



# TMU045015HLXXXA, TMU045015HLXXXB



## Constant Current LED Linear Module

- High Density, high brightness chip array for use in Class 2 Linear applications
- Constant current for maximum efficacy
- On-board connector for ease of assembly
- Available in standard CCT's
- Dimmable when used with a dimmable driver
- Suitable for use in retrofit rebate programs
- Optional lens to diffuse light
- 80 CRI standard and 90 CRI available

### General Ratings

Max Lumen Output @ Max Current	2130 lumens at 4000K / 80 CRI*
Nominal Current Input	350 mA (450mA Max.)
Nominal DC Power Consumption	11.5W (15.2 W Max.)
Nominal Operating Voltage @ Max Current	33.8 VDC
Beam Angle	120°
CRI	80, 90
Operating Ambient Temperature Range (Ta)	-35 to +40°C
Maximum Module Case Temperature (Tc)	L70 = 90°C (Ts = 95°C) / L90 = 60°C (Ts = 65°C)
Estimated Lumen Maintenance	L70 = >60,000hrs / L90 = >36,000hrs
Color Consistency	Binning per ANSI C78.377-2008; 4 SDCM
Overall Size	TMU045015HLXXXA: 22" x 0.94" x 0.24" (including connector) TMU045015HLXXXB: 22.88" x 0.94" x 0.24" (including connector)
PCB Material / Module Weight	CEM1 / 38 g
Maximum Screw Installation Torque	25 inch - ounces
Safety/Compliance	cURus (File # E351548) Class 2 Lighting System RoHS Compliant; CE
Energy Efficiency Label	A+ @Nominal Input Current
Warranty	5 years with suitable Fulham LED Drivers

\* At Tc mod = 25°C





TMU045015HLXXXA, TMU045015HLXXXB CE c US RoHS COMPLIANT

**Part Numbering Matrix**

T M U 045 015 H L 8 40 A

	<u>Type</u> M = Module (CE/UL Class 2)	<u>Control Type</u> U = None	<u>Max. Current</u> 045 = 450mA	<u>Max. Power</u> 015 = 15W	<u>PCB Material</u> H = CEM1 +Connector	<u>Shape</u> L = Linear	<u>CRI</u> 8* = 80 9 = 90	<u>CCT</u> 27 = 2700K 30* = 3000K 35 = 3500K 40* = 4000K 50 = 5000K	<u>Size/Options</u> A* = 22" x 0.94" B* = 22.88" x 0.94" C <sub>+</sub> = 22" Conformal Coating D <sub>+</sub> = 22.8" Conformal Coating
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\* Indicates standard module options. All others are built to order.  
† Contact Fulham for availability, MOQ and lead time applies.

**Electrical Specifications**

LED Module Part Number	Number of LED	Input Current	Nom. Forward Voltage	Nom. Rated Power		<u>Input Current</u>	<u>Module Abs. Max. Forward Voltage @Tc = 50°C***</u>
TMU045015HLxxxx	33	350mA	32.9 VDC	11.5W		50mA	33.3 VDC
		450mA**	33.8 VDC	15.2W		100mA	34.2 VDC
						150mA	34.8 VDC
						200mA	35.9 VDC
						250mA	36.7 VDC
						300mA	37.4 VDC
						350mA	38.0 VDC
						400mA	38.4 VDC
						450mA	38.9 VDC

\*\* Indicates maximum rated current. Modules may be operated at a current less than or equal to this value. Reference Current vs. Rel. Lum. Flux Table to calculate estimate lumen output at lesser currents.  
\*\*\* Absolute maximum forward voltage was not used in calculating nominal rated power. Data is provided to assist in selecting proper LED driver.

**Electrical and Optical Specifications**

LED Module Part Number	Color Temperature	Nominal Luminous Flux @ 350mA/90 CRI	Nominal Luminous Flux @ 350mA/80 CRI	Efficacy @ 80CRI
TMU045015HLx30x	3000K	1290 lumens	1600 lumens	139 lm/W
TMU045015HLx40x	4000K	1375 lumens	1720 lumens	149 lm/W

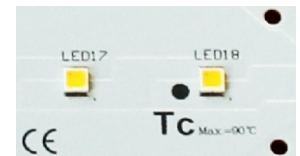
**Current vs Relative Luminous Flux Table**

Forward Current (mA)	Lumen De-rating Multiplier
350	1.00
450 **	1.24

NOTE:  
1) Electrical and optical specifications are based on Tc mod = 25°C. Reference Amb. Temp. vs Rel. Lum. Flux for other temperatures.  
2) Standard lumen output and efficacy is calculated for standard options. Reference CCT vs Rel. Lum. Flux chart for lumen ratio calculation.  
3) Specifications are subject to change without notice.

**Thermal Specifications**

	<b>With Connectors</b>
Storage Temperature Range	-35 to 100°C
Operating Ambient Temperature Range	-35 to 40°C
Maximum Case Temperature (Tc mod)	L70 = 90°C (Ts = 95°C) / L90 = 60°C (Ts = 65°C)



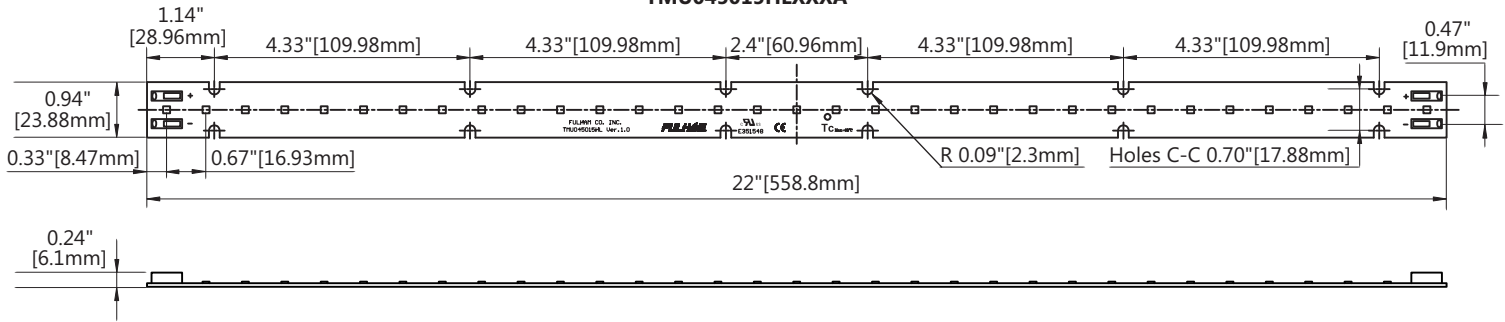


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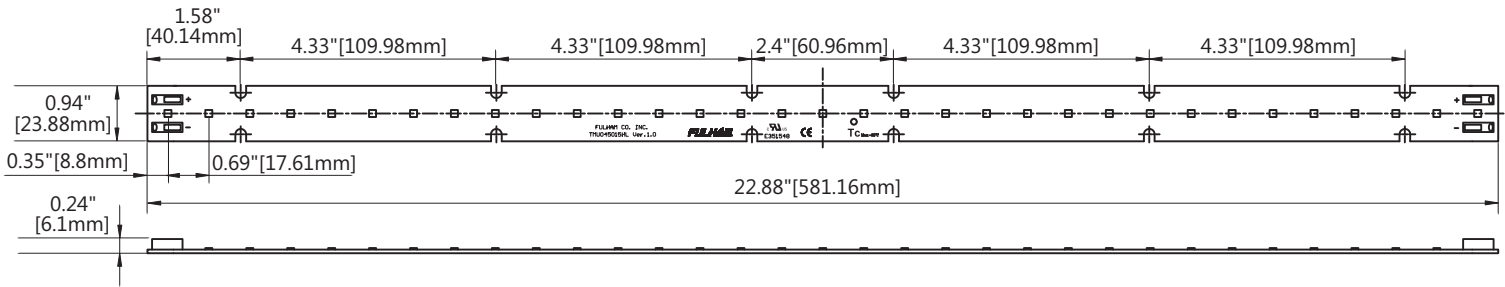


**Mechanical Drawings**

**TMU045015HLXXXA**



**TMU045015HLXXXB**





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**Accessories**

**Interconnects**

Wago Part Number: Single Pin **2060-951**

- Metal pin(s) to interconnect Modules

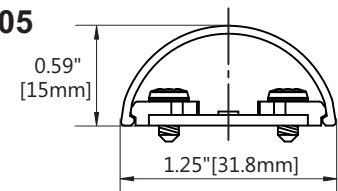
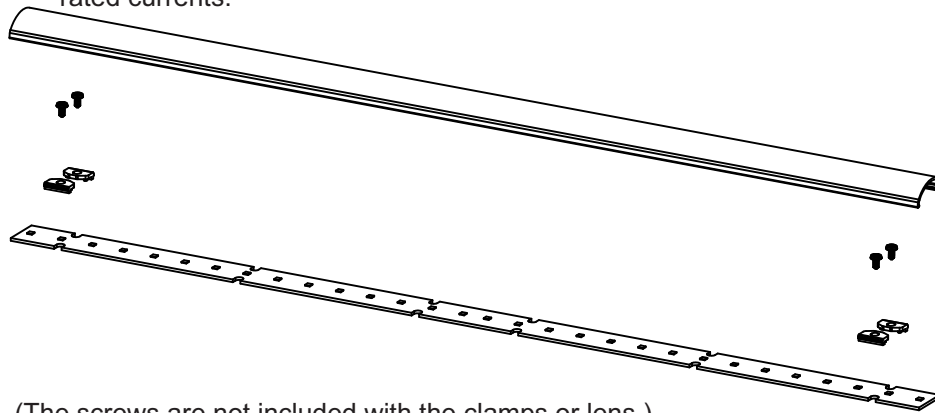
- For more detail information, please visit Wago's website: <http://www.wago.com/infomaterial/pdf/60291132.pdf>



**22", 22.88" Diffuser Lens (with 4 installation clamps)**

Fulham Part Number: **22"**: TLE-OPT-120-004; **22.88"**: TLE-OPT-120-005

- white polycarbonate diffuser lens - 82% transmissivity at nominally rated currents.



**Installation Steps when using clamps:**

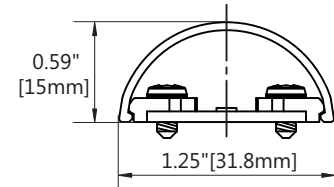
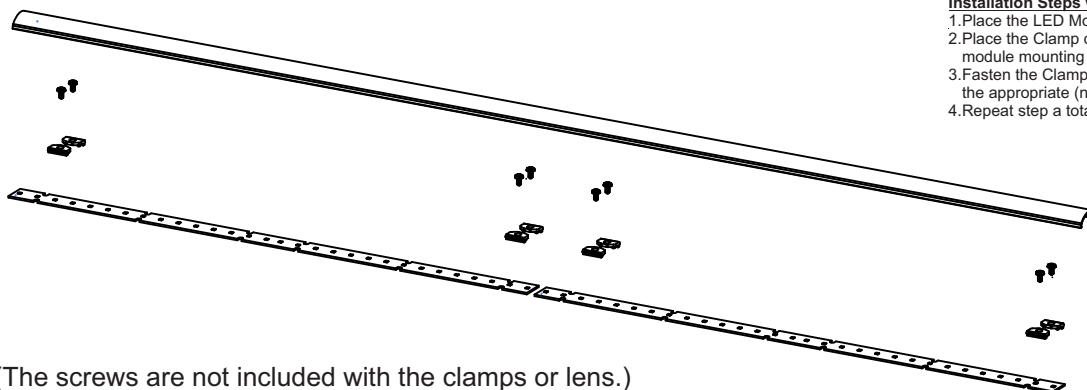
1. Place the LED Module on the luminaire surface.
2. Place the Clamp on top of LED module (line it up with LED module mounting hole).
3. Fasten the Clamp and LED module to the luminaire by using the appropriate (not provided) screws.
4. Repeat step a total of 4 times.

(The screws are not included with the clamps or lens.)

**45.76" Diffuser Lens (with 8 installation clamps)**

Fulham Part Number: **TLE-OPT-120-011**

- White polycarbonate diffuser lens



**Installation Steps when using clamps:**

1. Place the LED Module on the luminaire surface.
2. Place the Clamp on top of LED module (line it up with LED module mounting hole).
3. Fasten the Clamp and LED module to the luminaire by using the appropriate (not provided) screws.
4. Repeat step a total of 8 times.

(The screws are not included with the clamps or lens.)



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### Termination Notes

- If connectors are used, use solid wire size 24 – 18 AWG, rated at a minimum 50V, minimum 105°C, and stripped to length between 6-7 mm (0.24-0.28 inches).
- Push button for insertion of conductor and for easy removal of wires.
- Connector Type: WAGO PN# **2060-451/998-404**

**Push Button**

### Fastening Notes

- If fastening by screw hole, use any screw with diameter less than 0.185 in (4.7mm). Use all available screw holes to ensure good contact between back side of module and mounting surface. Refer to max specified torque for installation. Suggested screw sizes: #6 or M4 Pan Head screw.
- If fastening using double-sided tape, start with clean, oil-free and dust-free surface. Peel backing and place LED module on mounting surface. Firmly press down on the module to ensure good adherence. Follow the double-side tape manufacturer's installation instructions.
- BJB P2F (Push-to-Fix) fixing elements for PCBs can be used to fasten LED modules to mounting surface. Reference BJB's website for ordering information and specific model to use:  
<http://www.bjb.com/index.php?pid=376706&lid=10>.  
NOTE: Cannot be used when Fulham's white polycarbonate lens is being attached to the LED module. Use specified screws to fasten lens clamps and module to mounting surface



### Environmental Rating

- Modules are rated for dry locations, unless option for conformal coating is requested.
- Conformal coating is RTV based and rated for Environment and Moisture Protection per IPC-CC-830.

### Electrostatic Sensitive Product (ESD)

- Fulham LED products should be handled with proper measures to protect against any potential ESD damage.
- When servicing, personnel should be ground and direct contact with LED should be avoided.

### Thermal Management

- Proper thermal management should be employed to ensure life and reliability of product.
- Use of thermal grease, paste, pad, or other material interface is highly recommended.

### Polarity Notes

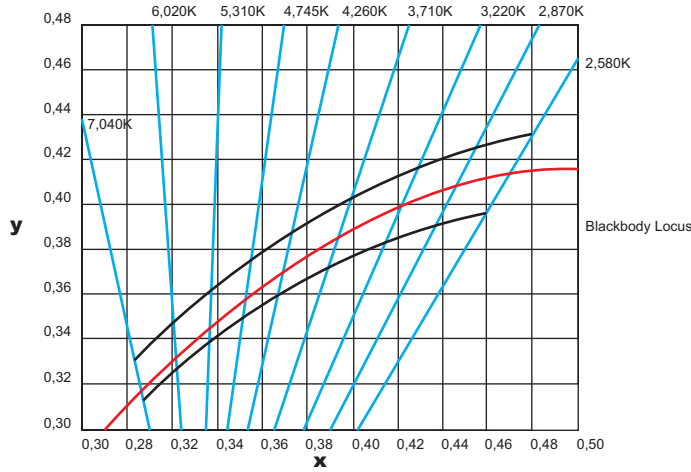
- Modules are polarity sensitive.
- Ensure that "positive" from LED Driver is connected to "positive" of LED modules and that "negative" from LED Driver is connected to "negative" of LED modules.
- Polarities of modules are marked with "+" for positive and "-" for negative.



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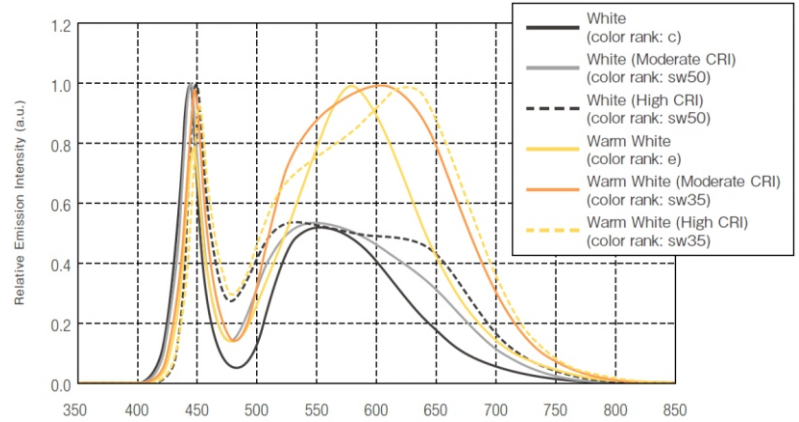


**Color and Binning**



Ref. Nichia  
Chromaticity Diagram for ANSI bins  
For reference only. For more detailed info, contact factory.

**Optical Spectrum\*\*\***



\*\*\* Value varies depending on product type and color rank  
Ref. Nichia  
LED Catalogue 2013  
For reference only. For more detailed info, contact factory.

**Thermal De-Rating**

Ambient Temperature (Ta)	Relative Luminous Flux
25°C	1
30°C	0.991
35°C	0.989
40°C	0.980
45°C	0.975
50°C	0.970
55°C	0.960
60°C	0.950

Ref. Nichia  
LED757 Spec Sheet  
For reference only. For more detailed info, contact factory.

**CCT vs Luminous Flux**

CCT	Relative Luminous Flux
2700K	0.87
3000K	0.93
3500K	0.96
4000K	1.00
5000K	1.07

Ref. Nichia  
LED757 Spec Sheet  
For reference only. For more detailed info, contact factory.



# TMU045015HLXXA, TMU045015HLXXB



## Compatible Fulham LED Drivers

Fulham Part Number	Driver Description	# of Modules/Driver	Wiring Diagram
T1T11200350-15L	350 mA, 15W CC Driver, 120V AC Input, TRIAC Dimmable	1	A
T1M1UNV0350-15L	350 mA, 15W CC Driver, Universal Input, 0-10V Dimmable	1	A
T1T11200350-17CB	350 mA, 17W CC Driver, 120V AC Input, TRIAC Dimmable	1	A
TC11200350-15C	350 mA, 15W CC Driver, 120V AC Input	1	A
T1UNV0350-60L	350 mA, 60W CC Driver, Universal Input	3-5	B
T1M1UNV0700-30L	700 mA, 30W CC Driver, Universal Input, 0-10V Dimmable	2	C
T1T11200700-30L	700 mA, 30W CC Driver, 120V AC Input, TRIAC Dimmable	2	C
T1(M1)UNV0700-28C	700 mA, 28W CC Driver, Universal Input, (0-10V Dimmable)	2	C
T1M13470700-28C/28V	700 mA, 28W CC Driver, 347V Input, 0-10V Dimmable	2	C
T1(M1)UNV0700-40C	700 mA, 40W CC Driver, Universal Input, (0-10V Dimmable)	2	C
T1M13470700-40C/40V	700 mA, 40W CC Driver, 347V Input, 0-10V Dimmable	2	C
T1(M1)UNV1050-42C	1050 mA, 42W CC Driver, Universal Input, (0-10V Dimmable)	3	C
T1(M1)UNV1400-60L	1400 mA, 60W CC Driver, Universal Input, (0-10V Dimmable)	4	C
T1UNV0700-200L	700 mA, 200W CC Driver, Universal Input	8(4S 2P), 10(5S 2P)	D
T1UNV1050-200L	1050 mA, 200W CC Driver, Universal Input	12(4S 3P), 15(5S 3P)	D
T1M1UNV105P-40E	250~1050 mA Programmable, 40W CC Driver, Universal Input, 0-10V Dimmable	1 (350mA) 2 (700mA)	A C
T1A1UNV105P-40E	250~1050 mA Programmable, 40W CC Driver, Universal Input, DALI Dimmable	1 (350mA) 2 (700mA)	A C
T1M1UNV105P-60E/60F	250~1050 mA Programmable, 60W CC Driver, Universal Input, 0-10V Dimmable	1 (350mA) 2 (700mA) 3 (1050mA)	A C C
T1A1UNV105P-60E/60F	250~1050 mA Programmable, 60W CC Driver, Universal Input, DALI Dimmable	1 (350mA) 2 (700mA) 3 (1050mA)	A C C
FHS2-UNV-36L	Hotspot2 at 350 - 700mA output		

**NOTE:**  
 1. Subject to rated loading conditions.  
 2. Modules are polarity sensitive. Ensure that "positive" from LED Driver is connected to "positive" of LED modules and that "negative" from LED Driver is connected to "negative" of LED modules.  
 3. List is subject to change without notice.

### Wiring Diagram

