Customer :

Specification for Approval

Part Name : WM28T1F-xx80B

Customer : **2014. . .**

Checked	Checked	Approved	Remark
/	/	/	

WOOREE E&L Co., Ltd. **2013. 08. 09.**

Designed	Checked	Checked	Approved
/	/	/	/

WOOREE E&L CO., LTD 636-3, Sunggok-dong, Danwon-gu, Ansan-si, Kyunggy-do, Korea.

Tel (031)599-3013 Fax (031)494-3174

WOOREE E&L Co.,Ltd.

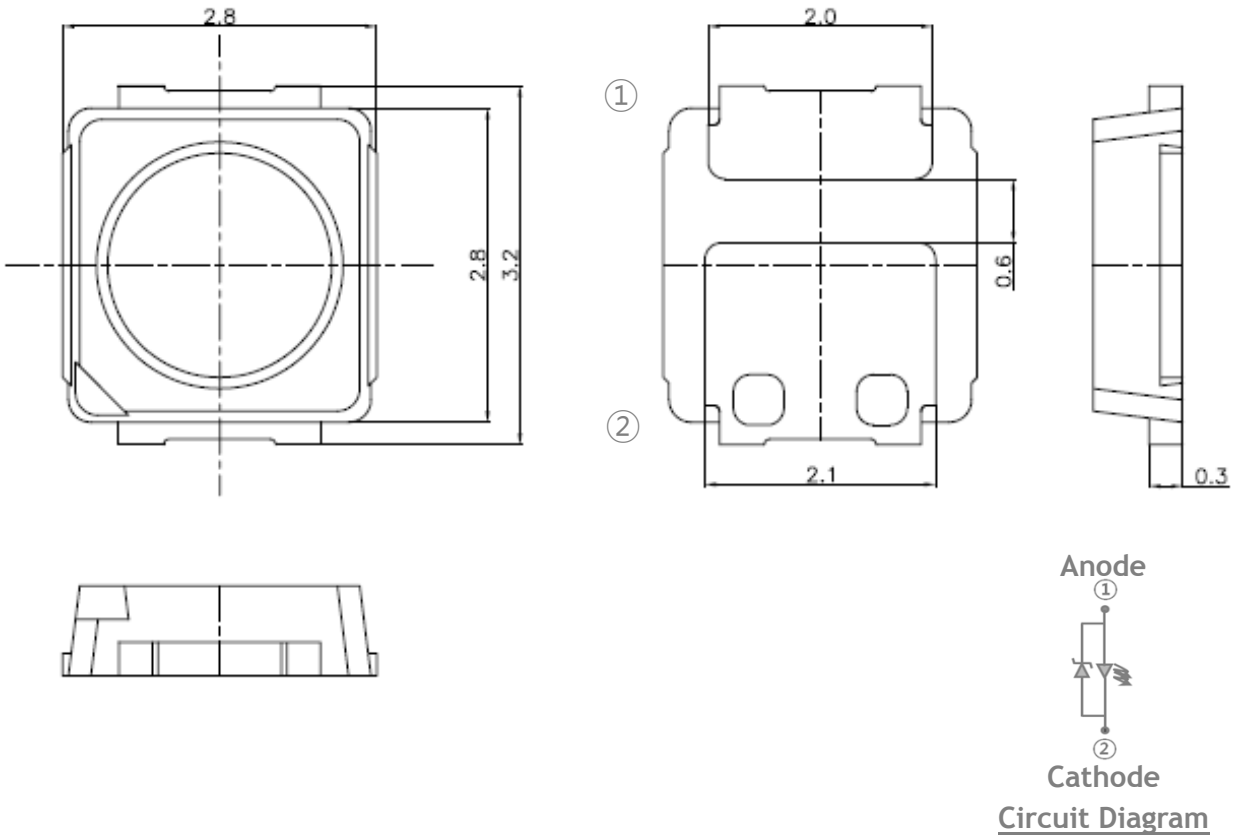
CONTENTS

1. Features

- SMD Top View Type with Lead Frame Base
- Long Time Reliability
- Package size is 3.2 * 2.8* 0.8t (mm), 2Lead
- Application : General Lighting

2. Outline Dimension

UNIT : mm
Tolerance : ± 0.1



Circuit Diagram

Part list

Parts No.	Name	Description
1	Chip source	Blue LED
2	Body	Thermo Plastic
3	Lead frame base	Copper Alloy Metal
4	Phosphor	R.G color Emitting
5	Resin	Silicone Encapsulant

3. Absolute maximum ratings

Item	Symbol	Absolute Maximum Ratings	Unit
Forward Current	I_F	150	mA
Power Dissipation	P_D	510	mW
Reverse Current	I_R	50	mA
Pulse Forward Current*1	I_{FP}	200	mA
Operating Temperature	T_{OPR}	-40 ~ +85	℃
Storage Temperature	T_{STG}	-40 ~ +100	℃
Junction Temperature	T_J	110	℃
Thermal Resistance	R_{TH}	25	℃/W

*1. Pulse Width ≤ 10msec, Duty ≤ 10%

4. Electrical/Optical characteristics

(Ta=25°c)

Item	Symbol	Condition	Value			Unit
			Min	Typ	Max	
Luminous Intensity *1	I_V	I_F=120mA	12.0	14.5	-	cd
Forward Voltage *2	V_F	I_F=120mA	2.95	3.15	3.45	V
Luminous Flux*1	Φ_V	I_F=120mA	40.0	48.5	-	lm
Color Temperature *3 [CIE 1931 Coordinates]	CCT	I_F=120mA	2643	-	8299	K
Reverse Voltage	V_R	I_R=5mA	0.7	-	1.2	V
Viewing Angle	2Θ1/2	I_F=120mA	-	120	-	Deg.
Color Rendering Index	Ra	I_F=120mA	80	-	-	-

*1. Luminous Intensity & Luminous Flux measurement allowance is ± 10%

*2. Forward voltage measurement allowance is ± 0.1V

*3. Color Temperature measurement allowance is ± 40

5. Ranks

(1) Forward Voltage (Ta=25℃)

Rank	Condition	Min.	Max.	Unit
9	I_F = 120mA	2.95	3.05	V
0		3.05	3.15	
1		3.15	3.25	
2		3.25	3.35	
3		3.35	3.45	

(2) Luminous Intensity (Ta=25℃)

Rank	Condition	2700K	3000K	4000K	5000K	6500K	7500K
120	I_F = 120mA Unit : cd	12.0-12.5	12.0-12.5	-	-	-	
125		12.5-13.0	12.5-13.0		-	-	
130		13.0-13.5	13.0-13.5	-	-	-	
135		13.5-14.0	13.5-14.0	13.5-14.0	13.5-14.0	13.5-14.0	13.5-14.0
140				14.0-14.5	14.0-14.5	14.0-14.5	14.0-14.5
145		-	-	14.5-15.0	14.5-15.0	14.5-15.0	14.5-15.0
150		-	-	15.0-15.5	15.0-15.5	15.0-15.5	15.0-15.5

* Luminous Intensity Measuring condition is 0.01sr (CIE1931, LED Condition B)

(3) Chromaticity coordinates **(I_F= 120mA, Ta=25℃)**

2700K (CCT 2793 ~ 2870K)

27A		27B		27C		27D		27E	
x	y	x	y	x	y	x	y	x	y
0.4326	0.3808	0.4373	0.3898	0.4420	0.3988	0.4515	0.4169	0.4562	0.4260
0.4373	0.3898	0.4420	0.3988	0.4515	0.4169	0.4562	0.4260	0.4609	0.4350
0.4428	0.3910	0.4477	0.4001	0.4576	0.4183	0.4625	0.4275	0.4674	0.4366
0.4379	0.3818	0.4428	0.3910	0.4477	0.4001	0.4576	0.4183	0.4625	0.4275

2700K (CCT 2719 ~ 2793K)

27F		27G		27H		27J		27K	
x	y	x	y	x	y	x	y	x	y
0.4379	0.3818	0.4428	0.3910	0.4477	0.4001	0.4576	0.4183	0.4625	0.4275
0.4428	0.3910	0.4477	0.4001	0.4576	0.4183	0.4625	0.4275	0.4674	0.4366
0.4483	0.3921	0.4534	0.4013	0.4636	0.4197	0.4688	0.4290	0.4739	0.4382
0.4432	0.3829	0.4483	0.3921	0.4534	0.4013	0.4636	0.4197	0.4688	0.4290

2700K (CCT 2648 ~ 2719K)

27L		27M		27N		27O		27P	
x	y	x	y	x	y	x	y	x	y
0.4432	0.3829	0.4483	0.3921	0.4534	0.4013	0.4636	0.4197	0.4688	0.4290
0.4483	0.3921	0.4534	0.4013	0.4636	0.4197	0.4688	0.4290	0.4739	0.4382
0.4538	0.3933	0.4591	0.4026	0.4697	0.4211	0.4750	0.4304	0.4803	0.4397
0.4485	0.3840	0.4538	0.3933	0.4591	0.4026	0.4697	0.4211	0.4750	0.4304

2700K (CCT 2580 ~ 2648K)

27Q		27R		27S		27T		27U	
x	y	x	y	x	y	x	y	x	y
0.4485	0.3840	0.4538	0.3933	0.4591	0.4026	0.4697	0.4211	0.4750	0.4304
0.4538	0.3933	0.4591	0.4026	0.4697	0.4211	0.4750	0.4304	0.4803	0.4397
0.4593	0.3944	0.4648	0.4038	0.4758	0.4225	0.4813	0.4319	0.4868	0.4413
0.4538	0.3850	0.4593	0.3944	0.4648	0.4038	0.4758	0.4225	0.4813	0.4319

3000K (CCT 3125 ~ 3220K)

30A		30B		30C		30D		30E	
x	y	x	y	x	y	x	y	x	y
0.4109	0.3726	0.4147	0.3814	0.4185	0.3902	0.4261	0.4077	0.4299	0.4165
0.4147	0.3814	0.4185	0.3902	0.4261	0.4077	0.4299	0.4165	0.4337	0.4253
0.4204	0.3835	0.4244	0.3923	0.4324	0.4100	0.4365	0.4189	0.4405	0.4277
0.4163	0.3747	0.4204	0.3835	0.4244	0.3923	0.4324	0.4100	0.4365	0.4189

3000K (CCT 3035 ~ 3125K)

30F		30G		30H		30J		30K	
x	y	x	y	x	y	x	y	x	y
0.4163	0.3747	0.4204	0.3835	0.4244	0.3923	0.4324	0.4100	0.4365	0.4189
0.4204	0.3835	0.4244	0.3923	0.4324	0.4100	0.4365	0.4189	0.4405	0.4277
0.4260	0.3856	0.4303	0.3945	0.4388	0.4123	0.4431	0.4213	0.4473	0.4302
0.4217	0.3767	0.4260	0.3856	0.4303	0.3945	0.4388	0.4123	0.4431	0.4213

3000K (CCT 2952 ~ 3035K)

30L		30M		30N		30O		30P	
x	y	x	y	x	y	x	y	x	y
0.4217	0.3767	0.4260	0.3856	0.4303	0.3945	0.4388	0.4123	0.4431	0.4213
0.4260	0.3856	0.4303	0.3945	0.4388	0.4123	0.4431	0.4213	0.4473	0.4302
0.4316	0.3877	0.4361	0.3967	0.4451	0.4146	0.4497	0.4236	0.4541	0.4326
0.4272	0.3787	0.4316	0.3877	0.4361	0.3967	0.4451	0.4146	0.4497	0.4236

3000K (CCT 2870 ~ 2952K)

30Q		30R		30S		30T		30U	
x	y	x	y	x	y	x	y	x	y
0.4272	0.3787	0.4316	0.3877	0.4361	0.3967	0.4451	0.4146	0.4497	0.4236
0.4316	0.3877	0.4361	0.3967	0.4451	0.4146	0.4497	0.4236	0.4541	0.4326
0.4373	0.3898	0.4420	0.3988	0.4515	0.4169	0.4562	0.4260	0.4609	0.4350
0.4326	0.3808	0.4373	0.3898	0.4420	0.3988	0.4515	0.4169	0.4562	0.4260

3500K (CCT 3574 ~ 3710K)

35A		35B		35C		35D		35E	
x	y	x	y	x	y	x	y	x	y
0.3862	0.3607	0.3890	0.3692	0.3916	0.3771	0.3970	0.3935	0.3996	0.4014
0.3890	0.3692	0.3916	0.3771	0.3970	0.3935	0.3996	0.4014	0.4023	0.4096
0.3953	0.3721	0.3983	0.3804	0.4042	0.3969	0.4072	0.4052	0.4101	0.4135
0.3924	0.3638	0.3953	0.3721	0.3983	0.3804	0.4042	0.3969	0.4072	0.4052

3500K (CCT 3447 ~ 3574K)

35F		35G		35H		35J		35K	
x	y	x	y	x	y	x	y	x	y
0.3924	0.3638	0.3953	0.3721	0.3983	0.3804	0.4042	0.3969	0.4072	0.4052
0.3953	0.3721	0.3983	0.3804	0.4042	0.3969	0.4072	0.4052	0.4101	0.4135
0.4018	0.3752	0.4050	0.3836	0.4115	0.4005	0.4148	0.4090	0.4180	0.4174
0.3986	0.3668	0.4018	0.3752	0.4050	0.3836	0.4115	0.4005	0.4148	0.4090

3500K (CCT 3329 ~ 3447K)

35L		35M		35N		35O		35P	
x	y	x	y	x	y	x	y	x	y
0.3986	0.3668	0.4018	0.3752	0.4050	0.3836	0.4115	0.4005	0.4148	0.4090
0.4018	0.3752	0.4050	0.3836	0.4115	0.4005	0.4148	0.4090	0.4180	0.4174
0.4082	0.3783	0.4118	0.3869	0.4188	0.4041	0.4223	0.4127	0.4258	0.4214
0.4047	0.3697	0.4082	0.3783	0.4118	0.3869	0.4188	0.4041	0.4223	0.4127

3500K (CCT 3220 ~ 3329K)

35Q		35R		35S		35T		35U	
x	y	x	y	x	y	x	y	x	y
0.4047	0.3697	0.4082	0.3783	0.4118	0.3869	0.4188	0.4041	0.4223	0.4127
0.4082	0.3783	0.4118	0.3869	0.4188	0.4041	0.4223	0.4127	0.4258	0.4214
0.4147	0.3814	0.4185	0.3902	0.4261	0.4077	0.4299	0.4165	0.4337	0.4253
0.4109	0.3726	0.4147	0.3814	0.4185	0.3902	0.4261	0.4077	0.4299	0.4165

4000K (CCT 4107 ~ 4260K)

40A		40B		40C		40D		40E	
x	y	x	y	x	y	x	y	x	y
0.3653	0.3504	0.3670	0.3578	0.3687	0.3652	0.3720	0.3800	0.3736	0.3874
0.3670	0.3578	0.3687	0.3652	0.3720	0.3800	0.3736	0.3874	0.3753	0.3948
0.3727	0.3613	0.3746	0.3689	0.3784	0.3841	0.3804	0.3917	0.3823	0.3993
0.3708	0.3536	0.3727	0.3613	0.3746	0.3689	0.3784	0.3841	0.3804	0.3917

4000K (CCT 3964 ~ 4107K)

40F		40G		40H		40J		40K	
x	y	x	y	x	y	x	y	x	y
0.3708	0.3536	0.3727	0.3613	0.3746	0.3689	0.3784	0.3841	0.3804	0.3917
0.3727	0.3613	0.3746	0.3689	0.3784	0.3841	0.3804	0.3917	0.3823	0.3993
0.3784	0.3647	0.3806	0.3725	0.3849	0.3881	0.3871	0.3959	0.3893	0.4037
0.3762	0.3569	0.3784	0.3647	0.3806	0.3725	0.3849	0.3881	0.3871	0.3959

4000K (CCT 3832 ~ 3964K)

40L		40M		40N		40O		40P	
x	y	x	y	x	y	x	y	x	y
0.3762	0.3569	0.3784	0.3647	0.3806	0.3725	0.3849	0.3881	0.3871	0.3959
0.3784	0.3647	0.3806	0.3725	0.3849	0.3881	0.3871	0.3959	0.3893	0.4037
0.3841	0.3682	0.3866	0.3762	0.3914	0.3922	0.3939	0.4002	0.3963	0.4082
0.3817	0.3602	0.3841	0.3682	0.3866	0.3762	0.3914	0.3922	0.3939	0.4002

4000K (CCT 3710 ~ 3832K)

40Q		40R		40S		40T		40U	
x	y	x	y	x	y	x	y	x	y
0.3817	0.3602	0.3841	0.3682	0.3866	0.3762	0.3914	0.3922	0.3939	0.4002
0.3841	0.3682	0.3866	0.3762	0.3914	0.3922	0.3939	0.4002	0.3963	0.4082
0.3898	0.3716	0.3925	0.3798	0.3979	0.3962	0.4006	0.4044	0.4033	0.4126
0.3871	0.3634	0.3898	0.3716	0.3925	0.3798	0.3979	0.3962	0.4006	0.4044

4500K (CCT 4613 ~ 4745K)

45A		45B		45C		45D		45E	
x	y	x	y	x	y	x	y	x	y
0.3503	0.3397	0.3512	0.3464	0.3521	0.3532	0.3539	0.3669	0.3548	0.3737
0.3512	0.3464	0.3521	0.3532	0.3539	0.3669	0.3548	0.3737	0.3557	0.3805
0.3551	0.3493	0.3562	0.3562	0.3584	0.3701	0.3595	0.3770	0.3606	0.3840
0.3541	0.3424	0.3551	0.3493	0.3562	0.3562	0.3584	0.3701	0.3595	0.3770

4500K (CCT 4488 ~ 4613K)

45F		45G		45H		45J		45K	
x	y	x	y	x	y	x	y	x	y
0.3541	0.3424	0.3551	0.3493	0.3562	0.3562	0.3584	0.3701	0.3595	0.3770
0.3551	0.3493	0.3562	0.3562	0.3584	0.3701	0.3595	0.3770	0.3606	0.3840
0.3591	0.3522	0.3604	0.3592	0.3629	0.3734	0.3642	0.3805	0.3655	0.3876
0.3578	0.3450	0.3591	0.3522	0.3604	0.3592	0.3629	0.3734	0.3642	0.3805

4500K (CCT 4371 ~ 4488K)

45L		45M		45N		45O		45P	
x	y	x	y	x	y	x	y	x	y
0.3578	0.3450	0.3591	0.3522	0.3604	0.3592	0.3629	0.3734	0.3642	0.3805
0.3591	0.3522	0.3604	0.3592	0.3629	0.3734	0.3642	0.3805	0.3655	0.3876
0.3630	0.3550	0.3645	0.3622	0.3674	0.3767	0.3689	0.3839	0.3704	0.3912
0.3616	0.3477	0.3630	0.3550	0.3645	0.3622	0.3674	0.3767	0.3689	0.3839

4500K (CCT 4260 ~ 4371K)

45Q		45R		45S		45T		45U	
x	y	x	y	x	y	x	y	x	y
0.3616	0.3477	0.3630	0.3550	0.3645	0.3622	0.3674	0.3767	0.3689	0.3839
0.3630	0.3550	0.3645	0.3622	0.3674	0.3767	0.3689	0.3839	0.3704	0.3912
0.3670	0.3578	0.3687	0.3652	0.3720	0.3800	0.3736	0.3874	0.3753	0.3948
0.3653	0.3504	0.3670	0.3578	0.3687	0.3652	0.3720	0.3800	0.3736	0.3874

5000K (CCT 5155 ~ 5311K)

50A		50B		50C		50D		50E	
x	y	x	y	x	y	x	y	x	y
0.3363	0.3307	0.3366	0.3369	0.3369	0.3431	0.3374	0.3554	0.3376	0.3616
0.3366	0.3369	0.3369	0.3431	0.3374	0.3554	0.3376	0.3616	0.3379	0.3678
0.3403	0.3398	0.3407	0.3462	0.3416	0.3589	0.3420	0.3652	0.3424	0.3716
0.3399	0.3335	0.3403	0.3398	0.3407	0.3462	0.3416	0.3589	0.3420	0.3652

5000K (CCT 5010 ~ 5155K)

50F		50G		50H		50J		50K	
x	y	x	y	x	y	x	y	x	y
0.3399	0.3335	0.3403	0.3398	0.3407	0.3462	0.3416	0.3589	0.3420	0.3652
0.3403	0.3398	0.3407	0.3462	0.3416	0.3589	0.3420	0.3652	0.3424	0.3716
0.3441	0.3428	0.3446	0.3493	0.3458	0.3623	0.3463	0.3688	0.3469	0.3753
0.3435	0.3363	0.3441	0.3428	0.3446	0.3493	0.3458	0.3623	0.3463	0.3688

5000K (CCT 4874 ~ 5010K)

50L		50M		50N		50O		50P	
x	y	x	y	x	y	x	y	x	y
0.3435	0.3363	0.3441	0.3428	0.3446	0.3493	0.3458	0.3623	0.3463	0.3688
0.3441	0.3428	0.3446	0.3493	0.3458	0.3623	0.3463	0.3688	0.3469	0.3753
0.3478	0.3457	0.3485	0.3524	0.3500	0.3658	0.3508	0.3724	0.3515	0.3791
0.3470	0.3391	0.3478	0.3457	0.3485	0.3524	0.3500	0.3658	0.3508	0.3724

5000K (CCT 4745 ~ 4874K)

50Q		50R		50S		50T		50U	
x	y	x	y	x	y	x	y	x	y
0.3470	0.3391	0.3478	0.3457	0.3485	0.3524	0.3500	0.3658	0.3508	0.3724
0.3478	0.3457	0.3485	0.3524	0.3500	0.3658	0.3508	0.3724	0.3515	0.3791
0.3515	0.3487	0.3524	0.3555	0.3542	0.3692	0.3551	0.3760	0.3560	0.3828
0.3506	0.3419	0.3515	0.3487	0.3524	0.3555	0.3542	0.3692	0.3551	0.3760

5700K (CCT 5823 ~ 6020K)

57A		57B		57C		57D		57E	
x	y	x	y	x	y	x	y	x	y
0.3226	0.3192	0.3222	0.3247	0.3218	0.3302	0.3210	0.3412	0.3206	0.3467
0.3222	0.3247	0.3218	0.3302	0.3210	0.3412	0.3206	0.3467	0.3202	0.3522
0.3258	0.3276	0.3256	0.3334	0.3251	0.3446	0.3249	0.3503	0.3247	0.3560
0.3260	0.3220	0.3258	0.3276	0.3256	0.3334	0.3251	0.3446	0.3249	0.3503

5700K (CCT 5641 ~ 5823K)

57F		57G		57H		57J		57K	
x	y	x	y	x	y	x	y	x	y
0.3260	0.3220	0.3258	0.3276	0.3256	0.3334	0.3251	0.3446	0.3249	0.3503
0.3258	0.3276	0.3256	0.3334	0.3251	0.3446	0.3249	0.3503	0.3247	0.3560
0.3294	0.3307	0.3293	0.3364	0.3292	0.3482	0.3292	0.3540	0.3291	0.3599
0.3294	0.3248	0.3294	0.3307	0.3293	0.3364	0.3292	0.3482	0.3292	0.3540

5700K (CCT 5468 ~ 5641K)

57L		57M		57N		57O		57P	
x	y	x	y	x	y	x	y	x	y
0.3294	0.3248	0.3294	0.3307	0.3293	0.3364	0.3292	0.3482	0.3292	0.3540
0.3294	0.3307	0.3293	0.3364	0.3292	0.3482	0.3292	0.3540	0.3291	0.3599
0.3330	0.3337	0.3331	0.3398	0.3333	0.3518	0.3334	0.3578	0.3335	0.3638
0.3329	0.3277	0.3330	0.3337	0.3331	0.3398	0.3333	0.3518	0.3334	0.3578

5700K (CCT 5311 ~ 5468K)

57Q		57R		57S		57T		57U	
x	y	x	y	x	y	x	y	x	y
0.3329	0.3277	0.3330	0.3337	0.3331	0.3398	0.3333	0.3518	0.3334	0.3578
0.3330	0.3337	0.3331	0.3398	0.3333	0.3518	0.3334	0.3578	0.3335	0.3638
0.3366	0.3369	0.3369	0.3431	0.3374	0.3554	0.3376	0.3616	0.3379	0.3678
0.3363	0.3307	0.3366	0.3369	0.3369	0.3431	0.3374	0.3554	0.3376	0.3616

6500K (CCT 6749 ~ 7040K)

65A		65B		65C		65D		65E	
x	y	x	y	x	y	x	y	x	y
0.3078	0.3066	0.3068	0.3113	0.3058	0.3160	0.3038	0.3256	0.3028	0.3304
0.3068	0.3113	0.3058	0.3160	0.3038	0.3256	0.3028	0.3304	0.3018	0.3351
0.3106	0.3150	0.3098	0.3199	0.3081	0.3299	0.3072	0.3348	0.3064	0.3397
0.3115	0.3101	0.3106	0.3150	0.3098	0.3199	0.3081	0.3299	0.3072	0.3348

6500K (CCT 6485 ~ 6749K)

65F		65G		65H		65J		65K	
x	y	x	y	x	y	x	y	x	y
0.3115	0.3101	0.3106	0.3150	0.3098	0.3199	0.3081	0.3299	0.3072	0.3348
0.3106	0.3150	0.3098	0.3199	0.3081	0.3299	0.3072	0.3348	0.3064	0.3397
0.3145	0.3187	0.3138	0.3238	0.3123	0.3341	0.3116	0.3393	0.3109	0.3444
0.3152	0.3136	0.3145	0.3187	0.3138	0.3238	0.3123	0.3341	0.3116	0.3393

6500K (CCT 6243 ~ 6485K)

65L		65M		65N		65O		65P	
x	y	x	y	x	y	x	y	x	y
0.3152	0.3136	0.3145	0.3187	0.3138	0.3238	0.3123	0.3341	0.3116	0.3393
0.3145	0.3187	0.3138	0.3238	0.3123	0.3341	0.3116	0.3393	0.3109	0.3444
0.3183	0.3224	0.3177	0.3277	0.3166	0.3384	0.3161	0.3437	0.3155	0.3490
0.3188	0.3171	0.3183	0.3224	0.3177	0.3277	0.3166	0.3384	0.3161	0.3437

6500K (CCT 6020 ~ 6243K)

65Q		65R		65S		65T		65U	
x	y	x	y	x	y	x	y	x	y
0.3188	0.3171	0.3183	0.3224	0.3177	0.3277	0.3166	0.3384	0.3161	0.3437
0.3183	0.3224	0.3177	0.3277	0.3166	0.3384	0.3161	0.3437	0.3155	0.3490
0.3221	0.3261	0.3217	0.3316	0.3209	0.3426	0.3205	0.3481	0.3201	0.3536
0.3225	0.3206	0.3221	0.3261	0.3217	0.3316	0.3209	0.3426	0.3205	0.3481

7000K (CCT 7349 ~ 7690K)

70A		70B		70C		70D		70E	
x	y	x	y	x	y	x	y	x	y
0.3010	0.2989	0.2997	0.3033	0.2984	0.3077	0.2958	0.3167	0.2945	0.3211
0.2997	0.3033	0.2984	0.3077	0.2958	0.3167	0.2945	0.3211	0.2931	0.3256
0.3032	0.3073	0.3021	0.3119	0.2998	0.3211	0.2986	0.3257	0.2975	0.3303
0.3044	0.3027	0.3032	0.3073	0.3021	0.3119	0.2998	0.3211	0.2986	0.3257

7000K (CCT 7040 ~ 7349K)

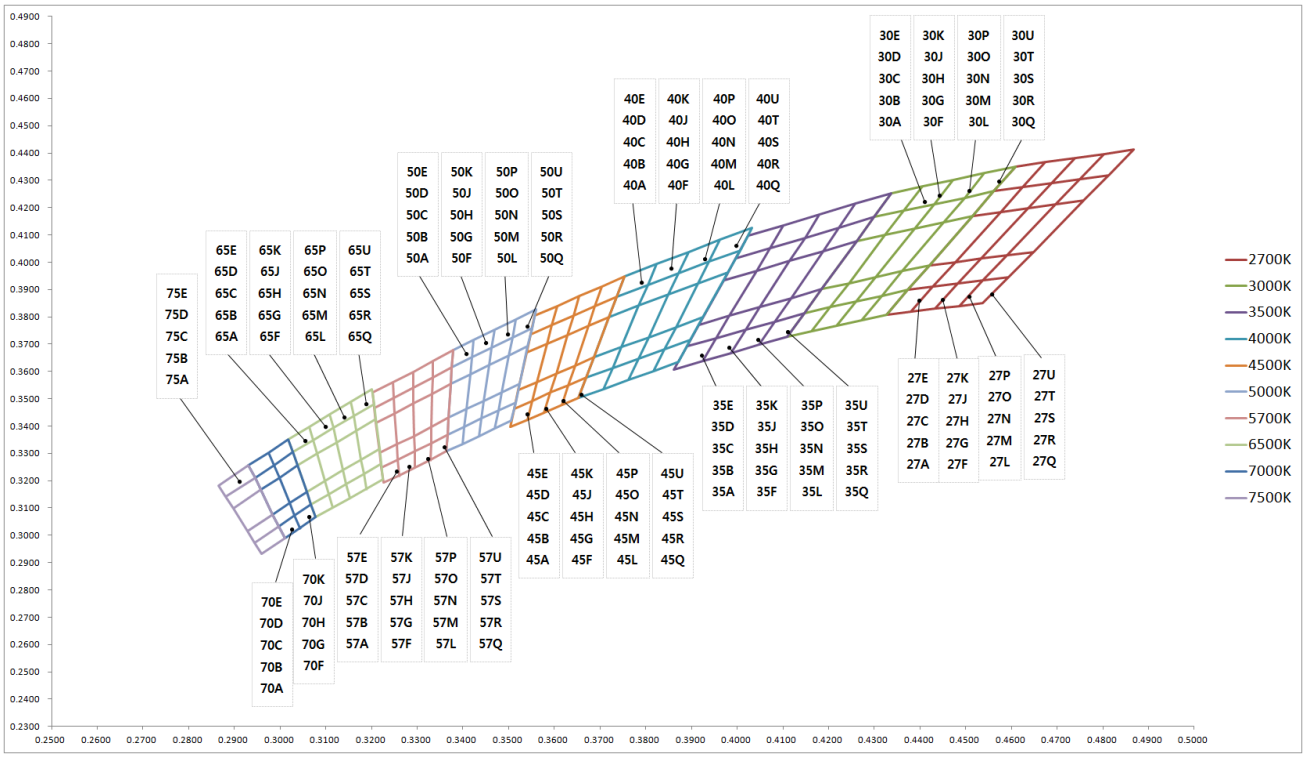
70F		70G		70H		70J		70K	
x	y	x	y	x	y	x	y	x	y
0.3044	0.3027	0.3032	0.3073	0.3021	0.3119	0.2998	0.3211	0.2986	0.3257
0.3032	0.3073	0.3021	0.3119	0.2998	0.3211	0.2986	0.3257	0.2975	0.3303
0.3068	0.3113	0.3058	0.3160	0.3038	0.3256	0.3028	0.3304	0.3018	0.3351
0.3078	0.3066	0.3068	0.3113	0.3058	0.3160	0.3038	0.3256	0.3028	0.3304

7500K (CCT 7690 ~ 8299K)

75A		75B		75C		75D		75E	
x	y	x	y	x	y	x	y	x	y
0.2959	0.2931	0.2944	0.2973	0.2928	0.3015	0.2897	0.3099	0.2881	0.3141
0.2944	0.2973	0.2928	0.3015	0.2897	0.3099	0.2881	0.3141	0.2866	0.3183
0.2997	0.3033	0.2984	0.3077	0.2958	0.3167	0.2945	0.3211	0.2931	0.3256
0.3010	0.2989	0.2997	0.3033	0.2984	0.3077	0.2958	0.3167	0.2945	0.3211

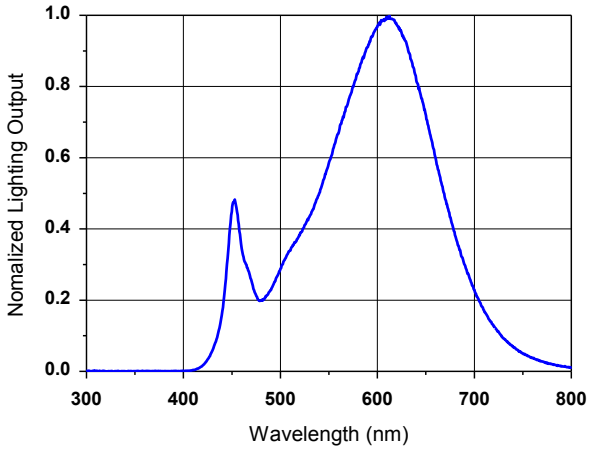
(4) Chromaticity Coordinates Diagram

(I_F=120mA, Ta=25℃)

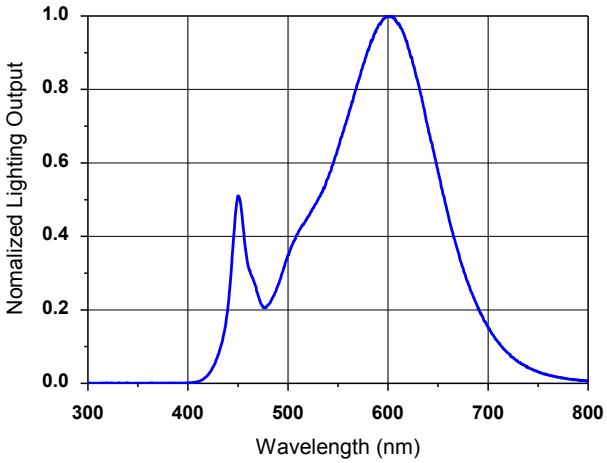


6.Color Spectrum

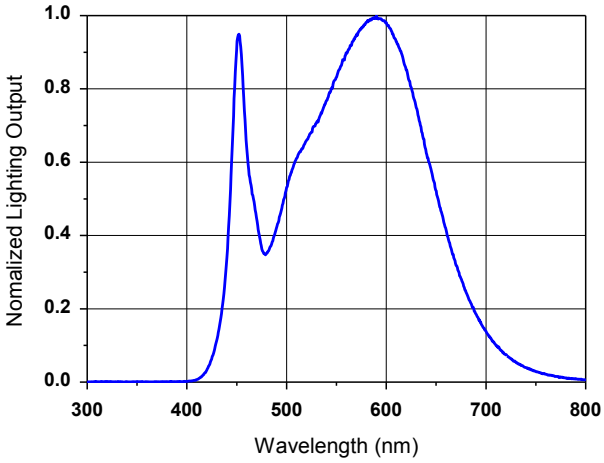
(I_F=120mA, Ta = 25℃)



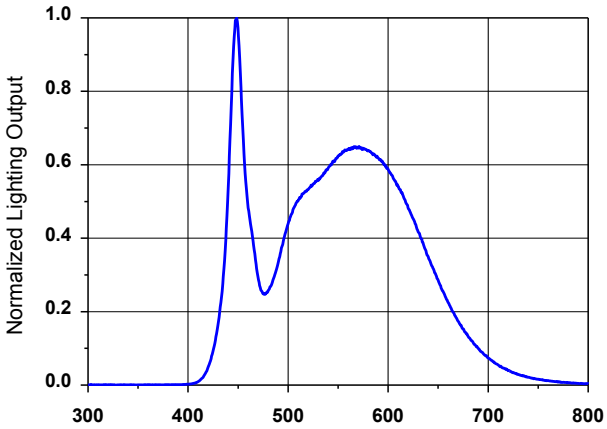
2700K Spectrum



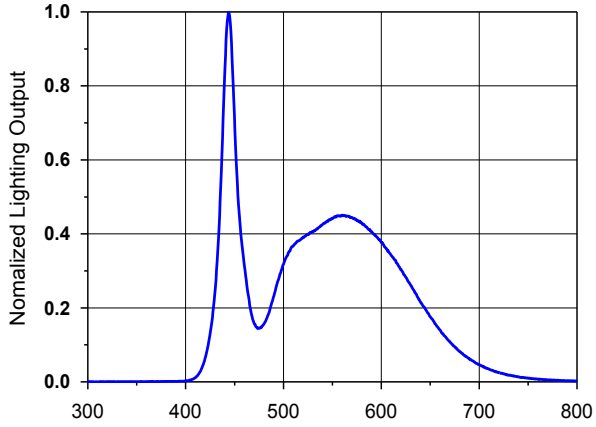
3000K Spectrum



4000K Spectrum



5000K Spectrum

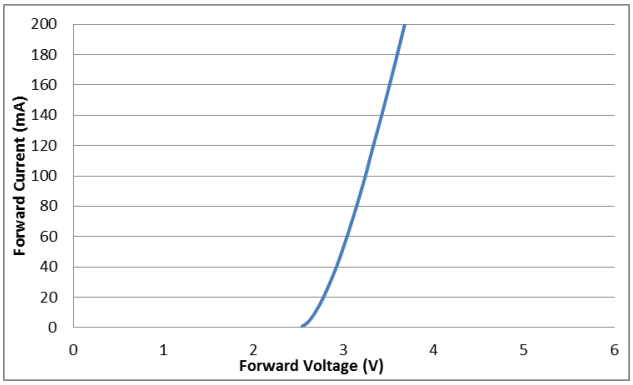


6500K Spectrum

7. Characteristic Diagrams

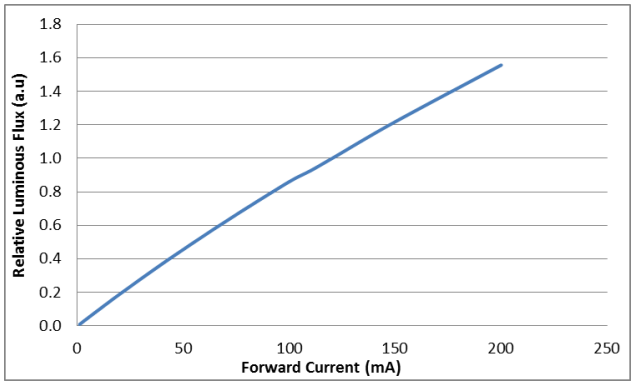
(1) Forward Voltage vs Forward Current

(Ta = 25℃)

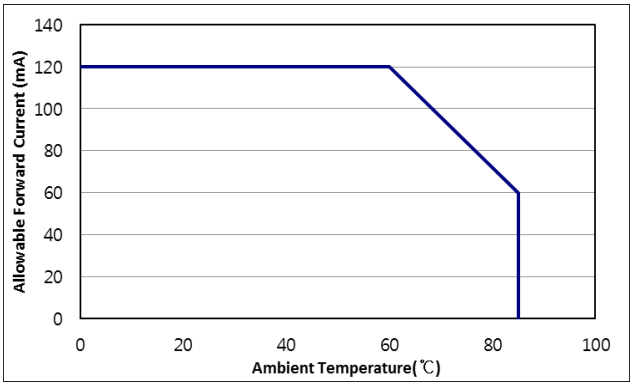


(2) Forward Current vs Relative L-Flux

(Ta = 25℃)

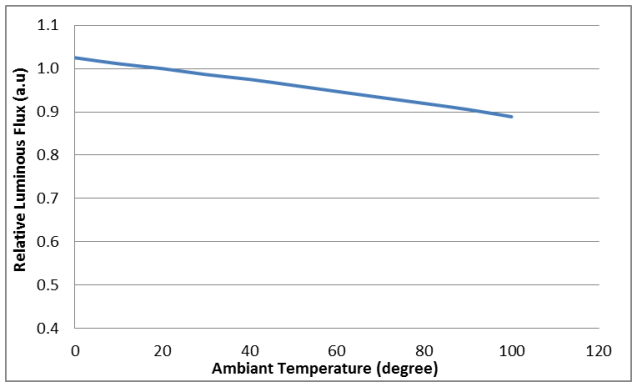


(3) Ambiemt Temperature vs Allowable Forward Current



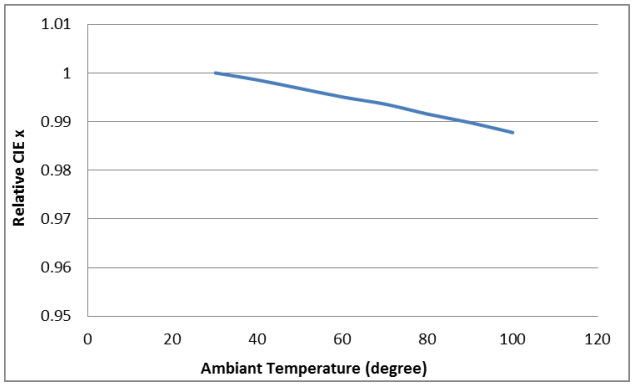
(4) Ambient Temperature vs Relative L-Flux

(I_F=120mA)



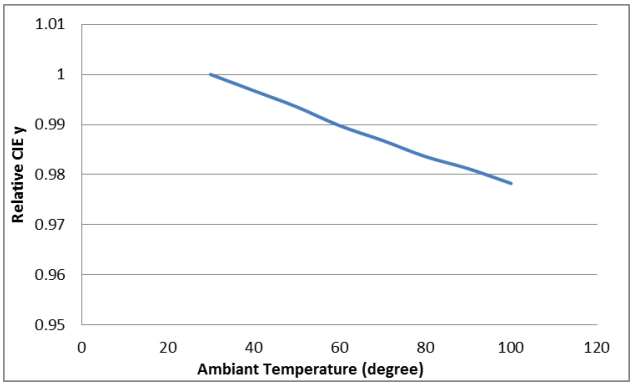
(5) Ambiant Temperature vs Relative CIE X

(I_F=120mA)



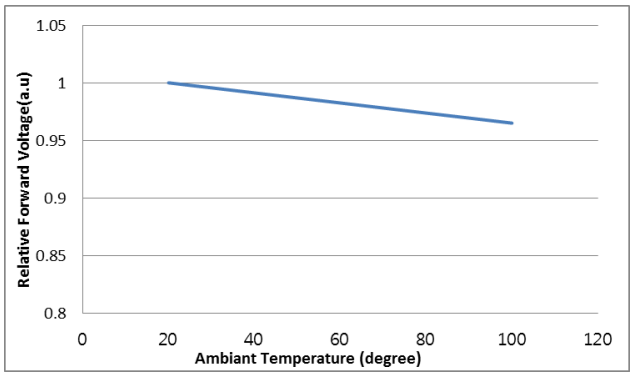
(6) Ambiant Temperature vs Relative CIE Y

(I_F=120mA)



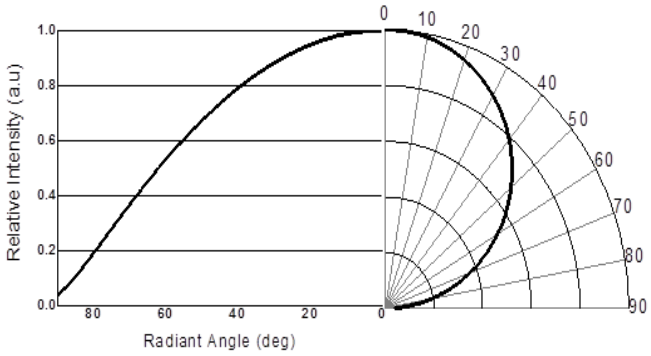
(7) Ambient Temperature vs Forward Voltage

(I_F=120mA)



(8) View angle profile

(I_F=120mA, Ta=25℃)



8. Reliability

(1) Test items and results

NO	Test Item	Standard Test Method	Test Conditions	Note	Number of Damaged
1	Temperature Cycle	JEITA ED-4701 100 105	-40℃~25℃~100℃~25℃ 30min. 5min. 30min. 5min	100 cycles	0/20
2	High Temperature Storage	JEITA ED-4701 200 201	Ta=100℃	1000 hrs	0/20
3	Temperature Humidity Storage	JEITA ED-4701 100 103	Ta=85℃, RH=85%	1000 hrs	0/20
4	Low Temperature Storage	JEITA ED-4701 200 202	Ta=-40℃	1000 hrs	0/20
5	Steady State Operating Life	-	Ta=25℃, I_F=150mA	1000 hrs	0/20
6	Steady State Operating Life of High Temperature	-	Ta=85℃, I_F=150mA	1000 hrs	0/20
7	Steady State Operating Life of High Humidity Heat	-	Ta=85℃, RH=85%, I_F=150mA	1000 hrs	0/20
8	Steady State Operating Life of Low Temperature	-	Ta=-40℃, I_F=150mA	1000 hrs	0/20
9	Electro-Static Discharge Threshold	ESD (HBM)	1500Ω, 100pF (Forward / Reverse)	6000V	0/10

(2) Criteria for judging the damage

ITEM	Symbol	Test Condition	Criteria for Judgement	
			Min.	Max.
Forward Voltage	V_F	I_F = 120mA	-	USL *1 × 1.1
Luminous Intensity	Iv	I_F = 120mA	LSL*2 × 0.7	

*1) U.S.L. : Upper Standard Level *2) L.S.L : Lower Standard Level

YOUR PARTNER FOR THE BEST QUALITY

TEST REPORT

Report No. : CUS2012-1098

Client
- o Name : WOOREE E&L CO., LTD.
- o Address : 636-3, Sunggok-dong, Danwon-gu, Ansan-si, Kyunggy-do, Korea
- o Representative : LEE HAK DONG

Purpose of Report : Quaility Management

Name of Product : LED Package

Rating/Model : Wx28T1F

Receipt Date : Sep. 03, 2012 Test Period : Sep. 03, 2012 ~ Jul. 09, 2013

Test Method : IES LM-80-08 : Approved Method for Measuring Lumen Maintenance of LED Light Sources

Test Environment : Temp : (25 ± 2) ℃ (Temperature) Hum : (50 ± 15) % R.H. (Relative humidity)

Test Result : See test results

Note :
1. The test result of this test report only limited in the sample and sample name presented by the client and do not guarantee the all products of the client.
2. This test report shall be used only within the purpose of its defined usage and also shall not be used for public relation, advertisement and suit without the KTR's written approval.

Jul. 09, 2013

Park Se Il
Prepared by Park Se Il
Tel : 82-31-679-9691

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Reviewed by Ko Jae Joon
E-mail : go@ktr.or.kr

Korea Testing & Research Institute

President Choi Kyeongki

KTR KOREA TESTING & RESEARCH INSTITUTE

TEST RESULT

1. SUMMARY of results and conditions of testing

1.1 Summary of test result						
1.1.1 Model Number: Wx28T1F (x = T or L or M, T : Top view, L : Low bright, M : Middle bright)						
1.1.2 Description: LED Package						
No	Drive Current (A)	Case Temperature (℃)	Ambient Temperature (℃)	Average lumen maintenance at 6000 hours (%)	Average Chromaticity Shift at 6000 hours ($\Delta u'v'$)	Maximum Chromaticity Shift at 6000 hours ($\Delta u'v'$)
1	0.120	55 (Specified)	55 ± 2	96.2	0.002 6	0.004 3
2	0.120	85 (Specified)	85 ± 2	96.4	0.002 5	0.005 4
3	0.120	100 (Selected)	100 ± 2	95.4	0.002 9	0.005 7

1.2 IES LM-80-08 report requirements	
1.2.1 Number of LED Light Sources tested	n = 25
1.2.2 Description LED light sources	LED package
1.2.3 Description of auxiliary equipment	Refer to clause 5
1.2.4 Operating cycle	Drive method : Constant current
1.2.5 Ambient conditions, temperature and relative humidity	LED packages are operated in temperature controlled chamber. The temperature around LED packages is controleld by air flowing through the chamber to meet LM-80-08 clause 4.4. TA : Refer to individual test pages RH : 〈 50 RH Air flow : Minimized
1.2.6 Case temperature	55 ℃, 85 ℃, 100 ℃
1.2.7 Drive current of the LED light source during lifetime test	0.120 A
1.2.8 Initial luminous flux and forward voltage at photometric measurement current	Refer to individual test pages
1.2.9 Lumen maintenance data for each individual LED light source	Refer to individual test pages
1.2.10 Observation of LED light source failures	No failure occurred during test.
1.2.11 LED light source monitoring interval	Refer to individual test pages
1.2.12 Photometric measurement uncertainty	Expanded measurement uncertainty for relative luminous flux measurements is 2.0 %, k =2
1.2.13 Chromaticity shift	Refer to individual test pages

TEST RESULT

2. Test Result for case temperature 55 ℃ @ 0.120 A

	0 h (Initial)		Lumen Maintenance (%)						Chromaticity Shift (⊿u'v')					
	Im	V_F	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h
1	48.4	3.17	99.6	98.3	99.3	98.4	97.3	96.9	0.000 8	0.000 7	0.000 9	0.000 8	0.000 9	0.004 1
2	48.7	3.18	99.4	98.6	99.8	99.8	98.7	96.3	0.001 2	0.000 8	0.001 0	0.000 9	0.000 9	0.001 8
3	49.3	3.17	99.6	98.4	99.9	99.5	98.2	96.1	0.002 8	0.000 7	0.000 9	0.000 9	0.001 0	0.003 6
4	49.2	3.18	99.8	98.4	99.6	99.0	97.8	95.9	0.001 6	0.000 6	0.001 1	0.001 3	0.001 1	0.002 3
5	48.6	3.17	99.8	98.8	99.7	99.7	98.7	96.5	0.002 2	0.000 8	0.000 9	0.001 1	0.001 0	0.004 0
6	48.9	3.15	99.6	99.0	100.0	98.6	98.1	96.3	0.002 2	0.000 8	0.000 9	0.000 9	0.000 9	0.003 4
7	48.5	3.13	99.8	96.3	94.7	94.8	94.7	93.0	0.001 7	0.000 7	0.001 4	0.001 2	0.000 8	0.002 9
8	49.0	3.16	99.8	98.6	99.2	99.1	97.6	96.3	0.000 6	0.000 7	0.000 9	0.001 1	0.000 8	0.001 7
9	48.8	3.16	100.0	99.0	100.4	99.5	98.4	96.7	0.000 7	0.000 6	0.000 6	0.001 0	0.000 8	0.001 0
10	49.4	3.16	99.8	98.8	99.9	99.3	98.1	96.4	0.000 4	0.000 7	0.000 9	0.000 9	0.001 1	0.002 1
11	48.6	3.13	100.0	99.2	100.1	99.5	98.7	96.9	0.001 6	0.000 6	0.000 9	0.001 0	0.000 8	0.001 8
12	48.9	3.17	100.0	99.0	99.4	99.0	98.5	96.7	0.000 6	0.000 6	0.000 9	0.001 1	0.000 9	0.001 8
13	48.1	3.15	100.0	99.2	99.4	98.9	98.1	96.0	0.000 4	0.000 6	0.000 9	0.001 2	0.001 5	0.002 1
14	48.7	3.15	99.8	99.0	99.0	98.6	97.8	96.1	0.002 2	0.000 6	0.000 6	0.000 9	0.000 9	0.003 5
15	49.2	3.16	99.8	99.0	100.1	99.2	98.3	96.3	0.001 9	0.000 8	0.000 9	0.001 1	0.001 1	0.002 6
16	49.6	3.16	99.8	99.4	100.7	99.2	97.7	96.4	0.003 5	0.000 9	0.001 2	0.001 2	0.001 1	0.004 3
17	48.6	3.12	99.8	99.0	99.9	99.0	97.9	96.5	0.003 3	0.000 8	0.001 1	0.001 2	0.001 2	0.003 3
18	48.7	3.17	99.8	98.8	99.5	98.7	97.8	96.1	0.000 7	0.000 8	0.001 1	0.001 0	0.001 0	0.002 7
19	49.0	3.16	99.8	99.0	100.1	98.9	98.3	96.7	0.001 9	0.000 7	0.001 0	0.001 0	0.000 9	0.001 6
20	48.2	3.16	99.6	98.3	99.3	99.2	97.8	96.1	0.002 3	0.000 8	0.001 0	0.001 0	0.001 0	0.003 9
21	48.8	3.17	99.8	98.6	99.7	99.4	97.4	95.9	0.002 8	0.000 6	0.000 9	0.001 1	0.001 1	0.002 1
22	49.3	3.17	100.0	99.2	100.5	100.1	98.2	96.6	0.000 6	0.000 7	0.001 0	0.001 0	0.001 0	0.003 0
23	49.2	3.16	99.8	98.8	100.3	99.9	97.9	96.5	0.002 0	0.000 7	0.000 9	0.001 1	0.001 0	0.002 1
24	48.4	3.13	99.8	99.0	100.3	99.9	98.1	96.5	0.002 9	0.000 8	0.000 9	0.001 1	0.000 9	0.002 7
25	49.2	3.16	99.8	98.8	100.2	100.3	97.8	96.1	0.003 2	0.000 7	0.000 9	0.001 0	0.001 0	0.001 4
Avg.	48.9	3.16	99.8	98.7	99.6	99.1	97.9	96.2	0.001 8	0.000 7	0.001 0	0.001 1	0.001 0	0.002 6
Median	48.8	3.16	99.8	98.8	99.9	99.2	98.1	96.3	0.001 9	0.000 7	0.000 9	0.001 0	0.001 0	0.002 6
std.dev.	0.3864	0.0164	0.1509	0.5819	1.1231	1.0138	0.7807	0.7346	0.001 0	0.000 1	0.000 2	0.000 1	0.000 2	0.000 9
min.	48.1	3.12	99.4	96.3	94.7	94.8	94.7	93.0	0.000 4	0.000 6	0.000 6	0.000 8	0.000 8	0.001 0
max.	49.6	3.18	100.0	99.4	100.7	100.3	98.7	96.9	0.003 5	0.000 9	0.001 4	0.001 3	0.001 5	0.004 3

Additional required information by IES TM-21-11	
1. Sample Size	25
2. Number of failures	0
3. DUT drive current used in the test	120 mA
4. Test duration	6 000 hours
5. Test duration used for projection	0 to 6 000
6. Tested case temperature	55 ℃
7. α	6.090E-06
8. *B*	1.007
9. Calculated L_{70}(9k)	60 000
10. Reported L_{70}(9k)	〉36 000

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TEST RESULT

3. Test Result for case temperature 85 ℃ @ 0.120 A

	0 h (Initial)		Lumen Maintenance (%)						Chromaticity Shift (⊿u'v')					
	Im	V_F	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h
1	47.2	3.16	100.0	98.3	100.4	100.0	100.6	98.7	0.003 2	0.000 6	0.000 5	0.001 4	0.001 6	0.002 9
2	48.4	3.11	99.4	98.3	99.8	101.1	94.8	97.3	0.001 0	0.000 6	0.000 6	0.000 8	0.002 9	0.001 8
3	48.7	3.17	99.6	98.2	99.1	98.6	97.7	92.8	0.000 3	0.000 5	0.000 6	0.001 0	0.002 4	0.005 4
4	48.6	3.11	99.6	97.9	99.6	98.9	97.4	96.5	0.002 8	0.000 6	0.000 7	0.000 9	0.001 4	0.002 3
5	48.7	3.16	100.0	98.2	99.8	99.3	97.6	96.3	0.000 6	0.000 5	0.000 6	0.000 8	0.001 2	0.002 2
6	48.8	3.17	99.8	98.2	100.0	99.8	97.4	96.5	0.001 3	0.000 6	0.000 7	0.000 8	0.001 0	0.002 0
7	48.6	3.17	99.8	97.5	99.6	99.6	97.9	97.1	0.001 3	0.000 5	0.000 6	0.000 8	0.001 9	0.002 6
8	49.0	3.16	99.8	96.9	98.0	97.8	96.9	95.7	0.002 3	0.000 5	0.000 8	0.001 1	0.002 6	0.002 8
9	48.7	3.17	100.0	98.2	98.9	98.9	97.5	96.1	0.002 1	0.000 5	0.000 5	0.000 8	0.004 0	0.004 1
10	48.6	3.18	100.0	98.4	99.5	99.3	98.0	96.7	0.001 1	0.000 6	0.000 7	0.000 9	0.000 8	0.001 8
11	48.7	3.16	99.8	98.2	99.4	99.1	98.2	96.7	0.001 3	0.000 7	0.000 6	0.000 9	0.001 1	0.002 1
12	49.0	3.17	99.8	98.6	99.4	99.3	97.0	95.7	0.000 8	0.000 5	0.000 5	0.000 9	0.001 6	0.002 2
13	49.0	3.16	99.8	98.4	99.7	99.1	97.9	96.3	0.000 3	0.000 6	0.000 6	0.000 8	0.001 4	0.002 4
14	48.0	3.13	100.0	98.3	99.9	99.9	100.4	99.2	0.000 8	0.000 4	0.000 6	0.000 9	0.001 8	0.002 4
15	49.2	3.16	99.8	98.4	99.7	99.5	96.0	94.5	0.003 9	0.000 6	0.000 7	0.001 0	0.002 2	0.002 9
16	48.9	3.16	99.6	98.2	99.8	99.2	98.2	97.1	0.002 5	0.000 6	0.000 6	0.000 7	0.004 4	0.003 7
17	48.5	3.16	99.8	97.7	99.6	99.6	98.6	97.5	0.001 7	0.000 4	0.000 5	0.000 8	0.001 6	0.002 1
18	49.0	3.16	99.6	98.2	98.6	98.5	96.4	95.1	0.001 4	0.000 5	0.000 6	0.000 9	0.001 2	0.002 2
19	48.6	3.13	99.6	97.9	99.2	98.8	97.7	96.7	0.000 5	0.000 6	0.000 5	0.000 8	0.001 0	0.002 1
20	48.9	3.16	99.8	98.6	99.9	99.3	96.8	95.5	0.000 8	0.000 6	0.000 5	0.000 8	0.000 7	0.001 8
21	48.7	3.15	99.6	98.4	99.6	99.1	98.3	97.1	0.000 2	0.000 7	0.000 7	0.000 9	0.002 4	0.002 7
22	48.6	3.13	100.0	98.6	99.7	99.1	97.9	96.7	0.002 4	0.000 6	0.000 7	0.001 0	0.000 9	0.001 9
23	48.7	3.17	99.4	97.5	98.9	98.7	97.9	96.3	0.001 7	0.000 6	0.000 7	0.001 0	0.001 1	0.002 2
24	48.5	3.17	99.6	98.8	100.1	100.0	97.8	96.3	0.000 9	0.001 0	0.001 0	0.000 9	0.000 4	0.001 7
25	48.8	3.14	99.6	98.0	99.4	99.4	97.8	96.5	0.003 1	0.001 2	0.000 6	0.000 9	0.000 9	0.001 3
Avg.	48.7	3.15	99.7	98.1	99.5	99.3	97.7	96.4	0.001 4	0.000 6	0.000 6	0.000 9	0.001 7	0.002 5
Median	48.7	3.16	99.8	98.2	99.6	99.3	97.8	96.5	0.001 3	0.000 6	0.000 6	0.000 9	0.001 4	0.002 2
std.dev.	0.3885	0.0189	0.1904	0.3927	0.5141	0.6304	1.1724	1.2437	0.001 0	0.000 2	0.000 1	0.000 1	0.001 0	0.000 9
min.	47.2	3.11	99.4	96.9	98.0	97.8	94.8	92.8	0.000 2	0.000 4	0.000 5	0.000 7	0.000 4	0.001 3
max.	49.2	3.18	100.0	98.8	100.4	101.1	100.6	99.2	0.003 9	0.001 2	0.001 0	0.001 4	0.004 4	0.005 4

Additional required information by IES TM-21-11	
1. Sample Size	25
2. Number of failures	0
3. DUT drive current used in the test	120 mA
4. Test duration	6 000 hours
5. Test duration used for projection	0 to 6 000
6. Tested case temperature	85 ℃
7. α	5.216E-06
8. *B*	1.003
9. Calculated L_{70}(9k)	69 000
10. Reported L_{70}(9k)	〉 36 000

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Issue date : 2013.07.09

TEST RESULT

4. Test Result for case temperature 100 ℃ @ 0.120 A

	0 h (Initial)		Lumen Maintenance (%)						Chromaticity Shift (⊿u'v')					
	Im	V_F	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h	1000 h	2000 h	3000 h	4000 h	5000 h	6000 h
1	49.4	3.15	99.6	98.4	100.1	99.7	95.7	94.5	0.002 3	0.001 2	0.001 1	0.001 2	0.001 3	0.002 1
2	49.0	3.14	99.6	98.0	99.2	98.8	97.9	96.5	0.001 6	0.001 4	0.001 1	0.001 4	0.000 9	0.001 9
3	49.2	3.17	99.6	98.0	99.3	99.5	95.9	94.7	0.001 1	0.002 6	0.001 0	0.001 2	0.002 9	0.003 4
4	49.4	3.17	99.6	98.0	99.6	99.0	96.2	94.9	0.001 3	0.002 1	0.000 8	0.001 0	0.002 0	0.003 0
5	49.3	3.13	99.8	98.0	98.8	98.3	96.6	95.1	0.000 8	0.000 9	0.001 2	0.001 3	0.003 2	0.003 5
6	49.6	3.17	99.6	98.2	99.6	99.5	96.7	95.4	0.000 9	0.004 3	0.001 0	0.001 3	0.002 3	0.002 0
7	48.2	3.14	99.8	98.1	99.9	99.8	100.1	98.8	0.001 5	0.001 4	0.000 9	0.001 2	0.004 2	0.003 5
8	48.8	3.17	99.4	98.0	99.4	98.8	95.2	94.1	0.001 2	0.003 3	0.001 0	0.001 1	0.003 0	0.003 8
9	49.2	3.16	99.6	97.8	98.8	98.8	95.8	94.7	0.002 2	0.000 6	0.001 1	0.001 2	0.002 5	0.003 2
10	48.9	3.15	99.4	98.0	99.0	98.7	96.6	95.5	0.001 1	0.000 4	0.002 9	0.001 3	0.001 3	0.002 1
11	48.4	3.15	99.8	98.1	99.4	99.5	96.9	96.1	0.002 1	0.001 0	0.001 1	0.001 2	0.001 7	0.002 4
12	49.1	3.16	99.6	98.4	98.6	98.3	95.7	94.7	0.002 8	0.001 4	0.000 9	0.001 1	0.000 7	0.001 7
13	49.0	3.17	100.0	98.0	99.4	99.3	96.9	95.3	0.001 9	0.000 7	0.001 0	0.001 4	0.003 1	0.003 5
14	48.2	3.16	100.0	97.9	99.2	99.0	98.3	97.1	0.002 2	0.003 8	0.001 0	0.001 4	0.001 9	0.002 4
15	48.4	3.17	100.0	97.3	98.5	98.6	95.9	94.8	0.002 5	0.003 7	0.001 0	0.001 5	0.003 3	0.002 5
16	48.9	3.16	99.8	98.2	99.2	99.3	95.2	94.3	0.002 5	0.000 4	0.000 9	0.001 3	0.003 1	0.003 9
17	49.6	3.18	99.6	98.2	99.4	99.3	95.2	94.6	0.002 7	0.002 0	0.000 9	0.001 2	0.001 2	0.002 3
18	47.8	3.17	100.0	98.3	99.4	99.6	100.1	99.2	0.000 9	0.001 0	0.000 8	0.001 1	0.002 8	0.003 3
19	48.0	3.17	99.8	97.9	98.9	99.0	96.5	95.6	0.001 3	0.000 9	0.001 1	0.001 2	0.001 1	0.002 2
20	49.0	3.17	99.8	98.4	99.6	99.0	94.4	93.5	0.001 6	0.003 8	0.001 0	0.001 1	0.000 9	0.001 8
21	49.7	3.20	100.0	98.6	98.0	97.7	95.6	92.4	0.002 8	0.004 0	0.001 3	0.001 4	0.003 1	0.003 6
22	48.8	3.17	99.8	98.4	99.7	99.6	98.2	97.1	0.001 4	0.004 7	0.001 0	0.001 3	0.005 4	0.005 7
23	48.9	3.17	99.8	97.8	99.0	98.6	96.6	95.5	0.003 3	0.002 2	0.000 9	0.001 2	0.003 3	0.002 2
24	48.6	3.18	99.6	98.4	99.4	99.1	96.9	95.7	0.000 8	0.002 9	0.001 0	0.001 2	0.004 0	0.004 5
25	48.8	3.18	99.8	98.0	99.3	99.2	96.0	95.1	0.002 2	0.005 6	0.001 0	0.001 2	0.002 3	0.003 2
Avg.	48.9	3.16	99.7	98.1	99.2	99.0	96.6	95.4	0.001 8	0.002 3	0.001 1	0.001 2	0.002 5	0.002 9
Median	48.9	3.17	99.8	98.0	99.3	99.0	96.5	95.1	0.001 6	0.002 0	0.001 0	0.001 2	0.002 5	0.003 0
std.dev.	0.5061	0.0146	0.1833	0.2683	0.4554	0.4986	1.4029	1.4838	0.000 7	0.001 5	0.000 4	0.000 1	0.001 2	0.001 0
min.	47.8	3.13	99.4	97.3	98.0	97.7	94.4	92.4	0.000 8	0.000 4	0.000 8	0.001 0	0.000 7	0.001 7
max.	49.7	3.20	100.0	98.6	100.1	99.8	100.1	99.2	0.003 3	0.005 6	0.002 9	0.001 5	0.005 4	0.005 7

Additional required information by IES TM-21-11	
1. Sample Size	25
2. Number of failures	0
3. DUT drive current used in the test	120 mA
4. Test duration	6 000 hours
5. Test duration used for projection	0 to 6 000
6. Tested case temperature	100 ℃
7. α	7.677E-06
8. *B*	1.007
9. Calculated L_{70}(9k)	47 000
10. Reported L_{70}(9k)	〉 36 000

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TEST RESULT

5. Description of auxiliary equipment

5.1 Active cooling life test system
- Consist of board with water-cooled heat sinks to control Case temperature.
- Current source : HP DC power supply

5.2 LED Measurement system
- Spectrometer : Labsphere CDS-600
- Integrating sphere : Labsphere 20"
- Current source : Keithley current source

6. Photographs

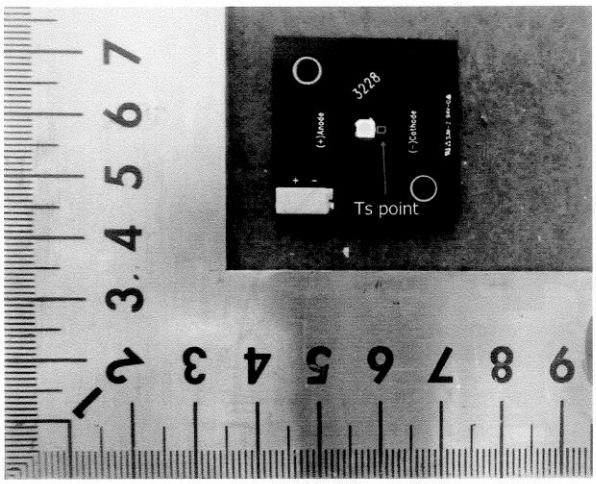


Fig. 1 Device Under Testing(DUT)

- END OF REPORT -

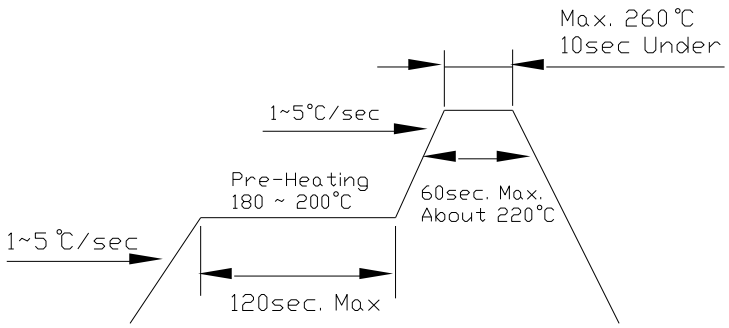
9. Precautions to taken

(1) Recommend soldering conditions

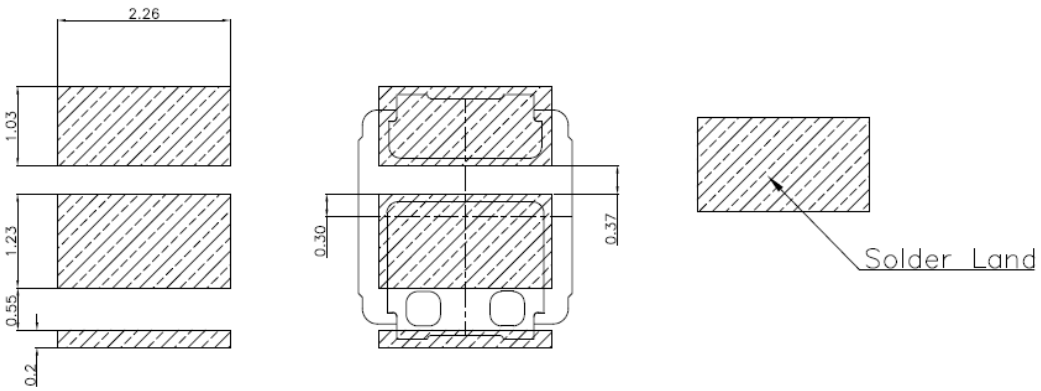
Reflow Soldering			Hand Soldering(Lead Part)	
	Lead Solder	Lead Free Solder		
Pre-heat Pre-heat time Peak temperature Soldering Time Condition	120~150℃ 120sec Max. 240℃ Max. 10sec	180~200℃ 120sec. Max. Max. 260℃ Max. 10sec	Temperature Soldering Time	Max. 340℃ Max. 3sec (only one time)

Temperature-profile

<Lead-free Solder>



<Recommended soldering pad design>



(2)Moisture Proof Package

When moisture is absorbed into the SMT package it may vaporize and expand during soldering. There is a possibility that this can cause exfoliation of the contacts and damage to the optical characteristics of the LEDs. For this reason, the moisture proof package is used to keep moisture to a minimum in the package. The moisture proof package is made of an aluminum moisture proof bag. A package of a moisture absorbent material(silica gel) is inserted into the aluminum moisture proof bag. The silica gel changes its color from blue to pink as it absorbs moisture.

(3)Storage

[Storage conditions]

Before opening the package

The LEDs should be kept at 30℃ or less and 90% RH or less. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material(silica gel) is recommended.

After opening the package

The LEDs should be kept at 30℃ or less and 70% RH or less. The LEDs should be soldered within 168 hours(7days) after opening the package. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with package of moisture absorbent material(silica gel). It is also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof bag again.

If the moisture absorbent material(silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.

Baking treatment : more than 24hours at 65±5℃

WOOREE E&L part's electrodes and leadframes are silver plated copper alloy.
The silver surface may be affected by environments which contain corrosive substances.
Please avoid conditions which may cause the LED to corrode, tarnish or discolor.
The corrosion or discoloration might lower solderability or might affect on optical Characteristics.

Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.

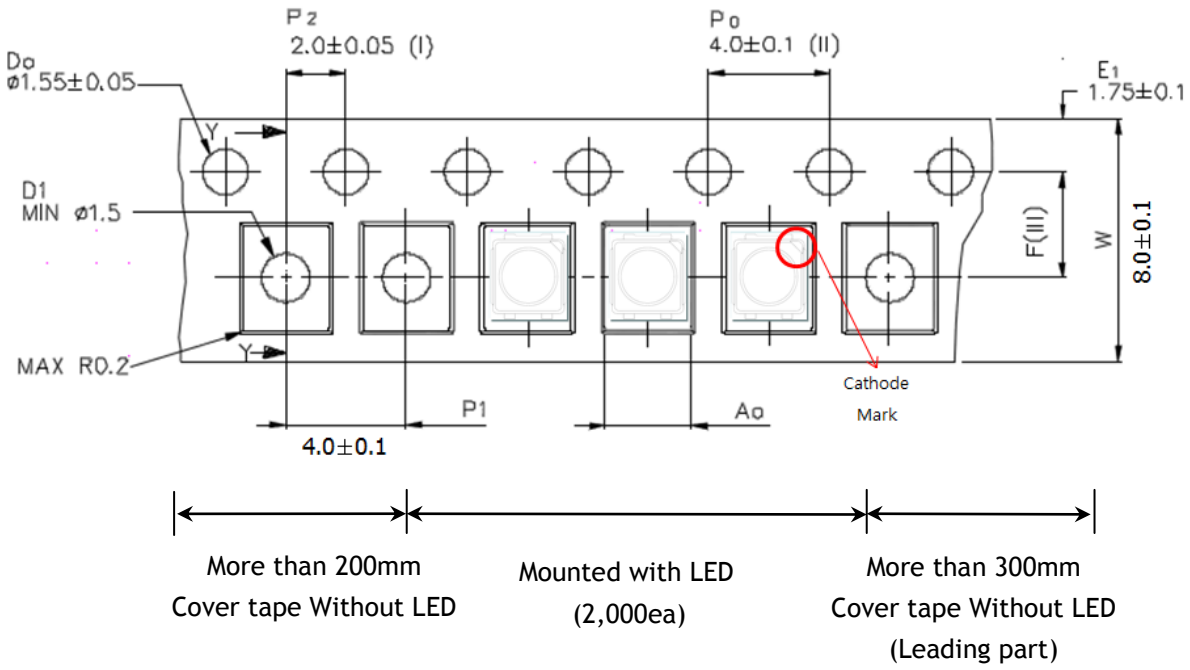
(4)Heat Generation

Thermal design of the end product is of paramount importance. Please consider the heat generation of the LED when making the system design. The coefficient of temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as other components. It is necessary to avoid intense heat generation and operate within the maximum ratings given in the specification.
The operating current should be decided after considering the ambient maximum temperature of LEDs.

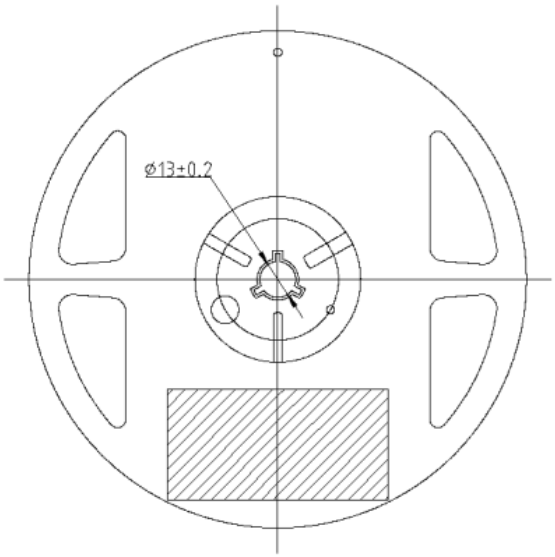
10. Packing

(1) Taping part

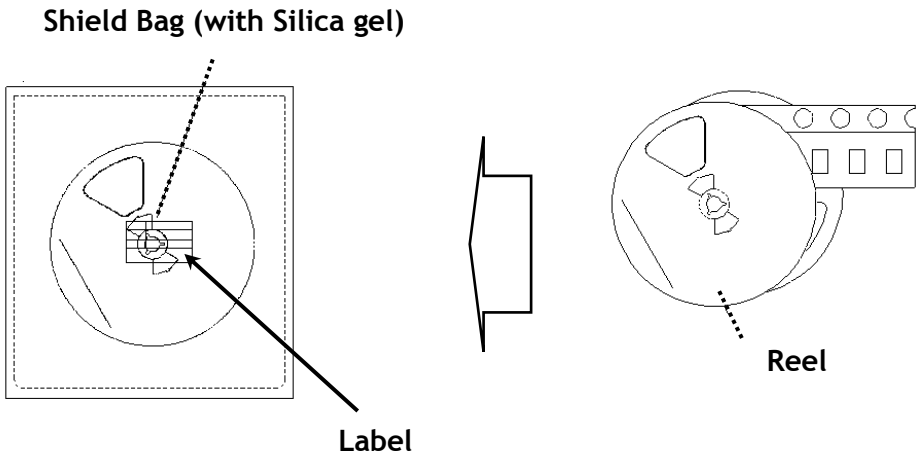
unit : mm



(2) Reel part (Q'ty : 2,000ea/Reel)



(3) Boxing

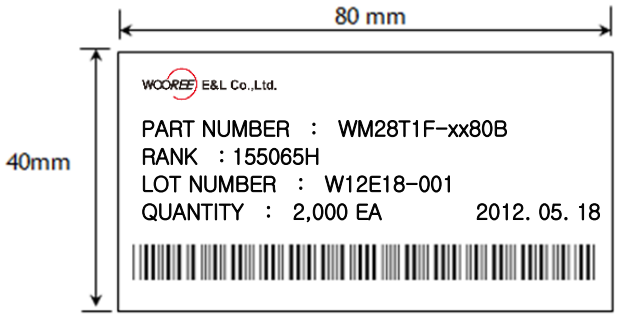


Out Box

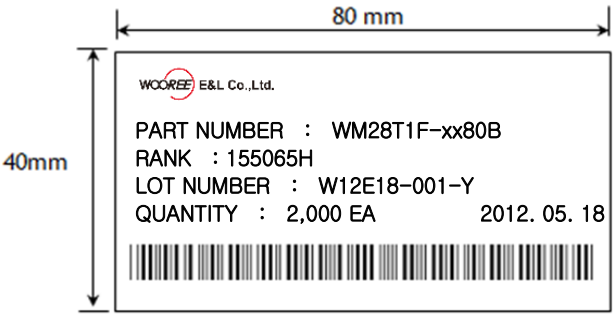
Dimension (mm)	Reel/Box	Quantity/Box
440*415*335	40 Reel max.	80,000 ea

(4) Label Information

<An-san Site>



<Yangzhou Site>

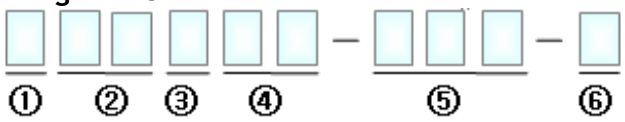


(5) Lot Number

<An-san Site>

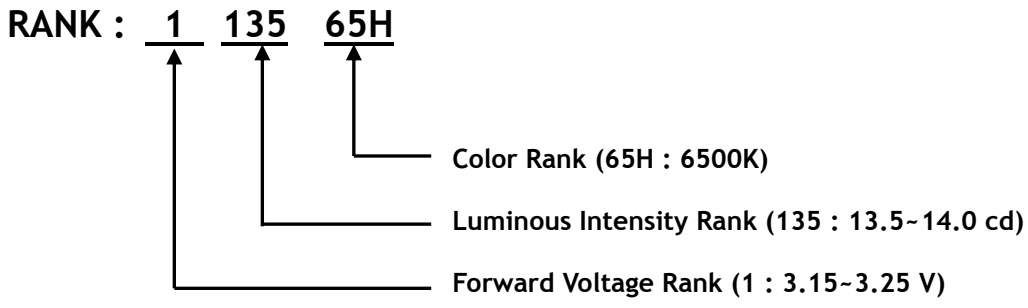
① **WOOREE** E&L Initial
② Year (11 for 2011, 12 for 2012)
③ Month (A for Jan., B for Feb., … , M for Dec.)
④ Day (01 for 1,….31 for 31)
⑤ WOOREE E&L Product Running Number

<Yangzhou Site>



① **WOOREE** E&L Initial
② Year (11 for 2011, 12 for 2012)
③ Month (A for Jan., B for Feb., … , M for Dec.)
④ Day (01 for 1,….31 for 31)
⑤ WOOREE E&L Product Running Number
⑥ WOOREE E&L Manufacturing Plant (Y for Yangzhou)

(6) Rank Code description



11. Revision History

Spec NO.			
Title	Specification for Approval		
Times	Date	Summary of revision	Remarks
1	2012. 06. 29	INITIAL ISSUE	R(0)
2	2013. 07. 09	CCT 7500K. addition	R(1)
3	2013. 07. 15	LM80 Report addition	R(2)
4	2013. 08. 09	Solder Land. Changed	R(3)