



# VMU045010EC9xxC



## 450mA CONSTANT CURRENT LED DC MODULES, 17" LINEAR

- For use in UL Class 2 lighting systems
- Constant current for maximum efficacy
- On-board connector for ease of assembly
- High lumen, high efficacy
- Suitable for DLC applications: L70>60,000hrs / L90=40,000hrs
- Meets UL8750 recognized
- RoHS compliant
- 90 CRI standard

### General Specifications

	Min.	Typical	Max.
Input Voltage <sup>①</sup>	21.0VDC	23.0VDC	23.5VDC
Input Current <sup>①</sup>	50mA	350mA	450mA
Input Power <sup>①</sup>	1.1W	8.1W	10.6W
Initial Lumens @4000K / 90CRI	173 lumens	1172 lumens	1475 lumens
Initial Efficacy @4000K / 90CRI	165 lm/W	145 lm/W	140 lm/W
Beam Angle	120°		
CRI	90CRI standard		
Storage Temperature Range	-40°C to 100°C / -40°F to 212°F		
Operating Temperature Range (ta)	-40°C to 45°C / -40°F to 113°F		
Maximum Case Temperature (Tc)	L70: Tc max 105°C / L90: Tc max 105°C		
Estimated Lumen Maintenance <sup>②</sup>	L70: >60,000Hrs / L90: =40,000Hrs		
Color Consistency	Binning per ANSI C78.377-2015 @ 25°C; 3 SDCM Typ., 5 SDCM max		
Overall Size	17" L x 0.71" W x 0.22" H (431.8mm x 18.09mm x 5.6mm)		
PCB Material / Thermal Conductivity	FR-4 / 0.3W/mK		
LED Quantity	24pcs.		
Module Weight	27g / 0.060lb		
PCB Part Number	VMU045010ECXXC		
Maximum Screw Installation Torque	25 inch - ounces		
Connector Type	BJB #46.131.1001.50 (single pin connector)		
Packaging: Master Carton	100pcs		
Thermal Feedback	Not Available		
Safety/Compliance	cURus (File # E351548) Suitable for UL Class 2 Lighting Systems RoHS Compliant Dry and Damp Location		
Energy Efficiency Label (EEI-Label)	A++		
Warranty	5 years @ Max. Tc from the date of manufacture		

<sup>①</sup>Nominal ratings. Performance based on Tc mod = 25° C. See thermal de-rating chart (pg. 3) for higher temperature operation

<sup>②</sup>TM-21 Reported Numbers



# VMU045010EC9xxC



## Electrical and Optical Specifications

LED Module Part Number	Number of LED	Input Current	Nom. Forward Voltage	Nom. Rated Power	Max. Fwd. Voltage	Max. Rated Power	Nom. Lum. Flux @4000K/90 CRI	Nom. Efficacy @4000K/90 CRI
VMU045010EC9xxC	24	50 mA	21.0 V	1.1 W	23 V	1 W	173 lm	165 lm/W
		75 mA	21.3 V	1.6 W	23 V	2 W	262 lm	164 lm/W
		100 mA	21.5 V	2.2 W	24 V	2 W	350 lm	163 lm/W
		125 mA	21.7 V	2.7 W	24 V	3 W	437 lm	161 lm/W
		150 mA	21.9 V	3.3 W	24 V	4 W	522 lm	159 lm/W
		175 mA	22.0 V	3.9 W	24 V	4 W	607 lm	157 lm/W
		200 mA	22.2 V	4.4 W	24 V	5 W	690 lm	156 lm/W
		225 mA	22.3 V	5.0 W	25 V	6 W	773 lm	154 lm/W
		250 mA	22.5 V	5.6 W	25 V	6 W	855 lm	152 lm/W
		275 mA	22.6 V	6.2 W	25 V	7 W	935 lm	150 lm/W
		300 mA	22.8 V	6.8 W	25 V	8 W	1015 lm	149 lm/W
		325 mA	22.9 V	7.4 W	25 V	8 W	1094 lm	147 lm/W
		350 mA	23.0 V	8.1 W	25 V	9 W	1172 lm	145 lm/W
		375 mA	23.1 V	8.7 W	25 V	9 W	1249 lm	144 lm/W
		400 mA	23.3 V	9.3 W	26 V	10 W	1325 lm	142 lm/W
		425 mA	23.4 V	9.9 W	26 V	11 W	1401 lm	141 lm/W
450 mA*	23.5 V	10.6 W	26 V	12 W	1475 lm	140 lm/W		

## Luminous Flux De-Rating: CCT and CRI Multipliers

	2700K	3000K	3500K	4000K	5000K	5700K	6500K
<b>CRI 80(R9&gt; 0)</b>	1.08	1.11	1.12	1.16	1.17	1.17	1.16
<b>CRI 90(R9&gt;50)</b>	0.90	0.93	0.95	1.00	1.01	1.00	1.00

### NOTES:

- 1) Performance based on Tc mod = 25°C. See thermal de-rating chart (pg. 3) for higher temperature operation
- 2) Standard lumen output and efficacy is calculated for standard options. Reference CCT & CRI vs Luminous Flux chart for lumen ratio calculation.
- 3) Specifications are subject to change without notice.
- 4) The LED DC Module can be configured with different LED chip quantities, series and parallel design configurations to meet a specific design requirement. Contact Fulham for further assistance.
- 5) \* Indicates minimum and maximum rated voltage. Modules may be operated at a voltage within this range, below the Tc rating.
- 6) 70CRI is NOT available.



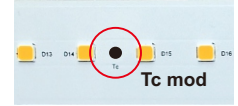
# VMU045010EC9xxC



## Thermal Specifications

### Eco series DC Modules

Storage Temperature Range	-40 to 100°C / -40 to 212°F
Operating Ambient Temperature Range (ta)	-40 to 45°C / -40 to 113°F
Maximum Case Temperature (Tc)	L70 = 105°C(221°F) / L90 = 105°C(221°F)



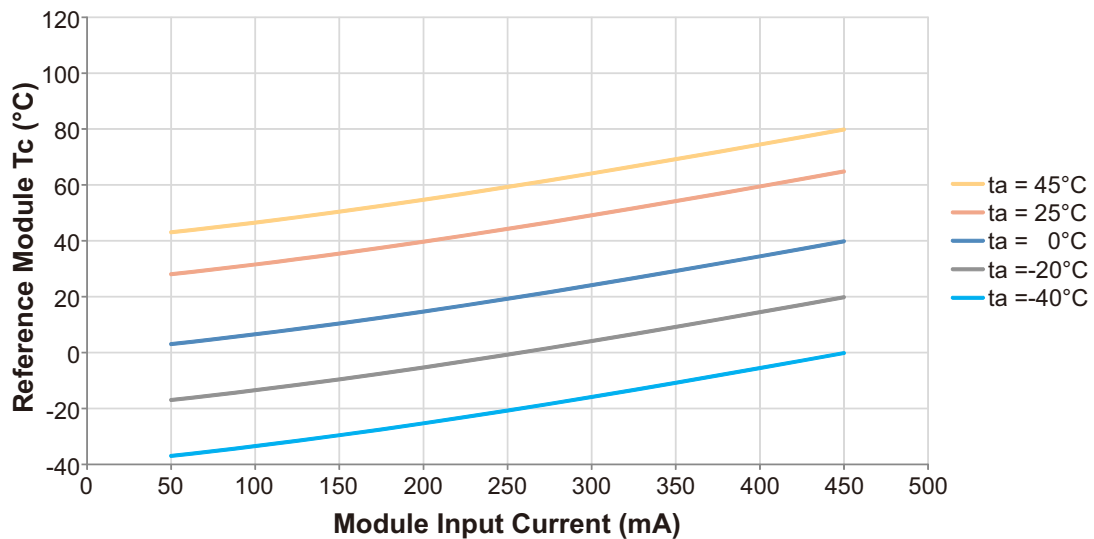
VMU045010EC9XXC

## Thermal De-Rating

### Module Tc vs. Luminous Flux vs. Forward Voltage

Module Case Temperature (Tc)	Total Vf Multiplier	Luminous Flux Multiplier
25°C	1.000	1.000
30°C	0.998	0.992
35°C	0.997	0.983
40°C	0.995	0.975
45°C	0.993	0.966
50°C	0.992	0.958
55°C	0.990	0.949
60°C	0.988	0.941
65°C	0.986	0.932
70°C	0.985	0.924
75°C	0.983	0.915
80°C	0.981	0.907
85°C	0.980	0.899
90°C	0.978	0.890
95°C	0.976	0.882
100°C	0.975	0.873
105°C	0.973	0.865

### Module Tc vs. Ambient (ta) vs. Module Input Current (mA)



#### NOTES:

1) Chart "Module Tc vs. Ambient (ta) vs. Module Input Current (mA)" for reference only in an open ambient. The performance within a luminaire will vary depending on the size and material of luminaire.



# VMU045010EC9xxC



## Certification Chart

Model	VMU045010EC9XXC
Classification	
	YES
	YES
Energy Efficiency Label (EEI-Label)	A++
Class 2 Lighting System	YES

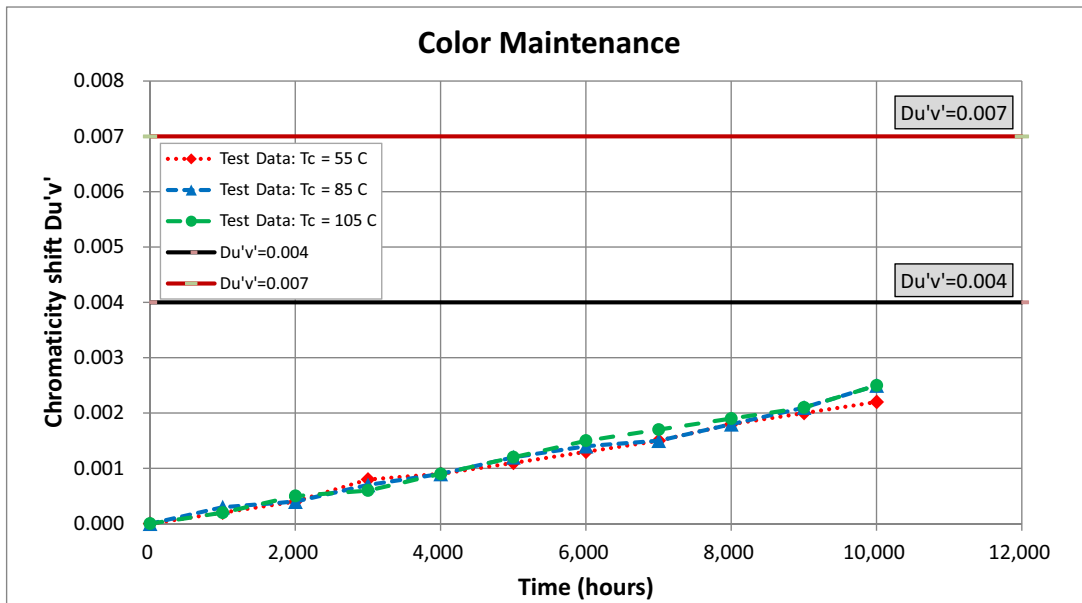
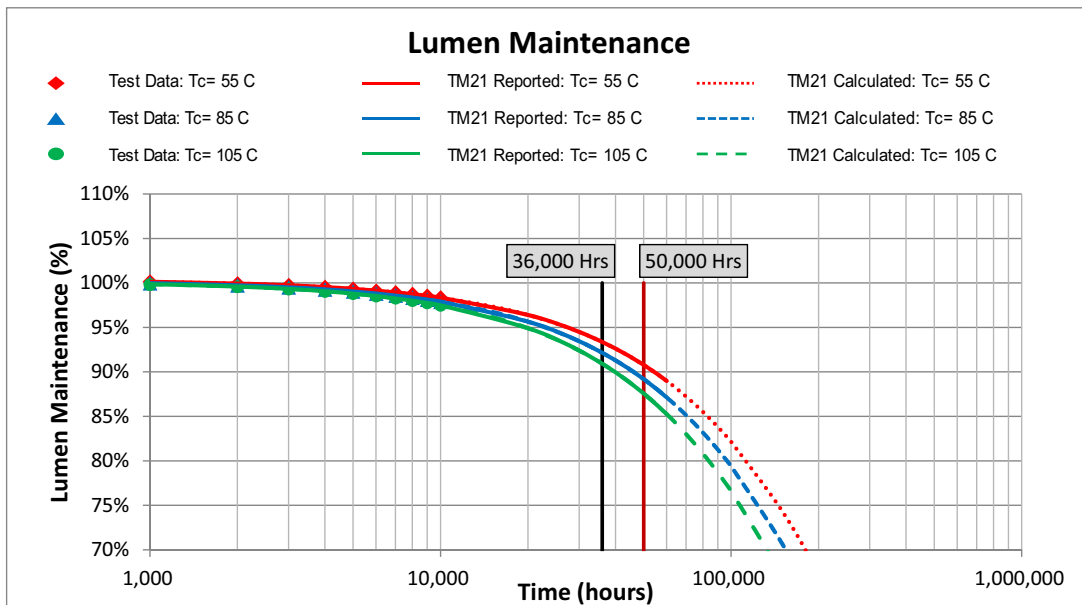
## Energy Star™ TM-21 Calculator Data

Tc Module	Reported L70	Reported L90
55°C	>60,000 Hrs	54,000 Hrs
85°C	>60,000 Hrs	46,000 Hrs
105°C	>60,000 Hrs	40,000 Hrs

Tc Module	Calculated L70	Calculated L90
55°C	180,000 Hrs	54,000 Hrs
85°C	154,000 Hrs	46,000 Hrs
105°C	133,000 Hrs	40,000 Hrs

## LED Lumen & Color Maintenance Data per LM-80 report and TM-21 Calculator





# VMU045010EC9xxC

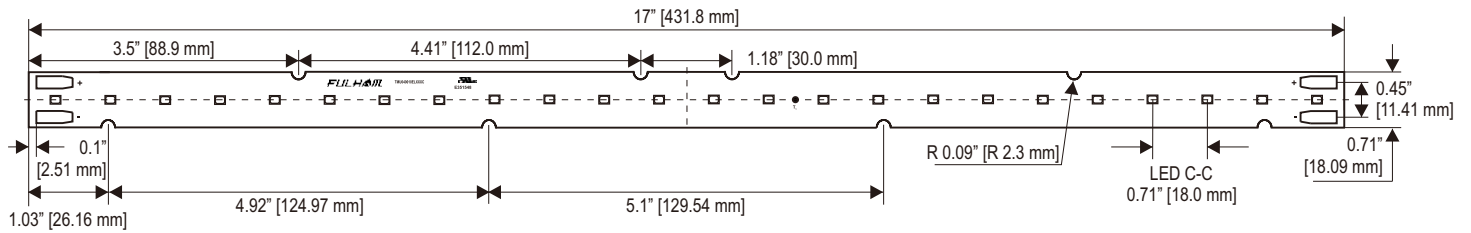


## Mechanical Drawings

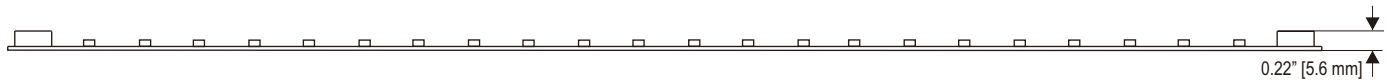
VMU045010EC9XXC

Overall Dimensions	
Length	17" [431.8mm]
Width	0.71" [18.09mm]
Height	0.22" [5.6mm]

**Top View**



**Side View**



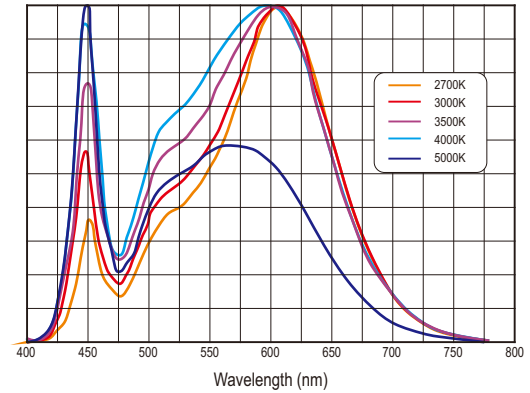
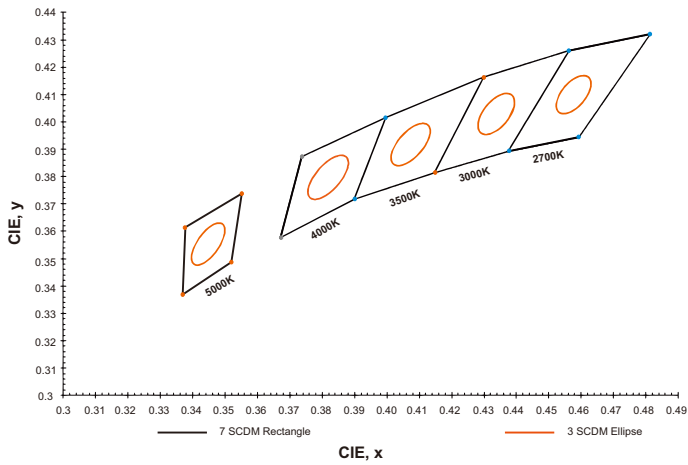


# VMU045010EC9xxC



## Color and Binning

## Optical Spectrum



## Compatible Fulham Drivers

(Please use the links below for a complete list of compatible Fulham drivers and wiring diagrams)

- Eco Series System Combination:
- Fulham's Wiring Diagrams: <https://cdn.fulham.com/PDFs/SpecSheets/DC-Modules-Wiring-Diagrams.pdf>
- Compatible with Fulham Hotspot EM Systems.

### NOTES:

- 1) The Color and Binning and Optical Spectrum charts are for reference only. For more detailed info, contact factory.
- 2) Reference Samsung Chromaticity Diagram for Color and Binning. Binning per ANSI C78.377-2015 @ 25°C; 3 SDCM.
- 3) The Optical Spectrum values vary depending on product type and color rank.
- 4) Driver not included.



# VMU045010EC9xxC



## Guidelines

### Termination Notes

- Connector Type: BJB Single Pole SMD Terminal Block, Part #: 46.131.1001.50
- URus Rating: 9A/300V; cUR Rating: 3A/300V
- Use solid wire size 24 – 18 AWG, rated at a minimum 50V, minimum 105°C, and stripped to length 8 mm (0.31 inches).
- To release wire, twist and pull the wire simultaneously.



### Optional Accessories - Interconnect Pins

- Single Interconnect Pin: Wago Part Number 2060-951  
Metal pin(s) to interconnect LED modules that are compatible with connector.  
For more detail information, please visit Wago's website: <http://www.wago.com/infomaterial/pdf/60291132.pdf>



### 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>.



### Environmental Rating

- LED DC Modules are rated for dry locations.

### 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. Max Tc of module should not be exceeded.
- Use of thermal grease, paste, pad, or other material interface is highly recommended.

### Polarity Notes

- LED DC 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.



# VMU045010EC9xxC



## Part Number Matrix

# V M U 045 010 EC 9 XX C

Product Line	Type	Control Type	Input Current	Typ. Power	Design	CRI	Color Temperature	Option
V = Vizion	M = Module (UL Class 2)	U = None	045 = 450mA Max.	010 = 10W	EC = Eco Series	Ⓣ9 = 90	27 = 2700K Ⓣ30 = 3000K Ⓣ35 = 3500K Ⓣ40 = 4000K 50 = 5000K	C = 17"

Ⓣ Standard Product offering (All other options are made to order with MOQ and lead time)

## Product Image: Eco DC Module

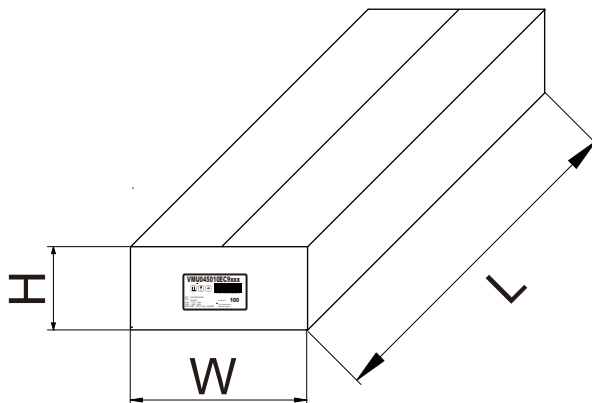


Top View

VMU045010EC9XXC

## Packaging

### Master Carton



OUTER DIMENSION		
L	W	H
18.11"(460mm)	6.69"(170mm)	4.72"(120mm)
Net Weight	Gross Weight	QUANTITY
5.95 lbs. (2.7kg)	8.20 lbs. (3.73kg)	100pc.