VERTICALLY URBAN

LED GROW LIGHTING SOLUTIONS

MADE IN BRITAIN

V010.02.21

Glossary of technical terms

Spectrum

Our enhanced spectrum LED grow lights use a blend of 450nm blue and 660nm red LEDs to provide a highly efficient solution for horticultural applications. The light intensity distribution has been calibrated to provide optimal light absorption through a stable, optical source, reducing 'hot spots' which can occur in other lighting products.

Passive Cooling

The advancement of LED technology has allowed us to design high-powered LED grow light with passive convection cooling. This fanless design means no moving parts are required for cooling, our system is extremely robust, offers an enhanced lifespan and operates with significantly reduced noise output.

Modular

The efficiency of our LED emitter technology is developing at a rate of around 6% per year, leading to the release of an updated product every five years. We wanted to deliver an LED grow light that could be easily upgraded by the user to future-proof the unit, allowing it to be adapted to developments in technology. Using smart designs has enabled us to develop product that is modular for our manufacturing processes, ensuring that the simple and safe electrical connections are accessible for future updates. The drivers like the LED modules (in some products) are also easily upgradeable/interchangeable via IP66 rated easy connectors and multiple mounting options.

TIR Optics

Our system features newly developed optical technology. Progressing from the lens series developed in our range, we sought to develop a solution that could achieve the same homogeneous distribution but in a single optical stage as opposed to multiple lenses. The resulting optics have a transmission efficiency of 93% and provide a stable homogeneous distribution, reducing hot spots in the beam angle. These developments in technology allow for a significant increase in the PAR (Photosynthetically Active Radiation) absorption by plants and improved plant quality and health.

PAR, PPF, PPFD AND DLI

There are a few terms that are important to know when considering grow lights: PAR, PPF, PPFD, and DLI. They are used often by grow light distributors and manufacturers, with some even describing their products using lumens. So what do they all mean and why are they important?

PAR (Photosynthetically Active Radiation)

PAR refers to the spectral range of radiation that is utilized by plants to drive photosynthesis. This range is 400-700nm (nanometers) however recent research suggests that plants utilize light outside this range causing many companies to use an extended PAR range of 380-780nm. When grow lights are advertised as "full spectrum", it means they emit wavelengths from the entire PAR range. PAR is not a measurement itself but is something one measures. The amount of PAR that reaches your crops from your grow light is what you want to know before investing.

PPF (Photosynthetic Photon Flux)

PPF is a way of quantifying PAR, it measures the total number of photons in the 400-700nm range a light source emits per second and is measured in micromoles per second (µmol/s). PPF is measured using a piece of equipment called an integrating sphere which Vertically Urban have as part of our lab. Knowing the PPF allows you to find out how efficient a light is. For example, how many photons in the PAR range are emitted per unit of energy the light draws. This is done by dividing the PPF by the wattage of the light to get a value for PPF efficiency measured in mol/joule (since watts are measured in joules per second) and the higher the value, the better the efficiency. µmol/j and efficiency are important metrics that you should know before buying a grow light. A light may look impressive with a high wattage but this does not always equate to better growth. You could end up throwing money away on an expensive lighting system and all the power it consumes for results that could be achieved with a less powerful but more efficient system that costs less.

PPFD (Photosynthetic Photon Flux Density)

PPFD (Photosynthetic Photon Flux Density) PPFD is the total number of photons in the PAR range that hit a square meter per second from a light source measured in µmol/m2s (alternatively written µmol m-2 s-1).
It determines the amount of PAR light reaching the crop canopy from a light source by using a quantum sensor that measures PPFD such as the Apogee SQ-520. These sensors measure the amount of PAR light reaching at a certain point each second and uses this reading to approximate for a square meter. This approximation works well for a fully homogenous light source like sunlight however for artificial lights, many readings should be taken over a square meter to get an accurate average PPFD measurement as results will be at a maximum directly under the light then will decrease as the sensor is moved away. Of course, these sensors can be costly to consumers, so companies often do their own tests on their lights and produce a PPFD map which may only capture the highpoint of the output directly under the light source. A PPFD map is a grid that shows the PPFD value measured at multiple points over a certain surface area at a specified distance from the light source. For example, a company may hang their light 60cm (24") from a 90cm x 90cm (36"x 36") surface area and take 100 measurements (10cm apart). These maps can be useful when buying a grow light however they can also be misleading as it is very easy to fabricate good results, by only measuring over a small area directly underneath the light or measuring in a reflective environment. There is no standard for producing PPFD maps, they are not the best way to compare the light output of grow lights. All of these properties noted above reflect the measure and influence of red and blue light in the multiple stages of the cannabis growth cycle. We use the precise number of micromoles (µmol) at each stage, throughout the growing process.

DLI (Daily Light Integral)

DLI is the number of photons in PAR range that are delivered to a square meter over the course of a day. It is often calculated by measuring the PPFD throughout the day then using the following data to estimate the DLI. This is an important metric to know as different types of plants require varied DLI for optimum growth. Growers in greenhouses often calculate the DLI they receive from the sun (which varies due to many factors including, latitude, seasons, weather conditions and greenhouse transmission efficiency) so that they can provide the correct amount of DLI from their grow lights to meet their crops needs. Indoor growers, however, rely solely on grow lights to provide the required DLI, which is why the lights are placed much closer to the canopy than they are in a greenhouse. It's worth noting that some plant species require a certain length of darkness over a day to trigger stages such as vegetative growth and flowering.

YPF (Yield Photon Flux)

Yield photon flux is another way of quantifying PAR. It differs from PPF in that PPF weights all wavelengths equally, whereas YPF is weighed to reflect how photons absorbed by plants yield different amounts of photosynthesis depending on their wavelength (350-750nm).

Photomorphogenesis

Photomorphogenesis is plant development that is triggered by light, such as seed germination, seedling development and flowering in photoperiod crops. This development triggers photoreceptors in the plant that respond to absorbing certain wavelengths of light. Typically plants contain phytochromes, which are photoreceptors that respond to red and far-red light, and cryptochromes that respond to blue light. Our light uses the correct mix of red and blue light to make the process of photo morphogenesis required at the various stages of growth in cannabis. By using our switching system, we can accurately set the optimal mix of blue and red to maximize growth and flowering.

Red Light and Far Red Light

Red and Far-red light trigger many developmental processes in plants. Phytochromes are responsible for processes such as flowering in short and long day plants, stem elongation in response to shade and the production of flavonoids such as anthocyanin (blue-purple plant pigment). There are two forms of phytochromes; the red light absorbing Pr and far-red light absorbing Pfr. Pr converts into Pfr after absorbing red light and Pfr converts into Pr after absorbing far-red light. Red light is generally available to plants during the daytime, with far-red light available in the shade and during the night, therefore plants use Pfr and Pr levels to determine when there are changes in the length of daylight and when they are in the shade.

Blue Light

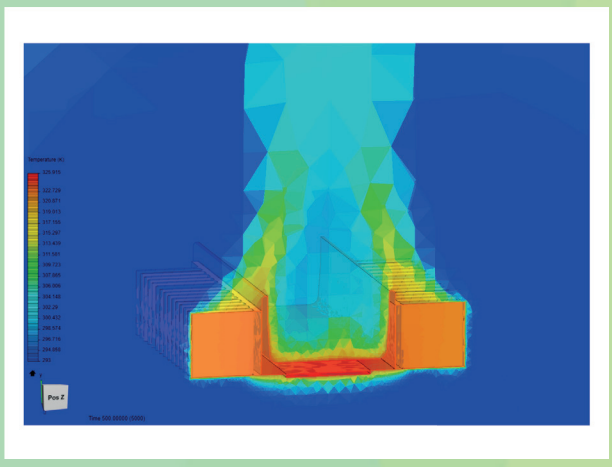
Blue light is responsible for similar processes to red and far-red light. One of the differences is that cryptochromes (which absorb blue light) can inhibit stem elongation. This means that adding more blue light to a spectrum could be ideal for those looking to offset the stretch that can be caused by far-red light (shade response). This often occurs in greenhouses where there is an abundance of far-red light. Blue light is also the trigger for photo-tropism where plants move and grow towards the light.

Micromoles (µmol)

Photons are measured in Micromoles. Blue photons are a short wavelength and red are a long wavelength. Plants are only interested in the number of photons to bind molecules of CO2 for photosynthesis. Our balance of micromoles per watt in the red and blue, optimise the correct growth rate required in cannabis at all stages required to make the best flowering plant possible.
Using our efficient photon extraction optic, we can make the spread of light as even as possible to give maximum coverage across the growing area.

VERTICALLY URBAN

Vertically Urban is a horticultural specialist in LED lighting solutions. We design and manufacture our products in the United Kingdom with the highest photon yielding LEDs available.We offer solutions for Top Lighting, Inter Lighting and Vertical farming. We only work with quality suppliers of electronic components and as a result deliver some of the highest yields in PPF on the market. Our R&D division are experts at designing luminaries and electronics.
Our mission is to deliver efficient lighting solutions that are easy to install, configure and control. We work hand in hand with our grow partners to deliver metrics that stand up to the requirement for either flexible tuneable solutions or to a specific recipe.



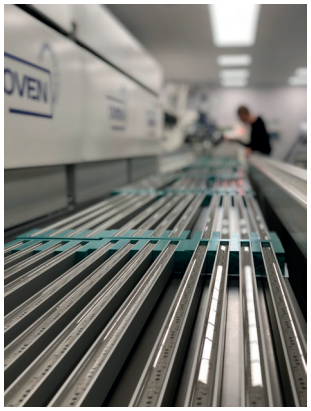
We deliver bespoke solutions to meet your crops needs. We have a range of LED products to suit a variety of crops from leafy greens, microgreens, tomatoes, lettuce, cucumber and other grows. We also offer solutions for medicinal cannabis growers as our spectrum-driven solutions provide a perfect entry into indoor growing requirements.

Technology

Our Horti-grow light engines are designed and manufactured in-house in the United Kingdom. We use the latest in LED technology and efficiency to achieve high levels of light output for optimum µmol/J ratings. This provides increased PPFD to your crop matter. We have various research led spectra in our product offering which in most cases is crop dependant. Our engineers have designed our products with ambient conditions taken into account and where required, an ingress protection of up to IP68 is achieved.
We use optimum heat-sinking technology to reduce heat generated from the luminaires.

TIR optics - Total internal reflection optics.

In some of our luminaires we use TIR optics to beam shape the light distribution more effectively. A typical LED package outputs between 80 and 120°. In some cases the light energy requires specific focusing. The addition of secondary lenses achieves this to project more light into the canopy at different angles, ensuring increases in photons are placed deeper into the plant.

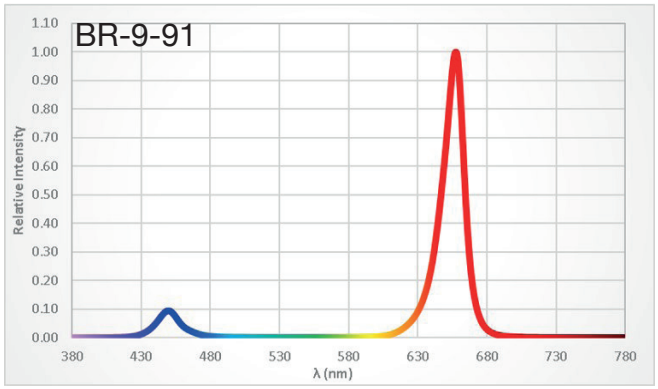


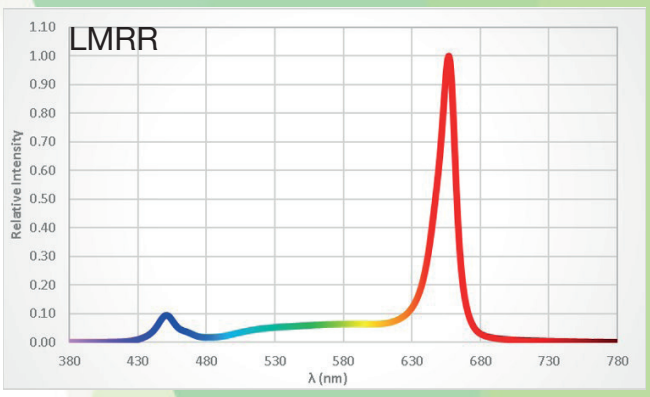
Encapsulation technology

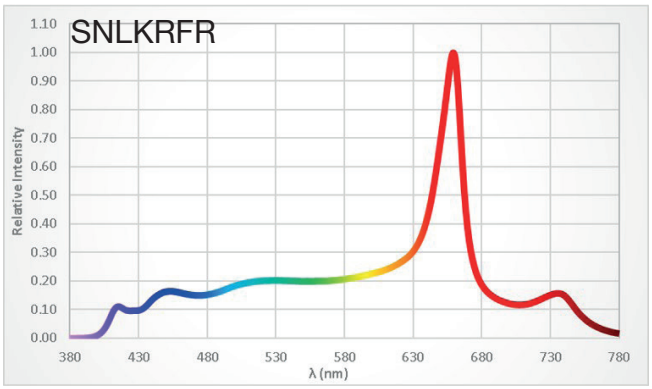
In some of our products, particularly our vertical farming range, complete encapsulation of the LED light engine is provided. This is achieved on our fully robotic resin production line. This process is done to protect the LED from water ingress and corrosion of the light engine. A vertical farm cleaning process can use harsh cleaning agents and in some cases high pressure cleaning methods to ensure both the racking and lighting is bacteria free between grow cycles. We use robust polyurethane resins that are optically transparent to create this ingress protection rating, coupled with IP68 rated interconnections.

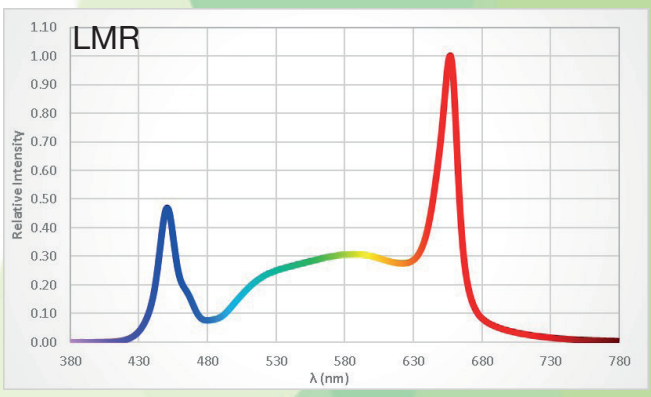
Spectra options.

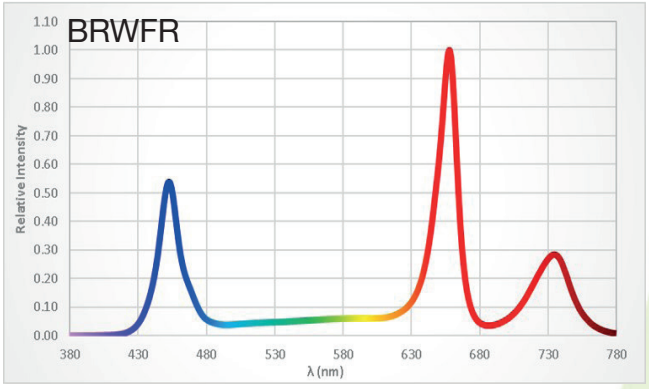
We recognise that not one growth spectrum fits all crops and that variation in a light that offers differences in PPF is also needed for different circumstances. That is why Vertically Urban has developed product for grow walls, vertical farming, grow pods, indoor glass houses or grow houses. We have a selection of 6 pre-set spectra for growers to chose from. In some cases our products can not only be dimmed but can also be tuned between channels, so a custom spectrum can be created or tested. If you require a custom spectrum for fixed application then our lab will work with you to create a light recipe to deliver this. Due to our in-house electronics PCBA build capability we are able to combine LEDs in a bespoke format to suit your needs. We also have in-house integrating sphere measurement equipment to provide you with spectrum results, power consumption and efficiency levels.

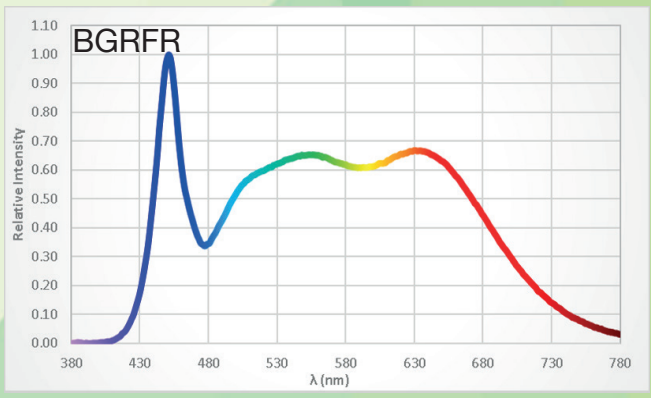






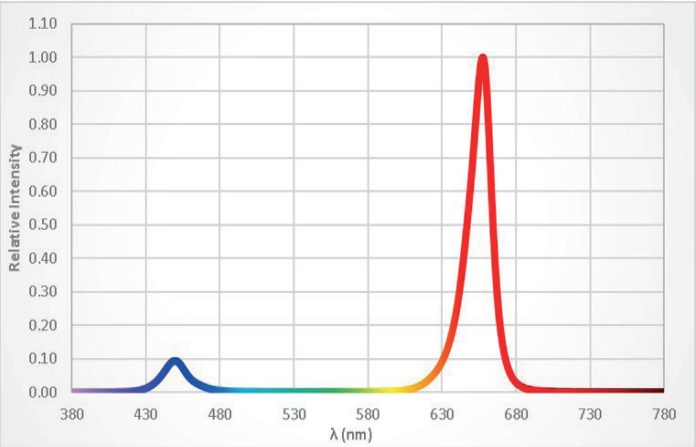






This specific spectrum is very energy efficient with a focus on 450nm blue and 660nm red. This is a 9 to 91% ratio. This is efficient in the amount of PPF vs power consumed and is by far one the most efficient ratios we offer. It is provided for a wide variety of crops and in particular leafy greens. This spectrum does emit a purple light output and visual inspection may require safety glasses.

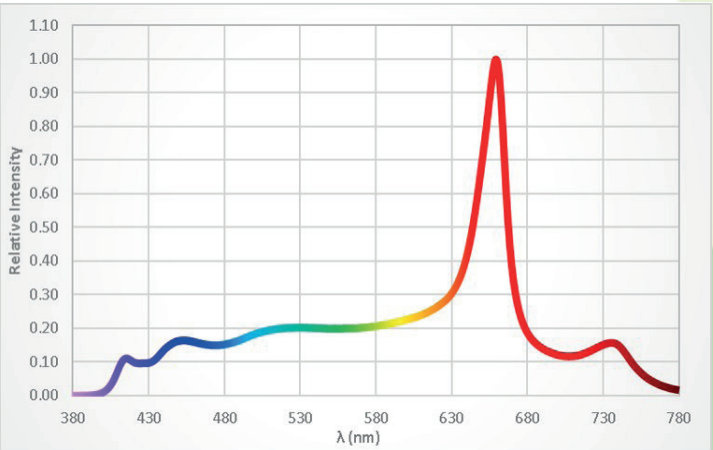
BR-9-91



PPF	%
BLUE	9%
GREEN	0%
RED	91%
FAR RED	0%

This is a spectrum for use in a variety, not for just mature crops - It is an enhanced full white light spectrum. This spectrum generates a white light as a visual apperance in the grow area,producing a comfortable 3900k light colour. Perfect for visual checking whilst providing a good balanced grow efficacy. The human eyes picks this wavelength up as crisp natural white light, creating a good environment for inspection. This spectrum has the added level of far red and a little more green in the mix.

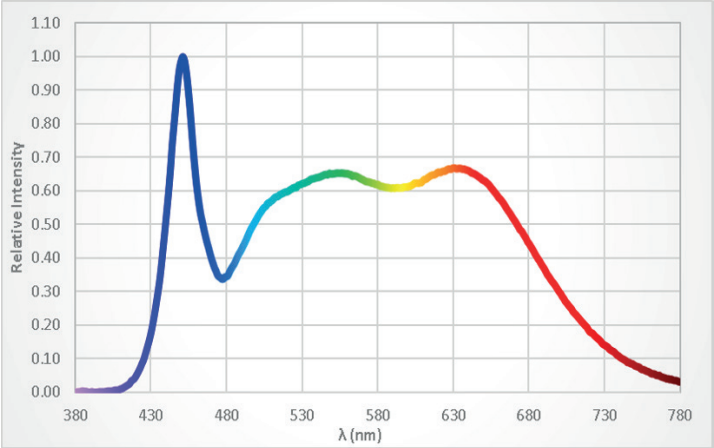
SNLKRFR



PPF	%
BLUE	17%
GREEN	26%
RED	48%
FAR RED	10%

This is a broad spectrum designed for indoor living wall spaces. Typically used in our track lights, it has the benefit of 96 CRI level and omits a crisp daylight white look of 5800k in CCT. It will aid the maintained wall of plants in the desired amount of light level. The grow walls are typically populated with plants that are irrigated from top to bottom providing a good living environment for the wall. This is spectrum that is not for commercial growers as it is designed to provide a good level of visual white light.

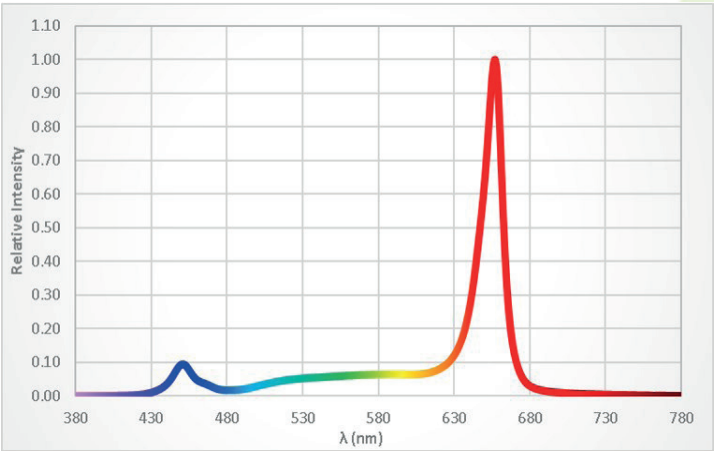
BGRFR



PPF	%
BLUE	23%
GREEN	37%
RED	34%
FAR RED	6%

This is a common spectrum for use in a variety of growing crops. It has a high level of red efficacy whilst emitting a warmer white light look in 2200k CCT range. It will aid and promote flowering, budding and leaf building. With a high content of red wavelength, cultivating crops such as bell peppers, egg plant, cucumbers and tomatoes and in some cases a variety of berries including leafy greens and micro greens. This spectrum is also good for cannabis flowering stage.The human eyes picks this wavelength up as warm white light, creating a satisfactory environment for inspection processes.

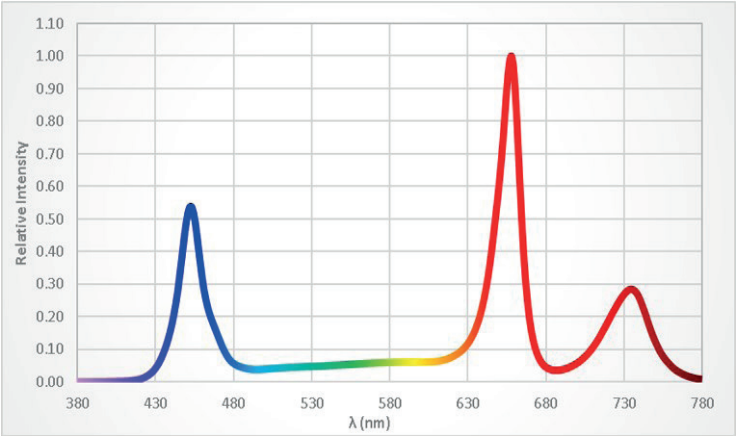
LMRR



PPF	%
BLUE	9%
GREEN	18%
RED	72%
FAR RED	1%

This is a 4 channel tuneable spectrum recipe designed to provide growers a full a variety spectrum choices to create light recipies. Balanced in Red content and added far red this spectrum is suited to vertical farms where a full coverage is required. When set to full power this spectrum creates a light blue colour with hints of pink. Designed for variation lab testing.

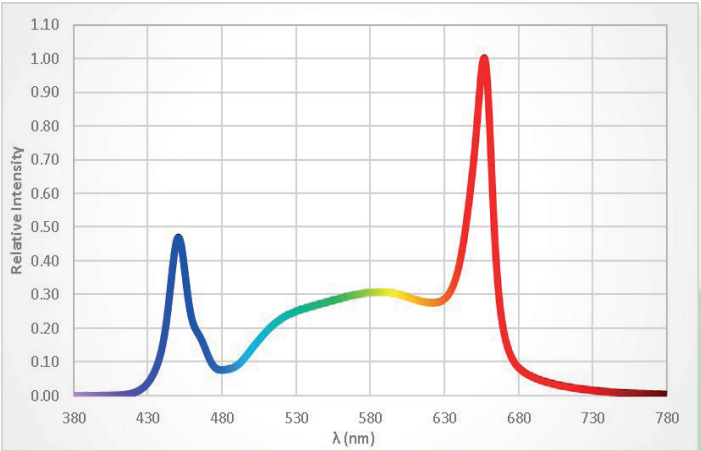
BRWFR



PPF	%
BLUE	25%
GREEN	10%
RED	45%
FAR RED	20%

This is a popular spectrum with growers for use in a variety, not for just mature crops - enhanced full white light spectrum. This spectrum generates a white light as a visual apperance in the grow area,producing a comfortable 4100k light colour. Perfect for visual checking whilst providing a good balanced grow efficacy. The human eyes picks this wavelength up as crisp natural white light, creating a good environment for inspection processes as this also yields a fantastic CRI level of 90.

LMR



PPF	%
BLUE	17%
GREEN	36%
RED	45%
FAR RED	2%

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Crop specific lighting levels

Plant	Min (µmol/s.m²)	Max (µmol/s.m²)	Typical (µmol/s.m²)
Pepper	100	200	100
Cucumber	100	200	150
Tomato	170	250	185
Cannabis	280	450	350
Cannabis Flowering	650	1,000	850

Potted plants

Plant	Min (µmol/s.m²)	Max (µmol/s.m²)	Typical (µmol/s.m²)
Orchid	80	130	105
Dendrobium	130	260	195
Bromelia	40	90	50
Anthurium	60	130	70
Kalanchoe	60	105	82
Chrysanthemum	40	80	50
Roses	40	60	50
Geranium	40	60	50

Cut flower

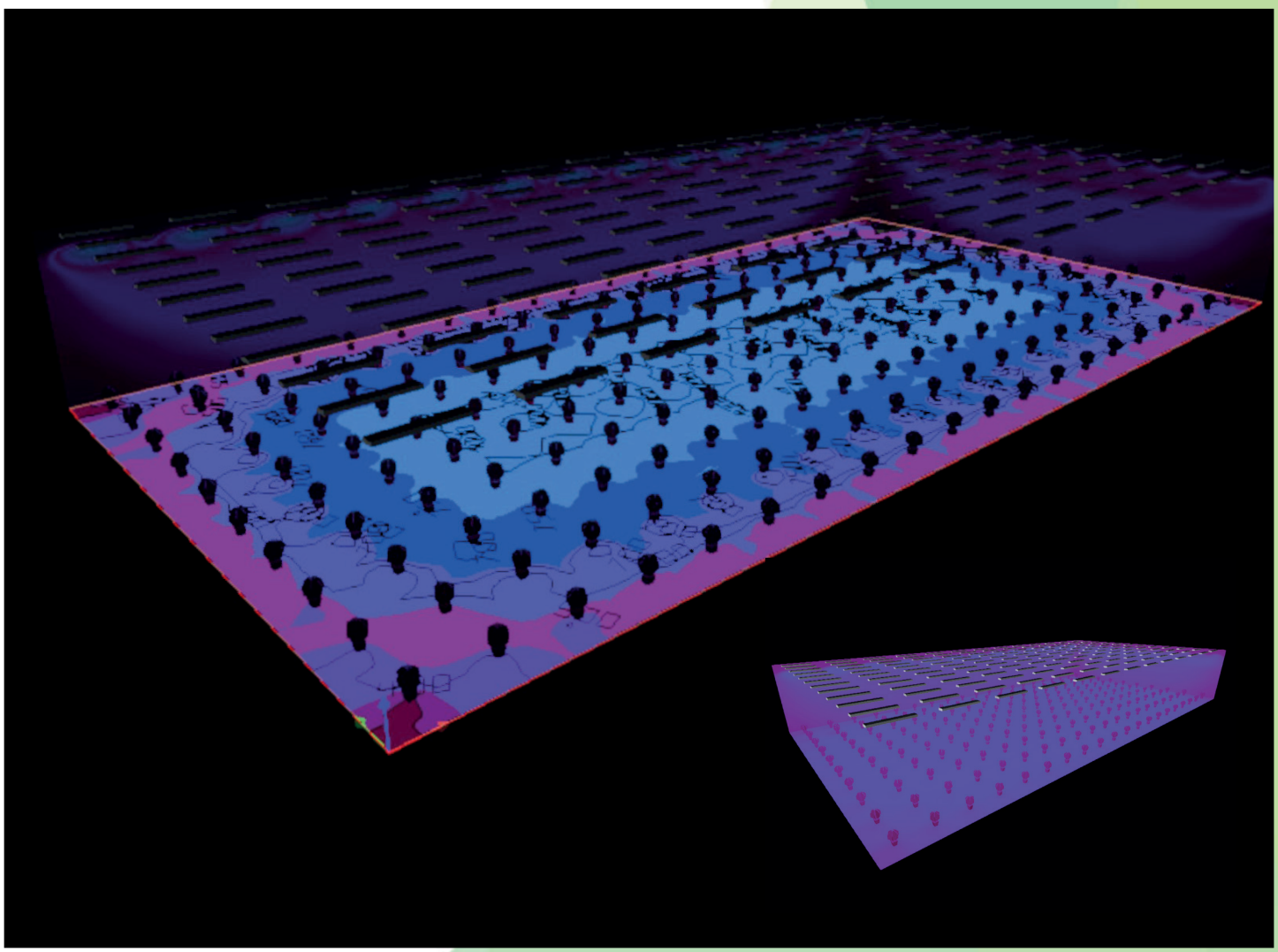
Plant	Min (µmol/s.m²)	Max (µmol/s.m²)	Typical (µmol/s.m²)
Chrysanthemum	105	160	117
Roses	170	300	182
Lily	80	100	90
Lisianthus	170	200	185
Alstroemeria	60	105	82
Orchid cut	80	105	92
Fressia	70	105	87
Gerbera	80	105	92
Tulip	25	40	32

Luminaire layout and lighting design

Vertically Urban use luminaire plotting software to design lighting layouts for greenhouses and indoor growing rooms. We can take into consideration the required height settings of the luminaire and the room configuration. This can be done from CAD files or the room can be modelled in the software directly. We can then layout the plants and generate reports to show the lighting levels and spreads that are needed to create an optimum growing environment. This system allows us to compare the range of lighting products we can offer to ensure the correct method is optimised.

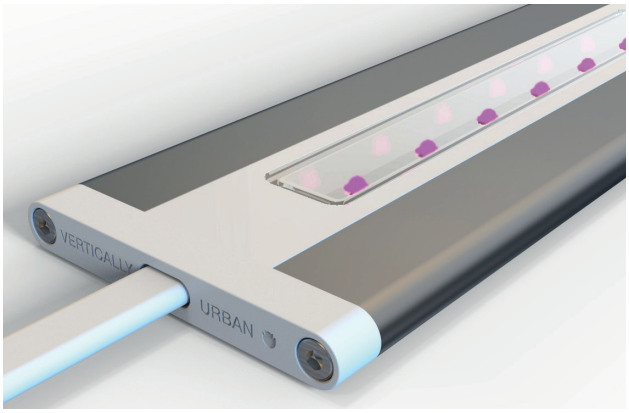
In most cases each luminaire will need to be wired and include dimming wiring for the light level protocol. We also offer wired and wireless solutions that can change light levels, zoning and switching. The controls software can be programmed with grouping, scheduling and in some cases specific dim levels and photoperiodic effects installed for the crop.

We have luminaire solutions delivering up 1700 µmol/s from a single source of one luminaire. This particular luminaire has passive cooling thanks to its unique thermal engineering design. We have products with and without total reflection optics that can improve photon injection into the canopy.



VU- HORTI-BLADE

MADE IN BRITAIN



A low-profile linear horticultural LED grow light ideal for vertical farming installations. This product is rated to IP68 and uses the latest in PU resin encapsulation technology. A robust linear extrusion with sealed end caps for installation allow ease of install. Can be linked together.

LIGHT OUTPUT

LED Colour	See Spectra options
PPE	up to 3.2 µmol/J
PPF	up to 115.2 µmol/s per 1234mm
Beam Angle	115°
LED	Mid / High Power

ELECTRICAL

Power Option	36 W per 1188mm
Input Voltage	48 VDC
Connection type	IP68 Connector
Maximum connected length	13 m
Approx Power Consumption	36 W / 1188mm
Dimmable	Yes (PSU type dependant)
PSU type	Meanwell >0.95 PFC

PHYSICAL & ENVIRONMENTAL

Finish	Anodised aluminium
Length options	612mm, 1188mm, 1764mm
Storage Temp	-30°C to 85°C
Operating Temp	-10°C to 40°C
IP Rating	IP67
IK Rating	03
LED Pitch	N/A
Cable Exit/Entry	End
Weight	0.85 kg/m

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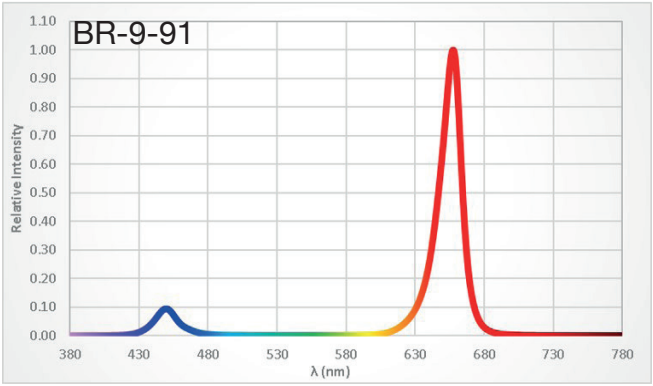
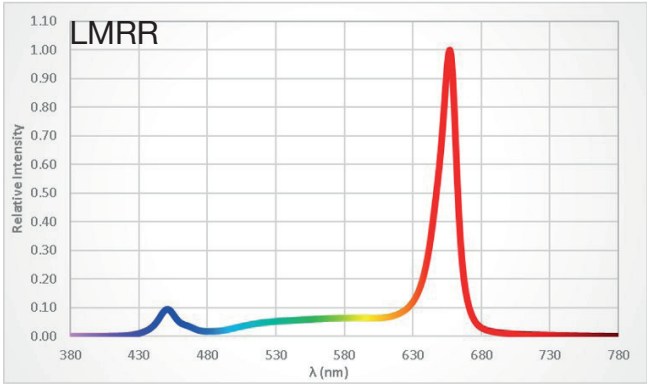
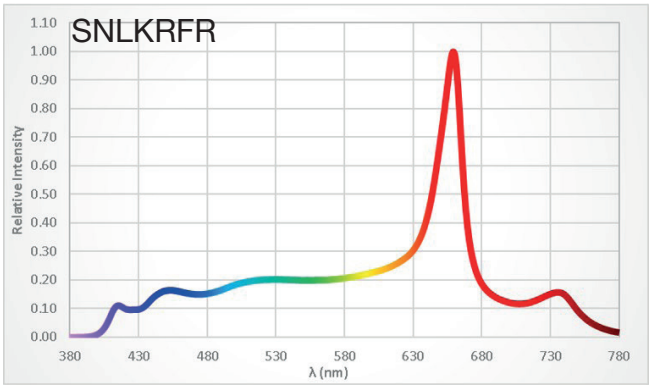
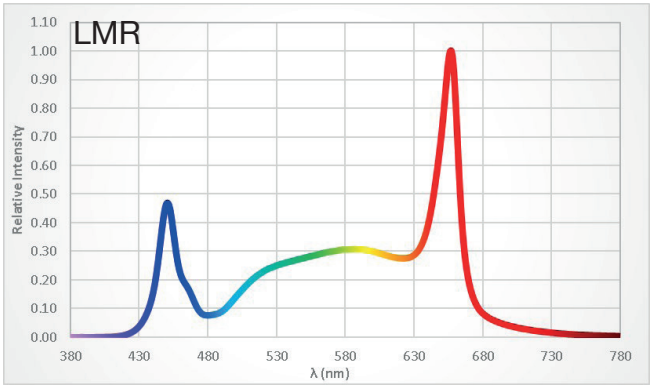
VU- HORTI-BLADE

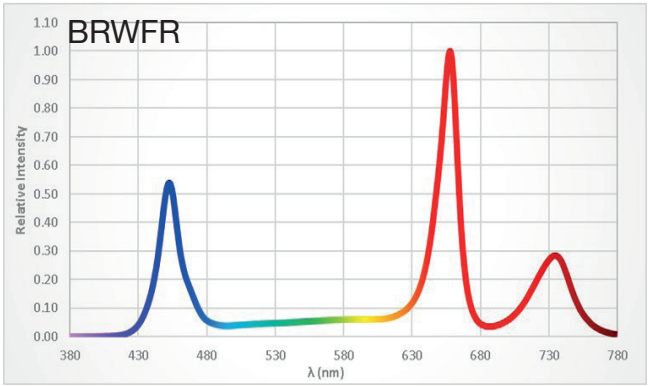
SPECTRUM OPTIONS









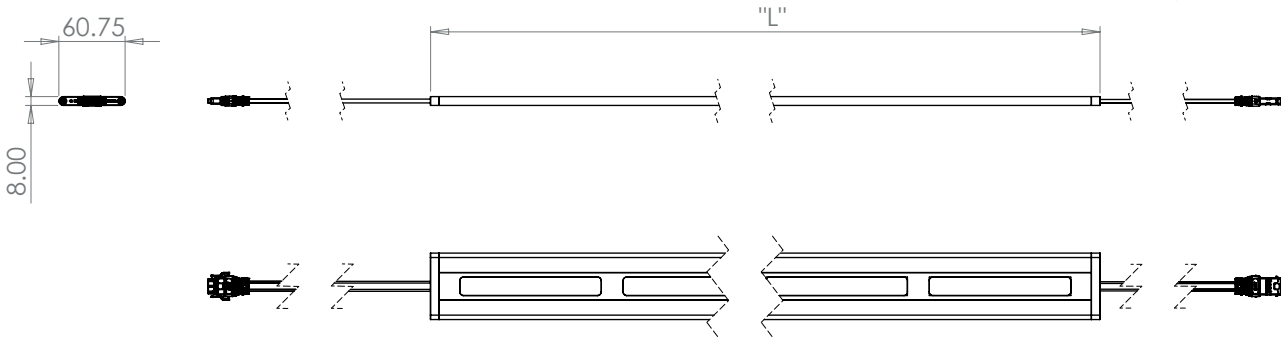


μmol/j table

BR-9-91	3.2
LMRR	2.5
SNLKRFR	1.4 (not inc FR)
LMR	2.4
BRWFR	1.5 (not inc FR)

DIMENSIONS

L=612mm,1188mm,1764mm



PART NUMBER: VU-HORTI-BLADE-SPECTRUM-LENGTH-IP67

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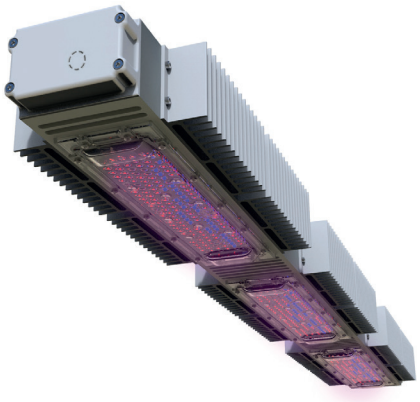
VERTICALLY URBAN

ODYSSEY 600

MADE IN BRITAIN



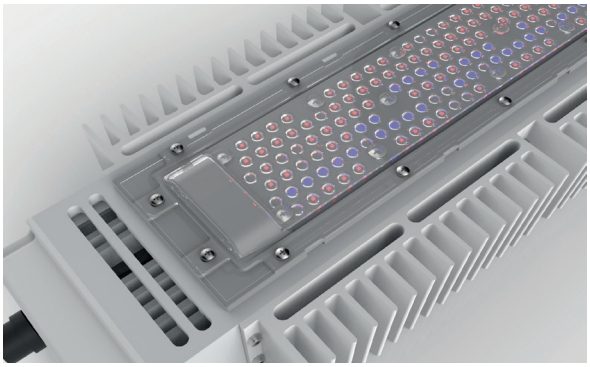
A high-power horticultural LED grow light ideal for mid to highbay farming installations. This product is rated to IP66 and uses the latest in LED technology. A robust linear extrusion with rear mounting brackets or suspension kit for ease of install. A remote PSU can be mounted externally to the grow room or in situ.

LIGHT OUTPUT

LED Colour	See spectra options
PPE	up to 3.15 µmol/J
PPF	up to 1700 µmol/s
Beam Angle	120°
LED	High Power

ELECTRICAL

Power Option	540 W
Input Voltage	90-305 VAC or 249-528 VAC
Connection type	IP66 Connector
Maximum connected length	N/A
Approx Power Consumption	540 W
Dimmable	1-10v
PSU type	Inventronics >0.95 PFC



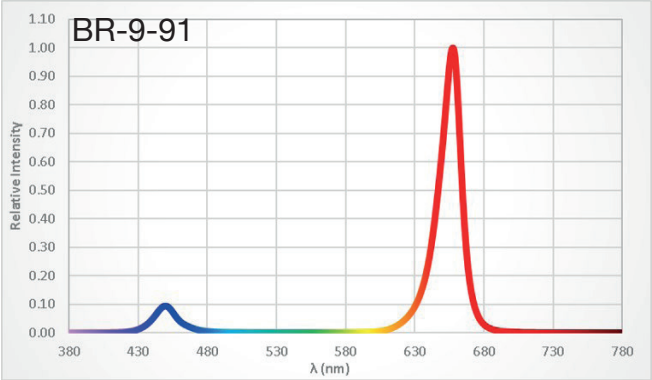
PHYSICAL & ENVIRONMENTAL

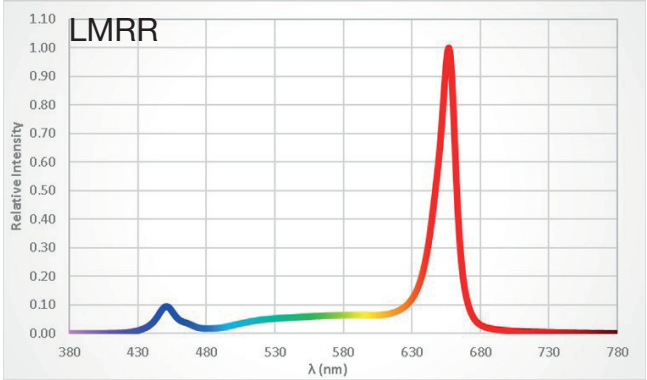
Finish	Anodised aluminium
Length options	1218mm
Storage Temp	-30°C to 85°C
Operating Temp	-10°C to 40°C
IP Rating	IP66
IK Rating	03
LED Pitch	N/A
Cable Exit/Entry	End
Weight	9.0 kg

VERTICALLY URBAN

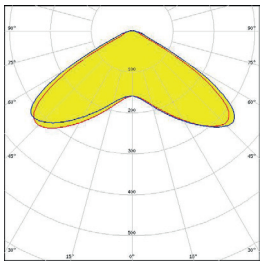
ODYSSEY 600

SPECTRUM OPTIONS

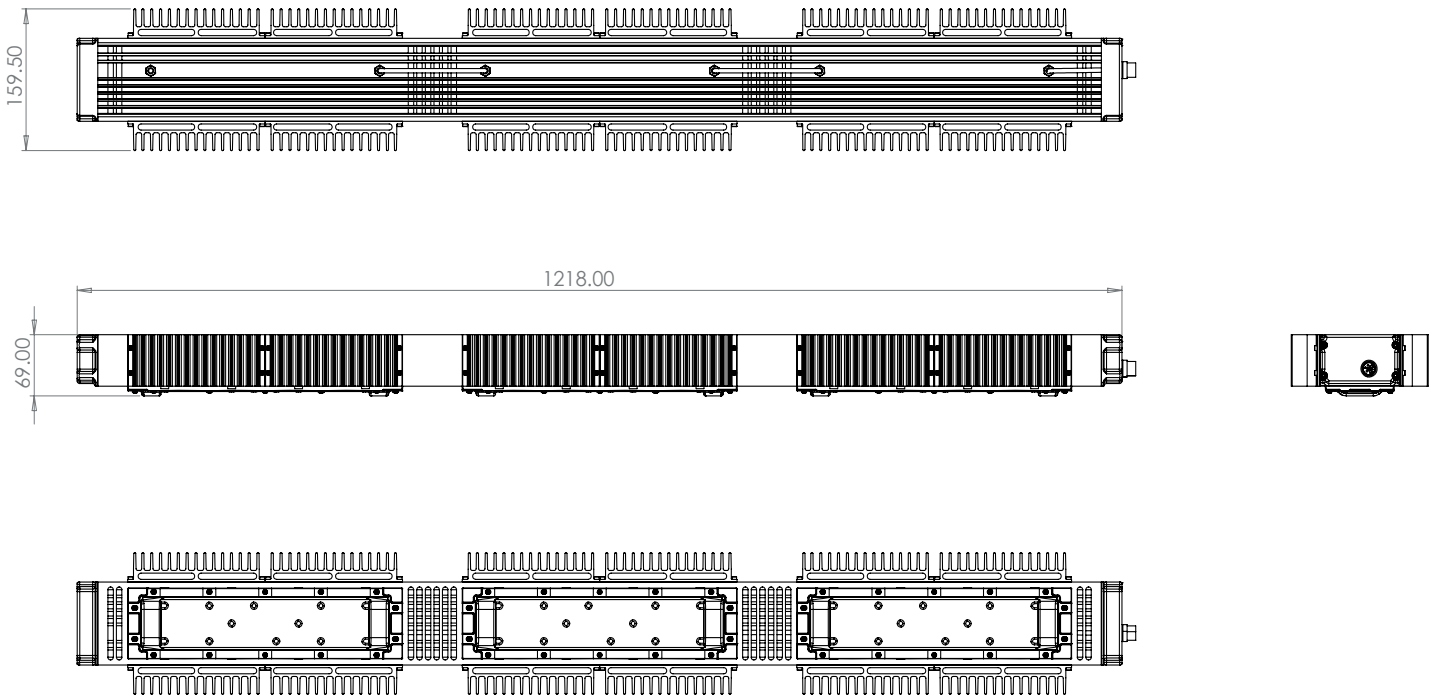




LIGHT DISTRIBUTION



DIMENSIONS IN MM



PART NUMBER: ODYSSEY600-SPECTRUM CODE-1218-IP66

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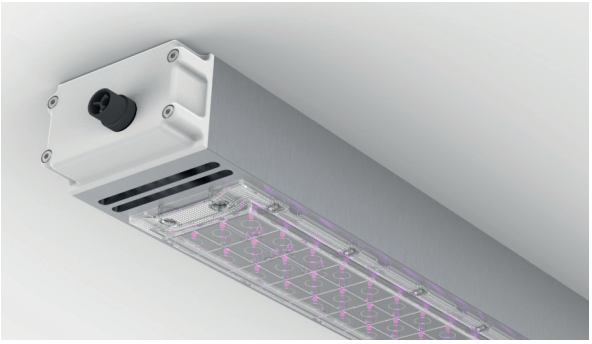
Tel: +44 (0)113 2434813, www.verticallyurban.com, hello@verticallyuban.com

VERTICALLY URBAN

ODYSSEY 200

MADE IN BRITAIN

A efficient horticultural LED grow light ideal for mid height glasshouse or indoor farming installations. This product is rated to IP66 and uses the latest in LED technology. A robust linear extrusion with rear mounting brackets or suspension kit for ease of install. A remote PSU can be mounted externally to the grow room or in situ.



LIGHT OUTPUT

LED Colour	See spectra options
PPE	up to 3.15 µmol/J
PPF	up to 560 µmol/s
Beam Angle	120°
LED	High Power

ELECTRICAL

Power Option	200 W
Input Voltage	90-305 VAC or 249-528 VAC
Connection type	IP66 Connector
Maximum connected length	N/A
Approx Power Consumption	200 W
Dimmable	1-10v
PSU type	Inventronics >0.95 PFC

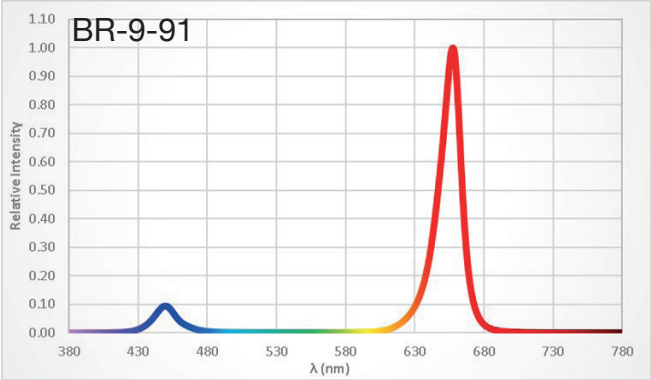
PHYSICAL & ENVIRONMENTAL

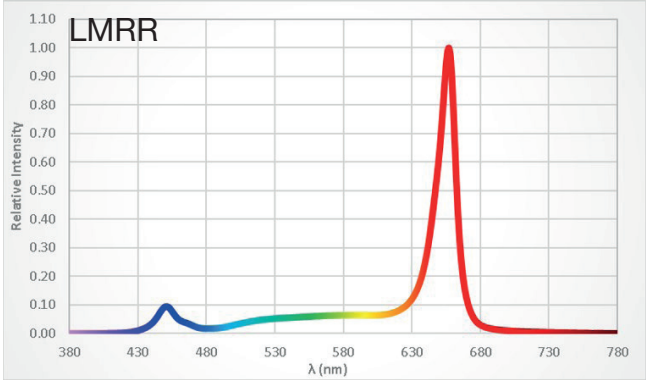
Finish	Anodised aluminium
Length options	1218mm
Storage Temp	-30°C to 85°C
Operating Temp	-10°C to 40°C
IP Rating	IP66
IK Rating	03
LED Pitch	N/A
Cable Exit/Entry	End
Weight	5.5 kg

VERTICALLY URBAN

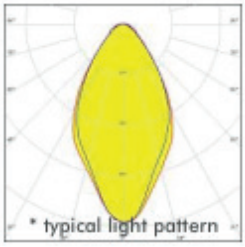
ODYSSEY 200

SPECTRUM OPTIONS

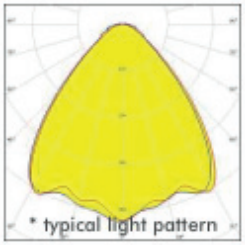




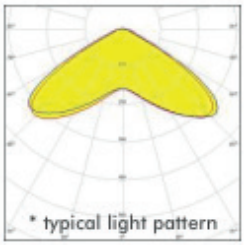
LIGHT DISTRIBUTION



60° option

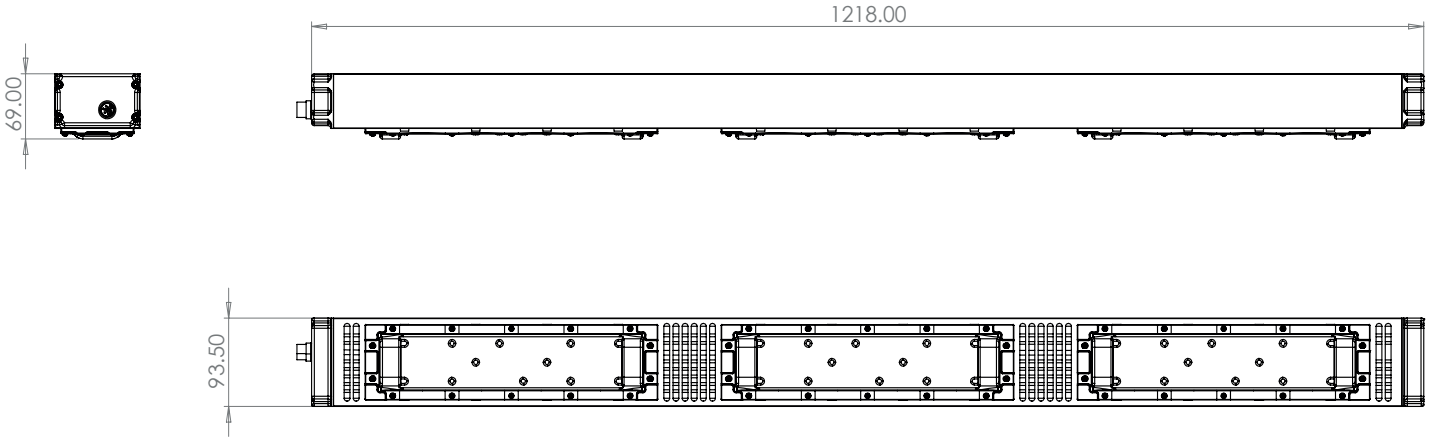


90° option



120° option

DIMENSIONS IN MM



PART NUMBER: ODYSSEY200-SPECTRUM CODE-1218-BEAM ANGLE-IP66

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Tel: +44 (0)113 2434813, www.verticallyurban.com, hello@verticallyuban.com

VERTICALLY URBAN

VU- GROW

MADE IN BRITAIN

An elegant aluminium based LED track light designed to illuminate internal grow walls. Manufactured in the UK using advanced LED electronics. Our horticultural grow product is designed for track fixing and is suitable to replace halogen fittings. This luminaire is ideal for indoor grow spaces that still require a white light grow spectrum.

LIGHT OUTPUT

LED CCT	White 5825K
Luminous Flux	2751 lumens (75 lm/w)
PPF	44.84 µmol/s
Beam Angle	25° or 60°
PAR	6.599W

ELECTRICAL

Power	36.43 W
Input Voltage	100-277 VAC 50-60 Hz
Connection type	Stucchi Track Adaptor
Maximum connected length	N/A
Approx Power Consumption	36.43 W
Dimmable	No
PSU type	Tridonic >0.95 PFC

PHYSICAL & ENVIRONMENTAL

Finish	Die cast aluminium & glass
Diameter	100mm
Storage Temp	-30°C to 85°C
Operating Temp	-10°C to 35°C
IP Rating	IP20
IK Rating	N/A
LED	Chip on board
Cable Exit/Entry	Track mounted
Weight	2.5 kg

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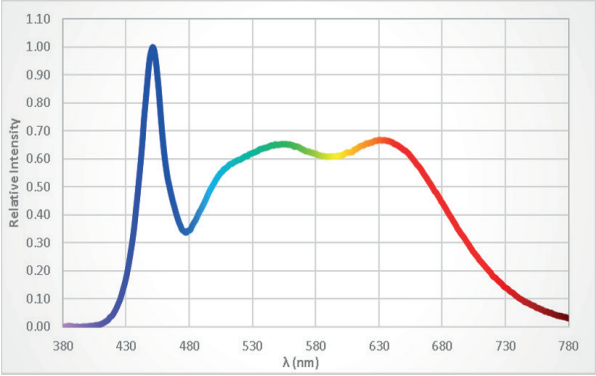
VU- GROW

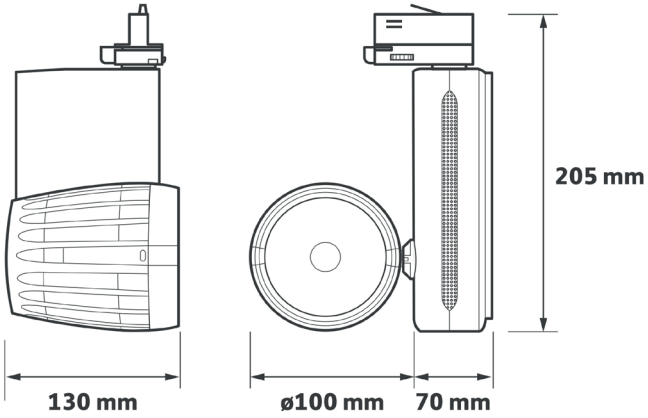
IMAGES

SPECTRUM

BGRFR



DIMENSIONS



PART NUMBER: VU-GROW-36-BGRFR-23-37-34-6-IP20

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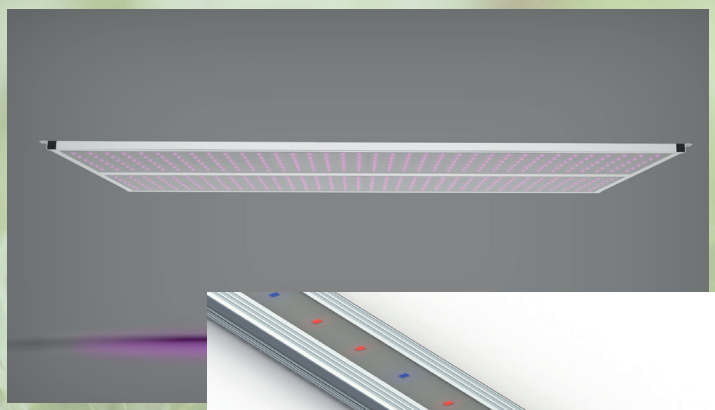
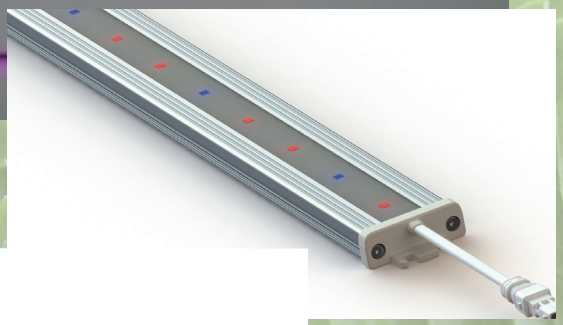
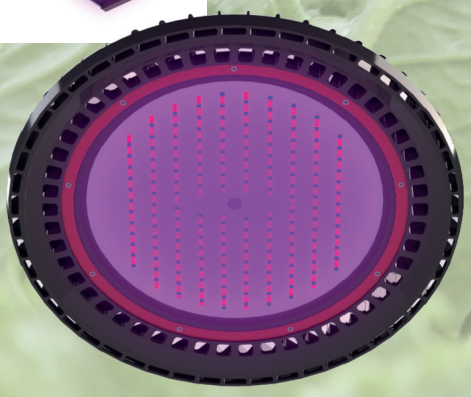
VERTICALLY URBAN

Bespoke lighting solutions

As experts in optoelectronic solutions and encapsulation techniques, Vertically Urban offers a bespoke design service to growers and OEM's. We design and offer solutions that are tailored to your requirement in both spectra, form factor, mechanical engineering, electronics, and product design. We can design and manufacture solutions for vertical farms, glass houses, indoor grow rooms, container farms and small scale on-site grow pods. We have solutions for propagation, nursery and industrial scale farms. We understand that not all solutions needs to be the same and therefore our service can address your requirements to create a product from the ground up.







VERTICALLY URBAN

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MADE IN BRITAIN