



MacAdam
3-Step



LED Solution

DC Board

TT22021-112L92765



Product Brief

Applications



Key Applications

- Ambient Indoor Lighting
- Troffer

Features & Benefits

- Long Life Time
- Simple BOM
- Lead Free Product
- RoHS Compliant
- High Efficacy

Description

High efficiency design
 Tube lighting for fluorescent replacement products used by the LED module

Table 1. Product Selection - Flux@ 25°C @ 150mA per LED

Part No.	Luminous Flux (lm)		CCT (K)	CR
	Minimum	Typical	CCT	Min.
TT22022-112L92765	3300	6500	2700/6500	90

References

Refer to page 5 'Part Information' regarding the meaning of 'Order Code' and 'Part No.'



Table 2. Product Selection - Vf@25°C

Part No.	Vf Bin	Forward Voltage (Vdc)	Forward Current (mA)
TT22021-112L92765	ALL	38.5	1200

Performance Characteristics

Table 3. Electro Optical Characteristics, $T_a = 25^\circ\text{C}^{(1)}$, $I_F = 1200\text{mA}$

Parameter	Symbol	Value			Unit	Mark
		Min.	Typ.	Max.		
Luminous Flux	$\Phi_V(2)$	3300	6500	7000	lm	-
Correlated Color Temperature(3)	CCT	2600	2700	2850	K	-
		6400	6500	6650		-
CRI	Ra	90	92	-	-	-
Efficacy @150mA	η	-	146	-	lm/W	-
Forward Voltage	V_{in}	37.5	3850	41.0	Vdc	-
Input Current	I_F	520	1200	1400	mA	-
Power Consumption	P	20.8	21.0	47	W	-
Viewing Angle	$2\theta_{1/2}$	-	120	-	deg.	-

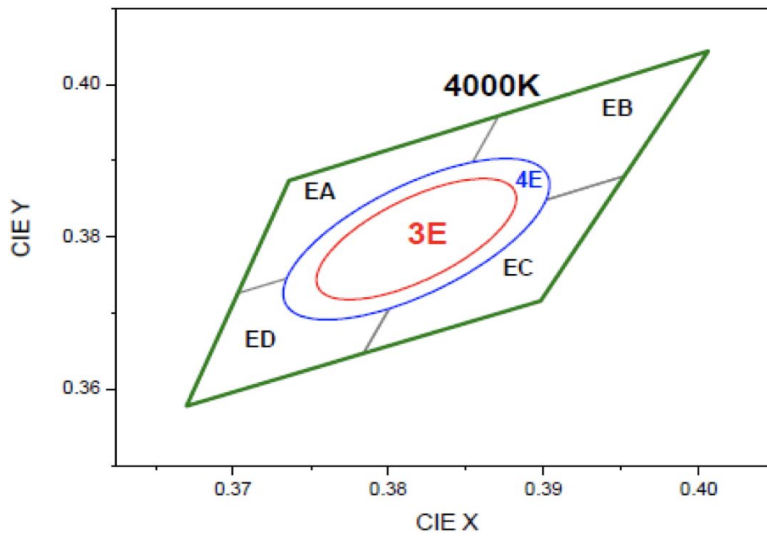
Notes:

- (1) Test Current is 1200mA at $T_a = 25^\circ\text{C}$.
- (2) Φ_V is the total luminous flux output measured with an integrated sphere.
- (3) Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.

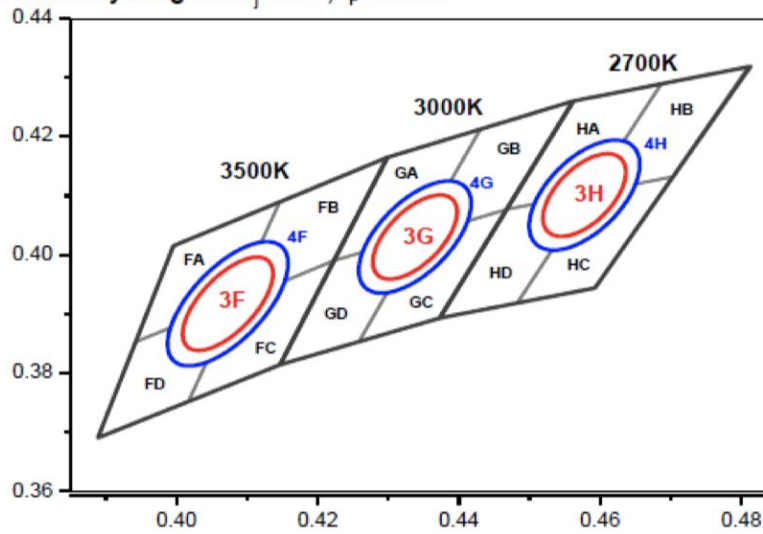


Color Bin Structure

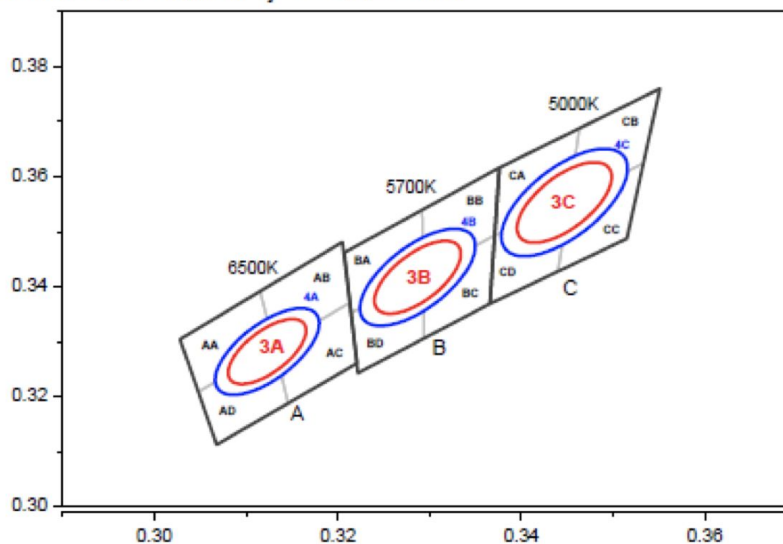
CIE Chromaticity Diagram $T_j=25^\circ\text{C}$, $I_F=65\text{mA}$



CIE Chromaticity Diagram $T_j=25^\circ\text{C}$, $I_F=65\text{mA}$



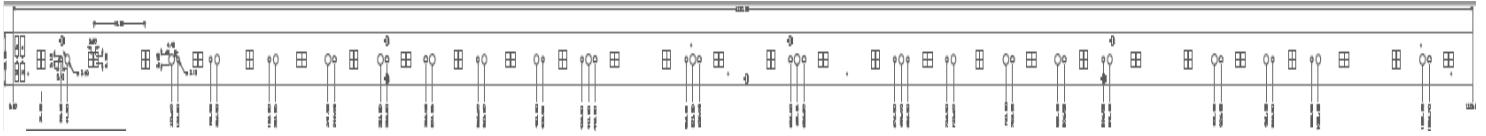
CIE Chromaticity Diagram $T_j=25^\circ\text{C}$, $I_F=65\text{mA}$





Mechanical Dimensions

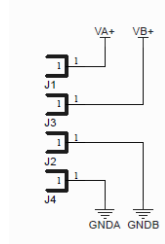
Image 1. Mechanical Dimensions



Notes:

- (1) All dimensions are in millimeters.
- (2) Scale : None
- (3) Module thickness : 1.6 ±0.10

Image 2. Circuit Schematic



	2700K		2700K
	3000K		3000K
	3500K		3500K
	4000K		4000K
	5000K		5000K
	5700K		5700K
	6500K		6500K

Part Information

Table 4. Part List

No.	Part	Reference	Specification	Qty
1	LED PKG	L1~L112	2790NA3500001 & 6590NA3500001	112
2	PCB	-	FR4/CEM	1
3	Connector	CN1-CN4	2060-451/998-404	4

Figure 1. Part Information

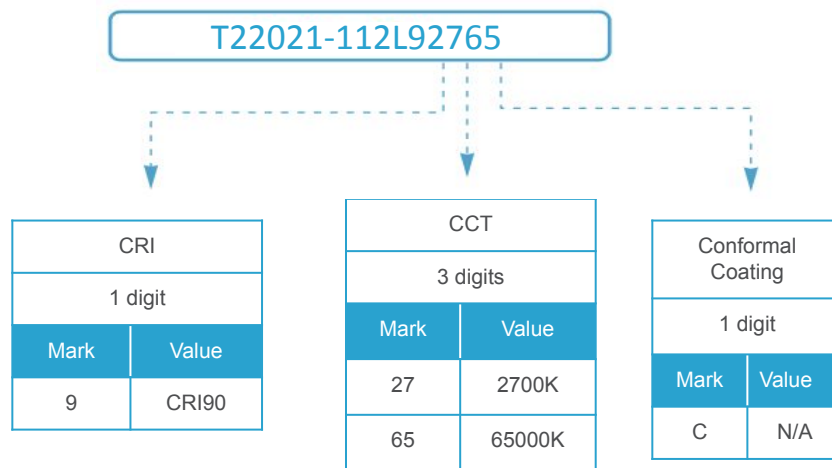


Table 5. Marking Point & Information

MF. Date (YYMMDD)	Module Rank ⁽¹⁾				Customer Part No.	Serial No.
	Flux Rank	CCT Rank	CRI Rank	Vf Rank		
200519	G82	O3	8	ALL	TT22021-112L927265	00001

Notes :

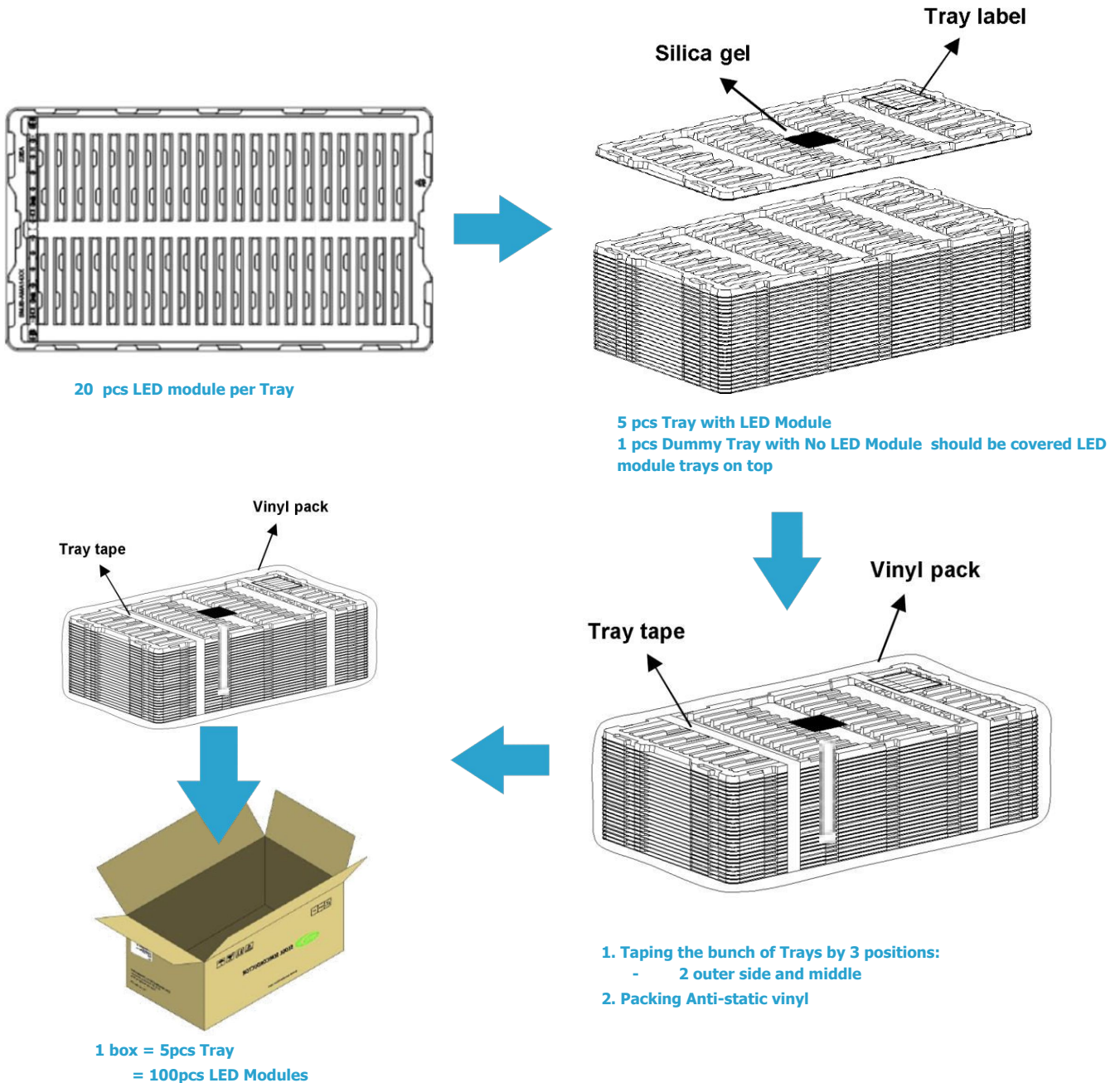
- (1) Module rank: refer to rank information in below table.
- (2) Customer part no.: TT22021-112L92765
- (3) Module CCT ran



Packing

Table 6. Packing

Tray			Box			Pallet		
Size (mm)	Module Qty (EA)	Material	Size (mm)	Tray Qty (EA)	Module Qty (EA)	Size (mm)	Box Qty (EA)	Module Qty (EA)
1210 X 335 X 26	22	Anti-static PET	1230 X 355 X 139	5(+1) Trays	110	1300x1100 x 150	21	2310





Conditions of Acceptable Usage

This component has been judged on the basis of the required spacing distances in the Standard for LED Equipment for Use in Lighting Products, UL 8750.

- 1) The LED modules are intended for connection to a constant current, Class 2 power supply. When the arrays are connected and used with power supplies other than class 2, the need for an additional evaluation shall be considered in the end use product investigation.
- 2) The LED modules shall be installed in compliance with the mounting, spacing, casualty, and the segregation requirements applicable to the ultimate application.
- 3) The LED modules were not subjected to the Normal Temperature Test. A Temperature Test shall be conducted in the end product with considerations for the following components, their ratings, and LED-to-LED spacing:
 - Printed Wiring Board – 105°C
 - Connectors – 105°C
- 4) The LED modules are intended for use in dry and damp locations when connected to a Class 2 power supply. Use in other than dry and damp locations powered by a Class 2 power supply shall be evaluated to the end use application.
- 5) All models shall be marked with any voltage and current rating that doesn't exceed the maximum ratings in the ELECTRICAL RATINGS table of this report. All models are to be used within their marked ratings.

Precaution for Use

- 1) Please review the module Application Note for proper protective circuitry usage.
- 2) DO NOT touch any of the circuit board, components or terminals with body or metal while circuit is active
- 3) Please do not add or change wires while module circuit is active.
- 4) Long time exposure to sunlight or UV can cause the lens to discolor.
- 5) Please do not use adhesives to attach the LED that outgas organic vapor.
- 6) Please do not use together with the materials containing Sulfur.
- 7) Please do not assemble in conditions of high moisture and/or oxidizing gas such as Cl, H₂S, NH₃, SO₂, NO_x, etc.
- 8) Please do not make any modification on module.
- 9) Please be cautious when soldering to board so as not to create a short between different trace patterns
- 10) LEDs are sensitive to Electrostatic Discharge (ESD) and Electrical Over Stress (EOS).

Below is a list of suggestions that Seoul Semiconductor purposes to minimize these effects.

A. ESD (Electro Static Discharge) Electrostatic discharge (ESD) is defined as the release of static electricity when two objects come into contact. While most ESD events are considered harmless, it can be an expensive problem in many industrial environments during production and storage. The damage from ESD to LEDs may cause the product to demonstrate unusual characteristics such as:

- Increase in reverse leakage current lowered turn-on voltage
- Abnormal emissions from the LED at low current

The following recommendations are suggested to help minimize the potential for an ESD event: One or more recommended work area suggestions:

- Ionizing fan setup
- ESD table/shelf mat made of conductive materials
- ESD safe storage containers



Precaution for Use

One or more personnel suggestion options:

- Antistatic wrist-strap
- Antistatic material shoes
- Antistatic clothes Environmental controls
- Humidity control (ESD gets worse in a dry environment)

B. EOS (Electrical Over Stress) Electrical Over-Stress (EOS) is defined as damage that may occur when an electronic device is subjected to a current or voltage that is beyond the maximum specification limits of the device. The effects from an EOS event can be noticed through product performance like:

Changes to the performance of the LED package (If the damage is around the bond pad area and since the package is completely encapsulated the package may turn on but flicker show severe performance degradation.)

Changes to the light output of the luminaire from component failure Components on the board not operating at determined drive power Failure of performance from entire fixture due to changes in circuit voltage and current across total circuit causing trickle down failures It is impossible to predict the failure mode of every LED exposed to electrical overstress as the failure modes have been investigated to vary, but there are some common signs that will indicate an EOS event has occurred.

- Damaged may be noticed to the bond wires (appearing similar to a blown fuse).
- Damage to the bond pads located on the emission surface of the LED package (shadowing can be noticed around the bond pads while viewing through a microscope).
- Anomalies noticed in the encapsulation and phosphor around the bond wires.
- This damage usually appears due to the thermal stress produced during the EOS event.

C. To help minimize the damage from an EOS event Seoul Semiconductor recommends utilizing

- A surge protection circuit
- An appropriately rated over voltage protection device
- A current limiting device

Handling of Silicone Resin for LEDs

- 1) LED is encapsulated with silicone resin for high optical efficiency.
- 2) Please do not touch the silicone resin area with sharp objects such as pincette(tweezers).
- 3) Finger prints on silicone resin area may affect the performance.
- 4) Please store LEDs in covered containers to prevent dust accumulation as this may affect performance.
- 5) Excessive force more than 3000gf to the silicone lens can result in fatal or permanent damage with LEDs.
- 6) Please do not cover the silicone resin area with any other resins such as epoxy, urethane, etc.



Storage Before Use

- 1) Do not impact or place pressure on this product because even a small amount of pressure can damage the product. The product should also not be placed in high temperatures, high humidity or direct sunlight since the device is sensitive to these conditions.
- 2) When storing devices for a long period of time before usage, please following these guidelines.
 - The device should be stored in the anti-static foam trays and fingers they were shipped in.
 - If the anti-static bag has been opened, re-seal preventing air and moisture from being present in the bag.

Guidelines for properly working with Module

- 1) Discharge the lighting system a minimum of 2-3 times prior to working with the module.
- 2) Use only properly rated test equipment and tools for the rated voltage and current of the product being tested.
- 3) It is strongly suggested to wear rubber insulated gloves and rubber bottom shoes.
- 4) Do not wear any conductive items (such as jewelry) which could accidentally contact electric circuits.
- 5) Perform several tests with power off and the lighting system unplugged.
- 6) Faults, lightning, or switching transients can cause voltage surges in excess of the normal ratings.
- 7) Internal component failure can cause excessive voltages.
- 8) Stored or residual electricity in long wire could be hazardous.
- 9) Make sure proper discharge prior to starting work.

Legal Disclaimer

Information in this document is provided in connection with Seoul Semiconductor products. With respect to any examples or hints given herein, any typical values state herein and/or any information regarding the application of the device. Thomas Technologies hereby disclaim any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party. The appearance and specifications of the product can be changed to improve the quality and/or performance without notice.

Revision History

Table 6. Revision History

Revision	Date	Remarks
A	2022.03.24	Data sheet for TT22021-120L92765