



# VHU150080LNFWR-46

## 46" HORTICULTURAL DC MODULE, 80W, 1500mA MAX CURRENT

- White + Red spectrum for horticultural application
- High PPF, high PPE up to 3.0  $\mu\text{mol}/\text{j}$
- Suitable for multilayer cultivation, leafy vegetables
- Low Profile design, direct mount to luminaire
- For use in UL Class 2 lighting systems
- Meets UL8750 recognized
- RoHS compliant
- The module is supplied by short circuit proof SELV controlgear

### General Specifications

|                                                             | Low                                                                                                                                                                 | Medium                                  | High                                    |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------|
| Input Voltage                                               | 49.4VDC                                                                                                                                                             | 50.9VDC                                 | 52.0VDC                                 |
| Input Current                                               | 500mA                                                                                                                                                               | 1000mA                                  | 1500mA                                  |
| Input Power                                                 | 24.7W                                                                                                                                                               | 50.9W                                   | 78.1W                                   |
| Initial Photosynthetic Photon Flux (PPF, 400-700nm)         | 81 $\mu\text{mol}/\text{s}$                                                                                                                                         | 163 $\mu\text{mol}/\text{s}$            | 241 $\mu\text{mol}/\text{s}$            |
| Initial Photosynthetic Photon Efficacy (PPE, 400-700nm)     | 3.30 $\mu\text{mol}/\text{j}$                                                                                                                                       | 3.21 $\mu\text{mol}/\text{j}$           | 3.08 $\mu\text{mol}/\text{j}$           |
| Initial Far-Red Photon Flux (PF <sub>FR</sub> , 700-800nm)  | 1.5 $\mu\text{mol}/\text{s}$                                                                                                                                        | 3.0 $\mu\text{mol}/\text{s}$            | 4.5 $\mu\text{mol}/\text{s}$            |
| Max. PPFD @ 12" distance                                    | 168 $\mu\text{mol}/\text{m}^2/\text{s}$                                                                                                                             | 337 $\mu\text{mol}/\text{m}^2/\text{s}$ | 497 $\mu\text{mol}/\text{m}^2/\text{s}$ |
| Initial Lumen Output                                        | 5072 lm                                                                                                                                                             | 10134 lm                                | 14899 lm                                |
| Initial Luminous Efficacy                                   | 205 lm/W                                                                                                                                                            | 199 lm/W                                | 191 lm/W                                |
| Beam Angle (without lens)                                   | 120°                                                                                                                                                                |                                         |                                         |
| CRI                                                         | 85CRI                                                                                                                                                               |                                         |                                         |
| Light recipe in Photon Flux% (400-800nm)                    | Blue (400-500nm): 14.2%      Red (600-700nm): 46.3%<br>Green (500-600nm): 37.7%      Far-Red (700-800nm): 1.8%                                                      |                                         |                                         |
| Storage Temperature Range                                   | -40°C to 100°C / -40°F to 212°F                                                                                                                                     |                                         |                                         |
| Operating Temperature Range (ta)                            | -40°C to 60°C / -40°F to 140°F (Need to evaluate together with heatsink)                                                                                            |                                         |                                         |
| Maximum Case Temperature (Tc)                               | Tc max 105°C                                                                                                                                                        |                                         |                                         |
| Photon Flux Maintenance, Photosynthetic (PFM <sub>p</sub> ) | White chip: Q90=42,000Hrs; Red chip: Q90=36,000Hrs @ Max. Tc                                                                                                        |                                         |                                         |
| Photon Flux Maintenance, Far-Red (PFM <sub>FR</sub> )       | White chip: Q90=30,000Hrs; Red chip: Q90=39,000Hrs @ Max. Tc                                                                                                        |                                         |                                         |
| Color Consistency                                           | N/A                                                                                                                                                                 |                                         |                                         |
| Overall Size                                                | 46" L x 0.866" W x 0.24" H (1168.4mm x 22mm x 6.1mm)                                                                                                                |                                         |                                         |
| PCB Material / Thermal Conductivity                         | MCPCB (Aluminum Clad) / 1.5W / mK                                                                                                                                   |                                         |                                         |
| Extruded Material / Finish                                  | Aluminum / surface treatment with Anodic Oxidation                                                                                                                  |                                         |                                         |
| LED Quantity                                                | 340pcs.                                                                                                                                                             |                                         |                                         |
| Module Weight                                               | 286g / 0.63lb                                                                                                                                                       |                                         |                                         |
| PCB Part Number                                             | PTL065C01M1                                                                                                                                                         |                                         |                                         |
| Maximum Screw Installation Torque                           | 25 inch - ounces                                                                                                                                                    |                                         |                                         |
| Connector Type                                              | WAGO #2060-452 / 998-404 (2 pin connector)                                                                                                                          |                                         |                                         |
| Packaging: Master Carton                                    | 40pcs                                                                                                                                                               |                                         |                                         |
| Thermal Feedback                                            | Not Available                                                                                                                                                       |                                         |                                         |
| Safety/Compliance                                           | cURus (File # E351548)<br>Suitable for UL Class 2 Lighting Systems<br>RoHS Compliant<br>Dry and Damp Location<br>CE (IEC 62031: 2008. AMD1: 2012, AMD2: 2014), SELV |                                         |                                         |
| Warranty                                                    | 5 years @ Max. Tc from the date of manufacture                                                                                                                      |                                         |                                         |



# VHU150080LNFWR-46



## Electrical and Optical Specifications

| Module Part Number | Number of LED | Input Current | Nom. Fwd. Voltage | Nom. Rated Power | Max. Fwd. Voltage | Max. Rated Power | Nom. PPF (400-700nm) | Nom. PPE (400-700nm) | Nom. PPF <sub>FR</sub> (700-800nm) | Nom. Lum. Flux | Nom. Efficacy |
|--------------------|---------------|---------------|-------------------|------------------|-------------------|------------------|----------------------|----------------------|------------------------------------|----------------|---------------|
| VHU150080LNFWR-46  | 340           | 500 mA        | 49.4 V            | 24.7 W           | 53 V              | 27 W             | 81 µmol/s            | 3.30 µmol/j          | 1.5 µmol/s                         | 5072 lm        | 205 lm/W      |
|                    |               | 550 mA        | 49.6 V            | 27.3 W           | 53 V              | 29 W             | 90 µmol/s            | 3.29 µmol/j          | 1.7 µmol/s                         | 5591 lm        | 205 lm/W      |
|                    |               | 600 mA        | 49.7 V            | 29.8 W           | 53 V              | 32 W             | 98 µmol/s            | 3.29 µmol/j          | 1.8 µmol/s                         | 6108 lm        | 205 lm/W      |
|                    |               | 650 mA        | 49.9 V            | 32.4 W           | 53 V              | 34 W             | 106 µmol/s           | 3.28 µmol/j          | 2.0 µmol/s                         | 6622 lm        | 204 lm/W      |
|                    |               | 700 mA        | 50.0 V            | 35.0 W           | 54 V              | 38 W             | 115 µmol/s           | 3.28 µmol/j          | 2.1 µmol/s                         | 7132 lm        | 204 lm/W      |
|                    |               | 750 mA        | 50.2 V            | 37.6 W           | 54 V              | 41 W             | 123 µmol/s           | 3.27 µmol/j          | 2.3 µmol/s                         | 7640 lm        | 203 lm/W      |
|                    |               | 800 mA        | 50.3 V            | 40.3 W           | 54 V              | 43 W             | 131 µmol/s           | 3.25 µmol/j          | 2.4 µmol/s                         | 8145 lm        | 202 lm/W      |
|                    |               | 850 mA        | 50.5 V            | 42.9 W           | 54 V              | 46 W             | 139 µmol/s           | 3.24 µmol/j          | 2.6 µmol/s                         | 8647 lm        | 202 lm/W      |
|                    |               | 900 mA        | 50.6 V            | 45.5 W           | 54 V              | 49 W             | 147 µmol/s           | 3.23 µmol/j          | 2.7 µmol/s                         | 9145 lm        | 201 lm/W      |
|                    |               | 950 mA        | 50.7 V            | 48.2 W           | 54 V              | 51 W             | 155 µmol/s           | 3.22 µmol/j          | 2.9 µmol/s                         | 9641 lm        | 200 lm/W      |
|                    |               | 1000 mA       | 50.9 V            | 50.9 W           | 54 V              | 54 W             | 163 µmol/s           | 3.21 µmol/j          | 3.0 µmol/s                         | 10134 lm       | 199 lm/W      |
|                    |               | 1050 mA       | 51.0 V            | 53.5 W           | 55 V              | 58 W             | 171 µmol/s           | 3.20 µmol/j          | 3.2 µmol/s                         | 10624 lm       | 199 lm/W      |
|                    |               | 1100 mA       | 51.1 V            | 56.2 W           | 55 V              | 61 W             | 179 µmol/s           | 3.18 µmol/j          | 3.3 µmol/s                         | 11111 lm       | 198 lm/W      |
|                    |               | 1150 mA       | 51.2 V            | 58.9 W           | 55 V              | 63 W             | 187 µmol/s           | 3.17 µmol/j          | 3.5 µmol/s                         | 11595 lm       | 197 lm/W      |
|                    |               | 1200 mA       | 51.4 V            | 61.6 W           | 55 V              | 66 W             | 195 µmol/s           | 3.16 µmol/j          | 3.6 µmol/s                         | 12076 lm       | 196 lm/W      |
|                    |               | 1250 mA       | 51.5 V            | 64.3 W           | 55 V              | 69 W             | 202 µmol/s           | 3.15 µmol/j          | 3.8 µmol/s                         | 12554 lm       | 195 lm/W      |
|                    |               | 1300 mA       | 51.6 V            | 67.1 W           | 55 V              | 72 W             | 210 µmol/s           | 3.13 µmol/j          | 3.9 µmol/s                         | 13029 lm       | 194 lm/W      |
|                    |               | 1350 mA       | 51.7 V            | 69.8 W           | 55 V              | 74 W             | 218 µmol/s           | 3.12 µmol/j          | 4.1 µmol/s                         | 13501 lm       | 193 lm/W      |
|                    |               | 1400 mA       | 51.8 V            | 72.5 W           | 55 V              | 77 W             | 225 µmol/s           | 3.11 µmol/j          | 4.2 µmol/s                         | 13970 lm       | 193 lm/W      |
|                    |               | 1450 mA       | 51.9 V            | 75.3 W           | 56 V              | 81 W             | 233 µmol/s           | 3.10 µmol/j          | 4.3 µmol/s                         | 14436 lm       | 192 lm/W      |
|                    |               | 1500 mA*      | 52.0 V            | 78.1 W           | 56 V              | 84 W             | 241 µmol/s           | 3.08 µmol/j          | 4.5 µmol/s                         | 14899 lm       | 191 lm/W      |

### NOTES:

- 1) Performance based on T<sub>c</sub> mod = 25°C. See thermal de-rating chart (pg. 3) for higher temperature operation
- 2) Specifications are subject to change without notice.
- 3) The LED DC Module can be configure with different LED chip quantities, series and parallel design configurations to meet a specific design requirement. Contact Fulham for further assistance.
- 4) \* Indicates maximum rated current. Modules may be operated at a current less than or equal to this value, below the T<sub>c</sub> rating.



# VH150080LNFWR-46

## Thermal Specifications

### Horticultural DC Module

|                                          |                               |
|------------------------------------------|-------------------------------|
| Storage Temperature Range                | -40 to +100°C / -40 to +212°F |
| Operating Ambient Temperature Range (ta) | -40 to 60°C / -40 to 140°F *  |
| Maximum Case Temperature (Tc)            | 105°C / 221°F                 |

\* need to evaluate together with heatsink

## Thermal De-Rating

### Tc vs. Forward Voltage vs. PPF

| Module Case Temperature (Tc) | Total Vf Multiplier | PPF Multiplier |
|------------------------------|---------------------|----------------|
| 25°C                         | 1.000               | 1.000          |
| 30°C                         | 0.998               | 0.996          |
| 35°C                         | 0.996               | 0.991          |
| 40°C                         | 0.994               | 0.987          |
| 45°C                         | 0.992               | 0.982          |
| 50°C                         | 0.990               | 0.978          |
| 55°C                         | 0.988               | 0.974          |
| 60°C                         | 0.986               | 0.969          |
| 65°C                         | 0.984               | 0.965          |
| 70°C                         | 0.982               | 0.960          |
| 75°C                         | 0.981               | 0.956          |
| 80°C                         | 0.979               | 0.952          |
| 85°C                         | 0.977               | 0.947          |
| 90°C                         | 0.975               | 0.943          |
| 95°C                         | 0.973               | 0.938          |
| 100°C                        | 0.971               | 0.934          |
| 105°C                        | 0.969               | 0.930          |



# VHU150080LNFWR-46



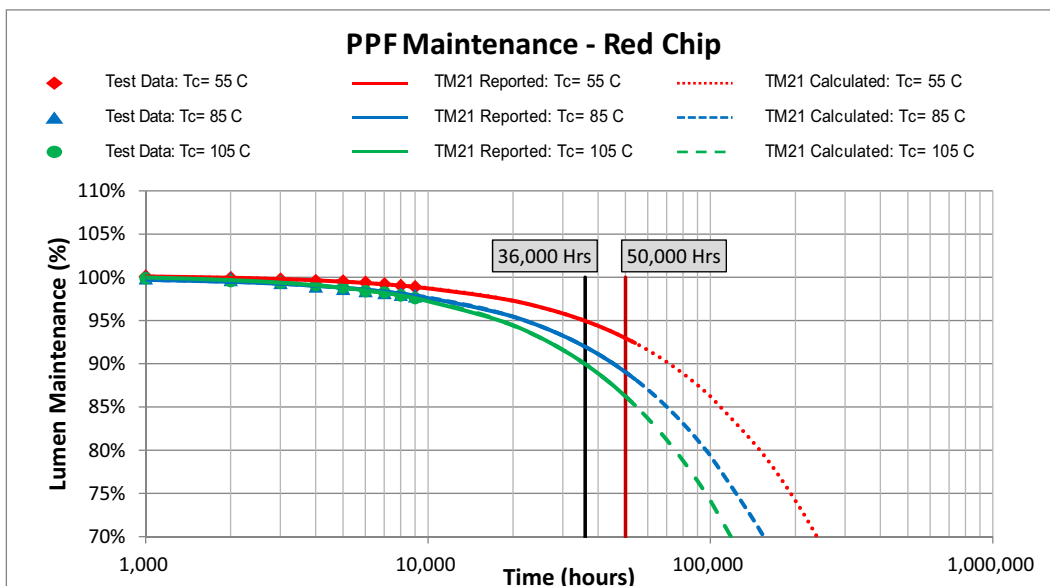
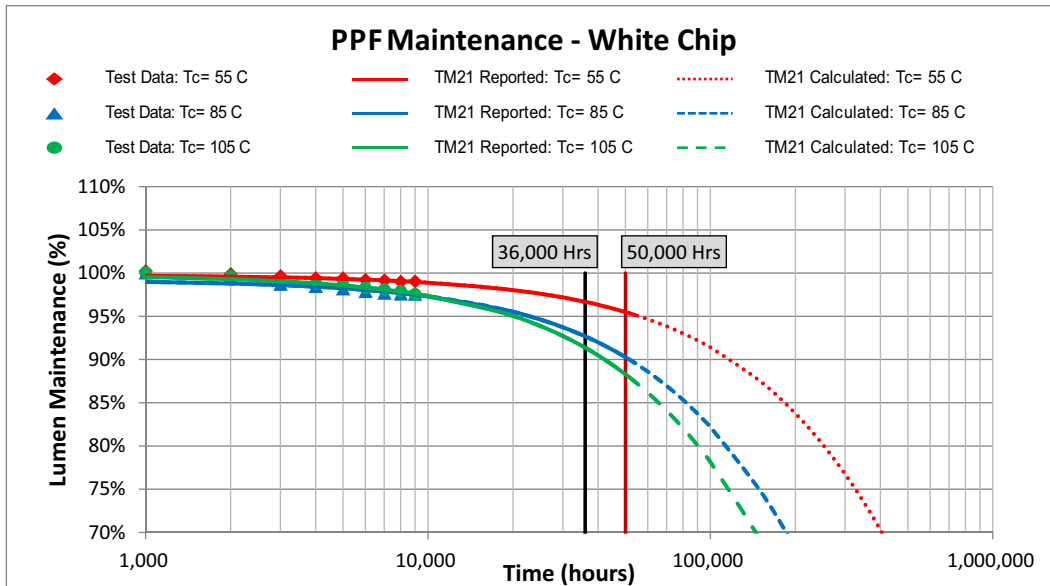
## Certification Chart

| Model                                   | VHU150080LNFWR-46 |
|-----------------------------------------|-------------------|
| Classification                          |                   |
| RoHS COMPLIANT                          | YES               |
| cUL US                                  | YES               |
| CE                                      | YES               |
| Suitable for UL Class 2 Lighting System | YES               |

## Photon Flux Maintenance (Reported Q90)

| White Chip |                                    |                              |
|------------|------------------------------------|------------------------------|
| Tc Module  | Photosynthetic (PFM <sub>p</sub> ) | Far-Red (PFM <sub>FR</sub> ) |
| 55°C       | > 54,000 Hrs                       | 41,000 Hrs                   |
| 85°C       | 52,000 Hrs                         | 36,000 Hrs                   |
| 105°C      | 42,000 Hrs                         | 30,000 Hrs                   |
| Red Chip   |                                    |                              |
| Tc Module  | Photosynthetic (PFM <sub>p</sub> ) | Far-Red (PFM <sub>FR</sub> ) |
| 55°C       | > 54,000 Hrs                       | 51,000 Hrs                   |
| 85°C       | 45,000 Hrs                         | 48,000 Hrs                   |
| 105°C      | 36,000 Hrs                         | 39,000 Hrs                   |

## LED PPF Maintenance Data per LM-80 report and TM-21 Calculator

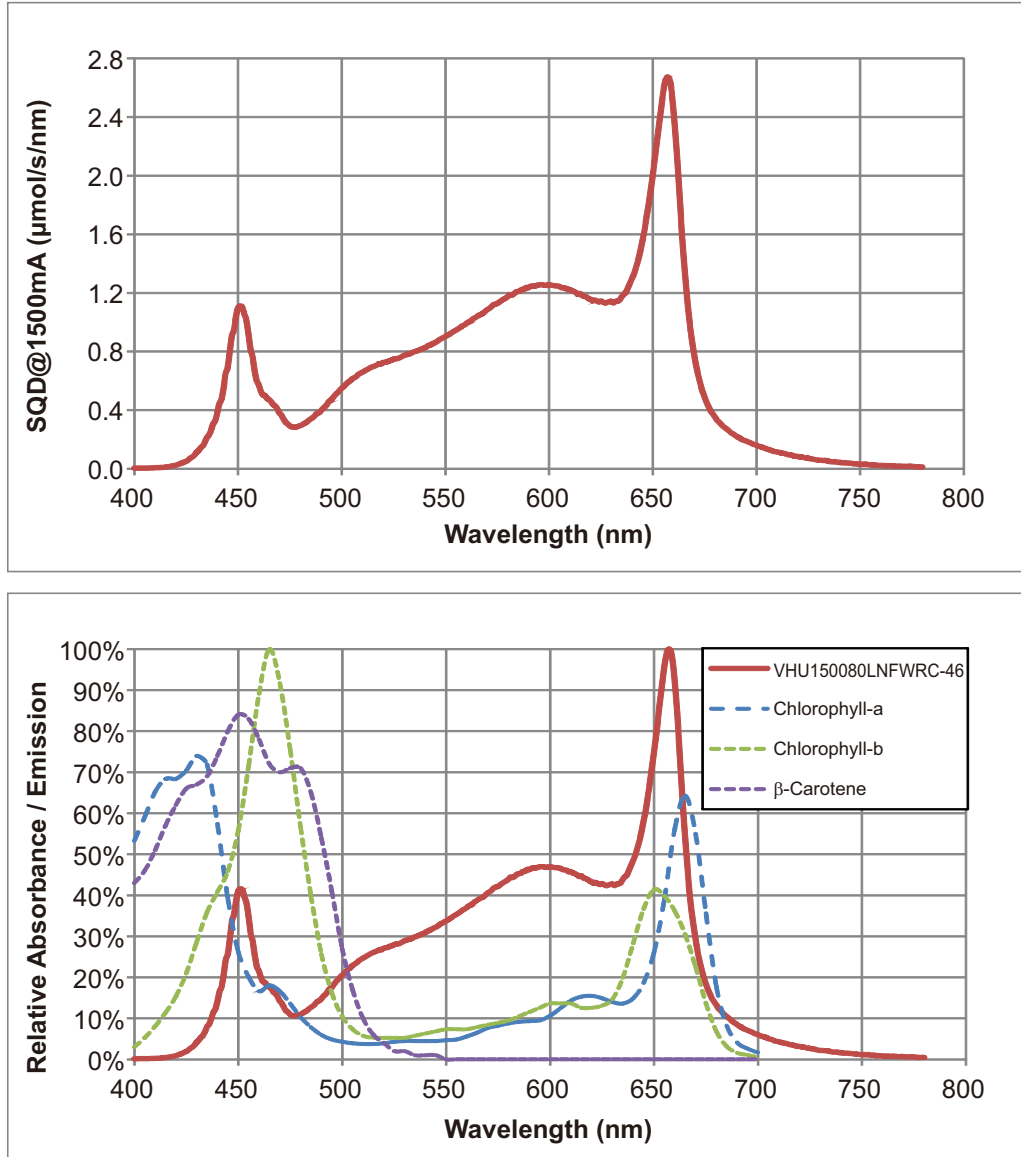




# VHU150080LNFWR-46



## Spectral Quantum Distribution (SQD)



## Compatible Fulham Drivers

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

- System Combination:
- Fulham's Wiring Diagrams: <https://cdn.fulham.com/PDFs/SpecSheets/DC-Modules-Wiring-Diagrams.pdf>

### NOTES:

- 1) The Optical Spectrum charts are for reference only. For more detailed info, contact factory.
- 2) The Optical Spectrum values vary depending on product type and color rank.
- 3) Driver not included.
- 4) Do not connect the Modules in parallel (end to end) if the current exceeds the maximum module rated current. This type of wiring would cause the pass-through current on the first module to exceed the rated current. This setup is in reference to wiring diagram #2 per Fulham's wiring diagram (see the link above). If the current is higher than the rated max, it is recommended to use wiring diagram #3.



# VHU150080LNFWR-46

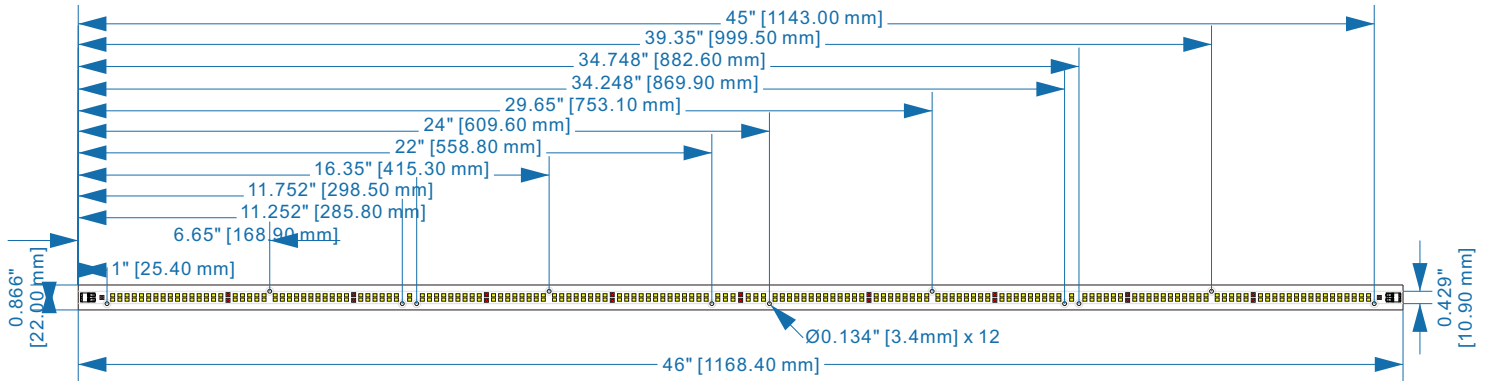
## Mechanical Drawings

**46"**

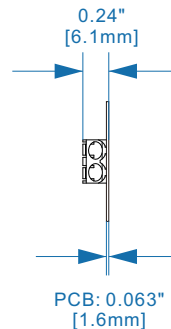
[1168.4mm]

### Overall Dimensions

|        |                   |
|--------|-------------------|
| Length | 46"<br>[1168.4mm] |
| Width  | 0.866"<br>[22mm]  |
| Height | 0.24"<br>[6.1mm]  |



TOP VIEW



SIDE VIEW



# VHU150080LNFWR-46

## Guidelines

### Termination Notes

- Connector Type: WAGO #2060-452 / 998-404 (2 pin push wire connector)
  - AWG: 24...18 solid wire
  - Strip length: 7...9mm / 0.28...0.35in
  - Connector Max amp. rating: 9 Amps.



For more detail information, please visit Wago's website: <http://www.wago.com/infomaterial/pdf/51300133.pdf>

### Fastening Notes

- If fastening by screw hole a recommended screw size: 6-20 x 5/8" flat head drilling screws. Use all available screw holes to ensure good contact between back side of module and mounting surface. Refer to max specified torque for installation.
- 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>.
- HEYCO HEYClip Snap Rivets 9035 is recommended for fast and easy installation with clean and finish look. For more detail information, please visit Heyco website: [https://www.heyco.com/Nylon\\_PVC\\_Hardware/product.cfm?product=Snap-Rivets](https://www.heyco.com/Nylon_PVC_Hardware/product.cfm?product=Snap-Rivets)



Heyco Rivet 9035

### Environmental Rating / Conformal Coating

- The Horticultural Modules have been evaluated for use in dry or damp locations only. If used in wet locations, acceptability and the need for additional evaluation shall be determined in the end product.
- Fulham's Horticultural Modules are optional for conformal coated. The conformal coating, is a silicone based material which is double sprayed on the module only (LEDs and PCB). Conformal coating is recommended for the following applications: near ocean where salt is present, constant moisture, refrigeration, continuously high humidity, or outdoor applications. An IP rating of IP64 or IP65 is achieved when the conformal coating is used, but other factors should be considered. Fulham still recommends the luminaire also meet an IP64/65 rating.

### 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

- DC Horticultural 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.



VHU150080LNFWR C-46



Part Number Matrix

**V H U 150 080 LN FWR C-46**

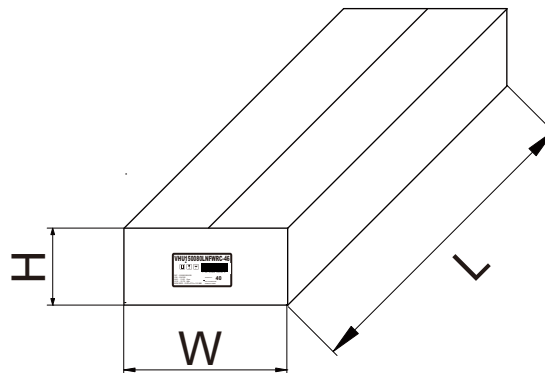
| Product Line            | Type                          | Control  | Max. Input Current | Max. Power | Design      | Spectrum Option   | Option                    | Length   |
|-------------------------|-------------------------------|----------|--------------------|------------|-------------|-------------------|---------------------------|----------|
| V = Vizion<br>FarmHorse | Horticultural<br>(UL Class 2) | U = None | 150 = 1500mA       | 080 = 80W  | LN = Linear | FWR = White + Red | C = 320 white<br>+ 20 Red | 46 = 46" |

Product Image: Horticultural Module

VHU150080LNFWR C-46

Packaging

Master Carton



| OUTER DIMENSION        |                         |               |
|------------------------|-------------------------|---------------|
| L                      | W                       | H             |
| 45.47" (1155mm)        | 10.63" (270mm)          | 4.33" (110mm) |
| Net Weight             | Gross Weight            | QUANTITY      |
| 25.2 lbs.<br>(11.43kg) | 28.19 lbs.<br>(12.79kg) | 40pc.         |