Data Sheet

PBXHMxxP1B4C, PCXHMxxG1G3C, PGXHMxxG6G7C, PYXBDxxY1Y9x and PRXBDxxT5T6x

Dynasty™ X Integrated Power LEDs

Blue, Cyan, Green, Amber and Red

DYNASTY™
Integrated Power LED

Description:

Dynasty™ X Integrated Power LED is a revolutionary high flux LED product that applies a completely new concept of die 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 and UV radiation.

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

Features:

- High lumen output
- Wide viewing angle with 360° horizontal and 275° vertical
- Unique Butterfly-Beam™
- Long lifetime
- Available in blue, cyan, green, amber, and red
- Threaded through-hole package
- RoHS compliant
- Superior performance in outdoor environment
- Copper alloy lead frame for best heat dissipation

Applications:

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

Device Selection Guide

Part Number	Color	Viewing Angle $\theta_{0.10V}$[1]	Luminous Flux Φ_V (lm) [2]		Dominant Wavelength λ_d(nm) [3]		Thread Polarity	Package Drawing
			Minimum	Maximum	Minimum	Maximum		
PBXHMFFP1B4C	Blue	275°/360°	5	10	430	480	Cathode	A
PBXHMGGP1B4C	Blue	275°/360°	10	15	430	480	Cathode	A
PCXHMKKG1G3C	Cyan	275°/360°	25	30	500	510	Cathode	A
PCXHMLLG1G3C	Cyan	275°/360°	30	35	500	510	Cathode	A
PCXHMMMG1G3C	Cyan	275°/360°	35	40	500	510	Cathode	A
PGXHMNNG6G7C	Green	275°/360°	40	45	520	530	Cathode	A
PGXHMPPG6G7C	Green	275°/360°	45	50	520	530	Cathode	A
PGXHMQQG6G7C	Green	275°/360°	50	55	520	530	Cathode	A
PGXHMRRG6G7C	Green	275°/360°	55	60	520	530	Cathode	A
PYXBDKKY1Y9C	Amber	275°/360°	25	30	580	598	Cathode	A
PYXBDLLY1Y9C	Amber	275°/360°	30	35	580	598	Cathode	A
PYXBDMMY1Y9C	Amber	275°/360°	35	40	580	598	Cathode	A
PYXBDNNY1Y9C	Amber	275°/360°	40	45	580	598	Cathode	A
PYXBDPPY1Y9C	Amber	275°/360°	45	50	580	598	Cathode	A
PYXBDQQY1Y9C	Amber	275°/360°	50	55	580	598	Cathode	A
PYXBDQQY1Y9C	Amber	275°/360°	55	60	580	598	Cathode	A
PRXBDJJT5T6C	Red	275°/360°	20	25	620	630	Cathode	A
PRXBDKKT5T6C	Red	275°/360°	25	30	620	630	Cathode	A
PYXBDLLY1Y9A	Amber	275°/360°	30	35	580	598	Anode	B
PYXBDMMY1Y9A	Amber	275°/360°	35	40	580	598	Anode	B
PYXBDNNY1Y9A	Amber	275°/360°	40	45	580	598	Anode	B
PRXBDKKT5T6A	Red	275°/360°	25	30	620	630	Anode	B
PRXBDLLT5T6A	Red	275°/360°	30	35	620	630	Anode	B
PRXBDMMT5T6A	Red	275°/360°	35	40	620	630	Anode	B

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. Typical spectrum half width is 25 nm.
3. The dominant wavelength is derived from the CIE 1931Diagram and represents the perceived color of the device. CAO maintains a tolerance of ±2nm for dominant wavelength measurements.

Part Numbering System

P	G	X	H	M	P	Q	G	6	G	7	C
1	2	3	4	5	6	7	8	9	10	11	12

Thread Polarity
A: Anode
C: Cathode

Maximum Color Bin

Minimum Color Bin

Maximum Luminous Flux Bin

Minimum Luminous Flux Bin

Maximum Forward Voltage Bin

Minimum Forward Voltage Bin

Dynasty™ Generations

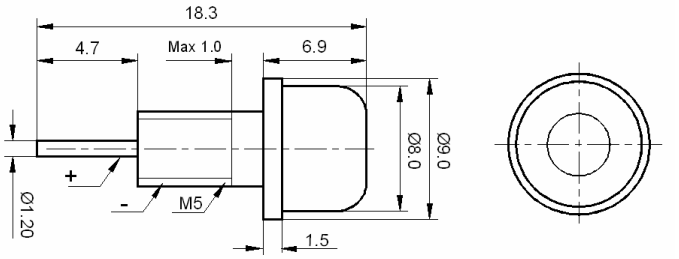
Emitting Color
B: Blue
C: Cyan
G: Green
Y: Amber
R: Red

Luminous Flux Bin Limits (lm)

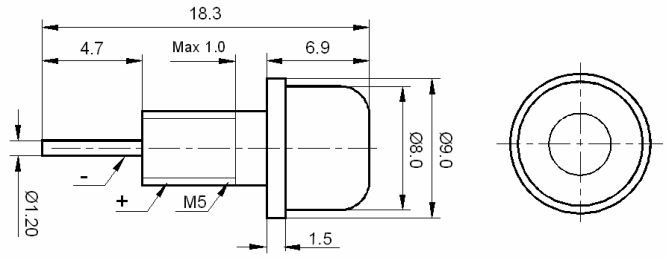
Bin Code	Min.	Max.
F	5	10
G	10	15
H	15	20
J	20	25
K	25	30
L	30	35
M	35	40
N	40	45
P	45	50
Q	50	55
R	55	60
S	60	65
T	65	70

Tolerance for each intensity bin limit is ±15%.

Mechanical Dimensions



Drawing A



Drawing B

Notes:

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

P/N	Color	Chip Material	Lead Frame	Weight
PBXHMxxP1B4C	Blue	InGaN	Copper Alloy	2.18±0.1g
PCXHMxxG1G3C	Cyan	InGaN	Copper Alloy	2.18±0.1g
PGXHMxxG6G7C	Green	InGaN	Copper Alloy	2.18±0.1g
PYXBDxxY1Y9C	Amber	AlGaInP	Copper Alloy	2.18±0.1g
PRXBDxxKT5T6C	Red	AlGaInP	Copper Alloy	2.18±0.1g
PYXBDxxY1Y9A	Amber	AlGaInP	Copper Alloy	2.18±0.1g
PRXBDxxKT5T6A	Red	AlGaInP	Copper Alloy	2.18±0.1g

Absolute Maximum Rating at T_A = 25°C

Parameters	Blue, Cyan and Green	Red and Amber
DC Forward Current [1]	480 mA	480 mA
Peak Pulse Forward Current [2]	1.6 A	1.6 A
Power Dissipation	2.0 W	1.2 W
Reverse Breakdown Voltage [3]	5 V	5 V
Operating Temperature Range	-30°C to +85°C	-40°C to +100°C
ESD Sensitivity (HBM)	Class 1	Class 1
LED Junction Temperature	120°C	120°C
Storage Temperature Range	-40°C to +100°C	-40°C to +100°C
Lead Soldering Temperature [4]	260°C for 5 Seconds	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

P/N	Color	Luminous Flux Φ_V (lm) [1]		Forward Voltage V_F[2] (V)			Dynamic Resistance [3] R_D (Ω)	Thermal Resistance Junction to Case $R\theta_{J-C}$ (℃/W)
		Min.	Typ.	Min.	Typ.	Max.		
PBXHMxxP1B4C	Blue	5	8	3.0	3.3	4.0	10.0	10.0
PCXHMxxG1G3C	Cyan	25	31	3.0	3.3	4.0	10.0	10.0
PGXHMxxG6G7C	Green	40	50	3.0	3.3	4.0	10.0	10.0
PYXBDxxY1Y9C	Amber	25	45	1.8	2.2	2.4	6.9	20.0
PRXBDxxKT5T6C	Red	20	26	1.8	2.2	2.4	6.9	20.0
PYXBDxxY1Y7A	Amber	30	36	1.8	2.2	2.4	6.9	20.0
PRXBDxxKT5T6A	Red	25	30	1.8	2.2	2.4	6.9	20.0

Notes:
1. Luminous flux ΦV is measured with an integrating sphere after the device is stabilized.
2. CAO Group, Inc. maintains a tolerance of ±0.1 V on forward voltage measurements.
3. 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

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 Φ_V ≤ 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

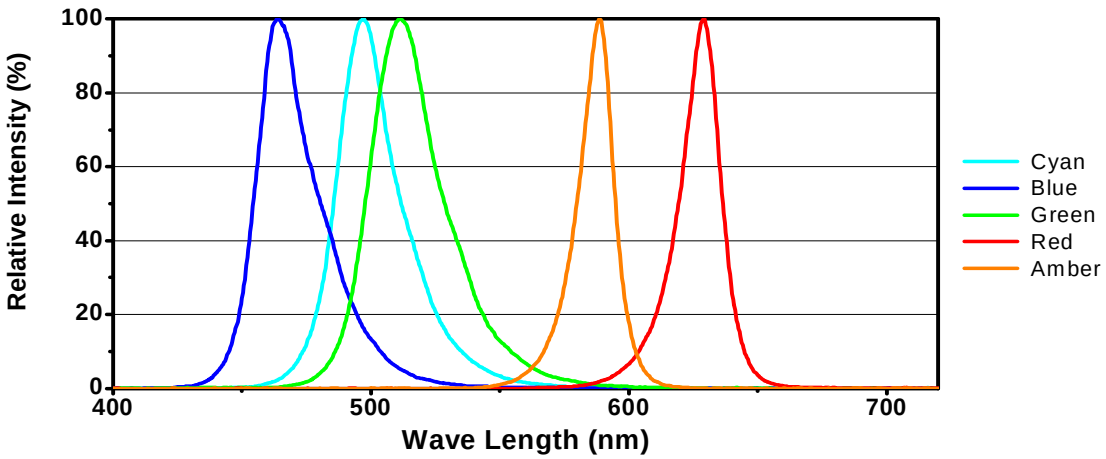


Figure 2: Forward Current vs. Forward Voltage

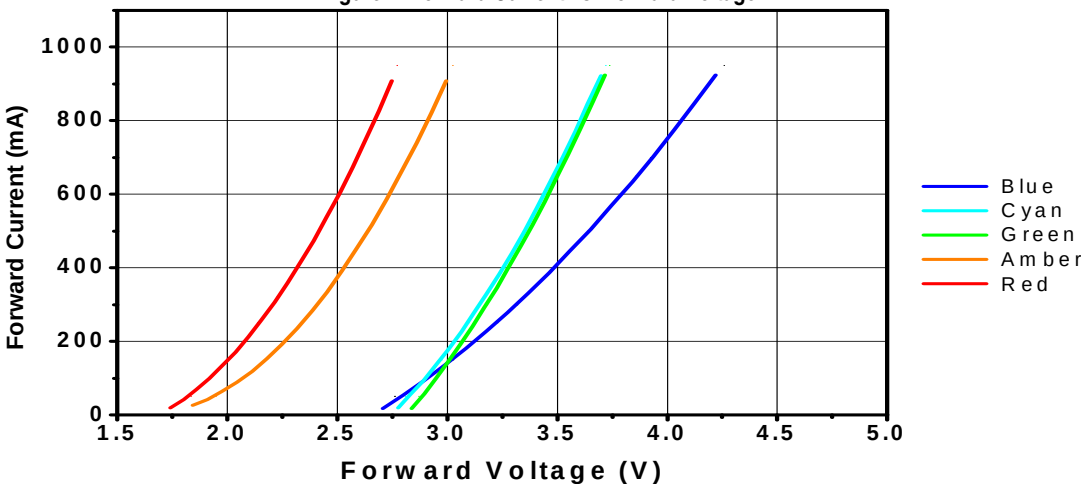


Figure 3: Relative Intensity vs. Forward Current

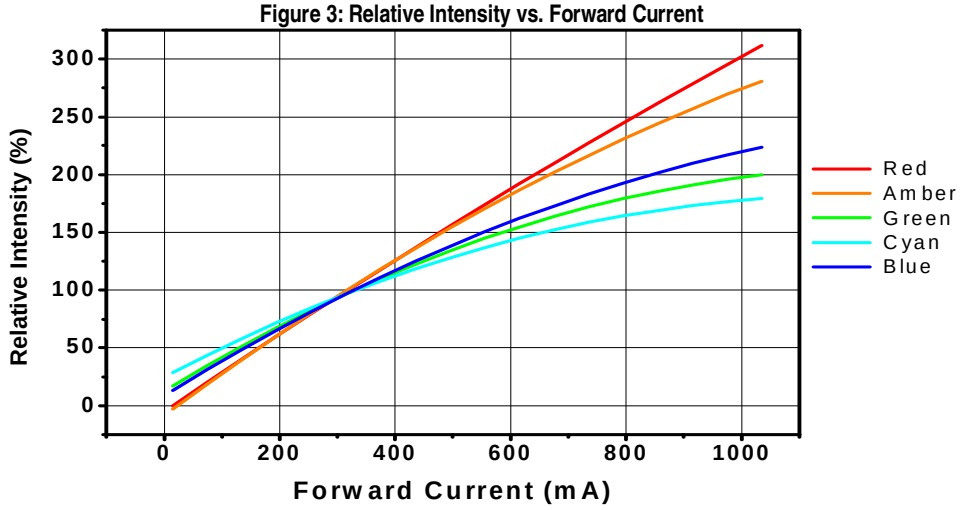


Figure 4: Relative Intensity vs. Ambient Temperature

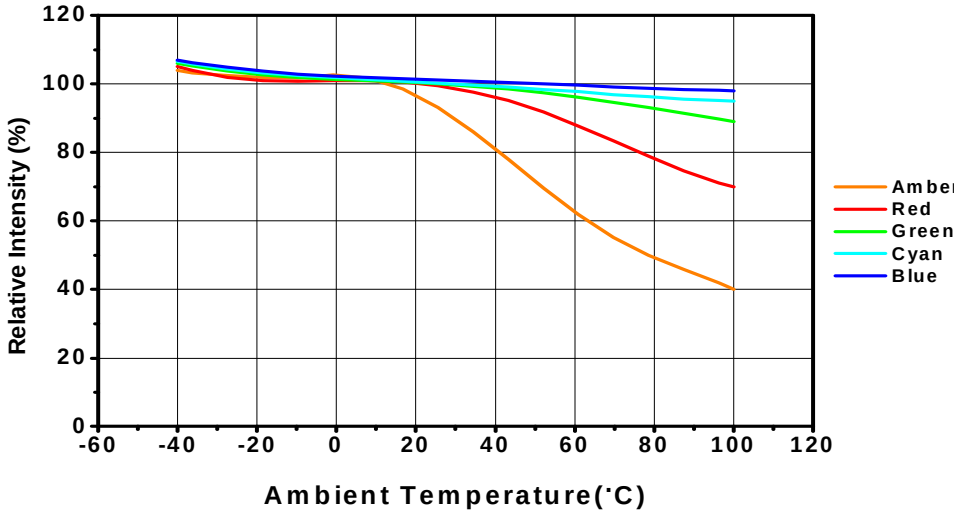


Figure 5: Forward Voltage vs. Ambient Temperature

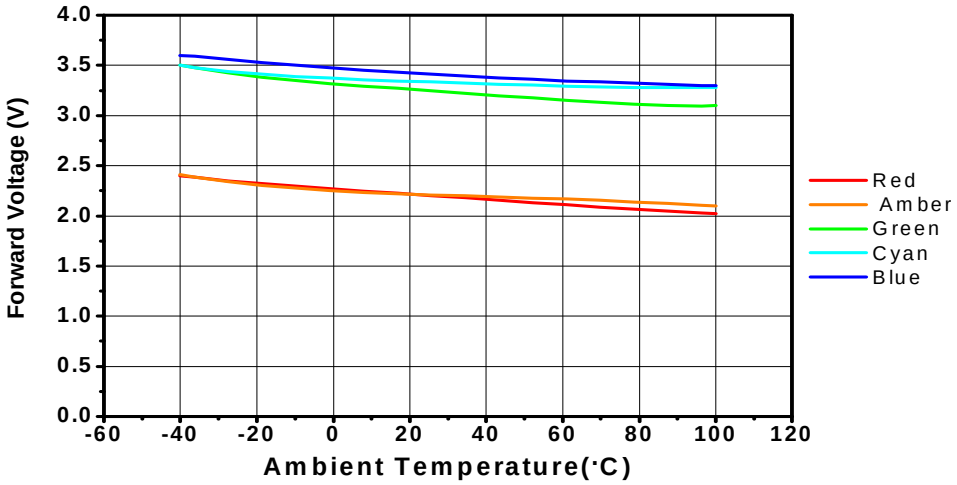


Figure 7: 2D Vertical Spatial Radiation Pattern – Relative Intensity vs. View Angle

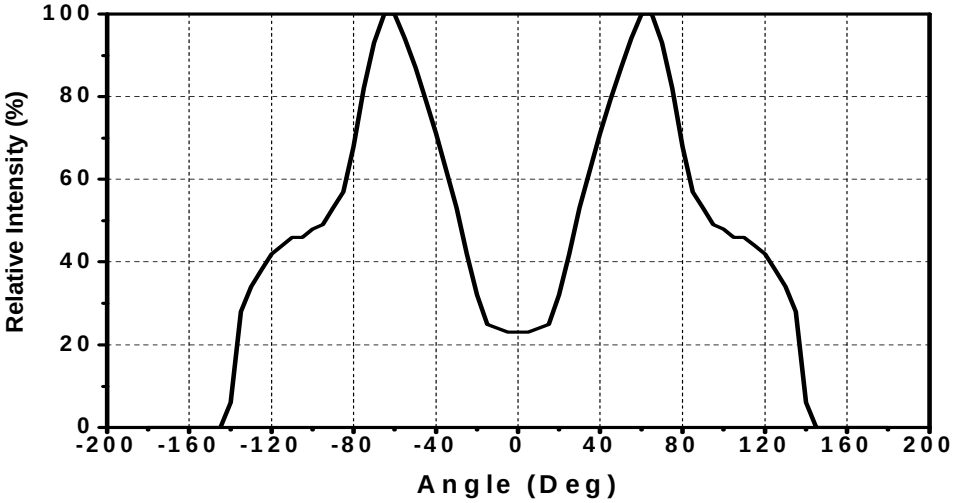
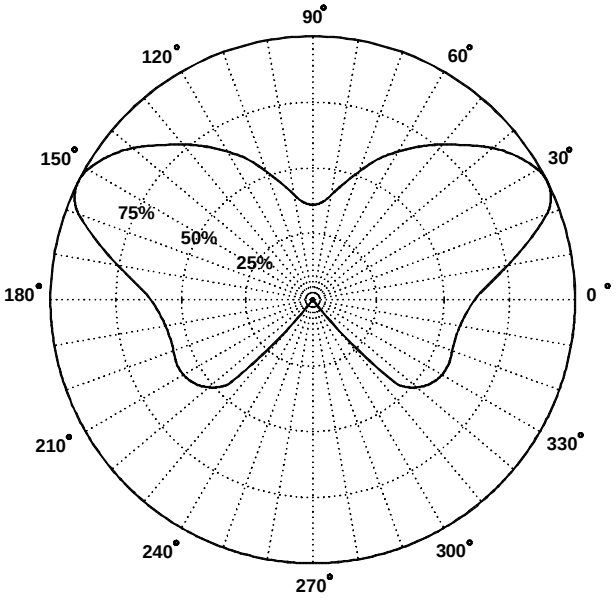


Figure 6: Butterfly-Beam™ - 3D Spatial Radiation Pattern: Relative Intensity vs. Angle



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.

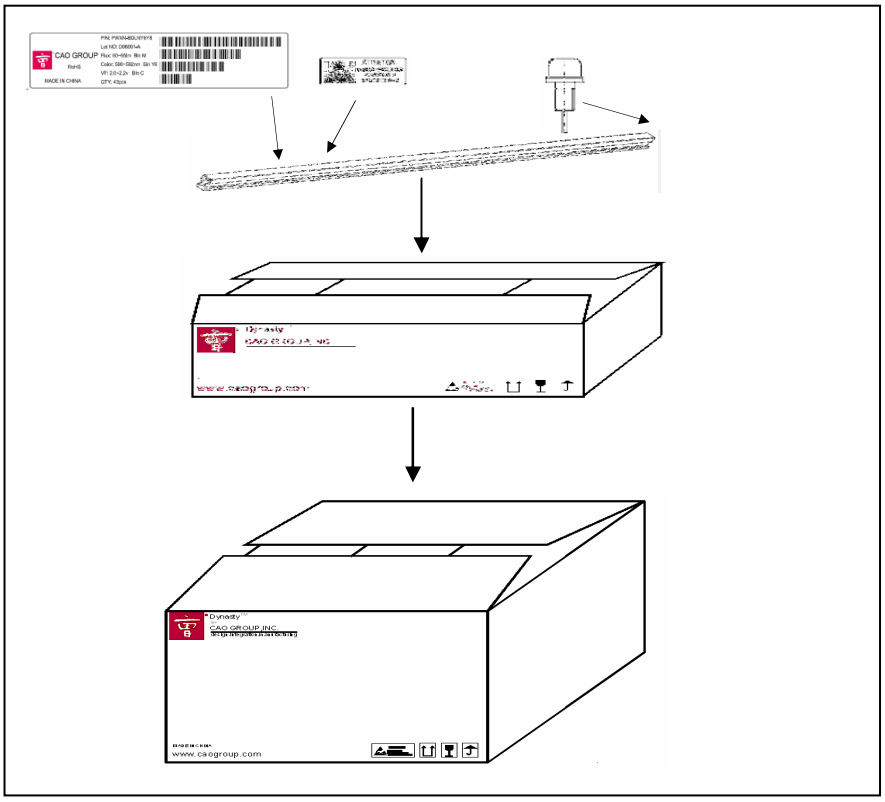
4. Safety

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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