

# SunLike Linear Reference Module



## Product Overview:

- Zhaga standard mounting pattern
- Uniformity of light and color.
- Best in class efficacy at typical driving currents

## Lighting Applications:



## Features:

- High Color Quality with CRI Min.95.
- Industry standard mechanical attributes
- Optimized to function with industry standard power supplies
- 3 SDCM
- ROHS compliant

## Applications:

- Residential
- Commercial
- Linear highbay

## Product Selection - SMJD-4846144G-XXN1 $I_F = 900\text{mA}$ , $T_a = 25^\circ\text{C}$

CCT	CRI	Flux		Length	Order Code
		Min	Typ.		
2700	95	3600	3800	560*39.8	SMJD-4846144G-XXN100D80H039AII
3000	95	3600	3800	560*39.8	SMJD-4846144G-XXN100D80G039AII
3500	95	3600	3800	560*39.8	SMJD-4846144G-XXN100D80F039AII
4000	95	4000	4200	560*39.8	SMJD-4846144G-XXN100E20E039AII
5000	95	4000	4200	560*39.8	SMJD-4846144G-XXN100E20C039AII
6500	95	4000	4200	560*39.8	SMJD-4846144G-XXN100E20A039AII

## Maximum Operating Specification: Ta = 25°C

Model	Parameter	Symbol	Unit	Value	Remark
SMJD-4846144G-XXN1	Power Consumption	P	W	70	
	Driving Current	I <sub>F</sub>	mA	1350	
SMJD-4846144G-XXN1	Operating Temperature <sup>(3)</sup>	T <sub>C</sub>	°C	- 40 ~ 98	Reference point
SMJD-4846144G-XXN1	Storage Temperature	T <sub>Ctg</sub>	°C	- 40 ~ 98	With no power
SMJD-4846144G-XXN1	Thermal resistance (T <sub>C</sub> to base)	R <sub>th(TC-base)</sub>	°C/W	0.3	
SMJD-4846144G-XXN1	ESD Sensitivity	-	KV	±8	IEC Air
				±4	HBM

## Electro Optical Characteristics , SMJD-4846144G-XXN1 I<sub>F</sub> = 900mA T<sub>a</sub> = 25°C<sup>[1]</sup>

Parameter	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Luminous Flux	Φ <sub>v</sub> <sup>[2]</sup>	3600	3800	-	lm	H,G,F
		4000	4200	-		E,C,A
Correlated Color Temperature <sup>[3]</sup>	CCT	6000	6500	7000	K	A
		4700	5000	5300		C
		3700	4000	4200		E
		3200	3500	3700		F
		2900	3000	3200		G
		2600	2700	2900		H
CRI	Ra	95	-	-	-	-
Input Voltage	V <sub>F</sub>	48	52	56	V <sub>DC</sub>	@900mA
Power Consumption	P	42	46	50	W	
Efficiency	LPW	-	90	-	Lm/W	H,G,F
		-	95	-		E,C,A

### Notes:

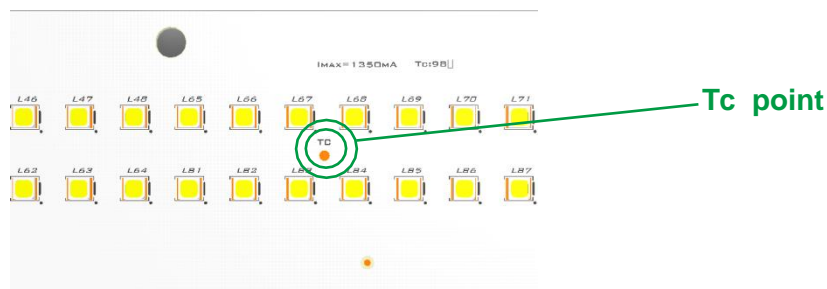
- 1 Above data tested with constant typical current at T<sub>a</sub> = 25°C.
- 2 Φ<sub>v</sub> is the total luminous flux output measured with an integrated sphere.
- 3 Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.
- 4 To use the module properly, recommend to drive the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

Notes:

\*CCT range and tolerance of 3-step MacAdam flexible LED modules.

CCT "Colour"	Center point(x,y)	Typ. CCT (K)	3-step MacAdam CCT range
F6500	x=0.3123, y=0.3282	6500	6530 ± 510
F5000	x=0.3447, y=0.3553	5000	5028 ± 283
F4000	x=0.3818, y=0.3797	4000	3985 ± 275
F3500	x=0.4073, y=0.3917	3500	3465 ± 245
F3000	x=0.4338, y=0.4030	3000	3045 ± 175
F2700	x=0.4578, y=0.4101	2700	2725 ± 145

#### ILLUSTRATION 1: How to predict components temperature [4]



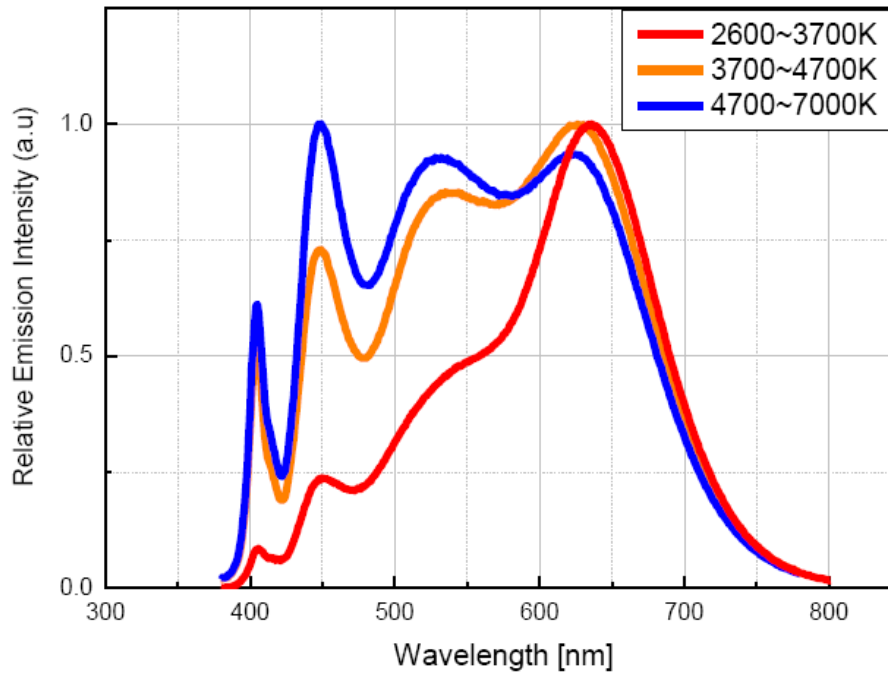
Notes :

*\*Recommended Tc Testing point*

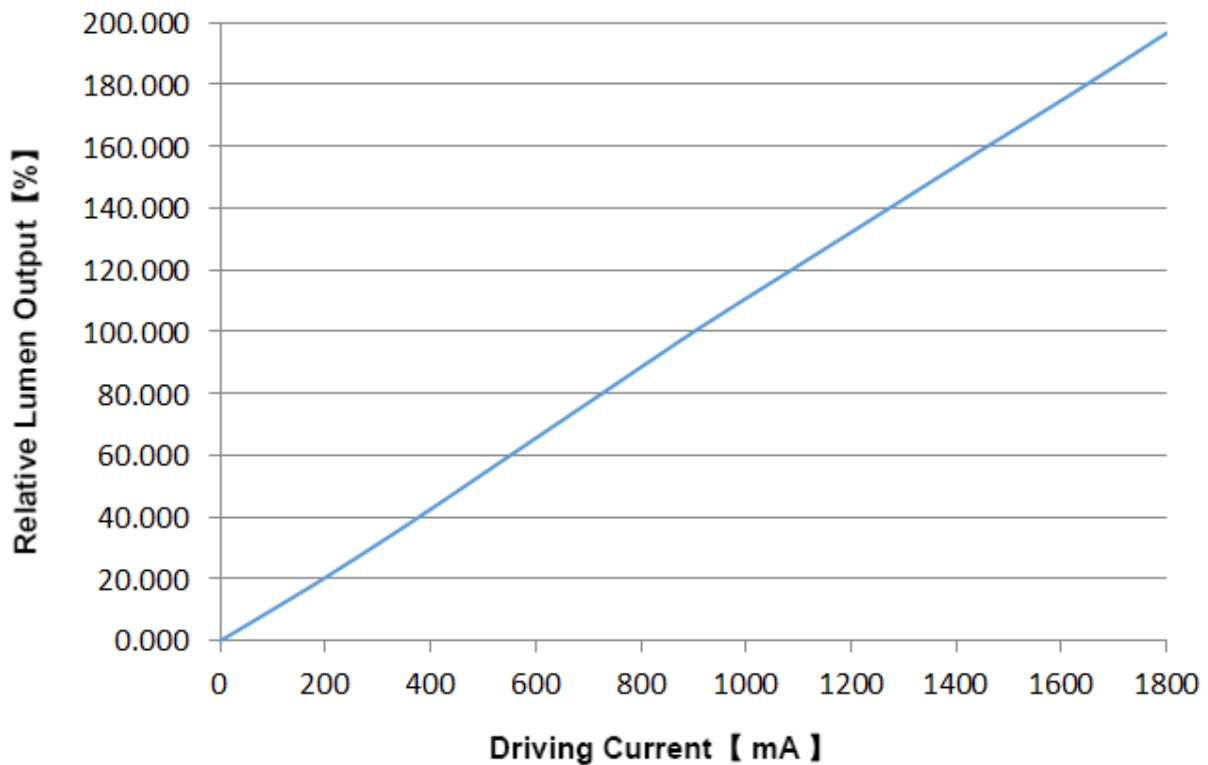
- (1) All guarantee are based on the Absolute Maximum Ratings listed.
- (2) Please use a Constant Current Source (CCS) to drive the module, the typical  $V_F$  of module is 52 VDC and  $V_{F\_MAX}$  is 56 VDC, respectively.
- (3) Operating temperature was tested at the assigned Tc point on the PCB.
- (4) To ensure the module works properly, Tc should be kept below 98 °C;

## Relative Spectral Distribution

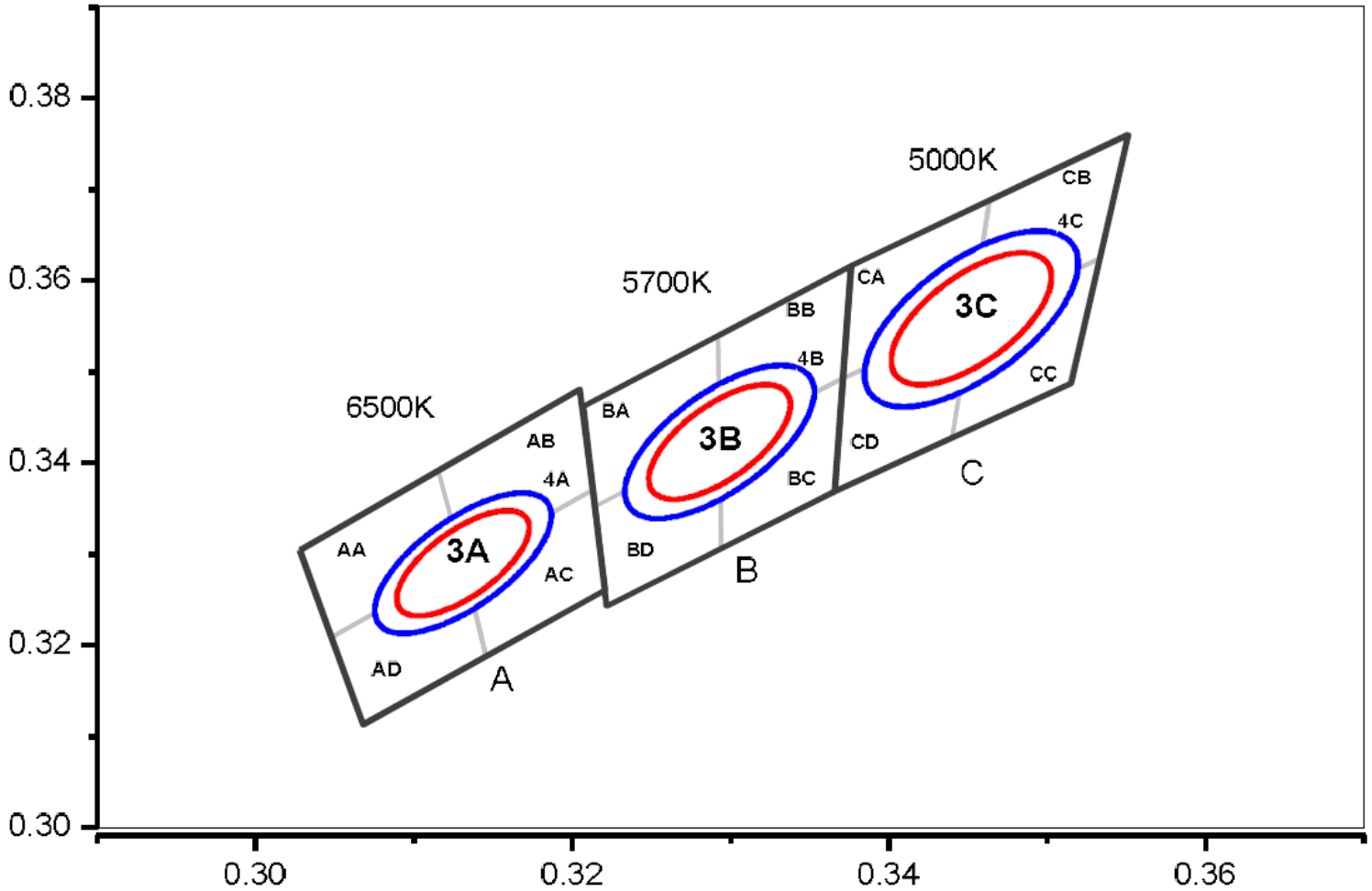
- Relative Spectral Distribution vs. Wavelength



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

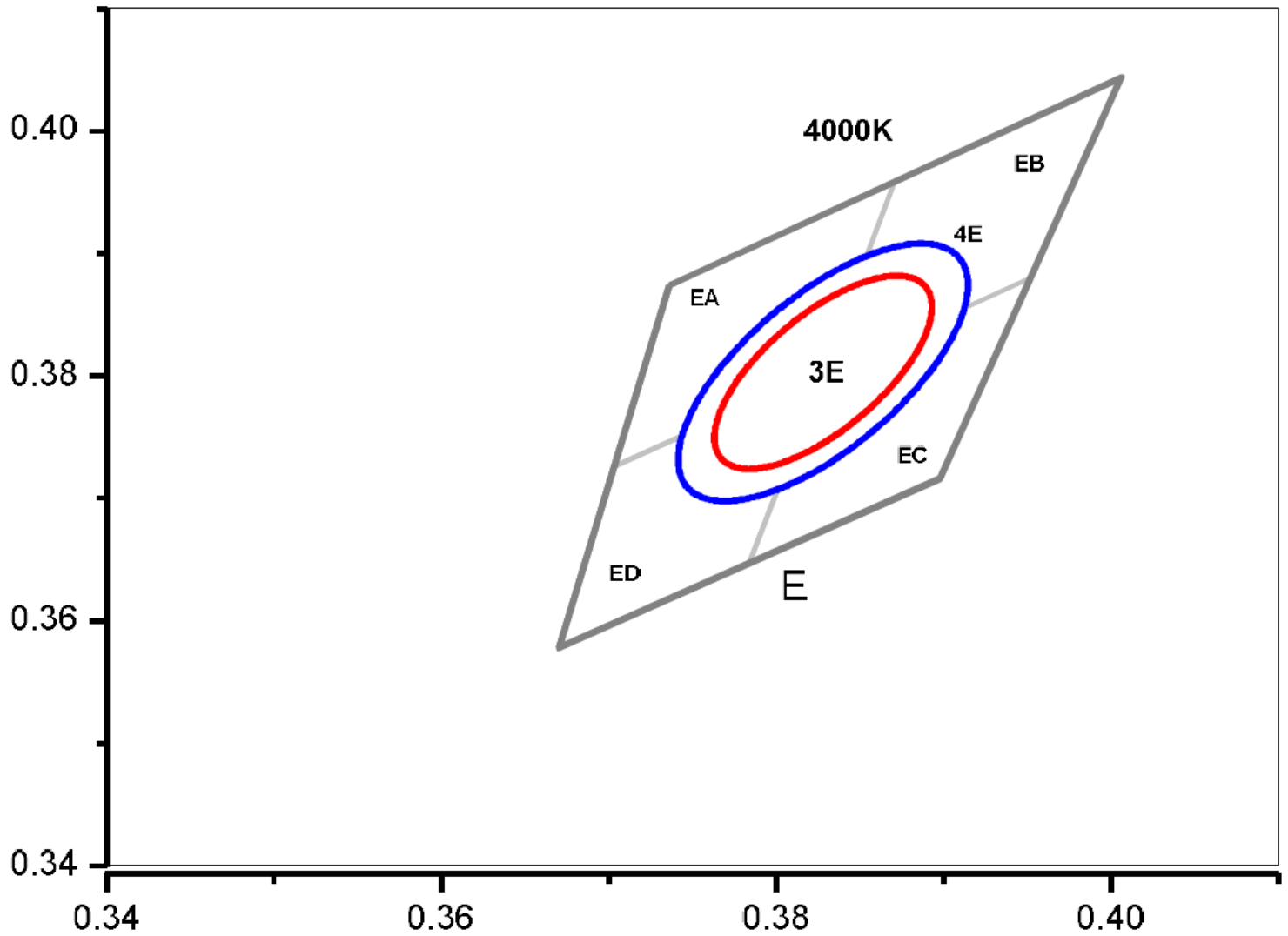


- CIE Chromaticity Diagram (Cool white),  $T_a=25^{\circ}\text{C}$



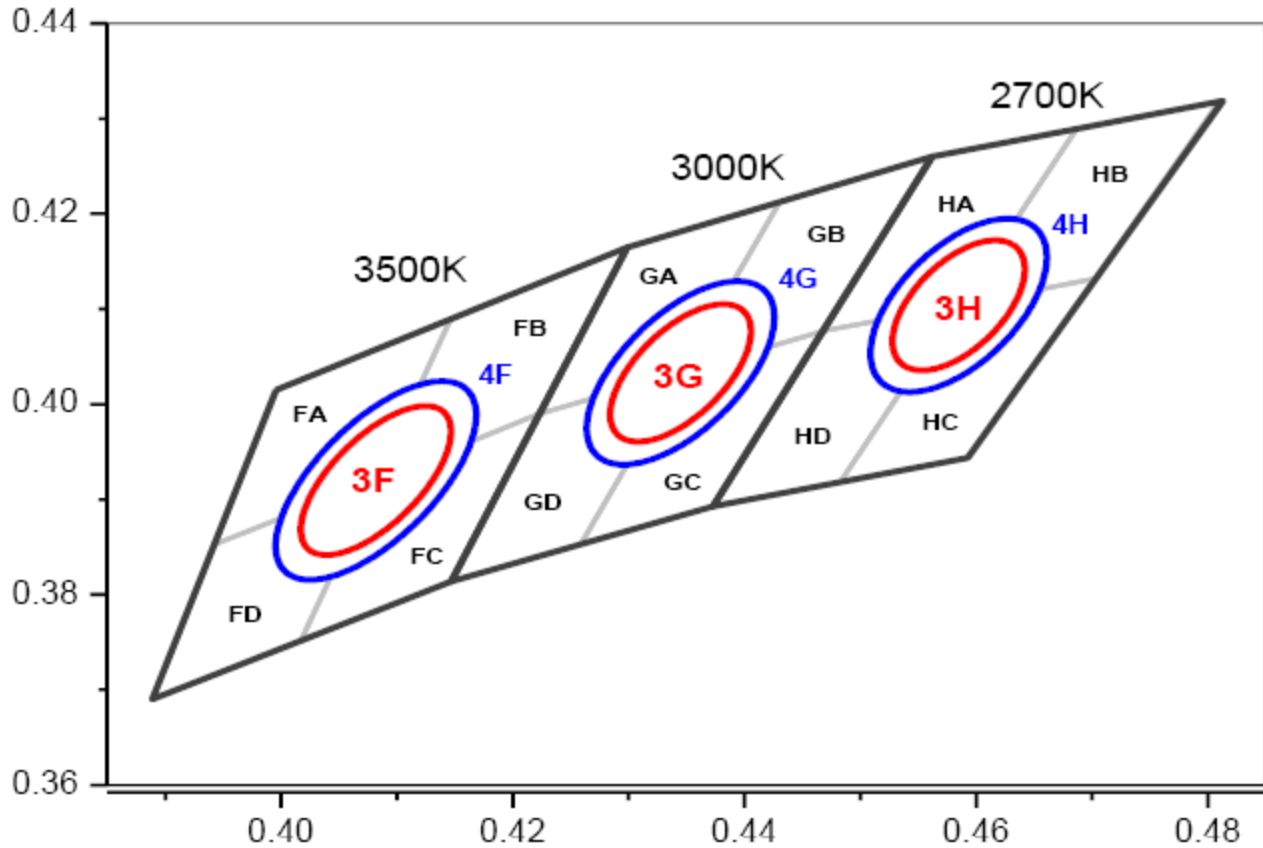
6500K 3 Step Ellipse					5700K 3 Step Ellipse					5000K 3 Step Ellipse				
3A					3B					3C				
x	y	a	b	theta	x	y	a	b	theta	x	y	a	b	theta
0.3123	0.3282	0.0066	0.0027	58	0.3287	0.3417	0.0071	0.0030	59	0.3447	0.3553	0.0081	0.0035	60

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



4000K 3 Step Ellipse				
3E				
x	y	a	b	theta
0.3818	0.3797	0.0094	0.004	53

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

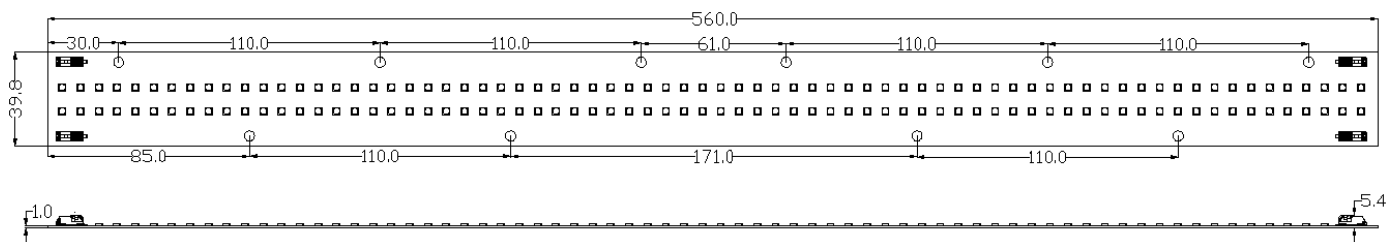


3500K 3 Step Ellipse					3000K 3 Step Ellipse					2700K 3 Step Ellipse				
3F					3G					3H				
x	y	a	b	theta	x	y	a	b	theta	x	y	a	b	theta
0.4073	0.3917	0.0093	0.0041	53	0.4338	0.4030	0.0085	0.0041	53	0.4578	0.4101	0.0079	0.0041	54

## Mechanical Dimensions

### • SMJD-4846144G-XXN1

Dimension	Specification	Tolerance	Unit
Module Length	560	±0.5	mm
Module Width	39.8	±0.3	mm
Module Height	5.4	±0.3	mm
PCB Thickness	1.0	±0.1	mm
Module weight	TBD	±10	g





## Product Nomenclature:

\*Please refer to the following chart

Seoul DC Module — **1** — **2** — **3** — **4** — **5** — **6** — **7** — **8**

**S M J D - 48 46 144 G - XX N 1**

Voltage		Power		LED Qty			Type	Custom	Dimming	Etc
4	8	4	6	1	4	4	G	XX	N	1
0 0V	0 0V	0 0W	0 0W	0 0ea	0 0ea	0 0ea	C 3030	XX ref	N Norm	1 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

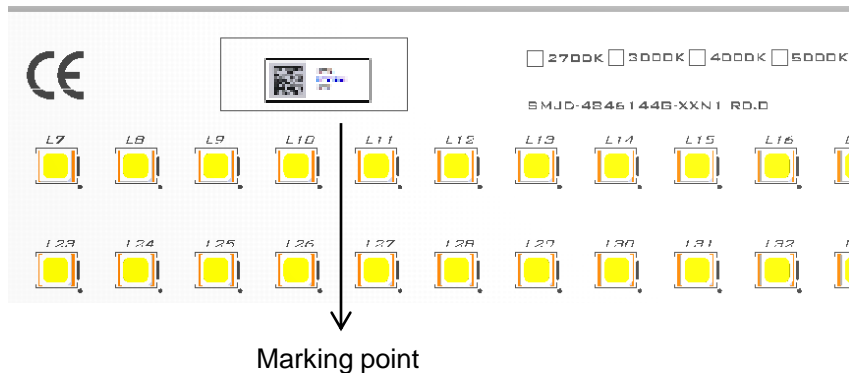
\*Please refer to the following chart

**00 E20 E03 9 All**

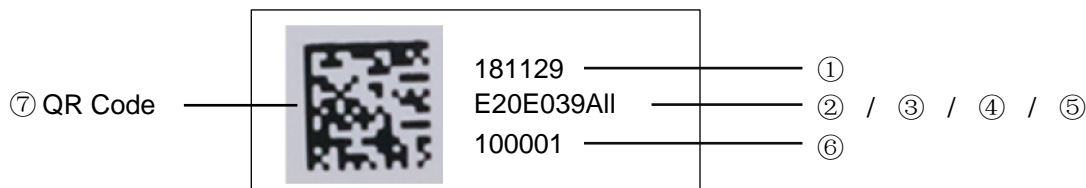
**A B C D E**

Lens Type	Flux Bin	CCT Bin	CRI Bin	VF Bin
00	D30	E03	8	All
00 No Lens	D80 3800lm	H03 2700k – 3step	9 CRI 95	All 48~56V <sub>DC</sub>
	D80 3800lm	G03 3000k – 3step		
	D80 3800lm	F03 3500k – 3step		
	E20 4200lm	E03 4000k – 3step		
	E20 4200lm	C03 5000k – 3step		
	E20 4200lm	A03 6500k – 3step		

## Marking Information



### • Marking Information



No.	Item	Information	DigiTc	Remark
①	Date	YYMMDD	6Digit	SMT date
②	Flux <sup>(1)</sup>	E20	3Digit	E20=4200lm <sup>(1)</sup>
③	CCT	X03 3-step Mixing	3Digit	X=A,C,E,F,G,H
④	CRI	9	1Dight	CRI=95
⑤	V <sub>F</sub>	All	3Digit	
⑥	Lot No.	1	1 Digit	0~9,A~Z
	Sequence No.	00001	5 Digit	00001 ~ 99999
⑦	QR Code	QR Code	-	Please refer bellow table

### Note:

(1) Flux bin please refer to the bellow binning definitions

Symbol	Im	Symbol	Im	Symbol	Im	Symbol	Im
A20	200	D20	3200	G20	6200	J20	9200
B20	1200	E20	4200	H20	7200	K20	10200
C20	2200	F20	5200	I20	8200	L20	11200

## Module QR Code Information




### QR Code Information

Items	Factory	SAP Code	SMT Date	Characteristics	Line No.	Lot No.	Serial number	Note
Digits	1 Digit	7 Digits	6 Digits	10 Digits	1 Digit	1 Digit	5 Digits	In Total 31 Digits
Information	1~9	*****	YYMMDD	E20E039All	1~9, A~Z	1~9, A~Z	00001	

#### Notes:

- 1 QR coded information shall include the fields described in the table above.
- 2 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.
- 3 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.
- 4 Each character is separated by ","  
Example: SMJD-4846144G-XXN1, XXXXXXX, 181129, 00E20E039All, 1, 1, 1, 00001

## Label Information

<b>PO Number</b> 	<b>XXXXXX</b> <sup>(1)</sup> 
<b>Supplier Part Number</b> 	<b>SMJD-4846144G-XXN100E20E039ALL</b> <sup>(2)</sup> 
<b>Bin Code</b> 	<b>E20E039All</b> <sup>(3)</sup> 
<b>Quantity</b> 	<b>XX</b> 
<b>Country of Origin</b> 	<b>XX</b> <sup>(4)</sup> 
<b>Date Code</b> 	<b>YYYYWW</b> <sup>(5)</sup> 
<b>Lot Code</b> 	<b>YYMDDXXXXX- XXXXXXX</b> <sup>(6)</sup> 
	<b>SEOUL SEMICONDUCTOR CO.,LTD.</b>

#### Notes:

- (1) This is customer's PO Number (6 digit code)
- (2) Product Name Rule (18 digit code) + Characteristics Rule (12 digit code)
- (3) Characteristics Rule (10 digit code)
- (4) Country of Origin: 2 digit code (KR : Korea, CN : China, VN : Vietnam)
- (5) Date Code : YYYYWW : Packing Date: Year + Week
- (6) 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
- (7) It is attached to the top left corner of the box.

# TOTAL Quantity



## XXX

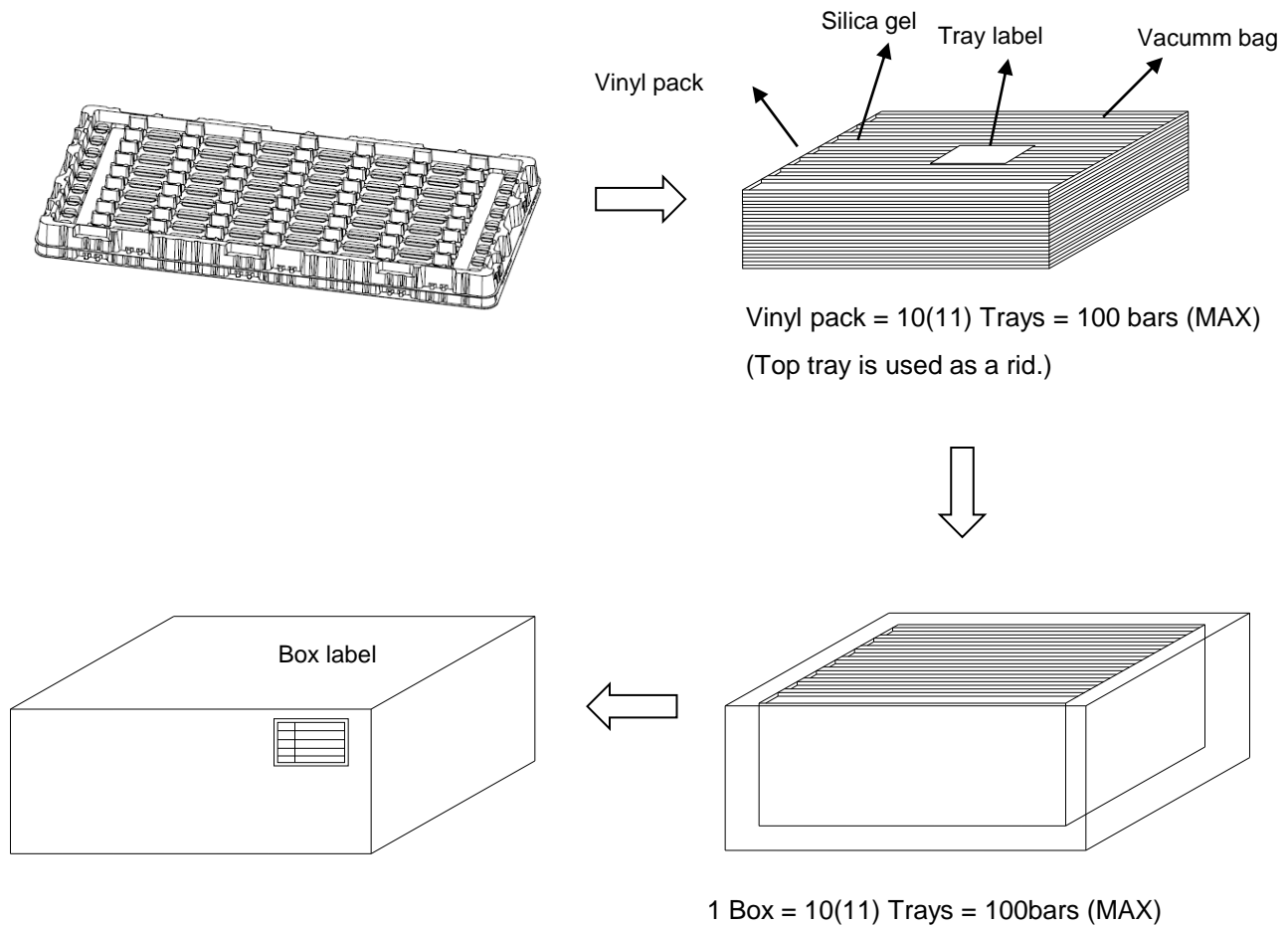


**SEOUL SEMICONDUCTOR  
CO.,LTD.**

#### Notes:

- [1] Attached to the bottom right corner of the carton box.

## Packaging Specification



Model	Tray		Box		Pallet	
	Size(mm)	Q'TY per Tray	Size(mm)	Q'TY per Box	Size(mm)	Q'TY per Pallet
SMJD-4846144G-XXN1	610 x 300 x 30	10	625*315*215	100	1000*1000	1800

## Precaution for Use

1. Check the appearance of engine before wiring/ assembly, **DO NOT** use the lens cracked or wire damaged engine.
2. The engine was designed to be driven with DC source, recognize the polarities of the engine was necessity.
3. It was not SELV engine, **DO NOT** connect the LED driver to main power during wiring.
4. **DO NOT** prolong the cable too much for long term using
5. No current regulator built in engine, unevenly load between different parallel engines may occur due to the engines VF variance.
6. **DO NOT** detach the lens at any application.
7. **DO NOT** let the lens face to touch rough stuff, and **DO NOT** touch lens with sharp matters
8. Please do not use together with the materials containing Sulfur.
9. Please do not make any modification on module.

10. LEDs are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS).  
The following contains suggestions that Seoul Semiconductor purposes to minimize these effects

### A. ESD (Electro Static Discharge)

Electrostatic discharge (ESD) is the defined as the release of static electricity when two object 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 an 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*

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 emission surface of the LED package (shadowing can be noticed around the bond pads viewing through microscope).*
- *Anomalies noticed in encapsulation & phosphor around bond wires. This damage usually appears due to thermal stress produced during EOS event.*

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

- Qualified LED driver with no big over shoot out put
- Isolated driver that to prevent harmful peaks passed to engine.
- A current limiting device



## Storage before use

1. DO NOT impact or place pressure on this product because even a small amount of pressure can damage the lens cover.
2. 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.

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