Thomas Research Products

Rev 8-10-2017

# Linear (Troffer) Module Family

LED Light Engines with Nichia LEDs

Intelligent Device ECOSYSTEM classic

## Electrical Specifications

| | |
|---|---|
| Driver Type: | Constant-Current |
| Drive Current: | 175mA Nominal (5.5″)<br>350mA Nominal (11″)<br>700mA Nominal (23″) |
| Nom. Forward Voltage: | 17.9V |
| Total Board Power: | 3.1W Nominal (5.5″)<br>6.3W Nominal (11″)<br>12.5W Nominal (23″) |
| Life: | 50,000 Hrs, 70% lumen maint.<br>@ Ta max 50ºC, used as specified |
| Max Junction Temp: | 90°C |
| Max Test Point Temp: | 80°C |
| Operating Temp: | -40ºC to +60ºC Ambient |
| Storage Temp: | -40ºC to +80ºC |
| Viewing Angle (FWHM): | 120° Lambertian distribution |
| CRI: | 83 typical |

### 5.5 Inch Linear DC LED Module

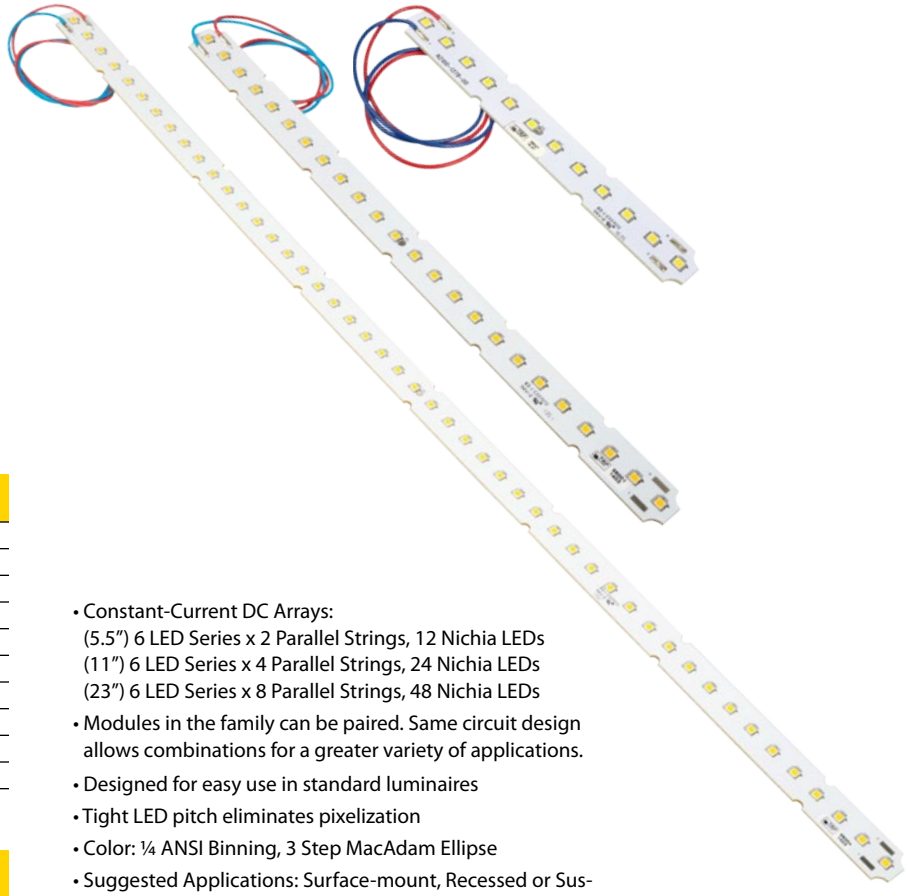
| Model | Color Temp *(K)* | Total Current *(mA)* | Total Board Power *(W)* | Lumens *(± 15%)* | Board LPW |
|---|---|---|---|---|---|
| 98045 | 2700 | 87.5 | 1.4 | 198 | 137 |
| | | 175 | 3.2 | 382 | 121 |
| 98046 | 3000 | 87.5 | 1.4 | 212 | 146 |
| | | 175 | 3.2 | 410 | 130 |
| 98047 | 3500 | 87.5 | 1.4 | 223 | 153 |
| | | 175 | 3.2 | 430 | 136 |
| 98048 | 4000 | 87.5 | 1.4 | 229 | 157 |
| | | 175 | 3.2 | 441 | 140 |
| 98049 | 5000 | 87.5 | 1.4 | 236 | 163 |
| | | 175 | 3.2 | 455 | 145 |

### 11 Inch Linear DC LED Module

| Model | Color Temp *(K)* | Total Current *(mA)* | Total Board Power *(W)* | Lumens *(± 15%)* | Board LPW |
|---|---|---|---|---|---|
| 98044 | 2700 | 175 | 2.9 | 397 | 137 |
| | | 350 | 6.3 | 765 | 121 |
| 98000 | 3000 | 175 | 2.9 | 425 | 146 |
| | | 350 | 6.3 | 820 | 130 |
| 98001 | 3500 | 175 | 2.9 | 446 | 153 |
| | | 350 | 6.3 | 860 | 136 |
| 98002 | 4000 | 175 | 2.9 | 458 | 157 |
| | | 350 | 6.3 | 883 | 140 |
| 98029 | 5000 | 175 | 2.9 | 472 | 163 |
| | | 350 | 6.3 | 910 | 145 |

### 23 Inch Linear DC LED Module

| Model | Color Temp *(K)* | Total Current *(mA)* | Total Board Power *(W)* | Lumens *(± 15%)* | Board LPW |
|---|---|---|---|---|---|
| 98026 | 2700 | 350 | 5.9 | 797 | 135 |
| | | 700 | 12.5 | 1,537 | 123 |
| 98003 | 3000 | 350 | 5.9 | 850 | 144 |
| | | 700 | 12.5 | 1,639 | 131 |
| 98004 | 3500 | 350 | 5.9 | 893 | 151 |
| | | 700 | 12.5 | 1,720 | 138 |
| 98005 | 4000 | 350 | 5.9 | 916 | 155 |
| | | 700 | 12.5 | 1,765 | 141 |
| 98028 | 5000 | 350 | 5.9 | 944 | 160 |
| | | 700 | 12.5 | 1,820 | 146 |



- Constant-Current DC Arrays:
  (5.5″) 6 LED Series x 2 Parallel Strings, 12 Nichia LEDs
  (11″) 6 LED Series x 4 Parallel Strings, 24 Nichia LEDs
  (23″) 6 LED Series x 8 Parallel Strings, 48 Nichia LEDs
- Modules in the family can be paired. Same circuit design allows combinations for a greater variety of applications.
- Designed for easy use in standard luminaires
- Tight LED pitch eliminates pixelization
- Color: ¼ ANSI Binning, 3 Step MacAdam Ellipse
- Suggested Applications: Surface-mount, Recessed or Suspended lighting, Troffers, Troffer Retrofits, Linear Recessed and Flush-mount
- Customizable: Engines can be modified to your application. Contact us.
- Engineered by Norlux
- 5 yr. Warranty

### Connectivity Options

| Suffix | Connection |
|---|---|
| *(blank)* | 12 IN, #22 AWG Stranded Leads |
| -01 | No Leads |
| -02 | Push-in Connectors |

For Poke-In Connectors, use
#24-18 AWG stranded or solid wire

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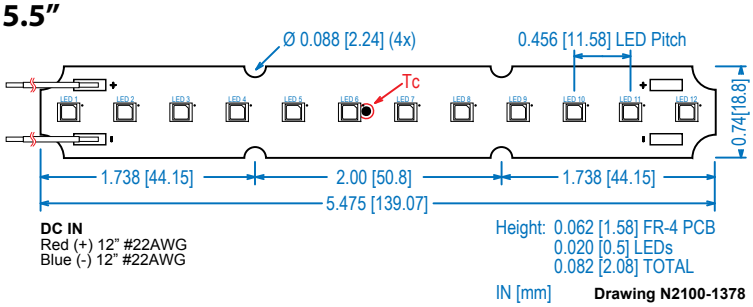
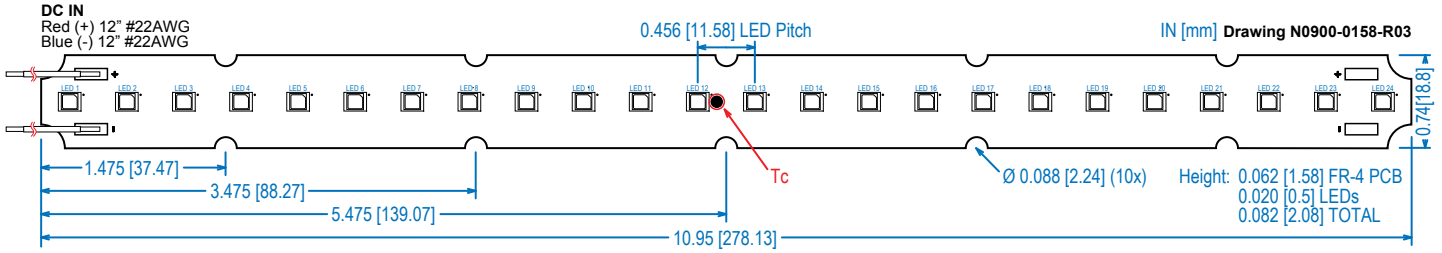
## Dimensions

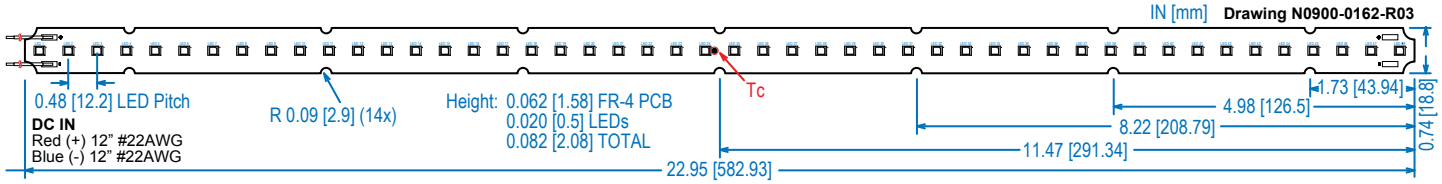
### 5.5”




### 11”




### 23”




## CIE Chromaticity Coordinates:

### 2700K

3 Step Macadams Ellipse

| X | Y |
|---|---|
| 0.4576 | 0.4183 |
| 0.4698 | 0.4212 |
| 0.4478 | 0.3999 |
| 0.4591 | 0.4025 |

### 3000K

3 Step Macadams Ellipse

| X | Y |
|---|---|
| 0.4325 | 0.4101 |
| 0.4452 | 0.4146 |
| 0.4244 | 0.3923 |
| 0.4362 | 0.3965 |

### 3500K

3 Step Macadams Ellipse

| X | Y |
|---|---|
| 0.4045 | 0.3975 |
| 0.4189 | 0.4044 |
| 0.3989 | 0.3819 |
| 0.412 | 0.3875 |

### 4000K

3 Step Macadams Ellipse

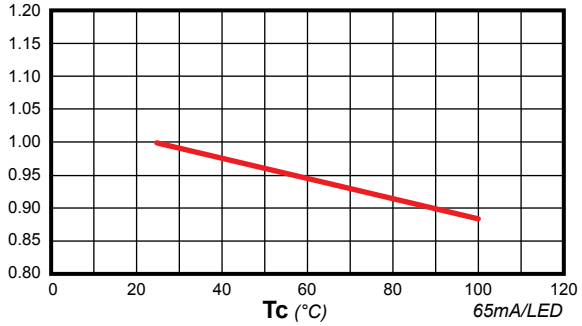
| X | Y |
|---|---|
| 0.3783 | 0.3836 |
| 0.3909 | 0.3906 |
| 0.3746 | 0.3687 |
| 0.3864 | 0.3757 |

### 5000K

3 Step Macadams Ellipse

| X | Y |
|---|---|
| 0.3408 | 0.3461 |
| 0.3485 | 0.3520 |
| 0.3416 | 0.3585 |
| 0.3499 | 0.3644 |

### Relative Luminous Flux / Tc Temperature



## Application Notes:

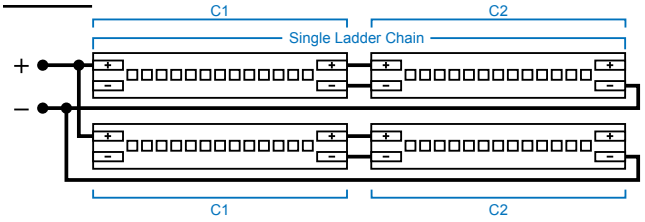
## Series/Parallel Configurations

Board combinations can include mixing 5.5", 11" and 23" modules.

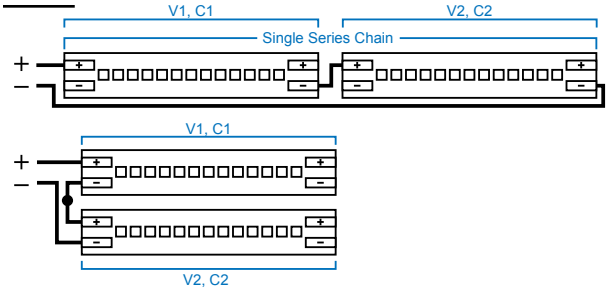
**Parallel:** The positive and negative of one board is connected to the respective positive and negative of the next. Current adds, so the supply must be current $C_1 + C_2$ for 2 boards in a chain, for example.

**Series:** The negative of one board is connected to the positive of the next. Voltage adds, so the supply must handle voltage $V_1 + V_2$ for 2 boards.

### Parallel




### Series




## Maximum Run Lengths

The max number of boards wired in a chain **(parallel or series)** is limited by the max current rating of the first board wired to the driver. The **sum of the board currents** in the chain funnels through the first board, when wired from one end. Multiple chains can connect directly to the power supply in parallel. See table for max chain length.

Improved wiring design for each parallel ladder chain should specify the positive and negative power connections at opposite ends of the chain to equalize current through each LED. Series ladder chains are naturally wired this way. Wiring from one end of the chain will create an uneven voltage across each section. The longer the ladder chain, the more important this becomes. Max current into each LED board section is 3.75A. The number of sections or chains wired in parallel directly from the driver is only limited by the supply wire size or driver capacity.

| Product | Parallel or Series Ladder Chain | Max Allowable Boards | |
|---|---|---|---|
| | | High Current *(Nom)* | Low Current |
| 5.5" Linear | Parallel or Series Ladder | 22 PCB | 44 PCB |
| 11" Troffer | Parallel or Series Ladder | 11 PCB | 22 PCB |
| 23" Troffer | Parallel or Series Ladder | 5 PCB | 11 PCB |
| Combination | Parallel or Series Ladder | $(C_1 + C_2 + ... C_n) < 3.75A$ *Use currents listed on Pg 1* | |

## Static Sensitive Device

Handle only at static-safe work stations.

### 5.5" Compatible TRP Drivers:

Calculate wattage, voltage and current required when mixed with other LED boards. Choose the best driver for your application.

### 11" Compatible TRP Drivers:

The drivers listed here are all compatible with this module alone or in multiples. Choose the best driver for your application.

- LED12W-24-C0350
- LED12W-36-C0350

## Packaging

50 per box standard.

## Mounting Notes

The LED assembly is supplied with mounting holes, per the dimensional drawing. It is important to mount the board in such a way as to maintain the Tc point below the max. The steady state thermals in application will dictate if the board needs to be mounted directly to metallic housing and/or include a thermal pad. For example fully enclosed recessed fixture will require better thermal mounting than an open air pendant.

## Thermal Application Notes

**This board requires additional heat sinking to run above 55ºC ambient** at nominal specifications. Heat sink is also required when operated above specified drive currents.

## Maximum Current

**5.5"** Max Current: **360mA**
Voltage at max current: **20V**, Power at max current: **14.4W**

**11"** Max Current: **720mA**
Voltage at max current: **20V**, Power at max current: **14.4W**

**23"** Max Current: **1440mA**
Voltage at max current: **20V**, Power at max current: **28.8W**

The total maximum current reflects the LED maximum forward current only, without considering thermal needs. Driving the LEDs this hard will likely violate their thermal limits, depending on the application. **Tc point must remain at or below the max temperature, or the warranty will be voided.** Temperature is directly correlated to LED current.

### 23" Compatible TRP Drivers:

The drivers listed here are all compatible with this module alone or in multiples. Choose the best driver for your application.

- LED12W-24-C0350
- LED12W-24-C0500
- LED17W-24-C0700
- LED20W-028-C0700
- LED20W-028-C0700-D
- LED20W-48-C0350
- LED20W-48-C0350-D
- LED20W-43-C0460
- LED20W-43-C0460-D
- LED20W-40-C0500
- LED20W-40-C0500-D
- LED25W-36-C0700
- LED25W-36-C0700-D
- LED25W-36-C0700-HL-B
- LED25W-36-C0700-HL-S
- LED25W-36-C0700-HL-BD
- LED25W-36-C0700-HL-SD
- LED25W-040-C0500
- LED25W-040-C0500-D
- LED25W-040-C0620
- LED25W-040-C0620-D
- LED30W-042-C0700
- LED30W-042-C0700-D

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