ground.
Note 6 If the Control pin is floated while the Enable pin is active high, the driver defaults to the full ON mode.
Note 7 Control pin input impedance is 112kΩ to ground.
Note 8 Loading with an impedance less than 100kΩ pull-up to Vcc or to GND may cause default levels to change.

Application Information

The ERG X450BF has been designed to be configured in multiple ways:

NO DIMMING

- OPERATION: The SFDHD can be configured to operate without dimming.
- Pins 1 and 2 of connector J1 must be connected to +Vin, between 10.8 and 13.2 Vdc. Pins 3 and 4 of connector J1 must be connected to GND. The Enable pin (J1-5) must be pulled up above Vthon.
- DISABLING DRIVER: Pulling the Enable pin (J1-5) below the minimum turn-off threshold of 0.8V or allowing the Enable pin to float, will disable the driver.

ONBOARD PWM DIMMING

- OPERATION: Onboard PWM configuration as shown in Figure 1 allows the user to control display brightness by controlling the onboard PWM generator. The user is responsible to provide an analog control signal.
- DIMMING: Dimming is accomplished by applying an analog voltage to the Control Pin (J1-7). Display brightness is modulated as shown in Graph 1.
- ENABLE/DISABLE: The driver may be enabled by applying a DC voltage to the Enable Pin(J1-5). Enable Pin on and off levels are specified in the Operating Characteristics section of the data sheet. The driver can be disabled by applying a minimum turn-off threshold of 0.8V or by allowing the Enable Pin to float.

FAULT INDICATOR

- The Fault Indicator pin (J1-8) may be used as a feedback signal that will fall below the fault level of 0.3V in the case of an open string, a shorted string, an output overvoltage condition, or an over temperature condition. If used, this pin should be loaded with a high impedance stage as specified in the Operating Characteristics. Do not drive this pin with a voltage, as it will damage the driver.

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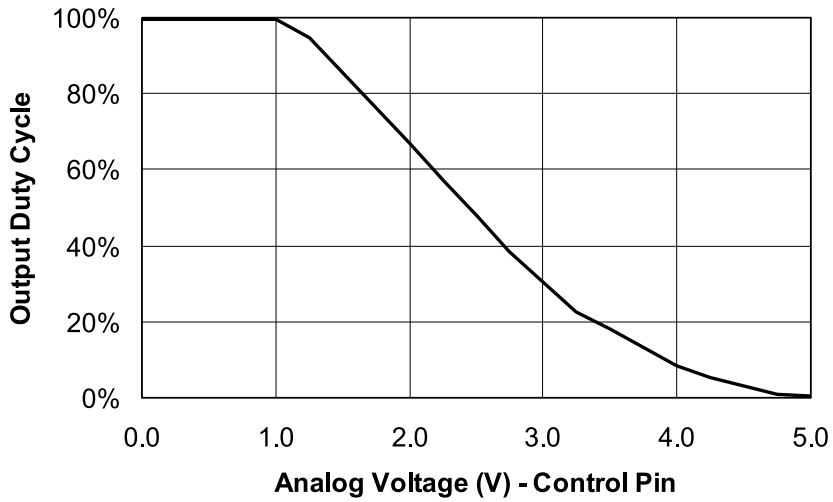
ONBOARD PWM DIMMING



Graph 1

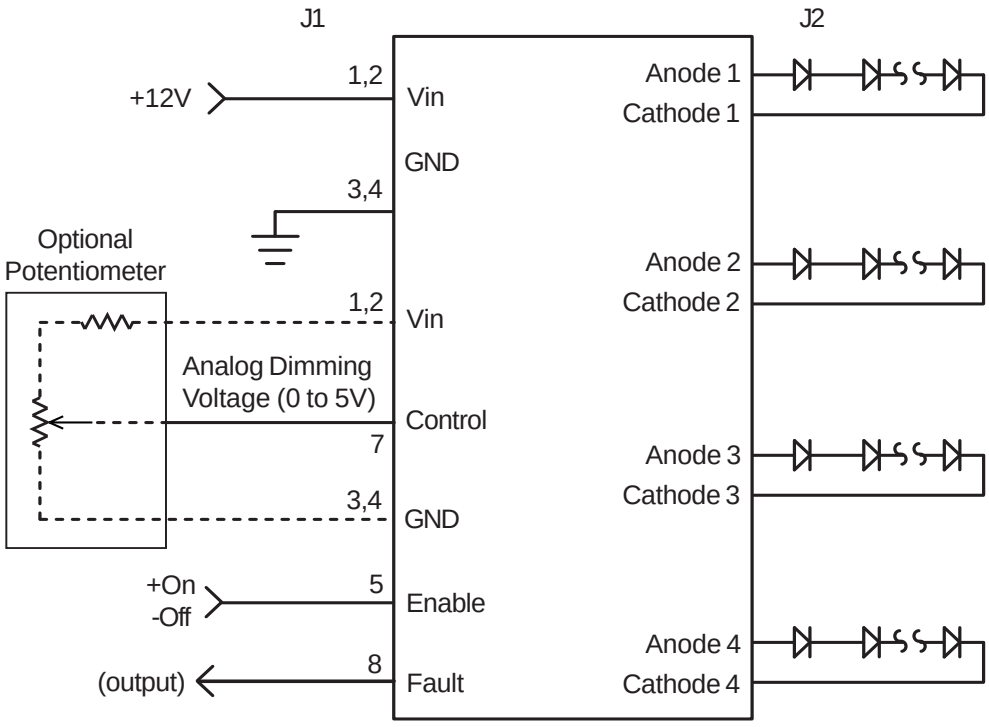


Figure 1