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Specifications and Applications Information

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Preliminary

The ERG *Smart Force Series* of LED Drivers are specifically designed for applications which require wide dimming and LCD brightness stability over a wide input voltage range. The SFDLB3902F is designed to provide backlight power for the Sharp LQ070Y3LG4A display.

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

- ✓ Less than 8 mm in height
- ✓ Wide input voltage range
- ✓ Constant LED current
- ✓ External or internal dimming
- ✓ High dimming ratio
- ✓ Separate enable & dimming function
- ✓ Soft start
- ✓ One year warranty

Connectors

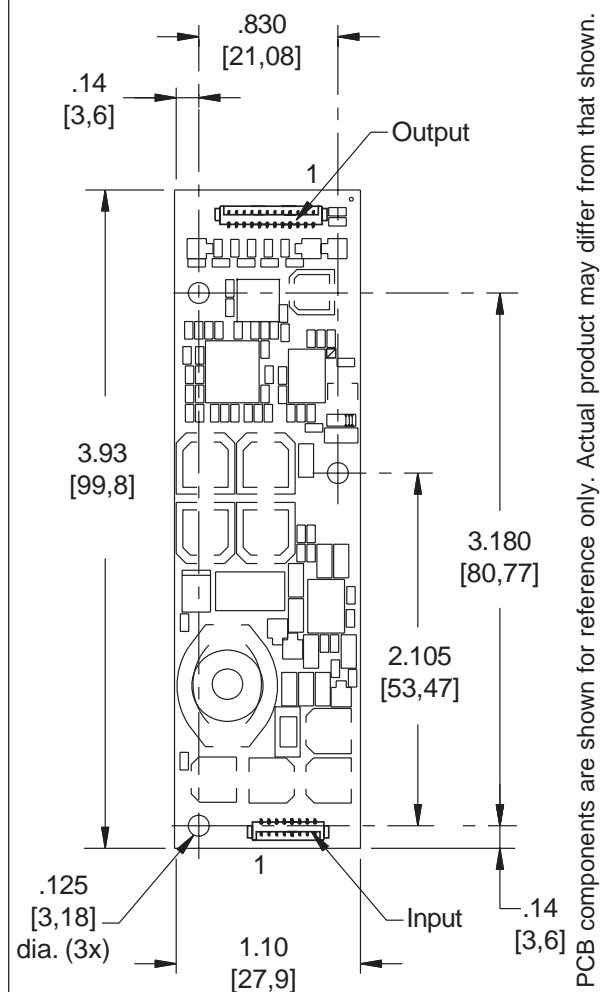
| Input Connector | Output Connector * |
|--|---|
| Molex 53261-0871 | Molex 53261-1271 |
| J1-1 Vin(+) J1-2 Vin(+) J1-3 GND J1-4 GND J1-5 Enable J1-6 Vin(+) J1-7 Control J1-8 GND | J2-1 Cathode 1 J2-2 Anode 1 J2-3 (do not use) J2-4 (do not use) J2-5 Cathode 2 J2-6 Anode 2 J2-7 (do not use) J2-8 (do not use) J2-9 Cathode 3 J2-10 Anode 3 J2-11 (do not use) J2-12 (do not use) |
| | * Requires harness ERG part number H11206XXX recommended |

SFDLB3902F



Smart Force LED Driver

Package Configuration



Mass: 17 grams



**Absolute Maximum Ratings**

| Rating | Symbol | Value | Units |
|----------------------|---------------|---------------|-------|
| Input Voltage Range | V_{in} | -0.3 to +20.0 | Vdc |
| Storage Temperature | T_{stg} | -40 to +85 | °C |
| Control Voltage | $V_{Control}$ | 0 to 5.0 | Vdc |
| Enable Input Voltage | V_{Enable} | 0 to V_{in} | Vdc |

Operating Characteristics

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} | +10.0 | +12.0 | +20.0 | Vdc |
| Component Surface Temperature (Note 1) | T_s | -20 | - | +80 | °C |
| Input Current | I_{in} | 0.17 | 0.20 | 0.23 | Adc |
| LED String Voltage | V_{LED} | 23.0 | 25.6 | 29.3 | Vdc |
| Efficiency | η | - | 64 | - | % |
| Output Current (per string) | I_{out} | 19 | 20 | 21 | mAdc |
| Enable Pin (Note 2) | | | | | |
| Turn-on Threshold | V_{thon} | - | - | 1.55 | Vdc |
| Turn-off Threshold | V_{thoff} | 1.25 | - | - | Vdc |
| Enable Input Impedance | R_{Enable} | - | 5.0 | - | kOhms |
| Control Pin | | | | | |
| Full-on Threshold | V_{fon} | - | 0.9 | - | Vdc |
| Full-off Threshold | V_{foff} | - | 4.2 | - | Vdc |

Specifications subject to change without notice.

- Note 1 Surface temperature must not exceed 80°C , except for U5 which must be kept below 100°C ; thermal management actions may be required.
- Note 2 The input voltage to the driver must be within its operating characteristic before the driver is enabled, otherwise the driver may not start or may shut down unexpectedly.



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 |

Application Information

The ERG SFDLB3902F has been designed to be configured in multiple ways:

NO DIMMING

- OPERATION: The SFD driver can be configured to operate without dimming by floating the Control Pin (J1-7), and the Enable Pin (J1-5).
- Pins 1 and 2 of connector J1 must be connected to +Vin, between 10 and 20 Vdc. Pins 3 and 4 of connector J1 must be connected to GND.

ONBOARD PWM DIMMING

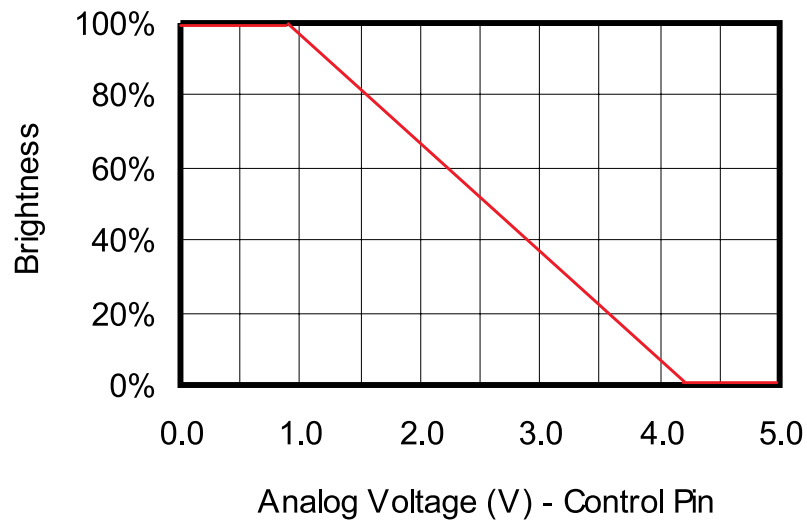
- OPERATION: Onboard PWM configuration as shown in Figure 1 allows the user to control display brightness by controlling the onboard PWM generator. The user is responsible to provide an analog control signal. A dimming ratio up to 1000:1 is possible with this configuration.
- DIMMING: Dimming is accomplished by applying an analog voltage to the Control Pin (J1-7). Display brightness is modulated by controlling the Control Pin voltage as shown in Graph 1.
- ENABLE/DISABLE: The driver may be enabled or disabled (turned on and off) 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 also be enabled by floating the Enable Pin.
- Pins 1 and 2 of connector J1 must be connected to +Vin, between 10 and 20 Vdc. Pins 3 and 4 of connector J1 must be connected to GND.

EXTERNAL PWM DIMMING

- OPERATION: External PWM configuration as shown in Figure 2 allows the user to control display brightness with an externally generated PWM signal. The user is responsible to provide the PWM signal. A dimming ratio up to 5000:1 is possible with this configuration.
- DIMMING: Dimming is accomplished by applying a PWM signal to the Enable Pin (J1-5). PWM on and off levels are specified in the Operating Characteristics section of the data sheet. Display brightness is modulated by controlling the PWM duty cycle as shown in Graph 2.
- ENABLE/DISABLE: The driver may be enabled or disabled (turned on and off) by applying a DC voltage to the Control Pin (J1-7). Control Pin on and off levels are specified in the Operating Characteristics section of the data sheet. The driver can also be enabled by floating the Control pin.
- Pins 1 and 2 of connector J1 must be connected to +Vin, between 10 and 20 Vdc. Pins 3 and 4 of connector J1 must be connected to GND.



ONBOARD PWM DIMMING



Graph 1

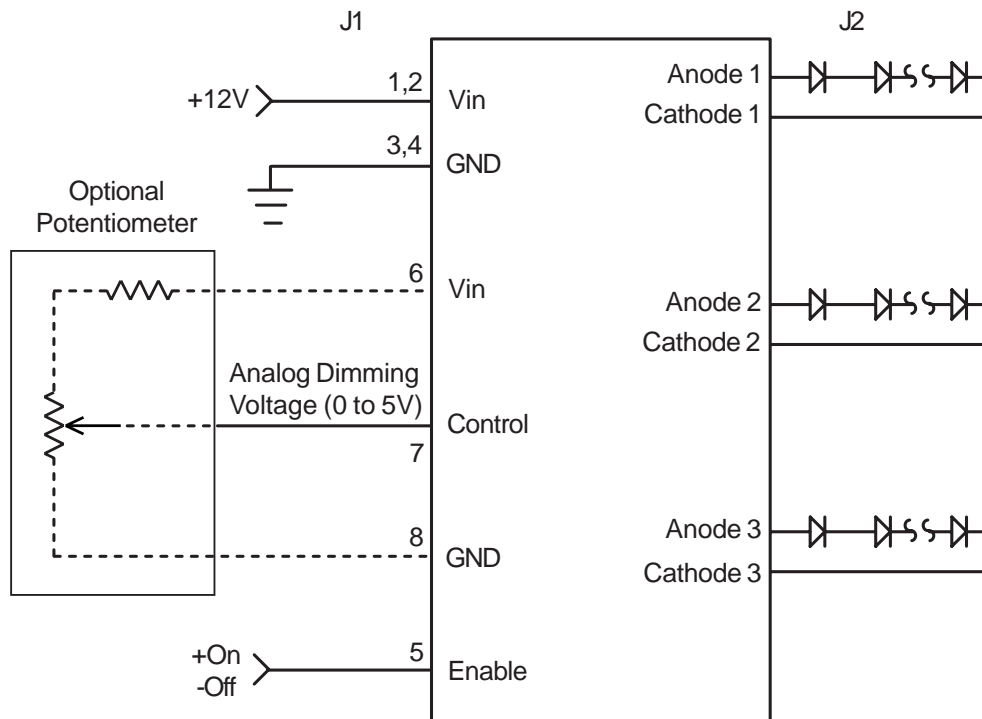
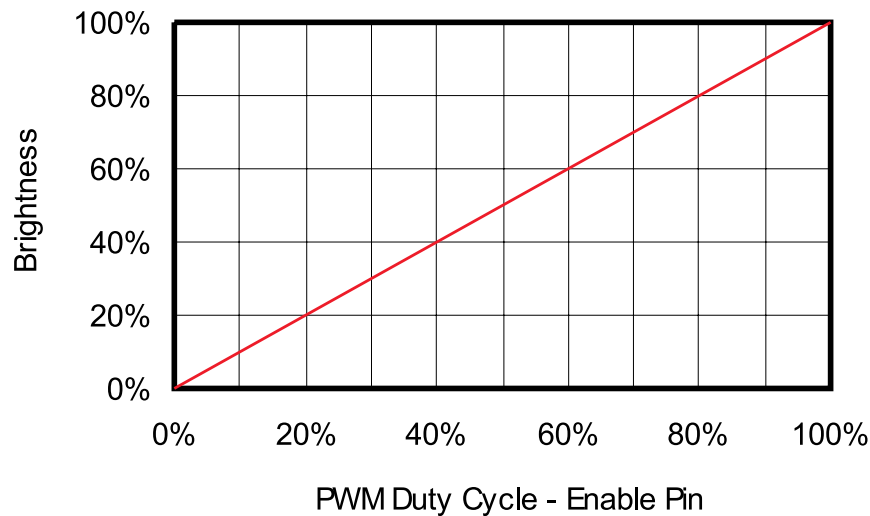


Figure 1



EXTERNAL PWM DIMMING



Graph 2

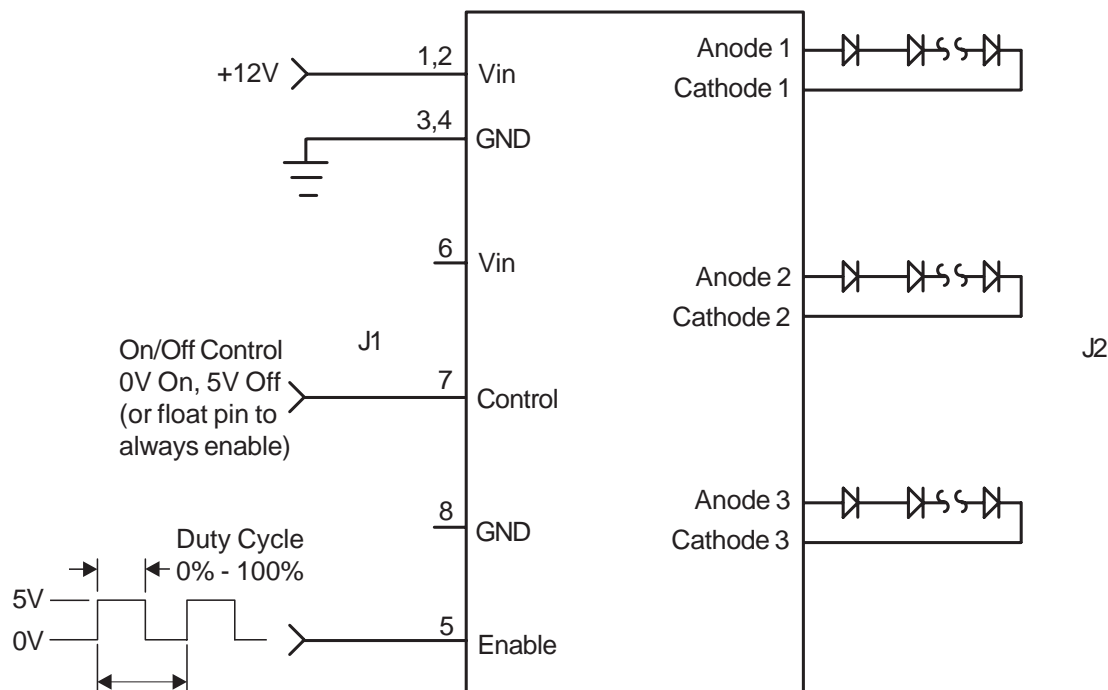


Figure 2



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.