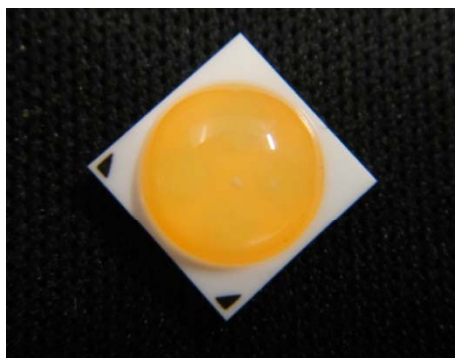




EA6565-04040D-XZ-01B20

PRODUCT SPECIFICATION CHIP-ARRAY-ON-CERAMIC TYPE SMD LED



Approved By Customer	Confirmed By ITC

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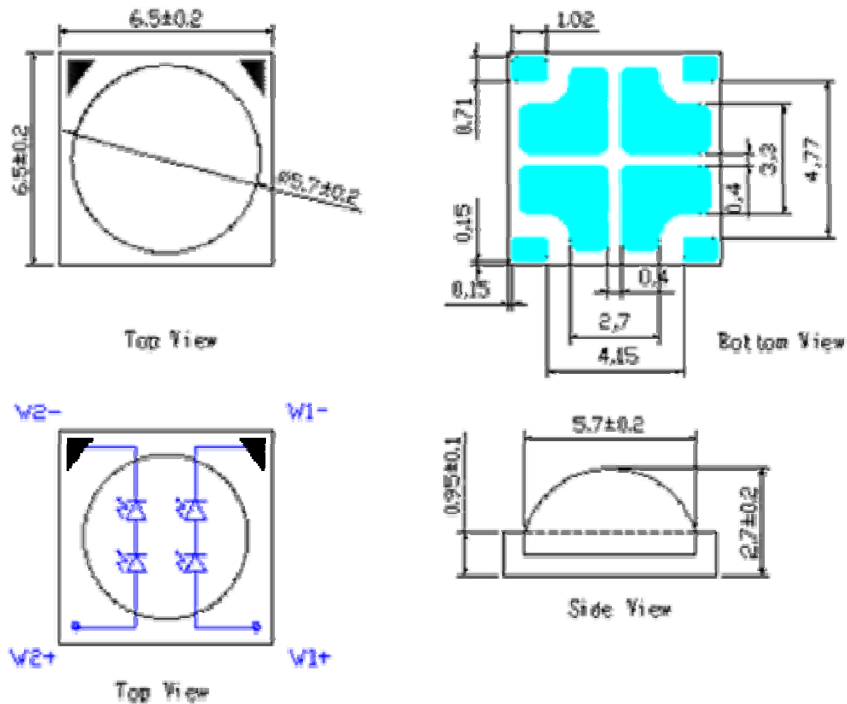
1. Features

- Dimensions: 6.5 × 6.5 × 2.70 mm (L×W×H)
- Package: Ceramic 2 chips Parallel and 2 Series
Array with low thermal resistance
- High power: 4W
- High efficacy
- Viewing angle: 130°
- Compliant with RoHS directive

2. Applications

- Indoor/Outdoor General Lighting
- Signage
- Portable Lighting
- Electronic Equipment

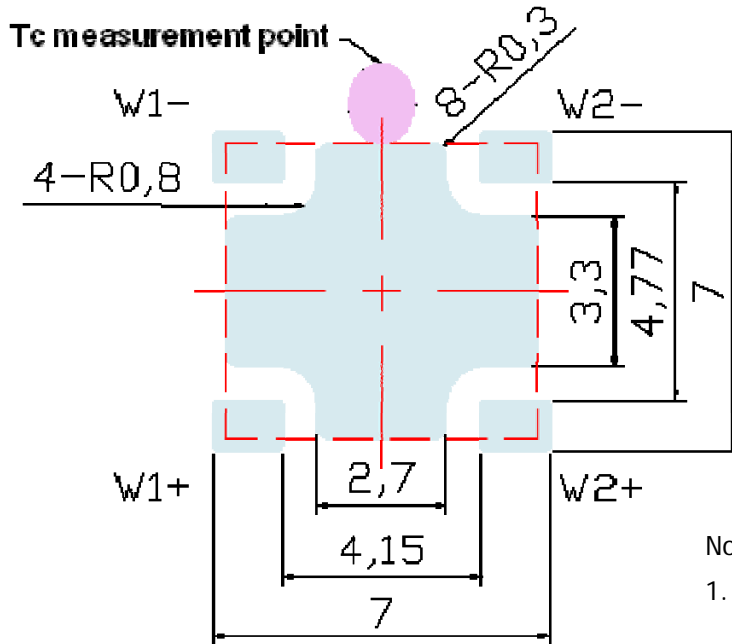
3. Mechanical Dimensions & Polarity



Notes :

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

4. Recommended Soldering Pad Layout



Notes :

1. Recommended stencil thickness 0.12 mm .
2. Tolerance is ± 0.2 mm.

5. Absolute Maximum Ratings (@ $T_a=25^\circ\text{C}$)

ITEM	SYMBOL	ABSOLUTE MAXIMUM RATING	UNIT
Power Dissipation	P_d	6	W
D.C. Forward Current(*1)	I_f	60	mA
Pulsed Forward Current (*1*2)	I_{fP}	120	mA
Storage Temperature	T_s	150	$^\circ\text{C}$
Junction Temperature(*3)	T_{jmax}	135	$^\circ\text{C}$
Soldering Temperature	T_{sld}	250	$^\circ\text{C}$
Soldering Temperature(Hand)	T_{sld}	350	$^\circ\text{C}$

*1: I_{fP} conditions: 1/10 Duty Cycle & 0.1ms for pulse width.

6. Electrical & Optical Characteristics

ITEM	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Forward Voltage	V _f	I _f =40mA (2S2P)	V	98	106	113
Viewing Angle	2θ _½	I _f =40mA	deg		130	
Color Rendering Index, CRI	R _a	I _f =40mA		80	85	
Thermal Resistance	R _{th}	I _f =40mA (Non corrected)	K/W		3.6	
Radiant Power Intensity	P _o	I _f =40mA	lm	265		460

*Measurement Uncertainty of the Radiant Power Intensity: ± 10%

7. Optical & Electrical Binning

(I_f=40mA_2S2P, T_a=25°C, pulsed measurement)

7-1 V_f Binning

V _f Code	MIN.	MAX.
V02	98	101
V03	101	104
V04	104	107
V05	107	110
V06	110	113

7-2 Flux Binning

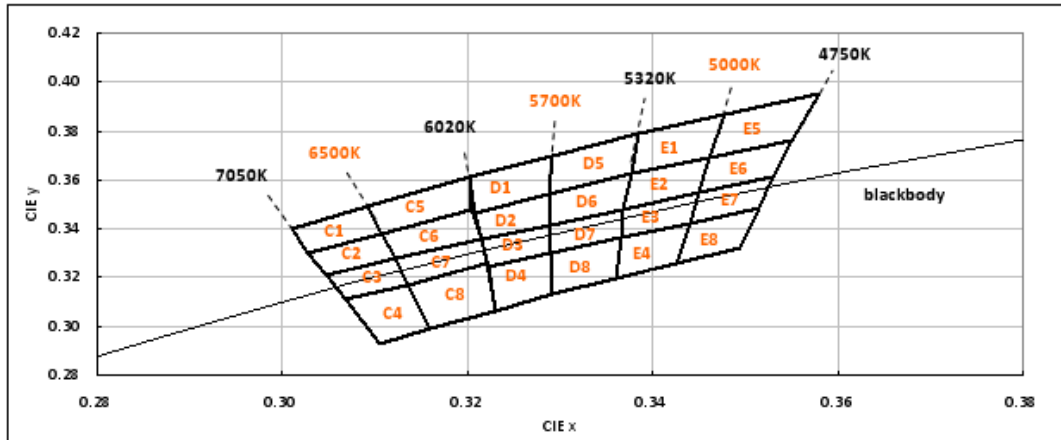
Emitting Color	Center CCT(K)	Flux Code	MIN.	MAX.	Model Name
Warm white	2700	F44	265	295	EA6565-04040D-TZ-01B20
		F45	295	330	
		F46	330	370	
	3000	F44	265	295	EA6565-04040D-RZ-01B20
		F45	295	330	
		F46	330	370	
F47		370	415		
Neutral white	4000	F45	295	330	EA6565-04040D-PZ-01B20
		F46	330	370	
		F47	370	415	
		F48	415	460	
Cool white	5000	F46	330	370	EA6565-04040D-EZ-01B20
		F47	370	415	
		F48	415	460	

*Measurement Uncertainty of the Radiant Power Intensity: $\pm 10\%$

8. Chromaticity Coordinates & Bin Grade Diagram

(IF=40mA, Ta=25°C, pulsed measurement)

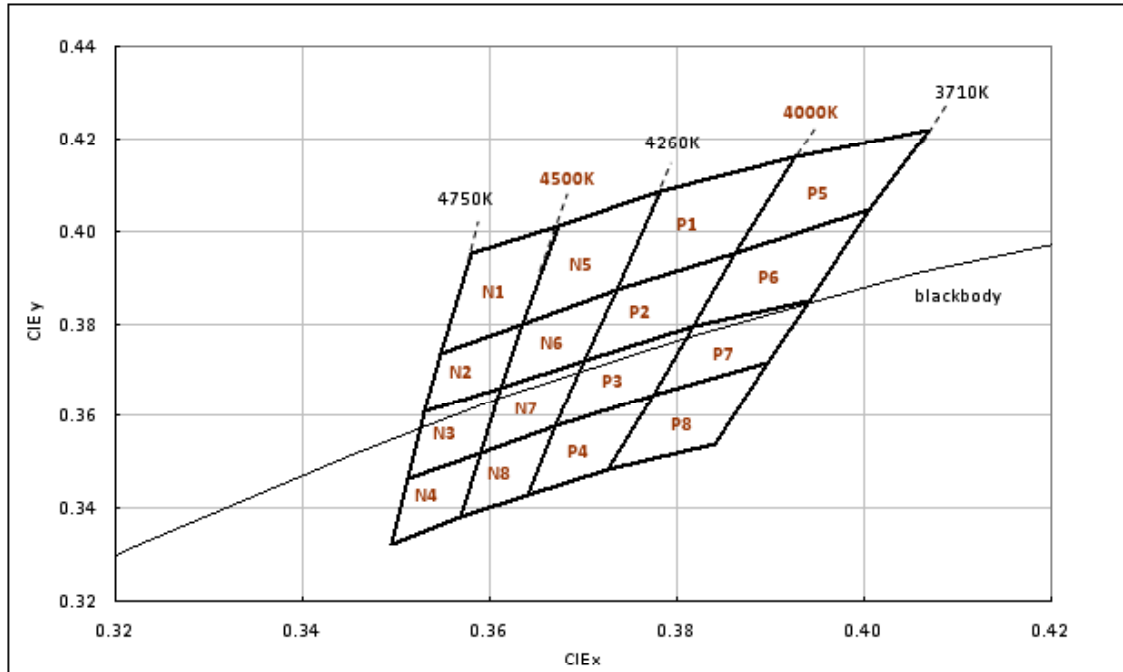
8-1. C.I.E Color Rank: Cool White – EZ(EY)



ITC Std Zone	Energy star ANSI	Rank	x1	y1	x2	y2	x3	y3	x4	y4	Center CCT(K)
CZ	CY	C2	0.3028	0.3304	0.3045	0.3210	0.3123	0.3282	0.3107	0.3380	6500
		C3	0.3045	0.3210	0.3072	0.3100	0.3136	0.3165	0.3123	0.3282	
		C6	0.3107	0.3380	0.3123	0.3282	0.3215	0.3360	0.3205	0.3481	
		C7	0.3123	0.3282	0.3136	0.3165	0.3222	0.3243	0.3215	0.3360	
		C1	0.3010	0.3400	0.3028	0.3304	0.3107	0.3380	0.3092	0.3495	
		C4	0.3072	0.3100	0.3105	0.2925	0.3160	0.2990	0.3136	0.3165	
		C5	0.3092	0.3495	0.3107	0.3380	0.3205	0.3481	0.3202	0.3610	
		C8	0.3136	0.3165	0.3160	0.2990	0.3230	0.3060	0.3222	0.3243	
DZ	DY	D2	0.3205	0.3481	0.3215	0.3360	0.3290	0.3417	0.3291	0.3560	5700
		D3	0.3215	0.3360	0.3222	0.3243	0.3290	0.3300	0.3290	0.3417	
		D6	0.3291	0.3560	0.3290	0.3417	0.3368	0.3480	0.3377	0.3625	
		D7	0.3290	0.3417	0.3290	0.3300	0.3366	0.3358	0.3368	0.3480	
		D1	0.3202	0.3610	0.3205	0.3481	0.3291	0.3560	0.3292	0.3700	
		D4	0.3222	0.3243	0.3230	0.3060	0.3292	0.3130	0.3290	0.3300	
		D5	0.3292	0.3700	0.3291	0.3560	0.3377	0.3625	0.3385	0.3790	
		D8	0.3290	0.3300	0.3292	0.3130	0.3360	0.3195	0.3366	0.3358	
EZ	EY	E2	0.3377	0.3625	0.3368	0.3480	0.3450	0.3550	0.3462	0.3693	5000
		E3	0.3368	0.3480	0.3366	0.3358	0.3437	0.3414	0.3450	0.3550	
		E6	0.3462	0.3693	0.3450	0.3550	0.3530	0.3610	0.3551	0.3760	
		E7	0.3450	0.3550	0.3437	0.3414	0.3512	0.3465	0.3530	0.3610	
		E1	0.3385	0.3790	0.3377	0.3625	0.3462	0.3693	0.3477	0.3870	
		E4	0.3366	0.3358	0.3360	0.3195	0.3425	0.3260	0.3437	0.3414	
		E5	0.3477	0.3870	0.3462	0.3693	0.3551	0.3760	0.3580	0.3950	
		E8	0.3437	0.3414	0.3425	0.3260	0.3495	0.3320	0.3512	0.3465	

*Measurement Uncertainty of the Color Coordinates : ± 0.01

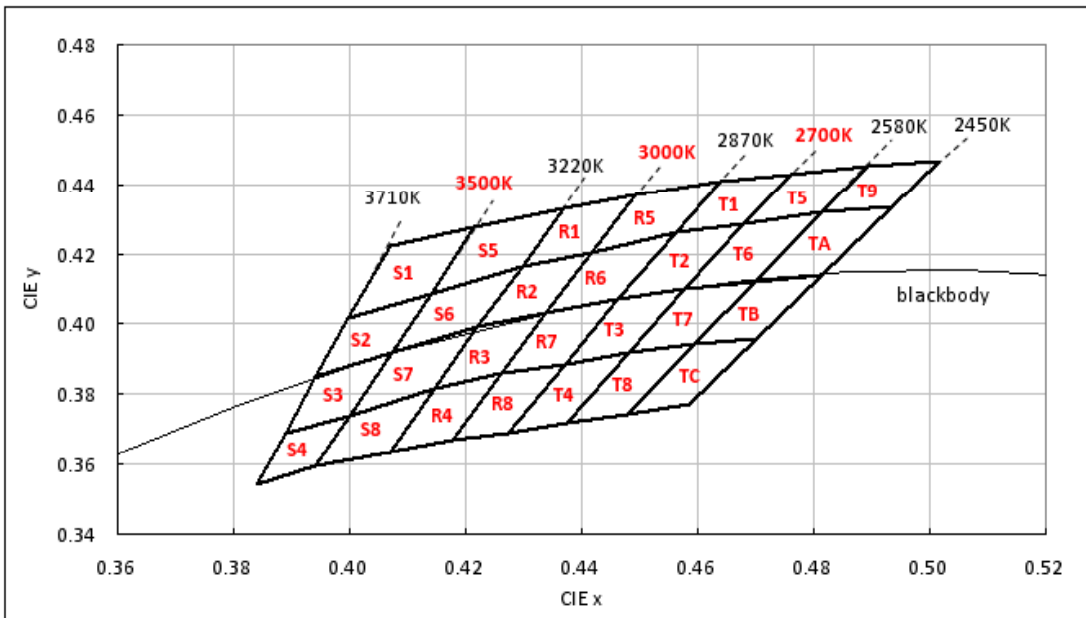
8-2. C.I.E Color Rank: Neutral White – PZ(PY)



ITC Std Zone	Energy star ANSI	Rank	x1	y1	x2	y2	x3	y3	x4	y4	Center CCT(K)
NZ	NY	N2	0.3551	0.3760	0.3530	0.3610	0.3611	0.3660	0.3640	0.3825	4500
		N3	0.3530	0.3610	0.3512	0.3465	0.3590	0.3520	0.3611	0.3660	
		N6	0.3640	0.3825	0.3611	0.3660	0.3700	0.3720	0.3740	0.3888	
		N7	0.3611	0.3660	0.3590	0.3520	0.3670	0.3568	0.3700	0.3720	
		N1	0.3580	0.3950	0.3551	0.3760	0.3640	0.3825	0.3673	0.4010	
		N4	0.3512	0.3465	0.3495	0.3320	0.3568	0.3380	0.3590	0.3520	
		N5	0.3673	0.4010	0.3640	0.3825	0.3740	0.3888	0.3783	0.4085	
		N8	0.3590	0.3520	0.3568	0.3380	0.3640	0.3430	0.3670	0.3568	
PZ	PY	P2	0.3740	0.3888	0.3700	0.3720	0.3818	0.3795	0.3863	0.3950	4000
		P3	0.3700	0.3720	0.3670	0.3568	0.3770	0.3630	0.3818	0.3795	
		P6	0.3863	0.3950	0.3818	0.3795	0.3941	0.3850	0.3996	0.4015	
		P7	0.3818	0.3795	0.3770	0.3630	0.3889	0.3690	0.3941	0.3850	
		P1	0.3783	0.4085	0.3740	0.3888	0.3863	0.3950	0.3926	0.4160	
		P4	0.3670	0.3568	0.3640	0.3430	0.3727	0.3482	0.3770	0.3630	
		P5	0.3926	0.4160	0.3863	0.3950	0.3996	0.4015	0.4070	0.4220	
		P8	0.3770	0.3630	0.3727	0.3482	0.3840	0.3540	0.3889	0.3690	

*Measurement Uncertainty of the Color Coordinates : ± 0.01

8-3. C.I.E Color Rank: Warm White - RZ(RY)&TZ(TY)



ITC Std Zone	Energy star ANSI	Rank	x1	y1	x2	y2	x3	y3	x4	y4	Center CCT(K)
SZ	SY	S2	0.3996	0.4015	0.3941	0.3850	0.4073	0.3917	0.4140	0.4086	3500
		S3	0.3941	0.3850	0.3889	0.3690	0.4000	0.3740	0.4073	0.3917	
		S6	0.4140	0.4086	0.4073	0.3917	0.4220	0.3990	0.4299	0.4165	
		S7	0.4073	0.3917	0.4000	0.3740	0.4147	0.3814	0.4220	0.3990	
	S1	0.4070	0.4220	0.3996	0.4015	0.4140	0.4086	0.4215	0.4276		
	S4	0.3889	0.3690	0.3840	0.3540	0.3942	0.3595	0.4000	0.3740		
	S5	0.4215	0.4276	0.4140	0.4086	0.4299	0.4165	0.4370	0.4332		
	S8	0.4000	0.3740	0.3942	0.3595	0.4070	0.3636	0.4147	0.3814		
RZ	RY	R2	0.4299	0.4165	0.4220	0.3990	0.4338	0.4030	0.4417	0.4200	3000
		R3	0.4220	0.3990	0.4147	0.3814	0.4260	0.3845	0.4338	0.4030	
		R6	0.4417	0.4200	0.4338	0.4030	0.4463	0.4070	0.4562	0.4260	
		R7	0.4338	0.4030	0.4260	0.3845	0.4371	0.3885	0.4463	0.4070	
	R1	0.4370	0.4332	0.4299	0.4165	0.4417	0.4200	0.4493	0.4370		
	R4	0.4147	0.3814	0.4070	0.3636	0.4178	0.3670	0.4260	0.3845		
	R5	0.4493	0.4370	0.4417	0.4200	0.4562	0.4260	0.4640	0.4410		
	R8	0.4260	0.3845	0.4178	0.3670	0.4273	0.3690	0.4371	0.3885		
TZ	TY	T2	0.4562	0.4260	0.4463	0.4070	0.4578	0.4101	0.4680	0.4285	2700
		T3	0.4463	0.4070	0.4371	0.3885	0.4482	0.3920	0.4578	0.4101	
		T6	0.4680	0.4285	0.4578	0.4101	0.4700	0.4120	0.4813	0.4319	
		T7	0.4578	0.4101	0.4482	0.3920	0.4593	0.3944	0.4700	0.4120	
	T1	0.4640	0.4410	0.4562	0.4260	0.4680	0.4285	0.4760	0.4430		
	T4	0.4371	0.3885	0.4273	0.3690	0.4376	0.3720	0.4482	0.3920		
	T5	0.4760	0.4430	0.4680	0.4285	0.4813	0.4319	0.4892	0.4450		
	T8	0.4482	0.3920	0.4376	0.3720	0.4480	0.3745	0.4593	0.3944		
	T9	0.4892	0.4450	0.4813	0.4319	0.4935	0.4335	0.5017	0.4465		
	TA	0.4813	0.4319	0.4700	0.4120	0.4815	0.4140	0.4935	0.4335		
	TB	0.4700	0.4120	0.4593	0.3944	0.4702	0.3960	0.4815	0.4140		
	TC	0.4593	0.3944	0.4480	0.3745	0.4585	0.3770	0.4702	0.3960		

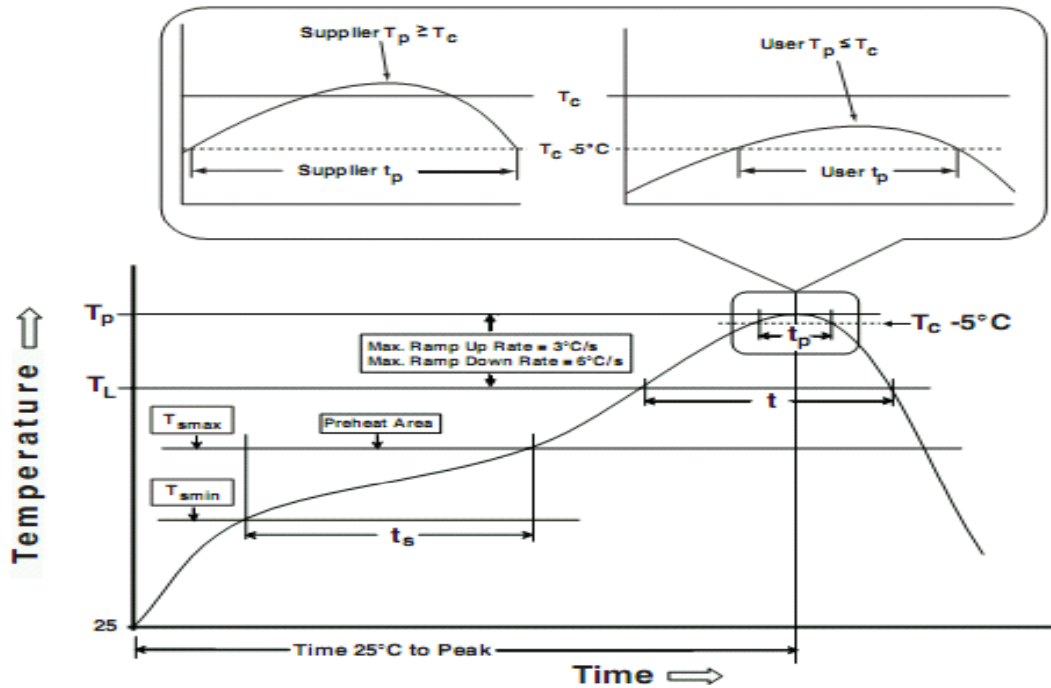
*Measurement Uncertainty of the Color Coordinates : ± 0.01

9. Soldering Characteristics

9-1. Reflow soldering: Follow JEDEC-J-STD-020D-01

As a general guideline, ITC recommends that users follow the recommended soldering profile provided by the manufacturer of solder paste used.

Note that this general guideline may not apply to all PCB designs and configurations of reflow Soldering equipment.



Profile Feature	Lead-Base Solder	Lead-Free Solder
Average Ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat - Temperature min (T _{smin}) - Temperature min (T _{smax}) - Time (T _{smin} to T _{smax}) (t _s)	100°C 150°C 60-120 seconds	150°C 200°C 60-120 seconds
Time maintained above: - Temperature (T _L) - Time (t _L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature (T_p)	220°C	250°C
Time within 5°C of actual Peak Temperature (t_p)	10 seconds Max.	10 seconds Max.
Ramp-down Rate	6°C/second max.	6°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

9-2. Manual Iron Soldering (NOT RECOMMENDED)

Use SN60 solder of solder with silver content.

Use 25W soldering iron at 350°C Max for 3 seconds or less.

Avoidance touch the lens when temperature of soldering >150°C.

The soldering time and temperature will be different according with different LED thermal dissipation base. Must not touch top resin portion of SMD LED by heated soldering iron.

Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.

10. Cautions

10-1. 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 affect the optical characteristics of the LEDs. For this reason, a moisture proof package is used to keep moisture to a minimum in the package.

10-2. Storage

Recommended storage environment:

Temperature: 5°C ~ 30°C (41°F ~ 86°F)

Humidity: 60% RH Max.

Use within 7 days after opening of sealed vapor/ESD barrier bags.

If LEDs remain unused, they should be stored in moisture proof packages, such as sealed containers with packages of moisture absorbent material.

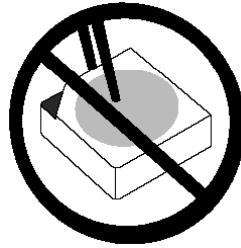
10-3. Heat Generation

Thermal design of the end product is of paramount importance. Heat generated by the LED must be considered in 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 this specification.

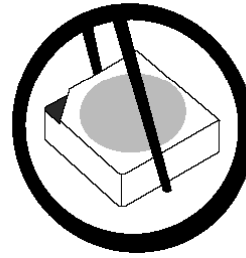
The operating current should be derated if ambient temperature is to exceed recommended value in this datasheet.

10-4. Handling Instructions of Silicone Resin LEDs

Mechanical stress on the surface should be minimized as much as possible during handling. Sharp objects of all types should not be used to avoid piercing the sealing compound.



NG



OK

10-5. Cleaning

It is recommended that isopropyl alcohol be used as a solvent for cleaning the LEDs. When using other solvents, it should be confirmed beforehand whether the solvents will damage the LED.

Avoid using organic solvents. Surface condition of this device may change when organic solvents such as trichloroethylene or acetone is applied.

Do not clean the LEDs by the ultrasonic method. When it is absolutely necessary, the effect of ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power, baking time and assembled condition. Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

10-6. Other

Not responsible for any damage caused due to using the LEDs at conditions exceeding our specifications.

These LEDs are designed and manufactured for use in typical consumer applications. It is recommended to consult us in advance if user's application requires any particular quality or reliability which concerns human life. Examples would be medical equipment, aerospace applications, traffic signals, safety system equipment and so on.

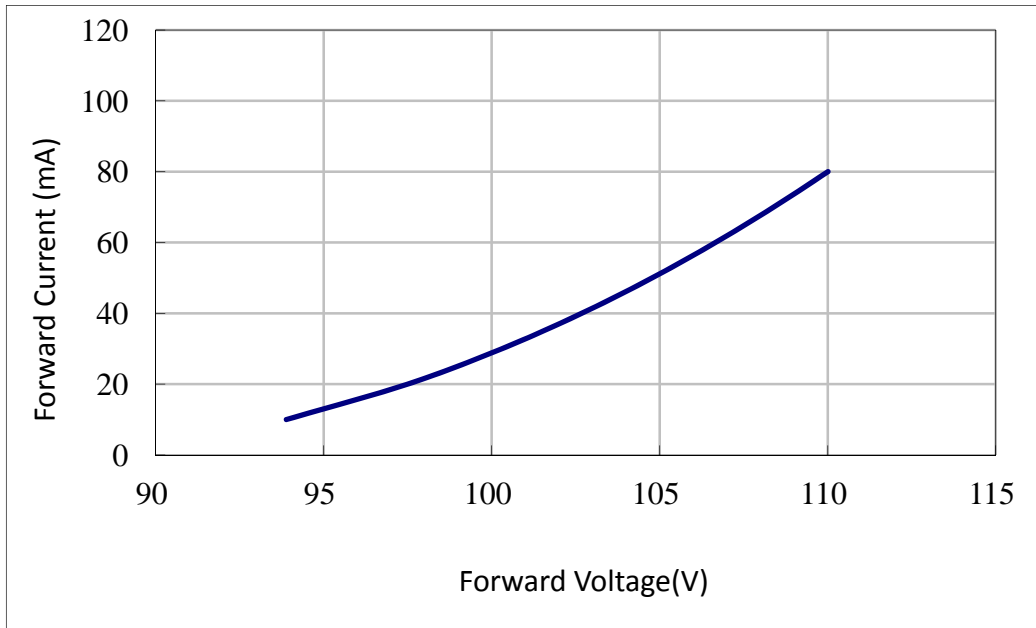
Care must be taken to ensure that the reverse voltage will not exceed the absolute maximum rating when using the LEDs with matrix drive.

The LED light output is strong enough to injure human eyes. Precautions must be taken to prevent looking directly at the LEDs with unprotected eyes for more than a few seconds.

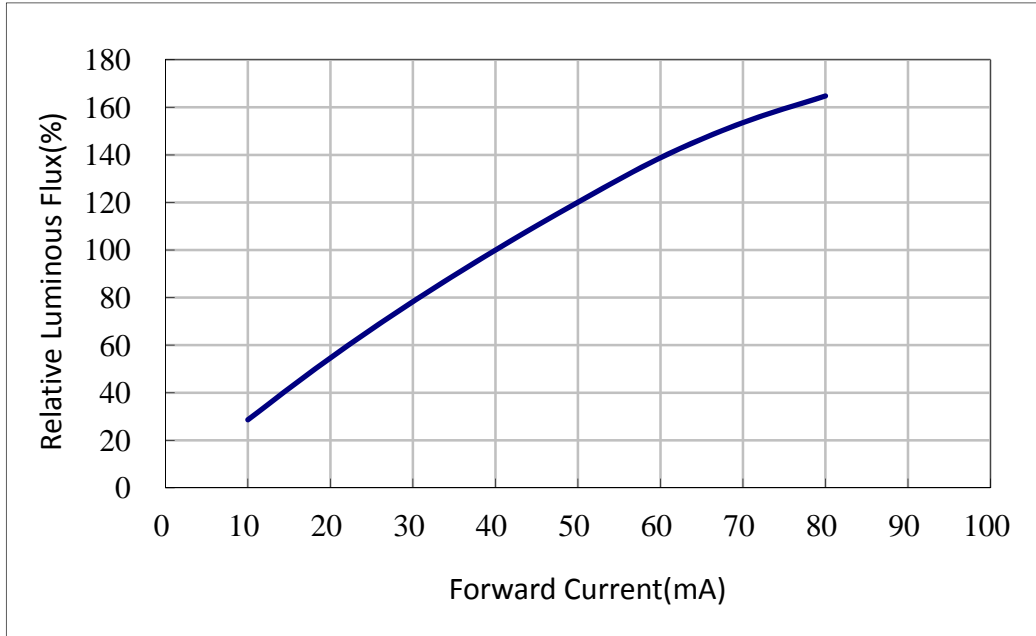
The appearance and specifications of the product may be modified for improvement without notice.

11. Typical Electrical & Optical Characteristic Curves

11-1. Electrical Characteristics (Ta=25°C, pulsed measurement)

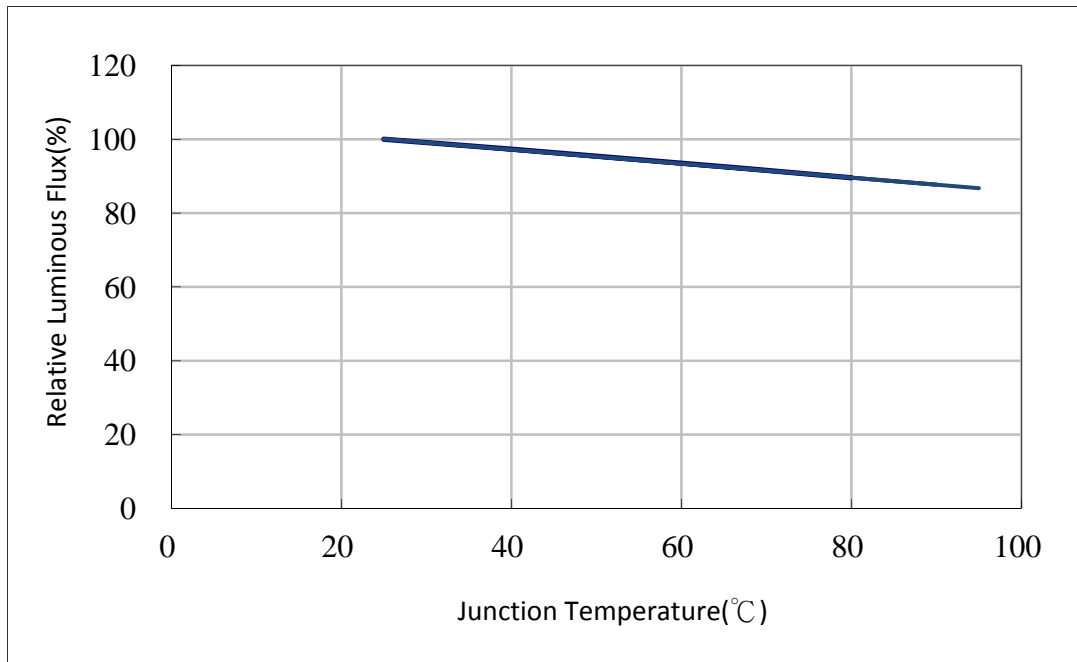


11-2. Relative Flux vs Forward Current (Ta=25°C, pulsed measurement)

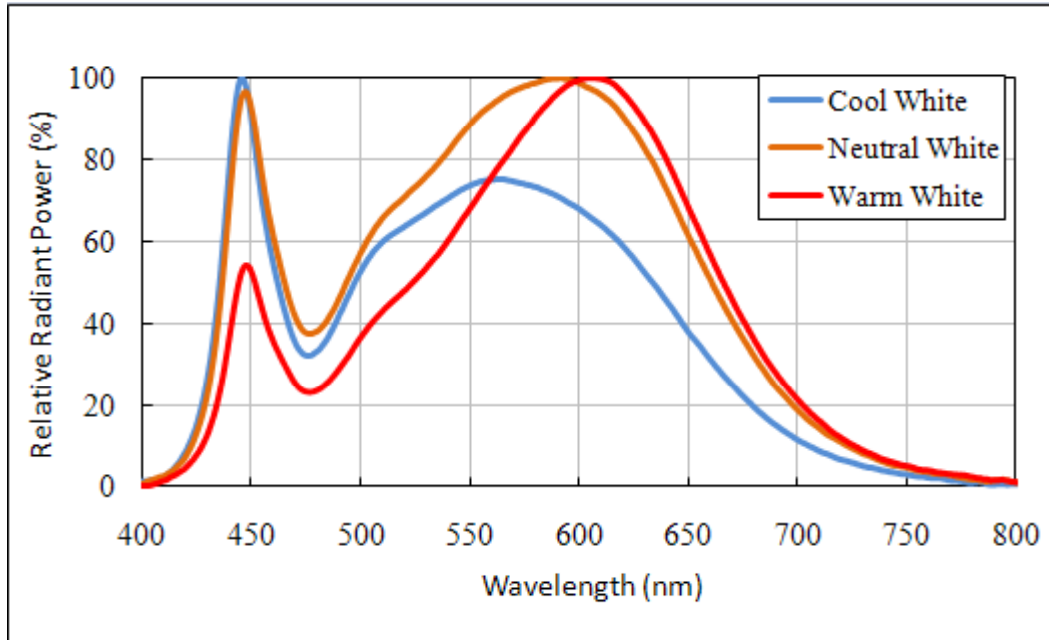


11. Typical Electrical & Optical Characteristic Curves:

11-3. Relative Flux vs Junction Temperature (IF=40mA)

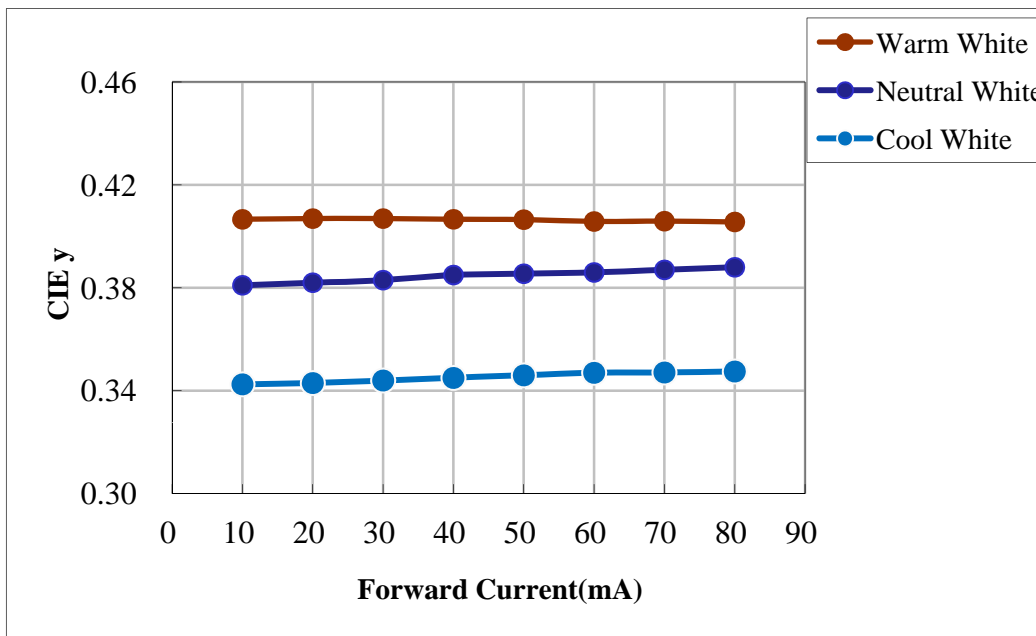
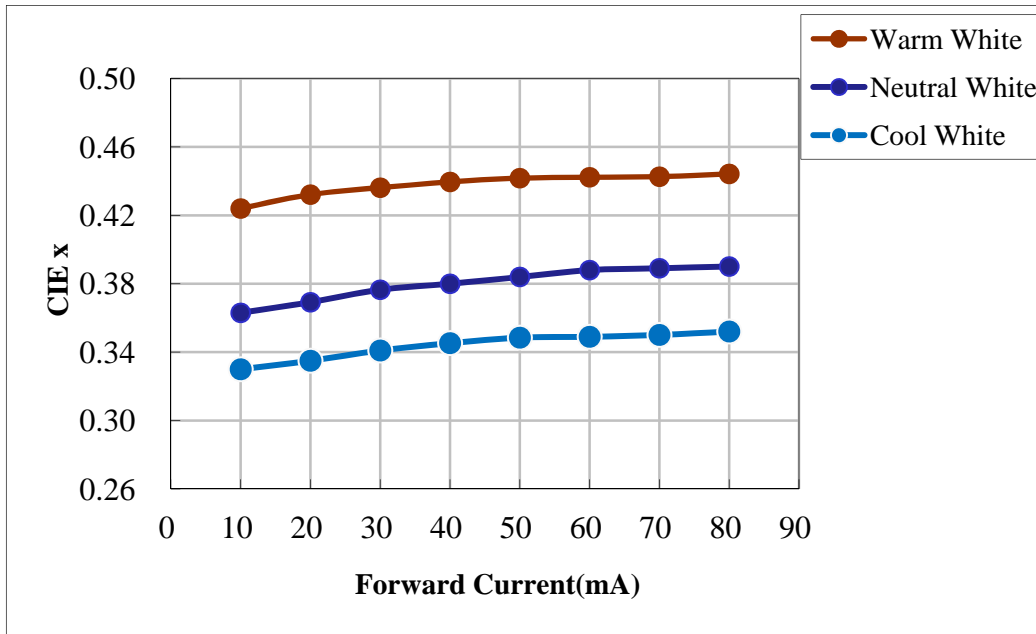


11-4. Spectrum (IF=40mA, Ta=25°C)



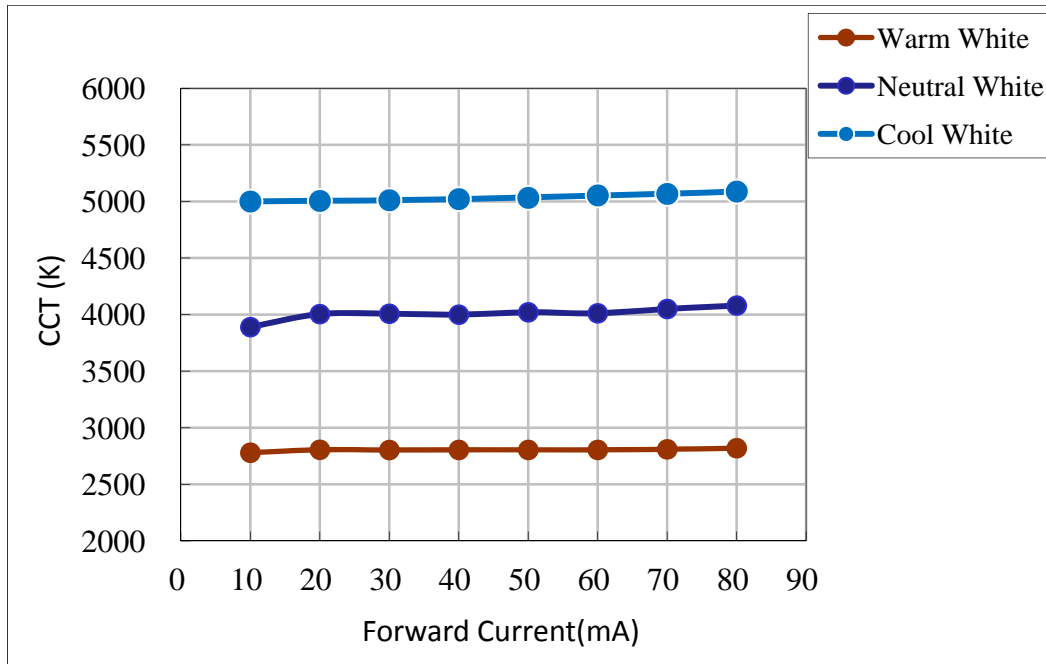
11. Typical Electrical & Optical Characteristic Curves:

11-5. Forward current vs CIE (x,y) (Ta=25°C, pulsed measurement)

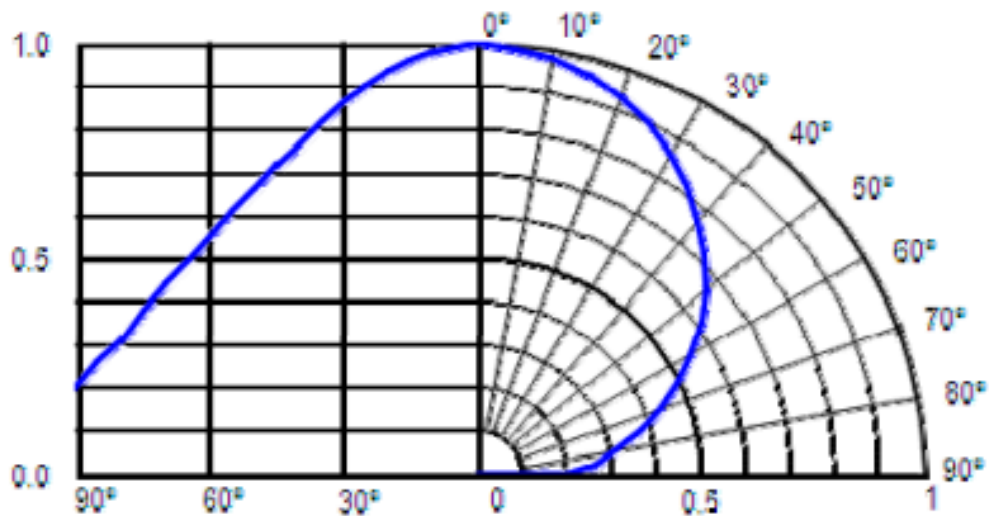


11. Typical Electrical & Optical Characteristic Curves:

11-6. Forward current vs CCT (K) ($T_a=25^\circ\text{C}$, pulsed measurement)

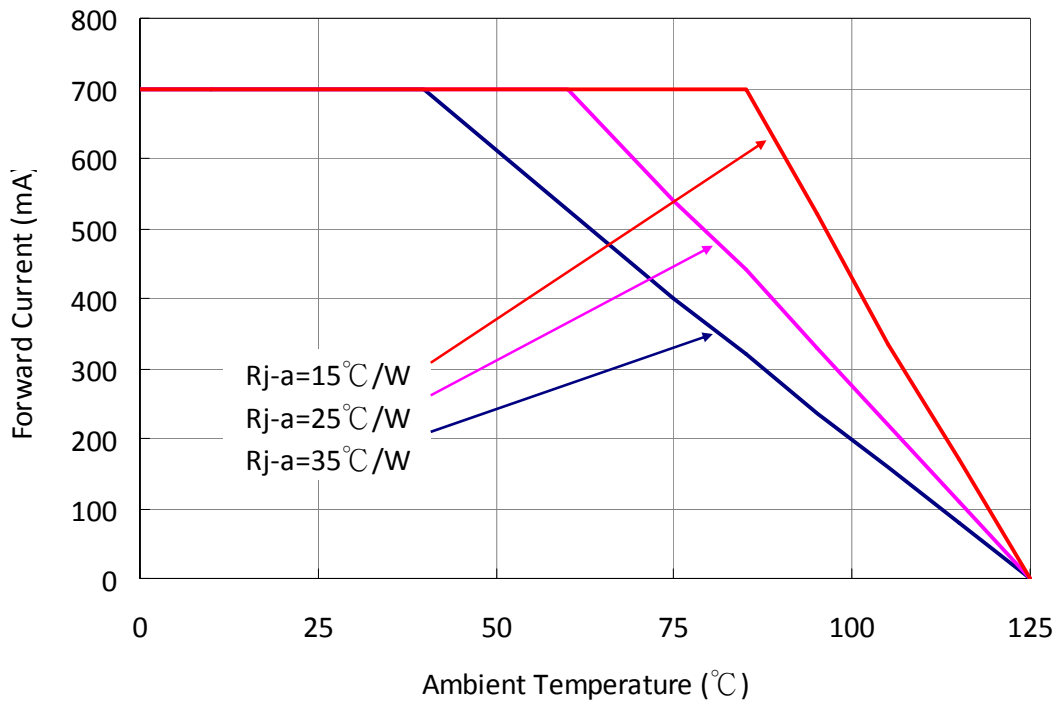


11-7. Radiant Angle & Pattern ($I_F=40\text{ mA}$, $T_a=25^\circ\text{C}$)



12. Thermal design

Ambient Temperature vs. Allowable Forward Current



13. Reliability Test Item and Criteria

NO	Test Item	Test Condition	
		Condition	Note
1	Soldering Heat	Tsld=260°C±5°C, 10sec	2 times
2	Thermal Shock	-40°C~125°C 15min dwell.,10sec transfer	500 cycles
3	Steady State Operating of High Temperature	Ta=85°C, IF=40mA	1000 hrs
4	Steady State Operating of High Humidity Heat	Ta=60°C, RH=90%, IF=40mA	1000 hrs

Criteria for Failure :

* Luminous Flux(lm) = 0.7 * initial flux @ rated current

* Vf = Initial Vf * 1.10 @ rated current

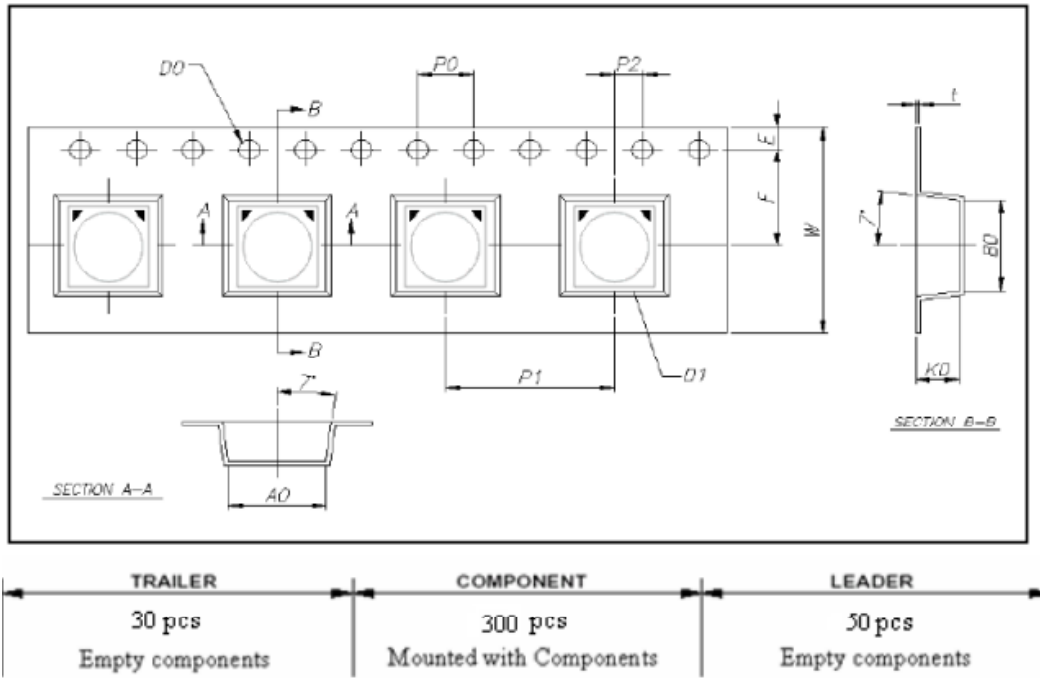
14. Model name Rule

	EA	6565		-	04	040	D	-	XZ	-	01	B	2	0
1	2	3	4	-	5	6	7	-	8	-	9	10	11	12

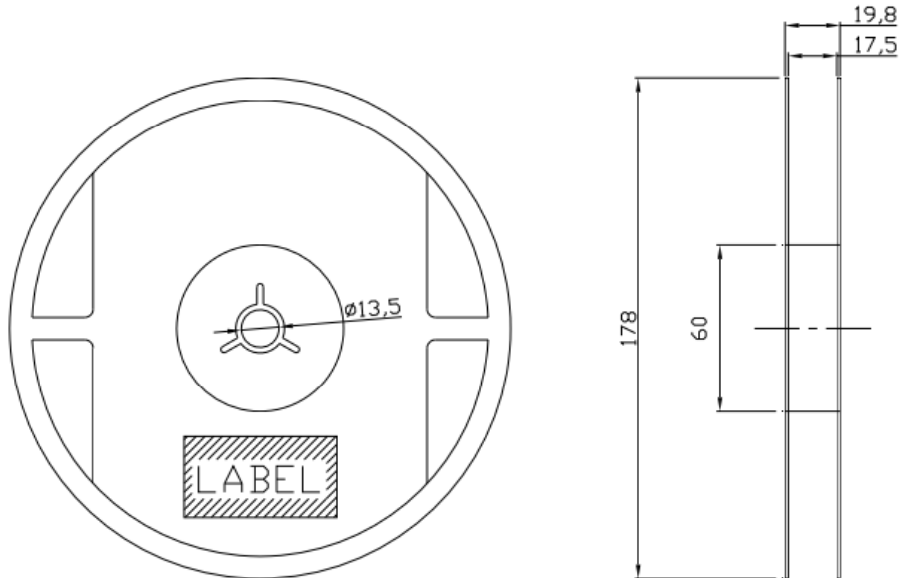
<p>1. Component type:</p> <p>AC: AC LED package</p> <p>Empty: Normal DC Package</p>																													
<p>2. Package type:</p> <p>C: Cetus series(Multi cavity)</p> <p>A: Apus series(Single Cavity)</p> <p>EA: EMMA DC High voltage Apus series (70V above)</p> <p>EC: EMMA DC High voltage Cetus series (70V above)</p>																													
<p>3. Dimension: Length × Width</p> <p>Ex: 6565 as 6.5mm×6.5mm</p>																													
<p>4. Specific code: Customer code or others</p>																													
<p>5. Chip number: Chip/Component</p>																													
<p>6. Power dissipation: Pd(W), Ex: 4W as 040</p>																													
<p>7. Process: Optical consideration</p> <p>Ex. Empty: No Dome Lens</p> <p>D: Dome Lens</p>																													
<p>8. CCT:</p> <p>Ex. TZ or TY: 2700K (Energy Star ANSI CIE specification)</p> <p>TI: 2700K (IEC CIE & color specification)</p> <p>XRRZ or XRRY: Direct color package (ex. XR: Direct Red)</p> <table border="1" data-bbox="209 1115 962 1188"> <thead> <tr> <th>TZ</th> <th>RZ</th> <th>SZ</th> <th>PZ</th> <th>NZ</th> <th>EZ</th> <th>DZ</th> <th>CZ</th> <th>BZ</th> <th>AZ</th> </tr> </thead> <tbody> <tr> <td>2700</td> <td>3000</td> <td>3500</td> <td>4000</td> <td>4500</td> <td>5000</td> <td>5700</td> <td>6500</td> <td>8100</td> <td>11000</td> </tr> </tbody> </table>										TZ	RZ	SZ	PZ	NZ	EZ	DZ	CZ	BZ	AZ	2700	3000	3500	4000	4500	5000	5700	6500	8100	11000
TZ	RZ	SZ	PZ	NZ	EZ	DZ	CZ	BZ	AZ																				
2700	3000	3500	4000	4500	5000	5700	6500	8100	11000																				
<p>9. Electrical Connecting</p> <p>Ex. 01:4 2 chips Parallel and 2 Series</p>																													
<p>10. View Angle</p> <p>Ex. 9: 110°</p> <p>A: 120°</p> <p>B: 130°</p>																													
<p>11. CRI respend</p> <p>Ex. 1: 75 3: 90</p> <p>2: 80</p>																													
<p>12. With Zener number</p> <p>Ex. 0: Without zener</p> <p>1: With one zener</p>																													

15. Packaging

15-1. Carrier & Tap



15-2. Reel



Notes :

1. All dimensions are in millimeters.
2. Tolerance is ± 0.5 mm

15. Packaging

15-3. Drying Package & Labeling

