WICOP Solution
WICOP DC Module

SMJD-3625012L-XXN1

C E

LM-80   RoHS

Product Brief

Description

- WICOP package on board with modular design that is extendable to multi applications
- Poke-in terminals for both input and thermal detection
- Thermal detection circuit on board and coming up with poke-in connector that enabled the module works steady and reliably.
- Multi CCT with tight color consistency
- Equipped with multiple optics matching with various projects demanding.
- Support dimming and smart control
- Zhaga complied footprint

Features and Benefits

- Long Life Time
- High Efficacy
- 4-step
- Zhaga complied footprint
- Lead Free Product
- RoHS Compliant

Key Applications

- Parking lighting
- Street lighting
- Area lighting
- Tunnel lighting

Table 1-1. Product Selection – Flux @T$_j$=85℃

Bin	Flux			Unit	Remark
	Min.	Typ.	Max.		
D91	3640	3910	-	Lm	CRI=70 E,C Rank
D74	3480	3740	-		CRI=70 A,B,G Rank

Table 1-2. Product Selection – CCT @T$_j$=85℃

Bin	CCT	Unit
X04	X=A,B,C,E,G (A=6500, B=5600, C=5000, E=4000, G=3000)	K

Table 1-3. Product Selection – CRI and V$_F$ @T$_j$=85℃

Bin		CRI	V$_F$
7ALL	7DF0	70	DC 30~33V
	7DG0	70	DC 33~36V

Table of Contents

Preliminary

Product Code Information

Product Name (Comments)	Characteristics	CCT	CRI	Flux
SMJD-3625012L-XXN1 (00W070)	00D74A047AII	6500	70	3740
	00D74B047AII	5700	70	3740
	00D91C047AII	5000	70	3910
SMJD-3625012L-XXN1 (00WN70)	00D91E047AII	4000	70	3910
SMJD-3625012L-XXN1 (00WW70)	00D74G047AII	3000	70	3740

Notes :

(1) The color of modules are fully comply with the CIE requested color temperature as the following listed table.

CIE	Nominal CCT	CCT(K)
A	6500 K	6530 ± 510
B	5700 K	5665 ± 355
C	5000 K	5028 ± 283
E	4000 K	3985 ± 275
G	3000 K	3045 ± 175

Product Nomenclature

Product Name Rule:

$$\underline{\text{S M J D}} \quad - \quad \underline{\text{36}} \quad \underline{\text{25}} \quad \underline{\text{012}} \quad \underline{\text{L}} \quad - \quad \underline{\text{XX}} \quad \underline{\text{N}} \quad \underline{\text{1}}$$

①   ②   ③   ④   ⑤   ⑥   ⑦   ⑧

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

Voltage				Power				LED Qty.						LED Type		Customer (Free)		Dimming		Etc. (Free)	
②				③				④						⑤		⑥		⑦		⑧	
3		6		2		5		0		1		2		L		XX		N		1	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	L	Y22	XX	Reference	N	Normal	1	Version
1	10V	1	1V	1	10W	1	1W	1	100EA	1	10EA	1	1EA	K	Y19			D	Dimming		
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																
…	…			…	…																
Z	350V			Z	350W																

Comments Rule:

$$(\quad \underline{\text{00}} \quad \underline{\text{W0}} \quad \underline{\text{70}} \quad)$$

A   B   C

Lens Type		CCT		CRI	
A		B		C	
00		W0		70	
00	No lens		6500K	70	CRI70
		W0	5700K	80	CRI80
			5000K		
		WN	4000K		
		WW	3000K		

Product Nomenclature

Characteristics Rule:

<div align="center">

00 **D91** **E04** **7** **All**

A **B** **C** **D** **E**

</div>

Lens type		Flux bin		CCT bin		CRI bin		VF Bin[1]	
A		**B**		**C**		**D**		**E**	
00		D91		E04		7		ALL	
00	No lens	D91	3910 lm	A04	6500K 4-step	7	CRI70	ALL	DC 30~36V
		D74	3740 lm	B04	5700K 4-step	8	CRI70		
				C04	5000K 4-step				
				E04	4000K 4-step				
				G04	3000K 4-step				

Notes :

(1) Module V_F Code include "DF0" and "DG0".

Module V_F Code		Remark For V_F Variation
ALL	DF0	DC 30~33V
	DG0	DC 33~36V

Performance Characteristics

Table 2. Electro Optical Characteristics, T$_j$ =85ºC, I$_F$= 0.7A [1]

Parameter	Symbol	Value			Unit	Mark
		Min.	Typ.	Max.		
Luminous Flux	ΦV [2]	3640	3910	-	Lm	D91 (C,E Rank)
		3480	3740			D74 (A,B,G Rank)
Luminous Efficiency	LPW	-	170	-	Lm/W	C,E Rank
		-	162	-		A,B,G Rank
Correlated Color Temperature [3]	CCT	2900	3000	3200	K	G04
		3700	4000	4200		E04
		4700	5000	5300		C04
		5300	5600	6000		B04
		6000	6500	7000		A04
CRI	Ra	70	-	-	-	
Color Consistency		-	-	4	SDCM	
Forward Voltage	Vin	30	33	37.2	Vdc	D36
Input Current	I$_F$	-	0.7	-	A	-
Power Consumption	P		23.1		W	23.1W
Viewing Angle	2Θ1/2		140		deg.	

Notes :

(1) The above data were tested at T$_j$=85ºC.

(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.

Absolute Maximum Ratings

Table 3. Absolute Maximum Ratings, I_F=0.7A, T_j= 85ºC [1]

Parameter	Symbol	Unit	Value	Remark
Power Consumption	P	W	49.5	$P_{\_Typ.}$= 23.1W
Driving Current[2]	I_F	A	1.5	$I_{F\_Typ.}$ = 0.7A
Operating Temperature[3]	T_c	ºC	- 40 ~ 105	Reference point
Storage Temperature	T_{stg}	ºC	- 40 ~ 105	With no power
ESD Sensitivity	-	KV	±15	IEC Air
			±8	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 33VDC and V_{F_MAX} is around 37.2VDC, 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 105 ºC;

Relative Spectral Distribution

Fig 1. Relative Spectral Distribution vs. Wavelength Characteristic
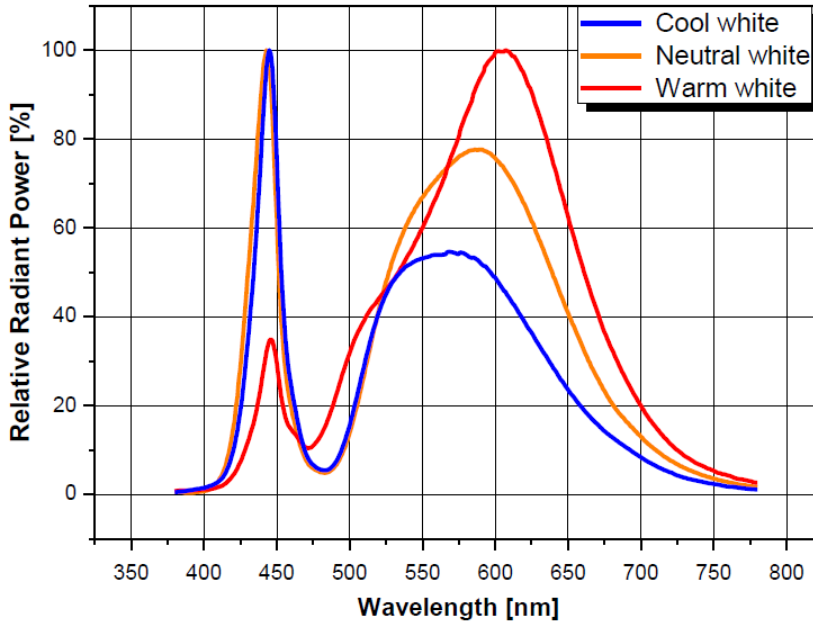
Fig 2. Forward Current vs. Relative Luminous Flux, T$_j$=85℃
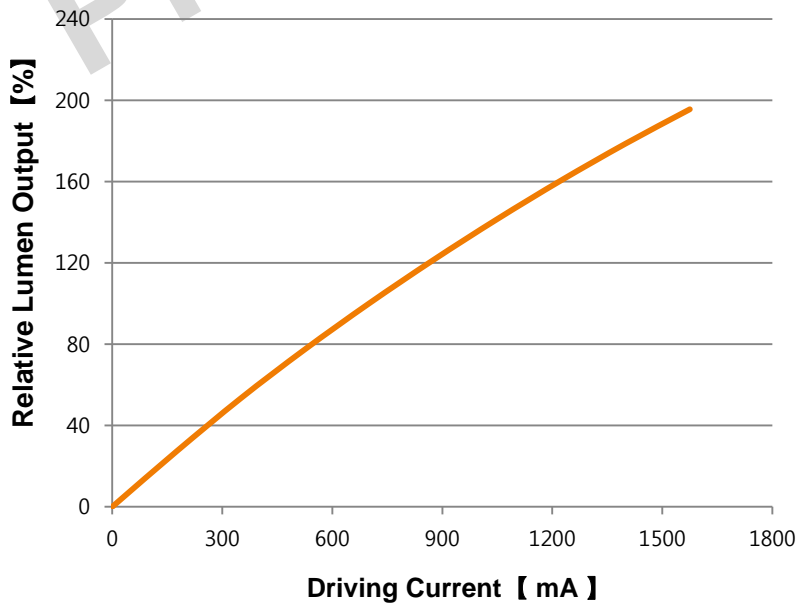
Relative Spectral Distribution

**Fig 3. Typical Spatial Distribution**
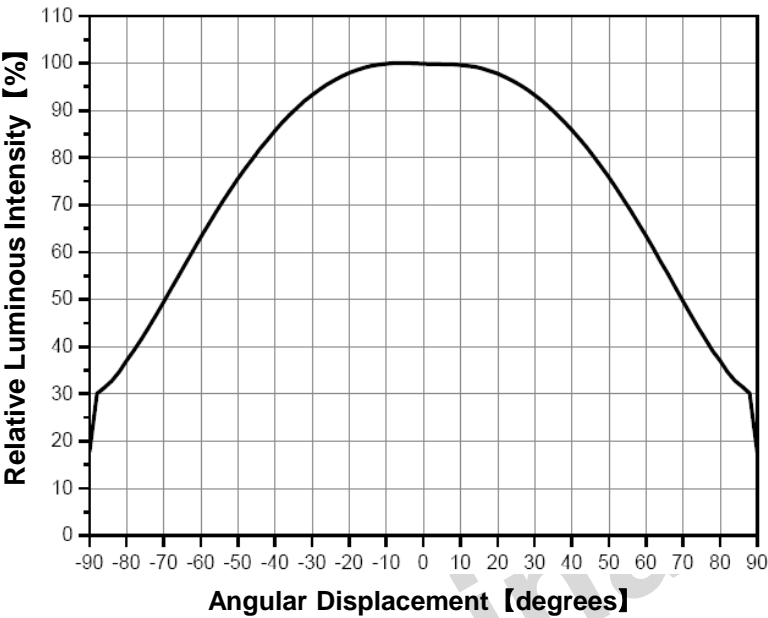
Color Bin Structure

Fig 4. CIE Chromaticity Diagram

6500K 4Step
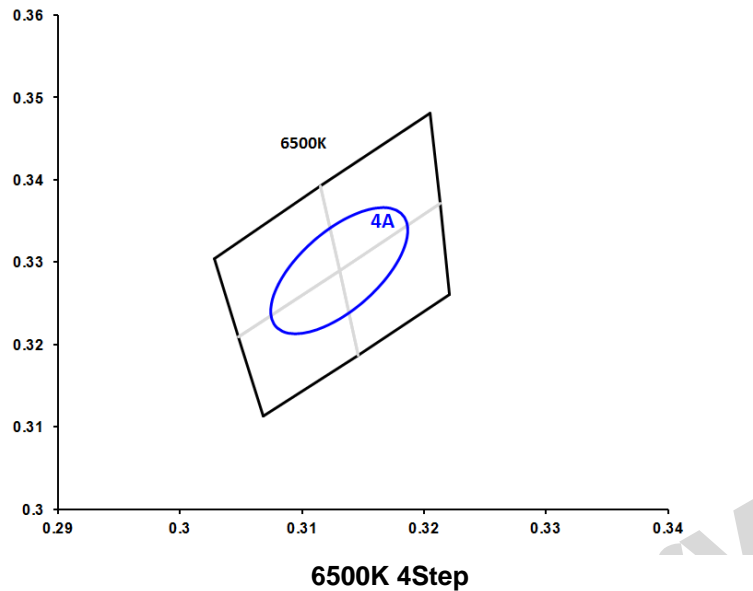
4A							
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3174	0.3290	0.3131	0.3349	0.3087	0.3290	0.3131	0.3231
0.3175	0.3293	0.3127	0.3345	0.3086	0.3287	0.3134	0.3234
0.3176	0.3296	0.3124	0.3342	0.3085	0.3284	0.3137	0.3237
0.3178	0.3299	0.3121	0.3339	0.3083	0.3281	0.3140	0.3240
0.3179	0.3302	0.3118	0.3337	0.3082	0.3277	0.3143	0.3243
0.3180	0.3306	0.3116	0.3334	0.3081	0.3274	0.3145	0.3245
0.3182	0.3310	0.3114	0.3332	0.3079	0.3270	0.3147	0.3248
0.3183	0.3314	0.3112	0.3329	0.3078	0.3265	0.3149	0.3250
0.3184	0.3319	0.3110	0.3327	0.3077	0.3260	0.3151	0.3253
0.3185	0.3324	0.3108	0.3325	0.3076	0.3255	0.3153	0.3255
0.3186	0.3330	0.3107	0.3322	0.3075	0.3249	0.3154	0.3257
0.3187	0.3336	0.3105	0.3320	0.3074	0.3243	0.3156	0.3259
0.3187	0.3342	0.3104	0.3318	0.3074	0.3237	0.3157	0.3261
0.3186	0.3349	0.3102	0.3316	0.3075	0.3231	0.3159	0.3263
0.3184	0.3354	0.3101	0.3314	0.3077	0.3225	0.3160	0.3265
0.3181	0.3359	0.3100	0.3312	0.3080	0.3220	0.3161	0.3267
0.3177	0.3363	0.3098	0.3310	0.3084	0.3216	0.3163	0.3269
0.3172	0.3366	0.3097	0.3308	0.3089	0.3214	0.3164	0.3271
0.3167	0.3366	0.3096	0.3306	0.3094	0.3213	0.3165	0.3274
0.3161	0.3366	0.3095	0.3304	0.3100	0.3214	0.3166	0.3276
0.3155	0.3364	0.3094	0.3302	0.3106	0.3215	0.3167	0.3278
0.3149	0.3361	0.3092	0.3300	0.3112	0.3218	0.3169	0.3280
0.3144	0.3358	0.3091	0.3297	0.3117	0.3221	0.3170	0.3282
0.3139	0.3355	0.3090	0.3295	0.3122	0.3224	0.3171	0.3285
0.3134	0.3352	0.3089	0.3292	0.3127	0.3228	0.3172	0.3287

Color Bin Structure

Fig 5. CIE Chromaticity Diagram
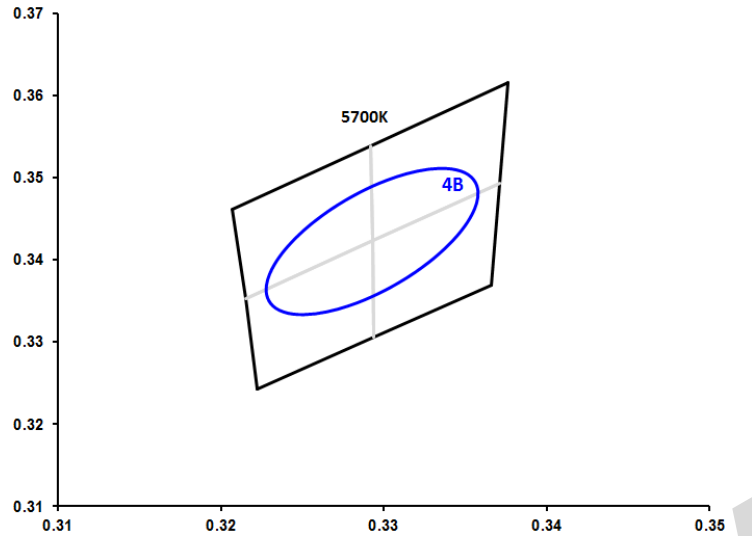
5700K 4Step

4B							
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3342	0.3422	0.3293	0.3490	0.3244	0.3422	0.3293	0.3355
0.3343	0.3426	0.3289	0.3486	0.3242	0.3419	0.3297	0.3359
0.3345	0.3429	0.3285	0.3482	0.3241	0.3416	0.3300	0.3363
0.3346	0.3433	0.3282	0.3479	0.3239	0.3412	0.3304	0.3366
0.3348	0.3437	0.3279	0.3476	0.3238	0.3408	0.3306	0.3369
0.3350	0.3441	0.3276	0.3473	0.3236	0.3404	0.3309	0.3372
0.3351	0.3446	0.3274	0.3470	0.3234	0.3399	0.3311	0.3375
0.3353	0.3451	0.3272	0.3467	0.3233	0.3394	0.3314	0.3378
0.3354	0.3456	0.3270	0.3464	0.3231	0.3389	0.3316	0.3381
0.3356	0.3462	0.3268	0.3462	0.3230	0.3383	0.3318	0.3383
0.3357	0.3469	0.3266	0.3459	0.3229	0.3376	0.3320	0.3386
0.3358	0.3476	0.3264	0.3457	0.3228	0.3369	0.3321	0.3388
0.3358	0.3484	0.3263	0.3455	0.3228	0.3361	0.3323	0.3390
0.3357	0.3491	0.3261	0.3452	0.3229	0.3354	0.3325	0.3393
0.3355	0.3498	0.3259	0.3450	0.3230	0.3347	0.3326	0.3395
0.3352	0.3504	0.3258	0.3448	0.3234	0.3341	0.3328	0.3397
0.3347	0.3508	0.3256	0.3446	0.3238	0.3337	0.3329	0.3399
0.3341	0.3511	0.3255	0.3443	0.3244	0.3334	0.3330	0.3402
0.3335	0.3511	0.3254	0.3441	0.3251	0.3334	0.3332	0.3404
0.3328	0.3510	0.3252	0.3439	0.3258	0.3335	0.3333	0.3406
0.3321	0.3508	0.3251	0.3436	0.3265	0.3337	0.3335	0.3409
0.3314	0.3505	0.3249	0.3434	0.3272	0.3340	0.3336	0.3411
0.3308	0.3501	0.3248	0.3431	0.3278	0.3344	0.3337	0.3414
0.3302	0.3497	0.3247	0.3428	0.3283	0.3348	0.3339	0.3417
0.3297	0.3493	0.3245	0.3425	0.3288	0.3352	0.3340	0.3420

Color Bin Structure

Fig 6. CIE Chromaticity Diagram
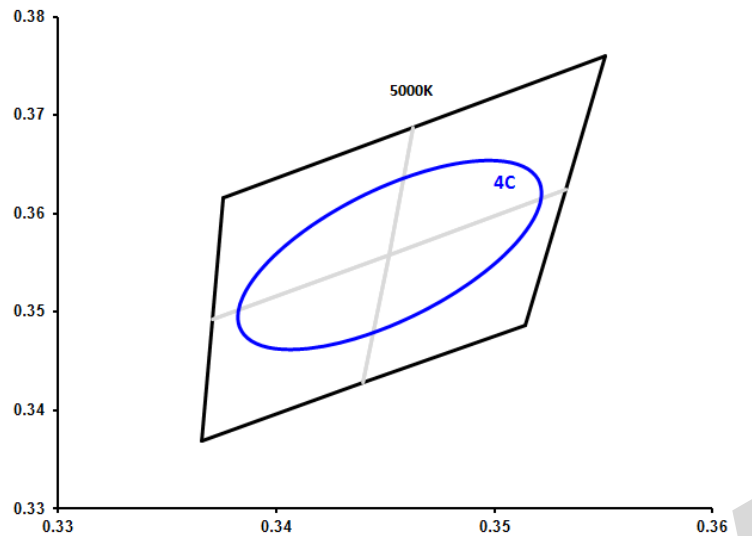
5000K 4Step

4C							
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3505	0.3558	0.3452	0.3631	0.3399	0.3558	0.3452	0.3485
0.3506	0.3561	0.3448	0.3627	0.3398	0.3555	0.3456	0.3489
0.3508	0.3565	0.3444	0.3623	0.3396	0.3551	0.3460	0.3493
0.3509	0.3569	0.3440	0.3619	0.3395	0.3547	0.3464	0.3497
0.3511	0.3573	0.3437	0.3616	0.3393	0.3543	0.3467	0.3500
0.3513	0.3578	0.3434	0.3612	0.3391	0.3538	0.3470	0.3504
0.3515	0.3583	0.3432	0.3609	0.3389	0.3533	0.3472	0.3507
0.3516	0.3588	0.3429	0.3606	0.3388	0.3528	0.3475	0.3510
0.3518	0.3594	0.3427	0.3603	0.3386	0.3522	0.3477	0.3513
0.3519	0.3601	0.3425	0.3600	0.3385	0.3515	0.3479	0.3516
0.3521	0.3608	0.3423	0.3598	0.3383	0.3508	0.3481	0.3518
0.3521	0.3615	0.3421	0.3595	0.3383	0.3501	0.3483	0.3521
0.3522	0.3623	0.3419	0.3593	0.3382	0.3493	0.3485	0.3523
0.3521	0.3631	0.3418	0.3590	0.3383	0.3485	0.3486	0.3526
0.3519	0.3639	0.3416	0.3588	0.3385	0.3477	0.3488	0.3528
0.3515	0.3645	0.3415	0.3585	0.3389	0.3471	0.3489	0.3531
0.3511	0.3650	0.3413	0.3583	0.3393	0.3466	0.3491	0.3533
0.3504	0.3653	0.3411	0.3580	0.3400	0.3463	0.3493	0.3536
0.3497	0.3654	0.3410	0.3578	0.3407	0.3462	0.3494	0.3538
0.3490	0.3653	0.3408	0.3575	0.3414	0.3463	0.3496	0.3541
0.3482	0.3651	0.3407	0.3573	0.3422	0.3465	0.3497	0.3543
0.3475	0.3647	0.3406	0.3570	0.3429	0.3469	0.3498	0.3546
0.3468	0.3643	0.3404	0.3567	0.3436	0.3473	0.3500	0.3549
0.3462	0.3639	0.3403	0.3564	0.3442	0.3477	0.3501	0.3552
0.3457	0.3635	0.3401	0.3561	0.3447	0.3481	0.3503	0.3555

SEOUL SEMICONDUCTOR

Color Bin Structure

Fig 7. CIE Chromaticity Diagram

4000K 4Step
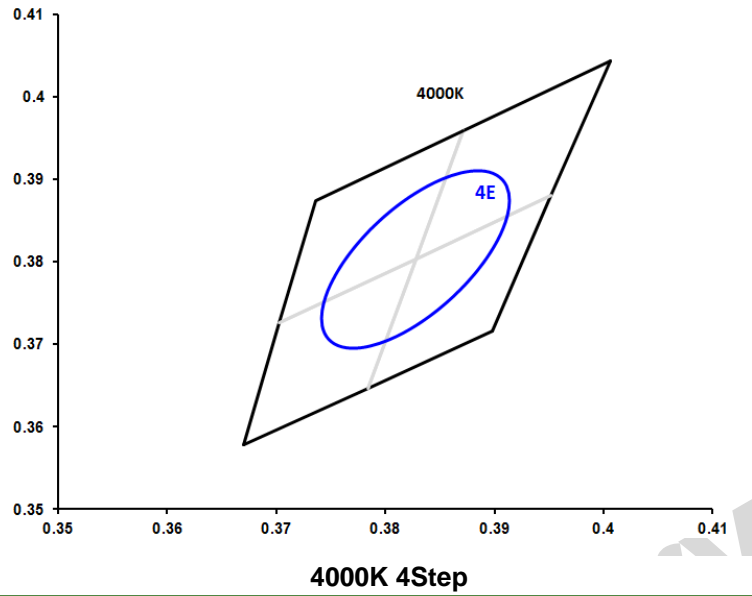
4E							
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3892	0.3803	0.3827	0.3883	0.3763	0.3803	0.3827	0.3723
0.3894	0.3807	0.3823	0.3879	0.3761	0.3799	0.3832	0.3727
0.3896	0.3812	0.3818	0.3875	0.3759	0.3794	0.3837	0.3731
0.3899	0.3817	0.3814	0.3872	0.3756	0.3789	0.3841	0.3734
0.3901	0.3822	0.3811	0.3868	0.3754	0.3784	0.3844	0.3738
0.3903	0.3828	0.3807	0.3865	0.3752	0.3778	0.3848	0.3741
0.3906	0.3834	0.3804	0.3861	0.3749	0.3772	0.3851	0.3745
0.3908	0.3841	0.3802	0.3858	0.3747	0.3765	0.3853	0.3748
0.3910	0.3848	0.3799	0.3855	0.3745	0.3758	0.3856	0.3751
0.3912	0.3856	0.3796	0.3852	0.3743	0.3750	0.3859	0.3754
0.3913	0.3865	0.3794	0.3849	0.3742	0.3741	0.3861	0.3757
0.3914	0.3874	0.3792	0.3846	0.3741	0.3732	0.3863	0.3760
0.3913	0.3883	0.3789	0.3844	0.3742	0.3723	0.3866	0.3762
0.3911	0.3892	0.3787	0.3841	0.3744	0.3714	0.3868	0.3765
0.3907	0.3899	0.3785	0.3838	0.3748	0.3707	0.3870	0.3768
0.3902	0.3905	0.3783	0.3835	0.3753	0.3701	0.3872	0.3771
0.3895	0.3909	0.3781	0.3832	0.3760	0.3697	0.3874	0.3774
0.3887	0.3911	0.3779	0.3830	0.3768	0.3695	0.3876	0.3776
0.3878	0.3910	0.3777	0.3827	0.3777	0.3696	0.3878	0.3779
0.3869	0.3908	0.3775	0.3824	0.3786	0.3698	0.3880	0.3782
0.3861	0.3905	0.3773	0.3821	0.3794	0.3701	0.3882	0.3785
0.3853	0.3901	0.3771	0.3817	0.3802	0.3705	0.3884	0.3789
0.3845	0.3896	0.3769	0.3814	0.3810	0.3710	0.3886	0.3792
0.3839	0.3892	0.3767	0.3811	0.3816	0.3714	0.3888	0.3795
0.3833	0.3888	0.3765	0.3807	0.3822	0.3718	0.3890	0.3799

Color Bin Structure

Fig 8. CIE Chromaticity Diagram

3000K 4Step
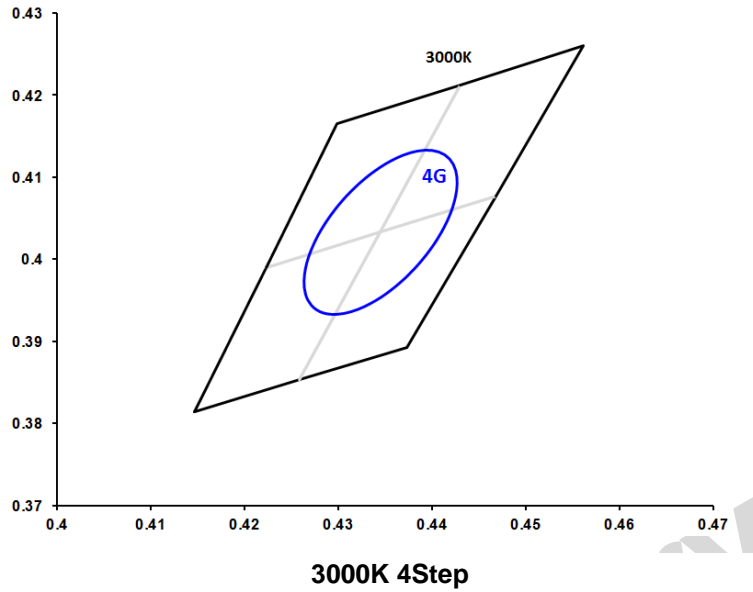
4G							
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.4410	0.4033	0.4345	0.4113	0.4280	0.4033	0.4345	0.3953
0.4412	0.4037	0.4340	0.4109	0.4278	0.4029	0.4350	0.3957
0.4414	0.4042	0.4336	0.4105	0.4276	0.4024	0.4354	0.3961
0.4416	0.4047	0.4332	0.4102	0.4274	0.4019	0.4358	0.3964
0.4418	0.4052	0.4328	0.4098	0.4272	0.4014	0.4362	0.3968
0.4420	0.4057	0.4325	0.4095	0.4270	0.4009	0.4365	0.3971
0.4422	0.4063	0.4322	0.4092	0.4268	0.4003	0.4369	0.3974
0.4424	0.4070	0.4319	0.4089	0.4267	0.3996	0.4371	0.3977
0.4425	0.4077	0.4316	0.4086	0.4265	0.3989	0.4374	0.3980
0.4426	0.4085	0.4314	0.4083	0.4264	0.3981	0.4377	0.3983
0.4427	0.4092	0.4311	0.4080	0.4264	0.3974	0.4379	0.3986
0.4427	0.4100	0.4309	0.4077	0.4264	0.3966	0.4382	0.3989
0.4425	0.4108	0.4307	0.4074	0.4265	0.3958	0.4384	0.3992
0.4423	0.4116	0.4304	0.4071	0.4268	0.3950	0.4386	0.3995
0.4419	0.4122	0.4302	0.4069	0.4272	0.3944	0.4388	0.3997
0.4414	0.4127	0.4300	0.4066	0.4277	0.3939	0.4390	0.4000
0.4407	0.4131	0.4298	0.4063	0.4283	0.3935	0.4392	0.4003
0.4400	0.4133	0.4296	0.4060	0.4290	0.3933	0.4394	0.4006
0.4392	0.4133	0.4294	0.4057	0.4298	0.3933	0.4396	0.4009
0.4384	0.4132	0.4292	0.4054	0.4306	0.3934	0.4398	0.4012
0.4377	0.4130	0.4290	0.4051	0.4314	0.3936	0.4400	0.4015
0.4369	0.4127	0.4288	0.4048	0.4321	0.3939	0.4402	0.4018
0.4363	0.4124	0.4286	0.4044	0.4328	0.3942	0.4404	0.4022
0.4356	0.4120	0.4284	0.4041	0.4334	0.3946	0.4406	0.4025
0.4350	0.4116	0.4282	0.4037	0.4340	0.3950	0.4408	0.4029

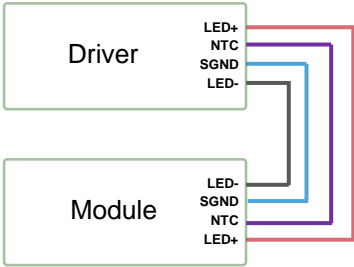# Mechanical Dimensions
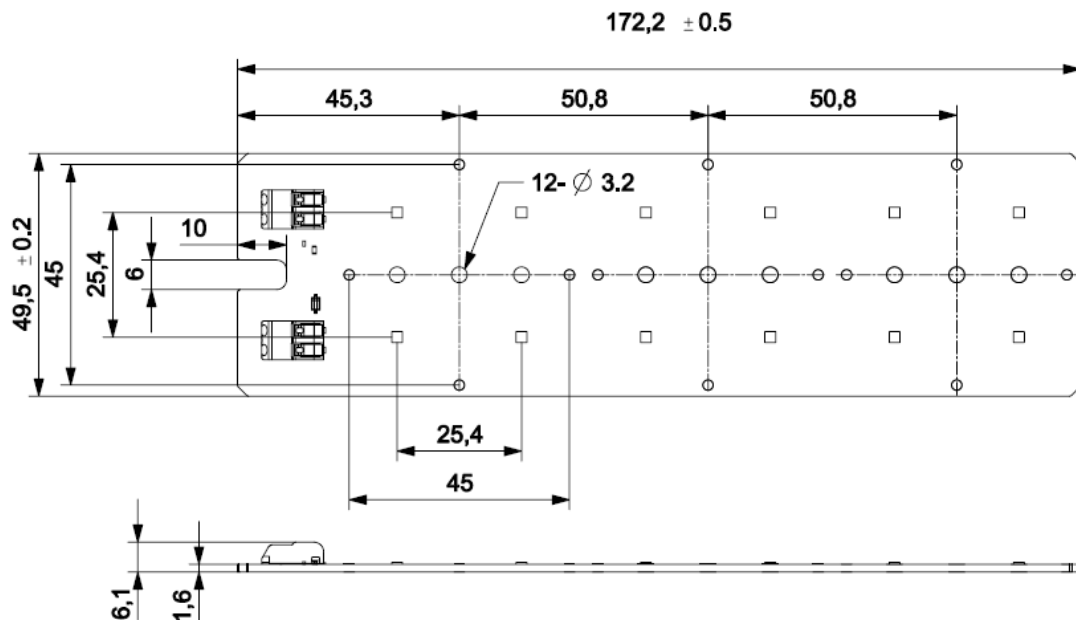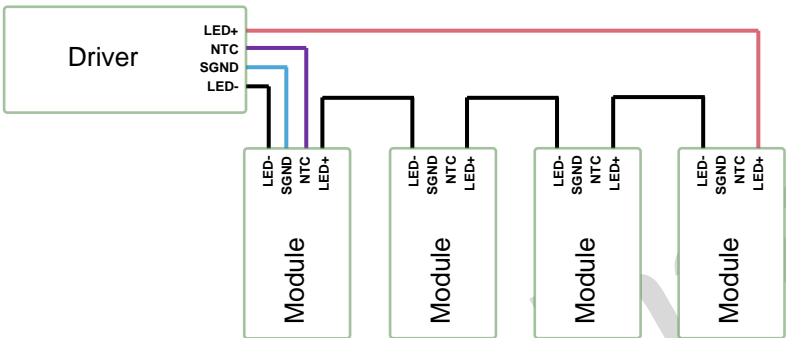

Circuit Drawing
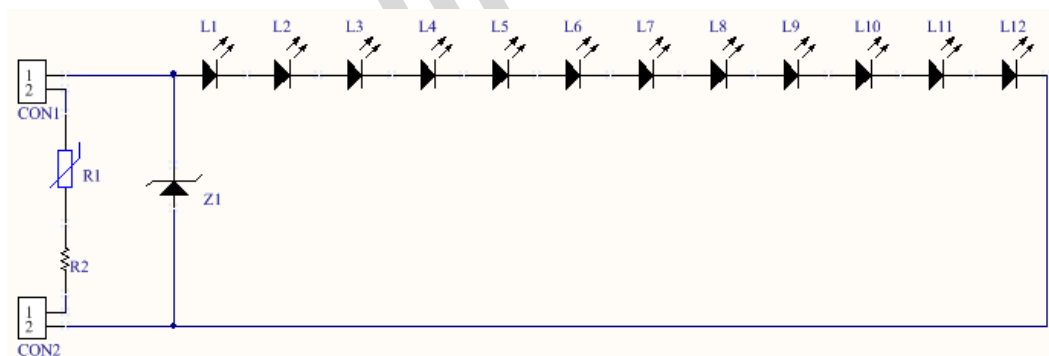
Notes :

(1)   All dimensions are in millimeters.

(2)   Scale : None

(3)   Module thickness : 1.6 ±0.1
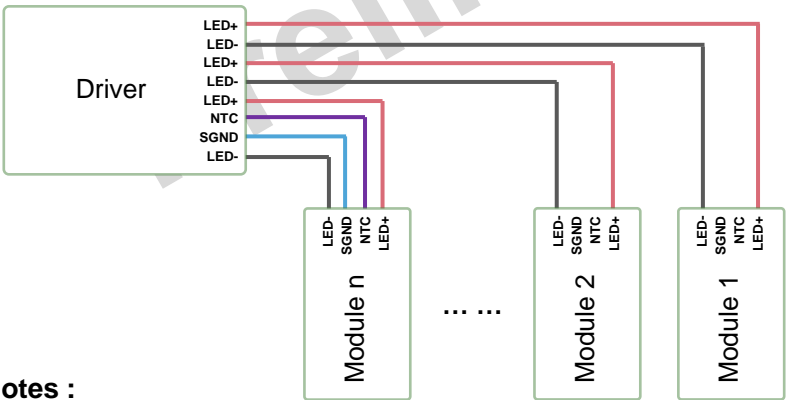
Application Information

a). Connection between driver and module

b). Multiple module on one driver

c). To use a driver with multi output channels for group application

Notes :

(1) In case of all modules have to be in parallel for a group application , please select <u>the SAME digit</u> of the modules for a group, 3 is the max quantity in parallel.

(2) Please refer to below table while selecting for a group parallel application.


```
YYMDD
D91E04
7ALL
100001
```

ALL	V_F (V)	Remark for V_F variation
DF0	31.5	30~33
DG0	34.5	33~36

Application Information

a). Application

IP rating	No IP-rating
Over Temperature Detection	A resistor and NTC in series, where R=2KOhm, R_{NTC}=15K Ohm
Luminaire Class	IEC Class I and Class II
Dimming	Yes

b). Certificates and Standards

UL 8750
CE

c). Zhaga

Book15, 2x6-DA Compliant

Marking Information

Fig 9. Marking Point

QR Code Information

YYMDD	①
D91E04	②
7ALL	③
100001	④
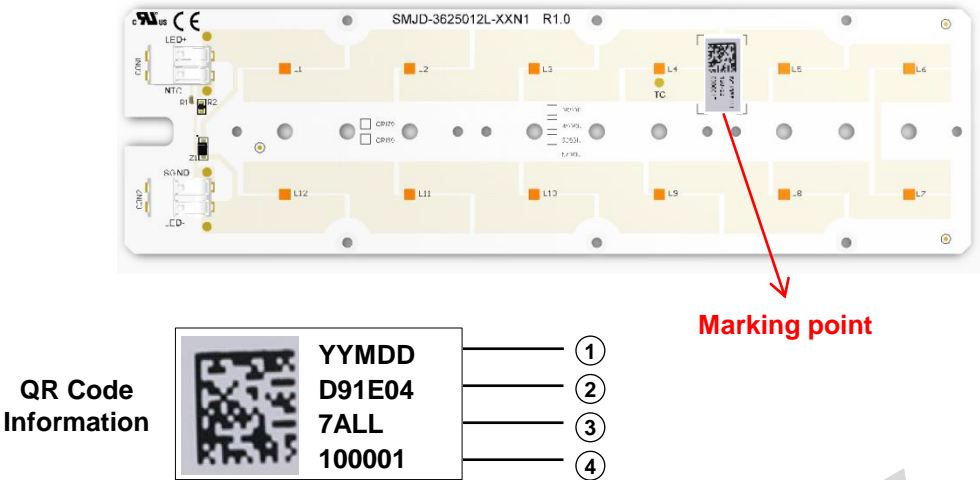
			QR Code Information				
Items	Factory	SAP Code	SMT Date	Rank Information	Line No.	Lot No.	Product	Notes
Digits	1 Digit	7 Digit	5 Digit	10 Digit	1 Digit	1 Digit	5 Digit	In Total 30 Digits
Information	*	*******	YYMDD	D91E04 7ALL	1~9, A~Z	1~9, A~Z	00001	

Plain Code Information

No.	Item	Information		Digits	Remark
①	Date	YYMDD		5Digit	SMT date
②	Flux(1)	D91		3Digit	D91=3910lm
	CCT	X04	4- step	3Digit	X=A,B,C,E,G
③	CRI	7		1Dight	CRI=70
		8		1Dight	CRI=80
	V_F	ALL	DF0	3Digit	DC 30~33V
			DG0		DC 33~36V
④	Lot No.	1		1 Digit	0~9,A~Z
	Sequence No.	00001		5 Digit	00001 ~ 99999

Notes :   # This product 4-step mixing can use different flux Bin

(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

Model No.	**SMJD-3625012L-XXN1**[1]
Rank	**D91E047ALL**[2]
Type	**Standard**
Quantity	**XXX**
Date	**YYMDDXXXXX-XXXXXXX**[3]
SEOUL	**SEOUL SEMICONDUCTOR CO.,LTD.**

Reference
- (1) Please refer to page 4.
- (2) Please refer to page 5.
- (3) Lot No. :
  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 Code

Notes:
- (1) It is attached to the top left corner of the box.

TOTAL Quantity

XXX

SEOUL SEMICONDUCTOR CO.,LTD.

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

Packaging Specification

1. Tray information
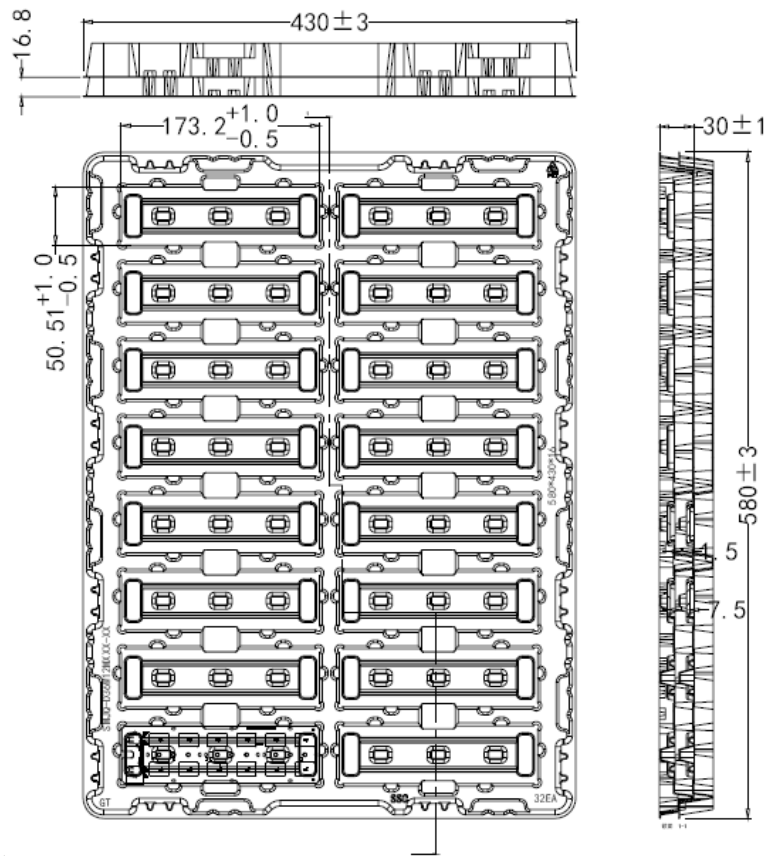
Notes:
(1) Quantity : 32 pcs/Tray
(2) All dimensions are in millimeters (tolerance : ±0.3)
(3) Scale none

2. Tray stack and taping

1 dummy Tray

9 Trays

Modules
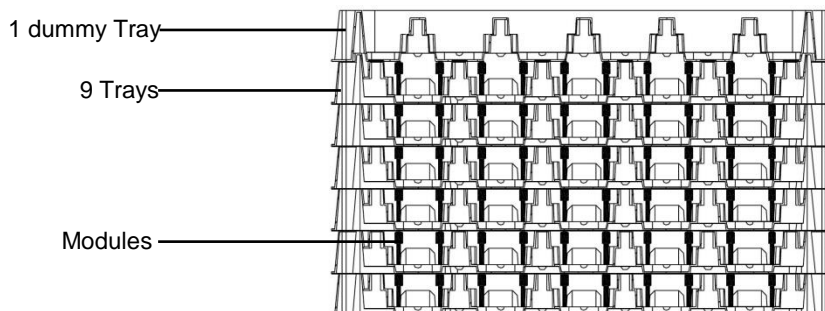
Notes:
(1) 9 Trays and additional 1 dummy tray up of box
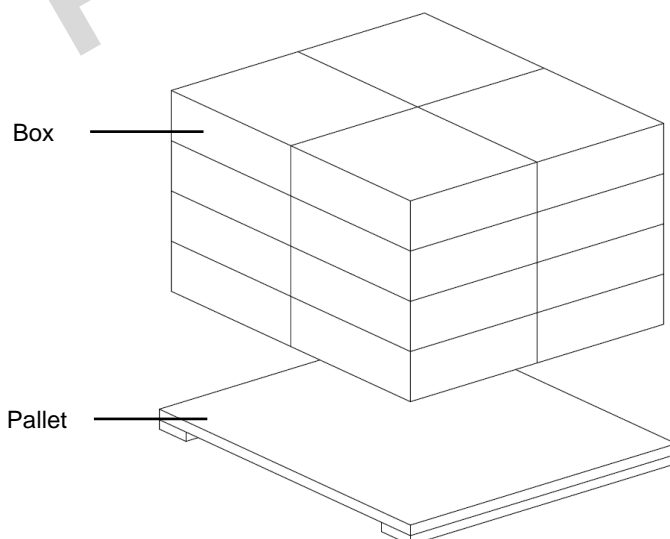
Packaging Specification

3. Box information & packing
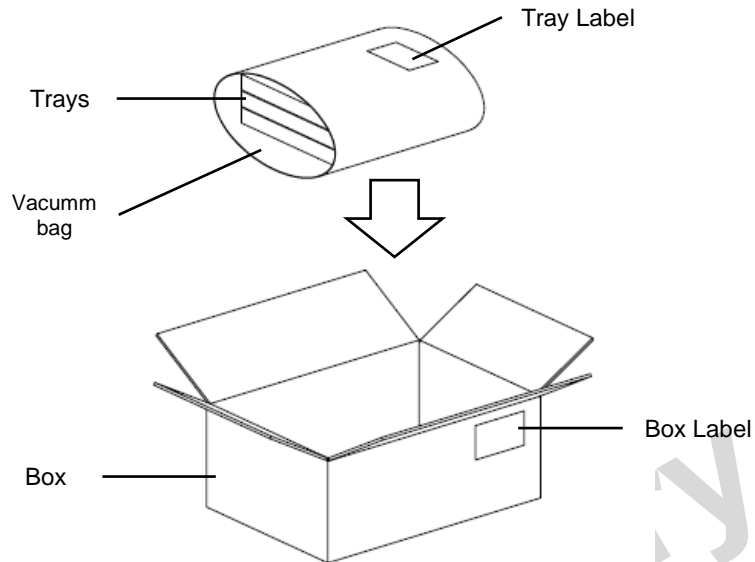
Notes:
- (1) Quantity: 9Trays (9*32=288pcs) / Box
- (2) Box size: 590*440*200 mm

4. Pallet information & packing

Notes:
- (1) Quantity: 1 Pallet = 20(4*5) Boxes = 180(20*9) Trays = 5,760(180*32) Modules
- (2) Pallet size: 1100*1100*12.5mm

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.

Preliminary

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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Company Information

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.

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Revision History

Revision	Date	Page	Remarks
R0.1	2018.06.15	All	
R0.2	2018.07.24	Page10~14	Updating CIE Chromaticity Diagram

Preliminary