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LITEON®
OPTOELECTRONICS

LED Middle POWER

3030 Product Data Sheet

SZKXX Series Preliminary

Created Date: 03 / 31 / 2015
Revision: 0.0, 03 / 31 / 2015



Lite-on Technology Corp.
www.liteon.com

LED Middle POWER 3030SZK Series

1. Description

The LiteON 3030 Product series is a wide beam angle standard-dimension package, combining the lifetime and reliability advantages of Light Emitting Diodes with the brightness of conventional lighting. It gives you total design freedom and unmatched brightness, creating a new opportunities for solid state lighting to displace conventional lighting technologies.

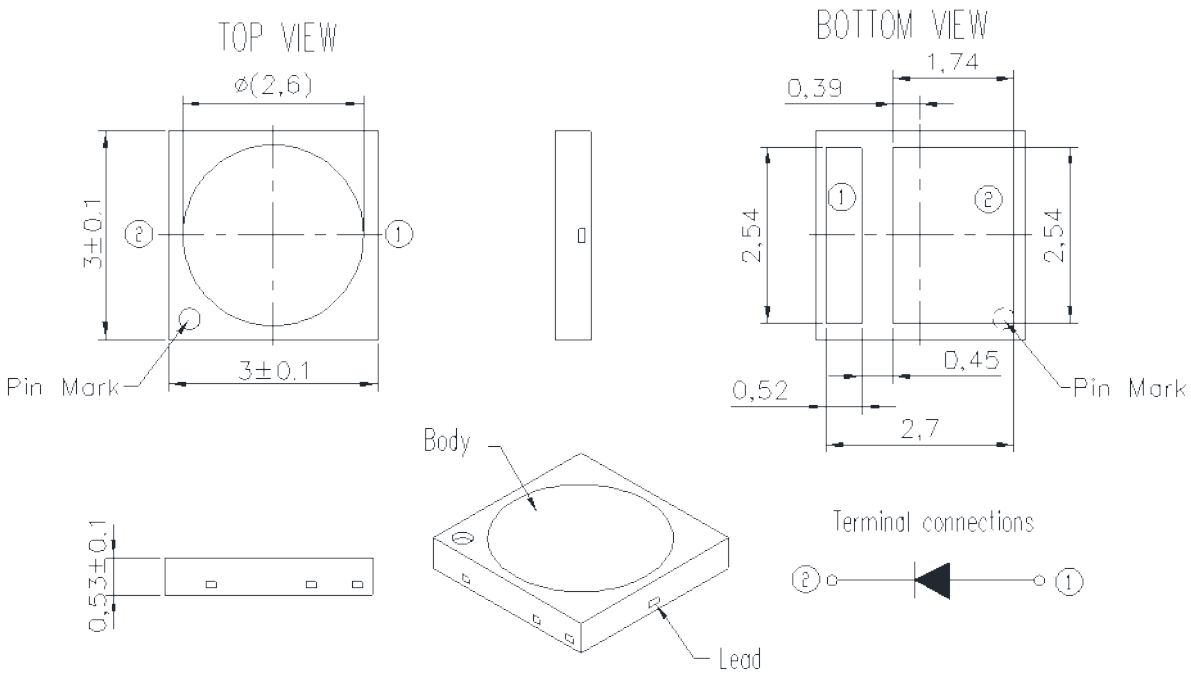
1.1 Features

- Package in 8mm tape on 7" diameter reels.
- Compatible with automatic placement equipment.
- Compatible with infrared and vapor phase reflow solder process.
- EIA STD package.
- I.C. compatible.
- Meet green product and Pb-free(According to RoHS)

1.2 Available Part Numbers

CCT	Part Number
6500K	LTW-3030SZK65
5700K	LTW-3030SZK57
5000K	LTW-3030SZK50
4000K	LTW-3030SZK40
3500K	LTW-3030SZK35
3000K	LTW-3030SZK30
2700K	LTW-3030SZK27

2. Outline Dimensions



Part No.	Lens Color	Source Color
LTW-3030SZK65	Orange	InGaN Blue
LTW-3030SZK57		
LTW-3030SZK50		
LTW-3030SZK40		
LTW-3030SZK35		
LTW-3030SZK30		
LTW-3030SZK27		

Notes:

1. All dimensions are in millimeters.
2. Tolerance is ±0.2 mm (.008") unless otherwise noted.

3. Absolute Maximum Ratings at T_a=25°C

Parameter	Symbol	Rating	Unit
Power Dissipation	P_o	700	mW
Continuous Forward Current	I_F	200	mA
Pulse Forward Current	I_{FP}	400	mA
Operating Temperature Range	T_{opr}	-40 ~ +85	°C
Pulse Forward Current Storage Temperature Range	T_{stg}	-40 ~ +100	°C
Junction Temperature	T_j	≦120	°C

Notes :

1. 1/10 duty cycle, Pulse width ≤10 μs.
2. Forbid to operating at reverse voltage condition for long.
3. It is recommended to follow de-rating curve to use maximum rating to ensure LED can operated normally.

4. Electro-Optical Characteristics

4.1 Typical Performance

Parameter	Symbol	Values								Unit	Test Condition
Correlated Color Temp.	CCT	Typ.	2700	3000	3500	4000	5000	5700	6500	K	
Chromaticity Coordinates	x	Typ.	0.458	0.434	0.408	0.382	0.345	0.329	0.312	-	I_F = 65mA
	y	Typ.	0.410	0.403	0.392	0.380	0.355	0.342	0.328		
Luminous Flux [1]	Φ_v	Min	25.2	26.1	27.0	27.0	27.0	27.0	27.0	lm	
		Typ.	27.5	29.0	30.8	30.8	30.8	31.4	30.2		
		Max.	33.0	33.8	34.7	34.7	34.7	34.7	34.7		
Optical Efficiency	η_{opt}	Typ.	149	158	161	161	161	163	158	lm/W	
Color Rendering Index	CRI	Min.	80							-	
Viewing Angle	$2\theta_{1/2}$	Typ.	120							deg	
Forward Voltage	V_F	Min	2.75							V	
		Typ.	2.95								
		Max.	3.10								
Thermal Resistance	R_{jt}	Typ.	15							°C/W	

Notes

1. Luminous flux is the total luminous flux output as measured with an integrating sphere.
2. Iv (flux Φ_v) classification code is marked on each packing bag.
3. The chromaticity coordinates (x, y) is derived from the 1931 CIE chromaticity diagram.
4. Caution in ESD:

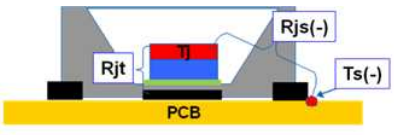
   Static Electricity and surge damages the LED. It is recommended using a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.
5. CAS140B is the test standard for the chromaticity coordinates (x, y) & Φ_v.
6. The chromaticity coordinates (x, y) guarantee should be added +/- 0.007 tolerances
7. CRI measurement allowance is ±5, R9 of all CCT is >0.
8. The thermal resistance is defined

   as the figure, R_{jt} is the R_{th} from T_j to thermal pad solder:

   Reference for thermal resistance:

   Using 2.5x 2.5x 0.17 cm aluminum MCPCB,

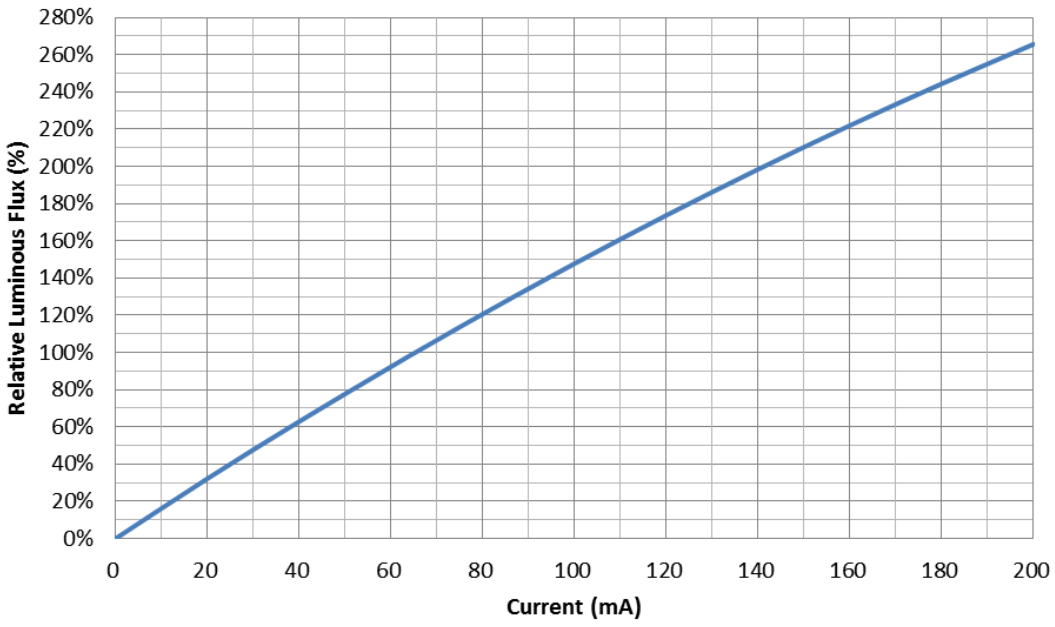
   R_{jt}=15°C/W, R_{js}=19 °C/W



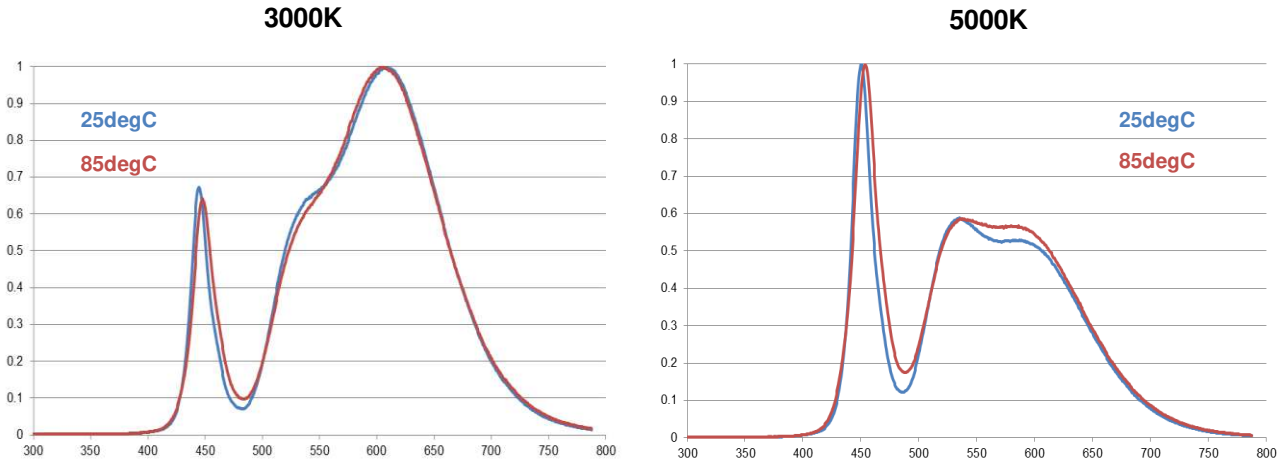
- Rjs = Rth of Tj to Ts
- Rjt = Rth of Tj to Thermal pad solder
- Rth definition in Datasheet = Rjt
- Rjt < Rjc
- Tj = Rjs*W+Ts

4.2 Forward Current vs. Lumen and Voltage

Current (mA)	VF (V)	Lumen (lm)						
		2700K	3000K	3500K	4000K	5000K	5700K	6500K
20	2.71	8.9	9.4	10.0	10.0	10.0	10.1	9.9
40	2.82	17.3	18.3	19.4	19.4	19.4	19.6	19.2
60	2.91	25.4	26.8	28.5	28.5	28.5	28.8	28.2
65	2.95	27.5	29.0	30.9	30.9	30.9	31.2	30.6
70	2.97	29.3	31.0	33.0	33.0	33.0	33.3	32.6
80	3.00	33.2	35.0	37.3	37.3	37.3	37.7	36.9
100	3.08	40.6	42.9	45.7	45.7	45.7	46.1	45.2
120	3.16	47.8	50.5	53.7	53.7	53.7	54.2	53.1
140	3.22	54.6	57.6	61.3	61.3	61.3	61.9	60.7
160	3.28	61.1	64.5	68.6	68.6	68.6	69.3	67.9
180	3.33	67.2	71.0	75.5	75.5	75.5	76.3	74.8
200	3.37	73.1	77.2	82.1	82.1	82.1	82.9	81.3



4.3 Relative Spectral Power Distribution at Typical Current



4.4 Radiation Characteristics

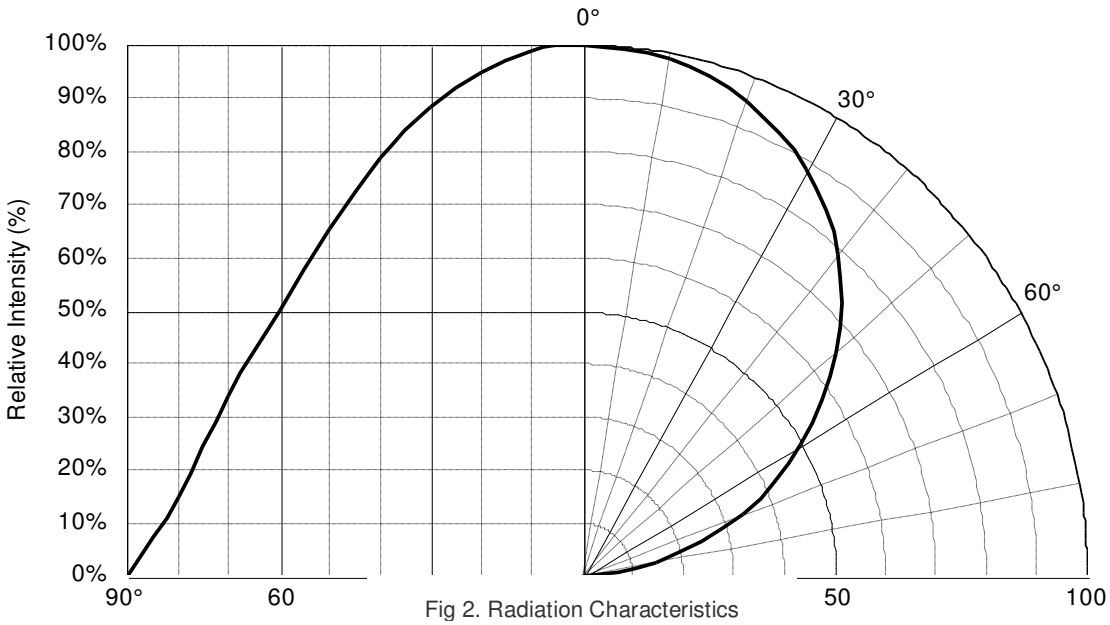
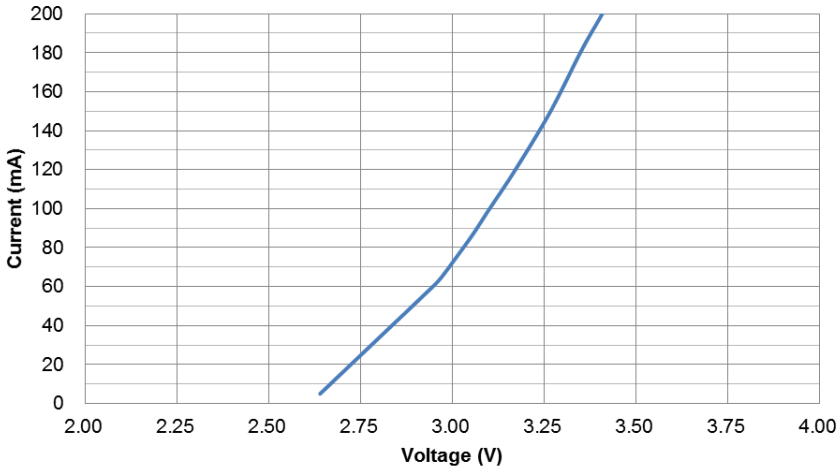
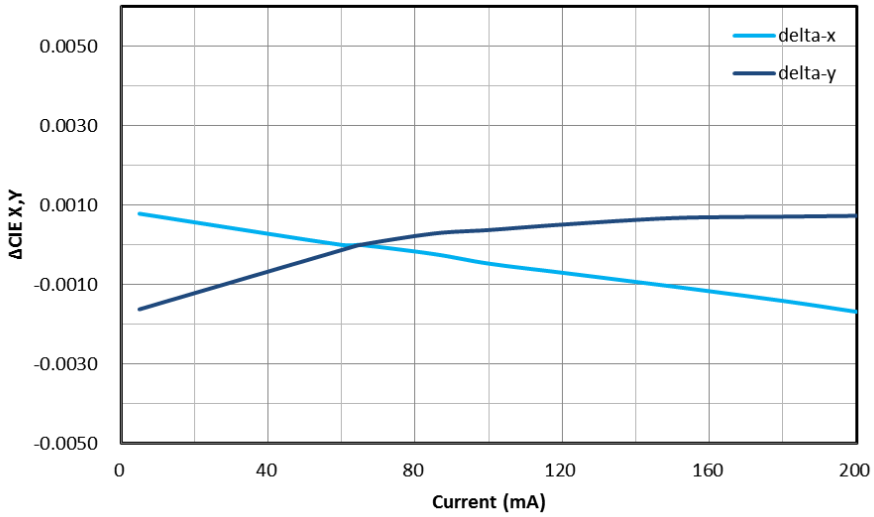


Fig 2. Radiation Characteristics

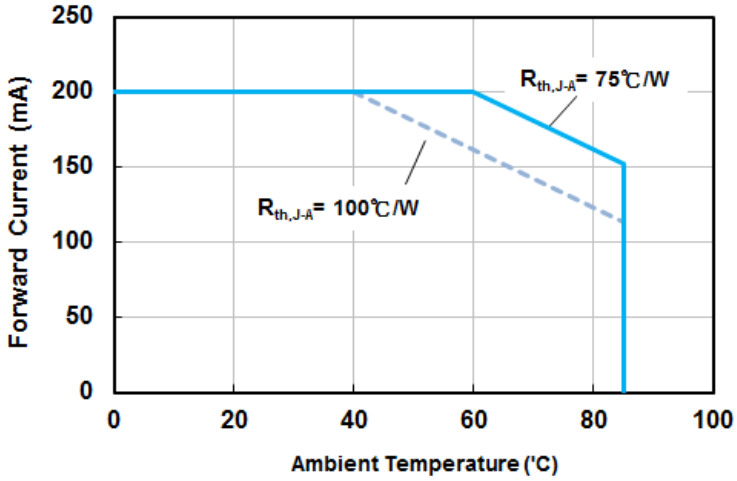
4.5 Forward Current vs. Forward Voltage



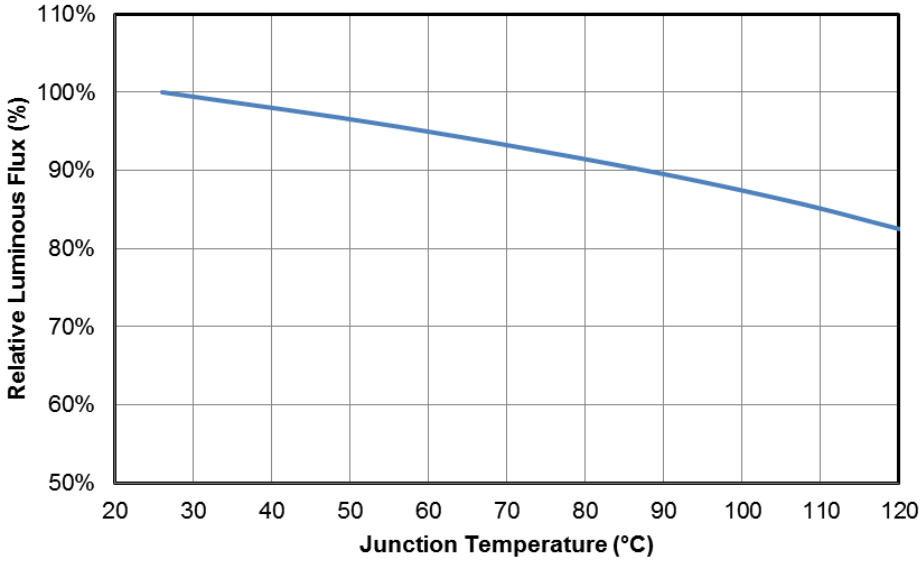
4.6 Color shift vs. Forward Voltage



4.7 Forward Current Derating Curve vs. Ambient Temperature

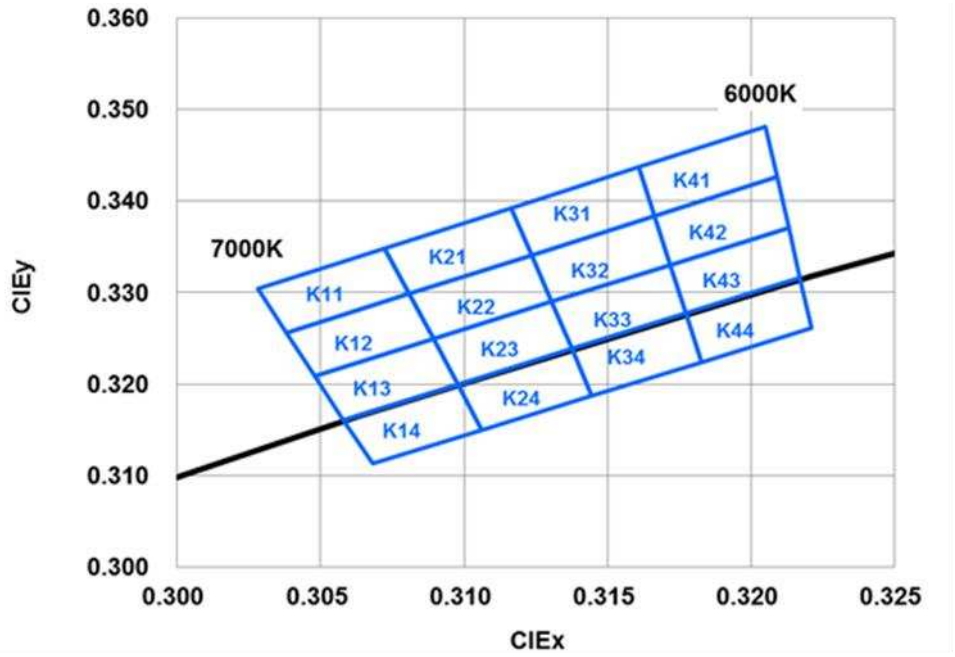


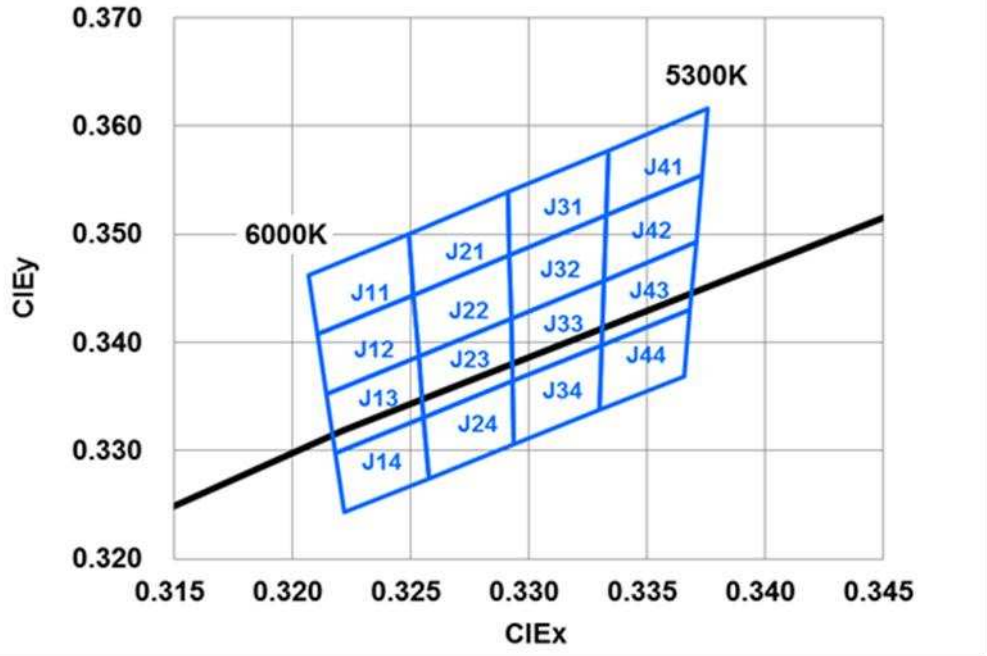
4.8 Relative Intensity vs. Junction Temperature

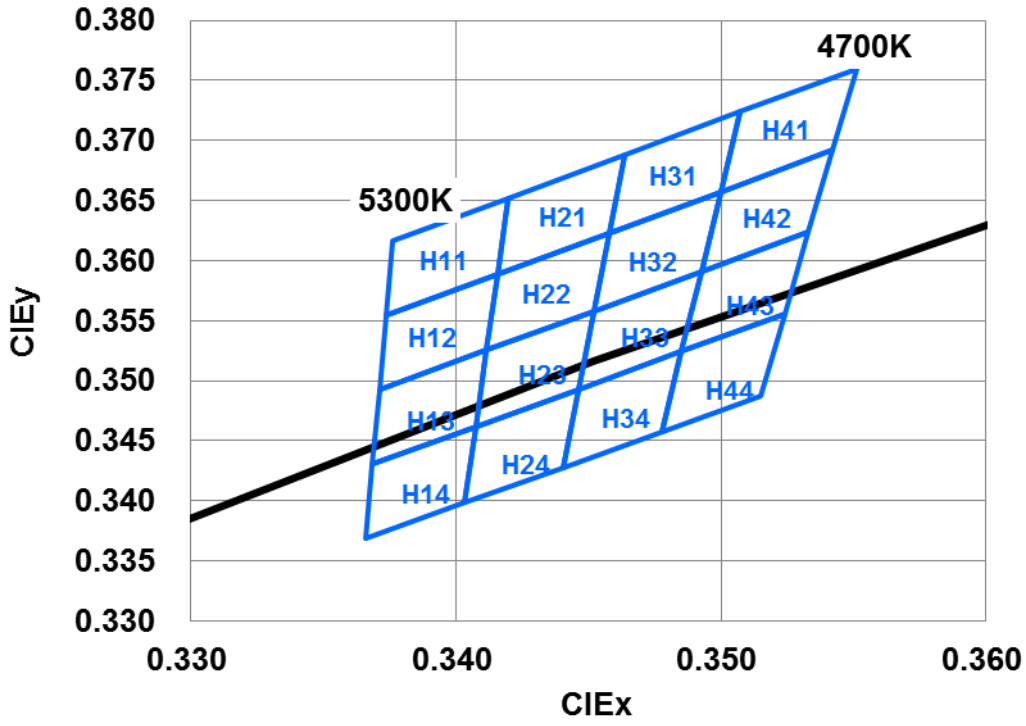


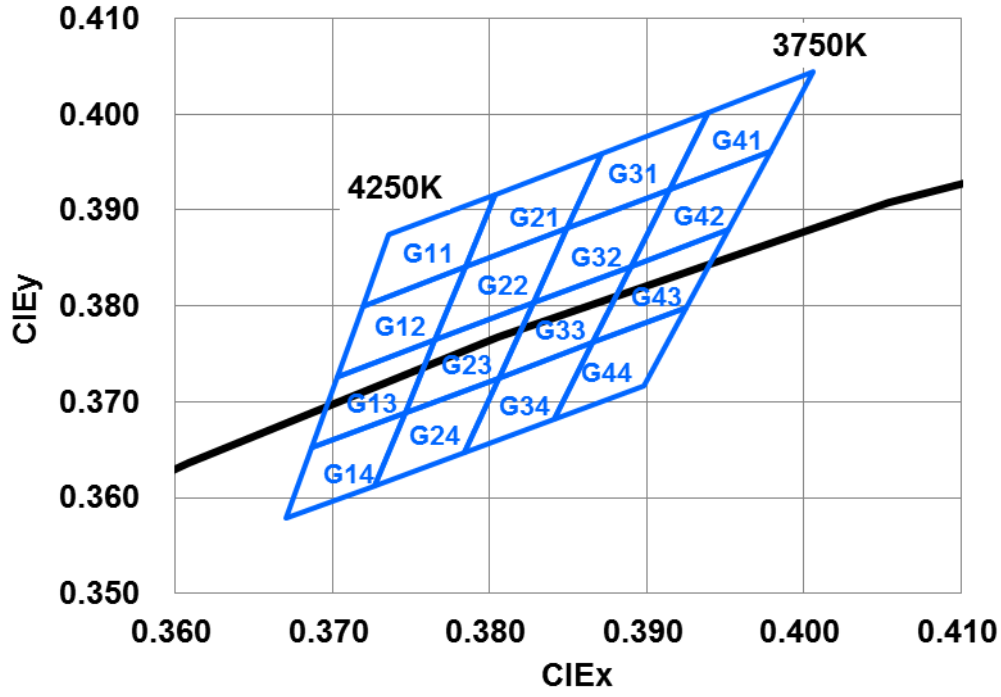
5. Binning Definition

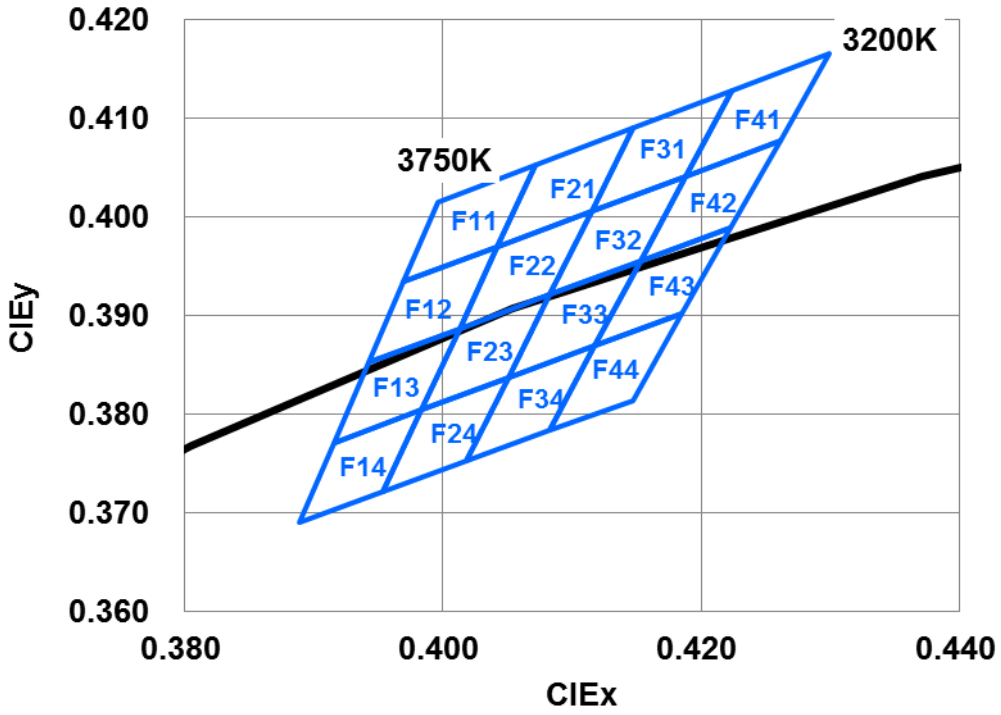
5.1 Color Bin

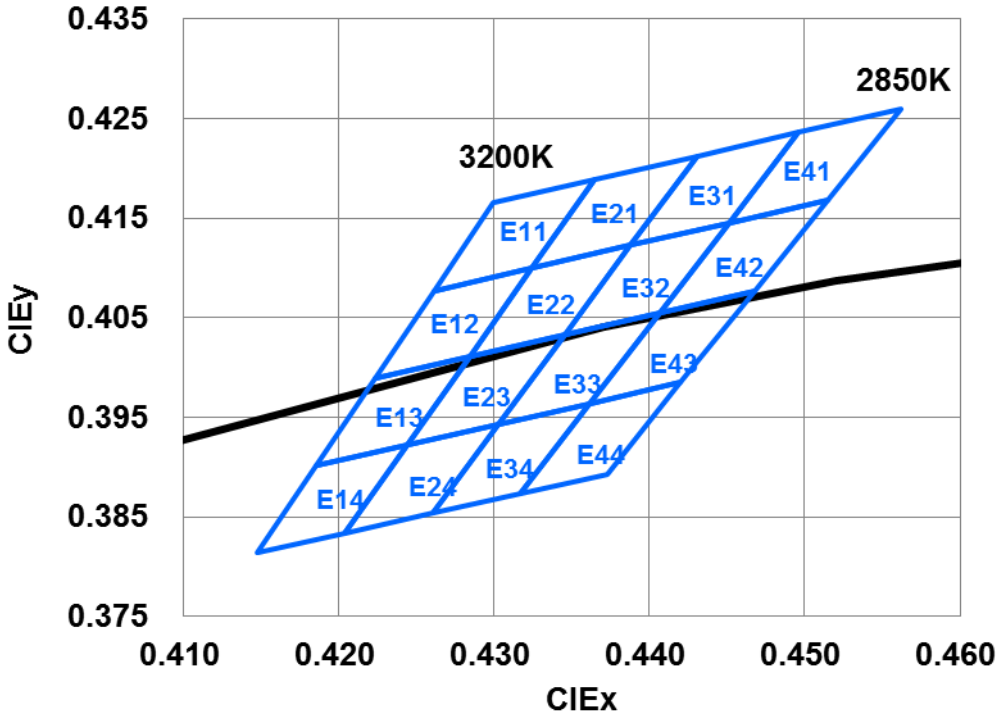


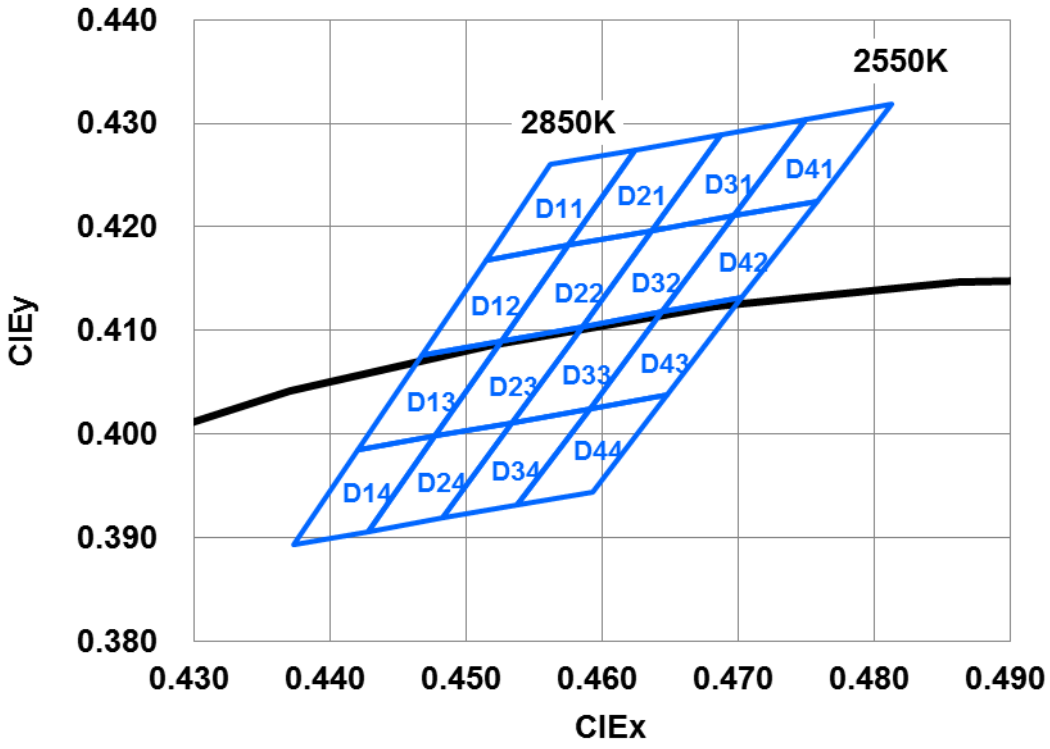



0.380
0.375
0.370
0.365
0.360
0.355
0.350
0.345
0.340
0.335
0.330
CIEy
0.330
0.340
0.350
0.360
CIEx
4700K
5300K
H11
H12
H13
H14
H21
H22
H23
H24
H31
H32
H33
H34
H41
H42
H43
H44


0.410
0.400
0.390
0.380
0.370
0.360
0.350
CIEy
0.360
0.370
0.380
0.390
0.400
0.410
CIEx
3750K
4250K
G11
G12
G13
G14
G21
G22
G23
G24
G31
G32
G33
G34
G41
G42
G43
G44


0.420
0.410
0.400
0.390
0.380
0.370
0.360
CIEy
0.380
0.400
0.420
0.440
CIEx
3200K
3750K
F11
F12
F13
F14
F21
F22
F23
F24
F31
F32
F33
F34
F41
F42
F43
F44


0.435
0.425
0.415
0.405
0.395
0.385
0.375
CIEy
0.410
0.420
0.430
0.440
0.450
0.460
CIEx
2850K
3200K
E11
E12
E13
E14
E21
E22
E23
E24
E31
E32
E33
E34
E41
E42
E43
E44


0.440
0.430
0.420
0.410
0.400
0.390
0.380
CIEy
0.430
0.440
0.450
0.460
0.470
0.480
0.490
CIEx
2550K
2850K
D11
D21
D31
D41
D12
D22
D32
D42
D13
D23
D33
D43
D14
D24
D34
D44

5.2 Color Rank

6500K (IF = 65 mA)															
Rank	-	x	y	Rank	-	x	y	Rank	-	x	y	Rank	-	x	y
K11	1	0.3028	0.3304	K21	1	0.3072	0.3348	K31	1	0.3117	0.3393	K41	1	0.3161	0.3437
	2	0.3038	0.3256		2	0.3081	0.3299		2	0.3124	0.3341		2	0.3166	0.3384
	3	0.3081	0.3299		3	0.3124	0.3341		3	0.3166	0.3384		3	0.3209	0.3426
	4	0.3072	0.3348		4	0.3117	0.3393		4	0.3161	0.3437		4	0.3205	0.3481
	1	0.3028	0.3304		1	0.3072	0.3348		1	0.3117	0.3393		1	0.3161	0.3437
K12	1	0.3038	0.3256	J32	1	0.3081	0.3299	K32	1	0.3124	0.3341	K42	1	0.3166	0.3384
	2	0.3048	0.3209		2	0.3089	0.3249		2	0.3131	0.3290		2	0.3172	0.3330
	3	0.3089	0.3249		3	0.3131	0.3290		3	0.3172	0.3330		3	0.3213	0.3371
	4	0.3081	0.3299		4	0.3124	0.3341		4	0.3166	0.3384		4	0.3209	0.3426
	1	0.3038	0.3256		1	0.3081	0.3299		1	0.3124	0.3341		1	0.3166	0.3384
K13	1	0.3048	0.3209	J33	1	0.3089	0.3249	K33	1	0.3131	0.3290	K43	1	0.3172	0.3330
	2	0.3058	0.3161		2	0.3098	0.3200		2	0.3138	0.3238		2	0.3177	0.3277
	3	0.3098	0.3200		3	0.3138	0.3238		3	0.3177	0.3277		3	0.3217	0.3316
	4	0.3089	0.3249		4	0.3131	0.3290		4	0.3172	0.3330		4	0.3213	0.3371
	1	0.3048	0.3209		1	0.3089	0.3249		1	0.3131	0.3290		1	0.3172	0.3330
K14	1	0.3058	0.3161	J34	1	0.3098	0.3200	K34	1	0.3138	0.3238	K44	1	0.3177	0.3277
	2	0.3068	0.3113		2	0.3106	0.3150		2	0.3145	0.3187		2	0.3183	0.3224
	3	0.3106	0.3150		3	0.3145	0.3187		3	0.3183	0.3224		3	0.3221	0.3261
	4	0.3098	0.3200		4	0.3138	0.3238		4	0.3177	0.3277		4	0.3217	0.3316
	1	0.3058	0.3161		1	0.3098	0.3200		1	0.3138	0.3238		1	0.3177	0.3277

Tolerance on each Hue bin (x,y) is +/- 0.01.

5700K (IF = 65 mA)															
Rank	-	x	y	Rank	-	x	y	Rank	-	x	y	Rank	-	x	y
J11	1	0.3207	0.3462	J21	1	0.3249	0.3501	J31	1	0.3292	0.3539	J41	1	0.3334	0.3578
	2	0.3211	0.3407		2	0.3251	0.3444		2	0.3292	0.3481		2	0.3333	0.3518
	3	0.3251	0.3444		3	0.3292	0.3481		3	0.3333	0.3518		3	0.3374	0.3554
	4	0.3249	0.3501		4	0.3292	0.3539		4	0.3334	0.3578		4	0.3376	0.3616
	1	0.3207	0.3462		1	0.3249	0.3501		1	0.3292	0.3539		1	0.3334	0.3578
J12	1	0.3211	0.3407	J32	1	0.3251	0.3444	J32	1	0.3292	0.3481	J42	1	0.3333	0.3518
	2	0.3215	0.3353		2	0.3254	0.3388		2	0.3293	0.3423		2	0.3332	0.3458
	3	0.3254	0.3388		3	0.3293	0.3423		3	0.3332	0.3458		3	0.3371	0.3493
	4	0.3251	0.3444		4	0.3292	0.3481		4	0.3333	0.3518		4	0.3374	0.3554
	1	0.3211	0.3407		1	0.3251	0.3444		1	0.3292	0.3481		1	0.3333	0.3518
J13	1	0.3215	0.3353	J33	1	0.3254	0.3388	J33	1	0.3293	0.3423	J43	1	0.3332	0.3458
	2	0.3218	0.3298		2	0.3256	0.3331		2	0.3293	0.3364		2	0.3331	0.3398
	3	0.3256	0.3331		3	0.3293	0.3364		3	0.3331	0.3398		3	0.3369	0.3431
	4	0.3254	0.3388		4	0.3293	0.3423		4	0.3332	0.3458		4	0.3371	0.3493
	1	0.3215	0.3353		1	0.3254	0.3388		1	0.3293	0.3423		1	0.3332	0.3458
J14	1	0.3218	0.3298	J34	1	0.3256	0.3331	J34	1	0.3293	0.3364	J44	1	0.3331	0.3398
	2	0.3222	0.3243		2	0.3258	0.3275		2	0.3294	0.3306		2	0.3330	0.3338
	3	0.3258	0.3275		3	0.3294	0.3306		3	0.3330	0.3338		3	0.3366	0.3369
	4	0.3256	0.3331		4	0.3293	0.3364		4	0.3331	0.3398		4	0.3369	0.3431
	1	0.3218	0.3298		1	0.3256	0.3331		1	0.3293	0.3364		1	0.3331	0.3398

Tolerance on each Hue bin (x,y) is +/- 0.01.

LED Middle POWER 3030SZK Series

5000K (IF = 65 mA)															
Rank	-	x	y	Rank	-	x	y	Rank	-	x	y	Rank	-	x	y
H11	1	0.3376	0.3616	H21	1	0.3420	0.3652	H31	1	0.3464	0.3688	H41	1	0.3507	0.3724
	2	0.3374	0.3554		2	0.3416	0.3589		2	0.3458	0.3623		2	0.3500	0.3657
	3	0.3416	0.3589		3	0.3458	0.3623		3	0.3500	0.3657		3	0.3542	0.3692
	4	0.3420	0.3652		4	0.3464	0.3688		4	0.3507	0.3724		4	0.3551	0.3760
	1	0.3376	0.3616		1	0.3420	0.3652		1	0.3464	0.3688		1	0.3507	0.3724
H12	1	0.3374	0.3554	J32	1	0.3416	0.3589	H32	1	0.3458	0.3623	H42	1	0.3500	0.3657
	2	0.3371	0.3493		2	0.3412	0.3525		2	0.3452	0.3558		2	0.3493	0.3591
	3	0.3412	0.3525		3	0.3452	0.3558		3	0.3493	0.3591		3	0.3533	0.3624
	4	0.3416	0.3589		4	0.3458	0.3623		4	0.3500	0.3657		4	0.3542	0.3692
	1	0.3374	0.3554		1	0.3416	0.3589		1	0.3458	0.3623		1	0.3500	0.3657
H13	1	0.3371	0.3493	J33	1	0.3412	0.3525	H33	1	0.3452	0.3558	H43	1	0.3493	0.3591
	2	0.3369	0.3431		2	0.3407	0.3462		2	0.3446	0.3493		2	0.3485	0.3524
	3	0.3407	0.3462		3	0.3446	0.3493		3	0.3485	0.3524		3	0.3524	0.3555
	4	0.3412	0.3525		4	0.3452	0.3558		4	0.3493	0.3591		4	0.3533	0.3624
	1	0.3371	0.3493		1	0.3412	0.3525		1	0.3452	0.3558		1	0.3493	0.3591
H14	1	0.3369	0.3431	J34	1	0.3407	0.3462	H34	1	0.3446	0.3493	H44	1	0.3485	0.3524
	2	0.3366	0.3369		2	0.3403	0.3399		2	0.3441	0.3428		2	0.3478	0.3458
	3	0.3403	0.3399		3	0.3441	0.3428		3	0.3478	0.3458		3	0.3515	0.3487
	4	0.3407	0.3462		4	0.3446	0.3493		4	0.3485	0.3524		4	0.3524	0.3555
	1	0.3369	0.3431		1	0.3407	0.3462		1	0.3446	0.3493		1	0.3485	0.3524

Tolerance on each Hue bin (x,y) is +/- 0.01.

4000K (IF = 65 mA)															
Rank	-	x	y	Rank	-	x	y	Rank	-	x	y	Rank	-	x	y
G11	1	0.3736	0.3874	G21	1	0.3804	0.3917	G31	1	0.3871	0.3959	G41	1	0.3939	0.4002
	2	0.3720	0.3800		2	0.3784	0.3841		2	0.3849	0.3881		2	0.3914	0.3922
	3	0.3784	0.3841		3	0.3849	0.3881		3	0.3914	0.3922		3	0.3979	0.3962
	4	0.3804	0.3917		4	0.3871	0.3959		4	0.3939	0.4002		4	0.4006	0.4044
	1	0.3736	0.3874		1	0.3804	0.3917		1	0.3871	0.3959		1	0.3939	0.4002
G12	1	0.3720	0.3800	J32	1	0.3784	0.3841	G32	1	0.3849	0.3881	G42	1	0.3914	0.3922
	2	0.3703	0.3726		2	0.3765	0.3765		2	0.3828	0.3803		2	0.3890	0.3842
	3	0.3765	0.3765		3	0.3828	0.3803		3	0.3890	0.3842		3	0.3952	0.3880
	4	0.3784	0.3841		4	0.3849	0.3881		4	0.3914	0.3922		4	0.3979	0.3962
	1	0.3720	0.3800		1	0.3784	0.3841		1	0.3849	0.3881		1	0.3914	0.3922
G13	1	0.3703	0.3726	J33	1	0.3765	0.3765	G33	1	0.3828	0.3803	G43	1	0.3890	0.3842
	2	0.3687	0.3652		2	0.3746	0.3689		2	0.3806	0.3725		2	0.3865	0.3762
	3	0.3746	0.3689		3	0.3806	0.3725		3	0.3865	0.3762		3	0.3925	0.3798
	4	0.3765	0.3765		4	0.3828	0.3803		4	0.3890	0.3842		4	0.3952	0.3880
	1	0.3703	0.3726		1	0.3765	0.3765		1	0.3828	0.3803		1	0.3890	0.3842
G14	1	0.3687	0.3652	J34	1	0.3746	0.3689	G34	1	0.3806	0.3725	G44	1	0.3865	0.3762
	2	0.3670	0.3578		2	0.3727	0.3613		2	0.3784	0.3647		2	0.3841	0.3682
	3	0.3727	0.3613		3	0.3784	0.3647		3	0.3841	0.3682		3	0.3898	0.3716
	4	0.3746	0.3689		4	0.3806	0.3725		4	0.3865	0.3762		4	0.3925	0.3798
	1	0.3687	0.3652		1	0.3746	0.3689		1	0.3806	0.3725		1	0.3865	0.3762

Tolerance on each Hue bin (x,y) is +/- 0.01.

LED Middle POWER 3030SZK Series

3500K (IF = 65 mA)															
Rank	-	x	y	Rank	-	x	y	Rank	-	x	y	Rank	-	x	y
F11	1	0.3996	0.4015	F21	1	0.4072	0.4053	F31	1	0.4148	0.4090	F41	1	0.4223	0.4128
	2	0.3969	0.3934		2	0.4042	0.3970		2	0.4115	0.4006		2	0.4188	0.4041
	3	0.4042	0.3970		3	0.4115	0.4006		3	0.4188	0.4041		3	0.4261	0.4077
	4	0.4072	0.4053		4	0.4148	0.4090		4	0.4223	0.4128		4	0.4299	0.4165
	1	0.3996	0.4015		1	0.4072	0.4053		1	0.4148	0.4090		1	0.4223	0.4128
F12	1	0.3969	0.3934	J32	1	0.4042	0.3970	F32	1	0.4115	0.4006	F42	1	0.4188	0.4041
	2	0.3943	0.3853		2	0.4013	0.3887		2	0.4083	0.3921		2	0.4153	0.3955
	3	0.4013	0.3887		3	0.4083	0.3921		3	0.4153	0.3955		3	0.4223	0.3990
	4	0.4042	0.3970		4	0.4115	0.4006		4	0.4188	0.4041		4	0.4261	0.4077
	1	0.3969	0.3934		1	0.4042	0.3970		1	0.4115	0.4006		1	0.4188	0.4041
F13	1	0.3943	0.3853	J33	1	0.4013	0.3887	F33	1	0.4083	0.3921	F43	1	0.4153	0.3955
	2	0.3916	0.3771		2	0.3983	0.3804		2	0.4050	0.3837		2	0.4118	0.3869
	3	0.3983	0.3804		3	0.4050	0.3837		3	0.4118	0.3869		3	0.4185	0.3902
	4	0.4013	0.3887		4	0.4083	0.3921		4	0.4153	0.3955		4	0.4223	0.3990
	1	0.3943	0.3853		1	0.4013	0.3887		1	0.4083	0.3921		1	0.4153	0.3955
F14	1	0.3916	0.3771	J34	1	0.3983	0.3804	F34	1	0.4050	0.3837	F44	1	0.4118	0.3869
	2	0.3889	0.3690		2	0.3954	0.3721		2	0.4018	0.3752		2	0.4083	0.3783
	3	0.3954	0.3721		3	0.4018	0.3752		3	0.4083	0.3783		3	0.4147	0.3814
	4	0.3983	0.3804		4	0.4050	0.3837		4	0.4118	0.3869		4	0.4185	0.3902
	1	0.3916	0.3771		1	0.3983	0.3804		1	0.4050	0.3837		1	0.4118	0.3869

Tolerance on each Hue bin (x,y) is +/- 0.01.

3000K (IF = 65 mA)															
Rank	-	x	y	Rank	-	x	y	Rank	-	x	y	Rank	-	x	y
E11	1	0.4299	0.4165	E21	1	0.4365	0.4189	E31	1	0.4431	0.4213	E41	1	0.4496	0.4236
	2	0.4261	0.4077		2	0.4324	0.4100		2	0.4388	0.4123		2	0.4451	0.4146
	3	0.4324	0.4100		3	0.4388	0.4123		3	0.4451	0.4146		3	0.4515	0.4168
	4	0.4365	0.4189		4	0.4431	0.4213		4	0.4496	0.4236		4	0.4562	0.4260
	1	0.4299	0.4165		1	0.4365	0.4189		1	0.4431	0.4213		1	0.4496	0.4236
E12	1	0.4261	0.4077	J32	1	0.4324	0.4100	E32	1	0.4388	0.4123	E42	1	0.4451	0.4146
	2	0.4223	0.3990		2	0.4284	0.4011		2	0.4345	0.4033		2	0.4406	0.4055
	3	0.4284	0.4011		3	0.4345	0.4033		3	0.4406	0.4055		3	0.4468	0.4077
	4	0.4324	0.4100		4	0.4388	0.4123		4	0.4451	0.4146		4	0.4515	0.4168
	1	0.4261	0.4077		1	0.4324	0.4100		1	0.4388	0.4123		1	0.4451	0.4146
E13	1	0.4223	0.3990	J33	1	0.4284	0.4011	E33	1	0.4345	0.4033	E43	1	0.4406	0.4055
	2	0.4185	0.3902		2	0.4244	0.3923		2	0.4303	0.3943		2	0.4361	0.3964
	3	0.4244	0.3923		3	0.4303	0.3943		3	0.4361	0.3964		3	0.4420	0.3985
	4	0.4284	0.4011		4	0.4345	0.4033		4	0.4406	0.4055		4	0.4468	0.4077
	1	0.4223	0.3990		1	0.4284	0.4011		1	0.4345	0.4033		1	0.4406	0.4055
E14	1	0.4185	0.3902	J34	1	0.4244	0.3923	E34	1	0.4303	0.3943	E44	1	0.4361	0.3964
	2	0.4147	0.3814		2	0.4204	0.3834		2	0.4260	0.3854		2	0.4317	0.3873
	3	0.4204	0.3834		3	0.4260	0.3854		3	0.4317	0.3873		3	0.4373	0.3893
	4	0.4244	0.3923		4	0.4303	0.3943		4	0.4361	0.3964		4	0.4420	0.3985
	1	0.4185	0.3902		1	0.4244	0.3923		1	0.4303	0.3943		1	0.4361	0.3964

Tolerance on each Hue bin (x,y) is +/- 0.01.

2700K (IF = 65 mA)															
Rank	-	x	y	Rank	-	x	y	Rank	-	x	y	Rank	-	x	y
D11	1	0.4562	0.4260	D21	1	0.4625	0.4275	D31	1	0.4688	0.4290	D41	1	0.4750	0.4304
	2	0.4515	0.4168		2	0.4576	0.4183		2	0.4636	0.4197		2	0.4697	0.4211
	3	0.4576	0.4183		3	0.4636	0.4197		3	0.4697	0.4211		3	0.4758	0.4225
	4	0.4625	0.4275		4	0.4688	0.4290		4	0.4750	0.4304		4	0.4813	0.4319
	1	0.4562	0.4260		1	0.4625	0.4275		1	0.4688	0.4290		1	0.4750	0.4304
D12	1	0.4515	0.4168	J32	1	0.4576	0.4183	D32	1	0.4636	0.4197	D42	1	0.4697	0.4211
	2	0.4468	0.4077		2	0.4526	0.4090		2	0.4585	0.4104		2	0.4644	0.4118
	3	0.4526	0.4090		3	0.4585	0.4104		3	0.4644	0.4118		3	0.4703	0.4132
	4	0.4576	0.4183		4	0.4636	0.4197		4	0.4697	0.4211		4	0.4758	0.4225
	1	0.4515	0.4168		1	0.4576	0.4183		1	0.4636	0.4197		1	0.4697	0.4211
D13	1	0.4468	0.4077	J33	1	0.4526	0.4090	D33	1	0.4585	0.4104	D43	1	0.4644	0.4118
	2	0.4420	0.3985		2	0.4477	0.3998		2	0.4534	0.4011		2	0.4591	0.4025
	3	0.4477	0.3998		3	0.4534	0.4011		3	0.4591	0.4025		3	0.4648	0.4038
	4	0.4526	0.4090		4	0.4585	0.4104		4	0.4644	0.4118		4	0.4703	0.4132
	1	0.4468	0.4077		1	0.4526	0.4090		1	0.4585	0.4104		1	0.4644	0.4118
D14	1	0.4420	0.3985	J34	1	0.4477	0.3998	D34	1	0.4534	0.4011	D44	1	0.4591	0.4025
	2	0.4373	0.3893		2	0.4428	0.3906		2	0.4483	0.3919		2	0.4538	0.3931
	3	0.4428	0.3906		3	0.4483	0.3919		3	0.4538	0.3931		3	0.4593	0.3944
	4	0.4477	0.3998		4	0.4534	0.4011		4	0.4591	0.4025		4	0.4648	0.4038
	1	0.4420	0.3985		1	0.4477	0.3998		1	0.4534	0.4011		1	0.4591	0.4025

Tolerance on each Hue bin (x,y) is +/- 0.01.

5.3 Flux Bin

2700K	Φ_v Luminous Flux Spec. Table	
Φ_v Bin	Lumen (lm) at I_F = 65 mA	
	Min	Max
FH	25.2	26.8
HL	26.8	30.5
LO	30.5	33.0

4000K	Φ_v Luminous Flux Spec. Table	
Φ_v Bin	Lumen (lm) at I_F = 65 mA	
	Min	Max
HK	27.0	29.7
KN	29.7	32.2
NQ	32.2	34.7

3000K	Φ_v Luminous Flux Spec. Table	
Φ_v Bin	Lumen (lm) at I_F = 65 mA	
	Min	Max
GJ	26.1	28.8
JM	28.8	31.3
MP	31.3	33.8

5000K	Φ_v Luminous Flux Spec. Table	
Φ_v Bin	Lumen (lm) at I_F = 65 mA	
	Min	Max
HK	27.0	29.7
KN	29.7	32.2
NQ	32.2	34.7

3500K	Φ_v Luminous Flux Spec. Table	
Φ_v Bin	Lumen (lm) at I_F = 65 mA	
	Min	Max
HK	27.0	29.7
KN	29.7	32.2
NQ	32.2	34.7

5700K	Φ_v Luminous Flux Spec. Table	
Φ_v Bin	Lumen (lm) at I_F = 65 mA	
	Min	Max
HK	27.0	29.7
KN	29.7	32.2
NQ	32.2	34.7

6500K	Φ_v Luminous Flux Spec. Table	
Φ_v Bin	Lumen (lm) at I_F = 65 mA	
	Min	Max
HK	27.0	29.7
KN	29.7	32.2
NQ	32.2	34.7

Tolerance on each Luminous Flux bin is +/- 7%.

5.4 Voltage Bin

V_F Bin	Forward Voltage (volts) at I_F = 65mA	
	Min	Max
V1	2.75	2.90
V2	2.90	3.00
V3	3.00	3.10

Tolerance on each Forward Voltage bin is +/- 0.1V

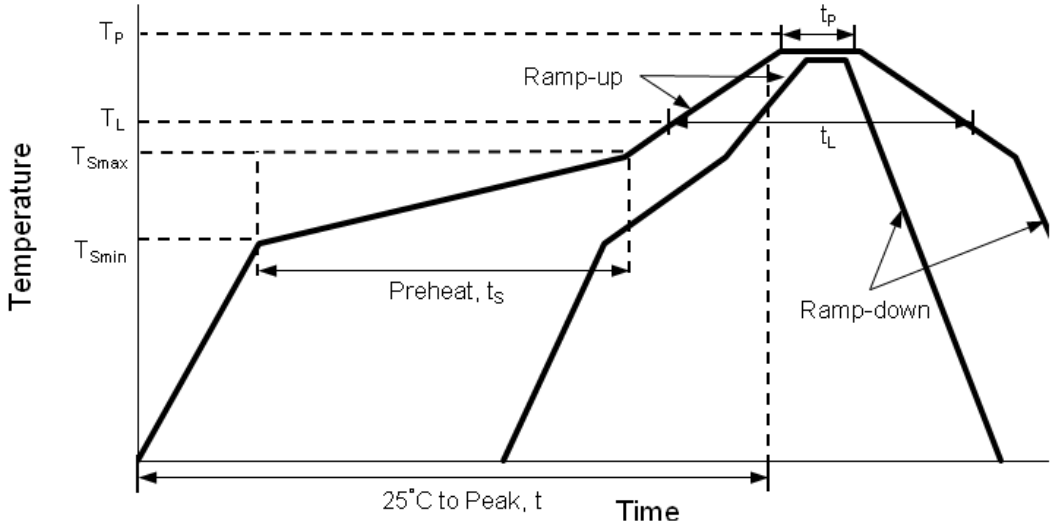
6. Bin Code List

※ Notes: Full Rank on Label

Example: V1 / HK / G5

Forward Voltage Rank	Luminous Flux Rank	Color Rank
V1	**HK**	**G5**

7. Reflow Soldering Characteristics



Profile Feature	Lead Free Assembly
Average Ramp-Up Rate (T_{Smax} to T_P)	3°C / second max
Preheat Temperature Min (T_{Smin})	150°C
Preheat Temperature Max (T_{Smax})	200°C
Preheat Time (t_{Smin} to t_{Smax})	60 – 180 seconds
Time Maintained Above Temperature (T_L)	217°C
Time Maintained Above Time (t_L)	60 – 150 seconds
Peak / Classification Temperature (T_P)	260°C
Time Within 5°C of Actual Peak Temperature (t_P)	5 seconds
Ramp – Down Rate	6°C / second max
Time 25°C to Peak Temperature	8 minutes max

Notes:

1. The LEDs can be soldered using the reflow soldering or hand soldering method. The recommended hand soldering condition is 350 °C max. and 2 secs max. for one time only, and the recommended reflow soldering condition is 260 °C max. and 5 secs max. for three times max.
2. All temperatures refer to topside of the package, measured on the package body surface.

3. The soldering condition referring to J-STD-020. The storage ambient for the LEDs should not exceed 30 °C temperature or 70% relative humidity. It is recommended that LEDs out of their original packaging are soldered within one week. For extended storage out of their original packaging, it is recommended that the LEDs were stored in a sealed container with appropriate desiccant, or desiccators with nitrogen ambient. If the LEDs were unpacked more than 168hrs, baking the LEDs at 60°C for 24hrs before soldering process.
4. The soldering profile could be further referred to different soldering grease material characteristic. The grease vendor will provide this information.
5. A rapid-rate process is not recommended for the LEDs cooling down from the peak temperature.
6. Although the recommended reflow conditions are specified above, the reflow or hand soldering condition at the lowest possible temperature is desirable for the LEDs.
7. LiteOn cannot make a guarantee on the LEDs which have been already assembled using the dip soldering method.

8. Reliability Test

No	Test item	Test Condition	Duration	Number of Damaged
1	Steady State Operating Life of High Temperature (HTOL)	Ts=55℃, I_F=120mA	1000 hrs	0/20
2	Steady State Operating Life of High Temperature (HTOL)	Ts=85℃, I_F=120mA	1000 hrs	0/20
3	Steady State Operating Life of Low Temperature (LTOL)	Ta=-40℃, I_F=120mA	1000 hrs	0/20
4	Pulse Wet Operating Life of High Temperature (PWHTOL)	60℃/90%RH, I_F=120mA 30mins ON/30min OFF	500 hrs	0/20
5	High Temperature Storage (HTS)	100℃	1000 hrs	0/20
6	Low Temperature Storage (LTS)	-40℃	1000 hrs	0/20
7	Thermal Cycle (TC)	-40℃~100℃ 30min dwell 5min transfer	200 cycles	0/20
8	Thermal Shock (TS)	-40℃~100℃ 20min dwell 20sec transfer	200 cycles	0/20
9	Solder Resistance (SR)	265℃, 3X MSL	5sec	0/20
10	Solder Ability (SA)	245℃5sec, 95% coverage	5sec	0/11
11	Mechanical Shock (MS)	1500G 0.5msec pulse shock	each 6 axis	0/6
12	Random Vibration (RV)	6G RMS, 10-2000Hz, 10min	per axis	0/6
13	Variable Vibration Frequency (VVF)	10-2000-10Hz, log or linear sweep rate, 20G for 1 min, 1.5mm each apply 3x per axis	over 6hrs	0/6
14	Salt Spread (SS)	35℃, 30g/m^2/day	48hrs	0/11
15	Pulse Operating Life of High Temperature	Ta=85℃, I_F=400mA, duty cycle=1/10, pulse width <10 μs	1000hrs	0/20

- Criteria for Judging the Damage

Item	Symbol	Test Condition	Criteria for Judgment	
			Min.	Max.
Forward Voltage	V_F	I_F=Typical Current		U.S.L. x 1.1
Luminous Flux	Im	I_F=Typical Current	L.S.L. x 0.7	
CCX&CCY	x,y	I_F=Typical Current		Shift<0.02

9. User Guide

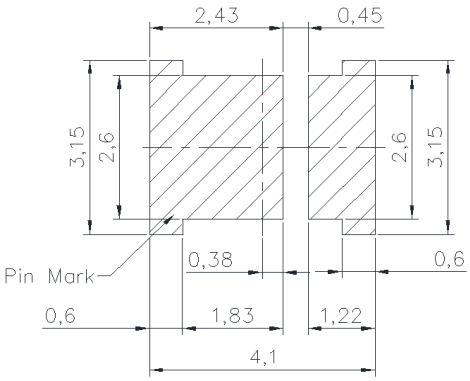
■ Cleaning

Do not use unspecified chemical liquid to clean LED they could harm the package. If cleaning is necessary, immerse the LED in ethyl alcohol or isopropyl alcohol at normal temperature for less than one minute.

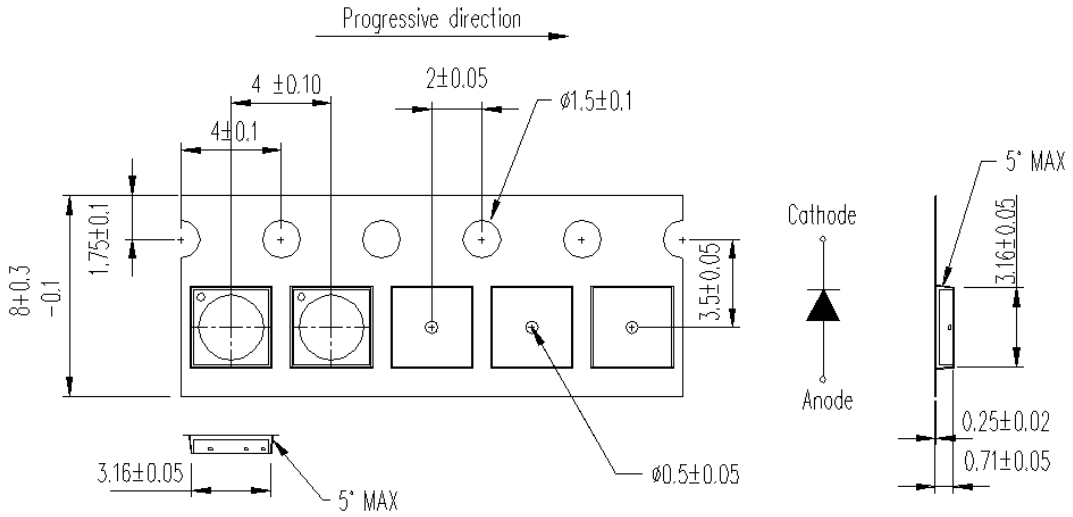
■ Recommend Printed Circuit Board Attachment Pad

Infrared / vapor phase

Reflow Soldering

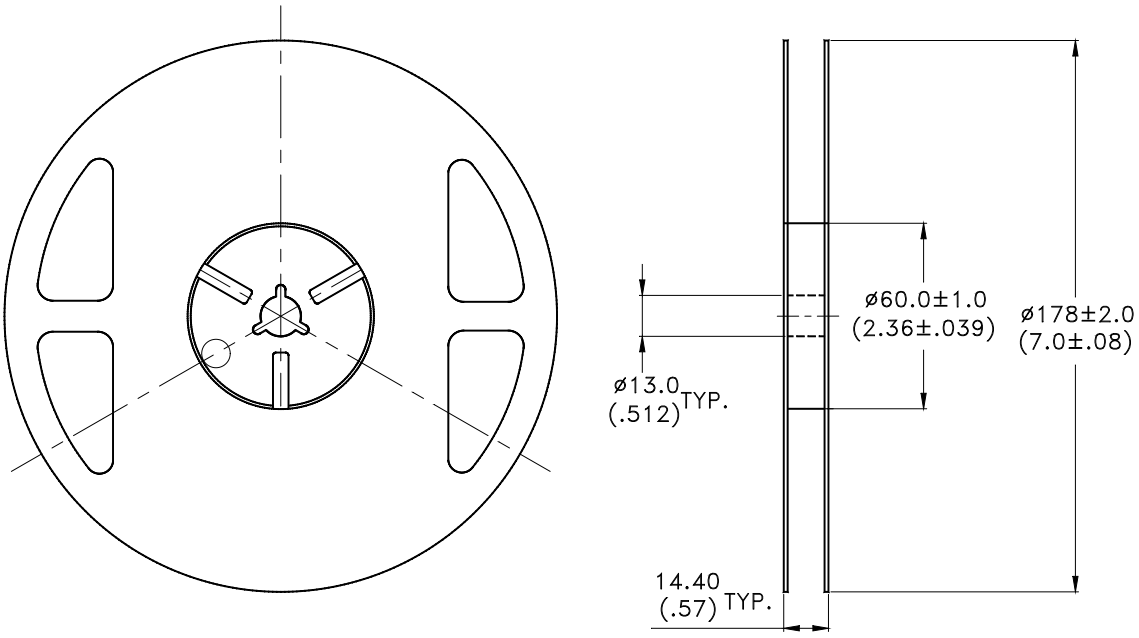


■ Package Dimensions of Tape



Note: All dimensions are in millimeters (inches).

■ Package Dimensions of Reel



Notes:

1. Empty component pockets sealed with top cover tape.
2. 7 inch reel-1000 pieces per reel.
3. Minimum packing quantity is 500 pieces for remainders.
4. The maximum number of consecutive missing lamps is two.
5. In accordance with EIA-481-1-B specifications.

10. Cautions

10.1 Application

The LEDs described here are intended to be used for ordinary electronic equipment (such as office equipment, communication equipment and household applications).Consult Liteon's Sales in advance for information on applications in which exceptional reliability is required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as in aviation, transportation, traffic control equipment, medical and life support systems and safety devices).

10.2 Storage

This product is qualified as Moisture sensitive Level 3 per JEDEC J-STD-020 Precaution when handing this moisture sensitive product is important to ensure the reliability of the product.

The package is sealed:

The LEDs should be stored at 30°C or less and 90%RH or less. And the LEDs are limited to use within one year, while the LEDs is packed in moisture-proof package with the desiccants inside.

The package is opened:

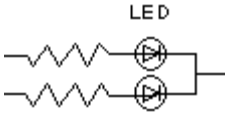
The LEDs should be stored at 30°C or less and 60%RH or less. Moreover, the LEDs are limited to solder process within 168hrs. If the Humidity Indicator shows the pink color in 10% even higher or exceed the storage limiting time since opened, that we recommended to baking LEDs at 60°C at least 24hrs. To seal the remainder LEDs return to package, it's recommended to be with workable desiccants in original package.

10.3 Cleaning

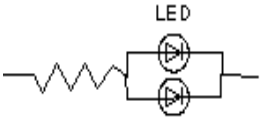
Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED if necessary.

10.4 Drive Mode

An LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below



Circuit model A



Circuit model B

(A) Recommended circuit.

(B) The brightness of each LED might appear different due to the differences in the I-V characteristics of those LEDs.

10.5 ESD (Electrostatic Discharge)

Static Electricity or power surge will damage the LED. Suggestions to prevent ESD damage:

- Use of a conductive wrist band or anti-electrostatic glove when handling these LEDs.
- All devices, equipment, and machinery must be properly grounded.
- Work tables, storage racks, etc. should be properly grounded.
- Use ion blower to neutralize the static charge which might have built up on surface of the LED's plastic lens as a result of friction between LEDs during storage and handling.

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or "no lightup" at low currents.To verify for ESD damage, check for "light up" and V_F of the suspect LEDs at low currents.The V_F of "good" LEDs should be >2.0V@0.1mA for InGaN product and >1.4V@0.1mA for AlInGaP product.

10.6 Suggested Checking List:

- Training and Certification
  1. Everyone working in a static-safe area is ESD-certified?
  2. Training records kept and re-certification dates monitored?

- Static-Safe Workstation & Work Areas
  1. Static-safe workstation or work-areas have ESD signs?
  2. All surfaces and objects at all static-safe workstation and within 1 ft measure less than 100V?
  3. All ionizer activated, positioned towards the units?
  4. Each work surface mats grounding is good?

- Personnel Grounding
  1. Every person (including visitors) handling ESD sensitive (ESDS) items wear wrist strap, heel strap or conductive shoes with conductive flooring?
  2. If conductive footwear used, conductive flooring also present where operator stand or walk?

3. Garments, hairs or anything closer than 1 ft to ESD items measure less than 100V*?
4. Every wrist strap or heel strap/conductive shoes checked daily and result recorded for all DLs?
5. All wrist strap or heel strap checkers calibration up to date?

Note: *50V for Blue LED.

- Device Handling
  1. Every ESDS items identified by EIA-471 labels on item or packaging?
  2. All ESDS items completely inside properly closed static-shielding containers when not at static-safe workstation?
  3. No static charge generators (e.g. plastics) inside shielding containers with ESDS items?
  4. All flexible conductive and dissipative package materials inspected before reuse or recycle?

- Others
  1. Audit result reported to entity ESD control coordinator?
  2. Corrective action from previous audits completed?
  3. Are audit records complete and on file?

10.7 Others:

- Do not put any pressure on the light emitting surface either by finger or any hand tool and do not stack the products. Stress or pressure may cause damage to the wires of the LED array.
- This product is not designed for the use under any of the following conditions, please confirm the performance and reliability are well enough if you use it under any of the following conditions
- Do not use sulfur-containing materials in commercial products including the materials such as seals and adhesives that may contain sulfur.
- Do not put this product in a place with a lot of moisture (over 85% relative humidity), dew condensation, briny air, and corrosive gas (Cl, H_2S, NH_3, SO_2, NO_X, etc.), exposure to a corrosive environment may affect silver plating.
- The appearance and specifications of the product may be modified for improvement without prior notice.

Revision History:

Revision Date: 2015-3-31 (Ver -0)

Version	Page	Content of Change	Date Record
0		**Preliminary Version**	2015.03.31