

DTC3531DWXXS3 Series

TECHNICAL SPECIFICATION

● **Absolute Maximum Characteristics**

The following table lists the product characteristics for the DTC3531DWXS3 series package.

Characteristics	Unit	Minimum	Typical	Maximum
Power Dissipation	W			2.6
Thermal Resistance, Junction to Solder Point	°C/W		12	
Viewing Angle (FWHM)	degrees		145	
LED Junction Temperature	°C			110
DC Forward Current per Die	mA			700
DC Reverse Voltage per Die	V			5
Operating Temperature	°C	-40		85
Storage Temperature	°C	-40		100

● **Electro-Optical Characteristics**

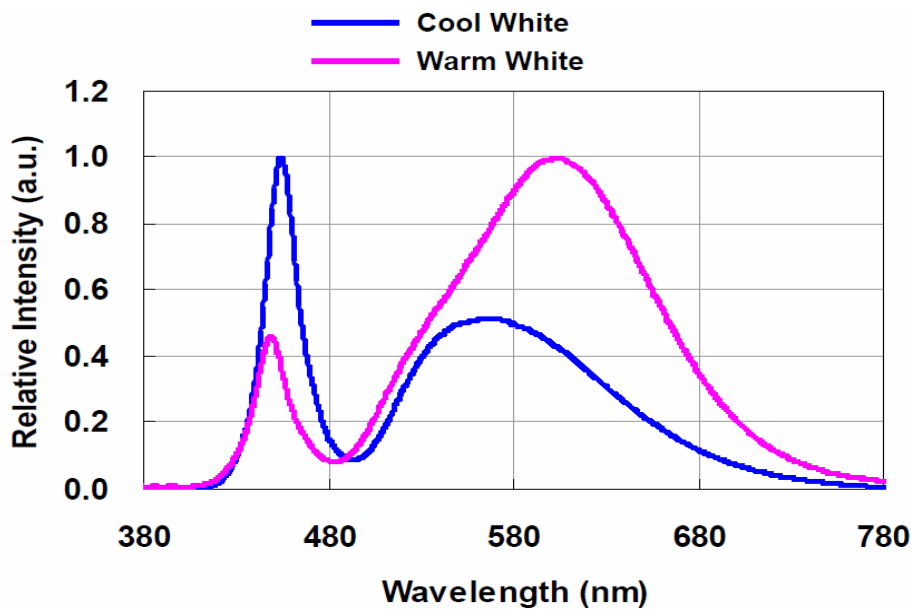
The following table lists the product characteristics for the DTC3531DWXS3 series package at I_f=350mA per die, T_j=25°C.

Color	Part No	CCT @ 350mA		Forward Voltage @ 350mA (V)		Luminous Flux @ 350mA (lm)		
		Min.	Max.	Typ	Max	Group	Min	Max
Warm White	DTC3531DW30S3	2,800 K	3,200 K	3.1	3.5	S3	80.6	87.4
						T1	87.4	93.9
						T2	93.9	100.0
						T3	100	107
Cool White	DTC3531DW50S3	5,000 K	6,500 K	3.1	3.5	T4	107	114
						U1	114	122
						U2	122	130

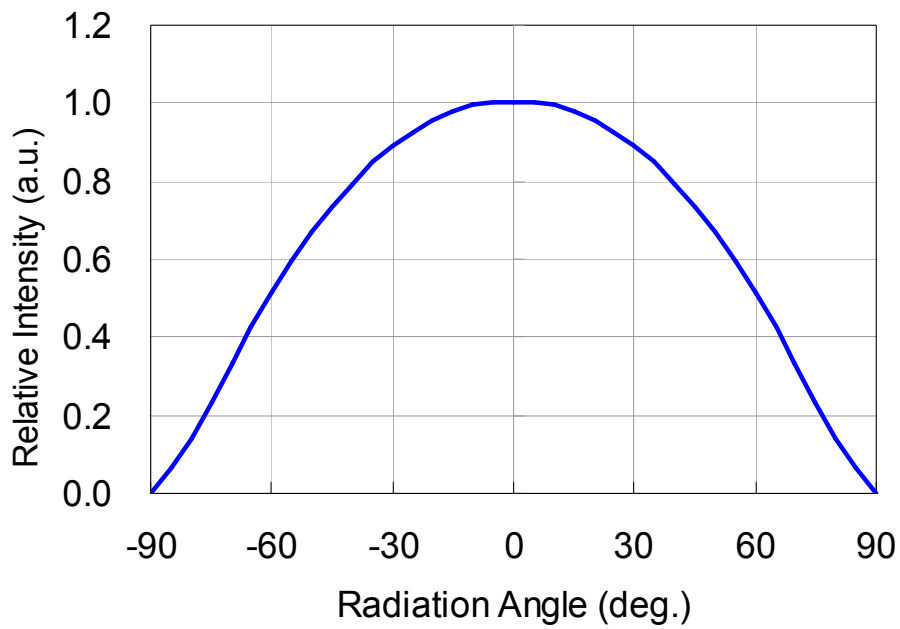
Notes:

- 1. We maintain a tolerance of ±10% on flux and power measurements and ±5% on CCT measurements.
- 2. The total luminous flux output is measured with an integrated sphere.
- 3. Correlated color temperature is derived from the CIE 1931 chromaticity diagram.
- 4. A tolerance of ±0.06V on forward voltage measurement.
- 5. Typical CRI Range for CCT is 70~75.
- 6. Flux and chromaticity are measured with each LED die connected to independent drive circuits at 350mA.
The flux and chromaticity are measured with all LEDs lit simultaneously.

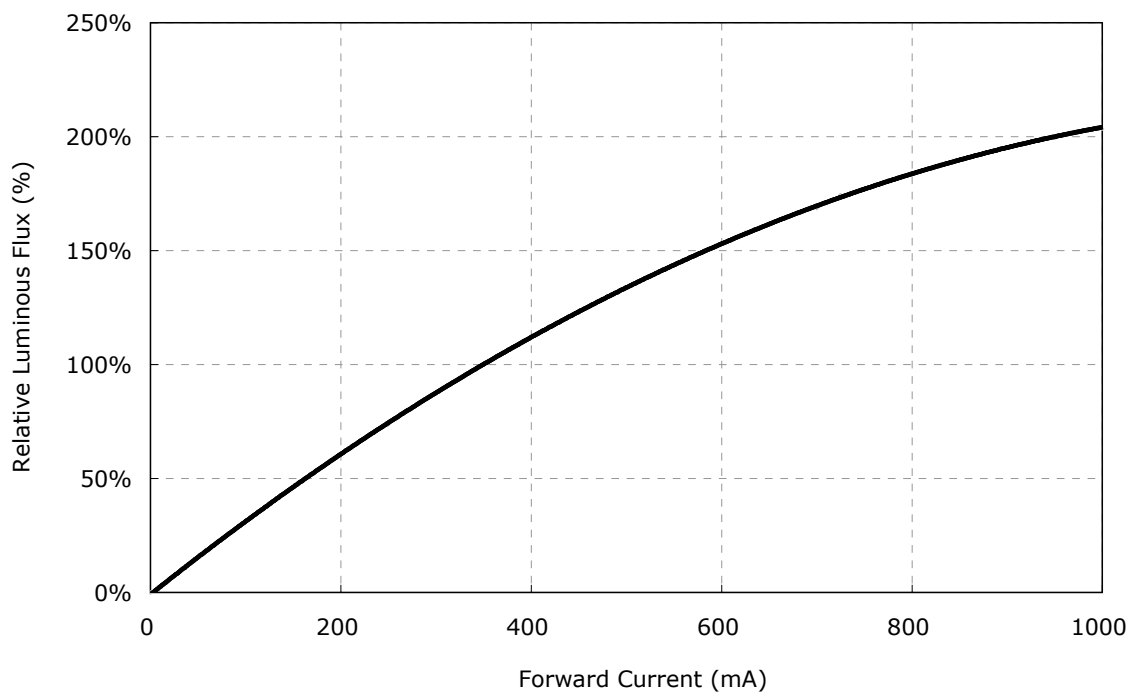
● **Relative Spectrum of Emission ($T_j = 25\text{ }^{\circ}\text{C}$)**



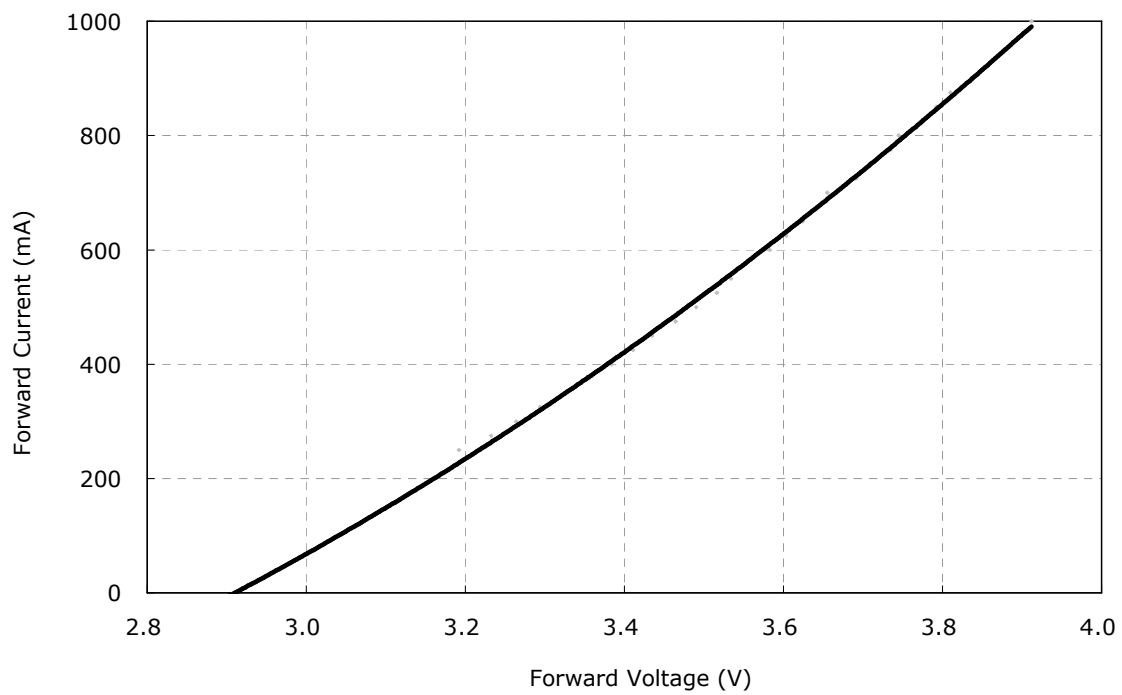
● **Typical Spatial Radiation Pattern**



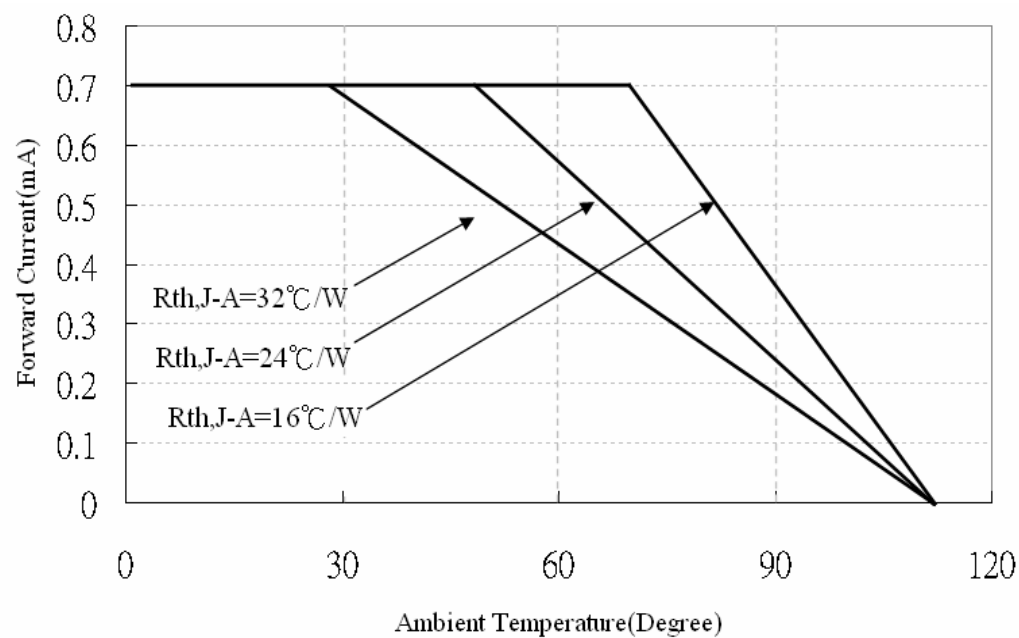
● **Relative Intensity vs. Current ($T_j = 25\text{ }^{\circ}\text{C}$)**



● **Electrical Characteristics ($T_j = 25\text{ }^{\circ}\text{C}$)**



● **Forward Current Derating Curve**



● Luminous Flux Categories

Code	Min. Luminous Flux @ 350 mA (lm)	Max. Luminous Flux @ 350 mA (lm)
S3	80.6	87.4
T1	87.4	93.9
T2	93.9	100.0
T3	100	107
T4	107	114
U1	114	122
U2	122	130

Notes:

1. The flux and chromaticity are measured with each LED die at driving current 350 mA.
2. The flux and chromaticity are measured with all LEDs lit simultaneously.
3. Luminous flux measurement allowance is $\pm 10\%$.

● Forward Voltage Categories

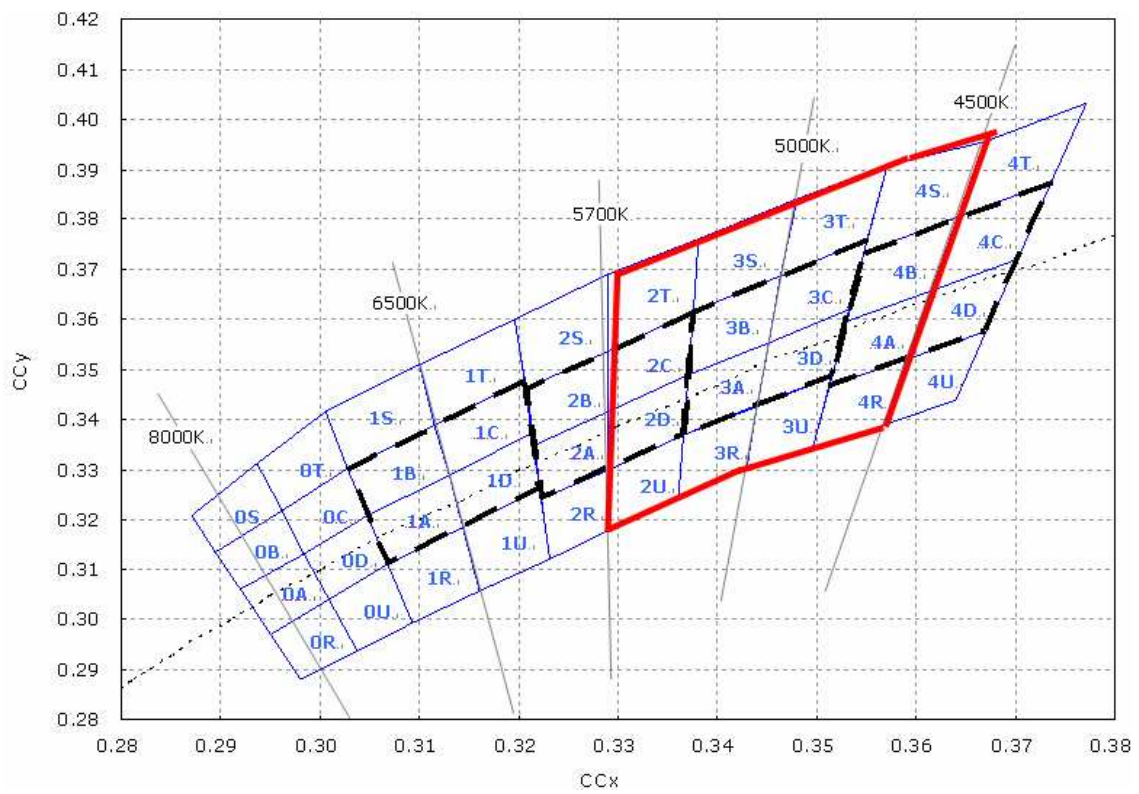
Part No	Code	Min. Forward Voltage @ 350 mA (V)	Max. Forward Voltage @ 350 mA (V)
DTC3531DWXXS3	U30	3.00	3.20
	U32	3.20	3.40
	U34	3.40	3.60

Notes:

1. The forward voltage is measured with each LED die at driving current 350 mA.
2. The forward voltage measurement allowance is $\pm 0.1V$.

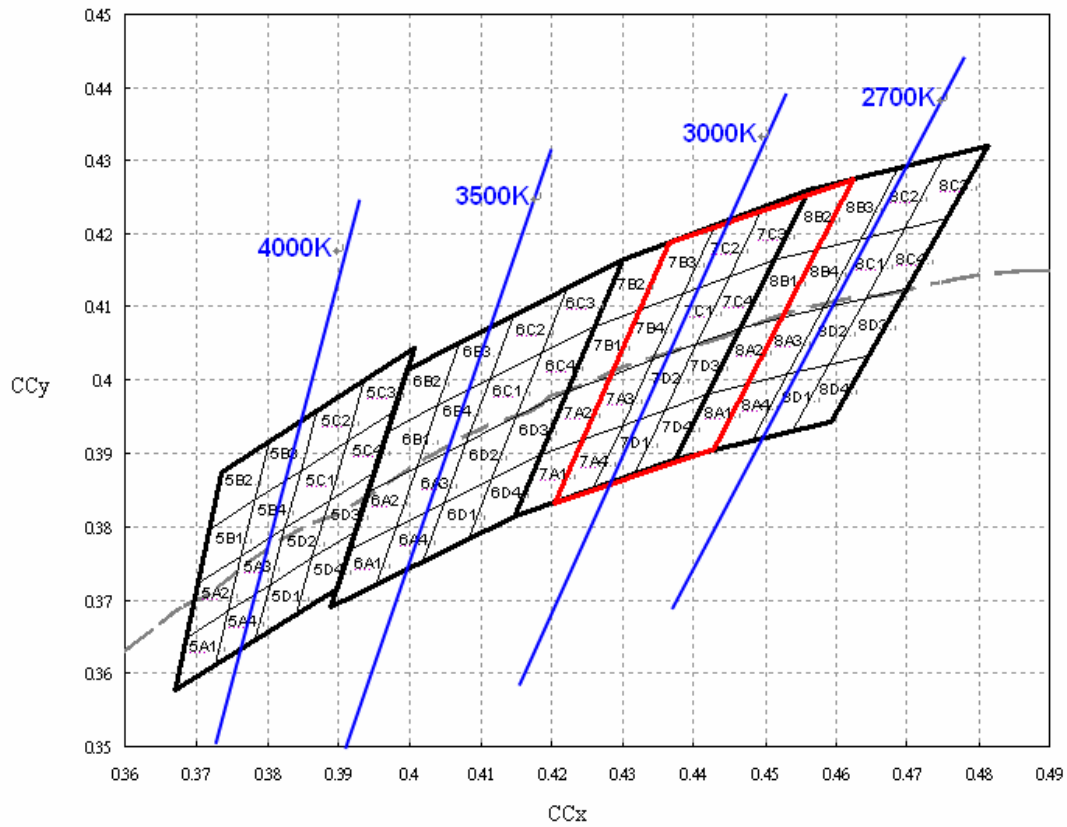
● Chromaticity Coordinate Categories

Code	x	y	Code	x	y	Code	x	y	Code	x	y
1A	0.3048	0.3207	1B	0.3028	0.3304	1C	0.3115	0.3391	1D	0.3130	0.3290
	0.3130	0.3290		0.3115	0.3391		0.3205	0.3481		0.3213	0.3373
	0.3144	0.3186		0.3130	0.3290		0.3213	0.3373		0.3221	0.3261
	0.3068	0.3113		0.3048	0.3207		0.3130	0.3290		0.3144	0.3186
1R	0.3068	0.3113	1S	0.3005	0.3415	1T	0.3099	0.3509	1U	0.3144	0.3186
	0.3144	0.3186		0.3099	0.3509		0.3196	0.3602		0.3221	0.3261
	0.3161	0.3059		0.3115	0.3391		0.3205	0.3481		0.3231	0.3120
	0.3093	0.2993		0.3028	0.3304		0.3115	0.3391		0.3161	0.3059
2A	0.3215	0.3350	2B	0.3207	0.3462	2C	0.3290	0.3538	2D	0.3290	0.3417
	0.3290	0.3417		0.3290	0.3538		0.3376	0.3616		0.3371	0.3490
	0.3290	0.3300		0.3290	0.3417		0.3371	0.3490		0.3366	0.3369
	0.3222	0.3243		0.3215	0.3350		0.3290	0.3417		0.3290	0.3300
2R	0.3222	0.3243	2S	0.3196	0.3602	2T	0.3290	0.3690	2U	0.3290	0.3300
	0.3290	0.3300		0.3290	0.3690		0.3381	0.3762		0.3366	0.3369
	0.3290	0.3180		0.3290	0.3538		0.3376	0.3616		0.3361	0.3245
	0.3231	0.3120		03207	0.3462		0.3290	0.3538		0.3290	0.3180
3A	0.3371	0.3490	3B	0.3376	0.3616	3C	0.3463	0.3687	3D	0.3451	0.3554
	0.3451	0.3554		0.3463	0.3687		0.3551	0.3760		0.3533	0.3620
	0.3440	0.3427		0.3451	0.3554		0.3533	0.3620		0.3515	0.3487
	0.3366	0.3369		0.3371	0.3490		0.3451	0.3554		0.3440	0.3427
3R	0.3366	0.3369	3S	0.3381	0.3762	3T	0.3480	0.3840	3U	0.3440	0.3428
	0.3440	0.3428		0.3480	0.3840		0.3571	0.3907		0.3515	0.3487
	0.3429	0.3307		0.3463	0.3687		0.3551	0.3760		0.3495	0.3339
	0.3361	0.3245		0.3376	0.3616		0.3463	0.3687		0.3429	0.3307



● Chromaticity Coordinate Categories

Code	x	y	Code	x	y	Code	x	y	Code	x	y
7A1	0.4147	0.3814	7A2	0.4183	0.3898	7A3	0.4242	0.3919	7A4	0.4203	0.3833
	0.4183	0.3898		0.4221	0.3984		0.4281	0.4006		0.4242	0.3919
	0.4242	0.3919		0.4281	0.4006		0.4342	0.4028		0.4300	0.3939
	0.4203	0.3833		0.4242	0.3919		0.4300	0.3939		0.4259	0.3853
7B1	0.4221	0.3984	7B2	0.4259	0.4073	7B3	0.4322	0.4096	7B4	0.4281	0.4006
	0.4259	0.4073		0.4299	0.4165		0.4364	0.4188		0.4322	0.4096
	0.4322	0.4096		0.4364	0.4188		0.4430	0.4212		0.4385	0.4119
	0.4281	0.4006		0.4322	0.4096		0.4385	0.4119		0.4342	0.4028
7C1	0.4342	0.4028	7C2	0.4385	0.4119	7C3	0.4449	0.4141	7C4	0.4403	0.4049
	0.4385	0.4119		0.4430	0.4212		0.4496	0.4236		0.4449	0.4141
	0.4449	0.4141		0.4496	0.4236		0.4562	0.4260		0.4513	0.4164
	0.4403	0.4049		0.4449	0.4141		0.4513	0.4164		0.4465	0.4071
7D1	0.4259	0.3853	7D2	0.4300	0.3939	7D3	0.4359	0.3960	7D4	0.4316	0.3873
	0.4300	0.3939		0.4342	0.4028		0.4403	0.4049		0.4359	0.3960
	0.4359	0.3960		0.4403	0.4049		0.4465	0.4071		0.4418	0.3981
	0.4316	0.3873		0.4359	0.3960		0.4418	0.3981		0.4373	0.3893
8A1	0.4373	0.3893	8A2	0.4418	0.3981	8A3	0.4475	0.3994	8A4	0.4428	0.3906
	0.4418	0.3981		0.4465	0.4071		0.4523	0.4085		0.4475	0.3994
	0.4475	0.3994		0.4523	0.4085		0.4582	0.4099		0.4532	0.4008
	0.4428	0.3906		0.4475	0.3994		0.4532	0.4008		0.4483	0.3919
8B1	0.4465	0.4071	8B2	0.4513	0.4164	8B3	0.4573	0.4178	8B4	0.4523	0.4085
	0.4513	0.4164		0.4562	0.4260		0.4624	0.4274		0.4573	0.4178
	0.4573	0.4178		0.4624	0.4274		0.4687	0.4289		0.4634	0.4193
	0.4523	0.4085		0.4573	0.4178		0.4634	0.4193		0.4582	0.4099



Notes:

1. The value is all dies operated performance at driving current 350 mA.
2. The chromaticity coordinates (x, y) is derived from the CIE 1931 chromaticity diagram.
3. IS CAS 140B is for the luminous flux and the CIE 1931 chromaticity coordinates (x, y) testing.
The chromaticity coordinates (x, y) guarantee should be added ± 0.01 tolerance.

● Pre-Release Qualification Test List (Operating Life Tests)

Test	Applicable Standards	Test Conditions & Failure Criteria
Room Temperature Operating Life Test (RTOL)	JESD22 Method A108-C	Test Conditions: <ul style="list-style-type: none"> Ambient temperature : 25°C Forward current : 350 mA per die Test period : 1000 hours Failure Criteria 1 : <ul style="list-style-type: none"> Forward voltage shift ₂ : > U.S.L x 10% Luminous flux degradation ₂ : > L.S.L. x 30% Catastrophic failure ₃
Wet High Temperature Operating Life Test (WHTOL)		Test Conditions: <ul style="list-style-type: none"> Forward current : 150 mA per die Ambient temperature : 85°C Humidity : 85% relative humidity (RH) Time : 1000 hours Failure Criteria 1 : <ul style="list-style-type: none"> Forward voltage shift ₂ : > U.S.L x 10% Luminous flux degradation ₂ : > L.S.L. x 30% Catastrophic failure ₃

Notes:

1. The entire test has failed if one LED (or more) from the sample set satisfy the listed failure criteria. If no LED satisfies the listed failure criteria, the test is successful.
2. Comparison is made between [value at time 0] and [value at the end of the test period].
3. A catastrophic failure is a failure that causes the LED to become non-functional (i.e., open or short).

● Pre-Release Qualification Test List (Non-Operating Life Tests)

Test	Applicable Standards	Test Conditions & Failure Criteria
Thermal Cycle	MIL-STD-202G Method 107G	Test Conditions: <ul style="list-style-type: none"> Temperature range : -40°C to 100°C Dwell time : 30 minutes Transfer time : 5 minutes Cycles : 200 cycles Failure Criteria 1 : <ul style="list-style-type: none"> LED no longer lights up after test
Thermal Shock		Test Conditions: <ul style="list-style-type: none"> Temperature range : -55°C to 105°C Dwell time : 15 minutes Transfer time : < 10 seconds Cycles : 200 cycles Failure Criteria 1 : <ul style="list-style-type: none"> LED no longer lights up after test
Moisture Resistance Cyclic		Test Conditions: <ul style="list-style-type: none"> Temperature range : -65°C / -10°C / 25°C Dwell time : 12 hours Transfer time : < 10 seconds Humidity : 90% relative humidity (RH) Cycles : 10 cycles Failure Criteria 1 : <ul style="list-style-type: none"> LED no longer lights up after test
High Temperature Storage		Test Conditions: <ul style="list-style-type: none"> Ambient temperature : 100°C Time : 1000 hours Failure Criteria 1 : <ul style="list-style-type: none"> Forward voltage shift ₂ : > U.S.L x 10% Luminous flux degradation ₂ : > L.S.L. x 30% Catastrophic failure ₃
Low Temperature Storage		Test Conditions: <ul style="list-style-type: none"> Ambient temperature : -40°C Time : 1000 hours Failure Criteria 1 : <ul style="list-style-type: none"> Forward voltage shift ₂ : > U.S.L x 10% Luminous flux degradation ₂ : > L.S.L. x 30% Catastrophic failure ₃

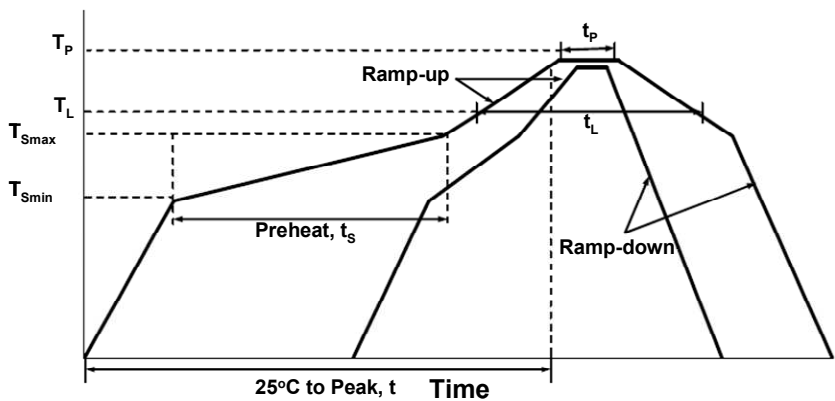
Notes:

1. The entire test has failed if one LED (or more) from the sample set satisfy the listed failure criteria. If no LED satisfies the listed failure criteria, the test is successful.

● **Reflow Soldering Characteristics**

In testing, we have found LEDs to be compatible with JEDEC J-STD-020C, using the parameters listed below. As a general guideline, we recommend that users follow the recommended soldering profile provided by the manufacturer of solder paste used.

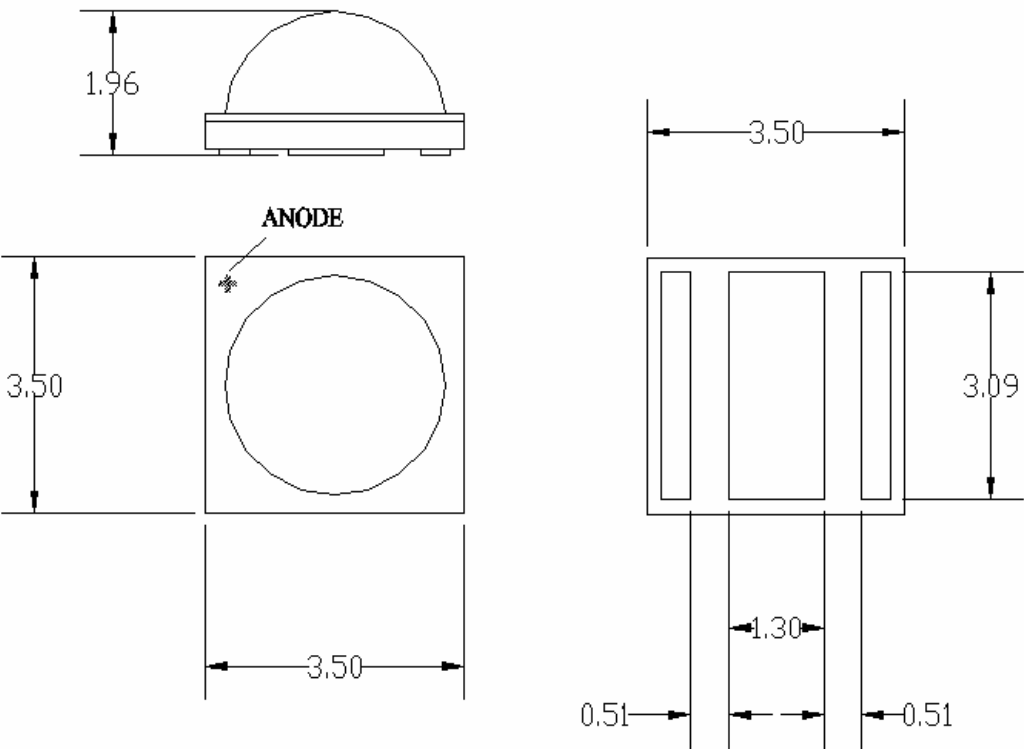
Note that this general guideline may not apply to all PCB designs and configurations of reflow soldering equipment.



Profile Feature	Lead-Based 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})	100°C	150°C
Preheat: Temperature Max (T _{Smax})	150°C	200°C
Preheat: Time (t _{Smin} to t _{Smax})	60-120 seconds	60-180 seconds
Time Maintained Above: Temperature (T _L)	183°C	217°C
Time Maintained Above: Time (t _L)	60-150 seconds	60-150 seconds
Peak/Classification Temperature (T _p)	215°C	260°C
Time Within 5°C of Actual Peak Temperature (t _p)	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.

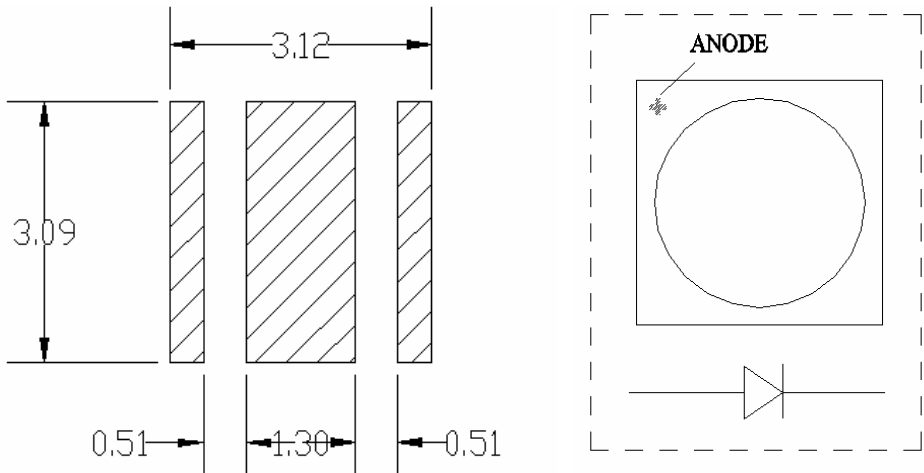
Note: All temperatures refer to topside of the package, measured on the package body surface.

● **Mechanical Dimensions**



Notes:

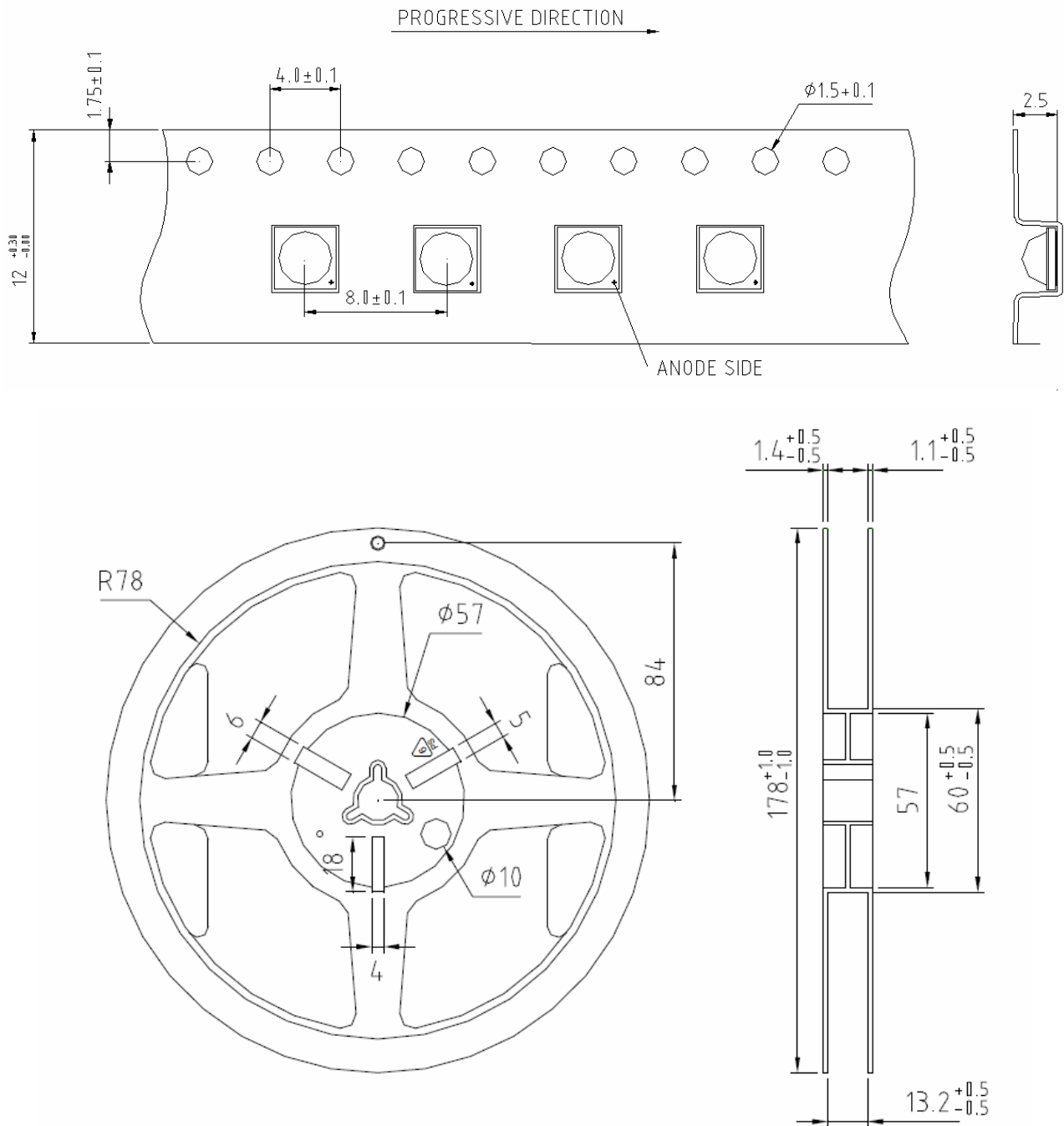
- 1. All dimensions are in millimeters.
- 2. Tolerance: ± 0.2 mm unless otherwise noted.



Recommend PCB Solder Pad

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

● Package Dimensions of Tape and Reel



Notes:

1. Empty component pockets sealed with top cover tape.
2. 1000 pieces per 7 inch reel.
3. In accordance with EIA-481-1-L23 specifications.

● Notes

Storage Conditions

The product is qualified as Moisture Sensitive Level 4 per JEDEC J-STD-020 Precaution when handling 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 72 hours. If the Humidity Indicator shows the pink color in 30% even higher or exceed the storage limiting time since opened, that we recommended to be with workable desiccants in original package.

ESD (Electrostatic Discharge)

Static electricity or power surge will damage the LEDs. Suggestions to prevent ESD damage:

- Use 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 light up" at low currents. To verify for ESD damage, check for "light up" and V_F of the suspect LEDs at low current. The V_F of "good" LEDs should be $>2.0@0.1mA$ for InGaN product.

Suggested Checking List

Static-Safe Workstation & Work Areas

- Static-safe working stations or work-areas have ESD signs.
- All surfaces and objects at all static-safe workstation and within 1 ft measure less than 100V
- All ionizer activated, positioned towards the units.
- Each work surface mats grounding is good.

Personnel Grounding

- Every person (including visitors) handling ESD sensitive (ESDS) items wear wrist strap, heel strap or conductive shoes with conductive flooring.
- If conductive footwear used, conductive flooring also present.
- Garments, hairs or anything closer than 1 ft to ESD items measure less than 100V.
- The wrist strap or heel strap / conductive shoes are checked daily and result recorded.
- All wrist strap or heel strap checkers calibration up to date.

Device Handling

- Each ESDS items identified by EIA-471 labels on item or packaging.
- No static charge generators (e.g. plastics) including containers with ESDS items.
- All flexible conductive and dissipative package materials are inspected before reuse or recycles.