

TTSW SMD 1W Power Series

Technical Data Sheet Ver. 1.1

The TTSW SMD series is a surface-mount high-power device featuring high lumen combined with a compact size to fit all lighting application, commercial & industrial lighting.

The thermal pad is electrically isolated providing convenience in thermal & electrical design. it's one of the most promising device in Tectonic's high power product to be up against the challenges of today's high-power LED requirements

PRODUCT SPECIFICATION

Features

- Small package with high efficiency
- ESD protection up to 8KV
- Soldering method: SMT
- Binning Parameters: Brightness, Forward Voltage, Wavelength and Chromaticity
- Moisture Sensitivity Level: 1
- RoHS compliant
- Matches ANSI binning
- Reliability testing conforms to IESNA LM80 Lumen maintenance test method

Applications

- General Lighting
- Decorative and Entertainment Lighting
- Signal and Symbol Luminaries
- Exterior and Interior Automotive Illumination



**Environmental
Compliance**



TECTONIC USA, Inc.

ISO 9001:2000 Products RoHs Compliance

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PRODUCT NOMENCLATURE

The product name is designated as below:

TTSW – ABCDE – FGHIJ – V1234

Designation:

AB = min. luminous flux (lm) or radiation power (mW) performance

C = radiation pattern [1]

D = color [2]

E = power consumption [3]

F = reserved for future product offerings

G = chip source [4]

H = packaging type [5]

IJ = internal coding

V = forward voltage bin

1234 = color bin or CCT bin

Notes

1. Table of radiation patterns

Symbol	Description
1	Lambertian

2. Table of color offerings:

Symbol	Color	Dominant wavelength range
R	Red	620~630nm
O	Orange	610~620nm
Y	Amber	585~595nm
G	Green	520~535nm
B	Blue	460~470nm
C	Cool-White	4745~7050K
N	Neutral-White	3710~4745K
M	Warm-White	2580~3710K

3. Table of power consumptions:

Symbol	Description
1	1W

4. Table of chip sources:

Symbol	Description
L	Standard
S	Alternate Source for custom requests
C	Alternate Source for custom requests

5. Table of packaging types:

Symbol	Description
P	Tape
B	Tube



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
DC Forward Current (mA)	I_F	400	mA
Peak Pulse Current (mA)	I_{Pulse}	1000	mA
ESD Resistance	V_B	8000	V
Reverse Voltage	V_R	Note 2	V
Thermal Resistance	R_{th}	10 ~ 12	°C/W
Junction Temperature	T_J	150/135 ^[3]	°C
Operating Temperature	T_{Opr}	-40 ~ +135/120 ^[4]	°C
Storage Temperature	T_{Stg}	-40 ~ +100	°C
Soldering Temperature	T_{Sol}	260	°C
Allowable Reflow Cycles	n/a	3	cycles

Notes:

1. Maximum forward current for 1W is 400mA ($T_{Thermal Pad} = 25^\circ C$).
2. The Shwo series LEDs are not designed for reverse bias operation.
3. Thermal Resistance is 10°C/W for Blue, Green, and White LEDs and 12°C/W for Red, Orange, and Amber LEDs.
4. Maximum T_j is 150°C for Blue, Green, and White LEDs and 135°C for Red, Orange, and Amber LEDs.
5. Maximum Operating Temperature (Thermal Pad) is 135°C for Blue, Green, and White LEDs and 120°C for Red, Orange, and Amber LEDs.

JEDEC MOISURE SENSITIVITY

Level	Floor Life		Soak Requirements Standard	
	Time (hours)	Conditions	Time (hours)	Conditions
1	Unlimited	$\leq 30^\circ C / 85\% RH$	168 (+5/-0)	85° C / 85% RH





Luminous Flux Characteristics for the Shwo series

Color	Part Number	1W	
		Minimum Luminous Flux(lm) or Radiometric Power(mW) ^[1]	Drive Current (mA)
Cool White	TTSW – F81CX	80	350
	TTSW – F91CX	90	350
	*TTSW – J11CX	100	350
Neutral White	*TTSW – F71NX	70	350
	*TTSW – F81NX	80	350
	*TTSW – F91NX	90	350
Warm White	TTSW – F61MX	60	350
	TTSW – F71MX	70	350
	*TTSW – F81MX	80	350
Red	TTSW – F41RX	45	350
	TTSW – F51RX	52	350
Orange	TTSW – F41OX	45	350
	TTSW – F51OX	52	350
Amber	TTSW – F41YX	45	350
	TTSW – F51YX	52	350
	*TTSW – F61YX	60	350
Green	TTSW – F71GX	70	350
	*TTSW – F81GX	80	350
Blue	TTSW – E61BX	13	350
	*TTSW – E71BX	17	350

Notes:

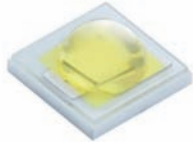
1. Luminous flux measurement tolerance: ±10%.
2. The data of luminous flux measured at thermal pad=25°C
3. Typical luminous flux or light output performance is operated within the condition guided by this datasheet.
4. Please contact sales for timing and availability of P/N's marked with an asterisk "**".





PN of the series: White LEDs

The table below is a list of part numbers for the Tectonic 1W series White LED. All parts listed match ANSI binning standards. Bin offerings of 6500K, 5700K, and 3000K are listed and currently available. CRI is also listed with a typical 75. These clearly listed binning options allow for proper design and implementation into lighting applications. The Order Codes below are currently available White Shwo LEDs.



Color	Radiation Pattern	CRI	CCT	Forward Voltage (V)	Minimum Luminous Flux (lm)
Cool White	Lambertian	75	57K-1 ~ 57K-2 ~ 57K-3 ~ 57K-4	2.95~3.25(V1) 3.25~3.55(V2) 3.55~3.85(V3)	80

White, at 350mA are listed below

Color	Order Code of TTSW	Minimum Luminous Flux (lm)	CCT (K) Wavelength (nm)	Forward Voltage (V)	CRI (Typical)
Cool White 6500	TTSW-F81C1-0LPGS-C6500	80	6500-1~6500-4	2.95~3.85	75
	TTSW-F91C1-0LPGS-C6500	90	6500-1~6500-4	2.95~3.85	75
Cool White 5700	TTSW-F81C1-0LPGS-C5700	80	5700-1~5700-4	2.95~3.85	75
	TTSW-F91C1-0LPGS-C5700	90	5700-1~5700-4	2.95~3.85	75
Warm White 3000	TTSW-F61M1-0LPGS-C3000	60	3000-1~3000-4	2.95~3.85	80
	TTSW-F71M1-0LPGS-C3000	70	3000-1~3000-4	2.95~3.85	80

Note: CRI measurement tolerance: ±5.

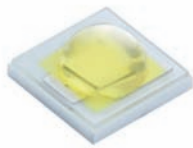




PN of the Color LEDs

The table below is a list of the binning options for the Everlight Shwo 1W series Color LED. Standard Tectonic color bins are listed according to wavelength and represent the standard primary colors of the spectrum. These clearly listed binning options allow for proper design and implementation into lighting applications. The Order Codes below are currently available Color Shwo LEDs.

For Example: If you order product using P/N **TTSW-F51R1-0LPNM-AR5R6**, you will be specifying:



Color Variant	Radiation Pattern	Dominant Wavelength (nm)	Forward Voltage (V)	Minimum Luminous Flux (lm)
Red	Lambertian	620~625(R5) 625~630(R6)	1.75~2.05(U1) 2.05~2.35(U2) 2.35~2.65(U3)	52

Color, LEDs at 350mA are listed below.

Color	Order Code of TTSW	Minimum Luminous Flux (lm)	Wavelength (nm)	Forward Voltage(V)
Red	TTSW-F41R1-0LPNM-AR5R6	45	620~630	1.75~2.65
	TTSW-F51R1-0LPNM-AR5R6	52	620~630	1.75~2.65
Orange	TTSW-F41O1-0LPNM-AR3R4	45	610~620	1.75~2.65
	TTSW-F51O1-0LPNM-AR3R4	52	610~620	1.75~2.65
Amber	TTSW-F41Y1-0LPNM-AA3A5	45	585~592.5	1.75~2.65
	TTSW-F51Y1-0LPNM-AA3A5	52	585~592.5	1.75~2.65
	TTSW-F41Y1-0LPNM-AA4A6	45	587.5~595	1.75~2.65
	TTSW-F51Y1-0LPNM-AA4A6	52	587.5~595	1.75~2.65
Green	TTSW-F71G1-0LPNM-CG1G2	70	520~530	2.95~3.85
	*TTSW-F81G1-0LPNM-CG1G2	80	520~530	2.95~3.85
	TTSW-F71G1-0LPNM-CG2G3	70	525~535	2.95~3.85
	*TTSW-F81G1-0LPNM-CG2G3	80	525~535	2.95~3.85
Blue	TTSW-E61B1-0LPNM-CB7B8	13	460~470	2.95~3.85
	*TTSW-E71B1-0LPNM-CB7B8	17	460~470	2.95~3.85

Note : Please contact sales for timing and availability of P/N's marked with an asterisk "**".





PRODUCT BINNING

Luminous Flux Bins

Group	Bin	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)
E	1	4	5
	2	5	6
	3	6	8
	4	8	10
	5	10	13
	6	13	17
	7	17	20
	8	20	23
	9	23	27
F	1	27	33
	2	33	39
	3	39	45
	4	45	52
	5	52	60
	6	60	70
	7	70	80
	8	80	90
	9	90	100

Group	Bin	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)
J	1	100	110
	2	110	120
	3	120	130
	4	130	140
	5	140	150
	6	150	160
	7	160	180
	8	180	200
	9	200	225
K	1	225	250
	2	250	275
	3	275	300
	4	300	325
	5	325	350
	6	350	375
	7	375	400
	8	400	425
	9	425	450
N	1	450	475
	2	475	500
	3	500	525

Note: Currently available brightness bins for White LEDs are highlighted and bolded.

RADIOMETRIC POWER BINS

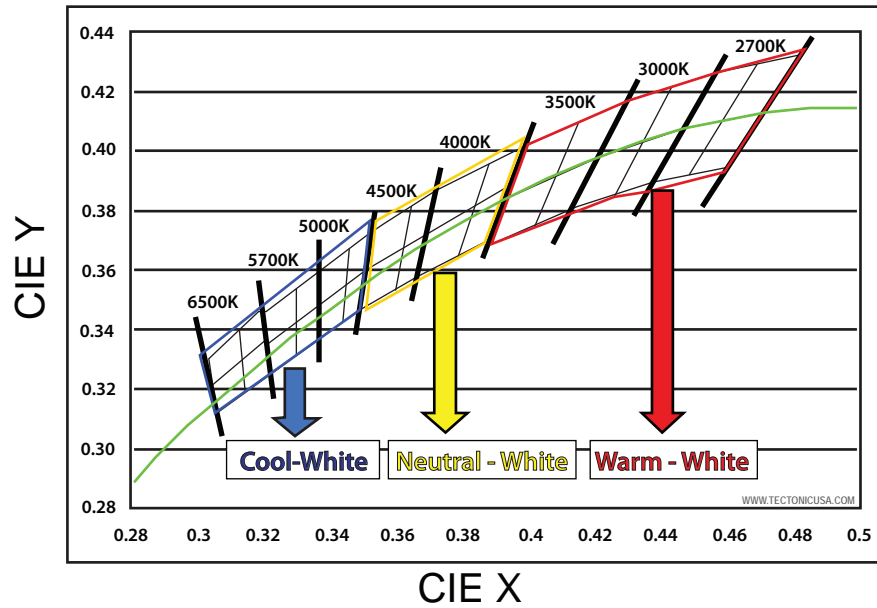
Group	Bin	Minimum Radiometric Power(mW)	Maximum Radiometric Power(mW)
Q	1	0	25
	2	25	50
	3	50	75
	4	75	100
	5	100	125
	6	125	175
	7	175	225
	8	225	275
	9	275	350

Group	Bin	Minimum Radiometric Power(mW)	Maximum Radiometric Power(mW)
R	1	350	425
	2	425	500
	3	500	600
	4	600	700
	5	700	800
	6	800	900
	7	900	1000
	8	1000	1300
	9	1300	1600





WHITE BIN STRUCTURE

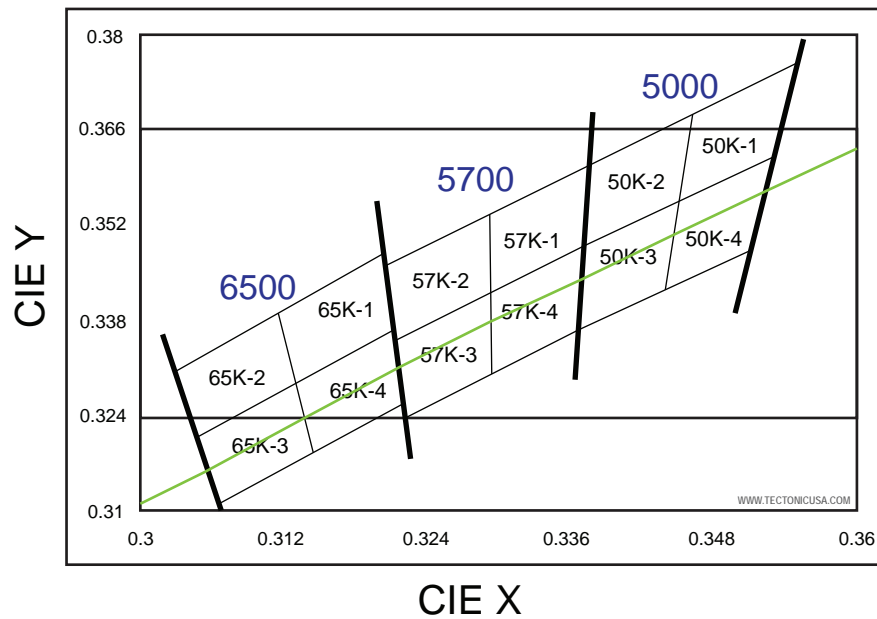


Chromaticity specification defined by ANSI

Notes:

1. The CCT range of Cool-White varies from 4745K to 7050K.
2. The CCT range of Neutral-White varies from 3710K to 4745K.
3. The CCT range of Warm-White varies from 2580K to 3710K
4. Color coordinates measurement allowance : ± 0.01
5. Color bins are defined at $I_F=350\text{mA}$ operation.

COOL-WHITE BIN STRUCTURE





COOL-WHITE BIN COORDINATES

5000K

Bin	CIE X	CIE Y
50K-1	0.346	0.369
	0.345	0.356
	0.353	0.362
	0.355	0.376
Reference Range: 4745~5000K		

Bin	CIE X	CIE Y
50K-2	0.338	0.362
	0.337	0.349
	0.345	0.356
	0.346	0.369
Reference Range: 5000~5310K		

Bin	CIE X	CIE Y
50K-4	0.345	0.356
	0.344	0.343
	0.352	0.349
	0.353	0.362
Reference Range: 4745~5000K		

Bin	CIE X	CIE Y
50K-3	0.337	0.349
	0.337	0.337
	0.344	0.343
	0.345	0.356
Reference Range: 5000~5310K		

5700K

Bin	CIE X	CIE Y
57K-1	0.329	0.354
	0.329	0.342
	0.337	0.349
	0.338	0.362
Reference Range: 5310~5700K		

Bin	CIE X	CIE Y
57K-2	0.321	0.346
	0.321	0.335
	0.329	0.342
	0.329	0.354
Reference Range: 5700~6020K		

Bin	CIE X	CIE Y
57K-4	0.329	0.342
	0.329	0.331
	0.337	0.337
	0.337	0.349
Reference Range: 5310~5700K		

Bin	CIE X	CIE Y
57K-3	0.321	0.335
	0.322	0.324
	0.329	0.331
	0.329	0.342
Reference Range: 5700~6020K		

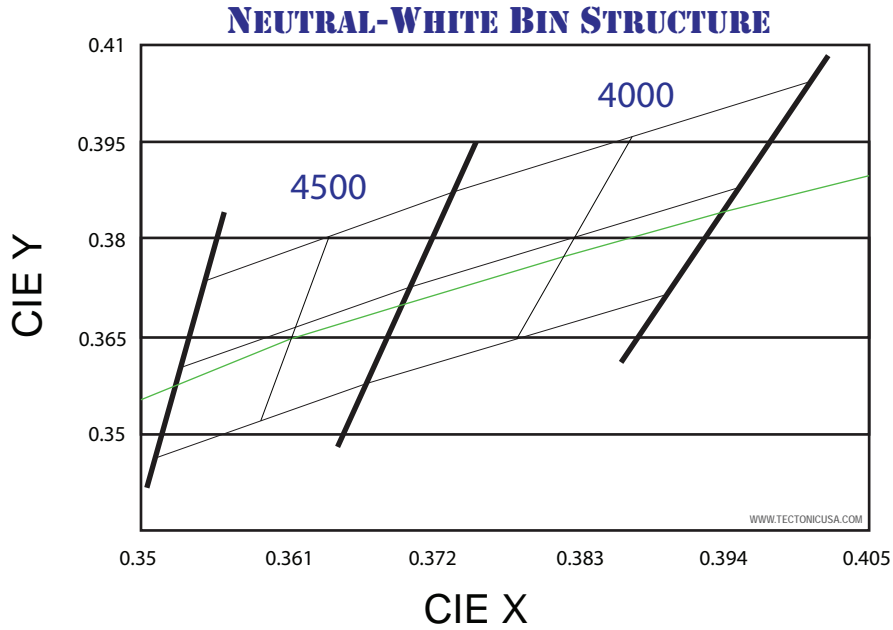
6500K

Bin	CIE X	CIE Y
65K-1	0.312	0.339
	0.313	0.329
	0.321	0.337
	0.321	0.348
Reference Range: 6020~6500K		

Bin	CIE X	CIE Y
65K-2	0.303	0.330
	0.305	0.321
	0.313	0.329
	0.312	0.339
Reference Range: 6500~7050K		

Bin	CIE X	CIE Y
65K-4	0.313	0.329
	0.314	0.319
	0.322	0.326
	0.321	0.337
Reference Range: 6020~6500K		

Bin	CIE X	CIE Y
65K-3	0.305	0.321
	0.307	0.311
	0.314	0.319
	0.313	0.329
Reference Range: 6500~7050K		



NEUTRAL-WHITE BIN COORDINATES

4000K

Bin	CIE X	CIE Y
40K-1	0.387	0.396
	0.383	0.380
	0.395	0.388
	0.401	0.404
Reference Range: 3710~4000K		

Bin	CIE X	CIE Y
40K-2	0.374	0.387
	0.370	0.373
	0.383	0.380
	0.387	0.396
Reference Range: 4000~4260K		

Bin	CIE X	CIE Y
40K-4	0.383	0.380
	0.378	0.365
	0.390	0.372
	0.395	0.388
Reference Range: 3710~4000K		

Bin	CIE X	CIE Y
40K-3	0.370	0.373
	0.367	0.358
	0.378	0.365
	0.383	0.380
Reference Range: 4000~4260K		

4500K

Bin	CIE X	CIE Y
45K-1	0.364	0.381
	0.362	0.366
	0.370	0.373
	0.374	0.387
Reference Range: 4260~4500K		

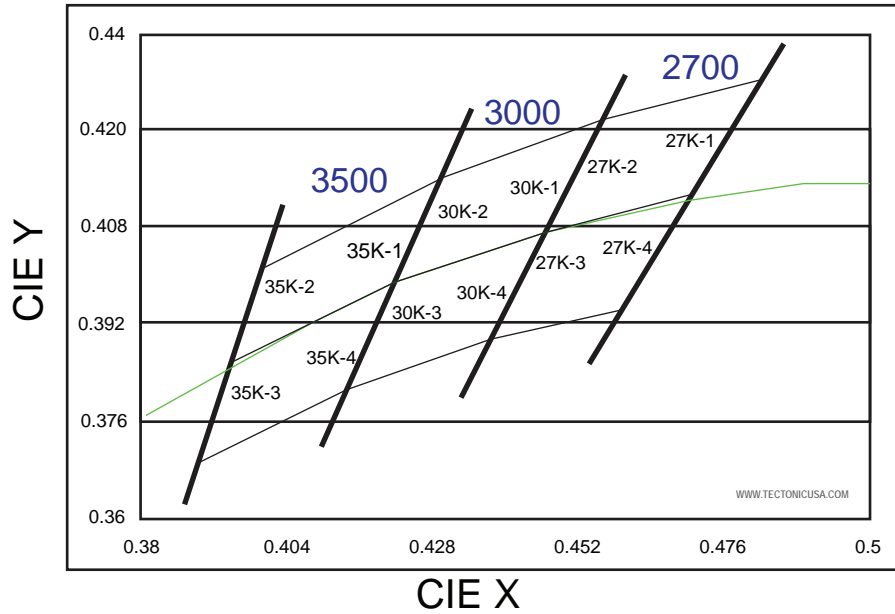
Bin	CIE X	CIE Y
45K-2	0.355	0.374
	0.353	0.360
	0.362	0.366
	0.364	0.381
Reference Range: 4500~4745K		

Bin	CIE X	CIE Y
45K-4	0.362	0.366
	0.359	0.352
	0.367	0.358
	0.370	0.373
Reference Range: 4260~4500K		

Bin	CIE X	CIE Y
45K-3	0.353	0.360
	0.351	0.347
	0.359	0.352
	0.362	0.366
Reference Range: 4500~4745K		



WARM-WHITE BIN STRUCTURE



Warm-White Bin Coordinates

2700K

Bin	CIE X	CIE Y
27K-1	0.469	0.429
	0.459	0.410
	0.470	0.413
	0.481	0.432
Reference Range: 2580~2700K		

Bin	CIE X	CIE Y
27K-2	0.456	0.426
	0.447	0.408
	0.459	0.410
	0.469	0.429
Reference Range: 2700~2870K		

Bin	CIE X	CIE Y
27K-4	0.459	0.410
	0.448	0.392
	0.459	0.394
	0.470	0.413
Reference Range: 2580~2700K		

Bin	CIE X	CIE Y
27K-3	0.447	0.408
	0.437	0.389
	0.448	0.392
	0.459	0.410
Reference Range: 2700~2870K		

3000K

Bin	CIE X	CIE Y
30K-1	0.443	0.421
	0.435	0.403
	0.447	0.408
	0.456	0.426
Reference Range: 2870~3000K		

Bin	CIE X	CIE Y
30K-2	0.430	0.417
	0.422	0.399
	0.435	0.403
	0.443	0.421
Reference Range: 3000~3220K		

Bin	CIE X	CIE Y
30K-4	0.435	0.403
	0.426	0.385
	0.437	0.389
	0.447	0.408
Reference Range: 2870~3000K		

Bin	CIE X	CIE Y
30K-3	0.422	0.399
	0.415	0.381
	0.426	0.385
	0.435	0.403
Reference Range: 3000~3220K		



3500K

Bin	CIE X	CIE Y
35K-1	0.415	0.409
	0.408	0.392
	0.422	0.399
	0.430	0.417
Reference Range: 3220~3500K		

Bin	CIE X	CIE Y
35K-2	0.400	0.402
	0.394	0.385
	0.408	0.392
	0.415	0.409
Reference Range: 3500~3710K		

Bin	CIE X	CIE Y
35K-4	0.408	0.392
	0.402	0.375
	0.415	0.381
	0.422	0.399
Reference Range: 3220~3500K		

Bin	CIE X	CIE Y
35K-3	0.394	0.385
	0.389	0.369
	0.402	0.375
	0.408	0.392
Reference Range: 3500~3710K		

Note: Currently available typical CCT ranges are 3000K, 5700K, and 6500K CCT.

Forward Voltage Bins

Group Name	Bins
A	U1+U2+U3
B	U2+U3+U4
C	V1+V2+V3
D	V2+V3+V4
E	V3+V4+V5
F	V1+V2
G	V1
H	U3+U4

Bin	Minimum Forward Voltage (V)	Maximum Forward Voltage (V)
U1	1.75	2.05
U2	2.05	2.35
U3	2.35	2.65
U4	2.65	2.95
V1	2.95	3.25
V2	3.25	3.55
V3	3.55	3.85
V4	3.85	4.15
V5	4.15	4.45

Notes:

1. Forward voltage measurement tolerance: $\pm 0.1V$.
2. Forward voltage bins are defined at $I_f=350mA$ operation.
3. Currently available Forward Voltage bins for White LEDs are highlighted and bolded.
4. Other Forward Voltage bins for White LEDs available upon request. Please contact us: info@tectonicusa.com for more info.



Color Bins

Group	Bin	Minimum Dominant Wavelength (nm)	Maximum Dominant Wavelength (nm)
B (Blue)	1	430	435
	2	435	440
	3	440	445
	4	445	450
	5	450	455
	6	455	460
	7	460	465
	8	465	470
G (Green)	1	520	525
	2	525	530
	3	530	535
	4	535	540
	5	540	545
	6	545	550
A (Amber)	1	580	582.5
	2	582.5	585
	3	585	587.5
	4	587.5	590
	5	590	592.5
	6	592.5	595
R (Red)	3	610	615
	4	615	620
	5	620	625
	6	625	630

Notes:

1. Dominant wavelength measurement tolerance: $\pm 0.5\text{nm}$.
2. Dominant wavelength bins are defined at $I_F=350\text{mA}$ operation.



Optical Characteristics

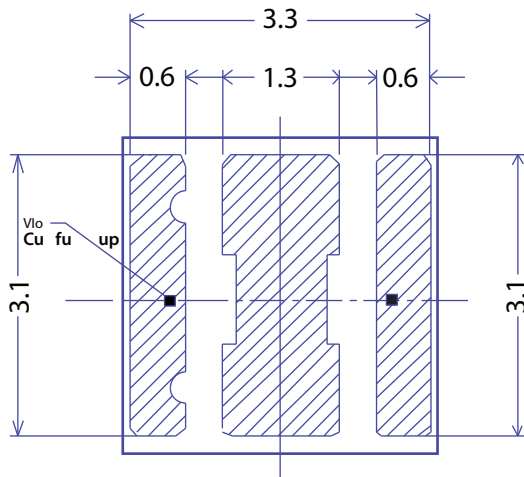
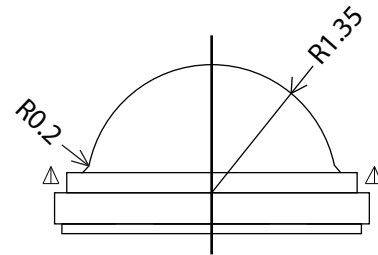
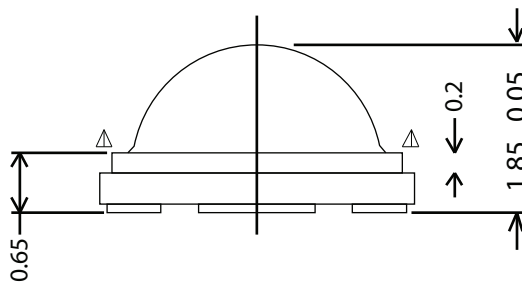
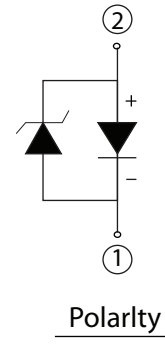
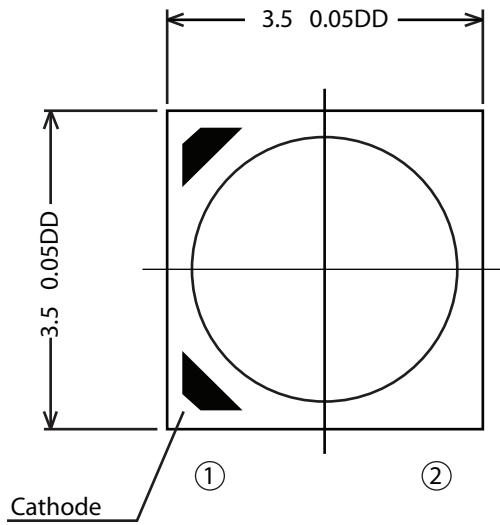
Color	Part Number	Dominant Wavelength λ_D Peak Wavelength λ_P Color Temperature CCT			Typical Temperature Coefficient of Dominant Wavelength (nm/°C)- $(\Delta\lambda_D/\Delta T_J)$	Typical Viewing Angle (degrees) $2\lambda_{1/2}$
		Min.	Typ.	Max.		
Cool-White	TTSW – XX1CX	4745K	5700K	7050K	---	130
Neutral-White	TTSW – XX1NX	3710K	4260K	4745K	---	130
Warm-White	TTSW – XX1MX	2580K	3000K	3710K	---	130
Red	TTSW – XX1RX	620nm	---	630nm	0.05	130
Orange	TTSW – XX1OX	610nm	---	620nm	0.08	130
Amber	TTSW – XX1YX	585nm	---	595nm	0.1	130
Green	TTSW – XX1GX	520nm	---	535nm	0.05	130
Blue	TTSW – XX1BX	460nm	---	470nm	0.05	130

Notes:

1. The test tolerance of Everlight is $\pm 0.5\text{nm}$ for dominant wavelength, $\pm 5\%$ for CCT.
2. Viewing angle is the width of half the light output intensity in all directions of 180° .
3. All Cool-White, Neutral-White, Warm-White, and dominant wavelength below 550nm LEDs are made with Indium Gallium Nitride (InGaN).
4. All LEDs with dominant wavelength exceeding 550nm are made with Aluminum Indium Gallium Phosphide (AlInGaP).



MECHANICAL DIMENSION



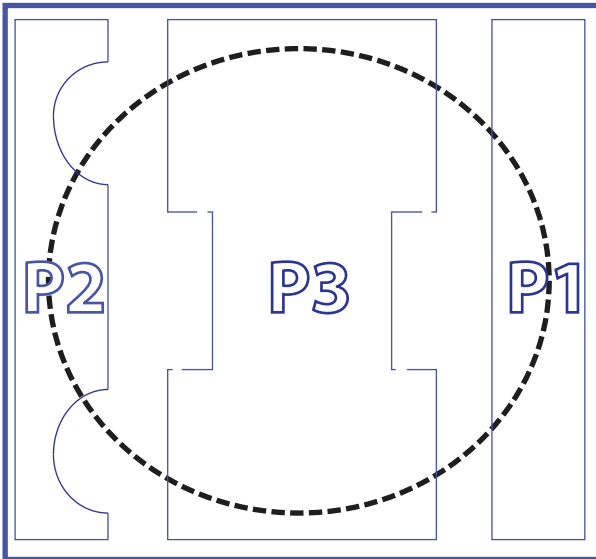
Bot. View

Notes:

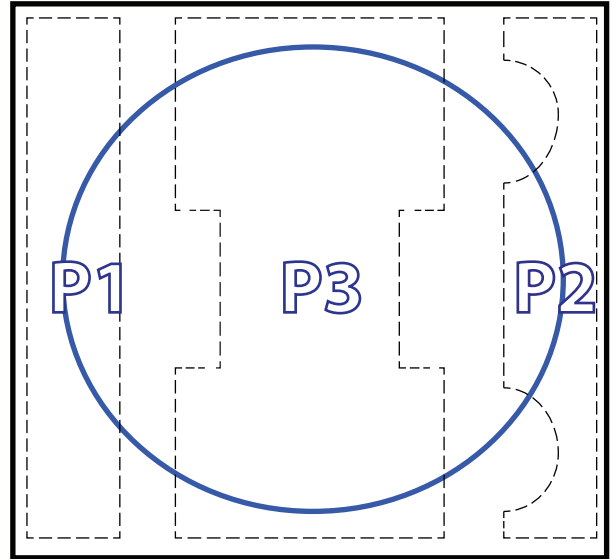
1. Dimensions are in millimeters.
2. Tolerances unless mentioned are ± 0.1 mm.
3. Do not handle the device by the lens. Incorrect force applied to the lens may lead to the failure of devices.
4. The thermal pad is electrically isolated from the Anode and Cathode contact pads.



PAD CONFIGURATION



BOTTOM VIEW



TOP VIEW

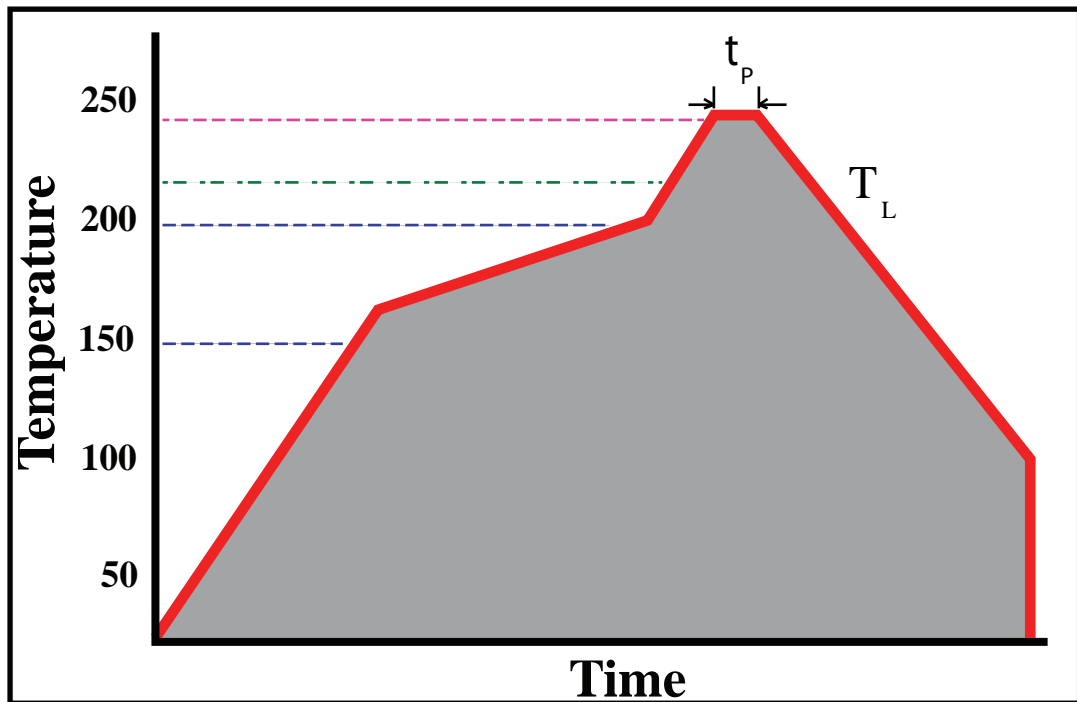
PAD	FUNCTION
P1	ANODE
P2	CATHODE
P3	THERMAL PAD



REFLOW SOLDERING CHARACTERISTICS

For Reflow Process

- a. TTSW series are suitable for SMT processes.
- b. Curing of glue in oven must be according to standard operation reflow processes.



Profile Feature	Lead Free Assembly
Ramp-Up Rate	2-3 C/S
Preheat Temperature	150-200 C
Preheat time (t _s)	60-120 S
Liquid Temperature (T _L)	217 C
Time maintained above T _L	60-90 S
Peak Temperature (T _P)	240 ±5C
Peak Time (t _p)	Max 20 S
Ramp-Down Rate	3-5 C/S

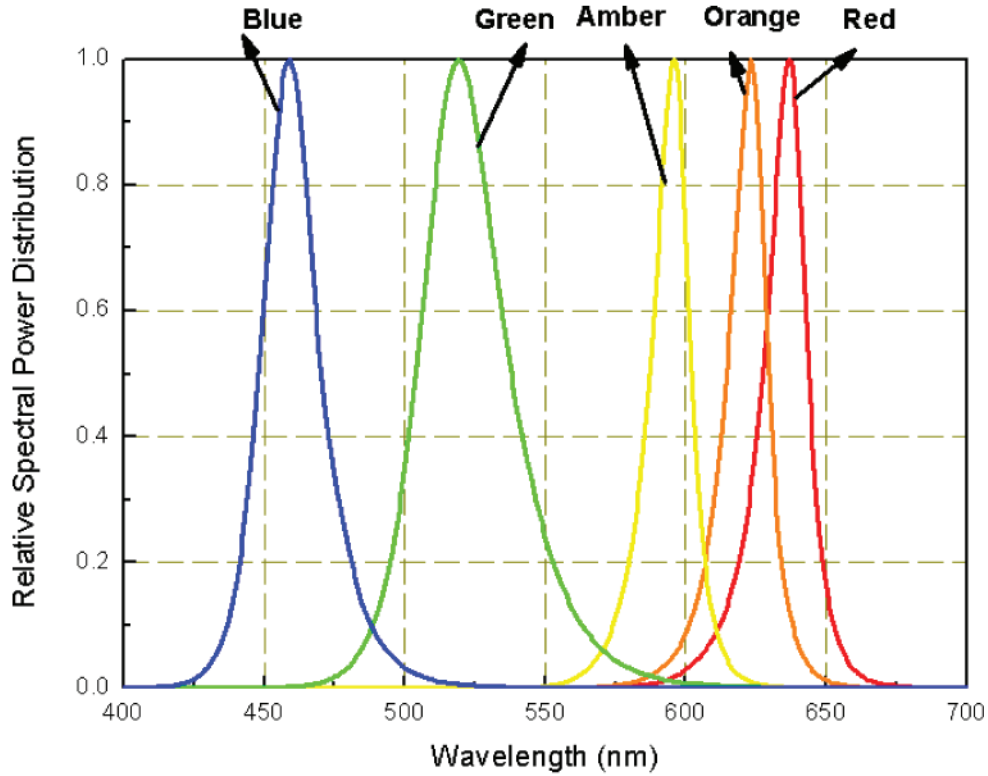
- c. Reflow soldering should not be done more than twice.
- d. In soldering process, stress on the LEDs during heating should be avoided.
- e. After soldering, do not bend the circuit board.



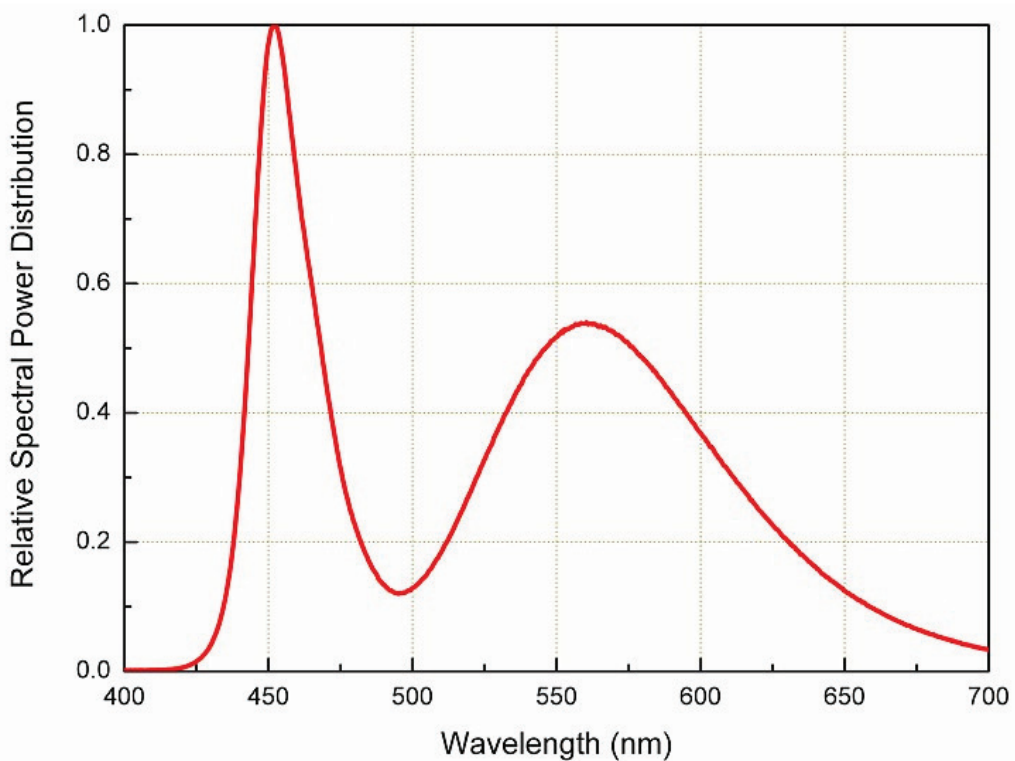
Wavelength Characteristics

For Red, Amber, Yellow, Green, Blue

@ Thermal Pad Temperature = 25 °C

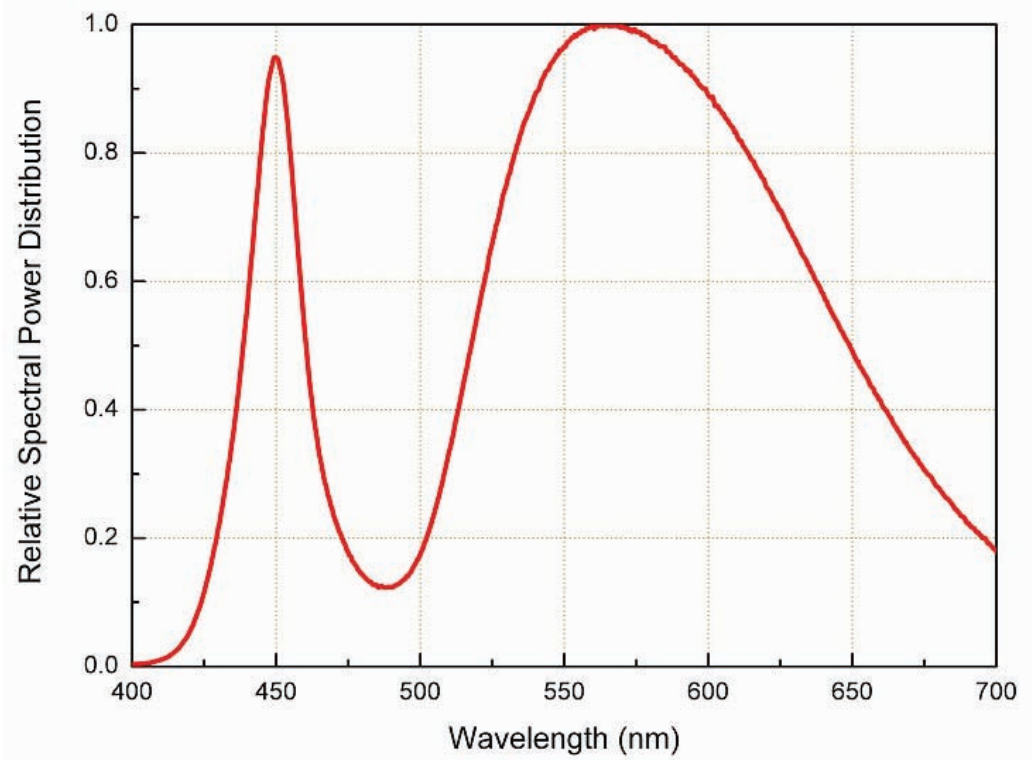


For Cool-White, @ Thermal Pad Temperature = 25 °C

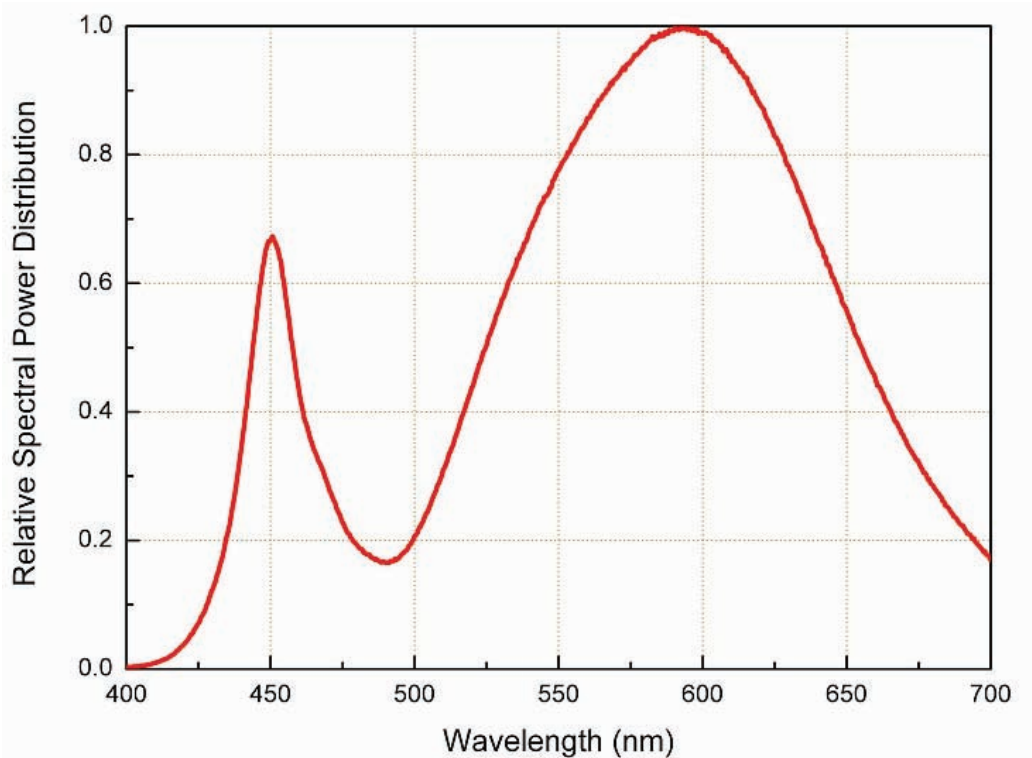




For Neutral-White, @ Thermal Pad Temperature = 25 °C



For Warm-White, @ Thermal Pad Temperature = 25 °C



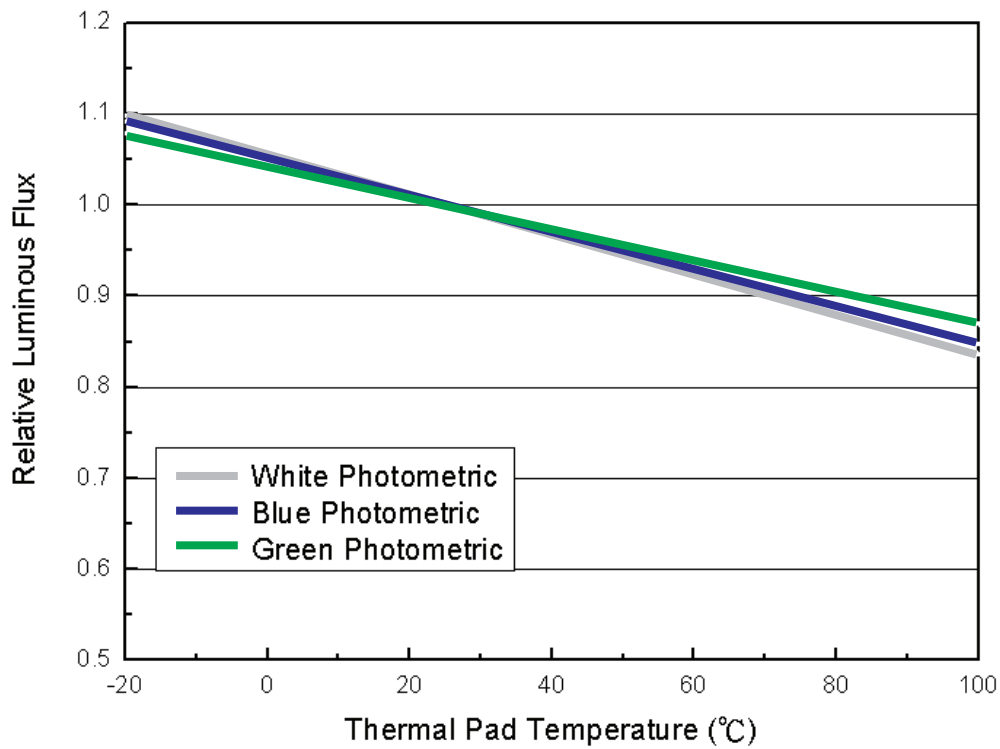


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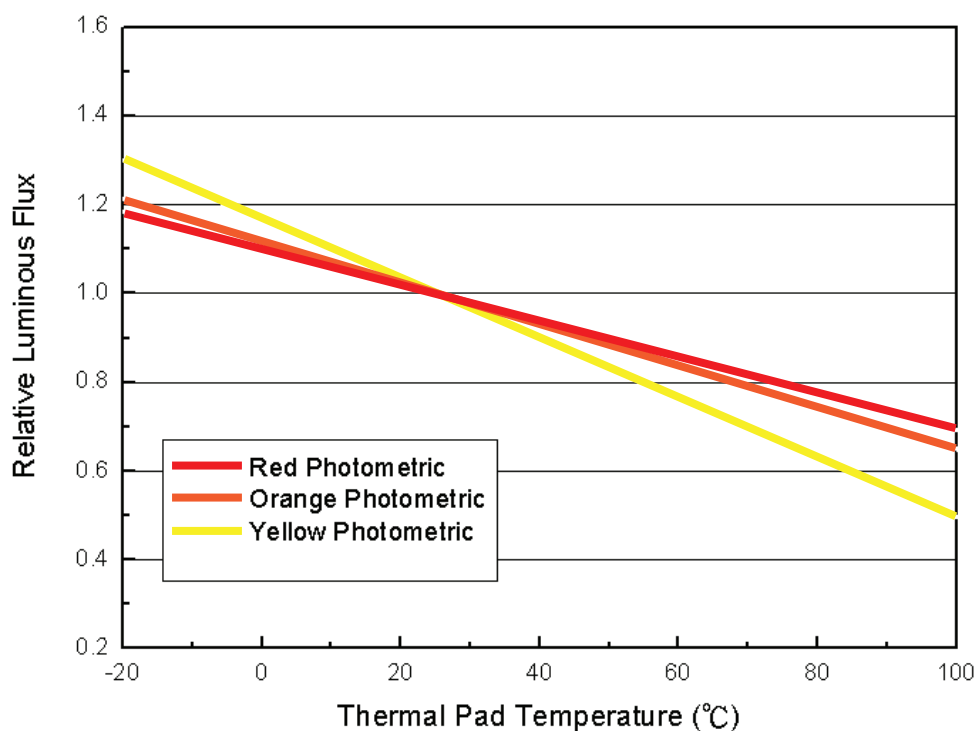
ISO 9001:2000 Products RoHS Compliance

Typical Light Output Characteristic vs. Thermal Pad Temperature

Cool-White, Neutral-White, Warm-White, Green, Blue
for 350mA Drive Current



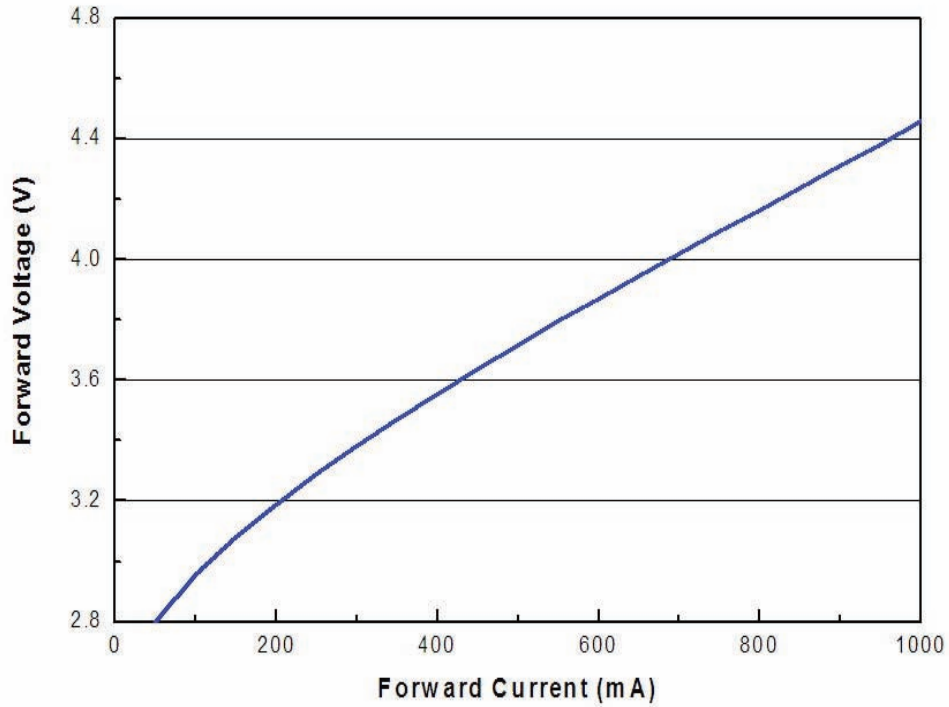
Red, Orange, Amber for 350mA Drive Current



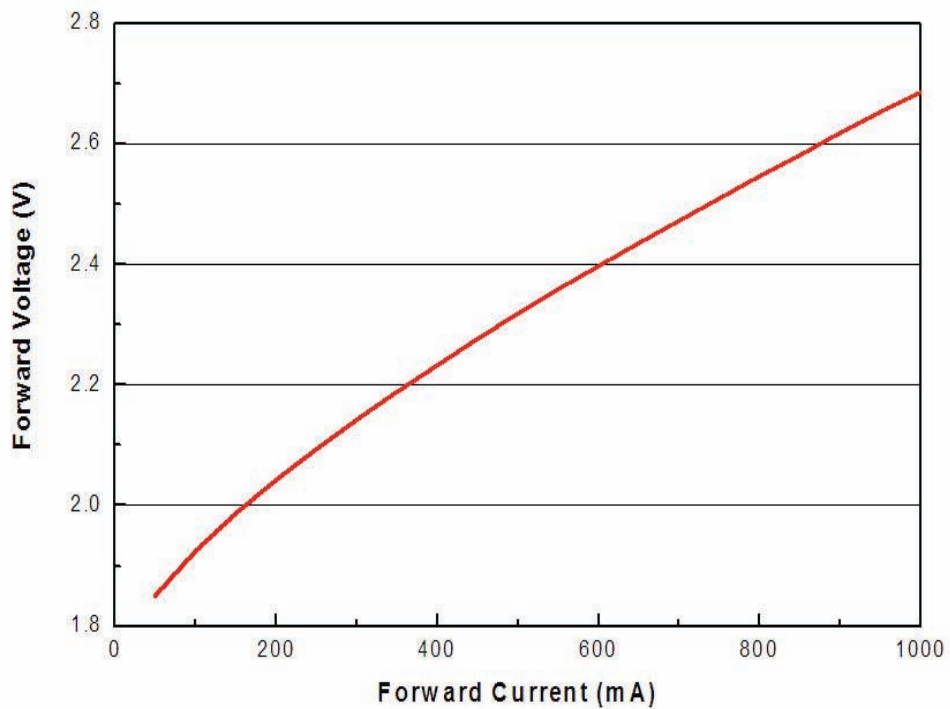


Typical Electrical Characteristics

For Cool-White, Neutral-White, Warm-White, Green, Blue
@ Thermal Pad Temperature = 25 °C



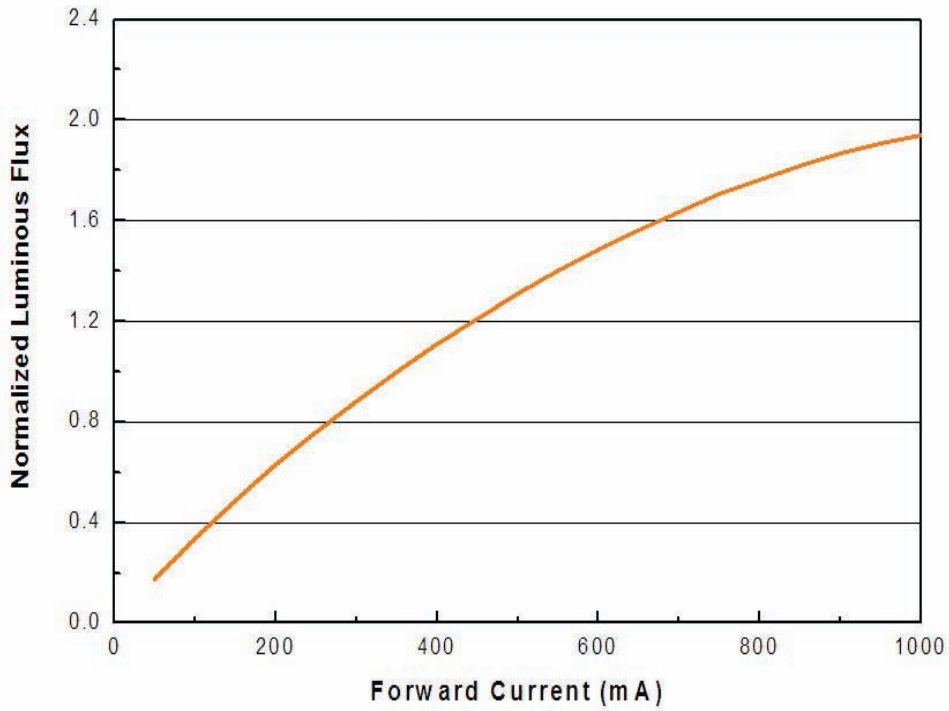
For Red, Orange, Amber,
@ Thermal Pad Temperature = 25 °C



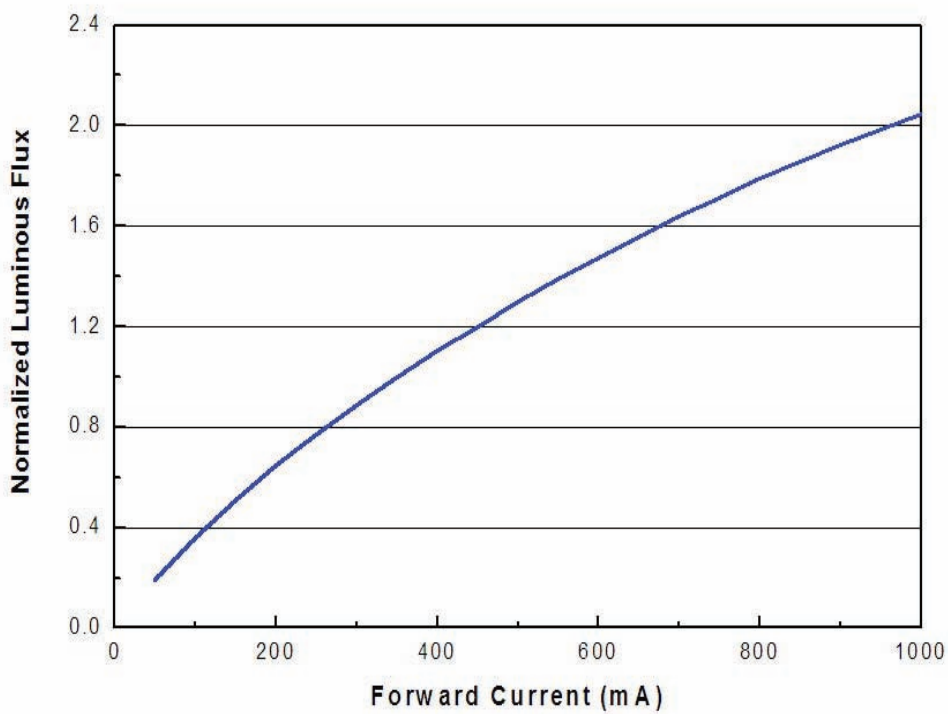


Typical Relative Luminous Flux vs. Forward Current

For Cool-White, Neutral-White, Warm-White
@ Thermal Pad Temperature = 25 °C



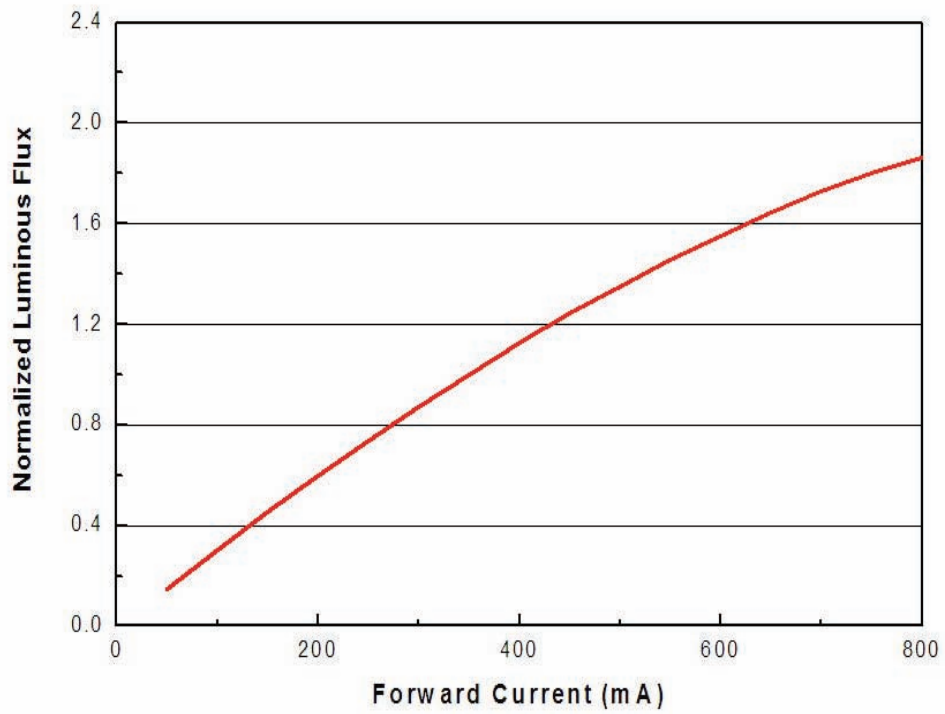
For Green, Blue, @ Thermal Pad Temperature = 25 °C





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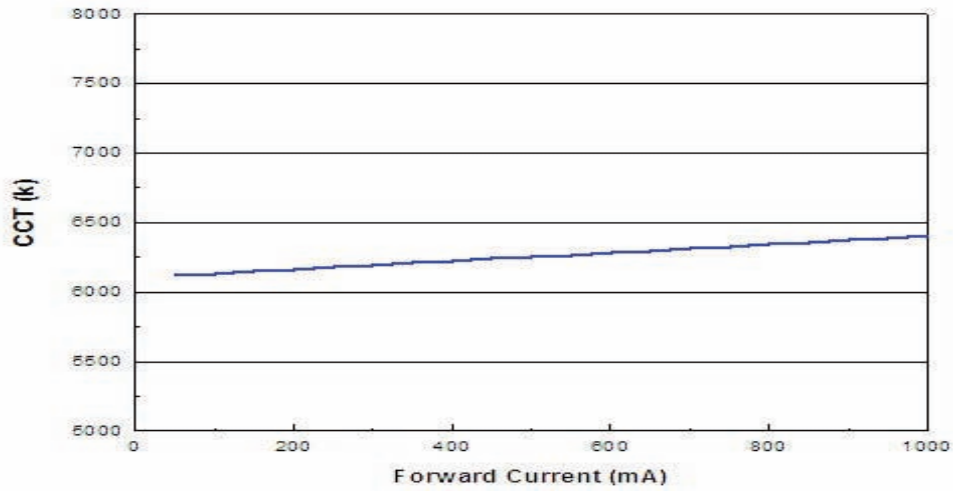
For Red, Orange, Amber,
@ Thermal Pad Temperature = 25 °C



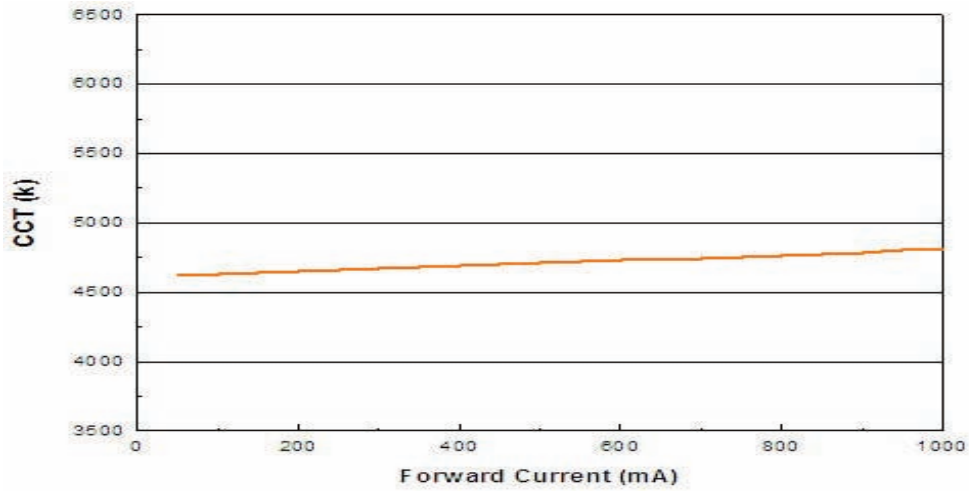


Typical Wavelength & CCT Shift Characteristics vs. Forward Current

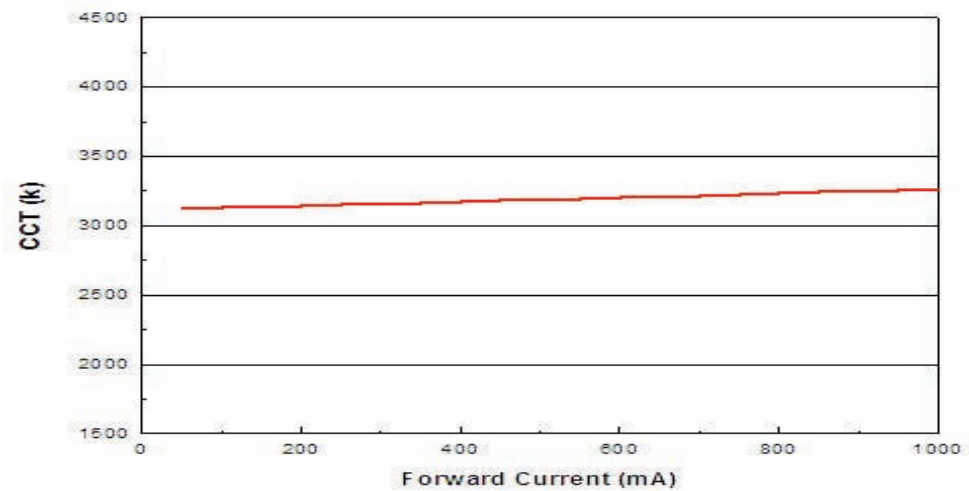
For Cool-White @ Thermal Pad Temperature = 25 °C



For Neutral-White @ Thermal Pad Temperature = 25 °C



For Warm-White @ Thermal Pad Temperature = 25 °C

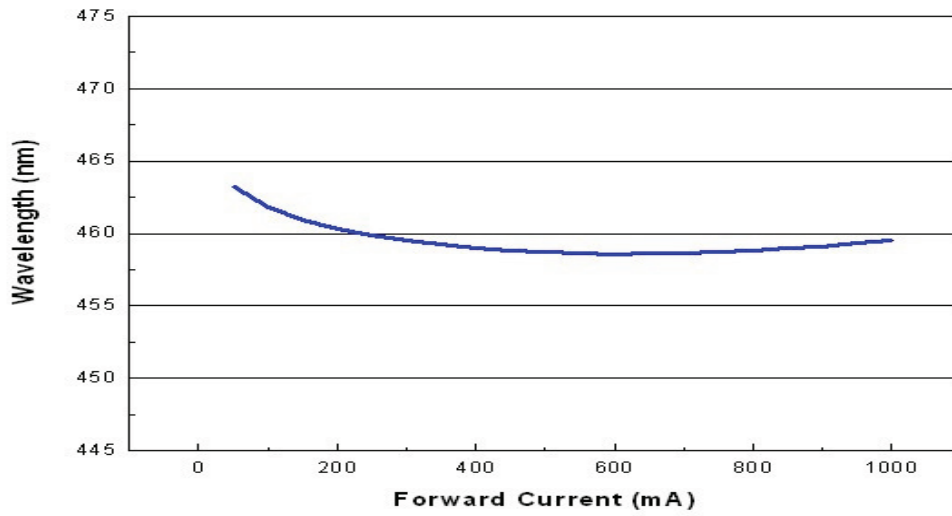




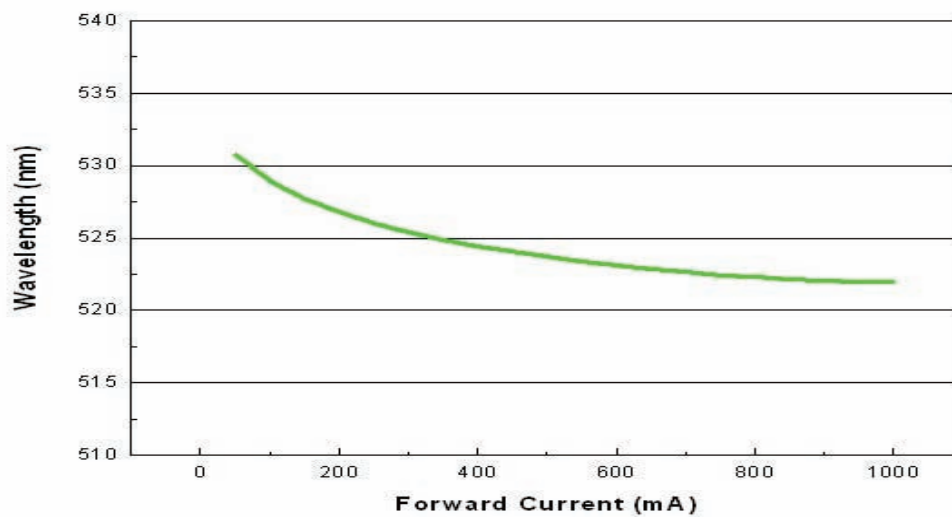
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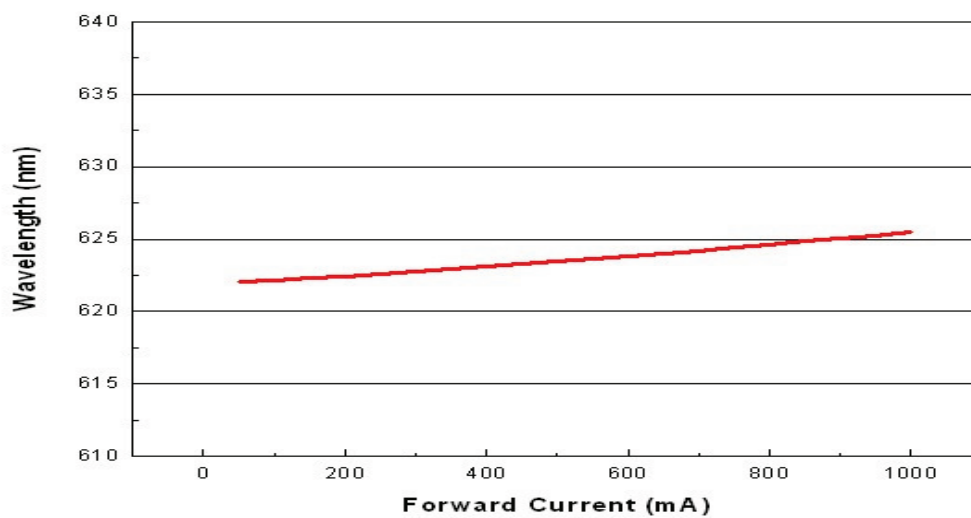
For Blue @ Thermal Pad Temperature = 25 °C



For Green @ Thermal Pad Temperature = 25 °C



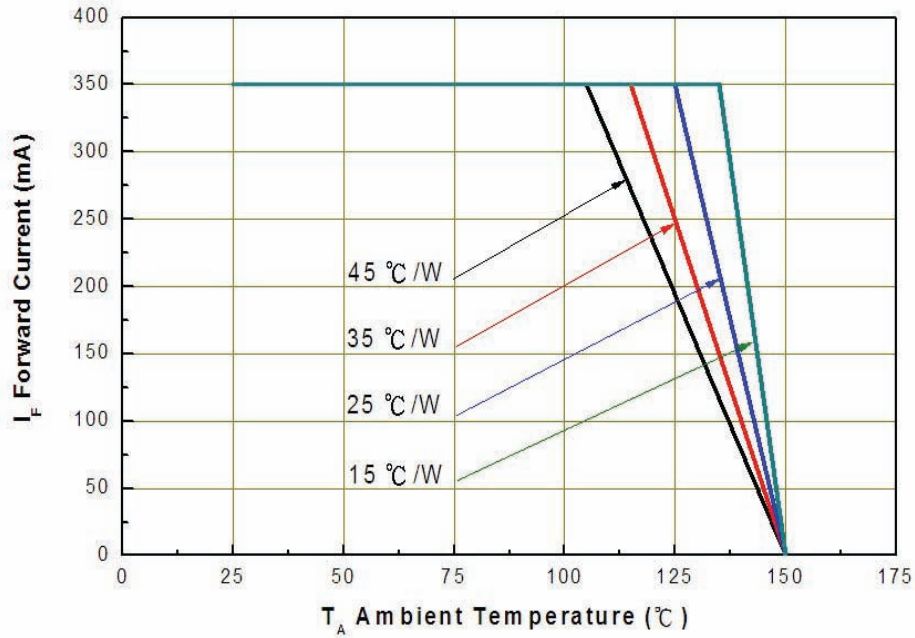
For Red @ Thermal Pad Temperature = 25 °C



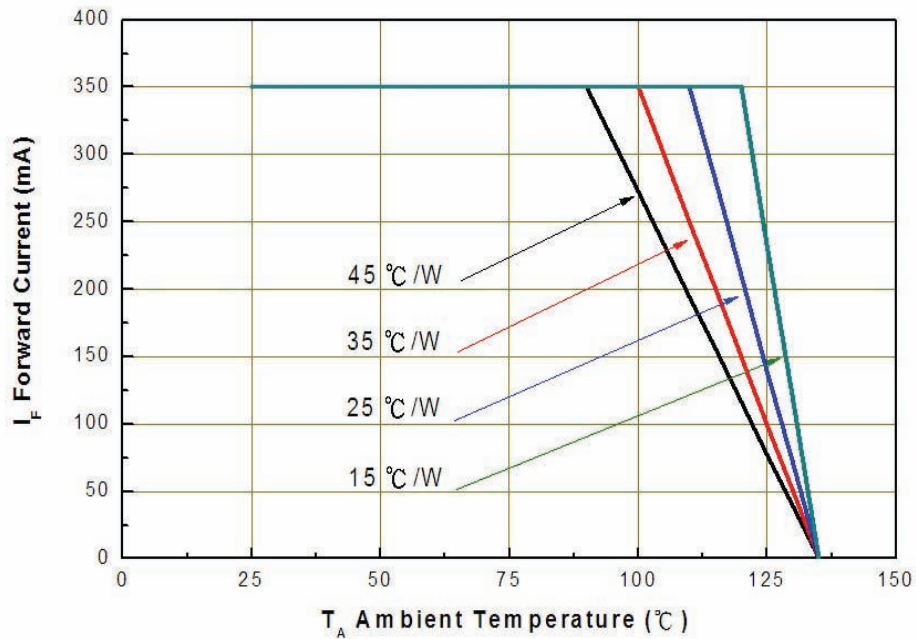


Current Derating Curves

**Current Derating Curve for 350mA Drive Current
Cool-White, Neutral-White, Warm-White, Green, Blue**



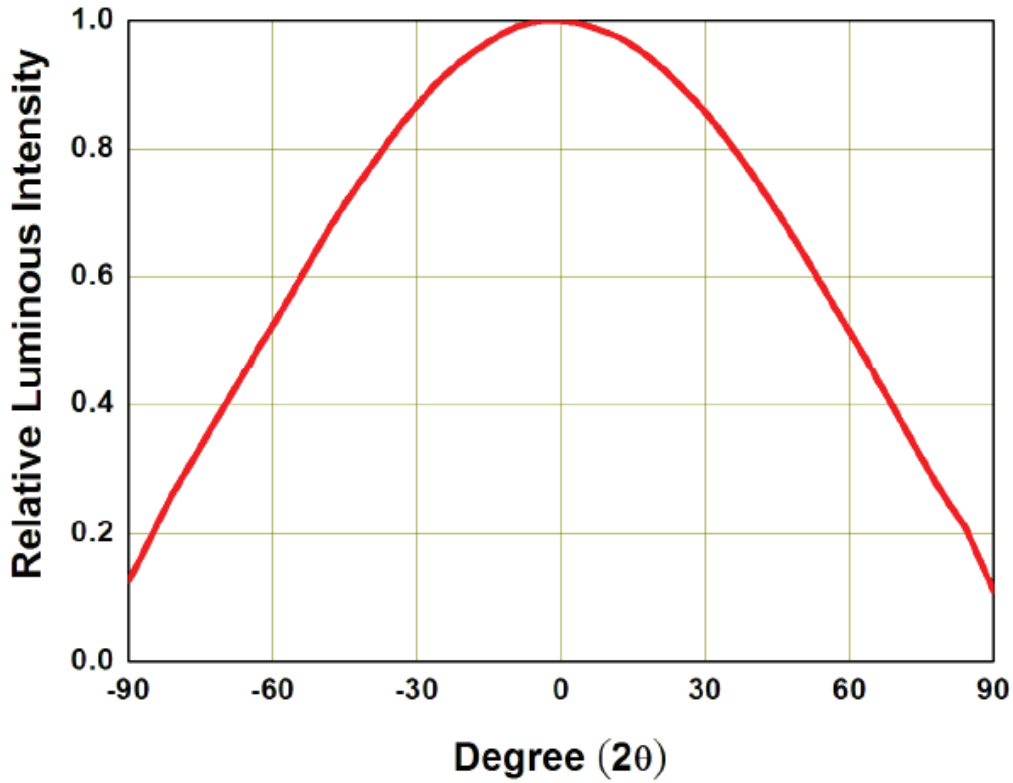
**Current Derating Curve for 350mA Drive Current
Red, Amber, Yellow**





Typical Radiation Patterns

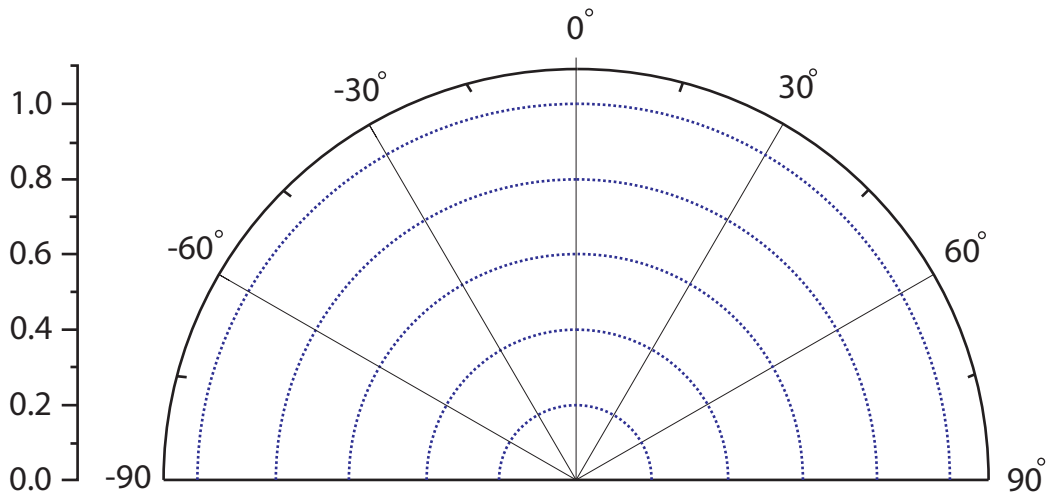
Typical Spatial Radiation Pattern for Cool-White, Neutral-White, Warm-White Lambertian



Notes:

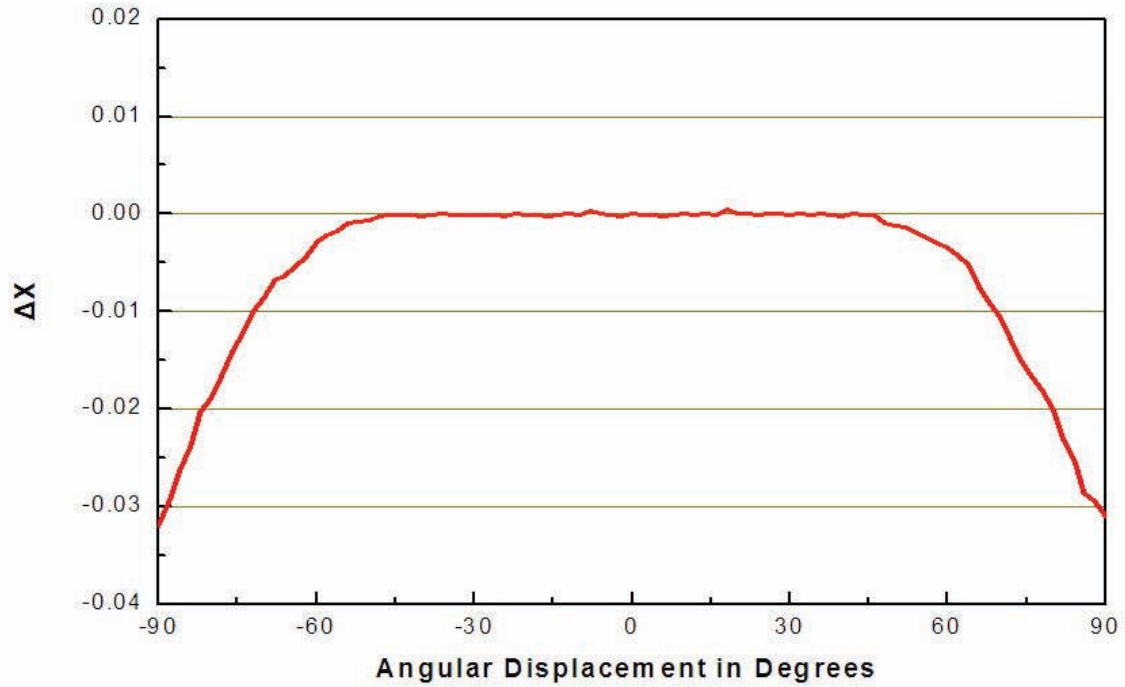
1. $2\theta_{1/2}$ is the off axis angle from lamp centerline where the luminous intensity is 1/2 of the peak value.
2. View angle tolerance is $\pm 5^\circ$.

Typical Polar Radiation Pattern for Cool-White, Neutral-White, Warm-White Lambertian

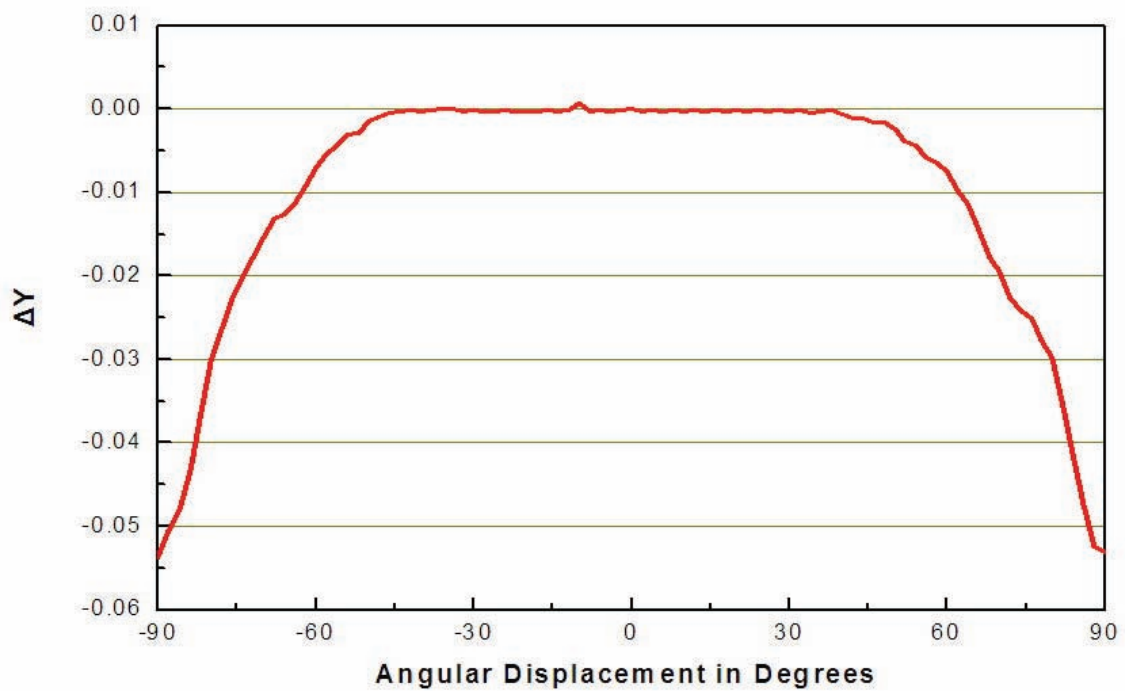




Typical Difference of CIE X of Cool-White vs. Angle



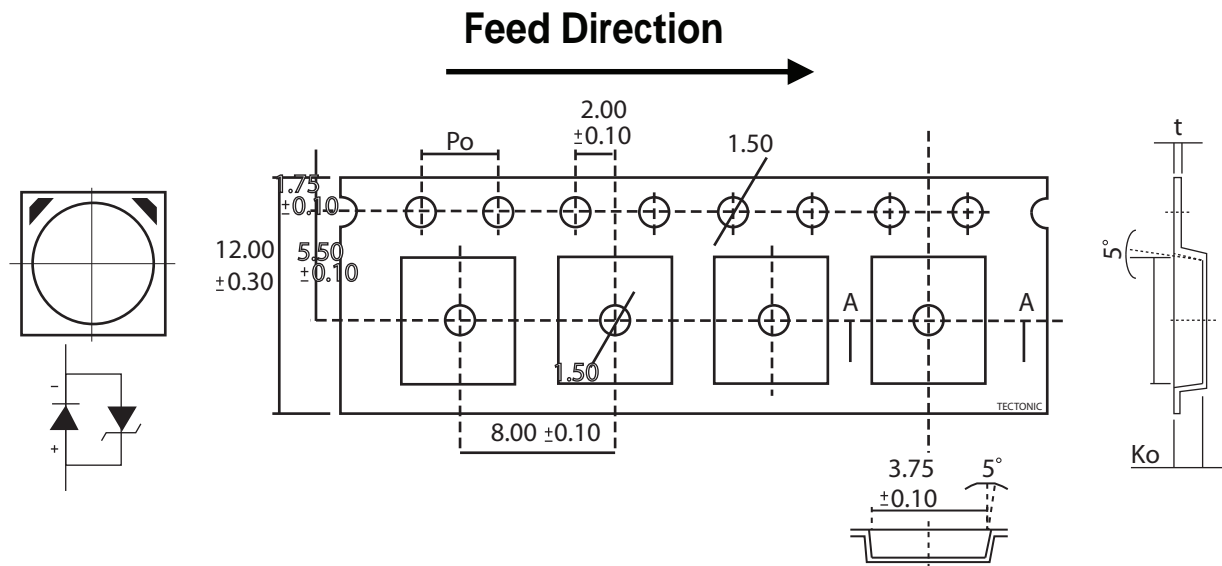
Typical Difference of CIE Y of Cool-White vs. Angle





Emitter Tape Packaging

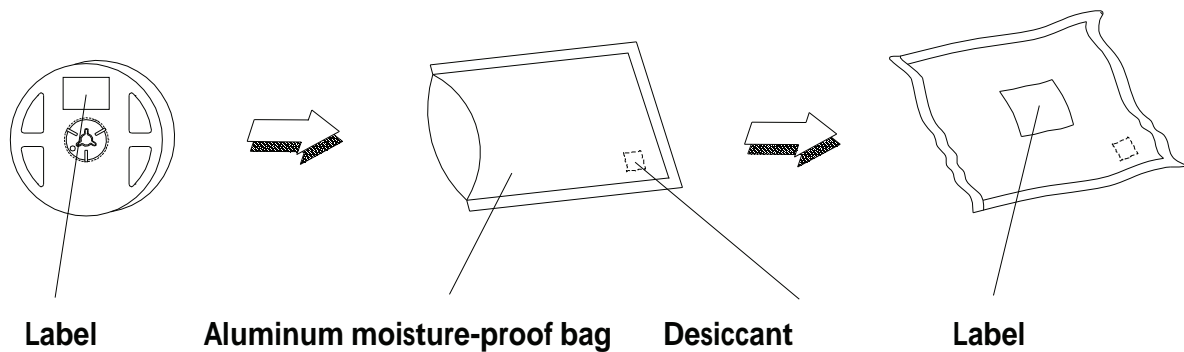
Carrier Tape Dimensions: Loaded quantity 400 PCS per reel



Notes:

1. Dimensions are in millimeters.
2. Tolerances for fixed dimensions are ± 0.1 mm.

Moisture Resistant Packaging



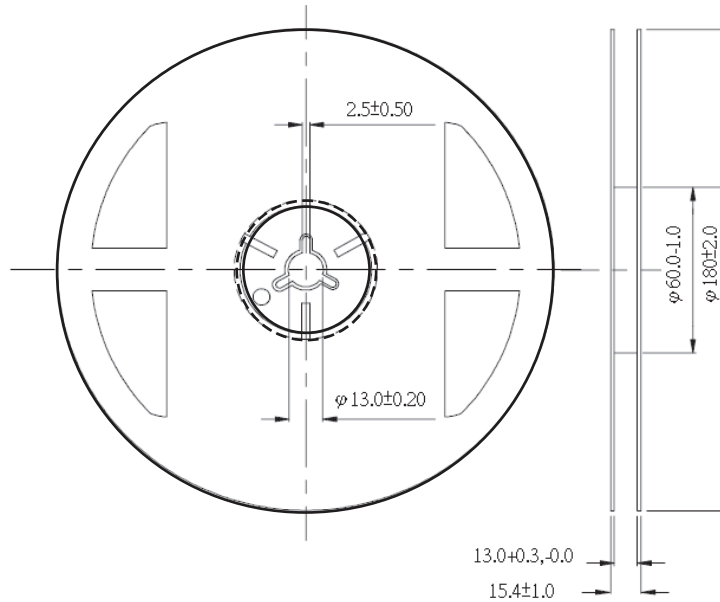


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Emitter Reel Packaging

Reel Dimensions



Notes:

1. Dimensions are in millimeters.
2. Tolerances unless mentioned are ± 0.1 mm.

Product Labeling

Label Explanation

CPN: Customer Specification (when required)

P/N : Tectonic Production Number

QTY: Packing Quantity

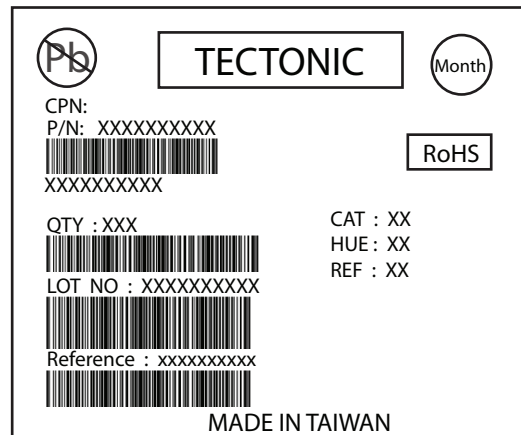
CAT: Luminous Flux (Brightness) Bin

HUE: Color Bin

REF: Forward Voltage Bin

LOT No: Lot Number

MADE IN TAIWAN: Production Place





Revision History

Current version: **2010/05/07**
Previous version: **N/A**

Device No: DHE-XXXXXXXX
Rev. Ver. 1

Page	Subjects (major change in previous version)	Date of change