

## Reference Module

The Linear ECO series utilizes Seoul's high performing and cost effective 3528 LEDs to deliver efficacies up to 170 Lm/W at typical driving currents. This solution features uniformity of light and color and enables easy installation with a Zhaga compatible mounting pattern.



### Applications:



### Features:

- Cost saving and normal efficacy, long life
- Optimized for the Book 7 of ZHAGA standard
- Flexible scalability with 280mm ECO series
- 3 SDCM
- ROHS Compliant

### Key Applications:

- Troffer Retrofit
- Tube
- LED Panel

### Product Selection: SMJD-2306032C-XXNA $I_F = 350\text{mA}$ , $T_c = 25^\circ\text{C}$

CCT	CRI	Flux		Dimension	Order Code
		Min.	Typ.		
3000	80	1180	1220	560.0 x 20.0	SMJD-2306032C-XXNA00B22G038AII
4000		1300	1400		SMJD-2306032C-XXNA00B40E038AII
5000					SMJD-2306032C-XXNA00B40C038AII

### Product Selection: SMJD-4612064C-XXNA $I_F = 350\text{mA}$ , $T_c = 25^\circ\text{C}$

CCT	CRI	Flux		Dimension	Order Code
		Min.	Typ.		
3000	80	2360	2440	560.0 x 20.0	SMJD-4612064C-XXNA00C44G038AII
4000		2600	2800		SMJD-4612064C-XXNA00C80E038AII
5000					SMJD-4612064C-XXNA00C80C038AII

**Electro Optical Characteristics: SMJD-2306032C-XXNA<sub>I<sub>F</sub></sub> = 350mA, T<sub>c</sub> = 25°C**

Parameter	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Luminous Flux	$\Phi_v$ <sup>[2]</sup>	1180	1220	-	lm	G
		1300	1400	-		C,E
Correlated Color Temperature <sup>[3]</sup>	CCT	4745	5028	5311	K	C
		3710	3985	4260		E
		2870	3045	3220		G
CRI	Ra	80	-	-	-	-
Input Voltage	VF	22.0	23.6	25.0	VDC	@350mA
Power Consumption	P	7.8	8.2	8.6	W	
Efficiency	LPW	-	149	-	Lm/W	G
		-	170	-		C,E

**Electro Optical Characteristics: SMJD-4612064C-XXNA<sub>I<sub>F</sub></sub> = 350mA, T<sub>c</sub> = 25°C**

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		Min.	Typ.	Max.		
Luminous Flux	$\Phi_v$ <sup>[2]</sup>	2360	2440	-	lm	G
		2600	2800	-		C,E
Correlated Color Temperature <sup>[3]</sup>	CCT	4745	5028	5311	K	C
		3710	3985	4260		E
		2870	3045	3220		G
CRI	Ra	80	-	-	-	-
Input Voltage	VF	44.0	47.2	49.6	VDC	@350mA
Power Consumption	P	15.6	16.4	17.2	W	
Efficiency	LPW	-	149	-	Lm/W	G
		-	170	-		C,E

**Notes:**

- 1 Above data tested with constant typical current at T<sub>c</sub> = 25°C.
- 2  $\Phi_v$  is the total luminous flux output measured with an integrated sphere.
- 3 Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.
- 4 To use the module properly, recommend to drive the module by a Constant Current Source (CCS). But the Maximum output voltage of the CCS should be limited by referring this sheet.

**Absolute Maximum Operating Specification:  $T_c = 25^\circ\text{C}$** 

Model	Parameter	Symbol	Unit	Value	Remark
SMJD-2306032C-XXNA	Power Consumption	P	W	19.8	
	Forward Voltage	$V_F$	V	25	
	Driving Current <sup>(2)</sup>	$I_F$	mA	800	
SMJD-4612064C-XXNA	Power Consumption	P	W	39.6	
	Forward Voltage	$V_F$	V	49.6	
	Driving Current <sup>(2)</sup>	$I_F$	mA	800	
All	Operating Temperature <sup>(3)</sup>	$T_c$	$^\circ\text{C}$	- 40 ~ 85	Reference point
	Storage Temperature	$T_{stg}$	$^\circ\text{C}$	- 40 ~ 100	With no power
	ESD Sensitivity	-	KV	$\pm 8$	IEC Air
$\pm 4$				HBM	

**Notes:**

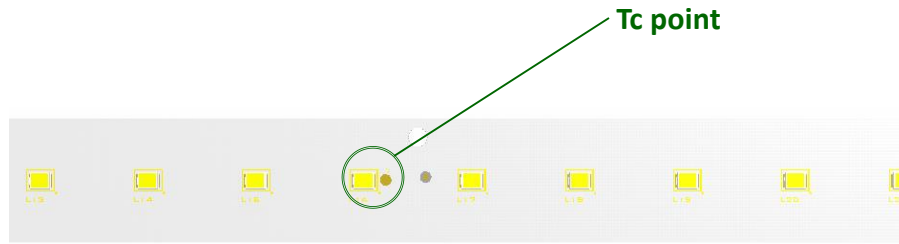
- 1 Above data tested with constant typical current at  $T_c = 25^\circ\text{C}$ .
- 2  $\Phi_v$  is the total luminous flux output measured with an integrated sphere.
- 3 Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.
- 4 To use the module properly, recommend to drive the module by a Constant Current Source (CCS). But the Maximum output voltage of the CCS should be limited by referring this sheet.

Notes:

\*Colors fully compliant with the CIE requested color temperatures on the following table:

Correlated Color Temperature	Nominal CCT	CCT (K)
C	5000 K	5028 ± 283
E	4000 K	3985 ± 275
G	3000 K	3045 ± 175

**Illustration: How to predict components temperature**



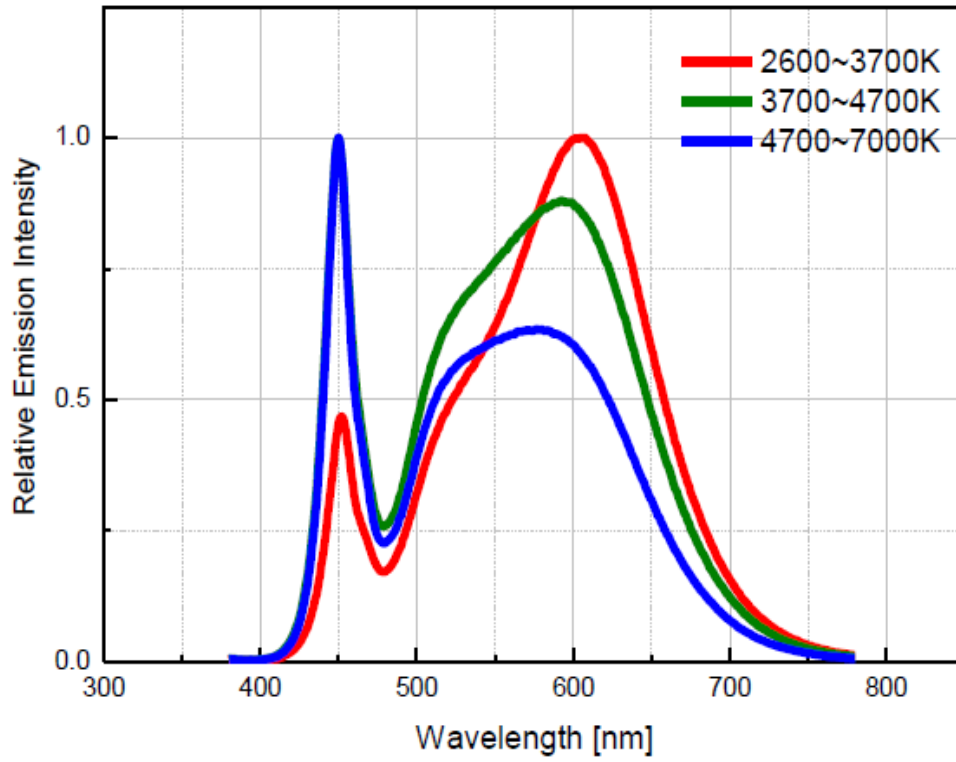
\* Recommended Tc Testing point

Notes:

- 1 The modules must be operated within the operating conditions stated in the Absolute Maximum Operating Specifications.
- 2 Please use a Constant Current Source (CCS) to drive the module.
- 3 Operating temperature was tested at the assigned Tc point on the PCB.
- 4 To ensure the module works properly, T<sub>C</sub> should refer to "Absolute Maximum Operating Specification".

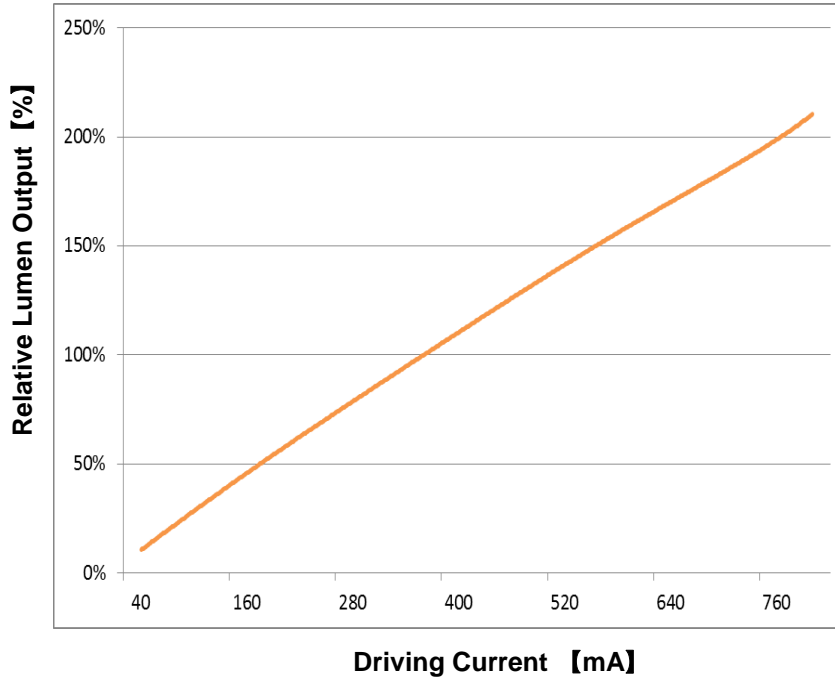
## Relative Spectral Distribution

- Relative Spectral Distribution vs. Wavelength

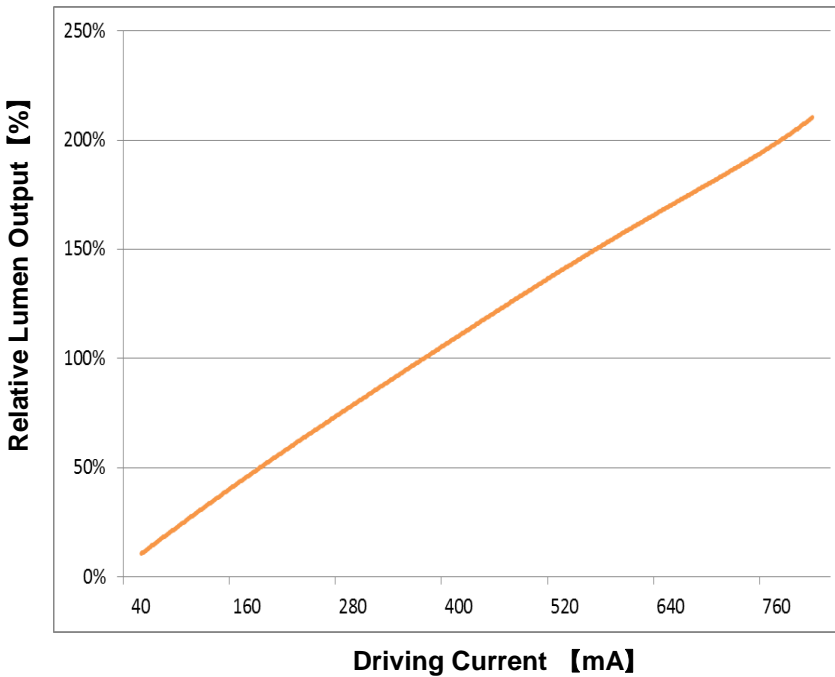


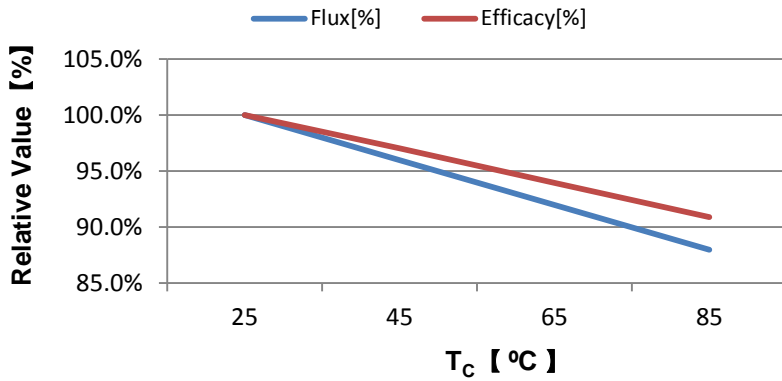
- Scale ratio curve for related lumen output VS driving current,  $T_c = 25\text{ }^\circ\text{C}$

**SMJD-2306032C-XXNA**

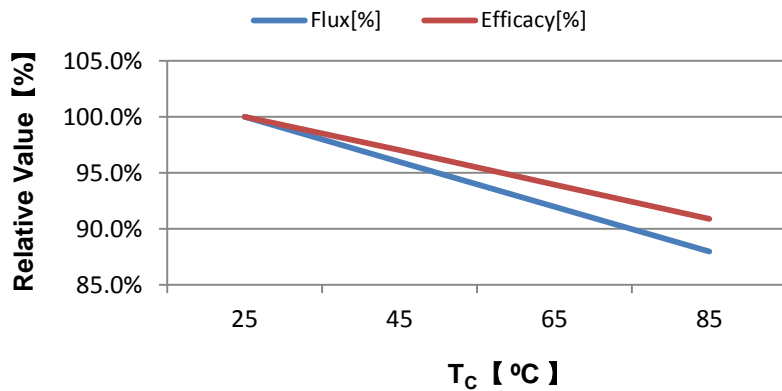


**SMJD-4612064C-XXNA**



**Flux and Efficacy Versus Temperature at  $T_C$ (at  $I_F$  nominal)**
**SMJD-2306032C-XXNA,  $I_F = 350\text{mA}$** 


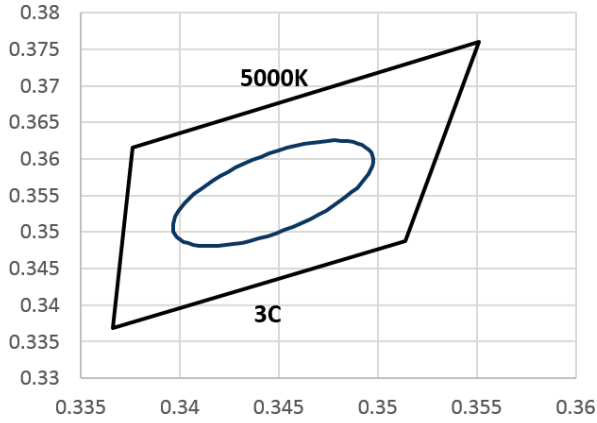
$T_C$ [°C]	Flux[%]	Efficacy[%]
25	100	100
45	96.0	97.0
65	92.0	94.0
85	88.0	90.9

**Flux and Efficacy Versus Temperature at  $T_C$ (at  $I_F$  nominal)**
**SMJD-4612064C-XXNA,  $I_F = 350\text{mA}$** 


$T_C$ [°C]	Flux[%]	Efficacy[%]
25	100	100
45	96.0	97.0
65	92.0	94.0
85	88.0	90.9

## Color Bin Structure

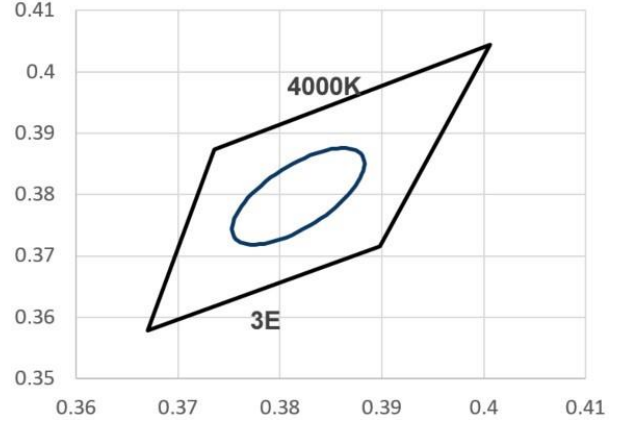
CIE Chromaticity Diagram (Cool white),  $T_c = 25\text{ }^\circ\text{C}$



5000K 3 Step Ellipse

3C				
x	y	a	b	theta
0.3447	0.3553	0.0081	0.0035	60

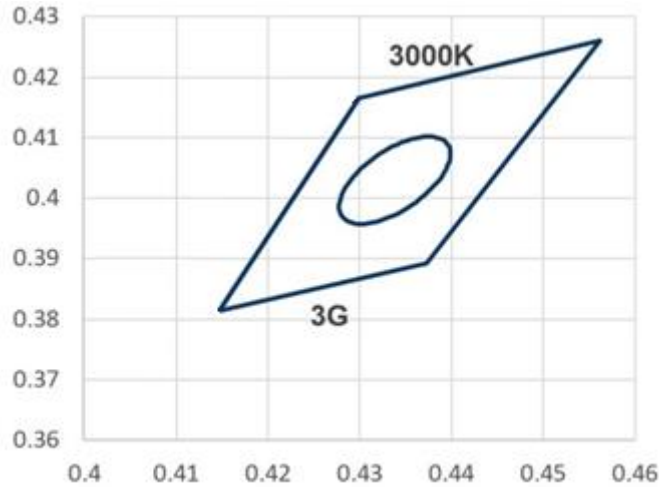
CIE Chromaticity Diagram (Nature white),  $T_c = 25\text{ }^\circ\text{C}$



4000K 3 Step Ellipse

3E				
x	y	a	b	theta
0.3818	0.3797	0.0094	0.004	53

CIE Chromaticity Diagram (Warm white),  $T_c = 25\text{ }^\circ\text{C}$



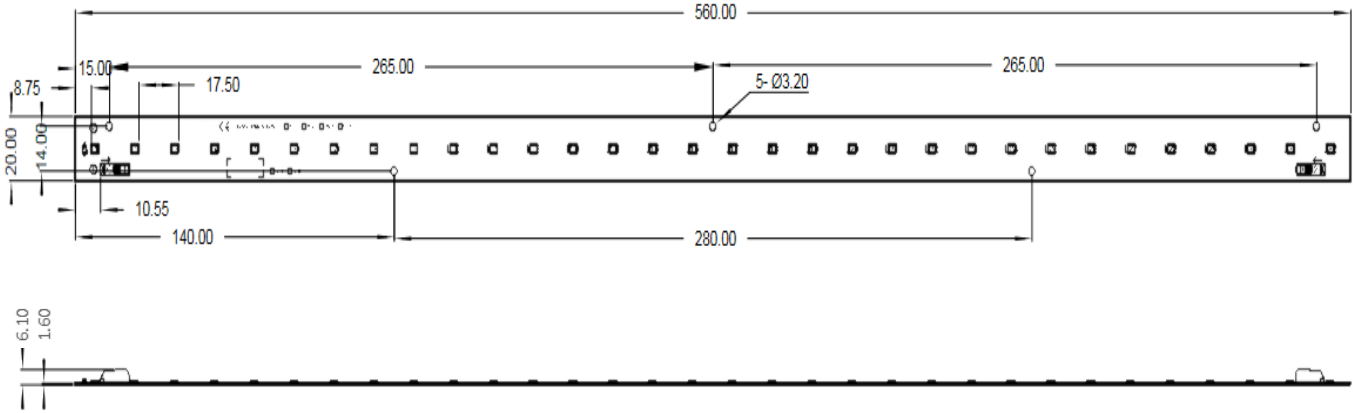
3000K 3 Step Ellipse

3G				
x	y	a	b	theta
0.4338	0.4030	0.0085	0.0041	53



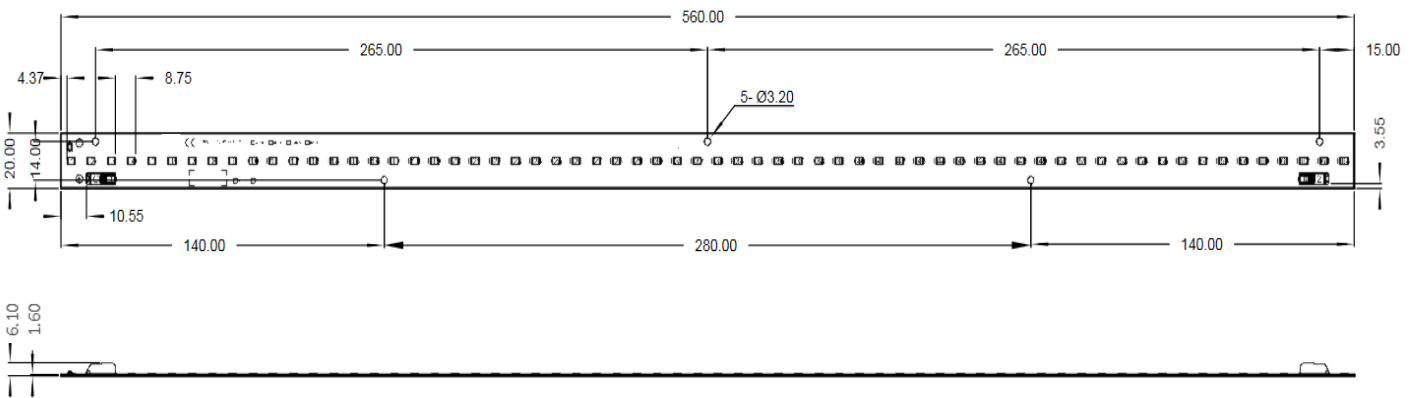
## Mechanical Dimensions

### SMJD-2306032C-XXNA



Dimension	Specification	Tolerance	Unit
Module Length	560.0	±0.5	mm
Module Width	20.0	±0.3	
Module Height	6.1	±0.3	
PCB Thickness	1.6	±0.1	

### SMJD-4612064C-XXNA



Dimension	Specification	Tolerance	Unit
Module Length	560.0	±0.5	mm
Module Width	20.0	±0.3	
Module Height	6.1	±0.3	
PCB Thickness	1.6	±0.1	

### Product Nomenclature:

\*Please refer to the following chart

**S M J D - 23 06 032 C - XX N A**  
 Seoul DC Module      (A)      (B)      (C)      (D)      (E)      (F)      (G)

Voltage		Power		LED Qty			Type	Custom	Dimming	Etc
2	3	0	6	0	3	2	C	XX	N	A
0 0V	0 0V	0 0W	0 0W	0 0ea	0 0ea	0 0ea	C 3528	XX ref	N Norm	A vers
1 10V	1 1V	1 10W	1 1W	1 100ea	1 10ea	1 1ea			D Dim	
2 20V	2 2V	2 20W	2 2W	2 200ea	2 20ea	2 2ea			E Etc	
3 30V	3 3V	3 30W	3 3W	3 300ea	3 30ea	3 3ea				
-	-	-	-	-	-	-				
9 90V	9 9V	9 90W	9 9W	9 900ea	9 90ea	9 9ea				
A 100V		A 100W		A 1000ea						
B 110V		B 110W		B 1100ea						
-		-		-						
Z 350V		Z 350W		Z 3500ea						

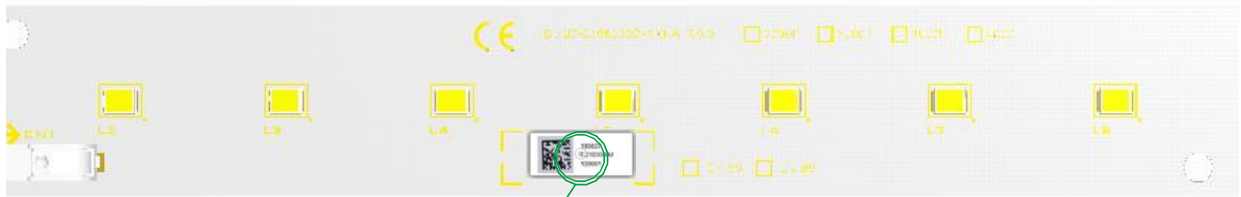
### Product Nomenclature: Binning

\*Please refer to the following chart

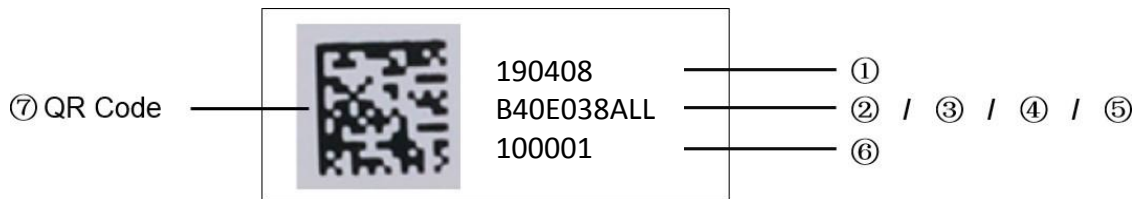
**00 B40 E03 8 ALL**  
 (A)      (B)      (C)      (D)      (E)

Lens Type	Flux Bin	CCT Bin	CRI Bin	VF Bin
00	B40	E03	8	ALL
00 No Lens	B22 1220 lm	G03 3000k - 3 step	8 CRI 80	All 22 ~ 25V <sub>DC</sub>
	B40 1400 lm	E03 4000k - 3 step		44 ~ 49.6V <sub>DC</sub>
	C44 2440 lm	C03 5000k - 3 step		
	C80 2800 lm			

## Marking Information



Marking point



No.	Item	Information	Digits	Remark
①	Date	YYMMDD	6 Digit	SMT date
②	Flux <sup>(*)</sup>	B40	3 Digit	B40=1400lm
③	CCT	X03   3-step Mixing	3 Digit	X=C,E,G
④	CRI	8	1 Digit	CRI=80
⑤	V <sub>F</sub>	ALL	3 Digit	
⑥	Lot No.	1	1 Digit	0~9,A~Z
	Sequence No.	00001	5 Digit	00001 ~ 99999
⑦	QR Code	QR Code	-	Please refer to below table

Note:

\*Flux Bin - please refer to following chart for definitions:

### Flux Bin Definitions

Symbol	lm	Symbol	lm	Symbol	lm	Symbol	lm
A50	500	D50	3500	G50	6500	J50	9500
B50	1500	E50	4500	H50	7500	K20	10200
C50	2500	F50	5500	I50	8500	L00	11000

## Module QR Code Information

<b>QR Code Information</b>								
Items	Factory	SAP Code	SMT Date	MP Information	Line No.	Lot No.	Product	Note
Digits	1 Digit	7 Digits	6 Digits	10 Digits	1 Digit	1 Digit	5 Digits	In Total 31 Digits
Information	*	*****	YYMMDD	B40E03 8ALL	1~9, A~Z	1~9, A~Z	00001	

**Notes:**

- QR coded information shall include the fields described in the table above.
- Minimum size of QR code shall be 4.5 mm x 4.5 mm and a minimum QR code grade of 'C'.  
\* 'A' grading is preferred.
- If the component is small to have a full label, it is acceptable to have only the QR code in minimum size of 6 mm by 6 mm printed on a label.
- QR Code Example: \*\*\*\*\*190408B40E038ALL11100001

## Label Information

<b>PO Number</b> 	XXXXXX <sup>(1)</sup> 
<b>Supplier Part Number</b> 	SMJD-2306032C-XXNA00B40E038ALL <sup>(2)</sup> 
<b>Bin Code</b> 	B40E038ALL <sup>(3)</sup> 
<b>Quantity</b> 	XX 
<b>Country of Origin</b> 	XX <sup>(4)</sup> 
<b>Date Code</b> 	YYYYWW <sup>(5)</sup> 
<b>Lot Code</b> 	YYMDDXXXX- XXXXXX <sup>(6)</sup> 
	SEoul SEMICONDUCTOR CO.,LTD.

**Notes:**

- This is customer's PO Number
- Please refer to SPEC page 10 (30 digit code)
- Please refer to SPEC page 10
- Country of Origin: 2 digit code . For example : Chinese Code: CN
- Date Code : YYYYWW : Packing Date: Year + Week
- Lot Code :  
Initial of manufacture is refer to the 2D code rule.  
YYMDD : Packing Date (Oct. : A, Nov. : B, Dec. : C)  
X : Initial of Manufacturer  
XXXX : Sealing Pack No.  
XXXXXXX : SSC SAP Code
- It is attached to the top left corner of the box.

<h1>TOTAL Quantity</h1> <h2>XX</h2>
<b>SEoul SEMICONDUCTOR CO.,LTD.</b>

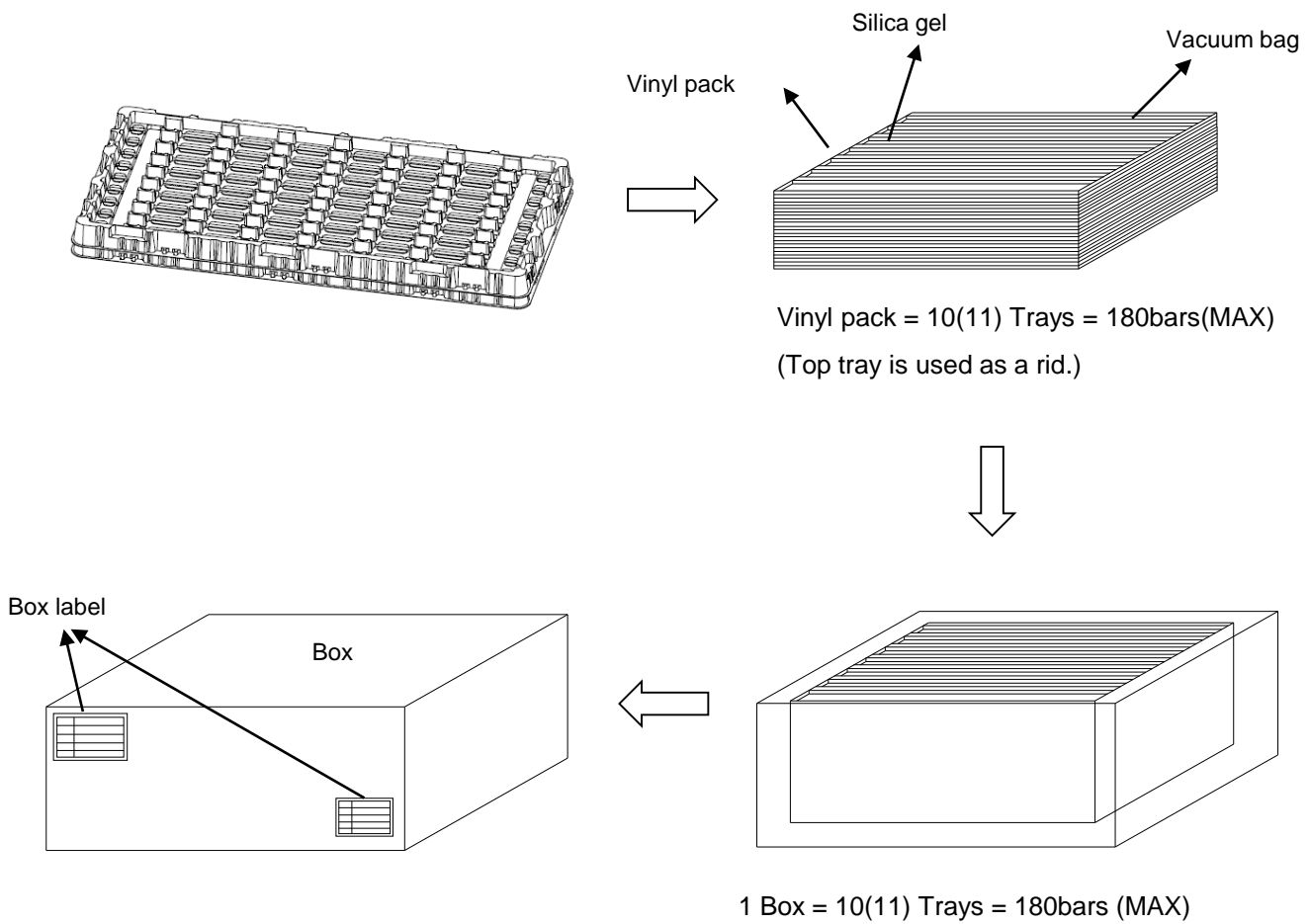
**Notes:**

- Attached to the bottom right corner of the carton box.

## Packaging Specification

Model	Tray		Box		Pallet	
	Size (mm)	Q'ty per tray (ea)	Size (mm)	Q'ty per box (ea)	Size (mm)	Q'ty per pallet(ea)
SMJD-2306032C-XXNA	610 x 300 x 26.3	18	630 x 320 x 230	180	1100 x 1100	3600
SMJD-4612064C-XXNA						

Note:  
1pallet= 4boxes \* 5layer=20boxes=3600ea





## Revision History

Revision	Date	Page	Remarks
Rev0.1	2019-11-28	All	Preliminary data sheet



## Storage before use

1. When storing devices for a long period of time before usage, please following these guidelines.
  - The devices should be stored in the anti-static bag that it was shipped in from Seoul-Semiconductor with opening
  - If the anti-static bag has been opened, re-seal preventing air and moisture from being present in the bag.



# SEOUL SEMICONDUCTOR

## Company Information

Seoul Semiconductor (SeoulSemicon.com) manufactures and packages a wide selection of light emitting diodes (LEDs) for the automotive, general illumination/lighting, appliance, signage and back lighting markets. The company is the world's fifth largest LED supplier, holding more than 10,000 patents globally, while offering a wide range of LED technology and production capacity in areas such as "nPola", deep UV LEDs, "Acrich", the world's first commercially produced AC LED, and "Acrich MJT - Multi-Junction Technology", a proprietary family of high-voltage LEDs. The company's broad product portfolio includes a wide array of package and device choices such as Acrich, high-brightness LEDs, mid-power LEDs, side-view LEDs, through-hole type LED lamps, custom displays, and sensors. The company is vertically integrated from epitaxial growth and chip manufacture in its fully owned subsidiary, Seoul Viosys, through packaged LEDs and LED modules in three Seoul Semiconductor manufacturing facilities. Seoul Viosys also manufactures a wide range of unique deep-UV wavelength devices.

## Legal Disclaimer

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