

# LINEARlight FLEX® Protect

## LFP1200/LFP2000/LFP3000



Reach out for the next level of illumination: With IP67 protection, the New LINEARlight FLEX Protect family of products gives designers and customers the ability to add high levels of light to almost any location that is desired, indoors or out. With a broad choice of light levels and high CRI color temperatures, you have a toolbox to transform regular venues into special places. Use them with our 24V OPTOTRONIC drivers to get the most out of this versatile system.

### Key Features & Benefits

- High brightness linear LED light sources available in 1200 lumens per meter up to 3000 lumens per meter (365 lumens per feet to 915 lumens per feet)
- IP67 protected modules and connectors for outdoor operation
- Flexible & field cuttable every 100mm (3.94") to support design freedom
- Long operational length per single power feed possible
- Each reel is shipped with a pre-installed IP67 input connector
- Extra strong self-adhesive backside for easy mounting
- Optimally paired with OPTOTRONIC® 24V power supplies
- Increased reliability due to single piece reel-to-reel technology
- Extra-long lifetime – 50,000 hours ( $L_{70}B_{50}$ )
- Dimmable with PWM technology
- Module can be bent to conform to curved surfaces with a radius as tight as 1.9" (50mm)

### Product Offering

| Family  | Ordering Abbreviation | Wattage       | CCT            |
|---------|-----------------------|---------------|----------------|
| LFP3000 | LFP3000-G3-8xx-03     | 65.4 to 86.7  | 2400K to 6000K |
| LFP2000 | LFP2000-G3-8xx-04     | 61.2 to 80.55 | 2400K to 6000K |
| LFP1200 | LFP1200-G3-8xx-09     | 72.9 to 95.4  | 2400K to 6000K |

### Application Information

#### Applications

- Architectural integration
- Border lighting
- General lighting
- Façade accent lighting
- Object integration
- Organically shaped luminaires
- Path and contour marking
- Signage applications

#### Specifications and Certifications



LINEARlight FLEX is UL8750 recognized for the US and Canada Class 2 unit (UL File #E346592)



## Ordering Information

| Ordering Abbreviation | Item Number | Module Length (feet/mm) | Power (W) <sup>1</sup> | Current (A) <sup>1</sup> | Luminous Flux     |                  |                  |    |      |        |      |         |                   | Maximum Operable Length (feet/mm) <sup>2</sup> | Beam Angle (°) |
|-----------------------|-------------|-------------------------|------------------------|--------------------------|-------------------|------------------|------------------|----|------|--------|------|---------|-------------------|--|----------------|
|                       |             |                         |                        |                          | (lm) <sup>1</sup> | CCT <sup>1</sup> | CRI <sup>1</sup> | V  | W/m  | W/feet | lm/m | lm/feet | lm/W <sup>1</sup> |  |                |
| LFP3000-G3-824-03     | 57865       | 9.84/3                  | 86.7                   | 3.61                     | 8400              | 2400K            | >80              | 24 | 28.9 | 8.81   | 2800 | 853     | 97                | 8.53/2600                                      | 120            |
| LFP3000-G3-827-03     | 57866       | 9.84/3                  | 86.7                   | 3.61                     | 9000              | 2700K            | >80              | 24 | 28.9 | 8.81   | 3000 | 915     | 104               | 8.53/2600                                      | 120            |
| LFP3000-G3-830-03     | 57867       | 9.84/3                  | 86.7                   | 3.61                     | 9000              | 3000K            | >80              | 24 | 28.9 | 8.81   | 3000 | 915     | 104               | 8.53/2600                                      | 120            |
| LFP3000-G3-840-03     | 57868       | 9.84/3                  | 71.1                   | 2.96                     | 9000              | 4000K            | >80              | 24 | 23.7 | 7.23   | 3000 | 915     | 127               | 9.84/3000                                      | 120            |
| LFP3000-G3-860-03     | 57869       | 9.84/3                  | 65.4                   | 2.73                     | 8400              | 6000K            | >80              | 24 | 21.8 | 6.65   | 2800 | 853     | 128               | 9.84/3000                                      | 120            |
| LFP2000-G3-824-04     | 57870       | 14.76/4.5               | 80.55                  | 3.4                      | 8100              | 2400K            | >80              | 24 | 17.9 | 5.46   | 1800 | 549     | 101               | 14.11/4300                                     | 120            |
| LFP2000-G3-827-04     | 57871       | 14.76/4.5               | 80.55                  | 3.4                      | 8550              | 2700K            | >80              | 24 | 17.9 | 5.46   | 1900 | 579     | 106               | 14.11/4300                                     | 120            |
| LFP2000-G3-830-04     | 57872       | 14.76/4.5               | 80.55                  | 3.4                      | 8550              | 3000K            | >80              | 24 | 17.9 | 5.46   | 1900 | 579     | 106               | 14.11/4300                                     | 120            |
| LFP2000-G3-840-04     | 57873       | 14.76/4.5               | 67.50                  | 2.8                      | 8550              | 4000K            | >80              | 24 | 15.0 | 4.57   | 1900 | 579     | 127               | 14.76/4500                                     | 120            |
| LFP2000-G3-860-04     | 57874       | 14.76/4.5               | 61.20                  | 2.6                      | 8100              | 6000K            | >80              | 24 | 13.6 | 4.15   | 1800 | 549     | 132               | 14.76/4500                                     | 120            |
| LFP1200-G3-824-09     | 57875       | 29.52/9                 | 95.4                   | 4.0                      | 9900              | 2400K            | >80              | 24 | 10.6 | 3.23   | 1100 | 335     | 104               | 24.61/7500                                     | 120            |
| LFP1200-G3-827-09     | 57876       | 29.52/9                 | 95.4                   | 4.0                      | 10,350            | 2700K            | >80              | 24 | 10.6 | 3.23   | 1150 | 350     | 108               | 24.61/7500                                     | 120            |
| LFP1200-G3-830-09     | 57877       | 29.52/9                 | 95.4                   | 4.0                      | 10,800            | 3000K            | >80              | 24 | 10.6 | 3.23   | 1200 | 366     | 113               | 24.61/7500                                     | 120            |
| LFP1200-G3-840-09     | 57878       | 29.52/9                 | 80.1                   | 3.3                      | 10,800            | 4000K            | >80              | 24 | 8.9  | 2.71   | 1200 | 366     | 135               | 29.52/9000                                     | 120            |
| LFP1200-G3-860-09     | 57879       | 29.52/9                 | 72.9                   | 3.0                      | 9900              | 6000K            | >80              | 24 | 8.1  | 2.47   | 1100 | 335     | 135               | 29.52/9000                                     | 120            |

<sup>1</sup>Data is related to entire module measured at steady state at an ambient temperature of 25°C unless values are listed as per foot or per meter. In view of the complex manufacturing process for light emitting diodes, the typical values given above for the technical LED parameters are merely statistical values that do not necessarily correspond to the actual technical parameters of an individual product; individual products may vary from the typical values.

<sup>2</sup>The maximum operable length is dependent on the product and the power supply wattage and in many cases is less than one full reel. See the "OPTOTRONIC® Power Supply Information" section of this bulletin.

## Specifications

|                           |  |
|---------------------------|--|
| Dimmable                  | Pulse width modulation (PWM)                                       |
| Binning                   | Fine White 3.5 steps MacAdam ellipse                               |
| Lifetime                  | 50,000 hrs (L <sub>70</sub> B <sub>50</sub> , T <sub>c</sub> 40°C) |
| Adhesive tape on backside | 3M   |
| Certifications            | UL Recognized, CE, VDE, ENEC 10 VDE                                |

## Power Supply Information

### Maximum OPTOTRONIC® Power Supply Loading\*

| Product           | OT20 <sup>5</sup><br>(51804) | OT50 <sup>5</sup><br>(51598) | OT96 <sup>5,6</sup><br>(51520, 51522, 51626) |
|-------------------|------------------------------|------------------------------|--|
| LFP3000-G3-824-03 | 5c = 19.7"                   | 13c = 51.2"                  | 26c = 102.4"                                 |
| LFP3000-G3-827-03 | 5c = 19.7"                   | 13c = 51.2"                  | 26c = 102.4"                                 |
| LFP3000-G3-830-03 | 5c = 19.7"                   | 13c = 51.2"                  | 26c = 102.4"                                 |
| LFP3000-G3-840-03 | 6c = 23.6"                   | 16c = 63.0"                  | 31c = 122.0"                                 |
| LFP3000-G3-860-03 | 7c = 27.6"                   | 18c = 70.9"                  | 34c = 133.9"                                 |
| LFP2000-G3-824-04 | 9c = 35.4"                   | 22c = 86.6"                  | 43c = 169.3"                                 |
| LFP2000-G3-827-04 | 9c = 35.4"                   | 22c = 86.6"                  | 43c = 169.3"                                 |
| LFP2000-G3-830-04 | 9c = 35.4"                   | 22c = 86.6"                  | 43c = 169.3"                                 |
| LFP2000-G3-840-04 | 11c = 43.3"                  | 27c = 106.3"                 | 53c = 208.7"                                 |
| LFP2000-G3-860-04 | 12c = 47.2"                  | 30c = 118.1"                 | 58c = 228.3"                                 |
| LFP1200-G3-824-09 | 15c = 59.0"                  | 39c = 153.5"                 | 75c = 295.3"                                 |
| LFP1200-G3-827-09 | 15c = 59.0"                  | 39c = 153.5"                 | 75c = 295.3"                                 |
| LFP1200-G3-830-09 | 15c = 59.0"                  | 39c = 153.5"                 | 75c = 295.3"                                 |
| LFP1200-G3-840-09 | 18c = 70.9"                  | 47c = 185.0"                 | 90c = 354.3"                                 |
| LFP1200-G3-860-09 | 20c = 78.74"                 | 51c = 200.8"                 | 99c = 389.8"                                 |

Notes:

- In the above chart, "c" = coupon
- A coupon is the Smallest Electrical Unit (SEU) independent sub-section of the module. For this product one SEU is 3.94" (100mm). Reference this bulletin's "Technical Drawings" for details.
- The module is designed to work with 24Vdc Constant Voltage power supplies only. Reference the Power Supply PIB # ECS050 for product specific information.
- To accurately determine the maximum LED load for the application refer to "Remote Mounting Distances" Application Note (LED126).
- The maximum load is dependent on the power supply wattage and in many cases is less than one full reel.
- Parallel runs may be required to achieve the numbers listed in this table. Please reference this bulletin's "Wiring Diagram" for product specific wiring instructions.

\*In order to drive OSRAM LED Modules safely, it is absolutely necessary to operate them with an electronically stabilized power supply protecting against short circuits, overload and overheating. Please see the relevant OPTOTRONIC brochure for more detailed information. OSRAM OPTOTRONIC control gear complies with all relevant standards and ensures safe operation.

## Minimum and Maximum Ratings

| Parameter                                     | Values                       |
|---|------------------------------|
| Operating Temperature at T <sub>c</sub> point | -20 to +70°C (-4 to +158°F)  |
| Storage Temperature                           | -40 to +80°C (-40 to +185°F) |
| Ambient Temperature (rated)                   | 25°C (77°F)                  |
| Voltage Range (V <sub>oc</sub> )              | 23-25Vdc                     |
| Reverse Voltage (V <sub>oc</sub> )            | 25Vdc                        |

Notes:

- Exceeding maximum ratings for operating and storage temperature will reduce expected life time or destroy the LED Module.
- Exceeding maximum ratings for operating voltage will cause hazardous overload and will likely destroy the LED Module.
- The temperature of the LED module must be measured at the T<sub>c</sub>-point according to EN60598-1 in a thermally constant status with a temperature sensor or a temperature sensitive label. The location of the T<sub>c</sub>-point for every SEU is marked on the side of the module.
- Temperature ramping for environmental test acc. IEC 62717 performed at 1K/min.

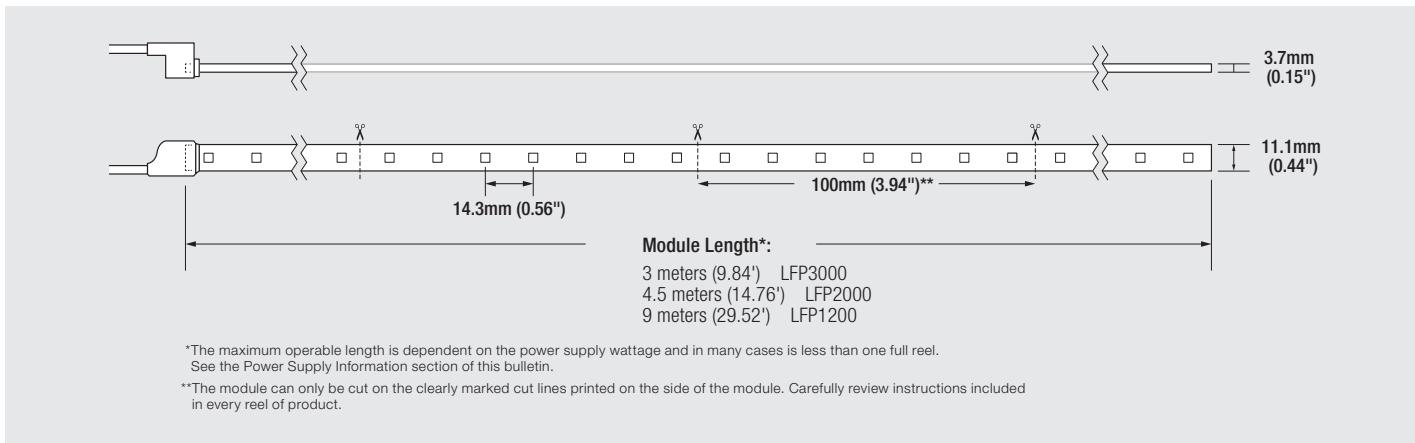
## Complementary Systems, Accessories & Shipping information



| Item Number                | Ordering Abbreviation | Description                                 | Length (inches) | Case Qty. | Order Qty. |
|----------------------------|-----------------------|---|-----------------|-----------|------------|
| <b>Protect Accessories</b> |                       |   |                 |           |            |
| 72667                      | LF/ENDCAP/IP67/LP     | Used to seal Protect product end when cut   | —               | 100       | 10         |
| 72668                      | LF/2CONN/IP67/LP      | IP67 Board to board connector               | 7               | 50        | 5          |
| 72669*                     | LF/2PIN/IP67/LP       | 2-Pin IP67 Input connector                  | 20              | 50        | 5          |
| 72363                      | LF-CLIP-FIXTURE       | Optional flexible silicone mounting bracket | —               | 500       | 50         |
| <b>Track Accessories</b>   |                       |   |                 |           |            |
| 72356                      | LAC-T/STS/7FT         | 6.9' aluminium track                        | 83              | 40        | 1          |
| 72357                      | LAC-M/STS/CLIP        | Optional mounting bracket for track         | 1.1             | 280       | 35         |
| 72360                      | LAC-T/STS-COV/C/7FT   | 6.9' clear cover for track                  | 83              | 40        | 1          |
| 72358                      | LAC-T/STS-COV/D/7FT   | 6.9' diffused cover for track               | 83              | 40        | 1          |
| 72359                      | LAC-S/STS/ENDCAP      | End cap used only with 72358                | 0.8             | 160       | 20         |

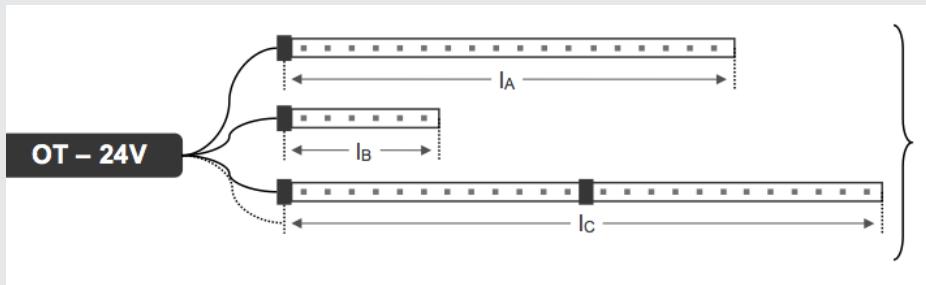
\*Every Protect module reel comes with one pre-wired input connector and install guide.

## Technical Drawings



## Wiring Diagram

Please consider that lengths may differ if further controls are installed.



**Maximum length per OT:**

$$IA + IB + IC + \dots \leq l_{max} \text{ per OT}$$

**Maximum length per strip:**

$$\begin{array}{ll} IA & \leq Lx \text{ max} \\ IB & \leq Lx \text{ max} \\ IC & \leq Lx \text{ max} \\ I\dots & \leq Lx \text{ max} \end{array}$$

**Lx max\***

|         |                   |
|---------|-------------------|
| LFP1200 | 9,000 mm (29.52') |
| LFP2000 | 4,500 mm (14.76') |
| LFP3000 | 3,000 mm (9.84')  |

\*The maximum operable length is dependent on the power supply wattage and the CCT of the module – in many cases the max length is less than one full reel.

See the "OPTOTRONIC Power Supply Information" section of this bulletin.

## Safety Information

1. The module must not be bent into a radius tighter than 1.9" (50mm). Bending the module tighter than 1.9" (50mm) will destroy it.
2. The LED module itself and all its components must not be mechanically stressed.
3. Assembly must not damage or destroy conducting paths on the circuit board.
4. Installation of LED modules (with power supplies) needs to be made with regard to all applicable electrical and safety standards. Only qualified personnel should be allowed to perform installations.
5. Observe correct polarity! Depending on the product incorrect polarity will lead to emission of red or no light. The module can be destroyed! Correct polarity immediately!
6. Parallel connection is highly recommended as safe electrical operation mode. Serial connection is not recommended. Unbalanced voltage drop can cause hazardous overload and damage the LED module.
7. Ensure that the power supply is of adequate power to operate the total load.
8. The maximum operable length of a run from a single power feed is: 3m (9.84') for LF3000, 4.5m (14.76') for LF2000, 9m (29.52') for LF1200. The maximum operable lengths are dependent on the wattage of the power supply and the CCT of the product and in many cases it is less than one full reel. See the OPTOTRONIC® Power Supply Information and Wiring Diagram sections of this bulletin.
9. Pay attention to standard ESD precautions when installing and handling the module.
10. Damage by corrosion will not be honored as a materials defect claim. It is the user's responsibility to properly seal the exposed ends of the module with a silicone end cap and sealant to protect against corrosive agents such as moisture and condensation and other harmful elements.

## Assembly Information

1. Read and understand the assembly instructions included in every reel of LINEARlight FLEX® product before installing the product.
2. The maximum operable length on a single feed is 1 full reel, but the length is dependent on the power supply. Remaining load must be connected on subsequent power feeds. Reference the "Power Supply Information" section of this PIB for module load per power supply requirements.
3. The module can be cut between any SEU (100 mm (3.94")) by cutting with a sharp razor knife ONLY on the designated cut lines printed on the side of the module (reference "Technical Drawings" in this PIB). Read the assembly instructions carefully to determine the correct cut point for each installation.
4. Solderless wiring can be accomplished using the accessory power feeders and board-to-board jumpers.
5. Mounting of the module is facilitated by the double-sided adhesive tape on the back-surface of the module.
6. Mounting surface must be clean and dry, free of oils or silicone coatings as well as dirt particles.
7. The mounting substrate must have sufficient structural integrity. Take care to completely remove the protective backing. Once the module is appropriately positioned, press on the module with about 20N/cm<sup>2</sup> (refer to application techniques of 3M adhesive transfer tapes). In difficult cases the use of a primer may help.
8. The minimum bending radius is 1.9" (50mm). Bending the module tighter than 1.9" (50mm) will destroy it.
9. Bending is only allowed within the bending axis of the PCB. Bending outside of that leads to torsion which will cause damage to the module and will lead to failure.
10. When installing in environments with large variations in temperature (e.g. outdoor applications) and operating length of more than 2m (6.5'), the use of adequate mounting surfaces is necessary. Otherwise it is advisable to use an additional thicker adhesive tape to absorb the stress of any mismatch in expansion.
11. As this module is for high flux illumination, heat dissipation is crucial in operation. Ensure smooth operation with an adequate metallic cooling body (thickness, shape, fins) to support this. Check and confirm that the operating temperature at the Tc point (marked on the side of every SEU) does not exceed 70°C in the installation.

## Warranty

OSRAM LED products are covered by our LED Module, OPTOTRONIC Power Supply or Control Warranty.

The LINEARlight FLEX Protect is covered under warranty as long as the temperature at the Tc point does not exceed 75°C; exceeding this temperature will void all warranties. For additional information or to download the warranty registration form, refer to the latest version of the warranty available at [www.osram.us/warranty](http://www.osram.us/warranty).

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LED-DS066 2-18

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