DC Module

SMJD-4212056C-G4N100

Product Brief

Description

- Multiple CCT is optional
- Modular design concept, easily expend to multitude application
- Poke-in connector in built
- Zhaga book 7 compliant LED module

Features and Benefits

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

Key Applications

- Linear lighting
- Decorative lighting
- Troffer

Product Code Information

Table 1. Order Code

CCT	CRI	Lens type	Order Code
6500	80	-	SMJD-4212056C-G4N100C24A038ALL
5700		-	SMJD-4212056C-G4N100C24B038ALL
5000		-	SMJD-4212056C-G4N100C27C038ALL
4000		-	SMJD-4212056C-G4N100C27E038ALL
3500		-	SMJD-4212056C-G4N100C24F038ALL
3000		-	SMJD-4212056C-G4N100C16G038ALL
2700		-	SMJD-4212056C-G4N100C10H038ALL
6500	90	-	SMJD-4212056C-G4N100B88A039ALL
5700		-	SMJD-4212056C-G4N100B88B039ALL
5000		-	SMJD-4212056C-G4N100B94C039ALL
4000		-	SMJD-4212056C-G4N100B94E039ALL
3500		-	SMJD-4212056C-G4N100B88F039ALL
3000		-	SMJD-4212056C-G4N100B81G039ALL
2700		-	SMJD-4212056C-G4N100B78H039ALL

Notes:

(1) Order code include 18D(Part Name) + 2D(lens Type) + 10D(Characteristics)

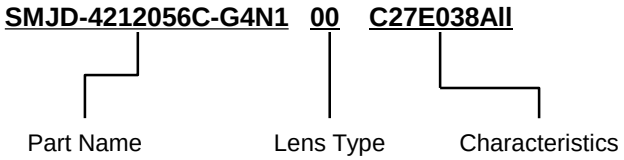


Table of Contents

Performance Characteristics

Table2-1. Electro Optical Characteristics, I_F = 308mA, T_c=25℃ for Ra80

Parameter	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Luminous Flux	Φ_V [2]	2080	2240	-	Lm	A rank
		2080	2240	-		B rank
		2110	2270	-		C rank
		2110	2270	-		E rank
		2080	2240	-		F rank
		2010	2160	-		G rank
		1950	2100	-		H rank
Luminous Efficiency	LPW	-	190	-	Lm/W	A rank
		-	190	-		B rank
		-	192	-		C rank
		-	192	-		E rank
		-	190	-		F rank
		-	183	-		G rank
		-	178	-		H rank
Correlated Color Temperature [3]	CCT	6000	6500	7000	K	A rank
		5300	5700	6000		B rank
		4700	5000	5300		C rank
		3700	4000	4200		E rank
		3200	3500	3700		F rank
		2900	3000	3200		G rank
		2600	2700	2900		H rank
CRI	Ra	80	-	-	-	
Color Consistency		-	-	3	SDCM	
Input Voltage	V_{in}	37.8	38.3	38.8	Vdc	
Forward Current	I_F		308		mA	
Power Consumption	P		11.8		W	
Viewing Angle	$2\Theta_{1/2}$		120		deg.	

Notes :

1) The above data were tested at T_c=25ºC.
2) Φ_V is the total luminous flux output measured with an integrated sphere, the tolerance is 7% .
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 datasheet.
5) Measurement precision for Vin +/- 3%.

Performance Characteristics

Table2-2. Electro Optical Characteristics, I_F = 308mA, T_c=25℃ for Ra90

Parameter	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Luminous Flux	Φ_V [2]	1750	1880	-	Lm	A rank
		1750	1880	-		B rank
		1800	1940	-		C rank
		1800	1940	-		E rank
		1750	1880	-		F rank
		1680	1810	-		G rank
		1660	1780	-		H rank
Luminous Efficiency	LPW	-	159	-	Lm/W	A rank
		-	159	-		B rank
		-	164	-		C rank
		-	164	-		E rank
		-	159	-		F rank
		-	153	-		G rank
		-	151	-		H rank
Correlated Color Temperature [3]	CCT	6000	6500	7000	K	A rank
		5300	5700	6000		B rank
		4700	5000	5300		C rank
		3700	4000	4200		E rank
		3200	3500	3700		F rank
		2900	3000	3200		G rank
		2600	2700	2900		H rank
CRI	Ra	90	-	-	-	
Color Consistency		-	-	3	SDCM	
Input Voltage	V_{in}	37.8	38.3	38.8	Vdc	
Forward Current	I_F		308		mA	
Power Consumption	P		11.8		W	
Viewing Angle	$2\Theta_{1/2}$		120		deg.	

Notes :

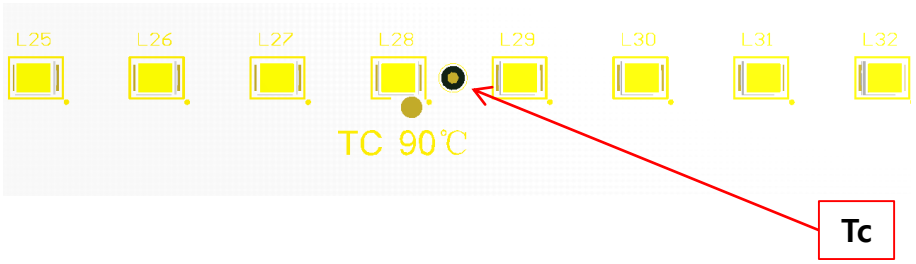
1) The above data were tested at T_c=25ºC.
2) Φ_V is the total luminous flux output measured with an integrated sphere, the tolerance is 7% .
3) Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.
4) To use the module properly, recommend to drive the module by a Constant Current Source (CCS). But the Maximum output voltage of the CCS should be limited by referring this datasheet.
5) Measurement precision for Vin +/- 3%.

Absolute Maximum Ratings

Table 3. Absolute Maximum Ratings, T_c= 25ºC (1)

Parameter	Symbol	Unit	Value	Remark
Power Consumption	P	W	32.1	$P_{\_Typ.}$= 11.8W
Driving Current(2)	I_F	mA	800	$I_{F\_Typ.}$ = 308mA
Operating Temperature(3)	T_c	ºC	- 40 ~ 90	Reference point
Storage Temperature	T_{stg}	ºC	- 40 ~ 100	With no power
ESD Sensitivity	-	KV	±8	IEC Air
			±4	HBM

ILLUSTRATION 1: How to predict components temperature (4)



Notes :

(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 around 38.3VDC and V_{F_MAX} is around 38.8VDC, respectively.

(3) Operating temperature was tested at the assigned Tc point on the PCB.

(4) To ensure the module works properly, DO NOT let the Tc upper than 90 ºC;

Relative Spectral Distribution

Fig 1. Relative Spectral Distribution vs. Wavelength Characteristic

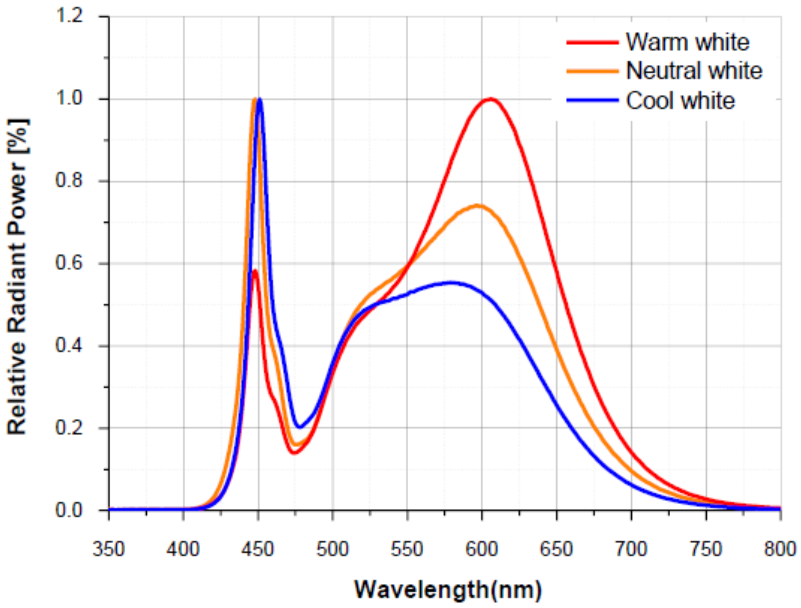
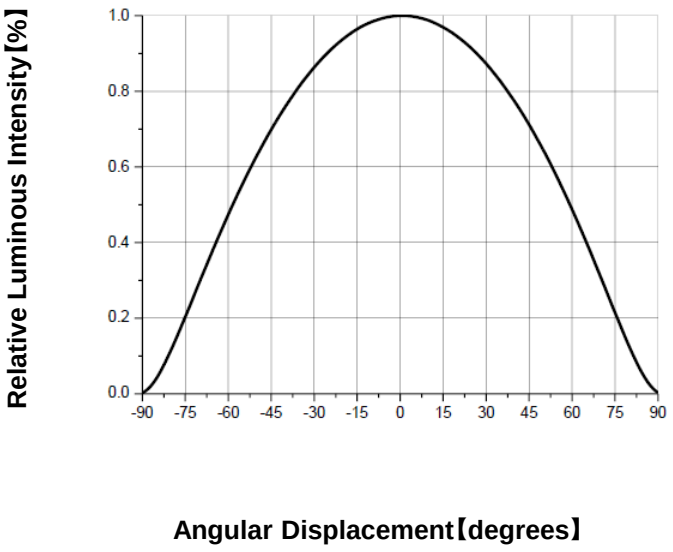


Fig 2. Typical Spatial Distribution



Relative Spectral Distribution

Fig 3. Flux and Efficacy vs. Temperature at T_C(at I_F=308mA)

T_C [ºC]	Flux[%]	Efficacy[%]
25	100%	100%
45	98%	99%
65	95%	97%
85	93%	95%

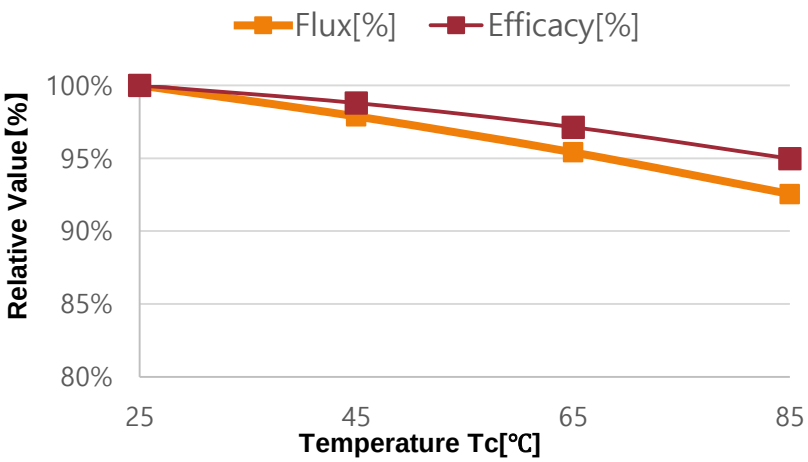
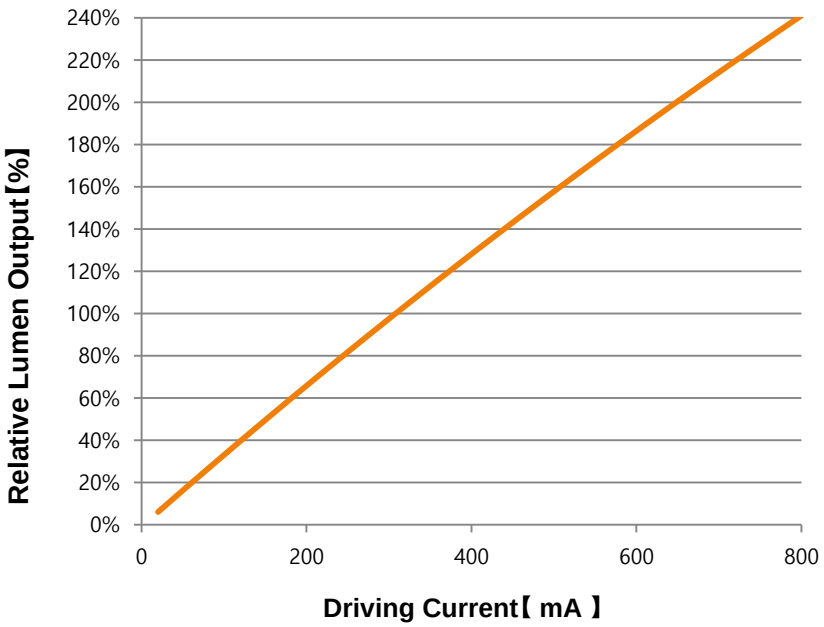
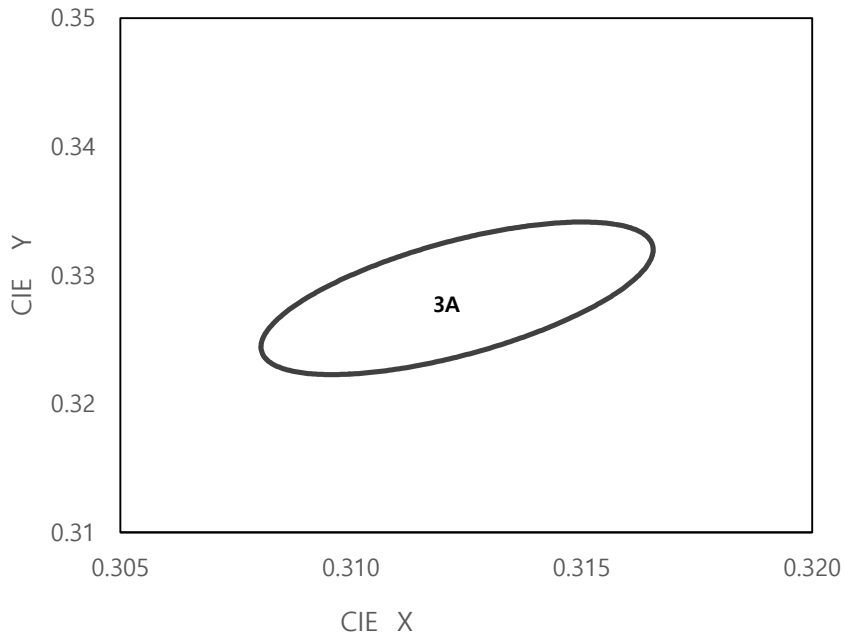


Fig 4. Forward Current vs. Relative Luminous Flux, T_c=25℃



Color Bin Structure

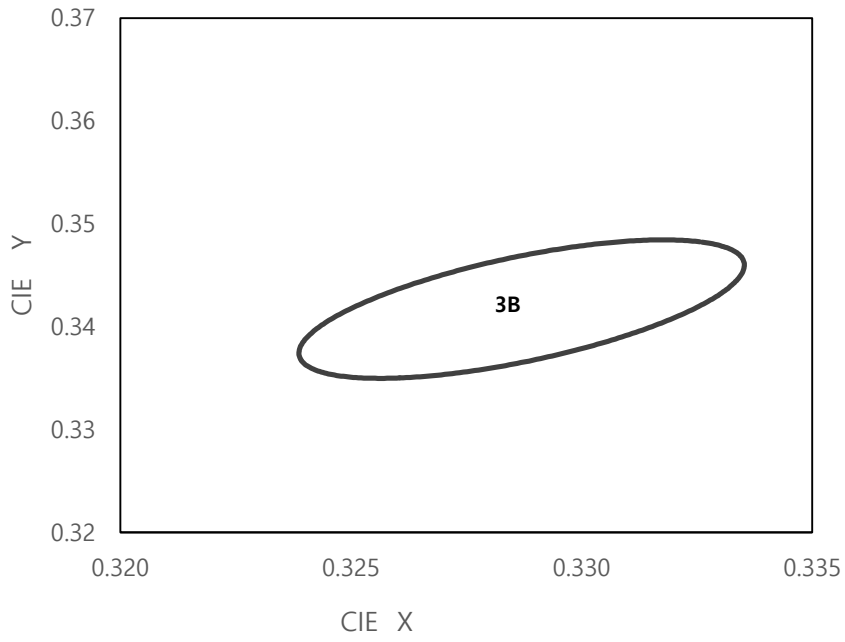
Fig 5. CIE Chromaticity Diagram



3A(3.0step)		
Center Point	0.3123	0.3282
Major Axis a	0.0067	
Minor Axis b	0.0029	
Ellipse Rotation Angle	59	

Color Bin Structure

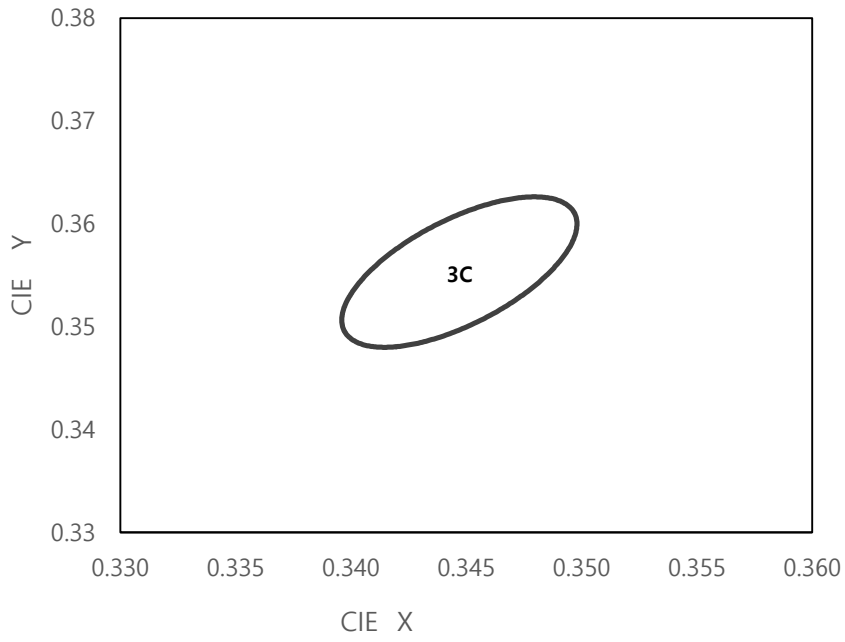
Fig 6. CIE Chromaticity Diagram



3B(3.0step)		
Center Point	0.3287	0.3417
Major Axis a	0.0076	
Minor Axis b	0.0033	
Ellipse Rotation Angle	59	

Color Bin Structure

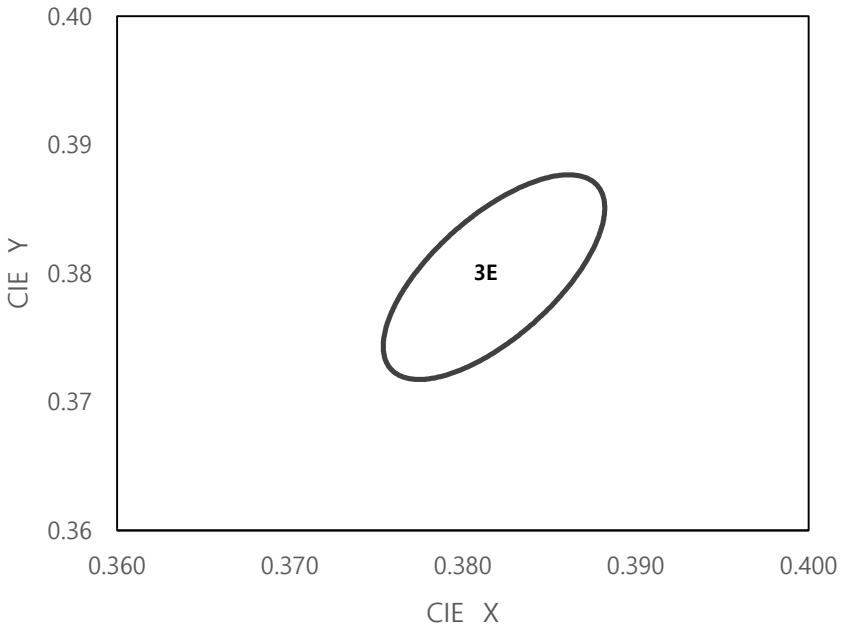
Fig 7. CIE Chromaticity Diagram



3C(3.0step)		
Center Point	0.3447	0.3553
Major Axis a	0.0082	
Minor Axis b	0.0035	
Ellipse Rotation Angle	60	

Color Bin Structure

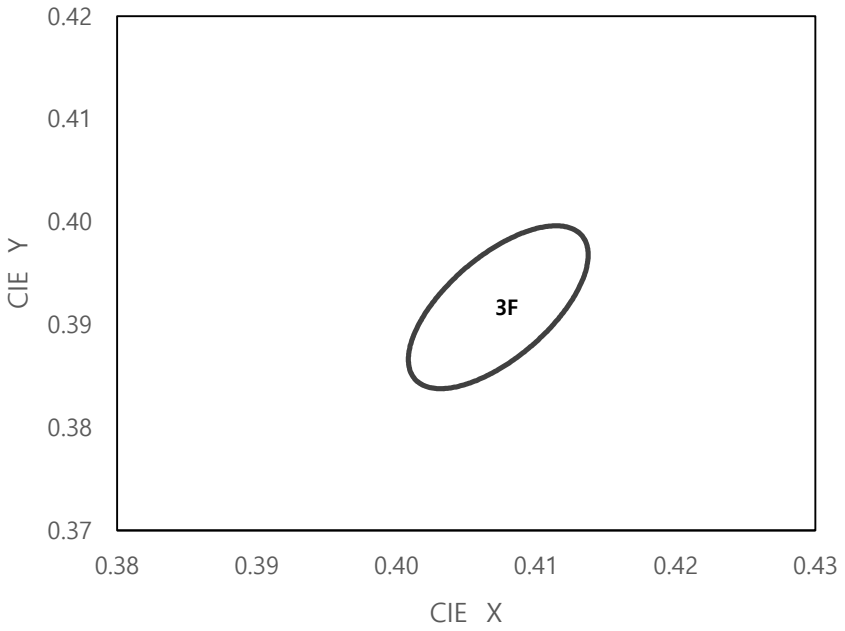
Fig 8. CIE Chromaticity Diagram



3E(3.0step)		
Center Point	0.3818	0.3797
Major Axis a	0.0094	
Minor Axis b	0.004	
Ellipse Rotation Angle	54	

Color Bin Structure

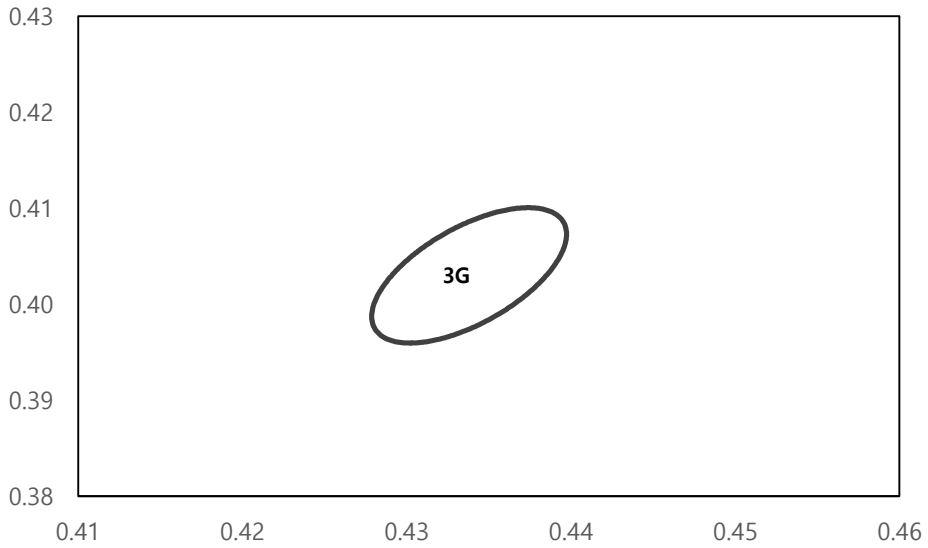
Fig 9. CIE Chromaticity Diagram



3F(3.0step)		
Center Point	0.4073	0.3917
Major Axis a	0.0093	
Minor Axis b	0.0042	
Ellipse Rotation Angle	54	

Color Bin Structure

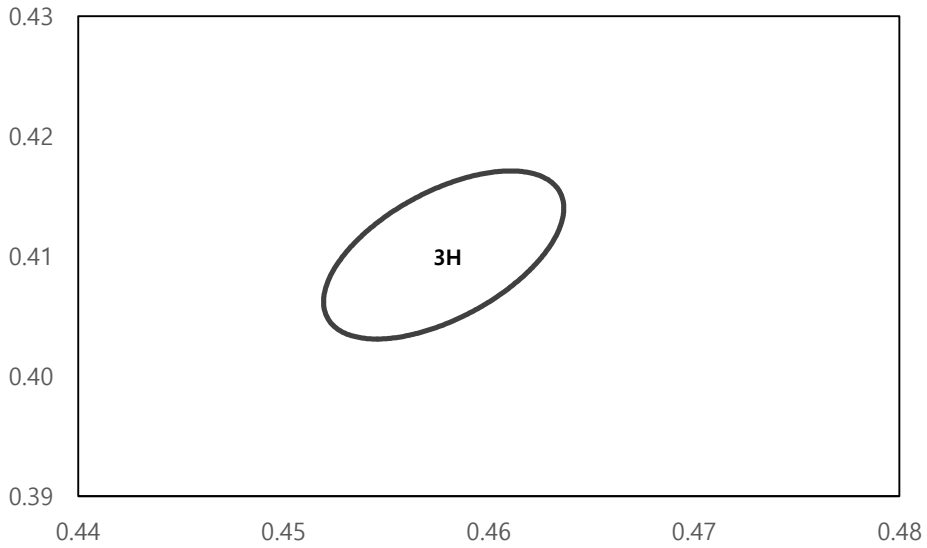
Fig 10. CIE Chromaticity Diagram



3G(3.0step)		
Center Point	0.4338	0.403
Major Axis a	0.0083	
Minor Axis b	0.004	
Ellipse Rotation Angle	53	

Color Bin Structure

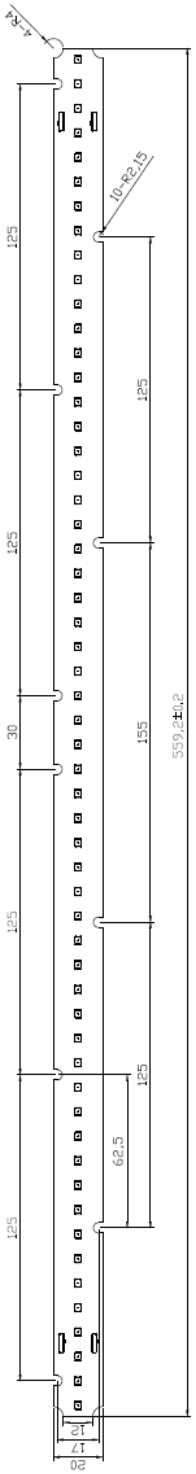
Fig 11. CIE Chromaticity Diagram



3H(3.0step)		
Center Point	0.4578	0.4101
Major Axis a	0.0081	
Minor Axis b	0.0042	
Ellipse Rotation Angle	54	

Mechanical Dimensions

Fig 12. PCBA Drawing

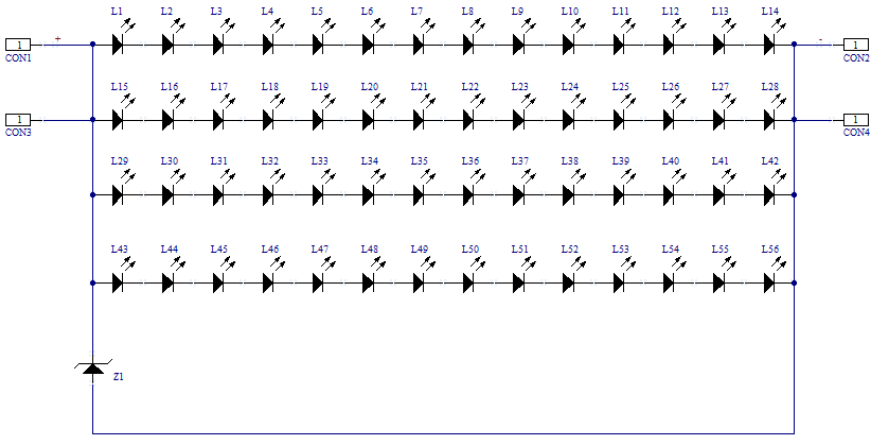


Notes :

1. All dimensions are in millimeters.

Circuit Drawing

Fig 13. Circuit Drawing



Terminals

Actuation type	Push-in , Push-button
Solid conductor	0.2 … 0.75 mm² / 24 … 18 AWG
Fine-stranded conductor	0.2 … 0.75 mm² / 24 … 18 AWG
Fine-stranded conductor; with insulated ferrule	0.25 … 0.34 mm²
Fine-stranded conductor; with uninsulated ferrule	0.25 … 0.34 mm²
Strip length	7 … 9 mm / 0.28 … 0.35 inch
Conductor connection direction to PCB	0 °
Pole No.	1

Certification

Item	Compliant to	Remark
Certification	UL/cUL	E315508

Product Nomenclature

Product Name Rule:

S M J D - 42 12 056 C - G4 N1 00

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①: SMJD – Seoul DC Module
② ~ ⑧: Refer to below table

Voltage				Power				LED Qty.						LED Type		Customer (Free)		FREE		Lens	
②				③				④						⑤		⑥		⑦		⑧	
4		2		1		2		0		5		6		C		G4		N1		00	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	C	3528	G4	Internal code	N1	version	00	No Lens
1	10V	1	1V	1	10W	1	1W	1	100EA	1	10EA	1	1EA								
2	20V	2	2V	2	20W	2	2W	2	200EA	2	20EA	2	2EA								
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																
…	…			…	…																
Z	350V			Z	350W																

Comments Rule:

(00 WN 80)

A B C

Lens Type		CCT		CRI	
A		B		C	
00		W0		80	
00	No lens	W0	6500K	80	CRI80
			5700K	90	CRI90
			5000K		
		WN	4000K		
		WW	3500K		
			3000K		
			2700K		

Product Nomenclature

Characteristics Rule:

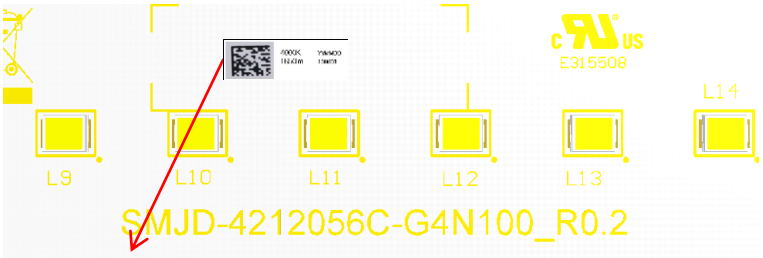
C27 E03 8 All

A B C D

Flux bin		CCT bin		CRI bin		VF Bin(1)	
A		B		C		D	
C27		E03		8		ALL	
C24	2240 lm	A03	6500K 3-step	8	CRI80	ALL	VF: ALL
C24	2240 lm	B03	5700K 3-step	9	CRI90		
C27	2270 lm	C03	5000K 3-step				
C27	2270 lm	E03	4000K 3-step				
C24	2240 lm	F03	3500K 3-step				
C16	2160 lm	G03	3000K 3-step				
C10	2100 lm	H03	2700K 3-step				
B88	1880 lm						
B88	1880 lm						
B94	1940 lm						
B94	1940 lm						
B88	1880 lm						
B81	1810 lm						
B78	1780 lm						

Marking Information

Marking Point



Marking point

QR Code Information

	QR Code Information							
Items	Factory	SAP Code	SMT Date	Rank Information	Line No.	Lot No.	Product	Notes
Digits	1 Digit	7 Digit	6 Digit	10 Digit	1 Digit	1 Digit	5 Digit	In Total 31 Digits
Information	*	*******	YYMMDD	C27E038ALL(1)	1~9, A~Z	1~9, A~Z	00001	

Plain Code Information

No.	Item	Information	Digits	Remark
①	CCT	4000K	5Digit	Refer to Page4
	Date	YYMMDD	6Digit	SMT date
②	Flux	2270lm	6Digit	Refer to Page4
	Lot No.	1	1 Digit	0~9,A~Z
	Sequence No.	00001	5 Digit	00001 ~ 99999

Notes :

(1) Module Flux code rule as below table

Symbol	lm	Symbol	lm	Symbol	lm	Symbol	lm
D91	3910	O50	14500	R50	17500	U50	20500
M20	12200	P50	15500	S50	18500	V20	21200
N00	13000	Q50	16500	T50	19500	W00	22000

Label Information

(K)PO Number	**XXXXXX** **IIIII II IIIII III**
(1P)Supplier P/N	**SMJD-4212056C-G4N100C27E038ALL(1)** **IIIII II IIIII III**
(33P)Bin Code	**C27E038ALL (2)** **IIIII II IIIII III**
(Q)Quantity	**XX** **IIIII II IIIII III**
(4L)Country of Origin	**XX (3)** **IIIII II IIIII III**
(10D)Date Code	**YYWW (4)** **IIIII II IIIII III**
(1T)Lot Code	**YYMDDXXXXX- XXXXXXX (5)** **IIIII II IIIII III**

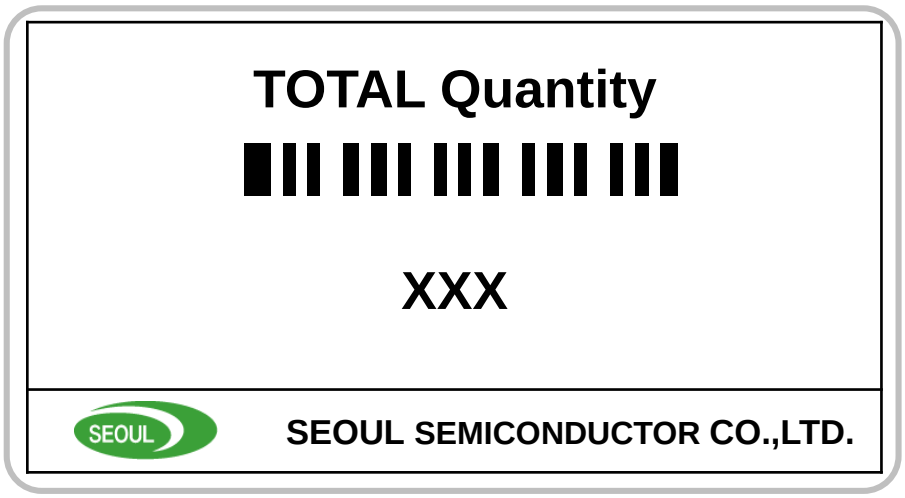
SEOUL SEMICONDUCTOR CO.,LTD.

Notes

(1) Please refer to SPEC page 19 (30 digit code)
(2) Please refer to SPEC page 20
(3) Country of Origin: 2 digit code . For example : Chinese Code: CN
(4) Date Code : YYWW : Packing Date: Year + Week
(5) 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
(6) Please refer to the font and size requirement for the label
the label must be clear , visible and scannable
(7) It is attached to the top left corner of the box.

Code 128	Length mm	Height	Font	Size
PO Number	0.17 mm	3.0mm	Arial	7
Supplier	0.17 mm	3.0mm	Arial	7
Bin Code	0.17 mm	3.0mm	Arial	7
Qty	0.17 mm	3.0mm	Arial	7
Country of Origin	0.17 mm	3.0mm	Arial	7
Date Code	0.17 mm	3.0mm	Arial	7
Lot Code	0.17 mm	3.0mm	Arial	7
White space(TOP)	2-4mm			
White space(Under)	17mm			
White space(Left)	2-4mm			
End Left Text ~ Start Barcode	5-10mm			
Text Width(PGM)	100%			
Spacing	0%			
Company Text			Arial	9.5
Logo	Width 22-16mm	9-6mm		
Label size	100mm	70mm		

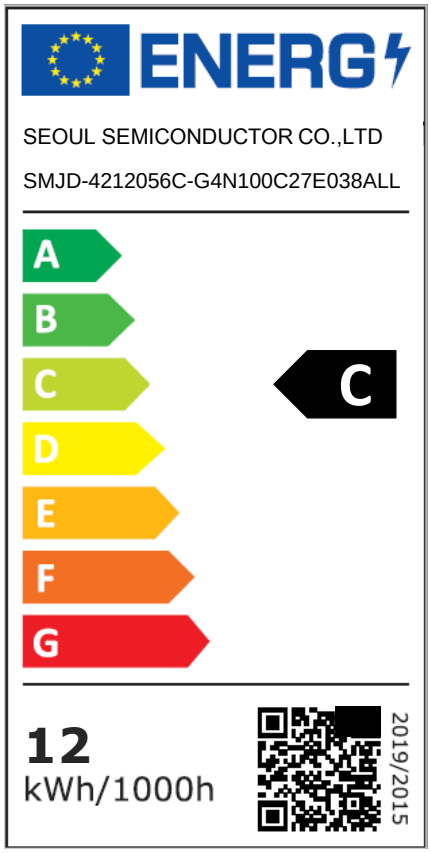
Label Information



Notes

(1) It is attached to the bottom right corner of the box.

Label Information

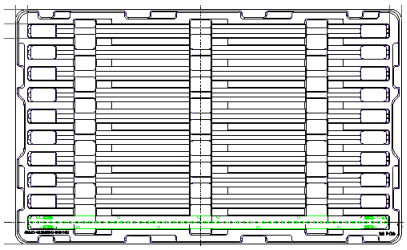


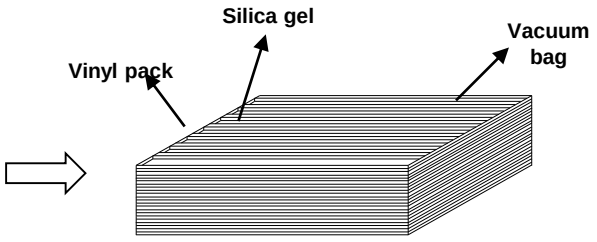
Notes

(1) The above is just an example, and the correct label must be downloaded from EPREL system
(2) The label size should be 72mm*36mm
(3) The background of the label shall be 100% white.
(4) The typefaces shall be Verdana and Calibri.
(5) Colours shall be CMYK – cyan, magenta, yellow and black,
following this example: 0-70-100-0: 0 % cyan, 70 % magenta, 100 % yellow, 0 % black.
(6) It is attached to the top right corner of the box.

Packaging Specification

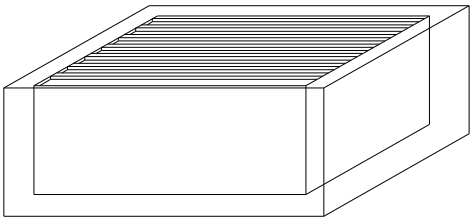
Model	Tray		Box		Pallet	
	Size (mm)	Q'ty per tray (ea)	Size (mm)	Q'ty per box (ea)	Saze (mm)	Q'ty per pallet(ea)
SMJD-4212056C-G4N100	600x364x22	20	620x384x230	220	1000*1200*150	4400

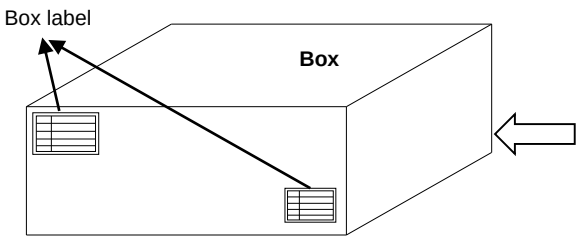




Vinyl pack = 11(12) Trays = 220bars(MAX)

(Top tray is used as a rid.)





1 Box = 11(12) Trays = 220bars (MAX)

Precaution for Use

(1) Check the appearance of module before wiring/ assembly, DO NOT use the LED cracked or PCB damaged module.
(2) The module was designed to be driven with DC source, recognize the polarities of the module was necessity.
(3) It was SELV module, DO NOT connect the LED directly to main power during wiring.
(4) DO NOT let the LED packages contacted with any hard matters.
(5) There was no current regulator built in module, unevenly load between different parallel modules may occur due to the modules V_F variance .
(6) Please do not use together with the materials containing Sulfur.
(7) Please do not make any modification on module.

Precaution for Use

(8) LEDs are sensitive to Electro-Static 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 the 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 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 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

- qualified LED driver with no big over shoot out put
- Isolated driver that to prevent harmful peaks passed to module.
- 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 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 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.

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.

Company Information

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Seoul Semiconductor (SeoulSemicon.com) manufacturers 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 it's 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

Information in this document is provided in connection with Seoul Semiconductor products. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Seoul Semiconductor hereby disclaims 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

Revision	Date	Page	Remarks
Rev0.1	2024-08-09	All	Preliminary data sheet for SMJD-4212056C-G4N100
Rev0.2	2024-08-21	1,4	Change Vf bin to G4A and update power and efficacy
Rev0.3	2024-08-28	4,5	Change Vf and make the maximum and minimum Vf less than 1V
Rev0.4	2024-10-10	2,5,19	Add Ra90 parameters
Rev0.5	2024-12-25	All	Add UL related information and update the related photos and packing information, and CIE coordinate