

2x8 DC Module Y22

**SMJD-4830016L-XXN1**



## 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

### Features and Benefits

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

### Key Applications

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

**Table 1- Order Code**

Nominal CCT (K)	CRI	Lens Type	Order Code
6500	70	-	SMJD-4830016L-XXN1 00E98A047ALL
5700	70	-	SMJD-4830016L-XXN1 00E98B047ALL
5000	70	-	SMJD-4830016L-XXN1 00F21C047ALL
4000	70	-	SMJD-4830016L-XXN1 00F21E047ALL
3000	70	-	SMJD-4830016L-XXN1 00E98G047ALL

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## Performance Characteristics

**Table . Electro Optical Characteristics,  $T_j = 85^\circ\text{C}$ ,  $I_F = 0.7\text{A}$  [1]**

Parameter	Symbol	Value			Unit	Mark
		Min.	Typ.	Max.		
Luminous Flux	$\Phi_V$ [2]	4850	5210	-	Lm	F21 (C,E Rank)
		4630	4980	-		E98 (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	5700	6000		B04
		6000	6500	7000		A04
Color Consistency		-	-	4	SDCM	
CRI	Ra	70	-	-	-	
Forward Voltage	$V_{in}$	40	44	49.6	Vdc	D48
Input Current	$I_F$	-	0.7	-	A	-
Power Consumption	P		30.8		W	30.8W
Viewing Angle	$2\theta_{1/2}$		140		deg.	

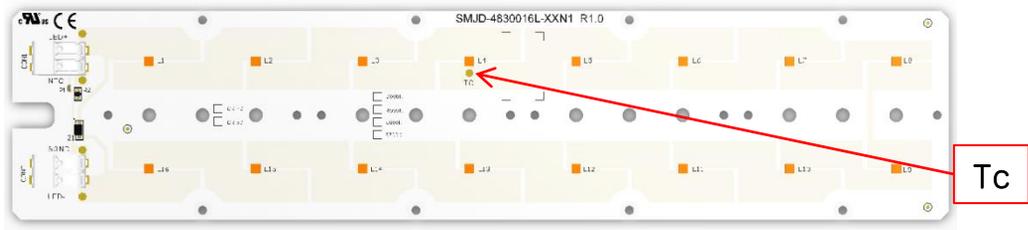
**Notes :**

- (1) The above data were tested at  $T_j = 85^\circ\text{C}$ .
- (2)  $\Phi_V$  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,  $I_F=0.7A$ ,  $T_j= 85^{\circ}C$  <sup>(1)</sup>**

Parameter	Symbol	Unit	Value	Remark
Power Consumption	P	W	66	$P_{Typ.} = 30.8W$
Driving Current <sup>(2)</sup>	$I_F$	A	1.5	$I_{F\_Typ.} = 0.7A$
Operating Temperature <sup>(3)</sup>	$T_c$	$^{\circ}C$	- 40 ~ 105	Reference point
Storage Temperature	$T_{stg}$	$^{\circ}C$	- 40 ~ 105	With no power
ESD Sensitivity	-	KV	$\pm 15$	IEC Air
			$\pm 8$	HBM

**ILLUSTRATION 1: How to predict components temperature <sup>(4)</sup>**

**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 44VDC and  $V_{F\_MAX}$  is around 49.6VDC, respectively.
- (3) Operating temperature was tested at the assigned  $T_c$  point on the PCB.
- (4) To ensure the module works properly, DO NOT let the  $T_c$  upper than 105  $^{\circ}C$ ;

## Relative Spectral Distribution

Fig 1. Relative Spectral Distribution vs. Wavelength Characteristic

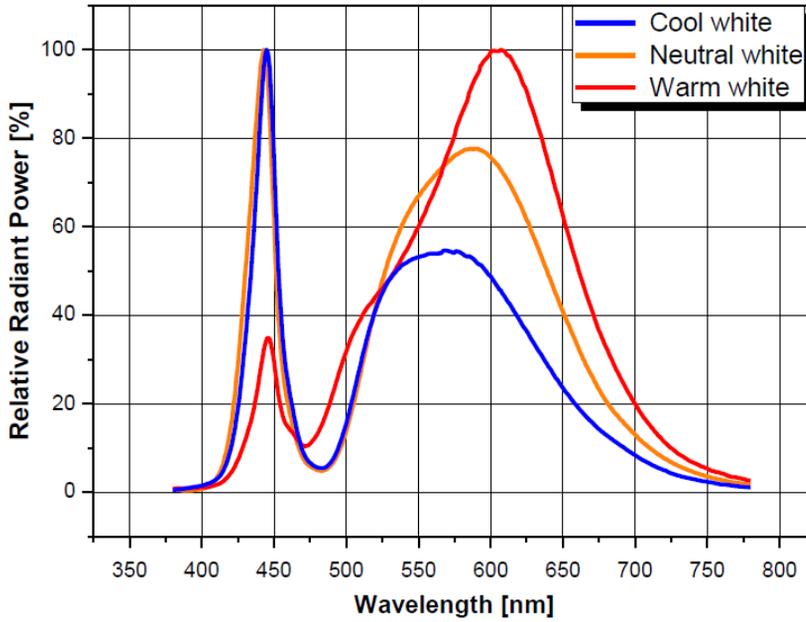
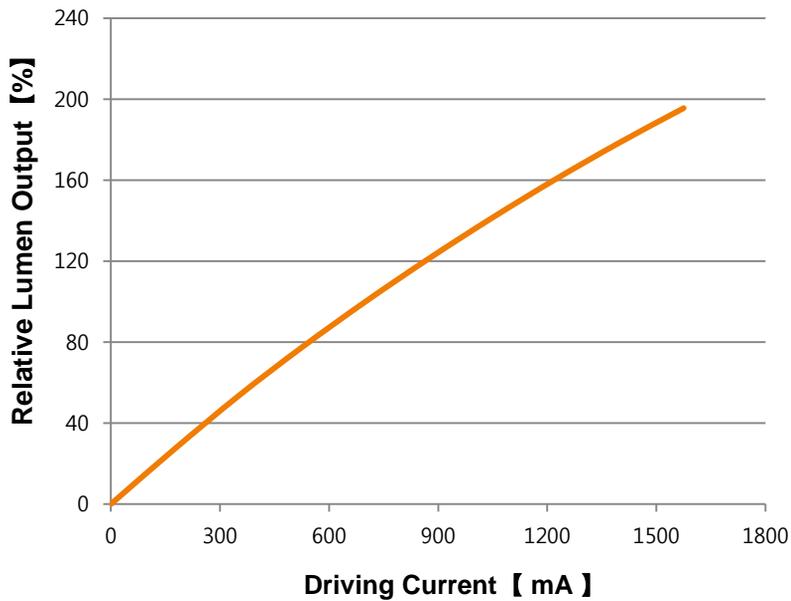
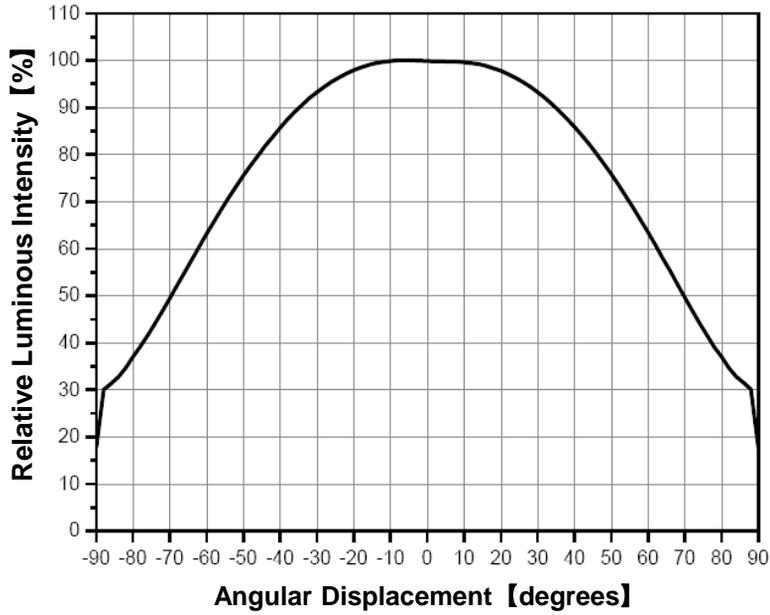


Fig 2. Forward Current vs. Relative Luminous Flux,  $T_j=85^\circ\text{C}$

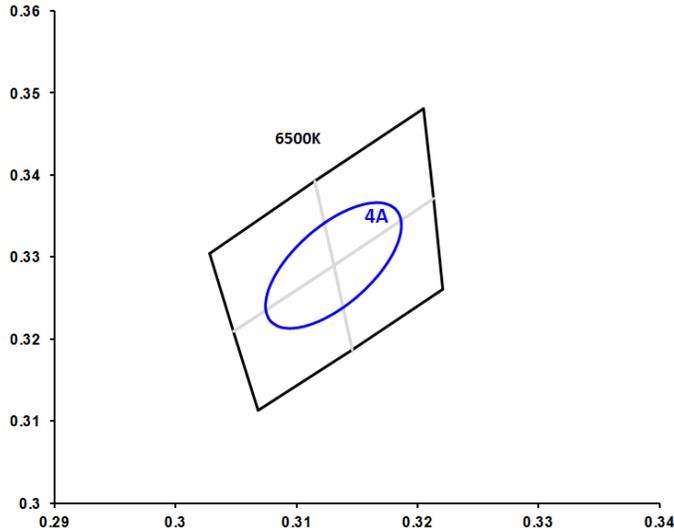


## Relative Spectral Distribution

Fig 3. Typical Spatial Distribution

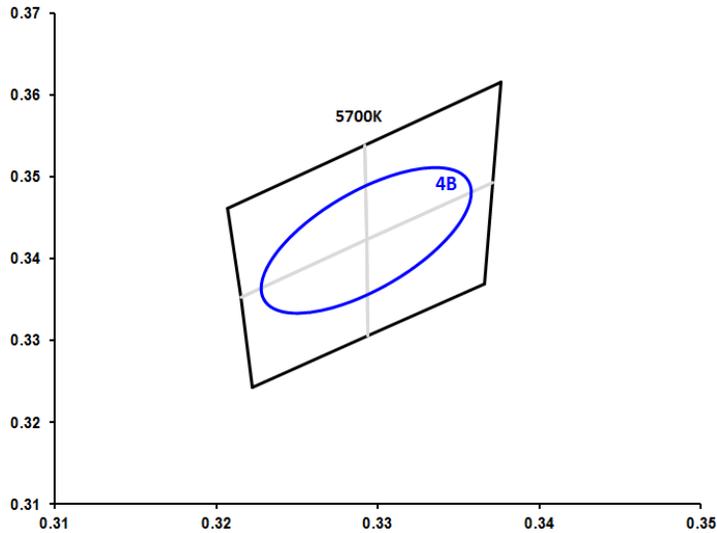


## Color Bin Structure

**Fig 4. CIE Chromaticity Diagram**

**6500K 4Step**

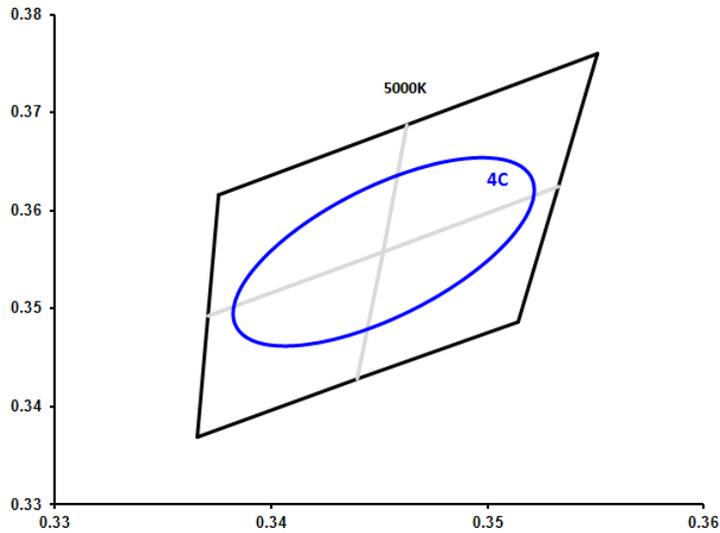
4A							
CIE X	CIE Y						
0.3174	0.3290	0.3127	0.3345	0.3086	0.3287	0.3134	0.3234
0.3175	0.3293	0.3124	0.3342	0.3085	0.3284	0.3137	0.3237
0.3176	0.3296	0.3121	0.3339	0.3083	0.3281	0.3140	0.3240
0.3178	0.3299	0.3118	0.3337	0.3082	0.3277	0.3143	0.3243
0.3179	0.3302	0.3116	0.3334	0.3081	0.3274	0.3145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

## Color Bin Structure

**Fig 5. CIE Chromaticity Diagram**

**5700K 4Step**

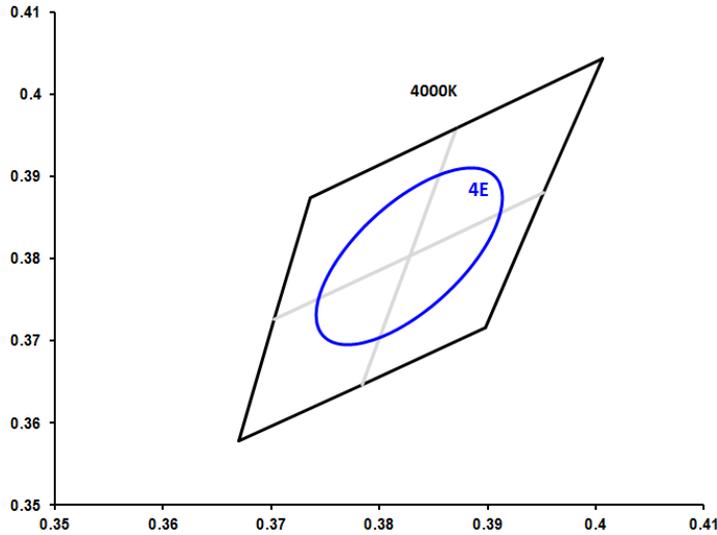
4B							
CIE X	CIE Y						
0.3342	0.3422	0.3289	0.3486	0.3242	0.3419	0.3297	0.3359
0.3343	0.3426	0.3285	0.3482	0.3241	0.3416	0.3300	0.3363
0.3345	0.3429	0.3282	0.3479	0.3239	0.3412	0.3304	0.3366
0.3346	0.3433	0.3279	0.3476	0.3238	0.3408	0.3306	0.3369
0.3348	0.3437	0.3276	0.3473	0.3236	0.3404	0.3309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

## Color Bin Structure

**Fig 6. CIE Chromaticity Diagram**

**5000K 4Step**

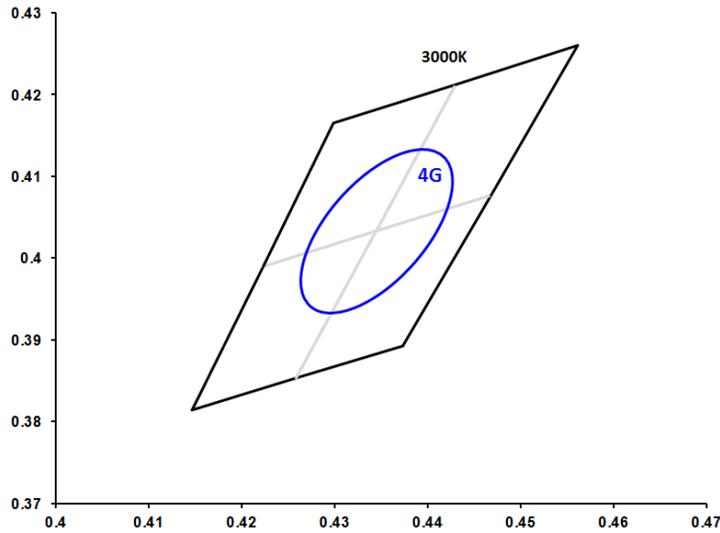
5000K 4Step							
4C							
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3505	0.3558	0.3448	0.3627	0.3398	0.3555	0.3456	0.3489
0.3506	0.3561	0.3444	0.3623	0.3396	0.3551	0.3460	0.3493
0.3508	0.3565	0.3440	0.3619	0.3395	0.3547	0.3464	0.3497
0.3509	0.3569	0.3437	0.3616	0.3393	0.3543	0.3467	0.3500
0.3511	0.3573	0.3434	0.3612	0.3391	0.3538	0.3470	0.3504
0.3513	0.3578	0.3432	0.3609	0.3389	0.3533	0.3472	0.3507
0.3515	0.3583	0.3429	0.3606	0.3388	0.3528	0.3475	0.3510
0.3516	0.3588	0.3427	0.3603	0.3386	0.3522	0.3477	0.3513
0.3518	0.3594	0.3425	0.3600	0.3385	0.3515	0.3479	0.3516
0.3519	0.3601	0.3423	0.3598	0.3383	0.3508	0.3481	0.3518
0.3521	0.3608	0.3421	0.3595	0.3383	0.3501	0.3483	0.3521
0.3521	0.3615	0.3419	0.3593	0.3382	0.3493	0.3485	0.3523
0.3522	0.3623	0.3418	0.3590	0.3383	0.3485	0.3486	0.3526
0.3521	0.3631	0.3416	0.3588	0.3385	0.3477	0.3488	0.3528
0.3519	0.3639	0.3415	0.3585	0.3389	0.3471	0.3489	0.3531
0.3515	0.3645	0.3413	0.3583	0.3393	0.3466	0.3491	0.3533
0.3511	0.3650	0.3411	0.3580	0.3400	0.3463	0.3493	0.3536
0.3504	0.3653	0.3410	0.3578	0.3407	0.3462	0.3494	0.3538
0.3497	0.3654	0.3408	0.3575	0.3414	0.3463	0.3496	0.3541
0.3490	0.3653	0.3407	0.3573	0.3422	0.3465	0.3497	0.3543
0.3482	0.3651	0.3406	0.3570	0.3429	0.3469	0.3498	0.3546
0.3475	0.3647	0.3404	0.3567	0.3436	0.3473	0.3500	0.3549
0.3468	0.3643	0.3403	0.3564	0.3442	0.3477	0.3501	0.3552
0.3462	0.3639	0.3401	0.3561	0.3447	0.3481	0.3503	0.3555
0.3457	0.3635	0.3399	0.3558	0.3452	0.3485	0.3505	0.3558
0.3452	0.3631						

## Color Bin Structure

**Fig 7. CIE Chromaticity Diagram**

**4000K 4Step**

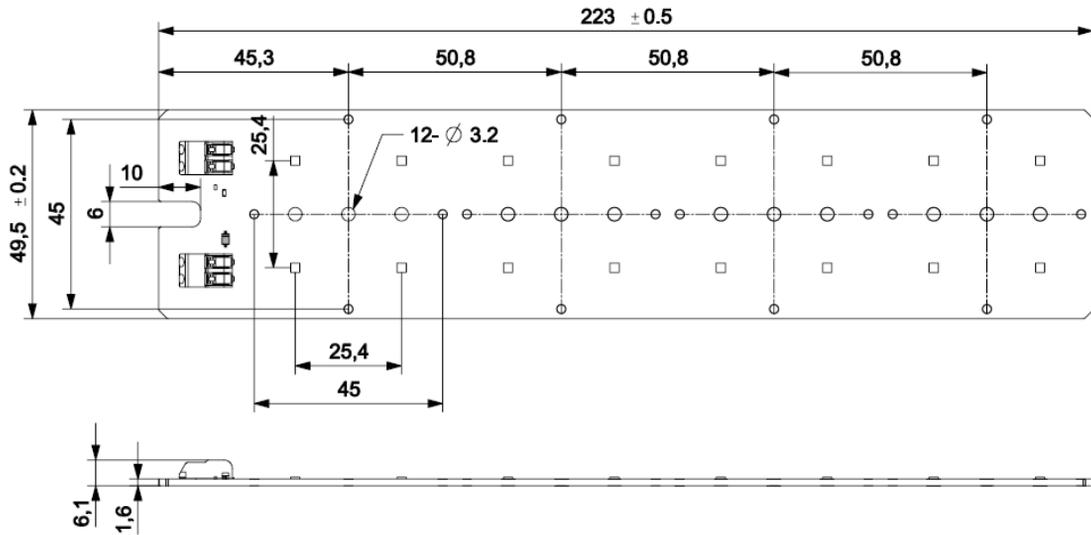
4E							
CIE X	CIE Y						
0.3892	0.3803	0.3823	0.3879	0.3761	0.3799	0.3832	0.3727
0.3894	0.3807	0.3818	0.3875	0.3759	0.3794	0.3837	0.3731
0.3896	0.3812	0.3814	0.3872	0.3756	0.3789	0.3841	0.3734
0.3899	0.3817	0.3811	0.3868	0.3754	0.3784	0.3844	0.3738
0.3901	0.3822	0.3807	0.3865	0.3752	0.3778	0.3848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

## Color Bin Structure

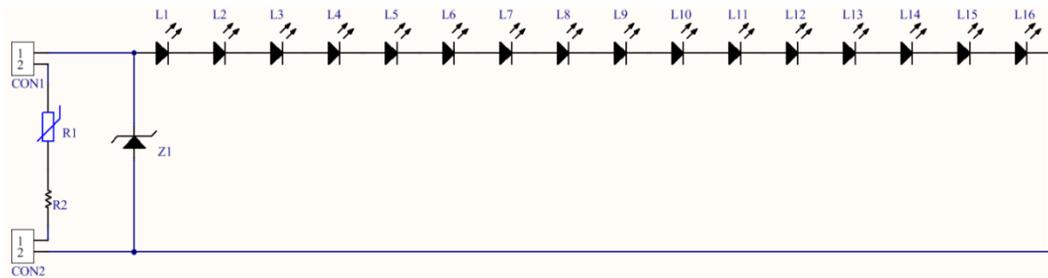
**Fig 8. CIE Chromaticity Diagram**

**3000K 4Step**

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

## Mechanical Dimensions



## Circuit Drawing

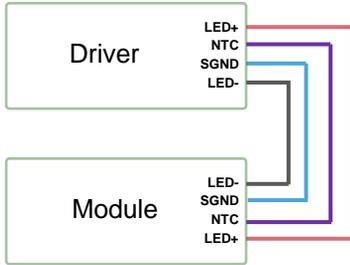


### Notes :

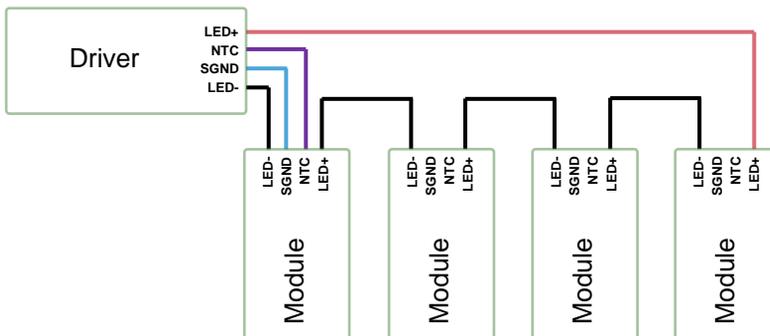
- (1) All dimensions are in millimeters.
- (2) Scale : None
- (3) Module thickness :  $1.6 \pm 0.1$

## Application Information

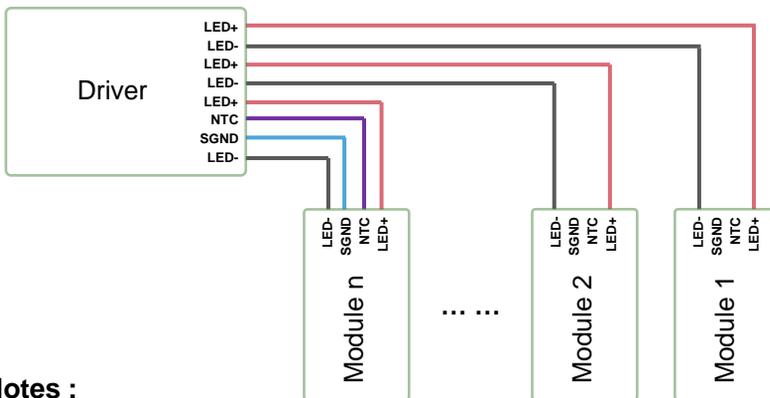
### a). Connection between driver and module



### 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 the SAME digit 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.



ALL	V <sub>F</sub> (V)	Remark For V <sub>F</sub> Variation
DF0	42	40~44
DG0	46	44~48

## Application Information

### a). Application

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

### b). Certificates and Standards

UL 8750  
CE

## Product Nomenclature

Product Name Rule:

**S M J D - 48 30 016 L - XX N 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	
4	8	3	0	0	1	6	L	Y22	XX	Reference	N	Normal	1	Version							
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:

**( 00 W0 70 )**  
**A                      B                      C**

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

## Product Nomenclature

Characteristics Rule:

00   F21   E04   7   All  
**A**   **B**   **C**   **D**   **E**

Lens type		Flux bin		CCT bin		CRI bin		VF bin	
A		B		C		D		E	
00		F21		E04		7		ALL	
00	No lens	F21	5210 lm	A04	6500K 4-step	7	CRI70	ALL	DC 40~48V
		E98	4980 lm	B04	5700K 4-step	8	CRI80		
		E54	4540 lm	C04	5000K 4-step				
				E04	4000K 4-step				
				G04	3000K 4-step				

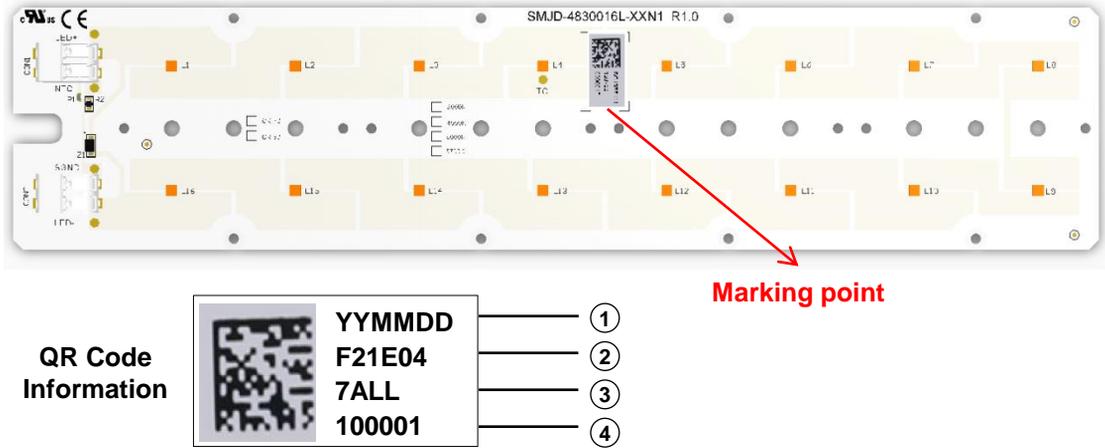
**Notes :**

(1) Module V<sub>F</sub> Code include “DF0” and “DG0”.

Module V <sub>F</sub> Code		Remark For V <sub>F</sub> Variation
ALL	DF0	DC 40~44V
	DG0	DC 44~48V

# Marking Information

Fig 9. Marking Point



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 D	F21E04 7ALL	1~9, A~Z	1~9, A~Z	00001	

### Plain Code Information

No.	Item	Information	Digits	Remark
①	Date	YYMMDD	6Digit	SMT date
②	Flux <sup>(1)</sup>	F21	3Digit	F21=5210lm
	CCT	X04    4- step	3Digit	X= A,B,C,E,G
③	CRI	7	1Digit	CRI=70
		8	1Digit	CRI=80
	V <sub>F</sub>	ALL    DF0 DG0	3Digit	DC 40~44V DC 44~48V
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	Im	Symbol	Im	Symbol	Im	Symbol	Im
F21	5210	O50	14500	R50	17500	U50	20500
M20	12200	P50	15500	S50	18500	V20	21200
N00	13000	Q50	16500	T50	19500	W00	22000

## Label Information

<b>Model No.</b>	<b>SMJD-4830016L-XXN1<sup>(1)</sup></b> 
<b>Rank</b>	<b>F21E047ALL<sup>(2)</sup></b> 
<b>Type</b>	<b>Standard</b>
<b>Quantity</b>	<b>XXX</b> 
<b>Date</b>	<b>YYMDDXXXXX-XXXXXXX<sup>(3)</sup></b>
	<b>SEOUL SEMICONDUCTOR CO.,LTD.</b>

**Reference**

- (1) Please refer to page 16.
- (2) Please refer to page 18.
- (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.

<p><b>TOTAL Quantity</b></p> <p>         </p> <p><b>XXX</b></p>
 <b>SEOUL SEMICONDUCTOR CO.,LTD.</b>

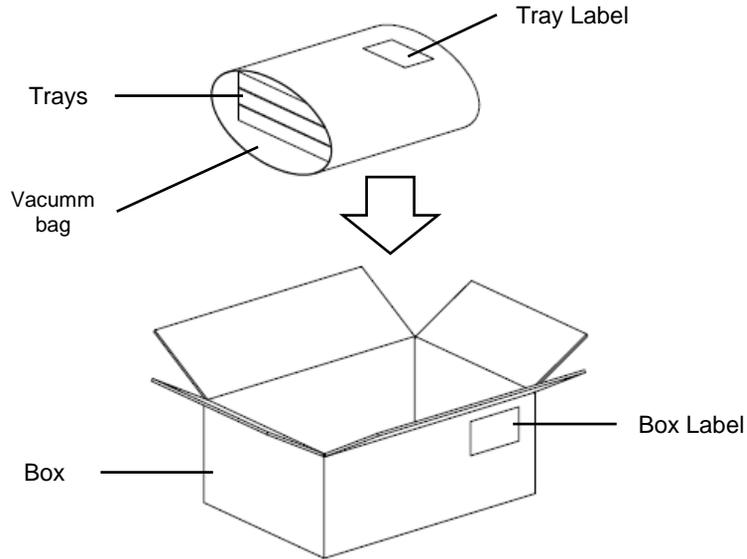
**Notes**

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



## Packaging Specification

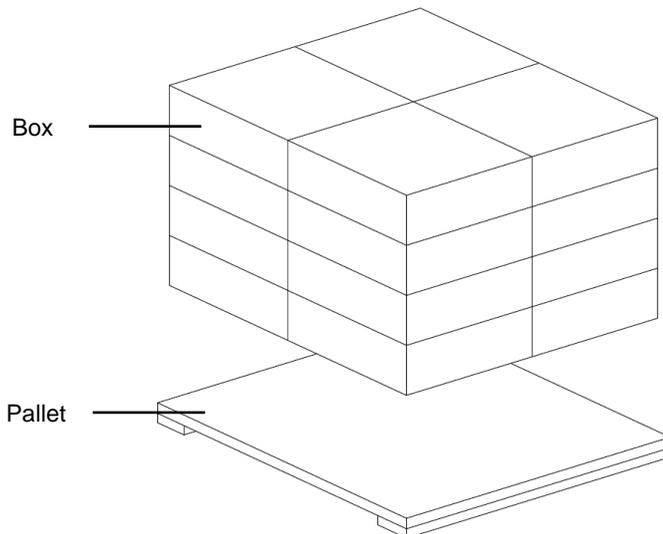
### 3. Box information & packing



**Notes:**

- (1) Quantity: 9Trays (9\*24=216pcs) / 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 = 4,320(180\*24) 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.

## 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 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

### Published by

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### 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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## Revision History

Revision	Date	Page	Remarks
R0.1	2018.06.15	All	
R0.2	2018.07.24	Page10~14	Updating CIE Chromaticity Diagram
R0.3	2018.10.29	All	Added Order Code