Data Sheet

PWXHMxxA0C, PWXHMxxB0C, PWXHMxxC0C, PWXHMxxD1C, PWXHMxxD2C, PWXHMxxE0C, PWXHMxxE1C, PWXHMxxF0C

Dynasty™ X Integrated Power LEDs

All White Colors

Features:

- High lumen output
- Wide view angle with 360°horizontal and 275° vertical
- Unique Butterfly-Beam™
- Long lifetime
- Color Temperature available in 2700, 3000, 3500, 4000, 4500, 5000, 5700, and 6500 Kelvin and up.
- Threaded through-hole package
- RoHS compliant
- Superior performance in outdoor environment
- Copper alloy lead frame for best heat dissipation

Description:

Dynasty™ X Integrated Power LED is a revolutionary high flux LED product that applies a completely new concept of packaging. Dynasty X uses a 3-dimensional (3D) lead frame which creates a Butterfly-Beam™ pattern (see figure 6) and has a 360°horizontal and a 275°vertical viewing angle.

Dynasty™ X Integrated Power LED features the optimum heat management of multiple LED chips in one package with the highest emitting efficiency. No additional heat sink is required for standard operation.

The packaging of Dynasty™ X Integrated Power LED is environmentally sealed, similar to regular oval and round LED lamps, and is highly resistant to moisture.

Dynasty™ X Integrated Power LED is available in threaded through-hole type.

Applications:

- Task lighting
- Ambient lighting
- Automotive lighting
- General lighting
- Backlighting
- Portable lighting
- Signaling
- Displays

This product is covered by US patent 6,465,961, 6,746,885 and other pending patents.

Device Selection Guide

Part Number	White Color	Viewing Angle $\theta_{0.10V}$[1]	Luminous Flux Φ_V (lm) [2]		Typical Color Temperature CCT (K) [3]	Thread Polarity
			Minimum	Typical		
PWXHMxxA0C	Incandescent White	275°/360°	40	70	2700	Cathode
PWXHMxxB0C	Warm White	275°/360°	40	70	3000	Cathode
PWXHMxxC0C	White	275°/360°	40	70	3500	Cathode
PWXHMxxD1C	Cool White	275°/360°	40	70	4000	Cathode
PWXHMxxD2C	Cool White 2	275°/360°	40	70	4500	Cathode
PWXHMxxE0C	Sun White	275°/360°	40	70	5000	Cathode
PWXHMxxE1C	Sun White 2	275°/360°	40	70	5700	Cathode
PWXHMxxF0C	Daylight	275°/360°	40	70	6500	Cathode
PWXHMxxG0C	Flexible Color	275°/360°	40	70	>7000	Cathode

Notes:
1. $\theta_{0.10V}$ is the included angle at which luminous intensity is 10% of the maximum.
2. Luminous flux ΦV is measured with an integrating sphere after the device is stabilized.
3. The color temperature CCT is derived from the CIE 1931 Chromaticity Diagram and represents the perceived color of the device.

Part Numbering System

P	W	X	H	M	R	R	D	0	C
1	2	3	4	5	6	7	8	9	10

Thread Polarity
C: Cathode

Color Temperature CCT

Maximum Luminous Flux Bin

Minimum Luminous Flux Bin

Maximum Forward Voltage Bin

Minimum Forward Voltage Bin

Dynasty™ Generations

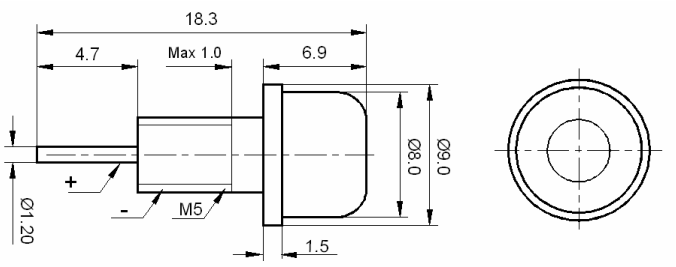
Emitting Color
W: White

Luminous Flux Bin Limits (lm)

Bin Code	Min.	Max.
M	20	30
N	30	40
P	40	50
Q	50	60
R	60	70
S	70	80
T	80	90
U	90	100
V	100	110
W	110	120
X	120	130
Y	130	140
Z	140	150

Tolerance for each intensity bin limit is ±15%.

Mechanical Dimensions



Notes:

1. Thread type is M5.
2. All dimensions are in millimeters.
3. The tolerance is ± 0.1mm.
4. + and – denote the polarity of the lead and thread.

Component Materials

Part Number	White Color	Chip Material	Lead Frame	Weight
PWXHMxxxxC	All White Colors	InGaN	Copper Alloy	2.18±0.1g

Absolute Maximum Rating at T_A = 25°C

Parameters	All White Colors
DC Forward Current [1]	480 mA
Peak Pulse Forward Current [2]	1.6 A
Power Dissipation	1.7 W
Reverse Breakdown Voltage [3]	5 V
Operating Temperature Range	-30°C to +85°C
ESD Sensitivity (HBM)	Class 1
LED Junction Temperature	120°C
Storage Temperature Range	-40°C to +100°C
Lead Soldering Temperature [4]	260°C for 5 Seconds

Notes:

1. Proper current derating must be observed to maintain junction temperature below the maximum.
2. Pulse forward current condition: 1/10 duty cycle, 0.1ms pulse width.
3. Reverse breakdown voltage is the voltage at the pins when reverse current IR=32μA
4. Soldering temperature measured at leads.

Electrical Characteristics at 320mA, Ambient Temperature T_A=25°C

Part Number	White Color	Forward Voltage V_F[1] (V)			Dynamic Resistance [2]	Thermal Resistance Junction to Case
		Min.	Typ.	Max.	R_D (Ω)	$R\theta_{J-C}$ (℃/W)
PWXHMxxxxC	All White Colors	3.0	3.3	4.0	10.0	10.0

Notes:

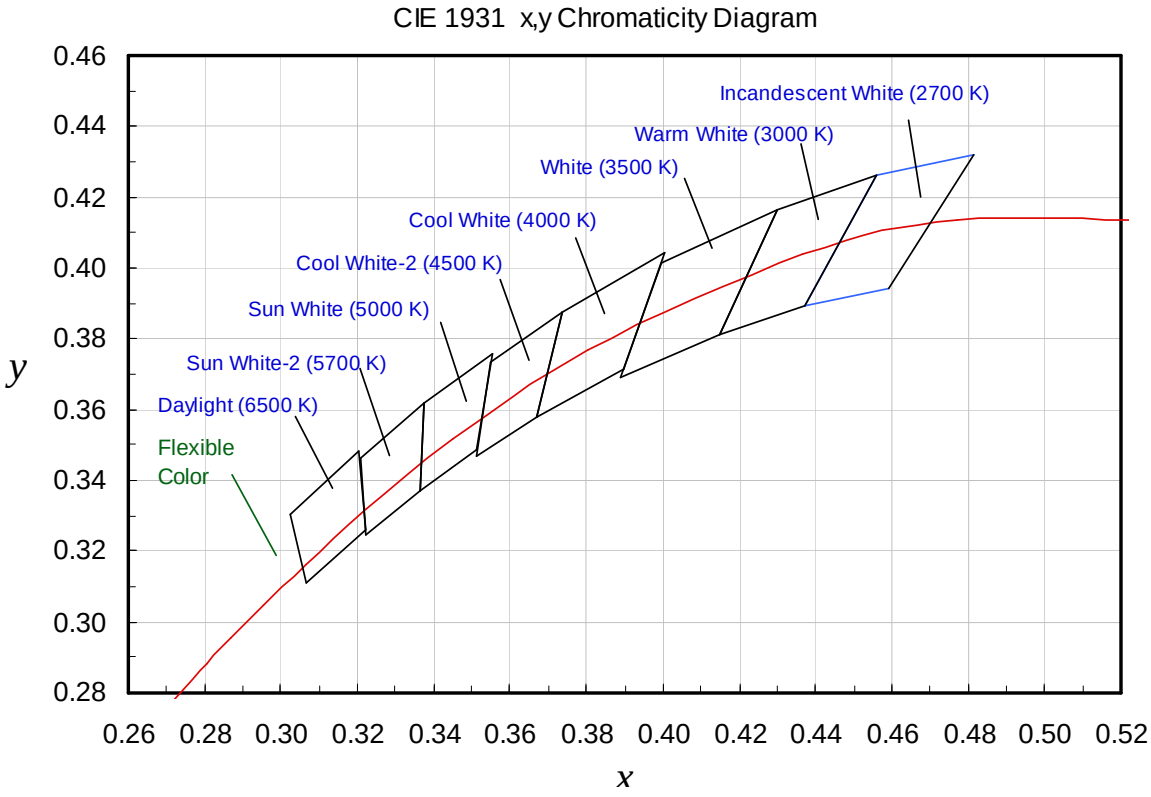
1. CAO Group, Inc. maintains a tolerance of ±0.1 V on forward voltage measurements.
2 Dynamic resistance is the inverse of the slope in linear forward voltage model for LEDs (See Figures 2). 25°C ≤T_J ≤ 110°C at I_F = 350mA, where T_J is the junction temperature of LEDs

Color Measurements

Color Code	White Color	Typical Color Temperature CCT (K)	CIE 1931 Chromaticity Coordinates							
			a		b		c		d	
			x	y	x	y	x	y	x	y
A0	Incandescent White	2700	0.4813	0.4319	0.4562	0.4260	0.4373	0.3893	0.4593	0.3944
B0	Warm White	3000	0.4562	0.4260	0.4299	0.4165	0.4147	0.3814	0.4373	0.3893
C0	White	3500	0.4299	0.4165	0.3996	0.4015	0.3889	0.3690	0.4147	0.3814
D1	Cool White	4000	0.4006	0.4044	0.3736	0.3874	0.3670	0.3578	0.3898	0.3716
D2	Cool White-2	4500	0.3736	0.3874	0.3548	0.3736	0.3512	0.3465	0.3670	0.3578
E0	Sun White	5000	0.3551	0.3760	0.3376	0.3616	0.3366	0.3369	0.3515	0.3487
E1	Sun White-2	5700	0.3376	0.3616	0.3207	0.3462	0.3222	0.3243	0.3366	0.3369
F0	Daylight	6500	0.3205	0.3481	0.3028	0.3304	0.3068	0.3113	0.3221	0.3261
G0	Flexible Color	>7000								

Note:
1. Tolerance for color coordinates measurement is ±0.001.

Chromaticity Diagram



Reliability

Test Item	Reference	Test Condition	Sample Size	Failure Rate [1]
Operation Life	MIL-STD-750:1026 MIL-STD-883:1005 JIS C 7021: B-1	Connect With a power I =320mA Ta = 25 °C Test Time = 1,000 hrs	50	0
High Temperature High Humidity Storage	MIL-STD-202:103B JIS C 7021: B-11	Ta = 60°C ± 5°C RH = 90% - 95% Test time = 500 hrs	50	0
High Temperature Storage	MIL-STD-883:1008 JIS C 7021: B-10	High Ta = 100°C ± 5°C Test time = 1,000 hrs	50	0
Low Temperature Storage	JIS C 7021 B-12	Low Ta= -40°C ± 5°C Test time = 1,000 hrs	50	0
Temperature Cycling	MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1010 JIS C 7021: A-4	-40°C - 25°C - 100°C - 25°C 30 min - 5 min - 30 min - 5 min Test time = 100 cycles	50	0
Thermal Shock	MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1011	100°C ± 5°C to -40°C ± 5°C 10 min - 10 min Test time = 100 cycles	50	0
Solder Resistance	MIL-STD-202:201A MIL-STD-750:2031 JIS C 7021:A-1	T_{sld} = 260 ± 5°C Dwell time = 10 ± 1 sec	22	0
Solderability	MIL-STD-202:208D MIL-STD-750:2026 MIL-STD-883:2003 JIS C 7021: A-2	T_{sld} = 230 ± 5°C Dwell time = 5 ± 1 sec	22	0
Lead Bending Stress	MIL-STD-750:2036 JIS C 7021 :A-11	0° - 90° - 0° bend, 3 cycles Weight 250g	22	0

Notes:
1. The criteria of failure is tested Forward Voltage Vf ≥ 1.1xInitial Level or Luminous Flux $\Phi_V \leq$ 0.7xInitial Level at the test condition of If=320 mA.
2. If Dynasty ™ X LED contains air bubbles, the bubbles and their location may affect the result of thermal shock test. According to the experimental results by CAO Group, when the emitter has no more than 2 bubbles with diameter less than 1 mm (for bubbles located at functional areas such as die bonding and wire bonding area) or 1.25mm (for bubbles located at non-functional area), the bubbles have little effect on thermal shock test.

Typical Electrical / Optical Characteristic Curves T_A = 25°C

Figure 1: Relative Intensity vs. Wavelength

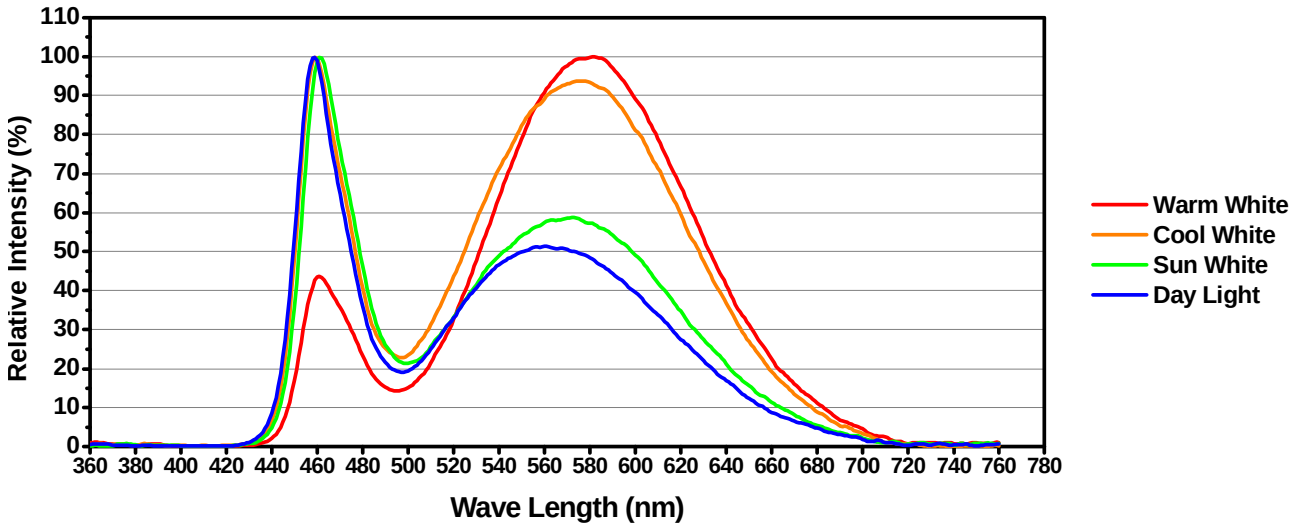


Figure 2: Forward Current vs. Forward Voltage

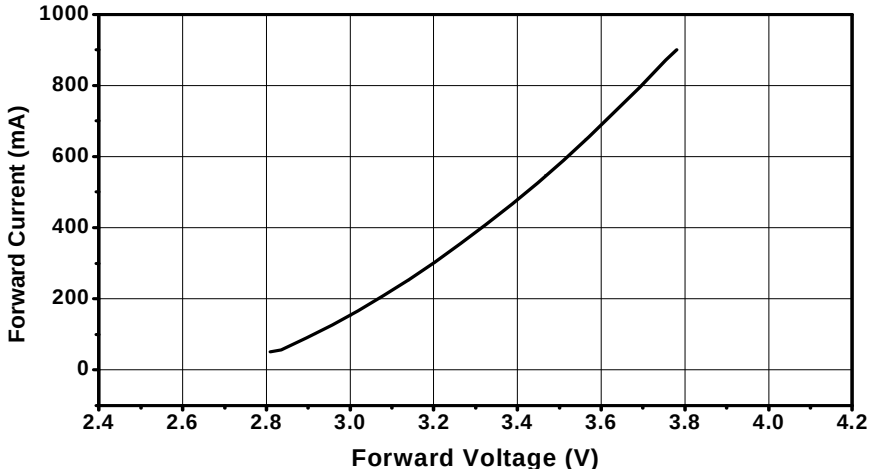


Figure 3: Relative Intensity vs. Forward Current

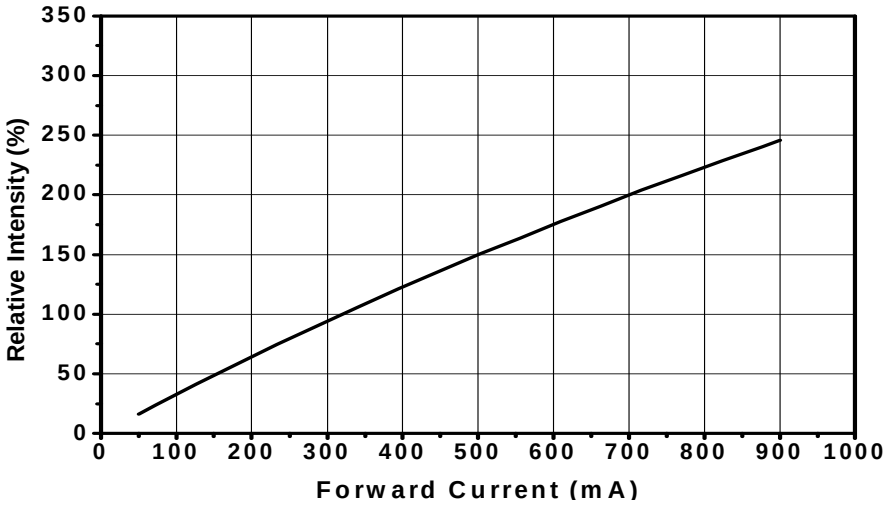


Figure 4: Relative Intensity vs. Ambient Temperature

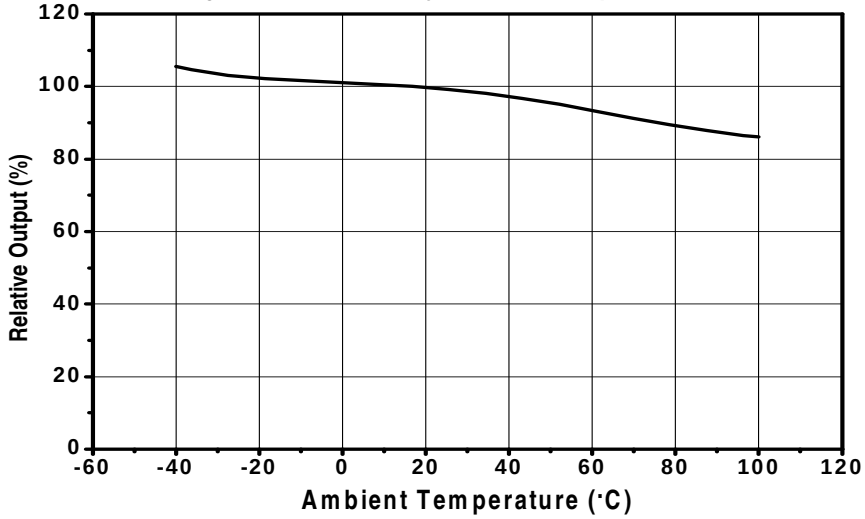


Figure 5: Forward Voltage vs. Ambient Temperature

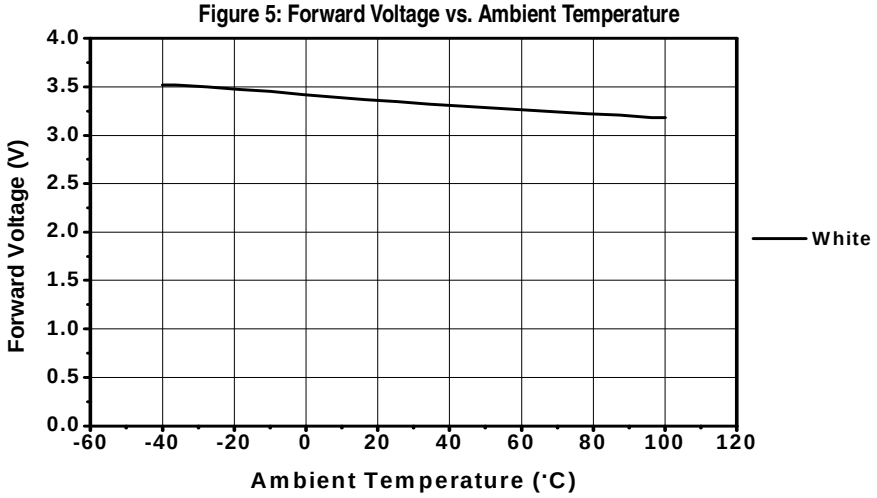


Figure 6: Butterfly-Beam™ - 3D Spatial Radiation Pattern: Relative Intensity vs. Angle

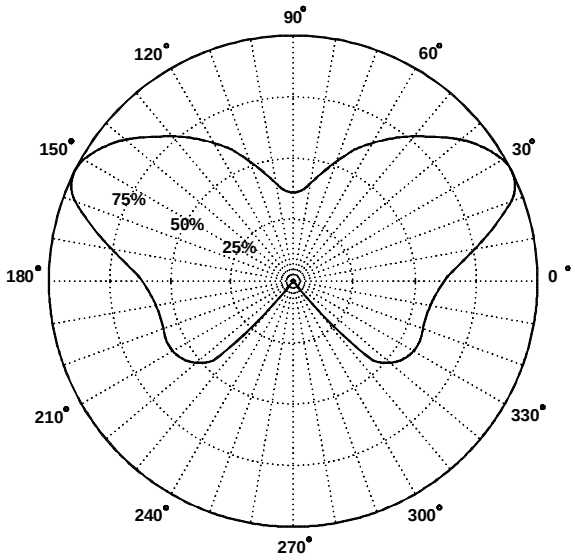


Figure 7: 2D Vertical Spatial Radiation Pattern – Relative Intensity vs. View Angle

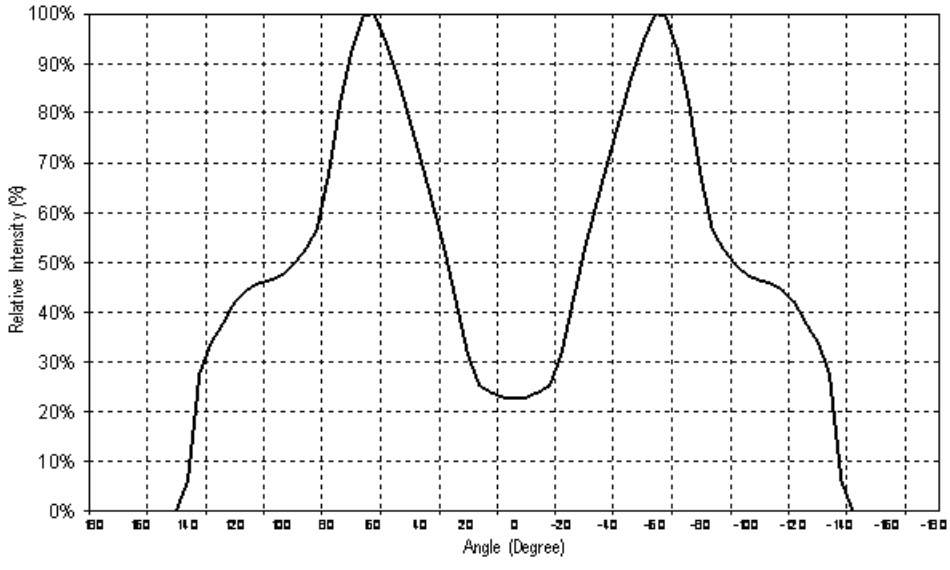
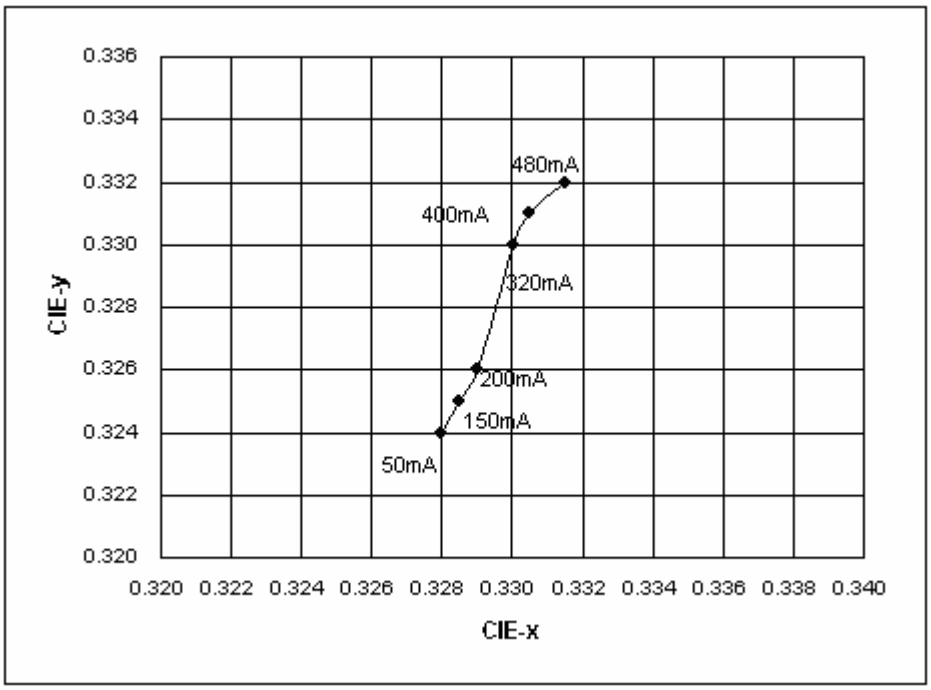


Figure 8: Forward Current vs. Chromaticity Coordinate



Cautions

1. Storage

Dynasty™ X is packaged in antistatic tubes; recommended storage temperature for Dynasty™ X is30ºC and 70%RH or less. Recommended assemble for Dynasty™ X is within five days after unpacking. Avoid direct contact with corrosive gas and liquid.

2. Static Electricity

Static electricity or surge voltage may damage Dynasty™ X. Wrist band or anti-electrostatic glove is required when handling the Dynasty™ X. All devices, equipments and machinery must be properly grounded.

3. Cleaning

Isopropyl alcohol is recommended to clean the Dynasty™ X surface; Dynasty™ X cannot be immersed in the isopropyl alcohol. Do not clean the Dynasty™ X with ultrasound.

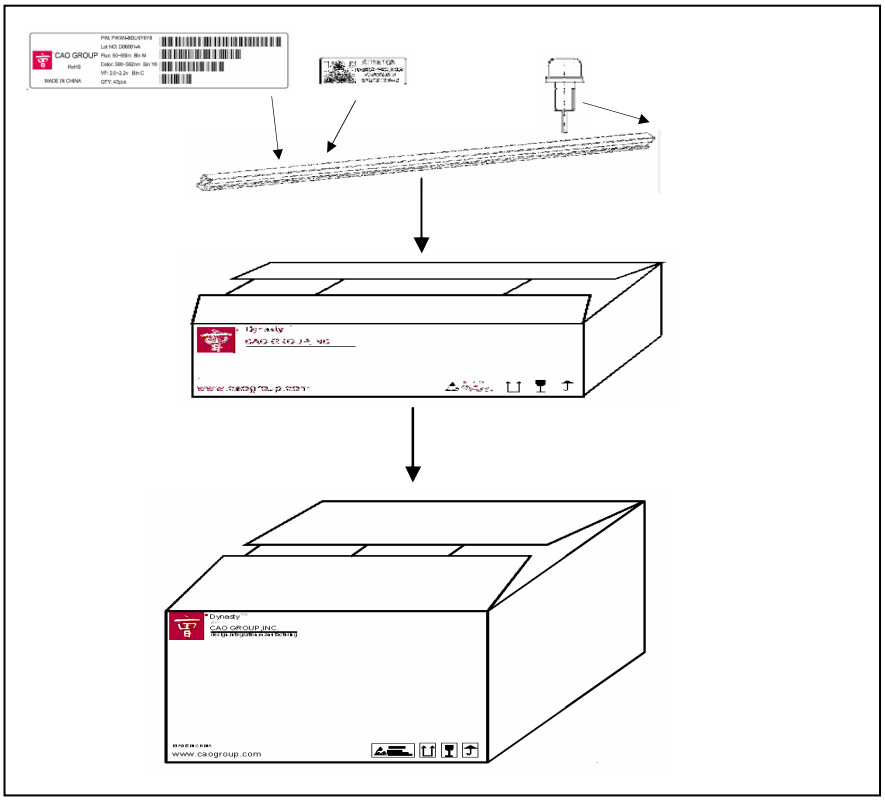
4. Safety

The light output of Dynasty™ X is intense enough to injure human eyes. To prevent eye damage, avoid looking directly at Dynasty™ X or it may damage eyes.

5. Responsibility

CAO Group, Inc. is not responsible for quality issues caused by improper maintenance and handling of our products.

Packaging



Notes:
1. Dynasty™ X is packaged in an anti-static tube with a capacity of 43 pieces per tube.
2. 60 tubes per inner box, 2580 pieces per inner box.
3. 4 inner boxes per outer box, 10320 pieces per outer box.

www.caogroup.com
For product information and a complete list of sales representatives, please go to our website.
For technical assistance call:
US/Canada: +1 (877) 877-9778 or (801) 256-9282
Data subject to change.

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