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SFDHDB4408F

RoHS Compliant

Specifications and Applications Information

12/18/15

Smart Force LED Driver

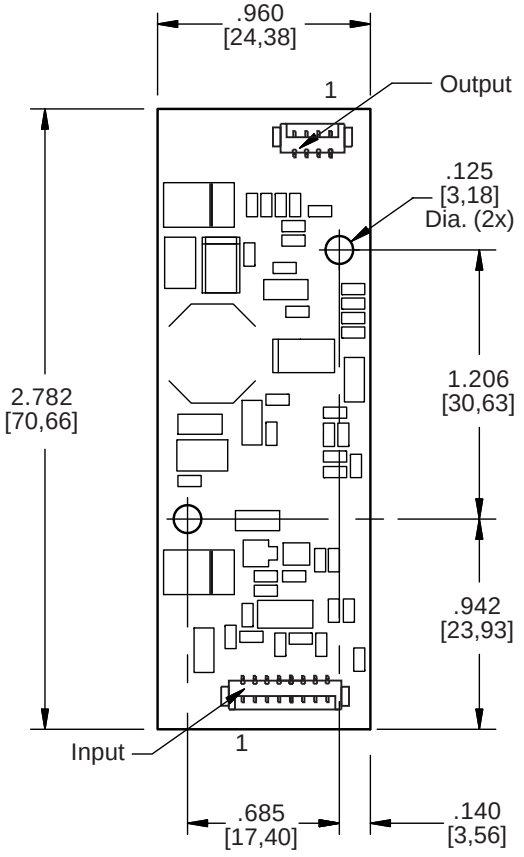
The ERG **Smart Force Series** of LED Drivers are specifically designed for applications which require high efficiency, small footprint and LCD brightness stability from a 12 Volt dc source. The SFDHDB4408F is designed to provide LED backlight power for the Mitsubishi AA104XG12 display.

Designed, manufactured and supported within the USA, the SFDHD 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

Connectors	
Input Connector	**Output Connector ***
Molex 53261-0871	Molex 53261-0471
J1-1 Vin(+) J1-2 Vin(+) J1-3 GND J1-4 GND J1-5 Enable J1-6 Analog Dim J1-7 Control J1-8 Fault Indicator (output)	J2-1 Cathode 1 J2-2 Anode 1 J2-3 Cathode 2 J2-4 Anode 2 * Requires harness: ERG part number H12104152 recommended

Package Configuration



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

Mass: 8 grams typ.

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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
Analog Input Voltage	V_{An}	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}	-	0.67	-	Adc
LED String Voltage (Note 2)	V_{LED}	15	-	35	Vdc
Efficiency (Note 3)	η	-	87	-	%
Output Current (per string)	I_{out}	133.4	140.4	147.4	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.)

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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
Analog Pin					
Analog Voltage (Note 9)	V_{An}	1.0	1.0	5	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 25V 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 Vdd = ~ 3.5V.
Note 9 Applying a voltage less than 1V on the Analog pin will cause the output to go above the design point. This will reduce the driver performance and require additional thermal considerations.

Application Information

The ERG SFDHDB4408F 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.

Analog DIMMING

- OPERATION: The SFDHD can be configured to analog dim.
- DIMMING: Dimming is accomplished by applying an analog voltage to the Analog Dim Pin (J1-6) as shown in Figure 2. The display brightness will decrease as V_{An} is increased from 1V to 5V.
- 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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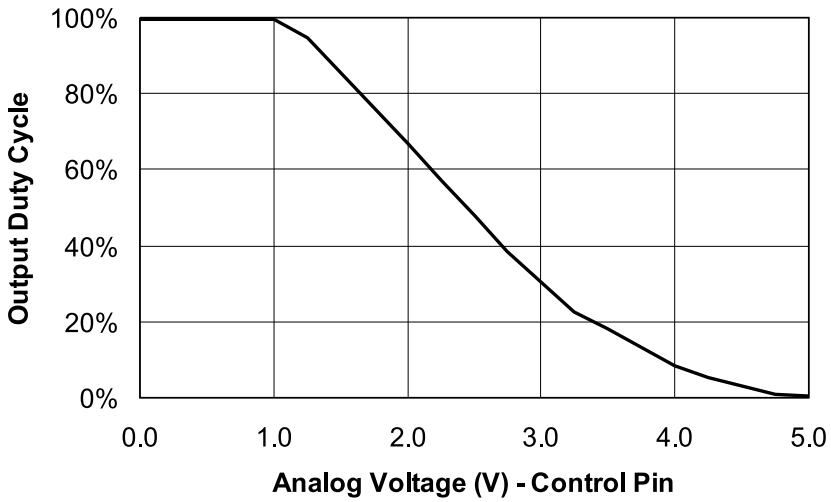
ONBOARD PWM DIMMING



Graph 1

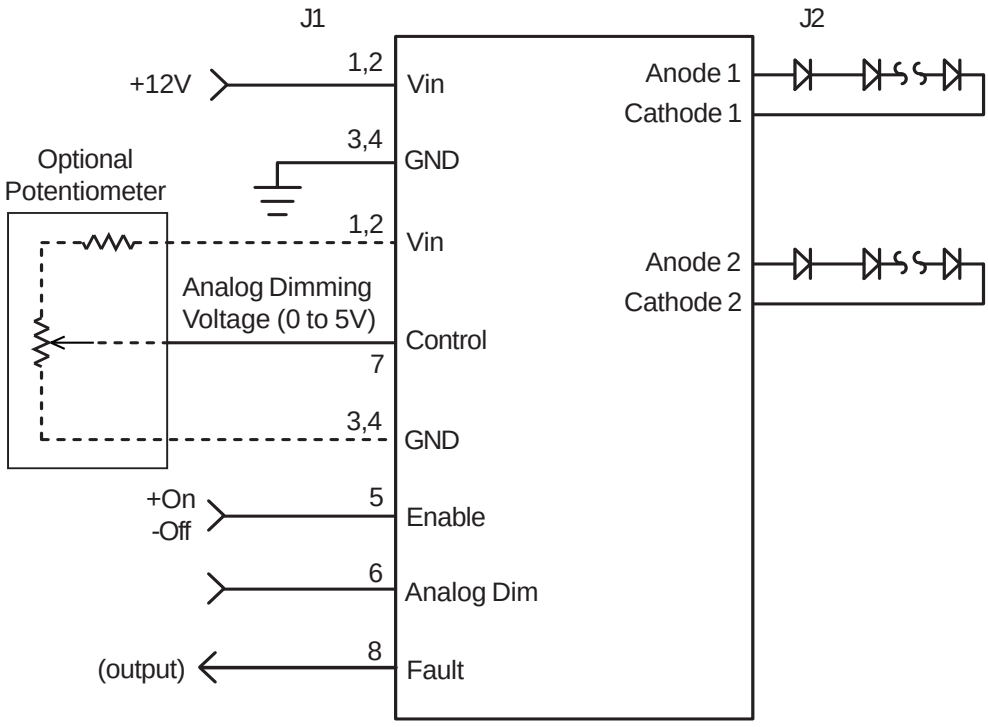


Figure 1

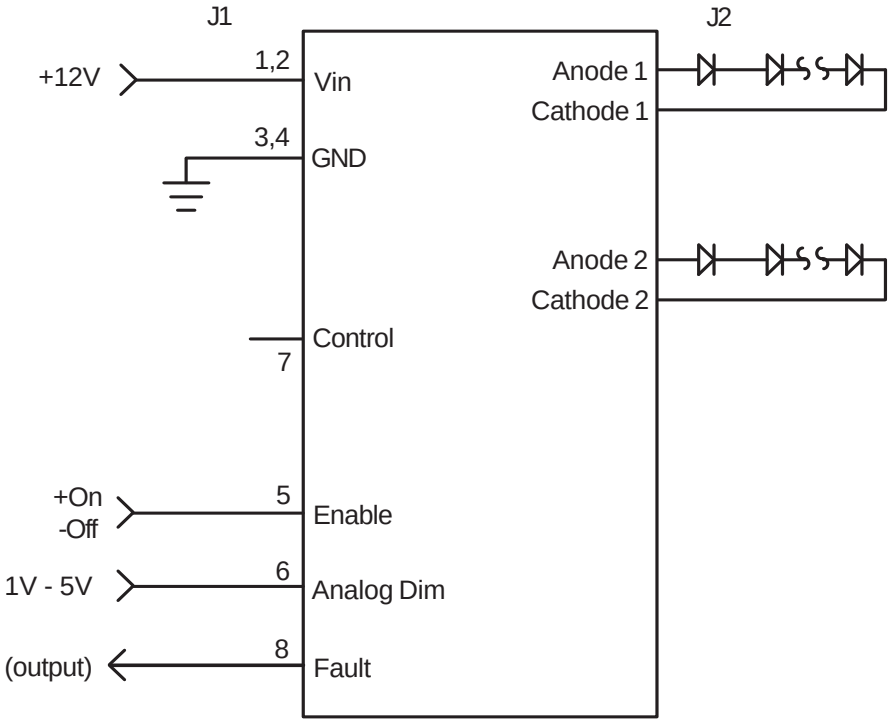


Figure 2

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.