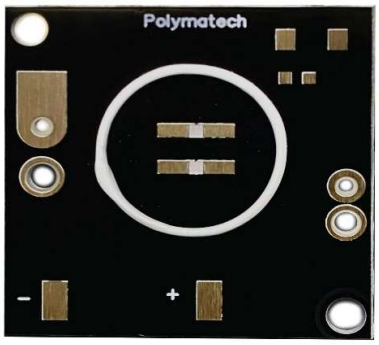
Polymatech®



DATA SHEET

POLYMATECH STANDARD COB Series

Version 2

FL02COB3030 UV-C LIGHT THERAPY

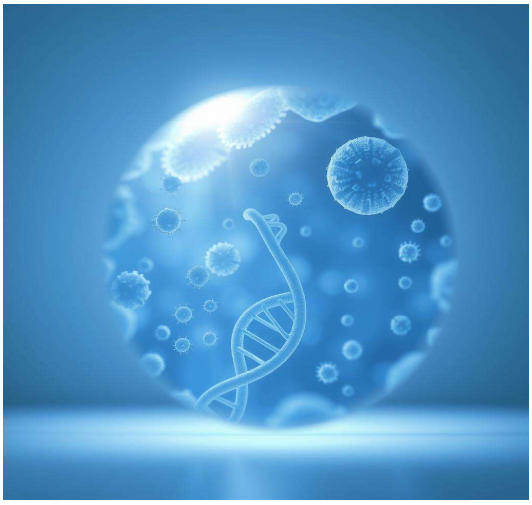
lead-free RoHS 2002/95/EC

POLYMATECH ELECTRONICS LIMITED
www.polymatech.in

Polymatech Far-UVC 222 nm LED Series

Precision Disinfection

Human-Safe Protection



Optimized Wavelengths for High-Efficiency Microbial Inactivation

Polymatech Far-UVC 222 nm LED Disinfection Series integrates precision-engineered UVC technology, delivering a powerful, contactless sterilization solution that surpasses traditional methods like alcohol-based disinfectants. Designed using advanced semiconductor packaging and high-purity materials, Polymatech's Far-UVC LEDs provide residue-free, chemical-free, and continuous disinfection for surfaces, air, and equipment in high-traffic or sensitive environments.

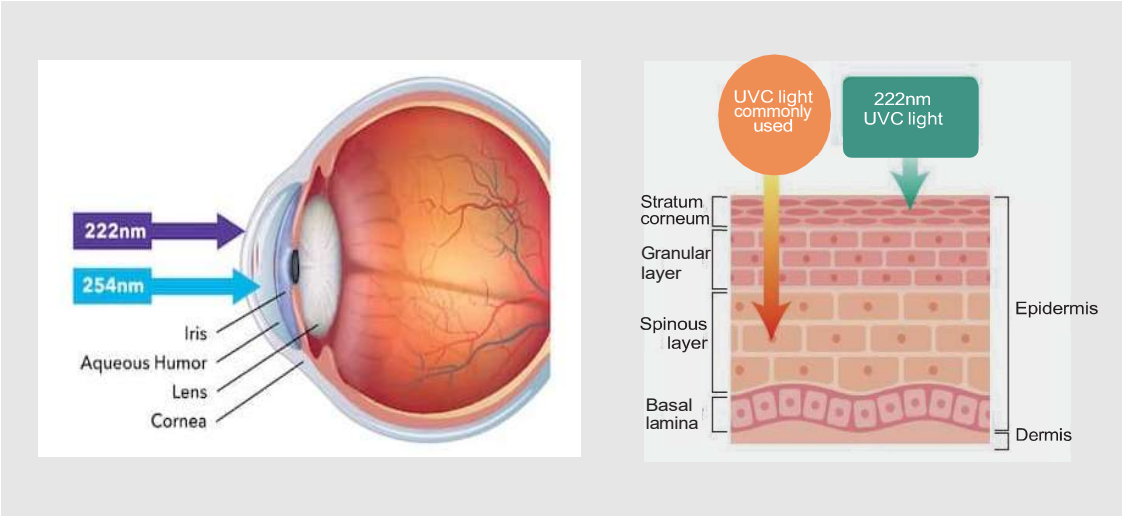
Featuring a peak emission at 222 nm, a wavelength scientifically recognized for being highly effective at inactivating viruses and bacteria while remaining safe for human exposure, this series neutralizes pathogens by disrupting their DNA and RNA structures. Its unique safety profile allows for real-time disinfection even in occupied spaces, making it ideal for hospitals, public facilities, medical devices, transportation hubs, elevators, and more.

Tested under controlled lab conditions, Polymatech's Far-UVC LEDs have demonstrated strong antimicrobial performance, including significant bacteriostatic effects against airborne and surface pathogens such as SARS-CoV-2 (COVID-19), without harming human skin or eyes. By offering low-power, compact, mercury-free, and ozone-free solutions, the Polymatech 222 nm UVC LED series provides a safer and sustainable alternative to conventional UV lamps—setting a new standard in modern disinfection and infection prevention.

Condition For Germicidal Irradiation

- Optimal Wavelength
- Sufficient Irradiance (Intensity)
- Proper Exposure Time
- Line-of-Sight Requirement
- Distance from Source
- Environmental Conditions
- Surface Cleanliness
- Safe Wavelength for Occupied Spaces

Polymatech's Far-UVC 222 nm LED Module is a next-generation ultraviolet disinfection solution designed to inactivate a broad spectrum of bacteria and viruses using narrow-band UVC light precisely emitted at 222 nanometers. This wavelength lies within the germicidal UV-C range but offers a unique advantage over traditional 254 nm UVC sources: effective microbial inactivation with proven safety for human exposure. While 254 nm ultraviolet light is indeed bacteriostatic due to its strong absorption by microbial DNA, it also penetrates the deeper layers of human skin and eyes, posing risks such as cellular DNA damage, erythema, and photokeratitis.



In contrast, Polymatech's 222 nm UVC light has a shorter wavelength and higher absorption coefficient in biological tissues, which means that when it irradiates human skin, the light energy is almost entirely absorbed by the outermost layer—the stratum corneum (composed of non-living cells). This prevents it from reaching the underlying basal layer where active human cells reside.

Despite this limited penetration in human tissue, 222 nm light remains

highly germicidal. It effectively penetrates and disrupts the genetic material of microorganisms such as SARS-CoV-2, E. coli, Influenza virus, and MRSA, rendering them inactive and unable to reproduce. This dual action—microbial inactivation and human safety—makes Polymatech's 222 nm LED modules ideal for use in occupied environments such as hospitals, outpatient clinics, elevators, public transport, offices, and classrooms, where constant disinfection is required without posing harm to occupants. Furthermore, Polymatech's 222 nm LED modules are designed using advanced AlGaN semiconductor materials and integrated optical filters, which block any residual longer-wavelength emissions above 230 nm, ensuring maximum safety compliance. The result is a mercury-free, ozone-free, and energy-efficient disinfection solution that combines high germicidal efficiency with safe, contactless sterilization, setting a new benchmark for modern hygiene technologies.

Safety Precautions

- The Threshold Limit Value (TLV) for 222nm UVC exposure is
- 478 mJ/cm² or less per day (within an 8-hour period).
- Avoid direct eye contact with the UVC LED at close range to prevent irritation.
- Photosensitive individuals and pregnant users should take standard UV protection precautions.
- Ensure correct installation height and angle to prevent over exposure.
- Recommended for controlled or monitored environments where exposure time can be regulated

Field of Use

Polymatech UVC LED: Advanced Disinfection & Therapeutic Applications

Polymatech's UVC LED solutions are engineered for high-efficiency disinfection, sterilization, and targeted light therapy. These UVC LEDs, developed using advanced semiconductor processes, emit short-wavelength ultraviolet light (200–280 nm), with a peak focus at 222 nm—recognized as the most effective wavelength for germicidal action. Designed for both medical and industrial environments, Polymatech's UVC LEDs offer reliable, chemical-free solutions for pathogen elimination and therapeutic use cases.

Peak Germicidal Power at 222 nm

• **DNA & RNA Disruption Efficiency**: UVC light around 222 nm is proven to inactivate viruses, bacteria, and fungi by breaking down their DNA and RNA. Polymatech's LEDs are tuned to this optimal wavelength for maximum disinfection performance in hospitals, labs, and air/water purification systems.

• **Rapid Sterilization**: The high photon energy of UVC LEDs ensures near-instant microbial inactivation, outperforming conventional UV lamps in efficiency and speed.

Therapeutic UVC Applications

• **Skin Therapy & Controlled Exposure**: Under medically supervised environments, narrow-band UVC LEDs can be used for skin therapy targeting conditions such as psoriasis, vitiligo, and eczema, where microbial load or abnormal skin cell activity needs to be controlled.

• **Precision Treatment**: Polymatech's UVC modules can be customized for therapeutic devices that require precise dose control, ensuring safety while maintaining efficacy.

Modular & Flexible Integration

• **Compact & Scalable**: Unlike bulky mercury UV lamps, Polymatech's UVC LEDs are compact, mercury-free, and environmentally safe. They can be integrated into handheld sterilizers, medical devices, HVAC systems, and surgical tools.

• **Customizable Modules**: Polymatech offers UVC in single-wavelength chips or multi-LED arrays tailored for specific intensity levels, exposure zones, or continuous vs. pulsed operation needs.

30% Higher Pathogen Kill Rate in Lab Trials

• **Superior Performance**: In Polymatech's controlled lab testing, UVC LED modules demonstrated up to 30% higher pathogen kill rates compared to conventional mercury vapor lamps. This performance advantage stems from wavelength precision, intensity control, and rapid on/off response.

• **Real-World Application Note**: While the 30% improvement is based on internal testing, actual disinfection performance will depend on environmental factors like exposure time, surface type, and microbial load.

Why Polymatech Outshines Competitors

• **Wavelength Precision**: Many competing UVC solutions operate broadly across the UV-C band, leading to reduced germicidal effectiveness. Polymatech's LEDs focus sharply around the 265 nm

peak for unmatched microbial targeting.

• **Longer Lifetime, Lower Power**: With improved thermal management and higher wall-plug efficiency, Polymatech UVC LEDs offer longer operational lifespans with lower energy consumption than traditional UV tubes.

• **Eco-Friendly**: Polymatech LEDs are RoHS compliant, mercury-free, and ozone-safe, making them a sustainable choice for both medical and consumer applications.

Conclusion

Polymatech's UVC LED solutions deliver high-efficiency sterilization and therapeutic capabilities by targeting the germicidal sweet spot of 222 nm. With up to 30% higher microbial kill rate in lab trials, these LEDs offer fast, reliable, and safe performance for disinfection, dermatological therapies, and clinical tools. Compact, customizable, and eco-friendly, Polymatech's UVC technology leads the way in next-gen light-based sanitation and treatment. Discover more at Polymatech's official website.

Applications:

- Hospital and Clinical Sterilization
- Air and Water Purification in Healthcare
- Medical Device and PPE Disinfection
- Dermatological and Phototherapy Treatments (Under Medical Supervision)
- Laboratory and Diagnostic Applications
- Pharmaceutical and Medical Packaging
- Safety and Regulation

Contents

Product Nomenclature

FL02COB3030 UV-C LIGHT THERAPY

[1]	Product shape	: FL02COB3030
[2]	Die count in series	: 12
[3]	Die count in parallel	: 01

INTRODUCTION

Product Description

The FL02COB3030 series of high-flux, multi-die arrays in a smaller, easy-to-use platform. With FL02COB3030 LED lighting-class reliability, the FL02COB3030's small, uniform emitting surface enables both directional and non-directional lighting applications including lamp retrofit and luminaire designs. featuring a 17-mm optical source, the FL02COB3030 brings new levels of flux and efficacy to this form factor.

The FL02COB3030 series is designed with flip chip technology which has high heat emission property thus increasing product life and maintaining same CRI output.

Features

- Mechanical Dimensions : 30×30×1(mm)
- Packaging Structure : Aluminum Base Chip on Board
- Reference Assembly : M4 screw, Connector
- CRI(Ra) : 90 Min.
- Thermal Resistance : 2C/W
- Maximum Drive Current : 700 mA
- RoHS Complaint.
- Better die arrangement for optics.
- Wide range of luminous flux and high efficacy.
- Improved lumen density compared with precious version.
- High Thermal conductivity package.
- Large, monolithic chips with uniform emitting area.
- Encapsulated die with low profile protective window for higher lumen output.
- Electricity isolated thermal path.
- Environmentally friendly: RoHS and REACH complaint.

Performance Characteristics

(Tj=85C)

Product code	Luminous flux (lm)			Efficacy (lm/W)	Forward Current (mA)	Forward Voltage (V)		
	Tj85C		Tc25C*					
	Min.	Typ.	Typ.	Typ.		Min.	Typ.	Max.
FL02COB3030 UV-C LIGHT THERAPY	396	450	489	148	700	5.2	5.75	6.3

Notes:

1. Polymatech Electronics maintains a tolerance of ±10% on luminous flux measurements.

2. Polymatech Electronics maintains a tolerance of ±3% on forward voltage measurements.

*: Values of Luminous flux at Tc=25C are provided as reference only.

Absolute Maximum Ratings

Parameter	Symbol	Rating	
Input Power	Pi	6.4	*1
Forward Current(mA)	If	700	*1
Reverse current(mA)	Ir	1	
Operating Temperature(C)	Top	-40 ~ +100	
Storage Temperature(C)	Tst	-40 ~ + 100	*2
Case Temperature(C)	Tc	105	
Junction Temperature(C)	Tj	125	*3

*1. Input power and forward current are the values when the LED is used within the range of the derating curve in this data sheet.

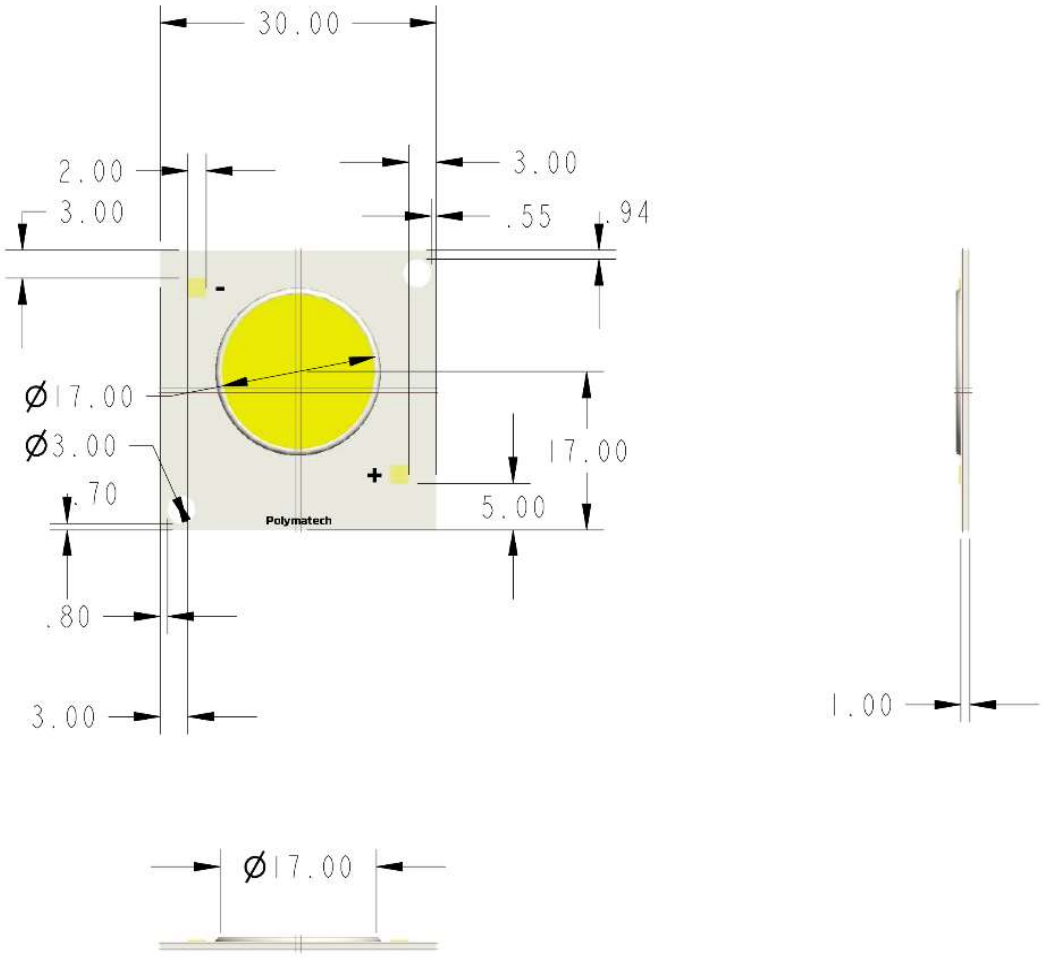
*2. Refer to 3. Outline drawing for Tc MEASUREMENT POINT.

*3. Junction temperature calculation formula: Tj = Tc + Rj-c × Pi

Mechanical Dimensions

The COB dimensions are 30 X 30 mm.

Tolerances Unless otherwise specified: +/-0.3



Dimensions are in mm.

Tolerances unless otherwise specified: +.13

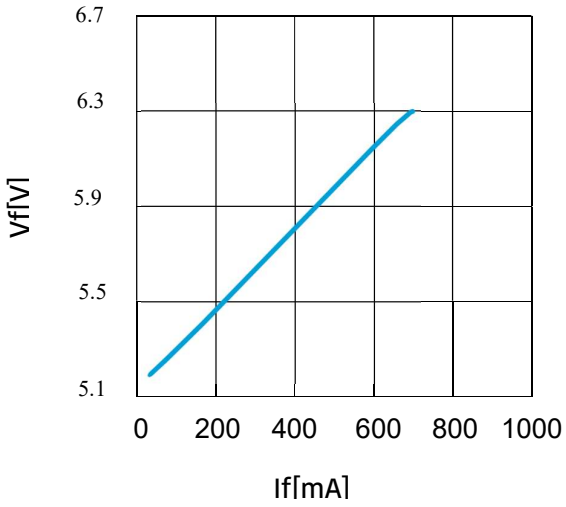
x° +1

Characteristics Curves

Forward Current Characteristic/Temperature Characteristics

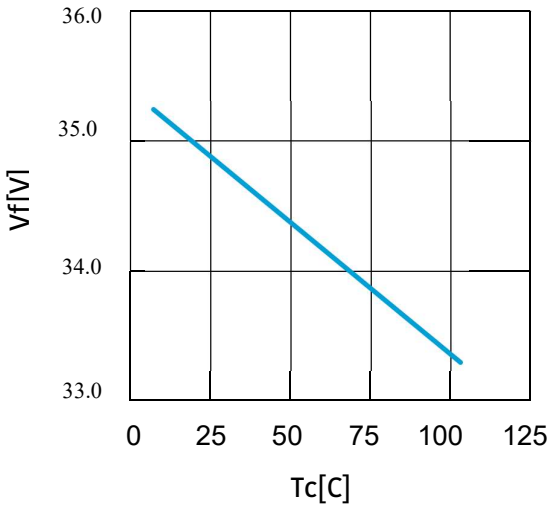
Forward Current VS. Forward Voltage

Tc=25C



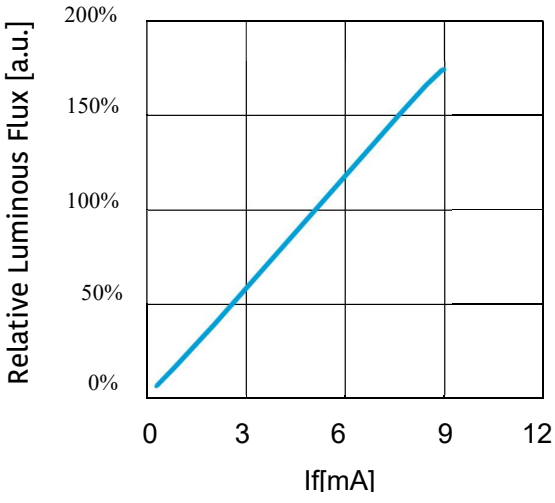
Case Temperature vs. Forward Voltage

If=90mA



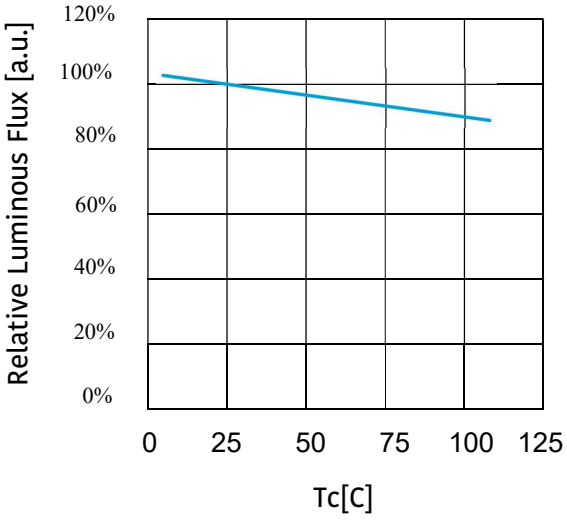
Forward Current VS. Relative Luminous Flux

Tc=25C

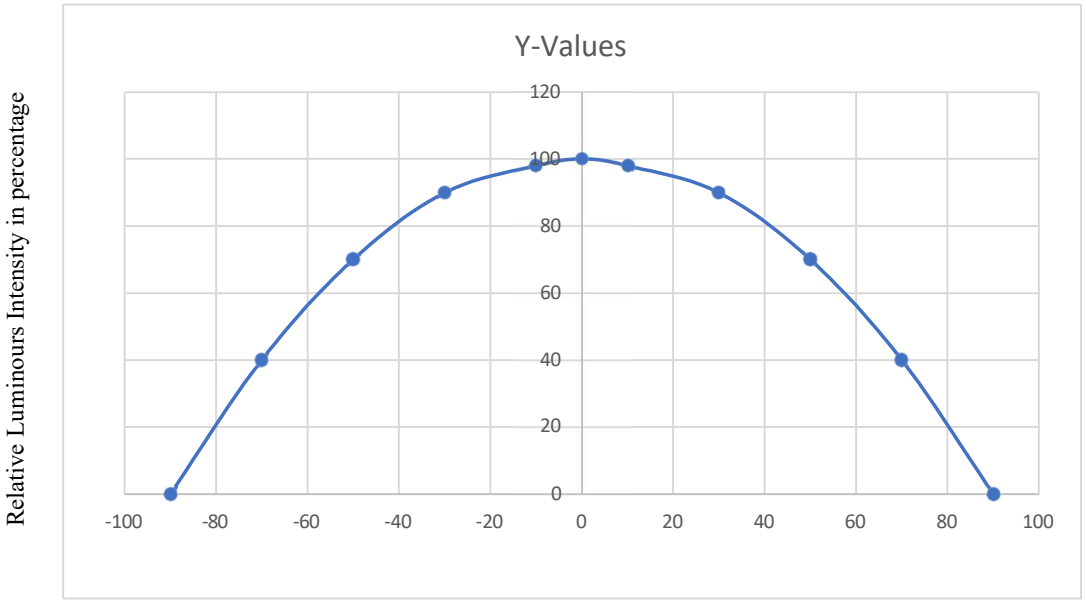


Case Temperature vs. Relative luminous flux

If=90mA



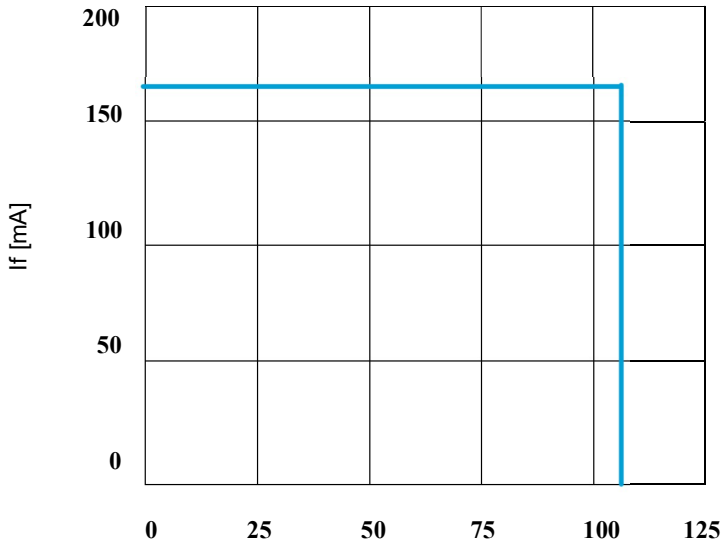
Optical characteristics
Radiation Characteristics



Spread Angle in Degrees

Derating Characteristics

Case Temperature
vs. Allowable Forward Current



Tc [C]

Reliability

Reliability Test

Test Item	Test Condition
Continuous Operation Test	If=90mA, Ta=25C (with A1-fin) × 1000 hours
	If=90mA, Tj=120C (with A1-fin) × 1000 hours
Low Temperature Storage Test	-40 C× 1000 hours
High Temperature Storage Test	100 C× 1000 hours
Moisture-proof Test	60C, 95%RH for 500 hours
Thermal Shock Test	-40 C × 30 minutes - 100 C × 30 minutes, 100 cycle

Failure Criteria

(Tc=25C)

Measuring Item	Symbol	Measuring Condition	Failure Criteria
Forward Voltage	Vf	If=90mA	>U× 1.1
Total Luminous Flux	ΦV	If=90mA	<S× 0.85

U defines the upper limit of the specified characteristics. S defines the initial value.

Note: Measurement shall be taken between 2 hours and 24 hours, and the test pieces should be return to the normal ambient conditions after the completion of each test.

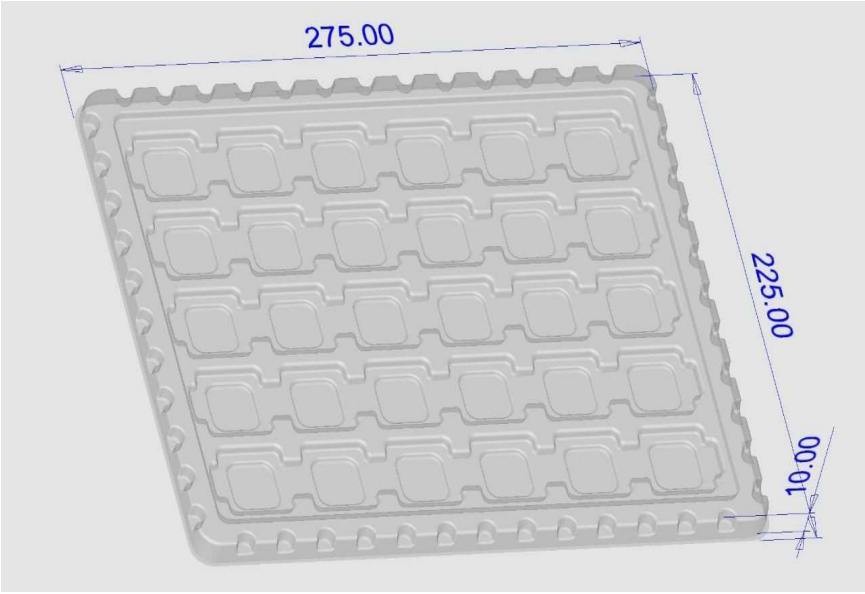
Operating limits

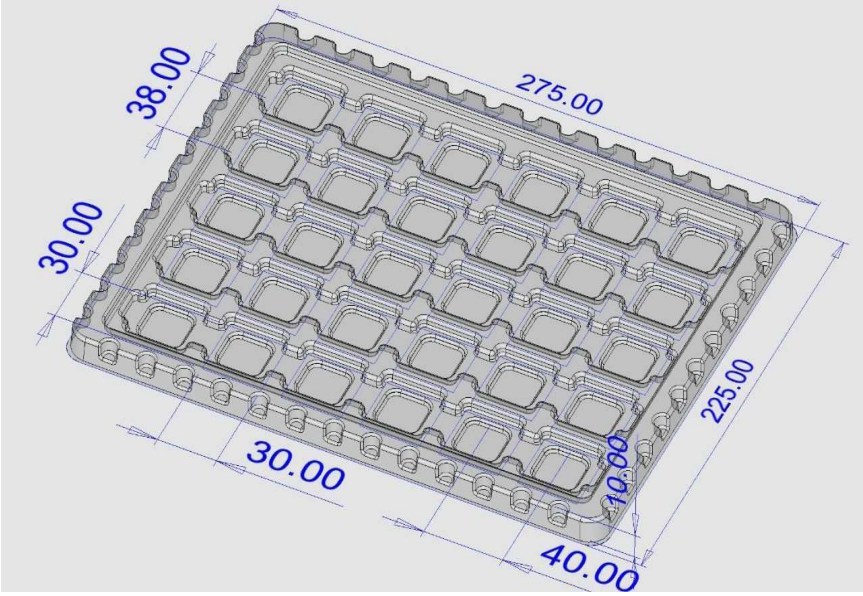
The maximum current rating of the FL02COB3030 depends on the case temperature (Tc) when the LED has reached thermal equilibrium under steady- state operation. The graphs shown below assume that the system design employs good thermal management (thermal interface material and heat sink) and may vary when poor thermal management is employed. Polymatech Electronics LED recommends a maximum Junction temperature of 135 °C to ensure optimal LED lifetime.

Packaging Specification

Packing

The package each tray contains 30 pieces of COBs and each box contains 12 trays of COBs (Vacuum Sealed).





Precaution

Handling with care for this product

-Both the light emitting area and white rim around the light emitting area is composed of resin materials. Please avoid the resin area from being pressed, stressed, rubbed, come into contact with sharp metal nail (e.g. edge of reflector part) because the function, performance and reliability of this product are negatively impacted.

-Please be aware that this product should not come into contact with any other parts while incorporating in your lighting apparatus or your other products.

-Please be aware that careful handling is required after the attachment of lead wires to prevent the application of any load to the connections.

-For more information, please refer to application note "Instruction Manual (COB LED Package)".

Countermeasure against static electricity

-Handling of this product needs countermeasures against static electricity because this is a semiconductor product.

-Please take adequate measures to prevent any static electricity being produced such as the wearing of a wristband or anti-static gloves when handling this product.

-Every manufacturing facility in regard to the product (plant, equipment, machine, carrier machine and conveyance unit) should be connected to ground and please avoid the product to be electric-charged.

-ESD sensitivity of this product is over 1000V (HBM, based on JEITA ED-4701/304). After assembling the LEDs into your final product(s), it is recommended to check whether the assembled LEDs are damaged by static electricity (electrical leak phenomenon) or not.

-It is easy to find static damaged LED dies by a light-on test with the minimum current value.

Caution of product assembly

-Regarding this product assembling on the heat sink, it is recommended to use M4 screw. It might be good for screw tightening on the heat sink to do temporary tightening and final tightening. In addition, please don't press with excess stress on the product.

-The condition of the product assembling on the heat sink and the control of screw tightening torque needs to be optimized according to the specification of the heat sink.

-Roughness, unevenness and burr of surface negatively impact thermal bonding between the product and heat sink and increase heat thermal resistance between them. Confidence of thermally and mechanical coupling between the product and heat sink are confirmed by checking the mounting surface and measuring the case temperature of the product.

-In order to reduce the thermal resistance at assembly, it might be good to use TIM (Thermal Interface Material) on whole contact surface of the product. In case of using thermal grease for the TIM, it might be good to apply uniformly on the contact surface of the product.

-In case of using thermal sheet for the TIM, it might be good to make sure that the product is NOT strained by stress when the screws are tightened for assembly.

-For more information, please refer to application note "Instruction Manual (COB LED Package)".

Thermal Design

-The thermal design to draw heat away from the LED junction is most critical parameter for an LED illumination system. High operating temperatures at the LED junction adversely affect the performance of LED's light output and lifetime. Therefore, the LED junction temperature should not exceed the absolute maximum rating in LED illumination system.

-The LED junction temperature while operation of LED illumination system depends upon thermal resistance of internal LED package (Rj-c), outer thermal resistances of LED package, power loss and ambient temperature. Please take both of the thermal design specifications and ambient temperature conditions into consideration for the setting of driving conditions.

-For more information, please refer to application note "Thermal Management", "Instruction Manual (COB LED Package)".

Driving Current

-A constant current is recommended as an applying driving current to this product.
In the case of constant voltage driving, please connect current-limiting resistor to each product in series and control the driving current to keep under the absolute maximum rating forward current value.

-Electrical transient might apply excess voltage, excess current and reverse voltage to the product(s). They also affect negative impact on the product(s) therefore please make sure that no excess voltage, no excess current and no reverse voltage are applied to the product(s) when the LED driver is turn-on and/or turn-off.

-For more information, please refer to application note "Driving", "Instruction Manual (COB LED Package)".

Lighting at a minimum current value

-A minimum current value of lighting of all dice is 5 mA.

-When a minimum current is applied, LED dice may look different in their brightness due to the individual difference of the LED element, and it is not a failed product.

Electrical Safety

-This product is designed and produced according to IEC 62031:2008 IEC 62031:2008 LED modules for general lighting. Safety specification)

-Dielectric voltage withstand test has been conducted on this product to see any failure after applying voltage between active pads and aluminum section of the product, and to pass at least 500V.

-Considering conformity assessment for IEC62031:2008, almost all items of the specification depend upon your final product of LED illumination system. Therefore, please confirm with your final product for electrical safety of your product. As well, the products comply with the criteria of IEC62031:2008 as single LED package.

Recommended soldering Condition (This product is not adaptable to reflow process.)

-For manual soldering Please use lead-free soldering. Soldering shall be implemented using a soldering bit at a temperature lower than 350C, and shall be finished within 3.5 seconds for one land. No external force shall be applied to resin part while soldering is implemented. Next process of soldering should be carried out after the product has return to ambient temperature. Contacts number of soldering bit should be within twice for each terminal.

* Polymatech Electronics cannot guarantee if usage exceeds these recommended conditions.
Please use it after sufficient verification is carried out on your own risk if absolutely necessary.

- For more information, please refer to application note "Instruction Manual (COB LED Package)".

Eye Safety

-The International Electrical Commission (IEC) published in 2006 IEC 62471 ”2006 Photobiological safety of lamps and lamp systems” which includes LEDs within its scope. When sorting single LEDs according to IEC 62471, almost all white LEDs can be classified as belonging to either Exempt Group (no hazard) or Risk Group 1 (low risk). However, Optical characteristics of LEDs such as radiant flux, spectrum and light distribution are factors that affect the risk group determination of the LED, and especially a high-power LED, that emits light containing blue wavelengths, might have properties equivalent to those of Risk Group 2 (moderate risk).
-Great care should be taken when directly viewing an LED that is driven at high current, has multiple uses as a module or when focusing the light with optical instruments, as these actions might greatly increase the hazard to your eyes. It is recommended to regard the evaluation of stand-alone LED packages as a reference and to evaluate your final product.

This product is not designed for usage under the following conditions.

If the product might be used under the following conditions, you shall evaluate its effect and appropriate them. In places where the product might:
-directly and indirectly get wet due to rain and/or at place with the fear.
-be damage by seawater and/or at place with the fear
-be exposed to corrosive gas (such as Cl2, H2S, NH3, SOx, NOx and so on) and/or at place with the fear.
-be exposed to dust, fluid or oil and/or at place with the fear.

The LEDs may not be able to maintain their specified performance if they used in a high temperature and high humidity environment.

Precaution with regard to product use

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The LEDs described in this brochure are intended to be used for ordinary electronic equipment (such as office equipment, communications equipment, measurement instruments and household appliances). Consult POLYMATECH Electronics' sales staff in advance for information on the applications in which exceptional quality and reliability are required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as for airplane, aerospace, submersible repeaters, nuclear reactor control system, automobiles, traffic control equipment, life support system and safety devices). This LED does not comply with ISO/TS 16949 (IATF16949) and is not intended for automotive applications.

The customer shall not reserve engineer by disassembling or analysis of the LEDs without having prior written consent from POLYMATECH Electronics. When defective LEDs are found, the customer shall inform POLYMATECH Electronics before disassembling or analysis.

When exporting our products, please ensure conformance with applicable laws and regulations and take appropriate actions such as obtaining an export license. Please do not use or supply our products for any weapons of mass destruction (WMD) or for any other military purposes. If we do not receive standing orders, we may recommend another product. If this product is to be used for a different model or for a succeeding model continuously, please contact our sales staff.

Please contact POLYMATECH ELECTRONICS' sales office if you have any questions regarding the information contained in this document, or if you have any other inquiries.