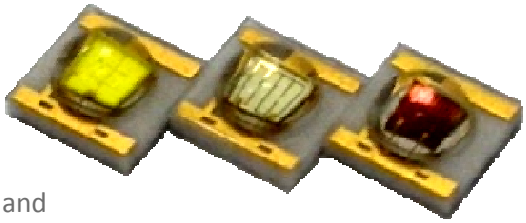
PRODUCT DATASHEET

C3535L.C3535M series High Power LED

Introduction



The C3535L, C3535M LED from TSLC brings industry leading technology to the solid state lighting market with its high quality and performance. With a silicone lens, C3535L, C3535M LEDs from TSLC feature very high brightness and efficacy, as well as excellent lifetime.

Table of Contents

RoHS Compliant

Characteristics

Absolute Maximum Ratings (Tj = 25°C)

Parameter	Rating
	White / Royal Blue / Blue / Green / Cyan / Amber / Red
DC Forward Current (mA)	1000 mA (White / Royal Blue / Blue / Green / Cyan)
DC Forward Current (mA)	700 mA (Amber/ Red / Super Red)
LED Junction Temperature	150℃ (White / Royal Blue / Blue / Green / Cyan)
LED Junction Temperature	125℃ (Red / Amber / Super Red)
LED Operating Temperature	-40℃~85℃
Storage Temperature	-40℃~125℃
Soldering Temperature	Max. 260℃ / Max. 10sec. (JEDEC 020)
ESD Sensitivity	2,000 V HBM (JESD-22A-114-B)
Reverse Voltage	Not designed to be driven in reverse bias (VR≦5V)
Preconditioning	Acc. to JEDEC Level 1

Product Name

C 3535 L – C0 L 1 - XXXXXX

1 2~5 6 7~8 9 10 11~16

Code 1: Substrate composition, C: Ceramic Al_2O_3

Code 2.3.4.5: Package size, 3535: 3.5*3.5mm

Code 6: Product Class

Code 7.8: Wavelength/CCT Class

Code 6: Product Class	Code 7.8: Wavelength Class	Color rendering
L (Lighting)	C0	Cool White CRI typ. 70
	N1	Neutral white CRI typ. 75
	W7	Warm white CRI min. 80
M (Pure color)	SN	Super red (650-670nm)
	RN	Red (620-635nm)
	AN	Amber (580-600nm)
	GN	Green (520-535nm)
	CN	Cyan (500-520nm)
	BN	Blue(460-475nm)
	DN	Royal blue (440-460nm)

Code 9: Lens type, L: 125~140 degree, A: 90 degree, F: 65 degree

Code 10: Lens version

Code 11~16: Internal code

General Characteristics at 350mA (Tj=25°C)

Part number	Color	Dominant Wavelength λ_d Peak Wavelength λp * Correlated Color Temperature, CCT		$2\theta_{1/2}$	Temperature Coefficient of Vf (mV/˚C)	Thermal Resistance Junction to Pad (°C/W)
		Min	Max		$\Delta V_F/\Delta T_J$	$R\Theta_{J-P}$
C3535L-C0 series	Daylight	4750K	10000K	130/90/65	-2~-4	8
C3535L-N1 series	Neutral White	3700K	4750K	130/90/65	-2~-4	8
C3535L-W7 series	Warm White	2600K	3700K	130/90/65	-2~-4	8
C3535M-SN series	Super Red	650	670	125/85/55	-2~-4	10
C3535M-RN series	Red	620	635	125/85/55	-2~-4	10
C3535M-AN series	Amber	580	600	125/85/55	-2~-4	10
C3535M-GN series	Green	520	535	130/90/65	-2~-4	8
C3535M-CN series	Cyan	500	520	130/90/65	-2~-4	8
C3535M-BN series	Blue	460	475	130/90/65	-2~-4	8
C3535M-DN series	Royal Blue	440*	460*	130/90/65	-2~-4	8

Notes:

1. The peak/dominant wavelength is measured with an accuracy of ±1nm
2. Typical CRI for Cool White (4750 K – 10,000 K CCT) is 70.
   Typical CRI for Neutral White (3700 K – 4750 K CCT) is 75.
   Minimum CRI for Warm White (2600 K – 3700 K CCT) is 80.

Luminous Flux and Forward Voltage (Tj=25°C), 125 degree

Part number	Color	Performance at Test Current (350mA)				Performance at 700mA
		Group	Minimum Luminous Flux (lm)	VF		Typical Luminous Flux (lm)
				Min	Max	
C3535L-C0L1-A1G11H	Daylight	NQE	107	2.8	3.6	180
		NRB	114	2.8	3.6	190
		NRC	122	2.8	3.6	205
		NRD	130	2.8	3.6	220
		NRE	139	2.8	3.6	235
		NSB	148	2.8	3.6	250
C3535L-N1L1-A1G11H	Neutral White	NQD	100	2.8	3.6	170
		NQE	107	2.8	3.6	180
		NRB	114	2.8	3.6	190
		NRC	122	2.8	3.6	205
		NRD	130	2.8	3.6	220
		NRE	139	2.8	3.6	235
C3535L-W7L1-A1G11H	Warm White	NQB	87.4	2.8	3.6	145
		NQC	93.9	2.8	3.6	160
		NQD	100	2.8	3.6	170
		NQE	107	2.8	3.6	180
		NRB	114	2.8	3.6	190
C3535M-SNL1-E1H11N	Super Red	ND2	240*	2.0	3.0	455*
		ND3	280*	2.0	3.0	530*
		ND4	320*	2.0	3.0	600*
C3535M-RNL1-E1H11N	Red	NMC	45.7	2.0	3.0	85
		NNB	51.7	2.0	3.0	95
		NNC	56.8	2.0	3.0	105
		NND	62.0	2.0	3.0	114
C3535M-ANL1-E1H11N	Amber	NMC	45.7	2.0	3.0	85
		NNB	51.7	2.0	3.0	95
		NNC	56.8	2.0	3.0	105
		NND	62.0	2.0	3.0	114

Part number	Color	Performance at Test Current (350mA)				Performance at 700mA
		Group	Minimum Luminous Flux (lm)	VF		Typical Luminous Flux (lm)
				Min	Max	
C3535M-GNL1-A1GJ11H	Green	NPB	67.2	2.8	3.6	105
		NPC	73.9	2.8	3.6	115
		NPD	80.6	2.8	3.6	125
		NQB	87.4	2.8	3.6	135
C3535M-CNL1-A1G11H	Cyan	NND	62.0	2.8	3.6	95
		NPB	67.2	2.8	3.6	105
		NPC	73.9	2.8	3.6	115
		NPD	80.6	2.8	3.6	125
C3535M-BNL1-A1G11H	Blue	NJB	18.0	2.8	3.6	30
		NJC	23.5	2.8	3.6	39
		NKB	30.6	2.8	3.6	50
C3535M-DNL1-A1G11H	Royal Blue	NE1	400*	2.8	3.6	680*
		NE2	440*	2.8	3.6	745*
		NE3	480*	2.8	3.6	815*
		NE4	520*	2.8	3.6	880*
		NE5	560*	2.8	3.6	950*
		NF1	600*	2.8	3.6	1020*

Note:

1. Luminous flux & Radiometric power is measured with an accuracy of ±10%
2. The forward voltage is measured with an accuracy of ±0.2V
3. For white, not all bins are available in all CCT.

Luminous Flux and Forward Voltage (Tj=25°C), 90 degree

Part number	Color	Performance at Test Current (350mA)				Performance at 700mA
		Group	Minimum Luminous Flux (lm)	VF		Typical Luminous Flux (lm)
				Min	Max	
C3535L-C0A1-A1G11H	Daylight	NQE	107	2.8	3.6	180
		NRB	114	2.8	3.6	190
		NRC	122	2.8	3.6	205
		NRD	130	2.8	3.6	220
		NRE	139	2.8	3.6	235
C3535L-N1A1-A1G11H	Neutral White	NQD	100	2.8	3.6	170
		NQE	107	2.8	3.6	180
		NRB	114	2.8	3.6	190
		NRC	122	2.8	3.6	205
		NRD	130	2.8	3.6	220
C3535L-W7A1-A1G11H	Warm White	NQB	87.4	2.8	3.6	145
		NQC	93.9	2.8	3.6	160
		NQD	100	2.8	3.6	170
		NQE	107	2.8	3.6	180
C3535M-SNA1-E1H11N	Super Red	ND2	240*	2.0	3.0	455*
		ND3	280*	2.0	3.0	530*
C3535M-RNA1-E1H11N	Red	NMC	45.7	2.0	3.0	85
		NNB	51.7	2.0	3.0	95
		NNC	56.8	2.0	3.0	105
		NND	62.0	2.8	3.6	114
C3535M-ANA1-E1H11N	Amber	NMB	39.8	2.0	3.0	73
		NMC	45.7	2.0	3.0	85
		NNB	51.7	2.0	3.0	95
		NNC	56.8	2.0	3.0	105
C3535M-GNA1-A1G11H	Green	NND	62.0	2.8	3.6	95
		NPB	67.2	2.8	3.6	105
		NPC	73.9	2.8	3.6	115
C3535M-CNA1-A1G11H	Cyan	NND	62.0	2.8	3.6	95
		NPB	67.2	2.8	3.6	105
		NPC	73.9	2.8	3.6	115

Part number	Color	Performance at Test Current (350mA)				Performance at 700mA
		Group	Minimum Luminous Flux (lm)	VF		Typical Luminous Flux (lm)
				Min	Max	
C3535M-BNA1-A1G11H	Blue	NJB	18.0	2.8	3.6	30
		NJC	23.5	2.8	3.6	39
C3535M-DNA1-A1G11H	Royal Blue	NE1	400*	2.8	3.6	680*
		NE2	440*	2.8	3.6	745*
		NE3	480*	2.8	3.6	815*
		NE4	520*	2.8	3.6	880*
		NE5	560*	2.8	3.6	950*

Note:

1. Luminous flux & Radiometric power is measured with an accuracy of ±10%
2. The forward voltage is measured with an accuracy of ±0.2V
3. For white, not all bins are available in all CCT.

Luminous Flux and Forward Voltage (Tj=25°C), 60 degree

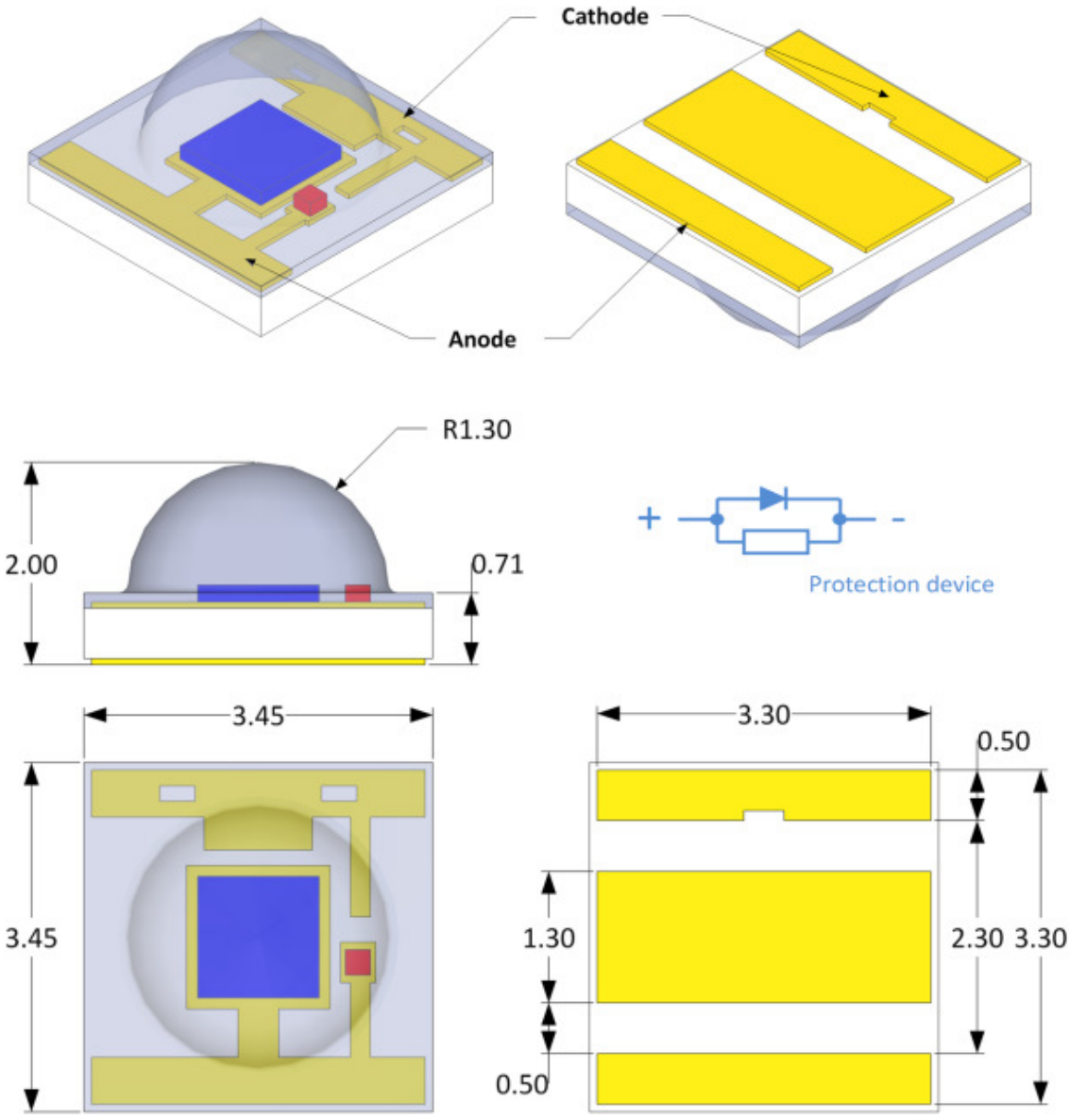
Part number	Color	Performance at Test Current (350mA)				Performance at 700mA
		Group	Minimum Luminous Flux (lm)	VF		Typical Luminous Flux (lm)
				Min	Max	
C3535L-C0F1-A1G11H	Daylight	NQD	100	2.8	3.6	170
		NQE	107	2.8	3.6	180
		NRB	114	2.8	3.6	190
		NRC	122	2.8	3.6	205
		NRD	130	2.8	3.6	220
C3535L-N1F1-A1G11H	Neutral White	NQC	93.9	2.8	3.6	160
		NQD	100	2.8	3.6	170
		NQE	107	2.8	3.6	180
		NRB	114	2.8	3.6	190
C3535L-W7F1-A1G11H	Warm White	NPD	80.6	2.8	3.6	135
		NQB	87.4	2.8	3.6	145
		NQC	93.9	2.8	3.6	160
		NQD	100	2.8	3.6	170
C3535M-SNF1-E1H11N	Super Red	ND1	200*	2.0	3.0	380*
		ND2	240*	2.0	3.0	455*
C3535M-RNF1-E1H11N	Red	NMC	45.7	2.0	3.0	85
		NNB	51.7	2.0	3.0	95
C3535M-ANF1-E1H11N	Amber	NMC	45.7	2.0	3.0	85
		NNB	51.7	2.0	3.0	95
C3535M-GNF1-A1G11H	Green	NND	62	2.8	3.6	95
		NPB	67.2	2.8	3.6	105
		NPC	73.9	2.8	3.6	115
C3535M-CNF1-A1G11H	Cyan	NND	62	2.8	3.6	95
		NPB	67.2	2.8	3.6	105
		NPC	73.9	2.8	3.6	115
C3535M-BNF1-A1G11H	Blue	NIC	14.0	2.8	3.6	23
		NJB	18.0	2.8	3.6	30
C3535M-DNF1-A1G11H	Royal Blue	NE1	400*	2.8	3.6	680*
		NE2	440*	2.8	3.6	745*

Note:

1. Luminous flux & Radiometric power is measured with an accuracy of ±10%
2. The forward voltage is measured with an accuracy of ±0.2V.
3. For white, not all bins are available in all CCT.

Mechanical Dimensions

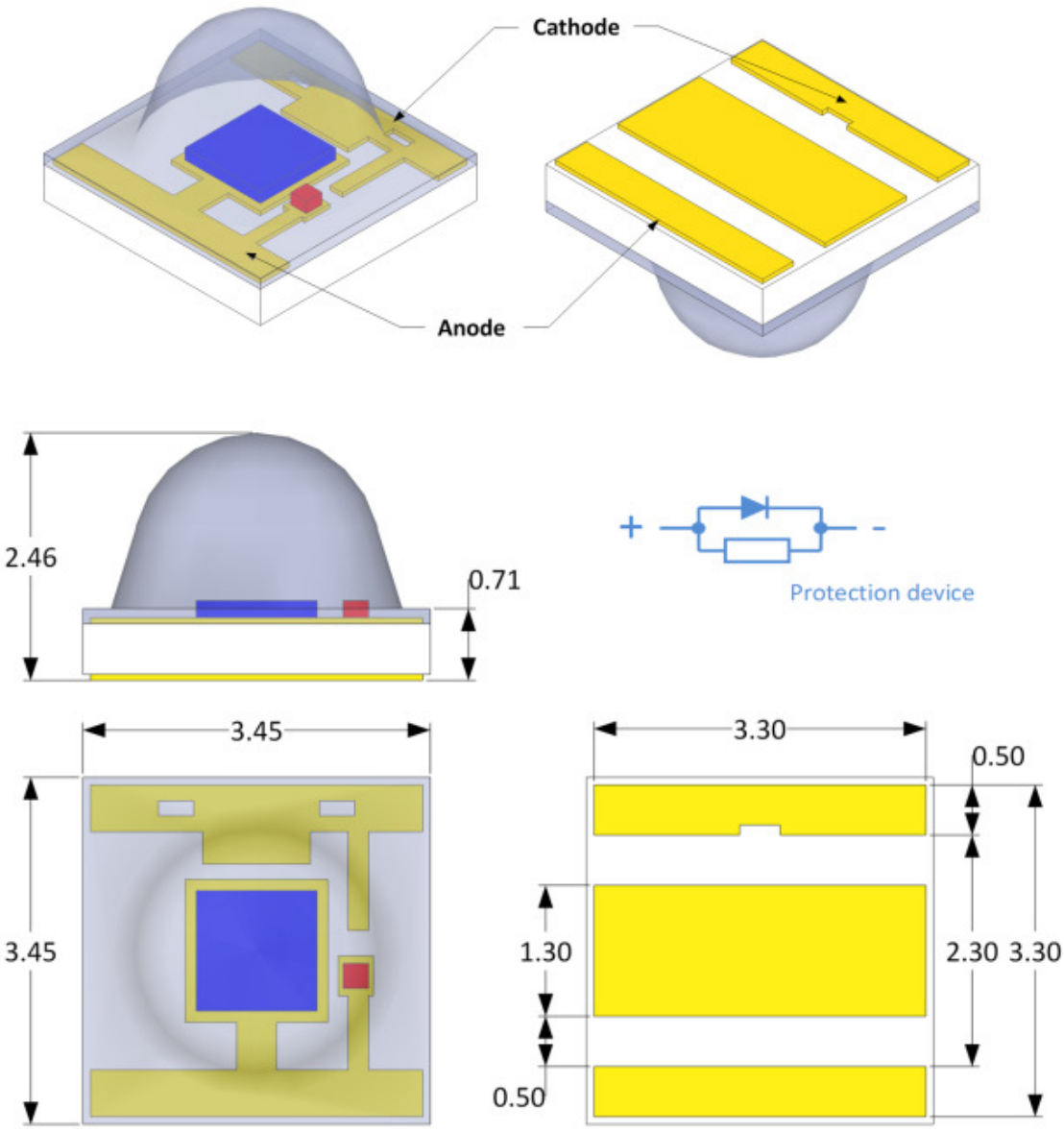
Beam angle 125°



Notes:

1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are ±0.13mm unless otherwise indicated

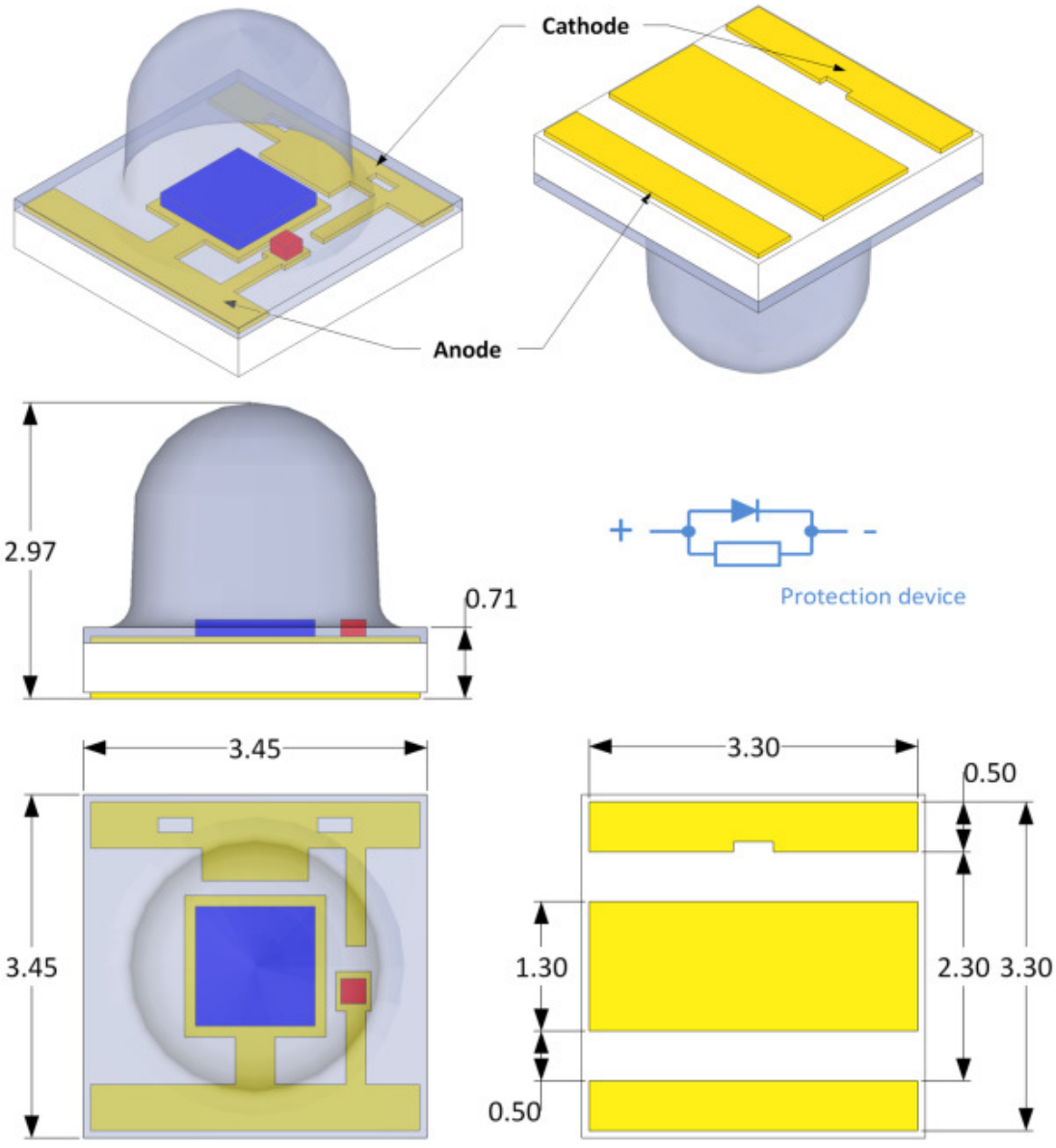
Beam angle 90°



Notes:

4. Drawing is not to scale
5. All dimensions are in millimeter
6. Dimensions are ±0.13mm unless otherwise indicated

Beam angle 65°

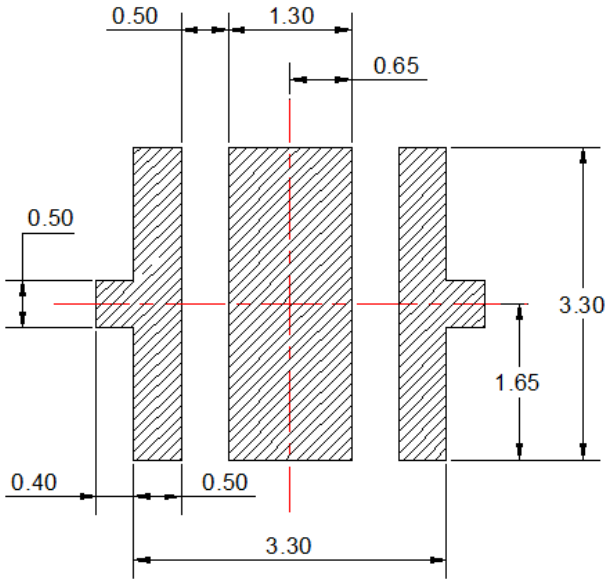


Notes:

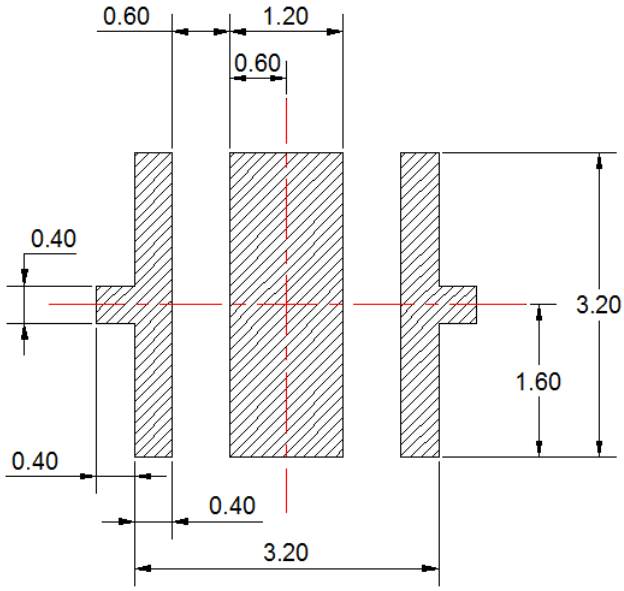
1. Drawing is not to scale
2. All dimensions are in millimeter
3. Dimensions are ±0.13mm unless otherwise indicated

Recommended Solder Pad Design

Recommended Soldering Pad Design



Recommended Stencil Pattern Design (Marked Area is Opening)

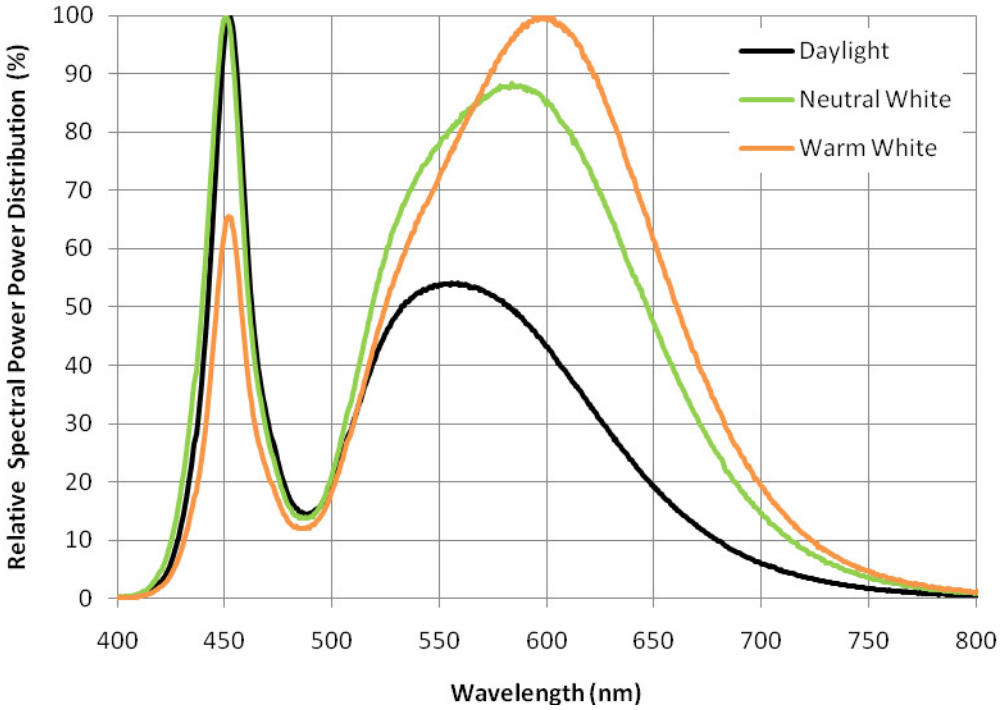


Notes :

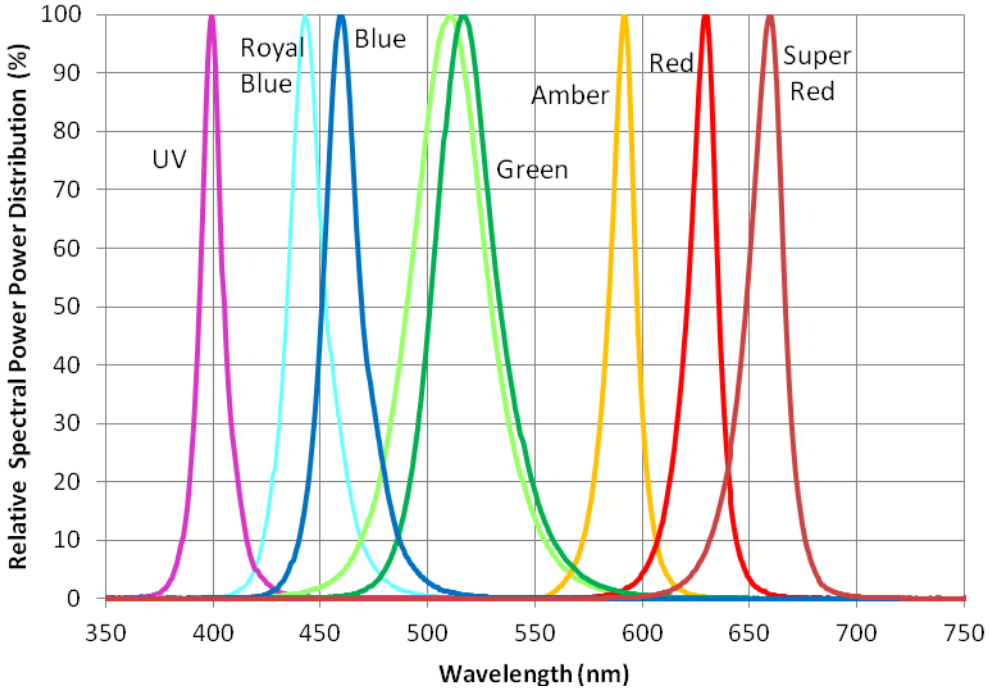
1. Drawing is not to scale
2. All dimensions are in millimeter

Relative Spectral Power Distribution, Tj=25˚C

White

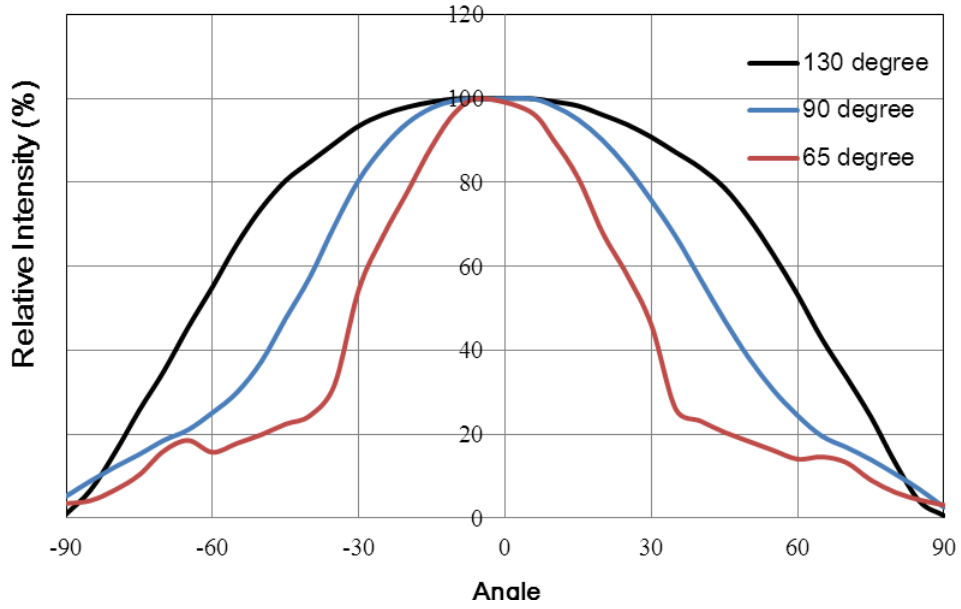


Royal Blue / Blue / Cyan / Green / Amber / Red / Super Red

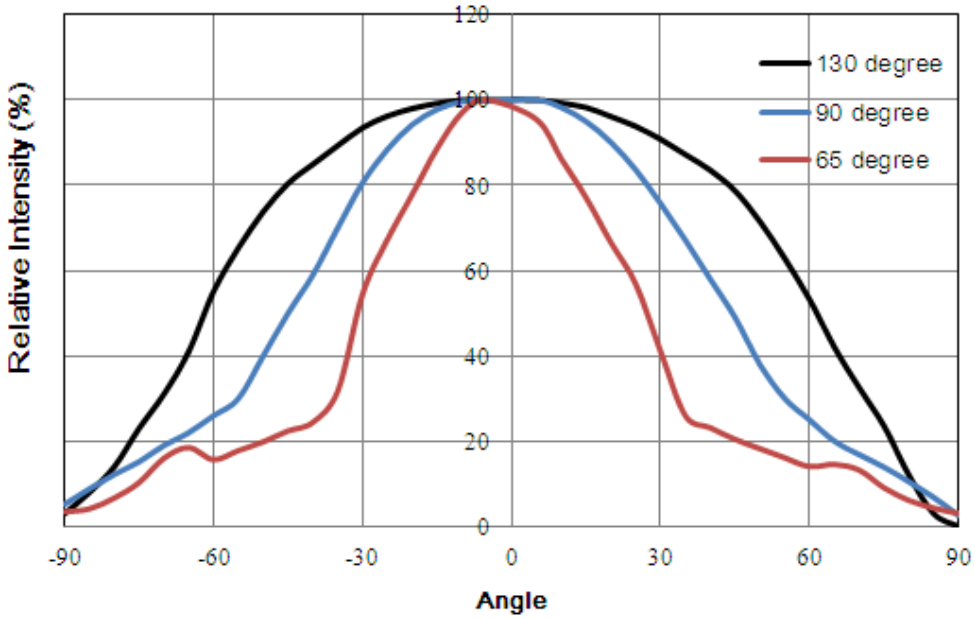


Typical Spatial Radiation Pattern

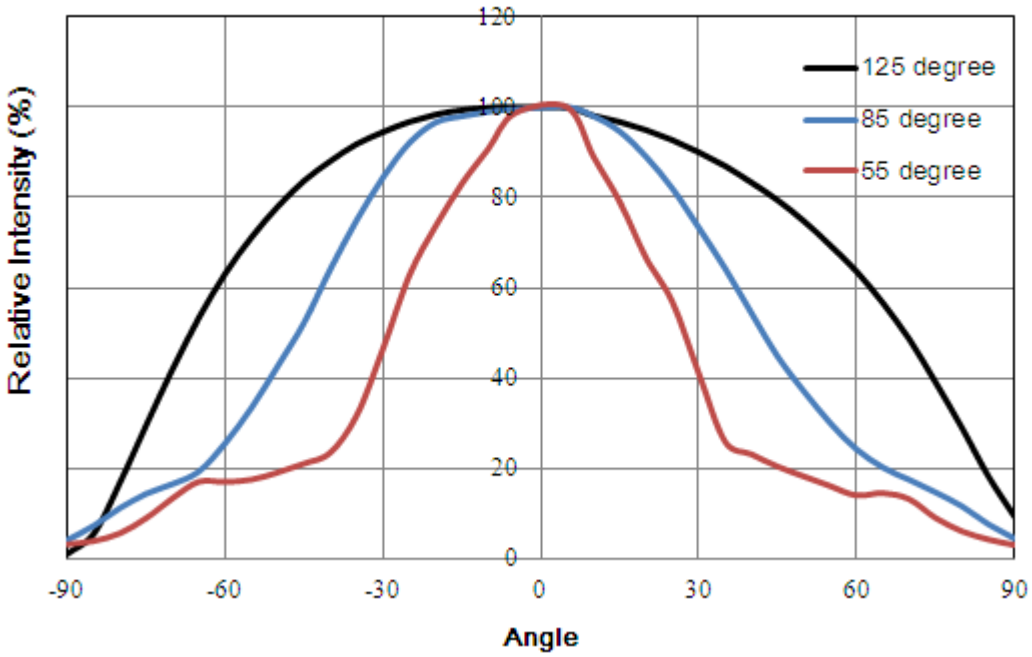
White



Royal Blue / Blue/ Green / Cyan

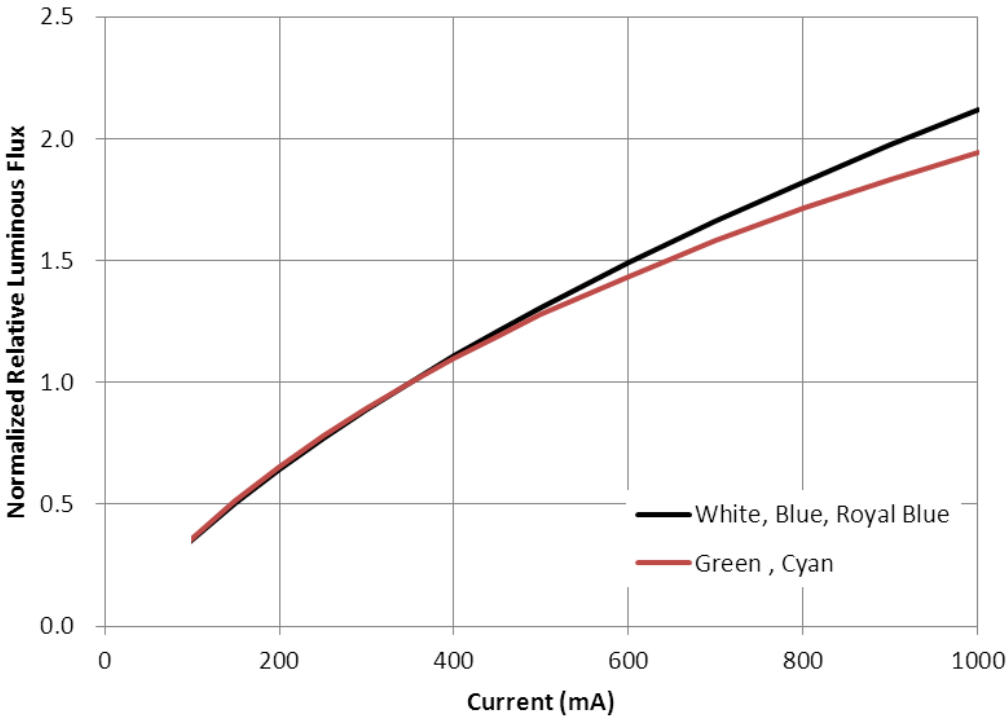


Amber / Red / Super Red

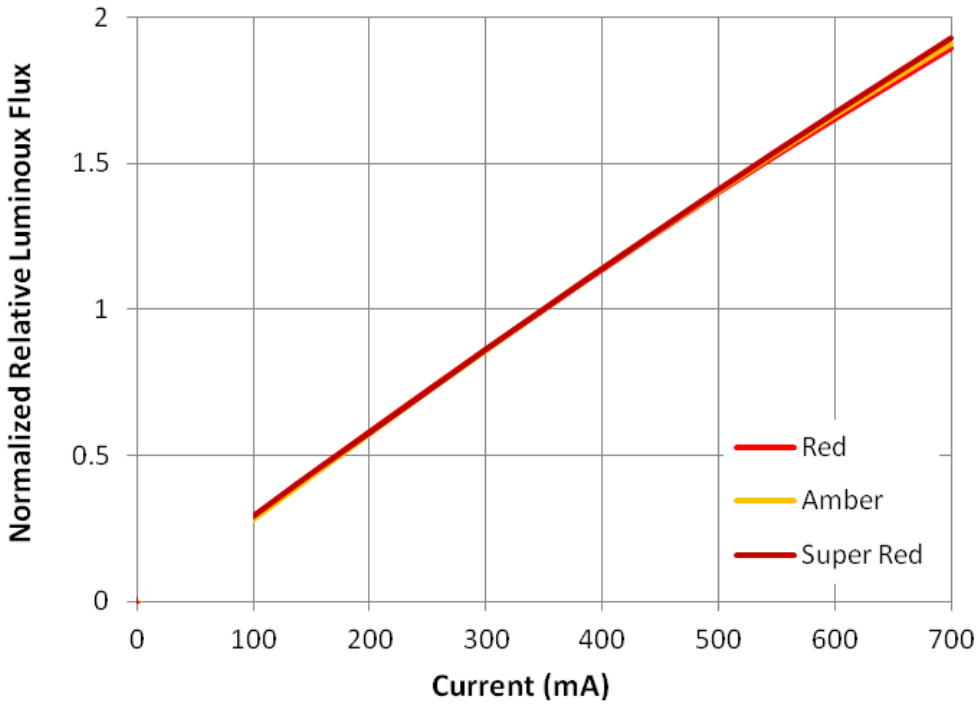


Typical Forward L-I Characteristics, Tj=25 ℃

White Series / Blue / Royal Blue / Green / Cyan

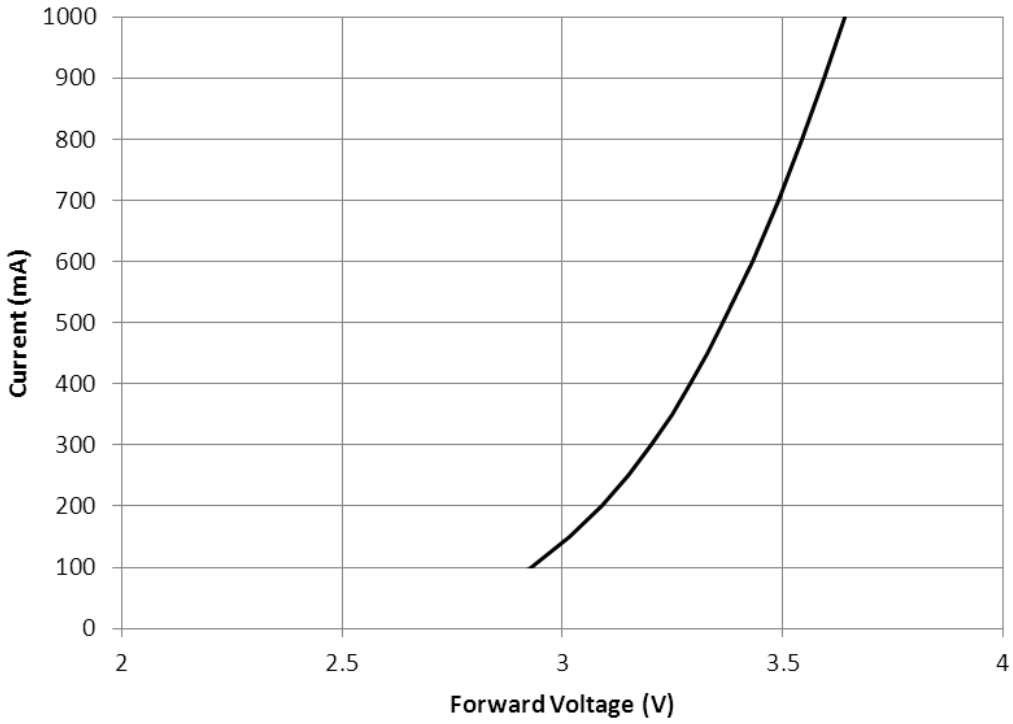


Amber / Red / Super Red

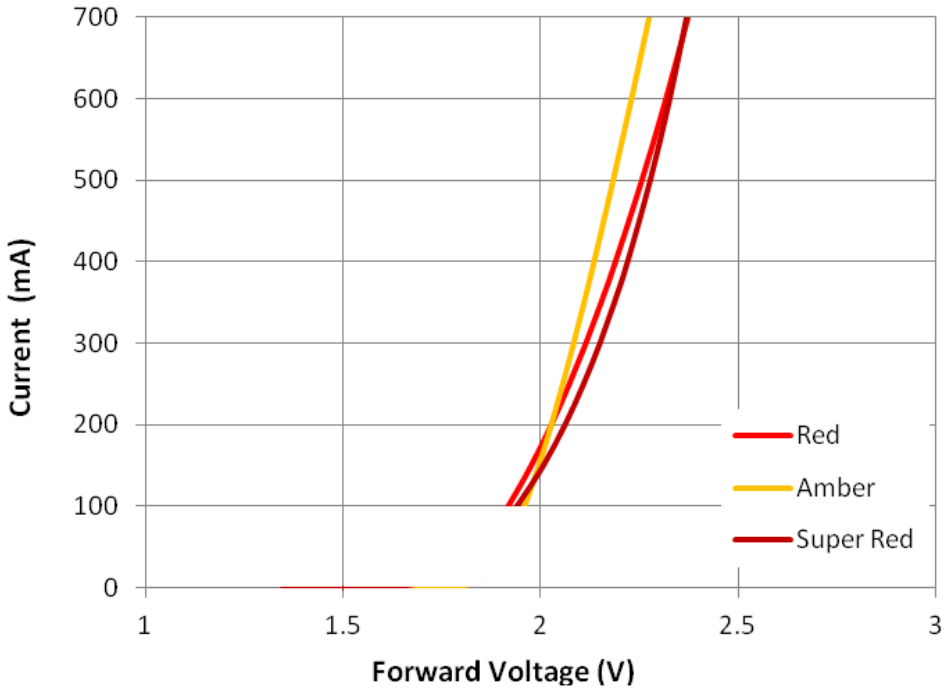


Typical Forward I-V Characteristics, Tj=25 ℃

White Series / Blue / Royal Blue / Green / Cyan

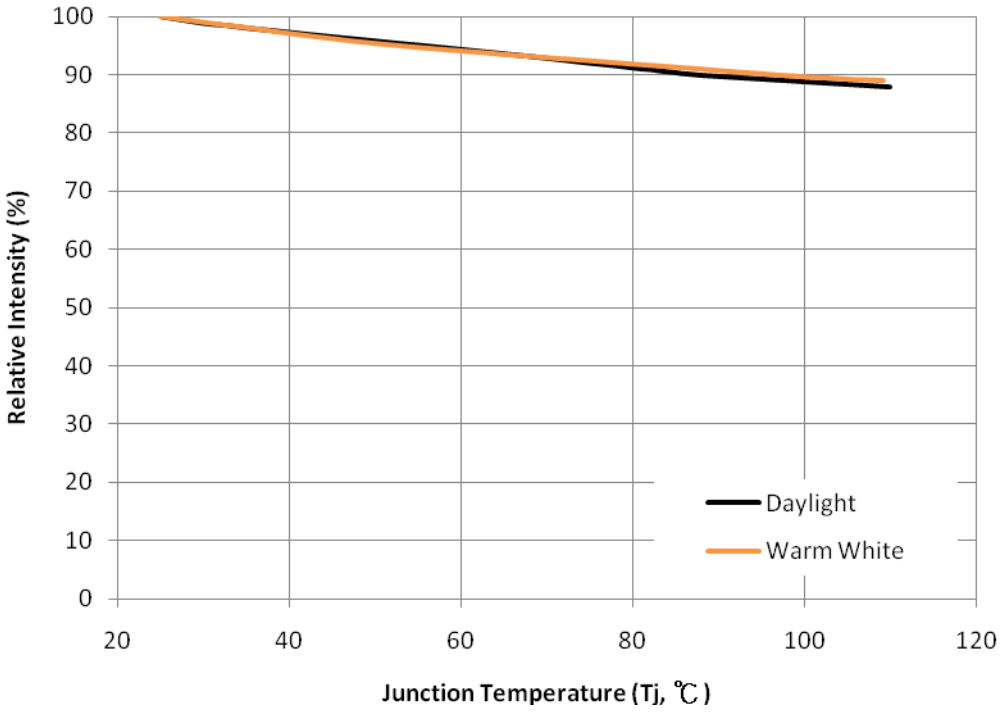


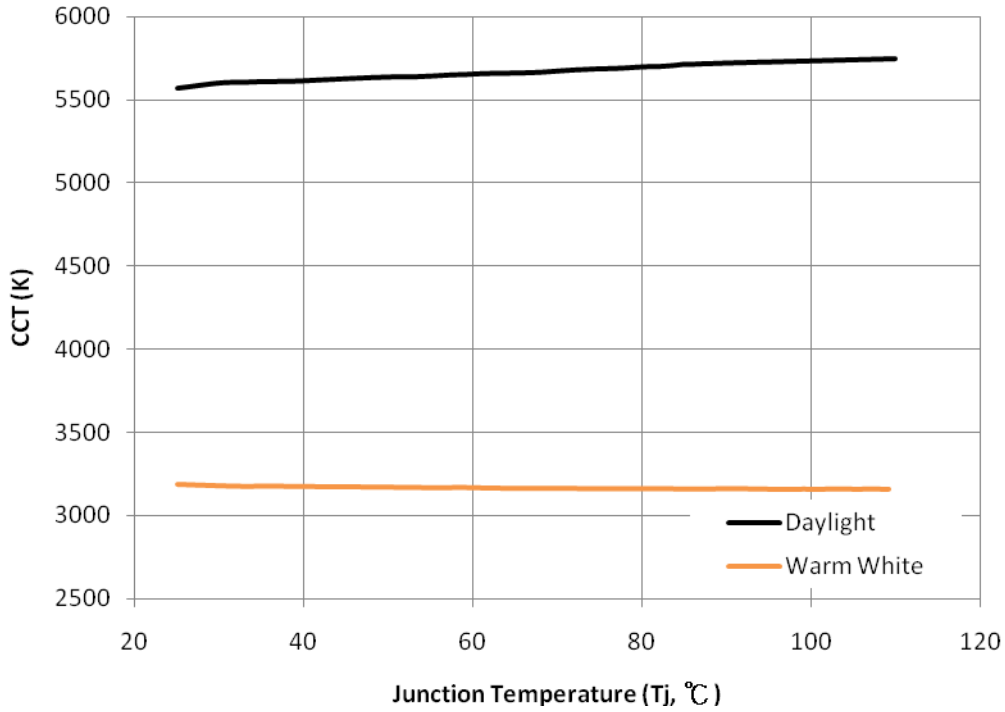
Amber / Red / Super Red



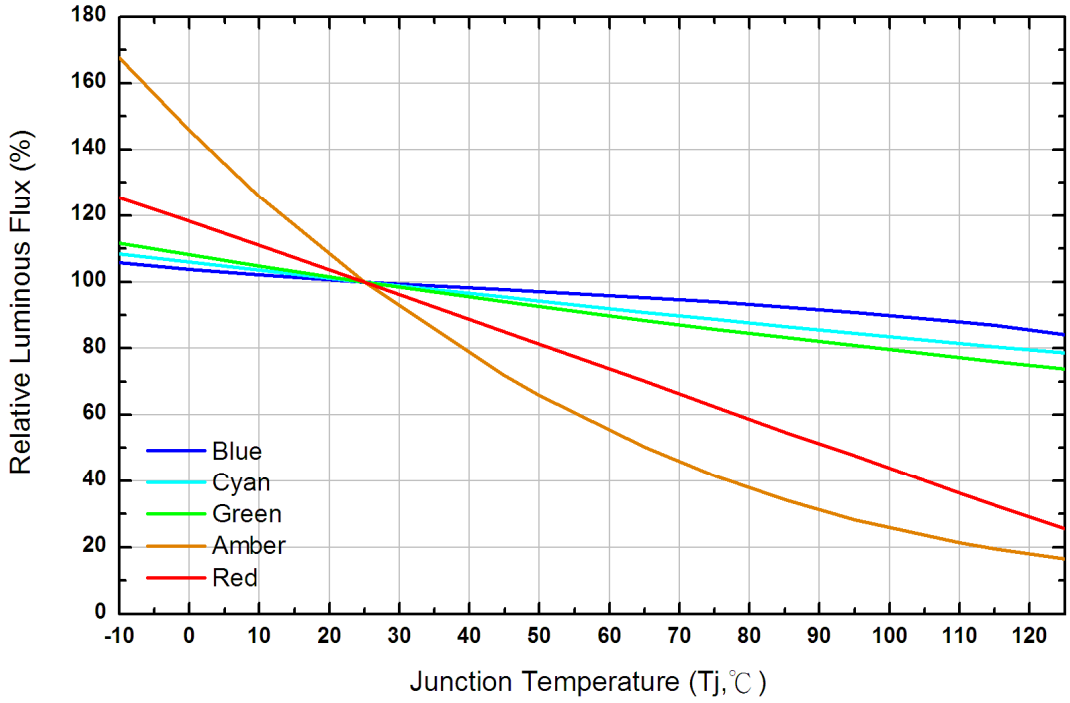
Typical L-Tj Characteristics

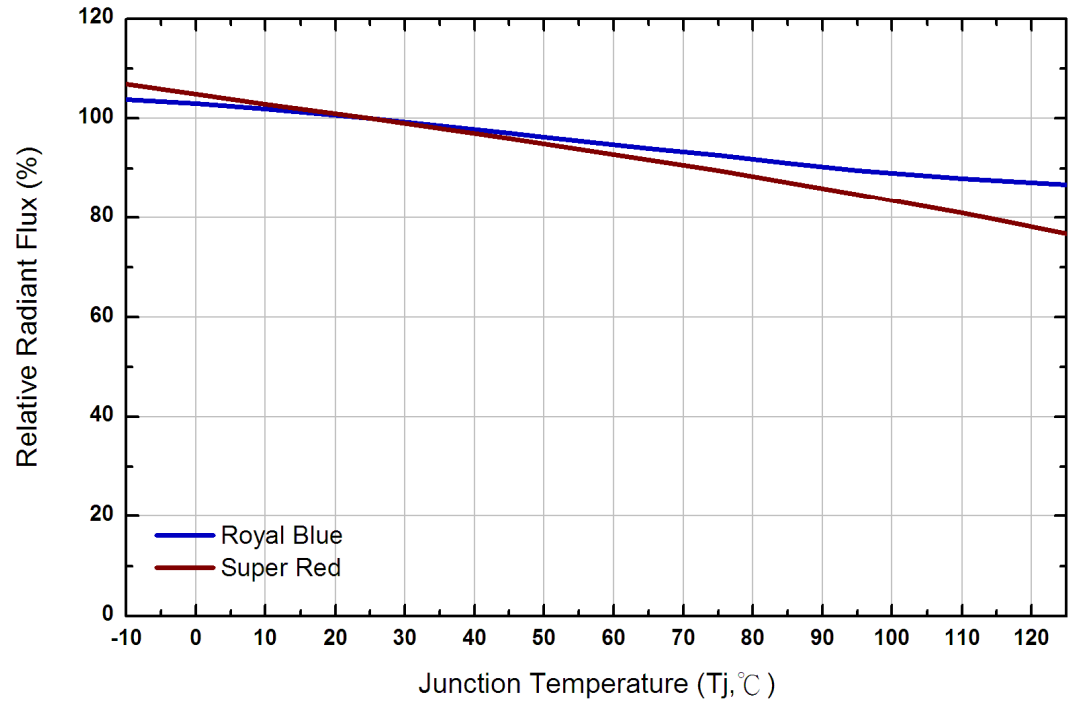
White Series

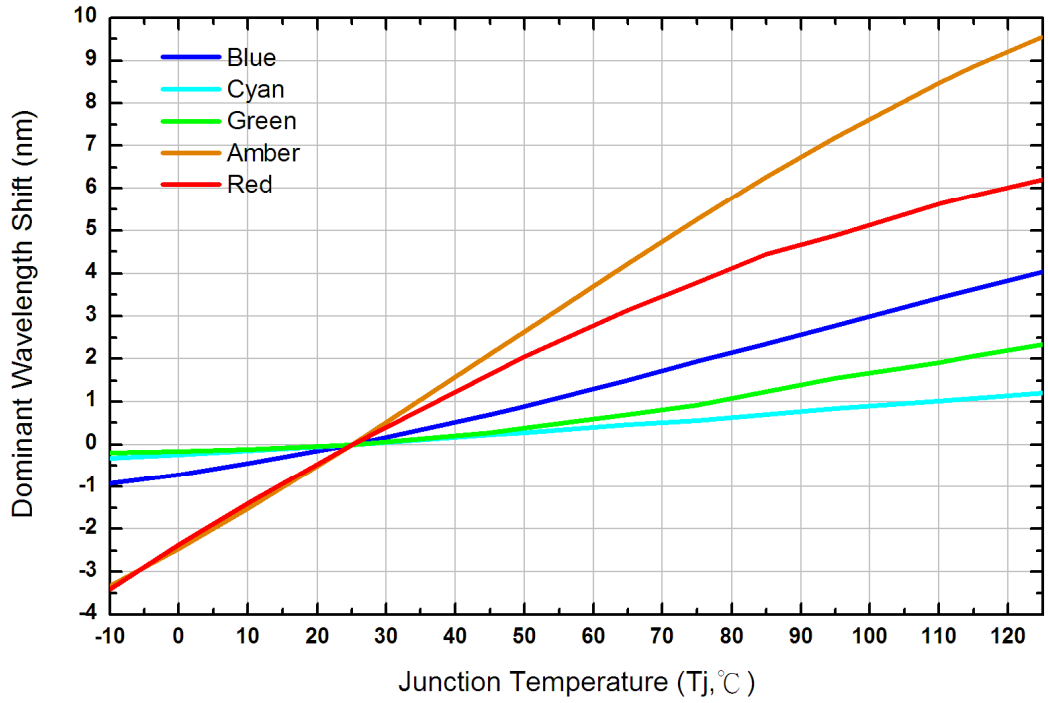


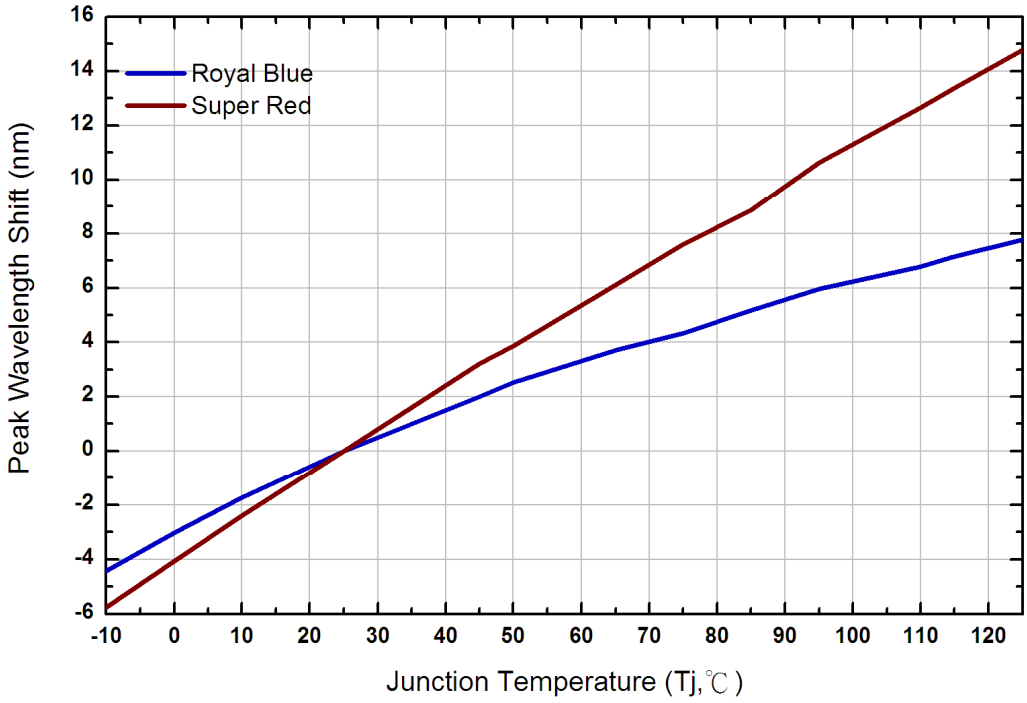


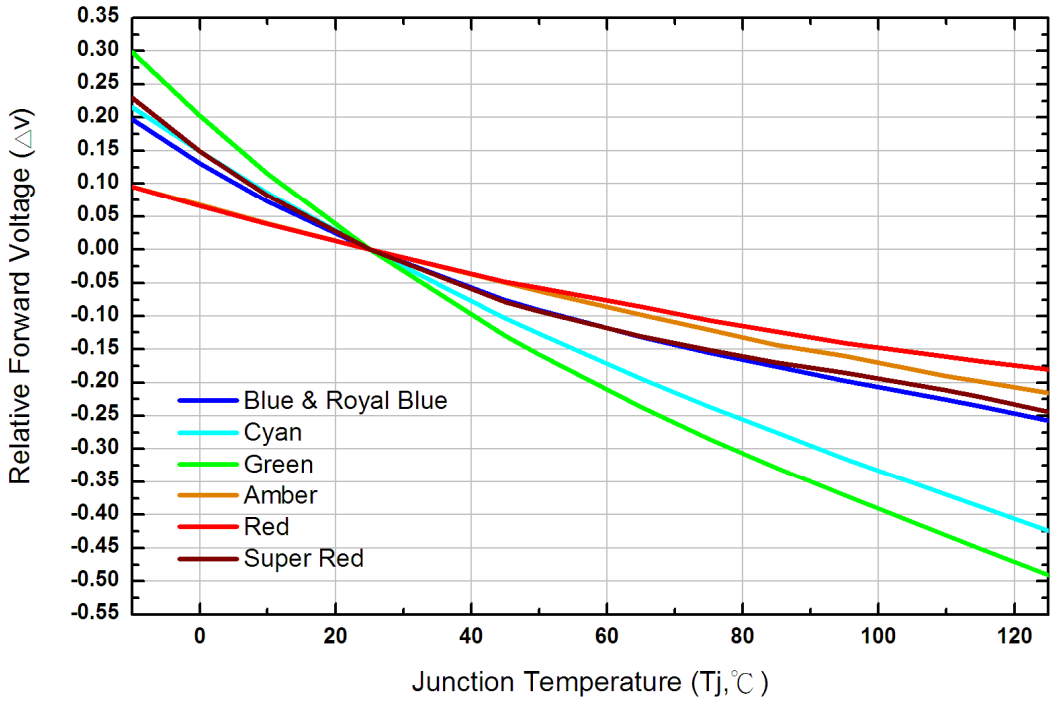
Blue / Royal Blue / Green / Cyan/ Amber / Red / Super Red





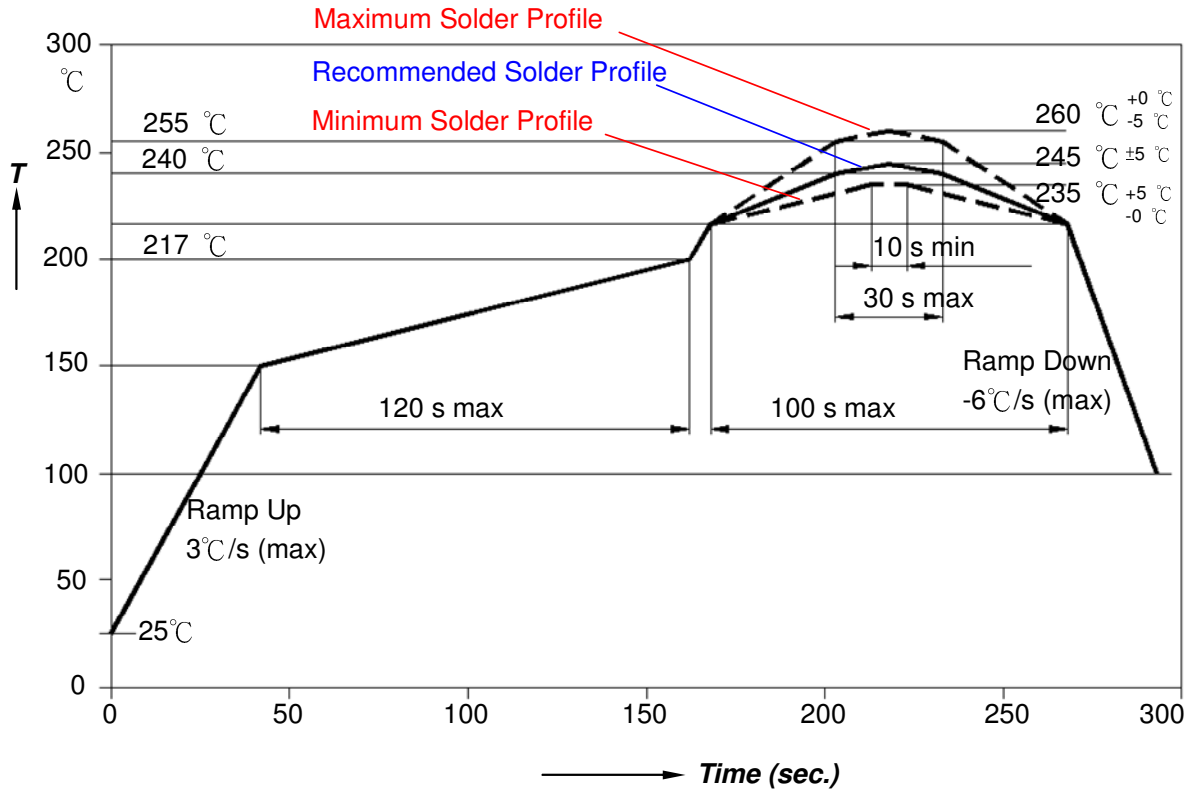






Recommended Soldering Profile

The LEDs can be soldered using the parameters listed below. As a general guideline, the users are suggested to follow the recommended soldering profile provided by the manufacturer of the solder paste. Although the recommended soldering conditions are specified in the list, reflow soldering at the lowest possible temperature is advised for the LEDs.

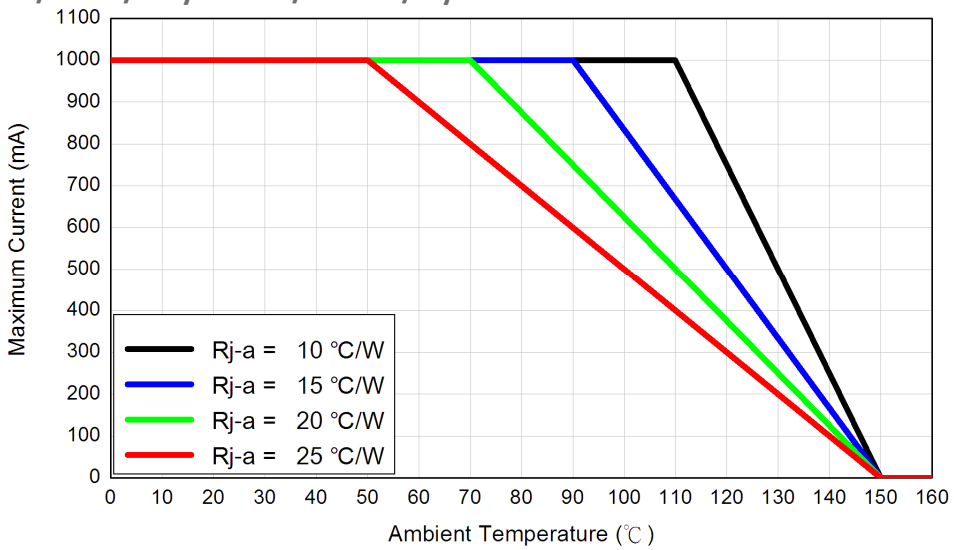


Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-up Rate (Ts_{max} to Tp)	3°C /second max.	3°C /second max.
Preheat - Temperature Min(Ts_{min}) - Temperature Max(Ts_{max}) - Time(ts_{min} to ts_{max})	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: - Temperature(T_L) - Time(t_L)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak/classification Temperature(Tp)	215°C	260°C
Time within 5°C of actual Peak Temperature(tp)	10-30 seconds	20-40 seconds
Ramp-Down Rate	6°C /second max.	6°C /second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

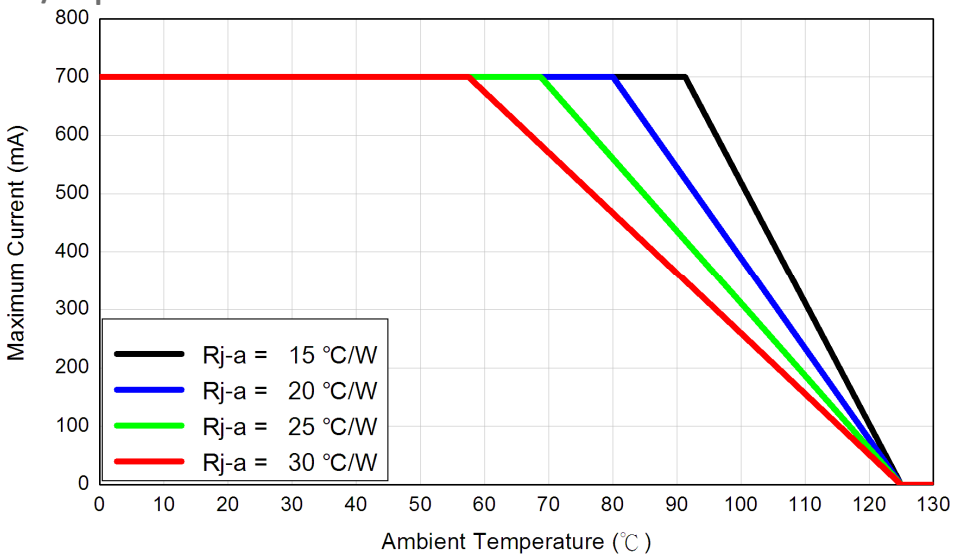
Thermal Design

Thermal design of the end product is important. The thermal resistance between the junction and the solder point and the end product should be designed to minimize the thermal resistance from the solder point to ambient in order to optimize the emitter life and optical characteristics. The maximum operation current is determined by the plot of Allowable Forward Current vs. Ambient Temperature.

White Series / Blue / Royal Blue / Green / Cyan



Amber / Red / Super Red



The junction temperature can be correlated to the thermal resistance between the junction and ambient (Rja) by the following equation.

$$Tj=Ta + Rja*W$$

Tj: LED junction temperature

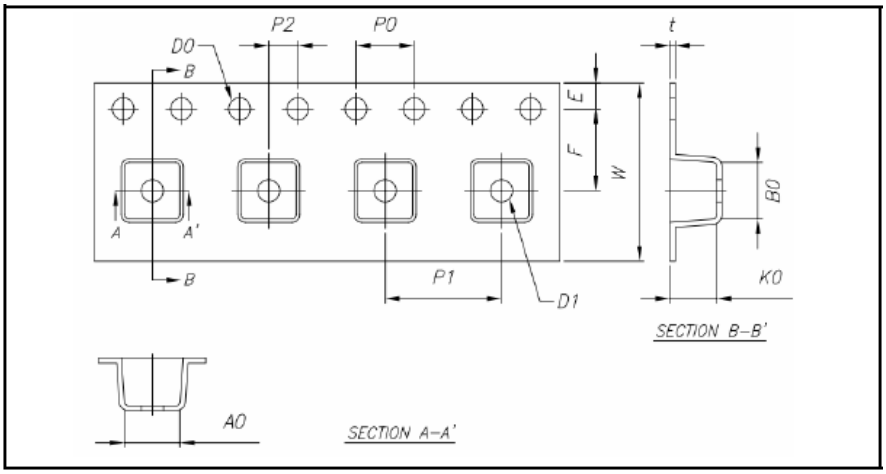
Ta: Ambient temperature

Rja: Thermal resistance between the junction and ambient

W: Input power (I_F*V_F)

Packing Information

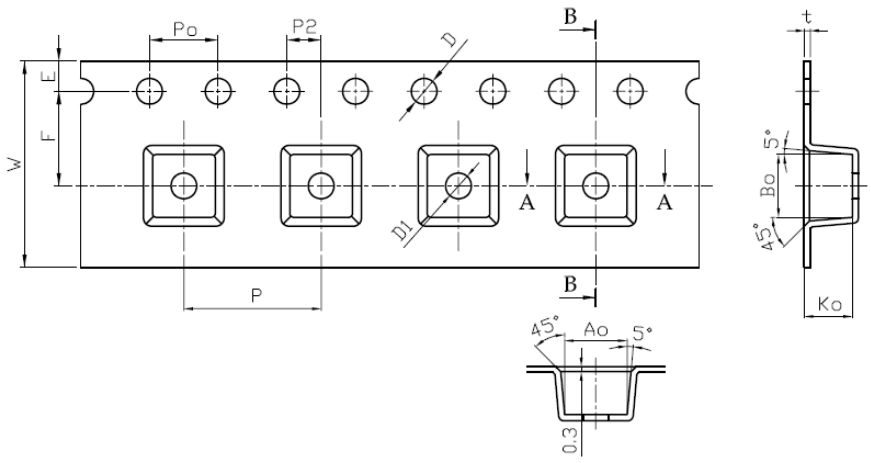
C3535L.C3535M series (beam angle 125°), Max QTY: 1000ea / roll



Item	Specification	Tol. (+/-)
W	12.00	± 0.30
E	1.75	± 0.10
F	5.50	± 0.10
D0	1.50	+0.10,-0
D1	1.50	+0.10,-0
P0	4.00	± 0.10
P1	8.00	± 0.10
P2	2.00	± 0.10
P0 x10	40.00	± 0.20

Item	Specification	Tol. (+/-)
t	**0.25**	**±0.05**
A0	**3.80**	**±0.10**
B0	**3.80**	**±0.10**
K0	**2.20**	**±0.10**

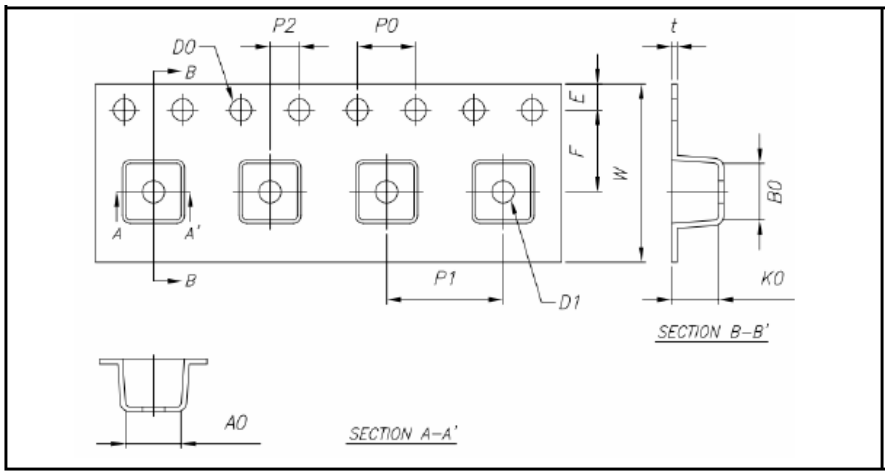
C3535L.C3535M series (beam angle 90°), Max QTY: 500ea / roll



外觀	規 格	公 差
W	12.00	±0.30
P	8.00	±0.10
E	1.75	±0.10
F	5.50	±0.10
P2	2.00	±0.10
D	1.50	+0.10 −0.00
D1	1.50	±0.10
Po	4.00	±0.10
10Po	40.00	±0.20

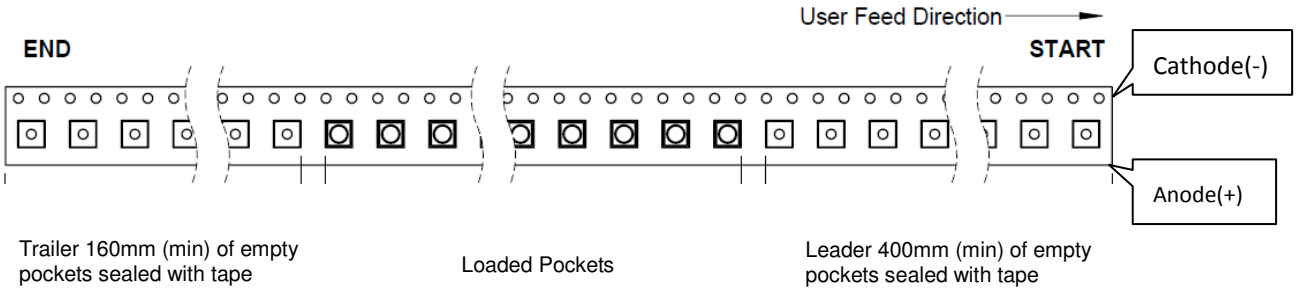
外觀	規 格	公 差
Ao	3.75	±0.10
Bo	3.75	±0.10
Ko	2.80	±0.10
t	0.35	±0.05

C3535L. C3535M series (beam angle 65°), Max QTY: 500ea / roll



Item	Specification	Tol. (+/-)
W	12.00	± 0.30
E	1.75	± 0.10
F	5.50	± 0.10
D0	1.50	+0.10,-0
D1	1.50	+0.10,-0
P0	4.00	± 0.10
P1	8.00	± 0.10
P2	2.00	± 0.10
P0 x10	40.00	± 0.20

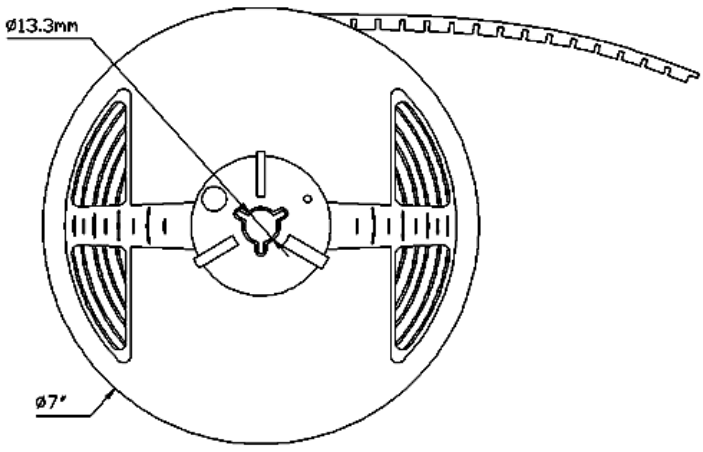
Item	Specification	Tol. (+/-)
t	0.35	±0.05
A0	3.80	±0.10
B0	3.80	±0.10
K0	3.20	±0.10



Trailer 160mm (min) of empty pockets sealed with tape

Loaded Pockets

Leader 400mm (min) of empty pockets sealed with tape



Note:

All dimensions are in millimeter.

About Us

TSLC Corporation is devoted to developing high-density, and multi-size emitters with powerful output to satisfy the needs of every customer.

TSLC Corporation is the leader in LED solutions. Unlimited design flexibility for interior and exterior spaces with high-end lighting effect; energy-efficient for UV curing to improve the quality of medical care; horticulture solutions create a better environment for everyone; high-intensity rotatable lightings for the entertainment industry, TSLC is always there for your lighting needs.

For further company or product information, please visit us at **www.tslc.com.tw** or please contact **sales@ tslc.com.tw.**

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