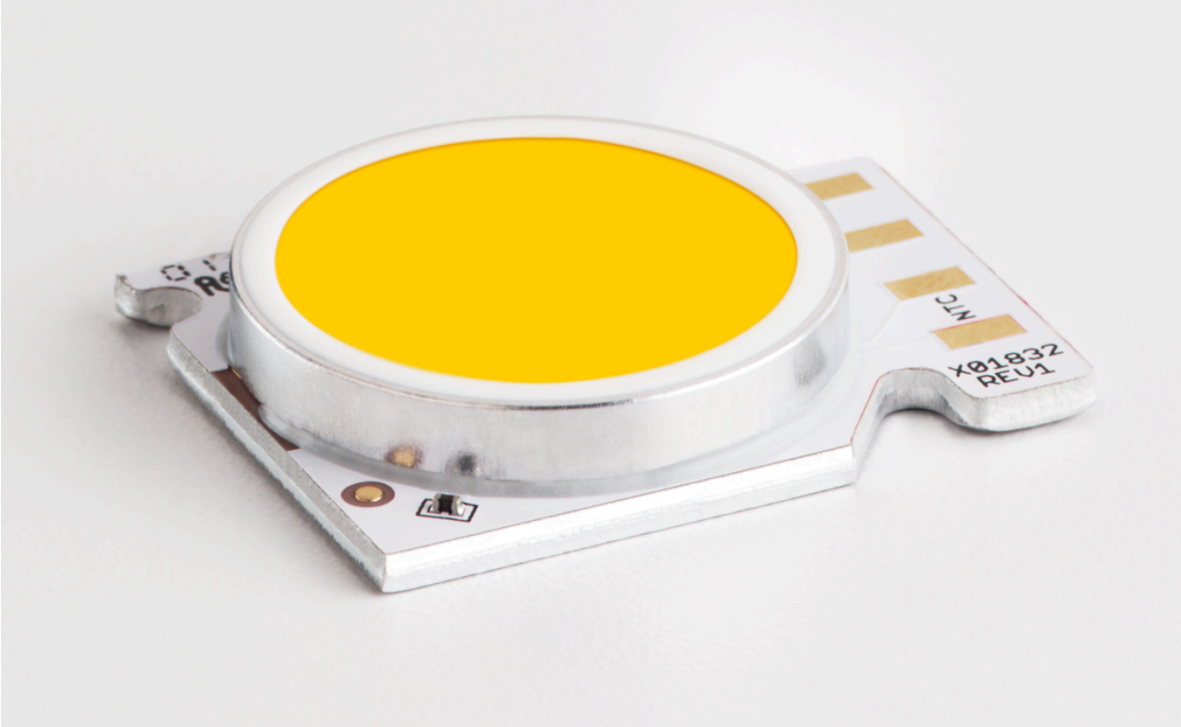
DETAILED DATA SHEET

XCA Core Array
with Corrected Cold Phosphor Technology®

Beauty Series



About Xicato

Xicato designs and develops light sources and electronics that enable architects, designers and building managers to create beautiful, smart spaces in which people love to live and work. With thousands of installations around the globe, Xicato continues to be a leading supplier of high quality lighting solutions. Xicato is defining the future of intelligent light sources by integrating electronics, software and connectivity. Founded in 2007, Xicato's headquarters is based in Silicon Valley and the company has offices in China, Europe and the US.

For further information, visit www.xicato.com.

ABOUT THIS DOCUMENT

This datasheet is just one of many documents and tools available from Xicato to assist lighting designers, specifiers, and luminaire manufacturers in understanding and using Xicato products. These include:

ACCESSORY SELECTION TOOLS (HEATSINKS, OPTICS, DRIVERS)

Xicato has a searchable database of driver, reflectors, and heat sinks that have been evaluated by Xicato and can be integrated with Xicato's light sources. Users can search and filter on a wide range of parameters to match the desired solution for their application. Contact your sales representative or technical application representative for more details.

CAD FILES & DRAWINGS

3D files are available for download on the Xicato website.

APPLICATION & TECHNICAL NOTES

Xicato has an extensive list of application notes for proper handling and usage of the modules.

TABLE OF CONTENTS

GENERAL DESCRIPTION

XCA

The Xicato Core Array (XCA) is the standard LED light source for Xicato Thin Module (XTM) and Xicato Intelligent Module (XIM) platforms, and is also designed for use with the Xicato XSA-401 45mm holder. Available in 19mm and 9mm Light Emitting Surface (LES) and many CRI, CCT, and lumen output options, XCA provides unique benefits due to the Xicato patented Corrected Cold Phosphor Technology® process, which features:

- Remote phosphor with separate thermal paths for the phosphor and the underlying LED array
- Dual phosphor coats – an initial coat is applied on the inner surface of the sapphire window, the unit is tested, and a second coat is applied to the outer surface to precisely target CCT and CRI values

It is the XCA with Corrected Cold Phosphor Technology that allows Xicato to provide a long term warranty on both lumen maintenance and color consistency, for lowest total cost of ownership and smallest ecological footprint. With Xicato's industry leading color quality, consistency and application-optimized light spectra, XCA provides simply the most beautiful lit effect, and our warranty insures that consistent lighting design quality is maintained from build to refurbish.

BEAUTY SERIES

Developed in collaboration with lighting designers and leading cosmetology professionals and backed by independent research, Xicato Beauty Series is a remarkable light source that makes people look and feel exceptional. Beauty Series is designed to enhance the natural beauty of human skin tones, with outstanding color rendering and extended gamut that aids in cosmetic color matching, but is appropriate for any location where people shop or socialize.

XICATO CORRECTED COLD PHOSPHOR PORTFOLIO (SEE ALSO XLT)

Xicato Portfolio	Lumen Output	Correlated Color Temperature 2700K		3000K		3500K		4000K	
Artist Series® CIE CRI: Ra 95+, R9 90+ IES TM-30: Rf 96, Rg 103	700	◎		◎		◎		◎	
	1300	◎	◉	◎	◉	◎	◉	◎	◉
	2000	•	◉	•	◉	•	◉	•	◉
	3000		•		•		•		•
	4000		•		•		•		•
Beauty Series™ CIE CRI: Ra 95 IES TM-30: Rf 91, Rg 107									
	1300		◉						
	2000		◉						
Designer Series™ CIE CRI: Ra 90+, R9 50+ IES TM-30: Rf 88, Rg 101	700	◎		◎		◎		◎	
	1300	◎	◉	◎	◉	◎	◉	◎	◉
	2000	◎	◉	◎	◉	◎	◉	◎	◉
	3000		◉		◉		◉		◉
	4500				•		•		•
Standard Series CIE CRI: Ra 80+ IES TM-30: Rf 78, Rg 101	700	◎		◎		◎		◎	
	1300	◎	◉	◎	◉	◎	◉	◎	◉
	2000	◎	◉	◎	◉	◎	◉	◎	◉
	3000		◉		◉		◉		◉
	4000		•		•		•		•
	5000		•		•		•		•
Vibrant Series® V80 CIE CRI: Ra 80+ IES TM-30: Rf 73, Rg 105	700			◎					
	1300			◎	◉				
	2000			◎	◉				
	3000				◉				
	4000				•				
	5000				•				
Vibrant Series® V95 CIE CRI: Ra 95+ IES TM-30: Rf 93, Rg 106	700			◎					
	1300			◎	◉				
	2000			•	◉				
	3000				•				
	4000				•				

LEGEND	XCA+XTM	+XIM
9mm LES	•	◎
19mm LES	•	◉

Note:
CRI listed as XX+ are guaranteed minimum values. Typical values are min+3.

ORDERING GUIDE

PART NUMBERING SYSTEM

NOTE that all combinations are not available. Please see listing, below.

X	IM	19	95	30	13	A2	A
Xicato	CA = Core Array IM = Intelligent Module TM = Thin Module	Light Emitting Surface (LES mm) 09 = 9 19 = 19	Series 80 = Standard 95 = Artist BT = Beauty V8 = Vibrant 80 V9 = Vibrant 95	CCT (K) 27 = 2700 30 = 3000 35 = 3500 40 = 4000 01 = NA	Flux (nominal) 07 = 700 13 = 1300 20 = 2000 etc.	Feature Group A2 = DALI A3 = 1-10V CC = constant current	Revision

PART CODES AND DESCRIPTIONS

XCA BEAUTY SERIES WITH 19MM LIGHT EMITTING SURFACE (LES)

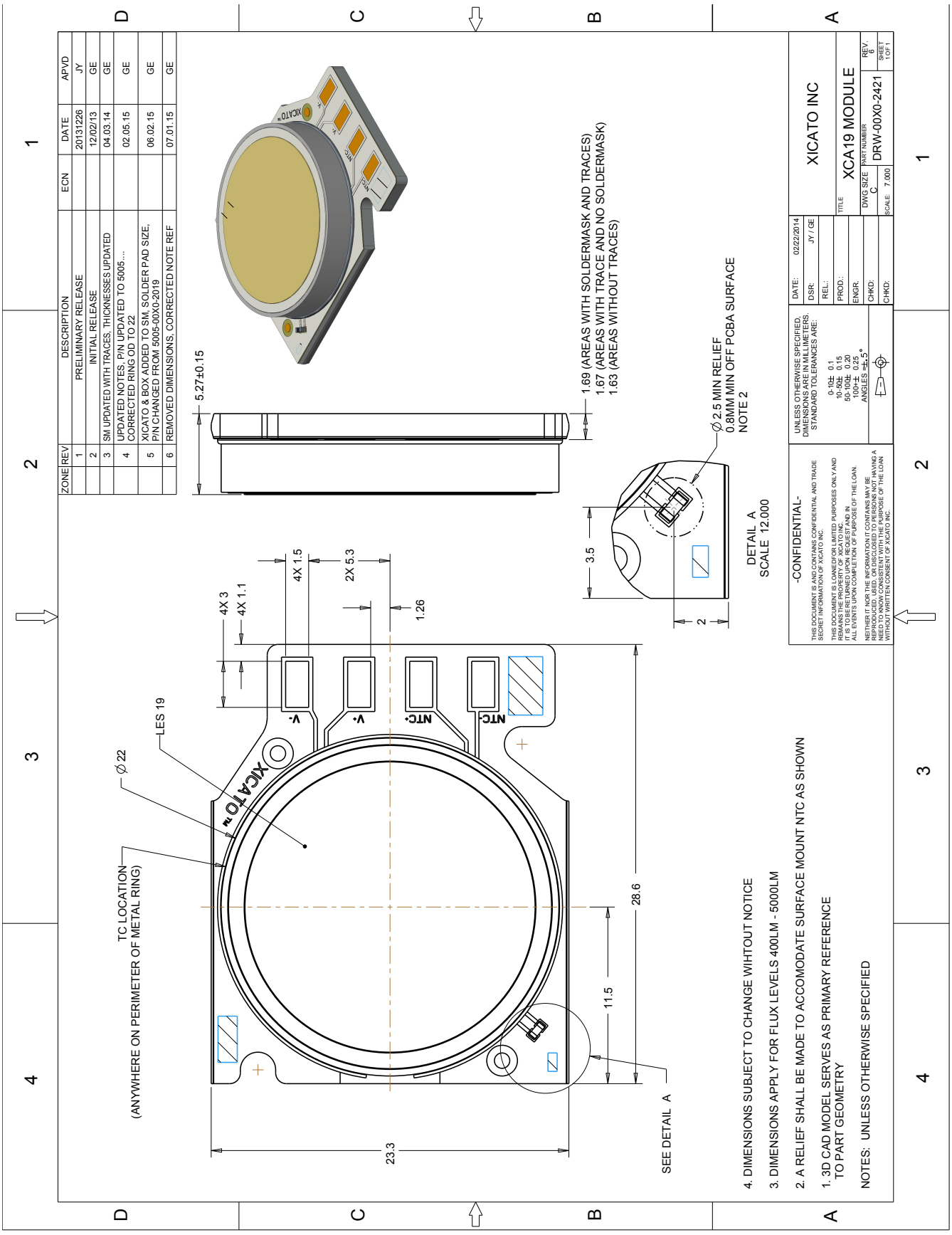
Part Number	Description
XCA19BT0113CCA	LED Core Array, XCA, LES19, Beauty, 2700K, 1300LM
XCA19BT0120CCA	LED Core Array, XCA, LES19, Beauty, 2700K, 2000LM

MECHANICAL CHARACTERISTICS

MECHANICAL SPECIFICATIONS

Dimensions:	28.6mm x 23.3mm (1.126” x 0.917”)
Weight:	6 grams (0.21 oz.)
Light Emitting Surface options:	Ø 9mm (0.35”) Ø 19mm (0.75”)
Module Source Type:	Corrected Cold Phosphor Technology®
Interfaces – Electrical:	Gold plated contacts for solder or spring contact connection.
Interfaces – Mechanical:	Thermal adhesive or clamp mechanism (holder) required for attachment. Screws or fasteners directly to XCA not permitted. Metal ring surrounding LES shall not be mechanically stressed or used as an alignment feature. XCA shall not be potted or otherwise encapsulated… optical cavity must maintain air ventilation. Electrical contacts may be selectively coated for electrical isolation, but coating shall not come into contact with LES or metal ring surrounding LES.
Interface – Thermal:	Integrated thermal pad. Recommend a mating thermal interface (i.e. heatsink) surface flatness of ≤ 0.1mm in order to maintain thermal performance. Xicato recommends that the heatsink have no center hole, as heatsink center hole and hole diameter affects thermal performance and max power – see *Application Note – Xicato XCA Assembly Guide* on Xicato website.
Maximum Case Temperature:	90°C
Shipping (100 count box):	45mm x 35mm x 5mm (18” x 14” x 2”) 0.9 kg (2 lbs.)
Storage Temperature:	-40°C to +85°C

MECHANICAL DRAWINGS



COLOR METRICS

Optimized for skin tones, developed by industry experts and verified by independent research.

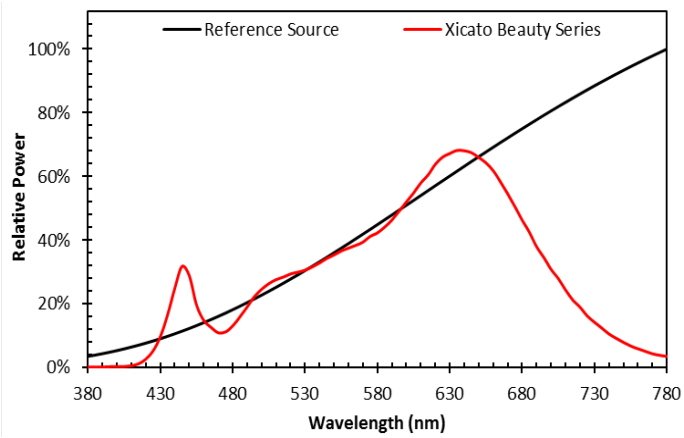
Beauty Series is designed with an application-specific color point and spectral power distribution designed to enhance the beauty of human skin tones. Traditional measures of CCT, CRI and color point are not adequate to compare Beauty Series with competing products, nor do they reflect the intended effect of the product.

All color rendering data at highest rated drive current and 70°C case temperature (T_c)
Tester consistency (reproducibility) ± 0.0002 Duv (CIE 1964) from NIST reference

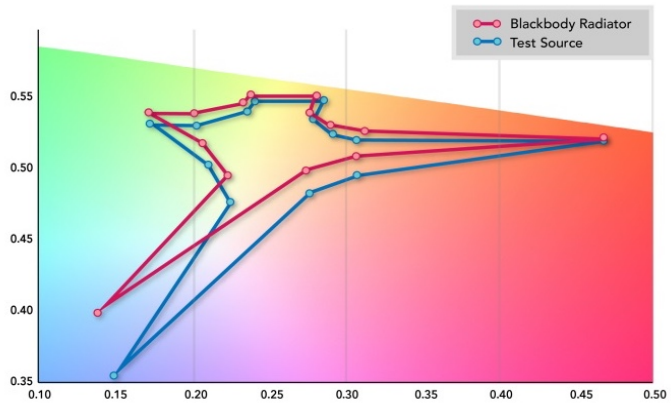
Correlated Color Temperature:	2700K nominal, 2730K actual ± 40K
Initial Color Consistency:	≤ 1 x 2 Macadam ellipses (SDCM) at 70°C, B0
Color Maintenance:	Consistency maintained < 0.003 Δu'v'
Lumen Maintenance:	L70/B0 at 50,000 hours (long term testing in progress)
Color Rendering:	Values are typical. Minimum CIE Ra is 93. IES TM-30-15: Rf = 91, Rg = 107
Warranty:	5 year for individual modules (B0) on mortality, color and lumen maintenance. Details at www.xicato.com/support/warranty

CIE	Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	GAI_{BB}
Beauty Series	95	96	96	97	94	95	92	94	95	95	92	91	88	95	99	97	133

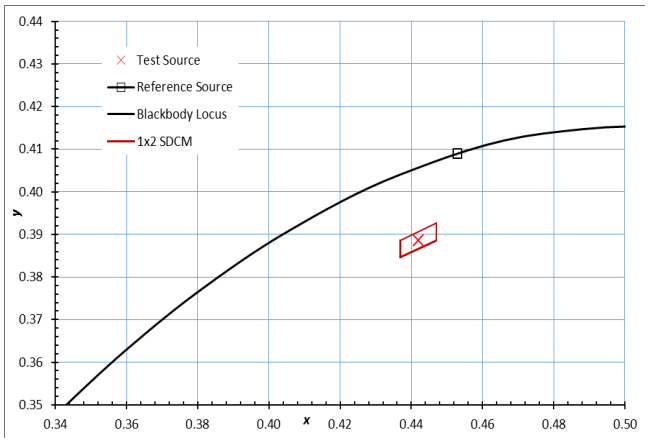
Spectral Power Distribution (SPD)



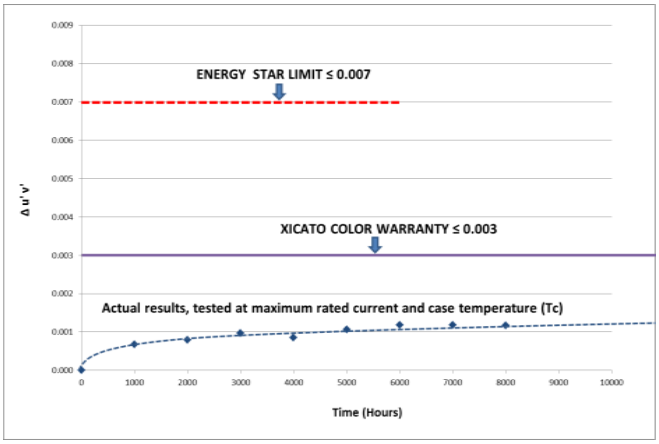
CIE CRI Color Gamut



Initial Color Point and Color Consistency



Color Maintenance



IES TM-30 COLOR METRICS

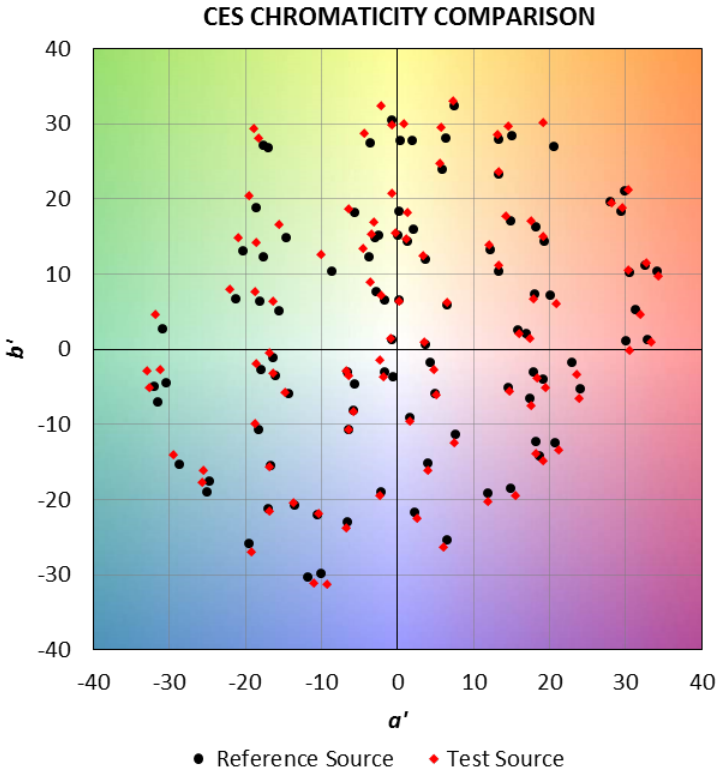
(Values are typical.)

IES TM-30 Color Fidelity (R_f) 91

IES TM-30 Color Gamut (R_g) 107

CES CHROMATICITY COMPARISON

This plot shows the shift in chromaticity for each individual color evaluation sample (CES). Closer proximity between paired dots indicates higher fidelity.

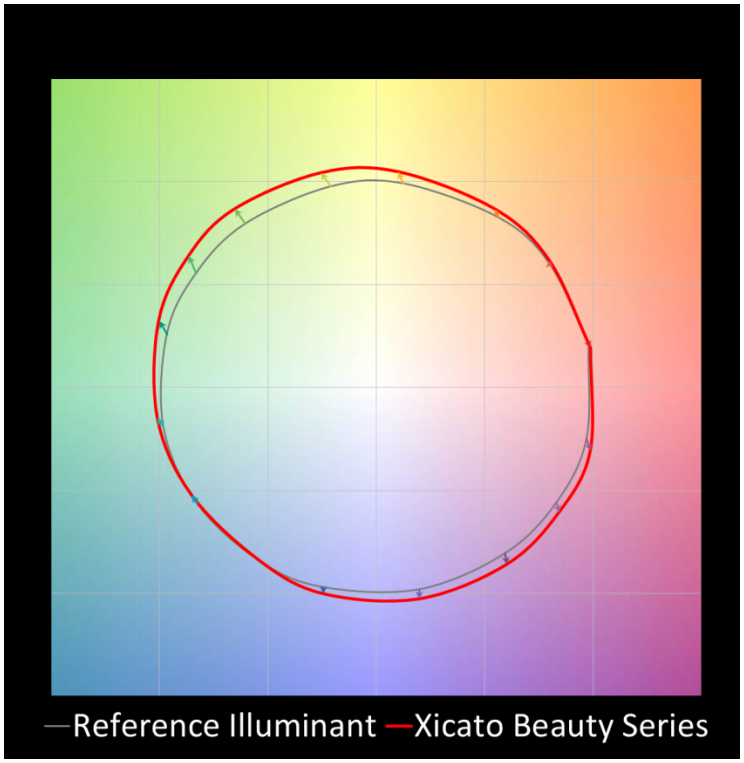


COLOR VECTOR GRAPHIC

This plot shows the average chromaticity shift for the samples within each of 16 hue bins, which are compiled out of the 99 IES TM-30 Color Evaluation Samples. The values are normalized so that the reference is a circle.

Vector arrows indicate the direction and degree of the shift for each hue bin.

- Radial shift indicates an increase/decrease in saturation.
- Tangential shift indicates a shift in hue.
- Length of arrow indicates degree of shift.

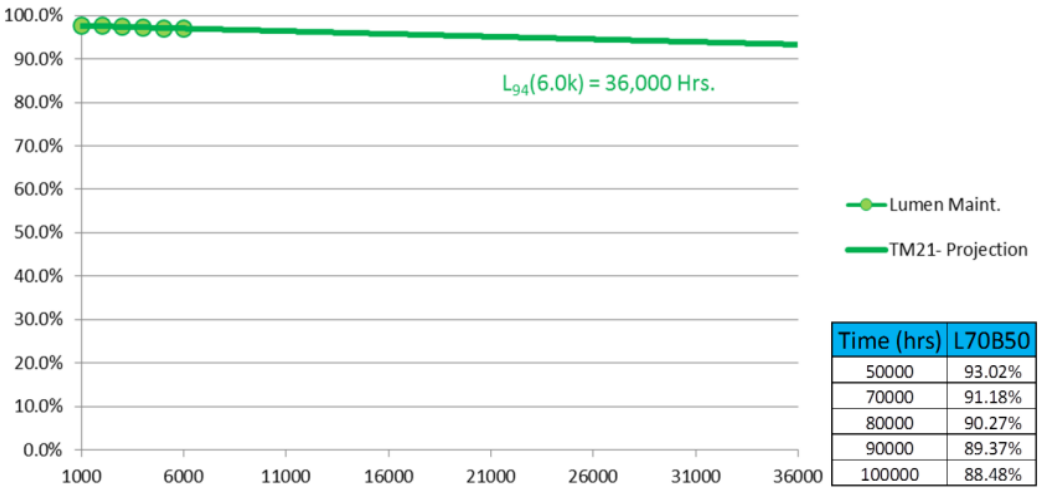


IES LM-80

BEAUTY SERIES® 19MM LES, 2700K, 2000LM

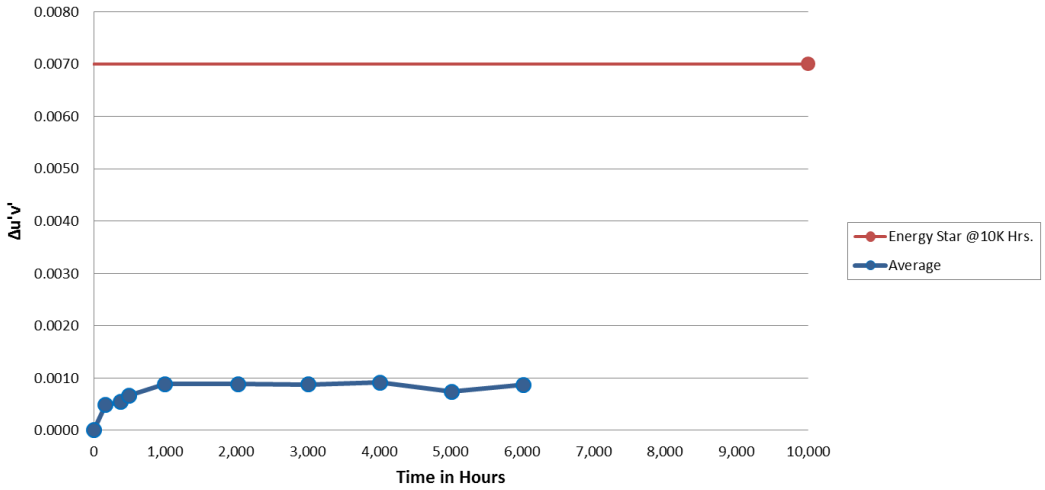
Testing conducted at T_c = 90°C, I_f = 1050mA, HTOL, 6000 Hrs.

LUMEN MAINTENANCE

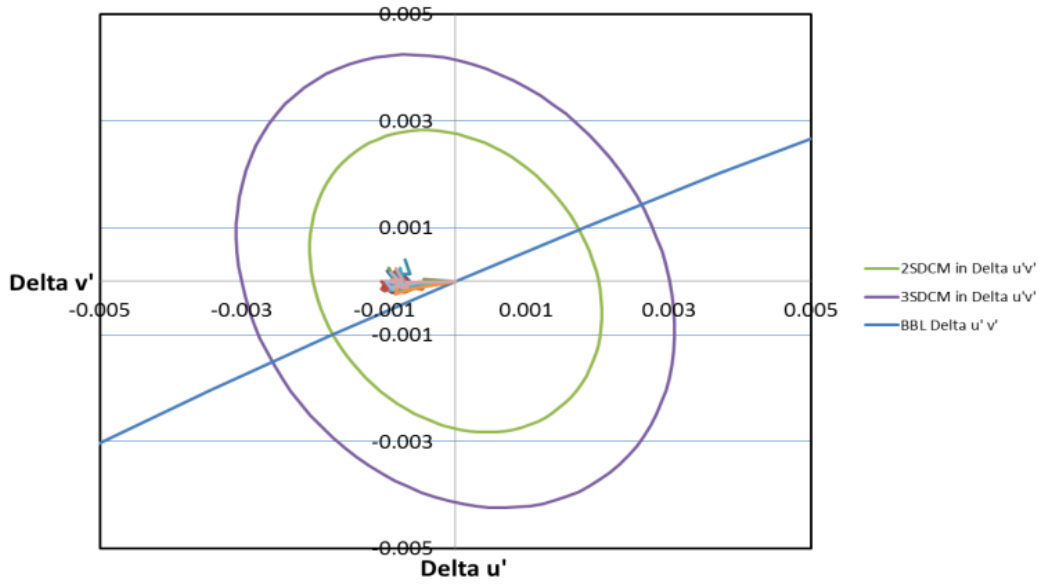


Time (hrs)	L70B50
50000	93.02%
70000	91.18%
80000	90.27%
90000	89.37%
100000	88.48%

COLOR MAINTENANCE



COLOR MAINTENANCE (NORMALIZED)



PERFORMANCE CHARACTERISTICS

More extensive performance data is available from your Xicato sales representative.

NOTES:

1. Data shown in the tables below are taken at a recommended operating test point (Tc) temperature of 70°C.
2. Voltage data is based on 20°C to 90°C operating range. For operation outside this range, contact Xicato.
3. Module is designed for use with a constant current power supply with maximum output current, including tolerance, of up to 770mA (700mA), 1100mA (1050mA), and 1500mA (1400mA).
4. Voltage data based on 20°C to 90°C operating range. For operation outside this range, contact Xicato.
5. Minimum, Maximum, and Typical power consumption can be calculated from the ranges provided.
6. Absolute range of lumen output is ±10% of typical value
7. Maximum peak ripple current with frequencies ≥ 100Hz for each product are 1400mA (700 lm), 2000mA (1300 lm) and 2800mA (2000 lm).
8. CCT data ANSI/NEMA compliant.
9. Specifications are subject to change without notice.

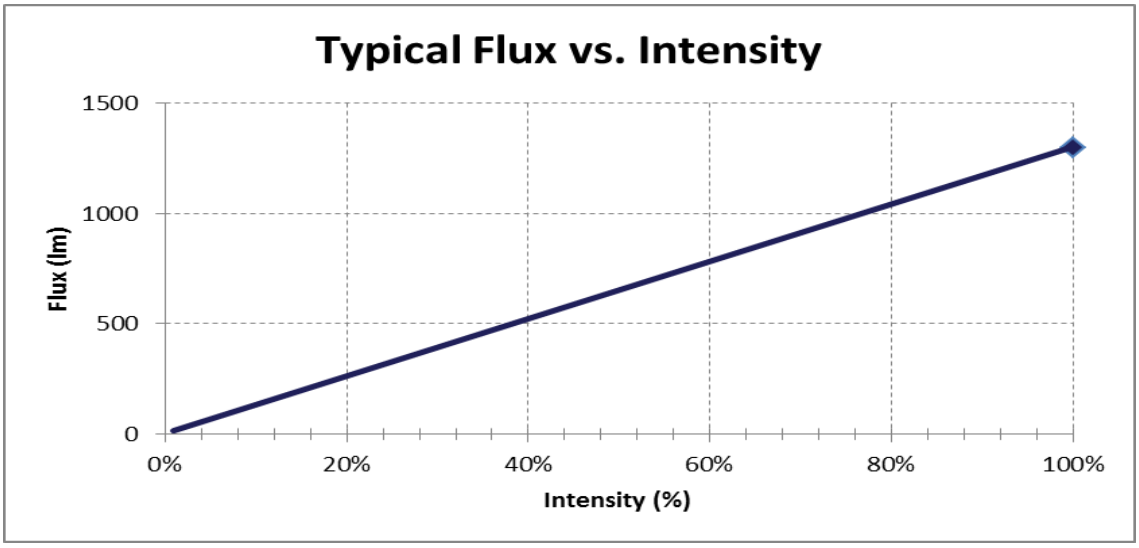
INITIAL COLOR CONSISTENCY

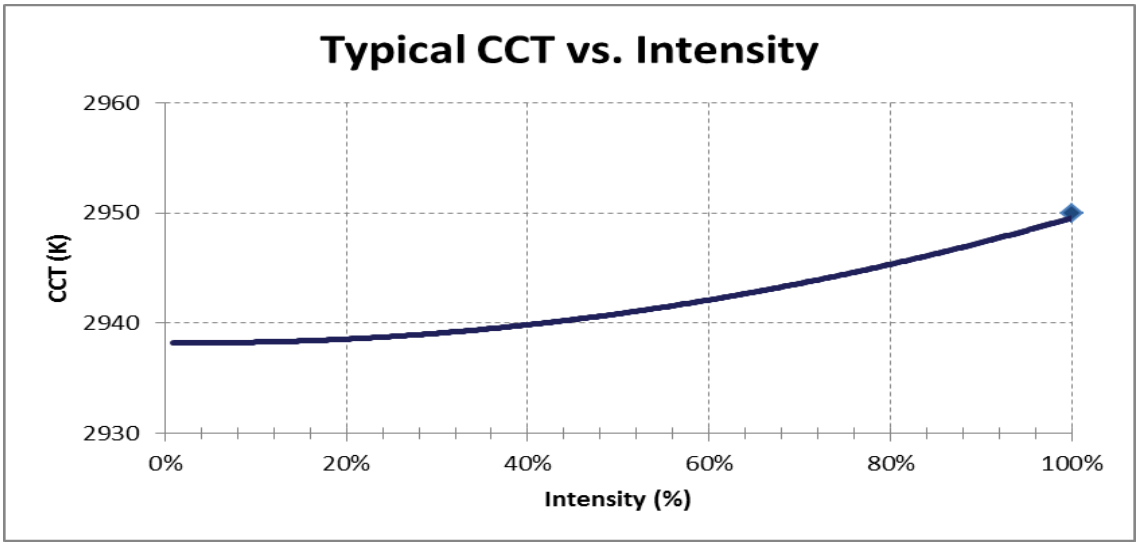
Correlated Color Temp			Initial Color Consistency	
Nominal	Actual	CCT	SDCM	Duv
2700K	2700K	± 40K	≤ 1 x 2	± 0.001
3000K	2950K	± 50K		
3500K	3420K	± 60K		
4000K	4000K	± 70K		

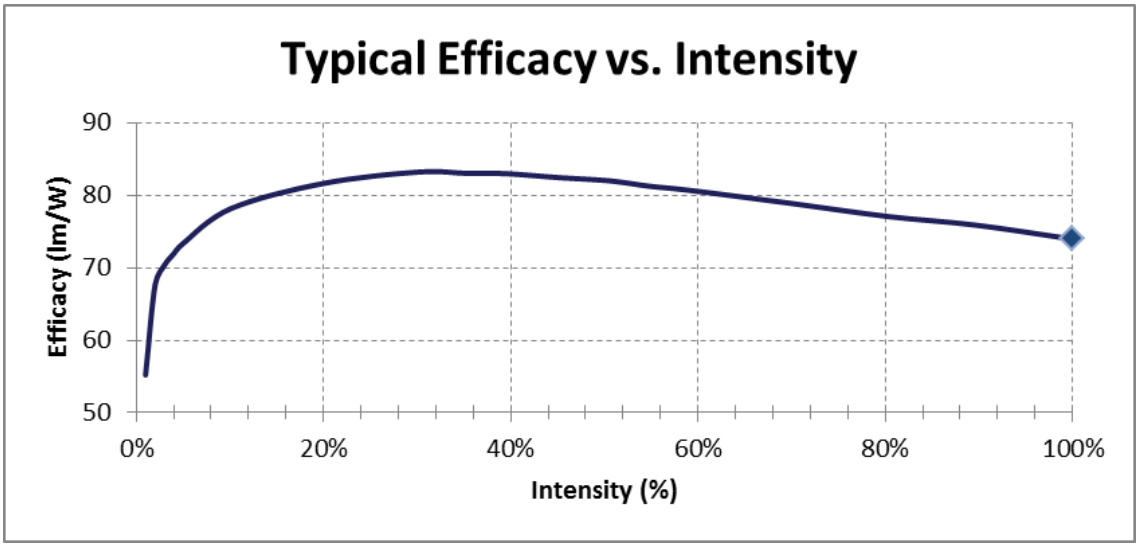
ELECTRICAL

LES	Module	Current	Forward Voltage			Typ. Power Consumption	Actual Output	Efficacy (Typical)
		mA	Min	Typical	Max	(W)	(Lm)	Lm/W
19mm	1300 lm	700	14.8	19.0	21.0	13.3	1300	98
		500	14.4	18.5	20.5	9.2	965	104
		350	14.0	18.1	20.0	6.3	720	114
	2000 lm	1050	17.3	19.0	24.0	20.0	2000	100
		700	16.7	18.4	23.3	12.9	1400	109
		500	16.3	18.0	22.8	9.0	1055	117
		350	16.0	17.7	22.5	6.2	800	129

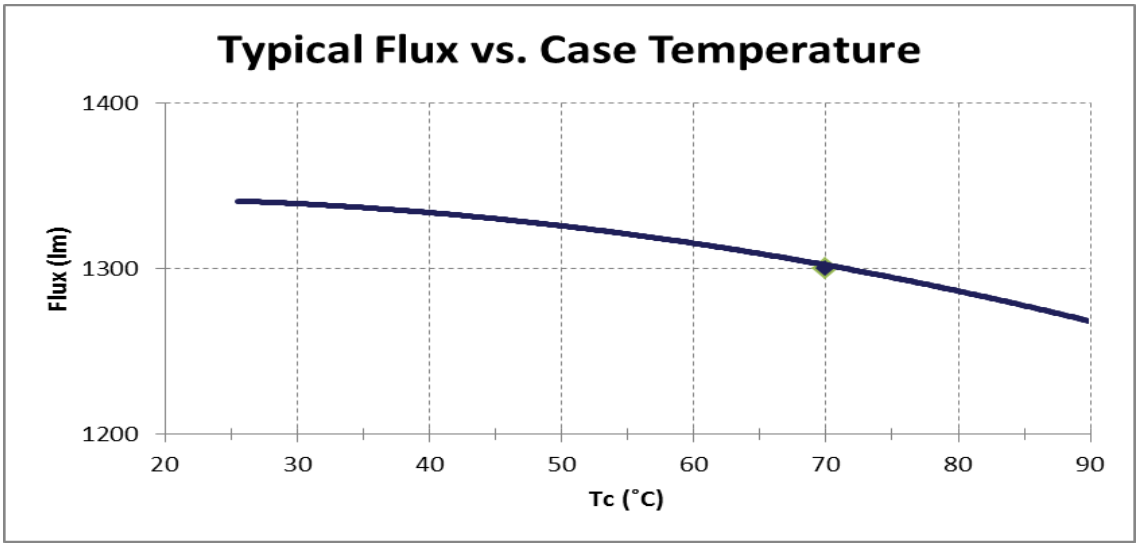
TYPICAL PERFORMANCE VS. INTENSITY: BEAUTY, 19MM LES, 2700K, 1300LM

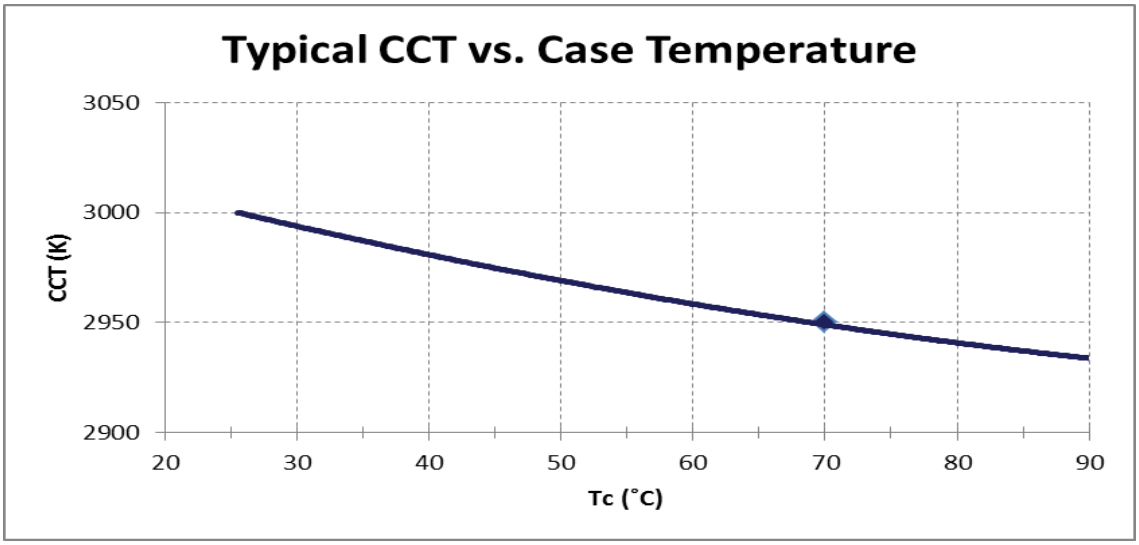


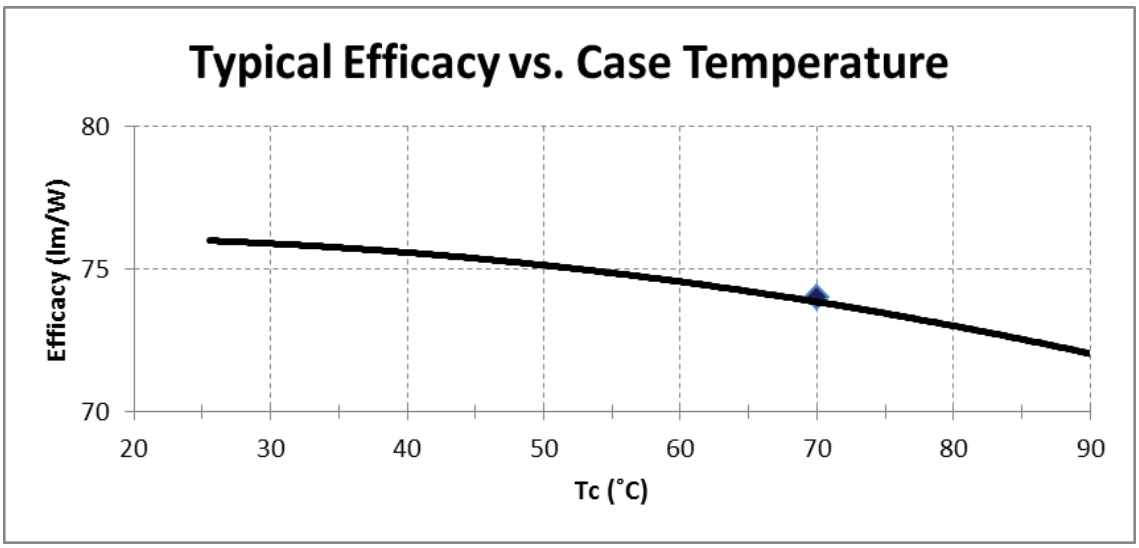




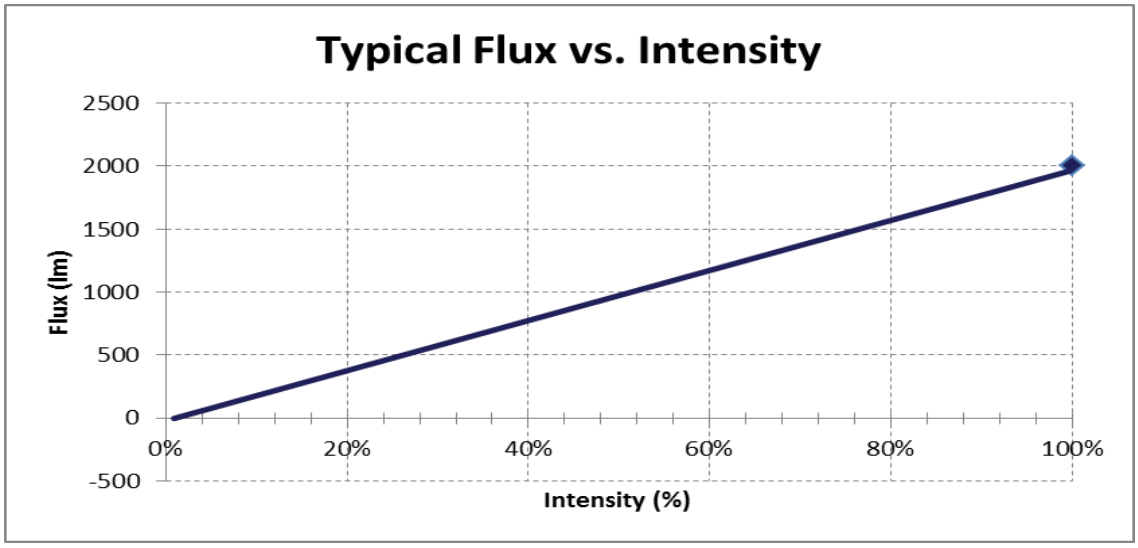
TYPICAL PERFORMANCE VS. CASE TEMPERATURE: BEAUTY, 19MM LES, 2700K, 1300LM

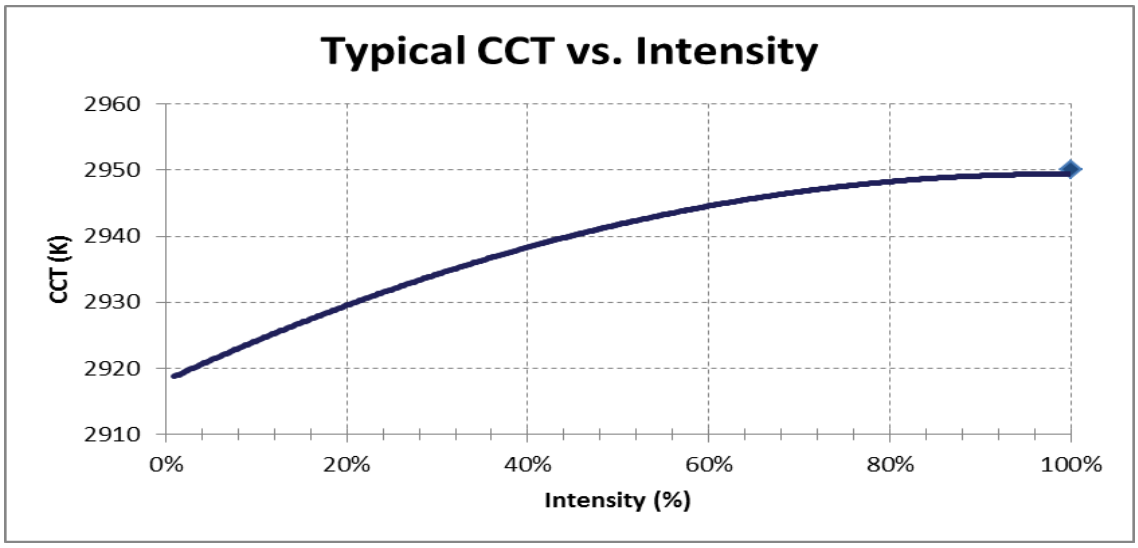


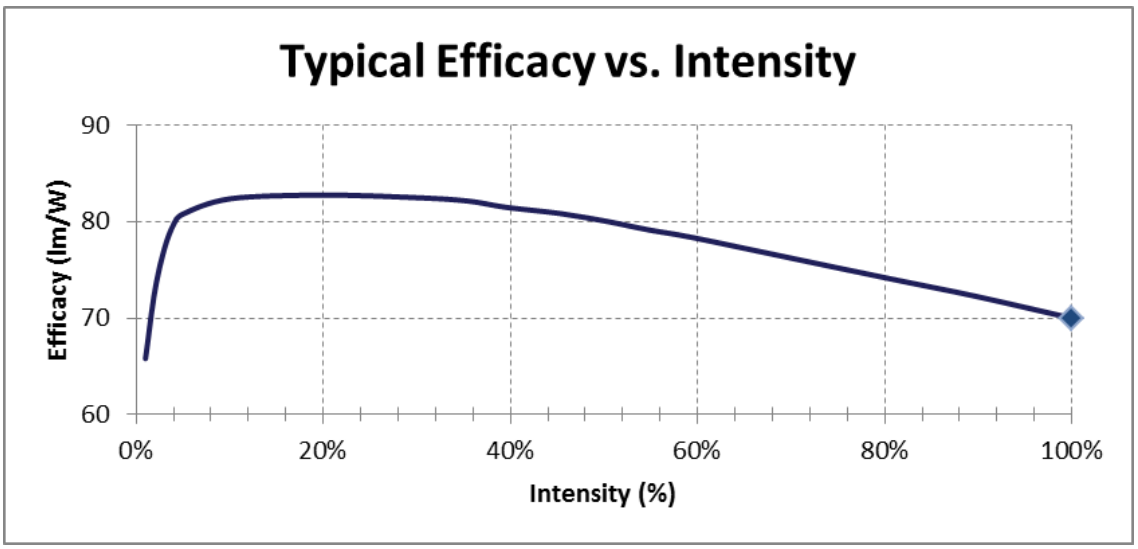




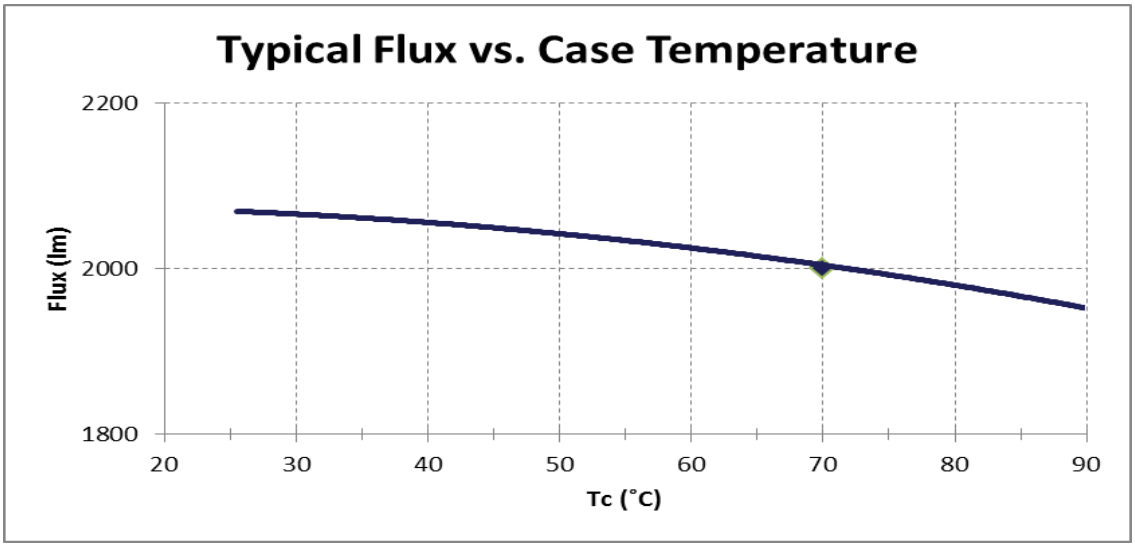
TYPICAL PERFORMANCE VS. INTENSITY: BEAUTY, 19MM LES, 2700K, 2000LM

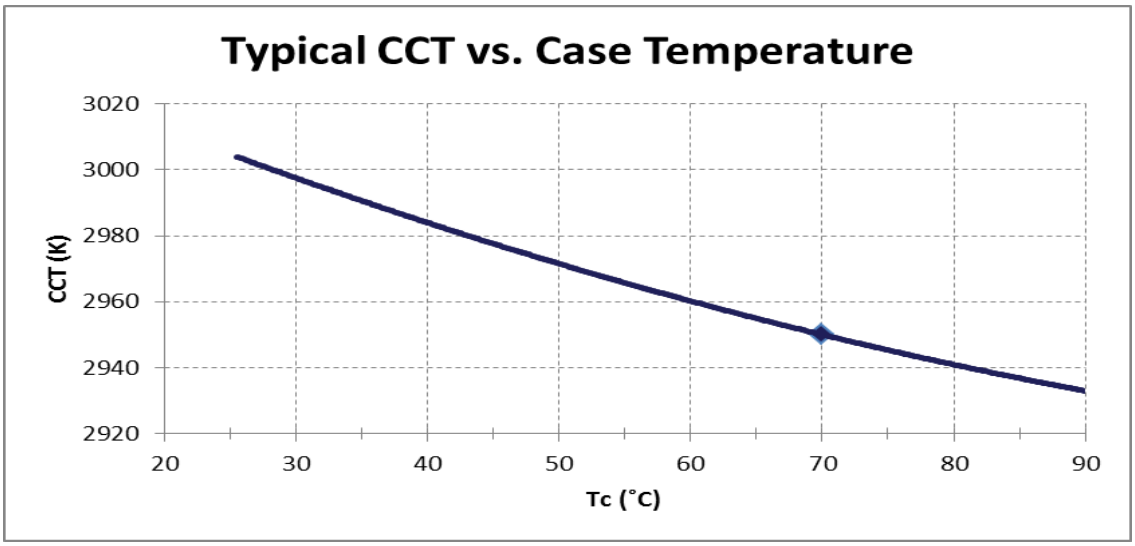


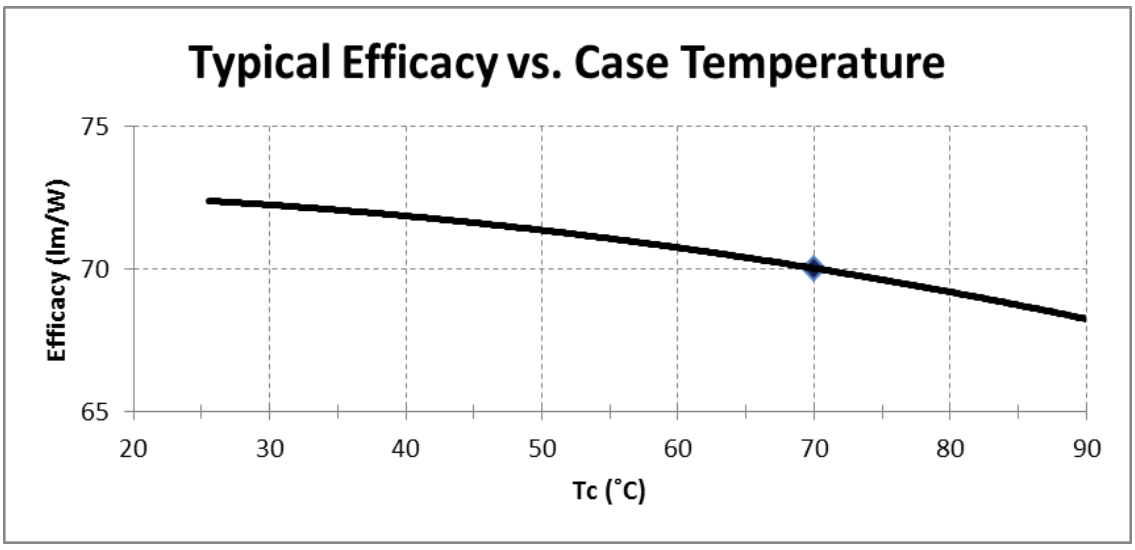




TYPICAL PERFORMANCE VS. CASE TEMPERATURE: BEAUTY, 19MM LES, 2700K, 2000LM







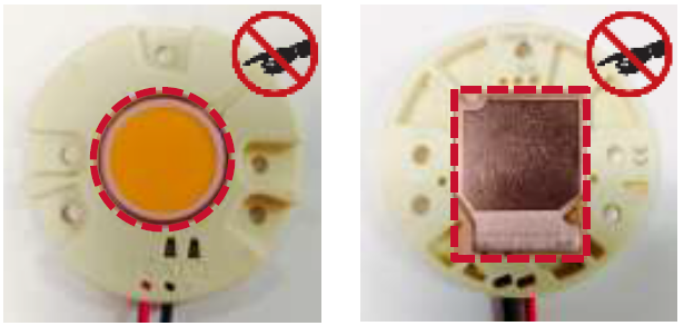
BASIC HANDLING AND ASSEMBLY

GENERAL HANDLING

Make sure your **hands and tools are clean** before handling module.

Do not drop module or allow modules to rattle in a loosely packed container. This may loosen the LED array from its protective holder, or scratch the phosphor or thermal interface pad.

Do not touch the phosphor coating on top of the LED array (the light emitting surface) **or the integrated thermal pad** underneath. These surfaces are sensitive to scratches, contamination, and debris which may decrease module performance. If any dust or debris accumulates on either surface, clean the surface by blowing on it with clean air. The phosphor surface can also be cleaned by gently wiping with isopropyl alcohol.



Do not touch sensitive surfaces. Keep them clean.

Take special care not to press down on the phosphor surface of the array. Pressure to this area may cause the array to dislodge itself from its protective plastic housing.

ASSEMBLY

Always use recommended screws and fasteners, and apply recommended torque. Take caution not to exceed these values as this may damage the module. Xicato recommends using a spring lock washer with either a flat washer or adapter ring at all mounting locations to reduce the likelihood that the fasteners will loosen under shock, vibration, or thermal cycling.

Be sure not to reverse polarity on the electrical leads to the module, as this will damage the LED array. Be absolutely certain to use the proper wire gauge and color and, when required, poke them into the proper connector. One-time poke-in connectors are not guaranteed to function properly if wires are pulled loose and reinserted.

Make sure that surfaces of thermal interface pad and heat sink are clean and free of debris before assembly. Visually verify that there are no gaps between thermal surfaces, and that pressure has been evenly applied across the entire surface.

Please note that Xicato is the only authorized distributor and supplier of twist-lock adaptor rings. For more information on adapter ring options, contact your XICATO account manager or technical representative.

For more detailed handling and assembly instructions, including:

- How to properly reinsert an LED array into its holder
- How to mount reflectors, adapters, fasteners
- How to mount unit to heat sinks
- How to mount spacers
- How to test the module for thermal performance

…and more, please see *Application Note – Xicato XCA Assembly Guide* on the Xicato website.

REGULATORY INFORMATION

DRIVE CURRENT

The product is designed for use with a constant current power supply. Refer to the Technical Data table for details on current and forward voltage limitations.

ELECTRICAL SAFETY & HANDLING

CE:	IEC 62031:2008, Class III
UL:	8750 recognized Class 2. Suitable for dry and damp locations.
Ingress Protection rating:	IP-20
CSA:	C22.2 No. 250.13-12.

ESD Class 3B (HBM). No special ESD handling procedures required.

EYE SAFETY

The product is tested in accordance with IEC 62471 and is rated as exempt for Actinic UV, and Near UV.
For Blue Light it is rated for Risk Group 1.

CHEMICAL SAFETY

The following chemicals should be avoided, even in small quantities, within the module:

Hydrochloric Acid	MEK (Methyl Ethly Ketone)	Dichloromethane
Sulfuric Acid	MIBK (Methyl Isobutyl Ketone)	Rosin Flux Solder
Nitric Acid	Toluene	Castor Oil
Acetic Acid	Xylene	Lard Oil
Sodium Hydroxide	Benzene	Linseed Oil
Potassium Hydroxide	Gasoline	Petroleum Oil
Ammonia	Mineral Spirits	Silicone Oil
Sulfur (Used in Rubber Processing)	Tetracholoromethane (Carbon tetrachloride – CCl_4)	Halogenated Hydrocarbons (Containing F, Cl, or Br)

ENVIRONMENTAL SAFETY

RoHS compliant

Lead content:	None
Mercury content:	None
UV or IRC Emissions:	None

LUMINAIRE SPECIFICATION: RECOMMENDED LED MODULE

GENERAL DESCRIPTION

Color Point and Spectral Power Distribution shall be optimized for skin tones, as developed by industry experts and verified by independent research.

Initial Color Consistency:	≤ 1 x 2 MacAdam Ellipses Every light source shall be within a 1 x 2 MacAdam Ellipse (1x2 SDCM) Flux and color point tuned at case temperature 70°C
Initial Color Point:	Below Black Body Locus (BBL)
Color Maintenance:	Remains within 3 MacAdam Ellipses (C3) at 50,000 hours at maximum operating drive current and maximum case temperature (90°C). LM-80 data shall show Duv < 0.003 at 6,000 hours.
Lumen Maintenance:	LM better than 70% (L70, B0, F0) at 50,000 hours at maximum operating drive current and maximum case temperature (90°C). LM-80 data shall show LM > 94.8% at 6,000 hours.
Phosphor Technology:	Remote, Corrected Cold Phosphor® technology.
Warranty:	5 years, including minimum on mortality, lumen maintenance, and color maintenance. Mortality: B0 – No failures. Lumen maintenance: L70, B0 (better than 70% on all units). Color maintenance: < 0.003 Duv

DETAILED COLOR SPECIFICATIONS

IES TM-30-15 Color rendering fidelity (R_f) shall be 91.

IES TM-30-15 Color rendering gamut (R_g) shall be 107.

Initial color point shall be 2700K, -0.005 Δu'v'

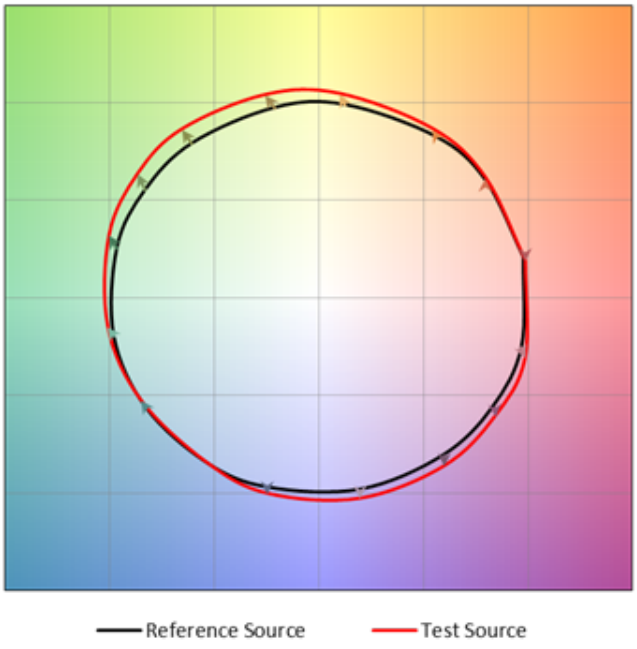
Minimum CIE CRI (Ra) shall be 93.

Individual CIE CRI R values shall be:

R1: 96	R9: 95
R2: 96	R10: 92
R3: 97	R11: 91
R4: 94	R12: 88
R5: 95	R13: 95
R6: 92	R14: 99
R7: 94	R15: 97
R8: 95	

CIE CRI Gamut Area Index GAI_{BB} shall be 133.

COLOR VECTOR GRAPHIC



LED module shall be Xicato Module # _____