

Introduction

Bolb 1x12 S6060 Array

Product Data Sheet DS20

The 12" M-DR1A-W270-P1200-V24 is a high-efficiency UVC LED module that delivers high optical power in a linear configuration. The 12" M-DR1A-W270-P1200-V24 module includes twelve S6060 LEDs mounted onto a metal core printed circuit board. In addition, the Bolb 1x12 S6060 Array is available with several connector, driver, thermal management, and beam shaping options that simplify the integration of the array into a solution or fixture.



Features and Benefits

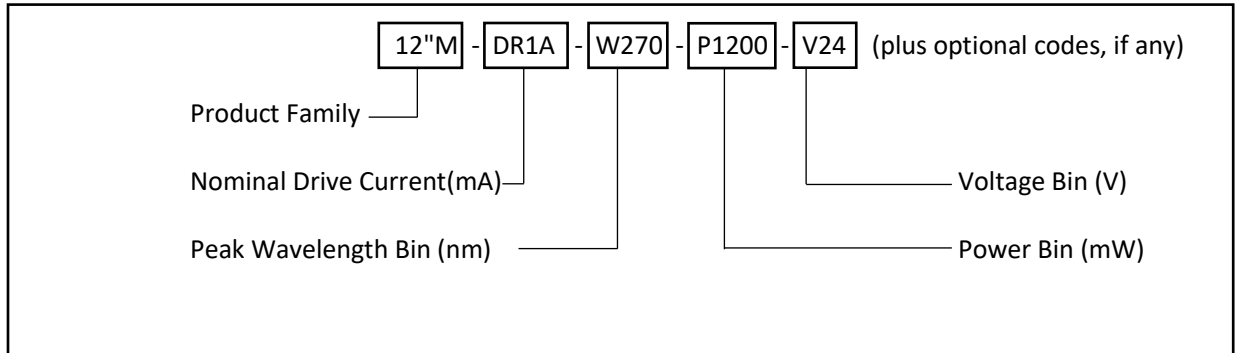
- Highest Wall Plug Efficiency (WPE) in the industry (7%), resulting in shortest irradiation times
- The narrow beam option delivers up to 670 $\mu\text{W}/\text{cm}^2$ intensity at 1m
- One 1x12 S6060 Array can disinfect 150 Cubic feet per minute air in situ, killing 99.9% of aerosolized staph bacteria and SARS2-COVID19
- Practical 1-inch x 12 inboard configuration
- Reduced engineering and simplified manufacturing without the need to solder
- Each parallel LED string has a separate driver
- Constant current drivers on the PCB produce a stabilized input current to the LEDs
- Fixed current setting range from 0.8 and 1.4 Amps
- Wide and narrow beam angles are available
- High irradiance performance

Applications

- High-demand air treatment, including upper air room disinfection, air troffers, floor standing air purifiers, etc.
- Industrial curing

Product Nomenclature 12"M-DR1A-W270-P1200-V24

The part number designation for Bolb 1x12 S6060 Array products is explained as follows:



The Bolb 1x12 S6060 Array is available with several connector, driver, thermal management, and beam shaping options that simplify the integration of the array into a solution or fixture. When placing an order that includes an option, use these option codes, the "-" symbol followed by specific letter and number combinations after the part number:

Optical		Thermal		Electrical		Connectivity	
Option Description	Option Code	Option Description	Option Code	Option Description	Option Code	Option Description	Option Code
S6060	-	No Heat Sink	-	1 Amp Constant Current Driver	-	Poke-In, 28434010-3	-
S6060-TL	-	Heat Sink with Integrated Fan	-HAS	0.8 Amp Constant Current Driver	-CC8	Molex 3mm 2-pin Connector	-CM3
Attached Narrow Beam Reflector	-B10	Heat Sink with Integrated Fan and Hosusing	-HSH	1.4 Amp Constnat Current Driver	-CC14		

Photobiological Warning

RISK GROUP 3

WARNING UV EMITTED FROM THIS PRODUCT
AVOID EYE AND SKIN EXPOSURE TO UNSHEIELDED PRODUCT

AVERTISSEMENT UV émis par ce produit. Éviter l'exposition des yeux et de la peau à un produit non protégé

ADVERTENCIA Emisión de rayos ultravioleta por este producto. Evite la exposición de los ojos y la piel al producto sin protección

警告 この製品から放出される紫外線。シールドされていない製品への目や皮膚の露出を避ける



CAUTION - RISK OF PERSONAL INJURY. THIS LED PACKAGE IS NOT INTENDED FOR GENERAL ILLUMINATION AND MAY REQUIRE THE USE OF SPECIAL SAFEGUARDS. INSTALL AND USE ONLY IN STRICT ACCORDANCE WITH THE PRODUCT AND PACKAGING MARKINGS

INTEGRATION OF THIS LED PACKAGE INTO LED LIGHT SOURCES (ARRAYS, LAMPS OR LUMINAIRES) OR ADDITION OF REFLECTIVE OR MAGNIFYING OPTICS MAY CHANGE THE EXPECTED PHOTOBIOLOGICAL SAFETY CHARACTERISTICS OF SUCH DEVICES. THE ASSIGNED RISK GROUP CLASSIFICATION OF THIS LED PACKAGE MAY NOT NECESSARILY INDICATE THE RISK GROUP CLASSIFICATION OF THE LED LIGHT SOURCE

Performance

Table 1: Typical performance at 25 deg C and active cooling

Parameter	Symbol	Unit	Part Number	Min	Typ	Max
Peak Wavelength ¹	λ_p	nm	12"M-DR1A-W270-P1200-V24	265	270	278
Radiant Flux ¹	ϕ_ε	W	12"M-DR1A-W270-P1200-V24	1	1.2	1.4
			12"M-DR1A-W270-P1200-V24-TL	0.9	1.08	1.26
			12"M-DR1A-W270-P1200-V24-B10	0.85	1.02	1.2
Forward Voltage ^{1,2}	V_f	V	12"M-DR1A-W270-P1200-V24	22	24	26
Forward Current ⁴	I_f	A	12"M-DR1A-W270-P1200-V24	0.9	1	1.1
Spectrum Half Width ¹	$\Delta\lambda$	nm	12"M-DR1A-W270-P1200-V24		12	
Viewing Angle, FWHM	$2\theta_{\frac{1}{2}}$	°	12"M-DR1A-W270-P1200-V24		160	
			12"M-DR1A-W270-P1200-V24-TL		39	
			12"M-DR1A-W270-P1200-V24-B10		10	
On-Axis Irradiance at 1m ^{5,6}	I	$\mu\text{W}/\text{cm}^2$	12"M-DR1A-W270-P1200-V24		30	
			12"M-DR1A-W270-P1200-V24-TL		90	
			12"M-DR1A-W270-P1200-V24-B10	460	550	670
Thermal Resistance ³	R_{j-b}	°C/W	12"M-DR1A-W270-P1200-V24		<10	

Notes for Table 1:

1. Bolb tests SMD6060 LEDs at 250mA per chip at a solder point temperature (Tsp) of 38° and Ta=25 °C. In addition, Bolb tests the 12"M-DR1A-W270-P1200-V24-B10 module at a solder point temperature of 38 °C.
2. The noted forward voltage includes LED and constant current driver electronics.
3. Thermal resistance is calculated using total electrical input power and includes the thermal resistance of the MCPCB board and thermal interface material.
4. Bolb sets the current at one amp on standard 1x12 Linear products, which produces 250mA per LED. Bolb can set the current to other values. Refer to the product option code table for details.
5. The spread of irradiance values reflects the performance of typical 270nm wavelength product.
6. Irradiance values are calibration, position, and solder point temperature sensitive. In addition, the irradiance value for the 12"M-DR1A-W270-P1200-V24-B10 is in the near-field, making it extra sensitive to meter positioning. Simulation results yielded the irradiance value for the TL product. However, the -B10 product option and the standard product irradiance values were physically measured.

Absolute Maximum Ratings

Table 2: 12"M-DR1A-W270-P1200-V24 Maximum Ratings

Parameter	Symbol	Unit	Max ²
Maximum DC Drive Current	IFM	A	1.4
Maximum Junction Temperature	T _{jmax}	°C	75
Maximum Solder Point Temperature	T _{jmax}	°C	TBD
Operating Temperature Limits ¹	T _{opr}	°C	-20 to 60
			-20 to 60
Storage Temperature ¹	T _{stg}	°C	-30 to 100

Notes for Table 2:

1. Maintain relative humidity at 40% or less.
2. Maximum rating provided for reference only. Do not drive the LED in reverse voltage.

Performance Curves

Figure 1: Forward Current vs. Forward Voltage Current

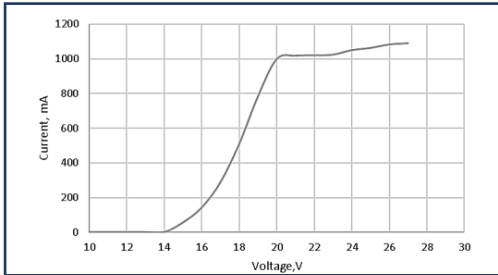


Figure 2: Relative Radiant Flux vs. Forward Current

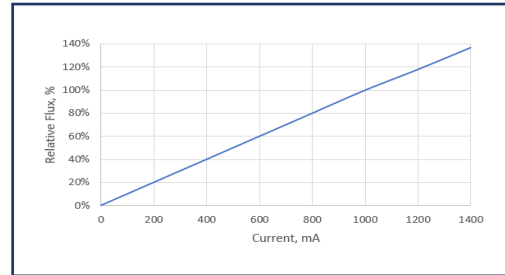


Figure 3: Peak Wavelength vs. Temperature

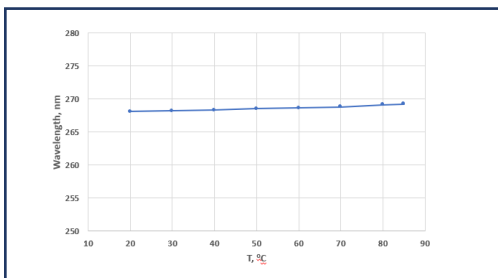


Figure 4: Typical Spectrum, at 250mA per LED

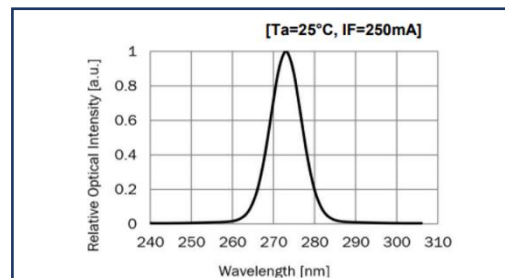


Figure 5: Forward Voltage vs. Temperature

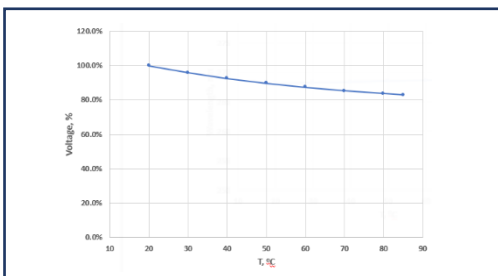
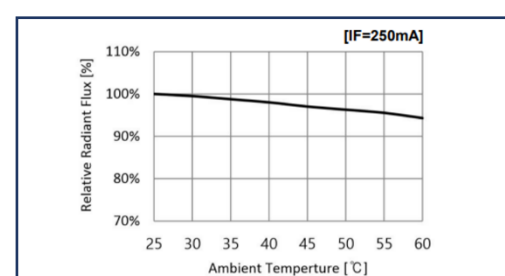


Figure 6: Relative Radiant Flux vs. Temperature



Performance Curves

Figure 7: Typical Relative Intensity vs. Emission Angle
12" M-DR1A-W270-P1200-V24

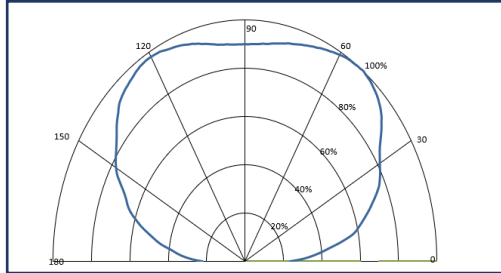


Figure 8: Typical Relative Intensity vs. Emission Angle
12" M-DR1A-W270-P1200-V24-TL

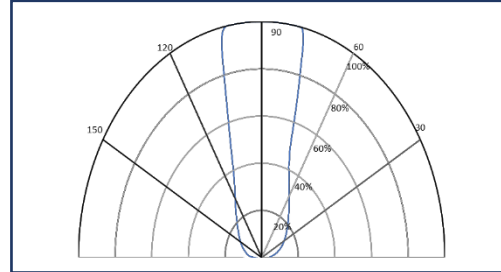


Figure 9: Typical Relative Intensity vs. Emission Angle
12" M-DR1A-W270-P1200-V24-B10

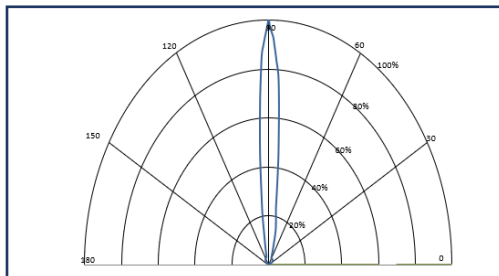
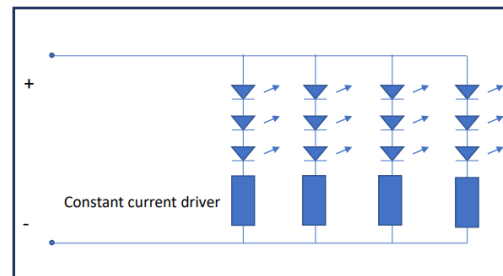


Figure 10: Electrical Diagram



Mechanical Dimensions

Figure 11: Mechanical Dimensions of 12" M-DR1A-W270-P1200-V24, units in mm

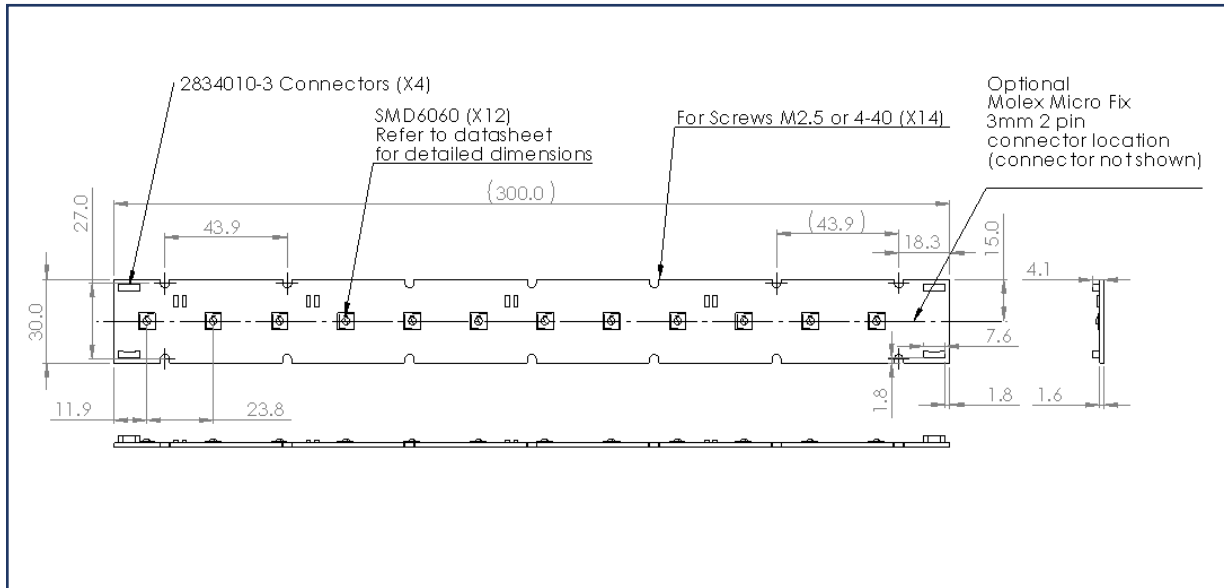
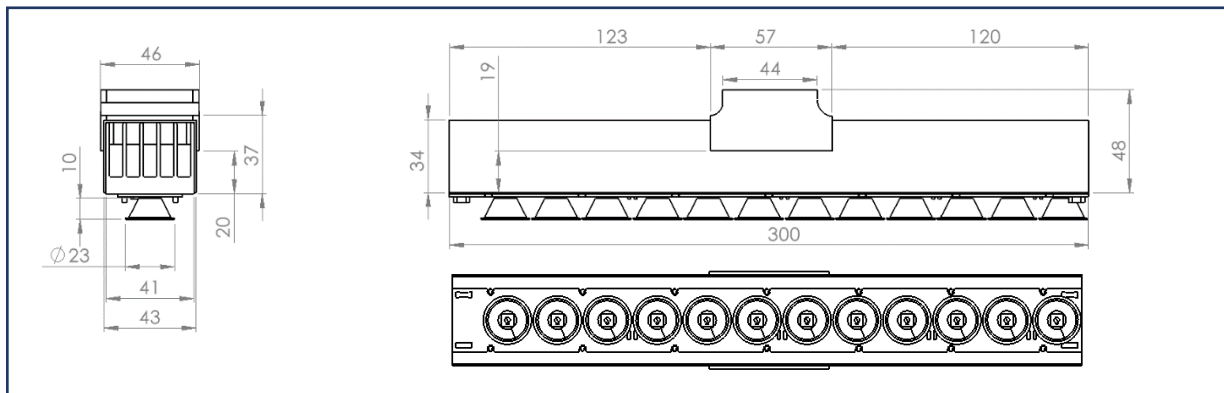


Figure 12: Mechanical Dimensions of 12" M-DR1A-W270-P1200-V24-HSS-B10

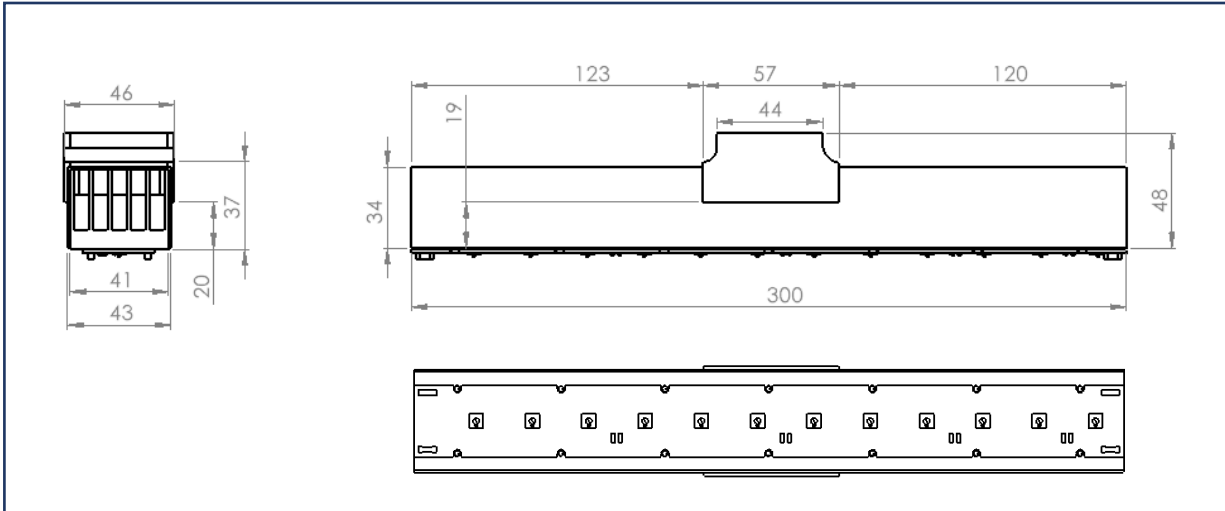


Notes for Figures 11 and 12:

1. Drawings are not to scale, and unless otherwise specified, tolerances are +/-2mm.
2. In figure 12, the air intake is through the sides, and the air exit is through the module's center. Therefore, DO NOT BLOCK AIRFLOW through the sides and center-fan area of the module.
3. Bolb 1x12 S6060 module dimensions not shown. Refer to Figure 11 for details. The module sits centered on the heat sink.
4. In figure 13, reflector dimensions have a tolerance of +/-0.2mm and do not include adhesive thickness.
5. 24VCD 0.1A sources power the 3010-cooling fan.
6. The complete module, including fans, requires a 24VDC >1.5A power supply.
7. The reflectors sit centered on each LED on the module.

Mechanical Dimensions

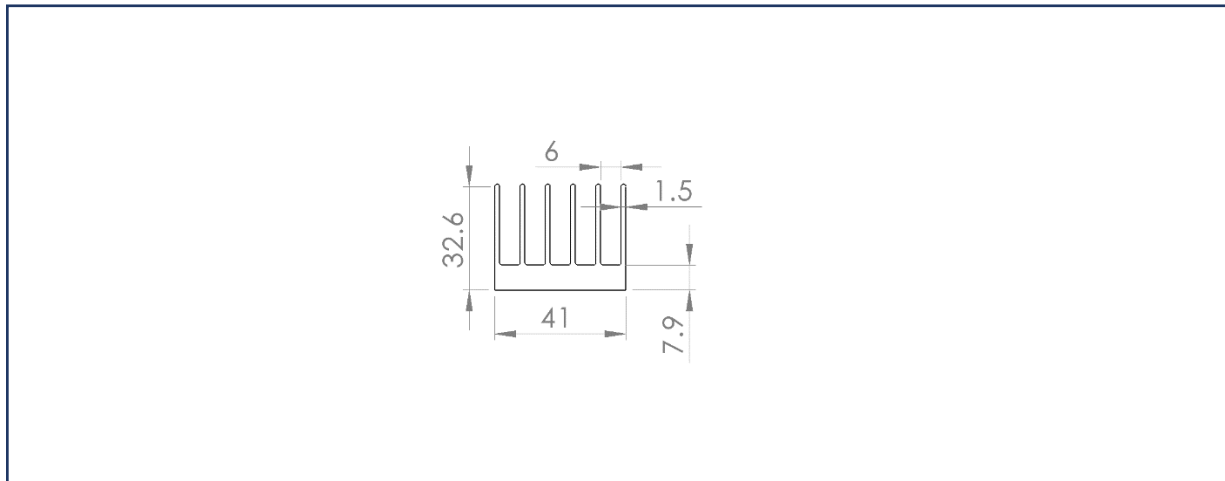
Figure 13: Mechanical Dimensions of 12"M-DR1A-W270-P1200-V24-HSH-B10, units in mm



Notes for Figure 13:

1. Drawing is not to scale, and unless otherwise specified, tolerances are +/-2mm.
2. The air intake is through the sides, and the air exit is through the module's center. Therefore, DO NOT BLOCK AIRFLOW through the sides and center-fan area of the module.
3. Bolb 1x12 S6060 module dimensions not shown. Refer to Figure 11 for details. The module sits centered on the heat sink.
4. 24VCD 0.1A sources power the 3010-cooling fan.
5. The complete module, including fans, requires a 24VDC >1.5A power supply.

Figure 14: Mechanical Dimensions of -HSA Heat Sink Cross Section



Notes for Figure 14:

1. Drawing is not to scale, and unless otherwise specified, tolerances are +/-0.2mm.

Electrical Connection Recommendations

Bolb's 12"M-DR1A-W270-P1200-V24 includes four TE Connectivity poke-in surface mount right-angle connectors for ease of connectivity to an external voltage source. The poke-in connector's tin-over-nickel finish copper contacts are ROHS compliant. Compatible wires include: 20AWG solid and tin dipped stranded, 22AWG solid and tin dipped stranded, and 24 AWG solid. Strip wire length 5.5 +/-0.3mm. The maximum insulation outer diameter is 1.75mm. Please email Bolb at bolb@info.com for additional information.

Bolb offers an optional Molex Micro-Fit 3mm 2-pins connector for ease of electrical connectivity. For more information, contact Bolb at bolb@info.com.

General Precautions and UVC Safety

Eye and Skin Safety Precautions

All assembly workers, operators, and bystanders must wear eye and skin protection when exposed to energized UVC LEDs. Bare-eye observation (including through microscopes) and bare-hand handling of a UVC LED in operation is **PROHIBITED**.

ESD Protection

Electrostatic discharge may damage UVC LEDs. Follow JDEC standard recommendations to prevent damage to the LEDs.

Disclaimers

By purchasing UVC LEDs or arrays from Bolb Inc., the customer agrees to indemnify the manufacturer of any bodily harm because of failure to follow common-sense precautions or warnings and guidelines contained within this datasheet. It is the buyer's responsibility to design products that ensure the safety of end-users.

Additional Resources

For additional design resources, including application and technical notes, visit our website at www.bolb.co.