

DETAILED DATA SHEET

XTM LED Module

with Corrected Cold Phosphor Technology®

Vibrant Series® V95



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 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:

- Product detailed data sheets (DDS)
- Accessory selection tools for heatsinks, optics, drivers and power supplies
- CAD files and drawings in 2D and 3D, and in multiple formats
- Application and technical notes for proper handling, design-in, and usage of the products
- Brochures to assist our distributors, OEM and lighting designer customers in promoting our products
- XCA-XTM-XIM Performance Curves, which provides graphs of flux, CCT and efficacy performance vs. intensity and temperature

See the Xicato website for these tools and more.

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GENERAL DESCRIPTION

XTM

The Xicato Thin Module (XTM) consists of a Xicato Core Array (XCA), pressure fit into a compact yet robust holder designed to allow attachment of a large ecosystem of lenses and heatsinks to facilitate design and construction of a wide variety of downlight and spot fixtures. The XTM includes:

- LED emitting core
- Zhaga-compatible holder
- Fixed wires

The integration of core and holder, with full UL and CE approval, provides the assurance of quality, and simplifies the certification of customer luminaires. XTM can accommodate Xicato's entire portfolio of color, CCT, and output options.

Xicato is the only light source provider to give 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, XTM provides simply the most beautiful lit effect, and our warranty insures that consistent lighting design quality is maintained from build to refurbish.

VIBRANT SERIES 95

Xicato Vibrant Series® products are designed with enhanced color gamut that adds vibrancy to colors, hues, and tones – especially whites, reds and blues – that do not “pop” under halogen lighting. Vibrant Series V95 delivers vibrancy with outstanding color rendering, and comes in 3000K, in flux packages from 700 to 4000 lumens, delivering typical CRI (Ra) of 96, with typical R9 of 96, and extremely high R values across all 15 CIE CRI samples.

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 90: Designer 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 30: 3000 40: 4000 45: 4500 50: 5000	Feature Group A2: DALI A3: 1-10V A5: DALI+BLE A6: 1-10V+BLE CC: constant current	Revision

PART CODES AND DESCRIPTIONS

XTM VIBRANT SERIES V95 WITH 9MM LIGHT EMITTING SURFACE (LES)

Part Number	Description
XTM09V93007CCA	LED Module, XTM, LES09, Vibrant 95, 3000K, 700LM
XTM09V93013CCA	LED Module, XTM, LES09, Vibrant 95, 3000K, 1300LM
XTM09V93020CCA	LED Module, XTM, LES09, Vibrant 95, 3000K, 2000LM

XTM VIBRANT SERIES V95 WITH 19MM LIGHT EMITTING SURFACE (LES)

Part Number	Description
XTM19V93013CCA	LED Module, XTM, LES19, Vibrant 95, 3000K, 1300LM
XTM19V93020CCA	LED Module, XTM, LES19, Vibrant 95, 3000K, 2000LM
XTM19V93030CCA	LED Module, XTM, LES19, Vibrant 95, 3000K, 3000LM
XTM19V93040CCA	LED Module, XTM, LES19, Vibrant 95, 3000K, 4000LM

MECHANICAL CHARACTERISTICS

MECHANICAL SPECIFICATIONS

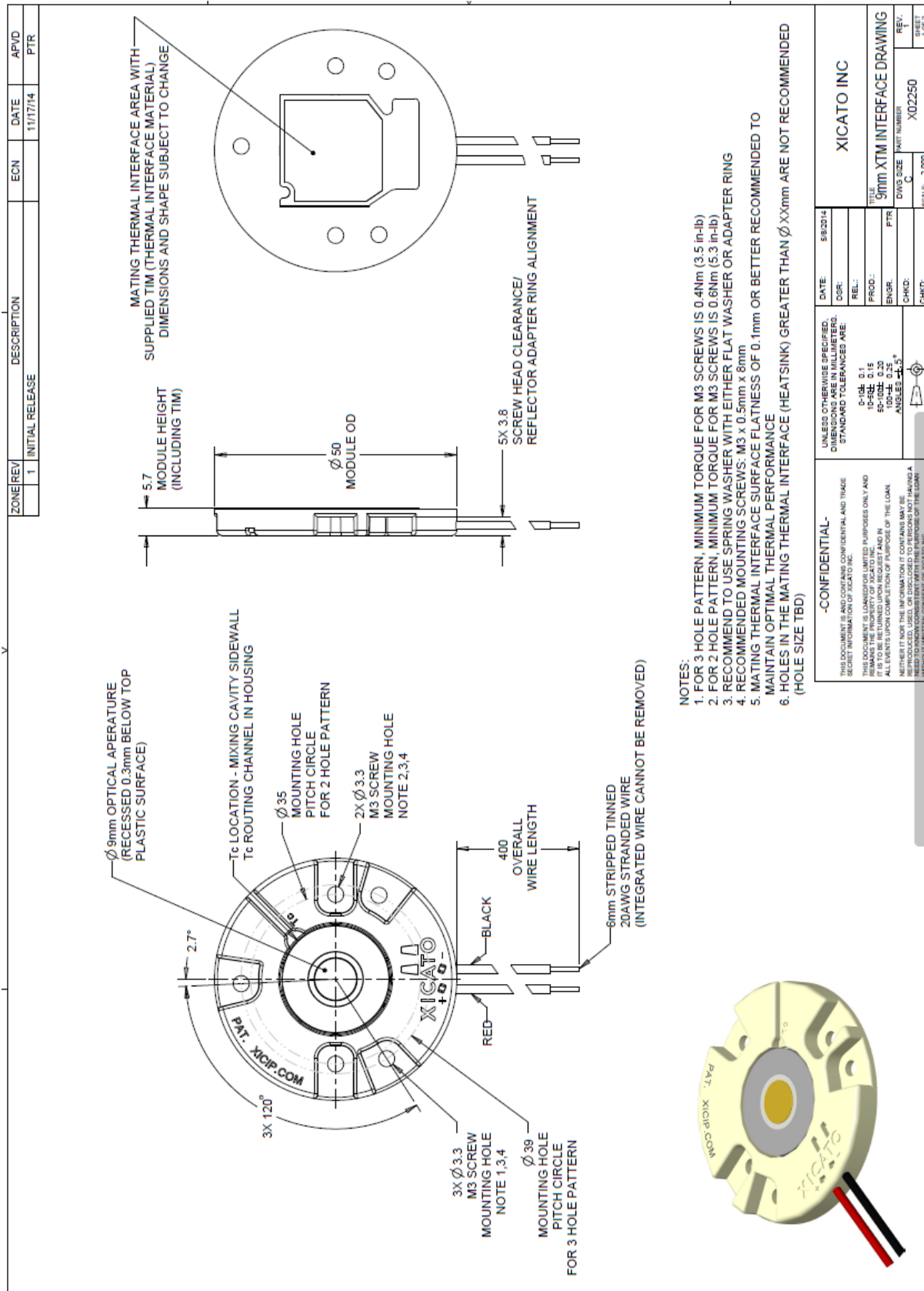
Dimensions:	50mm x 5.7mm (1.97" x 0.78")
Weight:	48 grams (1.69 oz.)
Light Emitting Surface options:	Ø 9mm (0.35") Ø 19mm (0.75")
Module Source Type:	Corrected Cold Phosphor Technology®
Interfaces – Electrical:	Fixed 20 gauge wires 600mm
Interfaces – Mechanical:	Recommended mounting screws: M3 x 0.5mm x 8mm with split lock washer.
Mounting Torque:	Three-hole pattern: min 0.36 Nm (3.2 in-lbs); max 0.43 Nm (3.8 in-lbs) Two-hole pattern: min 0.54 Nm (4.8 in-lbs); max 0.65 Nm (5.8 in-lbs)
Interface – Thermal:	Integrated thermal pad. Recommend a mating thermal interface (i.e. heatsink) surface flatness of ≤ 0.1mm in order to maintain thermal performance. Center hole diameter affects thermal performance and max power – see Application Note on Xicato website.
Maximum Case Temperature:	90°C
Shipping (100 count box):	533mm x 254mm x 153mm (21" x 10" x 6") 3 kg (7 lbs.)
Storage Temperature:	-40°C to +85°C

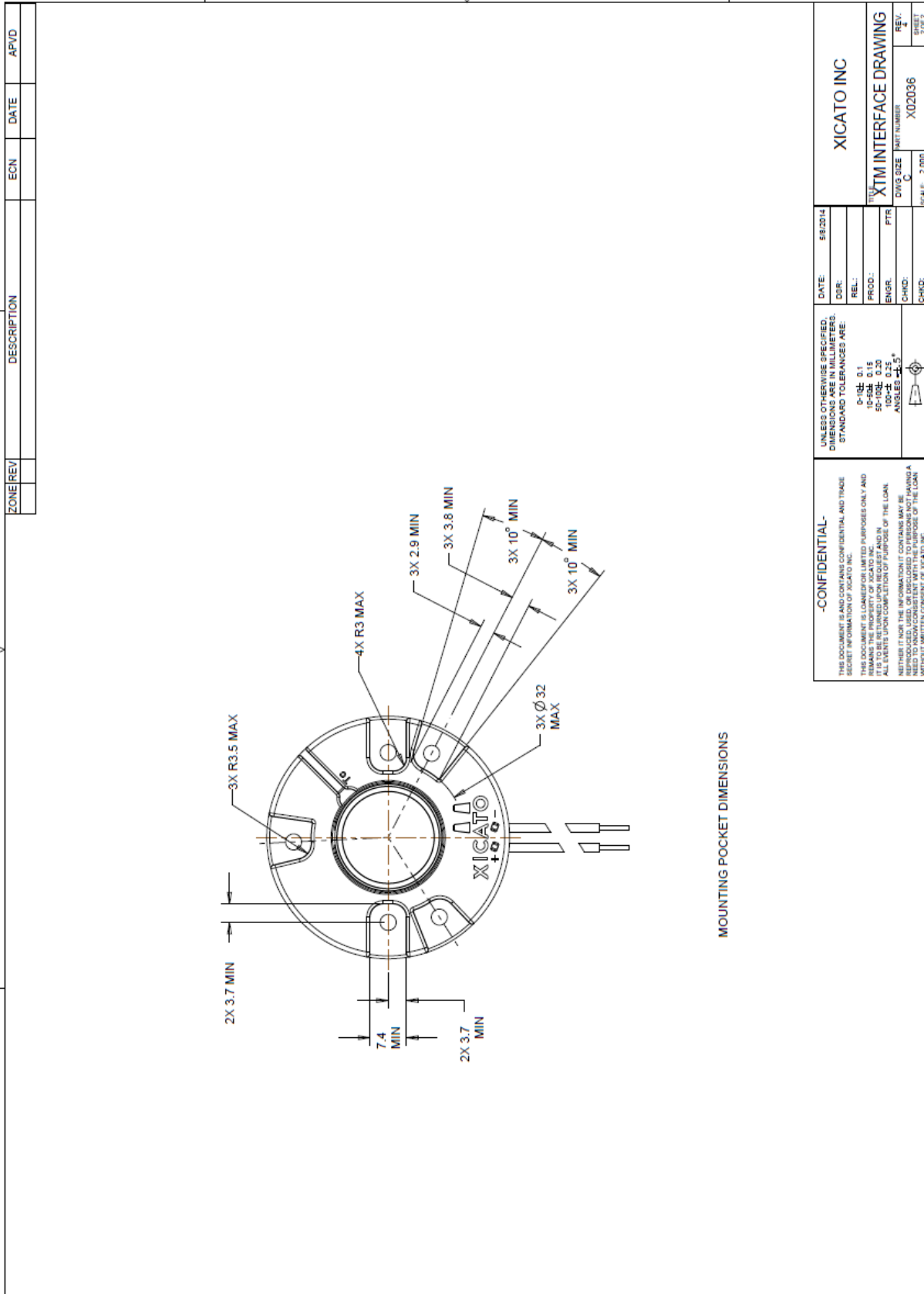


XTM with 9mm LES

MECHANICAL DRAWINGS

NOTE: XTM with 9mm LES and 19mm LES is identical except for the diameter of the light emitting surface.





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<p>DATE: 5/8/2014</p> <p>DIR: </p> <p>REL: </p> <p>PROD: </p> <p>ENGR: PTR</p> <p>CHKD: </p> <p>CHGD: </p>	<p style="text-align: center;">XICATO INC</p> <p style="text-align: center;">XTM INTERFACE DRAWING</p> <p>DWG. SIZE: A PART NUMBER: X020036 SCALE: 2:800</p> <p style="text-align: right;">REV: SHEET 2 OF 2</p>

COLOR METRICS: VIBRANT SERIES V95

Optimized for vibrant colors with outstanding color rendering and extremely high color gamut.

Vibrant Series V95 is designed to bring out the most attractive colors in fabrics, surfaces, and other materials.

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: 3000K nominal

Color Point Below black body locus (BBL)

Initial Color Consistency: $\leq 1 \times 2$ Macadam ellipses (SDCM) at 70°C, B0

CIE CRI Minimums: $R_a \geq 90$, $R_9 \geq 90$

Color Maintenance: Consistency maintained $< 0.003 \Delta u'v'$ at 50,000 hours

Lumen Maintenance: L70/B0 at 50,000 hours

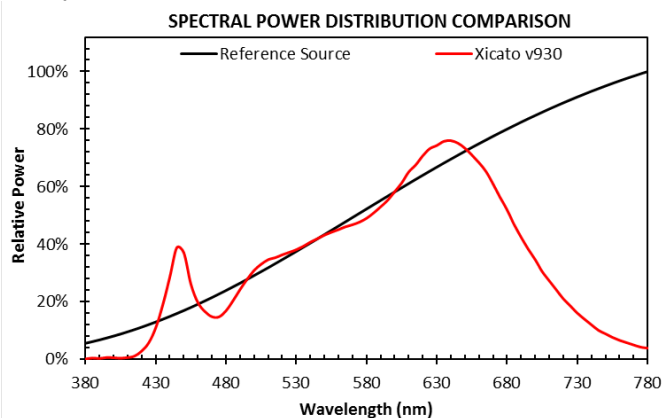
Warranty: 5 years on individual modules (B0) on mortality, color and lumen maintenance.

Details at www.xicato.com/support/warranty

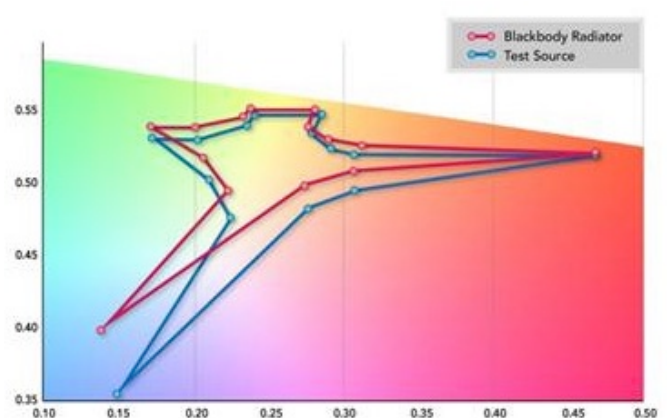
CIE CRI COLOR METRICS (VALUES ARE TYPICAL)

	Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	GAI _{BB}
Vibrant V95	96	96	97	97	94	96	94	95	97	96	95	91	92	96	98	97	123

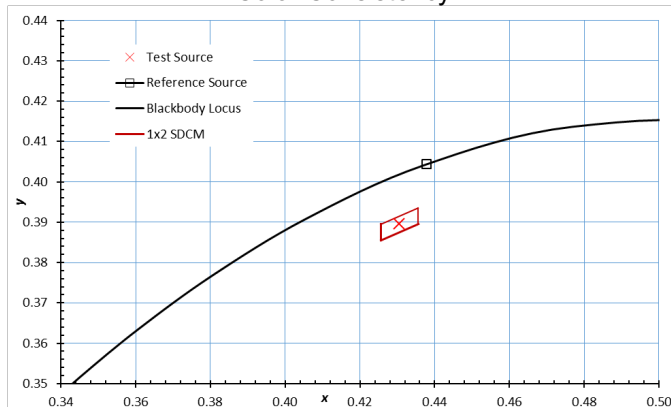
Spectral Power Distribution vs. Reference Source



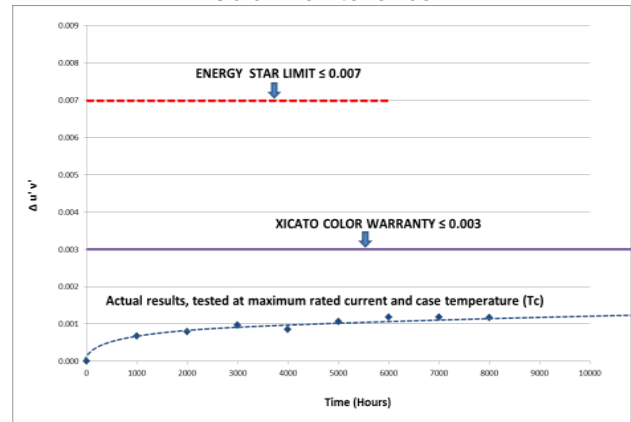
CIE Color Gamut



Color Consistency



Color Maintenance



IES TM-30 COLOR METRICS

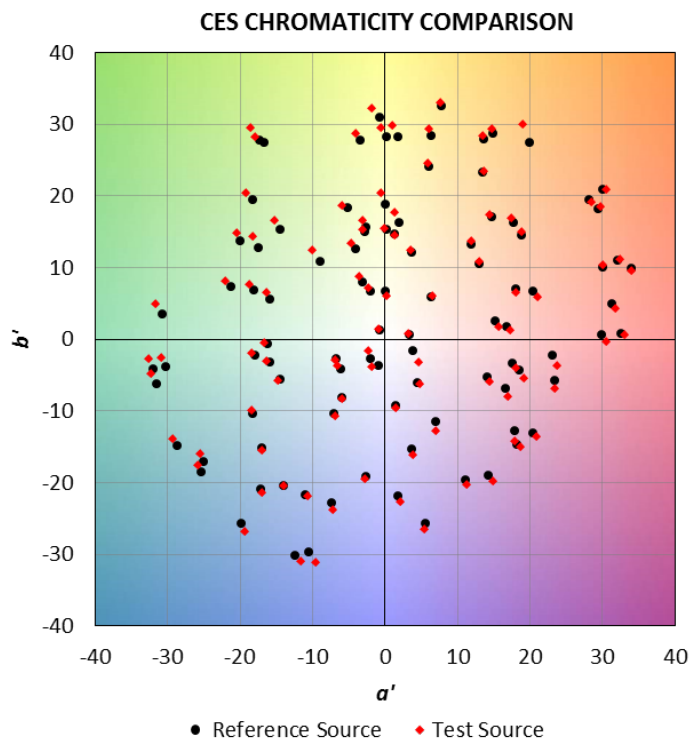
(Values are typical. Based on 3000K CCT)

IES TM-30 Color Fidelity (R_f) 93

IES TM-30 Color Gamut (R_g) 106

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.

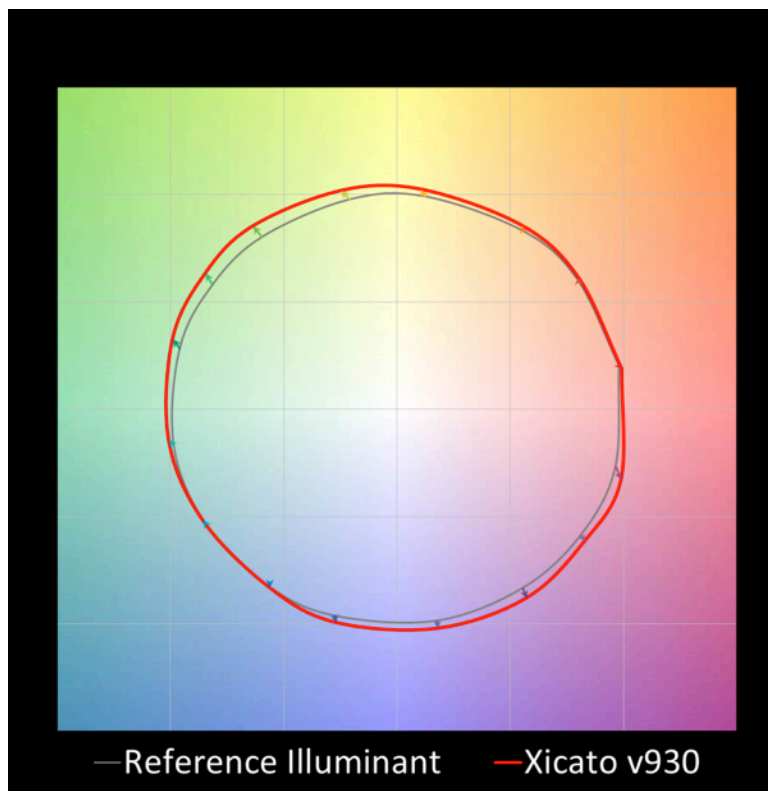


COLOR VECTOR GRAPHIC

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.

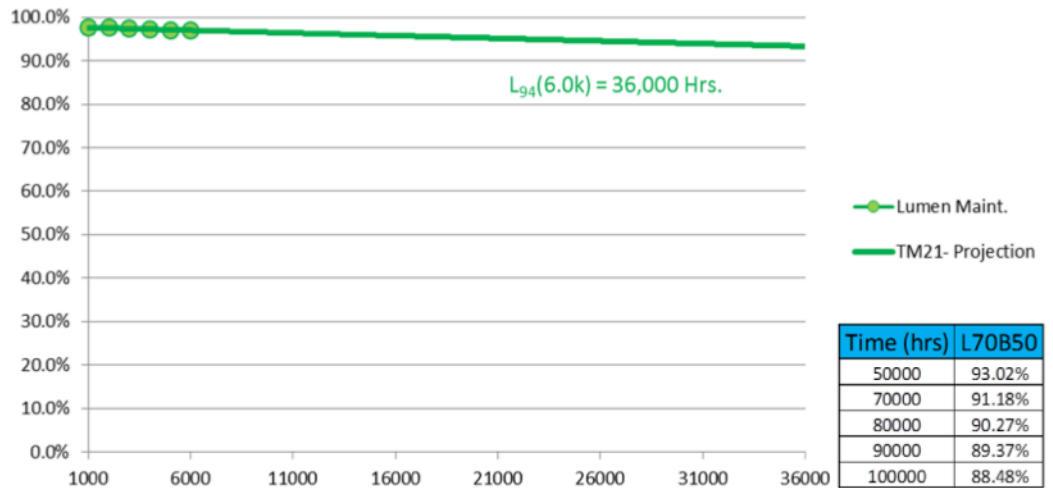


IES LM-80

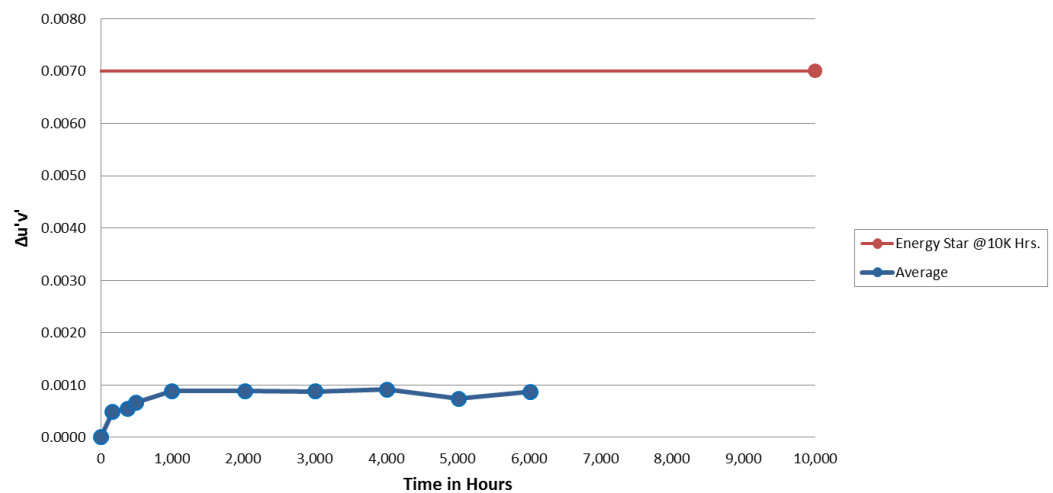
VIBRANT SERIES V95, 19MM, 2700K, 2000LM

Testing conducted at $T_c = 90^\circ\text{C}$, $I_f = 1050\text{mA}$, HTOL, 6000 Hrs.

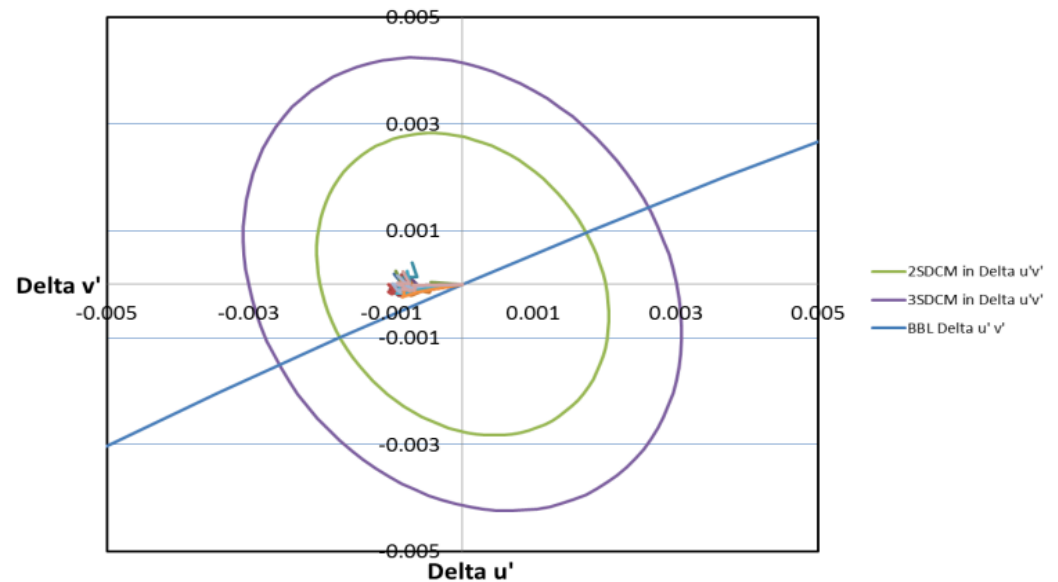
LUMEN MAINTENANCE



COLOR MAINTENANCE



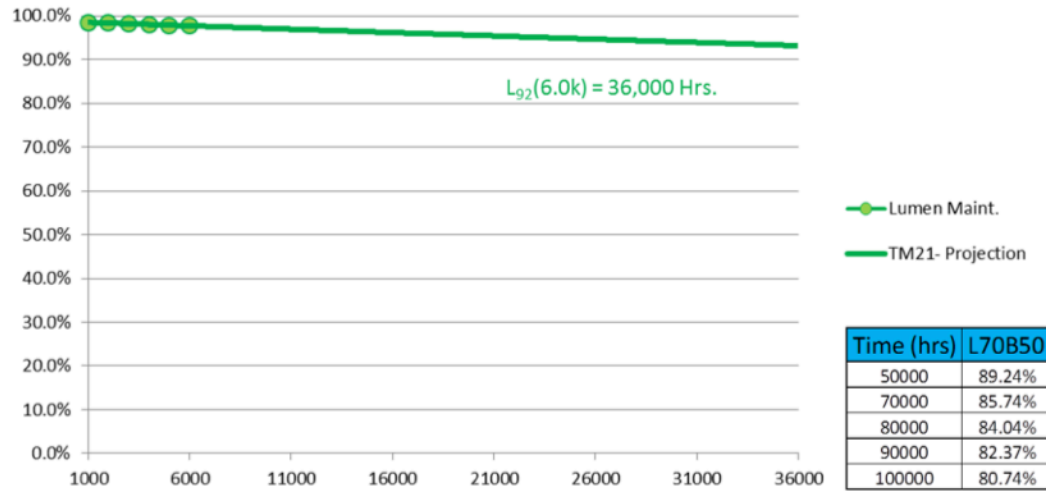
COLOR MAINTENANCE (NORMALIZED)



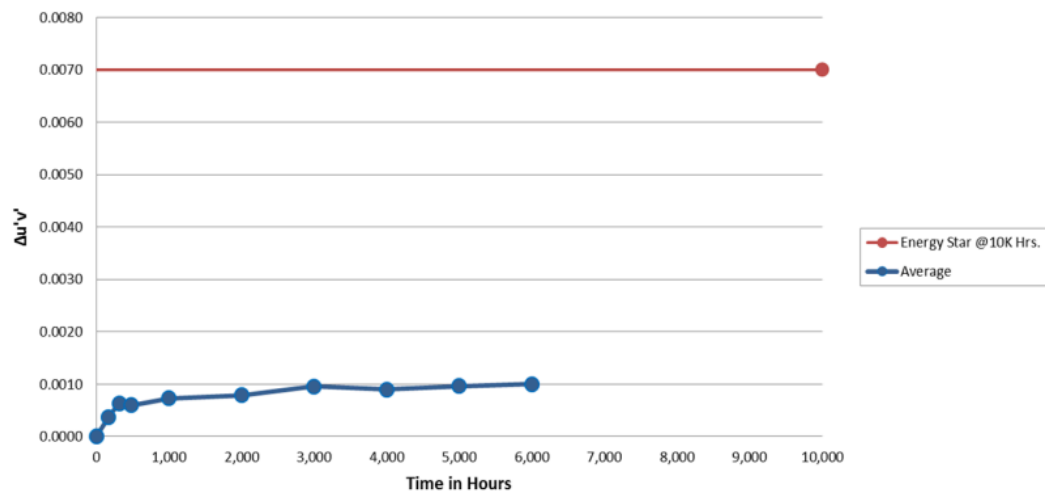
VIBRANT SERIES V95, 19MM, 3000K, 3000LM

Testing conducted at $T_c = 90^\circ\text{C}$, $I_f = 1050\text{mA}$, HTOL, 6000 Hrs.

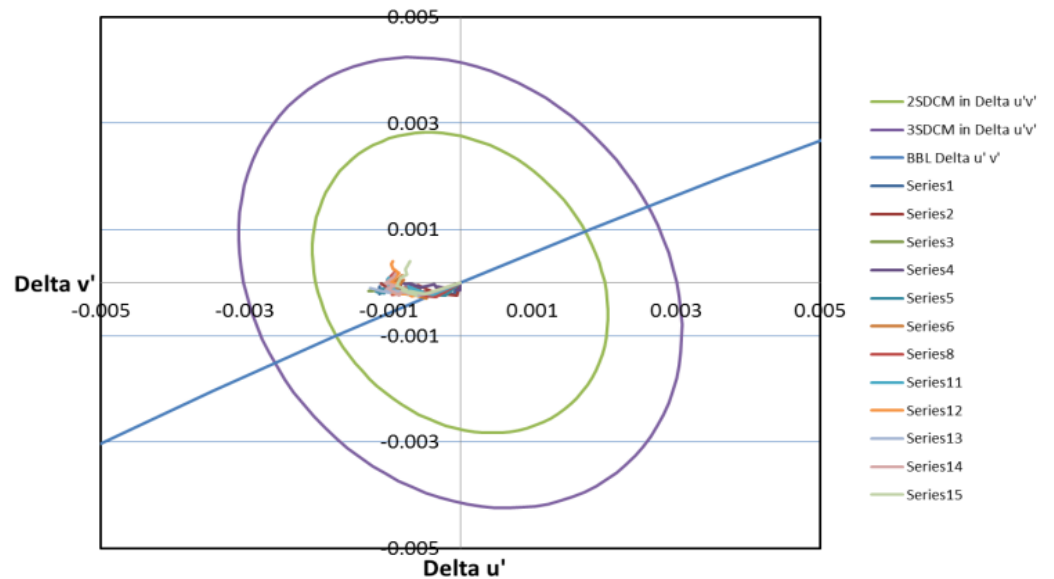
LUMEN MAINTENANCE



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 AND EFFICACY PERFORMANCE

LES	Module	Current	Forward Voltage			Typ. Power Consumption	Actual Output	Efficacy (Typical)
		mA	Min	Typical	Max	(W)	(Lm)	Lm/W
9mm	700 lm	700	9.9	13.9	15.0	9.7	700	72
		500	9.6	13.6	14.6	6.8	550	81
		350	9.4	13.2	14.3	4.6	400	87
	1300 lm	1050	17.9	23.1	24.8	24.3	1300	54
		700	17.3	22.3	24.0	15.6	930	60
		500	16.8	21.7	23.4	10.9	700	65
	2000 lm	350	16.4	21.2	22.9	7.4	500	67
		1400	24.1	30.1	32.3	42.1	2000	47
		1050	23.1	28.8	31.0	30.2	1560	52
		700	22.2	27.9	30.0	19.5	1110	57
		500	21.6	27.1	29.2	13.6	800	59

LES	Rated Lumens	Current	Forward Voltage			Power	Flux	Efficacy
		mA	Min	Typ	Max	(W)	Lm	Lm/W
19mm	1300	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	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
	3000	350	16.0	17.7	22.5	6.2	800	129
		1050	26.4	29.0	35.1	30.5	3000	98
		700	25.7	28.4	34.3	19.9	2140	108
	4000	500	25.2	27.9	33.8	13.9	1580	113
		350	24.9	27.5	33.4	9.6	1240	129
		1400	29.6	32.6	36.0	45.6	4000	88
4000	1050	28.8	31.7	35.1	33.3	3080	93	
	700	28.1	30.9	34.3	21.7	2160	100	

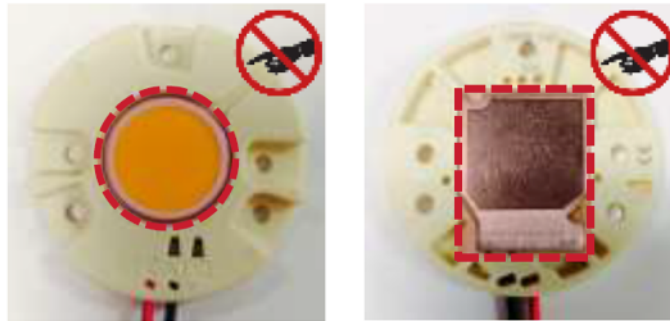
BASIC HANDLING AND ASSEMBLY

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 adaptor 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 - XTM Assembly Instructions 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 Ethyl 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)	Tetrachloromethane (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

OTHER

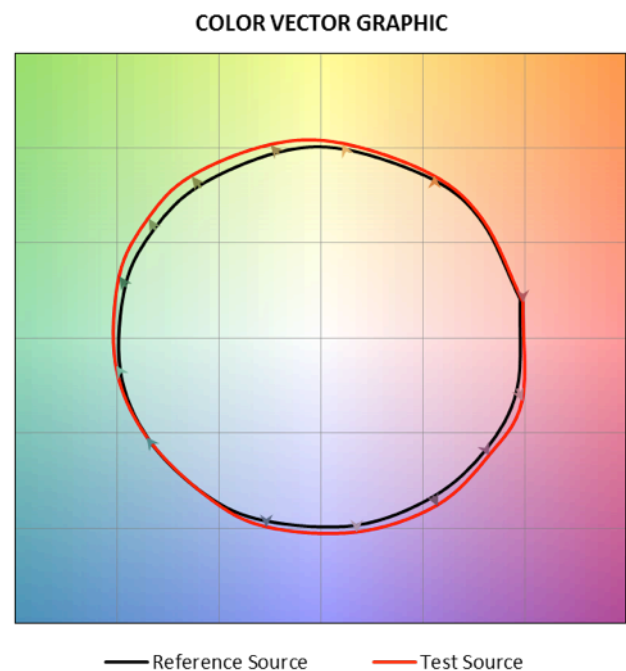
LUMINAIRE SPECIFICATION: RECOMMENDED LED MODULE

GENERAL DESCRIPTION

Initial Color Point	2950K CCT \pm 50, with Color Point below the black body locus
Initial Color Point Accuracy	All units within \pm 0.001 $\Delta u'v'$ of same initial color point
Color Rendering	CIE $R_a \geq 90$, $R_9 \geq 90$, Gamut Area Index $GAI_{BB} \geq 115$
Initial Color Consistency	$\leq 1 \times 2$ MacAdam Ellipses Every light source shall be within a 1×2 MacAdam Ellipse (1x2 SDCM) Flux and color point tuned at case temperature 70°C
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:	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 <u>all</u> units). Color maintenance: < 0.003 Duv at 50,000 hours

DETAILED COLOR SPECIFICATIONS

IES TM-30-15 Color rendering fidelity (R_f) shall be 96.
 IES TM-30-15 Color rendering gamut (R_g) shall be 103.
 Minimum CIE CRI (R_a) shall be 95; minimum R_9 shall be 90.



Typical CIE CRI R values shall be:

R1: 96	R9: 96
R2: 97	R10: 95
R3: 97	R11: 91
R4: 94	R12: 92
R5: 96	R13: 96
R6: 94	R14: 98
R7: 95	R15: 97
R8: 97	

Typical CIE CRI Gamut Area Index GAI_{BB} shall be 123.

LED module shall be Xicato Module # _____